

Dublin Central

Outline Construction & Demolition Management Plan – Site 4

Dublin Central GP Limited

DC-WAT-4X-XX-RP-C-001015

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Waterman Moylan Consulting Engineers Limited

Block S, Eastpoint Business Park, Alfie Byrne Road, Dublin D03 H3F4.

www.waterman-moylan.ie

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This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

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P1	07.05.21	R. Nelson	C. Beresford	R. Osborne
P2	10.05.21	R. Nelson	C. Beresford	R. Osborne
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P5	19.05.21	R. Nelson	C. Beresford	R. Osborne

Comments

FINAL ISSUE

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Appendix A – Site 4 Site Setup

1. Introduction

Waterman Moylan have prepared the following Outline Construction and Demolition Management Plan for the implementation of the construction stages of the proposed Dublin Central development. It is noted that the development will be constructed in phases which are outlined in this report. This plan is prepared for Site 4 relating to the relevant Planning Application.

Dublin Central GP Limited are aware of the challenges that exist in delivering such a large and complex development within the city centre.

The plan sets out typical arrangements and measures which may be undertaken during the demolition and construction stages of the project in order to mitigate and minimise disruption and disturbance to the area around the site. Of particular note, are the protected and retained buildings and facades within the site, and the adjoining National Monument.

This plan will be used to guide the Main Contractor/Contractors who will have ultimate responsibility for developing a more detailed demolition and construction management plan for formal agreement with Dublin City Council in advance of them commencing the demolition or construction works on site. This plan will provide Dublin City Council with an outline proposal of how construction will be managed to comply with Local Authority and statutory requirements and will be updated post award of planning to reflect specific planning conditions which may be applied to the development.

This plan should be read in conjunction with all other planning stage reports included as part of this planning application.

2. Site Master Plan

2.1 Overall Site Development

A site wide cumulative masterplan encompassing an area of c2.2 Ha has been prepared by the Applicant to set out the overall development vision for the Dublin Central project. 'The Masterplan' area encompasses almost entirely three urban blocks. The area is bounded generally by O'Connell Street Upper and Henry Place to the east, Henry Street to the south, Moore Street to the west, and O'Rahilly Parade and Parnell Street to the north. Moore Lane extends south from Parnell Street through the centre of the masterplan area, as far as its junction with Henry Place.

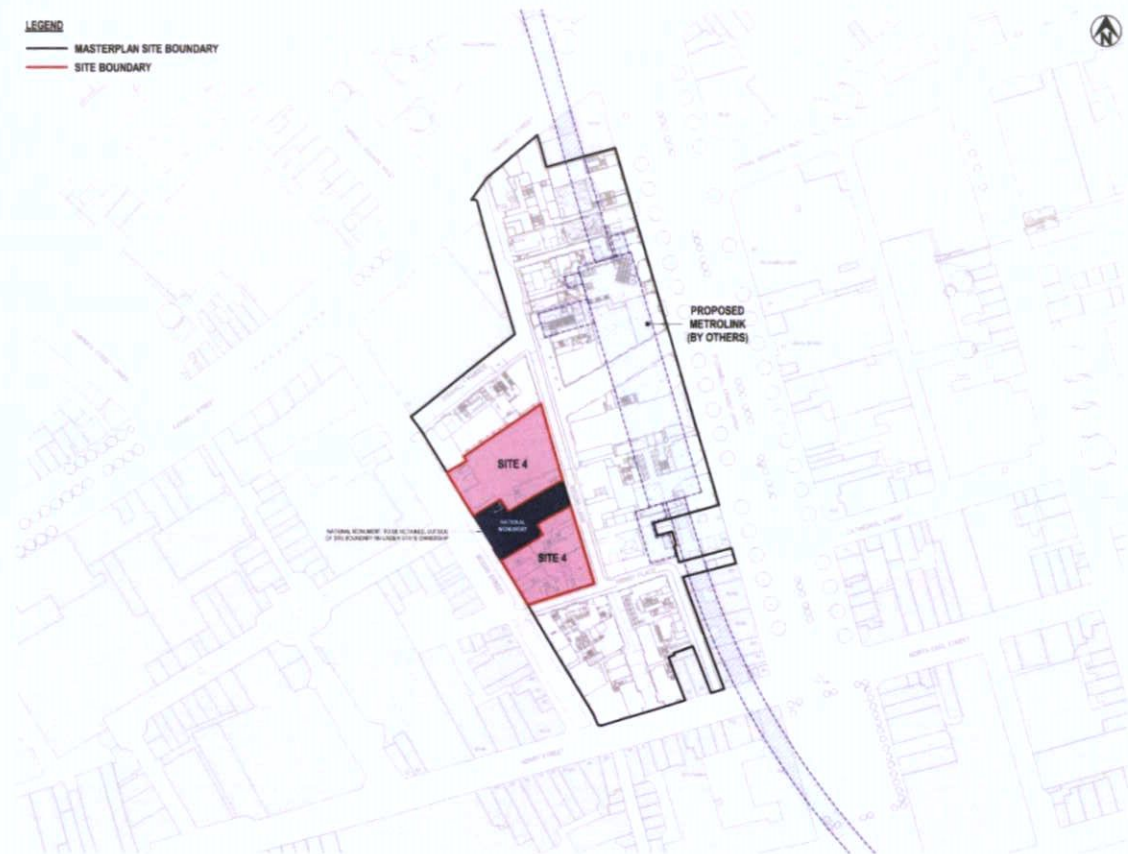


Figure 1 – Site 4 Location Plan

'The Masterplan' area includes structures of heritage significance that will be retained. Nos.14 -17 Moore Street are under the ownership of the Irish Government Office of Public Works and are not part of the Masterplan area. The buildings have been designated National Monument status and are subject to a preservation order.

The area will include a new Metrolink Station, to be the subject of a separate application by TII. The structure of the Metrolink Enabling Works (MEW) will be designed by the DCGP Ltd. civil/structural designer given the complex interface involved. The MEW is to be undertaken as part of the Dublin Central Development.

2.2 Development Phasing Strategy

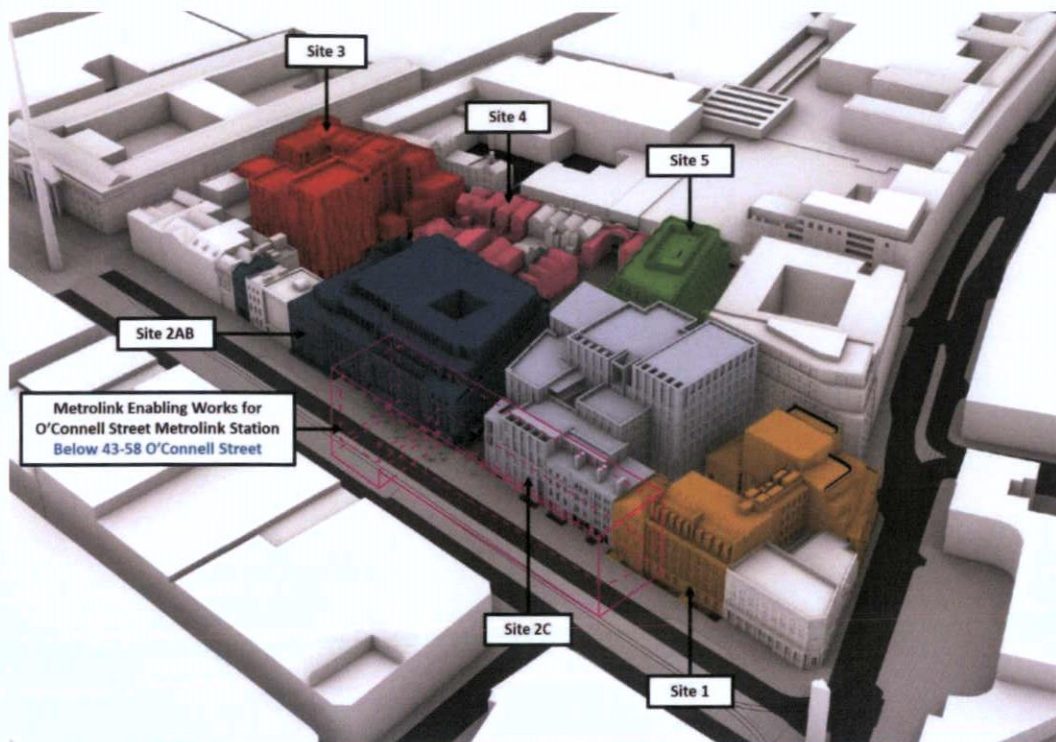


Figure 2 – Phasing Strategy

The Masterplan represents the cumulative development planned by the Applicant. Those elements outside the planning application site boundaries for Dublin Central Site 3, Site 4 and Site 5 are not fixed and remain simply an aspirational part of the 'the Masterplan' overall vision at this time. The Masterplan area has been divided into six identifiable sites for the purpose of making planning applications. The adopted site numbering is shown in Figure 2.

2.3 Site 4 Location

Site 4 Located in the west of 'the Masterplan' area, Site 4 is bounded by Moore Street to the west, Moore Lane to the east, Henry Place to the south and Site 5 to the north. Site 4 includes Nos. 10 – 13 and Nos. 18 – 21 Moore Street, Nos. 5 – 8 and Nos. 10 – 12 Moore Lane. Site 4 excludes the site of the National Monument and its protection zone at 14-17 Moore Street (protected structures) and the open area to the rear at Nos. 8 & 9 Moore Lane. The proposed development generally comprises a mixed-use scheme accommodating residential units and associated amenities, retail and café / restaurant uses, in two parts located north and south of the Nos. 14 – 17 Moore Street (National Monument / Protected Structures). Building height ranges from 1 – 3 storeys, including retained independent single storey basements. Provision of part of the proposed new public plaza and an archway onto new public square.

Site 4 is currently occupied by a variety of 2 and 3 storey masonry buildings which mainly comprise of retail units at ground floor along Moore Street with offices above. Along Moore Lane there are existing warehouses of 1 and 2 storey that appear vacant.

Site 4 includes structures of heritage significance that will be retained, including:

- 10 Moore Street
- 6-7 Moore Lane
- The 12/13 Party Wall
- 20-21 Moore Street

The Site 4 adjoins buildings 14-17 Moore Street, the National Monument. 14-17 Moore Street buildings have been designated National Monument status and are subject to a preservation order (PO 1/2007) and are under the ownership of the State and Office of Public Works (OPW).

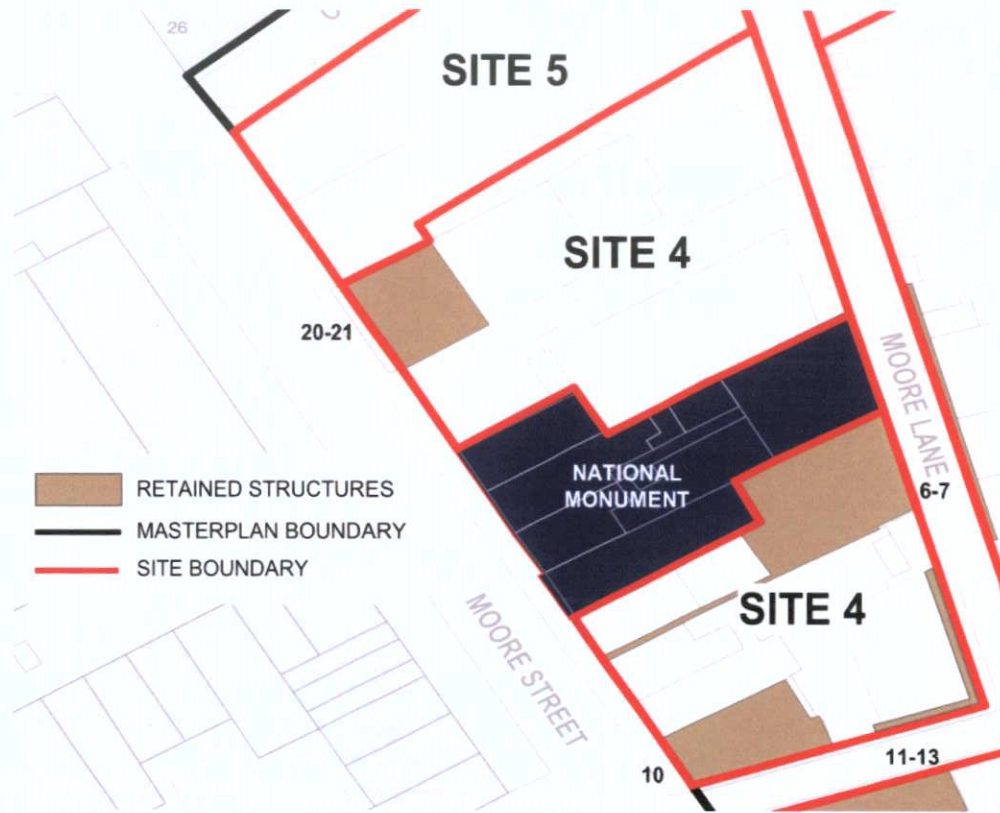


Figure 3 – Site 4 Location Plan

2.4 Key Milestones

Key Milestone Date	Site 4 Works
(Q3) 2022	Site Preparation (Site 4 North)
(Q3) 2023	Site Preparation (Site 4 South)
(Q2) 2025	Construction
(Q3) 2027	Fit-Out Works
(Q1) 2029	Completion

3. Site 4: Site Setup

3.1 Site Boundary

Hoarding will be required to the Site 4 boundary. This will be located along the Site 4 boundary to Henry Place, Moore Street and Moore Lane.

