BARRETT MAHONY
CIVIL & STRUCTURAL
CONSULTING ENGINEERS

Construction and Environmental Management Plan

Project: 20.170

Dundrum Central Development

DOCUMENT CONTROL

Project: Dundrum Central

Project No: 20.170

Document Title: Construction and Environmental Management Plan

Document No: 20.170 - CEMP – L01

DOCUMENT STATUS

Issue	Date	Description	Orig.	PE	Issue Check
PL2	05.06.24	Update	MS	MS	JPC
PL3	13.06.24	Update	MS	MS	JPC
PL4	02.08.24	Update	MS	MS	JPC
PL5	02.09.24	Update	MS	MS	JPC
PL6	18.09.24	Final	MS	MS	JPC

Prepared by:

BMCE
52-54 Lower Sandwith Street
Dublin 2
D02WR26

Prepared for:

Land Development Agency and DLRCC

CONTENTS

APPENDIX 1 – EXTRACTS FROM THE GEOTECHNICAL SITE INVESTIGATION REPORT

APPENDIX 2 – EARTHWORKS DRAWINGS

1. INTRODUCTION

1.1 PROJECT DESCRIPTION

A Part 10 Planning Application to An Bord Pleanála will be made for a development on lands at the former Central Mental Hospital, Dundrum Road, Dundrum, Dublin 14, a site of circa.9.7 ha. Tom Phillips + Associates, Town Planning Consultants, is instructed by Dún Laoghaire Rathdown County Council (referred to from hereon as the 'Applicant'), in partnership with The Land Development Agency (LDA), to submit this Part 10 Application to An Bord Pleanála. This application, taken on jointly by the LDA & DLRCC, forms part of DLRCC's goals under their 2022-2028 Development Plan.

Barrett Mahony Consulting Engineers (BMCE) are the civil and structural design engineers for the project and have been commissioned to prepare a Construction and Environmental Management Plan as part of planning application package.

Figure 1.1 – Site Location (note: the red line boundary shown here is approximate only)

Project Description:

The development will consist of the construction of a residential scheme of 934 no. dwellings on an overall site of c. 9.7 ha.

The development will consist of the demolition of existing structures associated with the existing use (3,677 sq m), including:

- Single storey former swimming pool / sports hall and admissions unit (2,750 sq m);
- Two storey redbrick building (305 sq m);
- Single storey ancillary and temporary structures including portacabins (618sq m);

- Removal of existing internal sub-divisions/ fencing, including removal of security fence at Dundrum Road entrance;
- Demolition of section of porch and glazed screens at Gate Lodge building (4 sq m);
- Removal of walls adjacent to Main Hospital Building;
- Alterations and removal of section of wall to Walled Garden.

The development will also consist of alterations and partial demolition of the perimeter wall, including:

- Alterations and removal of section of perimeter wall adjacent to Rosemount Green (south);
- Formation of a new opening in perimeter wall at Annaville Grove to provide a pedestrian and cyclist access;
- Alterations and removal of sections of wall adjacent to Dundrum Road (including removal of existing gates and entrance canopy), including reduction in height of section, widening of existing vehicular access, and provision of a new vehicle, cyclist and pedestrian access;
- Alterations and removal of section of perimeter wall adjacent to Mulvey Park to provide a pedestrian and cyclist access.

The development with a total gross floor area of c. 94,058 sq m (c. 93,980 sq m excluding retained existing buildings), will consist of 934 no. residential units comprising:

- 926 no. apartments (consisting of 342 no. one bedroom units; 98 no. two bedroom (3 person) units; 352 no. two bedroom (4 person) units; and 134 no. three bedroom units) arranged in 9 blocks (Blocks 02-10) ranging between 2 and 8 storeys in height (with a lower ground floor to Blocks 02 and Block 10 and Basements in Blocks 03 and 04), together with private balconies and private terraces and communal amenity open space provision (including courtyards) and ancillary residential facilities, including an 130 sq m internal residential amenity area at the Ground Floor Level of Block 3;
- 6 no. three bedroom duplex apartments located at Block 02, together with private balconies and terraces.
- 2 no. 5 bedroom assisted living units and private rear gardens located at Block 02.

The development will also consist of 4,380 sq m of non-residential uses, comprising:

- Change of use and renovation of existing single storey Gate Lodge building (former reception/staff area) to provide a café unit (78 sq m);
- 1 no. restaurant unit (266 sq m) located at ground floor level at Block 03;
- 3 no. retail units (1,160 sq m) located at ground floor level at Blocks 03 and 07;
- 1 no. medical unit (288 sq m) located at ground floor level at Block 02;
- A new childcare facility (716 sq m) and associated outdoor play area located at lower ground and ground floor level at Block 10;
- A management suite (123 sq m) located at ground floor level at Block 10; and
- A new community centre facility, including a multi-purpose hall, changing rooms, meeting rooms, storage and associated facilities (1,749 sq m) located at ground and first floor level at Block 06.

Vehicular access to the site will be from a new signalised access off Dundrum Road to the south of the existing access and the existing access of Dundrum Road will be retained for emergency vehicle, pedestrian and cyclist access only. The development will also consist of the provision of public open space and related play areas; hard and soft landscaping including internal roads, cycle and pedestrian routes, active travel routes for cyclists and pedestrians, pathways and boundary treatments, street furniture, wetland features, part-basement, car parking (524 no. spaces in total, including car sharing and accessible spaces); motorcycle parking; electric vehicle charging points; bicycle parking (long and short stay spaces including stands); ESB substations, piped infrastructural services and connections (including connection into existing surface water sewer in St. Columbanus Road); ducting; plant (including external plant for Air Source Heat Pumps and associated internal heating plantrooms); waste management provision; SuDS measures (including green roofs, blue

roofs, bio-retention areas); attenuation tanks; sustainability measures (including solar panels); signage; public lighting; any making good works to perimeter wall and all site development and excavation works above and below ground.

Please note that the subject site is in the immediate setting and curtilage of a number of protected structures, namely the 'Asylum' (RPS No. 2072), the 'Catholic Chapel' (RPS No. 2071) and the 'Hospital Building' (RPS No. 2073).

Construction of the development involves the following principal elements:

- Demolition of the existing buildings, excluding structures to be retained.
- Removal of sections of the perimeter wall.
- Site strip. Earthworks associated with the construction of the buildings and roads in the development.
- Construction of new buildings – apartments, the community facility and ancillary buildings.
- Construction of roads, footpaths and hard/soft landscaping.
- Buried site services installation. New foul pumping stations. Connection to public services.
- Works to the Dundrum Road along the site boundary, including modifying the existing site entrance and construction a new road entrance.

1.2 Purpose of the Report

This report has been prepared as part of the Part 10 Application for the Dundrum Central development. The purpose of this report is to ensure that best construction management practices are applied to the site by the main contractor and that measures are in place during construction to reduce as much as possible the impact of the works on people, property and the environment. The contractor will be asked to develop this report further in line with their detailed requirements.

The Engineering, Architectural and other drawings submitted with the planning application will be read in conjunction with this report. Other documents submitted with the planning application will also be read, in particular the EIAR, AA Screening Report, Natura Impact Statement, the Resource Waste Management Plan and the Construction Traffic Section of the Traffic and Transport Assessment Report and the Site Specific Flood Risk Assessment.

1.3 Previously Granted SHD

An SHD Planning Application was lodged with An Bord Pleanála in 2022. This application was for 977 no. units and ancillary facilities. Planning was granted by the Bord, ABP reference ABP-313176-22, subject to a number of conditions.

The overall site layout and layout of the residential blocks for the new Part 10 application is very similar to the layout submitted as part of the SHD. Ground floor levels are generally unchanged.

The buried foul drainage, surface water drainage and watermain layout are similar to those proposed for the SHD scheme. The SuDS layout is also very similar to that prepared for the SHD application.

Fig 1.2 Site layout plan

1.4 KEY INTERFACES

1.4.1 Existing Structures

The subject site is the location of the former Central Mental Hospital and now owned by the OPW. There are several hospital and ancillary buildings on the site. Three buildings, which are not within the Part 10 application area, are Protected Structures. See section 5.2 for images of the Protected Structures. The site also has a large green field area previously used for recreational use by the HSE.

1.4.2 Perimeter Wall

The perimeter stone wall, 1660mtres long, is between 4 and 5 metres in height and runs around the entire perimeter of the site. The only current opening in the wall is for vehicular and pedestrian traffic at the main entrance on the Dundrum Road at the northwest of the site (see Section 8.6 of this report for an image of the main gate), and two small openings with steel bar gratings in the wall along the eastern boundary which connect to the drainage ditch just outside the east boundary of the site. Refer to Photos 1.2 and 1.3 below. There is a locked steel door adjacent to the north-east grated wall opening.

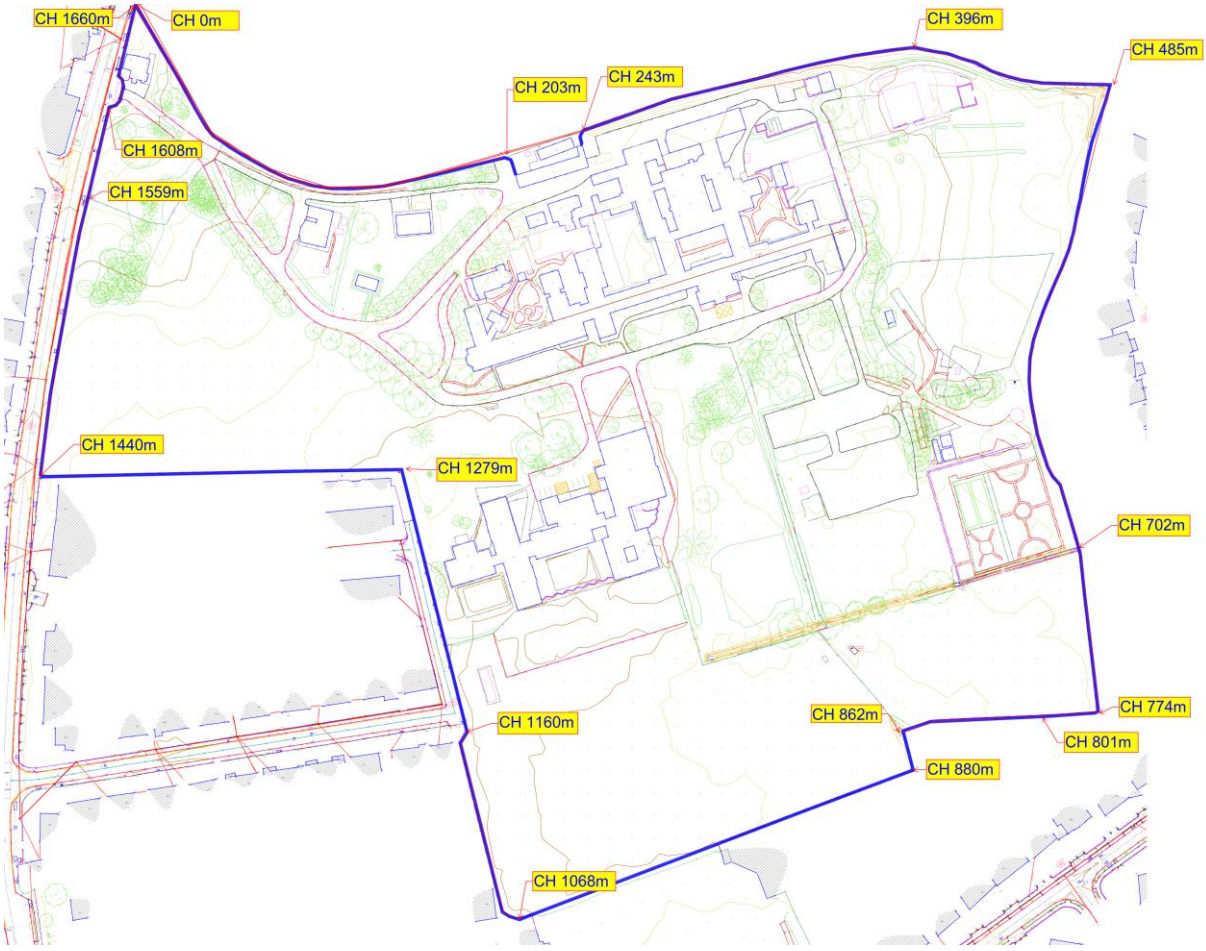


Figure 1.3: Perimeter wall plan showing chainages in metres along the wall measured from the northwest corner

1.4.3 Surrounding Residential Areas

The site is located in the residential areas of Dundrum and Clonskeagh. The site abuts the rear gardens of private residential properties on nearly all sides, with the exception of Rosemount Green football pitches to the south, and Annaville Grove (road) and Dundrum Road, both to the east. Both Annaville Grove and Dundrum Road contain residential properties on the opposite side of the road from the subject site. A number of small commercial units are located opposite the main entrance on the Dundrum Road. A summary of the adjacent areas are as follows:

- Northside: The perimeter wall of the site backs onto the rear gardens of residential houses on Mulvey Park. There is a strip of land directly behind the wall in the registered ownership of DLRCC but this appears to have been largely subsumed by the gardens.
- Westside: The perimeter wall runs along the Dundrum Road footpath edge. The existing hospital entrance is at the north end. The site also backs onto Annaville housing estate. This is an estate of residential houses and apartments in close proximity to the perimeter wall. Annaville Grove roadway runs directly alongside the wall along part of the boundary here.
- Southside: The perimeter wall backs onto Rosemount Green football pitches and onto the rear gardens of residential houses on Larchfield Road.
- Eastside: The perimeter wall backs onto the rear gardens of residential houses on Friarsland Road. There is a drainage ditch alongside the wall which is in separate ownership from the house properties.

