APPENDIX 3.1 OUTLINE CONSTRUCTION & DEMOLITION MANAGEMENT PLAN – MASTERPLAN

Dublin Central

Outline Construction & Demolition Management Plan – Master Plan

Dublin Central GP Limited

DC-WAT-XX-XX-RP-C-001010

May 2021

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Engineering Consultants

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Quality Assurance – Approval Status

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)

Issue	Date	Prepared by	Checked by	Approved by
P1	07.05.21	R. Nelson	C. Beresford	R. Osborne
P2	10.05.21	R. Nelson	C. Beresford	R. Osborne
P3	11.05.21	R. Nelson	C. Beresford	R. Osborne
P4	25.05.21	R. Nelson	C. Beresford	R. Osborne

Comments

FINAL ISSUE

Disclaimer

Content

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.

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

The following Outline Construction and Demolition Management 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 Outline Construction and Demolition Management 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 including the Outline Construction and Demolition Management Plan for each of the Sites.

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 Location Plan

The Site benefits from an existing planning permission for a new masterplan vision totalling 78,300 sqm. The planning permission runs to May 2022.

'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 Metrolink Enabling Works (MEW)

The National Transport Agency (NTA) and Transport Infrastructure Ireland (TII) approached the Applicant in 2018 with a view to locating a future MetroLink Station serving O'Connell Street within the Dublin Central site, in an effort to avoid locating the Station within the central median of O'Connell Street. TII is in the process of finalizing the design of the MetroLink project. TII is expected to make an Application for a Railway Order for the MetroLink project, including the O'Connell Street Station, in Q2 / Q3 2021.

The Applicant has agreed a Memorandum of Understanding with the NTA/TII to complete the enabling works that would accommodate the future station, but which would also ensure that the Applicant's project was structurally independent of, and not prejudicial to, the MetroLink project. These enabling works comprise the provision of a structural 'box' positioned below ground, within which the MetroLink project can be positioned and above which the Applicant's project can be constructed. The provision of this structural box (sometimes referred to as the "Station Box") and its ancillary works below ground are known collectively as the Metro Enabling Works (MEW) in the context of the Applicant's overall Dublin Central project.

The provision of the MetroLink O'Connell Street Station and its associated tunnel works would be completed by the NTA/TII once ready to do so and subject to the required consents being in place. It is envisaged that the MEW works would be completed in advance of the NTA/TII tunnel boring machines reaching the area.

Figure 2 – Location of O'Connell Street Station & Tunnel Route

In addition, the Applicant's proposals for development on Dublin Central Site 2AB and Site 2C have made allowance for future integration with the TII MetroLink project. For example, there are two entrances to the MetroLink Station envisaged at Site 2C: one from O'Connell Street, one from Moore Lane. Allowances have been made for fire escapes, air intake and air extract flues and other ancillary operational requirements of a MetroLink Station, within the design of 'the Masterplan' buildings. For clarity however, TII will make an application for the use of these areas as part of the MetroLink project, in

due course. The planning drawings being submitted by 'the Applicant' (i.e., DCGP Ltd), both currently as part of 'the Masterplan' and in due course as part of planning applications for Dublin Central Site 2AB and Site 2C, will clearly highlight this point.

The current NTA/TII proposals for the future MetroLink subterranean station at O'Connell Street Upper is located under Site 2AB and Site 2C of the Dublin Central Masterplan (Figure 3). Both planning applications for these developments will include the MEW.

The developments proposed at Sites 3, 4 and 5 are not affected by the emerging TII proposals for MetroLink.

For avoidance of doubt however, any references to 'MEW' in the plans and particulars that form part of the Site 3, Site 4, or Site 5 planning applications, will be understood to refer to the future Metro Enabling Works envisaged or planned at Site 2AB and Site 2C as part of the Dublin Central Masterplan.

Figure 3 – The 'Masterplan' Area (March 2020)

2.3 Development Phasing Strategy

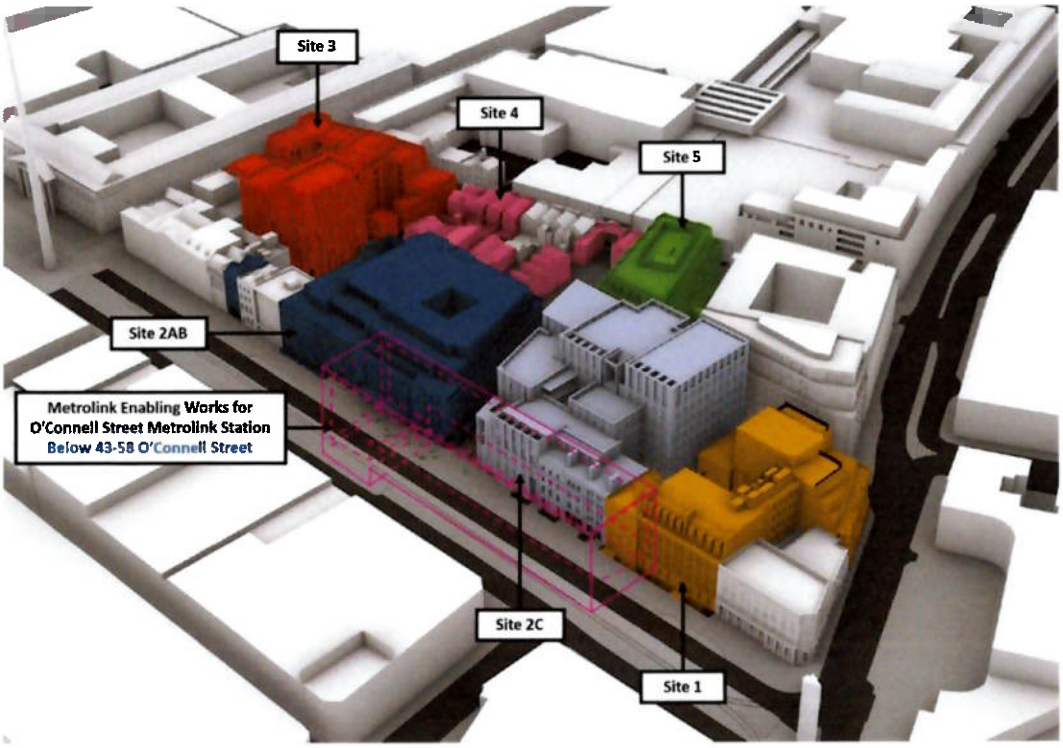


Figure 4 – Phasing Strategy

The development is split over five separate Sites, broadly outlined as follows:

Site 1 – Located in the north east of 'the Masterplan' area. Site 1 is bounded generally by O'Connell Street Upper to the east, Parnell Street to the north, Moore Lane to the west and 'Site 2' to the south. It includes Nos. 40 – 42 O'Connell Street Upper (including O'Connell Hall) and No. 70 – 71 Parnell Street (including Conway's pub).

No. 42 O'Connell Street, O'Connell Hall and No. 70 Parnell Street are protected structures, and Site 1 lies within the O'Connell Street ACA. 'The Masterplan' (March 2020) envisages a mixed-use scheme accommodating a hotel, office, cultural, retail and café / restaurant uses ranging in height from 4 – 8 storeys over new single storey basement.

Site 2 – Located in the east of 'the Masterplan' area. Site 2 is bounded generally by O'Connell Street Upper to the east, the front portion of No. 59 & 60 O'Connell Street, No. 61 O'Connell Street and Henry Place to the south, Moore Lane to the west and Site 1 to the north. It includes Nos. 43 – 59 O'Connell Street Upper (including the Carlton Cinema site), the rear of No. 59 & 60 O'Connell Street and No. 61 O'Connell Street. The planned MetroLink, to be delivered independently by Transport Infrastructure Ireland (TII), will have a future station under Site 2.

Site 2 contains the following protected structures (only upper facades protected): Nos. 43-44, 52-54, 57 58, the rear of 59-60 and 61 O'Connell Street Upper, and lies within the O'Connell Street ACA. 'The Masterplan' (March 2021) envisages the follow development for this area:

Site 2AB – Mixed-use scheme accommodating office, retail and café / restaurant uses in 1no. block ranging in height from 2 to 7 storeys over new single storey combined basement with Phase 2C. Provision of new street connecting O'Connell Street and Moore Lane, an arcade at ground floor under No. 61 O'Connell Street and a new pocket square. The entire basement under 2AB and 2C and associated site development works will also be provided to enable delivery of the Metro Enabling Works (MEW).

Site 2C – Mixed-use scheme accommodating office, retail and café / restaurant uses in a single block ranging in height from 5 to 8 storeys over new single storey combined basement with Phase 2AB. Provision of new street connecting O'Connell Street and Moore Lane. The entire basement under 2C and 2AB and associated site development works will also be provided to enable delivery of the Metro Enabling Works (MEW).

Site 3 – Located in the south west corner of 'the Masterplan' area, Site 3 is bounded by Henry Street to the south, Moore Street to the west and Henry Place to the north and east. Site 3 includes Nos. 36 – 41 Henry Street, Nos. 1 – 9 Moore Street and Nos. 3 – 13 Henry Place. Site 3 lies within the O'Connell Street ACA. The proposed development generally comprises a mixed-use scheme accommodating a hotel, residential units and associated amenities, cultural, retail and café / restaurant uses in 2no. blocks ranging in height from 1 – 9 storeys over existing and new single storey basements. Provision of a new street/laneway linking Henry Street with Henry Place/Moore Lane.

See planning notice for broader summary description of development.

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.

See planning notice for broader summary description of development.

Site 5 – Located in the west of 'the Masterplan' area, Site 5 is bounded by Moore Street to the west, Moore Lane to the east, O'Rahilly Parade to the north and Site 4 to the south. Site 5 includes Nos. 22 – 25 Moore Street, Nos. 1 – 8 O'Rahilly Parade and Nos. 13 – 15 Moore Lane. The proposed development generally comprises a mixed-use scheme accommodating office and café / restaurant uses in a single building ranging in height from 2 – 6 storeys (top floor set back) over new single storey localised basement. Provision of a part of the new public plaza.

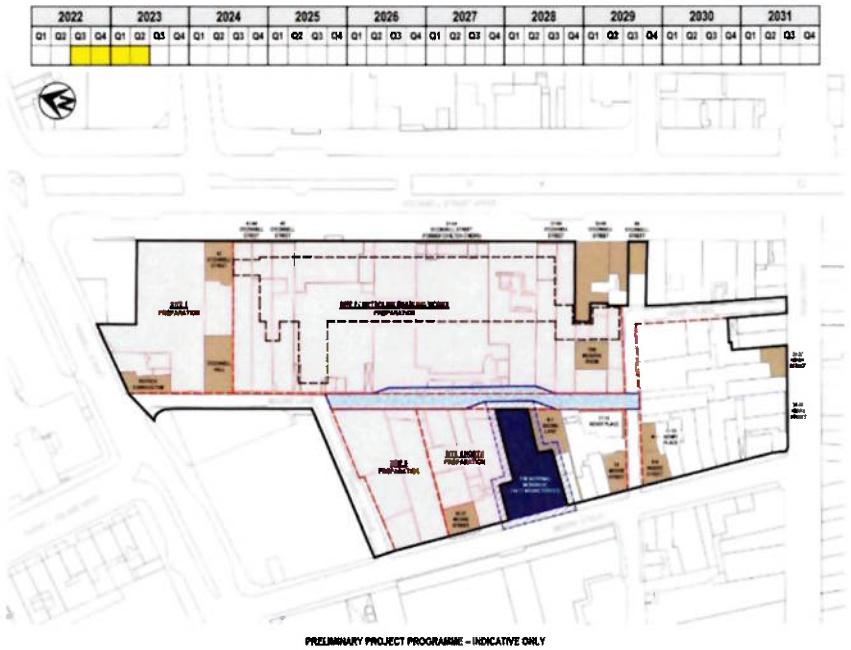
See planning notice for broader summary description of development.

2.4 Construction Stage Sequencing

The following preliminary construction sequencing for each of the sites will be developed by the Main Contractor/Contractors and will be subject to Planning Conditions. The Masterplan Programme and Phasing Strategy with key milestone dates, is shown in Appendix A. The Masterplan Programme broadly follows the following phasing strategy:

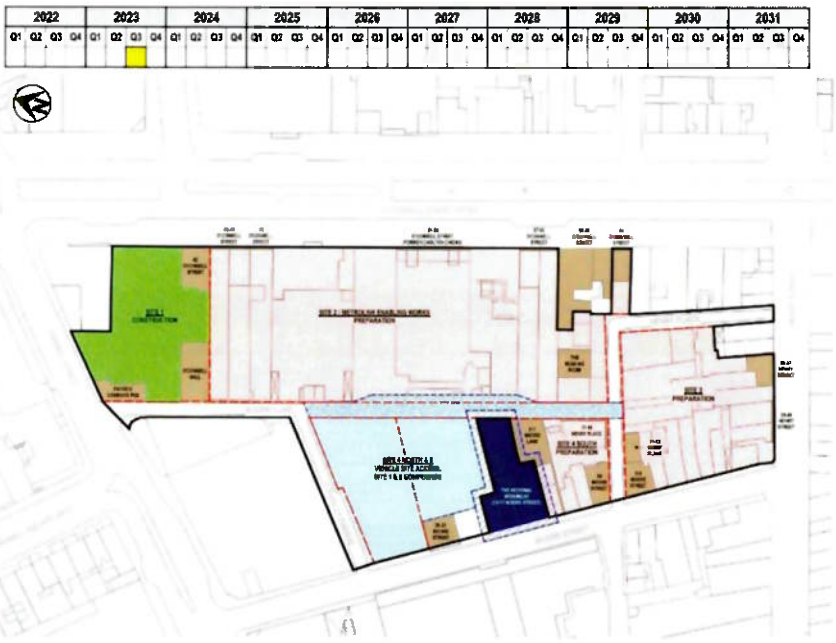
Stage 1 – Site Preparation

- Stage 1 will comprise the site preparation of Site 1, Site 2AB, Site 2C, Site 4 (North) and Site 5.
- A temporary exclusion zone will be implemented around No.14-17 Moore Street (National Monument).



Stage 2 – Site 1 Construction Commences

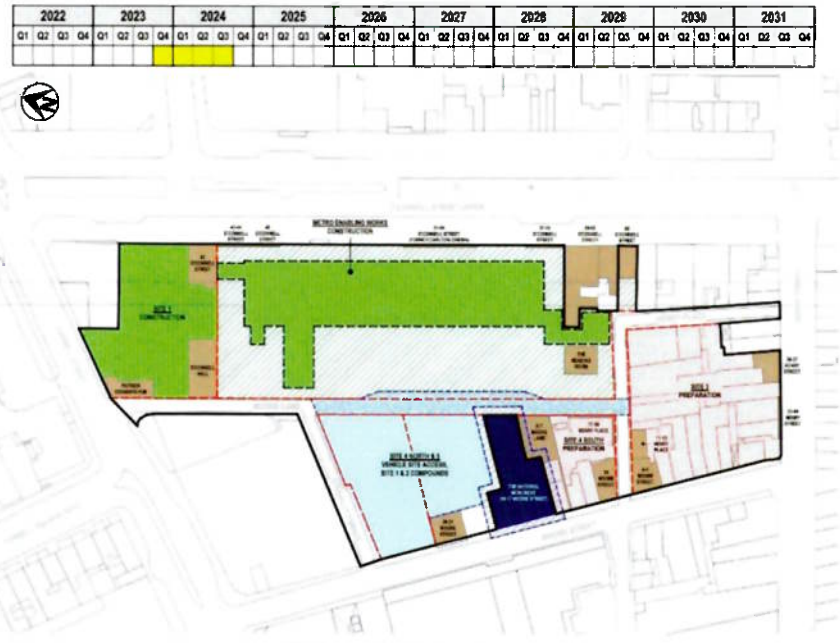
- Stage 2 will comprise the preparation of Site 2AB, Site 2C, Site 3 and Site 4 (South).
- Site 5 and Site 4 (North) will be used temporarily for vehicle access and compounds.



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Stage 3 – Construction of MEW

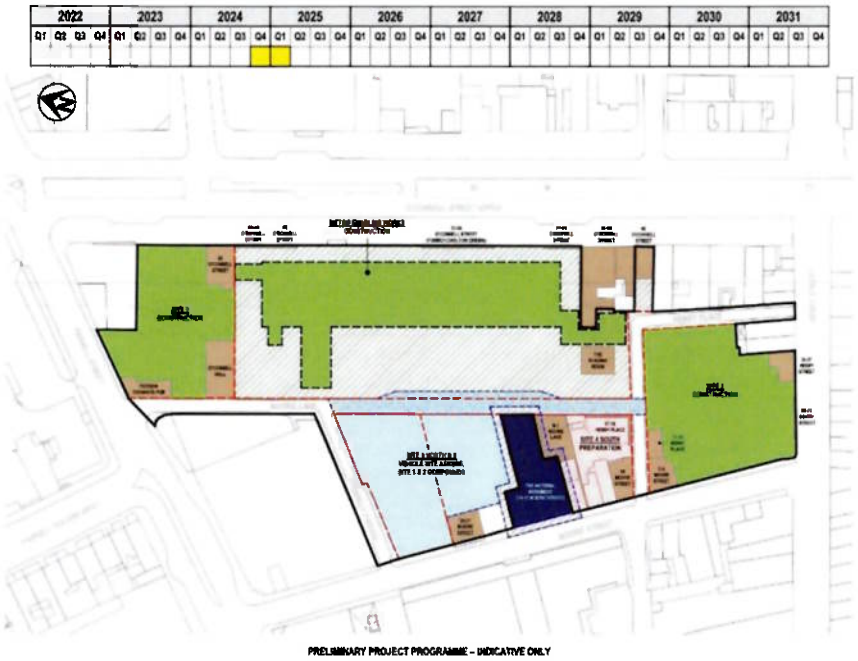
- Construction of MEW commences with the continued construction of Site 1.
- Continued site preparation of Site 3 and Site 4 (South)



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

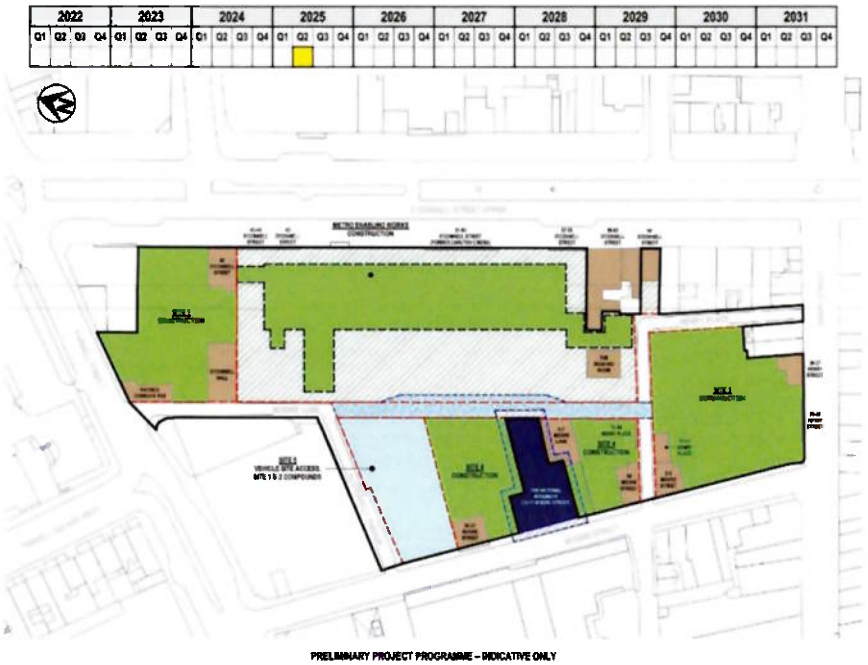
Stage 4 – Construction of Site 3

- Construction of the Site 3 commences with the continued construction of Site 1 and the MEW.
- Site preparation of Site 4 (South) continues.



Stage 5 – Construction of Site 4 Commences

- Construction of Site 4 commences with the continued construction of Site 1, the MEW and Site 3.

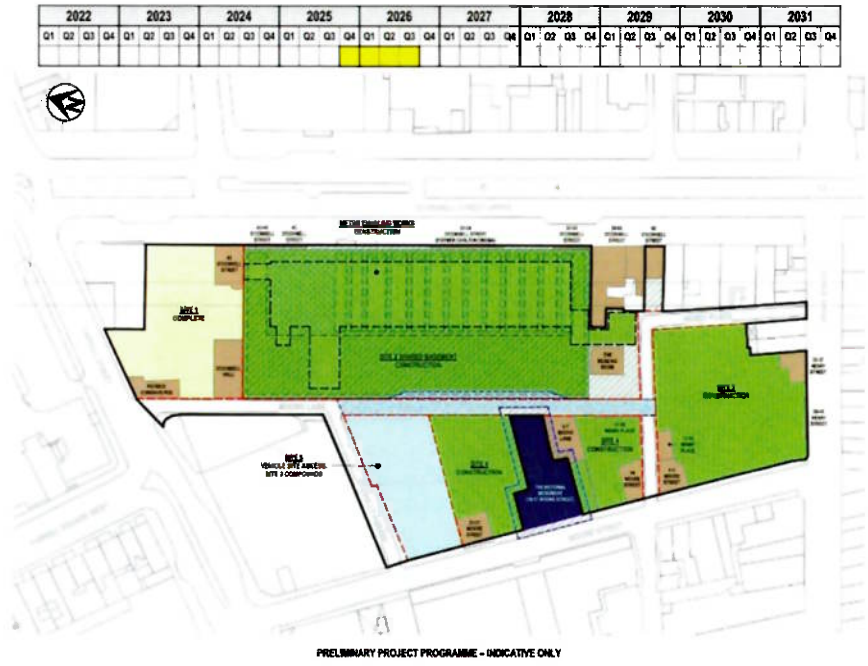


Stage 6 – Fit-Out of Site 1

- Fit-out of Site 1 commences with the continued construction of the MEW, Site 3 and Site 4.

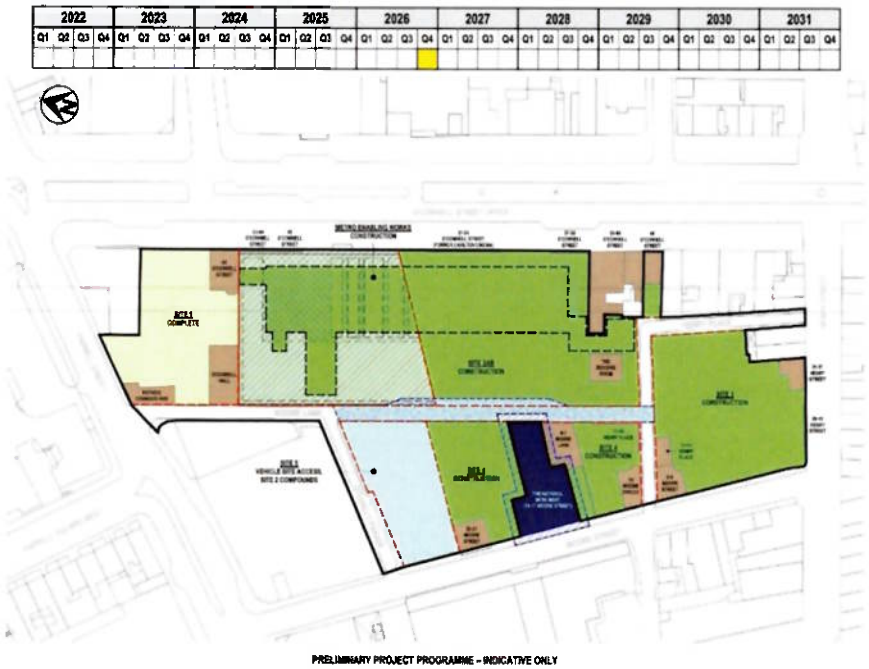
Stage 7 – Site 1 Complete

- Site 1 complete with the continued construction of the MEW, Site 3 and Site 4.



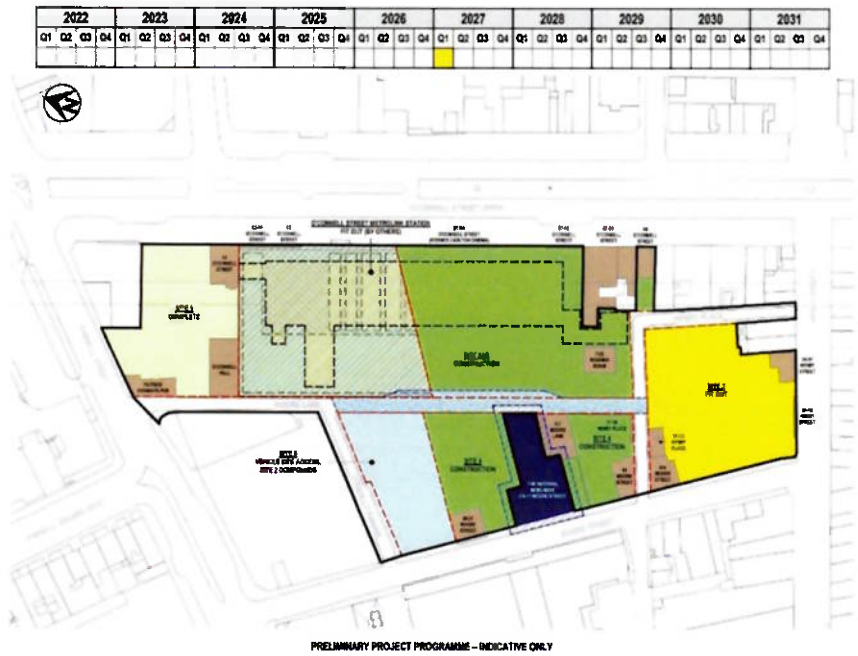
Stage 8 – Site 2AB Commences

- Site 2AB commences with the continued construction of the MEW, Site 3 and Site 4.



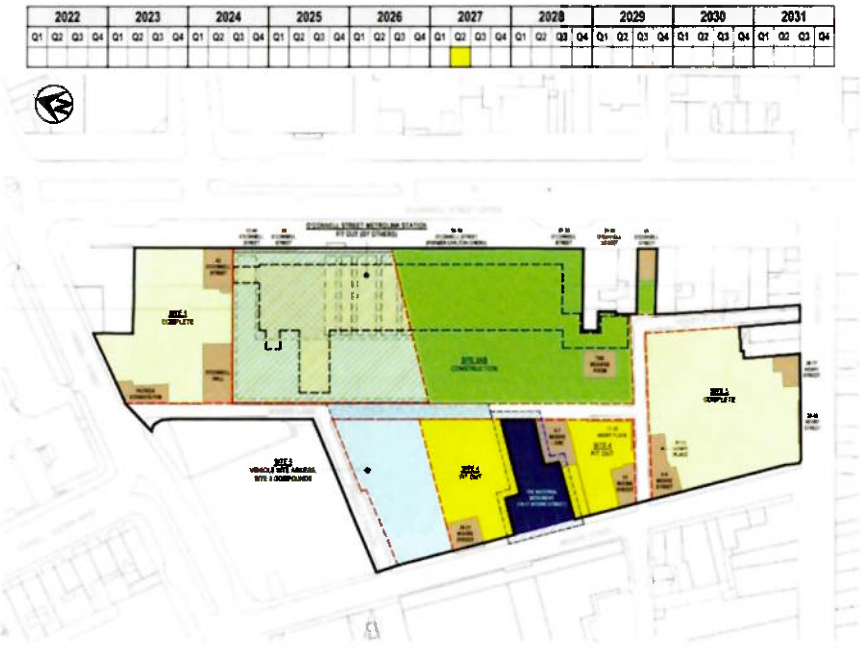
Stage 9 – Site 3 Fit-Out

- Fit-out works commence on Site 3 with the continued construction of the MEW, Site 2AB and Site 4.
- Fit-out of the O'Connell Street Station commences (by others).



Stage 10 – Site 3 Complete

- Site 3 is completed with the continued construction of Site 2AB and the commencement of fit-out works to Site 4.

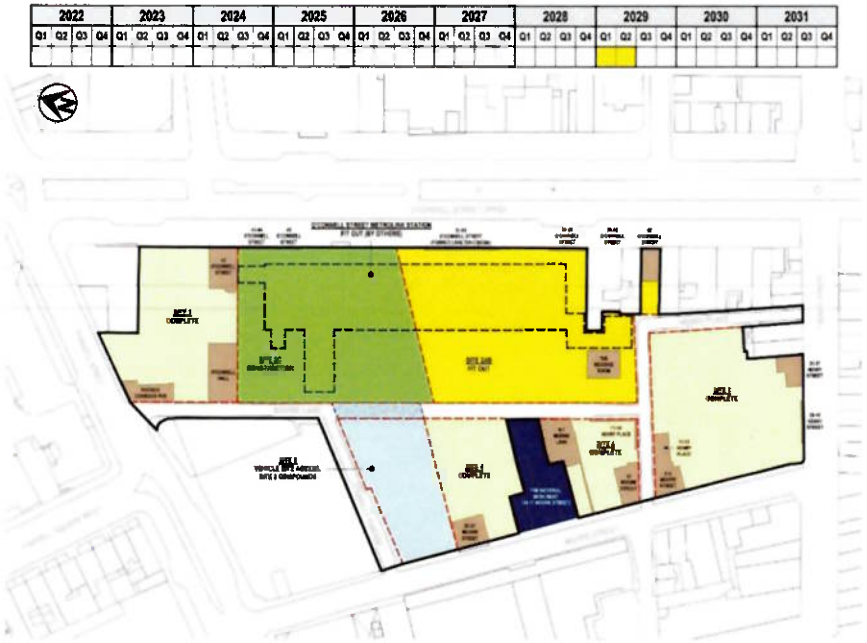


Stage 11 – Site 2C Commences

- Construction of Site 2C commences with the continued construction of Site 2AB and the delivery of fit-out to Site 4.

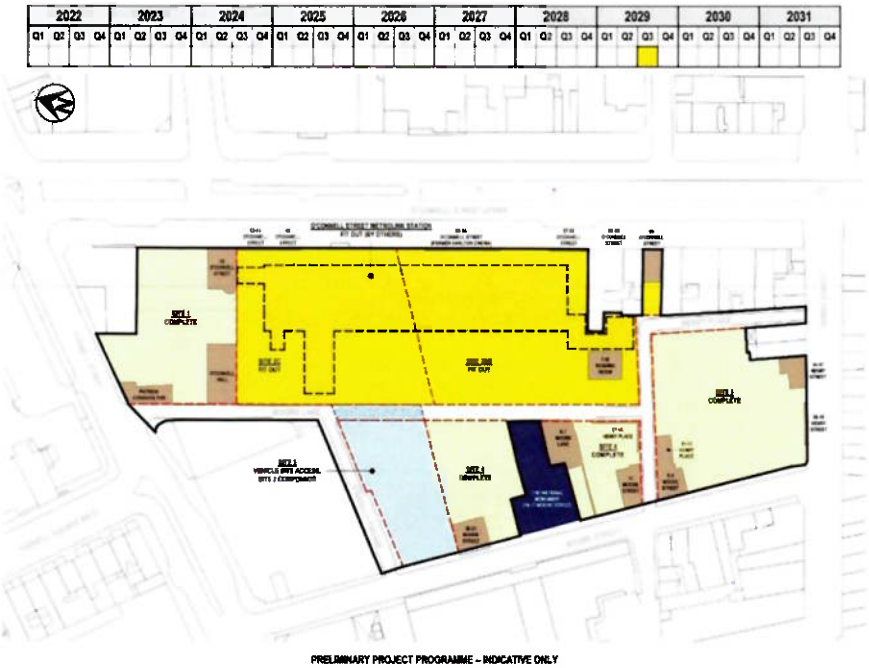
Stage 12 – Site 4 Complete

- Completion of Site 4 with the commencement of fit-out works to Site 2AB.



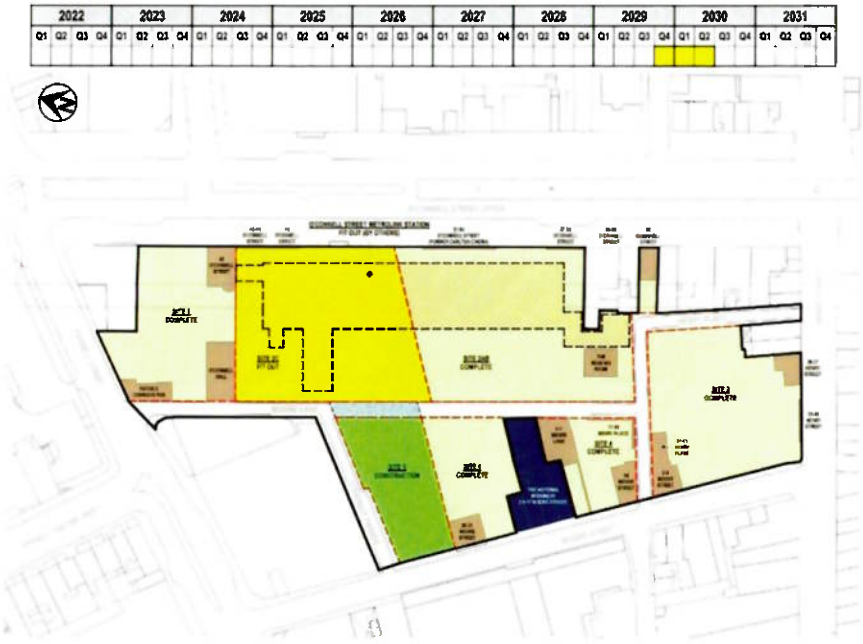
Stage 13 – Fit-out Works to Site 2C

- Fit-out works to Site 2C commences.



Stage 14 – Completion of Site 2AB

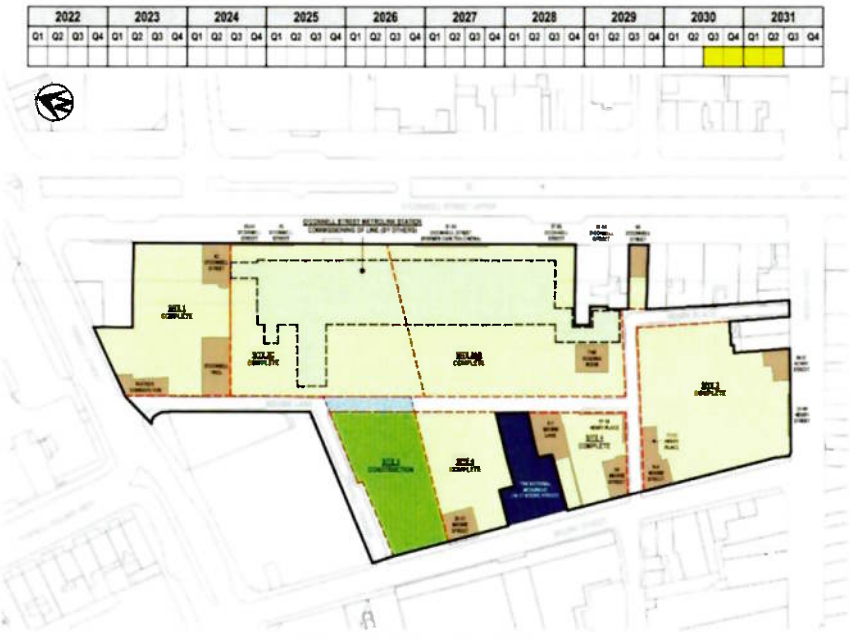
- Completion of Site 2AB and commencement of construction to Site 5 with the continued delivery of fit-out works to Site 2C.



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Stage 15 – Completion of Site 2C

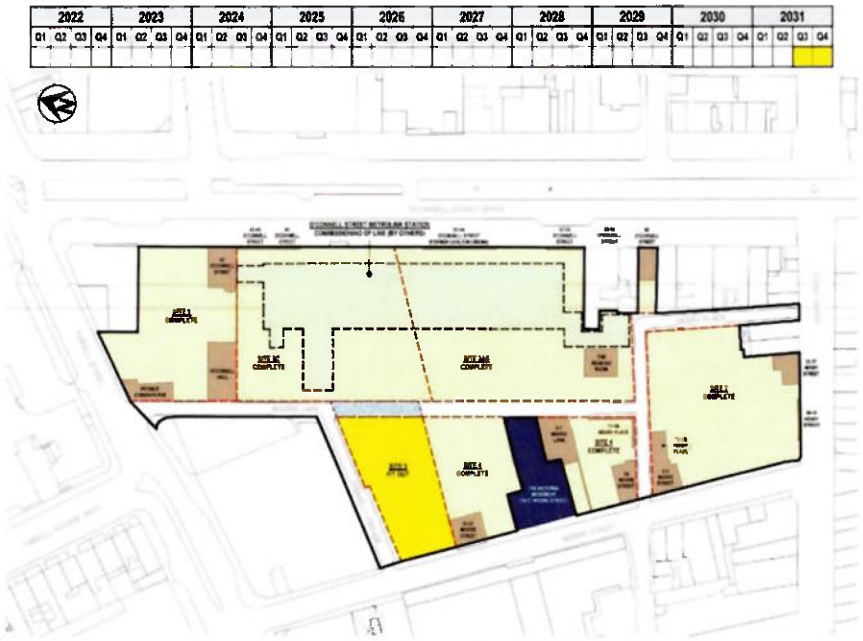
- Site 2C completed with continued construction of Site 5.



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

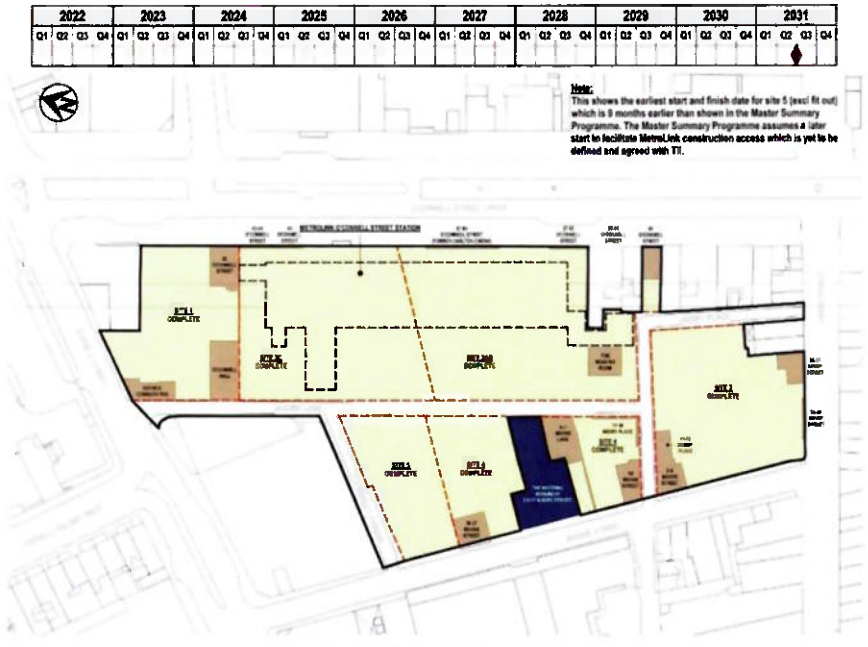
Stage 16 – Fit-out Site 5

- Commencement of fit-out works to Site 5.



Stage 17 – Completion of Site 5

- Completion of works on Site 5



2.5 Key Milestones

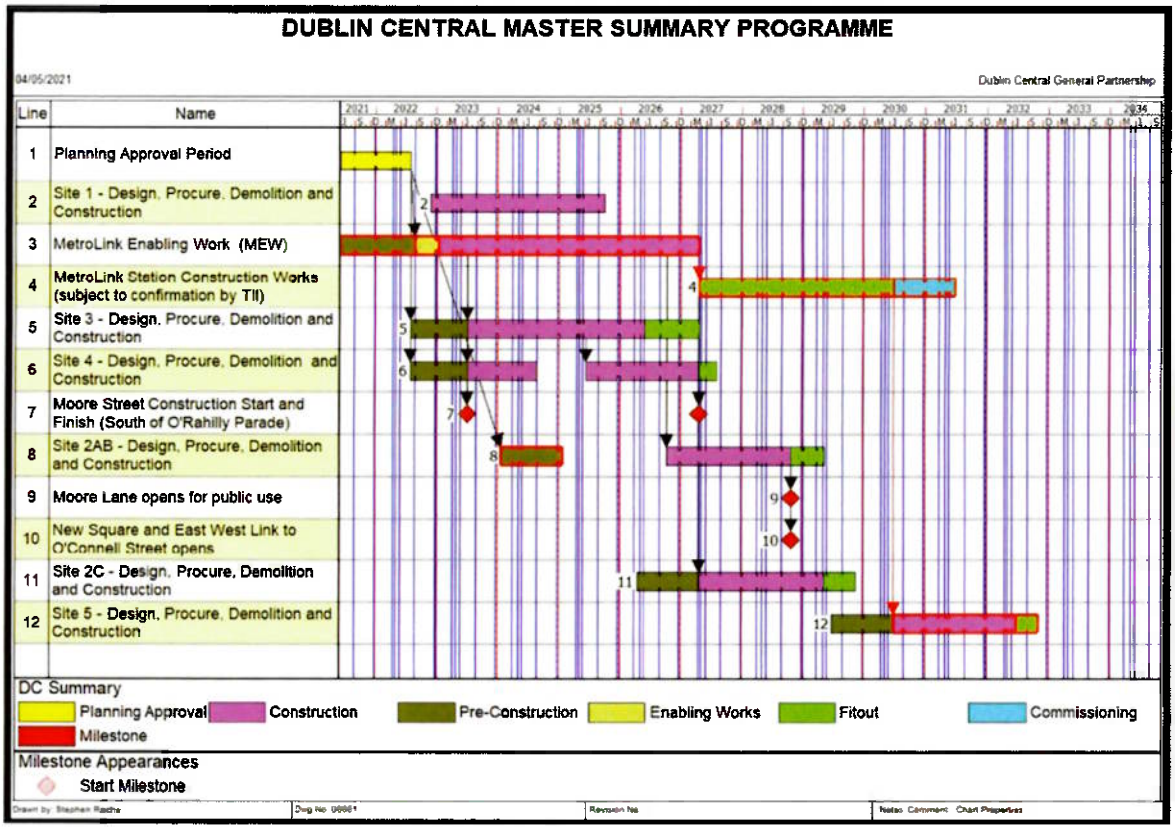


Table 1 – Masterplan Programme

3. Pre-Commencement Measures

The Main Contractor/Contractors will undertake a schedule of pre-commencement measure ahead of the works commencing on site or development phase, these include but are not limited to:

- Submission of all relevant Dublin City Council and Health and Safety Authority pre-commencement notices (including the AF1 and AF2 forms)
- Submission of all relevant agreements, approvals and all pre-commencement requirements outlined in the planning conditions or Third-Parties relevant to the Main Contractor/Contractors (including Hording Licenses, detailed Traffic Management Plans, Irish Water temporary connections, ESB connection agreements, etc).
- Dilapidation surveys to the neighbouring and adjoining properties within the area of the site.
- Condition surveys of the roads and infrastructure adjacent to the development.
- Liaise with adjoining property and business owners regarding the works
- Condition and locations surveys of all existing services within and adjacent to the site including pavements.
- Installation of monitoring regimes to all protected and/or retained structures within the site and adjoining buildings of historical importance. This will include the establishment of base-line readings.

4. General Site Setup

Detailed site setup, logistic, site compound arrangement and hoarding plans are shown in the Outline Construction and Demolition Management Plan relevant to each Site and submitted as separate documents as part of this planning application.

4.1 Site Boundary

Hoarding will be required to each of the Sites and will broadly follow the following parameters.

4.1.1 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 Henry Street, Moore Street, Moore Lane, O'Rahilly Parade and O'Connell Street Upper. 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 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.

4.1.2 Site Compounds

The site compounds 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.

4.1.3 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.

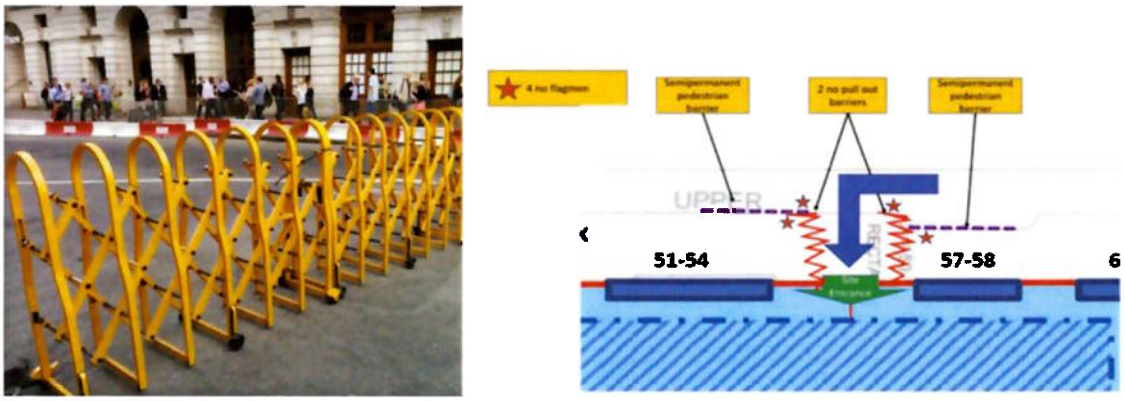


Figure 6 – Typical Pavement Crossover System

4.1.4 Site Logistics

Each development Site 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.

4.1.5 Proposed Craneage Strategy

Tower cranes will be required during each of the construction phase of the development. The Main Contractor/Contractors will nominate the location(s) of these once appointed. Mobile cranes may also be utilised on a short-term basis throughout the construction period.

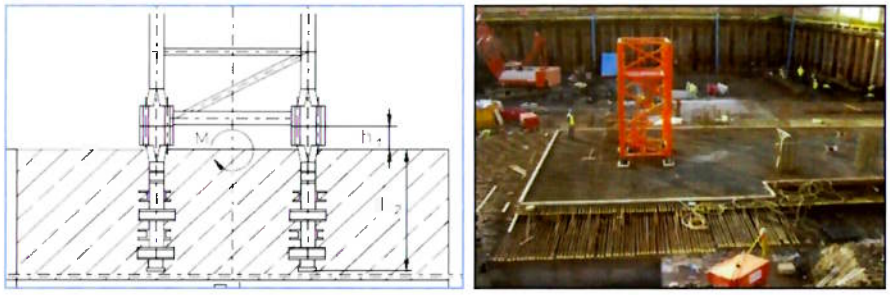


Figure 7 – Typical Tower Crane Anchors

The tower crane bases can be erected on foundation anchors and may be formed as part of the new building foundations.

4.1.6 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.

4.1.7 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.

4.1.8 Security

In additional 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 Siochana 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.

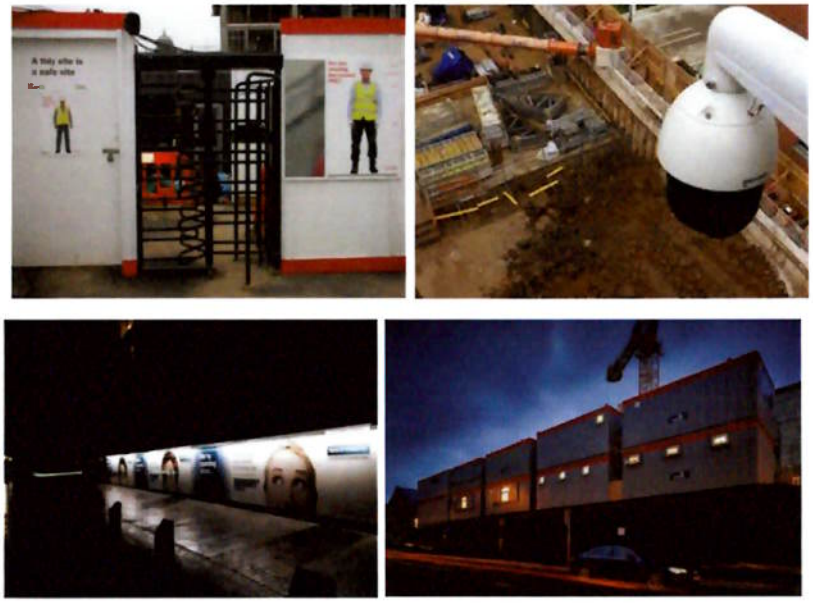


Figure 8 – Typical Site Security Measures

5. Construction Traffic Management Plan

A detailed site specific Preliminary Construction Traffic Management Plan has been prepared and submitted as a separate document for planning.

During the construction period, there will be a number of high activity phases where construction related traffic will be significant.

The most intensive of these phases are likely to be:

1. Demolition of existing buildings and removal of demolition waste off site.
2. Excavation of Metro box and disposal of the excavated spoil.
3. Pouring of the concrete box and frame for the station.

The nature of the construction process is such that the traffic generated will comprise short periods of intense activity interspersed with longer periods with relatively low level of truck movements into and out of the site. In addition, the various activities will occur at multiple locations around the site giving rise to a need for access for construction traffic from the street.

5.1 Site Measures to Minimise Impact from Construction Traffic

The measures, which are proposed to be operational at this site will include:

- Use of properly designed access and egress points to minimise impact on both external traffic and local amenity.
- Check on each arriving and departing vehicle at the site entrance from the public street.
- Use of banksman and/or traffic lights to control exit of construction vehicles onto public road.
- Controlled off-site HGV holding area where deliveries are called up as required. No HGV's waiting outside site.
- Issue of instructions and maps on getting to site to each sub-contractor to avoid 'lost' HGV's disrupting traffic.
- Establishment and maintenance of HGV holding areas within the site.
- Ongoing assessment of the most appropriate routes for construction traffic to and from the site.
- Interface with operation of HGV traffic from port terminals and suppliers.
- Restriction of work hours to industry standard working hours.

5.2 Site Control Measures

The designated and operational on-site control measures, which will be established and maintained at this site, will include:

- Designated hard routes through site.
- Each departing vehicle to be checked by banksman.
- Wheel wash facility at egress point.
- Provision and facilities to cover lorry contents, as necessary.
- Controlled loading of excavated material to minimise risk of spillage of contents.
- Spraying/damping down of excavated material on site by dedicated crews.
- Use of known routes for lorries to monitor impact on local area.
- Facility to clean local roads if mud or spillage occurs.

5.3 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.

5.4 Wheel Washing Facility Requirement

The Main Contractor/Contractors will ensure that the enabling works packages 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 9 – Typical Wheel Washing Facility

6. 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.

6.1 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 163,490m^3 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.

6.2 Potential Hazardous Wastes Arising

6.2.1 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.

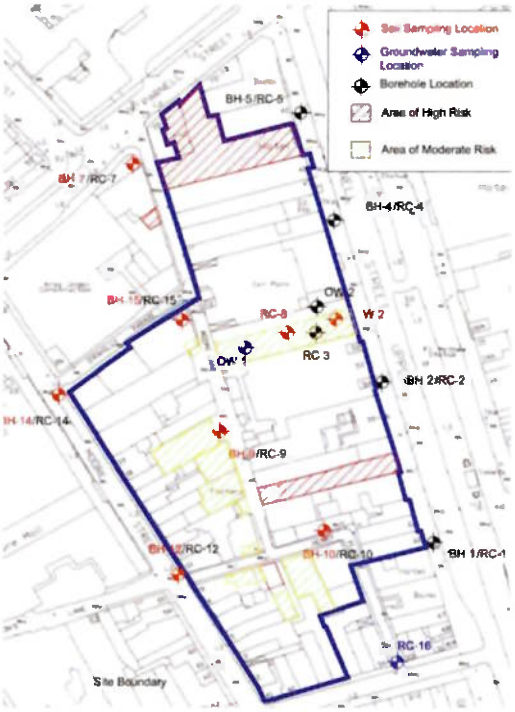


Figure 10 – Areas of Potential Contaminated Material

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).

6.2.2 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.

6.2.3 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.

6.2.4 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.

6.2.5 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.

