DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

Outline Construction Management Plan

March 2022

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APPENDICES

1. INTRODUCTION

This Outline Construction Management Plan (OCMP) has been prepared by T.J. O'Connor & Associates (TJOC) to accompany the Planning Application for a new residential development in Dundrum Village, including the Old Dundrum Shopping Centre and properties west of Main Street. The development is referred to as the "Dundrum Village SHD" for short in this application.

The Old Dundrum Shopping Centre is a 1970's 3-storey 'L' shaped building, known as Dundrum Village Centre, surrounded by a surface car park.

The document sets out, on a preliminary basis, a framework of measures to address the implications of the construction works. The Contractor appointed to undertake the works will be required to update this OCMP before commencing works on site and prepare a detailed Construction and Environmental Management Plan (CEMP) in line with their obligations under the Safety, Health and Welfare (Construction) Regulations 2013.

The development comprises 11no. urban blocks arranged around the central pedestrian spine and a series of 4 courtyards corresponding to 4 separate "zones" or character areas.

The buildings range in height from 4-5 storeys on Main Street to 9-16 storeys to the Dundrum Bypass.

The development will consist of c. 881no. residential units. This development also includes a foodstore, retail, café/restaurant and a creche are at ground floor level, fronting Main Street, as detailed in the Schedule of Accommodation included with this submission.

The development will include the demolition of all existing structures on the site with the exception of No.'s 1-3 Glenville Terrace which will be refurbished.

Vehicular and cycle parking is provided below podium with visitor cycle parking spaces in the public realm. Vehicular access to serve the proposed development will be provided via Dundrum Bypass.The existing vehicular entrance on Main Street will be closed.

Pedestrian connections and linkages are proposed through the site, forming connections that are not currently possible from within the site to Main Street; to the south via Church Square and the Dom Marmion Bridge (Ballinteer Road Bridge); and west via the proposed new Sweetmount Bridge connecting Main Street to the residential communities west of the Bypass.

2. CONSTRUCTION ACTIVITIES

2.1. Site Setup

The site establishment works, to be carried out by the appointed Contractor, will include erecting perimeter hoardings around the zone of the site to be developed, construction of the site compound and storage areas, forming site access and egress points, enacting the traffic management plan, providing site security and erecting cranes.

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

Hoarding - The hoarding will typically take the form of standard plywood hoarding to a height of 2.4m, the existing boundary may also be used in some places, given the large site and phased nature of the construction works. In areas of sensitivity, i.e. adjoining Protected Structure (Holy Cross Church) and Protected Structure (Parochial House), a 3.0m high hoarding will be provided. Controlled access points to the site, in the form of gates or doors, will be kept locked for any time that these areas are not monitored (e.g. outside working hours). The hoarding will be painted, well maintained and may contain graphics portraying project information.

Landtake - The site adjoins several existing public roads, including public footpaths along its boundaries. The proposed hoarding line is located directly adjacent to the kerbline of both the Dundrum Bypass to the west boundary and the Dundrum Main Street to the north and east boundaries. Pedestrian movements directly alongside the site or across site access points will be avoided in the interests of mitigating risks to the general public. All lands that are required for the construction of the development are within the red line.

Work Extents - The anticipated works are contained within the application site, as indicated by the 'red-line' on the Architects planning submission drawings.

This 'red-line' includes areas outside the lands in the ownership of the applicant, in order to provide for the construction of:

- The proposed shared pedestrian and cycle bridge to Sweetmount Park
- The upgrade of cycle tracks on the Dundrum Bypass
- The relocation of the main access/egress junction into the development site
- The proposed upgrades to soft and hard landscaping along the Main Street
- The proposed pedestrian crossing points on Main Street and the Don Marmion Bridge
- Utilty connections to public and private infrastructure

Compounds - The extent of compounds and storage space required by the Main Contractor will vary for the duration of the works for each of the development zones of the site. Given the size and nature of the site, it is envisaged that there is adequate space on the site for the compound, and adequate space to store materials on a temporary basis.

The proposed phasing drawings presented in Section 5 below and in Appendix A, identify the proposed indicative sequence of construction works and site set-up for each phase as it progresses.

2.2. Vehicular Access to Site

The use of access points will be determined by the Contractor in their Construction Traffic Management Plan (to be prepared as part of their CEMP prior to commencing works on site) and will vary depending on the phase of construction. Construction Access to the site will be via the Dundrum Bypass. Initially access will be via the existing all movement junction. When constructed, the slip lane to the north will be used for access and the slip to the south will be used for egress.

Construction traffic access will be confined to the Dundrum Bypass existing all movement junction and proposed slip-lane access and egress points. The predominate direction of construction traffic entering and exiting the site will be from the south (travelling to and from the M50).

Pedestrian gates to allow construction workers access the site directly from the Luas and Bus interchange via Main Street will be provided. These pedestrian access points will be controlled either by security officer or turn style and will also cater for cyclists. To the extent possible, all visitors will be encouraged to use sustainable travel modes. Visitors who choose to use their own vehicle will be accommodated with visitor parking either provided within the confines of the site or should space not be available, visitors will be directed to park in the Dundrum Town Centre car park (under the applicants control).

Fulltime Traffic Management Operatives will be located at all vehicle access points during the construction works.The Contractor will ensure that the delivery of materials is coordinated to minimise impacts to adjacent properties. The Contractor will ensure that all materials are adequately stored and secured in their site compound. The Contractor will ensure the roads adjacent to the site are kept clean and free of debris.

On site security will be available 24/7 to provide emergency vehicle access to the site if required.

2.3. Site Operatives

The number of workers on the site will vary throughout the construction programme. Based on industry standard figures during peak construction the number of site operatives is likely to be 200-300 workers depending on the number of buildings under construction at any one time.

On-site facilities will include a site office and staff welfare facilities (e.g. toilets, drying room, canteen, secure bike storage, etc.).

Vehicle parking for construction personnel will be accommodated within the development zone of the site (with overflow provision in the Dundrum Town Centre carpark). To the extent possible, personnel will be encouraged to use sustainable modes of transport – walking, cycling, public transport - Information on local transportation (i.e. Luas services via Dundrum luas stop and Dublin bus stops at Holy Cross Church and on Ballinteer Road) will be published on site.

2.4. Site Management

The facilities to be provided and maintained by the contractor will include:

- construction plant;
- hoisting equipment and cranes;
- scaffolding, platforms, access ladders, barriers, handrails;
- barricades and hoardings;
- temporary driveways, road crossovers and construction zone;
- on-site hardstand areas for vehicle loading and unloading;
- storage sheds and compounds;
- rubbish sorting areas;
- site amenities with all required equipment and facilities;
- construction worker accommodation;
- first aid facilities;
- site administration accommodation.

Key Plant and equipment used during the works are:

- Rigid and articulated trucks;
- Pilling-rigs, bulldozers, excavators, rock drills, and rock hammers or saws, rock crusher & screening machines, rock breakers
- Generators, compressors, concrete vibrators, power-floating machines
- Tower and mobile cranes;
- Concrete delivery trucks;
- Concrete pumps;
- Man and material hoists
- Scissor, boom and fork lifts

Harmful material will be stored on site for use in connection with the construction works only. These materials will be stored in a controlled manner. Where on site facilities are used, there will be a bunded filling area using double bunded steel tank at a minimum.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area will be completed as per the permitted layout.

2.5. Site Working Hours

Site development and building works are proposed during the following hours:-

Monday to Friday:	07:00 to 19:00
Saturdays:	08:00 to 14:00

Access to the site before 7am or after 7pm in the evening may be required for operatives arriving / departing work.

It may be necessary to deviate from these times in exceptional circumstances, for example: service diversions and connections; concrete finishing and fit-out works; erection of the proposed Sweetmount Pedestrian Bridge etc. There may also be occasions where it is necessary to make certain deliveries outside of these times, for example, where large loads are limited to road usage outside peak times.

2.6. Site Clearance and Demolition

The development site comprises of the Old Dundrum Shopping Centre and adjoinging lands including a number of properties of Main Street between the Old Shopping Centre and the Parachial House (including Glenville Terrace)

The site does contain a number of existing utilities which primarily serve Dundrum Village Centre. The main utility which serves other lands and is contained within the site is the combined sewer located in the surface car parking and runs from the south end of the site to the north end where it discharges into the Irish Water foul network at the junction of Main Street and the Dundrum Bypass.

The following is a high-level method statement for the demolition/break up of existing buildings (i.e. Dundrum Village Centre and adjacent properties to the west of Main Street[1]) and hardstanding area: The total area of demolition is 9,802m^2 GFA.

[1] Former Mulvey's Hardware (D14A250), 8 Main Street (D14W2W1), 15A Main Street (D14YP78), 15 Main Street (D14T3K2), 13 Main Street (D14P2X8), 13A Main Street (D14A0Y0), 4 Glenville Terrace (D14E261), and property on Main Street - former Post Office/ Joe Daly Cycles (D14V8K8).

Establish a site set-up for the zone of the site (Refer Fig 6.1), including hoarding and welfare facilities;

A detailed services survey has been carried out on the site using ground penetration radar survey to identify all buried services. This survey will be further validated using slit-trenching to accurately locate these services. A detailed investigation will also be used to determine what services are live, redundant and confirm what services are serving neighbouring properties. This will be performed before any ground excavation is performed on site.

Carry out any necessary services diversions and decommissioning works;

- The following specific protection measures will be applied for 1-3 Glenville Terrace and properties adjoining the site -

Zone 3 – 1-3 Glenville Terrace (Refer to Appendix 13B of the EIAR for further specific details):

- The contractor is required to carry-out an inspection of the building including a condition and structural inspection with the conservation architect to inform the protection measures to be provided to this building.
- The contractor will be required to submit a detailed conservation works method statement for any and all repair works, for the approval of the consulting engineer and conservation architect
- Develop and install temporary/permanent works to repair existing structural weakness in the building fabric of Glenville Terrace, as agreed with the consulting structural engineer and conservation architect
- Installation of vibration and tilt monitoring equipment to record and identify and adjust works practices if agreed thresholds are exceeded
- Sensitive demolition of existing returns and hand demolition at interface with the main terrace building
- Demolition of the return buildings is shown on the demolition drawings. Demolitions should take place once the roof finishes and structure have been stripped. The sequence of the dismantling is to be top down with hand-held power tools to be used where required, following the courses where evident.
- Temporary weathering to buildings upon removal of returns

Zone 4 – Holy Cross Church and Parochial House (Protected Structure / proposed Protected structure)

- Install 3.0m high solid hoarding to rear of Holy Cross Church & boundary with Parochial House
- Repair and refurbishment of existing granite stone boundary wall to the garden of the Parochial House as agreed with the conversation architect.
- Installation of vibration and tilt monitoring equipment to record and identify and adjust works practices if agreed thresholds are exceeded
- Pre-spilt rock adjacent the church to reduce the extent of rock breaking and install temporary retention systems to facilitate excavation (Refer Appendix C for further details)

Zone 4 – Other 3rd Party Boundaries

- Structural survey of connectivity with third party buildings (No.11 & No.16/17 Main Street) including opening up works in buildings to be demolished
- Installation of vibration and tilt monitoring equipment to record and identify and adjust work practices if agreed thresholds are exceeded
- Install temporary/permanent works alongside boundaries with 3rd Party Properties (Refer Section 3.1 for further details)
- Sensitive demolition and hand demolition at interface with third party buildings. Installation of temporary weathering to exposed gables of third party properties

Specific protection measures to be applied to protect the River *Slang include:*

- All ground water to be diverted to silt curtains and settlement tanks prior to discharging to the foul sewer outfall from the site
- Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing from the site and into the Dundrum Bypass road gullys
- Where possible trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site.
- All vehicles to use either truck wheel wash or manual wheel wash prior to leaving site.
- Road sweeper to be used to control any residual sediment from the site on the local road network, particularly the Dundrum Bypass.
- Additional measures such as installing silt collection bags in road gullys along Dundrum Bypass and routine cleaning of silt bags and road gully sumps
- The use of a road sweeper prior to rain forecasts to be used to further mitigate sediment material entering the River Slang
- Water quality monitoring station to be established adjacent Dundrum Library to record baseline water quality and weekly testing of water quality during the works.

A Waste Characterisation Assessment has been carried out by O' Callaghan Moran on the site and any materials identified as being hazardous and requiring removal, will be disposed of in strict accordance with the applicable legislation. All utilities that are not required will be disconnected and removed. Any existing slabs or hardstanding and concrete foundations will be broken out by excavators.

All reinforced concrete will be partially processed on site to separate the steel from the concrete. All materials will either be fully separated on site and disposed of to the applicable landfills/processing facility or failing that material will be sent to a processing facility for separation. Relevant certification and documentation confirming the final separation and most environmentally friendly disposal will be available.

The demolition waste reuse, recycle & disposal worst case scenario amounts are given in Table 2.2.

Table 2.2 – Demolition Waste, Recycle & Disposal

Waste Type	Predicted Tonnage to be Produced	Re-Use		Recyclable		Disposal	
		%	Tonnage	%	Tonnage	%	Tonnage
Mixed C&D	1654	10	165	80	1323	10	165
Timber	945	40	378	55	520	5	47
Plasterboard	709	30	213	60	425	10	71
Metals	236	5	12	90	213	5	12
Concrete	473	30	142	65	307	5	24
Mixed Waste	709	20	142	60	425	20	142
Total	**4725**	**22**	**1051**	**68**	**3213**	**10**	**461**

Concrete waste arising from the demolition will where possible be reused on site (subject to testing) as hardcore fill material for the temporary piling mat. This fill material would provide a stable and level mattress for the piling rigs as well as acting as temporary compensatory flood storage reservoir. This crushed concrete material would be removed from the site on completion of the piling works and a portion of the material could be used as general fill material elsewhere.

2.7. Excavation and Earthworks

The proposed site levels are determined by a combination of factors such as tie-ins with existing roads along the Dundrum Bypass and Main Street, the existing topography, TGD Part M (compliant access to ground floor levels etc.).

A surplus of “cut” material to the southern end of the site and along the Main Street will be exported off site to suitably licensed landfill facilities or soil recovery facility (c. 27,000m^3). Ground Investigations were carried on the site between 2004 to 2005 and recently in October 2021 (refer to Appendix 6A of the EIAR). The factual ground investigation identified that a significant proportion of the material to be excavated from the site is classified as varying thickness of “Made Ground” which consists of a mixture of builder’s rubble and imported very soft to firm sandy gravelly clay.

The bulk of the earthworks are principally associated with the removal of the Made Ground and the excavation into the eastern side of the site to create the Lower Ground Floor Level. The Lower Ground Floor level of the development is at +46.00m OD for Zones 1 and 2, rises to 46.50m OD for Zone 3 and 47.00m OD for Zone 4.

Part of the “cut” into the site includes circa 1200m^3 of granite rock removal along the Main Street. The removal of this rock will involve the use pre-drilling, splitting and breaking of the rock to form the Lower Ground Floor. It is proposed that this material would be crushed and screened on site for reuse as structural fill material, subject to obtaining a waste permit from DLRCC.

Table 2.3 – Excavation Volumes

Excavation material	Material Arising Volume (m^3)
Total Made Ground Volume	27,000
Total Rock Removal	1,200
Overall Arisings	**28,200**

The removal of existing made ground from the site to provide for a competent bearing for the Lower Ground Floor and the pile arisings will result in the generation of some soils waste on the site. The site is a brownfield site with a history of uses. Previous ground investigations were carried out by BMA in 2005 and environmental testing was carried out on a selected number of samples. This testing identified an underground Storage tank (UST) adjacent the north gable of the Dundrum Village Centre and directly adjacent to this tank identified significantly elevated levels of Total Volatile Organic Compounds, Benzene and Isobutylene.

Further sampling and testing in this area during the 2021 Waste Characterisation Assessment did note a medium hydrocarbon odour, however test results on samples taken from this area now identified that this material would be classified as Non-Hazardous and meeting the soil recovery criteria. It is expected that potential local pockets of soil around the underground tank will require further sampling and testing for classification during the excavation of the site.

The 2021 OCM Waste Characterisation Assessment concludes that no asbestos was detected in any of the thirty two (32 No.) samples. Ten of the samples are classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition waste other than those mentioned in 17 09 03). All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*). For further details refer to the OCM – Waste Characterisation Assessment located in Appendix 6A of the EIAR.

The Contractor is required to update the ***Site Specific Construction and Demolition Waste Management Plan*** [Byrne Environmental Consulting Ltd.] submitted with this application. The Contractors Plan must be prepared in accordance with the *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (Department of Environment, Heritage and Local Government, 2006) and ensure that all material is disposed of at an appropriately licensed land fill site.

Approximately 28,200m^3 of excavated material is anticipated to be removed from the site, which equates to approximately 2,400 truck movements departing the site. This is scheduled to take place over an estimated period of 60 days at the commencement of the construction of each zone, which equate to approximately 36 truck movements per day.

HGV vehicle movements are expected to average 6 vehicles per hour during the busiest period of construction works. A Traffic Management Plan will be prepared by the Contractor and agreed with Dun-Laoghaire Rathdown Council's Transportation Department & An Garda Siochana, to mitigate any impact of construction on the surrounding road network.

Refer to Section 5.2 in relation to measures that will be included in the Traffic Management Plan.

2.8. Major Construction Operations

Erection and operation of cranes
Tower cranes will be required. The exact number will be dictated by the programme and the specific construction requirements, it is likely that one or more tower cranes per residential block will be temporarily erected to accommodate the construction works for the distribution of reinforcing steel, concrete skips, concrete formwork element and general building materials. It is noted that to maximise efficiency of the tower cranes they will be supplemented by mobile cranes to facilitate lifts at and beyond the extremity of the reach of the tower cranes. No loads will be lifted over the public domain or adjacent properties.

The Contractor will need to obtain all necessary licences from the Local Authority. A "mast climber" may be installed at some local areas to facilitate façade features. The mast climber is essentially a climbing platform that allows the user to safely access any level without the requirement for a full scaffold tower.

Hoists and teleporters may also be used within the site and around its perimeter as required during the project, to facilitate material and waste movements into and out of the site.

Major Temporary Features
During the course of the initial work phases for each zone, there will be a requirement for major temporary features on the site to facilitate the construction form. These temporary features would be in the form of:

- Rock Breakers which will be fitted to excavators to break and trim the granite rock
- Rock percussion drills to drill into the rock and form pre-split lines for rock breaking
- Piling rigs will be required to drill through the overburden material (Made Ground, Clay) and socket the piles into the bedrock. It is anticipated that there would be 2 to 3 piling rigs on site at any one time
- A rock crusher and screening machine would be used to crush and screen the broken rock. These mobile machines would be located in the centre of the construction zone being developed for a period of 4 to 6 weeks. They will be sited away from sensitive receptors.
- Stockpiles of demolition debris, segregated waste materials, excavation arisings and crushed rock will be stored on site during the initial construction phases for disposal off site or for placing as a piling mat or to the rear of retaining walls.
- Holding ponds and settlement tanks will be used during the initial stages of construction to control any seepage/infiltration from rainfall events and ground water pumping to allow the removal of sediment prior to subsequent discharge, under licence, to the local sewerage drainage network. The Contractor will as part of their

CEMP include details of their proposed Water Management System within the site boundary to avoid polluted or silt laden surface water runoff being discharged from the site during the construction stage

- Site cabins and storage compound will be established by the contractor, which will vary in size through the duration of construction. Site cabins will be double to triple stacked and their location and size will be determined and included in the Construction and Environmental Management Plan developed by the Main Contractor.

Road closure / Diversions

The proposed works to the Dundrum Bypass to provide adequate lane width, cycle tracks and reinstatement of the righthand turn into the site (removed as part of DLRCC Covid Intervention Measures) will require temporary lane closure and diversion of the road layout towards the site, to allow the proposed works to be completed.

Additionally, drainage works to provide a new connection to the foul sewer in Main Street will be carried out at night in order to mitigate disruption to the Main Street. Works to provide new drainage connections for surface water outfall to the River Slang and foul outfall to the Irish Water infrastructure will require temporary lane closures and the introduction of a stop/go system on the Dundrum Bypass.

In order to install the proposed new shared pedestrian and cycle bridge from Sweetmount Park a temporary road closure would be required for a number of nights over a period of 2 to 3 weeks to allow the bridge to be lifted into position and secured.

2.9. Substructure and Superstructure

The current residential construction techniques provide for a number of options for the superstructure design and these may not be fully decided until detailed design. However, the most likely options would be reinforced concrete and either in situ reinforced concrete frame and flat slab, precast reinforced concrete cross wall and precast slab or precast twin wall and precast slab may be chosen, depending on the particular residential block in the development.

The following outlines a general construction sequence and principal construction methods for each phase of the development:

Excavation:

This includes demolition, site clearing and earthworks – soil / rock removal – required to prepare the site for the foundations and the Lower Ground Floor (See above)

Foundations:

The site varies in elevation from north to south and is complicated in relation to the underlying rock levels. The topography of the site rises from the north to the south along the Main Street to create a 7.0m level difference between the Main Street and Dundrum Bypass at the southern end of the site.

The granite rock below the ground, falls from the south to the north and is typically 1.0m to 2.0m below ground level alongside the Main Street and drops off steeply to the northwest corner of the site where the granite rock is up to 11.0m below ground level.

The significant varying level of competent rock across the site will likely require the residential blocks along the Main Street to be founded on isolated concrete pad foundations, directly on the granite rock. The residential blocks along the Dundrum Bypass and to the northern tip of the site will likely be founded on bored piles socketed into the rock to support pile caps. The concrete operations associated with the foundation solutions will require concrete deliveries to the site.

Access Road and Infrastructure:
In conjunction with the above, the existing junction into the site would be relocated to form the new main access junction into the development and additional access and egress points on the Bypass would be established. Construction would commence for a new foul water sewer within the proposed access road, including pumping station, balancing tanks and outfall.The construction of a new surface water sewer and attenuation measures along the access road and under the Lower Ground Floor. Construction of the watermain within the access road and under the residential blocks.

Lower Ground Floor:
The Lower Ground floor consists typically non-residential use to the north and car parking and plant use to the remainder of the site. Drainage, surface water attenuation area and the compensatory flood storage reservoir will be provided under the structural slab. Construction of retaining walls along the east of the site (Main Street). A concrete ground floor slab will be constructed to the footprint of this level with retaining walls. Construction of reinforced concrete columns and rising elements to Ground Floor Level and insitu-cast reinforced concrete transfer and podium slabs.

Super-Structure Above Ground Floor:
Construct rising elements such as walls, columns and cores above Ground Floor transfer level. Similar sequence of construction of rising elements to walls, cores and floor slabs for upper levels. Installation of bathroom pods and service constructions progressed with super-structure.

Envelope/Cladding:
Envelope construction to follow super-structure. Installation of window glazing and external cladding. Installation of balconies. Roof finishes/upstands and balustrades.

Mechanical & Electrical fit-out:
First Fix will commence at each level following behind the construction of the super structure. Second fix and final connections.

Fit-out:
Initial installation of any stud work when cladding is complete and floor is weather tight. Installation of equipment and associated connection to services.

Landscaping:
The soft Landscaping will be completed at the later stages of each construction phase to allow for occupation of the residential zones as they are completed. The landscaping works include some hard landscaping, roads, footpaths, cycle-paths, bed and tree planting, and significant open spaces.
This will include the completion of road works to the access road, footpaths surrounding site etc. Installation of bridge foundations and erection of new Sweetmount Bridge completed with Zone 2. The construct new pedestrian access points at the northeast of the site on Main Street and the pedestrian crossing to the south of the site on the Don Marmion Bridge.

Sweetmount Bridge (Zone 2):
The construction of the foundations for the new pedestrian/cyclist bridge from Sweetmount park would occur during the initial stages of the construction of Zone 2. On completion of the piling to Zone 2 the piling rig would be transferred into Sweetmount park to install the piled foundations.
Construction of bridge supports and reinstatement of the park area local to the bridge.
The new bridge will be prefabricated off site and will be delivered in a number of sections and craned into place.
The installation of the actual bridge would be in the final construction stage of Zone 2. This operation will require the night closures of the Dundrum Bypass for number of days over a period of 2 to 3 weeks.
Access to Sweetmount Park will be maintained during the bridge construction works with only localised interruption in the proposed works area.

The above is an indicative construction sequence. The final phasing and sequence will be dictated by the Contractor.