Photo 1.1 Perimeter wall viewed from the Dundrum Road

1.4.4 Drainage Ditch Running Across the Site.

There is an open channel drainage ditch located on the site running from west to east. This channel originates in the centre of the site at a discharge point from site land drainage. A buried SW sewer enters the site from Rosemount Green and also connects to the channel. The channel exits the site along the eastern boundary through a grated opening in the wall (Photo 1.3 below) and runs north alongside the boundary wall at the back of residential properties on Friarsland Road. In the north-east of the site there is a second short open channel drain which exits through an opening (Photo 1.2 below) and joins the main open channel drain. More information can be found in the Infrastructure Report and civil engineering drawings accompanying this application.

Figure 1.4 Aerial view showing the surface Water drain on the site

Photos 1.2 and 1.3: Grated Drainage Openings Along the Eastern Boundary

2. SITE TOPOGRAPHY

A detailed topographical survey of the existing site has been prepared. There is considerable variation in ground levels across the site. In broad terms the main part of the site slopes down gradually from the southwest corner towards the northeast corner, from +45.21m OD down to +39.76m OD. The western portion of the site slopes down towards the Dundrum Road entrance at +38.44m OD. These low points are the furthest locations from the high topography in the south corner at a distance of 410m and 430m away respectively. Figure 2.1 shows typical spot levels across the site. Refer to the topographical survey plan for further information,

In the proposed new development, the site levels typically follow the existing site topography.

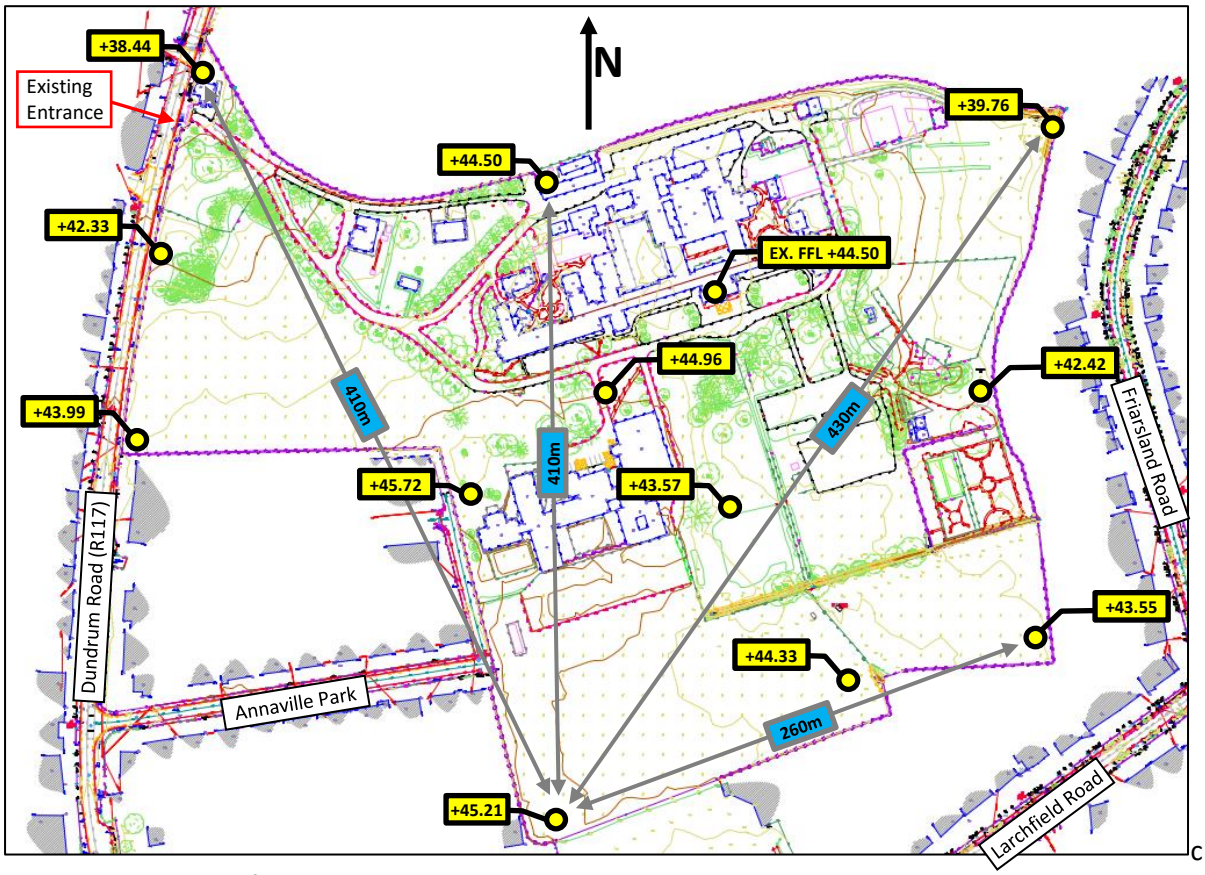


Fig 2.2. Summary of the Existing Site Topography Superimposed on the Topographical Survey Drawing. (Ordnance Datum Levels).

3. SITE HISTORY

The site has been the location of the Central Mental Hospital since the 1840's. Prior to this it was farmland, based on the Ordnance Survey (OSI) Maps from 1837-1842 (See Figure 3.1). Construction of the main hospital building commenced in 1847 and was completed in 1851. The building is 3 storeys high over a part-basement and was constructed with limestone and granite walls with a slate roof. The smaller infirmary building was constructed at the same time as the main hospital, while the chapel is also of similar construction and was built in 1901. Further additions to the site were made throughout the 20th century, including a large HSE facility to the south of the main building which was built in the late 1980's/early 1990's.

The 4 to 5m high perimeter wall is a dominating feature of the site. This was constructed in stages in the 19th and early 20th centuries in rough granite and limestone or later in mass concrete.

The original foul and surface water drainage on the site was drained to a sewage tank in the north east corner of the site (ref Figure 3.2). In the early 20th century, the onsite drainage was diverted to the north west corner of the site and was discharged into the new public combined sewer under the Dundrum Road. All subsequent drainage installed on site also drains into this public sewer. The sewer connection is located adjacent to the main entrance to the site.

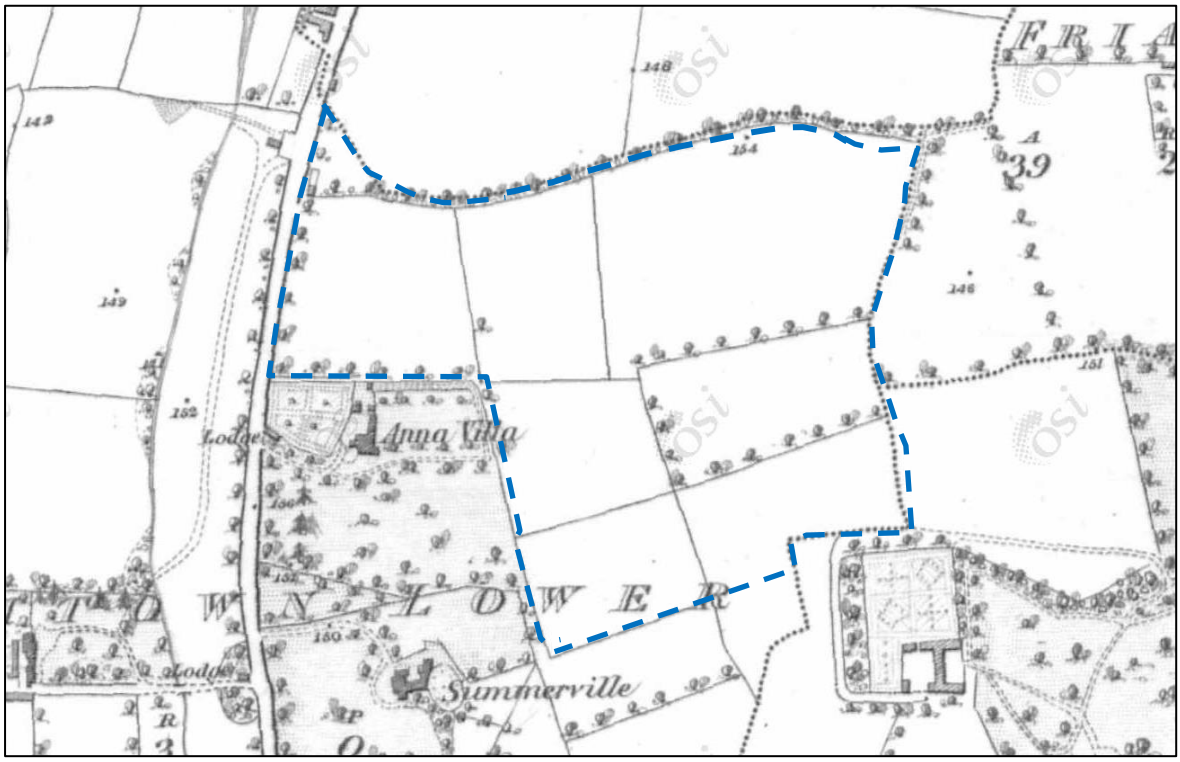


Fig 3.1 Location of the Proposed Development Delineated in Red on the OSI Historic Maps (1837-1842). Approx. line of perimeter wall shown in blue.

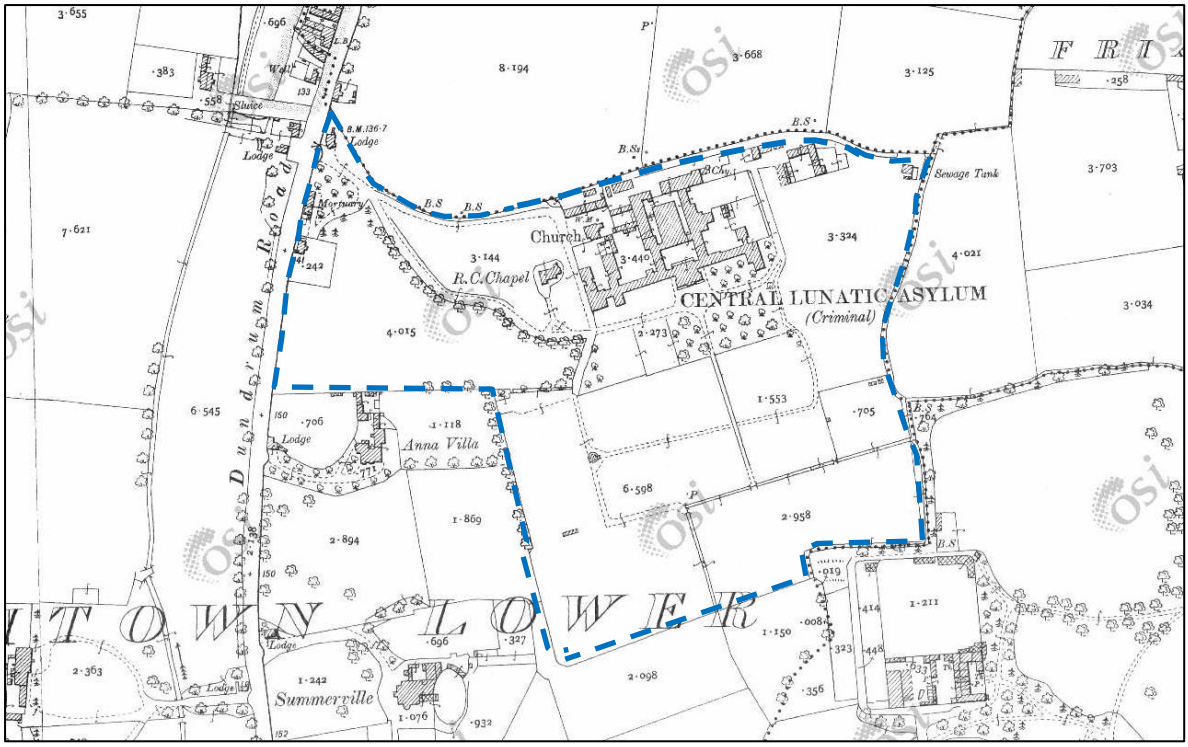


Fig 3.2 Location of the Proposed Development Delineated in Red on the OSI Historic Maps (1888-1913). Approx. line of perimeter wall shown in blue.