Vehicle gates with barriers will likely be accommodated at a security hut combined with a secure turnstile to control pedestrian and vehicle access.

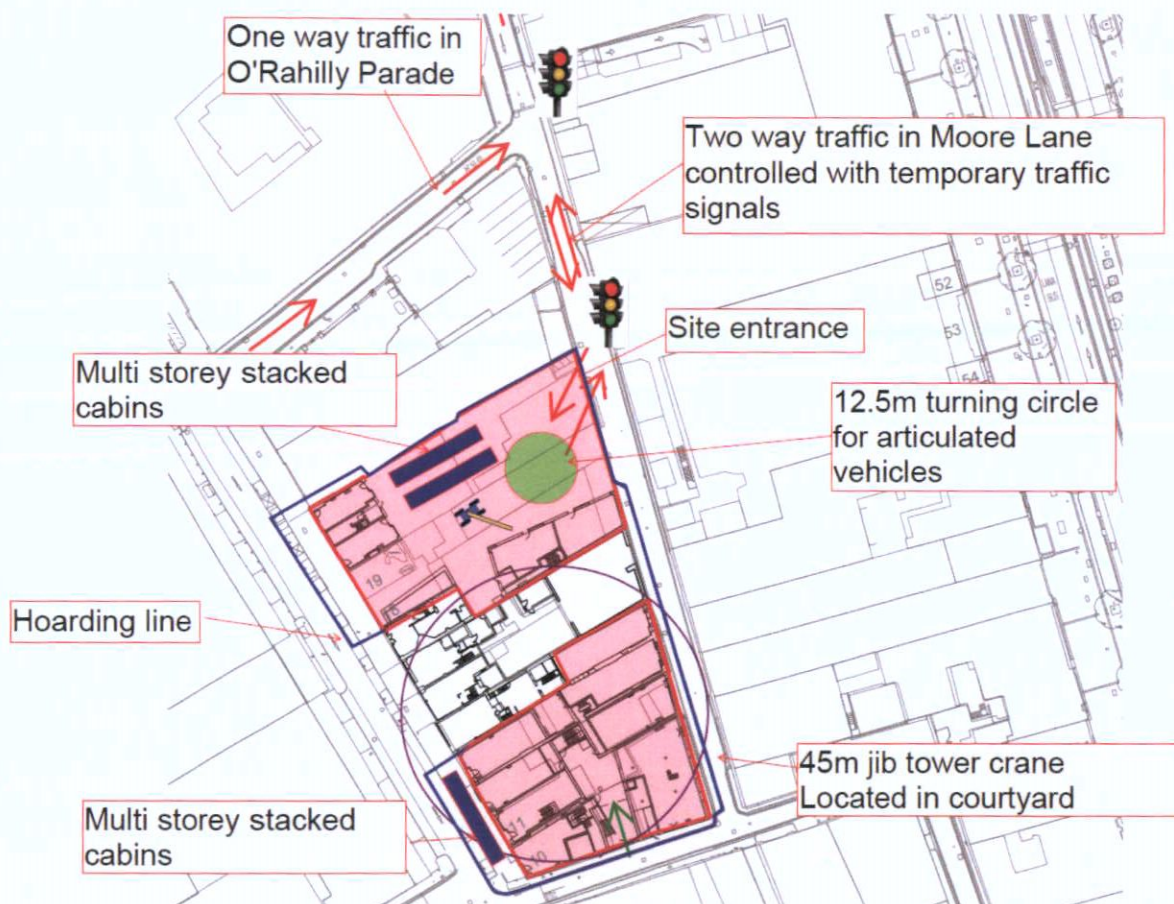


Figure 4 – Site 4 Proposed Site Setup

3.1.1 Site Hoarding

The hoarding will be designed at a later date by the Main Contractor/Contractor and will be designed to minimise impact to the footpaths along Moore Street, Moore Lane and Henry Place. Where necessary, the hoarding may be designed to incorporate covered walkways and elements of temporary works as part of the façade retention systems, to the agreement and approval of Dublin City Council.

The hoarding line will be maintained at all times during demolition and construction. In the event of any of the hoarding having to move outwards to facilitate construction activities, this will be done with the agreement of Dublin City Council including obtaining new hoarding licenses as required. If this encroaches on minimum footpath widths, the Main Contractor/Contractor will erect diversions to opposite footpaths to the agreement of Dublin City Council.

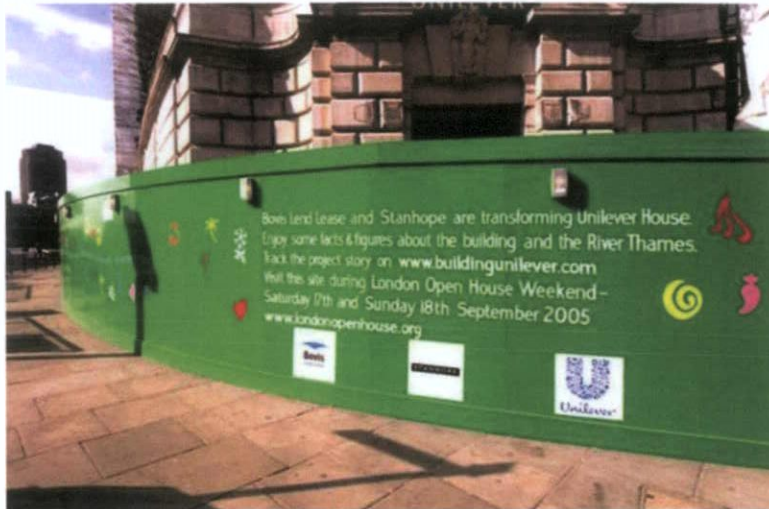


Figure 5 – Typical pavement hoarding with street lighting

Where there are ESB/telecommunication kiosks, light poles and traffic signage on the footpaths these will be maintained by the Main Contractor/Contractor where practical. The hoarding will be constructed around traffic lights and the kiosks to maintain visibility and access to the agreement of Dublin City Council.

3.1.2 Site Compound

The site compound will consist of:

- Offices
- Meeting Rooms
- Toilet / Shower Rooms
- Drying Rooms
- Canteens
- Storage Containers

All cabins will be steel securi-type with steel lockable shutters to windows and steel lockable door. All cabins will come to site in good condition and will be maintained in good order throughout the project. Double / triple stacking of cabins may be required with safe stairs and walkways provided to the upper levels of offices.

3.1.3 Site Access & Egress

Safety and ease of access to the site are to be provided for by the Main Contractor/Contractor when planning the works. Separation of vehicular and heavy plant traffic from pedestrians and operatives will be implemented as far as is practical when considering the layout of the site infrastructure and access points.

Where a site access crossing is required on a pavement this will require a dedicated pedestrian management setup to ensure there are no incidents of crossovers between pedestrians and site vehicles. This may require a turtlegate barrier in addition to with semi-permanent barriers along the kerb edge, flagmen to control barriers and flagmen to watch truck movement and pedestrians.

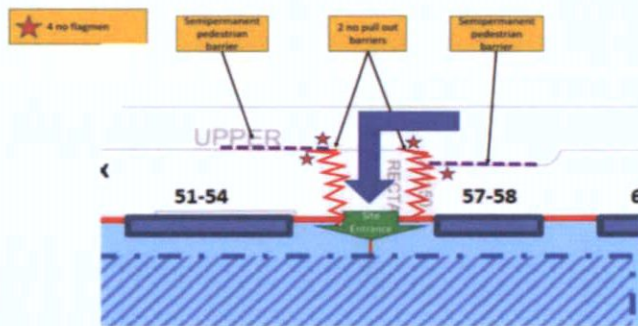


Figure 6 – Typical Pavement Crossover System

3.1.4 Site Logistics

Each development phase will require dedicated tower cranes to service the construction activities. This will include all stages of construction including the building envelope and fit-out lifting requirements. These may be complemented with teleporters, mobiles cranes, hoists and mobile concrete pumps as required.

The construction traffic and pedestrian routes are outlined in the Construction Traffic Management Plan. In general, trucks will be off loaded from the designated laydown areas. Deliveries will typically be on a just in time basis and this system will be strictly controlled by Main Contractor/Contractors who will organise the deliveries. The Main Contractor/Contractors will advise their suppliers on the delivery routes, ensuring the drivers are made aware of the site location and the correct route to site in accordance with the Dublin City Council heavy goods vehicles cordon restrictions.

If any plant setups are required outside the site, a road lane closure may be required. The road closure license will be obtained from Dublin City Council and an agreed traffic management plan will be implemented as required. Any traffic management measures will be designed by qualified personnel in accordance with Chapter 8 of the Traffic Signs Manual and implemented by Signing, Lighting & Guarding (SLG) trained operatives.

The logistics plan will be presented to workers during the site induction. Refresher training in the logistics plan will be presented in toolbox talks.

3.1.5 Proposed Craneage Strategy

Tower cranes will be required during each of the construction phase of the development. The Main Contractor will nominate the location(s) of these once appointed but indicative locations are shown in Appendix A – Proposed Site Setup. Mobile cranes may also be utilised on a short-term basis throughout the construction period.

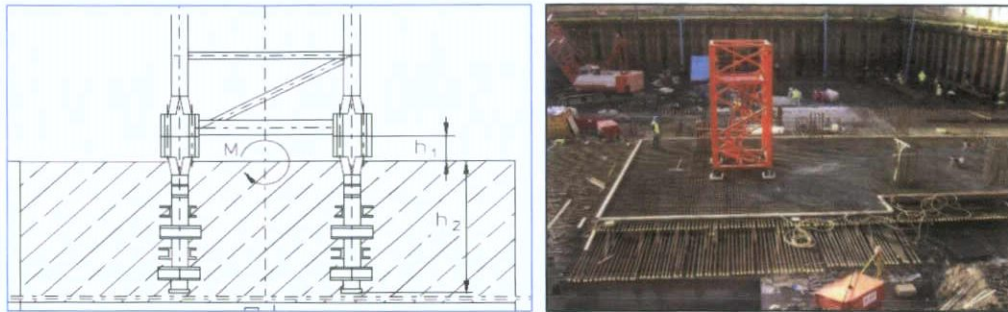


Figure 7 – Typical Tower Crane Anchors

The tower crane bases can be erected on foundation anchors and may be formed as part of the new building foundations. On Site 4 where the existing buildings foundations are to be retained the tower crane may be supported on temporary kentledge bases.