2.10. Materials

Approximate quantities of the primary construction materials are identified in table 2.4 below:

Table 2.4 – Construction Materials & Quantities

CONSTRUCTION MATERIAL QUANTITIES		
Element	**Quantity**	
Sub-Structure		
Imported Fill	960	M^3
Concrete Piling + Blinding + Foundations	18,420	M^3
Reinforcement	1,233	Tonne
Tanking membrane	21,700	M^2
Primary Structure		
Concrete	92,720	M^3
Reinforcement	4,750	Tonne
Concrete Precast Stairs	127	Nr.
Walls		
Concrete	2100	M^3
Reinforcement	280	Tonne
Membrane	1215	M^2
Brick	1180	M^2
Site Works		
Top Soil and Fill	18,210	M^2
Hard Landscaping: Paving + Roads	11,500	M^2
Façade & Envelope		
Brick	16,368	M^2
Insulation	33,710	M^2
Metal Cladding	5,715	M^2
Glazing (including insulated spandrels)	10,942	M^2
Internal Walls & Linings & Finishes		
Internal metal Stud Partitions	48,719	M^2
Wall Lining System	95,907	M^2
Plasterboard Ceilings	56,411	M^2
Floor Tiles	25,570	M^2
Floor Carpet + Vinyl	45,870	M^2

2.11. Disposal of water, wastewater and sewage

All site facilities during construction will be located entirely within the site. The facilities will include canteen, toilet block and drying room for all staff/workers. These facilities will be connected to the Irish Water sewage network with Irish Water approval.

Throughout the works, all surface water (water from excavations etc.) will be pumped to a holding tank on site. From here the water will be pumped to a series of settlement tanks. Further details are presented in Section 3.6 – Pollution Control.

2.12. Environmental Protection Measures

A project-specific Construction Environmental Management Plan (CEMP) will be prepared by the Main Contractor and submitted to the planning authority for approval prior to construction. The Contractor's CEMP will update the OCMP submitted with this application to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval. It will be maintained by the Contractor for the duration of the construction phase.

3. WORKS CONSTRAINTS

This section of the OCMP sets out the primary constraints for the Contractor to address as part of the Contractor's CMP to be developed in conjunction with the Contractor's Works Proposals. The constraints, which are not exhaustive, are listed hereunder:

3.1. Key Interfaces

Drawing 16013-TJOC-00-XX-DR-C-1043 identifies the principle interfaces of the proposed works adjacent Glenville Terrace, No.11 Main Street (Lisney) and No.16/17 Main Street(Mulvey Pharmacy), adjacent the Parochial House boundary wall and to the rear of the Holy Cross Church as identified in Figure 5.1 below and contained in Appendix D. Detailed technical reports are included in the Sub-Terranean Structure Report Appendix C in relation to temporary works along the Main Street boundary and the 3rd Party properties. A Waste Characterisation Assessment of the ground is included in Appendix 6A of the EIAR which provides details of soil sampling and testing that has been undertaken of the existing soils for waste classification purposes.

Figure 3-1: Interfaces along Main

Site Perimeter Conditions (Ref Figure 3-3)

The proposed development site is generally bound by the following:

1. The Dundrum Main Street to the north and east of the site and public footpath
2. The Dundurm Bypass to the west boundary
3. The Dom Marmion Bridge and associated undercroft area to the south

4. The Holy Cross Church and
5. Parochial House to the south east corner of the site.
6. 11 Main Street (Lisney) and 16/17 Main Street (Mulvey Pharmacy)

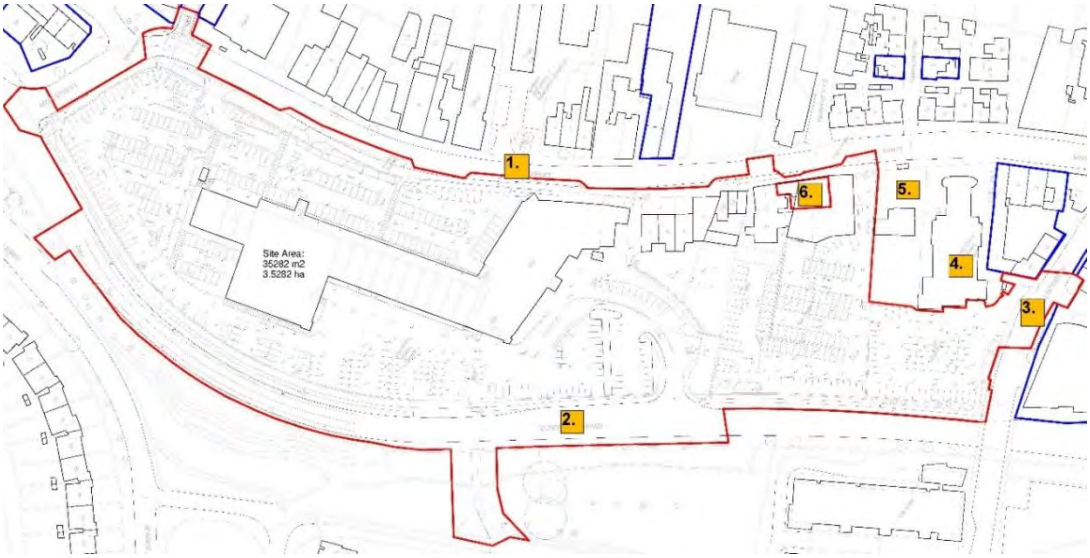


Figure 3-3: Site Perimeter

There are two existing entrances off the Main Street into the development site. The main access/egress junction to the Dundrum Village Centre and an access point in the car park at the rear of the church. Both access points will not be used by construction vehicles to access the site.

Figure 3-4: Existing Site Entrance

3.2. Construction Considerations at Key Interfaces:

Glenville Terrace

Glenville Terrace is a late 19th century terrace of three two-storey, two bay houses, beneath a shared and continuous pitched roof, set back from the Main Street.The Terrace contains returns to each of the three terrace houses. The structural condition of returns to these houses is documented in the Outline Structural Report on Return Buildings contained in Appendix E.

The proposed retaining wall to the Lower Ground floor is located 5.1m from the rear of the main building to No.1 Glenville Terrace and 2.4m from the south gable of No.3.It is proposed to temporarily remove and rebuild the returns of Glenville Terrace following the construction of the retaining wall of the Lower Ground Floor.

As outlined in the AGL report in Appendix C, where required particulary on the south gable of No.3 Glenville Terrace a temporary retaining solution in the form of a contiguous piled wall will be provided to prevent the potential of the proposed construction works undermining the existing foundations of the main terrace building. Refer to Appendix D for reference drawing in relation to the Lower Ground Floor construction works adjacent Glenville Terrace

Parochial House – Garden Boundary Wall

A visual survey of the boundary wall to the Parochial House garden has been undertaken with respect to the construction of the Lower Ground Floor adjacent the northwest corner of the garden.

The walls are generally in reasonable structural condition with most walls requiring only localised crack stitching and/or the localised rebuilding of local pockets and defects.

The conservation architect has also allowed for mortar repairs and reinstatement works necessary to maintain the walls and to mitigate the risk of structural deterioration.

The proposed retaining wall of the Lower Ground Floor is located approximately 1.9m from the boundary wall. As outlined in the Design Statement in Appendix C, the constractor will be required to install a temporary retaining wall system using a propped contiguous piled. Further details are provided on drawing 16031-TJOC-XX-XX-DR-S-0022 contained in Appendix D. The remainder of the proposed Lower Ground Floor alongside the garden is over 9.5m from the boundary wall and temporary retaining works are not considered necessary.

Holy Cross Church (Protected Structure)

The retaining wall to the Lower Ground Floor is located approximately 7.7m from the rear of the Holy Cross Church. The ground investigation of the site and solid granite structure of the church would indicate that the foundations of the church are supported onto the underlying rock and therefore this coupled with the distance of the excavation works of the proposed lower ground floor will not undermine the foundations of the church. The contractor will be required to installed a temporary retention system to maintain the external ground levels to the rear of the church. This temporary retaining system will be

in the form of kingpost retaining system or continguous piled wall as outlined in Appendix C and the provided on drawing 16031-TJOC-XX-XX-DR-S-0022 contained in Appendix D

Lisney (No.11 Main Street) & Mulvey Pharmacy (No.16/17 Main Street)

The proposed development requires site clearance and demolition works directly adjacent and connected to the buildings of No.11 and No.16/17 Main Street. The contractor will be required to develop a detailed Method Statement in relation to the demolition of the existing buildings adjacent to and connected to these two buildings.

A full condition survey will be carried out of the two properties with the owners consent prior to the commencement of the works adjacent to the properties. Settlement, tilt and vibration monitoring will be carried out during the works. This will provide advanced warning if prescribed limits are approached. Should this arise, the monitoring system will provide time to review on-going and activities, identify causes, and make necessary modifications to the working methods.

No.11 Main Street will require a new gable wall to be constructed alongside the north gable of the property following the remove of the existing single storey building (No.10) which abutts No.11.

No.16/17 Main Street requires the construction of new permament structure to maintain support of the existing Ground Floor and flat roof to the rear of the Pharmacy unit. Drawing 16031-TJOC-XX-XX-DR-S-0021 identifies the principle construction methodology.

3.3. Hours of work

The hours of construction work, unless otherwise amended by the Planning Authority, will be restricted as identified in Section 2.5 above.

3.4. Traffic Management

Construction traffic to and from the site is discussed in Section 5.3 below.

3.5. Environment

The Contractor will be required to implement appropriate measures to ensure that unacceptable noise and dust levels do not occur. Proposed measures are identified below:

Noise

To minimise nuisance caused by noise from the construction and demolition (C&D) works, the Contractor will be required to implement noise control measures in accordance with the requirements of British Standard BS5228-1:2009 ‘Noise Control on Construction on Open Sites, Part 1 – Code of Practice for basic information and procedures for noise

control'. In this regard, the Contractor will be required to ensure that noise levels from the C&D activities on site are within acceptable limits.

Measures employed to reduce noise will include but are not limited to the following:

- Noise monitoring stations, which will be monitored daily, will be located on site and at recommended locations in the vicinity of the proposed development to record background and construction noise activity, see Chapter 9 of the EIAR for monitoing locations for noise
- Proper maintenance of all operating plant to ensure noise emission compliance. Operating plant will be selected on the basis of incorporating noise reducing systems, and at a minimum be fitted with effective exhaust silencers.
- Compressors will be fitted with acoustically lined covers, which will remain closed while the machines are in operation.
- Plant such as pumps and generators which are required to work outside of normal working hours will be enclosed with acoustic enclosures.

The proposed vibration (V) and (N) monitoring locations in proximity to the closest receptors are shown below in Figure 3-5, as identified in Chapter 9 of the EIAR.

Figure 3-5: Vibration & Noise Monitoring Locations – Subject to Agreement

Vibration

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring shall be implemented during the course of the demolition and construction phases. It is proposed that vibration monitoring will be conducted at the closest adjacent residential properties to the site boundaries using live data logging vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed the specified warning and limit values an alert is triggered.

The monitoring points chosen for locating the geophone of the vibration measuring instrument are determined according to the guidelines in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from groundborne vibration.* The vibration monitoring locations (V) in proximity to the closest receptors are shown in Chapter 9 of the EIAR.

Measures employed to reduce vibration will include but are not limited to the following:

- During the demolition and construction phases, the appointed Contractor will implement best practice vibration mitigation and control methods outlined in BS 5228-1:2009+A1 2014. Part 2 – Vibration
- A comprehensive programme of continuous live vibration monitoring shall be conducted at structures in proximity to the site boundaries for the duration of the demolition and construction phases
- Where possible rock will be pre-split using drilling techniques

Dust

The Contractor will be required to implement dust control measures to minimise nuisance caused by dust, in accordance with best practice and with reference to the Air Pollution Act 1987. Mitigation techniques will be implemented through a construction phase air quality management and monitoring plan.
Construction phase Dust Deposition and Particulate Matter monitoring locations are included in Chapter 8 of of the EIAR. Mitigation measure as identified in the EIAR will include:

- Removal of Asbestos prior to demolition works.
- Use of water mist cannons to supress dust during demolition works.
- Screening and use of water spay bars on mobile crushing plant.
- Screening of building during demolition to contain dust.
- Provision shall be made for cleaning by a road sweeper during the course of the works. Road sweeping shall be undertaken as required during and on completion of the works. Exposed stockpiled demolition debris, excavated material, and disturbed ground surfaces will be dampened down as necessary.
- Vehicle/Plant engines shall be turned off when not in use
- During non-working hours, the site will be left in a condition that will prevent dust from being generated.

- All demolition activities and loading of C&D waste on site will be conducted using methods that minimise dust generation.
- Truck spraying and hosing down will be carried out during dry periods and as necessary to control dust.
- Solid hoarding will be provided around the perimeter of the site
- A programme of dust deposition and Particulate PM2.5 & PM10 monitoring shall be initiated prior to the commencement of demolition works.
- A complaints management procedure shall be developed prior to the commencement of works.
- Vehicle/Plant engines shall be maintained to ensure efficient operation Mains power shall be utilised for Site Offices instead of generators

The Contactor will put in place a regime for monitoring dust levels in the vicinity of the proposed development during the works in accordance with the monitoring and mitigation measures identified in Chapter 8 of the EIAR.

3.6. Pollution Control

The CEMP will include details on pollution prevention measures as well as the overall approach and emergency procedures for all construction stages.

Contractors on the site will have regard to the following best practice guidelines to ensure that water bodies are adequately protected from construction work:

- Construction Industry Research and Information Association (CIRIA) C649: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006)
- CIRIA C649: Control of water pollution from linear construction projects: Site guide (Murnane et al.2006)
- The Contractor shall comply with the following guidance documents:
- CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004).

This plan will provide precise details on methods to prevent sediment or pollutants from leaving the construction site:

General

- Demolition and Construction methods used will be tailored to reduce, as much as possible, dust and noise pollution.
- In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.) during site activity, all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the proposed development. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the proposed development.

- Prior to the commencement of demolition and construction, details will be provided for locations and safe-guards for refuelling of machinery, machine servicing, concrete-mixing, etc.

Surface Water Drainage & Ground Water Control

A specific method statement will be prepared by the Contractor and agreed with Dun-Laoghaire Rathdown County Council prior to commencement of the works, detailing the measures to be taken to ensure that no water run-off from the proposed development occurs during the construction period.

Throughout the works, all surface water (water from excavations etc.) will be pumped to a holding tank on site. From here the water will be pumped to a series of settlement tanks. These tanks will act as primary and secondary settlement. The settlement tanks will be of sufficient number and size to allow the necessary retention time for solids to settle. The discharge water from the final tank will be routed to the existing combined water system with approval from the local authority. Visual checks of the pumping and settlement system will be carried out on a routine basis.

Run-off control measures to include the following:

- The Contractor shall provide a Water Management System to avoid polluted or silt laden surface water runoff from the site.
- Dewatering measures will only be employed where necessary for local excavation.
- All ground water to be diverted to silt curtains and settlement tanks prior to discharging to the foul sewer outfall from the site
- Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing from the site and into the Dundrum Bypass road gullys
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site where possible.
- All vehicles to use either truck wheel wash or manual wheel wash prior to leaving site.
- Road sweeper to be used to control any residual sediment from the site on the local road network, particularly the Dundrum Bypass.
- Additional measures such as installing silt collection bags in road gullys along Dundrum Bypass and routine cleaning of silt bags and road gully sumps
- The use of a road sweeper prior to rain forecasts to be used to further mitigate sediment material entering the River Slang
- Water quality monitoring station to be established adjacent Dundrum Library to record baseline water quality and weekly testing of water quality during the works.
- For groundwater encountered during construction phase, mitigation measures will include;
    - Dewatering by pumping to an appropriate treatment facility or settlement tanks in order to allow sediment to settle from solution prior to discharge

    - Excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e., highly vulnerable groundwater areas
- All surface water sewer connections will be made under the supervision of the Local Authority/Irish Water and checked prior to commissioning
- All onsite surface water drains will be tested and surveyed prior to connection to the public sewer to prevent any possibility of ingress of ground water
- All surface water manholes and drains will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.
- Surface water discharge from the site will be managed and controlled for the duration of the construction works, as noted in the points above, until the permanently attenuated surface water drainage system of the proposed development is complete.
- Regular inspections of settlement tanks are to be carried out and additional treatment used if settlement is not adequate.
- Bunded areas will be created for the storage or use of any fuels, oils, greases, cement, etc.
- Refuelling of plant and machinery will be occur a minimum of 50m from the open water course and emergency spill kits will be kept close to works.

3.7. Protection of public areas from construction activity:

The hoarding will typically take the form of standard plywood hoarding to a height of 2.4m, in locations the existing boundary may also be used in places, given the large site and phased nature of the construction works. In sensitive area adjoining to Protected Structures (Holy Cross Church) and proposed Protected Structures (Parochial House) a 3.0m high hoarding will be provided. Controlled access points to the site, in the form of gates or doors, will be kept locked for any time that these areas are not monitored (e.g. outside working hours). The hoarding will be painted, well maintained and may contain graphics portraying project information.
Controlled access points to the site in the form of gates or doors will be kept locked for any time these areas are not monitored (e.g., outside working hours). The hoarding will be well maintained and will be painted and may contain graphics portraying project information.

Reinstatement/Road Cleaning

Prior to the works commencing, detailed photograph surveys (condition schedules) of adjoining walls, roads, footpaths, grass verges etc. will be prepared. Copies of the relevant parts are to be made available to Dun Laoghaire Rathdown County Council, as necessary. This record will form the basis of assessing repairs to adjoining areas in the future should a dispute arise as to their cause.

Roadways are to be kept clean of muck and other debris. A road sweeping truck is to be provided if necessary, to ensure that the road network adjacent to the site is maintained in the clean state.

3.8. Monitoring & Protection of Neighbouring Properties

A monitoring regime will be put in place to protect neighbours and neighbouring properties with a full and detailed vibration, noise, dust and surface water monitoring regime put in place for the duration of the works with due regard for mitigation and monitoring measures identified in Chapters 6, 8, 9 nd 10 of the EIAR. The Contractor will appoint a competent person to be referred to as the Surveying, Instrumentation and Monitoring Subcontractor and together with them will prepare and maintain the vibration, noise and dust monitoring plan, for the agreement/approval of the Client and their Technical Advisors.

The Contractor will be responsible for the preparation of condition surveys of surrounding buildings, walls, hardstanding area etc. prior to the carrying out of any works on the proposed development. The extent of surveys will be defined by the Developers Design Team members and agreed with Dun Laoghaire Rathdown County Council if required. The condition surveys shall be carried out to a level of detail, suitable to the nature and extent of conditions encountered in order to obtain an understanding of the general structural condition of the property/structure and/or external environments.

- The piling works for the residential block along the Dundrum Bypass are approximately 18.0m from the Main Street properties and approximately 52.0m to the closest residential properties on Sweetmount Avenue (Refer Fig 3-6). No third-party structures are immediately adjacent the building piling works and therefore it is not considered that the piling works will create settlement or damage to neighbouring properties. However monitoring of the retaining walls along the Main Street directly adjacent to the Parochial Garden Wall, Glenville and the Holly Cross Church using inclinometers, vibration meters and monitoring of water movements through control points will be implemented. The monitoring regrime will mitigate against any potential impacts that the construction works may have on sensitive properties and allow construction methodologies to be revised if required.

Figure 3-6: Extract of Architects Ground Floor Plan – Dimensions to adjoining structures

Vibration seismographs (Vibrographs) will be provided on adjoining buildings and on boundary walls adjacent to these building at locations to be agreed. If vibration and noise readings measured by the instrumentation exceed the specific Amber Trigger levels, the Contractor shall immediately suspend or stop such aggravating activities until the impacts are checked and fully understood.

Vibration monitoring stations will continually log vibration levels (including associated frequency) using the Peak Particle Velocity parameter more.

The following vibration limited are proposed:

- 8mm/s at frequencies of less than 10Hz
- 12.5mm/s at frequencies of 10Hz to 50Hz
- 20mm/s at frequencies of more than 50Hz

These are taken from Transport Infrastructure Ireland's 'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes' and in accordance with BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration'.

4. FLOOD PROTECTION MEASURES

Three parts of the site are at risk of pluvial flooding – refer to the Site Specific Flood Risk Assessment (SFFRA) produced by T.J.O' Connor & Associates as part of this planning application.

The site during construction must maintain the current flood storage volume that currently exists on the site to have no impact on flood risk in the Dundrum area.

The following controls that will be implemented by the Main Contractor should the construction site be subject to flooding during the construction works to Zones 1 and 2:

- Base of hoarding along Bypass in Zone 1 and 2 to be designed to allow flood water to enter the site. Base on hoarding to be provided with 300mm zone of terram or hinged section to base.
- Ground floor level of all site offices to be at 46.00m OD or greater
- Excavation to Zones 1 and 2 to progress in a sequenced manner allowing areas of site to be backfilled with hardcore capping layer and piling matt which will contain 35% voids to allow hardcore to act as compensatory flood storage reservoir in the event flood water enters the site
- Containment barriers will be provided at the periphery of the flood storage area to prevent flood waters entering the remaining site
- Contractor to provide clear barriered escape routes on site to guide operative to areas away from flood zone in the event that flood waters enter the site.
- Following the flooding event flood waters within the storage zone will be gathered locally to facilitate pumping with subsequent discharge, under licence, to the local sewerage drainage network. Prior to any discharge, the water will be passed through silt traps and hydrocarbon/oil interceptors within the construction site confines. This will result in the separation of sediment from the water prior to its discharge and will ensure that the water is of adequate quality before it enters the local authority drainage system.

The compensatory flood storage reservoir (underslab void) that is proposed under the Lower Ground Floor level will be utilised to store flood waters entering the site. Flood waters will be pumped with subsequent discharge, under licence, to the local sewerage drainage network in the temporary case.

In the permanent case where the Lower Ground Floor has been constructed in Zone 1, during a 0.1% Flood event the flood waters will enter the underslab void via a series of inlet screens alongside the proposed swale at the northern end of the Bypass. Following the flood event, flood waters will drain down from the void and be directed back to the River Slang via a draindown chamber. The Contractor's CEMP will cover all potentially polluting activities from this process and include an emergency response procedure.

5. POTENTIAL METHODOLOGY AND SEQUENCE OF WORKS

The construction of the project will involve conventional construction methodologies and so will require the use of typical construction plant and vehicles.This document assumes that the building will be constructed as an in-situ reinforced concrete frame up to the Ground Floor level and that the super-structure to the residential blocks will be constructed of a mixture of pre-cast concrete elements and insitu concrete elements may also be used, depending on design development.

The proposed development is anticipated to be constructed in four sequential phases, the first phase will include an enabling works phase to construct the new access junctions, access roadway and Dundrum Bypass works. Overlaps between construction of the development zones are anticipated which will be reviewed in further detal as the design progresses and upon Main Contractor appointment.

The anticipated duration of the works is over a period of 8 years and the phasing of construction will generally be as follows;

It is intended to split the site into two halves, Phase 1 and Phase 2. These Phases will each contain two sub-phases/development zones named Zone 1, Zone 2, Zone 3 and Zone 4. The construction sequencing for each phase of the development is described in chronological order as follows:

- Enabling Works :
  - Site Establishment
  - Demolition and Site Clearance
  - Utility Diversions

- Construction Phases 1-2:
  Car parking and podium areas, residential blocks, non-residential, public open space and communal open space as shown in Figure 6.1, are to be constructed in the following sequence:
  - Phase 1 - Zone 1
  - Phase 1 - Zone 2
  - Phase 2 - Zone 3
  - Phase 2 - Zone 4

Each Construction Phase will contain the following main works elements:

- Earthworks, Foundation and Podium Structure Works
- Superstructure Works
- Façade & Fit-Out Works
- Landscaping Works

Throughout each phase and completion of the zones in each phase, landscaping areas around the residential blocks and pedestrian links between the Main Street and the new development will be constructed and handed over on completion.