4. GROUND CONDITIONS

A detailed geotechnical and contamination site investigation has been carried out by Site Investigations Ltd in 2021 under the direction of BMCE. The investigation included extensive boreholes, trial pits and laboratory testing of samples for contamination. An extract from their report is contained in Appendix 1. Ground conditions on site have not changed since 2021 so the report remains current.

The bulk earthworks are associated with the site strip and the basement and half-basement excavations. The estimated earthworks quantities are set out in Section 6 of this report.

4.1 GROUND CONDITIONS:

The typical sequence of stratigraphy is given below.

1. Topsoil or gravel/bitmac/concrete roads and footpaths.
2. Made Ground: Encountered in most trial pit/borehole locations across the site, typically 1.0m deep approx.. but extending to 2.0m deep approx. below ground level, in one of the trial pits.
3. Boulder Clay: This underlies the made ground across the site. In places 1-2metres approx. of soft to firm clay overlies the stiffer boulder clays. Very stiff black boulder clay was encountered at depths of 3-4m typically below ground level (bgl).
4. Rock: Rock was not proven in any of the boreholes and was not encountered in any trial pit. The boreholes were terminated on boulder obstructions at depth of 4.5 to 9.0 m below ground level. Based on this information it is not anticipated that there will be rock removal required for the proposed single storey basement and half-basements in the development, or for building foundations, for service trenches or for any other construction works.

4.2 ENVIRONMENTAL TESTING

Samples of soil at various willow depths were taken across the site. Tests for various contaminants were carried out on the samples and the results are presented in the Waste Classification Report in Appendix 8 of the Site Investigation Report. Of the 70 no. samples tested, 36 no. were within the Inert waste threshold, 23 no. were outside the Inert threshold but within the Non-Hazardous threshold and 11 no. were outside of the test limits for Non-Hazardous materials. In the 11 no. cases, the samples were taken at a willow level between 0.2 and 0.4m bgl and all failed in the test for Total Organic Carbon Content only. This likely indicates the presence of wood in the samples.

4.3 CONSTRUCTION CONSIDERATIONS:

- Earthworks: Excavated material will be disposed off-site to a licensed waste disposal facility. The material will be classified for the purposes of disposal. An Environmental Engineer will be appointed prior to commencing earthworks on site.

- Excavations:
  Excavations in the Made Ground and boulder clay will be possible with typical plant and digging equipment.

- Open Cut Excavations

In areas where there is sufficient space and the excavation is one storey deep or less, a battered excavation can be provided. A batter of 1V:1H is recommended in the Made Ground, and 2V:1H in the boulder clay in the short term. The slopes will be protected with plastic sheeting against rainwater ingress and they will be inspected daily, and any signs of instability remediated.

- Foundations:
  Based on the bore holes results to date, it is proposed that the new buildings will be supported on spread foundations – pads & strips.

- Groundwater: Groundwater was recorded in 13 no. boreholes and 12 no. trial pits during the site investigation. This is likely to be groundwater perched on top of the impermeable clays. Groundwater ingress near the surface through granular made ground into excavations could be fast. Groundwater ingress through clays will be slow unless gravel lenses are present. If groundwater is encountered during excavations then it will need to be controlled by pumping it out from a pump sump or sumps. The disposal of pumped water will comply with the requirements set out in Section 9.9 of this report.

- Rainwater: Given the impervious nature of the clay sub-soils, basement/half-basement and other excavations will collect rainwater. This will be controlled by drainage to pump sumps within the excavation. Disposal requirements as above.

Photo 4.1 Typical Trial Pit Spoil heap (taken from the SI report).

5. DEMOLITIONS

5.1 INTRODUCTION

The demolition of a number of buildings are required as part of the proposed development. Fig 5.1 shows the main buildings to be demolished highlighted in orange and the buildings to be retained in blue. Photos of the buildings follow.

Fig 5.1 Aerial View showing the buildings to be demolished on site

While the exact demolition sequence and duration has not yet been determined, it will follow the sequence of works set out below during the demolition phase:

- Asbestos surveys.
- Buried Services Survey: A GPR survey of existing buried services has been carried out on site and will be consulted prior to any demolitions on site.
- Hazardous material will be removed in accordance with relevant waste disposal guidelines (see the Construction and Demolition Resource Waste Management Plan for more information)
- Soft strip of existing fixtures and fittings.
- The main structure will be demolished in a safe manner and in accordance with environmental considerations and monitoring requirements contained in Sections 9 and 10 of this report and in the EIAR which accompanies this planning application.

NOTE: The demolition contractor is required by law to appoint a competent person, experienced or trained for the operations they are involved in, to supervise and control of work on site.

Further to the above, all demolition works will be in accordance with the following guidelines:

- BS 6187:2000 'Code of practice for demolition'
- Health and Safety Executive Guidance Notes GS 29 / 1, 2, 3 and 4.
- S.I. 504 Safety, Health and Welfare at Work (Construction) regulations 2013
- Air Pollution Act 1987
- Environmental Protection Agency Act 1992
- BS 5228:2009 Part 1 'Noise Control on Construction and Open Sites'.

For additional information, please refer to the Construction and Demolition Waste Management Plan and also to the Architect's demolition drawings submitted as part of the planning application.

5.2 PROTECTED STRUCTURES

There are a number of Protected Structures on site. The structures are located outside the Part 10 application area. As they are in close proximity to the proposed development site, the main contractor must ensure the buildings are adequately protected and monitored during the construction process. See Section 10 of this report for more details.

Image P01 – Hospital Infirmary Building (Source: National Inventory of Architectural Heritage)

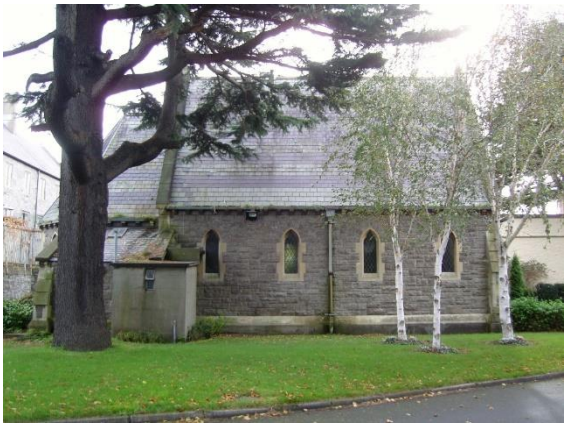


Image P02 – Chapel/Church Building (Source: National Inventory of Architectural Heritage)

Image P03 – Main Hospital Building (Source: National Inventory of Architectural Heritage)

Image P04 – Main Hospital Building (Source: National Inventory of Architectural Heritage)

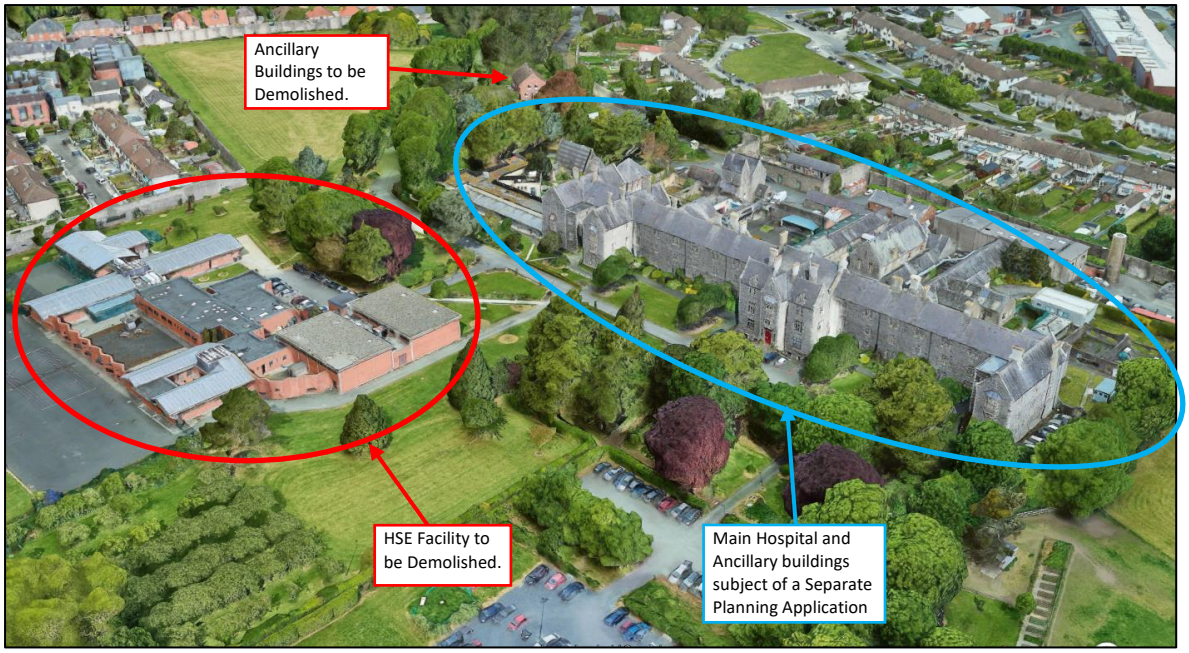


Fig 5.2. Indicative Aerial View of the Buildings to be Demolished highlighted in red.

6. OUTLINE CONSTRUCTION PROGRAMME AND PHASING

6.1 CONSTRUCTION PROGRAMME AND PHASING

The phasing of the site will be subject to market conditions and commercial considerations at the time of construction. It is currently envisaged that the project will be constructed and handed over in two phased building clusters as shown in Figure 6.1 below. Please note the following;

- Phase 1 includes the roads and primary infrastructure/services for the full scheme including works to the new Dundrum Road junction.
- Block commencements and completions within each phase will be based on a programme to be agreed with the contractor.
- Construction of the phases is expected to overlap and run concurrently.
- Subject to a final planning grant, the expected start date is currently envisaged to be mid-2025 with an envisaged 5 to 6 year construction period.
- Completion of the first residential units is anticipated in mid-2027.

Note: These dates are only an estimate, the exact start date and completions will be subject to the grant of planning, any legal challenges, market conditions and currently unforeseen issues that might arise.

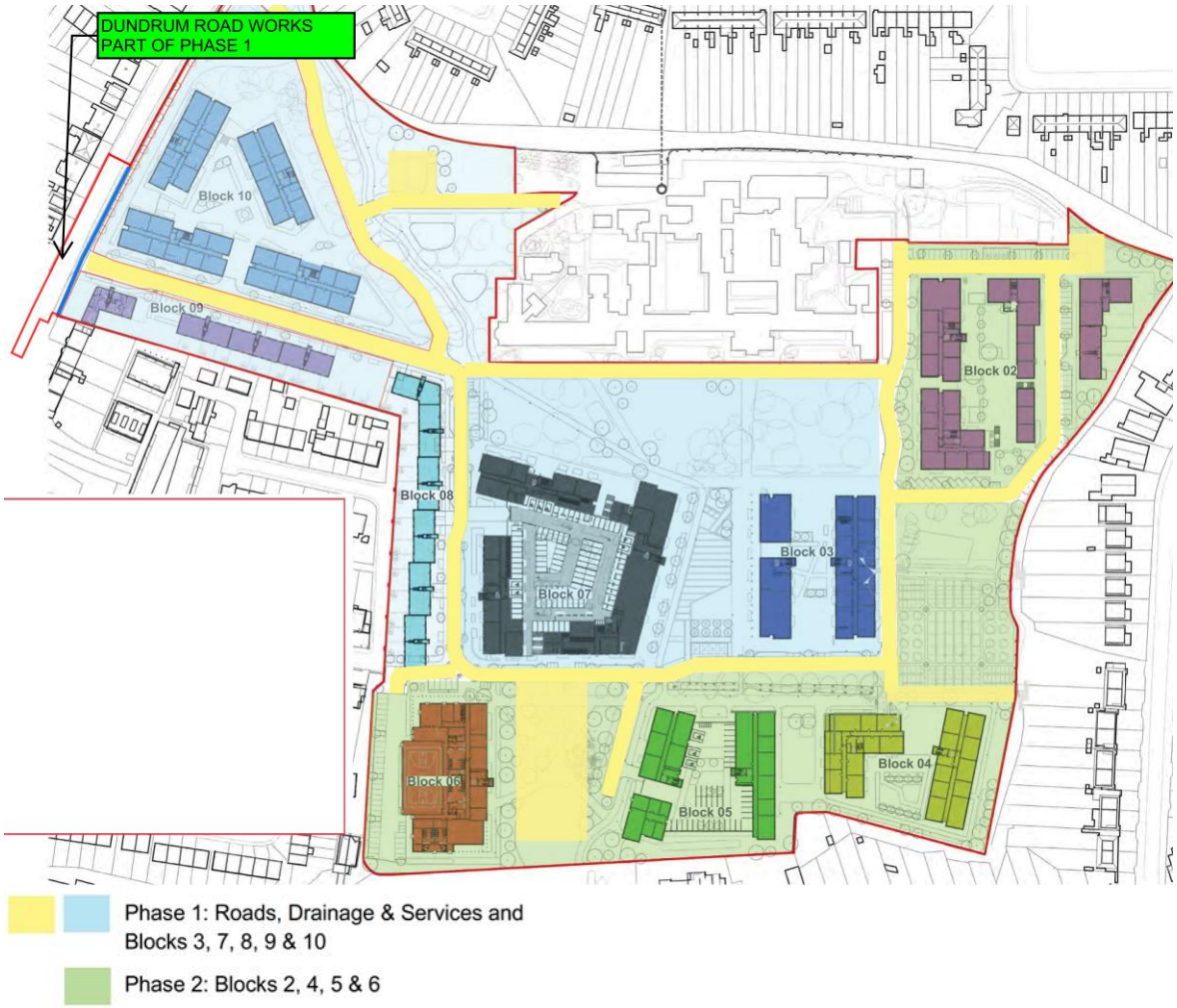


Fig 6.1 Plan View of the Development Showing the Block Layout and Outline Phasing.