6.3 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 2. Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

6.4 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 3 and 4.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	2027.9	0	0.0	85	1723.7	15	304.2
Concrete, Bricks, Tiles, Ceramics	11491.4	30	3447.4	65	7469.4	5	574.6
Plasterboard	901.3	30	270.4	60	540.8	10	90.1
Asphalts	225.3	0	0.0	25	56.3	75	169.0
Metals	3379.8	5	169.0	80	2703.9	15	507.0
Slate	1802.6	0	0.0	85	1532.2	15	270.4
Timber	2703.9	10	270.4	60	1622.3	30	811.2
Asbestos	7.0	0	0.0	0	0.0	100	7.0
Total	**22539.2**		**4157.2**		**15648.6**		**2733.4**

Table 3. Estimated off-site reuse, recycle and disposal rates for demolition waste from the Masterplan [extract AWN document ref. CB/20/11784WMR01]

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1631.9	10	163.2	80	1305.5	10	163.2
Timber	1384.6	40	553.9	55	761.5	5	69.2
Plasterboard	494.5	30	148.4	60	296.7	10	49.5
Metals	395.6	5	19.8	90	356.0	5	19.8
Concrete	296.7	30	89.0	65	192.9	5	14.8
Other	741.8	20	148.4	60	445.1	20	148.4
Total	**4945.1**		**1122.5**		**3357.7**		**464.8**

Table 4. Estimated off-site reuse, recycle and disposal rates for construction waste from the Masterplan [extract AWN document ref. CB/20/11784WMR01]

6.5 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.

6.6 C&D Record Keeping

It is the duty of the Main Contractor/Contractor's C&D Waste Manager to ensure that necessary licenses have been obtained as needed. Each consignment of C&D waste taken from the site will be subject to documentation which will conform with the table below along with Transportation Dockets to ensure full traceability of the material to its final destination.

7. Protection of Buildings during Construction

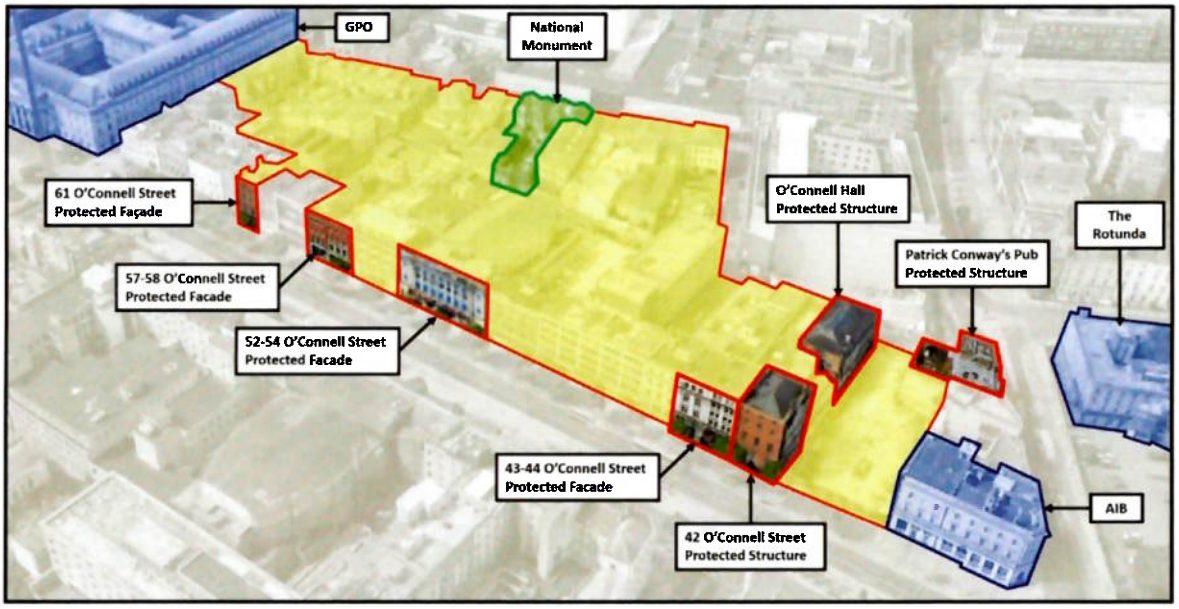


Figure 11 – Protected Heritage Assets within/adjacent to Dublin Central

Of particular importance to the development are the historical assets and protected structures both within and adjoining the overall site development, this includes the National Monument that adjoins Site 4 of the development.

Protected buildings within the site include:

- 42 O'Connell Street Upper & O'Connell Hall
- 70 Parnell Street / Conway's Pub

Protected facades (above ground only) within the site include:

- 43-44 O'Connell Street Upper
- 52-54 O'Connell Street Upper (former Carlton Cinema)
- 57-58 O'Connell Street Upper
- 61 O'Connell Street Upper

Other retained buildings of historical importance (in-part/whole) currently proposed within the site development include:

- 5 Henry Place (façade)
- 11-13 Henry Place
- 39-40 Henry Street (façade)
- 36-37 Henry Street
- 8-9 Moore Street
- 10 Moore Street
- 12-13 Moore Street (party wall only)
- 20-21 Moore Street
- 4-5 Moore Lane (to be rebuilt)
- 6-7 Moore Lane
- 10 Moore Lane
- 20-21 Moore Street
- 'The Reading Room' No.59-60 O'Connell Street Upper

7.1 Basement Impact Assessment

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

The Ground Movement Analysis considered each stage of the development including demolition, piling, bulk excavation and construction of the each phase of the development and relevant to each Site. Predicted ground movements resulting from the works have been analysed and are included as part of the Basement impact Assessment.

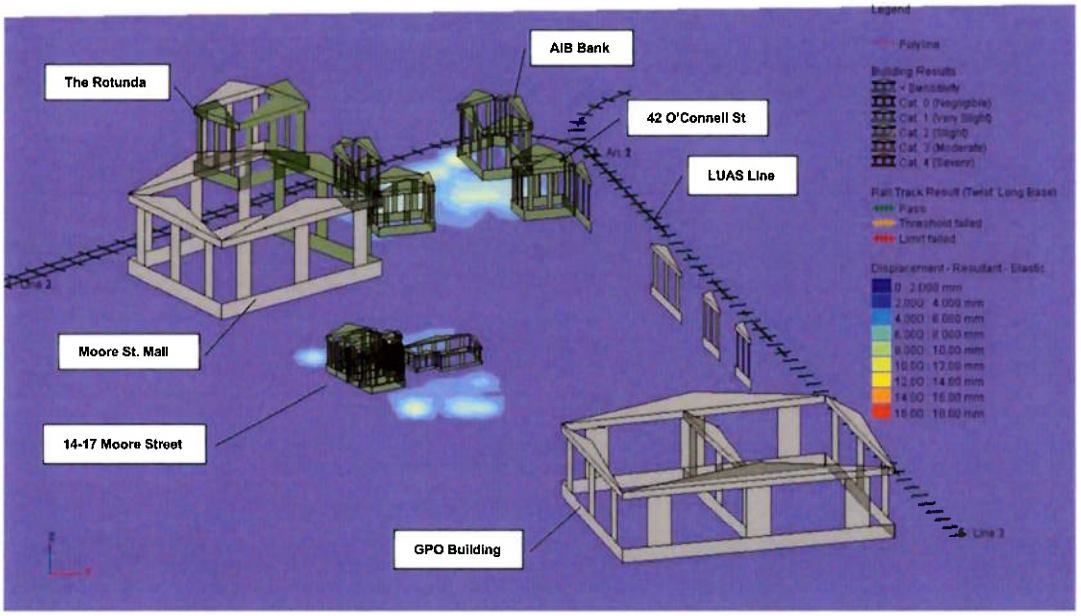


Figure 12 – Extract from BIA: Predicted Ground Movement to Protected Structures (PDisp Model)

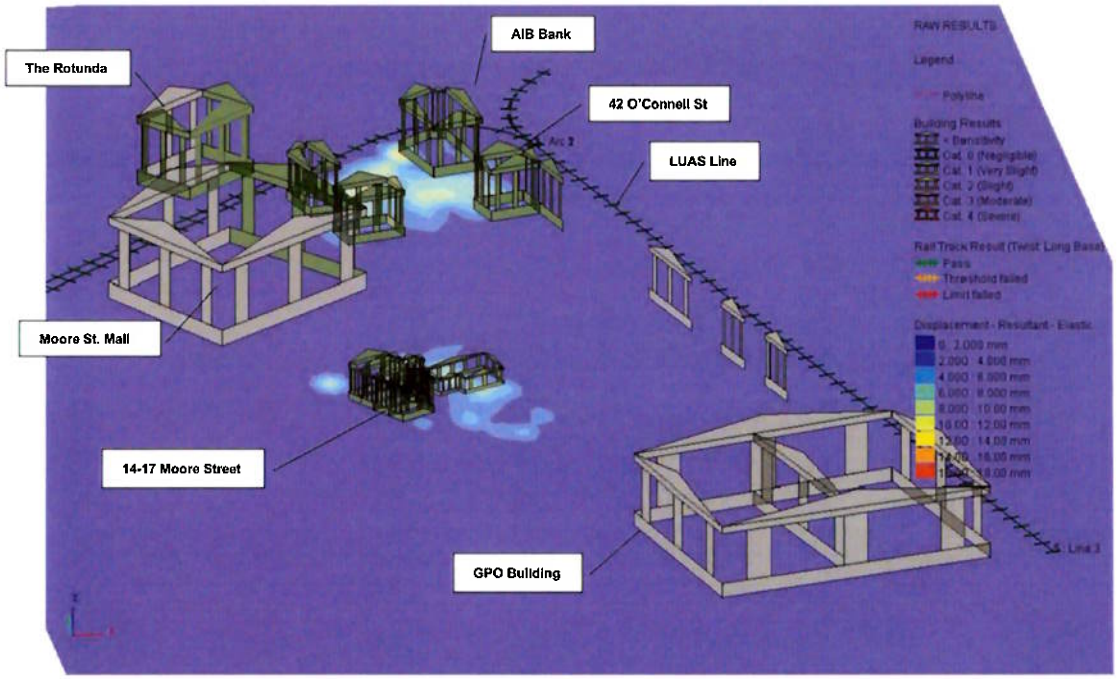


Figure 13 – Predicted Ground Movement to Protected Structures (XDisp Model)

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 heritage buildings and protected facades 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 façade is shown in Basement Impact Assessment included as part of planning.

According to the Subterranean Construction Method Statement [report STR15283-PR-0010-MS] 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.

The predicted movement results for the Luas light rail tracks do not show any onerous conditions for the assets and the calculated movements are below the limits proposed by the Code of engineering practice for works on, near or adjacent to the Luas light rail system. Therefore, the proposed works of Dublin Central development do not highlight any concerns to the day-to-day operations.

7.2 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 the Office of Public Works (OPW).

The predicted ground movement in relation to 14-17 Moore Street, the National Monument, shows that it is within the acceptable limits and does not exceed Category 1 damage. Similarly, the predicted ground movements to 42 O'Connell Street, O'Connell Hall and 70 Parnell Street (Conway's Pub) are within the acceptable limits and do not exceed Category 1 damage.

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.

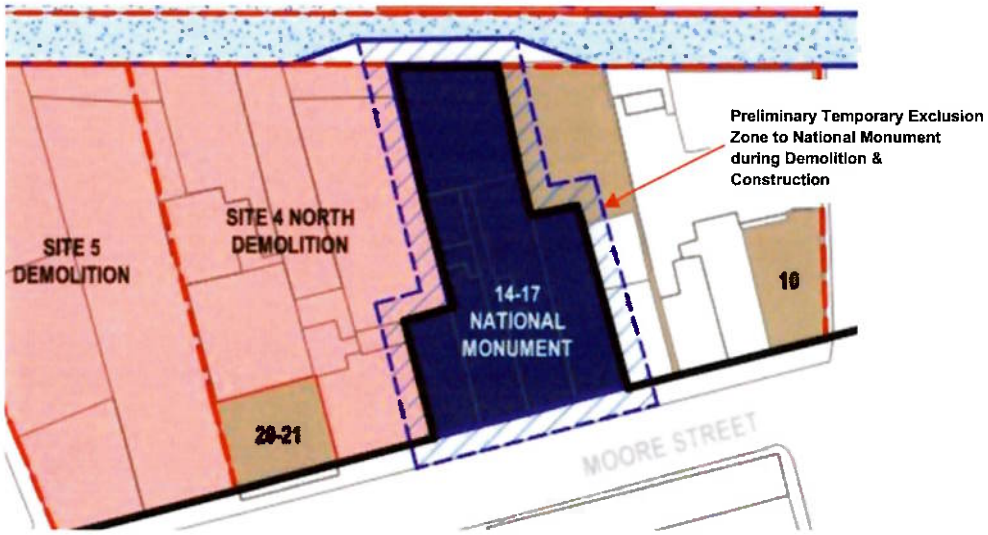


Figure 14 – Temporary Exclusion Zones to Protected Structures

7.3 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.

Outline preliminary temporary works arrangements are specific to each Site and reference should be made to the Outline Construction and Demolition Management Plan specific to each Site – submitted as part of this planning application.

7.4 Movement Monitoring of Retained and Existing Structures

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.

Details of the proposed monitoring regime are specific to each Site and reference should be made to the Outline Construction and Demolition Management Plan specific to each Site – and submitted as part of this planning application.

8. Control and Monitoring of Noise, Vibration and Dust on site

8.1 Condition Surveys

It will be necessary to carry out a detailed condition survey of all adjoining lands and properties prior to any works commencing on site, with particular attention paid to the protected structures noted previously in this report. In addition, baseline movement monitoring will be carried out in line with best practice.

8.2 Noise Monitoring

The contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives by means of risk assessment and mitigation / precautionary measures and equipment, all in full compliance with the current Health and Safety legislation.

Noise on site shall comply with Safety, Health and Welfare at work (construction) Regulations 2006 to 2013, Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for full and partial demolition, BS 5228:2009+A1:2014 Parts 1 & 2 - Code of Practice for noise and vibration control on construction and open sites (hereafter referred to as BS 5228), Environmental Protection Agency Act 1992 Sections 106-108, including all Local Authority specific requirements for this specific site.

A survey of baseline noise and vibration will be undertaken to gain an understanding of the typical range of the existing conditions in the surrounding area. Methods of minimising construction noise and vibration will be implemented where possible. The Main Contractor is to implement these recommendations and utilise the most efficient construction methods to reduce the impact on the neighbouring environment.

The nature of construction activities means that a certain level of noise is inevitable, but the appointed Main Contractor must endeavour to minimise this as far as practically possible and reduce the effect and any nuisance to the surrounding environment and neighbours.

Work methods are to be reviewed to ensure minimal noise and vibration are created; methods should include:

- Each item of plant used on site complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/ [S.I. No. 632 of 2001].
- All plant and equipment liable to create noise whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors and neighbouring occupied buildings.
- The use of barriers and hoarding to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective shall not be operated until repaired.
- Fixed items of construction plant shall be electrically powered in preference to diesel or petrol driven. The Main Contractor shall ensure that vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers.

- Machines in intermittent use shall be shut down or throttled down to a minimum during periods between works. Static noise emitting equipment operating continuously will be housed within suitable acoustic enclosures, where appropriate.
- Tower cranes will be utilized instead of crawler cranes as these are electrically powered and quieter in operation.
- Noise suppression hammers and shields will be used on rock breaking equipment.
- Working hours will be confined to those stipulated in the grant of planning permission.
- Noise emitting processes such as concrete breaking can be suspended during sensitive hours, to be agreed in consultation with DCC and neighbours.
- Alternative work practices will be investigated where the noise emitted is reduced (for example prefabricating building components off site).
- Site deliveries will be confined to working hours and allocated offloading location will be utilized for all deliveries.
- The Site Manager will also continually review and monitor the noise / dust / vibration levels / risk throughout the duration of the project and if necessary, adjust / add to the control measures to be employed to reduce nuisance.

8.2.1 Measures to Mitigate Noise

Of particular consideration is the noise from construction activities adjacent to the public footpaths and commercial areas (Moore Street, Henry Street and O'Connell Street Upper). Noise mitigation measure will be proposed by the Contractor and may include:

1. The installation of a solid timber hoarding to provide noise insulation.
2. A high-level acoustic wrap applied to the scaffolding to provide some degree of noise barrier.
3. Particularly noisy works can have an acoustic noise control barrier put around them when the works are being carried out.
4. When jack hammers are used a "no racket" jacket will be applied which reduced the noise by up to 10db when 50ft away.

Figure 15 – Typical Noise Mitigation Measures

8.3 Vibration

During the course of the work proposed ground borne vibrations from the proposed works could give rise to adverse effects to the Heritage Structures / Protected Structures / National Monument and these control measures are to be put in place during the works to ensure protection of the structures and finishes.

Details of the control measures, proposed monitoring regime, limits and mitigation measures are specific to each Site and reference should be made to the Outline Construction and Demolition Management Plan specific to each Site and submitted as part of this planning application.

8.3.1 Vibrations Standards

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). Guidance relevant to acceptable vibration within buildings is contained in the following documents:

• British Standard BS 7385:1993: Evaluation and Measurement of Vibration in Buildings Part 2: Guide to Damage Levels from Ground borne Vibration (hereinafter referred to as BS7385:1993).

• British Standard BS 5228-2 2009+A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration (hereinafter referred to as BS 5228-2 2009+A1:2014)

8.4 Air & Dust Management

A dust management plan will be compiled by the Main Contractor for the development.

The following precautions to minimise nuisance to the public and neighbouring occupiers caused by dust and dirt will be carried out by the contractor.

- Vehicle and wheel washing facilities shall be provided at site exit where practicable. If necessary, vehicles are to be washed down before exiting the site.
- Netting is to be provided to enclose scaffolding to mitigate escape of air borne dust from the existing buildings.
- Shroud piling machinery as shown below when operating near to boundaries.
- Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials to be permitted on site.
- Water sprays for dust suppression should be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste should be removed from site as quickly as possible to minimise risk of dust generation and any fine material should be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons should be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.

- Prior to commencement, the Main Contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods should be employed by the Main Contractor.

- The Main Contractor should allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The Main Contractor will be required to appoint a senior member of its site management team to act as the liaison with third parties in respect of complaints regarding dust and or site activities.
- Monitoring of dust deposition should be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Luft limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

Figure 16 – Typical Dust Mitigation Measures

9. Archaeology

Archaeological monitoring will take place where any preparatory ground reduction works are required including site investigation works and opening up works at basement or ground levels. Post-demolition archaeological investigation will be carried out in areas across the site without basements. This is required to establish the nature of below ground structures, foundation remnants and features of archaeological and historical importance and to establish the presence or otherwise of archaeological remains. Further resolution may involve the recording of historic features and full archaeological excavation (i.e., preservation of the archaeology in record form, of all archaeological soils or features encountered). The resolution will occur during this post demolition phase in the area of the find spot in advance of the main construction phase.

10. Ground Water Control

Details of the proposed ground water control are outlined in the Subterranean Construction Method Statement and Basement Impact Assessment and relevant to each Site and submitted as part of this planning application.

11. Building Control Amendment Regulations

11.1 Quality Assurance during Construction and BC(A)R Compliance

The Main Contractor/Contractors will need to demonstrate how they will be providing quality in construction. They shall comply fully with all requirements of the Amended Building Control regulations to the satisfaction of the Ancillary and Assigned certifiers.

The Main Contractor/Contractors will be responsible for the preparation of benchmark samples of each new element of the works to the satisfaction of the Assigned and Ancillary Certifiers under the Building Control regulations (BCAR). Each benchmark sample will be considered a 'hold point' under the Preliminary Inspection Plan (PIP) and will be required to be offered up to the Certifiers involved ahead of the works starting - with a minimum of two days' notice (in writing).

The Main Contractor/Contractors will be required to keep pre- and post-pour check sheets for submission to the assigned and ancillary certifiers where required.

Written acceptance will be required from the Certifiers after inspection of the benchmark samples before the rest of the works proceed.

Where 'specialist' suppliers are noted by the design team to have design responsibility, they will be required to provide Certificates of Design (Sd), Certificates of Inspection (Si) and Certificates of Completion (Sc). Ahead of appointment of the 'specialist' suppliers / designers - evidence of competency and Professional Indemnity insurance cover will be required for the approval of the Contract Administrator and Waterman Moylan.

This is to be confirmed by the Main Contractor/Contractors once appointed and will include a quality check regime.

12. Liaison with Third Parties

It is imperative that the Main Contractor/Contractors engages in discussions with local residents, businesses and the general public well in advance of work commencing on site. Formal communication should be provided to immediate neighbours regarding activities or possible disruptions.

The appointed contractor will be required to adopt the practices covered under the 'Considerate Constructors Scheme' for establishing a good neighbour strategy and maintaining good relationships with neighbouring communities. The ideas described within this scheme will be implemented on site where applicable to minimize negative impact on local community and the environment.

Handling of any complaints must be logged and actioned quickly by the Main Contractor/Contractors.

APPENDIX A

Masterplan Programme

DUBLIN CENTRAL MASTERPLAN

PROGRAMME REPORT

for Dublin Central GP Ltd

25th May 2021

CERTO

Management Services

Contents

Glossary of terms used:

Dublin Central	Name given to a proposed mixed-use development situated upon a 2.2ha site, located in Dublin 1
Overall Site	Comprises Sites 1, 2, 3, 4 & 5 in totality
Individual Sites	Individual components of the Overall Site
Advanced Works	Works that will include asbestos removal, demolition, archaeological investigations to Site 2
Enabling Works for MetroLink (MEW)	The MetroLink 'shell' of approximate dimensions 120m x 26m x 25m (length x width x depth)

1.0 INTRODUCTION

The purpose of this report is to set out the overall programme for the delivery of the inter-related sites (the 'Individual Sites') within the Dublin Central site (the 'Overall Site') and the resultant impact upon the duration required for each planning permission being sought.

The Overall Site (c. 2.2 ha) is located within a constrained, historically sensitive urban context with a variety of important stakeholders. Delivery of the project has necessitated careful planning from the outset, to ensure that it is delivered sensitively but also without undue delay.

The Overall Site 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 Overall Site, as far as its junction with Henry Place.

The project, by its very nature, necessitates a phased delivery strategy to suit the constraints and complexities tied to the Overall Site. A site-by-site phasing strategy has been adopted as the optimal solution in delivering the works, which, in summary leads to the construction of the Individual Sites on a phased basis in a south to north direction.

The Individual Sites that are covered by this development are as indicated in Figure 1 below:

Figure 1: The Dublin Central Masterplan: Individual Sites.

In devising a delivery strategy, five key constraints have been considered[1]:

1. Restricted access arising from the surrounding road network and the narrow existing lanes within the Overall Site.
2. Restricted access arising from two major pedestrianised streets flanking the Overall Site.
3. Protected Structures and non-protected structures proposed to be retained.
4. Neighbours including residents and local businesses.
5. The scale and nature of construction works to be undertaken.

The carefully considered strategy is borne out of these key constraints, resulting in a co-dependent construction approach that provides a realistic, sequential and most importantly, deliverable, scheme.

As this report sets out, the challenge will be to deliver the Dublin Central project and related works as quickly as possible being cognisant of the constraints and risks to programme that may arise. For several of the individual sites, above normal construction programmes necessitate above normal planning permission durations being proposed.

The approval periods that are sought are as follows: [2]

Site 2AB	-	11 years	
Site 2C	-	11 years	
Site 3	-	7 years	These will be constructed in tandem
Site 4	-	7 years	
Site 5	-	15 years	

This report seeks to provide a rationale as to these requested durations, bearing in mind the following:

i) Where one commences a development that has been permitted under Section 34 of the Planning & Development Act 2000, as amended, the requirement is that it is completed within the lifetime of that permission.

ii) Amendments to The Planning & Development Act 2000, while yet to be implemented, restrict the ability to seek an extension of duration of any permission where an EIAR was submitted with the planning application (as is the case with Dublin Central applications).

This report includes the general programme intention for Site 1 for completeness, but as noted elsewhere the date for the application is yet to be determined and hence the detail included within this report for Site 1 is subject to change.

[1] These constraints are discussed further in Section 2.0.

[2] The proposed programme assumes final grant of planning permission by June 2022 for each Site.

2.0 SITE CONSTRAINTS

A range of constraints are present on the Overall Site that have an impact on the proposed programme for the delivery of the Dublin Central development. The previously identified five key constraints are now discussed in more detail below:

1. Restricted access arising from the surrounding road network and the narrow existing lanes within the Overall Site.

The Overall Site is bounded to the east with O'Connell Street, a busy thoroughfare that accommodates the Luas along its central median. The street has a restricted vehicular traffic and servicing regime, relatively high footfall and is a confluence of Luas, Dublin Bus and leisure transportation (open top buses).

Constraints arising from the existing street network effectively dictate that the bulk of construction traffic must access the Overall Site, from Parnell Street, onto Moore Street, east along O'Rahilly Parade before egressing north up Moore Lane. It is preferable to have a counter-clockwise access route as far as Moore Street is concerned as the vehicles used to take muck away will be empty when using Moore Street, hence this will help to minimise dust on Moore Street.

Figures 2 and 3 below show how traffic is proposed to access and egress the Overall Site.

Figure 2 – Proposed site access

Figure 3 – Proposed site egress

The internal laneways within the Overall Site of Moore Lane, O'Rahilly Parade and Henry Place are narrow in nature and have a number of tight corners that restrict the ability of large vehicles to manoeuvre freely and quickly around the site.

The narrowness of the existing traffic access ways dictates that some temporary junction improvement works will be required to be carried out to facilitate vehicular access – these areas are shown below with green circles in Figure 7.

Once construction activity starts it will be necessary to provide a temporary haul road as shown below on Figure 8 to take heavy traffic away from the National Monument and other retained structures, predominantly in Site 4.

2. Restricted access arising from two major pedestrianised streets flanking the Overall Site.

Henry Street, one of the city's busiest pedestrianised thoroughfares, flanks the Overall Site to the south. Henry Street is pedestrianised after 11:00 am daily (service vehicles only prior to 11:00 am daily).

Moore Street, home to the long-standing street-market flanks the Overall Site to the west and is similarly pedestrianised after 11:00am (service vehicles only prior to 11:00 am daily).

In terms of streets available for vehicular construction access, this leaves only Parnell Street and O'Connell Street as primary options to access the Overall Site.

Figure 4: Henry Street, Dublin 1

3. Protected Structures and non-protected structures proposed to be retained.

Owing to the long and varied history of the Overall Site, there are several structures of heritage significance that must be carefully managed during works. These are shown in Figures 5 and 6 below:

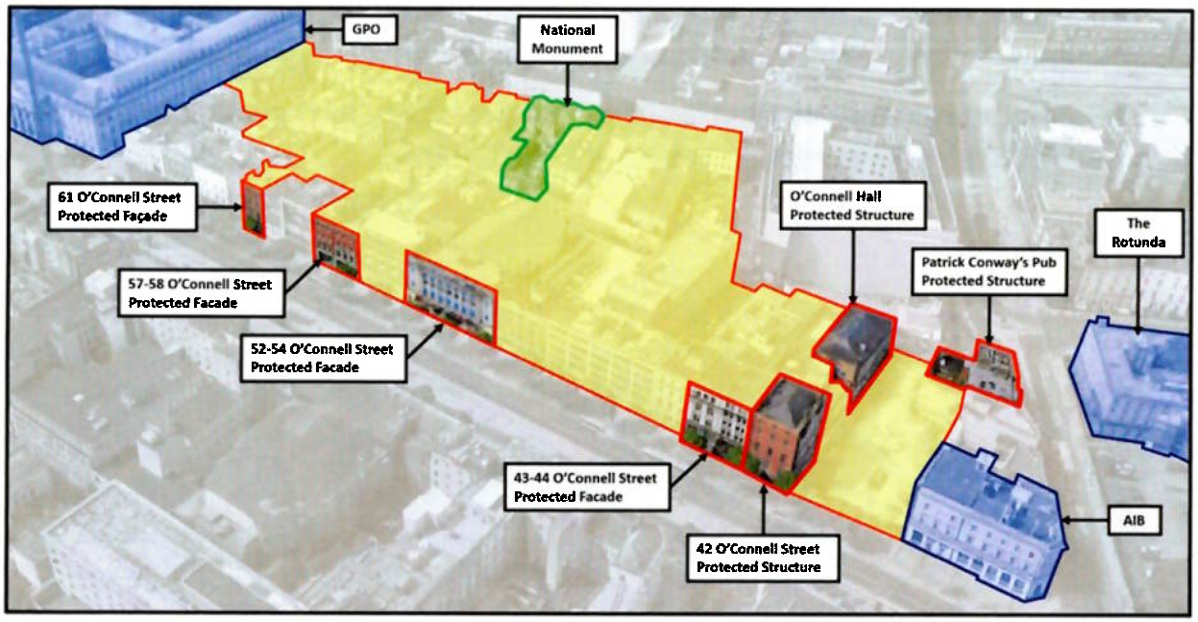


Figure 5- Protected Structures in and around the Overall Site.

Figure 6 below shows in plan form Protected Structures as well as non-protected structures anticipated to be retained, as follows:

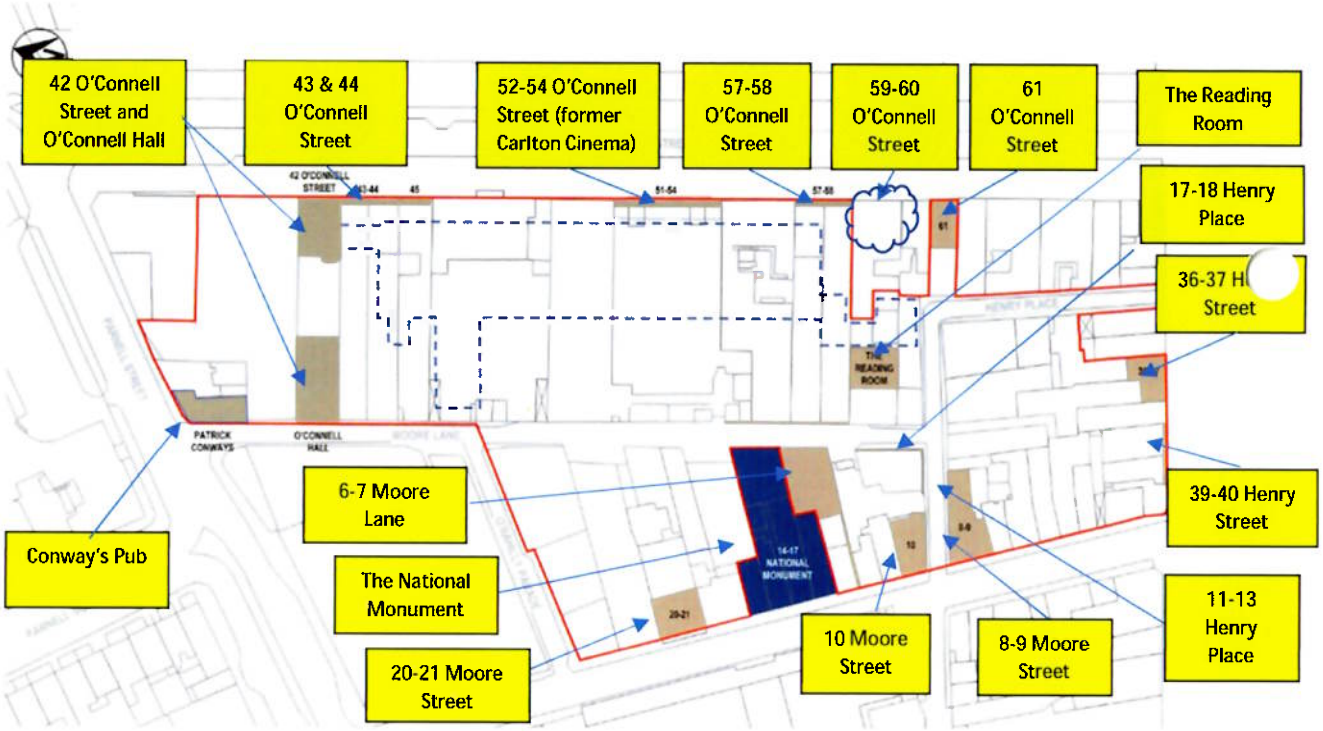


Figure 6 - Protected Structures and non-protected structures proposed to be retained.

Protected structures along O'Connell Street that are within the development lands are as follows:

i) 42 O'Connell Street & O'Connell Hall (to the rear)

ii) 52-54 O'Connell Street (former Carlton cinema; façade above ground floor only)

iii) 43 & 44 O'Connell Street (façades above ground floor only)

iv) 57-58 O'Connell Street (façades above ground floor only)

v) 61 O'Connell Street (façades above ground floor only)

vi) 70 Parnell Street (Conways Pub)

Non-Protected structures to be retained:

i) 8-9 Moore Street

ii) 10 Moore Street

iii) 20-21 Moore Street

iv) 17-18 Henry Place

v) 6-7 Moore Lane

vi) 11-13 Henry Place

vii) 36-37 Henry Street

viii) 39-40 Henry Street (upper floor facades only)

ix) 'The Reading Room' located to the Rear of No. 59 O'Connell Street

x) Buildings fronting 59/60 O'Connell Street (whilst outside of the Overall Site, they must be considered to ensure impacts are managed).

xi) 61 O'Connell Street (whilst only the façade is protected, it is currently being assessed as to whether the building will be retained or solely the façade).

Note that works in proximity to the National Monument require Ministerial Consent.

4. Neighbours including residents and local businesses.

In addition to the many shop traders on Moore Street, Moore Street is home of the Moore Street Market. The construction approach needs to take cognisance of the market traders and other retailers to allow for continuity of trading.

An active market and retail environment necessitates that construction vehicles must move off Moore Street / O'Rahilly Parade quickly, to avoid queuing on the street, and should progress to site immediately. Site 5 has been designated as the area to be used to receive the construction traffic before it progresses to a designated workface, compound or materials storage area, see Figure 7 below:

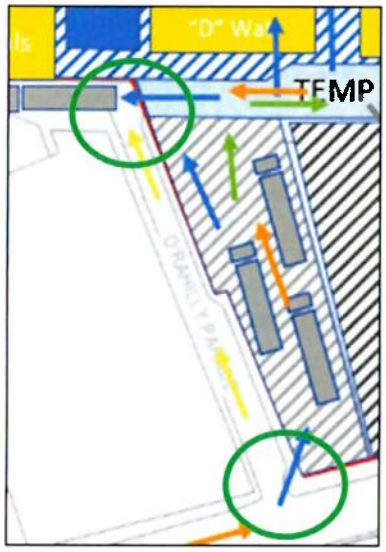


Figure 7 – Area to be used to receive construction traffic

5. The scale and nature of construction works to be undertaken.

The Dublin Central Masterplan anticipates delivering 77,090 sqm GFA in commercial and residential development. In isolation, delivering such a quantum in the context of the constraints noted above already puts significant pressure on any programme for delivery.

The 13No. months of the Advanced Works at Site 2 will consist of asbestos removal, soft strip and demolition, together with temporary works including protection of fabric proposed to be retained. This will be followed by an archaeological assessment in the normal way.

The Enabling Works for MetroLink on Site 2 that follow will require significant excavation followed by the construction of a MetroLink 'shell' of approximate dimensions 120m x 26m x 25m (length x width x depth), to be delivered within Site 2, as part of the Dublin Central GP Ltd.'s scope of works.

Unsurprisingly, the scope of the Enabling Works for MetroLink add considerably to the overall construction programme and carry additional inherent risks to programme. The Enabling Works for Metrolink must be substantially complete in order for the Sites 2AB and 2C Oversite Developments to proceed; approximately 3 and 2 years respectively after the commencement of the Enabling Works for MetroLink (on a risk adjusted basis, this timeline moves out to 6 years and 4 years, respectively).

Construction traffic volumes through the centre of the Overall Site during the above will constrain the pace of progress of Site 3 and Site 4, which will be progressed in tandem with Site 2. This constraint arises as a consequence of the single arterial road running in a north/south direction through the Overall Site (Moore Lane); acting as the sole point of access to each of the Individual Sites, as demonstrated in Figure 8.

Figure 8 – Necessary site area for construction and access / egress points.

With respect to Figure 8, the following should be noted:

- Separate contractors may be required for some/all of the Individual Sites, particularly given the variety of uses and the specialist nature of certain works. Each of these will have their own welfare and logistical needs.

- For Site 2, a considerable volume of excavated material must be disposed of offsite (estimated at 111,900m³), requiring a significant number of vehicular movements along the temporary haul road (Moore Lane).

- For Site 2, specialist construction works will necessitate significant additional space on-site for plant including a specialist compound for bentonite plant, reinforcement cages and dewatering equipment.

- The upshot of the above will lead to congestion on the Overall Site, which will in turn reduce construction efficiencies.

3.0 CONSTRUCTION SEQUENCE

In the context of Sections 1 & 2 above, the optimal construction approach can be shown graphically in Figure 9 as follows:

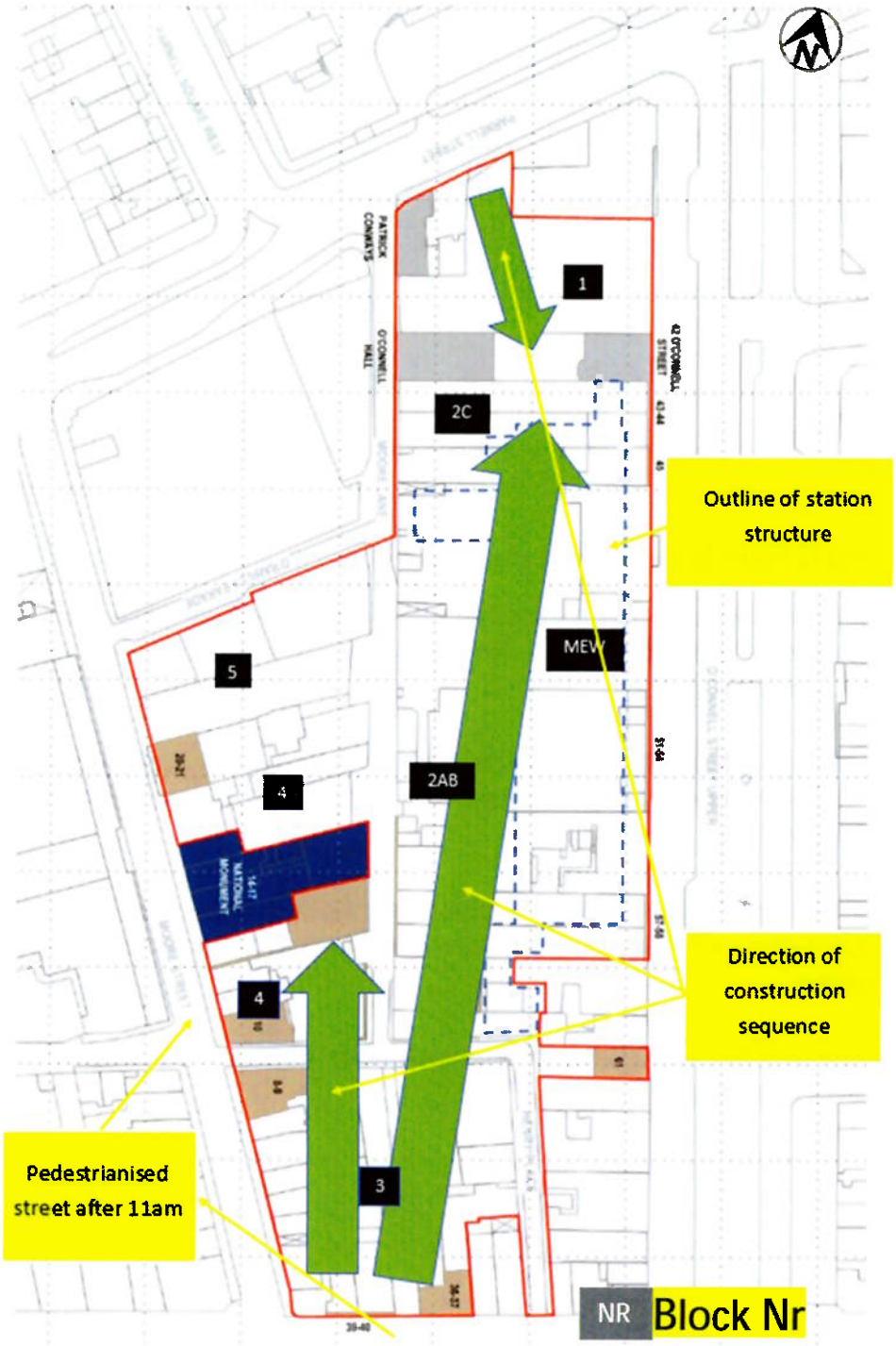


Figure 9 – Direction of construction approach.

This construction sequence proposed above reflects the following conditions:

1. The existing traffic regime whereby no vehicular traffic is allowed onto Moore Street (South of O'Rahilly Parade) or on Henry Street after 11:00 am daily.
2. In light of No. 1 above, Sites 3 and 4 are challenging access-wise and therefore must be developed first, as the direction of construction moves from south to north, with construction traffic utilising Moore Lane.
3. Site 5 should be considered the front and back "door" for all development works and so will be last to be constructed as it is the main arterial connection to the access / egress point on O'Rahilly Parade.
4. Site 2 works require a significant area to accommodate construction plant, materials and site offices.
5. The imperative to protect the National Monument at Nos. 14-17 Moore Street.
6. DCGP acknowledges that the market traders and retailers have had a long-standing contribution to the vibrancy, vitality, and uniqueness to the local area. Consequently, DCGP recognise the need to minimise disruption to the Moore Street Market Traders during the works whilst facilitating the needs of the construction process.

4.0 BASELINE PROGRAMME

The Baseline Programme that DCGP is working to for the project can be summarised in Figure 10:

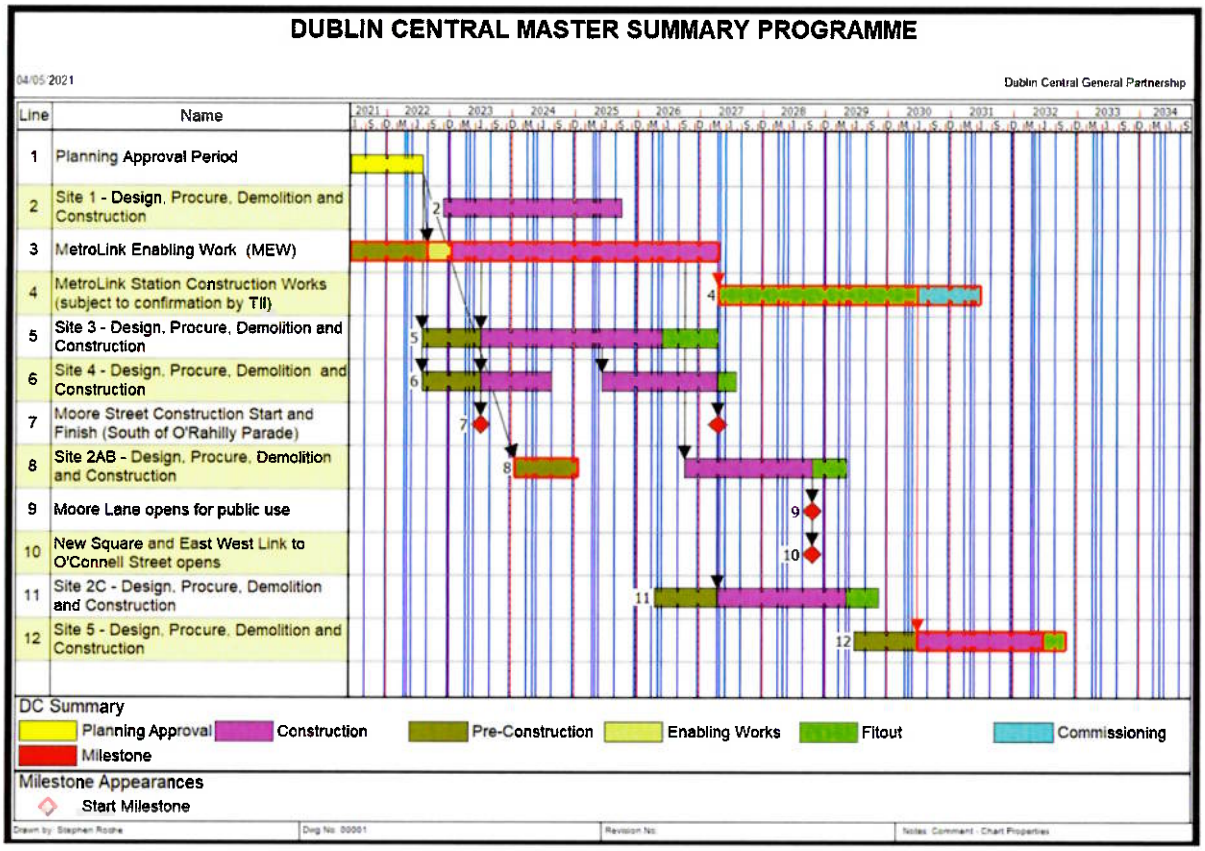


Figure 10 – Master Summary Programme

This programme assumes that Planning Applications will be submitted in three tranches as follows:

1. Sites 3, 4 and 5 as three stand-alone applications, to be submitted concurrently in May 2021.
2. Sites 2AB and Site 2C as two stand-alone applications but submitted together end of August 2021.
3. Site 1 submitted as a stand-alone application on a date yet to be determined.

5.0 KEY RISKS TO PROGRAMME

Key risks that the project is exposed to include:

- Depth of excavation that may discover unexpected issues / challenging ground conditions.
- Significant design variations that may arise from third parties.
- Challenging ground conditions.
- Delayed programme arising from caution in working adjacent to the National Monument and other Protected/retained structures.
- Contaminated ground in excess of what the ground investigation reports suggest exist.
- The high water table and all the risks associated with dewatering to enable construction.
- Archaeological finds and all the risks associated with recording etc.
- Restricted site access and egress points leading to slower progress.
- Site congestion due to significant number of contractors on site; leading to slower programme.
- Ministerial Consent requirement.

The above risk factors have all been given due consideration in determining the proposed planning durations, set our below, on a risk-adjusted basis.

6.0 SITE 2AB PROGRAMME

Proposed duration of planning permission: 11 years.

With reference to the Masterplan Summary Programme (Figure 10) as well as the constraints and risks outlined:

- Site 2AB works cannot commence until the Enabling Works for MetroLink are complete in this part of Site 2 (targeted for Q4-2026)
- Target completion date of May 2029: 7 years from receipt of Planning Approval.
- Risk adjusted duration of 11 years is being sought from the date of the Planning Approval.

7.0 SITE 2C PROGRAMME

Proposed duration of planning permission: 11 years.

With reference to the Masterplan Summary Programme (Figure 10) as well as the constraints and risks outlined:

- Site 2C works cannot commence until the advanced works for MetroLink are complete in this part of Site 2 (targeted for Q2-2027)
- Target completion date of November 2029: 7.5 years from receipt of Planning Approval.
- Risk adjusted duration of 11 years is being sought from the date of the Planning Approval.

8.0 SITE 3 PROGRAMME

Proposed duration of planning permission: 7 years.

With reference to the Masterplan Summary Programme (Figure 10) as well as the constraints and risks outlined:

- Likely to be the first phase of construction on the Overall Site (along with Site 4).
- Structurally independent of the Enabling Works for Metrolink and therefore can be progressed more quickly.
- Can be progressed independently of heavy works in Site 2 (albeit, programme likely to be impacted by scope of Site 2 works).
- Construction to commence in August 2023.
- Target completion date is April 2027 (5 years from Planning Approval)
- Risk adjusted duration of 7 years is being sought from the date of the Planning Approval.

9.0 SITE 4 PROGRAMME

Proposed duration of planning permission: 7 years

With reference to the Masterplan Summary Programme (Figure 10) as well as the constraints and risks outlined:

- Likely to be the first phase of construction on the Overall Site (along with Site 3).
- Ministerial Consent must be sought and granted.
- Structurally independent of the Enabling Works for Metrolink and therefore can be progressed more quickly.
- Construction to commence in August 2023.
- Likely to be constructed by the same contractor as for Site 3
- Target completion date is April 2027 (5 years from Planning Approval).
- Risk adjusted duration of 7 years is being sought from the date of the Planning Approval, in line with Site 3 above.

10.0 SITE 5 PROGRAMME

Proposed duration of planning permission: 15 years

With reference to the Masterplan Summary Programme (Figure 10) as well as the constraints and risks outlined:

- Demolition is required early in the Baseline programme to necessitate site access.
- Construction commencement is dependent on all the other works being substantially completed before this can commence construction.
- Construction to commence in August 2030.
- Target completion date is October 2032 (10.5 years from Planning Approval).
- Risk adjusted duration of 15 years is being sought from the date of the Planning Approval.

11.0 SITE 1 PROGRAMME

This report includes the general programme intention for Site 1 for completeness, but as noted elsewhere the date for the application is yet to be determined and hence the detail included within this report for this site is subject to change.

12.0 PHASING INTENTION FOR THE PUBLIC REALM

This section of the report provides a chronological timeline for the development of the various sites by showing a time-bar progression indicating how the site will be developed and delivered. This demonstrates when each portion of the public realm and streetscape will be completed and available for public use.

The key dates taken from the programme and delivery sequence are indicated in Figure 11 with the red highlighting indicating the key public realm delivery dates in the current indicative programme:

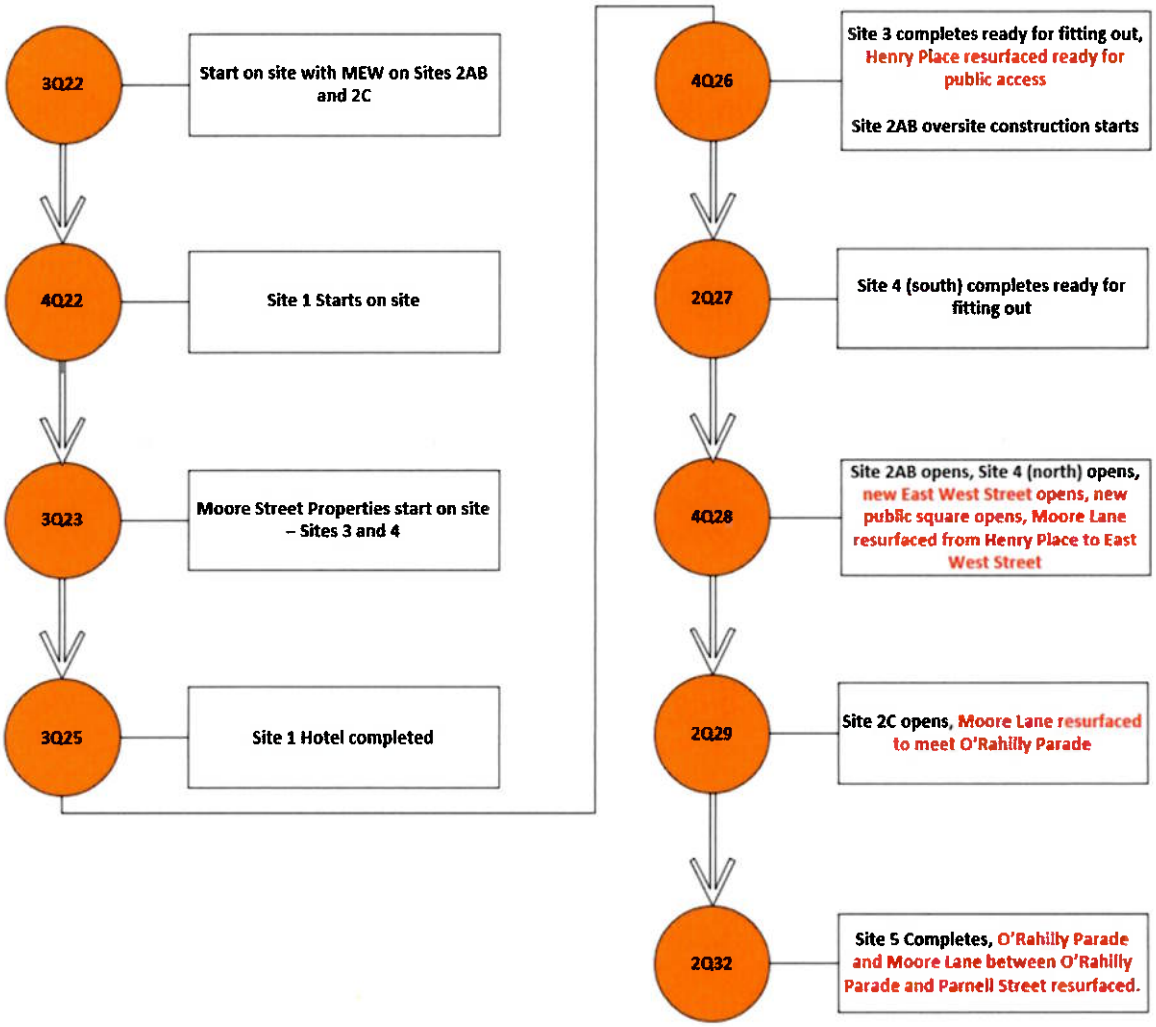


Figure 11

Appendix A gives further details.