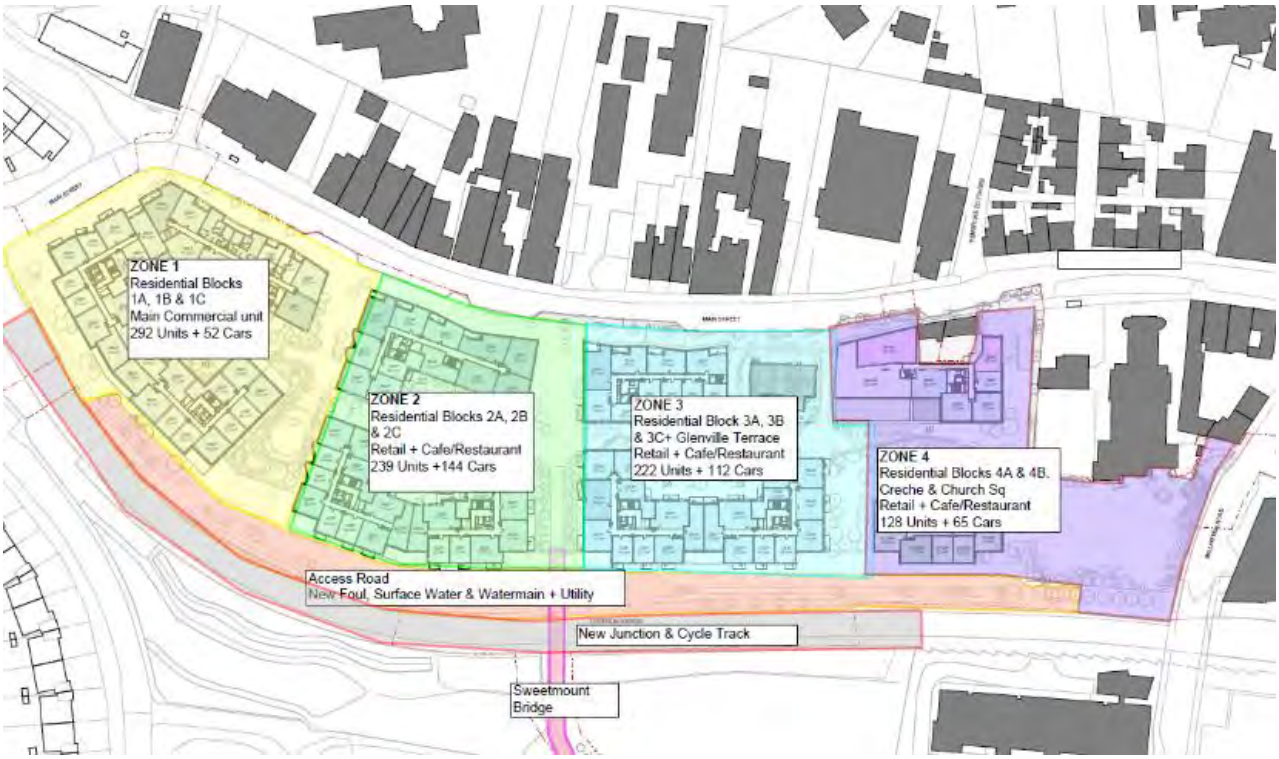


Figure 5-1: Overall Site Phasing

5.1. Construction Description of each Phase

The development is intended to commence at the north end of the site and be developed sequentially towards the southern end. As indicaed above in Figure 5.1, the site will be split into two phases, containing two development zones in each phase.

For each construction phase of the site, the development zones would be established. Demolition would proceed in Zone 1 initially and cross-over into Zone 2 as works progress. The sequencial development zone is intended to be used as the contractor compound and site parking.

As part of the site set-up for each phase the hoarding line will be established around this portion of the site.

The demolition of the existing Dundrum Village Centre and the properties on Main Street will be undertaken as works are due to commence in each zone, and where the sequential development zone is required for use by the contractor. Hoarding will be erected around the perimeter to restrict access.

It is intended on completion of each development zone that the landscaping and connectivity to both the Dundrum Bypass and Main Street will be established. Within Zone 2 the Sweetmount bridge will be constructed and opened to provide linkage from Sweetmount Park through the development with the Main Street.

The public car parks located to the rear of the former Mulvey's Hardware and Holy Cross Church (151 spaces) will remain operational until works commence in Zone 3 . On occupation of Blocks 1A, 1B and 1C, and pending the parking spaces in Zone 2 becoming operational, 105 spaces will be reallocated for use by the tenants of Blocks 1A, 1B and 1C. The public car park at the existing Dundrum Bypass entrance (33 spaces) will be removed when works commence in Zone 2.

This Outline Construction Management Plan sets out a likely and anticipated construction methodology and phasing which will be developed by a main contractor prior to commencement of construction on site. The main contractor will then develop their own fully detailed construction management plan prior to commencement of works on site.

The phasing noted is indicative, and the final phasing, which will be subject to non-construction related matters (i.e. funding, market forces etc.) will be reviewed by the developer and the appointed Contractor, prior to commencement.

5.2. Phasing

Phase 1 - Construction

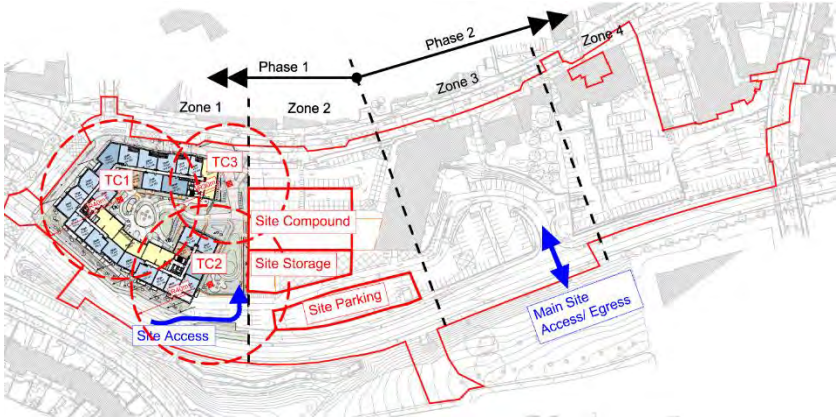


Figure 5-2: Phase 1 – Zone 1 Construction Logistics

Construction Description:

- Erect hoarding to Zone 1 and part Zone 2
- The demolition of part of the existing Dundrum Villag Centre
- Excavation of existing car park surface and foundations of existing buildings
- Construction of retaining walls along Main Street
- Construction of compensatory flood storage area to underside of Lower Ground Floor structure
- Construction of Lower Ground floor non-residential use, foodstore and car parking, podium structure to Ground Floor level and super-structure to residential blocks
- Works to Main street including pavement upgrades, pedestrian crossing to northeast corner and Dundrum Bypass new cycle lanes, slip lane at north of site and relocation of main access junction
- Removal of undergound utilities within Zone 1
- Site compound, storage and site car parking provided in Phase 1-Zone 2
- Site access to use existing entrance and proposed slip lane from Dundrum Bypass

Phase 1 - Completion

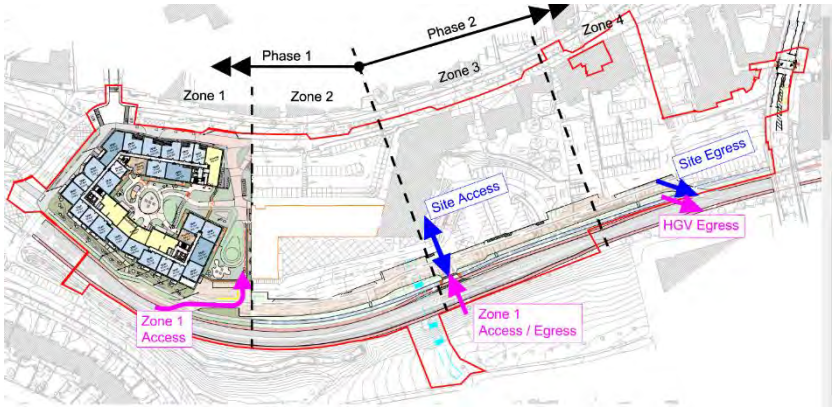


Figure 5-3: Phase 1 – Zone 1 Completion

Phase 1 – Zone 1, Completion

- Residential blocks **Blocks 1A, 1B & 1C** - 292 Residential Units,
- Non-Residential: 2399.9 sqm
- Car Parking: 52 No. Commercial Car Park Spaces. Zone 1 residential parking temporarily provided adjacent church
- Public Open Space: **Usher Place**
- Access Road and Dundrum Bypass relocated junction, slips lanes and cycle track upgrade
- Infrastructure to include New foul pumping station, compensatory flood storage, seperate foul sewers and surface water outfall connections to serve Zone 1
- New Main Street Pedestrian Crossing from Dundrum Luas
- Part Main Street pavement upgrade works adjacent Zone 1
- As noted, the proposed access road along the Dundrum Bypass will be constructed as part of the construction works to Zone 1. This includes the access slip lanes and new main junction serving the site. The construction of the access road and ancillary underground services will allow sequential development in Zones 2, 3 and 4 to be accessed from the internal access road.

Phase 1 – Zone 2 & Sweetmount Bridge Construction

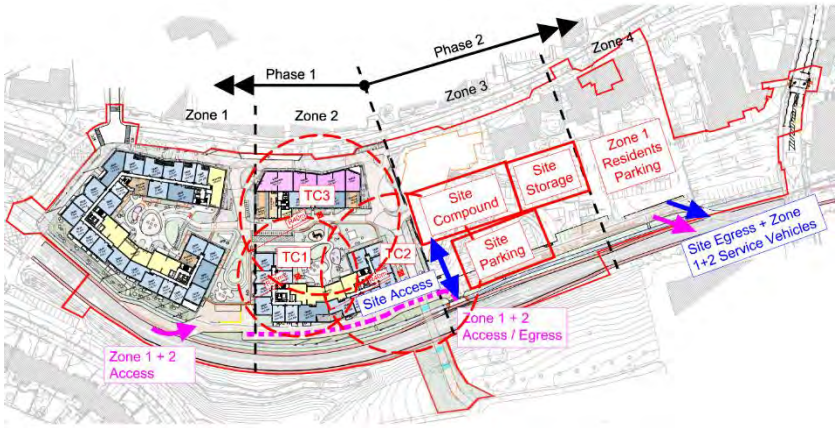


Figure 5-4: Phase 1 – Zone 2 Construction Logistics

Construction Description:

- The demolition of the remaining section of the existing Village Shopping Centre & adjoining Building, to north of Glenville Terrace
- Site compound, storage and site parking provided in Zone 3.
- Hoarding line to be extended to include Zone 3
- Zone 1 residential parking temporarily provided in existing car park adjacent church
- Excavation of existing car park surface*, lower levels of previous building and remove foundations of existing buildings
- Installation of temporary works along Main Street boundary and construction of retaining walls
- Construction of piles, foundations, podium and residential blocks
- The construction of a new pedestrian bridge from Sweetmount Park including piled foundations and bridge supports, landscaping works
- Hoarding to be erected in Sweetmount Park to allow construction of piles foundations and bridge support. Access required from The Laurels estate and Dundrum Bypass. Temporary impact on Sweetmount Park, access to park only impacted locally. Bridge to be erected at night as offsite manufactured elements and craned into position.

**Car parking remains available to the public in the 'Blue Car Park' at the rear of the Holy Cross Church.*

Phase 1 – Zone 2 Completion

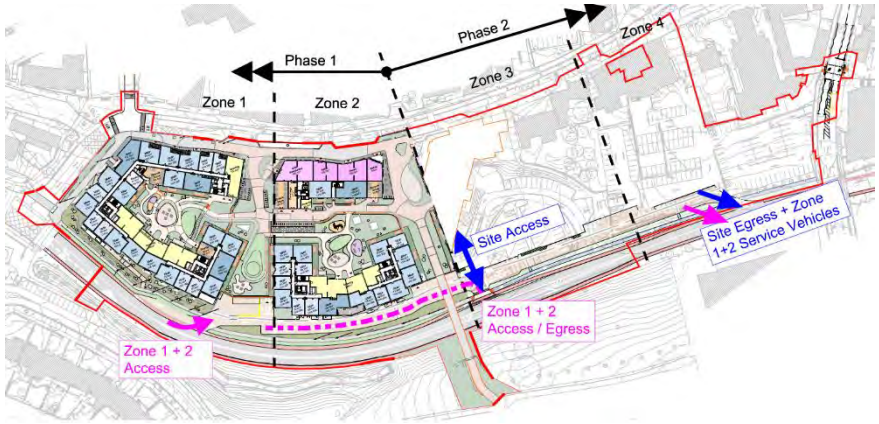


Figure 5-5: Phase 1 – Zone 2 Completion

Phase 1 –Zone 2 Complete & Sweetmount Bridge Construction

- Residential Blocks 2A, 2B, & 2C - 239 Residential Units
- Non-Residential: 503.8 sqm
- Car Parking: 144 No. Car Park Spaces including parking for Zone 1 residents (temporary parking in Zone 4 removed)
- Public Open Space: **Sweetmount Place**
- Sweetmount Bridge Constructed and open to public, landscaping upgrade locally in Sweetmount Park
- Part Main Street pavement upgrade works adjacent Zone 2
- Residential Parking for Zone 1 residents provided in Zone 2 Lower Ground Floor Car Park

Phase 2 –Zone 3 Construction

Figure 5-6: Phase 2 –Zone 3 Construction Logistics

Phase 2 –Zone 3 Completion

Figure 5-7: Phase 2 – Zone 3 Completion

Construction Description:

- Protection of Glenville Terrace and subsequent refurbishment works
- Site Access and egress via egress slip lane in Zone 4. Site compound and storage in Zone 4
- Demolition of existing buildings along Main Street to south of Glenville including including 13, 13A, 15, 15A and 8 Main Street
- Hoarding line to be established to Zone 4
- Refurbishment works to be carried out to Parochial Garden Wall
- Excavation of existing car park surface, lower levels of previous building and foundations of existing buildings
- Construction of piles, foundations, podium and residential blocks
- Installation of temporary works along Main Street boundary and rear of Glenville and construction of retaining walls

Phase 2 –Zone 3 Completion

- Residential Blocks 3A, 3B, & 3C & Glenville Terrace - 222 Residential Units,
- Non-Residential:407.8 sqm
- Car Parking: 112 No. Car Park Spaces.
- Public Open Space:**Glenville Terrace Square**
- Part Main Street pavement upgrade works adjacent Zone 3
- New Pedestrian Crossing to link Church Square to Dundrum Town Centre Pembroke District
- New pedestrian link from Dundrum Bypass to Don Marmion via Church Square
- Maintain existing car park link under Don Marmion

Phase 2 –Zone 4 Construction

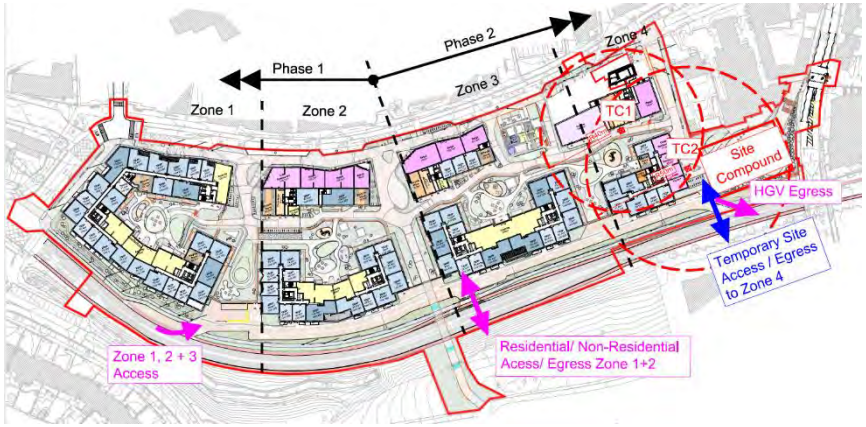


Figure 5-8: Phase 2 –Zone 4 Construction Logistics

Construction Description:

- Installation of hoarding proection at the rear of the Holy Cross church and to the perimeter of the boundary wall with the Parochial House.
- Demolition of former Mulvey's Hardware, Main Street including buildings to the rear (and to rear of No.16/17 Main Street (Mulvey's pharmacy) . Demolition to rear and side of No.11 Main Street
- Provide weathering to gable of No.11 Main Street and to rear of No.16/17 Main Street
- Excavation and construction of Lower ground floor car parking area and link under Don Marmion Bridge to connection to Dundrum Town Centre basement
- Construction of piles, foundations, podium and residential blocks
- Construction of new podium slab to rear of Holy Cross Church to provide for new landscaped square.

Phase 2 – Zone 4 Completion

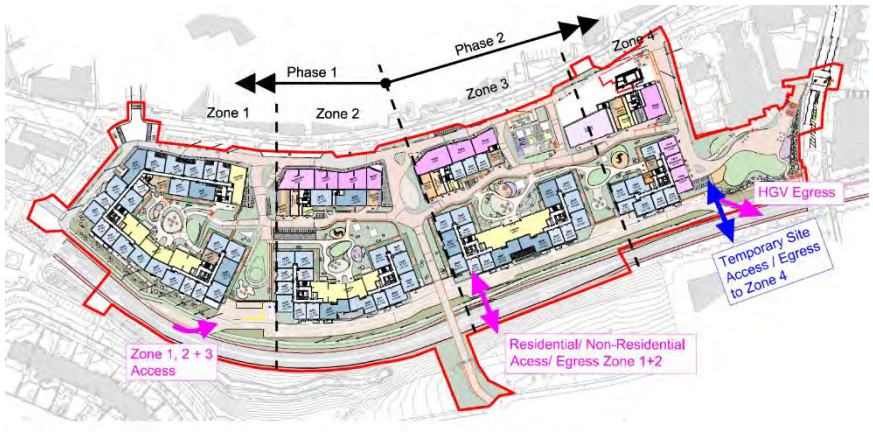


Figure 5-9: Phase 2. Zone 4 Completion

Phase 2 –. Zone 4 Completion

- Residential Blocks 4A & 4B - 128 Residential Units,
- Non Residential: 1147.2 Sqm (including creche)
- Car Parking: 65 No. Car Park Spaces.
- Public Open Space: **Church Square**
- Overland flood flow route from Don Marmion Bridge to Dundrum

5.3. Contractor's Traffic Management Plan

The Contractor is to prepare a Traffic Management Plan which must be agreed with Dun Laoghaire Rathdown County Council's Transportation Department, TII & An Garda Siochana in advance of the works. The Traffic Management Plan will provide for the following where required:

1. The Contractor shall be responsible for and make good any damage to existing roads or footpaths caused by his own contractor's or suppliers transport to and from the site. A condition survey of existing roads and paths is to be completed in addition to a CCTV survey of all underground services.
2. The Contractor shall at all times keep all public and private roads, footpaths entirely free of excavated materials, debris, rubbish, provide vehicle wheel wash and thoroughly clean all wheels and arches of all vehicles as they leave the site.
3. The Contractor shall confine his activities to the area of the site occupied by the works and the builders' compound, as far as practicably possible, during any particular phase of the proposed development.
4. Haul routes to and from the site will be defined and agreed with the Local Authority.
5. Properly designed and designated entrance and egress points to the construction site for construction traffic will be used to minimize impact on external traffic.
6. Existing fire hydrants are to remain accessible as required.
7. Every effort should be made to minimize impact on the adjoining road network during the construction phase. Movements in/out of the site will be controlled by traffic marshals
8. Wheel washing facilities to be provided.
9. Traffic marshal to ensure construction vehicles do not impact traffic flow on the Dundrum Bypass and stacking of construction vehicles is contained within the site
10. Other measures as required or directed by Dun Laoghaire Rathdown County Council's Transportation Department, TII & An Garda Siochana.

Suggested headings for the Contractor's Traffic Management Plan (non-exhaustive)

- Construction Traffic Management – General Requirements
- Traffic Safety and Control
- Temporary Traffic Diversions & one-way systems
- Emergency Contact Numbers and Personnel
- Emergency Plan
- Access Arrangements

A further list of measures to be included in the Construction Traffic Management Plan has been prepared by Systra – Traffic Consultants and included in Appendix F.

5.4. Public Traffic

The management of the public and traffic, both pedestrian & vehicular, is a key part of the proposed development due to the proximity of the busy surrounding roads and footpaths.

5.5. Construction Traffic

The vehicles associated with the construction activities are as follows: -

- Excavators
- Dump trucks
- Concrete delivery trucks
- Concrete pumps
- Delivery trucks – flatbed & containers
- Mobile cranes
- Mobile hoists
- Skips

Measure to Minimise Construction Vehicle Movements

- Consolidation of delivery loads to/from the site and manage large deliveries on site;
- Use of precast/prefabricated materials where possible;
- 'Cut' material generated by the construction works will be re-used on site where possible, through various accommodation works.
- There will be limited construction staff parking on site. Therefore, construction staff vehicle movements will be minimal. Staff car parking is to be arranged by the Contractor as described in Section 2.3 above.
- Public Transport: An information leaflet to all staff as part of their induction on site highlighting the location of the various public transport services in the vicinity of the construction site.

5.6. Site Compound

Refer to Figures 5-2 to 5-8 above. A site compound will be required for the duration of the works for the storage of materials, plant and equipment, and for a site office(s). It is proposed that the location of the site offices will be in the adjoinng development zone to the zone under construction.

Controlled access to the proposed development, in the form of gates and doors/turnstiles, will be kept locked for any time that these areas are not monitored (e.g., outside working hours).

During working hours, traffic marshals will control traffic movements and deliveries at any active site access to ensure safe access and egress to & from the proposed development onto the public roads. All personnel working on site must have a valid Safe Pass card and be inducted by the Main Contractor with regard to site specific information.

5.7. Cranes

3 no. tower cranes (minimum) will be required on site per Zone for construction of the works as identified in Figures 5-2 to 5.7 above. Tower cranes will be fitted with working space limiters / zoning devices to prevent lifting operations over neighbouring buildings.

All materials being lifted by crane will be controlled by guide ropes and will only be completed under the strict supervision of appropriately qualified and experienced banksmen. Tower cranes will be fitted with restrictors to prevent them lifting materials over existing buildings to the east and west of the site.

Nets and screens will be used to close in work at the perimeter of buildings to prevent any debris exiting the building. Method statements will be prepared by the Contractor where any plant is operating adjacent to existing buildings.

Mobile cranes and hoists will likely be required for construction works. Any works outside of the site hoarding (e.g., sewer connections) will be each subject to a method statement agreed with Dun-Laoghaire Rathdown County Council.

The Contractor is requested to notify the Irish Aviation Authority (IAA) 30 days prior to crane erection. Cranes will need to have obstacle lighting provided and this is in line with the requirements of S.I. 215of 2005 (Obstacles to aircraft in flight) Order.

5.8. Demolition and Site Clearnace

Pre-Demolition and Condition Surveys

A pre-demolition survey will be undertaken to provide sufficient information for the Main Contractor to prepare a detailed Demolition Management Plan (DMP), giving methodology and work sequences for the demolition phase.

This survey will inform the Design Team and Specialist Demolition Contractor of the structural framing, floor and wall construction, so that measures can be put in place to ensure the safe deconstruction of each building and to avoid uncontrolled collapse of a part of the structure.

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

Asbestos Audit

A further asbestos audit will be undertaken on all structures to be demolished prior to demolition. Asbestos waste will be removed from site by specialist contractors and holders of the appropriate waste collection permit.

Soft Strip Building Demolition

All loose internal fixtures and fittings such as furniture, kitchen fittings and other unattached items shall be removed by hand and segregated on site, where practical, into skips to allow

for collection and transport by an approved waste carrier. The approved Waste Contractor will provide appropriate skips to facilitate on-site segregation of waste materials.

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

Structural Demolition

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

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

- Demolition by hand or using hand-held tools:

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

- Saw cutting and lifting:

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

- Mini excavators and breakers:
  The use of mini excavators and breakers may be adopted in constricted locations around the site where larger machinery may not be appropriate.
- Use of a long reach excavator fitted with specialist concrete munching / pulverising equipment to allow for controlled demolition of the existing buildings.

- Hydraulic concrete breaking equipment:

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

5.9. Utility Diversions:

The existing sewerage system serving the area in the vicinity of the proposed development is recorded on Irish Water and Dun Laoghaire Rathdown County Council drainage record mapping identifies that a 300mm diameter combined sewer flowing northwards along the valley of the River Slang behind the Holy Cross Church and through the Dundrum Village Centre Car Park. This sewer receives connections from the existing development on the west side of Dundrum Main Street and from the existing shopping centre. It also receives surface water from these properties and from the existing shopping centre.

Phased construction of the development may require flows from some existing sewers to be maintained until subsequent phases of the new development are completed. Temporary discharge of wastewater during construction utilising the existing or permitted sewerage network shall be by agreement with Irish Water. All necessary health and safety measures shall be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.

No other diversions or temporary diversions of existing utilities through the site are required.

5.10. Ground Floor – Podium Structure

The proposed development requires the construction of four podium structures which will be a single storey above the Dundrum Bypass. This podium structure serves each of the residential apartment blocks on site. The podium structure underpins the residential development and provide support for the landscaped courtyards and open spaces between the buildings.

Figure 5-10: Foundation Structure Layout

5.11. Site Works

All the listed measures above will be implemented, the sequence of works is indicative only. In practice, the actual approach taken by the Contractor will be subject to a range of factors, including the following;

- Contractor's proposed works methodology
- Weather
- Time of the Year
- Resources
- Subcontractors
- Lead in times

Options for methods of construction will be further explored with the Main Contractor during the detailed design development. The intention is to reduce construction period by developing as much as possible off-site construction methods, both in terms of the structure itself, facades and fittings e.g., precast concrete elements, prefabricated facades, prefabricated balconies, pod bathrooms etc., thereby minimising the impact on the local environment.