A more detailed programme for each phase will be developed by the Main Contractor for that phase, once appointed, in agreement with the professional design team to reach early agreement on an acceptable construction sequence and programme. The programme must comply with information and requirements set out in this document.

All statutory consents and licenses required to commence an onsite activity will be obtained ahead of work commencing and giving the appropriate notice periods. These will include:

- Commencement notices.
- Connections to existing utilities, main sewers and the public water main system.
- License to discharge from the site to public systems.

7. EARTHWORKS

The bulk earthworks are associated with the site strip and excavation of basements, half-basements and foundations for the new buildings with some levelling and re-grading of the site to accommodate roads and footpaths as necessary. Estimated earthworks quantities are set out in Figure 7.2 below.

The excavated material volume to be disposed off-site is 71,000m^3 approx. which comprises of 22,000m^3 from the site strip and a net cut volume of 49,000m^3 from the bulk excavation. The net cut volume assumes reasonably that excavated material can be used as bulk fill on site. There will only be limited opportunities to use some of the site strip topsoil in green field and landscaped areas on site. Using a 30.0 tonne capacity (16m^3) articulated truck and allowing for a 5% bulking factor on excavated material, this equates to approximately 4,600 no. truck movements.

Excavated material will be disposed off-site to a licensed waste disposal facility. Refer to the Construction and Demolition Waste Management Plan for further information. See Appendix 2 for Earthworks Layout Drawing.

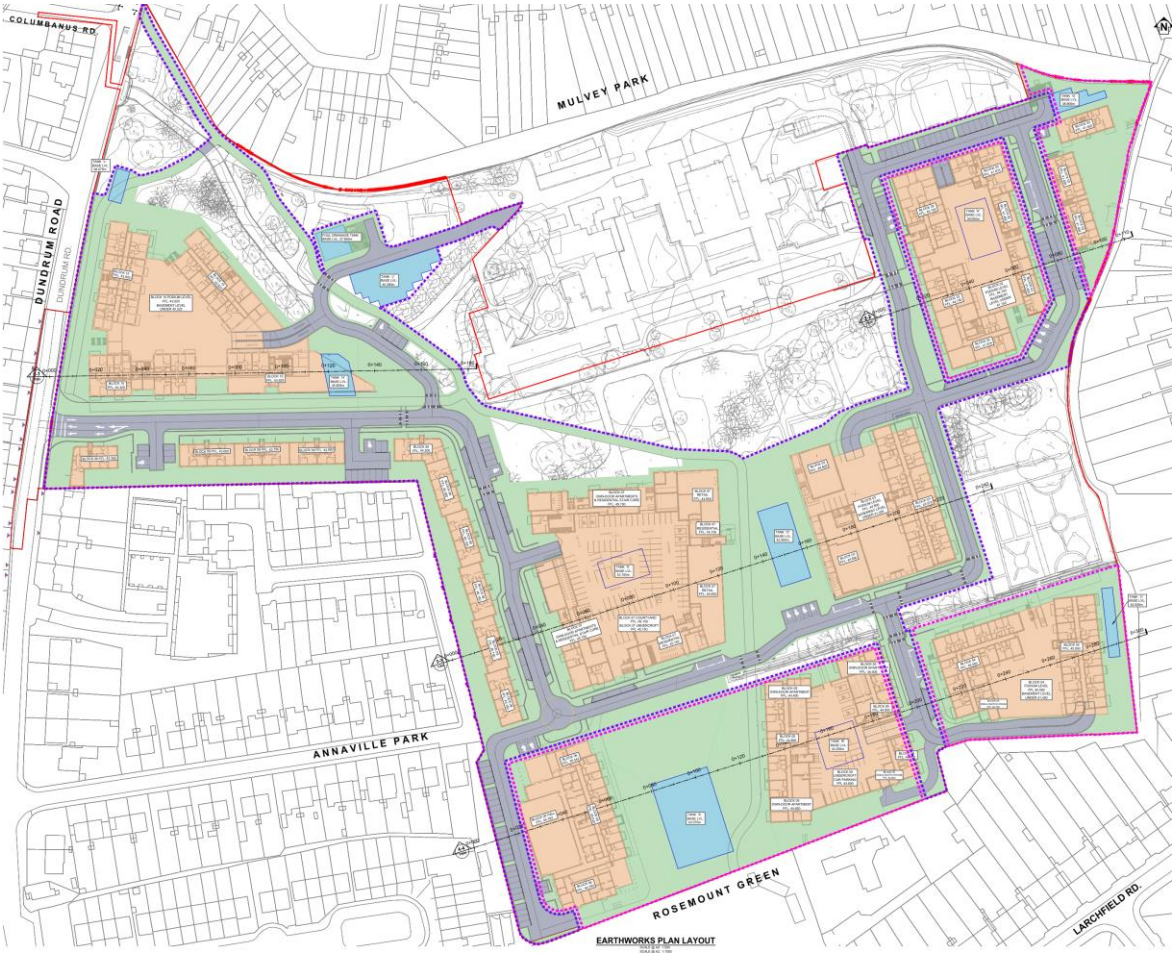


Figure 7.1: Extract from BM earthworks drawing based on Civil-3D modelling of the cut and fill earthworks on site

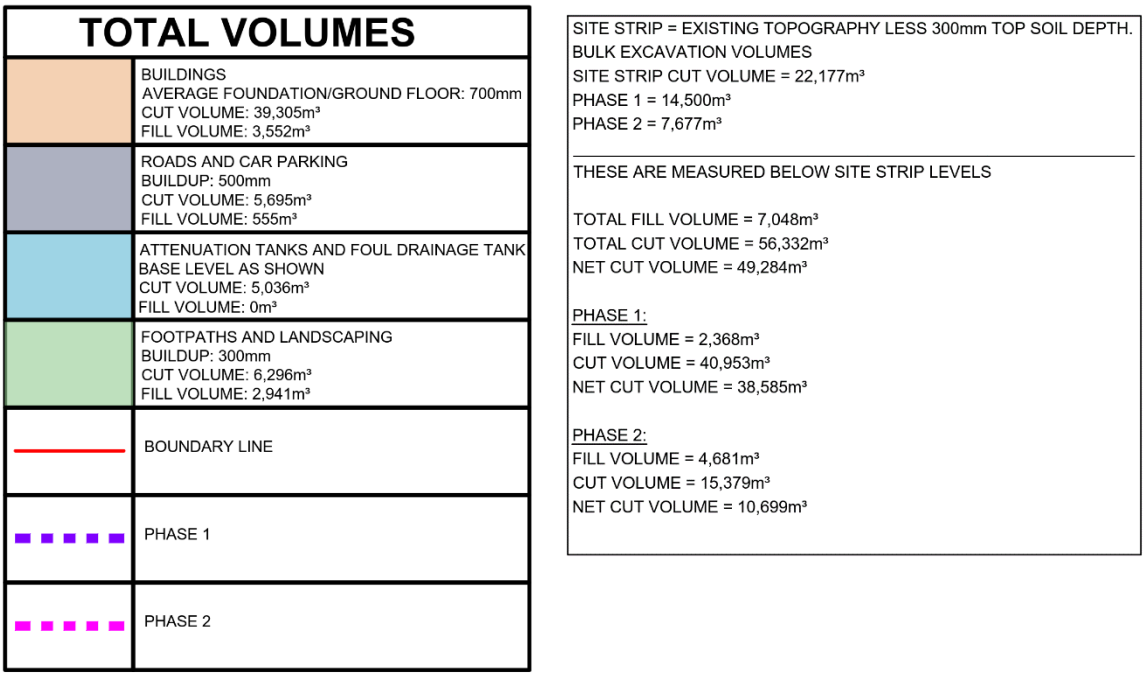


Figure 7.2: Estimated earthworks quantities (approximate values) extracted from BM earthworks drawings.

8. NEW CONSTRUCTION

The development will be divided out into two phases - refer to Section 6 of this report for more details. Works in each phase will consist of the following:

Enabling Works:

- Secure site and set up contractor welfare facilities and site accommodation.
- Locate and terminate existing live services.
- Install tree protection and remove trees that are earmarked to be felled.
- Asbestos surveys to be carried out to existing buildings.
- Removal of structures listed for demolition.
- Excavate and remove material to the required formation. This will require a site strip and removal from the site of material or temporary stock piling.
- Maintain the existing entrance and incorporate new haul roads and hardstanding as required.
- Make good and install any finished boundary treatments that can be installed at this stage.

Main Construction Works:

- Foundations: Excavate foundations down to boulder clay for the houses and duplexes. Bored piled foundations will be required for the apartment blocks.
- Basement/half-basement: In-situ reinforced concrete (RC) walls and slabs. External waterproofing membrane.
- Retail, creche and community spaces: In-situ RC frame with beam and slab floors. Glazing and cladding. These spaces are generally incorporated into the new apartment buildings. The community hall will be constructed in structural steel.
- Residential Apartments: RC frame with flat slab floors, typically supported off RC blade columns. In-situ RC stair/lift cores. Precast concrete or brick cladding typically with glazing.
- Glazing and cladding to all buildings.
- Architectural finishes, non-loadbearing walls, ceilings, sanitary ware, ironmongery etc associated with the above.
- Mechanical and Electrical services and lift installations associated with the above.
- External landscaping and green roof finishes.
- Buried drainage, water supply and other buried services associated with the development.

Note: The exact construction details are subject to detailed design by the Design Team Architects and Engineers.

9. CONSTRUCTION MANAGEMENT

9.1 HOARDING AND SITE SECURITY

The existing 4 to 5 metre high perimeter wall forms a safe/secure site perimeter. A 2.4m minimum high plywood painted timber hoarding or similar will be provided along the long-term boundaries of each phase of the works within the site and at other areas around the site where the perimeter wall is removed as part of the works. Heras type fencing will be used on short term site boundaries where appropriate to suit the works. The hoarding alignment and specification will be confirmed by the appointed Contractor prior to commencement.

Controlled access points to the site, in the form of gates or doors/turnstiles, will be kept locked for any time that these areas are not monitored (e.g. outside working hours). During working hours, a gateman will control traffic movements and deliveries at any active site access to ensure safe access and egress to and from site 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.

Photo 9.1 – Typical Site Hoarding Arrangement

9.2 CRANES

Each phase of the development will incorporate a tower crane or cranes. 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 overall site (there may be work outside of each phase area on the overall site e.g. buried service

installations) will be each subject to a method statement agreed with Dún Laoghaire-Rathdown County Council (DLRCC) as appropriate.

9.3 Site Accommodation and Site Parking

On site accommodation for each phase of the work will consist of:

- Staff welfare facilities (toilets, canteen, offices/meeting rooms,)
- Materials storage areas and drop off

Temporary water supply, electricity supply and foul drainage will be required for the new facilities. Connections to these are available inside the overall site or close to the site boundaries. The amount of construction personnel on site will vary considerably depending on the stage of construction and on any overlap in phases. Based on the estimated programme and time frames in this report, the estimated maximum number of construction worker on site at any one time will up to circa 700 workers during the peak of the construction work.

The neighbouring residential areas will not be used for contractor parking. All parking will be contained onsite. Limited parking for construction personnel will be provided within the site for the period of construction to encourage the use of public transport where possible. The site is readily accessible by Luas from the nearby Windy Arbour Luas stop, see Figure 9.1 below, and Dublin Bus services along the Dundrum Road. The contractor parking areas will be confirmed by the appointed Contractor prior to commencement. The contractor is to communicate clearly to all new staff the necessity of not parking in adjoining areas and is to provide full details of all the public transport options available.