3.1.6 Site Power, Waste & Drainage

A power supply from ESB Networks to power both the compound and the construction site will be applied for by the Main Contractor/Contractors. The size of supply will be calculated to ensure it is sufficient to power both the site compounds and construction site activities. A dedicated power supply will be provided for the tower cranes, task lighting, power tools and charging stations for plant such as electric hoists.

In the event of any delays securing the required power supply to power offices and cranes, generators may be required. Diesel generators will have sound enclosures and will be regularly serviced to prevent noise and odour pollution and setup in a spill tray to prevent any spillage contaminating the ground. Temporary site lighting will be installed to provide safe and well-lighted walkways around the site compounds and task lighting to the construction sites.

Water and drainage will be required to service the site toilets and canteen facilities. The Main Contractor/Contractors will carry out a site survey to identify the locations of the water and foul drainage connections to each of the sites. It will be the Main Contractor/Contractors responsibility to apply to Irish Water for connections to the water main and foul drain, ideally utilising existing connections.

3.1.7 Working Hours

The working hours will be dictated by the planning conditions and are expected to be as follows:

Days	Start Time	Finish Time
Monday-Friday	8:00	18:00
Saturday	8:00	14:00
Sunday	No work permitted	No work permitted
Bank or Public Holiday	No work permitted	No work permitted

Working times will be within the hours permitted by the Planning Decision for the development. It may be necessary to work outside these hours at times, for example for early morning concrete pours and late evening concrete finishing. The Contractor will consult Dublin City Council regarding out of hours working and local residents and businesses will be informed of any out of hours works required. A planning

derogation will be applied for to Dublin City Council when out of hours working is required. The terms and conditions of the planning derogation will be strictly adhered to at all times.

3.1.8 Car Parking

In general, there will not be car parking for operatives on site. Personnel will be encouraged and informed of the numerous public transport options available to access the works.

3.1.9 Wheel Washing Facility Requirement

The Main Contractor/Contractors will ensure that the enabling works package will include provisions for a wheel washing facility with water collection and filtering before any discharge to the public surface water drainage system. Trucks discharging concrete should have a wash out area to clean the chute prior to entering the wheel wash.



Figure 8 – Typical Wheel Washing Facility

3.1.10 Expected Vehicle Movement

An outline construction traffic management plan has been prepared and details access routes, site signage, haulage license protocols and environmental control procedures. Reference should be made to the Construction Traffic Management Plan submitted as part of the planning documents.

Once the construction programme is finalised by the appointed Main Contractor/Contractors, a detailed breakdown of the expected vehicle movements will be available.

3.1.11 Security

In addition to the hoard to the site perimeter the following measures will be adopted by the Main Contractor/Contractors:

- A dedicated site security team with 24hr access to the site and direct contact with the local An Garda Síochána station.
- Each person on site will have been inducted and fingerprint access control will be used for site entry and exit. The Contractor will know who is on site at all times.
- There will be a site CCTV system which may be extended to cover the footpaths and roads around the site (depending on the GDPR regulations).
- Hoarding lighting will be incorporated to increase the general illumination levels around the site.
- Siting the cabins behind the hoarding with windows overlooking the streets will provide a greater degree of natural surveillance to the area to ward against anti-social behaviour.



Figure 9 – Typical Site Security Measures

4. Site 4: Construction Methodology

4.1 Description of the works

Site 4 is a mixture of 2 and 3 storey structures. The Ground floor incorporates retail and food and beverage units. 1st floor provides an external podium area from which access is provided to the 1st, 2nd, and 3rd floor residential units. The site includes part of a new public plaza with access from Moore Street through a new brickwork archway.

Site 4 is located to the north and south of nos. 14-17 Moore Street which is of heritage significance and is under the ownership of the State having been designated a National Monument.

A separate Structural Design and Construction Management Plan has been prepared to consider the approach to works adjacent to the National Monument. The structures at 10 Moore Street, 20-21 Moore Street, and 6-8 Moore Lane are to be retained and incorporated into the scheme along with the retained façade to 5 Moore Lane and the party/dividing wall between 12 and 13 Moore Street.



Figure 10 – Site 4 - Ground Floor Layout - ACME Drawing
DC-ACM-04-00-DR-A-20-1100



Figure 11 – 1st Floor Layout - ACME Drawing DC-ACM-04-01-DR-A-20-1101

4.2 Site Surveys Required

At the next stage of the project, intrusive structural investigations will be undertaken on the structural fabric. These have not been possible at this stage because of the restrictions on travel and access due to the COVID-19 pandemic. Investigations will include sampling and testing of the structural fabric to determine strength and material properties. Structural works will be based on the desire to conserve the structures with intervention limited to the essential works required to enable the buildings to provide the required performance and long-term durability. As the approach for these particular buildings is refurbishment and conservation rather than replacement, consideration will also be given to the need for ongoing and potentially increasing maintenance given the age of the existing structures.

Ahead of the demolition activities commencing, extensive site surveys will be required, including:

- Opening-up works to confirm existing buildings load-paths;
- Opening-up works to confirm existing materials & historic alterations and adaptations made;
- Opening-up works to areas covered, unexposed or inaccessible;
- Conditions/dilapidation surveys of the existing retained/protected structures;
- Additional Geotechnical Investigations (if required);

4.3 Substructure

The foundation and substructure strategy has been developed considering the age and condition of the existing structures that are proposed to be retained in and around the Site 4 development, and with particular care and specific consideration to the boundaries with the National Monument.

4.3.1 Foundation Strategy

As the Planning Stage structural design has been developed a number of different options have been considered for the Site 4 foundations.

The main factors that have influenced the preferred solution being: -

- The Location and importance of the National Monument,
- The existence of basements beneath some but not all of the buildings in or adjacent to site 4,
- Existence of made ground of variable quality to a depth of 5m above the Boulder Clay.
- Buildings along the boundaries that are to be retained.
- Relatively light new building loads.

The development consists of 2 and 3 storey residential buildings with small retail uses at ground and basement level. Therefore, the foundation loads are quite low and do not warrant the use of a traditional deep pile system founded in the limestone rock. Therefore, mini-bored piles (between circa 150mm to 300mm diameter) have been considered within the Planning Stage design. The main advantage of this approach is that there is no bulk excavation require adjacent to the National Monument.

Piling can be bored from this existing basement level using a low access rig. The small amount of spoil arising from 150mm to 300mm diameter pile is significantly less than excavating a conventional trench strip or pad foundation near another building with shallow foundations. Thereby minimising the potential for ground movement to the adjacent structures. Furthermore, by arranging the mini piles in groups contained within a pile cap minimises the impact on potential below ground archaeology that can be left in-situ and preserved.

The use of mini-bored piles minimises vibration and noise to adjacent structures and surrounding environment. Piling can be undertaken using a low-access rig that is suitable for piling around temporary works or within existing basements.

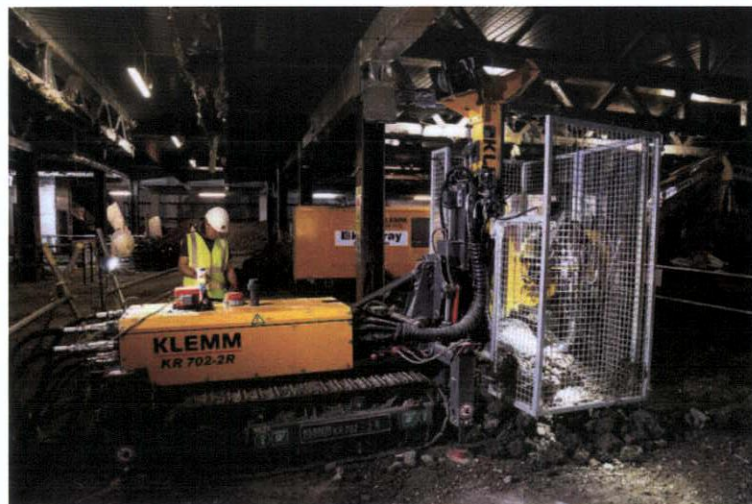


Figure 12 – Typical Mini-Piling Operation

4.3.2 Basements

Basements with Site 4 are mainly to be used for Plant and storage with the existing basement beneath 6-8 Moore Lane to be used for the café/restaurant above.

The design concepts that have been adopted will provide some long-term flexibility to enable these spaces to be used for a variety of purposes with minimal adaption.

We have assumed all new basements should be capable of being constructed to at least Grade 2 as defined by BS 8102:2009 Code of practice for protection of below ground structures against water from the ground.

Existing Basements

There are a number of existing basements located on the site. Beneath the retained buildings at 10 Moore Street and 6-8 Moore Lane the basements are to be retained and used for residential storage and a café/restaurant respectively.

The condition of these basements will need to be examined to enable them to be improved if necessary. The existing construction is unlikely to be watertight and will most likely not incorporate any damp proofing within the construction. If the existing basements are to be provided as storage or as habitable space or similar, additional works may be required. This could include the addition of waterproof rendering on the inside of basement walls, in conjunction with a waterproof membrane beneath a new basement floor screed. The architect would need to consider this and specify suitable treatments within the finishes to upgrade the basement spaces. Ventilation would also be essential.

Proposed Basements

As noted above, new basements are constructed in some areas of Site 4. These are to be minimised as far as possible and will be in the location of the existing basements on site. They will be used to house plant for the residential and retail units above and remove the requirement for area above ground to be allocated to plant. The retail unit at 11 Moore Street will also have an accessible basement for use with the retail store.

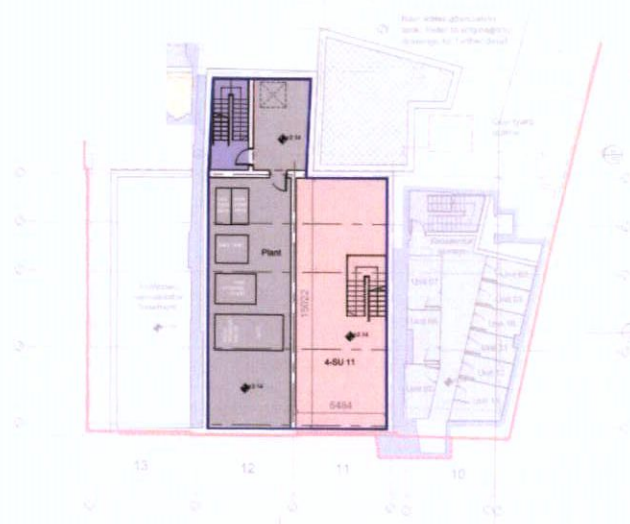


Figure 12 – Proposed Basements

The external walls and slab of the proposed basement areas will be constructed from a minimum thickness of 250mm reinforced concrete. The basement slab will potentially be thicker and designed as piled raft to enable a simple flat concrete construction. Alternatively, ground beams may be adopted and this will be examined over the next stage.

The basement structure will be designed in accordance with BS8102:2009 "Code of Practice for Protection of Structures against water from the ground". The protection of the basement against water penetration will be provided by the reinforced concrete basement structure and will be designed and detailed to achieve a Grade 2 structure with Type B (structurally integral) protection.

Additionally, a radon gas membrane is to be installed beneath the substructure, to be detailed by the specialist. The basement slab will extend across the whole area of the new basement. The slab at the higher level beneath the attenuation tank will extend to provide the base for the lift and form the lift pit beneath the ground floor.

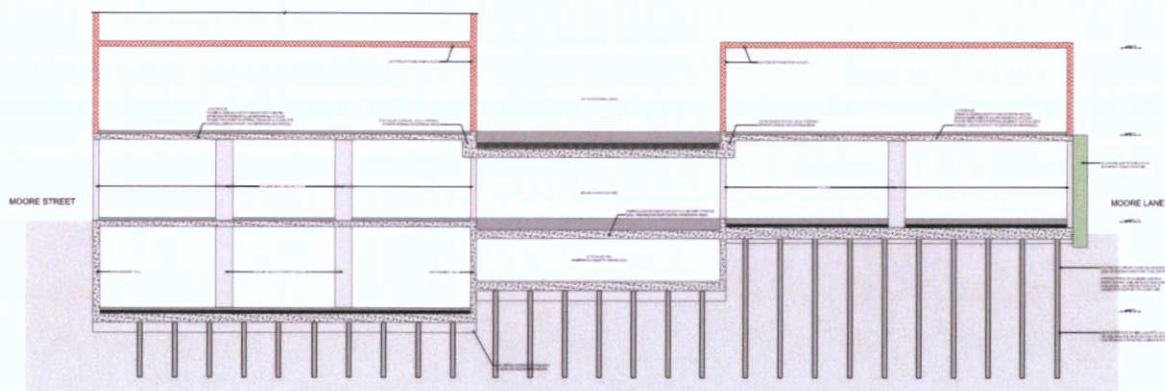


Figure 13 – Section Through Site 4 Showing Basement Foundation Strategy and Basement Levels.