6. CONCLUSIONS

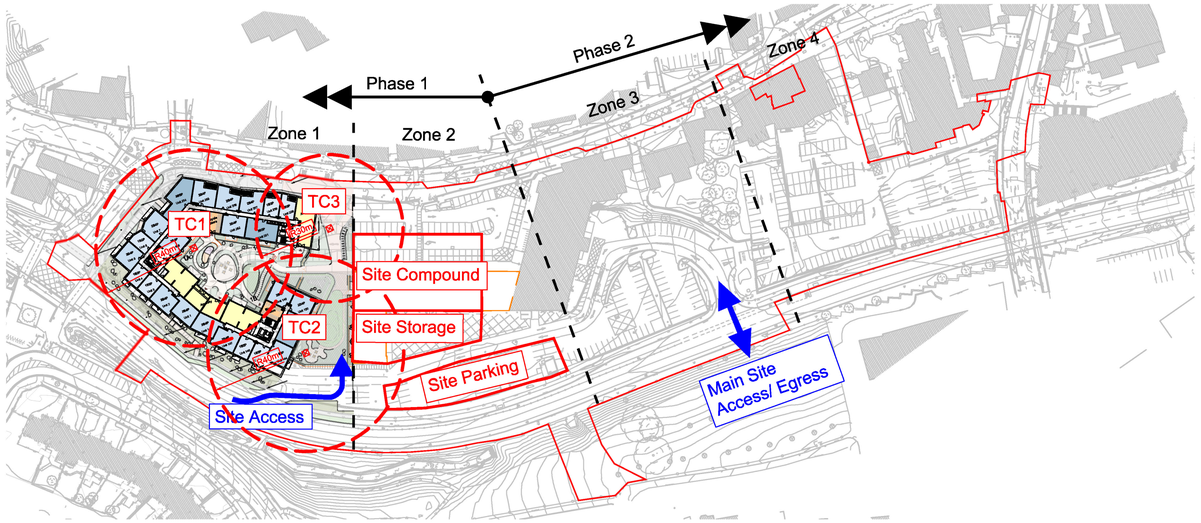
This document is prepared on a preliminary basis for the purpose of the Planning Submission. It sets out mitigation measures to be implemented and developed by the appointed Contractor as part of their obligation to properly manage the site and control all related activities so that any related impact on people, property, and the environment is reduced, insofar as is possible, to an acceptable level.

This Outline Construction Management Plan sets out a likely and anticipated construction methodology and phasing which will be developed by a main contractor prior to commencement of construction on site. The main contractor will then develop their own fully detailed construction management plan prior to commencement of works on site.

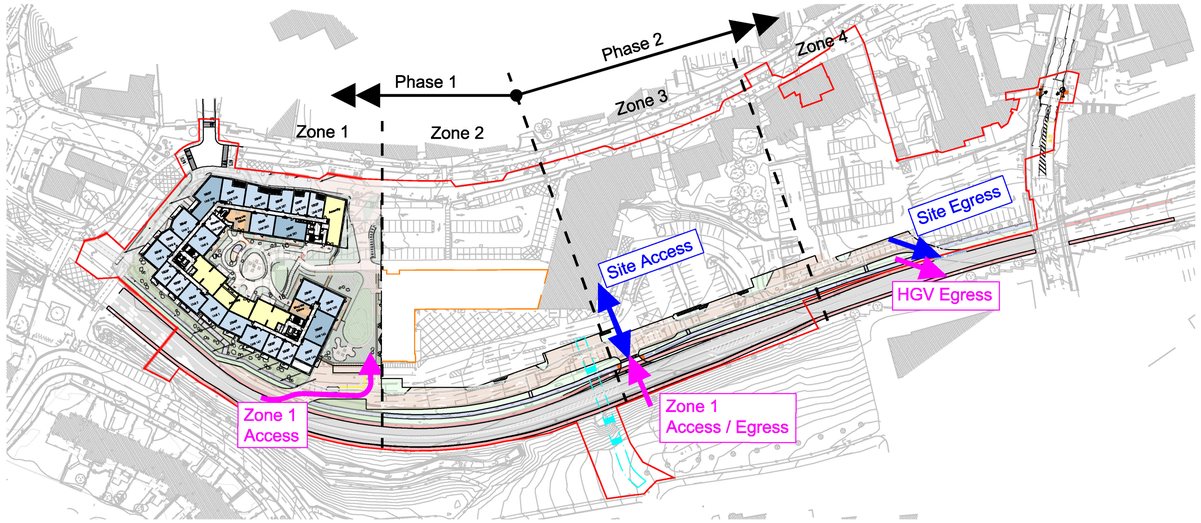
The phasing noted is indicative, and the final phasing, which will be subject to non-construction related matters (i.e. funding, market forces etc.) will be reviewed by the developer and the appointed Contractor, prior to commencement.

APPENDIX A

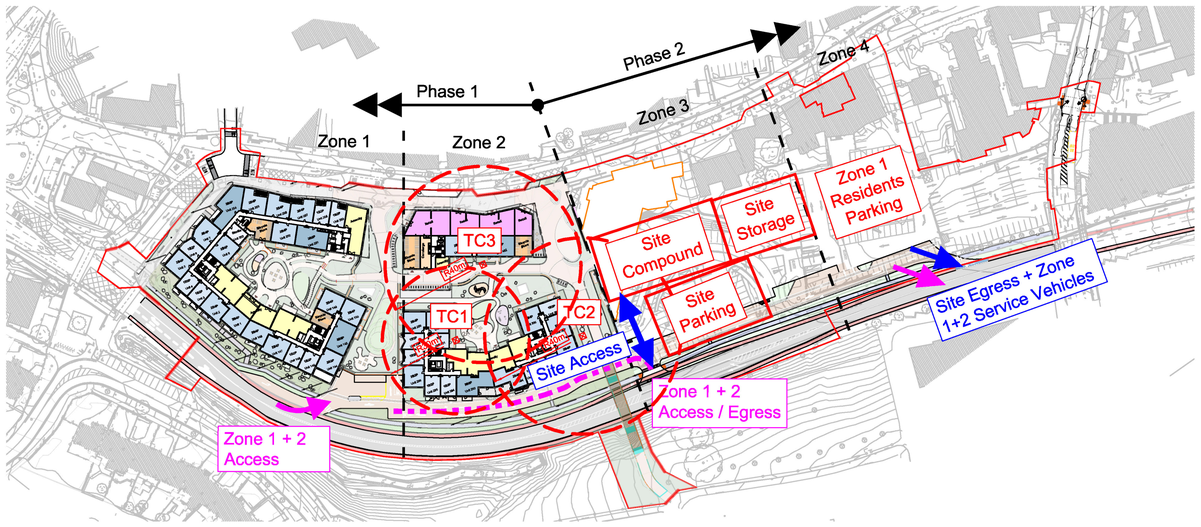
Proposed Phasing & Construction Site Layout Plan



PHASE 1 - ZONE 1

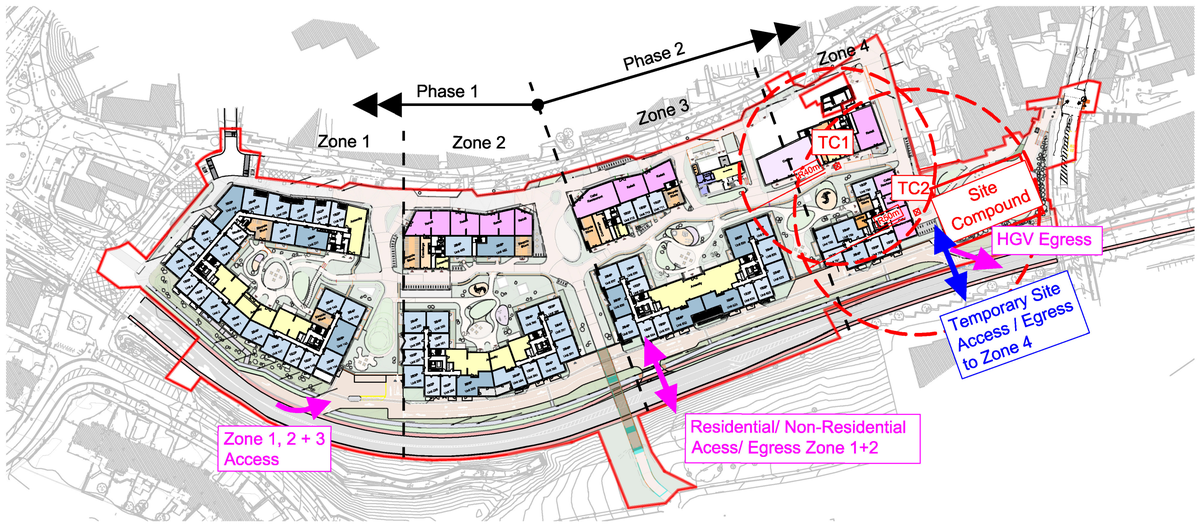


PHASE 1 - ZONE 1 + BYPASS / ACCESS ROAD



PHASE 1 - ZONE 1 + 2

PHASE 2 - ZONE 3



PHASE 2 - ZONE 4

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	2,4 → 22,8	42 - 42,7	12	10,8	10	8,8	8,2	7,4	6,9	6,4	6	5,6	5,4	5	4,7	4,4	4,1	3,8	3,5	3,2	3,1	2,8	t P+
65	2,4 → 23,9	44,2 - 45	12	11,4	10,5	9,3	8,7	7,8	7,4	6,7	6,4	6	5,7	5,2	4,9	4,4	4,1	3,8	3,5	3,3	t		
	2,4 → 23,9	44,2 - 45	12	11,4	10,5	9,3	8,7	7,8	7,4	6,7	6,4	6	5,7	5,3	5,1	4,7	4,4	4	3,8	3,5	t	P+	
60	2,4 → 25,2	46,7 - 48	12	12	11,1	9,9	9,2	8,4	7,9	7,2	6,8	6,3	6	5,6	5,2	4,7	4,5	4,1	t				
	2,4 → 25,2	46,9 - 48	12	12	11,2	9,9	9,3	8,4	7,9	7,2	6,8	6,3	6	5,7	5,4	5	4,7	4,4	t	P+			
55	2,4 → 24,6	45,6 - 46,4	12	11,8	10,8	9,6	9	8,1	7,6	7	6,6	6,1	5,9	5,5	5,3	4,9	t						
	2,4 → 24,6	45,6 - 46,4	12	11,8	10,8	9,6	9	8,1	7,6	7	6,6	6,1	5,9	5,5	5,3	4,9	t	P+					
50	2,4 → 24,7	45,9 - 47	12	11,8	10,9	9,7	9	8,2	7,7	7	6,6	6,1	6	5,5	t								
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45	2,4 → 25,6		12	12	11,3	10,1	9,4	8,5	8	7,3	6,9	6,4	t										
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40	2,4 → 25,7		12	12	11,3	10,1	9,3	8,4	7,9	7,2	t												
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35	2,4 → 25,8		12	12	11,4	10,1	9,4	8,5	t														
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30	2,4 → 25,8		12	12	11,4	10,1	t																
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LOAD CURVES - FOR INFORMATION ONLY

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
HH	TG	TG

TJ O'CONNOR & ASSOCIATES CONSULTING ENGINEERS
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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: Dundrum Village - Strategic Housing Development

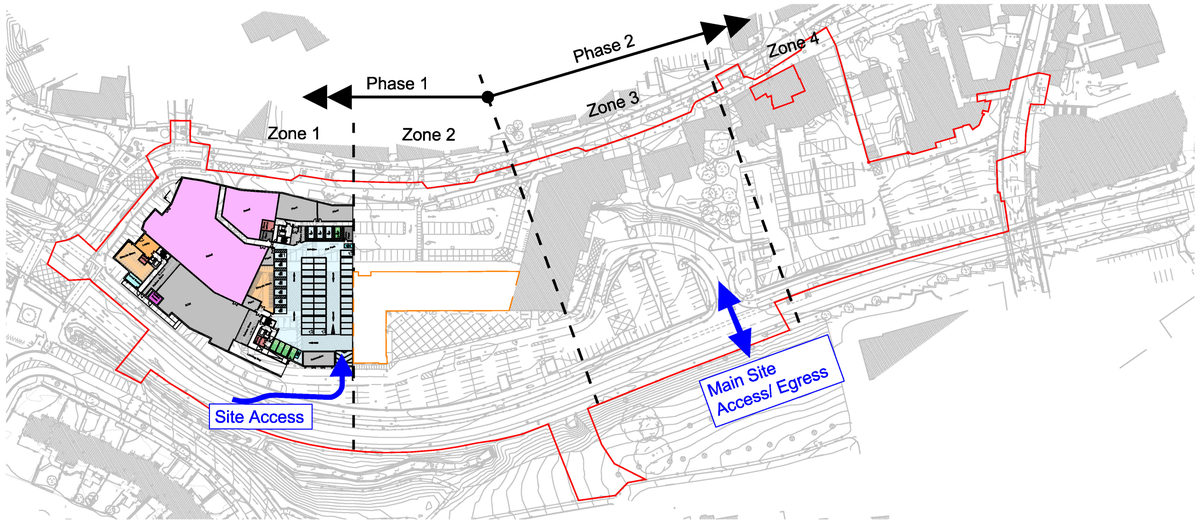
CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Proposed Construction Site Layout Plans

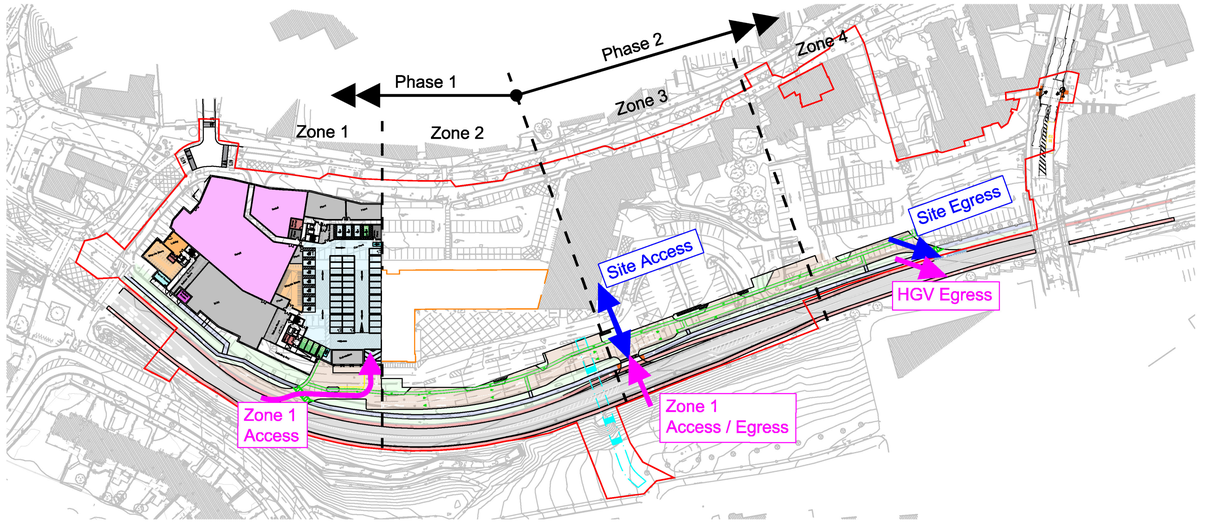
SCALE: 1:1250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031-TJOC-00-XX-DR-C-1040

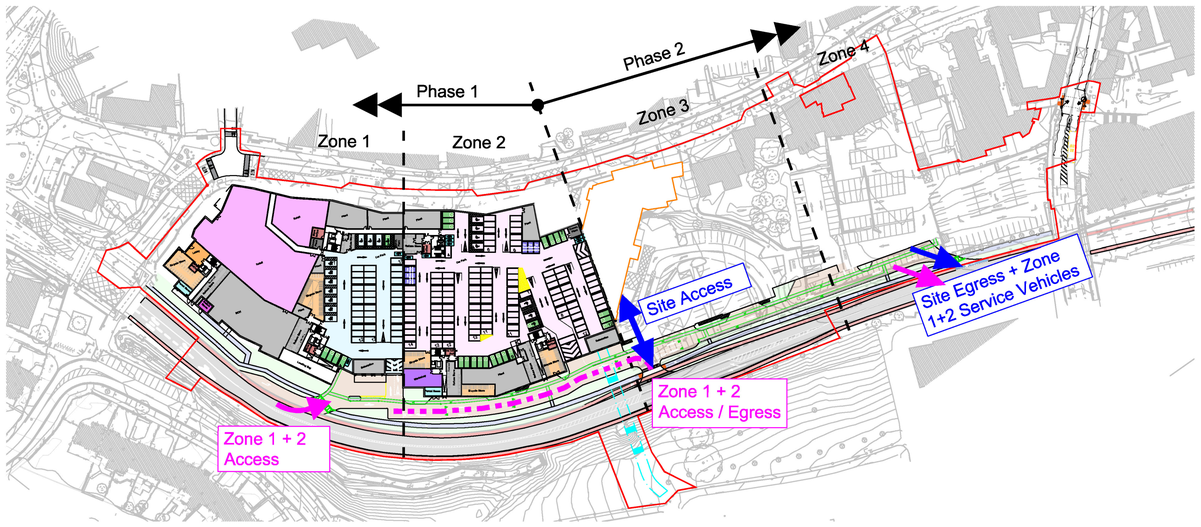
REV: C01



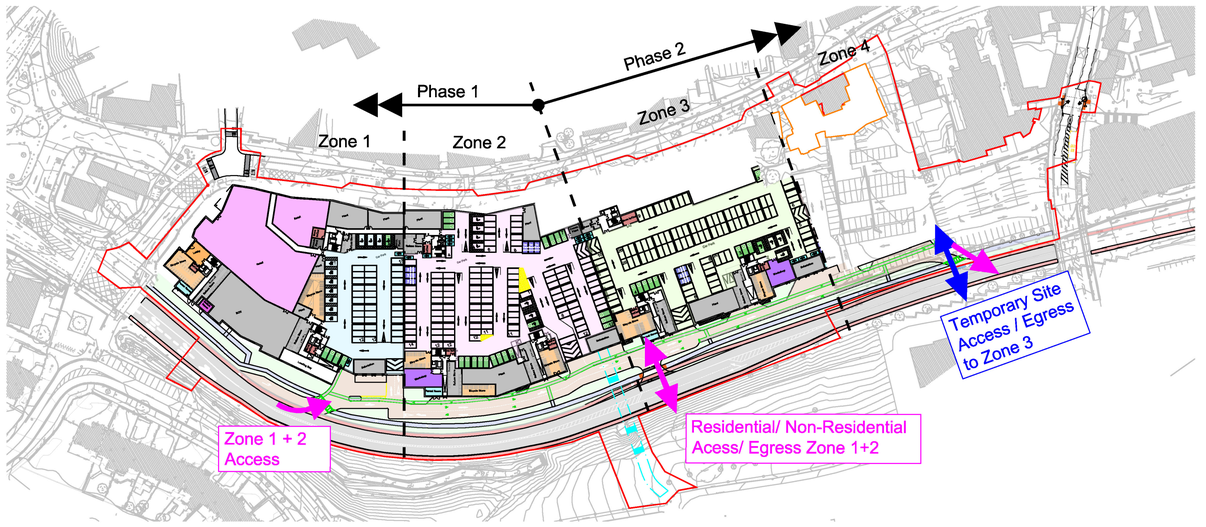
Phase 1 - Zone 1 Construction



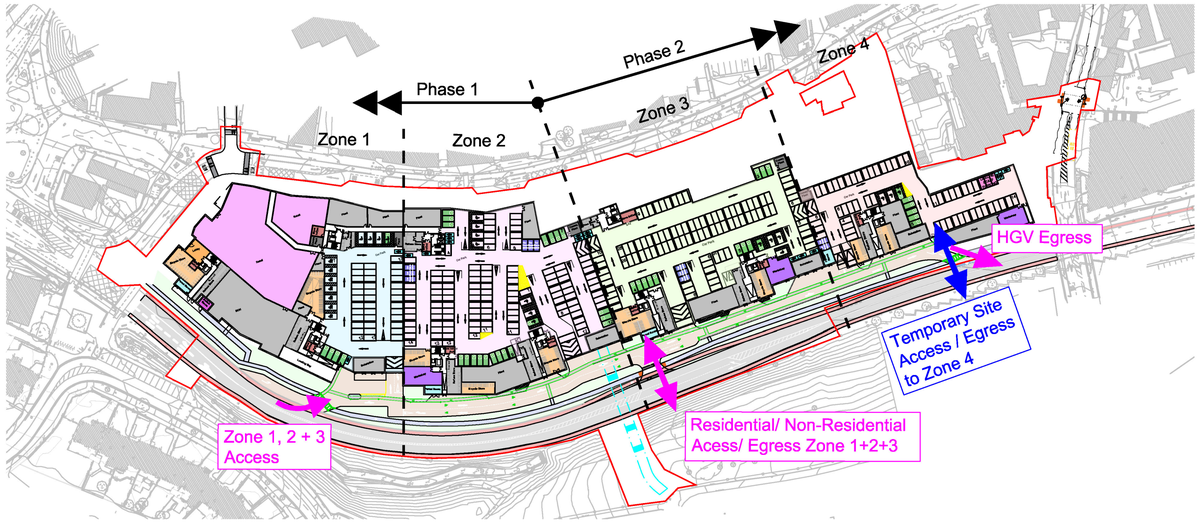
Phase 1 - Zone 1 & Internal Access Road Works Complete



Phase 1 - Zone 1 Complete + Zone 2 and Sweetmount Bridge Construction



Phase 2 - Zone 1 & 2 Complete + Zone 3 Construction



Phase 2 - Zone 1, 2 & 3 Complete + Zone 4 Construction

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
HH	TG	TG

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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: Dundrum Village - Strategic Housing Development

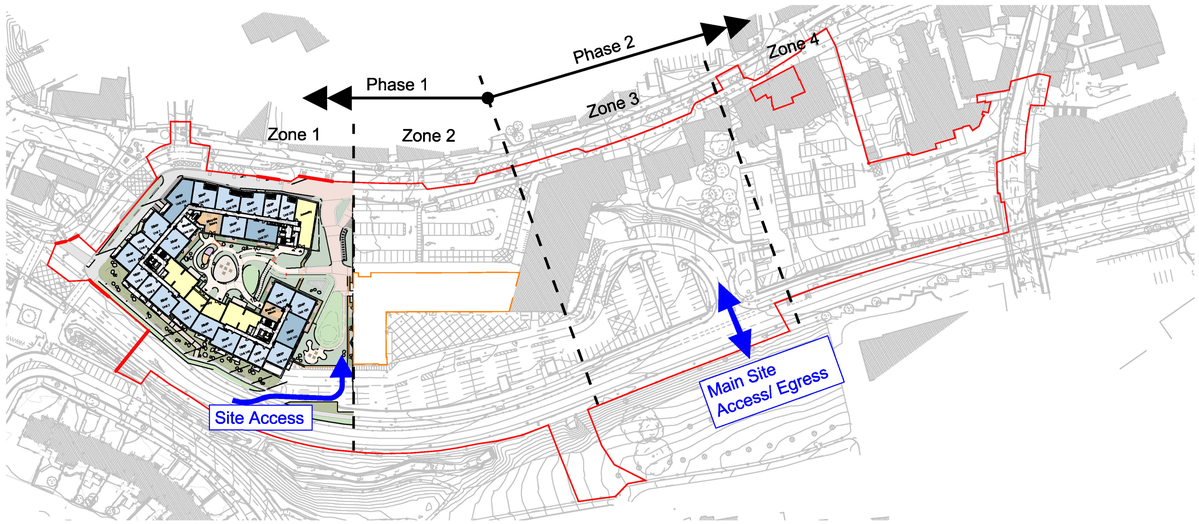
CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Proposed Phasing - Lower Ground Floor

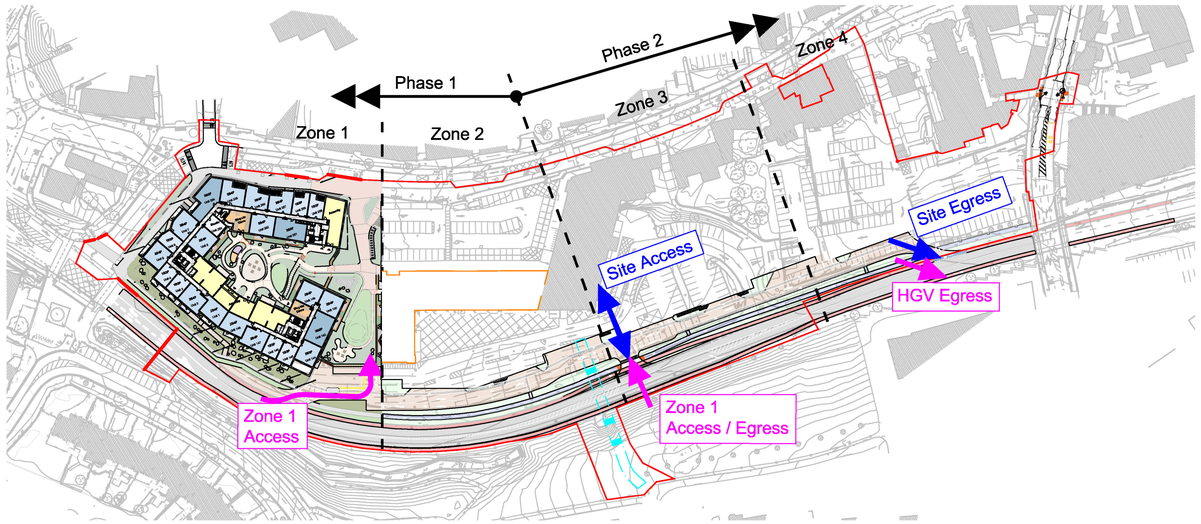
SCALE: 1:1250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031-TJOC-00-XX-DR-C-1041