Appendix A - Public Realm Phasing Approach - Demonstrating Availability of the Public Realm when delivering the Dublin Central Masterplan

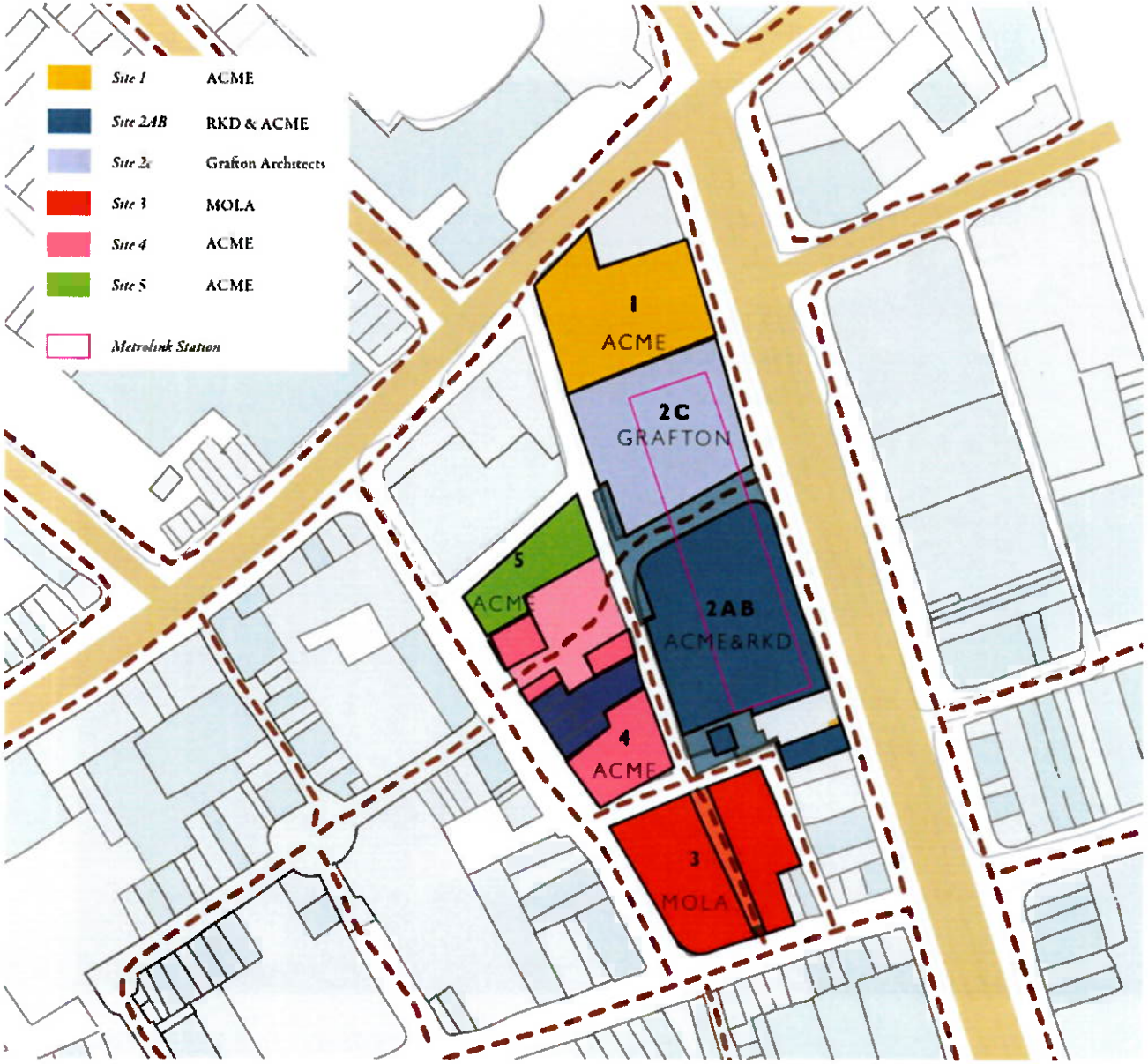
DUBLIN CENTRAL

Public Realm Phasing Approach -

Demonstrating Availability of the Public Realm when delivering the Dublin Central Masterplan

for Dublin Central GP Ltd

- 25TH May 2021



DUBLIN CENTRAL – PHASING TIMESLICE DIAGRAMS

Introduction and purpose of this document

- This document has been prepared to demonstrate the approach and assumptions that have been made when compiling the programme and phasing approach for the delivery of the Dublin Central Masterplan.

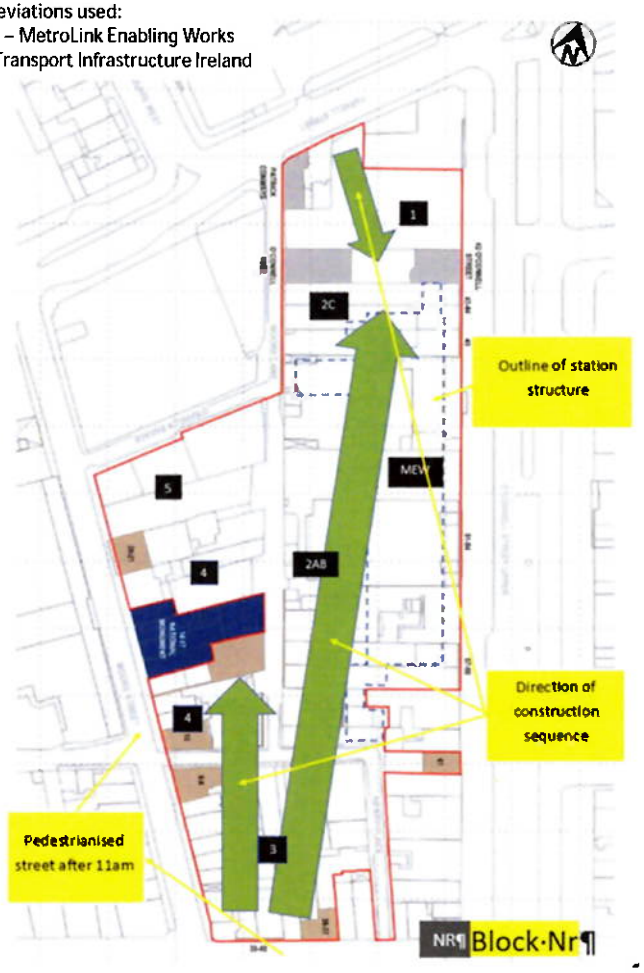
- It sets out the information using a timeline bar at the bottom of each page to demonstrate the activity that is scheduled for each site during that period of time.

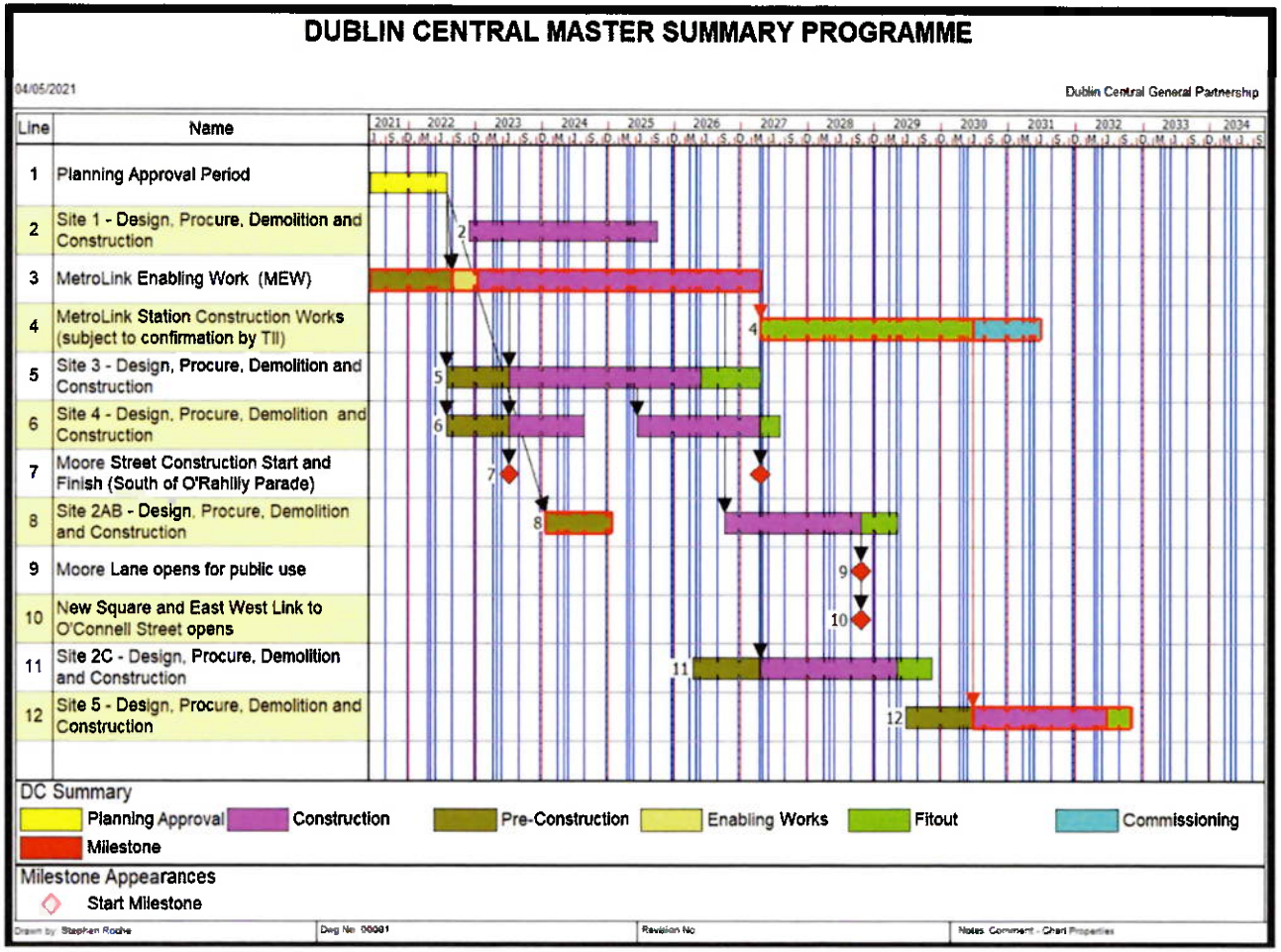
- Indicative hoarding positions have been shown (blue lines) to show how each of the construction areas will be delineated from each other

- The images demonstrate when areas can be opened to public use at the earliest practical time when working from a southerly to northerly construction direction (see next page).

THE CONSTRUCTION APPROACH AND MASTER PROGRAMME

Abbreviations used:
MEW – MetroLink Enabling Works
TII – Transport Infrastructure Ireland





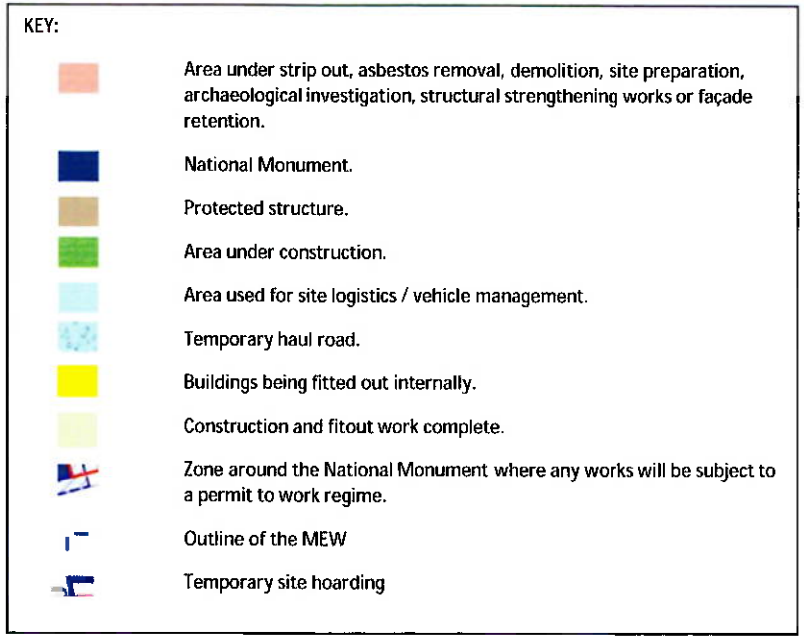
The programme indicated above is an indicative programme showing the general intent at this stage.

TIMESLICE IMAGES APPROACH

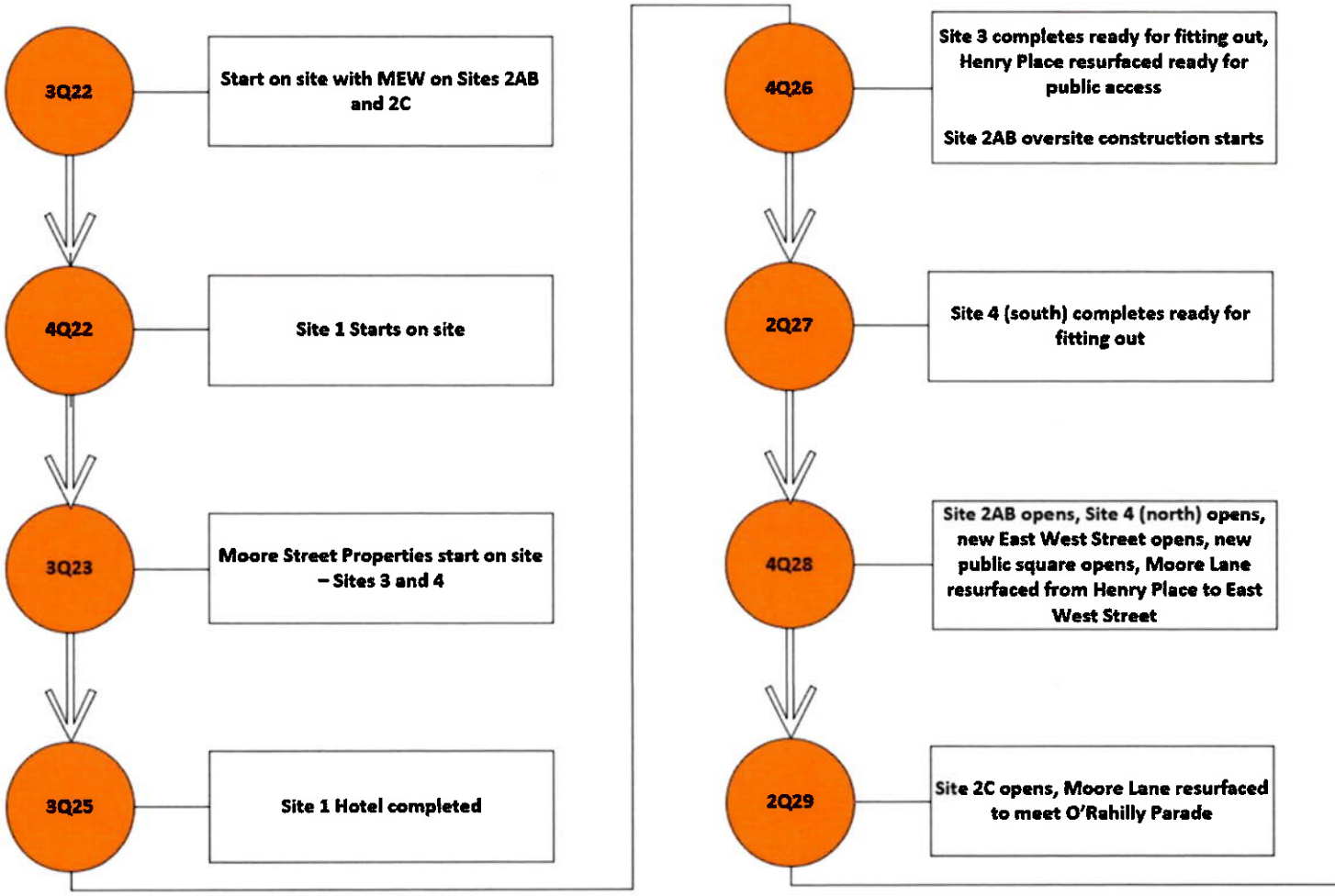
The phasing sequence will be demonstrated by using a series of timeslice images that will portray, for the period shown in the time bar at the bottom of the image, what activity will be being carried out on each portion of the site, and more importantly when the various parts of the public realm will become open and free for the public to use.

The key to the various colours that have been used in the images that follow is opposite.

Whilst the timeslice diagrams include Site 1 for completeness, the programme for these works is still provisional at this stage and likely to change. Similarly the retention of the façade to Nr 71 O'Connell Street is still being considered and will be addressed in the Site 1 Planning Application in due course.



KEY DATES TAKEN FROM THE MASTER SUMMARY PROGRAMME



The key dates from the programme are indicated opposite. These are the programmed target dates extracted from the Baseline Programme.

They assume Planning Approvals will be granted in June 2022 to allow a start on the MEW two months later.

The dates for Site 1 are subject to change once commercial terms are agreed with an operator.

Note:
This shows the later start and finish dates for site 5 which is 9 months later than shown in the following timeslice images. The timeslice images assume an earlier start on the basis that the site will not need to be delayed to facilitate MetroLink construction access which is yet to be defined and agreed with TII. Hence the Master Summary Programme is more cautious at this stage.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 0

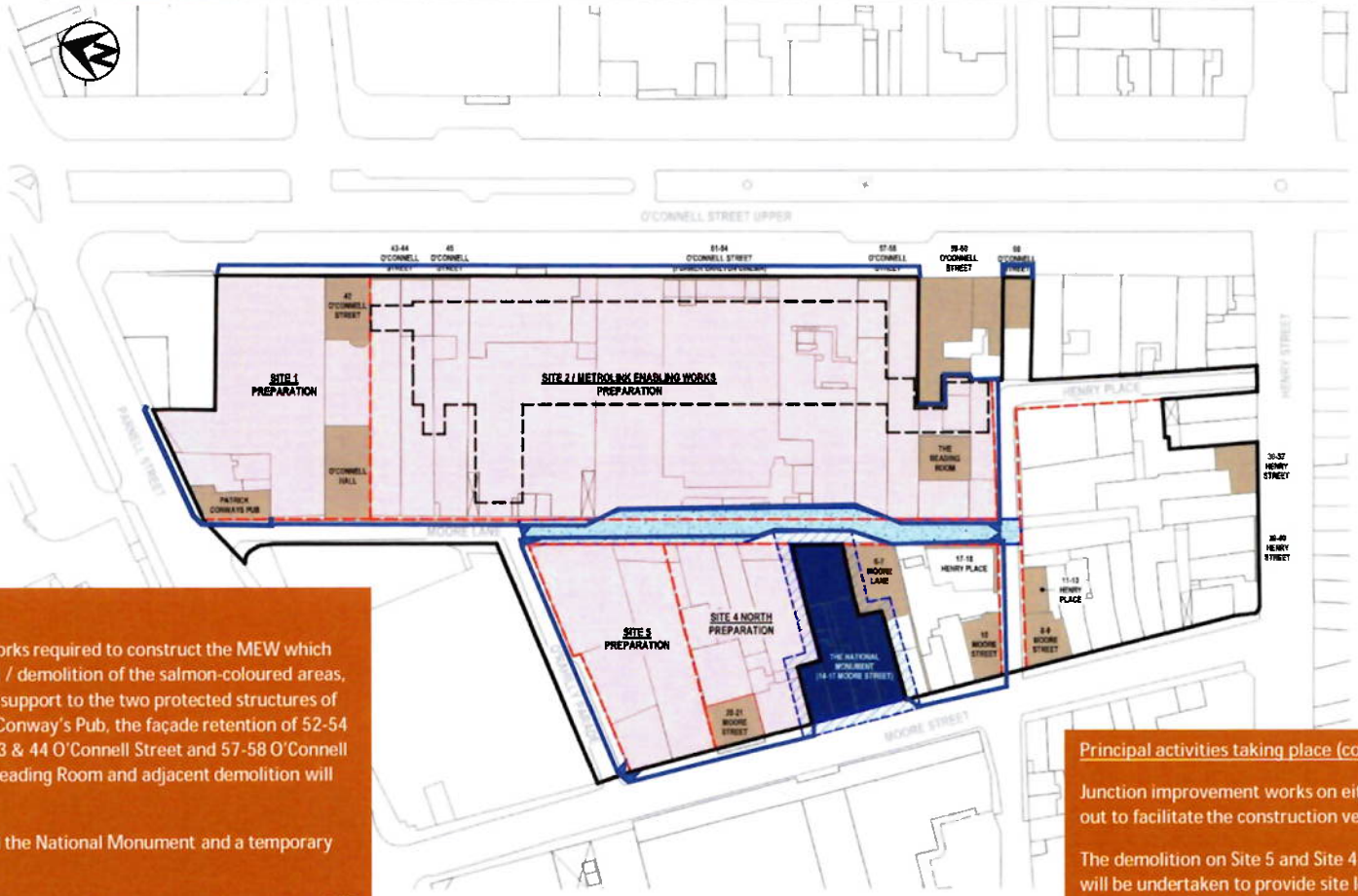
Assumes Planning Approval Granted in June 2022

Principal activities taking place:

This image demonstrates the site as it currently exists. It shows the proximity of the National Monument together with other Protected Structures and Non-Protected structures of historical significance to be retained.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 1

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Principal activities taking place:

This image shows the initial period of the works required to construct the MEW which will involve the soft strip / asbestos removal / demolition of the salmon-coloured areas, the archaeological investigations, structural support to the two protected structures of 42 O'Connell Street and O'Connell Hall and Conway's Pub, the façade retention of 52-54 O'Connell Street (former Carlton cinema), 43 & 44 O'Connell Street and 57-58 O'Connell Street. The necessary underpinning to the Reading Room and adjacent demolition will also commence.

A protected zone will be established around the National Monument and a temporary haul road will be installed.

Site 1 works commence with the structural support of the two protected structures of 42 O'Connell Street and O'Connell Hall.

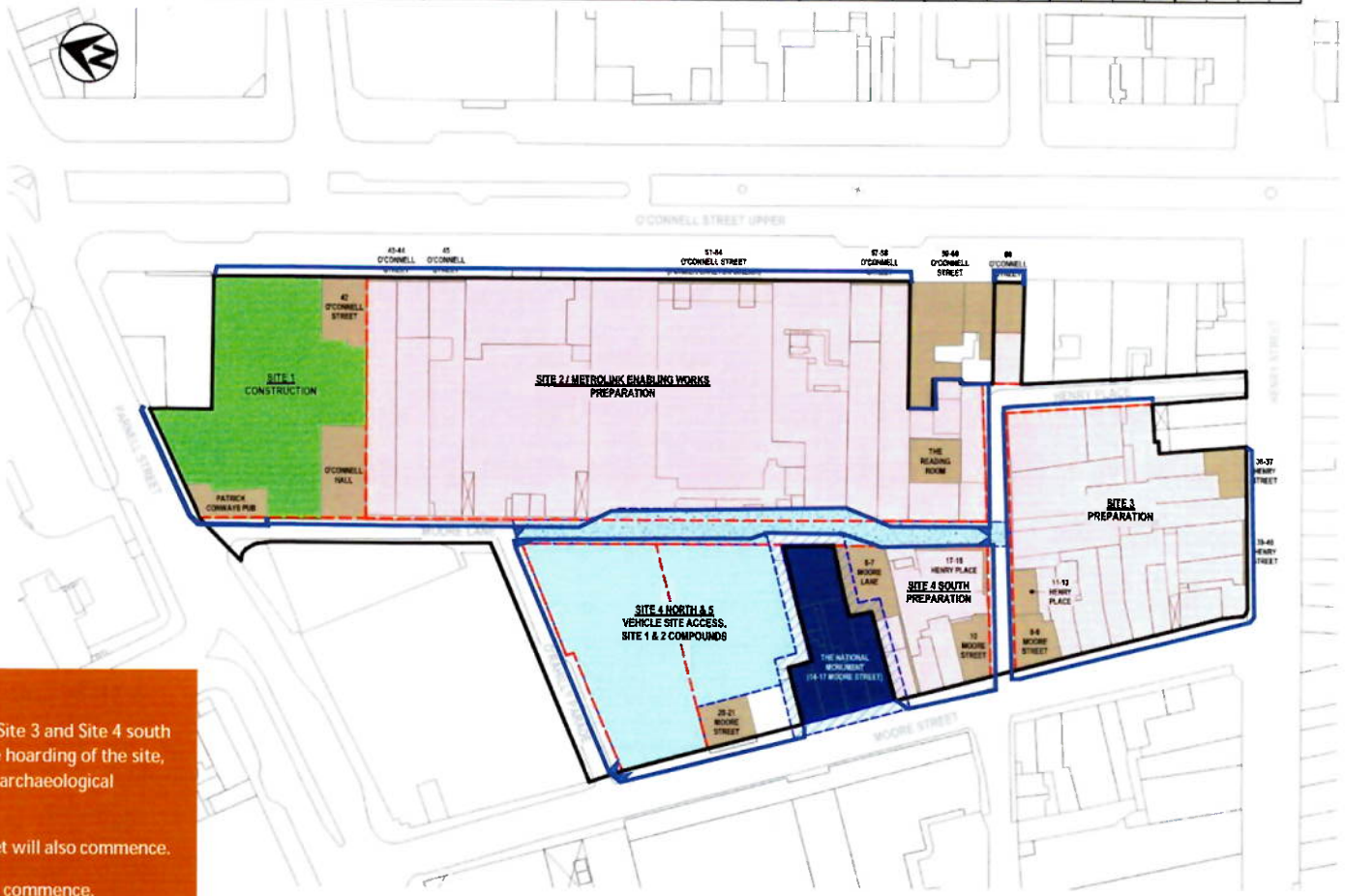
Principal activities taking place (con't):

Junction improvement works on either end of O'Rahilly Parade will be carried out to facilitate the construction vehicle movements.

The demolition on Site 5 and Site 4 to the north of the National Monument will be undertaken to provide site logistics areas, with particular emphasis being on Site 5 which is necessary to manage the traffic entering the site from Moore Street and O'Rahilly Parade.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 2

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Principal activities taking place:

This image shows the work commencing on Site 3 and Site 4 south of the National Monument. This includes the hoarding of the site, soft strip, asbestos removal, demolition and archaeological investigations.

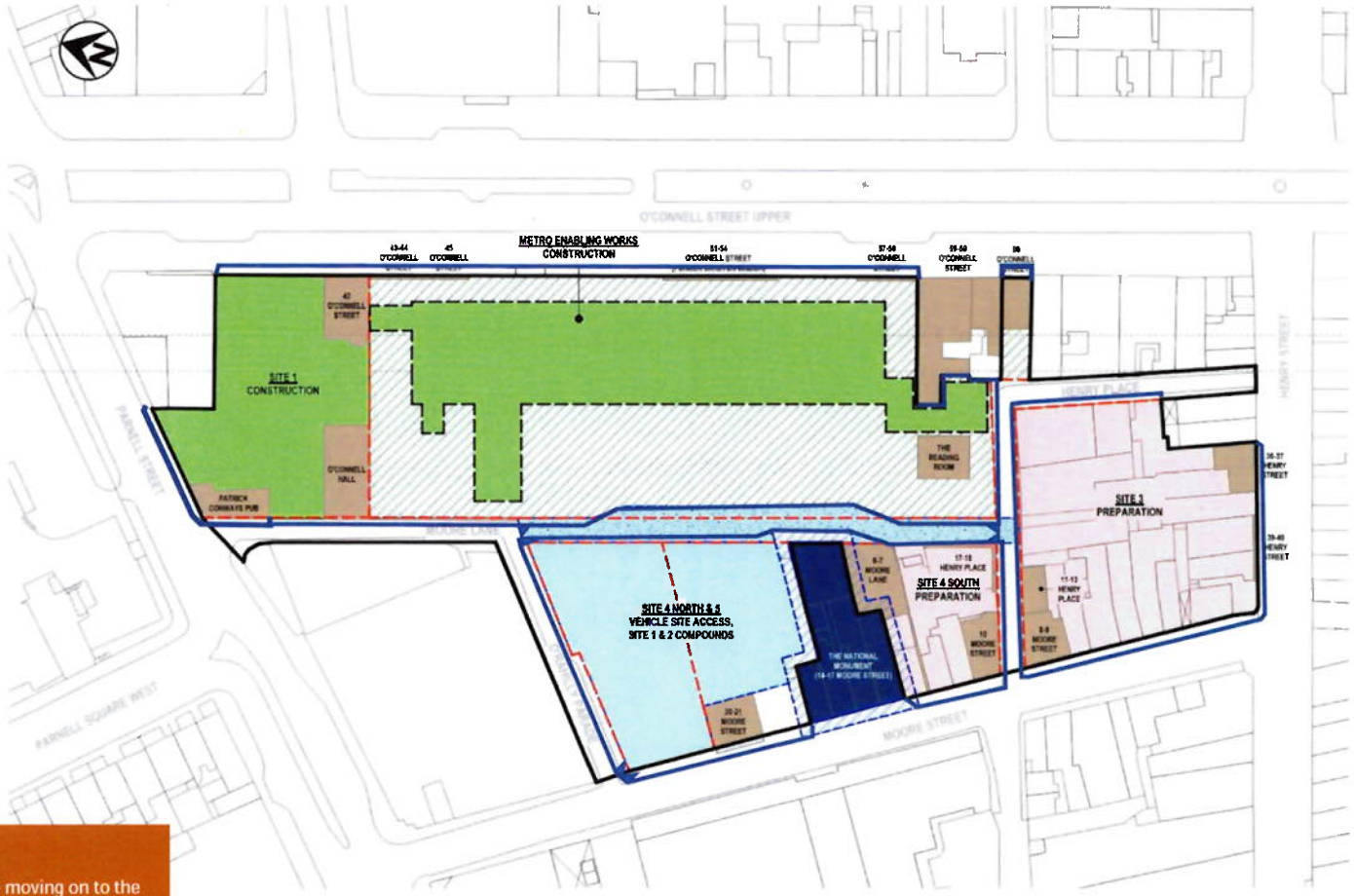
Facade retention works to 39-40 Henry Street will also commence.

The works to Nr 60 O'Connell Street will also commence.

Works on Site 1 will now move onto the construction phase.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 3

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



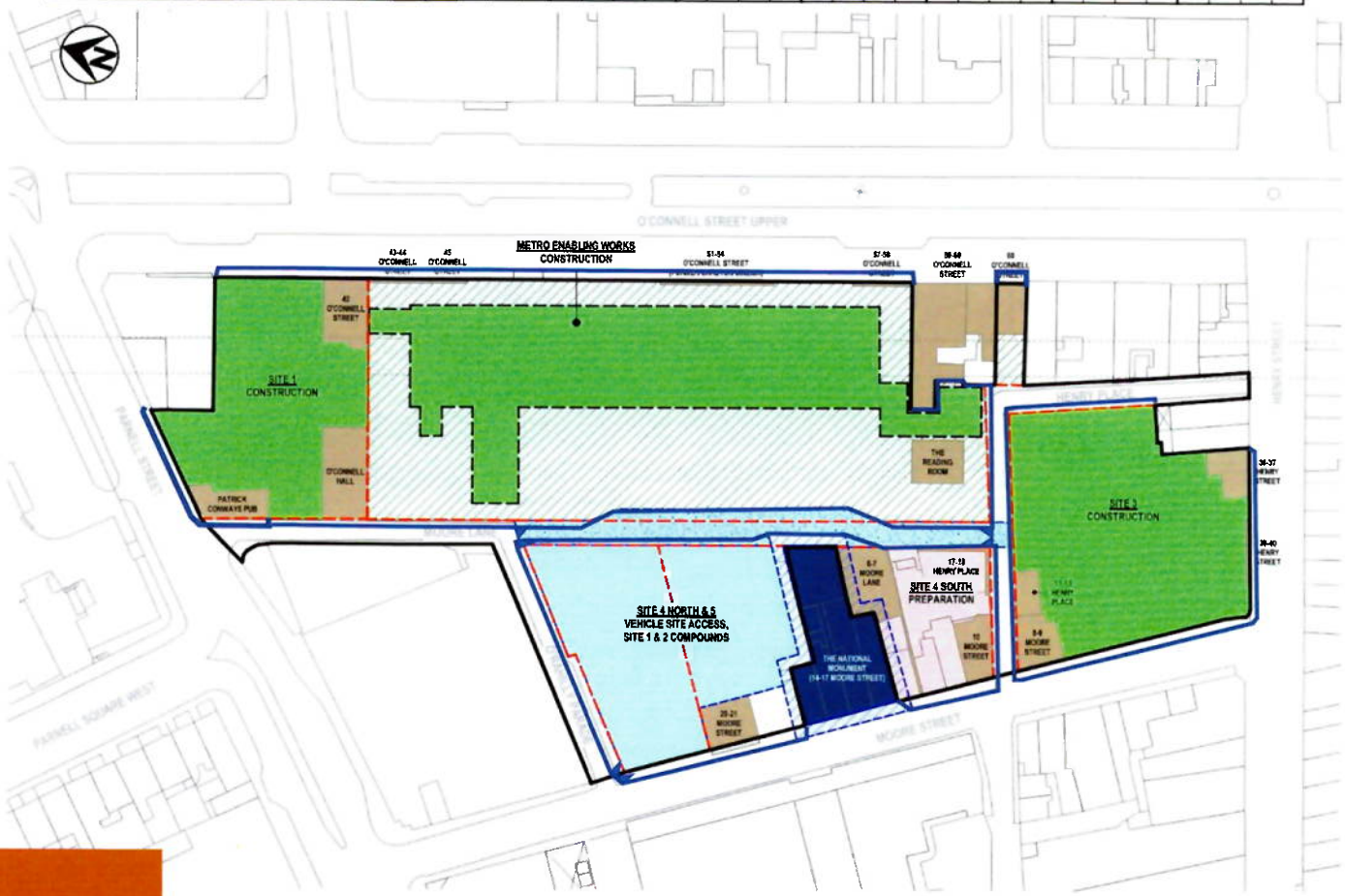
Principal activities taking place:

This image shows the work on the MEW site moving on to the construction phase, with the diaphragm walling, piling, dewatering, excavation and concrete works being carried out.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 4

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



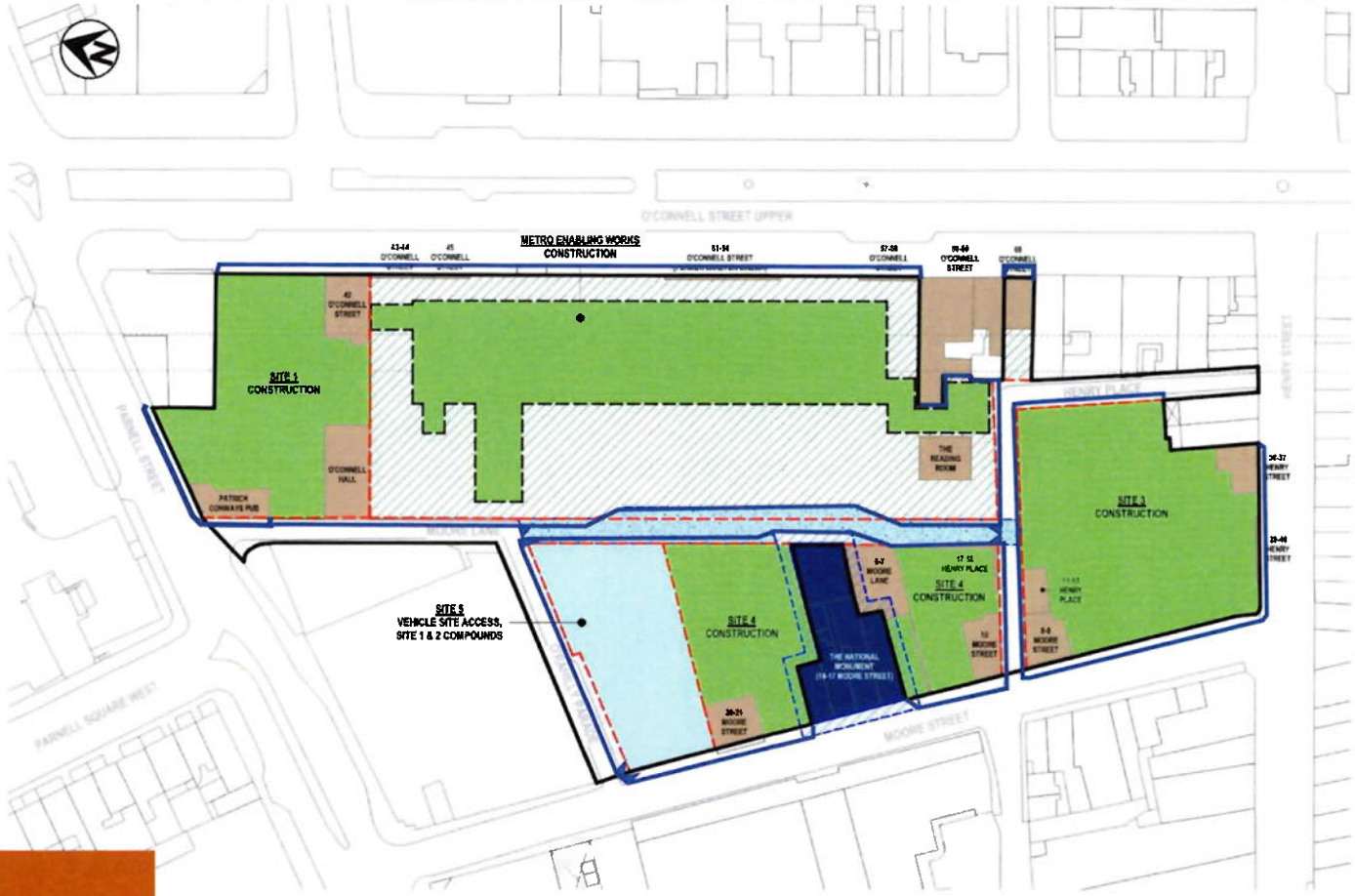
Principal activities taking place:

This image shows the work on Site 3 moving on to the construction phase.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 5

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



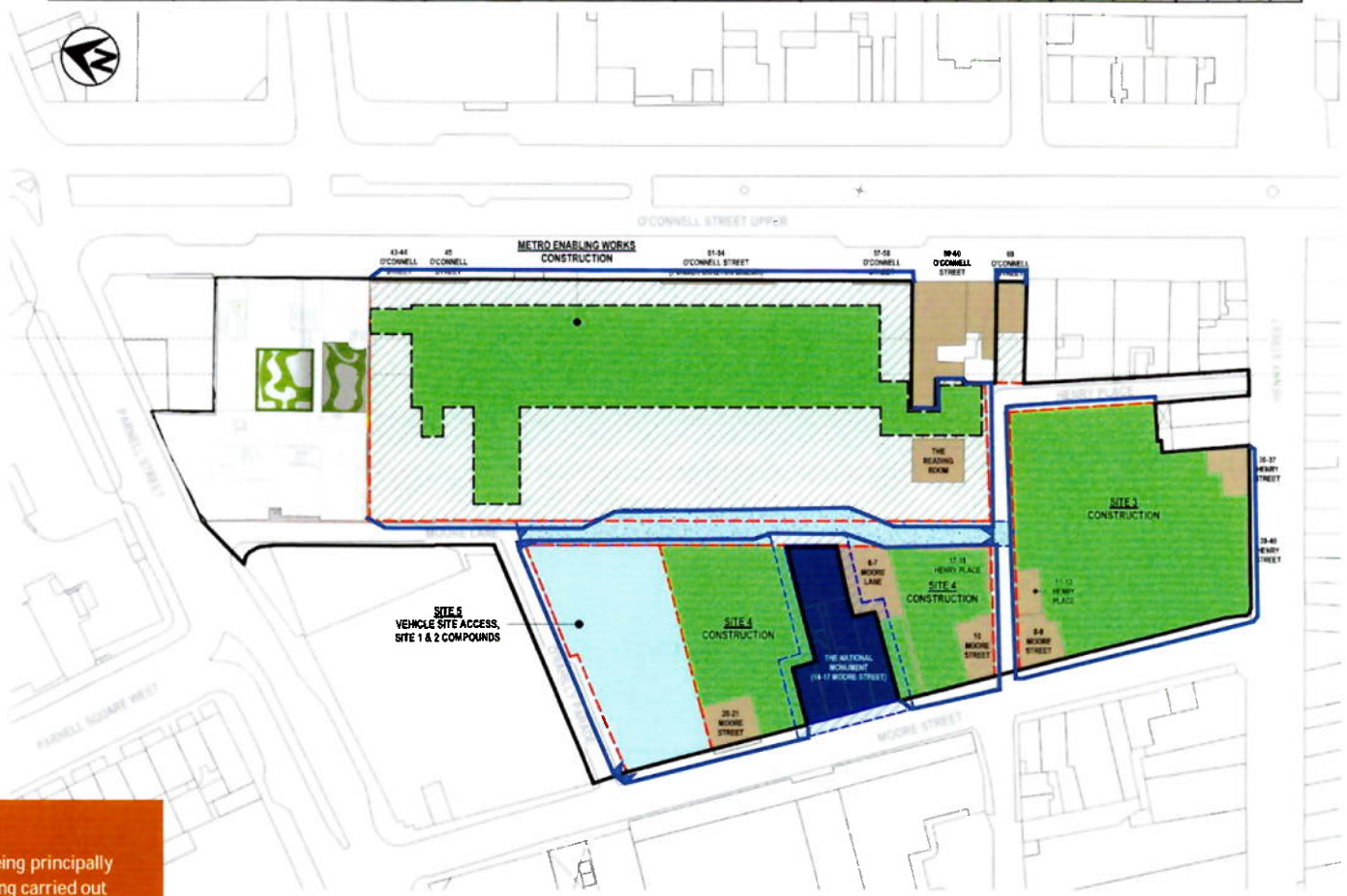
Principal activities taking place:

This image shows the work on Site 4 moving on to the construction phase.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 6

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Principal activities taking place:

This image shows the work on Site 1 now being principally complete, with fitting out activities now being carried out internally to complete the hotel and offices together with the ground floor retail.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 7

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

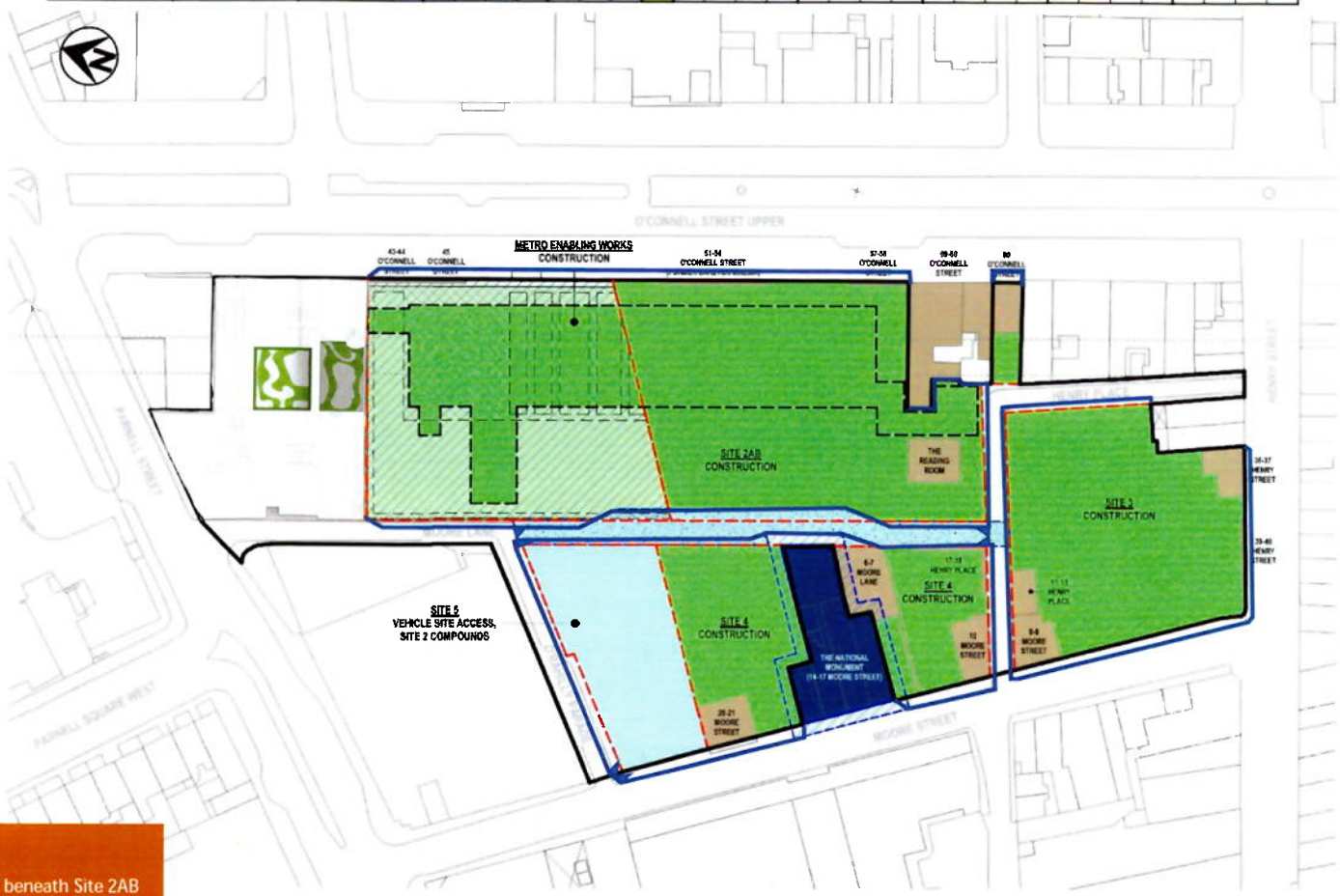
Principal activities taking place:

This image shows the work on Site 1 continuing with the fitting out activities internally to complete the hotel and offices together with the ground floor retail.

The other major change is the work to the MEW now starts to involve the basement construction under Sites 2AB and 2C. This demonstrates further how constrained the site is to enable the construction to be carried out.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 8

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



Principal activities taking place:

This image shows that the work to the MEW beneath Site 2AB is now sufficiently advanced that works can now commence with the construction of the Site 2AB offices and retail.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 9

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Principal activities taking place:

This image shows that the work to Site 3 is now complete for the shell which enables the fitting out of the hotel and residential to be carried out. This is the first time that some of the public realm around Site 3 and the passageway connection from Henry Place onto O'Connell Street is opened to the public. Everything to the north of Henry Place is still a construction zone and within the site hoardings, but everything to the south is now opened for public use.

Henry Place will have been resurfaced to its completed form.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 10

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Principal activities taking place:

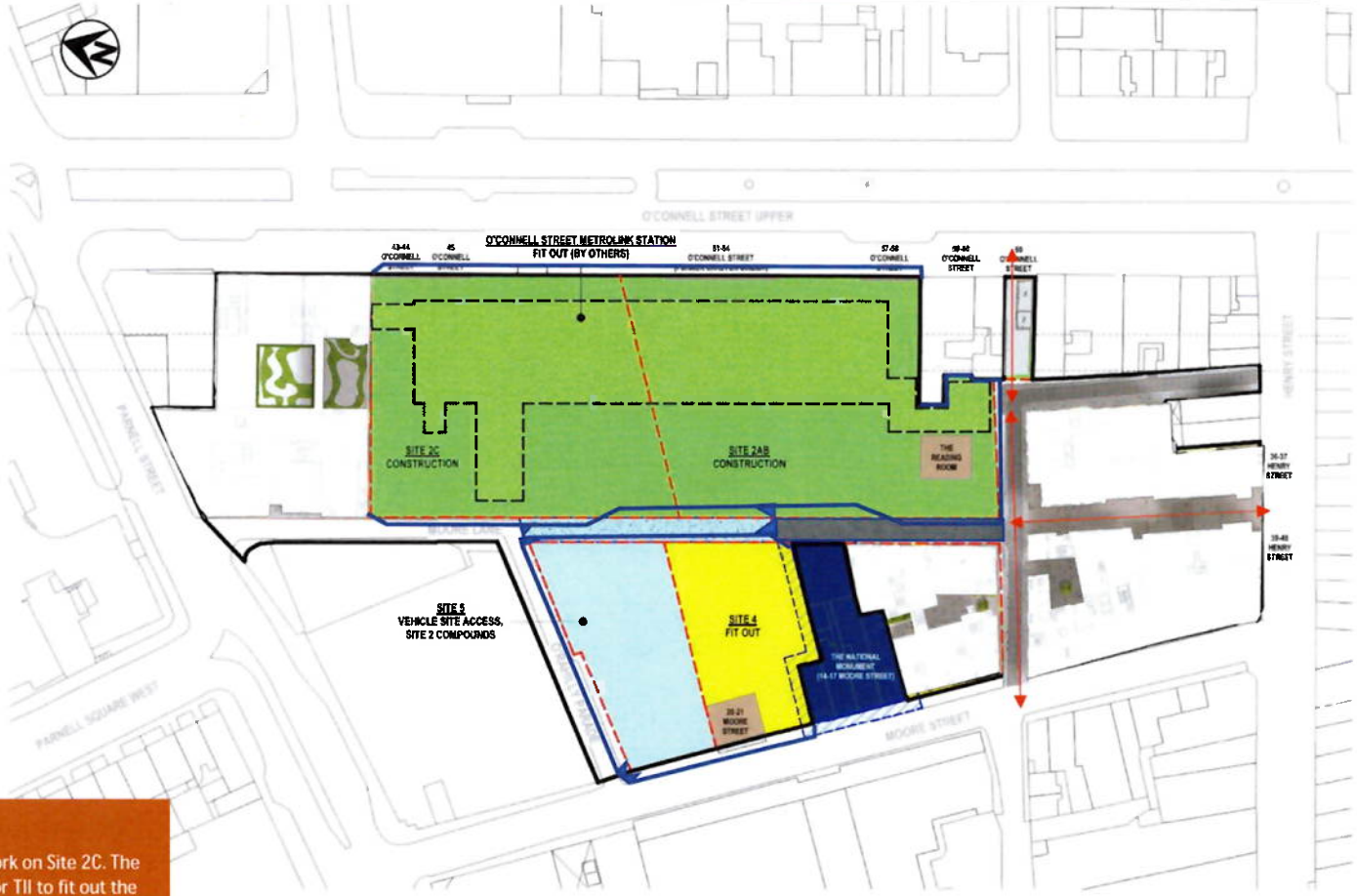
This image shows that the Site 4 residential areas are now completed and capable of being accessed from Henry Place. The retail on Moore Lane in Site 4 would not be opened yet.

The south of Moore Lane is available to access using a temporary tarmac surface at this stage (the final surface will be applied once the rest of Moore Lane can be surfaced with the existing setts and new materials.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 11

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4



Principal activities taking place:

The principal change on this image is the work on Site 2C. The MEW are now complete and handed over for TII to fit out the station, connect the tunnels etc. Site 2C now commences with its construction activity.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 12

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Principal activities taking place:

This image shows a major milestone in the delivery of the project. At the end of 2028 Site 2AB will be completed externally and will be being fitted out ready for occupation.

Site 4 north will also be completed.

The major milestone will be the resurfacing of Moore Lane and the creation of the new public square sufficient to allow the pedestrian connection across from O-Connell Street to Moore Lane at the end of 2028.

Construction of Site 2C will continue.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 13

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Principal activities taking place:

This image shows another major milestone in that the shell of Site 2C will now be complete and be being fitted out. This will allow the full extent of the pedestrian route between Site 2AB and 2C to be opened for public use.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 14

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Principal activities taking place:

This image shows the commencement of the construction of Site 5. The site will be discreetly hoarded off.