Adjacent to the National Monument where an existing basement is located on both sides of the wall it is important that the existing conditions for the party walls are maintained. Constructing a new basement wall against the existing wall would change the existing conditions which Malloy Associates have advised would be detrimental to the wall. Furthermore, constructing a concrete wall directly against the basement wall of the National Monument could result in excavating below the wall foundations and also risk construction impact damage. Therefore, it is proposed to construct the new basement wall 1.2-1.5m away from the National Monument basement wall. Beams beneath the ground floor slab will then cantilever over the new basement wall to support the superstructure over. The basement within No. 13 Moore Street is to be classed as a non-habitable ventilated space therefore no structural wall is required against the 12/13 Moore Street party wall and the slab over can be supported from columns. Alternatively, a structural concrete wall can be provided all-round the basement to 13 Moore Street and the space may in the future be upgraded to achieve a Type 2 or Type 3 quality space.

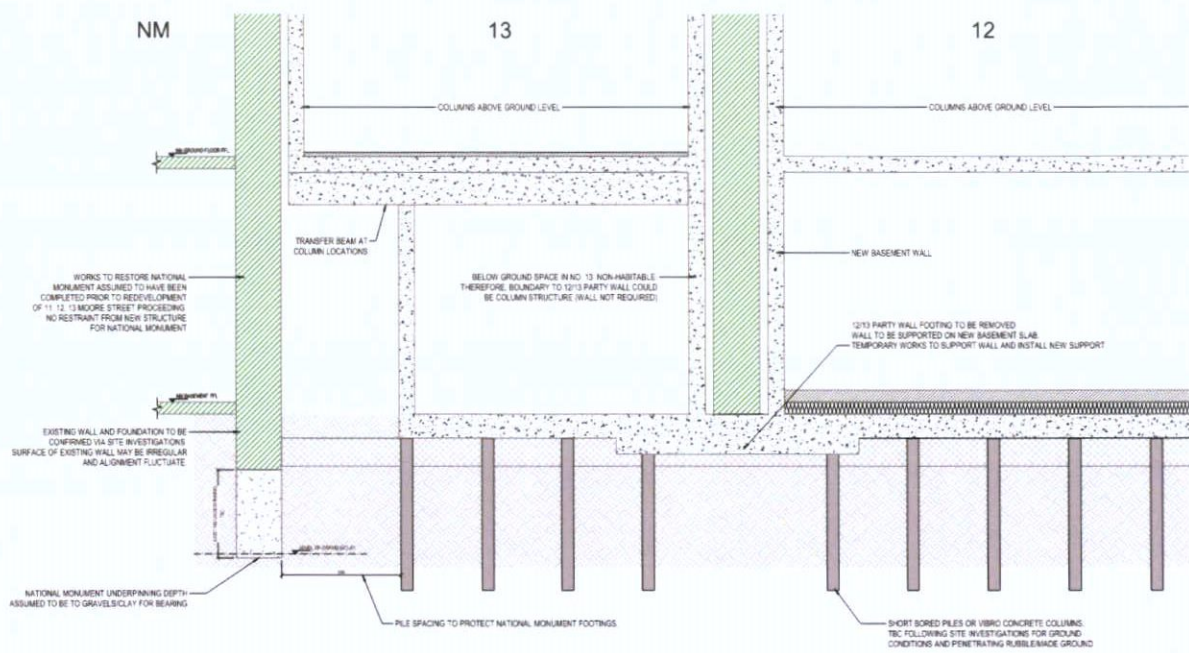


Figure 14 –Foundations Adjacent to National Monument

Where the proposed buildings are adjacent to retained but not protected structures, the structural slabs will cantilever from the piles where the building boundary abuts the existing building walls, to provide the required floor areas and support the structure above. In doing so each retained building foundation is less likely to be disturbed and undermined during construction and the risk of ground movement affecting the retained buildings is reduced.

It is proposed that the basement slab beneath 11-13 Moore Street is continuous beneath the retained 12/13 party wall. Taking the basement/foundation beneath the wall provides structural support for the wall and allows for lateral restraint to be provided from the new structure at the upper levels. A thickening of the basement slab spanning between the lines of piles on either side of the wall is required to support the wall. Temporary works will be required to support the wall during the construction of the basement slab beneath the wall. It is envisaged that sections of the basement slab in 12 and 13 Moore Street will be constructed. Steel beams (needles) spanning between these sections of slab can then be installed through penetrations in the wall to provide temporary support for the wall. The base of the wall and existing foundation can then be removed, and the new slab connected across the party wall line. The concrete can be cast to the underside of the party wall to reinstate the vertical support, following which

the needles can be removed and the penetrations made good. The temporary works scheme for the site is to be developed by the contractor.

Where the proposed buildings are adjacent to retained but not protected structures, the structural slabs will cantilever from the piles where the building boundary abuts the existing building walls, to provide the required floor areas and support the structure above. In doing so each retained building foundation is less likely to be disturbed and undermined during construction and the risk of ground movement affecting the retained buildings is reduced.

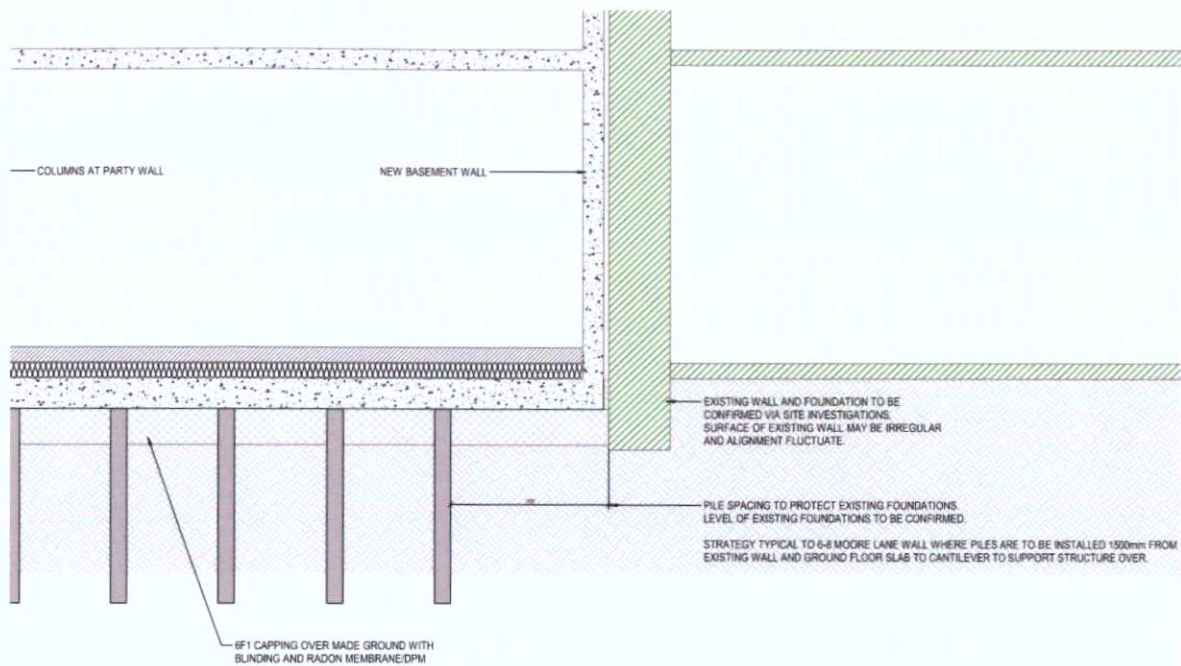


Figure 14 – Example of Foundation Adjacent to Retained Structure.

Attenuation Tank

The drainage strategy includes attenuation to regulate the flow to the main sewer system which is to be provided through a combination of attenuation tanks and blue roofs. Site 4 requires 124m³ of attenuation through the combination of blue roofs and an attenuation tank. It is understood that the requirement of the local authority is for a concrete tank into which access can be gained. Therefore, a below ground crate storage system has been discounted from current proposals.

The location of the tank has been positioned to avoid the location of the lift and tree proposed at ground floor. Access to the attenuation tank is to be located within the cycle store at ground floor with the access hatch coordinated with the external finishes.

The tank is to be constructed from 300mm thick concrete walls and slab. The concrete will include a waterproof additive to produce a waterproof construction. The north and west walls of the tank will be shared with the basement. The design of the tank will require further consideration at stage 3 to ensure the risk of leakage into the adjacent basement areas is minimised. It may be necessary to add a drained cavity wall to prevent water entering the useable basement areas. Alternatively, the attenuation tank construction can be simplified, and a sectional tank or liner be added to provide a self-contained storage vessel.

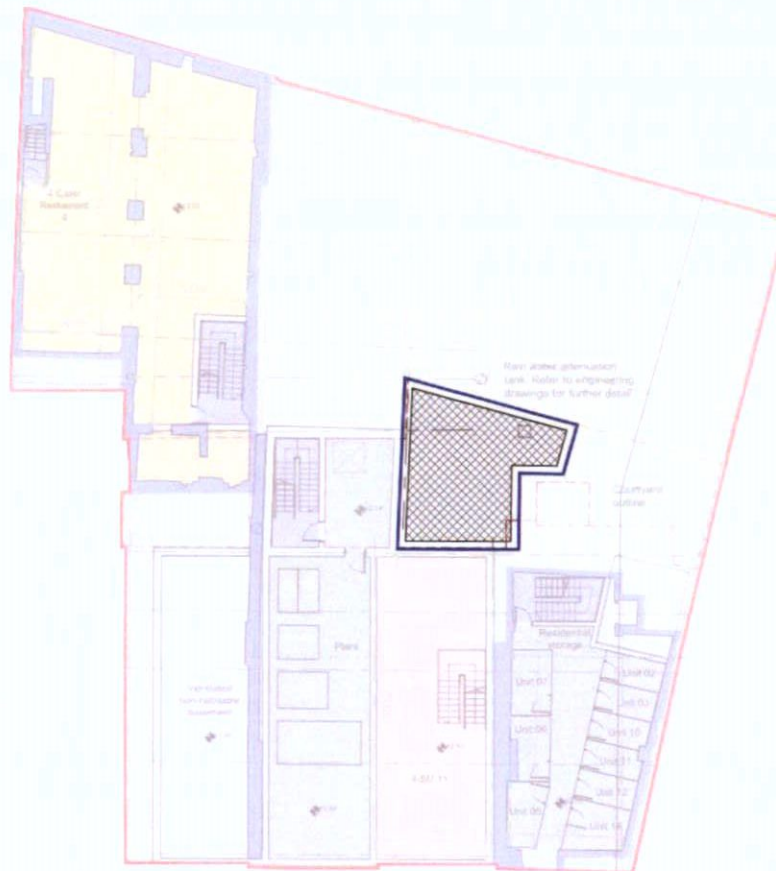


Figure 15 – Proposed Location of Attenuation Tank

4.4 Superstructure Strategy

The strategy for the primary structure has then developed through the discussions regarding the National Monument and the buildings and structures which are now being retained across the site. A consistent solution is proposed across the scheme to provide an efficient and sustainable construction.

Waterman are proposing a simplified construction of reinforced concrete up to 1st floor slab level. alternatives have been considered but involve many more components and complications where a combination of steel, masonry, and pre-cast concrete construction were considered.