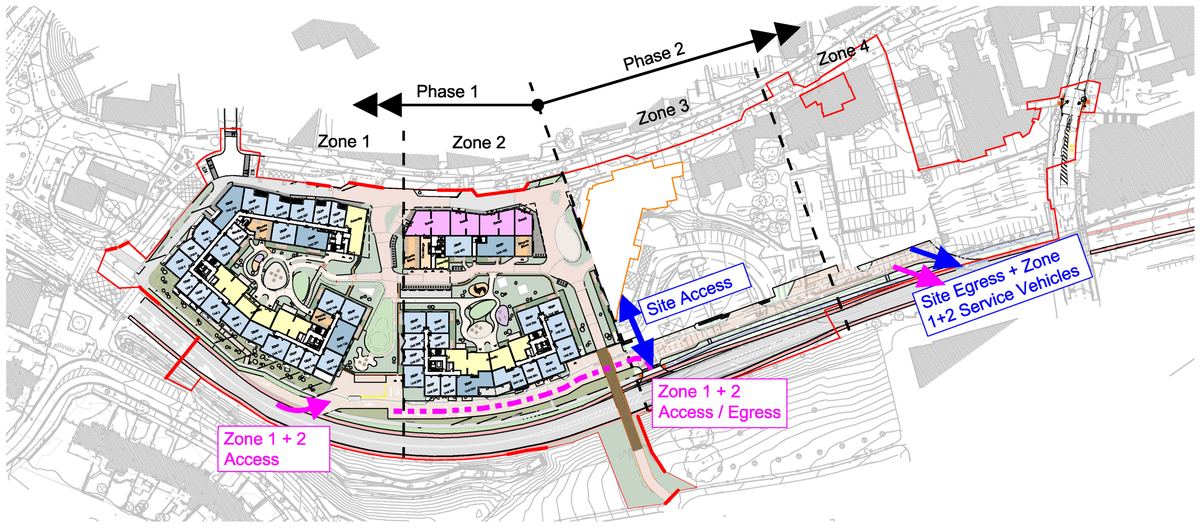
REV: C01



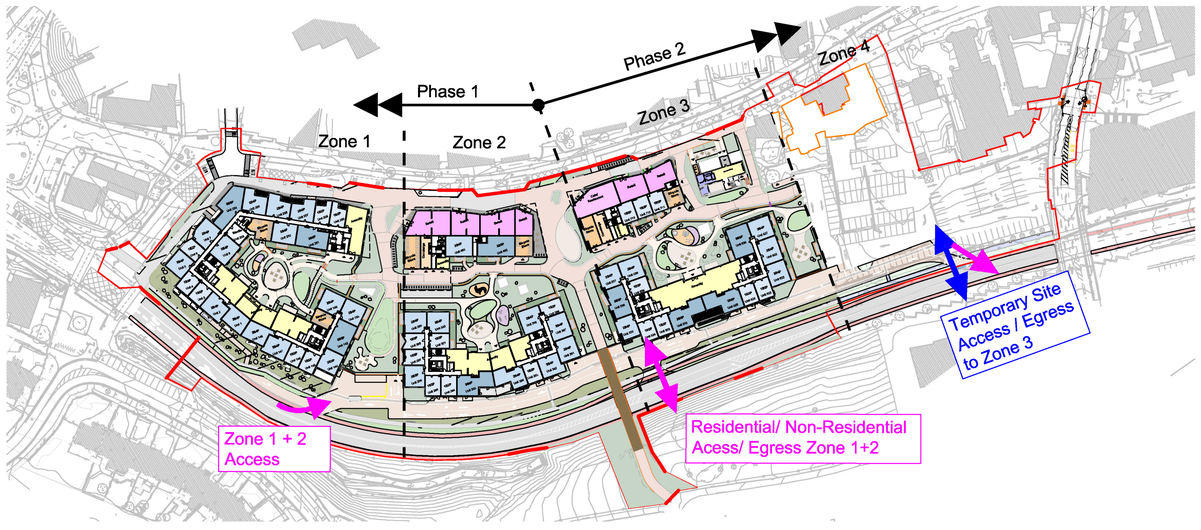
Phase 1 - Zone 1 Construction



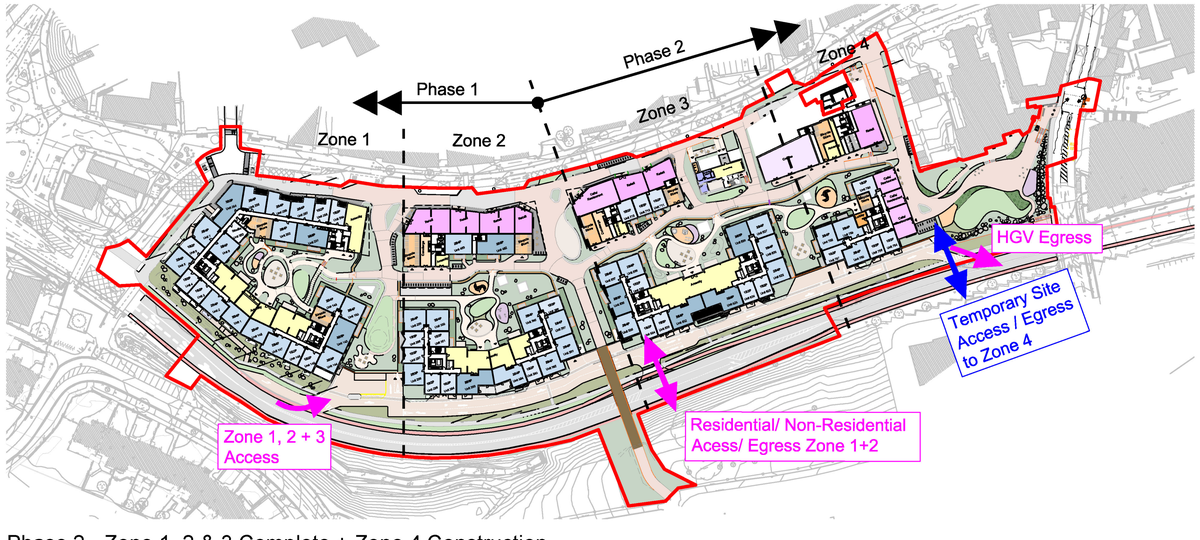
Phase 1 - Zone 1 & Internal Access Road Works Complete



Phase 1 - Zone 1 Complete + Zone 2 and Sweetmount Bridge Construction



Phase 2 - Zone 1 & 2 Complete + Zone 3 Construction



Phase 2 - Zone 1, 2 & 3 Complete + Zone 4 Construction

C01	AP	ISSUED FOR PLANNING	25.03.2022
REV	STAT	DESCRIPTION	DATE

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
RF	TG	TG

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PROJECT: Dundrum Village - Strategic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Proposed Phasing
Ground Floor Level

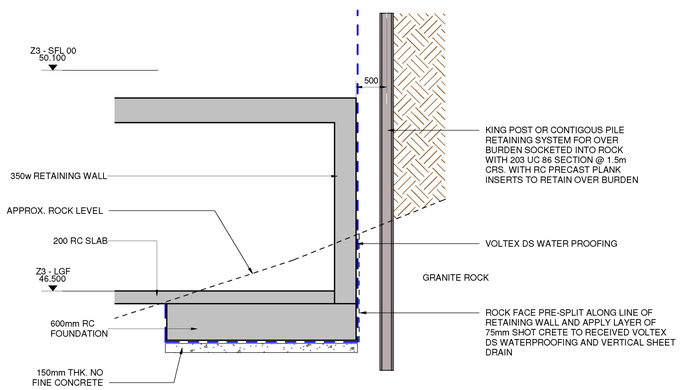
SCALE: 1:1250 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
16031-TJOC-00-XX-DR-C-1042

REV: C01

APPENDIX B

Sub-Terranean Structures Plan



1 / 1031 Retaining Wall - Detail 1

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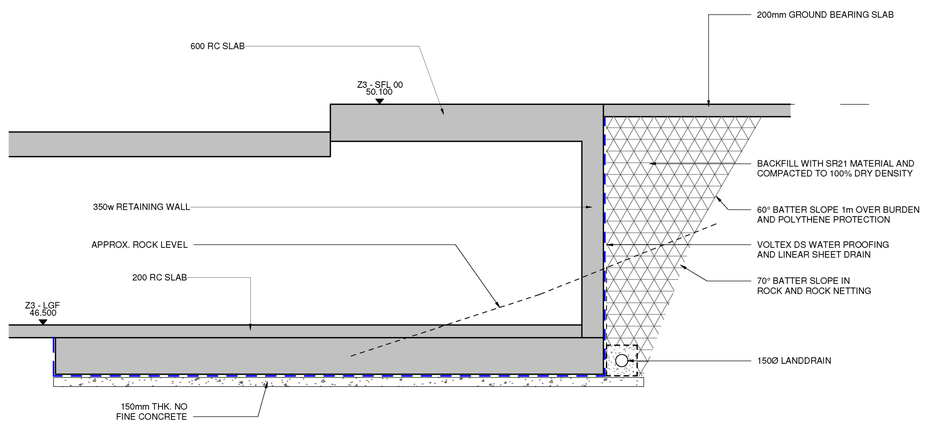

2 / 1031 Retaining Wall - Detail 2

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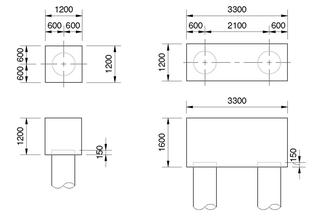
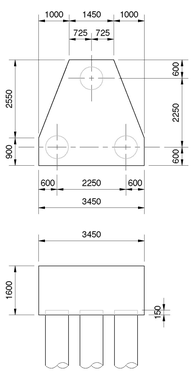


PILE CAP - P1

PILE CAP - P2



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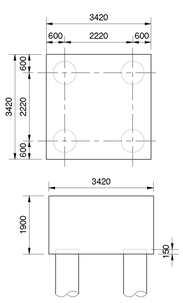

PILE CAP - P4

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
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PROJECT: Dundrum Village - Stratigic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum retail limited Patnership)

DRAWING TITLE: FOUNDATIONS - RETAINING WALLS AND PILING LAYOUT

SCALE: As indicated (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031 -TJOC -00 -XX -DR -C -1031

REV: C01

SITE LOCATION PLAN
SCALE: 1:750

LEGEND

DENOTES LOWER GROUND FLOOR RETAINING WALL STRUCTURE

REV	STAT	DESCRIPTION	DATE
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PROJECT: Dundrum Village - Strategic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Distances to Neighbouring Properties

SCALE: 1:750 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
16031-TJOC-00-XX-DR-C-1043

REV: C01

APPENDIX C

AGL Consulting - Temporary Retaining Wall Design Statement

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

TEMPORARY RETAINING WALL
DESIGN STATEMENT

for

Dundrum Retail GP DAC
acting for and on behalf of
Dundrum Retail Limited Partnership

By

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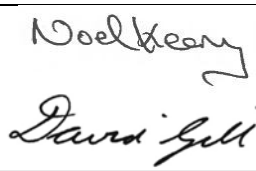
March 2022

Document Approval Form

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

TEMPORARY RETAINING WALL
DESIGN STATEMENT

Revision	Description	Date	Notes
0	Design Statement	01/02/2022	First issue
1	Design Statement	17/02/2022	Updated for comments
2	Design Statement	16/03/2022	Updated for client comments

Document No:	**21-157-R02**	**Signature**
Made:	Noel Keary / Dr David Gill	
Approved:	Niamh Farrell	

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

TEMPORARY RETAINING WALL DESIGN STATEMENT

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DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

TEMPORARY RETAINING WALL
DESIGN STATEMENT

1 INTRODUCTION

It is proposed to construct a Strategic Housing Development with some non-residential use at ground floor level at a site, referred to herein as Dundrum Village Strategic Housing Development (Dundrum Village SHD) in Dundrum, Co. Dublin. The site location is shown in the aerial photograph in Figure 1-1. The site measures 3.53 hectares and is currently used a shopping centre and car park. It is bounded to the north and east by Dundrum Main Street, to the south by the Dundrum Town Centre, to the west by the Dundrum Bypass. The proposed layout is shown in Figure 1-2.

Due to the general fall in ground levels at the site from east to west, the lower ground floor level is within cut at the eastern side of the site, adjacent to Dundrum Main Street and is at or above existing ground level at the western side of the side, adjacent to the Dundrum Bypass. This will require a temporary retaining wall for the local retention of Dundrum Main Street and of some of the properties between the main street and the site, including an historical masonry boundary wall at the church grounds.

AGL Consulting was requested to prepare a design statement for submission to An Bord Pleanála that includes information on the design and construction of the retaining wall. This information is included in this Design Statement.

Note: This is not a design report and the details herein should not be used for design purposes.

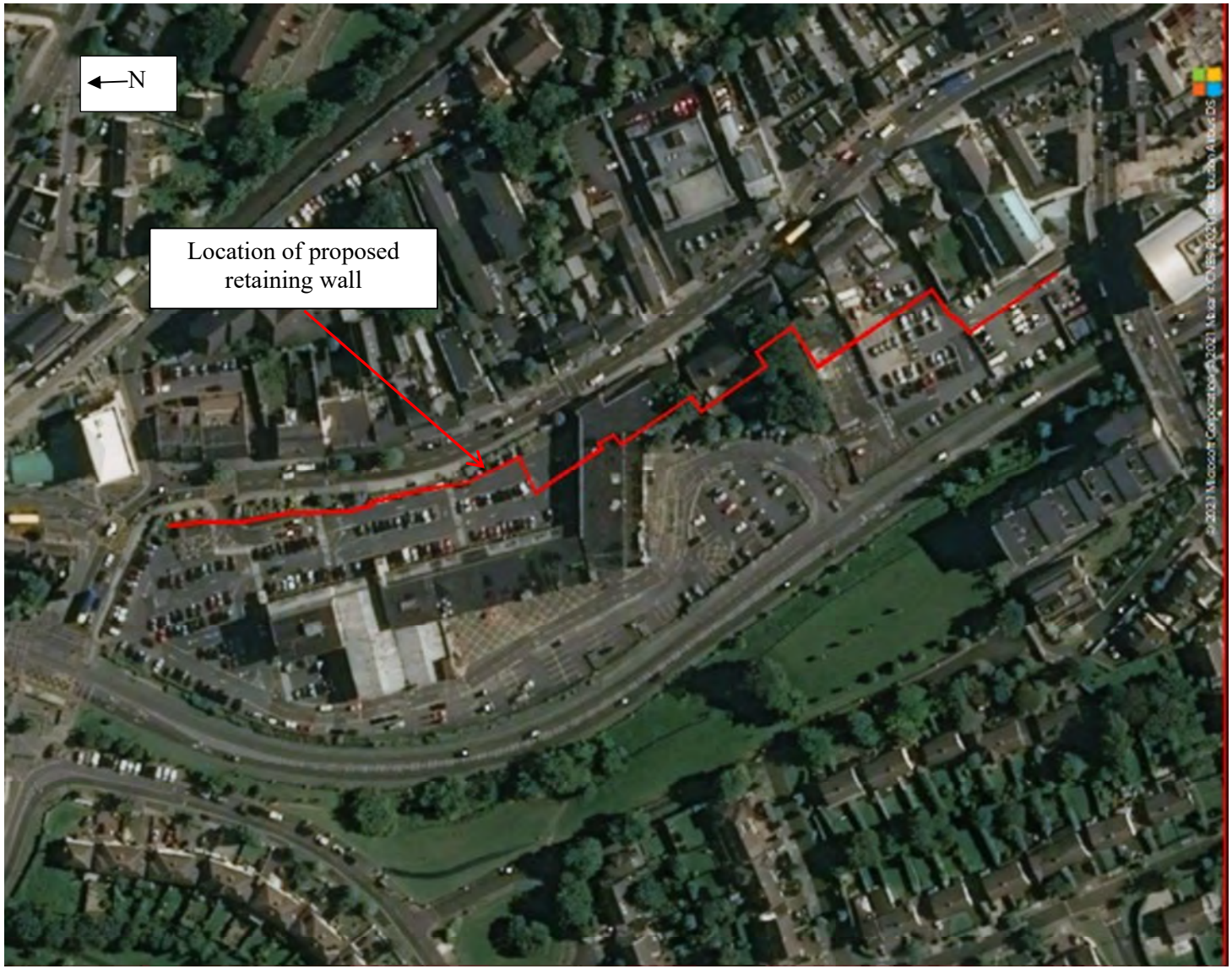


Figure 1-1 Aerial photograph (Bing Maps)

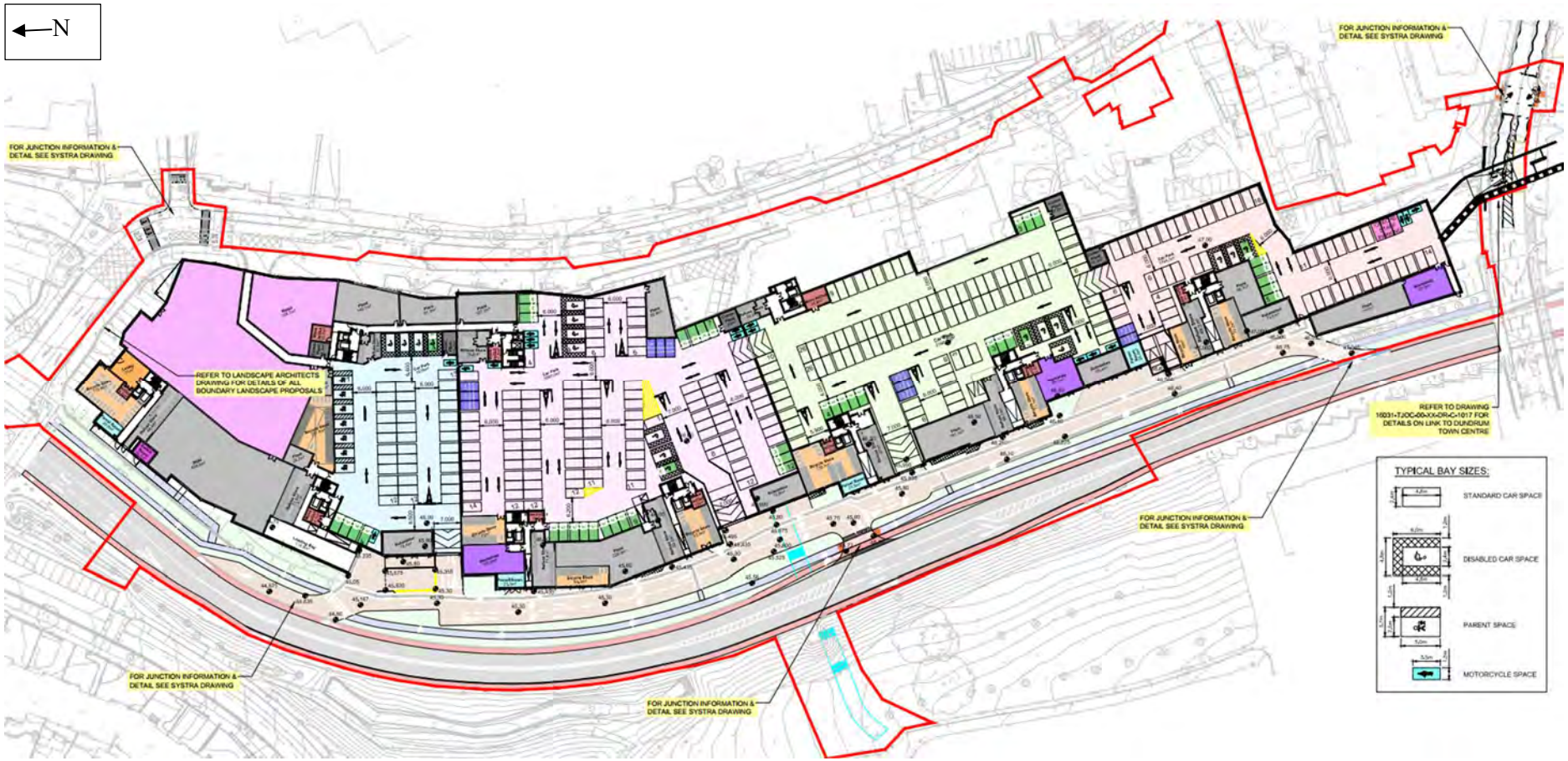


Figure 1-2: Layout of the proposed development

2 SITE DESCRIPTION AND TOPOGRAPHY

2.1 General

The general topography at the site is that ground levels fall from south to north and from east to west (i.e., across the site from Dundrum Main Street to the Dundrum bypass). The existing ground levels close to the proposed location of the retaining wall along the eastern site boundary ranges from 46.5mOD at the northern end rising to 50.8mOD in the south.

The structures and infrastructure that is adjacent to the site and that is required to be retained in the temporary and permanent conditions includes the following:

- Dundrum Main Street.
- 2 storey buildings along the western side of Dundrum Main Street, including Nos. 2 (Pembroke House), 9, 13, 15, and 17, Glenville Terrace, No.11 (Lisney) and No.16/17 (Mulvey Pharmacy). These comprise residential properties and retail units.
- Holy Cross Church and Pastoral Centre, including a masonry boundary wall.

3 PROPOSED DEVELOPMENT

The proposed development at the site comprises apartment blocks of 4 to 16 storeys in height. A lower ground floor level is also proposed, which comprises car parking and retail. Due to the general fall in ground levels at the site from east to west, the lower ground floor level is within cut at the eastern side of the site, adjacent to Dundrum Main Street and is at or above existing ground level at the western side of the side, adjacent to the Dundrum Bypass.

The proposed top of the Lower Ground Floor slab level is 46.0mOD in the northern part of the site rising to 47.0mOD in the south. Allowing for the thickness of slabs and build-up of stone fill below these (i.e., sub-base and capping layers) the excavation formation level is expected to be approximately 1m below the proposed top of slab level. Locally deeper excavations for spread foundations (i.e., strips and pads) may also be required.

The retained height of temporary walls at the site is expected to range between 3m and 5m, typically increasing in height from north to south along the wall alignment.

4 GROUND AND GROUNDWATER CONDITIONS

4.1 Ground Investigations

The existing ground investigation information at the site includes the following reports:

- BMA Geoservices Ltd, Report titled "Geotechnical Interpretative Report – Rock" dated February 2006
- Site Investigations Ltd, Logs of April 2004 SI exploratory points (Appendix 1 of BMA Report)
- Geotech Specialists Ltd, Factual Report No. KD4124 titled "Dundrum Village Centre – Dundrum, Co. Dublin – Report on Site Investigation" dated April 2005 (Appendix 4 of BMA Report)
- Glovers Site Investigation Ltd, Logs of February 2005 SI exploratory points of SI carried out at Sweetmount Park, Dundrum in February 2005 (Appendix 1 of BMA Report)
- Glovers Site Investigation Ltd, Report No. 06-871 titled "Dundrum Town Centre – Phase II" dated March 2007.
- IGSL Ltd, Report titled "Dundrum Village SHD", dated October 2021

4.2 Relevant GI investigation points

A list of the relevant GI points pertinent to the retaining wall that is to be constructed along the eastern boundary of the site to enable excavation of the lower ground floor of the proposed development is presented in Table 4-1.

A combined location plan of the ground investigations in the region around the proposed retaining wall is shown in Figure 4-1

Table 4-1: Relevant Investigation Points for the retaining wall

Reference	Boreholes	Rotary Coreholes	Trial Pits	Dynamic Probes
Geotech Specialists 2004	BH37	-	-	-
Glovers Site Investigation 2005	BH46 & BH48	-	-	-
Glovers Site Investigation 2006	-	BH61	-	-
BMA GeoServices Ltd 2005	-	-	TP5 & TP6	-
IGSL 2021	-	-	TP02, TP06, TP07,TP22, TP26, TP29, TP31, TP32	DP14, DP18, DP21-24
ROD 1999	BHOF7, B7	-	-	-
Albion	BH132, BH133	-	-	-
Site Investigations 2004	BH1 – BH19	-	-	-

Figure 4-1: SI location plan showing the available points at the retaining wall location

4.3 Description of ground and groundwater conditions

The ground conditions encountered in the exploratory holes were found to comprise the following strata:

- Made ground (i.e., uncontrolled fill)
- Old (buried) topsoil
- Glacial till
- Granite bedrock

A summary of the ground conditions is presented in Table 4-5 and a north-south subsurface profile with relevant GI points along the proposed alignment of the wall is presented in Figure 4-2 and in Appendix A. This summary of ground conditions relates specifically to the conditions encountered in GI point at the east of the site in proximity to the proposed wall. It does not comprise a site-wide assessment of the ground conditions.