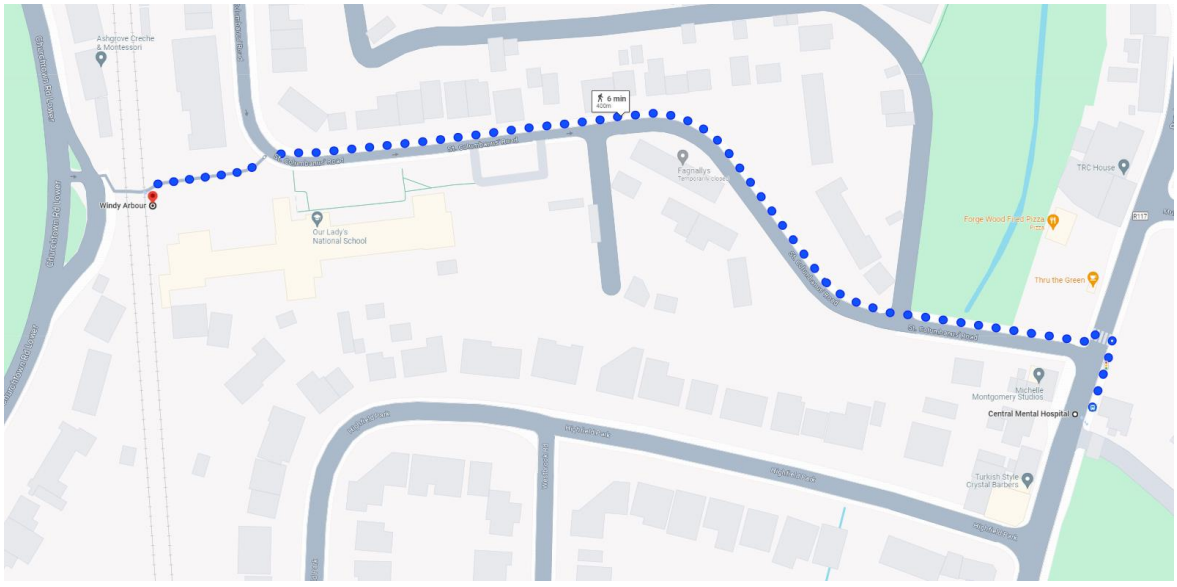


Figure 9.1. Pedestrian Route from Windy Arbour Luas Stop to the Site. 6 minute walk.

9.4 Hours of Working / Delivery Times

Unless otherwise conditioned, it is proposed that standard construction working hours will apply, i.e.:

- 7am to 7pm Monday to Friday
- 8am to 2pm on Saturdays.

If there is any occasion where work may be carried out outside normal daytime working hours, DLRCC, local residents and businesses in the area which are likely to be affected by the proposed works will be notified in advance in the form of a letter or leaflet containing the following information:

- Name, address and telephone number of person responsible for carrying out works.
- Nature of the works and reasons for carrying out at the proposed time.

The Contractor will ensure that these works are carried out in a manner that will minimise the risk and disruption to residents and members of the public. All reasonable precautions will be taken for the operation of plant and equipment to avoid nuisance and excess noise impact on the surrounding residents.

9.5 Traffic Management

9.5.1 General

The works associated with the construction of the proposed development will result in additional traffic on the neighbouring road network, with vehicle movements associated with the removal of excavated material, demolition waste, construction waste, and the delivery of new materials, concrete trucks etc.

It is proposed that construction traffic access to the site will be primarily via the existing access road off Dundrum Road (Photo 9.3 below). The new road entrance from the site onto the Dundrum Road is circa 150m south from the existing entrance. Figure 9.2 shows the recommended construction traffic routes from the site to the main road network (the M50 motorway).

Unloading bays will be provided for deliveries to the site within the hoarded perimeter of the site for each phase. They are required to be accessible by tower crane and fork lifts. Appropriately demarcated storage zones will be used to separate and segregate materials.

All deliveries to site will be scheduled to ensure their timely arrival and to avoid the need for storing large quantities of materials on site. Deliveries will be scheduled outside of peak traffic hours to avoid disturbance to pedestrian and vehicular traffic in vicinity of the site. The storage area will be located on site. The vehicular site security barrier in each phase of the development will be located at a sufficient distance back from the site entrance to allow construction traffic to build up inside of the site in the event of a high concentration of deliveries at once, for example, during a concrete pour. No construction or delivery vehicle will be left outside of the site while waiting to gain access to the site. There is no available space on Dundrum Road or roads within the proposed development for construction traffic to queue.

Photo 9.2 – Existing Site Access onto Dundrum Road. View looking South.

Photo 9.3 – Location of Proposed Main Site Access onto Dundrum Road at the right side edge of the Photo. View looking North along Dundrum Road.

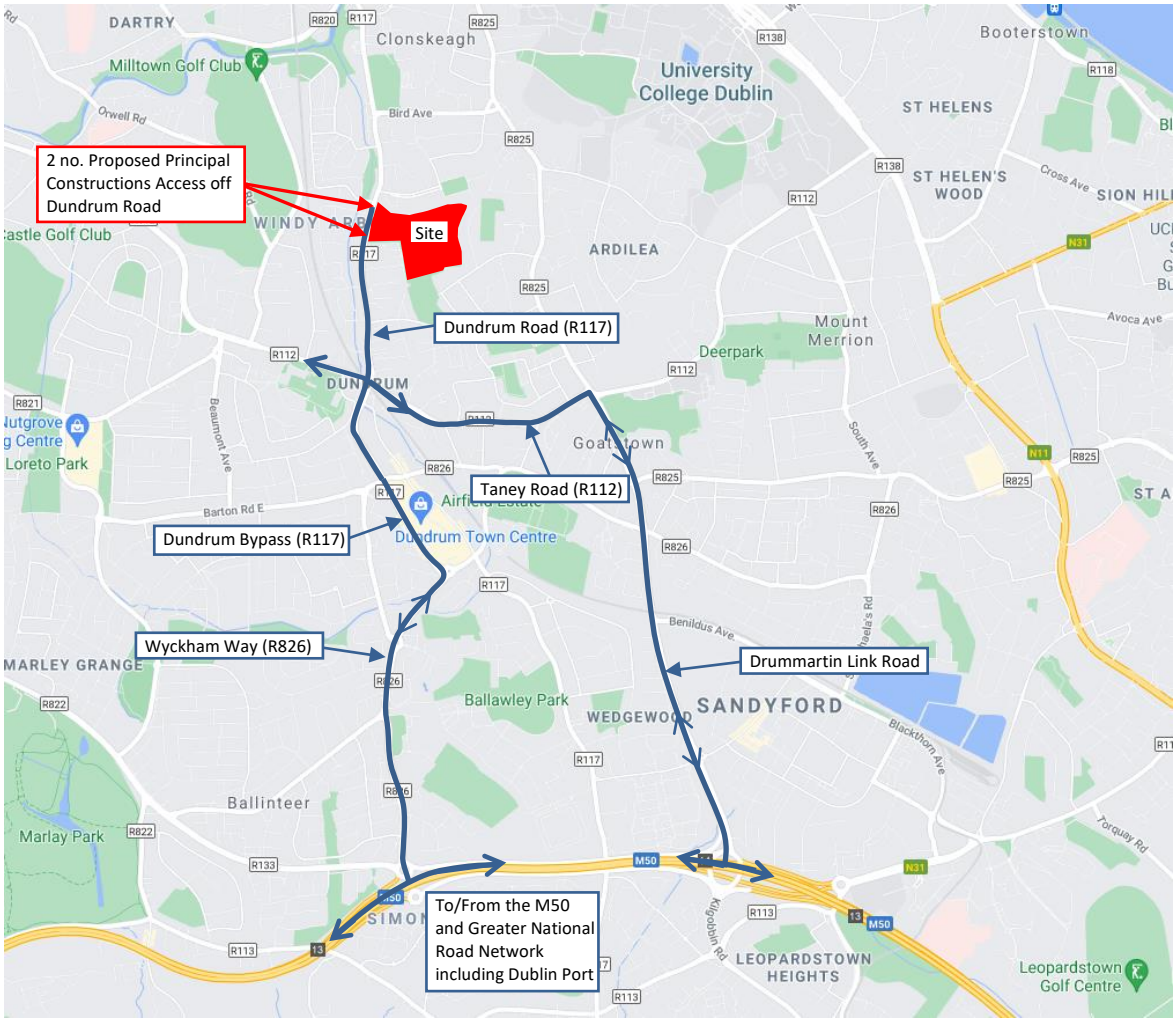


Fig 9.2 Construction Traffic Access Routes

9.5.2 Estimated Construction Traffic Movements

The histogram in Figure 9.3 below is a high level estimate of the quantity of construction vehicle trip movements to and from site per week for the duration of the works based conservatively on a condensed construction period of circa 4.5 years (the likely construction period as set out in Section 6 of the report is 5-6 years).

The histogram covers all the construction and demolition works (not just earthworks). These figures will vary between the different stages of construction, e.g., demolition, substructure, superstructure, fit-out etc. The histogram assumes an overlap between Phases 1 and 2. The numbers are based on jobs of similar type and gross floor area in Dublin. These figures are only indicative, and the exact quantity and frequency of construction vehicle movements will depend on the appointed contractors detailed construction programme, time frames and construction methodology.

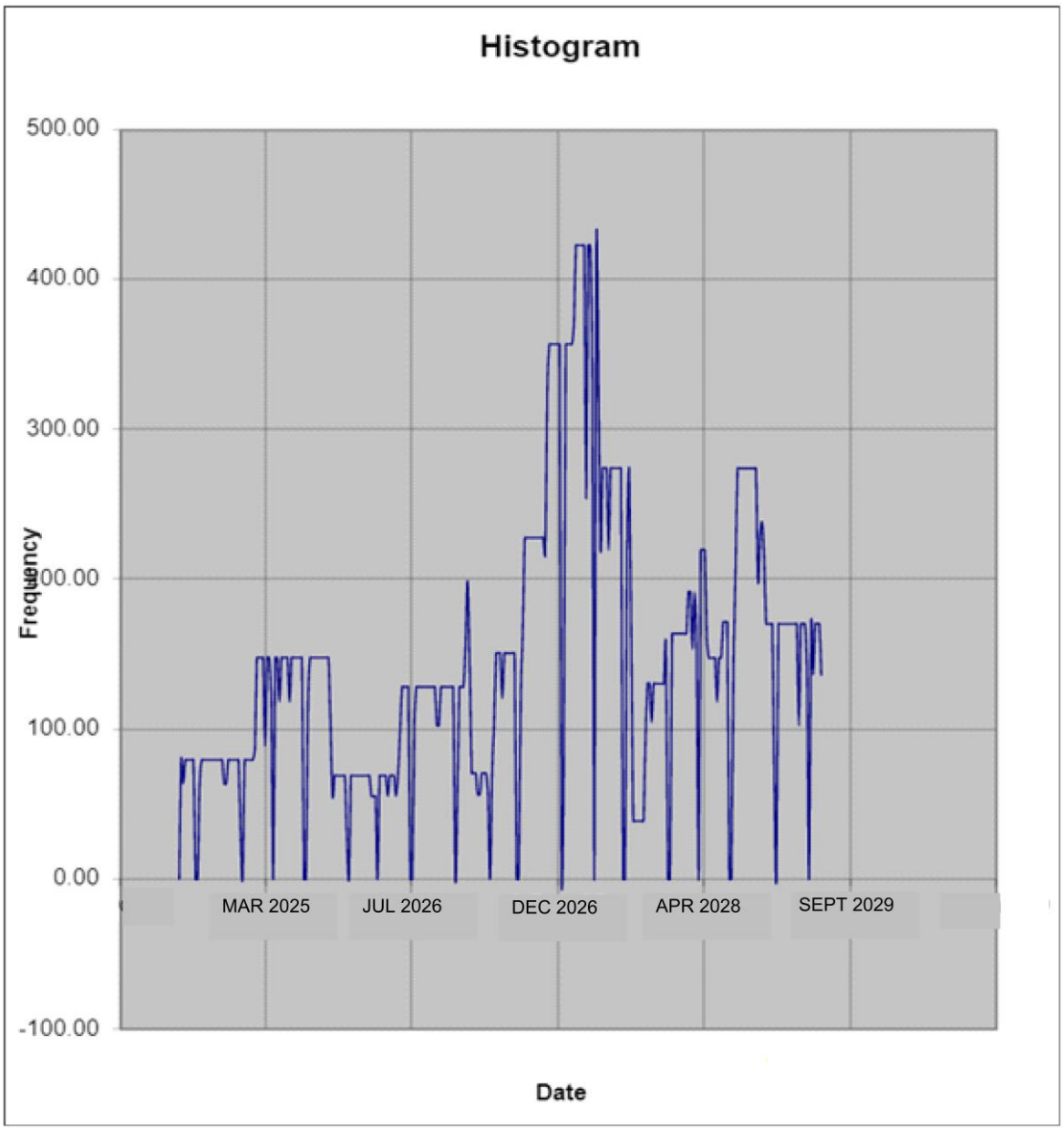


Fig 9.3 Approximate Weekly Construction Vehicle Trip Movements To/From Site

9.5.3 Contractor's Traffic Management Plan

A Traffic Management Plan will be prepared by the contractor and agreed with DLRCC's Transportation Department and if necessary An Garda Siochana, to mitigate any impact of construction on the surrounding road network. The Traffic Management Plan will provide for the following:

1. The contractor will be responsible for and make good any damage to existing roads or footpaths caused by his own vehicles and those of sub-contractors or suppliers travelling to and from the site.
2. The contractor will 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 will 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 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. Flagmen will be used to control the exit of construction vehicles from the site onto the public road.
7. Existing fire hydrants are to remain accessible as required.