4.4.1 Proposed 1st Floor Structure

It is proposed that the 1st floor slab is constructed from reinforced concrete which will also require steps in level to suit the various finishes whether the slab is within an internal floor area of an external courtyard /podium area. The slab, typically 250mm thick, will be supported from columns aligned with the reinforced concrete basement walls and basement columns below.

By providing a reinforced concrete 1st floor slab the required fire and acoustic separation between the ground floor retail units and the residential units at 1st floor can be achieved. Additionally, the 1st floor layouts include an external podium terrace area. Additional thermal insulation, waterproofing membrane, drainage, and finishes will be required within the finishes zone above the slab across the external areas in comparison to the internal areas. A fold within the concrete slab can be constructed to provide a level difference in the structural slab level between internal and external areas to accommodate the different build ups and ensure a level threshold. The deck waterproofing will need to be specified and detailed by the Architect to tie in with the damp proof courses in the superstructures.

Expansion and contraction joints may be required and will be assessed over the next stage.

4.4.2 Upper Floors

It is proposed that upper stories are constructed from a lightweight frame. It is assumed that lightweight frames such as timber and load bearing steel framing can maximise the sustainable opportunities for the construction. The construction of the frame from a podium slab also allows for flexibility in layouts and construction as the scheme develops at the next stage.

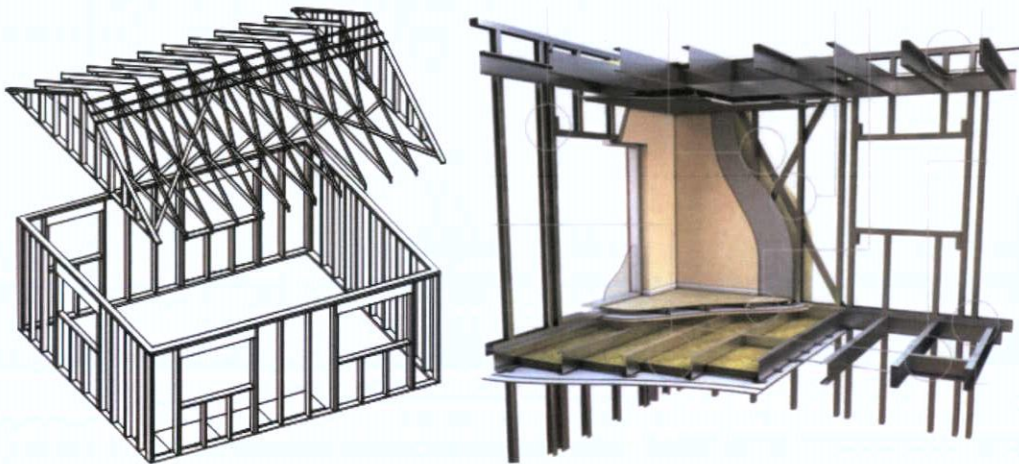


Figure 16 – Lightweight Timber Frame and Metsec SFS Load Bearing Frame.

4.4.3 10 Moore Lane

It is proposed to construction the two-storey food and beverage unit in the location of the existing 10 Moore Lane from a typical lightweight superstructure frame noted for the residential units. The units are single use and therefore do not require the same acoustics and fire separation provided by the 1st floor slab proposed over the residential unit in the main part of the site.

The ground floor will be constructed from a reinforced concrete slab over a mini pile foundation. The use of a mini pile foundation maintains a typical solution across the site. The proposed building also sits adjacent to the National Monument where the wall of 9 Moore Lane is to be retained. The construction of the wall is unknown and therefore, similar to the description above, a mini pile foundation solution with a cantilever ground floor slab adjacent to the existing wall mitigates the risk of damage to the existing wall or undermining the existing foundations from excavation adjacent to the wall.

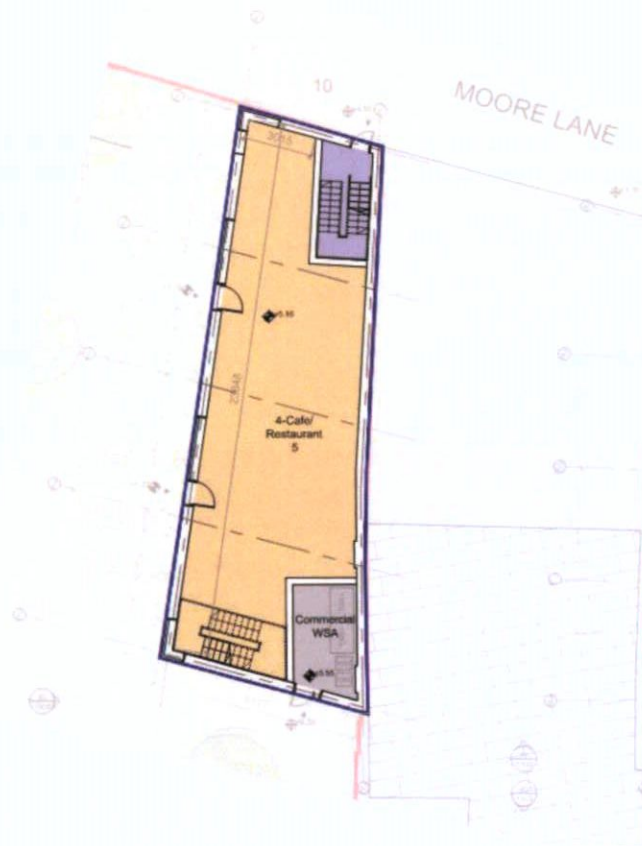


Figure 17 – Food and Beverage Unit 10 Moore Lane.

4.4.4 Facades

Current proposals are for a brick façade for the new elements. It is assumed the façade will be a cavity wall system with an external skin of brickwork supported on thermally broken brackets at the face of the slab edge and laterally restrained to an inner skin of blockwork or framing system such as Metsec, supported on the slab edge. It has been assumed that the façade will be supported on a floor-by-floor basis however opportunities to support 2 or possibly 3 floors of façade will be explored at the next stage to reduce the number of horizontal movement joints.

The facades of the retained buildings are to be maintained. Where site investigations highlight damage or degradation to the wall, repairs are to be undertaken to ensure the integrity of the wall. Repairs should be undertaken with consideration to the existing materials and construction.

The façade at 5 Moore Lane is to be retained and incorporated into the proposed development however the façade is to be deconstructed prior to the demolition phase and reconstructed as part of the main site works. The existing façade will be reconstructed from the new ground floor slab and restrained to the new frame. Supporting the reconstructed façade from the new slab will provide a foundation for the wall and ensure no differential settlement occurs between the new and retained elements of the building.

It is proposed to construct a new entrance archway between Moore Street and the internal square between Sites 4 and 5. The arch will sit within the Moore Streetscape adjacent to the National Monument and proposed 18a Moore Street building being designed by the OPW team building, in the location of the demolished Nos. 18-19. The structure for the arch is to be independent from the National Monument and the 18a Moore Street building.

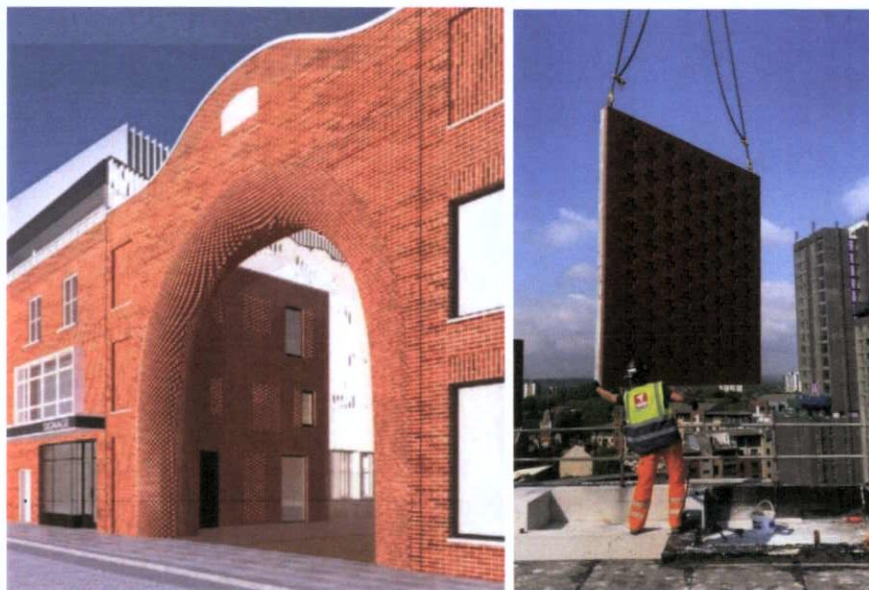


Figure 18 – Moore Street Archway & Typical Precast Panel Installation

It is envisaged that the form of the arch is produced with bricks cast onto a precast concrete backing panel although this requires further discussion with pre-cast concrete/cladding specialists over the next stage. The primary structural concrete frame provides a structure from which the pre-cast concrete panels are then supported and laterally restrained. Various joints will be required in the panels to enable them to be manufactured, transported to site, and lifted into place. The design of the brickwork detailing, and the location of joints will be a challenging design issue.

5. Construction and Demolition Waste Management

AWN Consulting Ltd. has prepared a Site-specific Construction & Demolition Waste Management Plan (C&D WMP) on behalf of Dublin Central GP Limited and is submitted as part of this planning application [document reference CB/20/11784WMR01].

The C&D WMP provides information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with the current legal and industry standards including the Waste Management Acts 1996 - 2011 and associated Regulations, Protection of the Environment Act 2003 as amended, Litter Pollution Act 1997 as amended and the Eastern-Midlands Region Waste Management Plan 2015 – 2021.

In particular, the C&D WMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

The C&D WMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams.

5.1 Non-Hazardous Construction Waste

There will be waste materials generated from the demolition and renovation of the existing buildings, hardstanding areas on site, as well as from the further excavation of the building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete etc.

There will be soil, stones, clay and made ground excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. The preliminary estimated 163,490m³ of material will need to be excavated to do so. There is limited chance for reuse of material onsite and it is envisaged that all material, will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and/or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

5.2 Potential Hazardous Wastes Arising

5.2.1 Contaminated Soil

In 2008 an initial joint geotechnical and environmental site investigation was undertaken (by O' Callaghan Moran & Associates) comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The intrusive investigations were confined to open areas in the middle of the site and around the site parameter. It is envisaged that further site investigations and environmental soil analysis will be undertaken post demolition and prior to any excavated material being removed from site.

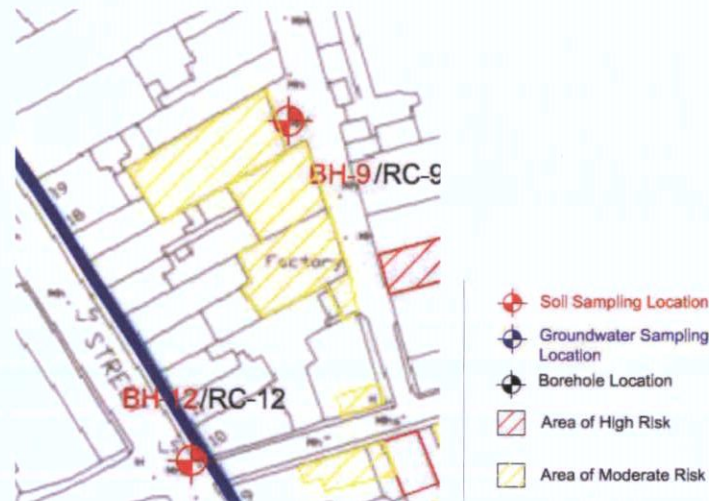


Figure 19 – Site 4 areas of Potential Contaminated Material

Three (3) samples of the fill material from BH-7, 9 and 10 were analysed for Total Petroleum Hydrocarbons (TPH), BETX (benzene, toluene, ethylbenzene and xylene), PAH (polycyclic aromatic hydrocarbons) and metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium and zinc).