A description of the main strata encountered is given in the sections below.

4.3.1 Made Ground / Former Topsoil

Made Ground was encountered in all exploratory holes along the section of the proposed retaining wall. It typically consisted of Tarmacadam over brown, clayey sandy GRAVEL/gravelly SAND or reworked boulder clay described as very soft to stiff, slightly sandy slightly gravelly to gravelly CLAY with some cobbles and occasional fragments of wood, plastics, building materials, and organic material.

Former Topsoil was encountered in TP6 at 2.2-2.45mbgl and was described as dark brown, silty CLAY with organic matter (rootlets) (Topsoil). Organic material is also reported in a number of other SI points at the site (Geotech BH22, 27, 28, 29, 30,31 and 33) and (IGSL 2021 TP09, TP16, TP19-21, TP25-26) at 1.5-4.0mbgl and was described as very soft to soft and firm, slightly sandy to sandy, slightly gravelly to gravelly CLAY/SILT with roots and plant material.

The thickness of Made Ground ranges from 0.8m to 2.45 (+44.57 to +42.84mOD), locally 5.2m at BH37 (+43.83mOD), along the length of the retaining wall.

4.3.2 Glacial Till (Brown Boulder Clay)

The Made Ground layer was underlain by deposits of glacial till in 9 No. of the 21 No. GI points along the retaining wall. The material was described as soft to stiff greyish brown sandy to very sandy, gravelly to very gravelly CLAY with medium granite cobbles (Brown Boulder Clay).

The stratum was encountered at 0.8 to 2.45mbgl (+44.57 to +42.84mOD) and its thickness ranged from 0.3m to 1.4m at these locations.

4.3.3 Rock

Rock was encountered in all the boreholes and rotary coreholes and was described as completely weathered GRANITE recovered as clayey, SAND and/or GRAVEL overlying highly weathered to fresh, moderately strong to strong GRANITE.

The rockhead profile at the north-east of the site is reported to be 3.3mBGL (+43.0mOD) at BH46, and rises towards the south-east, along the length of the retaining wall to 1.0mbgl (+48.5mOD) at BH61 before falling to 5.8mbgl (+43.23mOD) at BH37.

15 No. Point Load Index (PLI) Tests were carried out on samples of rock and recorded a typical range of 1.54 – 3.98MPa (Is_{50}), or 30.8 - 79.6MPa (UCS) using the correlation UCS = 20 x Is_{50}. 13 No. UCS

tests were also carried out on samples of rock and values typically ranged from 17.04-55.06MPa. These values indicate a variable rock strength of Weak to Strong according to Table 25 of BS5930: 2015.

A summary of the rock coring parameters is presented in Table 4-2.

Table 4-2: Rock Coring Results

	TCR (%)	SCR (%)	RQD (%)
Maximum	100	100	100
Minimum	10	0	0
Average	82	43	38

4.3.4 Groundwater

Table 4-3 summarises the recorded groundwater strikes in relevant exploratory holes, which are located close to the proposed wall alignment. A groundwater strike close to the proposed wall was encountered at 43.6 mOD in BH9. Groundwater strikes were typically encountered in the lower (western) part of the site at circa 42mOD to 44.5mOD. Note that groundwater strikes in boreholes, coreholes and trial pits may not provide a reliable indication of the static groundwater level unless holes remain open for a sufficient period to enable groundwater levels within the hole to stabilise. However, they may indicate where permeable soils are present below the groundwater table or where perched water levels exist above low permeability soils or rock.

Table 4-3: Groundwater strikes close to eastern site boundary

Reference	Ground water depth (mbgl)	Ground water elevation (mOD)	Comments on Exploratory Log	Highest groundwater elevation observed (mOD)
BH9	3.5	43.63	Water observations at 3.5m	43.63

3 No standpipes were installed for groundwater monitoring at BH7, BH8 and BH9. Table 4-4 summarises the recorded groundwater readings. Groundwater was recorded between 44.9 and 45.2mOD. The equalised water level recorded in the standpipes is noted to be higher than that recorded in water strikes.

Table 4-4: Summary of the groundwater monitoring readings

Reference	No. of readings	Max GW level recorded (mOD)	Min GW level recorded (mOD)	Avg. GW level recorded (mOD)	Max GW depth recorded (mBGL)	Min GW depth recorded (mBGL)	Avg. GW depth recorded (mBGL)
BH7	2	45.93	45.90	45.91	3.44	3.41	3.42
BH8	4	45.71	45.36	45.51	2.90	2.55	2.75
BH9	3	45.26	45.12	45.20	2.01	1.87	1.93

Table 4-5: Summary of ground and groundwater conditions

Stratum	Description	Depth to Top of Stratum (m)	Thickness (m)	Comment
Tarmacadam	Tarmac	0	0.2	Reported in TP5-6 and BH7-9
Made ground	Brown, clayey sandy GRAVEL/gravelly SAND or reworked boulder clay described as very soft to stiff, slightly sandy slightly gravelly to gravelly CLAY with some cobbles and occasional fragments of wood, plastics, building materials, and organic material.	0.0 – 0.2	0.8 – 2.45	Overburden reported as "soil cover" in BH48
Former Topsoil	Dark brown, silty CLAY with organic matter (rootlets) (Topsoil)	2.2 (47.1mOD)	0.25	Only reported in TP6
Brown Boulder Clay	Soft to stiff brown slightly sandy, slightly gravelly to gravelly CLAY with some cobbles	0.8 – 2.45 (44.6 to 42.8mOD)	0.3 – 1.4	Not reported in TP06, BH48, TP02, BH61, BHOF7, TP26, BH133, BH134, TP29, TP31, TP32, BH37
Weathered Rock	Completely weathered GRANITE recovered as clayey, SAND and/or GRAVEL	1.2-3.65 (43.0 to 46.0mOD)	0.9 - 10.7	Not reported in TP07, TP06, TP02, TP6, TP26, BH133, BH134, TP31, TP32, BH37, BH7, BH48 OR BH61
Rock	Highly variable - highly weathered to fresh, moderately strong to strong GRANITE	1.0-14.0 (32 to 48.5mOD)	Not proven	Not reported in BH9 OR B7
Groundwater	Groundwater strikes at 43.6 mOD in BH9, elsewhere at the site between 42mOD to 44.5mOD. Groundwater level in piezometers was recorded between 44.9 and 45.2 mOD.			

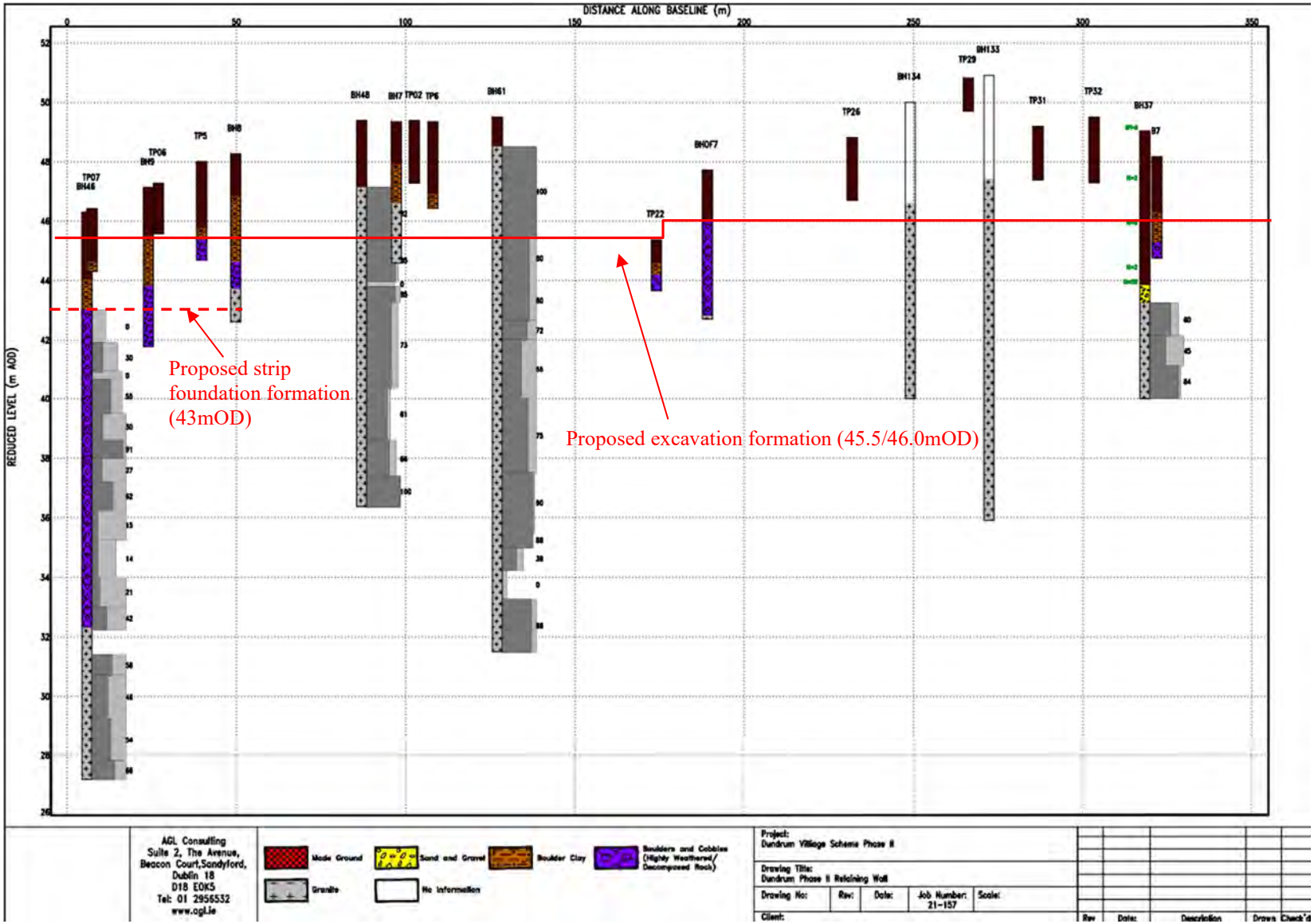


Figure 4-2: Sub-surface profile at proposal retaining wall alignment

5 PROPOSED EMBEDDED PILE RETAINING WALL

5.1 Temporary embedded retaining wall types

Where there is insufficient space from the proposed permanent retaining wall to the site boundary or to adjacent structures to allow the excavation of unsupported slopes then a temporary embedded retaining wall will be required to retain the ground and to limit potential ground movements outside the site to be within acceptable limits. Some typical embedded retaining wall options include:

- Sheet pile walls
- Rotary bored secant and contiguous pile walls
- Continuous flight auger (CFA) secant and contiguous pile walls
- Rotary bored/CFA/Odex pile king post walls

The ground conditions at the site, which includes rock close to the proposed excavation formation level are not suitable for sheet piles which are required to be driven into the ground. Therefore is expected that replacement (i.e., drilled-in-place) piling methods that can penetrate into rock will be required.

Rotary bored piling comprises the construction of concrete piles both with and without steel reinforcement. This method requires the use of temporary casing to support the ground and allows drilling through both overburden soils and also strong rock by use of rock augers and core barrels.

CFA piling methods also comprise the construction of concrete piles with and without steel reinforcement. However no temporary casing is required with drilling carried out by a hollow-stemmed continuous flight auger that is rotated into the ground to the required depth. As the auger is withdrawn, concrete is pumped down the hollow stem to form the pile. After the auger is extracted and the pile concreted to the surface, a reinforcing cage can then be inserted into the wet concrete. CFA piling is suitable for drilling in the overburden soil and into very weak or highly weathered/decomposed rock. Only limited penetration can be achieved into a competent rock. Predrilling of rock sockets by Odex rotary percussive methods can be carried out in advance of CFA pile methods to allow construction of CFA piles in strong rock.

The Odex system is a rotary percussive system, with the drillhole and casing advanced simultaneously with a pilot bit and eccentric reamer. The percussion mechanism is directly behind the drill bit and is driven by compressed air. This breaks any hard material (e.g., rock, concrete etc.) into small pieces and is flushed to the surface by the compressed air exhaust from the hammer. Vibrations from this method of drilling are typically low to moderate. The method typically requires the use of temporary casings when drilling in overburden soils with poor stability (e.g water-bearing sands and gravels, soft silts and clays). Odex pile diameters up to 640mm are possible.

A secant pile wall is formed by constructing alternating primary (female) and secondary (male) piles where the secondary piles partially cut into either side of the primary piles in order to form a continuous structure. Secant piles walls can be constructed by either bored or CFA piling methods and are used where groundwater ingress through a retaining wall may be an issue.

A contiguous pile wall is constructed with spaces/gaps between adjacent reinforced concrete piles. The typical spacing between piles is 100 to 175mm. Contiguous pile walls are installed using rotary bored or CFA techniques and are used when groundwater ingress or ground loss between piles is not an issue, e.g., excavation above the water table or in low permeability fine grained soils. An example of a contiguous CFA pile wall is shown in Figure 5-1.

King post walls comprise “king” piles formed by either bored or CFA methods that are filled with concrete and reinforced with a steel H-section. This allows concrete pre-stressed panels or timber lagging to be inserted between the webs of the H sections. This method can be economical as it reduces the number of piles required although is only suitable where the retained ground is above the

groundwater table and is sufficiently self-supporting to allow the panels to be installed without ground loss or significant ground movement. The panels/lagging are inserted from the top of the wall, so typically would be used for maximum retained heights of 4 to 5m. An example of a king post wall with precast concrete infill panels is shown in Figure 5-2.

Figure 5-1: Example of a cantilever CFA contiguous pile wall (source AGL)

Figure 5-2: Example of a cantilever king post wall with precast concrete infill panels (source AGL)

5.2 Recommended temporary retaining walls

The granite bedrock at the site was encountered at 43 to 48mOD, which ranges from just below to above the expected excavation formation level of 45.5 to 46.0 mOD. Therefore the retaining wall system will be required to penetrate into rock for stability. The rock along the proposed line of the wall varies between highly weathered/decomposed rock that was recovered in the coreholes as Sand and Gravel to

a weak to strong fresh/slightly weathered Granite. CFA piling methods would not be expected to penetrate into the fresh/slightly weathered Granite, therefore rotary bored piles are expected to be the most suitable piling method at the site.

Groundwater at the eastern part of the site was encountered between 43 and 45.9mOD, which ranges from below to just at the expected excavation formation level of 45.5 to 46.0mOD. The ground conditions just above formation level will typically comprise a low permeability brown Boulder Clay, highly weathered/decomposed Granite and slightly weathered to fresh Granite. Given the ground conditions and that the maximum groundwater level would be just at formation, the rate of groundwater flow/seepage into the excavation would be expected to be low. The retaining wall will therefore not be required to provide a cut-off to groundwater flow in the temporary condition, as any inflow that occurs can be disposed of by sump pumping.

In the permanent condition, any part of the temporary wall that extends below the permanent retaining wall is also required not to obstruct groundwater flow across the site.

The most suitable wall types are therefore considered to be:

- Rotary bored king post walls or contiguous pile walls. A secant pile wall may also be an more economical alternative to a contiguous pile wall to reduce the number of reinforced pile and overall length of drilling in rock.
- CFA/Odex drilled king post walls. CFA piling is typically faster and more economical method of piling to rotary bored piles. This can be combined with predrilling of rock sockets by Odex methods to allow CFA piles to be constructed in the slightly weathered/fresh medium strong to strong Granite.

King post walls are likely to be more economical as the “king” piles with steel H-sections can be spaced at 2.5 to 3.5m centres by use of precast concrete infill panels to retain the ground. King post walls are likely to be suitable for retained heights of up to 5m. The suitability of use of unpropped cantilever walls at the site will depend on the expected wall defection and the presence of sensitive structures or buildings in the retained ground.

Cantilever king post walls are likely to be suitable for retained heights of up to 4m. However for greater retained heights or where the retaining walls are close to sensitive structures then propped support will be required to reduce the ground movements. Alternatively contiguous bored pile walls may be used, as the closer spacing of the reinforced piles increases the wall flexural stiffness and can allow greater retained heights without the use of prop support.

In some instances secant pile walls can be more economical than contiguous pile walls as these allow a greater spacing between the reinforced piles and can reduce the overall length of drilling in rock.

5.3 Design Standards

In Ireland the design of temporary and permanent embedded retaining walls, is carried out in accordance with IS EN 1997-1:2005 Eurocode 7: Geotechnical design. This considers the Ultimate Limit State (ULS) with partial factors applied to actions and to ground strength parameters. Allowance is also typically made for a temporary over-dig (i.e., increased retained height). The retaining wall deflection and the resulting ground movements are assessed in Serviceability Limit State (SLS) analysis using characteristic actions and soil parameters.

The structural design of bored and CFA piles with reinforced concrete is carried out in accordance with IS EN 1992-1-1:2005 Eurocode 2 Design of Concrete Structures. The design of steel H-section king posts is carried out in accordance with IS EN 1993-1-1:2005 Eurocode 3 General Rules and IS EN 1993-5:2007 Eurocode 3 Design of Steel Structures -Part 5 Piling.

5.4 Typical Construction Sequence

The example of a construction sequence for a king post wall and for a contiguous pile wall is given below

King Post Wall

(i) Place piling mat/platform.
(ii) Install "king" piles, which comprises drilling with temporary casing to top of rock, drilling a rock socket, placement of a steel H-beam and concrete and then extraction of the temporary casing.
(iii) Installation of the first infill panel between the steel H-sections. This will require an initial low unsupported excavation (<1m) to allow the first panel to be placed. Any subsequent excavation would be carried out below the panel similar to an underpinning method, with the panel progressed downwards to support the exposed ground.
(iv) The second panel is then placed above the first panel at the top of the wall. The excavation can then progress deeper with the panels moved down in sequence to support the ground.
(v) Further panels are installed as required to allow for excavation to formation.
(vi) Prop support is installed as required in the construction sequence from items (ii) to (iv). This would typically comprise a raked steel prop to a concrete thrust block excavated in the rock. A berm of soil is left in place in front until the prop is in place.
(vii) The permanent RC wall is constructed.
(viii) Backfill comprising compacted structural fill is placed between the permanent wall and temporary wall.
(ix) Props, where used, are removed.

In order to minimise ground movement the following good practice would be followed for king post walls.

- The panels would be in contact with the flange on the excavation side of the king post UC section, so the panel can't move towards the excavation after it is installed. To achieve this, excavation into the face of retained soil shouldn't exceed the thickness of the panel. This will also ensure that the panel is tight against the retained soil.
- Voids between the panels and the retained soil may need to be filled with grout or sand to prevent ground surface movements occurring due to subsequent collapse of the soil into this void. The grout is only required to be a void filler, so would have no target strength requirements. It would need to be sufficiently fluid to allow it flow down the back of the panels into any voids but also have sufficient viscosity so that it doesn't flow into the excavation and can be contained. A cement-bentonite grout is be most suitable for this.

Contiguous Pile Wall

(i) Place piling mat/platform
(ii) Install piles, which comprises drilling with temporary casing to top of rock, drilling a rock socket, placement of a steel reinforcement cage and concrete and then extraction of the temporary casing.
(iii) Prop support is installed as required, with a berm of soil left in place until the prop and thrust block are in place.
(iv) The permanent RC wall is constructed.
(v) Backfill comprising compacted structural fill is placed between the permanent wall and temporary wall.
(vi) Props, where used, are removed.

5.5 Monitoring

5.5.1 Wall deflection and ground movement

Ground movement and wall deflection monitoring is normally specified as part of the wall design. This would typically include total station monitoring of targets on the wall, points within the retaining ground and any structures that could potentially be affected by the works. For contiguous or secant pile walls inclinometers may also be installed in selected piles at sensitive areas to allow the wall deflection to be observed.

The monitoring is carried to confirm that movements are consistent with calculated values. Trigger or action wall deflection/movement limits are typically specified as part of the design to allow early intervention to prevent excessive movement and damage to external structures. This would also include contingency measures to be implemented if the action limits are exceeded (e.g., placement of excavated material against wall to arrest wall movement, or install additional temporary props)

5.5.2 Vibration and noise control

The proposed bored and CFA piling methods are low vibration methods. Vibrations from Odex piling is low to moderate. Monitoring of vibrations would therefore only be expected to be required where piling is carried out close to sensitive structures and where Odex piling is proposed to be carried out to ensure that vibration limits are not exceeded.

Guidance on conservative threshold vibration limits for damage from piling operations are given in BS 5228-4:1992 *Code of practice for noise and vibration control applicable to piling operations.* Table 5.1 presents a summary of the recommended vibration limits given in BS 5228-4:1992 for structures and services. The limits are applicable to the ***component*** peak particle velocity measured for a frequency range of 10 to 50 Hz, which is stated to be the typical range for piling operations. The vibration levels in Table 5.1 refer to maximum component value in "vertical, radial or tangential direction".

Table 5.1 Peak particle velocities which provide conservative thresholds for minor damage from piling operations (derived from BS 5228 Part4 and applicable to a frequency range of 10-50 Hz)

Structure type/services	Intermittent mm/s	Continuous mm/s
Soundly constructed residential property in good repair[1]	10	5
Structures where preliminary surveys reveal existing significant defects of a structural nature[1]	5	2.5
Light and flexible structures for commercial and industrial use[1]	20	10
Heavy and stiff structures for commercial and industrial use[1]	30	15
Underground Services[2]	30	15
Notes: [1]At frequencies below 10Hz the values above relevant to *structures* should be reduced by 50%. [2] It is noted that a p.p.v. of 30mm/s gives rise to dynamic stresses that are equivalent to approx. 5% of the allowable working stress in concrete and less than 5% in iron and steel pipes.		

The relevant threshold limit for peak particle velocity for the prevention of minor or cosmetic damage to soundly constructed residential properties in good repair is 10 mm/s for intermittent vibration sources and 5mm/s for continuous vibration sources (such as Odex piling).

Guidance for predicting and measuring noise and assessing its impact on those exposed to it are given in BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites Part 1: Noise.* Recommendations are also given for method of noise control. The works would be carried out in accordance with BS 5228-1:2009+A1:2014 to ensure the impact on neighbouring property is minimised.

6 ENGINEERING DESIGN CONSIDERATIONS

The following is a list of the considerations that would need to be addressed by the Designer when developing the embedded pile wall design:

1. Suitability of ground conditions for the proposed piling method
2. Ground movements during excavation
3. Effect on groundwater regime
4. Vibrations/Noise During Construction

These engineering considerations are discussed separately in this section and design measures to mitigate the impacts, where relevant, are outlined.

6.1 Suitability of Ground Conditions for Embedded Pile Walls

The ground conditions close to the eastern boundary comprise made ground (typically reworked glacial till), old buried topsoil, firm/stiff glacial till (brown boulder clay) over highly weathered/decomposed Granite or slightly weathered/fresh weak to strong Granite. The presence of rock at site that is close to or above the proposed excavation formation level precludes the use of sheet piles which would not penetrate the rock without pre-drilling. The use of CFA piling methods would be suitable in the overburden and highly weathered/decomposed rock but would achieved only limited penetration into the slightly weathered/fresh Granite. Predrilling by Odex methods can also be used in combination with CFA piling to achieve rock sockets and is feasible. Rotary bored piling is considered to be the most suitable piling method for this site.

The wall system used may be a king post wall or contiguous pile wall. King post walls are likely to be most cost effective, although contiguous pile walls may be preferred where located very close to buildings or boundary walls as these are stiffer wall systems. Contiguous pile walls also lower the risk of settlement due to poor workmanship during excavation. The construction of king post walls requires the infill panels to be constructed tight to the retained ground and also the reliance on ground to be self-supporting during the excavation below the panels should be minimised.

6.2 Ground Movements during and post construction (Effects on Nearby Properties)

Ground movements during the excavation works can be controlled to remain within acceptable limits by use of appropriately selected wall systems and, if necessary, with temporary propping. The closest properties are located approximately 4.7m from the rear of Glenville Terrace (excluding annex), 2.4m to the boundary wall to the Parochial House and 8.4m to the rear of the Holy Cross Church. In general for the typical retained height of 3 to 4m and given that the walls are not required to be water retaining structures it is expected that cantilever walls will give acceptable ground movements. The use of propped support or stiffer contiguous pile methods would be considered where constructed close to buildings and where retained height >4m are required.

Where the retaining wall is designed in accordance with the appropriate standards and good practice is observed during construction the risk of damage to neighbouring properties from ground movement is considered to be low.

6.3 Effect on Groundwater regime

Groundwater at the eastern part of the site was encountered between 43 and 45.9mOD, which ranges from below to just above the expected excavation formation level of 45 to 45.5mOD. Therefore some local dewatering of the excavation may be required in the temporary condition, if encountered. This can be carried out by sump pumping from the base of the excavation. Given the low permeability of the glacial till and rock, the rate of groundwater flow/seepage into the excavation would be expected to be

low. Any drawdown of the wall level outside of the site would be expected to be very minor. The ground movement associated with this drawdown would be expected to be negligible.