Refer to the Construction Traffic Section of the Traffic and Transport Report for further information.

Contractor's Traffic Management Plan will include the following headings at a minimum:

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

9.5.4 Public Traffic

The safe management of the Public traffic, both pedestrian and vehicular, is a key part of this development due to the proximity of the busy surrounding roads and footpaths, in particular the Dundrum Road (R117).

9.5.5 Construction Traffic

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

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

9.5.6 Measures to Minimise Construction Vehicle Movements

Construction vehicles will fall into two categories, heavy and light vehicles. Heavy vehicles will include vehicles for removing excavated material from the site as well as deliveries of concrete and other larger construction elements such as large prefabricated elements of structure or cladding. Light vehicles will include cars and small delivery vehicles such as vans. See Section 6 for estimated trip movements.

Construction vehicle movements will be minimised through:

- Consolidation of delivery loads to/from the site and manage large deliveries on site to occur outside of peak periods, the peak traffic hours are defined as 08:00 – 09:00 and 17:00 – 18:15.
- Use of precast/prefabricated materials where possible;

- Excavated material generated by the construction works will be re-used on site where possible, through various accommodation works.
- Adequate storage space on site will be provided;
- Construction staff vehicle movements will also be minimised by promoting the use of public transport.
- Car sharing among the construction staff will be encouraged, especially from areas where construction staff may be clustered. Such a measure offers a significant opportunity to reduce the proportion of construction staff driving to the off-site car parking facility and will minimise the potential traffic impact on the road network surrounding this facility.
- 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.
- The vast majority of site workers will access the site just before the permitted working hours start i.e. before 07:00, this means they will be entering and leaving the site outside of peak traffic hours;

9.6 Site Safety

The Contractor will be responsible for the security of the site during each phase. The Contractor will:

- Operate a site induction process for all site staff.
- Ensure all site staff will have current *'safe pass'* cards.
- Install adequate site hoarding to the site boundary.
- Maintain site security staff at all times.
- Separate pedestrian access from construction at the main site entrance off the Dundrum Road and provide a safe walkway for pedestrians along the main access road in to the site.
- Ensure restricted access is maintained to the works.

9.7 Water Supply

A water supply will be required for various activities on site.
The main contractor will require a water source for the duration of the works. Water will be required for:

- Main contractor's welfare facilities.
- Wheel wash and vehicle wash-down (use recycled water where feasible).
- Dust suppression (as applicable).
- Curing of concrete in warm weather.
- General construction cleaning materials/equipment etc.

There are existing water mains on the site, which could be used during the construction subject to Uisce Éireann approval.

9.8 Groundwater Control/De-Watering

The ground conditions and likely groundwater flow rates are discussed in Section 4 of this report. The deepest excavation on site is 4.0m approx. below existing topographical levels associated with basement and half-basement excavations. 5.0m deep excavations will be required for the wastewater pumping station in the north-east of the site. In all cases only limited groundwater ingress is expected into the excavation, given the relatively impermeable ground conditions i.e. clay soils. Some de-watering will still be required to remove any groundwater or rainwater accumulations.

A new surface water sewer will be laid from the site entrance to a manhole adjacent to the River Slang on St. Columbanus' Road. The trench excavation for this drain is 2metres below ground level approx. and no significant groundwater ingress is expected into the trench during construction. Trench boxing and pumping will be required to control any groundwater ingress into pipe trenches that does occur. Any particular requirements in respect of de-watering (and all other construction management requirements) are subject to agreement by the contractor with Dún Laoghaire-Rathdown County Council.

Groundwater in the excavations will be pumped out. As noted, it is estimated that the required pumping rate will be low. It is envisaged that the water to be discharged will be clean groundwater as the areas to be excavated are not contaminated (based on site investigation information). It is therefore proposed that the water be discharged into the existing sewer network on the surrounding public roads under a discharge license regulated by Dún Laoghaire-Rathdown County Council/Uisce Éireann, issued under the Water Pollution Act (Section 4 License). Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the sewers. Silt traps will be used to remove silt and any significant suspended solids prior to discharge from the site in accordance with the requirements of the discharge license.

9.9 Public Relations/Community Liaison

The site is located in a residential area near Dundrum Village in the suburbs of Dublin. The Main Contractor will ensure that all agents, sub-contractors and suppliers act in a manner to minimise disruption to the locality. Construction staff will be encouraged to remove all Personal Protective Equipment (PPE) and use wash down facilities before leaving the site.

A senior member of the contractor's site staff will be appointed Liaison Manager and will be responsible for the following:

- Participation and distribution of a local information leaflet on site activities.
- Briefing as necessary with neighbours on progress and issues.
- Liaison with Dún Laoghaire-Rathdown County Council and emergency services as appropriate.
- Liaison with An Garda Siochana, particularly in relation to traffic movements and permits.
- Preparation of reports for the site meetings on neighbourhood issues.
- Recording and dealing with complaints.

Efficient signage, maintenance and cleanliness of services and temporary facilities will be given high priority.

Due to the nature of construction works, it is essential to operate Good Neighbour Policies wherever possible. The key aspects of the Projects Team's Good Neighbour Policy include:

- Early implementation
- Good client, staff and neighbourhood liaison.
- Reduction of nuisance factors.
- Clear access for neighbouring premises.
- Clear and concise information.
- Designated liaison officer.
- Working within the prescribed hours

It is essential that the Good Neighbour Policy and any necessary procedures be in place before any works are commenced on site.

10. ENVIRONMENTAL CONSIDERATIONS

The main contractor will be required to be accredited with ISO14001 Environmental Management Systems. The main contractor will mitigate the impact of the construction works on the environment. Proposed measures in relation to a number of items are set out in the following sections.

10.1 Environmental Impact Assessment Report

An Environmental Impact Assessment Report (EIAR) has been prepared as part of the planning application package. A series of construction mitigation measures have been set out in the chapters of the EIAR. The contractor will implement these measures. These measures are summarised in a specific mitigation measures chapter of the EIAR, Chapter 24.

10.2 Storage of Hazardous Materials

To minimise environmental risks the following requirements will be adhered to:

- Hazardous liquid materials or materials will be stored in the site compound in a bunded area (for liquids). All oils, fuels and other hazardous liquid materials will be clearly labelled and stored in an upright position. The capacity of the bunded area will conform with EPA Guidelines ('Guidelines for the identification and proper management of hazardous fractions in construction and demolition waste') and should hold 110% of the contents or 110% of the largest container whichever is greater.
- Fuel may also be stored in fuel bowsers located in the proposed compound location. Fuel bowsers will have certificates of conformity or will be integrity tested.
- Smaller quantities of fuel may be carried/stored in clearly labelled metal jerry cans. These cans will be in good condition, have secure lockable lids and be stored in an appropriate manner i.e. over drip trays. Contents of drip trays to be suitably disposed by a licensed waste disposal contractor.
- Inductions and regular toolbox talk will be carried out for all operatives in relation to the material storage arrangements and actions to be taken in the event of an accidental spillage.

10.3 Plant and Equipment

To minimise environmental risks the following requirements will be adhered to

- Plant and equipment to be used during works, will be in good working order and regularly maintained with no evidence of leaks or damaged exhausts. Equipment will be parked in areas remote from any environmentally sensitive locations at the end of each day i.e. the open channel drainage ditch crossing the site.
- Exhaust silencers will be fitted to plant and machinery that is likely to cause a noise nuisance. Construction plant used on site will comply with the relevant Irish regulations in relation to noise and vibration requirements.
- The contractor will have a re-fuelling protocol in place. Re-fuelling will be carried out inside the site compound area in a designated area.
- Toolbox talks are also will be held with all operatives to highlight environment risk areas or works. Environmental control measures are also will be highlighted.

10.4 NOISE

Some impact of noise is likely to occur as a result of the construction activity. Construction work is of a temporary nature and the resulting noise levels are usually acceptable, subject to typical management and time control procedures which are common to most urban based development projects.

The recommendations given in BS 5228. 'Noise Control on construction and Open Sites' and BS 6187 Code of Practice for Demolition (latest editions) will be adhered to.

The noise limits to be applied for the duration of the construction works are those specified below, unless conditioned otherwise.

- Daytime (07:00 to 19:00 hrs) – 55dB Laeq, 15 m ins.
- Evening (19:00 to 23.00 hrs) – 50dB Laeq, 15 mins
- Night-time (23:00 to 07:00 hrs) – 45Db Laeq, 15 mins

Refer to Section 11 of this report for the proposed noise monitoring regime.

The following will be implemented to mitigate and control construction noise impacts in order to avoid unacceptable impact on sensitive receptors in particular local residents:

- Noise Management Procedures: Prior to the start of the works, strictly enforced noise management procedures will be put in place by the contractor and communicated to staff via an induction and follow-on toolbox talks.
- Noisy operation will be avoided where possible or replaced with a lower noise alternative if possible.
- Noise will be controlled at source in accordance with BS 5228 (latest edition). Measures used will include the use of exhaust silencers on vehicles and machinery that have the potential to cause a nuisance, the use of rubber wheeled/tracked vehicles where possible, the use of low noise generators and other machinery with manufacturer approved acoustics covers or linings. Electrically powered equipment will be used in preference to diesel/petrol powered equipment. Pneumatic percussive tools will be fitted with manufacturer approved mufflers or silencers. All excavator mounted pneumatic breakers used for demolition and concrete/rock breaking activities will be fitted with effective dampeners. Where breaking out work is likely to be prolonged, the work area will be enclosed within a noise absorbing blanket structure to ensure noise emissions are within the defined limits. Such enclosures will also be considered for other static noise generating operations or machinery as necessary.
- Idling and rev'ving of machinery and vehicles will be avoided. Vehicles and machinery not in use will be shut down.
- Noisy operations will be staggered to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
- Dragging of materials such as steel covers, plant or excavated materials along ground surfaces will not be permitted.
- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, tonal reversing alarms on construction vehicles will be replaced with broadband alarms.
- As per Section 8.11 of this report, a Liaison Manager appointed from the contractor's senior staff on site, will deal with complaints and liaise with the local community, the Local Authority and other stakeholders as necessary in relation to noise issues. All complaints are will be recorded and responded to. Appropriate actions will be taken to avoid similar future causes for complaint.

10.5 DUST

The Contractor's proposals will include dust control measures in accordance with best practice and with reference to the following:

- Air Pollution Act 1987 (as amended)
- BS 6187: Code of Practice for Demolition

A dust minimisation plan will be formulated for the construction phase of the project. The Contactor will put in place a regime for monitoring dust deposition rates in the vicinity of the site during the works using the Bergerhoff Method. The amount of dust deposited anywhere outside the proposed development, when averaged over a 30-day period, will not exceed the values below:

- 130mg/m2 per day when measured according to the BS method which takes account of insoluble components only or,
- 350mg/m2 per day when measured according to TA Luft, which includes both soluble and insoluble matter. (EPA compliance monitoring is based on the TA Luft method).

Refer to Section 11 of this report for the proposed dust monitoring regime. Dust mitigation and control measures will include the items listed below. Dust generating activities will cease if limits are exceeded until appropriate mitigation measures are put in place by the contractor.

- Spraying: During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water. Stockpiles of excavated material, demolition rubble, sand etc will be covered with tarpaulins or if this is impracticable will be sprayed with water from a bowser.
- A road sweeper will be used to keep hard surfaced roads inside the site and in it's vicinity, clean.
- Use of rubble chutes and receptor skips during construction activities.
- Construction vehicle speeds will be restricted to less than 15 kph to avoid raising dust. The overloading of tipper trucks exiting the site will not be permitted and such trucks will be covered. Skips containing dust generating material will also be covered.
- Vehicles and construction plant/equipment will be regularly serviced to ensure that exhaust emissions are within permissible limits. Idling of vehicles to be avoided.
- For concrete cutting or stone cutting operations, dust emissions controls will be in place.
- Dust netting on scaffolds and along boundaries will be installed as necessary to avoid escaping dust emissions from the site falling on third party lands and existing residential areas.
- As per Section 8.11 of this report, a Liaison Manager appointed from the contractor's senior staff on site will deal with complaints and liaise with the local community, the Local Authority and other stakeholders as necessary in relation to dust issues, out-of-hours work etc. All complaints will be recorded and responded to. Appropriate actions will be taken to avoid similar future causes for complaint.

10.6 Vibration Control

Construction activities can give rise to ground borne vibrations. To control nuisance to local residents and potential damage to other nearby structures vibrations from construction related activities will be controlled.

The following vibration limits are initially 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'. A lower range of values will apply to the retained structures on site.

Photo 9.1: Typical Vibrograph installation

Refer to Part 10 of this report for the vibration monitoring regime.