Site 2C will still be being fitted out.

Note:

This shows the earliest start and finish date for site 5 which is 9 months earlier than shown in the Master Summary Programme. The Master Summary Programme assumes a later start to facilitate MetroLink construction access which is yet to be defined and agreed with TII.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 15

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Principal activities taking place:

This image shows the works continuing with the construction of Site 5

Site 2C will now be complete.

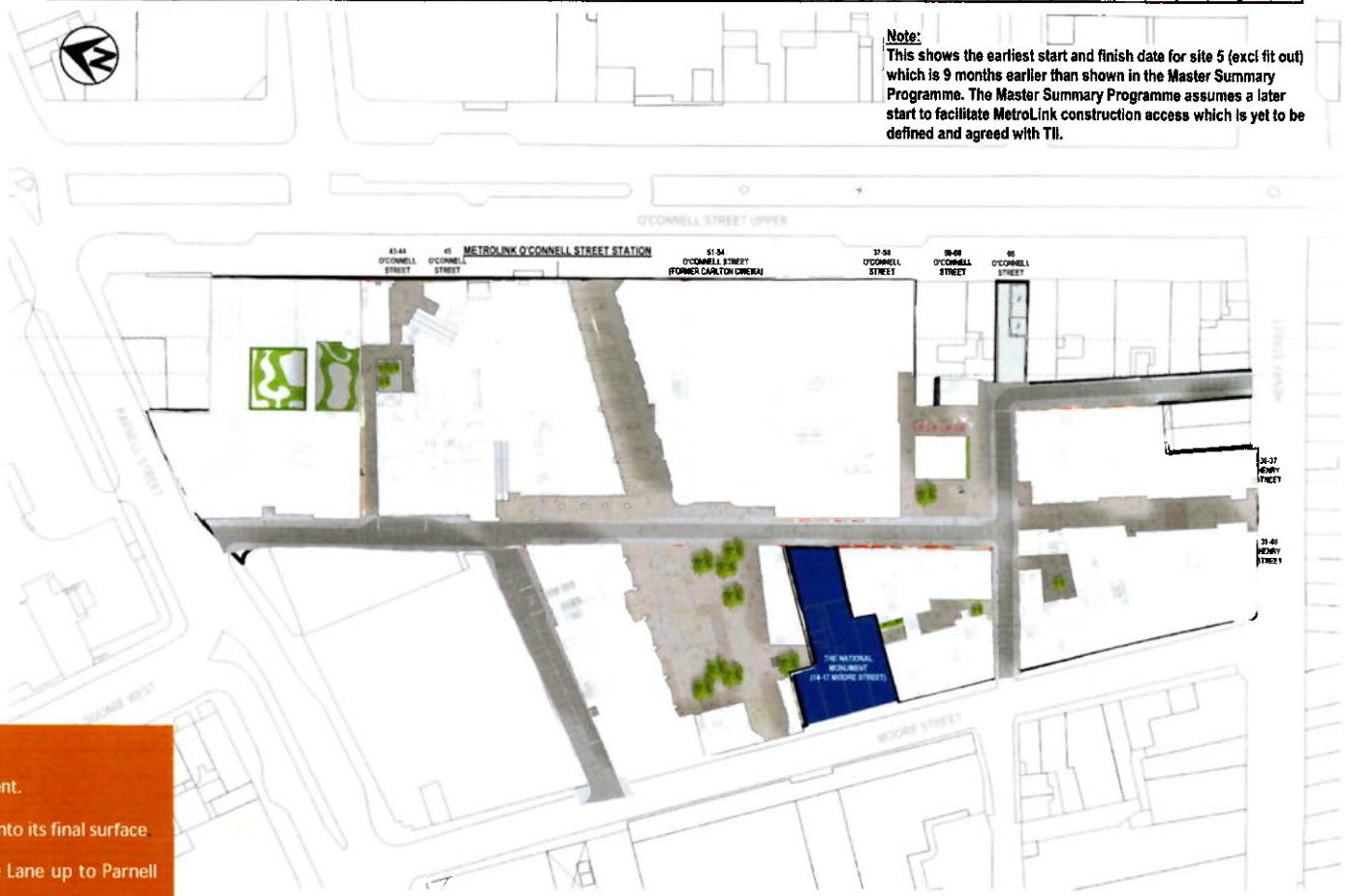
PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

Note:
This shows the earliest start and finish date for site 5 which is 9 months earlier than shown in the Master Summary Programme. The Master Summary Programme assumes a later start to facilitate MetroLink construction access which is yet to be defined and agreed with TII.

DUBLIN CENTRAL – INDICATIVE TIMESLICE SEQUENCE DIAGRAM NUMBER: 16

2022				2023				2024				2025				2026				2027				2028				2029				2030				2031			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
																																		◆			

Note:
This shows the earliest start and finish date for site 5 (excl fit out) which is 9 months earlier than shown in the Master Summary Programme. The Master Summary Programme assumes a later start to facilitate MetroLink construction access which is yet to be defined and agreed with TII.



Principal activities taking place:

This image shows the completed development.

O'Rahilly Parade will have been resurfaced into its final surface

Resurfacing the northern section of Moore Lane up to Parnell Street will have been completed.

PRELIMINARY PROJECT PROGRAMME – INDICATIVE ONLY

UK and Ireland Office Locations

APPENDIX 3.2 OUTLINE CONSTRUCTION & DEMOLITION MANAGEMENT PLAN – SITE 3

Dublin Central

Outline Construction & Demolition Management Plan – Site 3

Dublin Central GP Limited

DC-WAT-3X-XX-RP-C-001011

May 2021

Waterman Moylan Consulting Engineers Limited
Block S. Eastpoint Business Park, Alfie Byrne Road, Dublin D03 H3F4.
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Waterman Moylan
Engineering Consultants

Client Name:	Dublin Central GP Limited
Document Reference:	DC-WAT-3X-XX-RP-C-001011
Project Number:	19-021

Quality Assurance – Approval Status

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)

Issue	Date	Prepared by	Checked by	Approved by
P1	07.05.21	R. Nelson	C. Beresford	R. Osborne
P2	10.05.21	R. Nelson	C. Beresford	R. Osborne
P3	11.05.21	R. Nelson	C. Beresford	R. Osborne
P4	18.05.21	R. Nelson	C. Beresford	R. Osborne
P5	19.05.21	R. Nelson	C. Beresford	R. Osborne

Comments

FINAL ISSUE

Disclaimer

Content

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 3 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 3 Location within Masterplan

'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's 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.

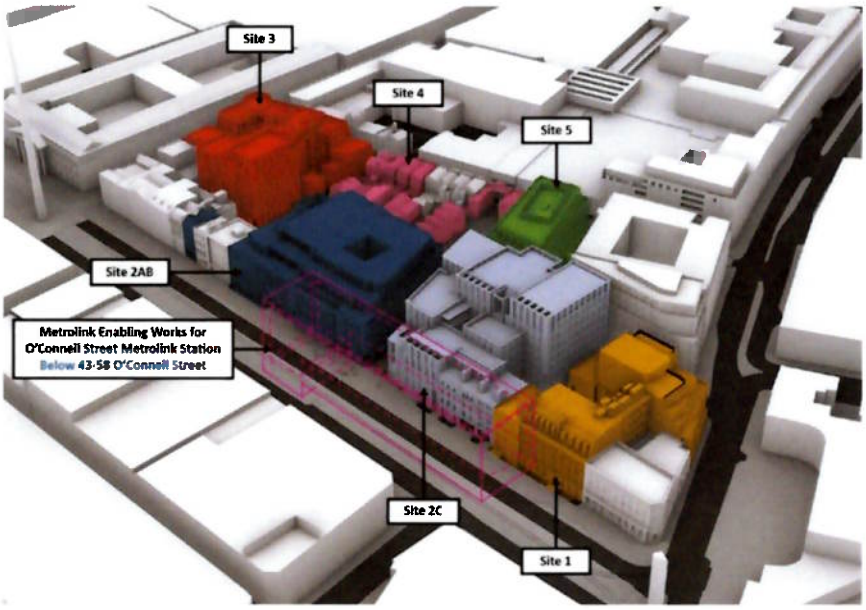


Figure 2 Phasing Strategy

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.

2.2 Site 3 Location

Site 3 is located in the south west corner of 'the Masterplan' area, Site 3 is bounded by Henry Street to the south, Moore Street to the west and Henry Place to the north and east. Site 3 includes Nos. 36 – 41 Henry Street, Nos. 1 – 9 Moore Street and Nos. 3 – 13 Henry Place. Site 3 lies within the O'Connell Street ACA. The proposed development generally comprises a mixed-use scheme accommodating a hotel, residential units and associated amenities, cultural, retail and café / restaurant uses in 2no. blocks ranging in height from 1 – 9 storeys over existing and new single storey basements. Provision of a new street/laneway linking Henry Street with Henry Place/Moore Lane.

Site 3 is currently occupied by a variety of existing 3 and 4 storey masonry buildings which mainly comprise of retail units at ground floor along Moore Street and Henry Street with offices above. Along Henry Place there are existing warehouse of 2 and 3 storey.

The existing retained buildings within Site 3 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. There are a number of structures that are of heritage significance and are to be retained in the proposed scheme. The retained structures within Site 3 are:

- 36 and 37 Henry Street
- The façades of 39 and 40 Henry Street
- 8-9 Moore Street
- 11-13 Henry Place

Figure 3 - Site 3

2.3 Key Milestones

Key Milestone Date	Site 3 Works
(Q3) 2023	Site Preparation
(Q4) 2024	Construction
(Q1) 2027	Fit-Out Works
(Q2) 2027	Completion

3. Site 3: Site Setup

3.1 Site 3 Boundary

Hoarding will be required to the Site 3 boundary. This will be located along the Site 3 boundary to Henry Street, Moore Street and Henry Place.

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 3 Proposed Site Setup

3.1.1 Site 3 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 Henry Street, Moore Street 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 3 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 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.

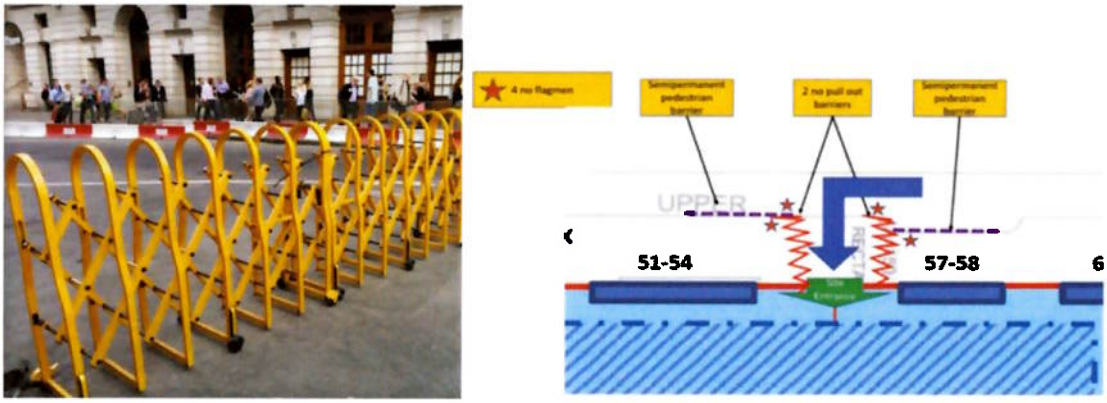


Figure 6 - Typical Pavement Crossover System

3.1.4 Logistics

Each development site 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.

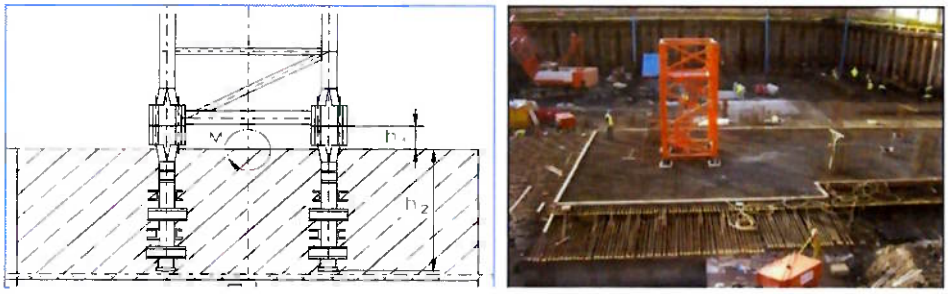


Figure 7 Typical Tower Crane Anchors

3.1.6 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 additional to the hoard to the Site 3 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 Siochana 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 3: Construction Methodology:

4.1 Description of the works

Site 3 is proposed as a mixed-use scheme over 2 separate buildings. Above ground, Block A consists of 4 to 8 stories containing circa 150 hotel bedrooms and Block B consists of 6 stories containing circa 80 residential units. Both blocks include retail, cultural, and food and beverage units at ground floor. A new street/laneway between the block's links Henry Street with Henry Place and Moore Lane. Single storey basements beneath block accommodate associated amenities for the buildings above.

Block A incorporates the existing buildings at 36 and 37 Henry Street, where the 4-storey section to the front of the building is to be retained. Block B incorporates the retained existing building at 8-9 Moore Street and the existing facades at 39 and 40 Henry Street and 11-13 Henry Place.

Figure 10 - Architectural Layout - MOLA Drawing DC-MLA-3X-02-DR-A-201002

4.2 Site Surveys Required

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);

At the next stage of the project, intrusive structural investigations will be undertaken to the structures/facades to be retained. 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 current condition, 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.

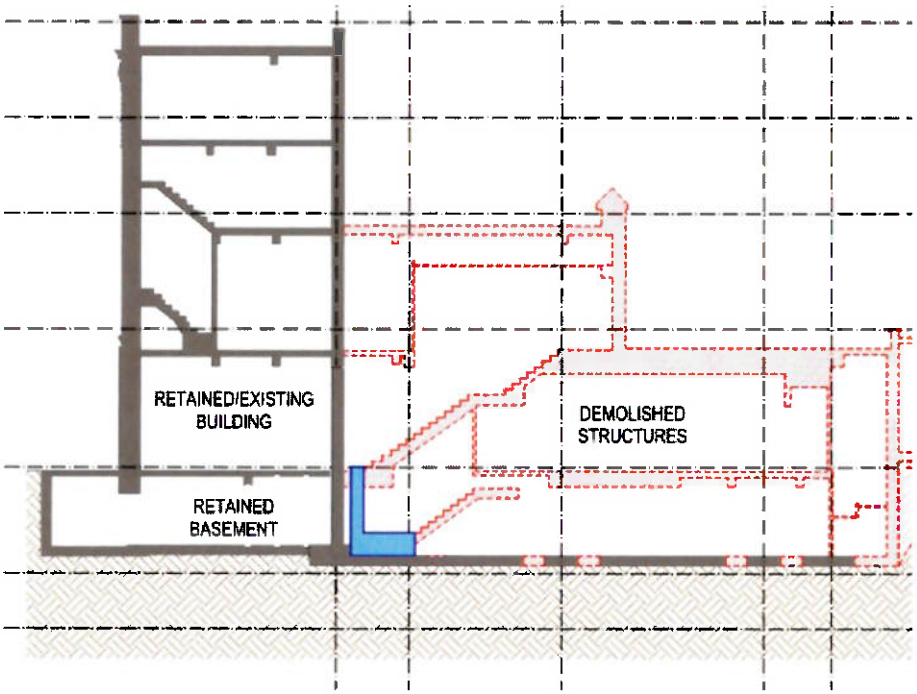
4.3 Demolition & Enabling Works

The sequence of works for Site 3 is typically as follows:

STAGE 1 – INSTALLATION OF TEMPORARY / ENABLING WORKS

- Temporary works will be required to the retained facades, structures and adjoining party/boundary walls that rely on the existing building for lateral restraint.
- Back propping will be required within the existing retained basements along Henry Street to allow for the demolition of the existing internal cross walls at Basement and Ground Floor levels.

STAGE 2 – DEMOLISH EXISTING BUILDINGS & PROBE/BREAK OUT FUTURE PILE LOCATIONS

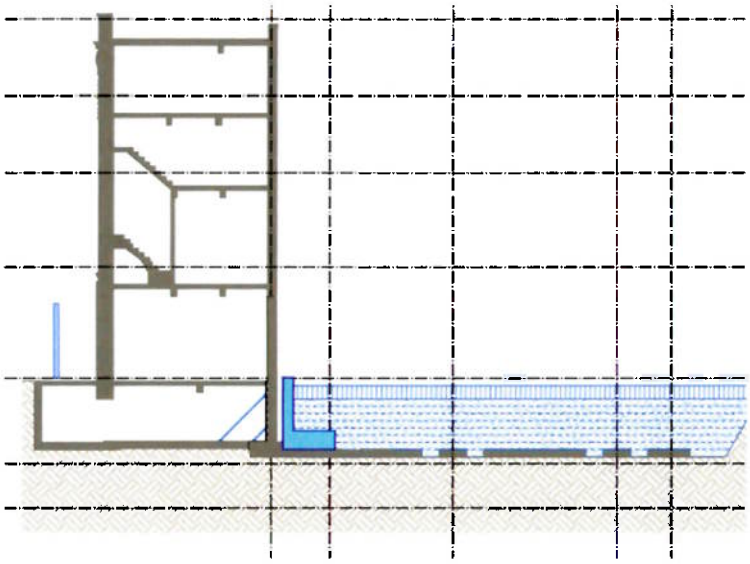


- Demolition of the existing buildings will be undertaken top-down using traditional methods with all demolition arising segregated and removed from site. The extent of demolition is shown on the Architect's drawings.
- Portions of the existing Basement Level slab, foundations and obstructions will be removed at proposed pile locations.
- Structure adjacent to retained elements or boundary/party walls will be demolished using non-percussive methods. This will likely involve saw-cutting the slabs/walls first to isolate the members before commencing the demolition activities.
- The retained basements will require a new basement retention system to avoid surcharging the existing structure. This may involve new precast reinforced concrete retaining walls located

against the existing basement walls included as part of the enabling works to support the follow-on piling activities.

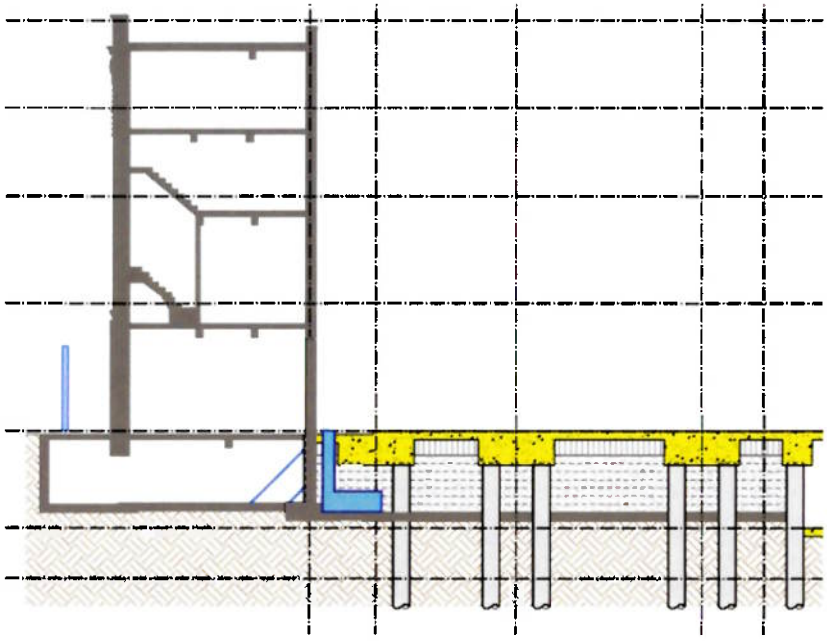
- In consultation with the conservation Architect, it is envisaged that a breather membrane and compressible filler will be installed between the new retaining wall and the existing basement wall to protect the existing wall.
- A void between the new retaining walls and existing basement walls may be accommodated and will be to the Conservation Architect requirements and details.

STAGE 3 – EXISTING BASEMENTS WILL BE BACKFILLED WITH WELL GRADED HARDCORD IN COMPACTED LAYERS TO SUIT PILING MAT REQUIREMENTS



- The piling mat will be well graded hardcore to the Piling Contractors requirements and subject to design by the Temporary Works specialist. This will provide a level platform from which the piling operation will be undertaken.
- The existing basements will be infilled with well graded hardcore that is suitable for piling and conforms to SR:21 Annex E requirements.

STAGE 4 – INSTALL BEARING PILES AND SECANT PILED BASEMENT WALL



- Piling will comprise of continuous flight auger (CFA) or rotary bored methods to minimise ground borne vibrations during piling.
- Piling will also include a secant piled wall that will form the enclosure to the new basement perimeter wall.
- Reinforced concrete will form the new pile caps, basement slab and ground floor structure.

4.4 Sub-Structure & Foundations

In order to minimise the excavation to form the basement level it is proposed to construct the single storey basement via a 600mm diameter secant pile wall.

The secant piled wall comprises interlocking hard (male) and firm (female) piles, which will provide an inherently stiff wall which will enable a robust temporary works solution to be adopted. The secant wall will also provide resistance to water penetration and loss of any fine material from behind the wall which could affect adjacent buildings and infrastructure. Piles will be spaced to be ensure interlock to below base excavation level and of sufficient length to achieve hydraulic cut-off for construction. The secant wall will also provide direct support for the superstructure, with the capping beam distributing substantial vertical loads on to the embedded retaining wall and using the inherent vertical load capacity of the wall and thus minimising bearing pile requirements.

The top of the piled wall will be tied together with a 1050x1000m reinforced concrete capping beam which will allow the transfer of vertical frame and floor loads onto the piles. The secant wall will be designed by the piling specialist for the lateral pressures due to earth, water and surcharge plus vertical loads both in the temporary and permanent conditions. The specialist will also be responsible for all temporary propping prior to completion of the permanent works for final load transfer.

The secant wall will be designed by the piling specialist for the lateral pressures due to earth, water and surcharge plus vertical loads both in the temporary and permanent conditions. The specialist will also be responsible for all temporary propping prior to completion of the permanent works for final load transfer. A 300mm thick reinforced concrete floor at basement level will be tied to and supported by the secant wall.

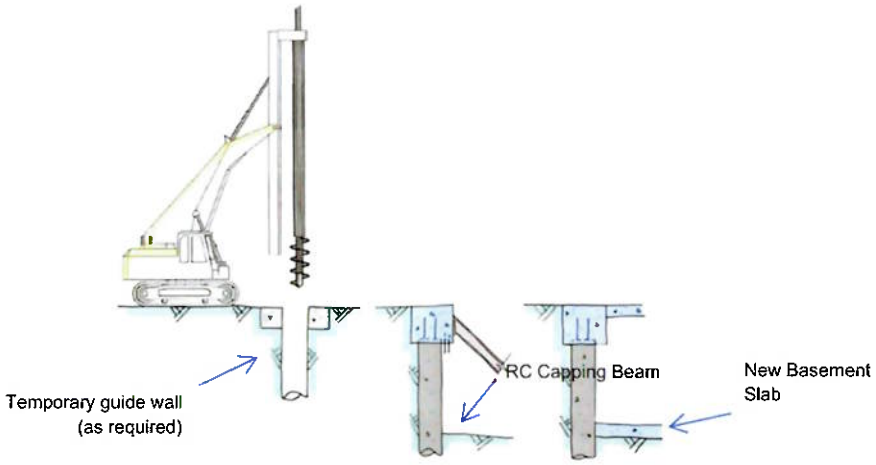


Figure 11 Typical Secant Piled Wall Installation

Where columns are not located above the secant pile wall of the basement, based on the ground conditions identified in geotechnical investigations and the anticipated loads, the Site 3 structures will be supported on piled foundations. Piles are anticipated to be traditional non-displacement rotary bored piles, end bearing into the Calp Limestone formation. Based on the ground conditions identified and the building frame loads, our conceptual design assumes 3 piles per column. 1200mm deep pile caps above the piles transfer the load from the columns over.

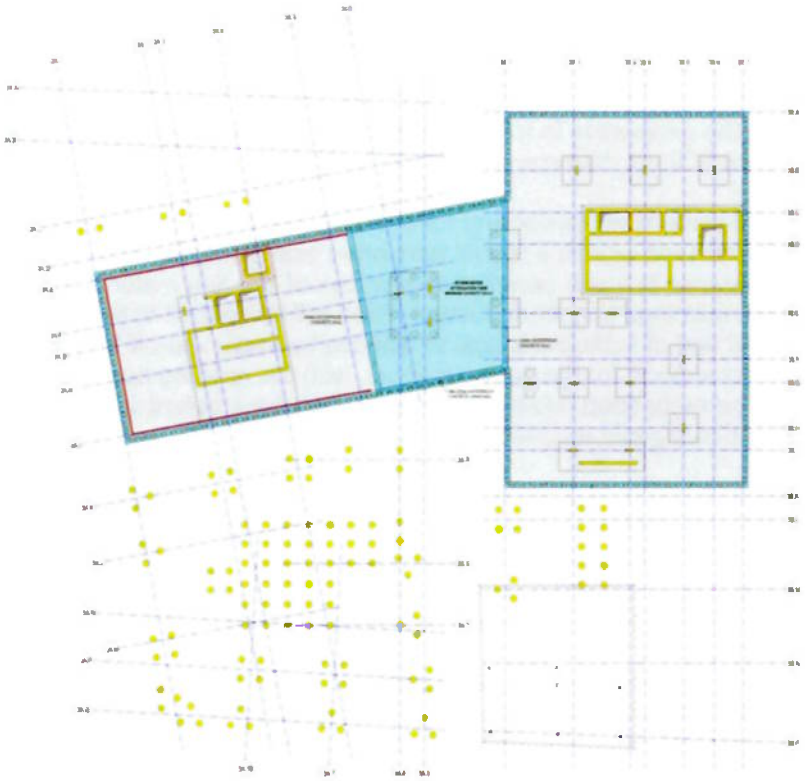


Figure 12 - Site 3 Preliminary Pile Layout

4.5 Super-Structure

The proposed structural solution for Site 3 is a reinforced concrete frame with flab slabs. This provides a flat soffit to maximise horizontal services distribution and minimise floor to floor heights, whilst providing inherent acoustic and inertial mass to mitigate against noise and vibration transmission in the residential areas. The columns have been sized to resist the applied loads for the proposed structural grid and floor heights and achieve a fire resistance period of 90 minutes. In situ concrete column sizes are 450x450mm or 400x400mm at basement and ground floor within the plant and retail areas. Columns at upper floors are 200x800mm to sit within wall lines between residential or hotel units.

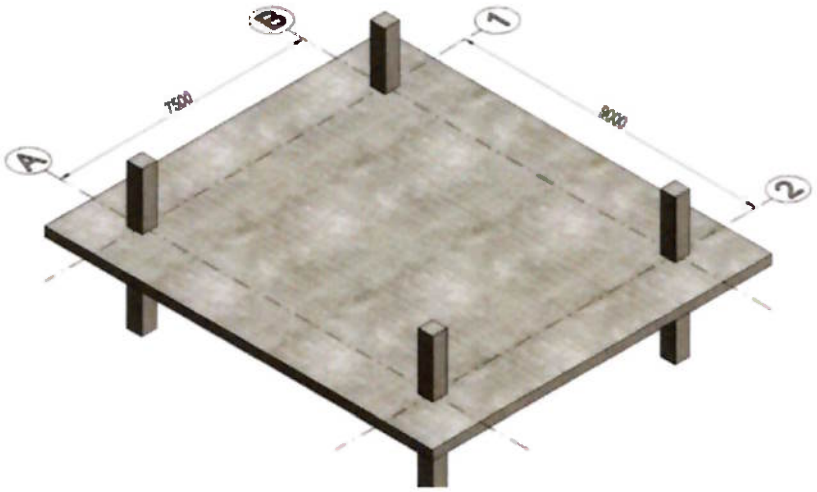


Figure 13 - Typical RC Structural Grid

The super-structure will likely use traditional construction techniques. The sequence of pouring the concrete stair and lift core and columns followed by the floor slab will continue on a sequential floor by floor basis.

The suspended slabs at each floor level above will likely use a proprietary formwork system (Peri Skydeck or similar). The decking will be erected complete with edge handrails and access towers to each level. Steel reinforcement will then be installed on the deck. Lifting of decking and rebar will be done using the tower cranes while static concrete pumps will be used to pour the concrete.

Figure 14 - Typical RC Formwork (Skydeck)

After curing of the slab, the formworks will be removed for reuse on the next floor above while the supports remain in place as back propping. Back props will be removed at a later date once the building has progressed and the concrete has cured sufficiently to remove the props.

Concrete placement will typically be via pumping for all large pours to free up the crane for other lifting operations. Wind and weather will be monitored and crane usage will be restricted as required during inclement weather to ensure safety of all personnel.

Figure 15 - Typical Concrete Placement

4.6 Existing Buildings

Site 3 is occupied by a variety of 3 and 4 storey buildings which mainly comprise retail units at ground floor along Moore Street and Henry Street with offices above. Block A incorporates the existing buildings at 36 and 37 Henry Street, where the 4-storey section to the front of the building is to be retained. Block B incorporates the retained existing building at 8-9 Moore Street and 11-13 Henry Place and the existing facades at 39 and 40 Henry Street.

Figure 16 - Site 3 Retained Structures

While these buildings are not Protected Structures, their significance is appreciated and the approach for their integration into Site 3 is to preserve these structures, with intervention limited to the essential works required to enable the buildings to provide the required performance and long-term durability. We recognise the importance of these buildings with respect to the heritage of the area. The approach is refurbishment and conservation rather than replacement, but considerations will also be given to the need for ongoing and potentially increasing maintenance given the age of the existing structures.

The extent of the works will be dependent on the condition and integrity of the structural elements discovered when the buildings internal finishes are opened up and the structural elements can be examined and assessed. Structural design strategies, construction methodology and sequencing, and temporary works strategies have been reviewed and proposed in order to protect retained structures on and adjacent to the site.

Investigations will include trial pits at the foundation/footing level of existing masonry walls and along building frontages and rear elevations to determine the nature of the foundations.

The structures will be monitored for movement during the course of the demolition and reconstruction works. Prior to demolition of the existing buildings an external survey control system is to be established. This will be carried out using traditional closed traverse surveying techniques and will involve the setting up of sufficient external control stations to allow monitoring of the neighbouring structures during and after demolition. The control stations are to 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. The initial control survey is to be carried out by the Contractor and may be independently checked and verified by the appointed survey contractor.

In addition to the impact of adjacent demolition and sub-structure works, great care will be taken during the works to protect retained structures 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 upon the demolition of adjacent structures, or the opening up of existing structures for new connections to the proposed structure or extensions. Typical temporary measures included the application of felt and battening to the exposed walls as demolition proceeds from top down, or to erect a covering scaffold over the locations where waterproofing and finishes have been removed. 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.

After the demolition and excavation of the proposed works further investigations to re-assess the existing structures will be undertaken. The design details will be reviewed on an individual building basis and the strategy revised and adjusted where necessary to suit the conditions found.

4.6.1 36 & 37 Henry Street Building (Retained)

Within Site 3, the buildings at 36 and 37 Henry Street are to be retained and linked to the new Hotel (Block A). Although inspection has not been possible at this time, the existing structure is believed to

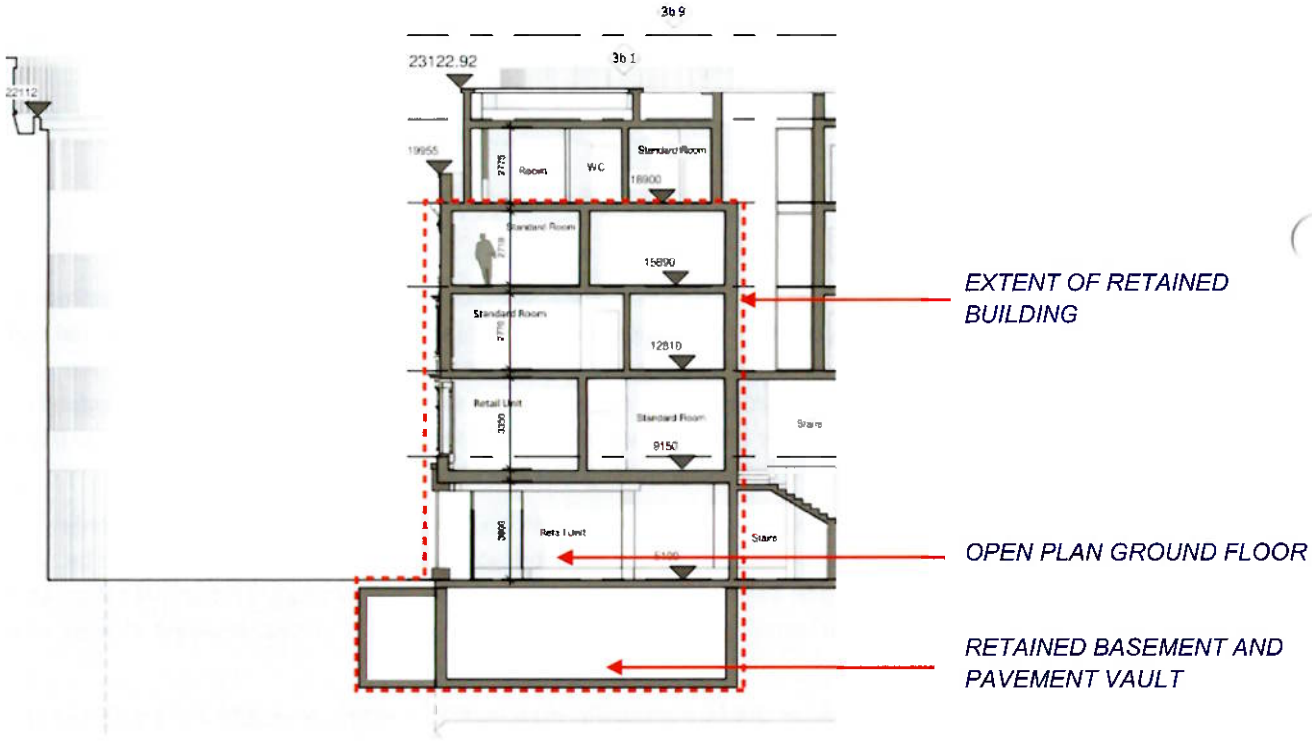


Figure 17 Cross Section 36-37 Henry Street

consist of load bearing perimeter and internal walls supporting steel beams with timber joist floors and potentially a concrete slab at roof level. The structural proposals considered in this report take account of the various floor constructions, details are to be confirmed following opening up works in the future stages of design.

The new architectural design requires the ground floor space to be opened up requiring the removal of the rear elevation at ground floor level and the internal party wall between 36 and 37 Henry Street at ground floor and basement level.

Perimeter walls are also to be removed to provide the new shop frontages onto Henry Street and the new passageway into the site.

A system of back propping and temporary works will be required to enable the structure to be supported during the removal of the walls. A method statement will be developed to consider the best sequence of work wall by wall, re-supporting the wall above at each location before proceeding to the next wall.

Steel transfer structures will be designed with limits on vertical deflections to reduce movement of the structure. The transfer structures may also be preloaded by jacking or precambered to further control structural movement at the time the load is transferred to the new supporting structure.

This temporary works will need to be designed by the contractor undertaking the work in accordance with their construction sequence and method statement. The temporary works may also need to consider the introduction of some pre-stress in the props to minimise the movement during the demolition stage which will form part of the structural specification.

As with any alteration of an existing structure where elements are being removed and re-supported to create clear spans, there will be movement and stresses induced in the masonry walls. Once the new steel transfer structures have been incorporated and the loads re-supported any movement related cracking can then be made good.

There is also a possibility that existing cracking may be found upon opening up the structures, if this is severe some pre-commencement repairs may be required prior to the above work commencing.

Generally, the proposed buildings within Site 3 will have limited areas of basement, however where existing buildings have basements such as at 36-37 Henry Street, these will be retained and incorporated into the scheme.

The following figures provide further detail of the above.

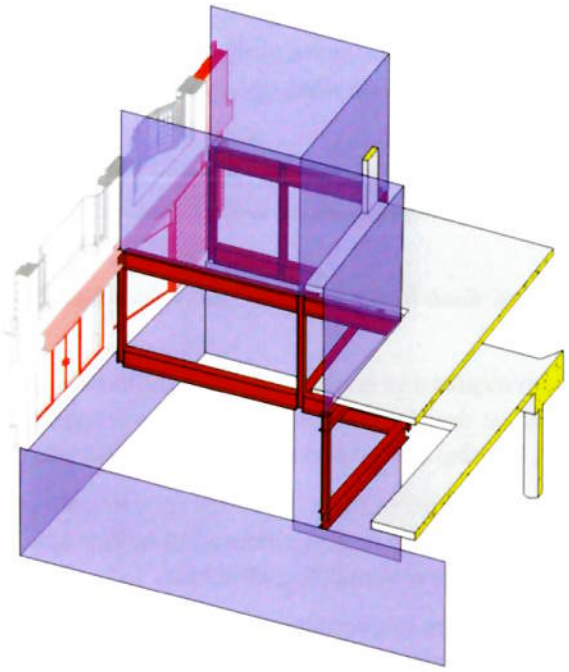


Figure 18 36-37 Henry Street New Transfer Structures

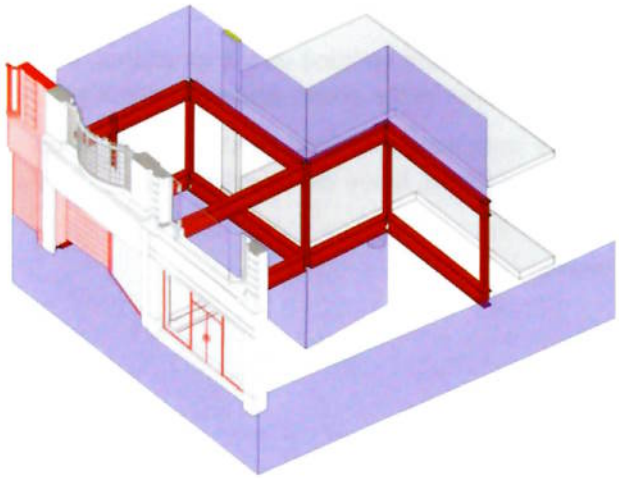


Figure 19 36-37 Henry Street Transfer Structures

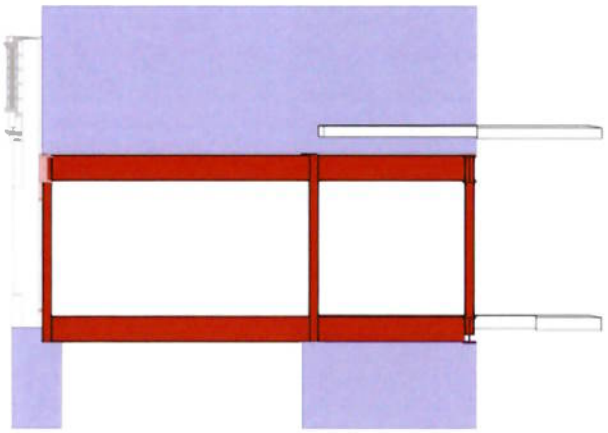


Figure 20 36-37 Henry Street New Transfer Structures

The following sequence of works is proposed. This is to be reviewed following site investigations to confirm the existing construction and condition and following discussions with the contractor. By staging the installation sequence of the new 1st floor frame stresses and movement within the retained building can be minimised.

Frame numbers relate to those shown in Figure 21 and Figure 22.

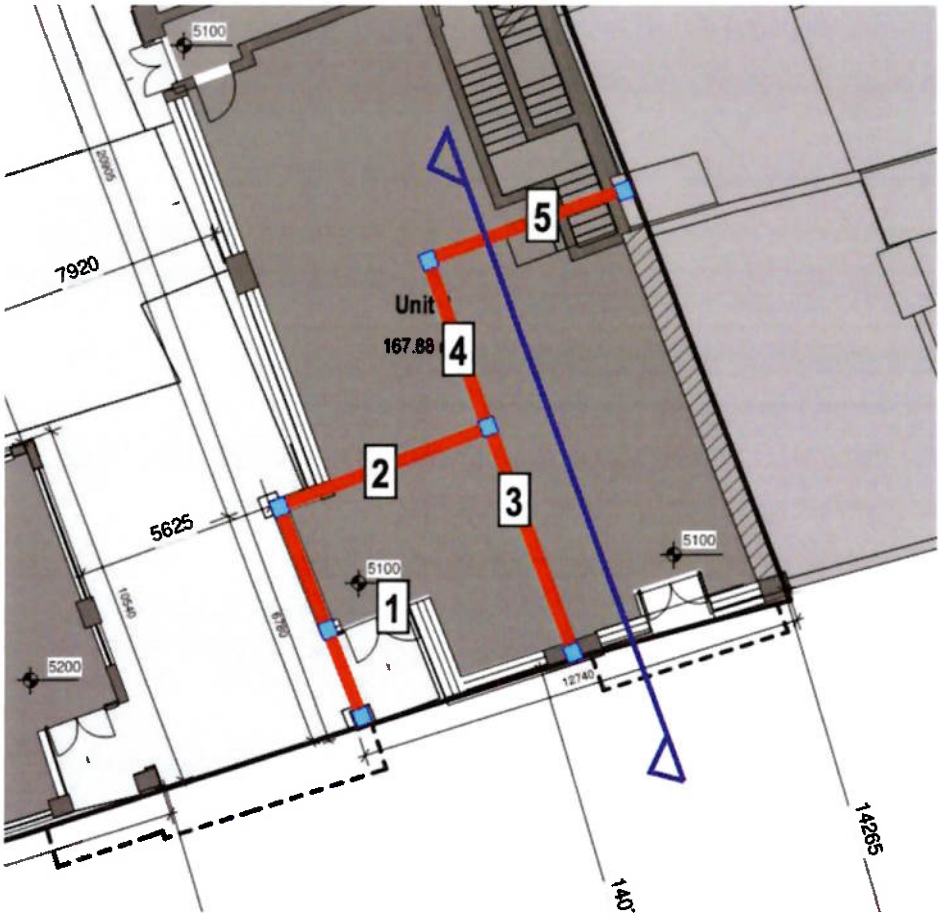


Figure 21 36-37 Henry Street New Steel Layout Ground Floor

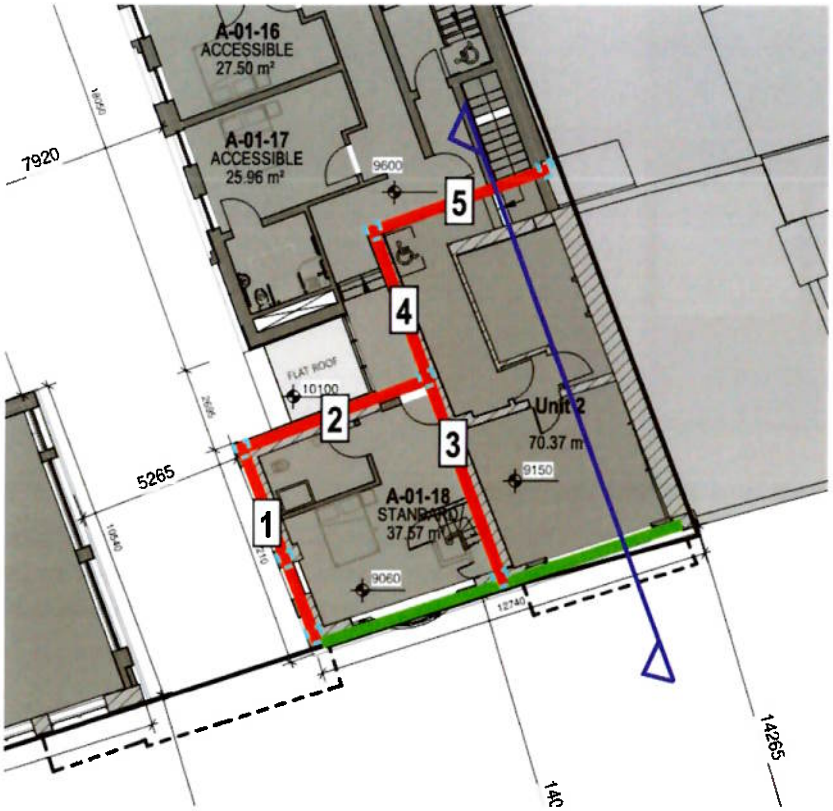


Figure 22 - 36-37 Henry Street New Steelwork Layout 1st Floor

Sequencing for installation of new steelwork

The following is to be provided to the main contractor and is to be developed with the specialist sub-contractors into a fully detailed method statement taking into account the movement monitoring and other requirements for the safe and controlled completion of this work.

1. Temporary support of 37/38 Henry Street party wall at 1st floor.
2. Demolition of 37/38 Henry Street party wall ground to 1st floor.
3. Installation of box frame (1) in 37/38Hnery Street party wall between ground and 1st floor.
4. Temporary support of rear wall 37 Henry Street at 1st floor.
5. Demolition of 37 Henry Street rear wall between ground and 1st floor.
6. Installation of box frame (2) in 37 Henry Street rear wall between ground and 1st floor.
7. Temporary support of 36/37 Henry Street party wall at 1st floor.
8. Temporary support of existing façade beam at 1st floor.
9. Demolition of 36/37 Henry Street party wall in location of frame (4) between basement and 1st floor.
10. Installation of box frame (4) in 36/37 Henry Street party wall.
11. Demolition of 36/37 Henry Street party wall in location of frame (3) between basement and 1st floor.

12. Installation of steel transfer beam at first floor and steel ground floor support beam (3) in location of 36/37 Henry Street party wall.
13. Connection of existing façade beam to new steel beams (3).
14. Temporary support of 36 Henry Street rear wall at 1st floor.
15. Demolition of 36 rear wall between ground and 1st floor.
16. Installation of support beam (5) at t Ground floor.
17. Installation of transfer beam (5) beneath 36 Henry Street rear wall at 1st floor.

The existing staircases in no.36 Henry Street from 2nd to 3rd floor, and no. 37 Henry Street from 1st to 3rd floor are to be retained in the proposed layouts. Fire compartmentation and fire protection of the steel and timber floor structure is to be specified by the Architect.

The existing staircase ground floor in no. 36 Henry Street is to be infilled to provide the hotel layouts at each level. It is assumed the staircase has been trimmed within the existing building by additional timber joists and/or steel beams. The stairs will be removed, and the void infilled with timber joists typical to the existing floors (provided they are suitable for the proposed loads). The existing structure trimming the stair void will be validated for the infill.

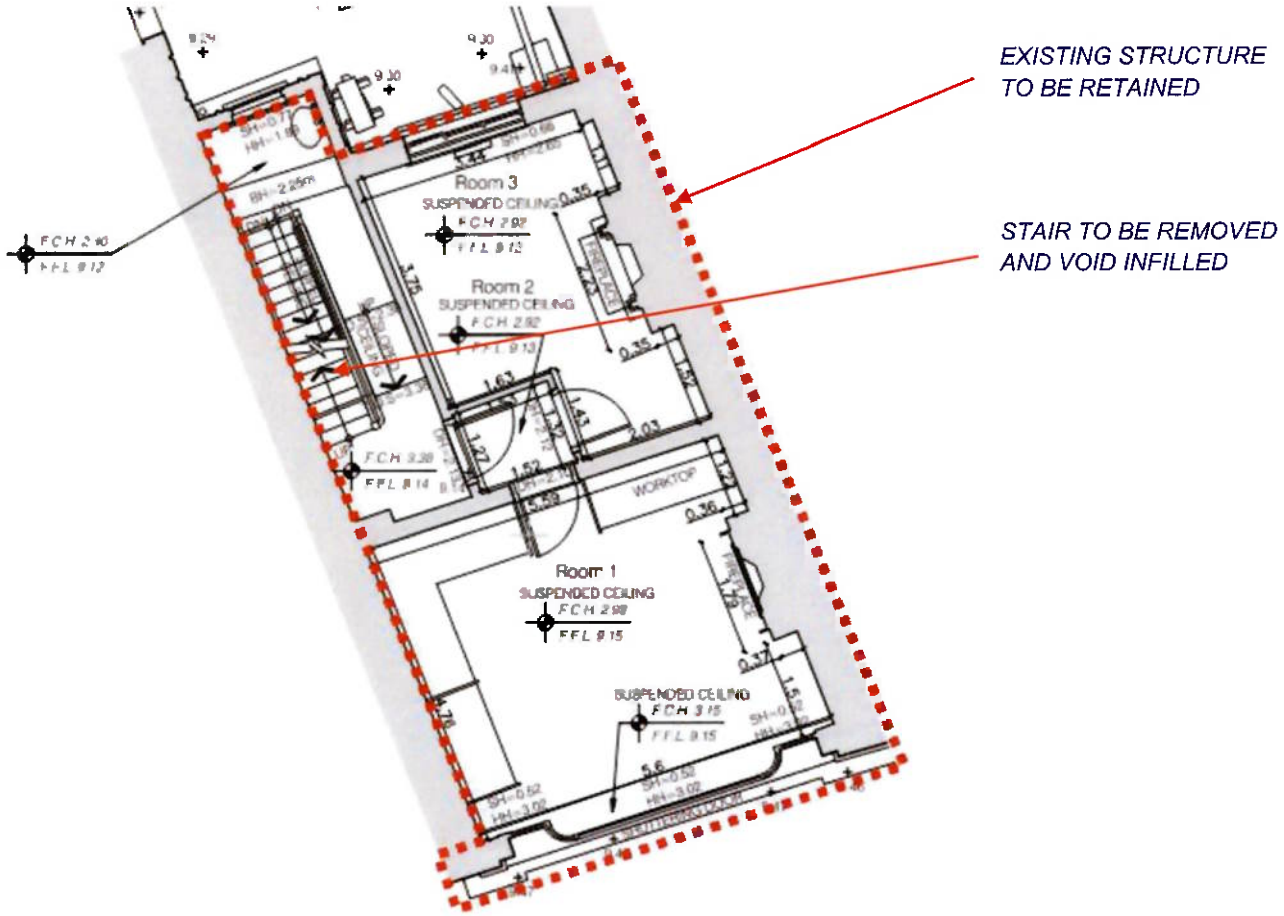


Figure 23 – No. 36 Henry Street - Stair to be Removed – Murphy's Survey Drawing DC-MUR-3X-01-FP-G-00-1216.

It is proposed to add an additional storey to the existing buildings at 36 and 37 Henry Street.

A new lightweight metal structural framing system (SFS), such as Metsec Load Bearing SFS, is to be constructed above the roof level of the existing building to provide an additional 5th storey. It is understood the existing roof is a concrete slab and this is to be retained. Investigation works are to be undertaken at the next stage to confirm the construction and condition of the roof structure. The lightweight SFS system will limit the additional loads to be supported by the existing slab, walls and foundations under.

The extension increases the overall building to 5 stories. As such, this falls into category 2B with regard to disproportionate collapse. It is assumed that there are unlikely to be ties within the existing masonry, such as an embedded steel frame or other measures. Therefore, vertical ties will be retrofitted to the existing building. The location and detailing of these ties will require careful consideration as this is naturally quite intrusive work. The solutions will need to be assessed once the finishes have bene removed with each location potentially requiring a bespoke solution.

The roof top extension is to be supported from the existing masonry walls below where wall lines are coincidental. Along the Henry Street elevation, where the building steps back from the façade, the new lightweight SFS structure will be supported on the existing concrete roof slab. The capacity of this slab requires further investigation and if necessary a new steel or concrete beam may also need to be introduced.

Figure 24 – Proposed Single Storey Extension of Retained Buildings at 36 and 37 Henry Street

At the next stage of the project, intrusive structural investigations will be undertaken on the structural elements. This will include sampling and testing to test for strength and material properties. Where the structural capacity is insufficient, the materials will be replaced with a suitable structural material. Where steelwork bears onto the masonry walls concrete padstones will be installed to distribute the load.