In the long term a king post or contiguous pile wall will not obstruct water flow as there will be gaps between the embedded piles. Therefore the effect of the proposed works on the temporary groundwater levels is not expected to be significant and will be negligible in the long term condition.

6.4 Vibrations/Noise During Construction

The proposed bored and CFA piling methods are low vibration methods. Vibrations from Odex piling is low to moderate. Monitoring of vibrations would therefore only be expected to be required where piling is carried out close to sensitive structures and more generally where Odex piling is proposed to be carried out to ensure that vibration limits are not exceeded.

6.5 Geometric constraints

The position of the proposed temporary pile has been positioned to ensure that it fits within the site boundaries and that it doesn't encroach on neighbouring properties, as can be seen on the following drawings:

- 16031-TJOC-00-XX-DR-C-1043

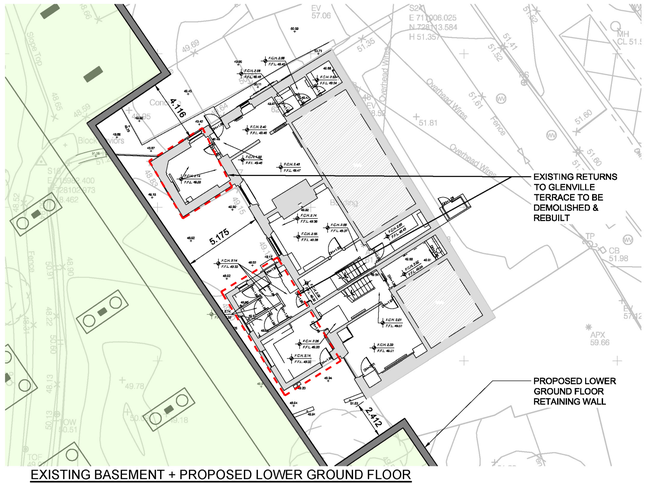
7 SUMMARY & CONCLUSION

- AGL Consulting was requested by T.J. O'Connor & Associates (TJOC) to prepare a design statement for submission to An Bord Pleanála that includes information on the design and construction of the temporary retaining wall at the Dundrum Village – SHD and the potential impact to the properties outside the site. This information is included in this Design Statement.
- The proposed development at the site is to comprise the construction of apartment blocks of 4 to 16 storeys in height above ground level. A lower ground floor level is also proposed, which comprises car parking and retail.
- Due to the general fall in ground levels at the site from east to west, the lower ground floor level is within cut at the eastern side of the site, adjacent to Dundrum Main Street and is at or above existing ground level at the western side of the side, adjacent to the Dundrum Bypass. This will require a temporary retaining wall for the local retention of Dundrum Main Street and of some of the properties between the main street and the site, including an historical masonry boundary wall at the church grounds.
- The existing ground levels close to the proposed location of the retaining wall along the eastern site boundary ranges from 46.5mOD at the northern end rising to 50.8mOD in the south. The proposed top of lower ground floor slab level is 46.0mOD to 47.0mOD. Allowing for the thickness of slabs and build-up of stone fill below these the excavation formation level is expected to be approximately 1m below the proposed top of slab level. Locally deeper excavations for spread foundations (i.e., strips and pads) may also be required. The retained height of temporary walls at the site is expected to range between 3m and 5m, typically increasing in height from north to south along the wall alignment.
- The ground conditions at the site comprise made ground (typically reworked glacial till), old buried topsoil, firm/stiff glacial till (brown boulder clay) over highly weathered/decomposed Granite or slightly weathered/fresh weak to strong Granite. The Granite rock was encountered just below or above the proposed excavation formation level.
- The suitable piling methods will required drilling into rock and are considered to comprise either rotary bored piling or CFA piling used in combination with Odex predrilling of rock sockets, where necessary.
- The wall system may comprise either king post walls or contiguous pile walls. King post walls are likely to be most cost effective but should not be considered where control of ground movements is critical close to sensitive structures. The construction of king post walls requires the infill panels to be constructed tight to the retained ground and also relies on ground to be temporarily self-supporting during the excavation below the panels. Therefore contiguous pile walls will be used where the wall is located close to buildings/boundary walls. This will provide a stiffer wall system and also lowers the risk of settlement due to poor workmanship during excavation.
- Ground movements during the excavation works will be controlled to remain within acceptable limits by use of appropriately selected pile and H-section sizes and also, where necessary, with temporary propping. The closest properties to the proposed retaining wall are located approximately 4.7m at the rear of Glenville Terrace and 8.4m to the rear of the Holly Cross Church. In general for the typical retained height of 3 to 4m and given that the walls are not required to be water retaining structures it is expected that cantilever walls will give acceptable ground movements. The use of propped support and/or stiffer contiguous pile methods will be considered where constructed close to buildings and where retained heights >4m are required.
- The wall design would be carried out in accordance with the most up to date design standards and best practice guidelines.

- The following is a list of the considerations that would need to be addressed by the Designer when developing the temporary wall design:
    - Suitability of ground conditions for the method of piling
    - Ground movements during and post construction and effects on nearby properties.
    - Effect on groundwater regime
    - Vibrations/noise during construction
- These engineering considerations are discussed separately in the report. In summary,
    - Rotary bored piles or CFA piles used in combination with Odex pre-dilling is considered suitable for the expected ground conditions at the site.
    - Ground movements during the excavation works will be controlled to remain within acceptable limits by use of appropriately selected pile systems with temporary propping, if necessary.
    - Monitoring will also be carried out to confirm that the movement comply with the design and will give early warning if contingency measures are required. Where the retaining wall is designed in accordance with the appropriate standards and good practice is observed during construction the risk of damage to neighbouring properties from ground movement is considered to be low.
    - The effect of the proposed works on the temporary groundwater levels is not expected to be significant and will be negligible in the long term condition.
    - The Monitoring of vibrations and noise will be carried out during the works to ensure the design is constructed in accordance with the specification. Bored and CFA piling are low vibration methods. The vibrations from Odex piling are low to moderate and would require greater monitoring to ensure vibrations do not exceed permitted limits at nearby structures.

APPENDIX D

Key Interface Drawings



EXISTING BASEMENT + PROPOSED LOWER GROUND FLOOR
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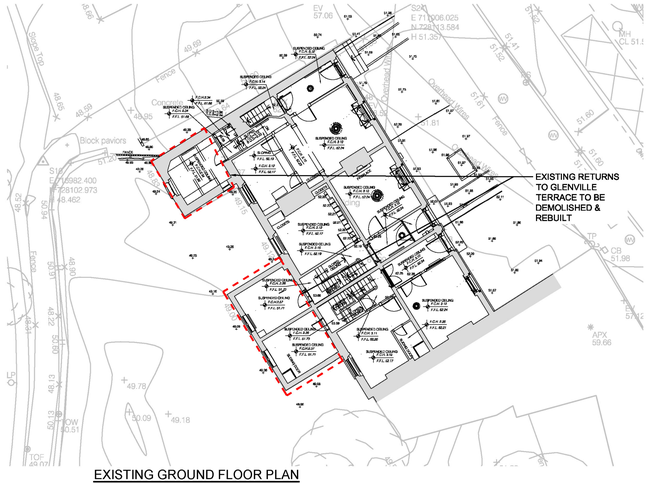

EXISTING GROUND FLOOR PLAN
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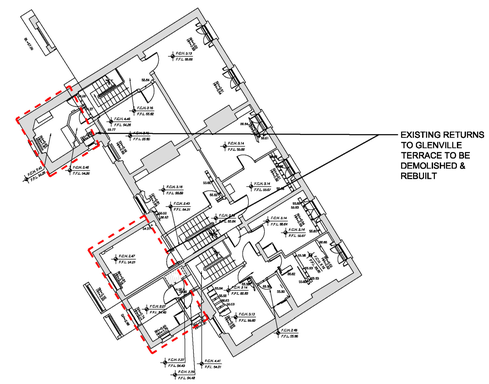

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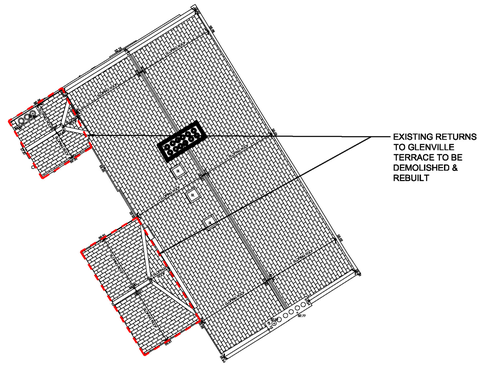

EXISTING ROOF PLAN
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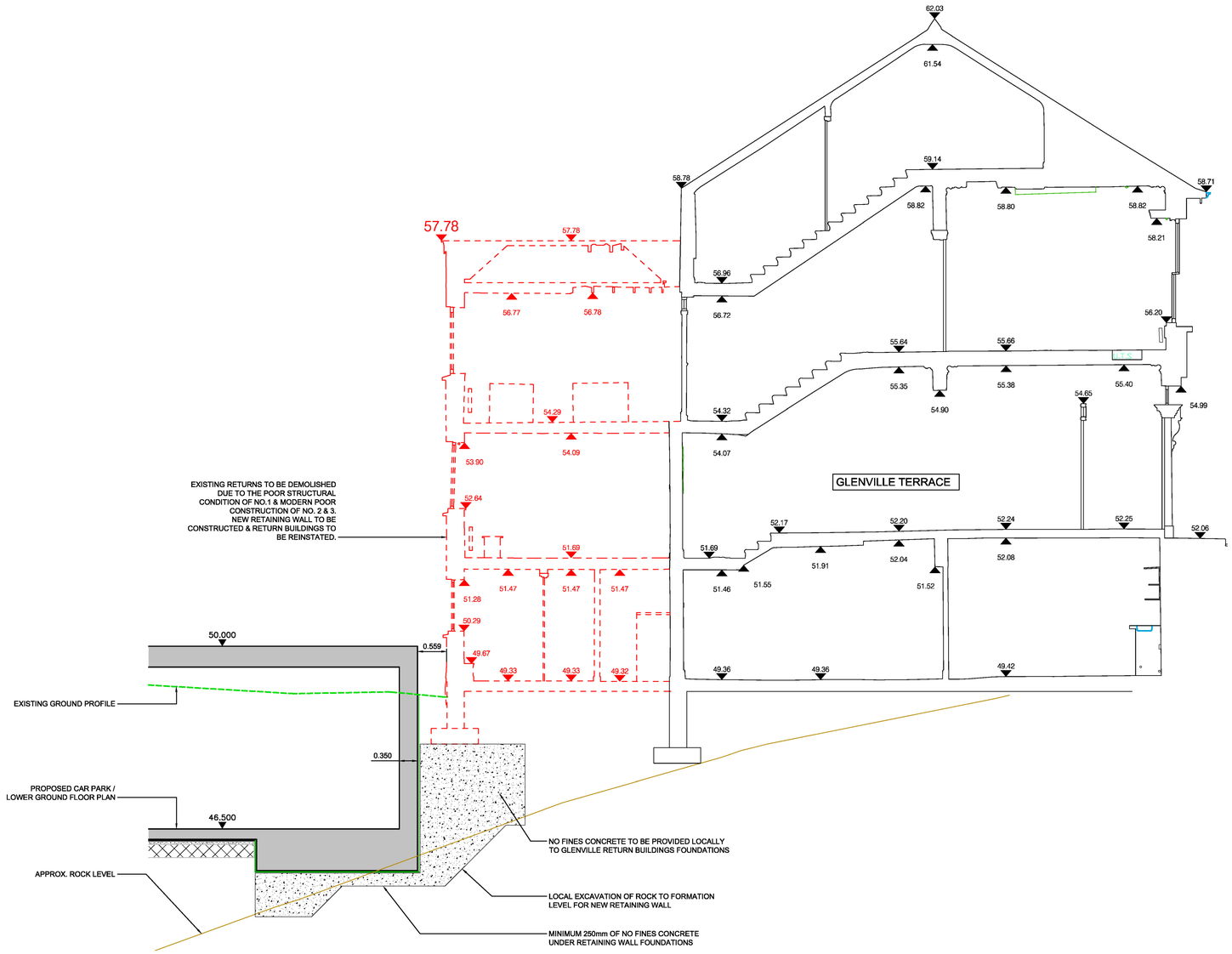

SECTION - GLENVILLE TERRACE
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REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
HH	TG	TG

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PROJECT: Dundrum Village - Strategic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: GLENVILLE TERRACE - LOWER GROUND FLOOR INTERFACE DRAWING

SCALE: 1:200/ 1:50 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031-TJOC-XX-XX-DR-S-0020

REV: C01

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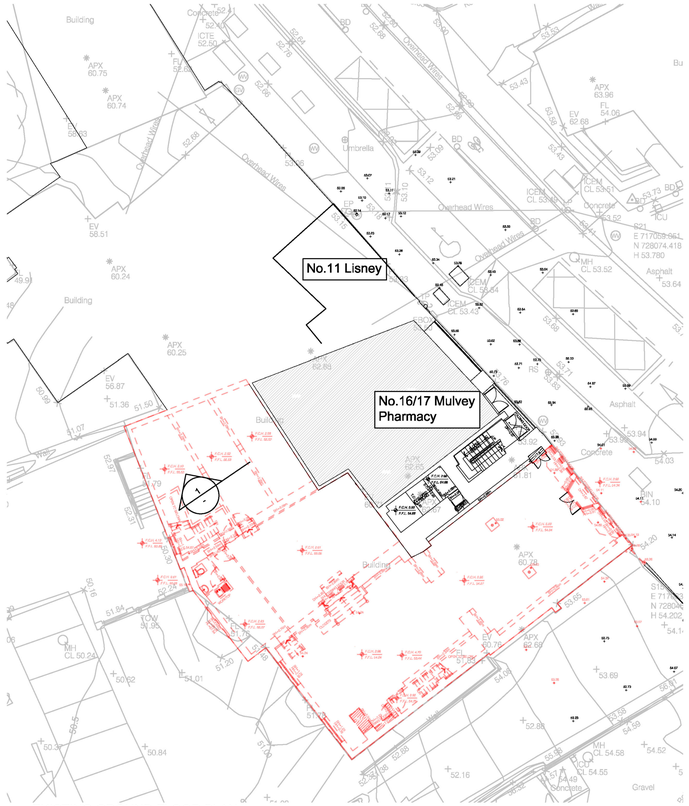

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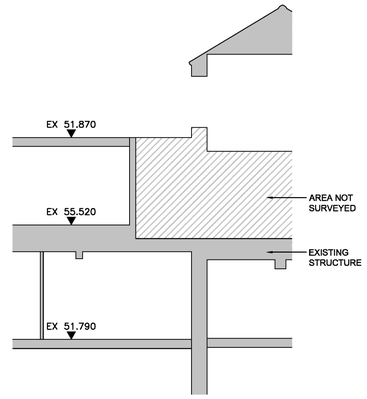

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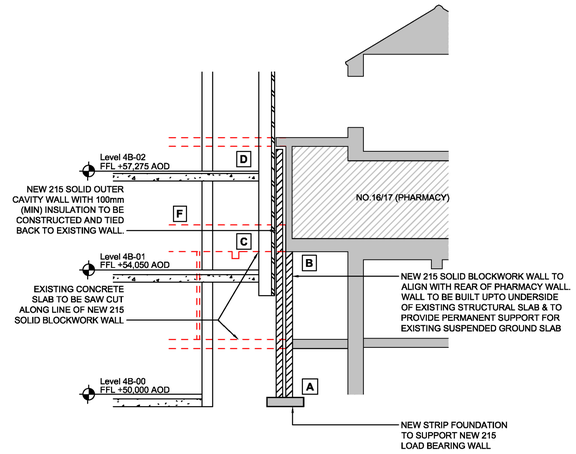


SECTION 1 - PROPOSED
SCALE: 1:100

PRINCIPLES OF DEMOLITION & CONSTRUCTION METHODOLOGY:

SURVEYS:

- FULL CONDITIONS SURVEYS TO BE CARRIED OUT OF BOTH No.11 & No.16 MAIN STREET SUBJECT TO THE OWNERS CONSENT TO ACCESS THE PROPERTIES.
- OPENING UP WORKS TO BE CARRIED OUT IN ADJOINING PROPERTIES TO INVESTIGATE THE STRUCTURAL CONNECTION AND STRUCTURAL RELIANCE BETWEEN THE BUILDINGS.
- DETAILED METHOD STATEMENT TO BE DEVELOPED BY THE MAIN CONTRACTOR FOR CIRCULATION AND AGREEMENT WITH ADJOINING OWNERS.

NO.11 - LISNEYS:

1. SINGLE STOREY FLAT ROOF BUILDING (NO.10) TO THE NORTH AND WEST OF NO.11 TO BE DEMOLISHED USING HANDHELD BREAKERS AND EQUIPMENT.
2. EXISTING FOUNDATIONS TO THE NORTH OF NO.11 TO BE WIDENED IF REQUIRED
3. EXPOSED GROUND FLOOR GABLE WALL OF NO.11 TO BE WEATHERED WITH THE CONSTRUCTION OF A NEW GABLE WALL
4. NEW FLASHING TO BE CONSTRUCTED TO WEATHER NEW GABLE WALL INTO EXISTING WALL AND PITCHED ROOF AS AGREED.

NO.16 - MULVEYS PHARMACY:

A. EXISTING GROUND FLOOR SLAB TO BE REMOVED LOCALLY TO ALLOW NEW STRIP FOUNDATION FOUNDED ON SUITABLE FORMATION TO BE CONSTRUCTED & RISING WALL TO SUPPORT 450 SOLID BLOCK INNER LEAF, INSULATED CAVITY & 215MM RENDERED OUTER LEAF.

B. NEW 215 SOLID BLOCKWORK WALL TO BE BUILT UP TO UNDERSIDE OF EXISTING CONCRETE SLAB AND DRY-PACKED WITH SAND/CEMENT TO PROVIDE BEARING FOR EXISTING SLAB.

C. THE EXISTING CONCRETE GROUND FLOOR SUSPENDED SLAB TO BE SAW CUT THE ALIGN WITH THE REAR OF THE PHARMACY PARTY WALL. CONCRETE SLAB TO BE SUBSEQUENTLY PARTIALLY REMOVED BY DEMOLITION CONSTRUCTION

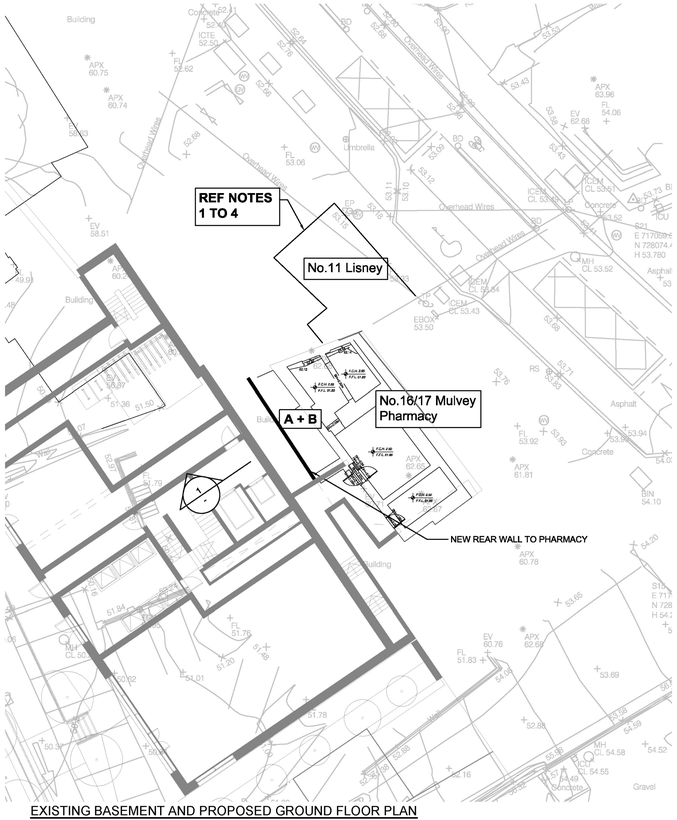
D. NEW 215 OUTER LEAF WITH INSULATED CAVITY TO BE CONSTRUCTED AND RESTRAINED BACK TO INNER WALL UPTO UNDERSIDE OF EXISTING ROOF SLAB. NEW OUTER LEAF TO PROVIDE SUPPORT FOR EXISTING ROOF.

E. THE EXISTING ROOF IS TO BE SAW ALONG THE NEW WALL LOCATION AND NEW FLASHING PROVIDED.

F. THE DEMOLITION OF THE BUILDING CAN PROGRESS UPON COMPLETION OF THE SUPPORT TO THE REMAINING STRUCTURE OF THE PHARMACY BUILDING.

G. FOLLOWING REMOVAL OF THE EXISTING BUILDING TO THE REAR OF THE PHARMACY A SAND/CEMENT RENDER IS TO BE APPLIED TO THE NEW REAR WALL.

DETAILED METHOD STATEMENT TO BE DEVELOPED FOLLOWING LOCAL OPENING UP WORKS + AGREEMENT WITH OWNERS OF NO.11 & 16. THE ABOVE PRINCIPLES ARE SUBJECT TO CHANGE & ADJUSTMENTS.