Nineteen (19) samples, of the fill and natural ground from, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2, were tested for the WAC, which included Total Organic Carbon (TOC), BETX, PCBs (polychlorinated biphenyls, 7 congeners), Mineral Oil (C10 to C40) and PAH sum of 17. They were also subjected to leach testing at a liquid to solid ratio of 10:1 and the leachate analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium, zinc, chloride, fluoride, sulphate, phenols, dissolved organic carbon and total dissolved solids.

If any potentially contaminated material is encountered, it will need to be segregated from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' using the HazWasteOnline application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC, which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos containing materials (ACMs) are found, the removal will only be carried out by a suitably permitted waste contractor, in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify DCC and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s).

5.2.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel/oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site.

5.2.3 Invasive Plant Species

An ecological site survey was undertaken by Scott Cawley Ecology in June 2020. This included a site walkover survey of the entire site, and around part of the outside perimeter to search for any schedule 3 invasive species. Japanese Knotweed *Fallopia japonica*, which is listed on the Third Schedule of the Birds and Habitats Regulations, was not recorded on the site.

Japanese Knotweed (*Fallopia japonica*) is an alien invasive species listed under schedule 3 of Regulations SI No. 355/2015. SCE's report concludes that it is not present on this site and there was no indication that it is growing in the immediate vicinity.

5.2.4 Asbestos

Multiple asbestos refurbishment/demolition survey were undertaken by About Safety Ltd in September and October 2020. The scope of the survey's were confined to all accessible areas of the existing buildings which are due for demolition and/or refurbishment in the future.

Asbestos Containing Materials (ACM) were detected in several locations within some of the buildings including but not limited to floor tiling, roof slates, roof felt, rope seals, bitumen and woven rope.

Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All material will be taken to a suitably licensed or permitted facility.

5.2.5 Other known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.3 Main Construction and Demolition Waste Categories

AWN Consulting Ltd. has prepared Site-specific Construction & Demolition Waste Management Plan submitted as part of this planning application [document reference CB/20/11784WMR01] and is summarized below.

The main non-hazardous and hazardous waste streams that could be generated by the demolition and construction activities at a typical site are shown in. The List of Waste (LoW) code (as effected from 1 June 2015) (also referred to as the European Waste Code or EWC) for each waste stream is also shown.

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

* individual waste type may contain hazardous substances

Table 1. Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

5.4 Demolition Waste Generation

The demolition stage will involve the demolition of multiple brick buildings onsite. The demolition areas are identified in the planning drawings provided with this application. The anticipated demolition waste and rates of reuse, recycling/recovery and disposal is shown in Table 2 and 3.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	244.4	0	0.0	85	207.7	15	36.7
Concrete, Bricks, Tiles, Ceramics	1384.7	30	415.4	65	900.1	5	69.2
Plasterboard	108.6	30	32.6	60	65.2	10	10.9
Asphalts	27.2	0	0.0	25	6.8	75	20.4
Metals	407.3	5	20.4	80	325.8	15	61.1
Slate	217.2	0	0.0	85	184.6	15	32.6
Timber	325.8	10	32.6	60	195.5	30	97.7
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	2716.1		500.9		1885.7		329.5

Table 2. Estimated off-site reuse, recycle and disposal rates for demolition waste from Site 4 [extract AWN document ref. CB/20/11784WMMR01]

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	62.3	10	6.2	80	49.9	10	6.2
Timber	52.9	40	21.2	55	29.1	5	2.6
Plasterboard	18.9	30	5.7	60	11.3	10	1.9
Metals	15.1	5	0.8	90	13.6	5	0.8
Concrete	11.3	30	3.4	65	7.4	5	0.6
Other	28.3	20	5.7	60	17.0	20	5.7
Total	188.9		42.9		128.2		17.8

Table 3. Estimated off-site reuse, recycle and disposal rates for construction waste from Site 4 [extract AWN document ref. CB/20/11784WMMR01]

5.5 Appointment of C&D Waste Manager

The Main Contractor/Contractors will appoint a C&D Waste Manager. The C&D Waste Manager will have overall responsibility for the implementation of the project Waste Management Plan (WMP) during the construction phase.

Copies of the Waste Management Plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed regarding the objectives of the Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the Waste Management Plan. Posters will be designed to reinforce the key messages within the Waste Management Plan and will be displayed prominently for the benefit of site staff.

6. Protection of Buildings during Construction

Where buildings are to be demolished with the adjacent building retained, all due care and attention will be taken to protect the retained structure. Demolition of the existing structure will be undertaken with non-percussive machinery. Where the structures connect, cutting tools will be used to separate the buildings rather than breaking out the existing structure. The demolition contractor's method statement will be carefully considered and then reviewed and approved prior to commencement of the works. Additionally, where existing buildings are being removed, the stability of the retained structures will be reviewed. Where necessary, structural works to reinstate the stability will be provided with the insertion of straps and ties to maintain the structural integrity of the building.

It has not been possible to inspect any of the existing structures due to the ongoing restrictions caused by the COVID-19 Pandemic. It will be essential to carry out detailed structural surveys of the elements that are to be retained. These investigations will also include trial pits at the foundation/footing level of the existing masonry walls and along the building frontage and rear elevations to determine the nature of the foundations.

A summary of the existing buildings on site is provided below with a description of the proposed works within the Site 4 development:

- **10 Moore Street**
 - To be retained and integrated into the proposed scheme.
- **11-13 Moore Street**
 - To be demolished as part of the proposed scheme excluding the existing party/shared wall between 12/13 Moore Street which is to be retained as it is understood a creep hole between the terraces, created during the 1916 Easter Rising, remains in the wall.
 - New terrace buildings are to be constructed as part of the proposed scheme.
- **18-19 Moore Street**
 - To be demolished as part of the proposed scheme.
 - An extension to National Monument for ancillary use to National Monument, named the Slither Building, is to be constructed adjacent to the 17/18 Moore Street Party wall as part of the National Monument works. This new building is proposed by the OPW team to protect the northern flank wall of the National Monument such that the environmental conditions enjoyed by the National Monument wall remain unchanged. Without this addition the wall would potentially be exposed. The design and construction of 18a is within the OPW team works and is not part of the DCGP Ltd. scheme.
 - A new entrance archway from Moore Street to the external square is proposed in the location of the existing 18-19 Moore Street, adjacent to the proposed Slither Building. Refer to section **Error! Reference source not found.**
- **20-21 Moore Street**
 - To be retained and integrated into the proposed scheme.
- **5 Moore Lane**
 - Internal fabric to be demolished with a new building constructed.
 - Existing single storey façade to be retained and reused within the proposed scheme.
- **6-7 Moore Lane**
 - To be retained and integrated into the proposed scheme.
- **11 Moore Lane**
 - Existing building to be demolished with a new structure to be constructed as part of the scheme.

The redevelopment of Site 4 incorporates the retention of several existing buildings along Moore Street and Moore Lane. These buildings are not Protected Structures and therefore do not fall under the same limitations for change although there is an ambition to maintain as much of the original structural fabric as practically possible. This will be dependent on the condition and structural integrity of the materials found when the buildings are investigated.

Of particular importance, are the existing historical features within the retained elements including "crawl holes" that were likely formed within the masonry party walls to allow connection between the terrace buildings. It is proposed to retain these features and either sympathetically incorporate or preserve them within the proposed development. During the demolition and construction works, great care will be taken by the contractor to ensure these features are preserved. Typical temporary measures will include the application of felt and battening to the exposed walls as demolition proceeds from top down, or to erect a covering scaffold. This strategy will be developed further during the detailed design stages and will be set out to the main contractors at tender and into construction stages.

At the next stage of the project, intrusive structural investigations will be undertaken on the structural fabric. This will include a visual structural inspection with the finishes removed and sampling and testing of the structural fabric to test for strength and material properties. Structural works will be limited to essential works required to enable the buildings to provide the required performance and long-term durability. As the approach for these particular buildings is refurbishment rather than replacement, consideration will also be given to the need for ongoing and potentially increasing maintenance given the age of the existing structures.

6.1 Site 4: Basement Impact Assessment

The Basement Impact Assessment (BIA) including a Ground Movement Analysis is included as part of the planning documents.

The Ground Movement Analysis considered each stage of the development including demolition, piling, bulk excavation and construction of the each phase of the development. Predicted ground movements resulting from the works shall be monitored against baseline readings prior to commencing the works. Monitoring of noise and vibration shall be undertaken to all protected structures during the works.

The overall aim of the Ground Movement Analysis included the predicted potential impact of the proposed development to the adjacent buildings and retained structures within the site. A building damage assessment was used in accordance with CIRIA C760 'Criteria of building damage assessment'.

The maximum predicted results predict that the potential damage for all retained buildings and structures within Site 4 remains at categories ranging of Category 0 'Negligible' to Category 1 'Very Slight' damage during all construction and demolition stages. A full schedule of the predicted ground movement and the associated damage category for all nearby buildings and retained elements is shown in the Basement Impact Assessment.

According to the Site 4 Subterranean Construction Method Statement and in accordance with the DCC guidance, the damage to the existing buildings should not exceed Category 2 generally and Category 1 for protected buildings.

6.2 National Monument & Protected Structures

Particular consideration has been given to the protected structures within and adjacent to the site including 14-17 Moore Street, the National Monument. 14-17 Moore Street buildings have been designated National Monument status and are subject to a preservation order (PO 1/2007) and are under the ownership of the State and Office of Public Works (OPW).

The predicted ground movement in relation to 14-17 Moore Street, the National Monument, shown in the Basement Impact Assessment, predicts that it is within the acceptable limits and does not exceed Category 1 damage.

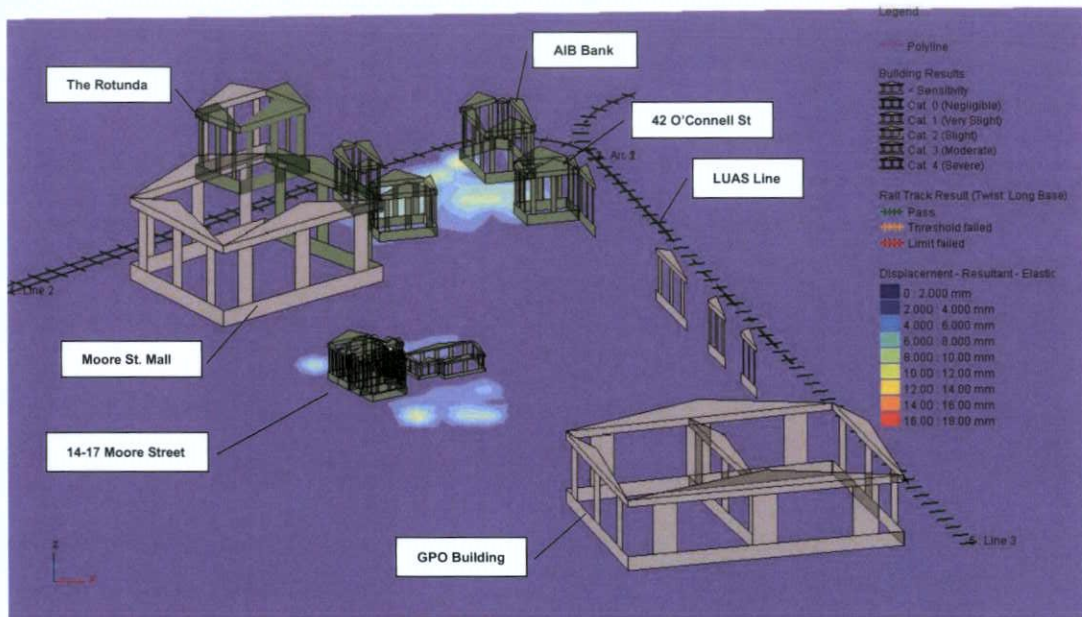


Figure 20 – Extract from BIA: Predicted Ground Movement to Protected Structures (PDisp Model)