Figure 25 – Typical Metsec SFS System

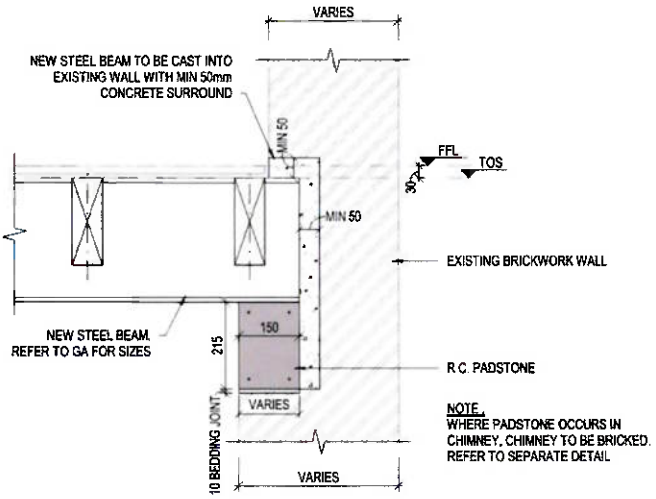


Figure 26 – Typical Padstone Detail for Steel to Masonry Wall

The 1st floor frame to support the retained walls will be supported on pad foundations at the existing basement level. These will need to be installed as part of an initial works package to enable the site wide construction phasing, alongside the retention structures for the existing basement infill where sections of basement are being retained.

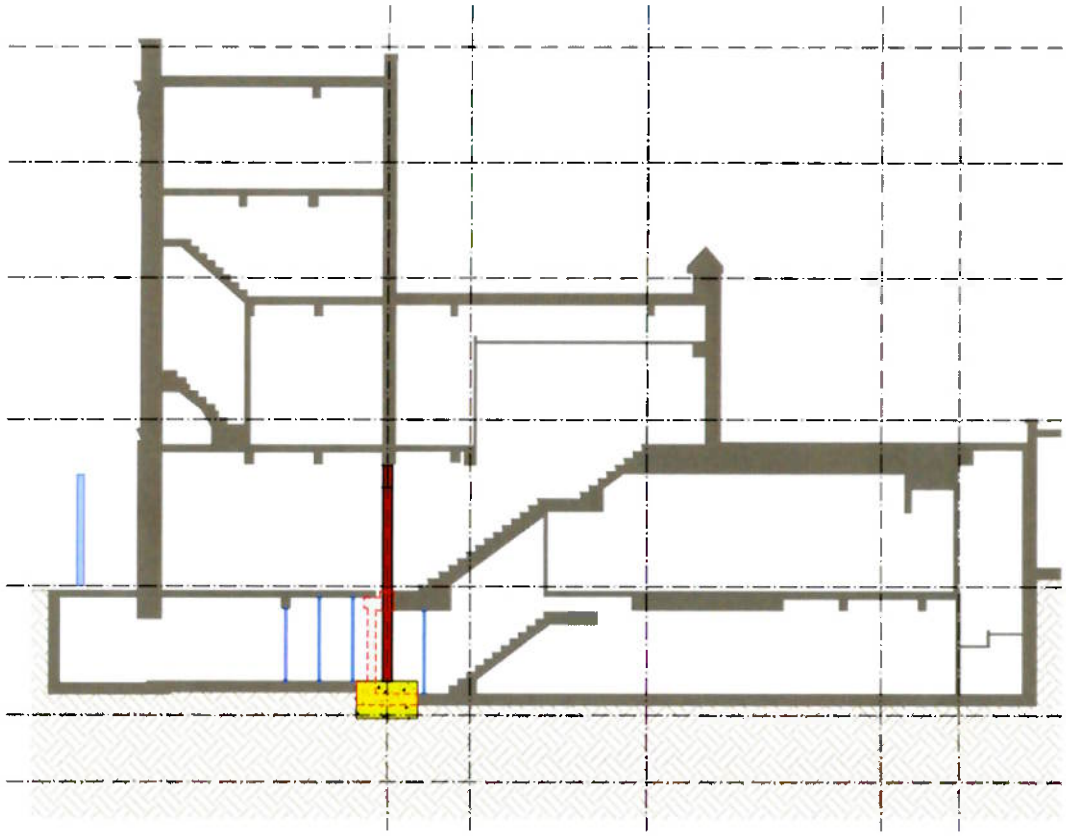


Figure 27 – New Pad Foundations for Support Frame.

4.6.2 8-9 Moore Street / 11-13 Henry Place (Retained)

Part of Block B includes a 4-storey residential unit to the north west corner of the site in the location of the existing 3 storey 8-9 Moore Street and the 2 storey 11-13 Henry Place to the rear. The existing buildings are to be retained and incorporated into the scheme.

A new single storey extension will be added over each part of the retained building, constructed from a lightweight steel frame supported on steel beams spanning between the existing load bearing masonry walls. Due to degradation of the waterproofing and likely damage to the timber construction, the existing roof structures are to be replaced as part of the single storey extension over each of 8-9 Moore Street and 11-13 Henry Place.

A new lift shaft installed within the existing stair void will be constructed from a steel frame or load bearing blockwork, to be confirmed at the next stage, allowing for installation within the existing fabric. An existing staircase to the rear of 8-9 Moore Street, currently serving ground and 1st floors will be extended to provide access to the upper floors. The extension will be formed via a continuation of the existing masonry walls. Existing masonry is to be surveyed and validated for the proposed works.

As above, the existing buildings are supported on ground bearing foundations and adjacent new building on pile foundations. Therefore, to avoid differential settlement creating stresses within the building, an isolation joint between the two constructions is to be installed.

Figure 28 – Location of Masonry-Timber Structure at 8-9 Moore Street.

Existing layouts are to be retained within the new scheme, with minor alterations to facilitate the lift and stairs. The existing ground floor layout provides a semi-open plan space. It is assumed there is structure within the 1st floor to support the load bearing wall lines at the centre and rear of the building from 1st floor. These will need to be retained within the proposed scheme, to provide the architectural layouts and support for the proposed extension over. The existing support structure will need to be investigated for

the proposed loads. The existing concrete ground floor slab within 11-13 Henry Place is to be removed and a new floor installed to create level access between existing footpath and the residential lobby.

The construction of a new concrete ground floor slab would require new supports and breaking out of the existing walls. To minimise the works to the existing structure, new floors are to be constructed from 75mm x 300mm deep C24 timber joints at 300mm c/c supported on joists hangers and spanning between the existing loading bearing masonry walls. Steel straps are to be used to tie the joists to the masonry. Spans are to be limited to 6m and 38mm thick and 225mm deep solid timber strutting (noggins) are to be installed at the mid-span of joist.

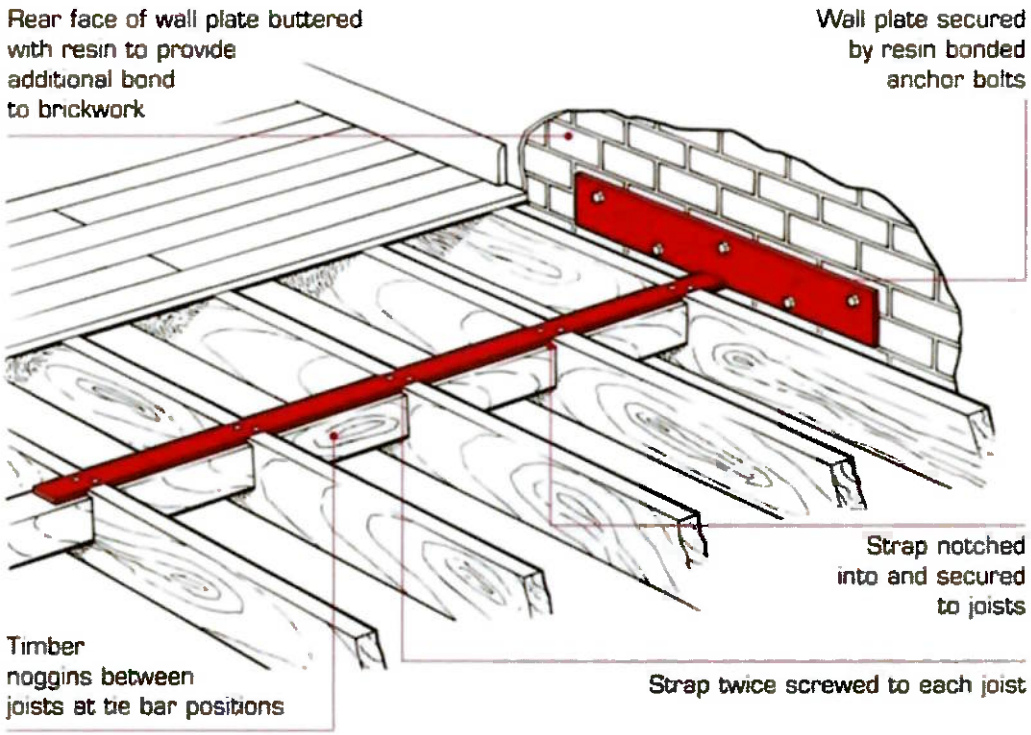


Figure 29 – Typical Remedial Timber to Masonry Detail.

Additionally, the replacement of an existing concrete slab with a timber floor balances the structural loading against the increase in loading from the proposed extension. Therefore, loads to the existing foundations are unchanged and risks of damage to the existing building are mitigated.

The roofs of the proposed single storey extensions are to be formed in the structural frame system with steel purlins to support the finishes over. No plant has been allowed for at the roof level and there will be a waterproofing finish with access for maintenance only.

The new build single storey extensions over the existing building steps back from the existing façade lines to Moore Street and Henry Place. Therefore, structure at the existing roof levels of each building will be required to support the building lines above.

It is proposed that the new walls are supported on steelwork spanning between the existing masonry walls. The extensions will be formed from a light-weight load bearing steel frame, such as Metsec Load Bearing SFS, in order to minimise the load to the existing masonry and foundations.

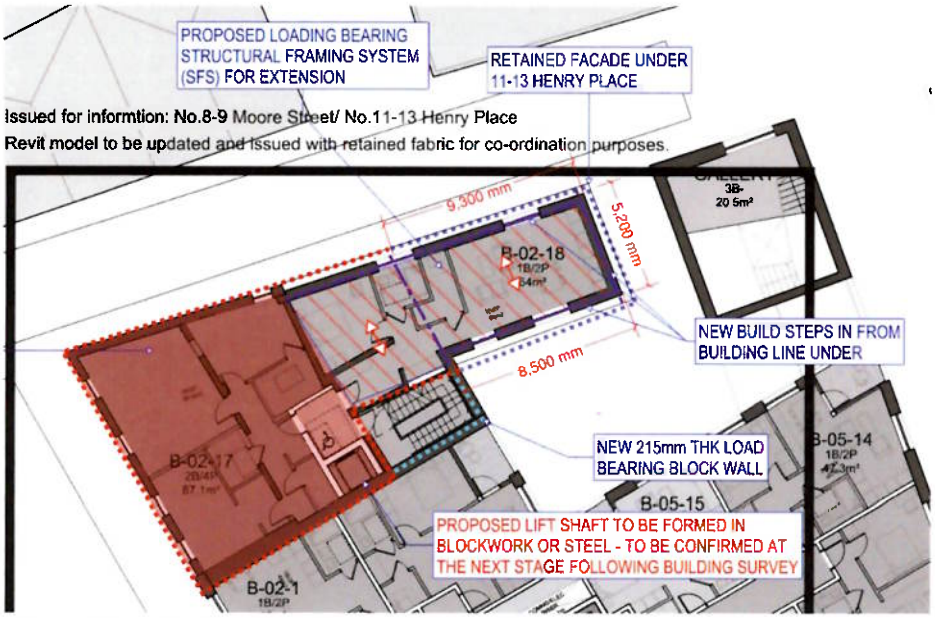


Figure 30 – Steel at 2nd Floor to Support Extension Over 11-13 Henry Place.

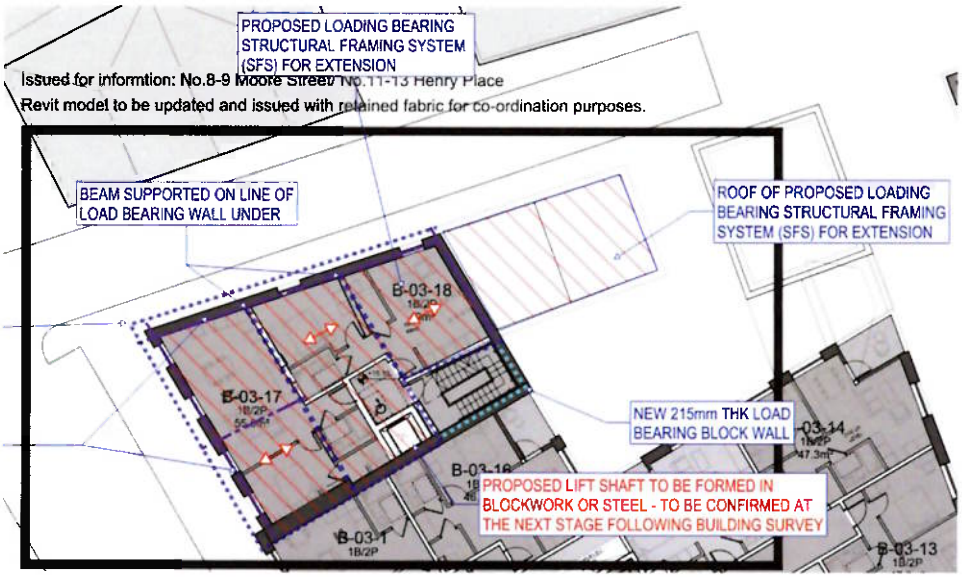


Figure 31 – Steel at 3rd Floor to Support Extension Over 8-9 Moore Street.

At the next stage, investigations for the masonry will be required to establish compressive strength. Steel beams will be supported on concrete padstones within the existing masonry to distribute the concentrated load and reduce stresses within the existing masonry walls.

4.7 Existing Basements

There are a number of existing basements across the site. Where not beneath retained structures, it is proposed that these are filled to provide a level piling platform, from which the proposed reinforcement concrete frame can be constructed.

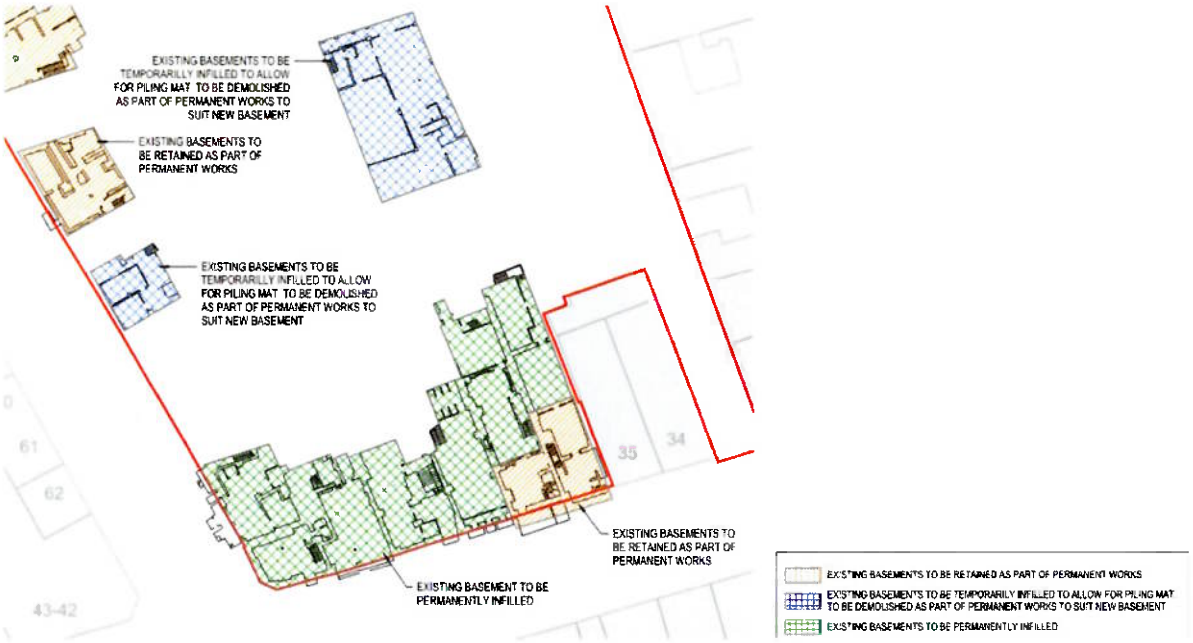


Figure 32 – Site 3 Existing Basements

The existing building at 8-9 Moore Street, including the basement is to be retained. The existing 4 storey elements to the Henry Street frontage of 36 and 37 Henry Street, including the basement area beneath, are to be retained. The 1 and 2 storey elements to the rear of 36 and 37 Henry Street are to be demolished and the basements beneath these areas infilled.

Additionally, it is assumed there are existing basements beneath 34 and 35 Henry Street, these structures occupy the boundary with Site 3 and the buildings are connected to 36 Henry Street and the Site 3 boundary wraps around the rear of these structures.

There are currently no records to show the existence of basements adjacent to the existing basements at 8-9 Moore Street and to the rear of 34 and 35 Henry Street. Therefore, these buildings basement walls are currently supporting the retained earth/fill and the ground floor loading of the adjacent buildings. In the proposed design this condition is unchanged, and as there will be no increase in lateral load on the basement walls of 34,35 Henry Street and 8-9 Moore Street no structural strengthening works are required. Additionally, the new basement secant wall is to be constructed to the rear of 34 and 35 Henry Street and therefore there will be a reduction in surcharge loading on the wall. The effect of this unloading will be examined in more detail as the design progresses. In the temporary condition during construction, vehicular loading from construction works may increase the surcharge loading on the retained basement walls. Therefore, to protect these walls, temporary works will be required during the construction phase.

As 34 and 35 Henry Street are outside of the site boundary, temporary pre-cast concrete units will be installed adjacent to the basement wall, within the site, to retain the backfill/piling mat and avoid surcharge loading being applied to the basement wall. As the basement at 8-9 Moore Street is within the site, temporary raking props can be installed within the basement to brace the existing basement wall.

Where existing basements are being infilled to provide a level piling platform around the basements at 36 and 37 Henry Street and to the west side of 35 Henry Street, new permanent retaining walls are to be constructed adjacent to the retained/existing basements to avoid surcharging the existing walls from the retained soil. Additionally, the retaining structure will protect the basement wall beneath 37 Moore Street from vehicle surcharge loading where the new permanent vehicular access is to be created in the location of 38 Henry Street, which become part of the servicing strategy to the new development. The retaining walls will be pre-cast concrete units, placed on the existing ground at basement level adjacent to the basement wall following demolition of the structure above, these below ground structures will then become part of the permanent works. Temporary weather protection in the form of felt and battening will be fastened to all exposed walls as demolition proceeds, and this will be left in place until the new permanent works progress.

To the front of the existing building, basement vaults are located beneath the pavement outside of the building line. The vaults are to be retained but are not accessible from the proposed scheme. The strategy for the retention is to be developed at the next stage following site investigations to confirm the condition of the existing structure. Structural intervention will be limited to the essential works required to enable the buildings to provide the required performance and long-term durability.

Figure 33 – Location of Existing Historical Pavement Vaults

The basement vault at No. 38 will need to be backfilled to allow for vehicle loading as the proposed passageway is part of the servicing strategy to the new development.

Where retained, existing basements will need to be investigated at the next stage. Any structural defects will be examined and remedial works will be developed and considered according to the heritage status of these buildings.

Where repairs are required, these will be in accordance with the typical procedures for retained buildings where the materials will be replaced with a suitable structural material.

4.8 Building Envelope

Current proposals are for a primarily brick façade. 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. In accordance with structural codes, masonry can be supported at every 3rd storey or 12m, whichever is lower. However, the levels at which vertical support of the outer skin is provided will be dictated by the loading from the façade and deflection criteria for the slab edge.

To the Henry Street, Moore Street, and Henry Place elevations, where the building line steps back at upper floors proposed cladding includes Corten steel. The cladding system will be designed by the specialist, but it is assumed to be supported on the slab and laterally restrained to the primary frame.

Figure 34 – Henry Street Façade Treatment

The White Building at 10 Henry Place is to provide gallery space. It is proposed to construct the primary structure for the white building in timber.

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 163,490m^3 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.

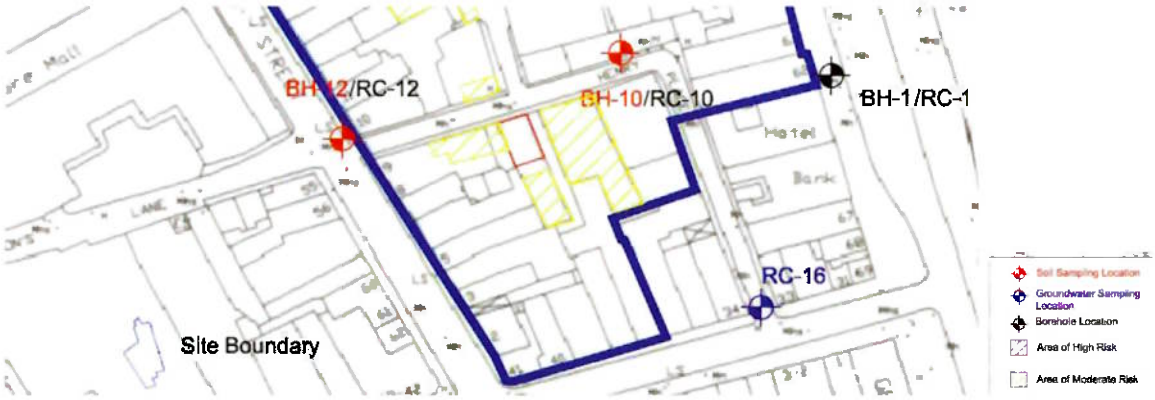


Figure 35 – Site 3 areas of Potential Contaminated Material

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.

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Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	361.8	0	0.0	85	307.6	15	54.3
Concrete, Bricks, Tiles, Ceramics	2050.5	30	615.1	65	1332.8	5	102.5
Plasterboard	160.8	30	48.2	60	96.5	10	16.1
Asphalts	40.2	0	0.0	25	10.1	75	30.2
Metals	603.1	5	30.2	80	482.5	15	90.5
Slate	321.6	0	0.0	85	273.4	15	48.2
Timber	482.5	10	48.2	60	289.5	30	144.7
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	**4021.5**		**741.8**		**2792.3**		**487.5**

Table 2. Estimated off-site reuse, recycle and disposal rates for demolition waste from the Site 3 [extract AWN document ref. CB/20/11784WMR01]

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	308.4	10	30.8	80	246.7	10	30.8
Timber	261.7	40	104.7	55	143.9	5	13.1
Plasterboard	93.5	30	28.0	60	56.1	10	9.3
Metals	74.8	5	3.7	90	67.3	5	3.7
Concrete	56.1	30	16.8	65	36.5	5	2.8
Other	140.2	20	28.0	60	84.1	20	28.0
Total	**934.7**		**212.2**		**634.6**		**87.9**

Table 3. Estimated off-site reuse, recycle and disposal rates for construction waste from the Site 3 [extract AWN document ref. CB/20/11784WMR01]

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

Of particular importance to the Site 3 development are the retained facades and buildings of historical importance and the adjoining buildings to the site.

Retained facades within Site 3 include:

- 5 Henry Place
- 39-40 Henry Street

Other retained buildings of historical importance (in-part/whole) currently proposed within the site development include:

- 36-37 Henry Street
- 8-9 Moore Street
- 11-13 Henry Place

Buildings Adjacent to Site 3 include:

- 34-35 Henry Street

Nearby Building to Site 3 include:

- General Post Office (National Monument)
- 14-17 Moore Street (National Monument)

The redevelopment of Site 3 incorporates the retention of existing buildings on Henry Street and Moore Street, specifically buildings a Nos. 36 and 37 Henry Street and 8-9 Moore Street. 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.

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 3: 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 3 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 3 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 Site 3 - Temporary Works & Exclusion Zones

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 36 – Site 3 - 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 Adjoining & Retained Buildings

The boundary and party walls of the adjoining and retained buildings that rely on the existing buildings for lateral restraint will require a temporary retention system to restrain the existing buildings during demolition and construction stages. This condition potentially exists at the rear of 35 Henry Street and a temporary restraint structure may be required to provide lateral support to this structure during demolition and reconstruction of the new Block A.

This will likely comprise of temporary raking props between the boundary/party walls and thrust blocks located a ground level. The thrust blocks may form part of the foundations to the new development. The temporary raking props will be designed to provide lateral restraint at every existing floor level in addition to lateral wind loads applied to the building.

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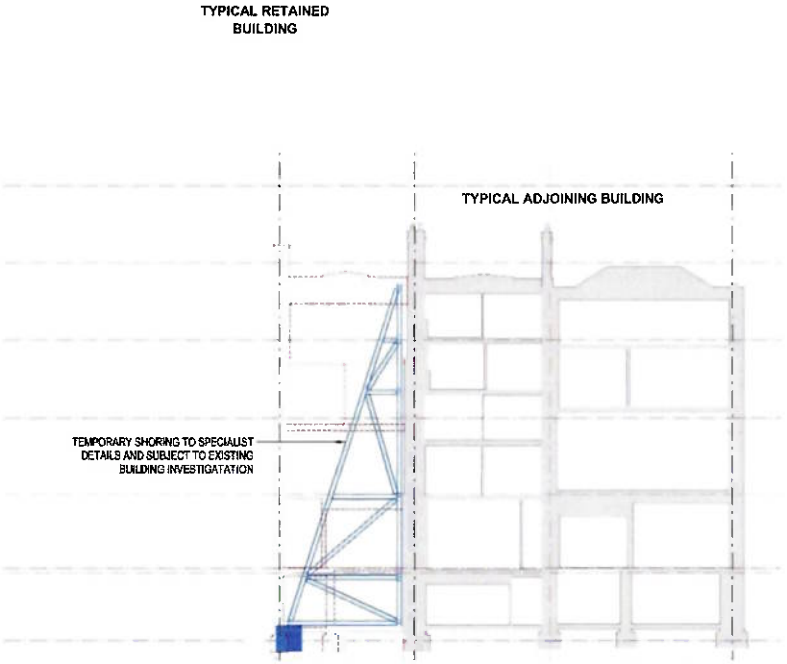


Figure 37 – 34 Henry Street Temporary Boundary/Adjoining Retention System

Once the temporary raking props have been installed the exposed party/boundary walls will be protected from the weather using felt and battens (or as agreed with the neighbouring property owner). The boundary walls and retained structure within the site will be continuously monitored for movement and vibration during demolition and construction.

On completion of the adjoining structural frame, the new development may restrain the existing boundary/party walls via lateral restraint fixings. Typically, these are fixed into the existing masonry walls at every floor level.

Considerations are to be made by the contractor during demolition and construction where the existing building are to be temporarily exposed to external elements, such as new openings for stair connections or where roof structures are being removed. The contractor is to ensure suitable protection is provided through the use of external scaffolding and building sheeting to avoid the ingress of water.

6.4 Retained Façades

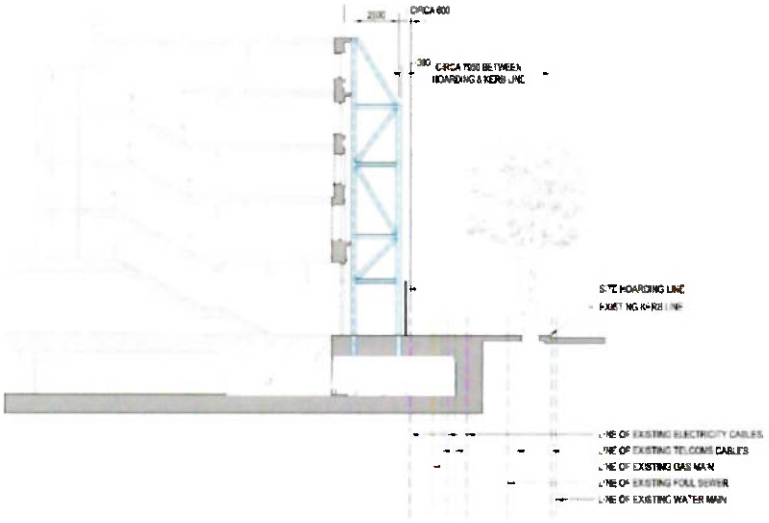
The retained façade at 39-40 Henry Street will require a temporary retention system. The system will be designed by the temporary works specialist but will typically involve a cantilevered steel frame from pavement level, supported on concrete kentledge and laterally restraining the existing retained façade at the existing floor levels. The retained facades will be continuously monitored for movement and vibration through all stages of the project.

Typically, the façade retention system will be located externally to the building envelope to allow for unobstructed for the new construction. However, in certain circumstances where there is not sufficient space or safe access along the pavements or roads, the retention system will be installed on the internal face of the façade. This will need to be factored into the design of the façade retention system, access strategy and construction sequencing. Existing vaults beneath the pavement will also need to be factored into the construction phasing and the design of the façade retention system.

façade retention system will include:

Stage 1 – Installation

- Back-propping of basement vaults where necessary.
- Erection of a cantilevered steel frame on kentledge blocks or piled footings.
- Façade restrained at existing floor or mid-floor levels via steel waling beams either side of the facade fixed using through-bolts located at existing openings or site drilled to locations agreed with the Conservation Architect.
- Timber framing and bracing to the existing window and door openings within the façade via timber bracing/blockwork.

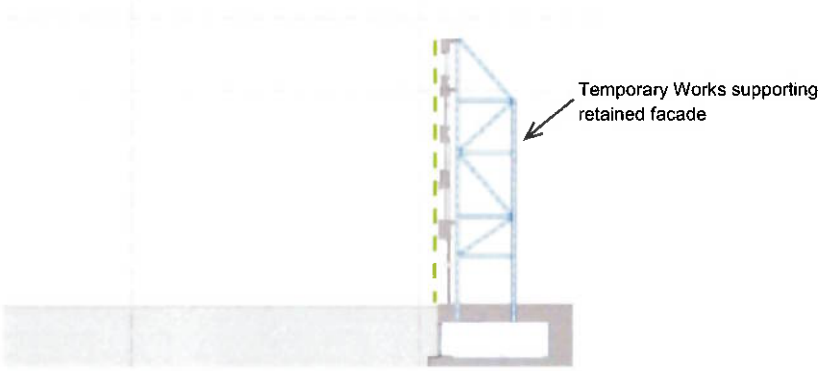


Notes

1. *The temporary façade retention system will be designed later by the Temporary Works Specialist to performance criteria agreed with Waterman.*
2. *The extent of the façade retention system on the pavements and will need to be agreed and approved with Dublin City Council.*

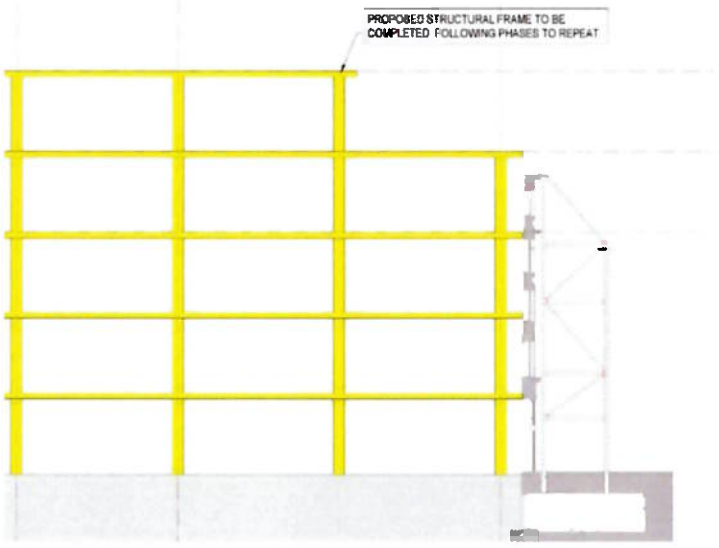
Stage 2 – Demolition

- Demolished adjacent to the retained facades will be undertaken top-down using low vibration demolition techniques. It may be necessary to first saw cut connected elements and isolate the façade from the main demolition works that may cause vibration.
- Temporary weather protection measures (felt and battens) will be applied to the rear of the retained façade to ensure the façade is protected during the works.



Stage 3 – Construction & Completion

- Once the structural frame is completed and new façade and the new restraint fixing have been installed, tested and approved by all parties, the temporary works can be removed.



In the permanent condition the façade will be laterally restrained to the primary structure.

Coordination is to be undertaken with the masonry specialist alongside further investigative works however typical principles involve brackets fixed to the slab edge with a fixing detail to the internal face of the existing façade. Due to the different ground bearing strips and pads and piled foundations solutions for the existing and proposed structures respectively, to avoid stresses in the structure and connections created by differential settlement, vertically slotted holes are provided within the fixing detail. Brackets are to be provided at regular centres and anchor fixings resin bonded into the masonry.

In order to inform the number and type of fixings brick and mortar strength tests will be required to be undertaken on the existing facades. Fixing pull out tests will also be required to confirm capacity of fixings.

The following sections provide typical details for fixings from both a concrete and steel primary frame into a solid masonry wall or embedded steelwork within the masonry. They type of connection to be used on the development will be confirmed following site investigations to confirm the existing construction.

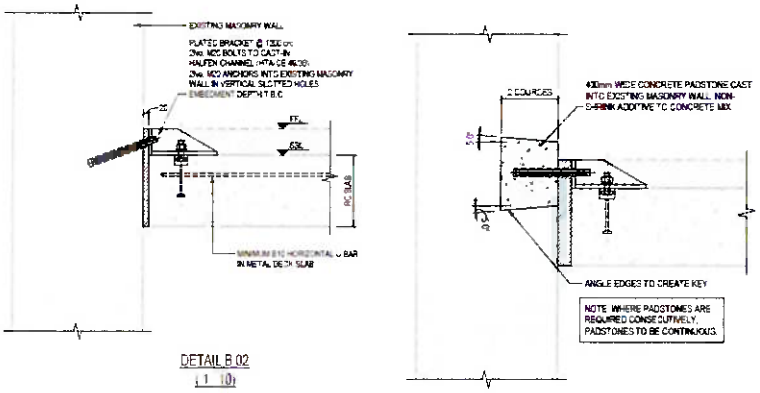


Figure 37 – Typical Permanent Façade Restraint Fixing (RC Frame)

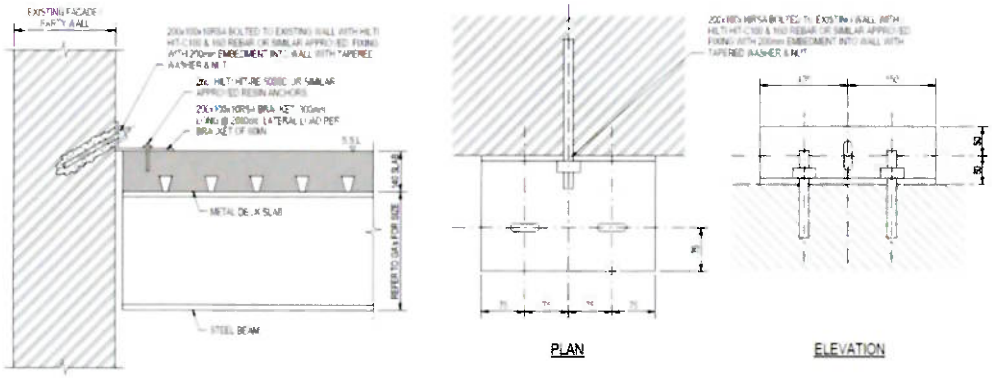


Figure 38 – Typical Permanent Façade Restraint Fixing (Steel Frame)

6.5 Movement Monitoring of Retained and Existing Structures

6.5.1 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.

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.

6.5.2 Proposed Monitoring Regime

The retained structures and neighbouring buildings shall be continuously monitored for changes in vertical and lateral movement with real-time data available. 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

Table 4 – Proposed Movement Trigger Levels

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.

7. Control and Monitoring of Noise, Vibration and Dust on site

7.1 Condition Surveys

It will be necessary to carry out a detailed condition survey of all adjoining lands and properties prior to any works commencing on site, with particular attention paid to the protected structures noted previously in this report. In addition, baseline movement monitoring will be carried out in line with best practice.

7.2 Noise Monitoring

The contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives by means of risk assessment and mitigation / precautionary measures and equipment, all in full compliance with the current Health and Safety legislation.

Noise on site shall comply with Safety, Health and Welfare at work (construction) Regulations 2006 to 2013, Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for full and partial demolition, BS 5228:2009+A1:2014 Parts 1 & 2 - Code of Practice for noise and vibration control on construction and open sites – Vibration, Environmental Protection Agency Act 1992 Sections 106-108, including all Local Authority specific requirements for this specific site.

A survey of baseline noise and vibration will be undertaken to gain an understanding of the typical range of the existing conditions in the surrounding area. Methods of minimising construction noise and vibration will be implemented where possible. The Main Contractor is to implement these recommendations and utilise the most efficient construction methods to reduce the impact on the neighbouring environment.

The nature of construction activities means that a certain level of noise is inevitable, but the appointed Main Contractor must endeavour to minimise this as far as practically possible and reduce the effect and any nuisance to the surrounding environment and neighbours.

Work methods are to be reviewed to ensure minimal noise and vibration are created; methods should include:

- Each item of plant used on site complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/ [S.I. No. 632 of 2001].
- All plant and equipment liable to create noise whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors and neighbouring occupied buildings.
- The use of barriers and hoarding to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective shall not be operated until repaired.
- Fixed items of construction plant shall be electrically powered in preference to diesel or petrol driven. The Main Contractor shall ensure that vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers.
- Machines in intermittent use shall be shut down or throttled down to a minimum during periods between works. Static noise emitting equipment operating continuously will be housed within suitable acoustic enclosures, where appropriate.
- Tower cranes will be utilized instead of crawler cranes as these are electrically powered and quieter in operation.
- Noise suppression hammers and shields will be used on rock breaking equipment.

- Working hours will be confined to those stipulated in the grant of planning permission.
- Noise emitting processes such as rock breaking can be suspended during sensitive hours, to be agreed in consultation with DCC and neighbours.
- Alternative work practices will be investigated where the noise emitted is reduced (for example prefabricating building components off site).
- Site deliveries will be confined to working hours and allocated offloading location will be utilized for all deliveries.
- The Site Manager will also continually review and monitor the noise / dust / vibration levels / risk throughout the duration of the project and if necessary, adjust / add to the control measures to be employed to reduce nuisance.

7.2.1 Measures to Mitigate Noise

Of particular consideration is the noise from construction activities adjacent to the public footpaths and commercial areas (Moore Street, Henry Street and O'Connell Street Upper). Noise mitigation measure will be proposed by the Contractor and may include:

1. The installation of a solid timber hoarding to provide noise insulation.
2. A high-level acoustic wrap applied to the scaffolding to provide some degree of noise barrier.
3. Particularly noisy works can have an acoustic noise control barrier put around them when the works are being carried out.
4. When jack hammers are used a "no racket" jacket will be applied which reduced the noise by up to 10db when 50ft away.

Figure 39 – Typical Noise Mitigation Measures

7.3 Vibration

During the course of the work proposed at Site 3 Ground borne vibrations from the proposed works could give rise to adverse effects to the Heritage Structures / Protected Structures / National Monument and these control measures are to be put in place during the works to ensure protection of the structures and finishes.

7.3.1 Proposed works and potential risks

The proposed works involve excavations; piling works and general construction works of basements, multi-storey framed building and repairs to the historic structures / protected structures themselves immediately adjoining.

Potential risks arising from Demolition and Construction Works identified:

(a) Vibration induced damage from demolition, piling and excavation works.

(b) Physical impact from machinery and /or swing of material deliveries

(c) General implementation of works such as landing shutters / reinforcement / steelwork deliveries in close proximity to the historic / protected structures.

(d) Works to the historic / protected structures themselves.

7.3.2 Vibrations Standards

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (hereinafter referred to as BS7385:1993).
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration* (hereinafter referred to as BS 5228-2 2009+A1:2014).

7.3.3 Impact of ground borne vibrations arising from Proposed works

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration*
-

BS7385-2:1993 and BS5228-2:2009+A1:2014 advise that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges.

The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 5. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at base of the building.

Historically important buildings, that are difficult to repair might require special consideration on a case by case basis, but buildings of historical importance should not be assumed to be more sensitive unless they

are structurally unsound. If a building, is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other groundborne disturbance.

The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed, depending on their structural integrity. Where no structural defects are noted, the same limit to those for light framed buildings apply. For other structures and buildings that are determined to be potentially vulnerable to vibration due to significant structural defects, a further stringent criteria has been applied for transient vibration. It is assumed that known buildings and structures of this kind, will be subject to condition surveys well in advance of the works, and any defects identified repaired. The results of conditions surveys will determine whether a building or structure is classed as "vulnerable".

Table 5 sets out the limits as they apply to vibration frequencies below 4Hz where the most conservative limits are required. At higher frequencies, the limit values for transient vibration within Table B.2 of BS5228-2:2009+A1:2014 will apply, with similar reductions applied for continuous vibration and those for protected structures.

Structure Type	Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:	
	Transient Vibration	**Continuous Vibration**
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings *Note 1	6mm/s – 15mm/s	3 mm/s – 7.5mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/s	

- *Note 1: The relevant threshold value to be determined on a case by case basis. Where sufficient structural information is unavailable at the time of assessment, the lower value within the range will be used.*

Table 5 – Thresholds relating to the Transient and Continuous Vibrations in buildings and structures

7.3.4 Mitigation Measures to be put in place prior to works

For controlling vibration reference should be made to BS 5228:2009+A1:2014 which offers detailed guidance on the control of vibration from demolition and construction activities. In general BS5228:2009+A1:2014 advises the following:

- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimize drop height of materials.
- Regular and effective maintenance by trained personnel should be carried out to reduce vibration from plant and machinery.

• Hand demolition, cutting of the separation joints of the buildings in advance and small robotic breakers and 'munchers'

Level of protection and procedure put in place will be dictated by potential risk resulting from work to be carried out.

The proposed construction methodology for the structures directly adjacent to upstanding historic structures will be designed by the contractor to ensure that all protection measures are adhered to and that all new works are undertaken in such a way as to limit vibration.

All works within the sensitivity zones of the historic structures will be carried out using piling and excavation and assembly techniques to ensure vibration levels are kept below the threshold level.

7.3.5 Monitoring and Mitigation for Ground borne Vibrations during Construction Works

Detailed monitoring will be used to control the proposed works and to ensure compliance with the proposed control limit to protect the Historic Structures / Protected Structures / National Monument.

Vibrations movements will be actively measured during the works with a pre-determined plan of action ready to be put in place should actual measurements vary from the expected levels.

The works will have appropriate level of site management, on site monitoring and supervision. A site representative will be present during the works to ensure the levels are as expected and to supervise any measures should the levels be exceeded.

A real-time response remote monitoring system with warning system will be adopted to monitor vibration. This is to be continuously monitored by on site personnel during demolition; excavation; piling and general construction works. Review of the monitoring data will happen concurrently with the works to ensure that corrective action is undertaken if a limit is breached, or if the developing trend in measurements indicates a limit may be breached if works continue. This real time review and response of the monitoring data is critical to ensuring no limit is exceeded.

In the event that control limit is approached the contractor for the works will explore a revised approach for completion of the works.

Monitoring will include vibration monitoring carried out at the historic structures along with survey points installed on the walls of the historic structures to monitor any movement during the works.

Tell-tale crack monitors will also be installed on existing defects on the historic structures and or its boundary wall where appropriate.

In accordance with established good practice, baseline monitoring will be undertaken in advance of the proposed works in order to establish the existing environment around the historic structures and to verify the correct operation of the proposed instruments.

A series of trigger limits will be set for the works following what is commonly called a 'traffic light' system.

- For measurements below an 'amber limit' works can continue.
- For measurements between an 'amber/red limit' and below the 'red limit' operations will be suspended immediately. The construction methodology will be reviewed and adjusted as required to allow works to proceed on a manner that maintains the integrity of the historic structures.
- Works can continue between the amber and maximum red limit but only when methodologies have been revised to attempt to bring vibrations back below the amber level and also with a greater level of monitoring and control.

Should vibrations go above the red limit works will be suspended for a full review of the exceedance event(s); revision of works procedures and approval by the clients' representatives / OPW before operations can proceed again.

7.3.6 Limits for Ground Borne Vibrations

Vibration monitoring and controls are required to be installed prior to the works commencing and for the full duration of the works to ensure the proposed control limit is not exceeded thus avoiding adverse impacts on the historic structure.

A warning threshold shall be implemented as per the limits outlined in Tables 5 above.

Baseline vibration monitoring will be undertaken prior to commencement. The baseline readings should be referenced and incorporated into any Agreement with neighbouring properties and DCC on maximum vibration limits permissible when working nearby.

Toolbox talks should also be carried out with personnel in respect to managing vibration on site. Exposure limits as set out in Regulation 4 of BS 5228:2009+A1:2014 will be reviewed, risk assessments carried out, detecting signs of injury, safe working practices and suppression techniques will all be incorporated. Methods of construction should be adopted to omit and or control vibration at the source, utilize lower levels of vibration; use vibration pads and gloves where possible. Any activity which will generate vibration should as far as practicable be isolated from sensitive receptors.

7.4 Air & Dust Management

A dust management plan will be compiled by the Main Contractor for the development.

The following precautions to minimise nuisance to the public and neighbouring occupiers caused by dust and dirt will be carried out by the contractor.

- Vehicle and wheel washing facilities shall be provided at site exit where practicable. If necessary, vehicles are to be washed down before exiting the site.
- Netting is to be provided to enclose scaffolding to mitigate escape of air borne dust from the existing buildings.
- Shroud piling machinery as shown below when operating near to boundaries.
- Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials to be permitted on site.
- Water sprays for dust suppression should be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste should be removed from site as quickly as possible to minimise risk of dust generation and any fine material should be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons should be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.
- Prior to commencement, the Main Contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods should be employed by the Main Contractor.
- The Main Contractor should allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The Main Contractor will be required to appoint a senior member of its site management team to act as the liaison with third parties in respect of complaints regarding dust and or site activities.
- Monitoring of dust deposition should be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Lift limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

Figure 40 – Typical Dust Mitigation Measures

8. Archaeology

Archaeological monitoring will take place where any preparatory ground reduction works are required including site investigation works and opening up works at basement or ground levels. Post-demolition archaeological investigation will be carried out in areas across the site without basements. This is required to establish the nature of below ground structures, foundation remnants and features of archaeological and historical importance and to establish the presence or otherwise of archaeological remains. Further resolution may involve the recording of historic features and full archaeological excavation (i.e., preservation of the archaeology in record form, of all archaeological soils or features encountered). The resolution will occur during this post demolition phase in the area of the find spot in advance of the main construction phase.

9. Building Control Amendment Regulations

9.1 Quality Assurance during Construction and BC(A)R Compliance

The Main Contractor/Contractors will need to demonstrate how they will be providing quality in construction. They shall comply fully with all requirements of the Amended Building Control regulations to the satisfaction of the Ancillary and Assigned certifiers.

The Main Contractor/Contractors will be responsible for the preparation of benchmark samples of each new element of the works to the satisfaction of the Assigned and Ancillary Certifiers under the Building Control regulations (BCAR). Each benchmark sample will be considered a 'hold point' under the Preliminary Inspection Plan (PIP) and will be required to be offered up to the Certifiers involved ahead of the works starting - with a minimum of two days' notice (in writing).

The Main Contractor/Contractors will be required to keep pre- and post-pour check sheets for submission to the assigned and ancillary certifiers where required.

Written acceptance will be required from the Certifiers after inspection of the benchmark samples before the rest of the works proceed.

Where 'specialist' suppliers are noted by the design team to have design responsibility, they will be required to provide Certificates of Design (Sd), Certificates of Inspection (Si) and Certificates of Completion (Sc). Ahead of appointment of the 'specialist' suppliers / designers - evidence of competency and Professional Indemnity insurance cover will be required for the approval of the Contract Administrator and Waterman Moylan.

This is to be confirmed by the Main Contractor/Contractors once appointed and will include a quality check regime.

10. Liaison with Third Parties

It is imperative that the Main Contractor/Contractors engages in discussions with local residents, businesses and the general public well in advance of work commencing on site. Formal communication should be provided to immediate neighbours regarding activities or possible disruptions.

The appointed contractor will be required to adopt the practices covered under the 'Considerate Constructors Scheme' for establishing a good neighbour strategy and maintaining good relationships with neighbouring communities. The ideas described within this scheme will be implemented on site where applicable to minimize negative impact on local community and the environment.

Handling of any complaints must be logged and actioned quickly by the Main Contractor/Contractors.

APPENDIX A

Site 3 – Site Setup

REV DATE DRN APP.	STATUS: PRELIMINARY	CLIENT: Dublin Central GP Ltd. / ARCHITECT	TITLE: Preliminary Site Setup Plan
C:\Users\nicksmith\Documents\		PROJECT: Dublin Central - Site 3	DRWN. RN · DESIGNED RN · APPROVED RO · DATE 26.11.20
			SCALE NTS · JOB NO. 19-021 · DRG NO. DC-WM-ZZ-ZZ-SK-S-100 · REVISION

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UK and Ireland Office Locations

APPENDIX 3.3 OUTLINE CONSTRUCTION & DEMOLITION MANAGEMENT PLAN – SITE 4

Dublin Central

Outline Construction & Demolition Management Plan – Site 4

Dublin Central GP Limited

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

May 2021

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Waterman Moylan
Engineering Consultants

Client Name: Dublin Central GP Limited
Document Reference: DC-WAT-4X-XX-RP-C-001015
Project Number: 19-021

Quality Assurance – Approval Status

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)

Issue	Date	Prepared by	Checked by	Approved by
P1	07.05.21	R. Nelson	C. Beresford	R. Osborne
P2	10.05.21	R. Nelson	C. Beresford	R. Osborne
P3	11.05.21	R. Nelson	C. Beresford	R. Osborne
P4	18.05.21	R. Nelson	C. Beresford	R. Osborne
P5	19.05.21	R. Nelson	C. Beresford	R. Osborne

Comments

FINAL ISSUE

Disclaimer

This report has been prepared by Waterman Moylan, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the Client.

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report is confidential to the Client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Content

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.