EXISTING BASEMENT AND PROPOSED GROUND FLOOR PLAN
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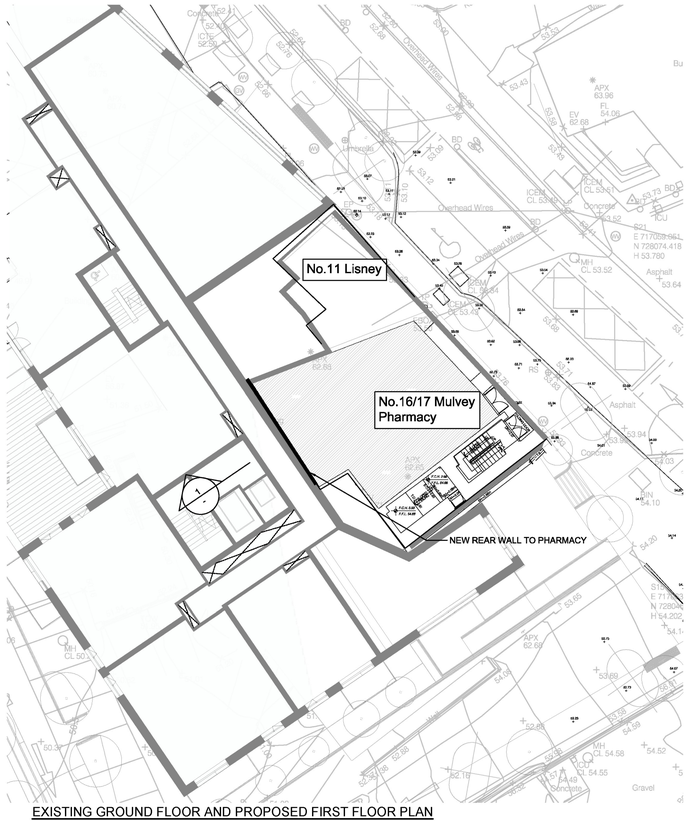

EXISTING GROUND FLOOR AND PROPOSED FIRST FLOOR PLAN
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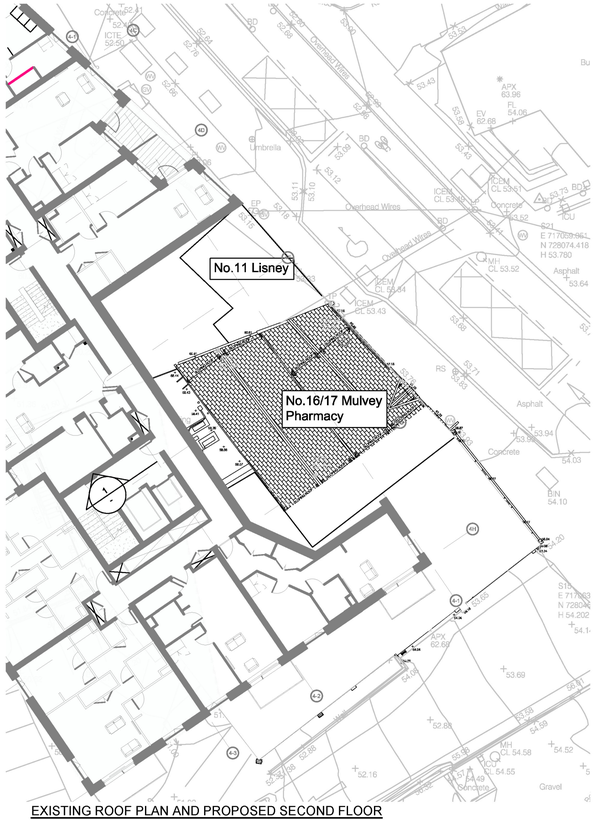

EXISTING ROOF PLAN AND PROPOSED SECOND FLOOR
SCALE: 1:200

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

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HH	TG	TG

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PROJECT: Dundrum Village - Strategic Housing Development

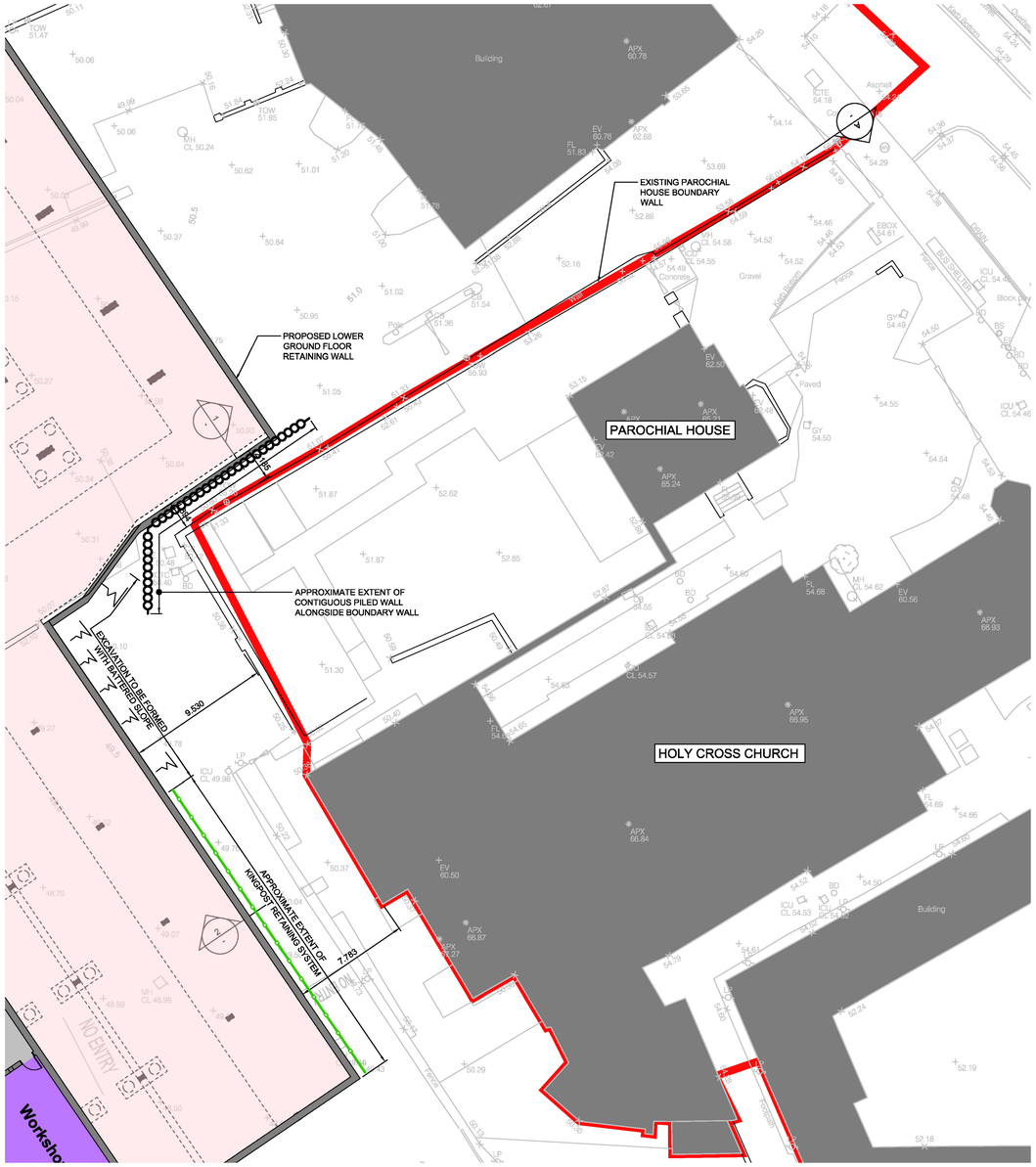
CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: NO.11 (LISNEY) + NO.16/17 (MULVEY PHARMACY) INTERFACE WORKS

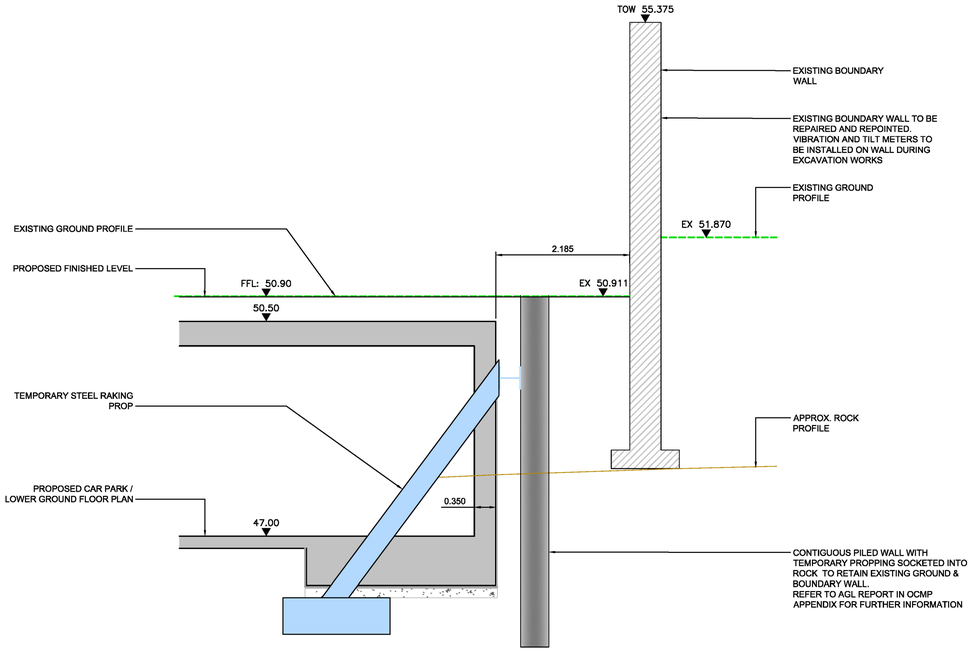
SCALE: 1:200/ 1:50 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031-TJOC-XX-XX-DR-S-0021

REV: C01



PLAN
SCALE: 1:200



SECTION 1
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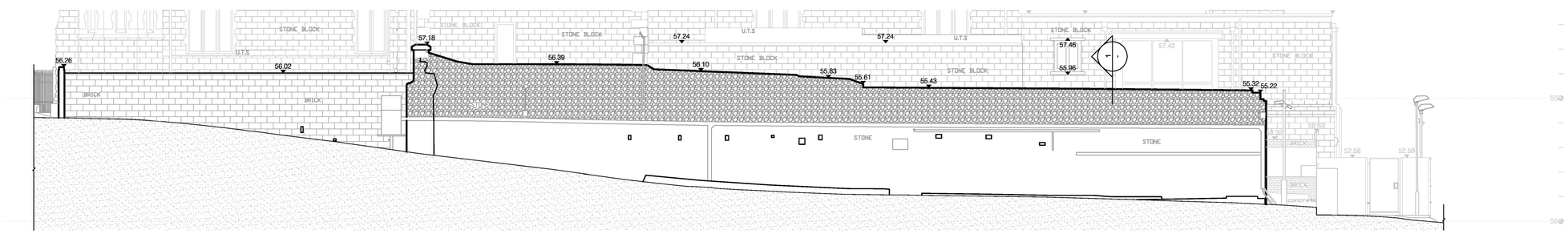
SECTION 2
SCALE: 1:50



EXISTING ELEVATION A - ON BOUNDARY WALL
SCALE: 1:100

REV	STAT	DESCRIPTION	DATE
C01	AP	ISSUED FOR PLANNING	25.03.2022

DRAWING STATUS: ISSUED FOR PLANNING

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HH	TG	TG

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PROJECT: Dundrum Village - Strategic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Church

SCALE: 1:200/ 1:100 (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER: 16031-TJOC-XX-XX-DR-S-0022

REV: C01

APPENDIX E

GLENVILLE TERRACE

Outline Structural Report on Return Buildings

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

Glenville Terrace
Outline Structural Report on Return Buildings

March 2022

TJ O'CONNOR & ASSOCIATES CONSULTING ENGINEERS

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File Name:	16031-TJOC-ZZ-ZZ-RP-S-3706_Glenville

Revision Code	Status Code	Description of Revision	Prepared By	Checked By	Approved By	Date of Issue
C01	AP	Issued For Stage 3 Planning Application	TG	KF	TG	25.03.2022

Disclosure to a Third Party:

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CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

1.1. Description of the Works

As part of the proposed strategic housing developing on the Dundrum Village Centre site, refurbishment and development works are proposed to Glenville Terrace which will form part of the amenity space to support the residential development.

The development works to Glenville Terrace comprise three distinct structural elements:

- The refurbishment and amalgamation of the existing Glenville Terrace dwellings No.1 to 3 into one building;
- Removal of returns of Glenville Terrace and rebuilding of return following construction of Lower Ground Floor
- The conversion of the return buildings of No.2 and 3 into a new lift and staircore;
- The construction of new Lower Ground Floor of the main development directly adjacent the rear of the Glenville Terrace return buildings.

A Series of photographs are included as Appendix A of this Report.

The appraisal of the existing return buildings of Glenville Terrace is outlined in the following sections.

2. EXISTING STRUCTURE

2.1. Glenville Terrace, No.1 to 3

2.1.1. General Description

Glenville Terrace consists of three two-storey, (three storey to rear) two bay houses, beneath a shared and continuous pitched roof, set back from the Main Street. The Terrace contains returns to each of the three terrace houses. The buildings are traditional type construction comprising loadbearing masonry walls, ground and first floors of suspended timber construction, and cut timber pitched roofs finished with slates.

The return of No. 1 is of traditional construction similar to the main terrace. The return buildings to No.2 and 3 are of newer blockwork cavity wall construction, with modern fibre cement roof tiles.

The front wall elevation to the Main Street is red bricked faced, set in Flemish bond. The gable and rear walls are rendered.

It is understood that the Terrace was constructed in the late 19th century. The terrace is not currently a protected structure.

2.1.2. Condition

A Record of the Existing Buildings was prepared by Cathal Crimmins and is included in Appendix 13A – Architectural Heritage of the Environmental Impact Risk Assessment.

The condition of the existing main terrace building is generally found to be in reasonable condition. The Record of the Existing Buildings notes that the return to No.2 and No.3 Glenville is of modern construction and should be demolished.

T.J. O'Connor & Associates have carried out a number of structural reviews and investigations into relation to on going concerns relation to the structural condition of the return to No.1 Glenville terrace. These reviews and investigations are outlined in Section 3.

2.1.3. Proposed Lower Ground Floor Construction

The proposed retaining wall to the Lower Ground floor is located 5.1m from the rear of the main terrace building to No.1 Glenville Terrace and 2.4m from the south gable of No.3. Due to the poor condition of the return to No.1 and the modern construction of the returns to No.2 and No.3 it is proposed to temporarily remove and rebuild the returns of Glenville Terrace following the construction of the retaining wall of the Lower Ground Floor.

3. NO.1 GLENVILLE TERRACE RETURN

3.1. Inspection Findings

Visual inspections and opening up works to investigate the on-going cracking and settlement of the floors in the return of No.1 were carried out previously under the direction of T.J. O'Connor & Associates.

The principle major items of structural concern were the following:

- Structural cracking to rear gable wall of return of up to 7mm in width
- Horizontal bow in rear gable wall
- Structural cracking at intersection between return and main terrace adjacent the window reveals
- Previous poor quality builders work to provide service opes in south wall of return
- Fall of floors towards rear gable
- Internal cracking of liner board and window reveals
- Cracking of ceilings

Figure 3-1: No.1 Glenville Terrace Return, Gable wall cracking

The lower section of the rear gable has been previously rendered with a sand/cement render and local patches of render repair have been carried out, possibly to cover up previous cracking. These local repairs have subsequently cracked as the building has continued to move due to settlement of the foundations.

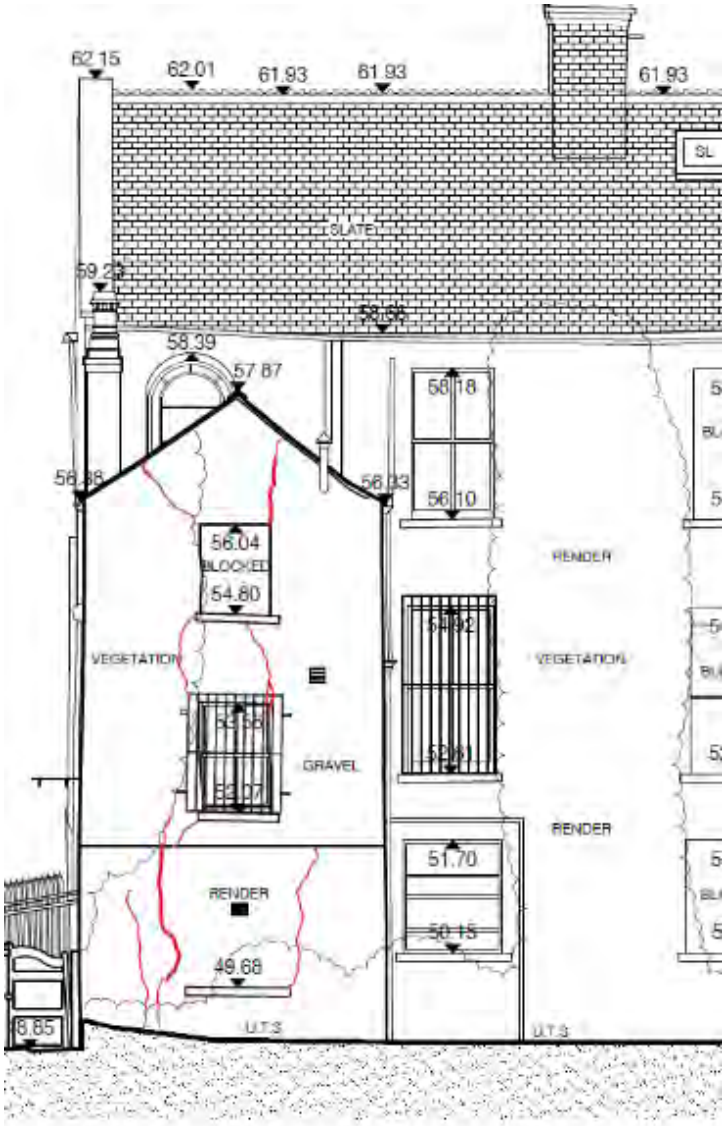

Figure 3-2: No.1 Glenville Return, Schematic of Gable wall cracking

A book of photos taken of structural defects recorded of the return to No.1 Glenville Terrace are located in Appendix A.

3.2. Foundation Investigations

Trial pits was carried out directly adjacent the gable wall of the return of No.1 in May 2010, to investigate the formation level of the foundations to the return building and the cause of movement of the return away from the main terrace.

This trial pit identified that previous underpinning works had been carried out to the foundations, however the underpinning works were local to the rear gable wall of the return and had not been successful due to the capacity of the underlying clay to support the foundation load and the localised nature of the underpinning. The return building therefore has continued to settle and pull away from the main terrace.

Figure 3-3: Photos of Trial pits at gable wall of return to No.1 Glenville Terrace

3.3. Internal Inspection

As the return has continued to settle the structural connection of the return to the rear wall of the main terrace was investigated. Local removal of the liner board to the Internal wall was carried out at the 1st floor at the head of the window.

This local opening up works identified that lateral movement has occurred at the point of support of the lintel bearing onto the main wall. The cracking in the external render would indicate that the window openings on the south wall of the return are acting as the weak point of the wall and movement of the return is from this point.

Figure 3-4: Photos of Internal Investigation

Figure 3-5: Weak point on RHS of Window Reveals

Additionally, the gable wall of the return would appear to have a horizontal bow and that the main north gable of the terrace is providing some restraint to the northwest corner and therefore the return gable is splitting and bowing outwards.

4. NO.2 & 3 GLENVILLE TERRACE RETURN

The return buildings to No.2 and 3 are of newer blockwork cavity wall construction, with modern fibre cement roof tile.

The proposal for these returns is the removal of the existing floors and convert this return into the main stairs and lift core to serve the refurbished terrace building.

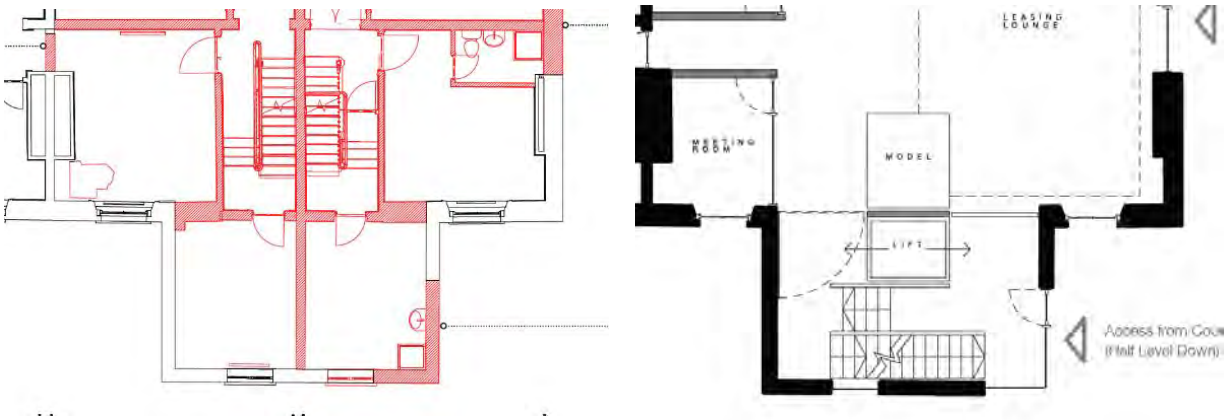

Figure 4-1: Proposed Demolition & Proposed Plan for No.2 & No.3

5. CONCLUSION

The report provides a summary of inspections carried out in relation to the structural condition of the return of No.1 Glenville Terrace.

As the structure of No.1 has been significantly compromised as a result of the poor formation for the foundations to the return, the unsuccessful underpinning and continued movement of the return, it is considered that the construction of the Lower Ground Floor of the Dundrum Village residential develop would allow new foundations to be constructed and the return to No.1 Glenville to be reinstated to rectify the previous structural deficiencies and subsequent defects.

It is considered in the context of the return to No.2 and No.3 Glenville Terrace that as this structure is of a modern construction and that significant alternations are required that this return would be removed and rebuilt.

APPENDIX A

Book of Photos





















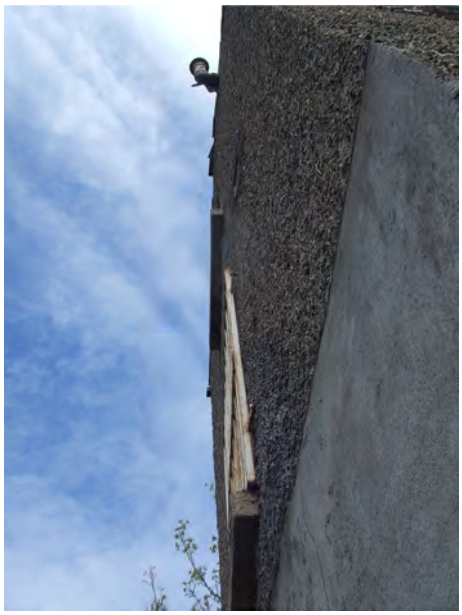

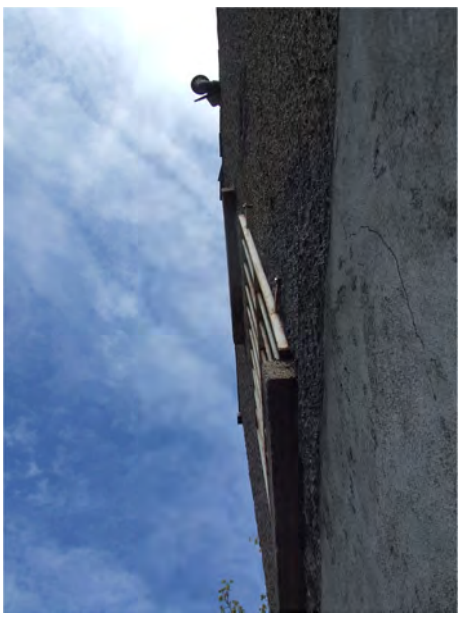









APPENDIX F

Construction Traffic Management Plan - Measures

CTMP MEASURES

Date	18 March 2022
Job No/ Name	Dundrum Village Strategic Housing Development
Subject	CTMP Measures

Introduction

This note is intended to list the measures that will be included in the CTMP that will be prepared in advance to support the construction phase of the development.

Purpose of CTMP

The purpose of the Construction Traffic Management Plan (CTMP) will be to ensure traffic management practices and necessary arrangements are in place throughout the construction period, to safeguard highway impact and the amenity of the area surrounding the site. The content of the final CTMP will be subject to the approval of Dún Laoghaire-Rathdown County Council (DLRCC).

Measures to be Included in the CTMP

The following measures will be included in the CTMP:

Construction Manager - There will be a designated Site Manager to deal with any complaints and enquiries from the general public and any other interested parties. Any changes to the designated Site Manager will be notified to DLRCC. The details of the Site Manager (including a 24-hour phone number) will be provided to DLRCC prior to commencing on-site. The Site Manager's details will also be advertised at the site entrance.

Sub-contractors - Individual subcontractors involved in activities such as waste removal will be required to incorporate the relevant requirements from the CTMP into their activities as well as statutory requirements. Any potential sub-contractors will be required to show how they will comply with the CTMP and how targets will be achieved and impacts minimised.

Dust and Dirt Control - The control of dust and dirt is a prime concern for all construction projects, particularly during periods of dry and windy weather. Best practice guidance 'Dust and Air Mitigation Measures' guidance provided by the Institute for Air Quality Management will be utilised to control dust.

A wheel cleaning procedure will be used in order to mitigate the amount of mud that could potentially be deposited on the surrounding road network by vehicles exiting the site. A power washer will be used as necessary to wash off any mud from the vehicles wheels, with excess mud/slurry being collected and disposed of.

Pedestrian Safety Measures - Pedestrian safety throughout the construction programme will be paramount. To ensure pedestrian safety during loading and unloading activity, a traffic marshal will be present at site entrances and exits to minimise the likelihood of conflict with pedestrians. Warning signage will be provided locally to the site to ensure that vehicles, pedestrian and cyclists are aware that construction activity is taking place.

Site Induction - An induction specific to the development site will be provided to all personnel before construction commences. This will incorporate health and safety; on-site construction works and issues and sensitivities in the context of the surrounding community particularly in relation to local schools and existing users of Main Street, Dundrum Bypass and the Dundrum Town Centre development.

Construction Travel Plan - The contractor will be asked as part of the contract to introduce a Travel Plan for its staff to limit the number of private car trips to the site.

The construction site will provide facilities to encourage sustainable travel such as drying areas, storage facilities and secure bike parking. Where staff are required to travel to site by car, they will be encouraged to do so outside the peak traffic hours.

Control of Deliveries - On a weekly basis, the Construction Manager will evaluate details of the daily profile of deliveries proposed for the upcoming week. Hauliers will be required to contact the site and indicate their delivery schedule for the following day. The proposed deliveries will be checked against the weekly delivery schedule. This will be overseen by the Site Manager to ensure that HGV deliveries are scheduled, ensuring that there is always space at the site to accommodate the necessary plant and deliveries.

Delivery and Servicing for the Site - All vehicles will be met by a banksman before being directed into a dedicated unloading area. All users associated with the site will be made aware of construction deliveries and appropriate safety measures will be put in place to ensure safety of staff and pedestrians. The Construction Manager will stagger the deliveries to minimise the impact on and off the site. A banksman will meet all deliveries on site prior to vehicles undertaking any manoeuvres**.**

Construction Vehicle Routes – Designated construction routes will be agreed with DLRCC and included in the final CTMP. This will seek to limit the impact of construction vehicles on unsuitable road links.

Route Compliance - Use of the agreed vehicle routes will need to be followed by the main contractor and will be communicated to all individuals associated with the works. It is envisaged that this information will be communicated in the form of a leaflet or email and will include information with regard to times of operation, delivery routes, the call up procedure and delivery slot information. Any sub-contractor agreements will need to include adherence to the CTMP including the arrangements for vehicle routing and site access.

Recycling and Reuse – A policy will be employed on site to maximise the recycling and re-use of materials so that the amount of waste coming off site is minimised.

Distribution	Design Team
Name/ Signed	Systra 18th March 2022