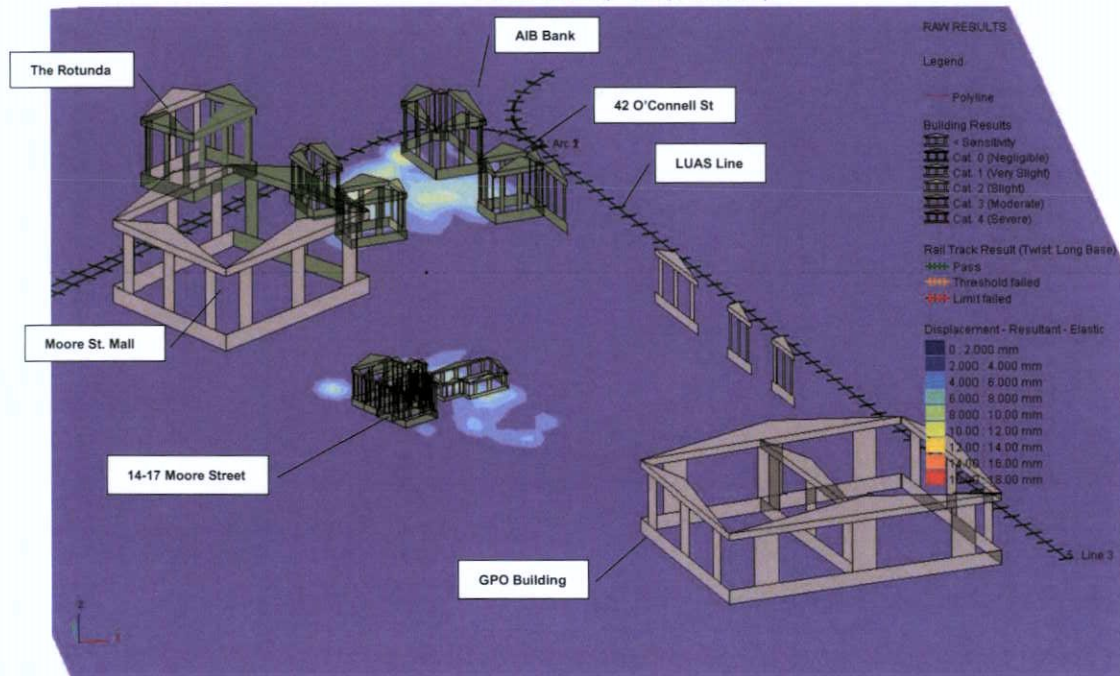


Figure 21 – Predicted Ground Movement to Protected Structures (XDisp Model)

In order to further safeguard 14-17 Moore Street, it is proposed to maintain a temporary exclusion zone around the protected buildings during the development stages, subject to agreement with the Main Contractor/Contractors and their construction methodology and sequence of works. The exclusion zone sterilises the existing structure from the adjacent construction activities and further mitigates the risk from noise and vibration.

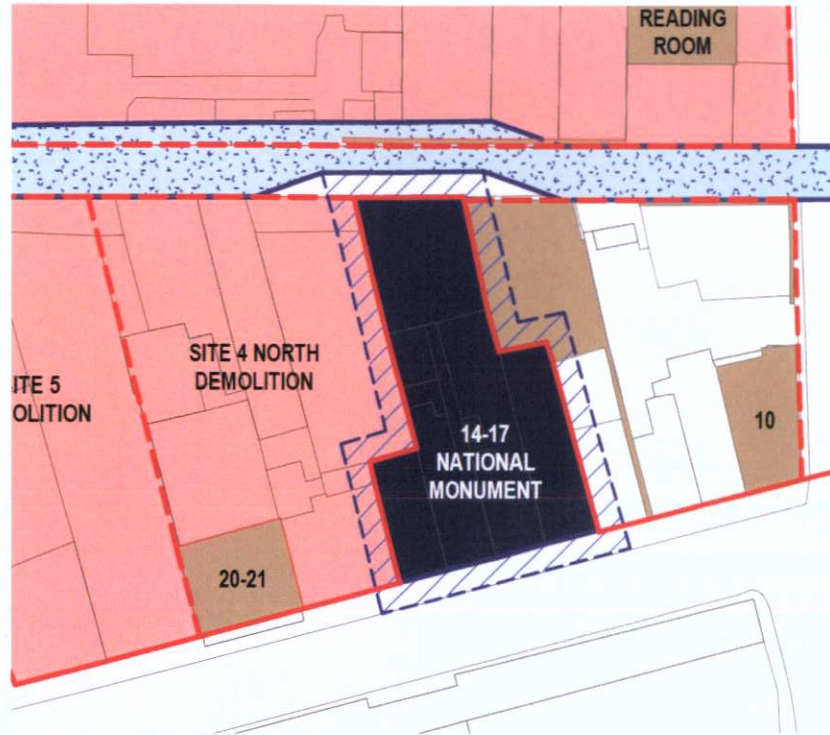


Figure 22 – Temporary Exclusion Zones to Protected Structures

6.3 Site 4 - Temporary Works

Particular consideration has been given to the retained and/or protected structures on or adjacent to the site. These shall be protected during demolition and construction via extensive temporary works required throughout the development that will be coordinated and incorporated into the permanent works. The following proposed retention systems outlined in this report are for guidance purposes only and will be subject to site investigations of the existing conditions and design by the Temporary Works Specialists.

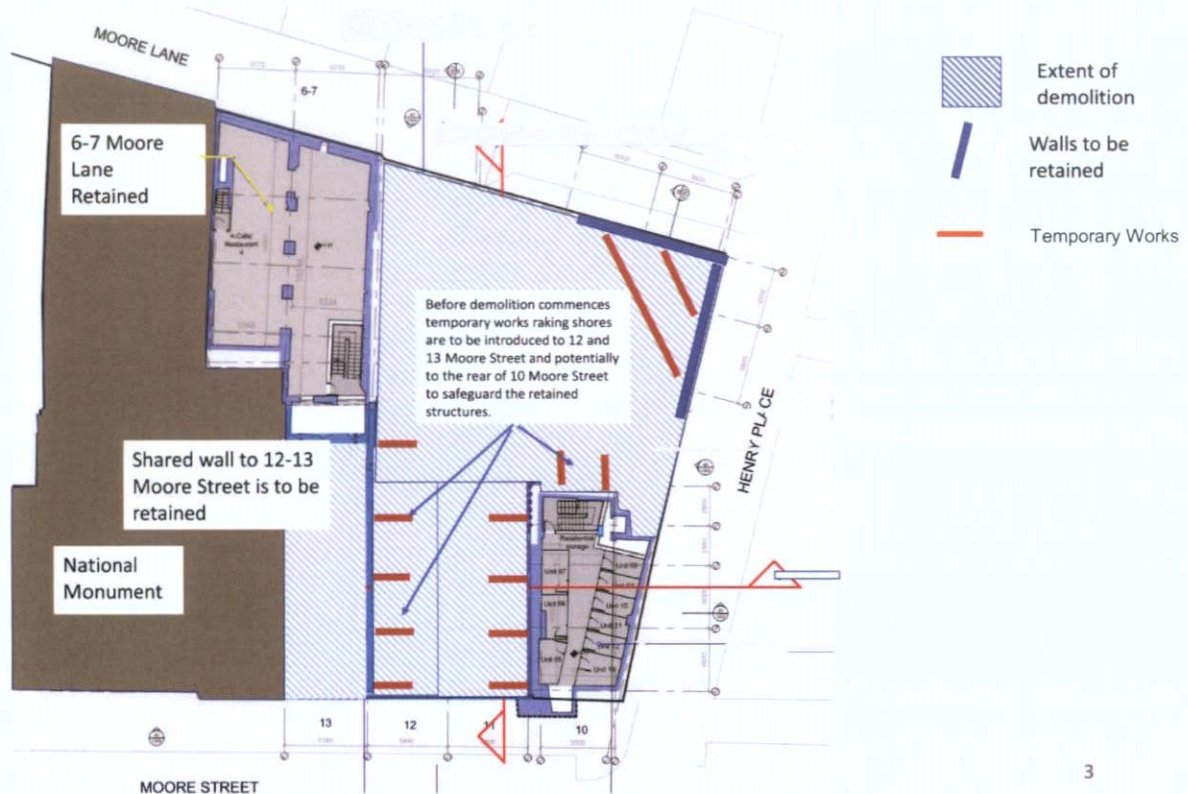


Figure 23 – Site 4 - Extent of Preliminary Temporary Works

As part of the temporary works, great care will be taken during the works to protect the retained structures and exposed boundary/party wall from exposure to weather and general construction activities. This is particularly relevant to the flank wall surfaces of the retained structures which will become exposed.

Typical temporary measures will include the application of felt and battening to the exposed walls as demolition proceeds from top down, or to erect a covering scaffold. This strategy will be developed further during the detailed design stages and will be set out to the main contractors at tender and into construction stages.

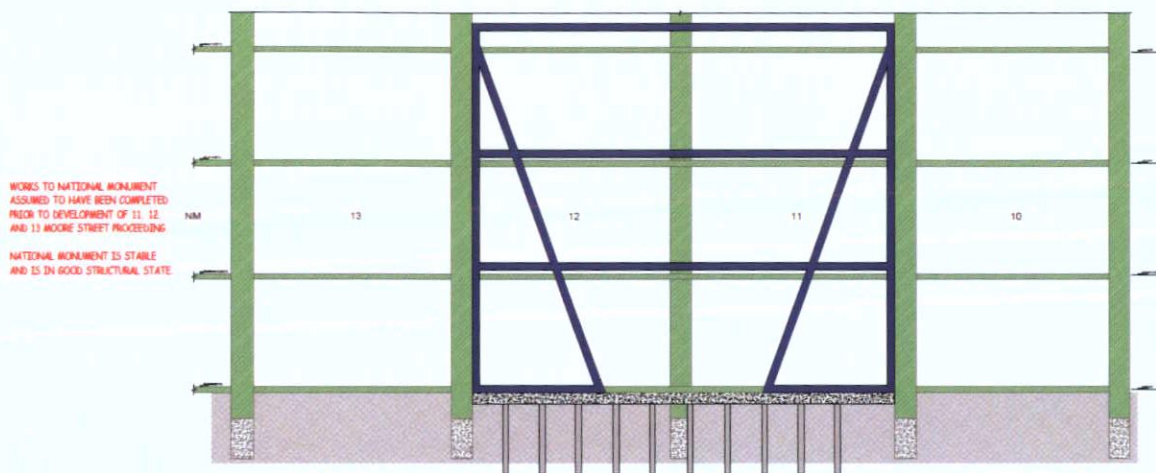
6.3.1 Indicative Temporary Works Adjacent to the National Monument

Unless otherwise agreed with the National Monument or determined through surveys and site investigations, it is assumed that the National Monument is independently stable and all structural works required to the National Monument to have been completed prior to the development of 11, 12 and 13 Moore Street.

In order to undertake the works adjacent to the National Monument, it is likely that a cantilevered steel truss retention systems will be required to 10-12 Moore Street to up hold the retained Party Wall and 10 Moore Street Building. This will be later designed by the Temporary Works Specialist and may follow:

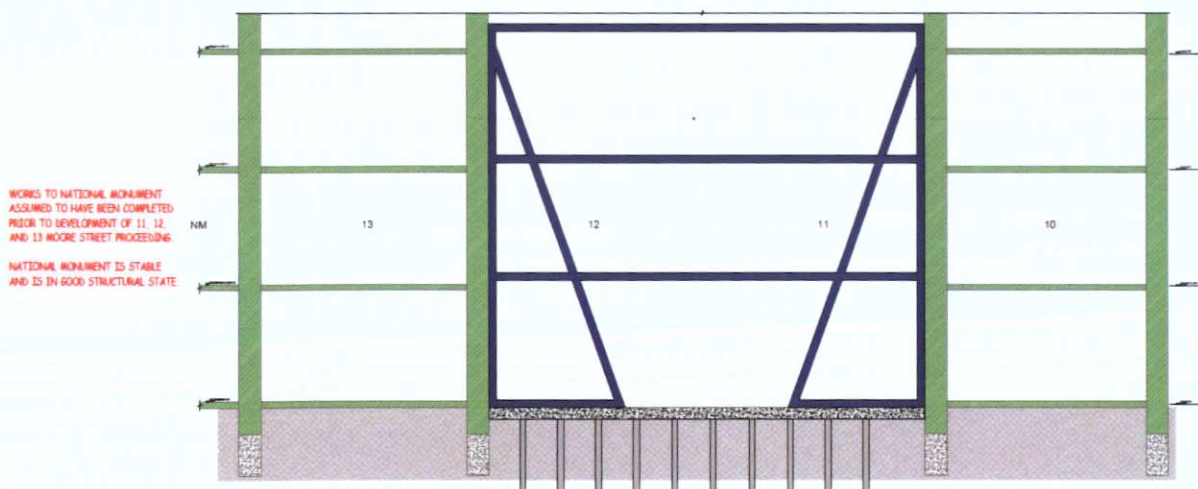
Stage 1 – Installation

- Installation of cantilevers retention system to uphold 10 & 12 Moore Street Party Walls
- Piling works undertaken prior to Temporary Works using a low access mini-piling rig.