The following vibration mitigation and control measures will be implemented during the construction phase:

- Breaking out concrete elements using low vibration tools and programming such work for less sensitive parts of the day when background noise outside of the site is at it's highest.
- Locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating any fixed equipment causing vibrations on resilient/rubber mounts
- Keeping equipment well maintained.
- As per Section 8.11 of this report, a Liaison Manager appointed from the contractor's senior staff on site will deal with complaints and liaise with the local community, the Local Authority and other stakeholders as necessary in relation to vibration issues. All complaints will be recorded and responded to. Appropriate actions will be taken to avoid similar future causes for complaint.

10.7 Protection to Wildlife and Trees

In order to reduce the levels of disturbance to wildlife during the construction phase of the project, the following mitigation measures will be implemented:

- Noise, dust and vibration control and mitigation measures as outlined in the EIAR and in the preceding sections of this report.
- All trees felled to facilitate the development will be inspected by a bat specialist prior to felling. The trees will be felled and left on the ground undisturbed for a minimum of 24 hours prior to logging or removal. This is standard practice to allow any bats present the opportunity to leave will they have remained undiscovered in pre-felling checks.
- Gaps will be left (200mm minimum) at point along the base of the site security fencing to allow the free movement of mammal species through the site throughout the construction phase.
- The tree felling and vegetation clearance will be conducted outside of the bird breeding season (March-August inclusive) to minimize the risk of disturbance to breeding birds.

- There will be no floodlighting of the site during construction. Down-lighting and low intensity lights (sodium lamps) will be used where possible. Construction equipment such as cranes will be sensitively lit to allow birds to see them at night.
- Construction operations will largely take place during the hours of daylight to minimise disturbances to faunal species active in the nocturnal/crepuscular period.
- Any temporary excavations will be checked on a daily basis during working periods to minimise the risk of animals becoming trapped.
- All edible and putrescible wastes will be stored and disposed of in an appropriate manner. Similarly, all construction materials will be stored and stockpiled at planned locations.

The advice of an ecologist and arborist will be obtained in relation to the above. Refer to the Bio-diversity Chapter of the EIAR for further information.

10.8 Invasive Species Control

There is potential that invasive species may be accidentally introduced to a location via contaminated vehicles and equipment, in particular tracked vehicles, which were previously used in locations that contained invasive species. Adapted from the Uisce Éireann Guidance (2016), the following best practice avoidance measures will help to contain and/or prevent the introduction of invasive species on a site as follows:

- All plant and equipment employed on the proposed works (e.g. diggers, tracked machines, footwear etc.) must be thoroughly cleaned down using a power washer unit, and washed into a dedicated and contained area prior to arrival on site and on leaving site to prevent the spread of invasive aquatic / riparian species such as (but not limited to) Japanese knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*). A sign off sheet must be maintained by the contractor to confirm cleaning;
- Material gathered in the dedicated and contained clean down area will be appropriately treated as contaminated material on site;
- For any material entering the site, the supplier will provide an assurance that it is free of invasive species;
- Ensure all site users are aware of invasive species management plan and treatment methodologies. This can be achieved through Toolbox talks before works begin on the site;
- Adequate site signage, hoarding and fencing will be erected in relation to the management of non-native invasive species.

10.9 Pollution Control

Prior to the commencement of construction, the appointed contractor will be required to obtain formal agreement from the Local Authority on pollution prevention measures as well the overall approach and emergency procedures for all construction stages.
Contractors 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)

10.9.1 General

- Demolition and Construction methods used will be tailored to reduce, as much as possible, dust and noise pollution.
- Mitigation and control measures in relation to hazardous material spillages, plant and equipment emissions, noise, dust, vibration, disturbance to trees and wildlife set out in preceding sections of this report and in the EIAR document, will be adhered to for the duration of the construction works.
- The location and size of stockpile areas for sands and gravel will be specified and identified on the maps.
- Sediment runoff will be minimised by standard engineering measures including sediment skirts around soil stockpiles, sediment retention barriers in surface water drains and the use of adequate construction roads.

10.9.2 Surface Water Drainage and Ground Water Control

A method statement will be prepared by the contractor and agreed with Dún 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 site occurs during the construction period This method statement must comply with this CEMP document. Any run-off will be intercepted on site, where the ground falls towards adjoining properties or public roads/footpaths. This will be achieved with open drains or French drains and collected for treatment based on the conditions of a DLRCC and/or Uisce Éireann licence, prior to pumping to the surface sewer network. There is a drainage ditch running through the site. Direct uncontrolled run-off into this will not be allowed.

Run-off control measures to include the following:

- Dewatering measures will only be employed where necessary.
- 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.
- If concrete mixing is carried out on site, the mixing plant will be situated in a designated area with an impervious surface.
- Existing surface drainage channels within the site that serve adjacent lands will be retained where possible to prevent causing increased flooding impacts.
- All surface water sewer connections will be made under the supervision of the Local Authority/Uisce Éireann 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.
- Areas surrounding the site will be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the demolition and construction phase. To prevent this from occurring, 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 site is complete.
- Regular inspections of settlement tanks will 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.

- Emergency spill kits will be kept close to works.

10.9.3 Soil

- If un-contaminated, any existing topsoil will be retained on site if possible to be used for the proposed development. Topsoil will be stored in an appropriate manner on site for the duration of the construction works and protected for re-use on completion of the main site works.
- During the demolition and construction phase, all excavations and exposed sub-soils in open cuts will be blinded and protected with clean broken stone as soon as possible after exposing the subsoil in order to prevent erosion.

10.10 REINSTATEMENT / ROAD CLEANING

10.10.1 Construction Stage

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 will be made available to adjoining owners and Dún Laoghaire-Rathdown County Council. This record will form the basis of assessing repairs to adjoining areas in the future will a dispute arise as to their cause. Roadways will be kept clean of muck and other debris. A road sweeping truck will be provided if necessary to ensure that this is so.

10.10.2 On Completion

Reinstatement at completion of the works will involve:

- The cleaning of the existing sewers in the vicinity of the development as required.
- Testing and cleaning of all watermains in the development to the requirements of the Local Authority prior to connection to the public watermain. This will reduce the risk of contamination to the public water supply when the new network is connected to the system.
- Repair of any damage to any adjacent public roadways, kerbs, grass verges etc. as a result of construction activities, in accordance with Dún Laoghaire-Rathdown County Council requirements.
- Reinstatement of all excavations to the requirements of Dún Laoghaire-Rathdown County Council
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.

11. MONITORING AND PROTECTION OF NEIGHBOURING PROPERTIES

A monitoring regime will be put in place to protect neighbours and neighbouring properties. A full and detailed vibration, noise and dust monitoring regime will be put in place for the duration of the works in accordance with the requirements set out in the preceding sections of this report and in accordance with the requirements of the EIAR.

11.1 MONITORING WORKS SPECIALIST:

The Contractor will appoint a competent person will be referred to as the Monitoring Subcontractor **(MSC)** and together with them will prepare and maintain the vibration, noise, and dust monitoring plan.

11.2 CONDITION SCHEDULES:

The MSC will be responsible for preparing or organising the preparation of condition surveys of surrounding buildings, walls, hardstanding area etc. prior to the carrying out of any works on site. Retained structures within the site are also to be surveyed.

The condition surveys will 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.

11.3 MOVEMENT MONITORING

Movement will be monitored through a weekly survey of targets fixed to adjoining structures deemed within the zone of influence of the construction works. The limits for settlements of structures immediately adjacent to piling works (if any) will be determined through further analysis of the piling solution (by the piling contractor's designer), with guidance from Ciria C580 in terms of maximum settlement limits. Gross movement of the substructure will be limited to a level that will cause 'negligible' damage to adjoining structures as defined in BRE251.Defects and distress will be categorised and classified in accordance with BRE Digest 251 "Assessment of Damage in Low-Rise Buildings".

11.4 VIBROGRAPH MONITORS:

6 no. (minimum) vibrographs will be provided on adjoining buildings and a further 6 no. (minimum) required on the perimeter wall. Refer to Figure 11.2. The timing of the provision of the vibrographs at particular locations will be governed by the phasing and sub-phasing of the development (refer to Section 6).

If vibration and noise readings measured by the instrumentation exceed the specific Amber Trigger levels, the Contractor will 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. Vibration Limits to be confirmed prior to commencement of construction. Refer to Part 10.6 of this report for proposed limits.

The MSC will monitor, collate and report on vibration results for the duration of critical work activities as part of the overall monitoring regime.

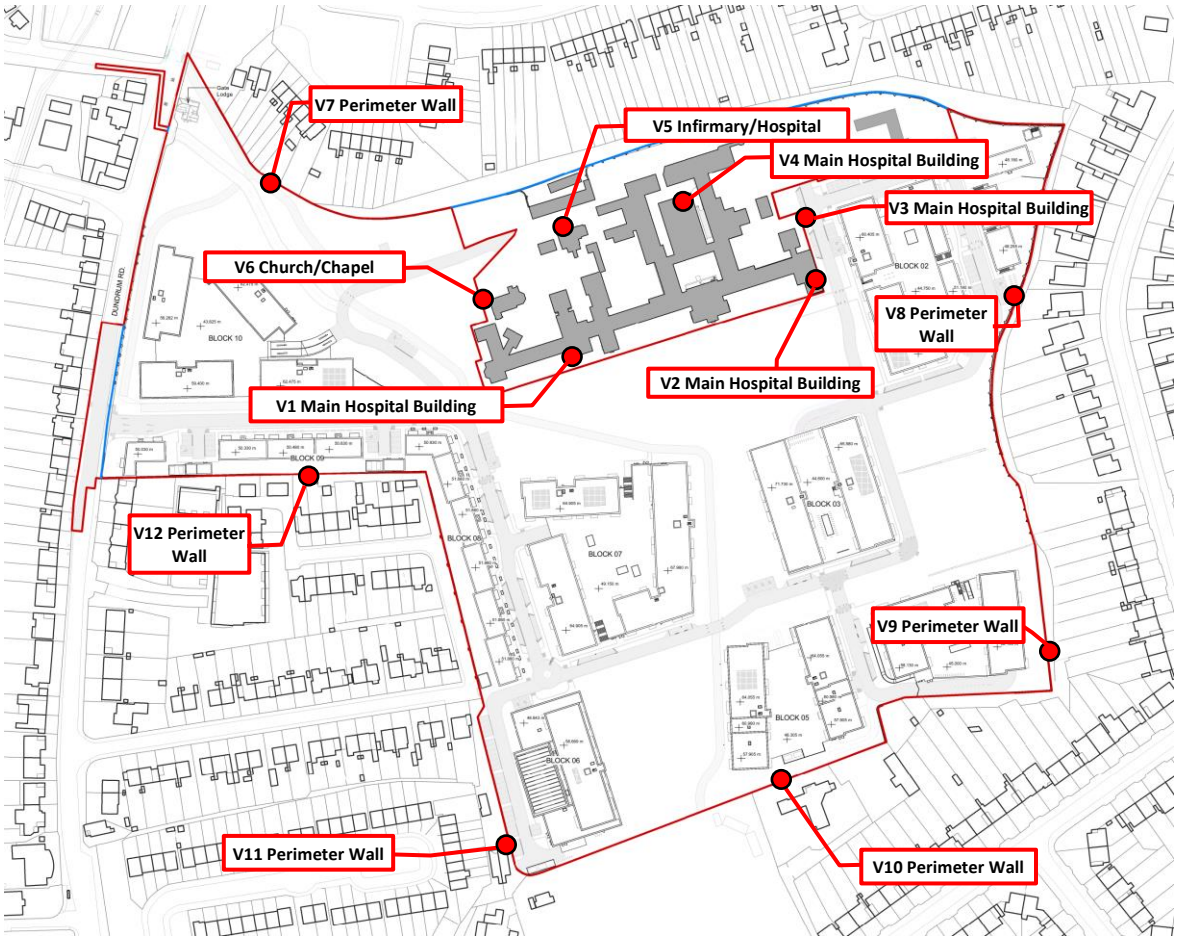


Figure 11.2: Suggested Vibrograph Locations. Locations will be finalised prior to the construction start.

11.5 NOISE AND DUST MONITORING :

Noise and dust monitoring will be carried out at locations to be agreed on the perimeter of the site. Refer to Sections 10.4 and 10.5 of this report for details of noise and dust measurement and limits. The frequency of testing will be strictly in accordance with the recommendations in Chapter 24 of the EIAR document.

11.6 REPORTING:

The MSC will monitor, collate, and report on vibration, noise and dust results in report format, on a fortnightly basis during critical activities.

Appendix 1

Extracts from the Geotechnical Site Investigation Report

S.I. Ltd Contract No: 5811

Client:	Land Development Agency
Engineer:	Barrett Mahony
Contractor:	Site Investigations Ltd

Dundrum Central Development
Dundrum, Dublin 14
Site Investigation Report

Prepared by:

Letch

.....