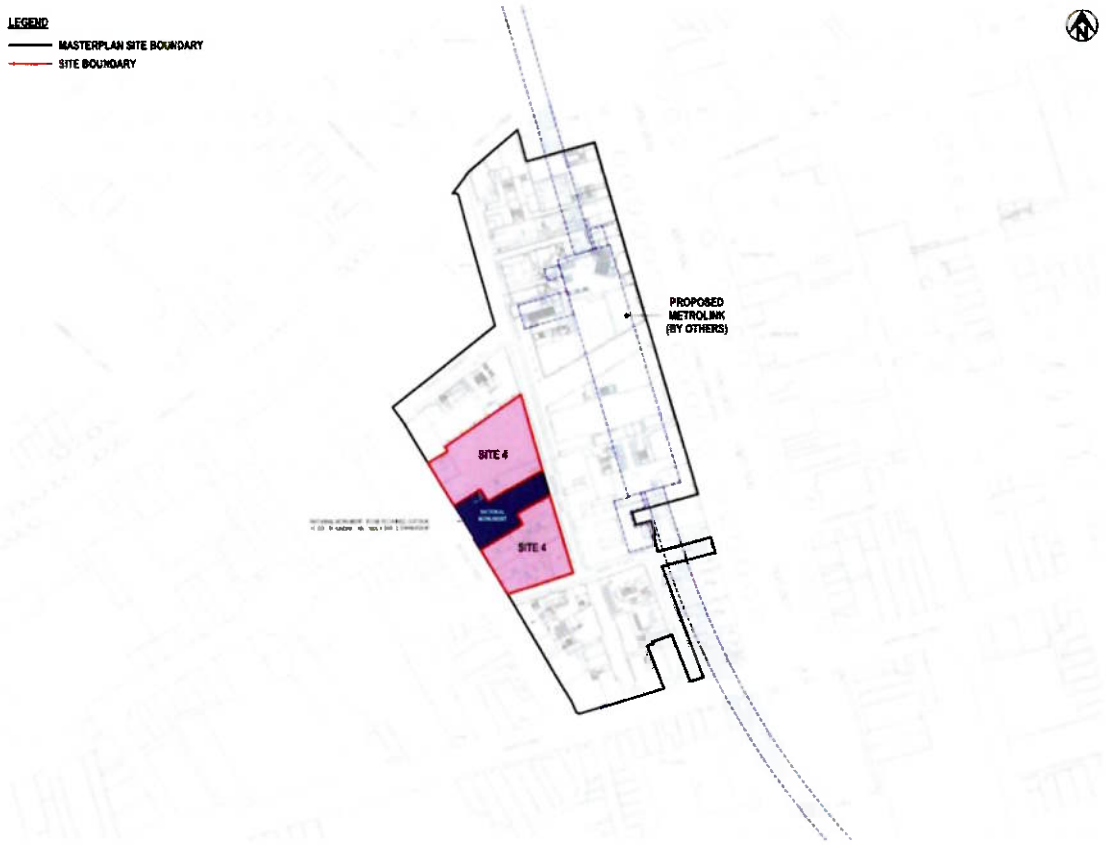


Figure 1 – Site 4 Location Plan

'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

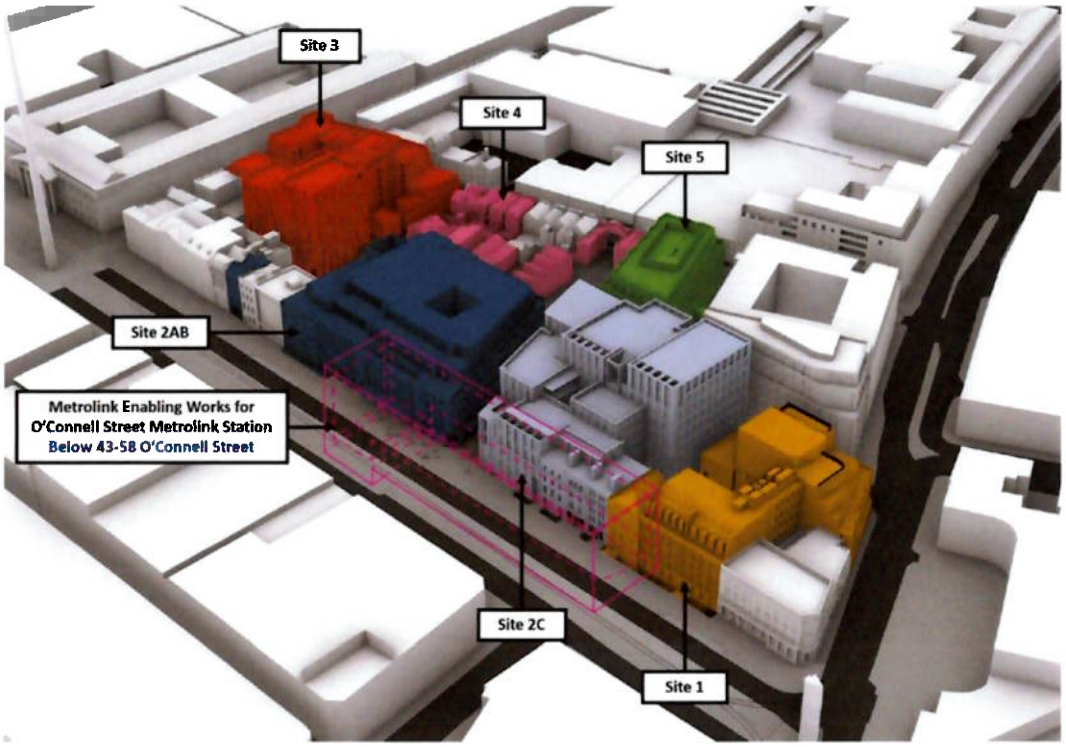


Figure 2 – Phasing Strategy

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).

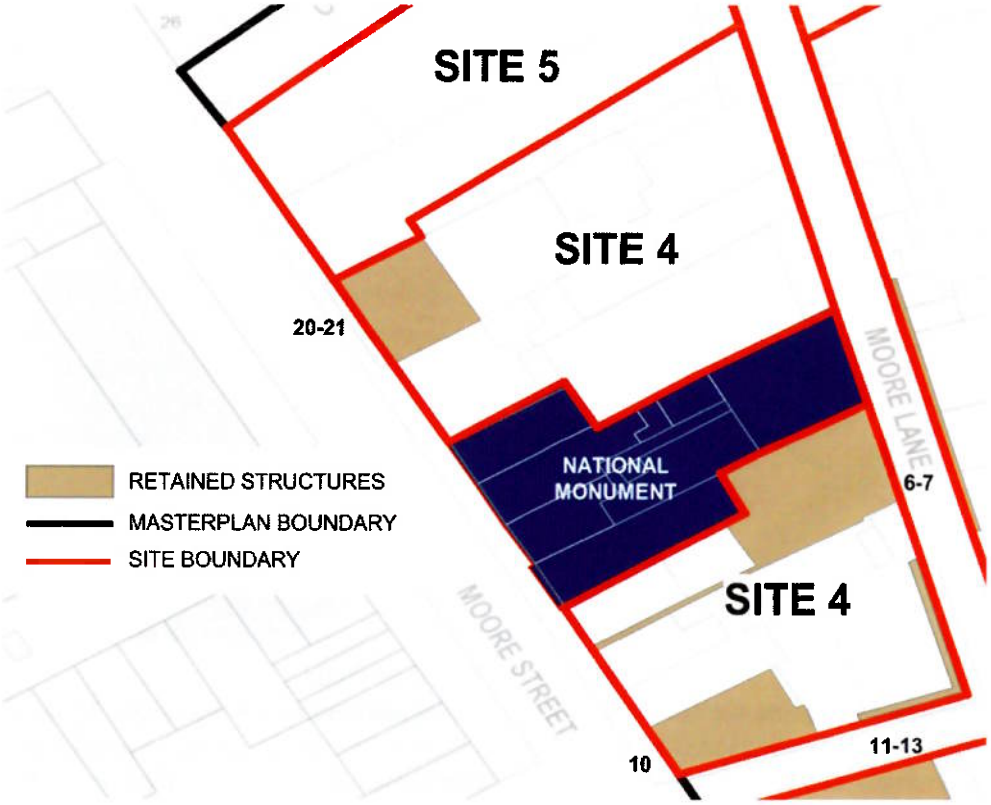


Figure 3 – Site 4 Location Plan

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.

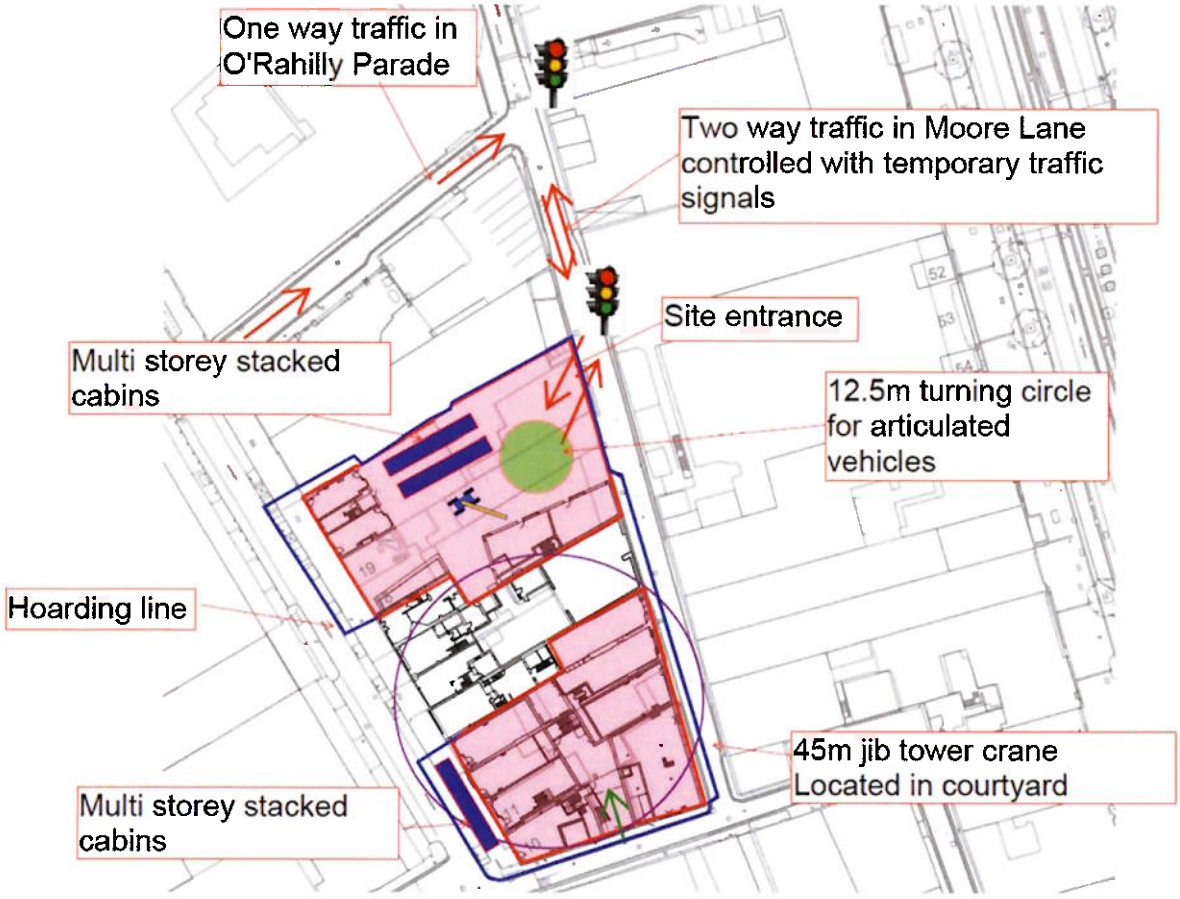


Figure 4 – Site 4 Proposed Site Setup

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.

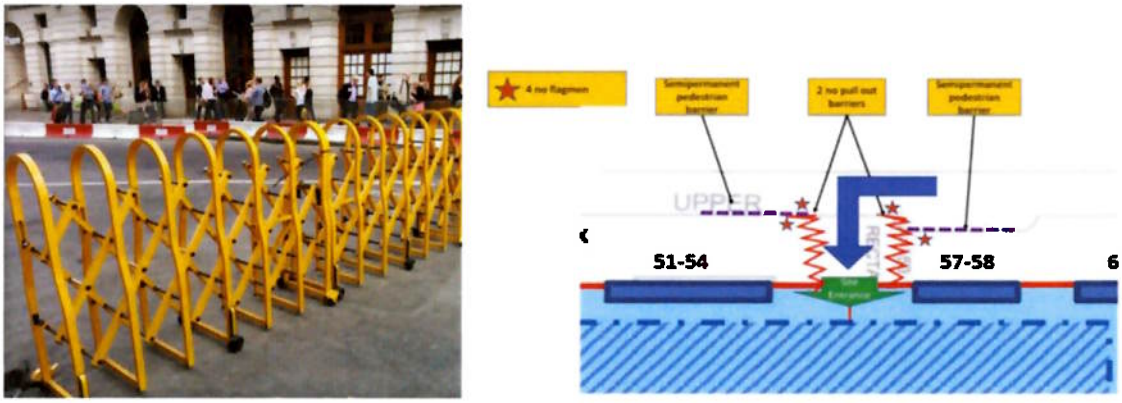


Figure 6 – Typical Pavement Crossover System

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.

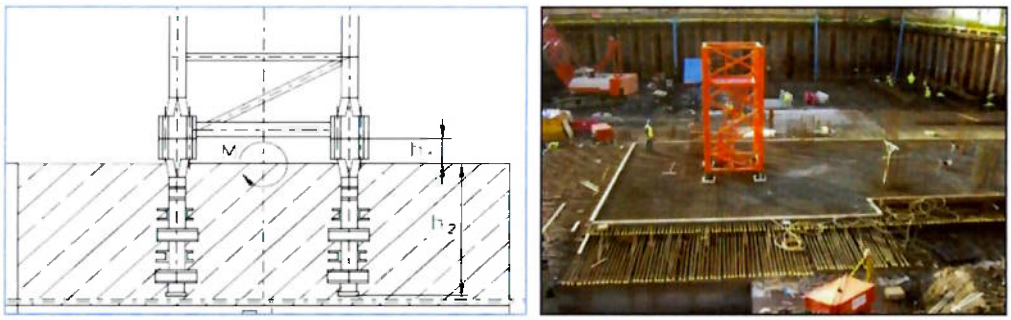


Figure 7 – Typical Tower Crane Anchors

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 additional 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 Siochana 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.

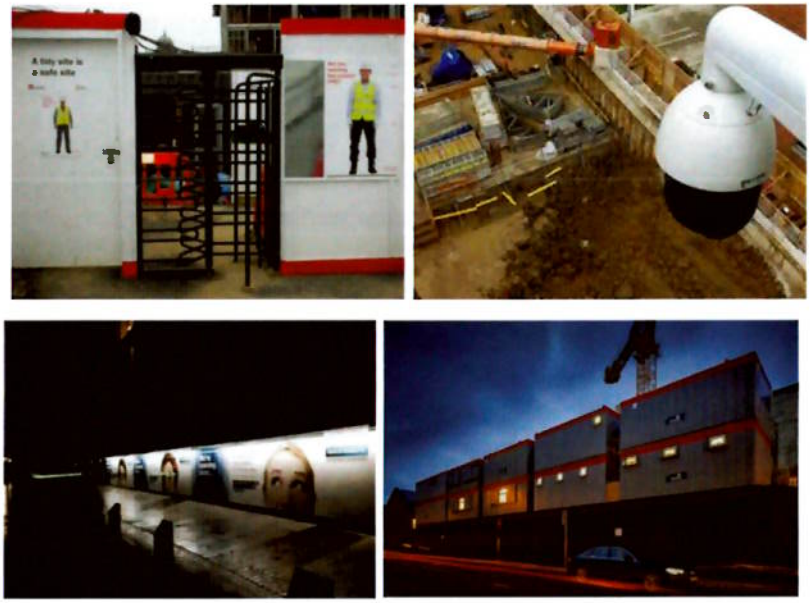


Figure 9 – Typical Site Security Measures

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.

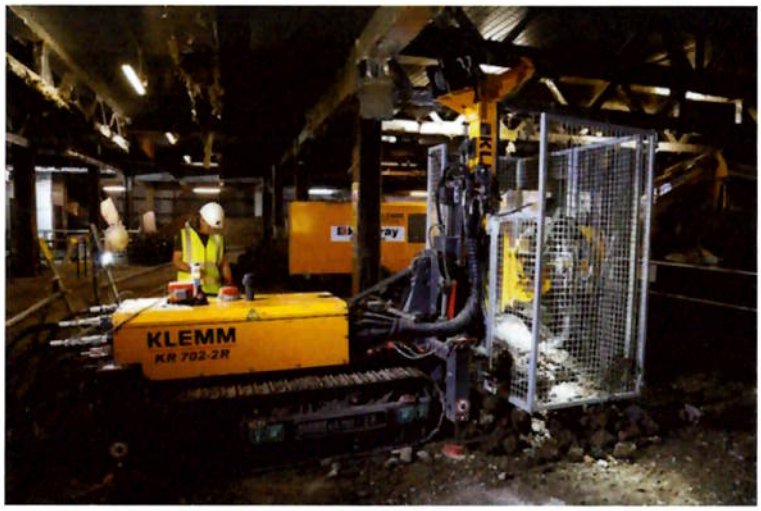


Figure 12 – Typical Mini-Piling Operation

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.

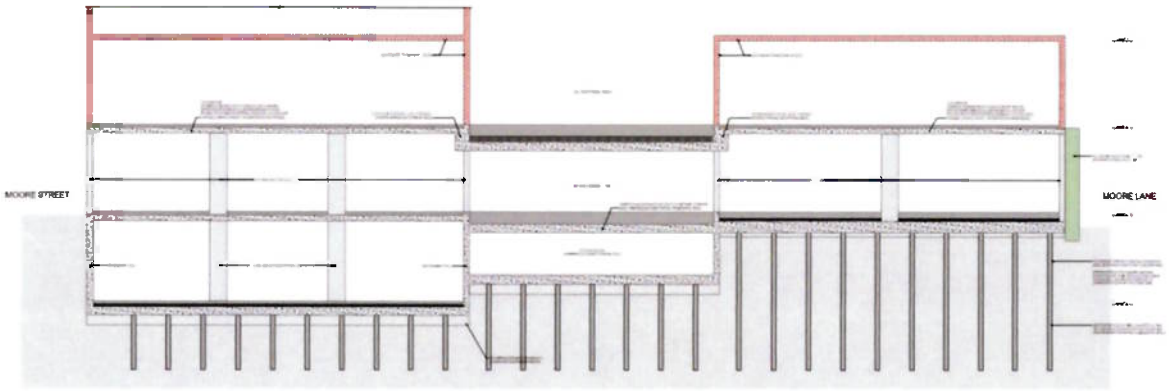


Figure 13 – Section Through Site 4 Showing Basement Foundation Strategy and Basement Levels.

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.

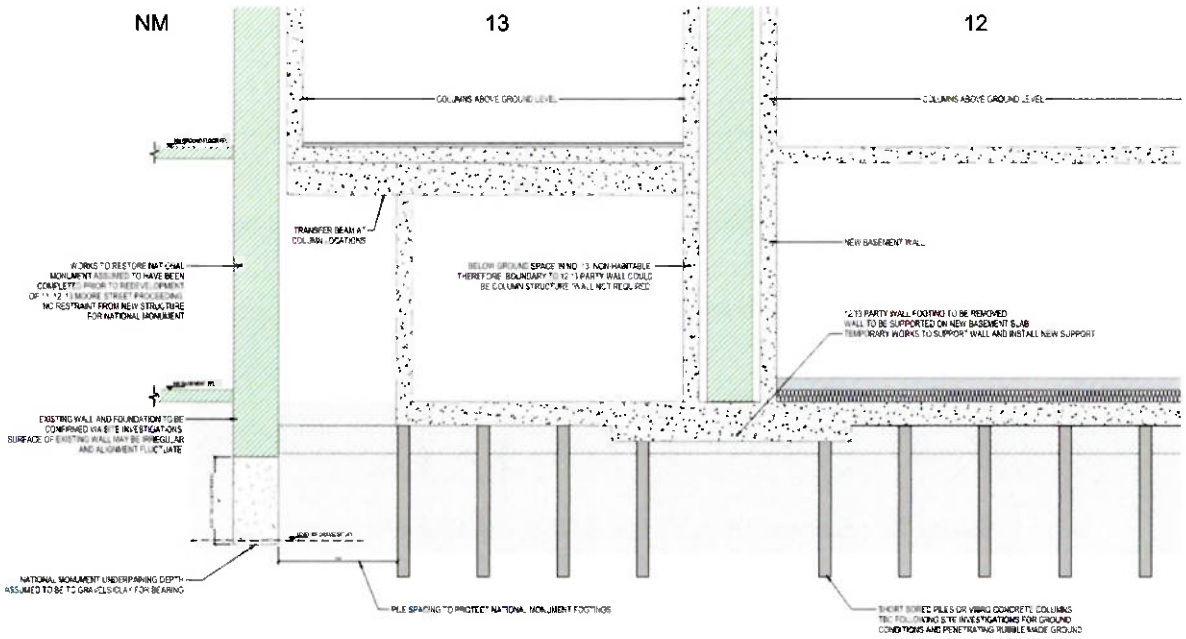


Figure 14 –Foundations Adjacent to National Monument

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 restrained 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.

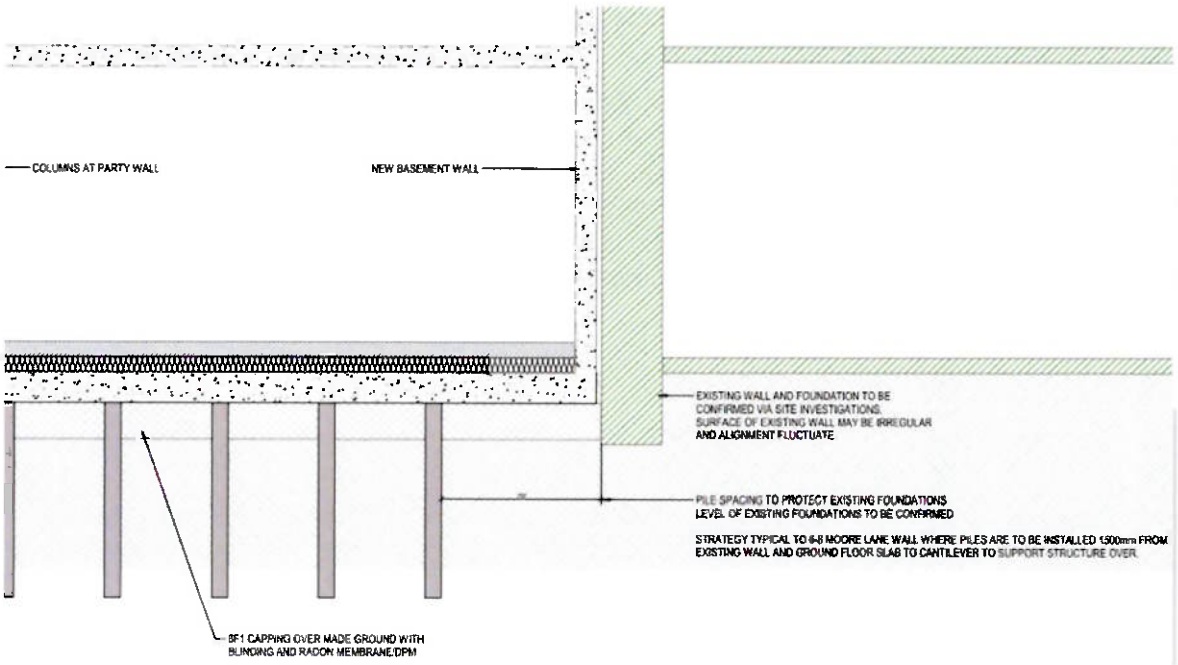


Figure 14 – Example of Foundation Adjacent to Retained Structure.

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.

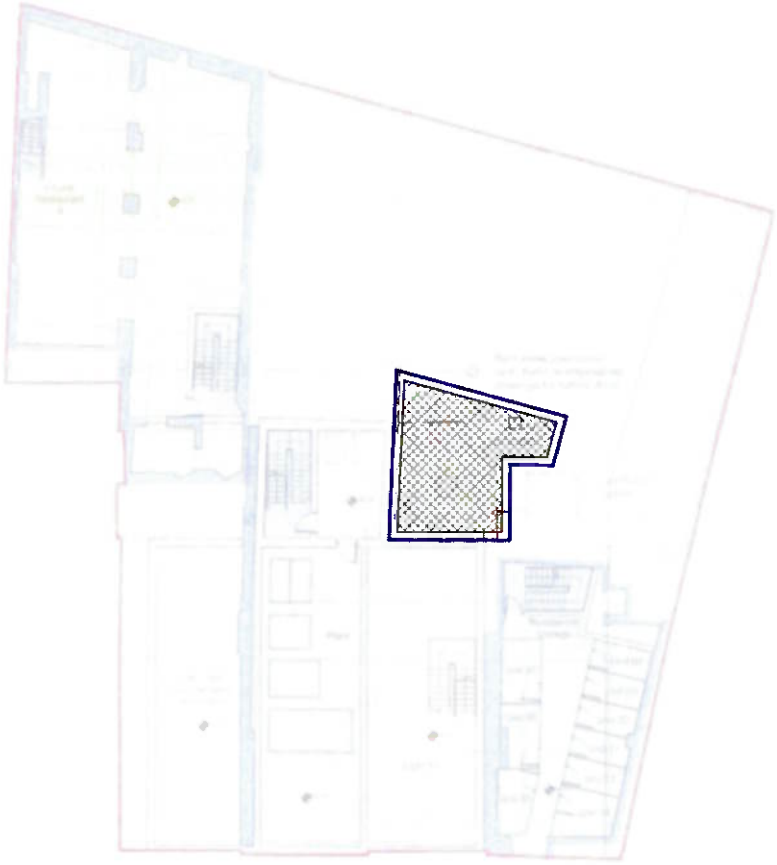


Figure 15 – Proposed Location of Attenuation Tank

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.

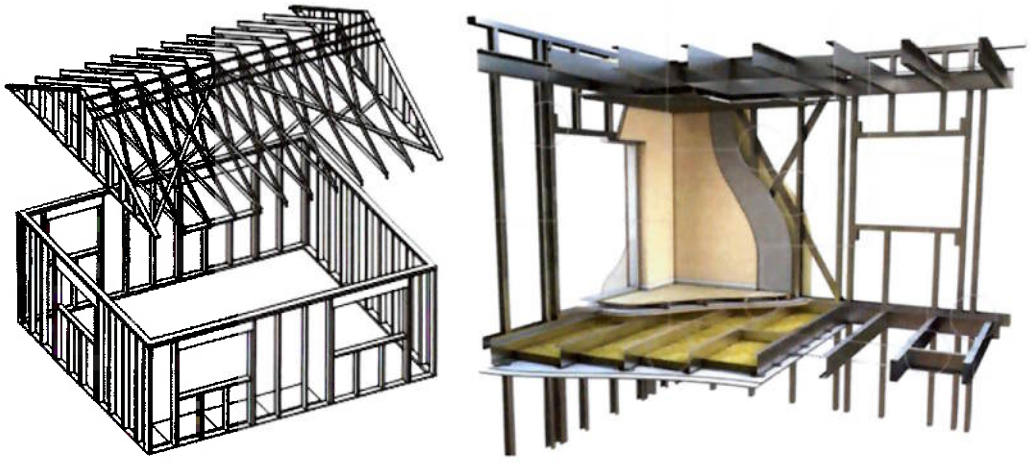


Figure 16 – Lightweight Timber Frame and Metsec SFS Load Bearing Frame.

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 163,490m^3 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.

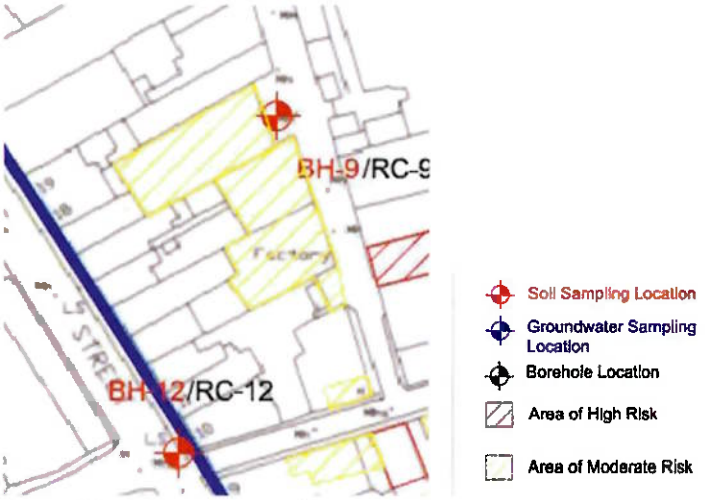


Figure 19 – Site 4 areas of Potential Contaminated Material

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/20/11784WMR01]

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/20/11784WMR01]

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.

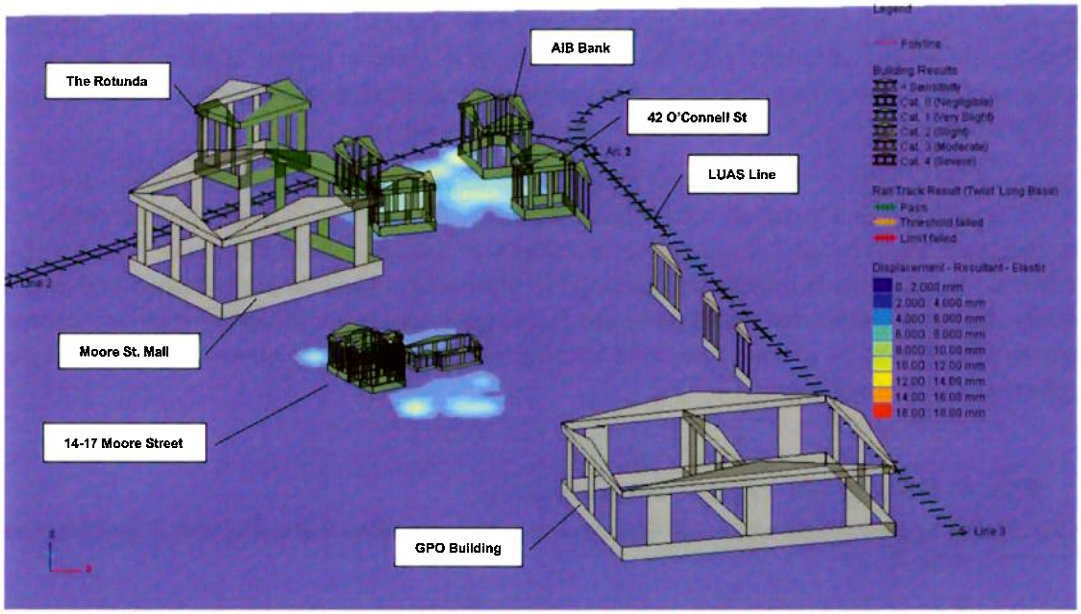


Figure 20 – Extract from BIA: Predicted Ground Movement to Protected Structures (PDisp Model)

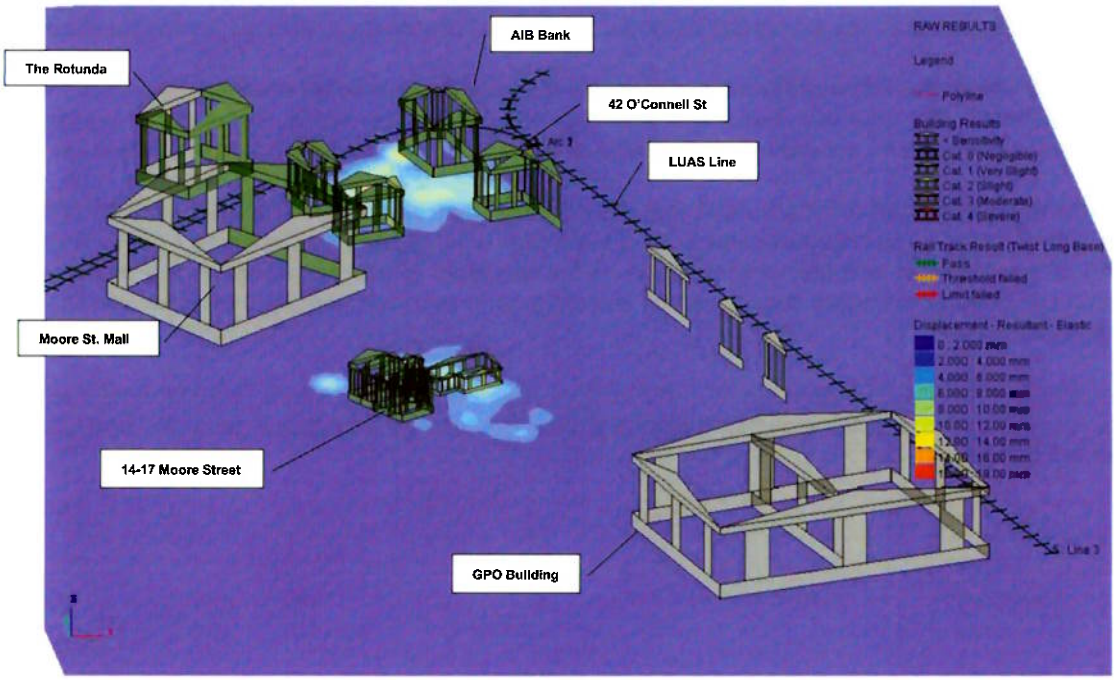


Figure 21 – Predicted Ground Movement to Protected Structures (XDisp Model)

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.

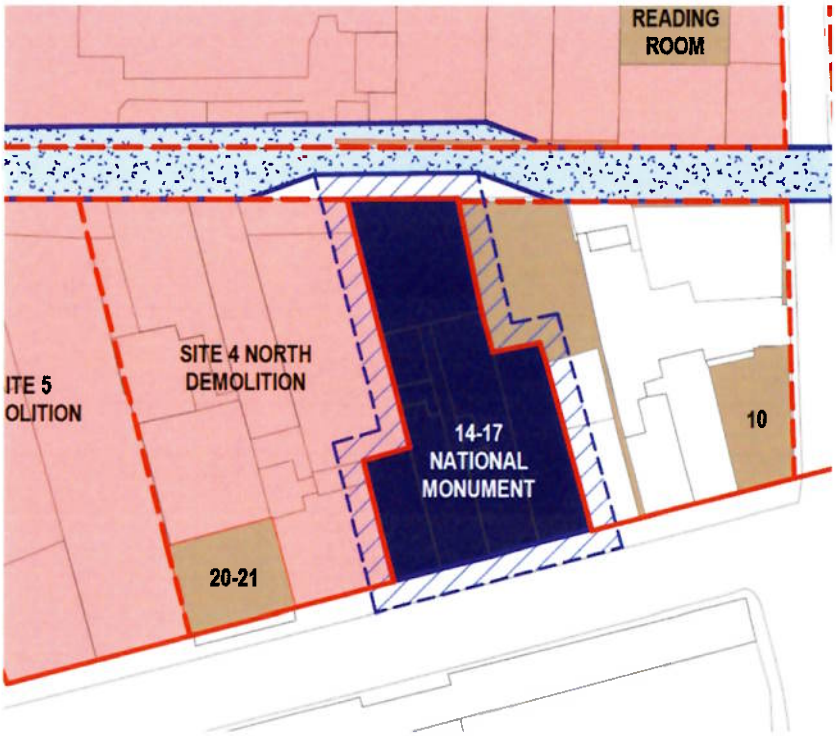


Figure 22 – Temporary Exclusion Zones to Protected Structures

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.

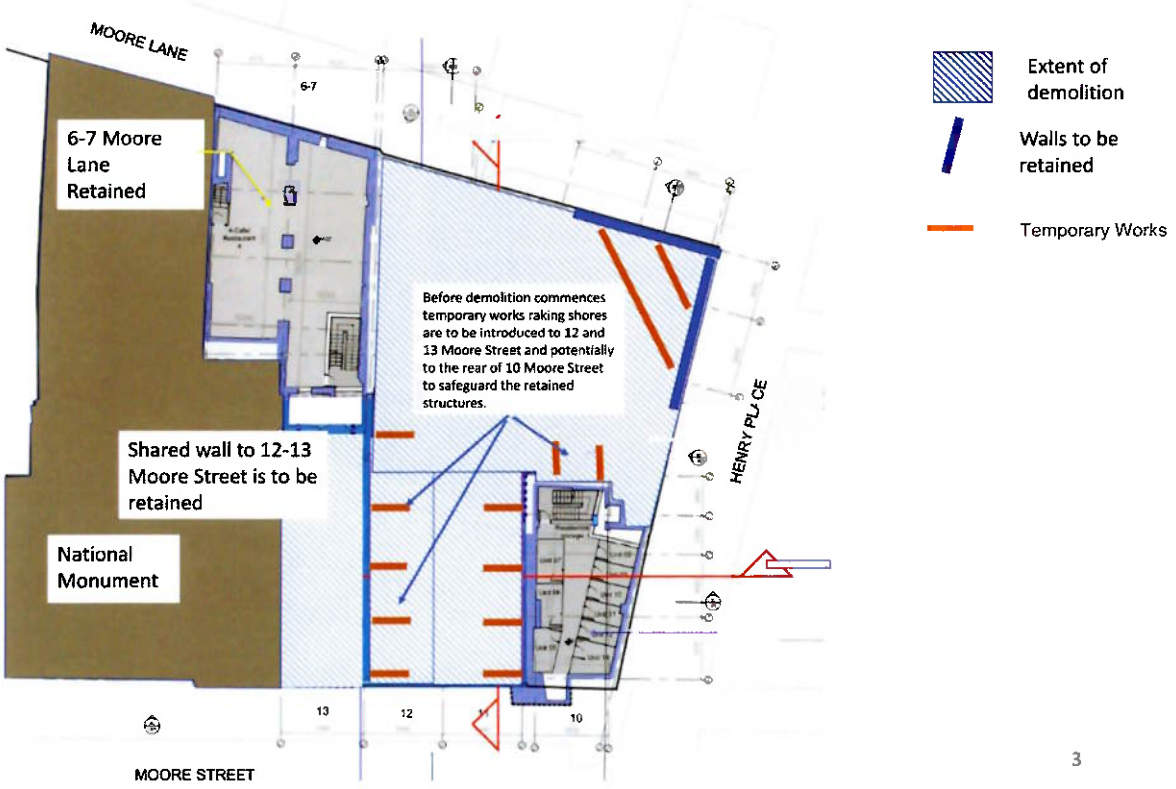


Figure 23 – Site 4 - Extent of Preliminary Temporary Works

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.

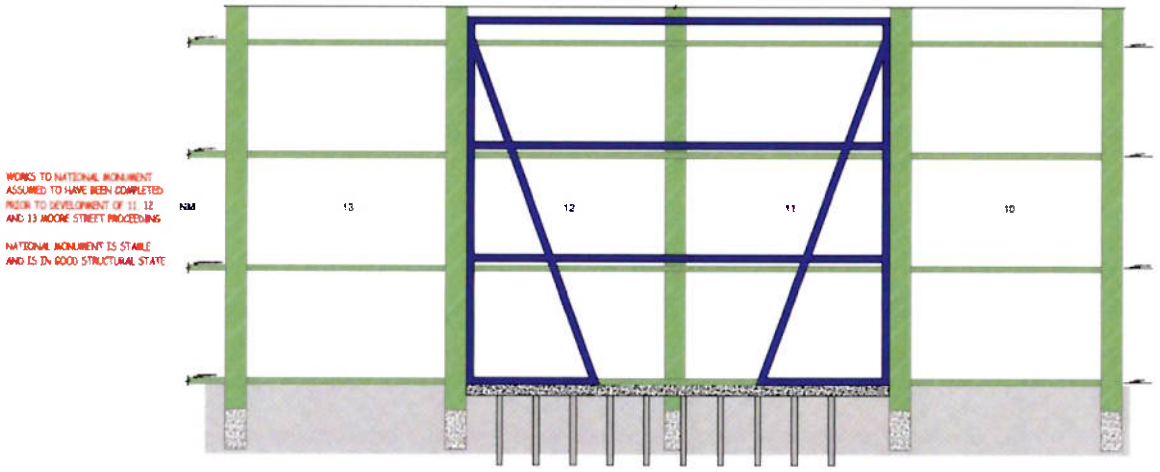
6.3.1 Indicative Temporary Works Adjacent to the National Monument

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:

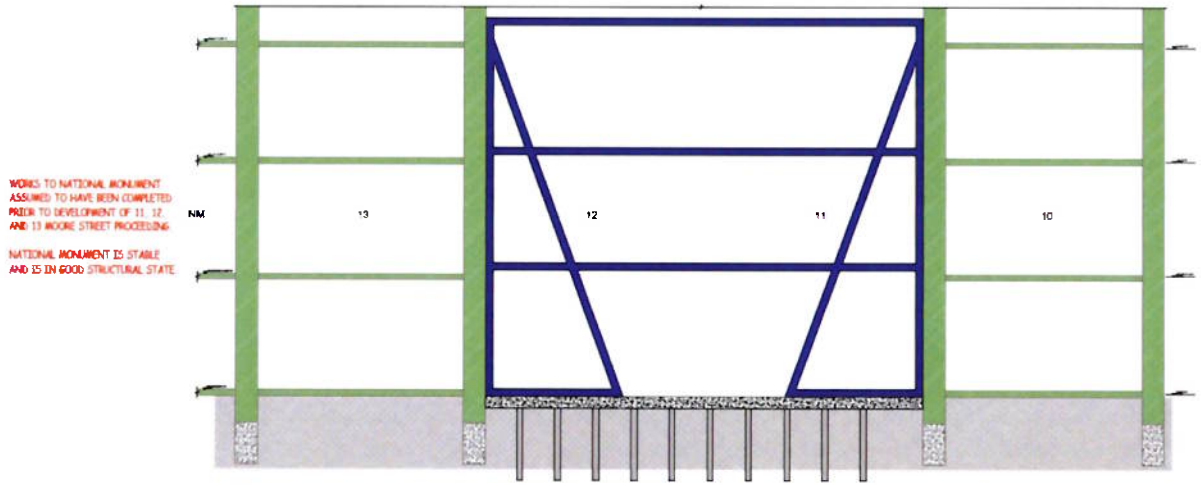
Stage 1 – Installation

- 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.



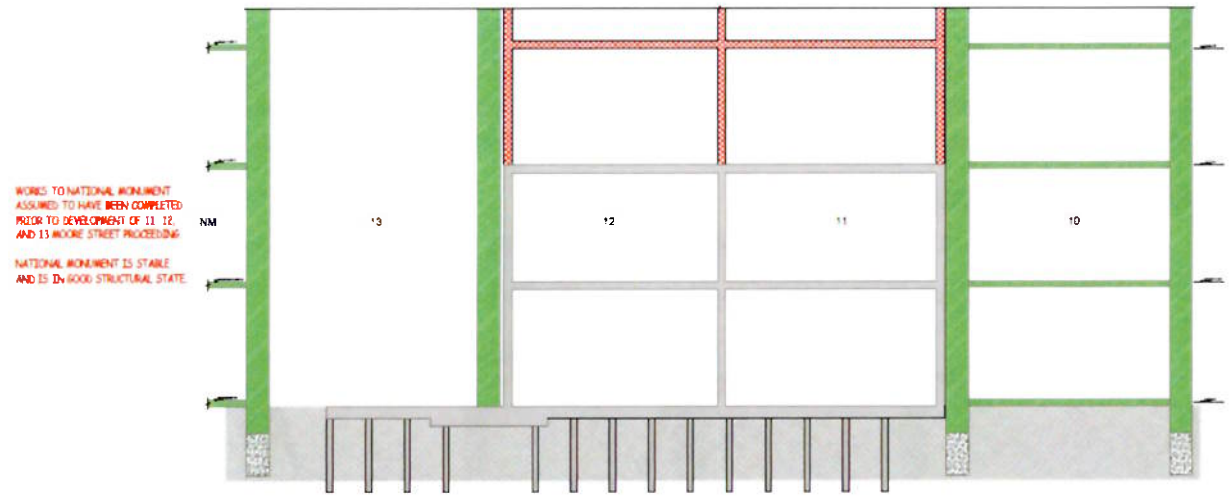
Stage 2 – Demolition

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



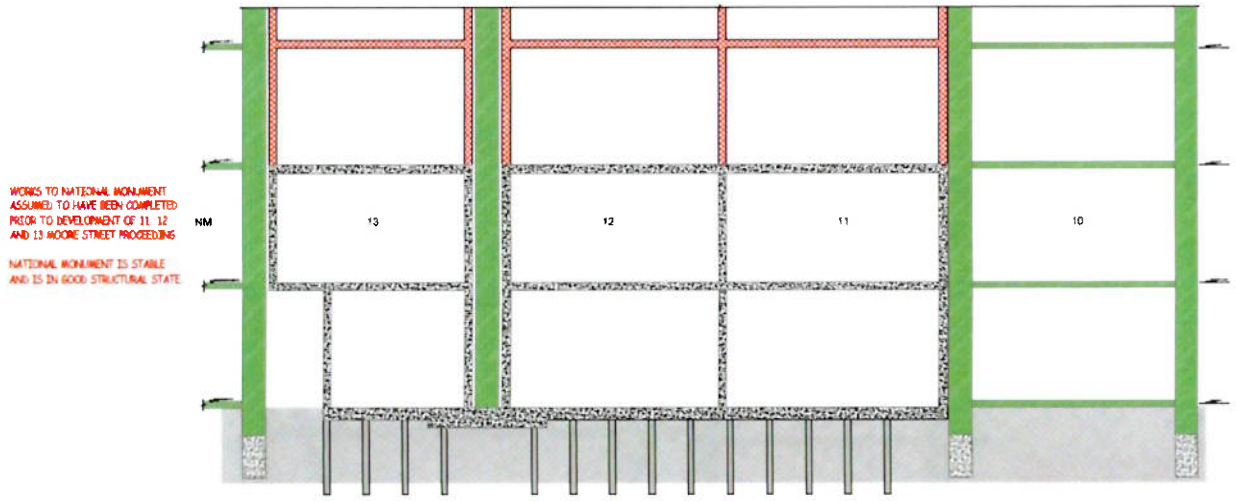
Stage 3 – Construction of 11&12 Moore Street

- 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.

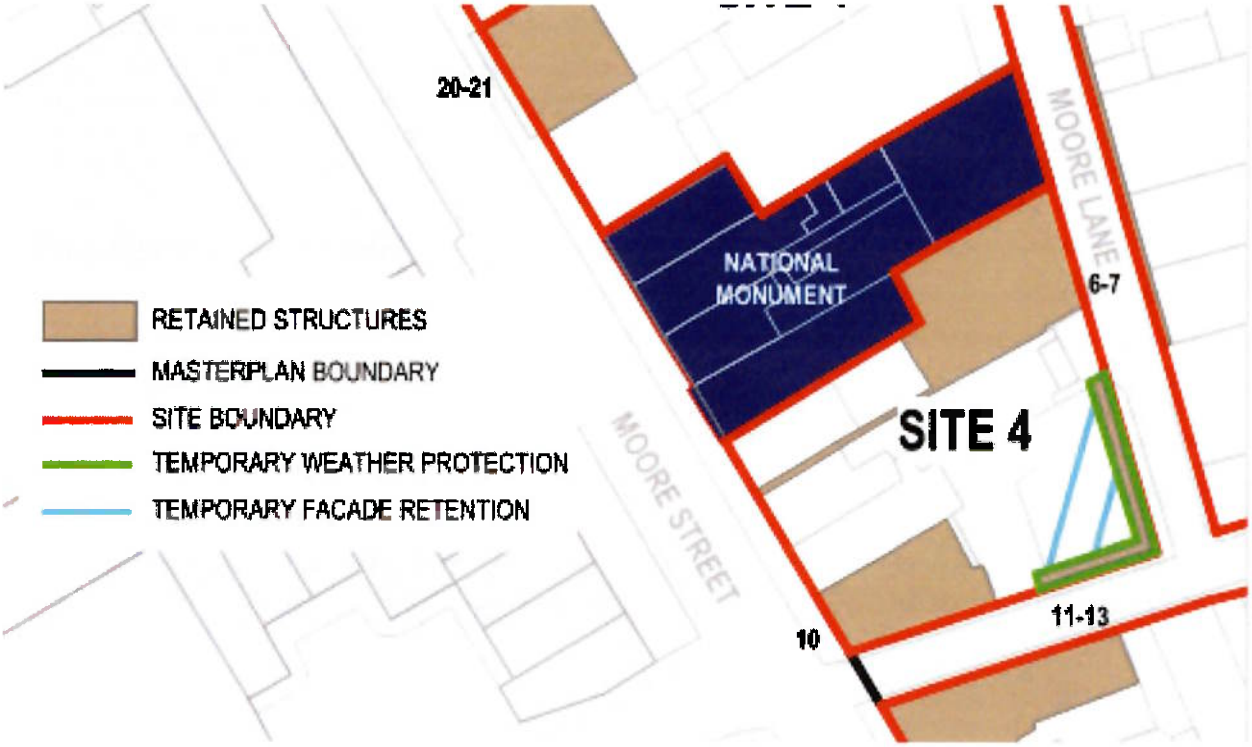


Figure 24 – Site 4 - Preliminary Temporary Works (5 Moore Lane)

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.

7. Control and Monitoring of Noise, Vibration and Dust on site

7.1 Condition Surveys

It will be necessary to carry out a detailed condition survey of all adjoining lands and properties prior to any works commencing on site, with particular attention paid to the protected structures noted previously in this report. In addition, baseline movement monitoring will be carried out in line with best practice.

7.2 Noise Monitoring

The contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives by means of risk assessment and mitigation / precautionary measures and equipment, all in full compliance with the current Health and Safety legislation.

Noise on site shall comply with Safety, Health and Welfare at work (construction) Regulations 2006 to 2013, Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for full and partial demolition, BS 5228:2009+A1:2014 Parts 1 & 2 - Code of Practice for noise and vibration control on construction and open sites (hereafter referred to as BS 5228:2009+A1:2014), Environmental Protection Agency Act 1992 Sections 106-108, including all Local Authority specific requirements for this specific site.

A survey of baseline noise and vibration will be undertaken to gain an understanding of the typical range of the existing conditions in the surrounding area. Methods of minimising construction noise and vibration will be implemented where possible. The Main Contractor is to implement these recommendations and utilise the most efficient construction methods to reduce the impact on the neighbouring environment.

The nature of construction activities means that a certain level of noise is inevitable, but the appointed Main Contractor must endeavour to minimise this as far as practically possible and reduce the effect and any nuisance to the surrounding environment and neighbours.

Work methods are to be reviewed to ensure minimal noise and vibration are created; methods should include:

- Each item of plant used on site complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/ [S.I. No. 632 of 2001].
- All plant and equipment liable to create noise whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors and neighbouring occupied buildings.
- The use of barriers and hoarding to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective shall not be operated until repaired.
- Fixed items of construction plant shall be electrically powered in preference to diesel or petrol driven. The Main Contractor shall ensure that vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers.
- Machines in intermittent use shall be shut down or throttled down to a minimum during periods between works. Static noise emitting equipment operating continuously will be housed within suitable acoustic enclosures, where appropriate.
- Tower cranes will be utilized instead of crawler cranes as these are electrically powered and quieter in operation.

- Noise suppression hammers and shields will be used on rock breaking equipment.
- Working hours will be confined to those stipulated in the grant of planning permission.
- Noise emitting processes such as rock breaking can be suspended during sensitive hours, to be agreed in consultation with DCC and neighbours.
- Alternative work practices will be investigated where the noise emitted is reduced (for example prefabricating building components off site).
- Site deliveries will be confined to working hours and allocated offloading location will be utilized for all deliveries.
- The Site Manager will also continually review and monitor the noise / dust / vibration levels / risk throughout the duration of the project and if necessary, adjust / add to the control measures to be employed to reduce nuisance.

7.2.1 Measures to Mitigate Noise

Of particular consideration is the noise from construction activities adjacent to the public footpaths and commercial areas (Moore Street, Henry Street and O'Connell Street Upper). Noise mitigation measure will be proposed by the Contractor and may include:

1. The installation of a solid timber hoarding to provide noise insulation.
2. A high-level acoustic wrap applied to the scaffolding to provide some degree of noise barrier.
3. Particularly noisy works can have an acoustic noise control barrier put around them when the works are being carried out.
4. When jack hammers are used a "no racket" jacket will be applied which reduced the noise by up to 10db when 50ft away.

Figure 26 – Typical Noise Mitigation Measures

7.3 Vibration

During the course of the work proposed at Site 4 Ground borne vibrations from the proposed works could give rise to adverse effects to the Heritage Structures / Protected Structures / National Monument and these control measures are to be put in place during the works to ensure protection of the structures and finishes.

7.3.1 Proposed works and potential risks

The proposed works involve excavations; piling works and general construction works of basements, multi-storey framed building and repairs to the historic structures / protected structures themselves immediately adjoining.

Potential risks arising from Demolition and Construction Works identified:

(a) Vibration induced damage from demolition, piling and excavation works.

(b) Physical impact from machinery and /or swing of material deliveries

(c) General implementation of works such as landing shutters / reinforcement / steelwork deliveries in close proximity to the historic / protected structures.

(d) Works to the historic / protected structures themselves.

7.3.2 Vibrations Standards

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (hereinafter referred to as BS7385:1993).
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration* (hereinafter referred to as BS 5228-2 2009+A1:2014)

7.3.3 Impact of ground borne vibrations arising from Proposed works

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration*
-

BS7385-2:1993 and BS5228-2:2009+A1:2014 advise that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges.

The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at base of the building.

Historically important buildings, that are difficult to repair might require special consideration on a case by case basis, but buildings of historical importance should not be assumed to be more sensitive unless they are structurally unsound. If a building, is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other groundborne disturbance.

The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed, depending on their structural integrity. Where no structural defects are noted, the same limit to

those for light framed buildings apply. For other structures and buildings that are determined to be potentially vulnerable to vibration due to significant structural defects, a further stringent criteria has been applied for transient vibration. It is assumed that known buildings and structures of this kind, will be subject to condition surveys well in advance of the works, and any defects identified repaired. The results of conditions surveys will determine whether a building or structure is classed as "vulnerable".