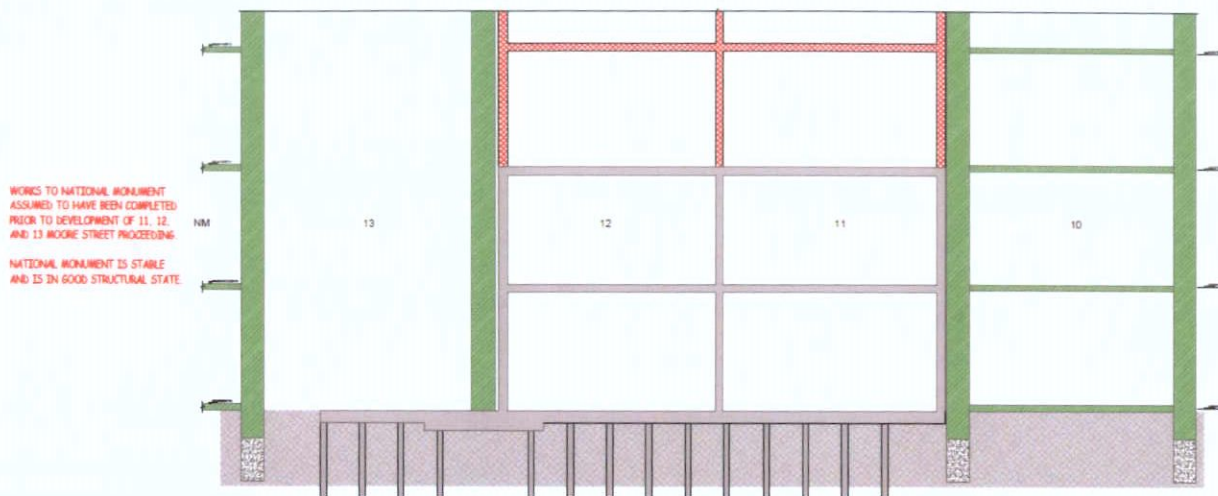
Stage 2 – Demolition

- Demolition of the existing 11 & 12 Moore Street slabs and walls.



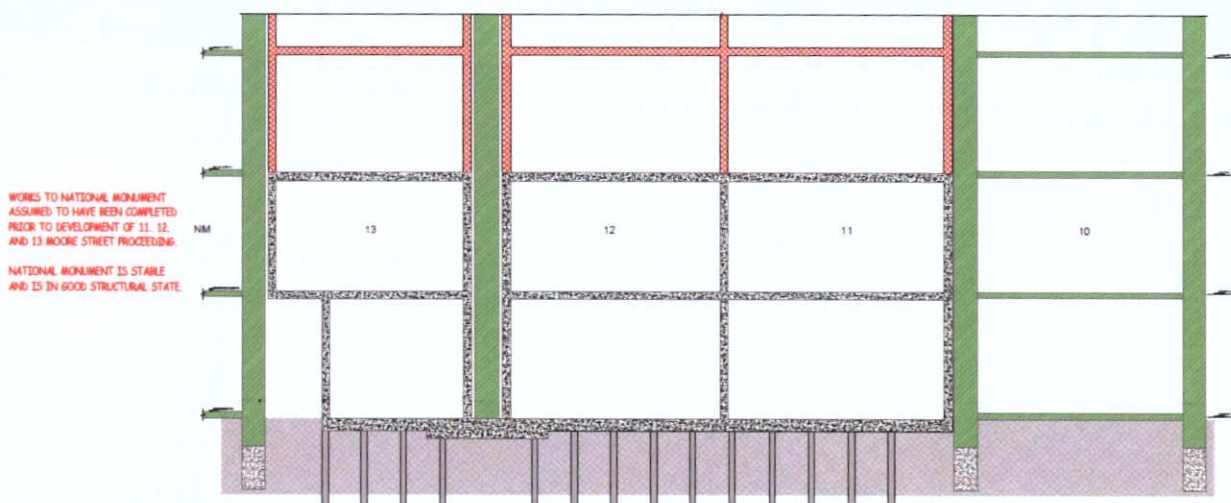
Stage 3 – Construction of 11&12 Moore Street

- Construction of 11&12 Moore Street
- Demolition of existing slabs within 13 Moore Street



Stage 4 – Construction of 13 Moore Street

- Construction of 13 Moore Street that is structurally independent to the National Monument unless otherwise agreed.



6.3.2 5 Moore Lane (Retained Façade)

The existing single storey façade at 5 Moore Lane is to be retained. The detailed design of the temporary works will be included in the demolition stage works and coordinated with the main contractor's programme and sequence. It is proposed that the temporary works will be bracing to the internal face due to the restricted space on Moore Lane and Henry Place.

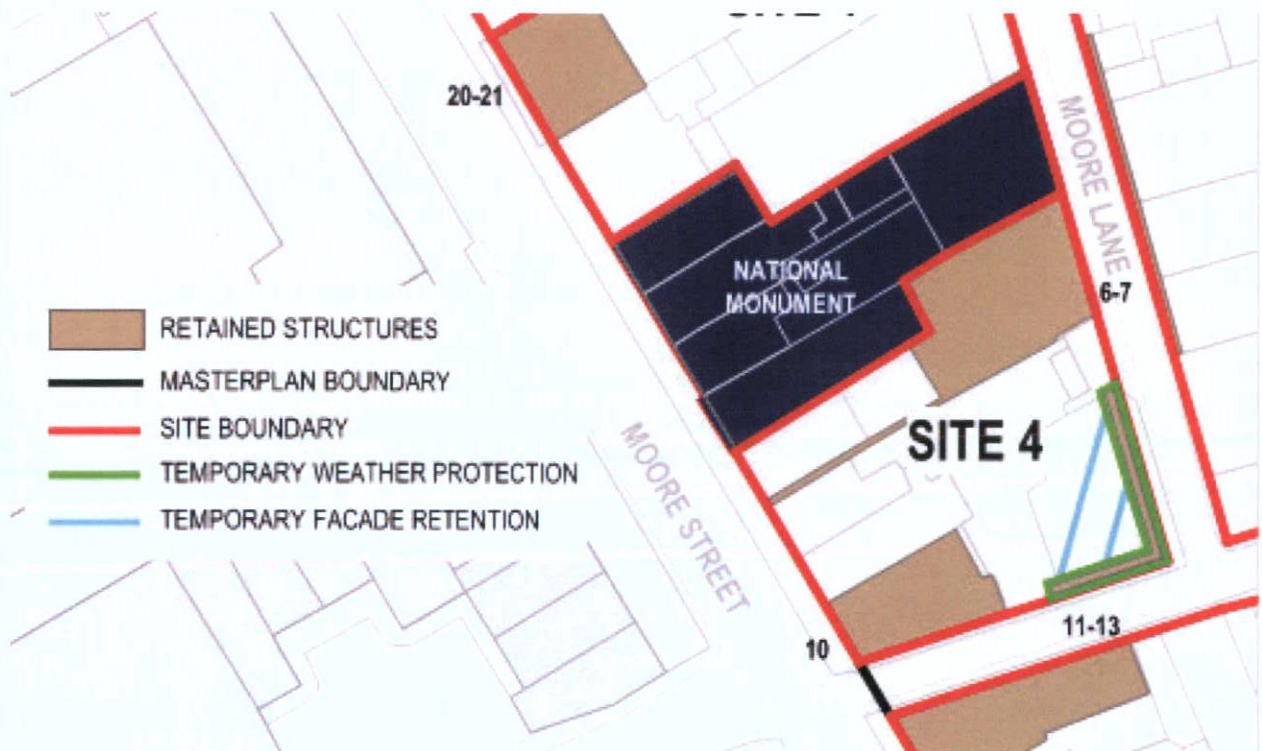


Figure 24 – Site 4 - Preliminary Temporary Works (5 Moore Lane)

Structural investigations for the façade have not been undertaken due to the restrictions on travel and access due to the COVID-19 pandemic. Investigations will be undertaken at the next stage to confirm the condition of the wall at 5 Moore Lane however it is understood from Molloy Associates that this wall is in a severely compromised condition. Therefore, all due care and attention will be provided in the design of the temporary works to retain the wall in the construction phase and the long-term durability of the wall in the permanent condition. Structural intervention will be limited to the essential works required to enable the wall to provide the required performance and long-term durability.

During the demolition and reconstruction works the facade will need to be surveyed and monitored. A site wide monitoring package will be commissioned with acceptable movement limits defined to enable the constant checking of the condition of the retained structures.

Additionally, the retained facade will be protected against weathering in the temporary case. Felt and battening and sheet will be installed to minimise the risk of weathering while the façade is exposed. As the new structure is constructed within 5 Moore Lane, the weathering protection will be sequentially removed as the façade is restrained to the new structure and the new building provides a watertight environment.

6.4 Movement Monitoring of Retained and Existing Structures

6.4.1 Overview

Prior to demolition of the existing building, an external survey control system is to be established around the site, including all protected structures, retained buildings, retained facades and the National Monument.

This will be carried out using either traditional closed traverse surveying techniques or continuous automated total station (AMTS) monitoring of movement, depending on the sensitivity of the existing buildings and proposed method of construction/demolition. The form of monitoring will be subject to the condition of the existing structures following site surveys. The Contractor will ensure there are sufficient external control stations to allow for the continuous monitoring of the structures during and after demolition and throughout the construction stage.

Monitoring of movement adjacent to the National Monument and Protected Structures will be carried out using continuous automated total station (AMTS) monitoring of movement.

The monitoring regime shall have co-ordinates which are directly correlated to the building grids and datum levels related to those shown on the Land Survey drawings, issued by the Architect. An initial control survey is to be carried out by the Contractor and may be independently checked and verified by the appointed survey contractor.

The targets will consist of reflective optical survey targets (typically prisms) that shall be adhered to the external surface of the retained structures and neighbouring buildings. The target locations shall be agreed with the relevant parties and the target adhesive shall be tested to demonstrate that no damage will be caused to the existing building fabric surface upon removal of the targets.

6.4.2 Proposed Monitoring Regime

The retained structures and neighbouring buildings shall be continuously monitored for changes in vertical and lateral movement. The monitoring of movement will be measured against trigger levels with direct alerts (via email/SMS text) sent from the system to nominated persons.

The results shall be measured with co-ordinates in eastings, northings and elevation (E, N, Z) established. A minimum number of baseline co-ordinates shall to be recorded and checked for control purposes 2 weeks prior to commencement of the demolition works. The results are to be recorded and the directional change and quantum movement from the controls and previous readings calculated.

Proposed Trigger Level	Movement (mm)
Green	Less than 12
Amber	Between 12 and 15
Red	Greater than 15

Unless otherwise agreed, movements of any target position equal to or greater than 12mm from baseline readings shall trigger 'amber' and shall be addressed by the Contractor. The Contractor shall advise the Engineer on the reason for the movement and advise his proposals to control further movement.

Movements of any target equal to or greater than 15mm from baseline readings shall trigger 'red' where immediate action is required by the Contractor. The Engineer and Contract Administrator shall be notified immediately.