Table 4 sets out the limits as they apply to vibration frequencies below 4Hz where the most conservative limits are required. At higher frequencies, the limit values for transient vibration within Table B.2 of BS5228-2:2009+A1:2014 will apply, with similar reductions applied for continuous vibration and those for protected structures.

Structure Type	Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:	
	Transient Vibration	**Continuous Vibration**
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings *Note 1	6mm/s – 15mm/s	3 mm/s – 7.5mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/s	

- *Note 1: The relevant threshold value to be determined on a case by case basis. Where sufficient structural information is unavailable at the time of assessment, the lower value within the range will be used.*

Table 4 – Thresholds relating to the Transient and Continuous Vibrations in buildings and structures

7.3.4 Mitigation Measures to be put in place prior to works

For controlling vibration reference should be made to BS 5228:2009+A1:2014 which offers detailed guidance on the control of vibration from demolition and construction activities. In general, BS5228:2009+A1:2014 advises the following:

- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimize drop height of materials.
- Regular and effective maintenance by trained personnel should be carried out to reduce vibration from plant and machinery.
- Hand demolition, cutting of the separation joints of the buildings in advance and small robotic breakers and 'munchers'

Level of protection and procedure put in place will be dictated by potential risk resulting from work to be carried out.

The proposed construction methodology for the structures directly adjacent to upstanding historic structures will be designed by the contractor to ensure that all protection measures are adhered to and that all new works are undertaken in such a way as to limit vibration.

All works within the sensitivity zones of the historic structures will be carried out using piling and excavation and assembly techniques to ensure vibration levels are kept below the threshold level.

7.3.5 Monitoring and Mitigation for Ground borne Vibrations during Construction Works

Detailed monitoring will be used to control the proposed works and to ensure compliance with the proposed control limit to protect the Historic Structures / Protected Structures / National Monument.

Vibrations movements will be actively measured during the works with a pre-determined plan of action ready to be put in place should actual measurements vary from the expected levels.

The works will have appropriate level of site management, on site monitoring and supervision (for example a site representative will be present during the works to ensure the levels are as expected and to supervise any measures should the levels be exceeded).

A real time response remote monitoring system with warning system will be adopted to monitor vibration. This is to be continuously monitored by on site personnel during demolition; excavation; piling and general construction works. Review of the monitoring data will happen concurrently with the works to ensure that corrective action is undertaken if a limit is breached, or if the developing trend in measurements indicates a limit may be breached if works continue. This real time review and response of the monitoring data is critical to ensuring no limit is exceeded.

In the event that control limit is approached the contractor for the works will explore a revised approach for completion of the works.

Monitoring will include vibration monitoring carried out at the historic structures along with survey points installed on the walls of the historic structures to monitor any movement during the works.

Tell-tale crack monitors will also be installed on existing defects on the historic structures and or its boundary wall where appropriate.

In accordance with established good practice, baseline monitoring will be undertaken in advance of the proposed works in order to establish the existing environment around the historic structures and to verify the correct operation of the proposed instruments.

A series of trigger limits will be set for the works following what is commonly called a 'traffic light' system.

- For measurements below an 'amber limit' works can continue.
- For measurements between an 'amber/red limit' and below the 'red limit' operations will be suspended immediately. The construction methodology will be reviewed and adjusted as required to allow works to proceed on a manner that maintains the integrity of the historic structures.
- Works can continue between the amber and maximum red limit but only when methodologies have been revised to attempt to bring vibrations back below the amber level and also with a greater level of monitoring and control.

Should vibrations go above the red limit works will be suspended for a full review of the exceedance event(s); revision of works procedures and approval by the clients' representatives / OPW before operations can proceed again.

7.3.6 Limits for Ground Borne Vibrations

Vibration monitoring and controls are required to be installed prior to the works commencing and for the full duration of the works to ensure the proposed control limit is not exceeded thus avoiding adverse impacts on the historic structure.

A warning threshold shall be implemented as per the limits outlined in Tables 4.

Baseline vibration monitoring will be undertaken prior to commencement. The baseline readings should be referenced and incorporated into any Agreement with neighbouring properties and DCC on maximum vibration limits permissible when working nearby.

Toolbox talks should also be carried out with personnel in respect to managing vibration on site. Exposure limits as set out in Regulation 4 of BS 5228:2009+A1:2014 will be reviewed, risk assessments carried out, detecting signs of injury, safe working practices and suppression techniques will all be incorporated. Methods of construction should be adopted to omit and or control vibration at the source, utilize lower levels of vibration; use vibration pads and gloves where possible. Any activity which will generate vibration should as far as practicable be isolated from sensitive receptors.

7.4 Air & Dust Management

A dust management plan will be compiled by the Main Contractor for the development.

The following precautions to minimise nuisance to the public and neighbouring occupiers caused by dust and dirt will be carried out by the contractor.

- Vehicle and wheel washing facilities shall be provided at site exit where practicable. If necessary, vehicles are to be washed down before exiting the site.
- Netting is to be provided to enclose scaffolding to mitigate escape of air borne dust from the existing buildings.
- Shroud piling machinery as shown below when operating near to boundaries.
- Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials to be permitted on site.
- Water sprays for dust suppression should be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste should be removed from site as quickly as possible to minimise risk of dust generation and any fine material should be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons should be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.
- Prior to commencement, the Main Contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods should be employed by the Main Contractor.
- The Main Contractor should allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The Main Contractor will be required to appoint a senior member of its site management team to act as the liaison with third parties in respect of complaints regarding dust and or site activities.
- Monitoring of dust deposition should be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Luft limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

Figure 27 – Typical Dust Mitigation Measures

8. Archaeology

Archaeological monitoring will take place where any preparatory ground reduction works are required including site investigation works and opening up works at basement or ground levels. Post-demolition archaeological investigation will be carried out in areas across the site without basements. This is required to establish the nature of below ground structures, foundation remnants and features of archaeological and historical importance and to establish the presence or otherwise of archaeological remains. Further resolution may involve the recording of historic features and full archaeological excavation (i.e., preservation of the archaeology in record form, of all archaeological soils or features encountered). The resolution will occur during this post demolition phase in the area of the find spot in advance of the main construction phase.

9. Building Control Amendment Regulations

9.1 Quality Assurance during Construction and BC(A)R Compliance

The Main Contractor/Contractors will need to demonstrate how they will be providing quality in construction. They shall comply fully with all requirements of the Amended Building Control regulations to the satisfaction of the Ancillary and Assigned certifiers.

The Main Contractor/Contractors will be responsible for the preparation of benchmark samples of each new element of the works to the satisfaction of the Assigned and Ancillary Certifiers under the Building Control regulations (BCAR). Each benchmark sample will be considered a 'hold point' under the Preliminary Inspection Plan (PIP) and will be required to be offered up to the Certifiers involved ahead of the works starting - with a minimum of two days' notice (in writing).

The Main Contractor/Contractors will be required to keep pre- and post-pour check sheets for submission to the assigned and ancillary certifiers where required.

Written acceptance will be required from the Certifiers after inspection of the benchmark samples before the rest of the works proceed.

Where 'specialist' suppliers are noted by the design team to have design responsibility, they will be required to provide Certificates of Design (Sd), Certificates of Inspection (Si) and Certificates of Completion (Sc). Ahead of appointment of the 'specialist' suppliers / designers - evidence of competency and Professional Indemnity insurance cover will be required for the approval of the Contract Administrator and Waterman Moylan.

This is to be confirmed by the Main Contractor/Contractors once appointed and will include a quality check regime.

10. Liaison with Third Parties

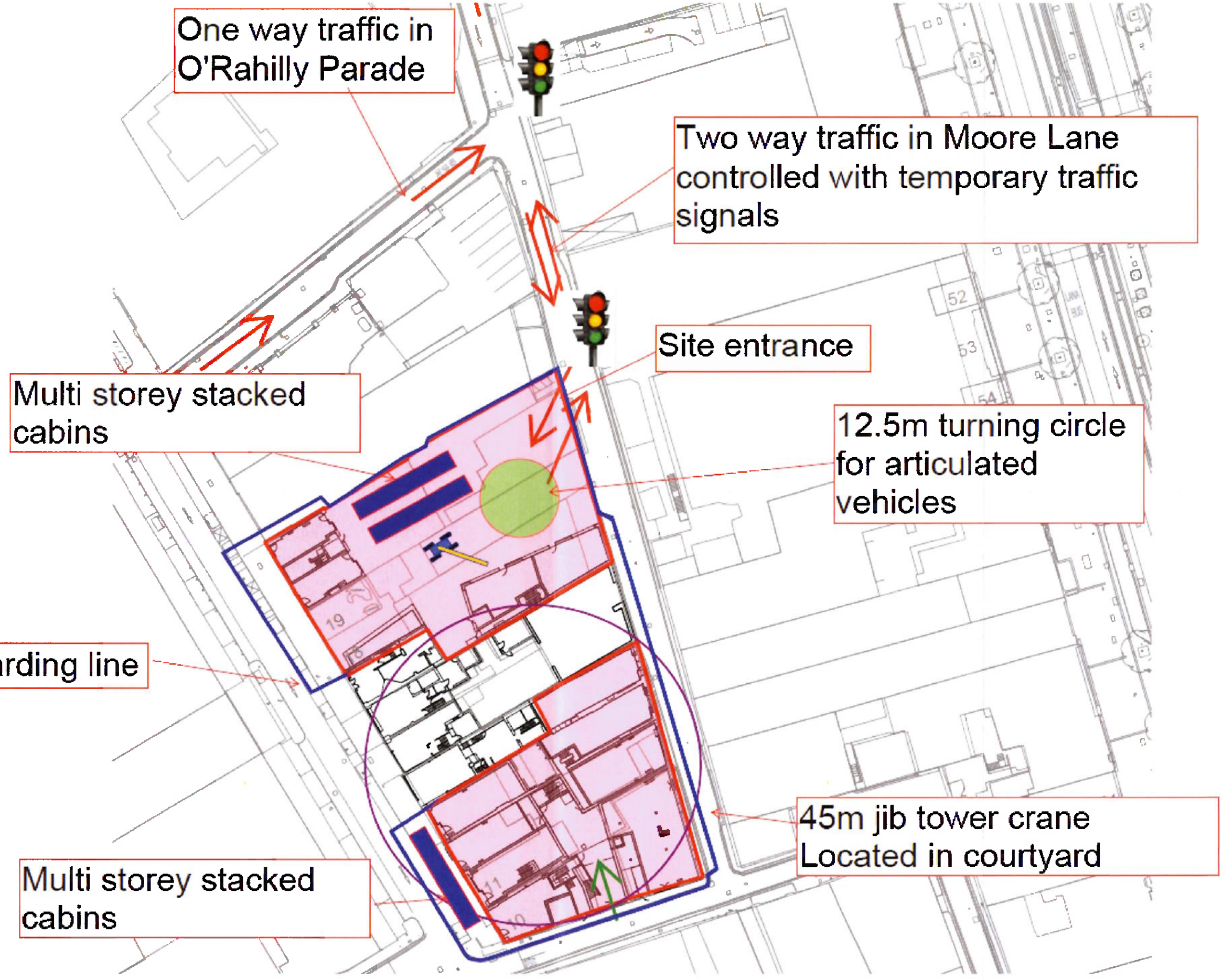
It is imperative that the Main Contractor/Contractors engages in discussions with local residents, businesses and the general public well in advance of work commencing on site. Formal communication should be provided to immediate neighbours regarding activities or possible disruptions.

The appointed contractor will be required to adopt the practices covered under the 'Considerate Constructors Scheme' for establishing a good neighbour strategy and maintaining good relationships with neighbouring communities. The ideas described within this scheme will be implemented on site where applicable to minimize negative impact on local community and the environment.

Handling of any complaints must be logged and actioned quickly by the Main Contractor/Contractors.

APPENDIX A

Site 4 – Site Setup



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STATUS
PRELIMINARY

CLIENT Dublin Central GP Ltd.
ARCHITECT
PROJECT Dublin Central - Site 4

TITLE Preliminary Site Setup Plan

DRWN	DESIGNED	APPROVED	DATE
RN	RN	RO	26.11.20

SCALE	JOB NO	ORG. NO	REVISION
NTS	19-021	DC-WM-ZZ-ZZ-SK-S-101	

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UK and Ireland Office Locations

APPENDIX 3.4 OUTLINE CONSTRUCTION & DEMOLITION MANAGEMENT PLAN – SITE 5

Dublin Central

Outline Construction & Demolition Management Plan – Site 5

Dublin Central GP Limited

DC-WAT-5X-XX-RP-C-001016

May 2021

Waterman Moylan Consulting Engineers Limited
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Waterman Moylan
Engineering Consultants

Client Name:	Dublin Central GP Limited
Document Reference:	DC-WAT-5X-XX-RP-C-001016
Project Number:	19-021

Quality Assurance – Approval Status

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)

Issue	Date	Prepared by	Checked by	Approved by
P1	07.05.21	R. Nelson	C. Beresford	R. Osborne
P2	10.05.21	R. Nelson	C. Beresford	R. Osborne
P3	11.05.21	R. Nelson	C. Beresford	R. Osborne
P4	18.05.21	R. Nelson	C. Beresford	R. Osborne
P5	19.05.21	R. Nelson	C. Beresford	R. Osborne

Comments

FINAL ISSUE

Disclaimer

Content

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 5 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 5 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

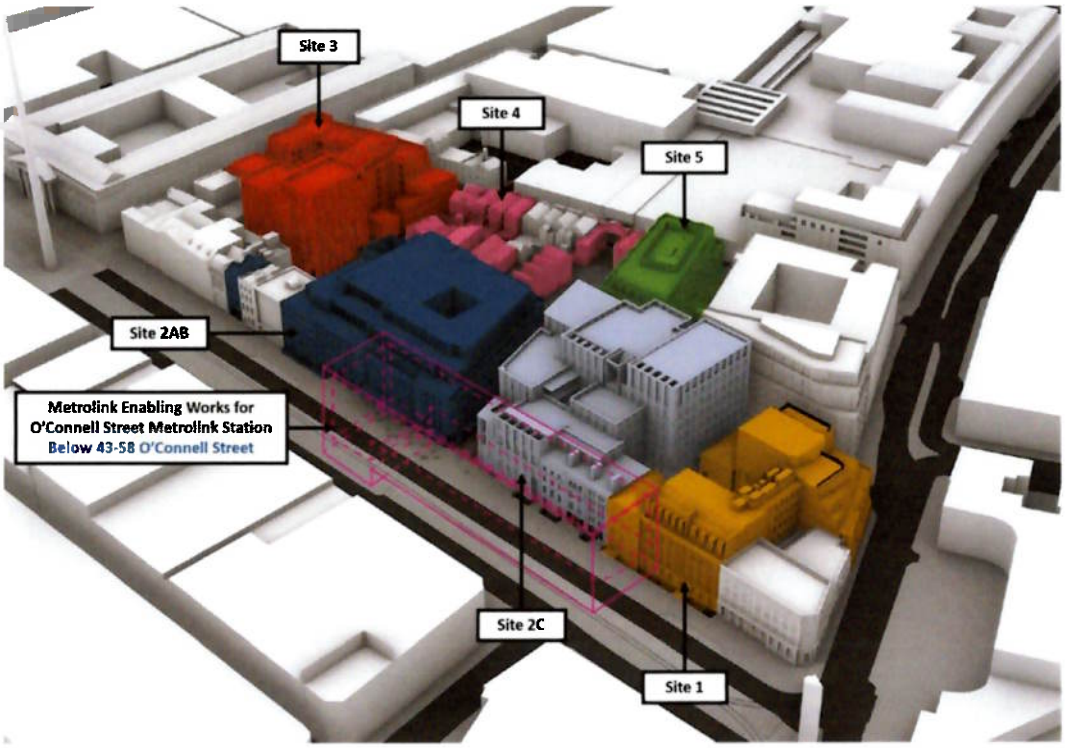


Figure 2 – Phasing Strategy

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 5 Location

Located in the west of 'the Masterplan' area, Site 5 is bounded by Moore Street to the west, Moore Lane to the east, O'Rahilly Parade to the north and Site 4 to the south. Site 5 includes Nos. 22 – 25 Moore Street, Nos. 1 – 8 O'Rahilly Parade and Nos. 13 – 15 Moore Lane. The proposed development generally comprises a mixed-use scheme accommodating office and café / restaurant uses in a single building ranging in height from 2 – 6 storeys (top floor set back).

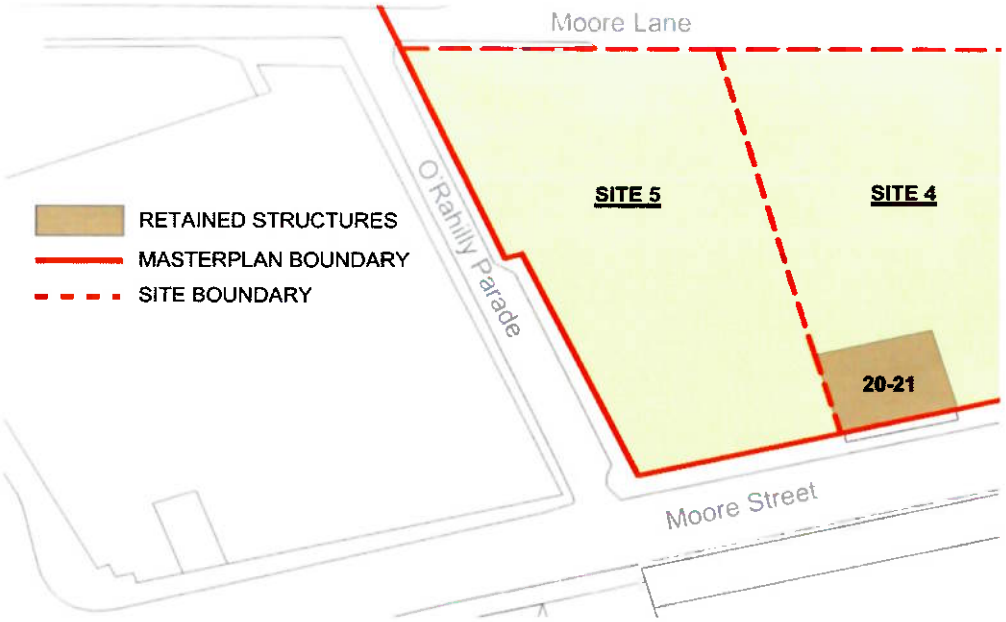


Figure 3 – Site 5 Location Plan

2.4 Key Milestones

Key Milestone Date	Site 5 Works
(Q3) 2022	Site Preparation
(Q4) 2029	Construction
(Q3) 2031	Fit-Out Works
(Q4) 2031	Completion

3. Site 5: Site Setup

3.1 Site Boundary

Hoarding will be required to the Site 5 boundary. This will be located along the Site 5 boundary to O'Rahilly Parade, 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.

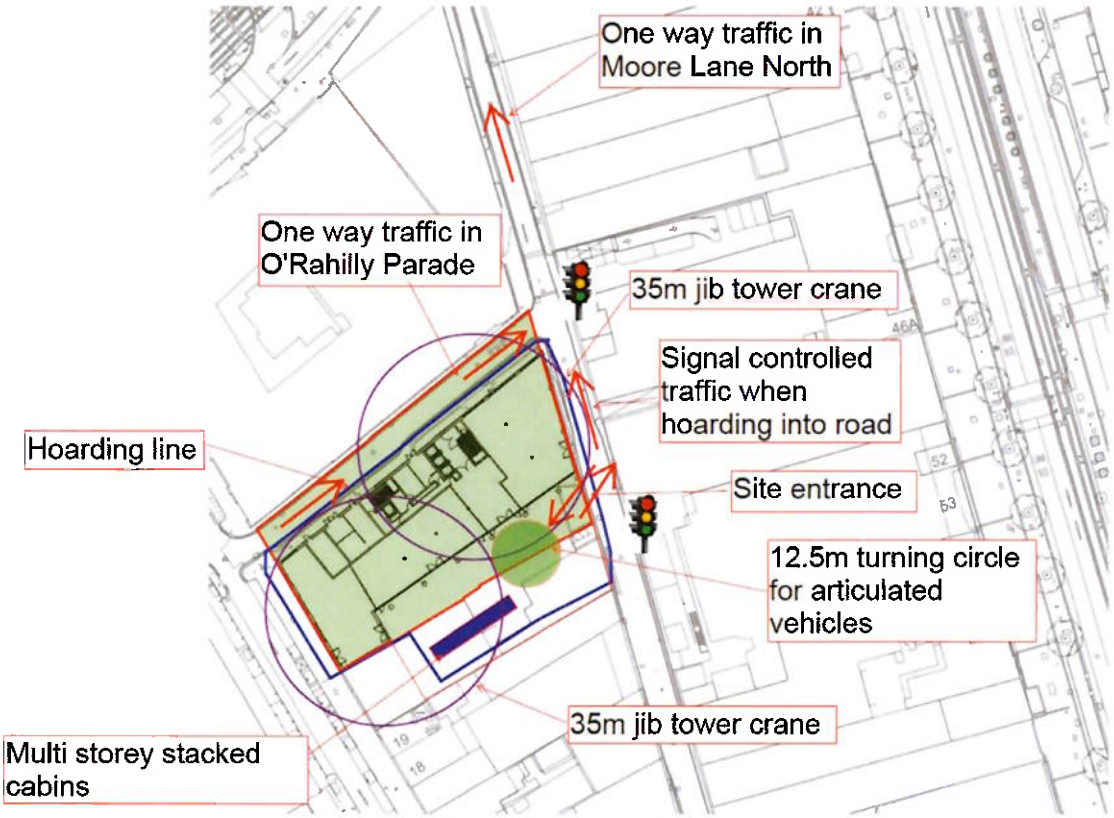


Figure 4 – Site 5 Proposed Site Setup

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 and O'Rahilly Parade. 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 5 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 Site 5 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.

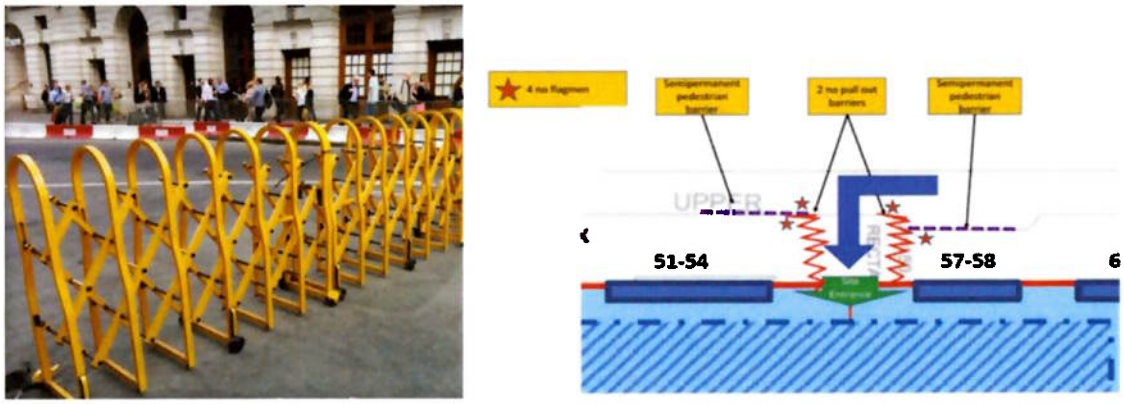


Figure 6 – Typical Pavement Crossover System

3.1.4 Site Logistics

Site 5 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 stage of the construction of the Site 5. The Main Contractor/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.

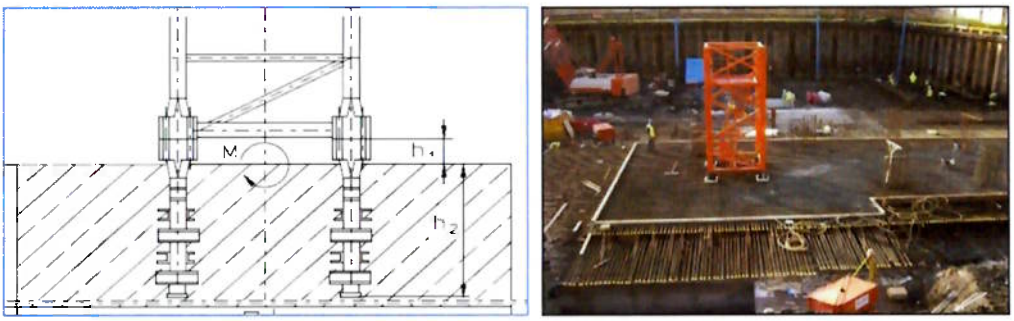


Figure 7 – Typical Tower Crane Anchors

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 additional 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 Siochana 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 5: Construction Methodology:

4.1 Description of the works

Site 5 is a 2 to 6 storey building for office use. In addition to the office entrance and reception there are food and beverage units at ground floor and a partial single storey basement to house plant.

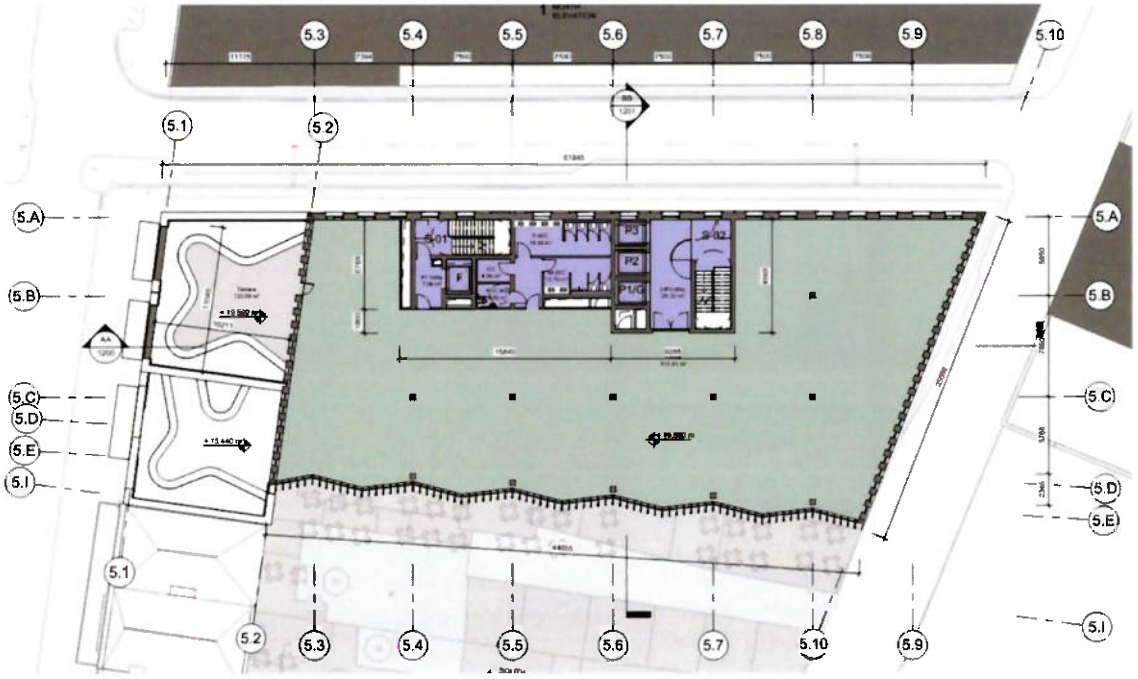


Figure 10 – Site 5 Architectural Layout

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 Demolition & Enabling Works

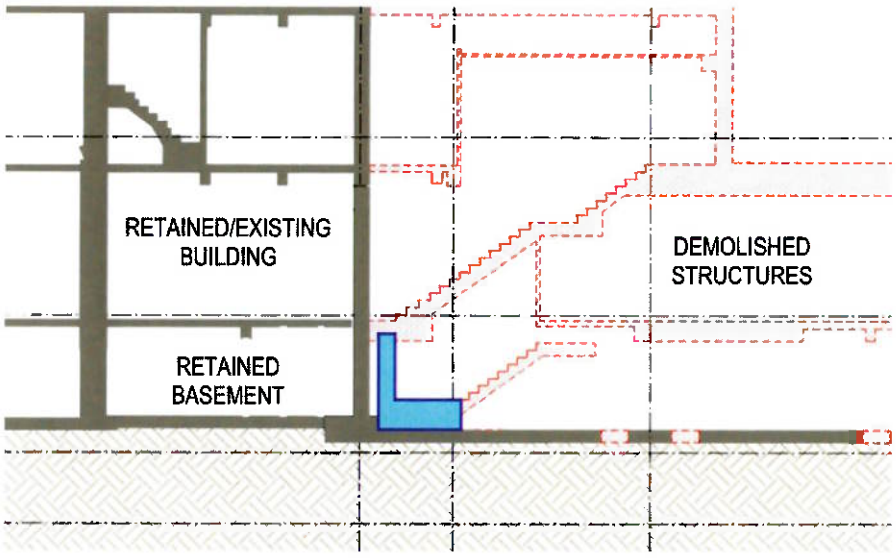
All demolition is to be carried out in accordance with *BS 5228-1 2009, Code of Practice for Noise & Vibration Control on Construction and Open Sites.*

The sequence of works for Site 5 is typically as follows:

STAGE 1 – INSTALLATION OF TEMPORARY / ENABLING WORKS

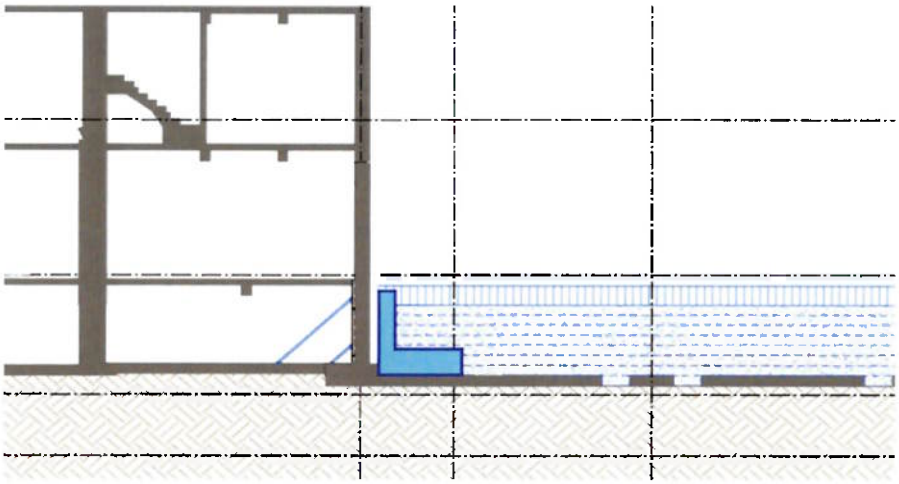
- Temporary works will may required to the boundary/party to 20-21 Moore Street subject to site investigations.

STAGE 2 – DEMOLISH EXISTING BUILDINGS & PROBE/BREAK OUT FUTURE PILE LOCATIONS



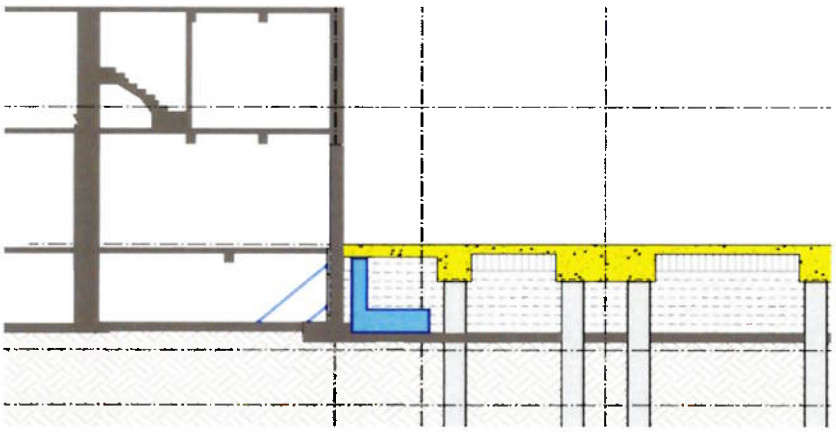
- Demolition of the existing buildings will be undertaken top-down using traditional methods with all demolition arising segregated and removed from site. The extent of demolition is shown on the Architect's drawings.
- Portions of the existing Basement Level slab, foundations and obstructions will be removed at proposed pile locations.
- Structure adjacent to 20-21 Moore Street boundary/party wall will be demolished using non-percussive methods. This will likely involve saw-cutting the slabs/walls first to isolate the members before commencing the demolition activities.
- The retained basements will require a new basement retention system to avoid surcharging the existing structure. This may involve new precast reinforced concrete retaining walls located against the existing basement walls included as part of the enabling works to support the follow-on piling activities.
- In consultation with the conservation Architect, it is envisaged that a breather membrane and compressible filler will be installed between the new retaining wall and the existing basement wall to protect the existing wall.
- A void between the new retaining walls and existing basement walls may be accommodated and will be to the Conservation Architect requirements and details.

STAGE 3 – EXISTING BASEMENTS WILL BE BACKFILLED WITH WELL GRADED HARDCORD IN COMPACTED LAYERS TO SUIT PILING MAT REQUIREMENTS



- The piling mat will be well graded hardcore to the Piling Contractors requirements and subject to design by the Temporary Works specialist. This will provide a level platform from which the piling operation will be undertaken.
- The existing basement will be infilled with well graded hardcore that is suitable for piling and conforms to SR:21 Annex E requirements.

STAGE 4 – INSTALL BEARING PILES AND SECANT PILED BASEMENT WALL



- Piling will comprise of continuous flight auger (CFA) or rotary bored methods to minimise ground borne vibrations during piling.
- Piling will also include a secant piled wall that will form the enclosure to the new basement perimeter wall.
- Reinforced concrete will form the new pile caps, basement slab and ground floor structure.

4.4 Sub-Structure & Foundations

In order to minimise the excavation to form the basement level it is proposed to construct the single storey basement via a 600mm diameter secant pile wall.

The secant piled wall comprises interlocking hard (male) and firm (female) piles, which will provide an inherently stiff wall which will enable a robust temporary works solution to be adopted. The secant wall will also provide resistance to water penetration and loss of any fine material from behind the wall which could affect adjacent buildings and infrastructure. Piles will be spaced to be ensure interlock to below base excavation level and of sufficient length to achieve hydraulic cut-off for construction. The secant wall will also provide direct support for the superstructure, with the capping beam distributing substantial vertical loads on to the embedded retaining wall and using the inherent vertical load capacity of the wall and thus minimising bearing pile requirements.

The top of the piled wall will be tied together with a 1050x1000m reinforced concrete capping beam which will allow the transfer of vertical frame and floor loads onto the piles. The secant wall will be designed by the piling specialist for the lateral pressures due to earth, water and surcharge plus vertical loads both in the temporary and permanent conditions. The specialist will also be responsible for all temporary propping prior to completion of the permanent works for final load transfer.

The secant wall will be designed by the piling specialist for the lateral pressures due to earth, water and surcharge plus vertical loads both in the temporary and permanent conditions. The specialist will also be responsible for all temporary propping prior to completion of the permanent works for final load transfer. A 300mm thick reinforced concrete floor at basement level will be tied to and supported by the secant wall.

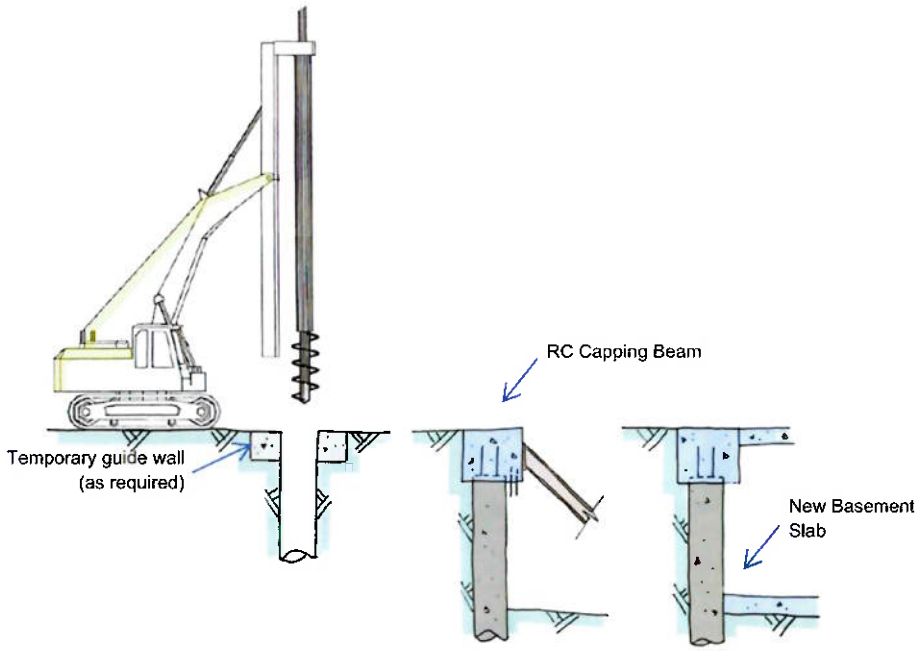


Figure 11 – Typical Secant Piled Wall Installation

Where columns are not located above the secant pile wall of the basement they are proposed to be founded on piles. Piles are anticipated to be traditional non-displacement rotary bored piles founded within the clay Based on the ground conditions identified and the building frame loads, 3 piles are used per column. Using 3 piles also provides the stability for individual columns and avoids restraint ground beams. 1200mm deep pile caps above the piles support the columns over.

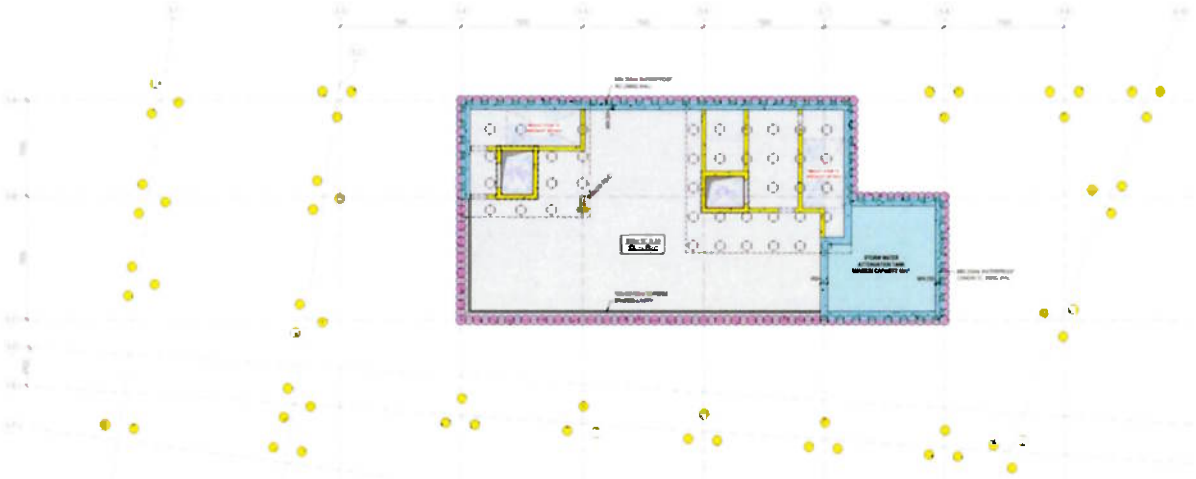


Figure 12 – Proposed Pile Layout

4.4.1 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 5 requires 46m³ of attenuation through the combination of blue roofs and an attenuation tank. With regard to the 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.

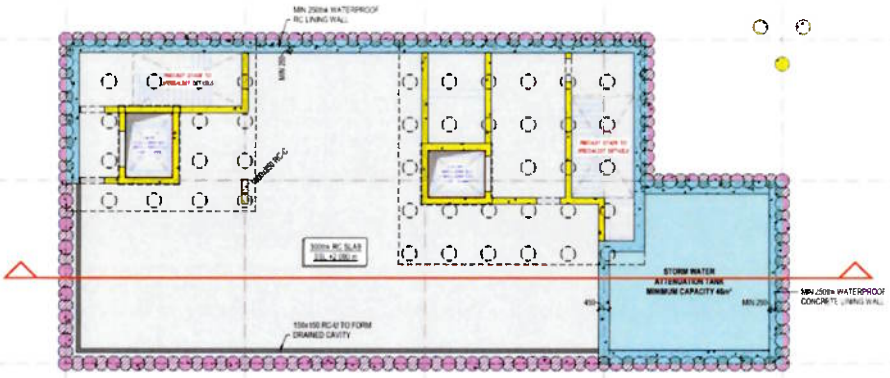


Figure 13 – Proposed Attenuation Tank

The secant pile wall will follow the perimeter of the basement and the attenuation tank. The separating wall between the attenuation tank and the basement will be constructed as a 450mm thick RC wall spanning between the secant pile perimeter wall/core walls, with minimum 250mm thick concrete lining walls to the secant piled wall. The tank slab is to be a minimum 300mm thick Waterproofing for the tank is to be provided by including a waterproof additive within the walls and slab. Should the invert levels of the attenuation tank not allow for gravity drainage to the main sewer a sump will be included within the slab of the attenuation tank.

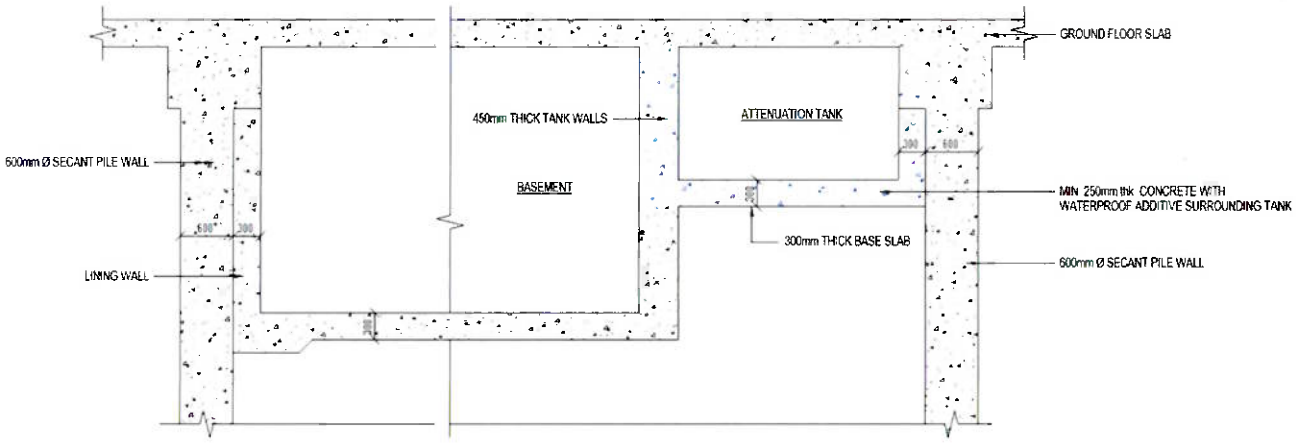


Figure 14 – Typical Section Through Attenuation Tank

4.5 Super-Structure

The proposed structural solution for superstructure is a steel frame with composite concrete metal deck slabs.

This will coprise of a grillage of 533x210x82 UB primary structural beams typically run parallel to the long with 533x165x66 UB secondary beams are provided at 2.5m centres. Spacing of secondary beams allows for un-propped Comflor51 re-entrant metal decks slabs to be used in construction.

Columns are typically 305x305x118 UC sections. Slabs are proposed as 140mm thick to support the applied loads and provide 90 minutes fire resistance. 250mm thick in situ concrete core walls to house the lifts and stairs provide stability to the structure.

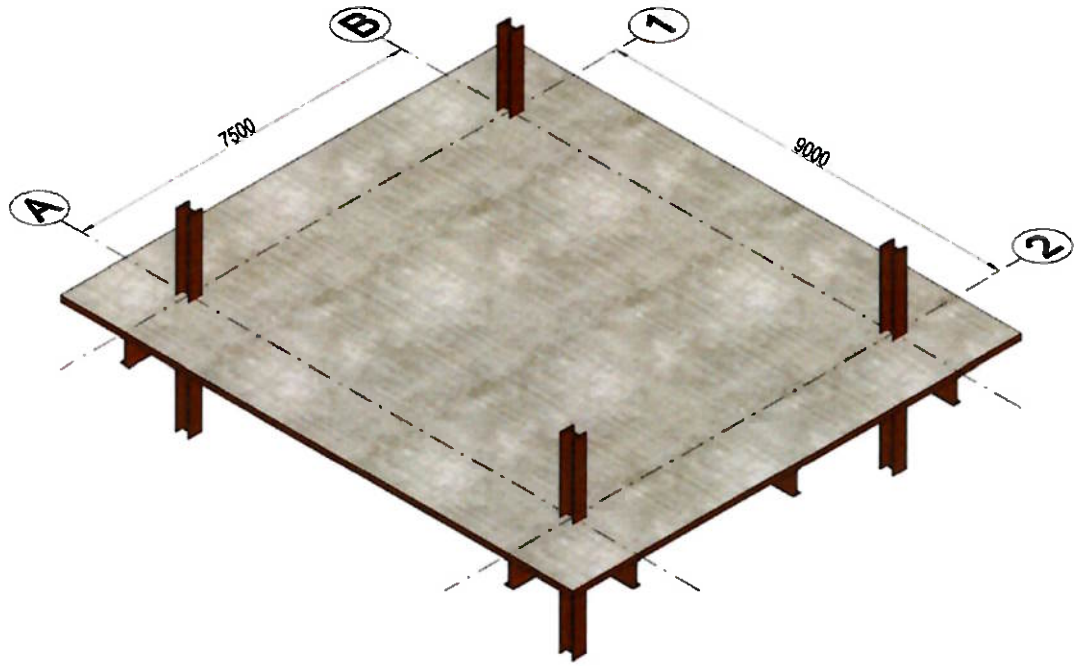


Figure 15 – Typical Steel Frame Structural Grid

The super-structure will likely use traditional construction techniques. The steel beams and stanchions will be erected typically on a floor-by-floor basis using the tower cranes to lift the bolted section in to position. The metal decks on each floor will provide a safe working platform to guide the sections in to position.

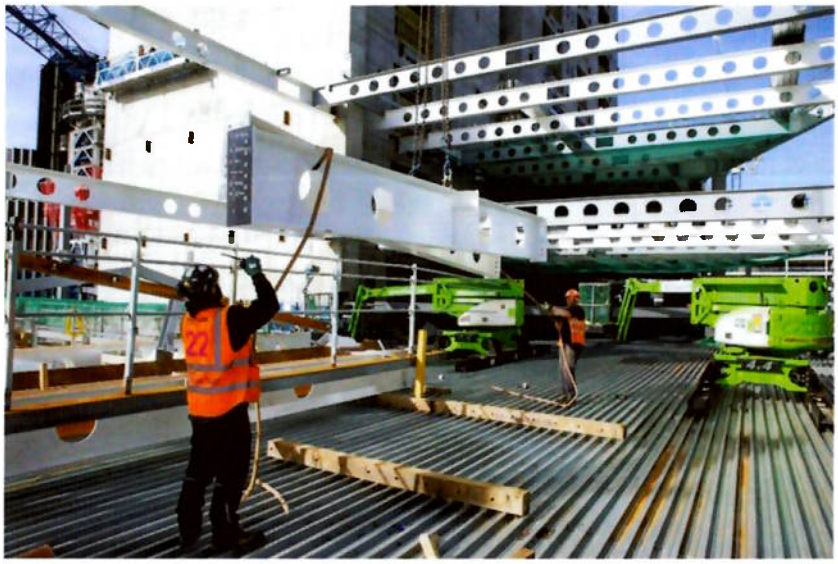


Figure 16 – Typical Steel Frame Erection

The bolted steel sections will typically arrive on site with prefixed edge protection and off-site applied intumescent paint fire protection applied, to limit the amount of site works required.

Figure 17 – Typical Concrete Pour on Metal Decking

The sequence of pouring the concrete on the metal decks will typically occur after 2-storeys of metal deck are completed to safeguard the concrete pours from the overhead steel erection operations. The metal decks will typically not require temporary back-propping or formwork in advance of the concrete placement. Concrete placement to the metal decks will typically be via pumping for all large pours to free-up the crane for other lifting operations. Wind and weather will be monitored, and crane usage will be restricted as required during inclement weather to ensure safety of all personnel.

4.6 Existing Structures

4.6.1 Interface to 20-21 Moore Street

No. 20-21 Moore Street is located within the Site 4 boundary which sits adjacent to Site 5. Consideration for the boundary has been made within the structural proposals where there is no proposed basement in this location and foundations for the superstructure adjacent to the building have been moved away from the boundary to mitigate the risk of undermining existing foundations and causing damage to the existing building during construction.

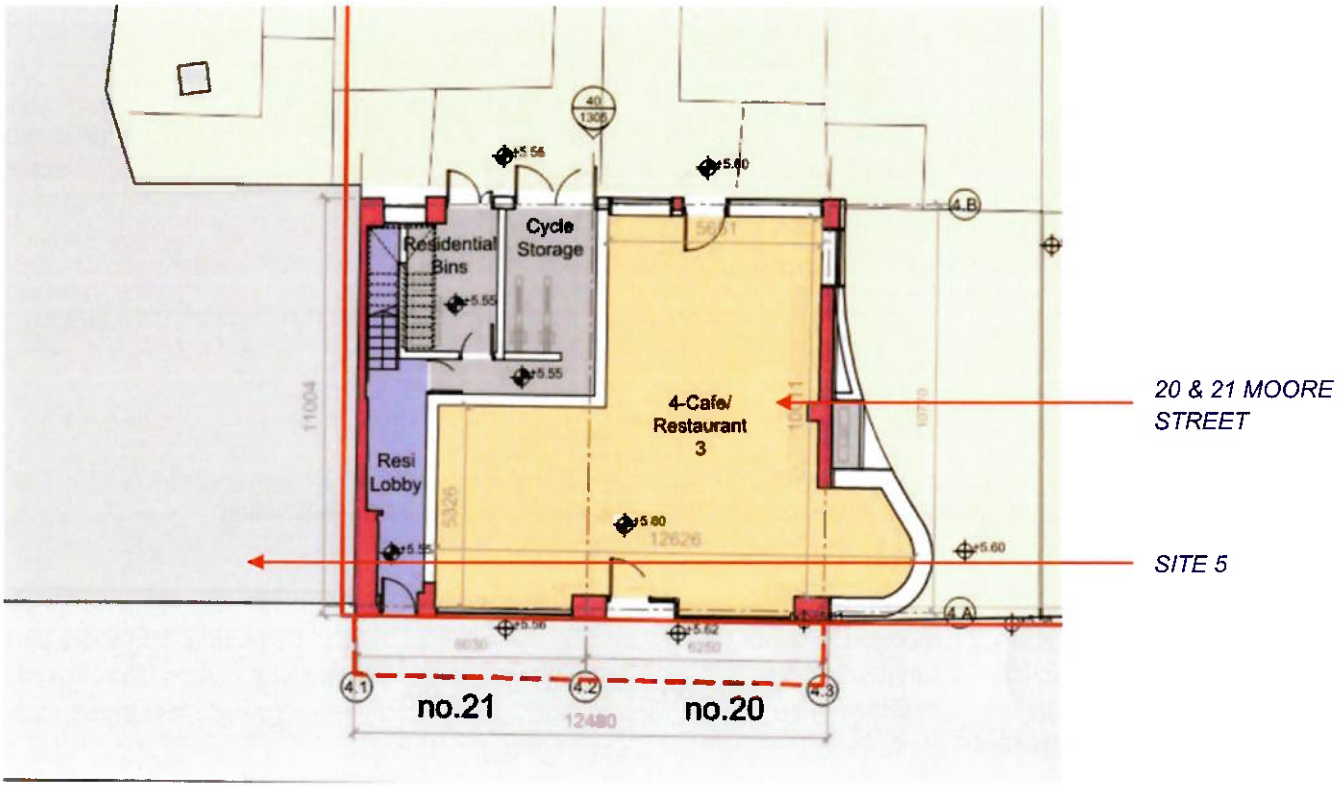


Figure 18 – Retained 20-21 Moore Street - ACME Site 4 Drawing DC-ACM-4X-B1-DR-A-20-1199-P05.

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.

Pile foundations along the boundary with No. 20-21 Moore Street, will be offset from the building line to allow access for a piling rig away from the retained wall. Ground beams will cantilever from the pile caps to support the columns at the corners of the building. It is understood that there are no basements beneath 20 and 21 Moore Street therefore construction at the ground level will not surcharge the structure.

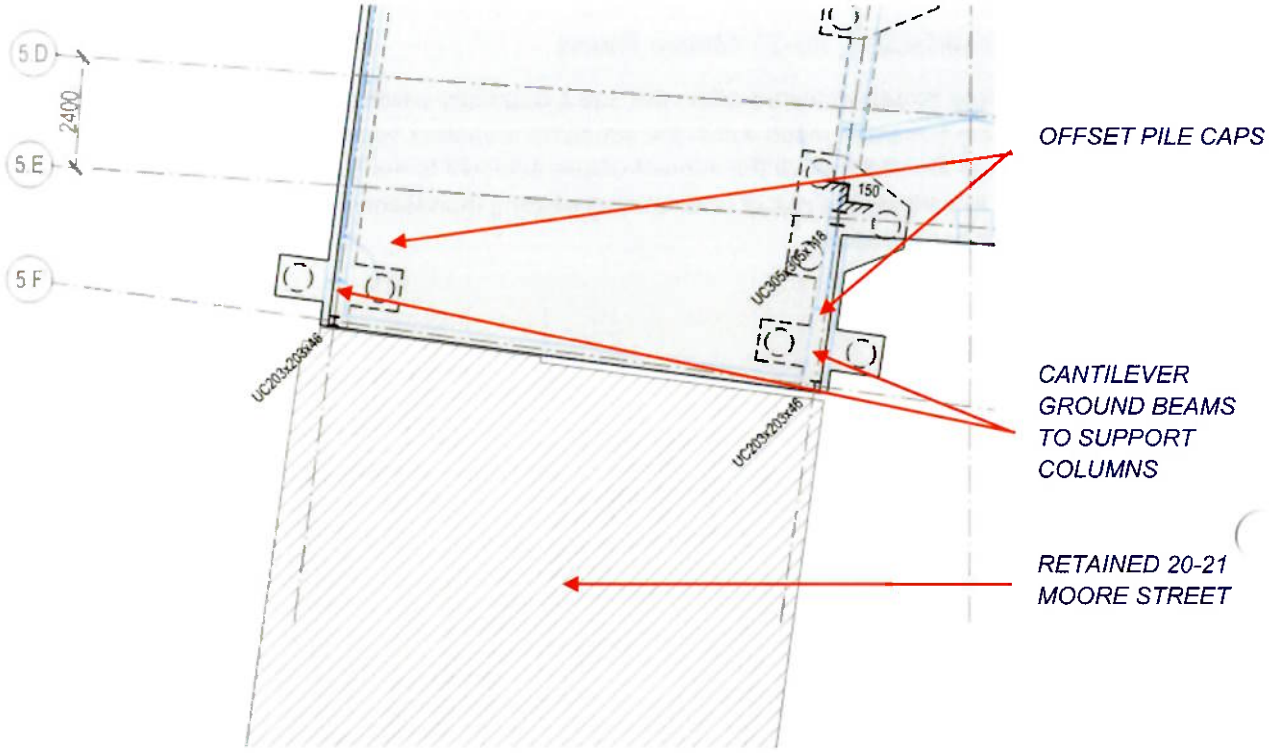


Figure 19 – Proposed Foundation Arrangement Adjacent to Existing Building

4.6.2 Existing Basements

There is an existing basement beneath Nos. 22 and 23 Moore Street, which extends to 13 Moore Lane to the rear, which lies within the Site 5 boundary. The buildings are to be demolished and it is proposed that the basements are infilled to provide a level piling platform, from which the proposed steel frame structure can be constructed.

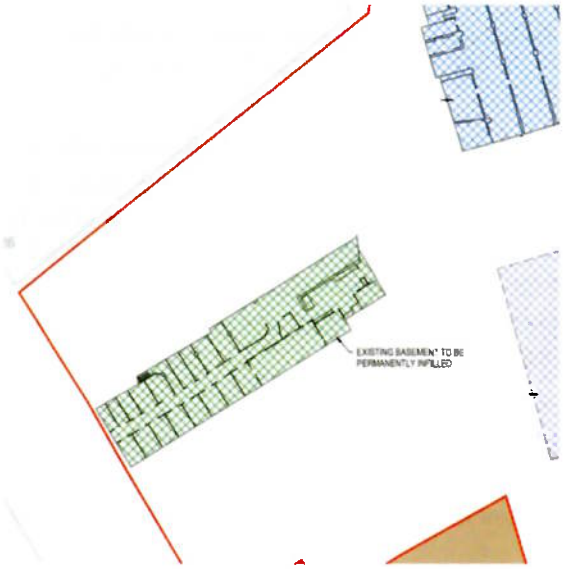


Figure 20 – Existing Basements on Site 5 Site (22&23 Moore Street and 13 Moore Lane).

Whilst not shown on current survey drawings, it is understood that there may be existing basements at 20 and 21 Moore Street. Therefore, as the existing basement at No. 22 Moore Street is to be infilled a new retaining wall is to be installed adjacent to the retained/existing basement at 21 Moore Street to avoid surcharging the existing walls. The retaining wall can be cast in situ or installed as pre-cast concrete units, placed on the existing soil level adjacent to the basement wall. Should the existing condition of the basement walls be required to be maintained, i.e., with an open environment to each side of the wall, then the retention structures can be installed to provide a cavity between the new concrete and the existing basement wall. This is to be developed at the next stage alongside any requirements to vent the cavity.

4.7 Envelope

Proposals for the façade include a curtain walling system with architectural fins fronting the public square on the south elevation while the setback façade at ground floor will be full height double glazing. The east elevation of the building is to be clad with perforated cementitious boards. The facades to the external boundaries of Site 5, north and west, are to be clad in red brick to match the existing fabric of neighbouring properties.

Construction of masonry facades will either be traditional requiring a perimeter scaffolding or prefabricated precast construction where the bricks are fixed to a precast concrete greyback panel.

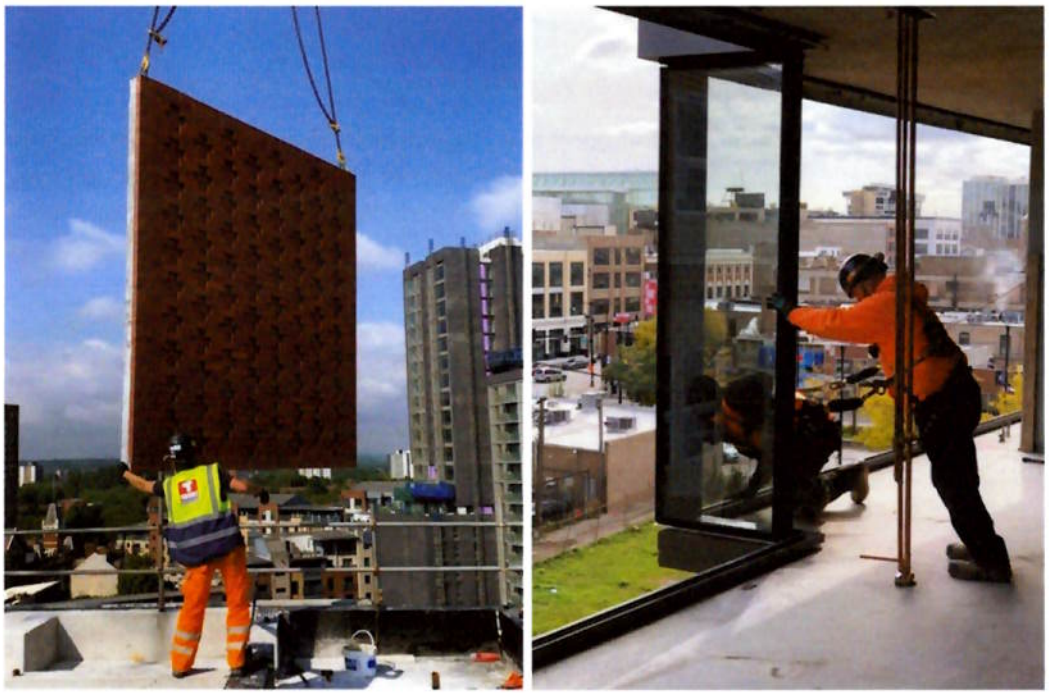


Figure 21 – Typical Precast Concrete Panel & Curtain Wall Panel Installation

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 163,490m^3 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.

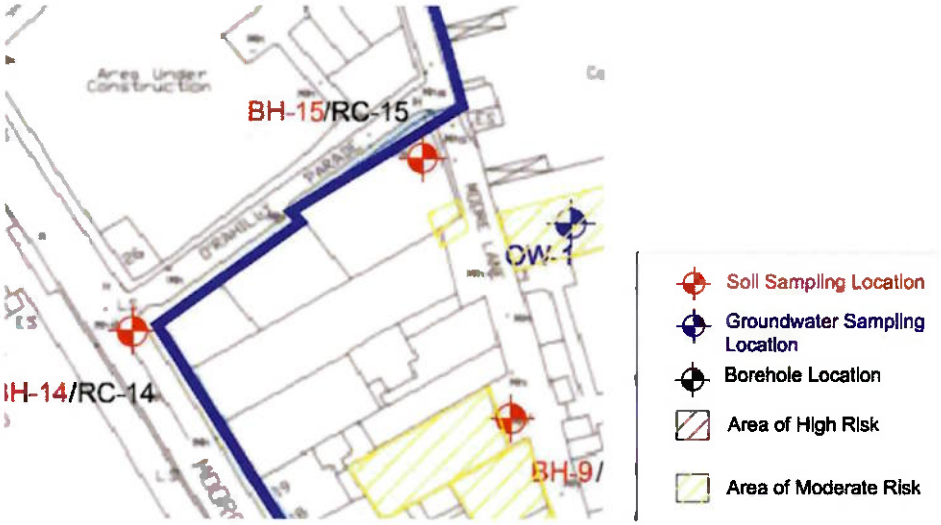


Figure 22 – Site 5 areas of Potential Contaminated Material

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	124.9	0	0.0	85	106.1	15	18.7
Concrete, Bricks, Tiles, Ceramics	707.6	30	212.3	65	459.9	5	35.4
Plasterboard	55.5	30	16.6	60	33.3	10	5.5
Asphalts	13.9	0	0.0	25	3.5	75	10.4
Metals	208.1	5	10.4	80	166.5	15	31.2
Slate	111.0	0	0.0	85	94.3	15	16.6
Timber	166.5	10	16.6	60	99.9	30	49.9
Asbestos	1.0	0	0.0	0	0.0	100	1.0
Total	**1387.4**		**256.0**		**963.5**		**167.9**

Table 2. Estimated off-site reuse, recycle and disposal rates for demolition waste from the Site 5 [extract AWN document ref. CB/20/11784WMR01]

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	127.4	10	12.7	80	101.9	10	12.7
Timber	108.1	40	43.2	55	59.4	5	5.4
Plasterboard	38.6	30	11.6	60	23.2	10	3.9
Metals	30.9	5	1.5	90	27.8	5	1.5
Concrete	23.2	30	6.9	65	15.1	5	1.2
Other	57.9	20	11.6	60	34.7	20	11.6
Total	**386.0**		**87.6**		**262.1**		**36.3**

Table 3. Estimated off-site reuse, recycle and disposal rates for construction waste from the Site 5 [extract AWN document ref. CB/20/11784WMR01]

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

Of particular importance to the Site 5 development are the neighbouring buildings to the site.

Nearby Building to Site 5 include:

- 14-17 Moore Street (National Monument)
- 20-21 Moore Street
- The Rotunda Hospital

6.1 Site 5: 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. 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 neighbouring buildings and structures adjacent to Site 5 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 5 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 Site 5 - Temporary Works & Exclusion Zones

Particular consideration has been given to the adjacent 20-21 Moore Street party/boundary wall. The wall shall be protected during demolition and construction via temporary works 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.

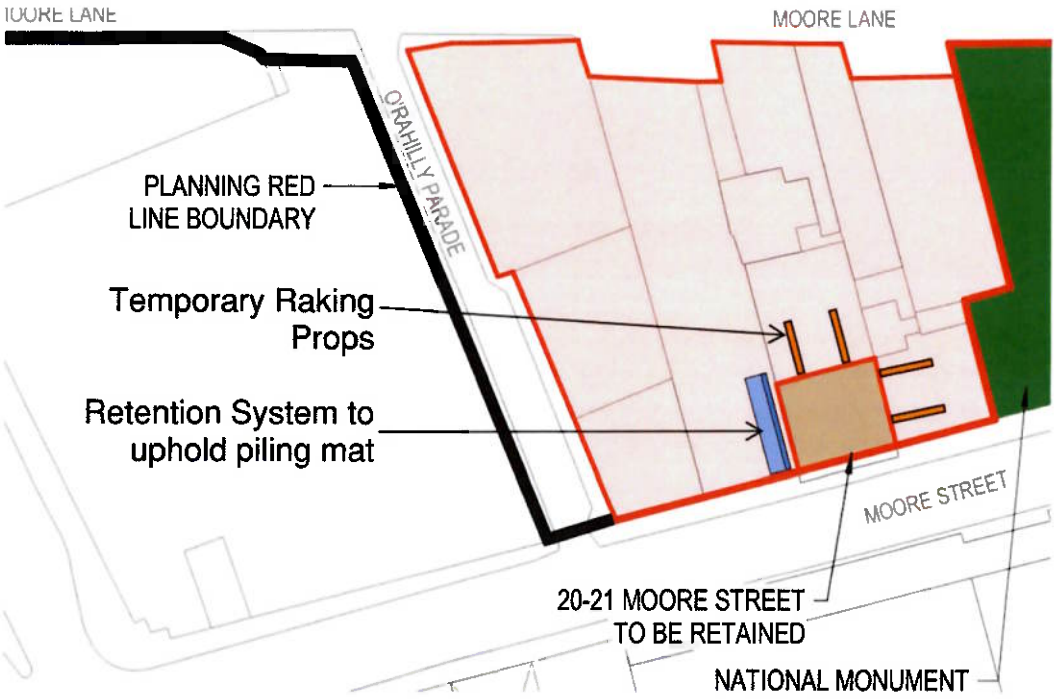


Figure 23 – Preliminary Site 5 Temporary Works

6.3 Adjoining & Retained Buildings

The 20-21 Moore Street boundary/party walls that rely on the existing buildings within Site 5 for lateral restraint will require a temporary retention system to restrain the existing buildings during demolition and construction stages.

This will likely comprise of temporary raking props between the boundary/party walls and thrust blocks located a ground level. The trust blocks may form part of the foundations to the new development. The temporary raking props will be designed to provide lateral restraint at every existing floor level in addition to lateral wind loads applied to the building.

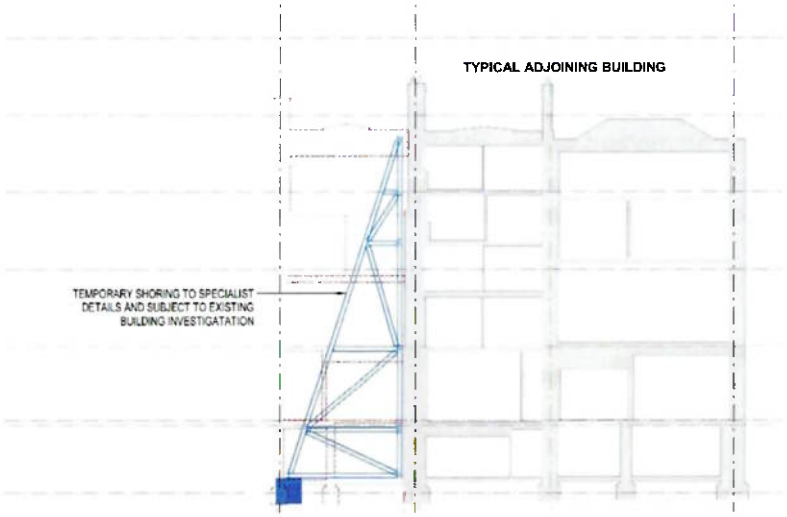


Figure 24 – Typical Temporary Boundary/Adjoining Retention System

Once the temporary raking props have been installed the exposed party/boundary walls will be protected from the weather using felt and battens (or as agreed with the neighbouring property owner). The boundary walls and retained structure within the site will be continuously monitored for movement and vibration during demolition and construction.

On completion of the adjoining structural frame, the new development may restrain the existing boundary/party walls via lateral restraint fixings. Typically, these are fixed into the existing masonry walls at every floor level.

Considerations are to be made by the contractor during demolition and construction where the existing building are to be temporarily exposed to external elements, such as new openings for stair connections or where roof structures are being removed. The contractor is to ensure suitable protection is provided through the use of external scaffolding and building sheeting to avoid the ingress of water.

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 adjoining buildings.

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.

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 with real-time data available. 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.

The monitoring of retained structures and neighbouring buildings shall continue after completion of the demolition works and the construction of the superstructure and building envelope is substantially complete with removal of all temporary works.

7. Control and Monitoring of Noise, Vibration and Dust on site

7.1 Condition Surveys

It will be necessary to carry out a detailed condition survey of all adjoining lands and properties prior to any works commencing on site, with particular attention paid to the protected structures noted previously in this report. In addition, baseline movement monitoring will be carried out in line with best practice.

7.2 Noise Monitoring

The contractor will deal with the immediate dangers to hearing etc. associated with high noise levels and the impact of same on construction operatives by means of risk assessment and mitigation / precautionary measures and equipment, all in full compliance with the current Health and Safety legislation.

Noise on site shall comply with Safety, Health and Welfare at work (construction) Regulations 2006 to 2013, Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for full and partial demolition, BS 5228:2009+A1:2014 Parts 1 & 2 - Code of Practice for noise and vibration control on construction and open sites (hereafter referred to as BS 5228), Environmental Protection Agency Act 1992 Sections 106-108, including all Local Authority specific requirements for this specific site.

A survey of baseline noise and vibration will be undertaken to gain an understanding of the typical range of the existing conditions in the surrounding area. Methods of minimising construction noise and vibration will be implemented where possible. The Main Contractor is to implement these recommendations and utilise the most efficient construction methods to reduce the impact on the neighbouring environment.

The nature of construction activities means that a certain level of noise is inevitable, but the appointed Main Contractor must endeavour to minimise this as far as practically possible and reduce the effect and any nuisance to the surrounding environment and neighbours.

Work methods are to be reviewed to ensure minimal noise and vibration are created; methods should include:

- Each item of plant used on site complies with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/ [S.I. No. 632 of 2001].
- All plant and equipment liable to create noise whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors and neighbouring occupied buildings.
- The use of barriers and hoarding to absorb and/or deflect noise away from noise sensitive areas will be employed where required and reasonably practicable.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective shall not be operated until repaired.
- Fixed items of construction plant shall be electrically powered in preference to diesel or petrol driven. The Main Contractor shall ensure that vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers.
- Machines in intermittent use shall be shut down or throttled down to a minimum during periods between works. Static noise emitting equipment operating continuously will be housed within suitable acoustic enclosures, where appropriate.
- Tower cranes will be utilized instead of crawler cranes as these are electrically powered and quieter in operation.
- Noise suppression hammers and shields will be used on rock breaking equipment.

- Working hours will be confined to those stipulated in the grant of planning permission.
- Noise emitting processes such as rock breaking can be suspended during sensitive hours, to be agreed in consultation with DCC and neighbours.
- Alternative work practices will be investigated where the noise emitted is reduced. E.g. prefabricating building components off site.
- Site deliveries will be confined to working hours and allocated offloading location will be utilized for all deliveries.
- The Site Manager will also continually review and monitor the noise / dust / vibration levels / risk throughout the duration of the project and if necessary, adjust / add to the control measures to be employed to reduce nuisance.

7.2.1 Measures to Mitigate Noise

Of particular consideration is the noise from construction activities adjacent to the public footpaths and commercial areas (Moore Street, Henry Street and O'Connell Street Upper). Noise mitigation measure will be proposed by the Contractor and may include:

1. The installation of a solid timber hoarding to provide noise insulation.
2. A high-level acoustic wrap applied to the scaffolding to provide some degree of noise barrier
3. Particularly noisy works can have an acoustic noise control barrier put around them when the works are being carried out.
4. When jack hammers are used a "no racket" jacket will be applied which reduced the noise by up to 10db when 50ft away.

Figure 25 – Typical Noise Mitigation Measures

7.3 Vibration

During the course of the work proposed at Site 5 Ground borne vibrations from the proposed works could give rise to adverse effects to the Heritage Structures / Protected Structures / National Monument and these control measures are to be put in place during the works to ensure protection of the structures and finishes.

7.3.1 Proposed works and potential risks

The proposed works involve excavations; piling works and general construction works of basements, multi-storey framed building, adjacent to heritage and protected structures including the nearby National Monument.

Potential risks arising from Demolition and Construction Works identified:

(a) Vibration induced damage from demolition, piling and excavation works.

(b) Physical impact from machinery and /or swing of material deliveries

(c) General implementation of works such as landing shutters / reinforcement / steelwork deliveries in close proximity to the historic / protected structures.

7.3.2 Vibrations Standards

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV). Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (hereinafter referred to as BS7385:1993).
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration* (hereinafter referred to as BS 5228-2 2009+A1:2014)

7.3.3 Impact of ground borne vibrations arising from Proposed works

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- British Standard *BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.*
- British Standard *BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration*
-

BS7385-2:1993 and BS5228-2:2009+A1:2014 advise that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges.

The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at base of the building.

Historically important buildings, that are difficult to repair might require special consideration on a case by case basis, but buildings of historical importance should not be assumed to be more sensitive unless they are structurally unsound. If a building, is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other groundborne disturbance.

The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed, depending on their structural integrity. Where no structural defects are noted, the same limit to those for light framed buildings apply. For other structures and buildings that are determined to be potentially vulnerable to vibration due to significant structural defects, a further stringent criteria has been applied for transient vibration. It is assumed that known buildings and structures of this kind, will be subject to condition surveys well in advance of the works, and any defects identified repaired. The results of conditions surveys will determine whether a building or structure is classed as "vulnerable".

Table 4 sets out the limits as they apply to vibration frequencies below 4Hz where the most conservative limits are required. At higher frequencies, the limit values for transient vibration within Table B.2 of BS5228-2:2009+A1:2014 will apply, with similar reductions applied for continuous vibration and those for protected structures.

Structure Type	Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:	
	Transient Vibration	**Continuous Vibration**
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings *Note 1	6mm/s – 15mm/s	3 mm/s – 7.5mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/s	

- *Note 1: The relevant threshold value to be determined on a case by case basis. Where sufficient structural information is unavailable at the time of assessment, the lower value within the range will be used.*

Table 4 – Thresholds relating to the Transient and Continuous Vibrations in buildings and structures

7.3.4 Mitigation Measures to be put in place prior to works

For controlling vibration reference should be made to BS 5228:2009+A1:2014 which offers detailed guidance on the control of vibration from demolition and construction activities. In general, BS5228:2009+A1:2014 advises the following:

- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimize drop height of materials.
- Regular and effective maintenance by trained personnel should be carried out to reduce vibration from plant and machinery.
- Hand demolition, cutting of the separation joints of the buildings in advance and small robotic breakers and 'munchers'

Level of protection and procedure put in place will be dictated by potential risk resulting from work to be carried out.

The proposed construction methodology for the structures directly adjacent to upstanding historic structures will be designed by the contractor to ensure that all protection measures are adhered to and that all new works are undertaken in such a way as to limit vibration.

All works within the sensitivity zones of the historic structures will be carried out using piling and excavation and assembly techniques to ensure vibration levels are kept below the threshold level.

7.3.5 Monitoring and Mitigation for Ground borne Vibrations during Construction Works

Detailed monitoring will be used to control the proposed works and to ensure compliance with the proposed control limit to protect the Historic Structures / Protected Structures / National Monument.

Vibrations movements will be actively measured during the works with a pre-determined plan of action ready to be put in place should actual measurements vary from the expected levels.

The works will have appropriate level of site management, on site monitoring and supervision. A site representative will be present during the works to ensure the levels are as expected and to supervise any measures should the levels be exceeded.

A real-time response remote monitoring system with warning system will be adopted to monitor vibration. This is to be continuously monitored by on site personnel during demolition; excavation; piling and general construction works. Review of the monitoring data will happen concurrently with the works to ensure that corrective action is undertaken if a limit is breached, or if the developing trend in measurements indicates a limit may be breached if works continue. This real time review and response of the monitoring data is critical to ensuring no limit is exceeded.

In the event that control limit is approached the contractor for the works will explore a revised approach for completion of the works.

Monitoring will include vibration monitoring carried out at the historic structures along with survey points installed on the walls of the historic structures to monitor any movement during the works.

Tell-tale crack monitors will also be installed on existing defects on the historic structures and or its boundary wall where appropriate.

In accordance with established good practice, baseline monitoring will be undertaken in advance of the proposed works in order to establish the existing environment around the historic structures and to verify the correct operation of the proposed instruments.

A series of trigger limits will be set for the works following what is commonly called a 'traffic light' system.

- For measurements below an 'amber limit' works can continue.
- For measurements between an 'amber/red limit' and below the 'red limit' operations will be suspended immediately. The construction methodology will be reviewed and adjusted as required to allow works to proceed on a manner that maintains the integrity of the historic structures.
- Works can continue between the amber and maximum red limit but only when methodologies have been revised to attempt to bring vibrations back below the amber level and also with a greater level of monitoring and control.

Should vibrations go above the red limit works will be suspended for a full review of the exceedance event(s); revision of works procedures and approval by the clients' representatives / OPW before operations can proceed again.

7.3.6 Limits for Ground Borne Vibrations

Vibration monitoring and controls are required to be installed prior to the works commencing and for the full duration of the works to ensure the proposed control limit is not exceeded thus avoiding adverse impacts on the historic structure.

A warning threshold shall be implemented as per the limits outlined in Tables 4 above.

Baseline vibration monitoring will be undertaken prior to commencement. The baseline readings should be referenced and incorporated into any Agreement with neighbouring properties and DCC on maximum vibration limits permissible when working nearby.

Toolbox talks should also be carried out with personnel in respect to managing vibration on site. Exposure limits as set out in Regulation 4 of BS 5228:2009+A1:2014 will be reviewed, risk assessments carried out, detecting signs of injury, safe working practices and suppression techniques will all be incorporated. Methods of construction should be adopted to omit and or control vibration at the source, utilize lower levels of vibration; use vibration pads and gloves where possible. Any activity which will generate vibration should as far as practicable be isolated from sensitive receptors.

7.4 Air & Dust Management

A dust management plan will be compiled by the Main Contractor for the development.

The following precautions to minimise nuisance to the public and neighbouring occupiers caused by dust and dirt will be carried out by the contractor.

- Vehicle and wheel washing facilities shall be provided at site exit where practicable. If necessary, vehicles are to be washed down before exiting the site.
- Netting is to be provided to enclose scaffolding to mitigate escape of air borne dust from the existing buildings.
- Shroud piling machinery as shown below when operating near to boundaries.
- Engines and exhaust systems should be maintained so that exhaust emissions do not breach stationary emission limits set for the vehicle / equipment type and mode of operation.
- Dust emission over the site boundary should be minimised using static sprinklers or other watering methods as necessary.
- No burning of materials to be permitted on site.
- Water sprays for dust suppression should be affixed to mechanical excavators/munchers involved in demolition works.
- Demolition waste should be removed from site as quickly as possible to minimise risk of dust generation and any fine material should be covered with a tarpaulin or similar material and tied down.
- Water sprays and cannons should be used where possible during cutting, with protective measures applied to retained finishes local to the cutting.
- Prior to commencement, the Main Contractor should identify the construction operations which are likely to generate dust and to draw up action plans to minimise emissions.
- In areas of poor natural ventilation, dust capture/extraction methods should be employed by the Main Contractor.
- The Main Contractor should allocate suitably qualified and experienced personnel to be responsible for ensuring the generation of dust is minimised and effectively controlled.
- The Main Contractor will be required to appoint a senior member of its site management team to act as the liaison with third parties in respect of complaints regarding dust and or site activities.
- Monitoring of dust deposition should be undertaken at nominated boundary locations to ensure that dust levels comply with the TA Luft limit value of 350mg/(m²/day) based on a 30-day average using Bergerhoff gauges (Limits to be agreed with local authority).

Figure 26 – Typical Dust Mitigation Measures

8. Archaeology

Archaeological monitoring will take place where any preparatory ground reduction works are required including site investigation works and opening up works at basement or ground levels. Post-demolition archaeological investigation will be carried out in areas across the site without basements. This is required to establish the nature of below ground structures, foundation remnants and features of archaeological and historical importance and to establish the presence or otherwise of archaeological remains. Further resolution may involve the recording of historic features and full archaeological excavation (i.e., preservation of the archaeology in record form, of all archaeological soils or features encountered). The resolution will occur during this post demolition phase in the area of the find spot in advance of the main construction phase.

9. Building Control Amendment Regulations

9.1 Quality Assurance during Construction and BC(A)R Compliance

The Main Contractor/Contractors will need to demonstrate how they will be providing quality in construction. They shall comply fully with all requirements of the Amended Building Control regulations to the satisfaction of the Ancillary and Assigned certifiers.

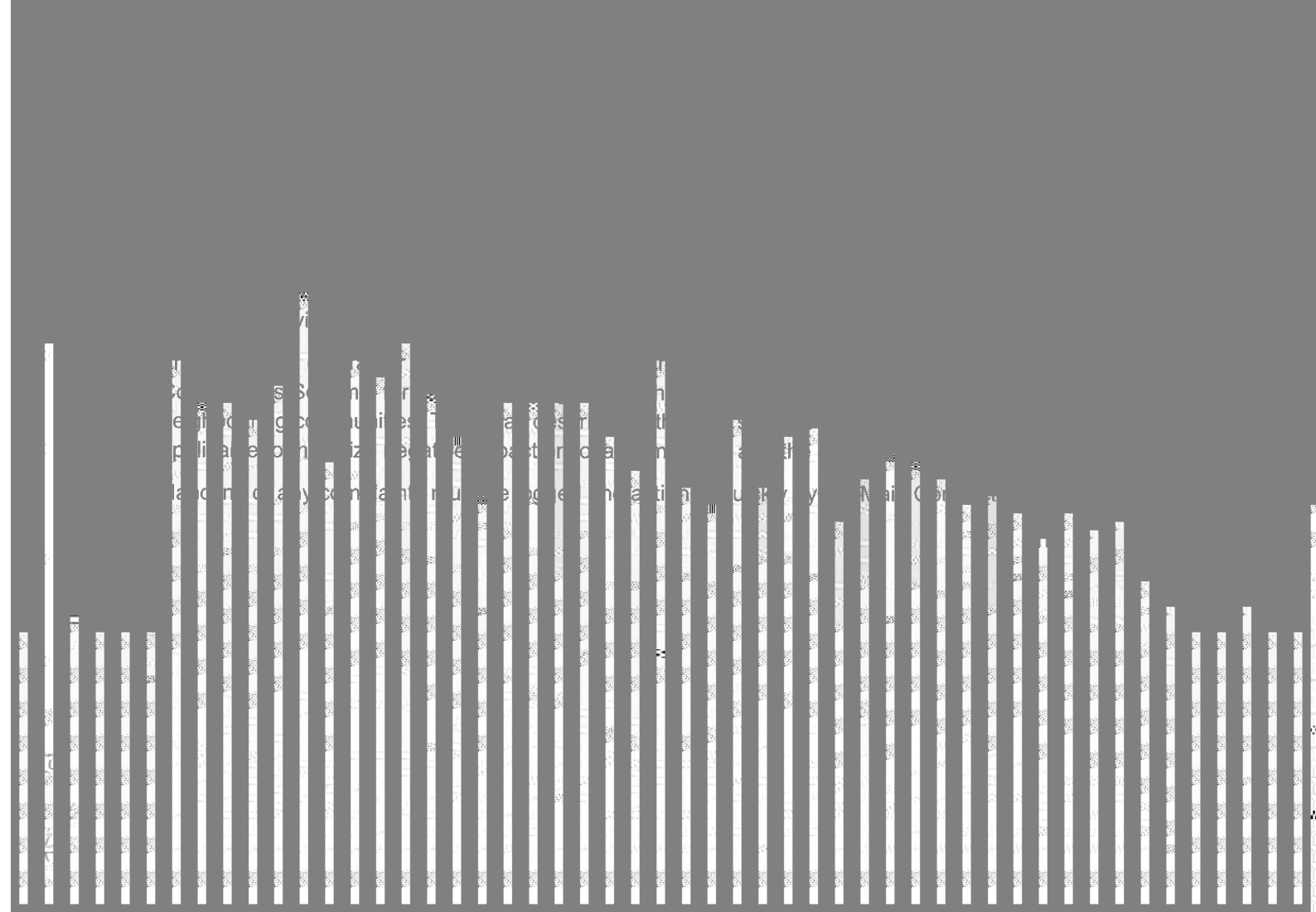
The Main Contractor/Contractors will be responsible for the preparation of benchmark samples of each new element of the works to the satisfaction of the Assigned and Ancillary Certifiers under the Building Control regulations (BCAR). Each benchmark sample will be considered a 'hold point' under the Preliminary Inspection Plan (PIP) and will be required to be offered up to the Certifiers involved ahead of the works starting - with a minimum of two days' notice (in writing).

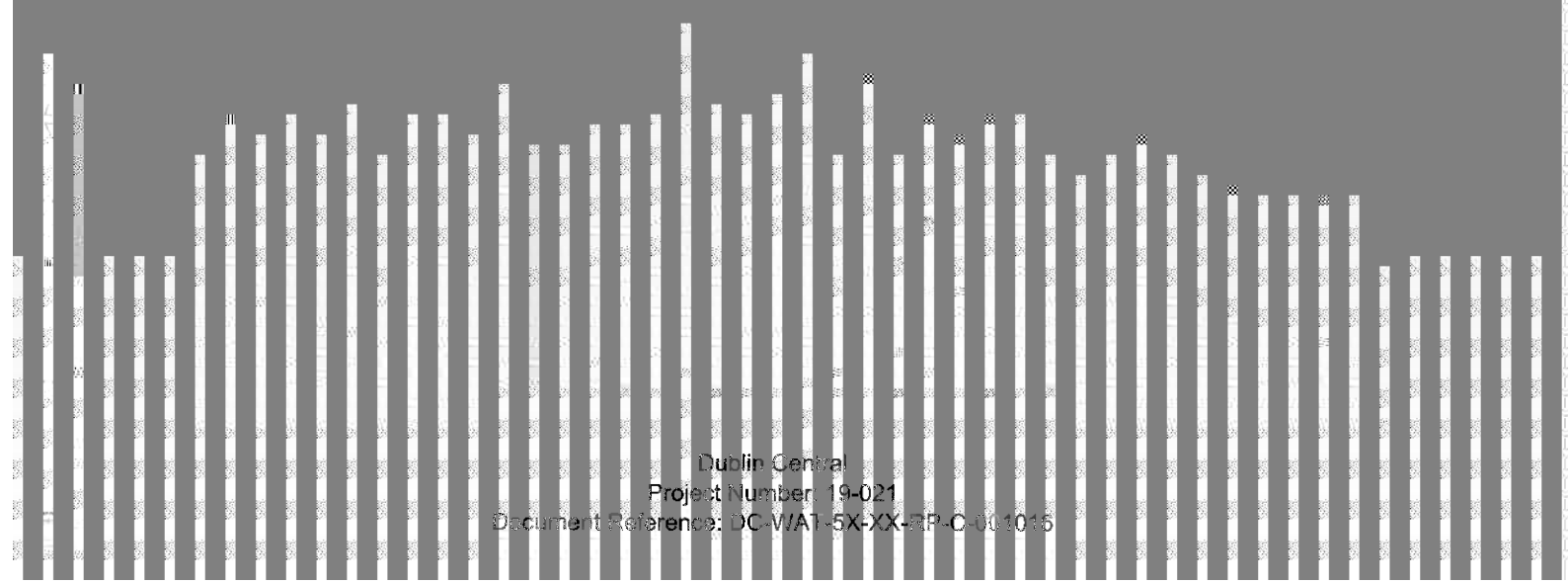
The Main Contractor/Contractors will be required to keep pre- and post-pour check sheets for submission to the assigned and ancillary certifiers where required.

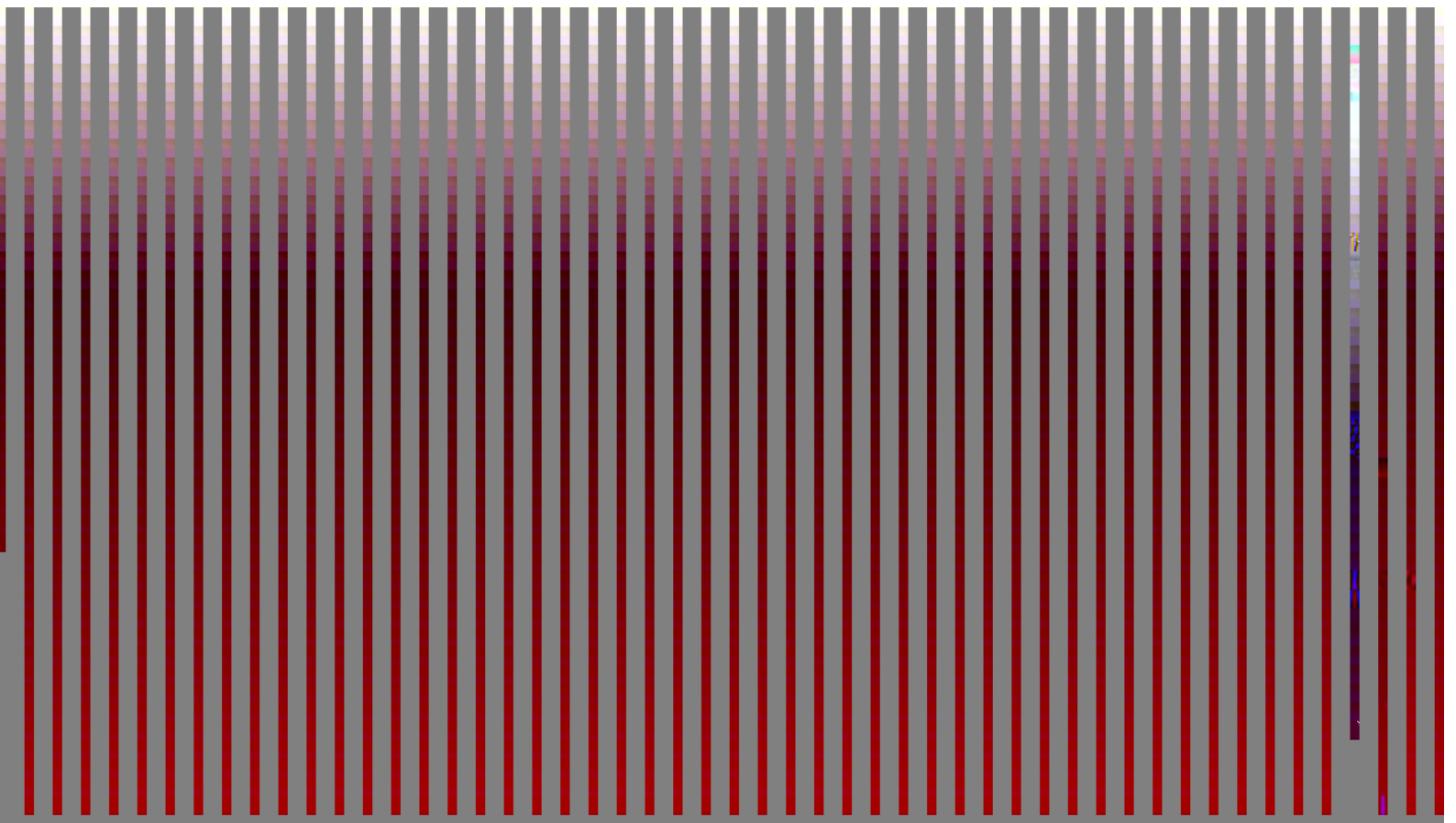
Written acceptance will be required from the Certifiers after inspection of the benchmark samples before the rest of the works proceed.

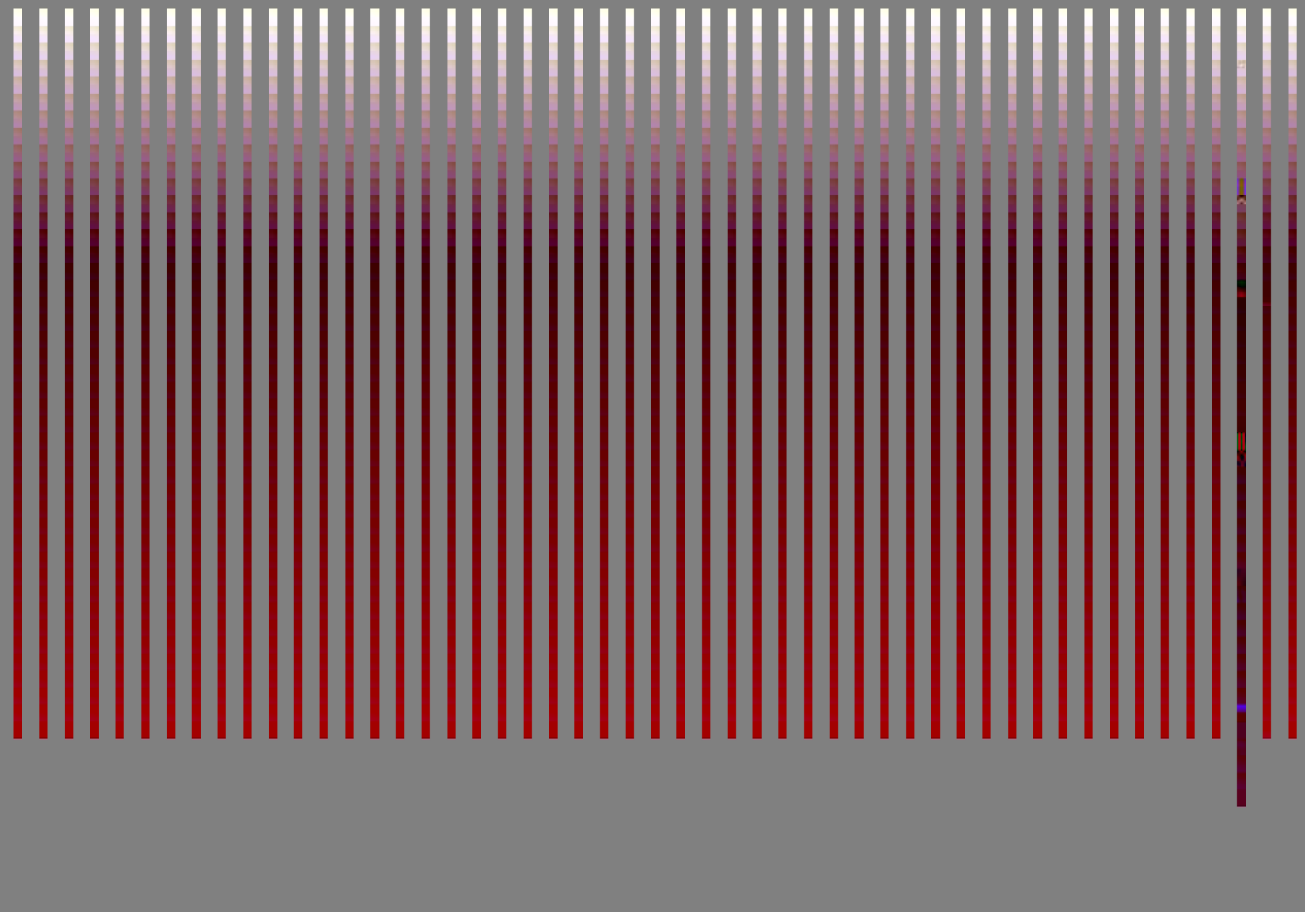
Where 'specialist' suppliers are noted by the design team to have design responsibility, they will be required to provide Certificates of Design (Sd), Certificates of Inspection (Si) and Certificates of Completion (Sc). Ahead of appointment of the 'specialist' suppliers / designers - evidence of competency and Professional Indemnity insurance cover will be required for the approval of the Contract Administrator and Waterman Moylan.

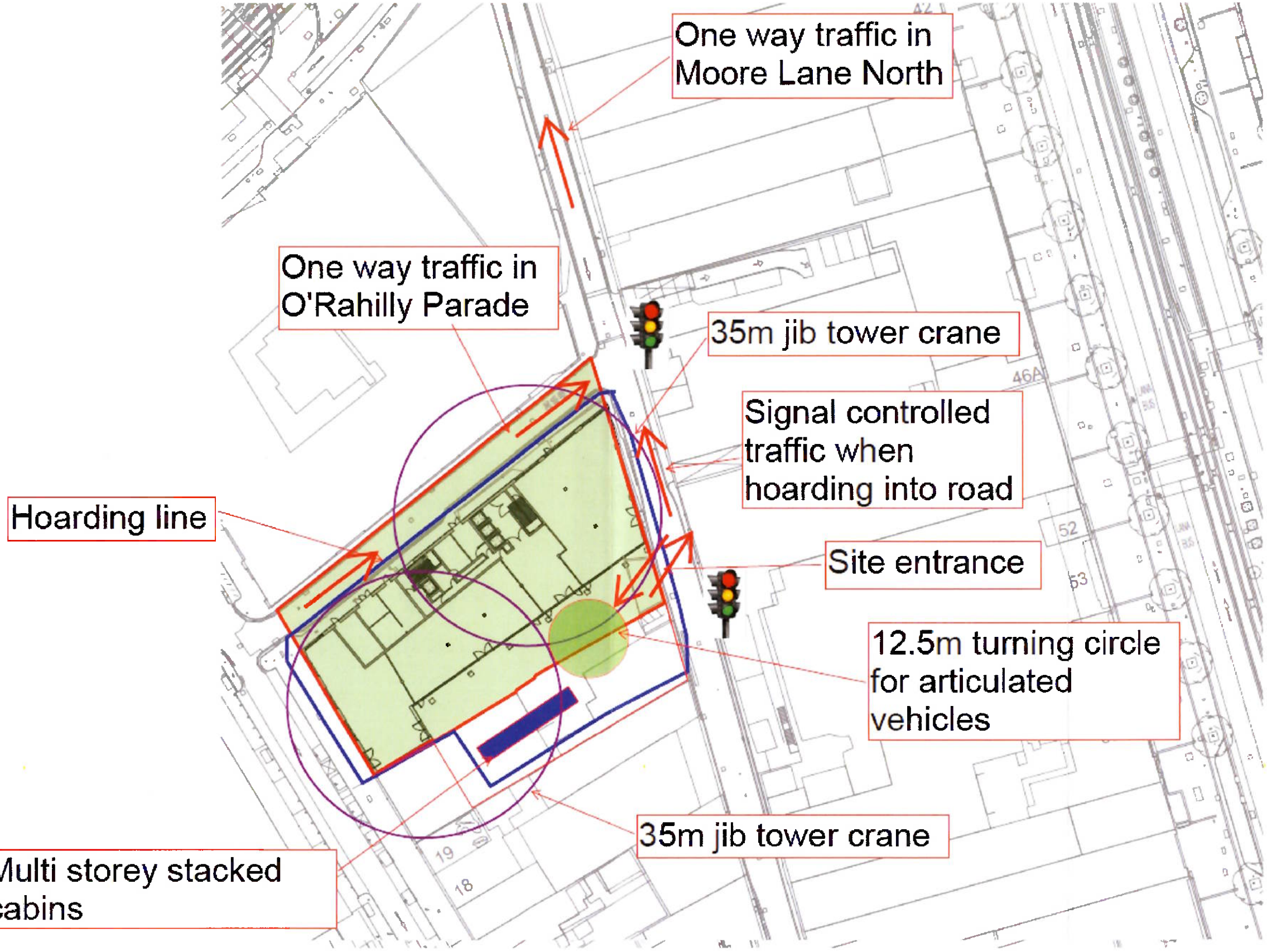
This is to be confirmed by the Main Contractor/Contractors once appointed and will include a quality check regime.











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STATUS
PRELIMINARY

CLIENT Dublin Central GP Ltd.
ARCHITECT
PROJECT Dublin Central - Site 5

TITLE Preliminary Site Setup Plan

DRWN.	DESIGNED	APPROVED	DATE
RN	RN	RO	26.11.20

SCALE	JOB NO.	DRG. NO.	REVISION
NTS	19-021	DC-WM-ZZ-ZZ-SK-S-102	

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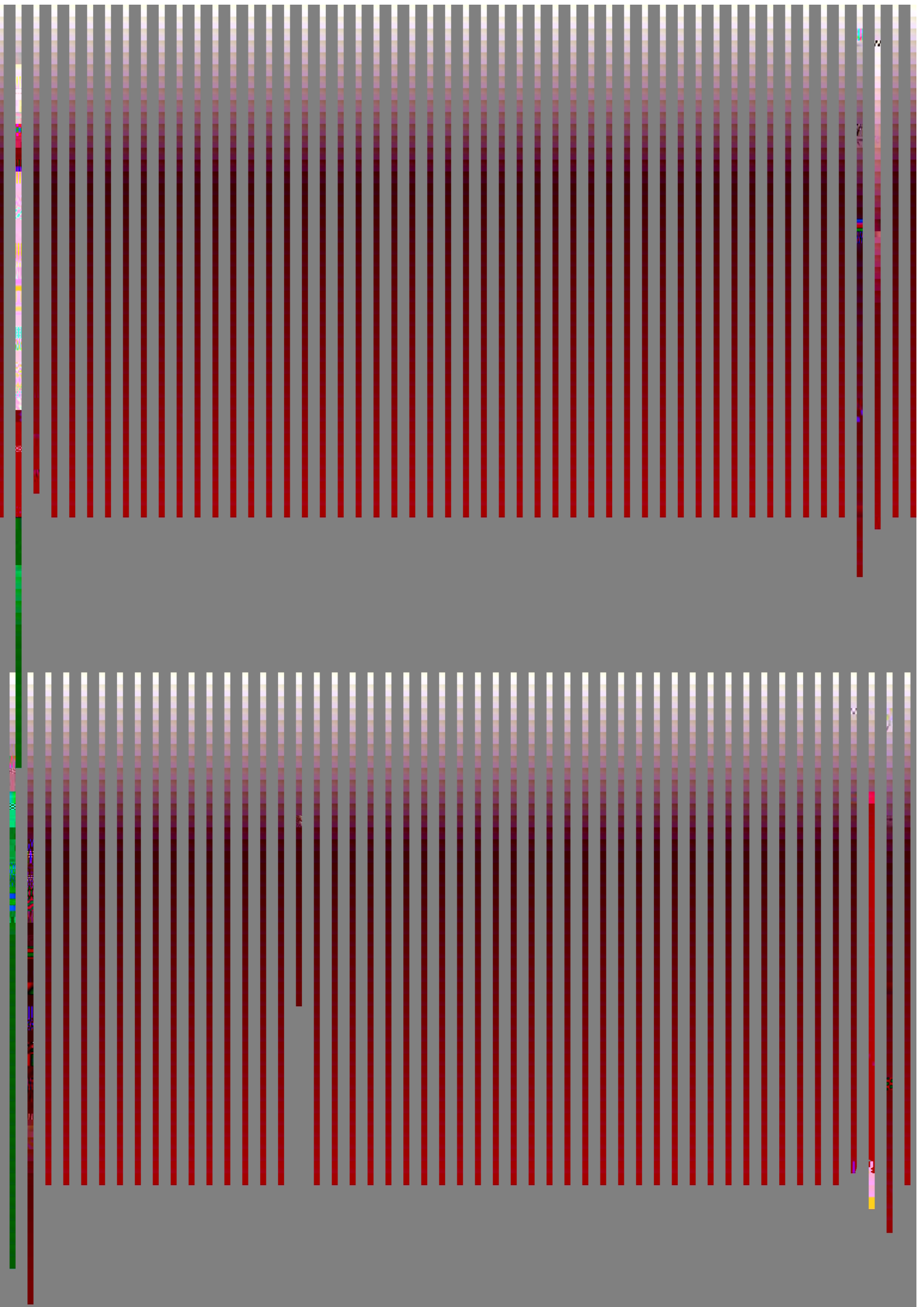

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