Stephen Letch

Issue Date:	09/11/2021
Status	Final
Revision	1

Contents:

Appendices:

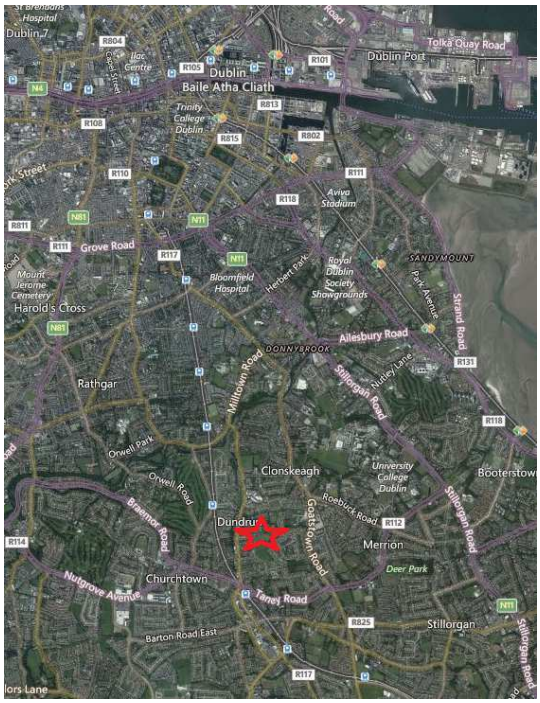
1. Introduction

On the instructions of Barrett Mahony, Site Investigations Ltd (SIL) was appointed to complete a ground investigation at the former Central Mental Hospital site in Dundrum, Dublin 14. The investigation was for a residential development on the site and was completed on behalf of the Client, Land Development Agency. Due to supervision issues, the fieldworks were initially started in March 2021 and then postponed until August and completed in September 2021.

This report presents the factual geotechnical data obtained from the field and laboratory testing with interpretation of the ground conditions discussed.

2. Site Location

The site is located in to the north of Dundrum town centre, which is to the south of Dublin city centre. The first map below shows the location of the site to the south of the city centre and the second map shows the location of the site to the north of Dundrum town centre.



3. Fieldwork

The fieldworks comprised a programme of cable percussive boreholes, trial pits, soakaway tests, foundation pits, slit trenches and California Bearing Ratio tests. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design.

The fieldworks comprised of the following:

- 16 No. cable percussive boreholes
- 35 No. trial pits
- 4 No. soakaway tests
- 7 No. foundation inspection pits
- 3 No. slit trenches
- 6 No. California Bearing Ratio tests

3.1. Cable Percussive Boreholes

Cable percussion boring was undertaken at 16 No. locations using a Dando 150 rig and constructed 200mm diameter boreholes. Hand dug inspection pits were excavated to check for underground services at each borehole location. The boreholes terminated at depths ranging from 4.50mbgl (BH12) to 8.60mbgl (BH11). It was not possible to collect undisturbed samples due to the granular soils encountered so bulk disturbed samples were recovered at regular intervals.

To test the strength of the stratum, Standard Penetration Tests (SPT's) were performed at 1.00m intervals in accordance with BS 1377 (1990). In soils with high gravel and cobble content it is appropriate to use a solid cone (60°) (CPT) instead of the split spoon and this was used throughout the testing. The test is completed over 450mm and the cone is driven 150mm into the stratum to ensure that the test is conducted over an undisturbed zone. The cone is then driven the remaining 300mm and the blows recorded to report the N-Value. The report shows the N-Value with the 75mm incremental blows listed in brackets (e.g., BH01 at 1.00mbgl where N=12-(2,2/2,4,3,3)). Where refusal of 50 blows across the test zone was encountered was achieved during testing, the penetration depth is also reported (e.g., BH01 at 7.60mbgl where N=50-(25 for 5mm/50 for 5mm)).

At 5 No. locations, standpipes to allow for long term groundwater monitoring were installed. These were slotted pipes with a gravel response zone to allow for the groundwater to equalise within the standpipe.

The logs are presented in Appendix 1.

3.2. Trial Pits

35 No. trial pits were excavated using a wheeled excavator with TP21 cancelled due to access issues. The pits were logged and photographed by SIL geotechnical engineer and representative disturbed bulk samples were recovered as the pits were excavated, which were returned to the laboratory for geotechnical testing.

The trial pit logs and photographs are presented in Appendix 2.

3.3. Soakaway Tests

At 4 No. locations, soakaway tests were completed and logged by SIL geotechnical engineer. BRE Special Digest 365 stipulates that the pit should be filled three times and that the final cycle is used to provide the infiltration rate. The time taken for the water level to fall from 75% volume to 25% volume is required to calculate the rate of infiltration. However, if the water level does not fall at a steady rate, then the test is deemed to have failed and the area is unsuitable for storm water drainage.

The soakaway test results and photographs are presented in Appendix 3.

3.4. Foundation Pits

At seven locations, foundation pits were excavated to investigate the depths of the foundations of the existing structure. FI02 was cancelled due to issues accessing the proposed location. The pits included hand excavating around the foundation to measure the depth to the top, extension out from the wall and the thickness of the foundation. The pits were then photographed, backfilled with arisings and reinstated.

The foundation pit logs are presented in Appendix 4.

3.5. Slit Trenches

Slit trenching was completed at 3 No. locations by hand digging with machine assistance where possible. The trenches were completed to check for any underground services at the selected locations. The trenches were logged and photographed before they were backfilled with the arisings.

The slit trench logs with photographs are presented in Appendix 5.

3.6. California Bearing Ratio Tests

At 6 No. locations, undisturbed cylindrical mould samples were recovered to complete California Bearing Ratio tests in the laboratory. The results facilitate the designing of the access roads and associated areas and are completed to BS1377: 1990: Part 4, Clause 7 ‘Determination of California Bearing Ratio’. The results are presented as part of Appendix 6 with the geotechnical laboratory test data.

3.7. Surveying

Following completion of all the fieldworks, a survey of the exploratory hole locations was completed using a GeoMax GPS Rover. The data is supplied on each individual log and along with a site plan in Appendix 9.

4. Laboratory Testing

Geotechnical laboratory testing was completed on representative soil samples in accordance with BS 1377 (1990). Testing included:

- 65 No. Moisture contents
- 12 No. Atterberg limits
- 25 No. Particle size gradings with 12 No. hydrometers
- 3 No. shear boxes
- 10 No. pH and sulphate content

Environmental testing was completed by Eurofins Chemtest Ltd and this allows for a Waste Classification report to be produced. The environmental testing consists of the following:

- 70 No. Suite I analysis

The geotechnical laboratory test results are presented in Appendix 6 with the environmental test results and Waste Classification report in Appendix 7 and 8 respectively.

5. Ground Conditions

5.1. MADE GROUND

MADE GROUND was encountered at most locations across the site generally to 1.10mbgl or shallower although it did extend deeper at 6 No. locations with TP02 recording fill material to 2.20mbgl. The fill material is dominated by consists of granular sand and gravel fill although some cohesive clay soils were also recorded. The foreign material recorded in these soils include concrete, timber, tarmacadam, pottery, bone, ash, slag, plastic bags and red brick fragments.

5.2. Overburden

The natural ground conditions are consistent with cohesive soils encountered across the site. This includes brown and brown grey overlying black slightly sandy gravelly silty CLAY with high cobble and low boulder content soils. The black CLAY was recorded at depths ranging from 1.80mbgl to 3.20mbgl. At the trial pit locations, some layers of granular GRAVEL were also recorded towards the north of the site. The boreholes terminated at depths ranging from 4.50mbgl to 8.60mbgl on boulder obstructions.

The SPT N-values in the natural ground at 1.00mbgl range from 4 to 19 indicating soft to stiff soils. The N-values then increase to 11 to 33 at 2.00mbgl and steadily increase with depth as the boreholes progress.

Laboratory tests of the shallow cohesive soils confirm that CLAY soils dominate the site with low to intermediate plasticity indexes of 14% to 16% recorded. The particle size distribution curves were poorly sorted straight-line curves with 22% to 53% fines content.

5.3. Groundwater

Groundwater details in the boreholes and trial pits during the fieldworks are noted on the logs in Appendix 1 and 2. Groundwater ingresses were recorded in 13 No. boreholes with initial water strikes between 0.80mbgl and 3.20mbgl. At four of the boreholes, BH11, BH13, BH15 and BH16, the initial strike was sealed off by the borehole casings and then groundwater re-entered the borehole between 3.50mbgl and 4.50mbgl.

Groundwater was recorded in 12 of the trial pits at depths ranging from 1.30mbgl to 2.10mbgl with ingress rates recorded as seepages to slow.

6. Recommendations and Conclusions

Please note the following caveats:

The recommendations given, and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between the exploratory hole locations or below the final level of excavation, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for adjacent unexpected conditions that have not been revealed by the exploratory holes. It is further recommended that all bearing surfaces when excavated should be inspected by a suitably qualified Engineer to verify the information given in this report.

Excavated surfaces in clay strata should be kept dry to avoid softening prior to foundation placement. Foundations should always be taken to a minimum depth of 0.50mBGL to avoid the effects of frost action and possible seasonal shrinkage/swelling.

If it is intended that on-site materials are to be used as fill, then the necessary laboratory testing should be specified by the Client to confirm the suitability. Also, relevant lab testing should be specified where stability of side slopes to excavations is a concern, or where contamination may be an issue.

6.1. Shallow Foundations

Due to the unknown depth of foundation and no longer-term groundwater information, this analysis assumes the groundwater will not influence the construction or performance of these foundations.

As stated previously, man-made soils were recorded across the site to a maximum depth of 2.20mbgl. SIL do not recommend that narrow shallow foundations are placed on fill material due to the unknown compaction methods used during laying of man-made material. This unknown could result in softer spots and differential settlement once construction is completed. If shallow foundations are to be used and man-made soils are encountered below foundation level, then the soil should be removed and replaced with engineered fill which is compacted to the required standard.

Beneath the fill material the boreholes recorded cohesive CLAY soils. Using a correlation proposed by Stroud and Butler, the SPT N-values and plasticity indices can be used to calculate the undrained shear strength. With the low to intermediate plasticity indexes recorded in the laboratory for the soils encountered on site, this correlation is C_u=6N. This value can then be used to calculate the ultimate bearing capacity (UBC), and finally, a factor of safety is applied to get the allowable bearing capacity, with a factor of 3 chosen for this project.

BH:	1.20m				2.00m				3.00m			
	SPT	C_u	UBC	ABC	SPT	C_u	UBC	ABC	SPT	C_u	UBC	ABC
01	-	-	-	**-**	33	198	1045	**350**	32	192	1033	**345**
02	7	42	235	**80**	13	78	434	**145**	21	126	695	**230**
03	-	-	-	**-**	18	108	587	**195**	29	174	942	**315**
04	-	-	-	**-**	20	120	648	**215**	30	180	972	**325**
05	15	90	480	**160**	14	84	465	**155**	20	120	666	**220**
06	7	42	235	**80**	17	102	556	**185**	21	126	695	**230**
07	-	-	-	**-**	22	132	710	**235**	24	144	788	**265**
08	11	66	358	**120**	14	84	465	**155**	31	156	1000	**335**
09	19	114	603	**200**	19	114	617	**205**	31	156	1000	**335**
10	14	84	450	**150**	31	156	985	**330**	31	156	1000	**335**
11	10	60	328	**110**	19	114	617	**205**	35	210	1125	**375**
12	4	24	144	**50**	17	102	556	**185**	22	132	727	**245**
13	11	66	358	**120**	11	66	372	**125**	26	156	850	**285**
14	11	66	358	**120**	25	150	800	**265**	30	180	972	**325**
15	9	54	297	**100**	15	90	495	**165**	32	192	1033	**345**
16	14	84	450	**150**	33	198	1045	**350**	39	234	1247	**415**

All values are in kN/m^2.

The following assumptions were made as part of these analyses. If any of these assumptions are not in accordance with detailed design or observations made during construction these recommendations should be re-evaluated.

- Foundations are to be constructed on a level formation of uniform material type (described above).
- The bulk unit weight of the material in this stratum has a minimum density of 19kN/m^3.
- All bearing capacity calculations allow for a settlement of 25mm.

The trial pit walls remained stable during excavation. However, it would still be recommended that all excavations should be checked immediately and regular inspection of temporary excavations should be completed during construction to ensure that all slopes are stable. Temporary support should be used on any excavation that will be left open for an extended period.

6.2. Groundwater

The caveats below relating to interpretation of groundwater levels should be noted:
There is always considerable uncertainty as to the likely rates of water ingress into excavations in clayey soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water.

Furthermore, water levels noted on the borehole and trial pit logs do not generally give an accurate indication of the actual groundwater conditions as the borehole or trial pit is rarely left open for sufficient time for the water level to reach equilibrium.

Also, during boring procedures, a permeable stratum may have been sealed off by the borehole casing, or water may have been added to aid drilling. Therefore, an extended period of groundwater monitoring using any constructed standpipes is required to provide more accurate information regarding groundwater conditions. Finally, groundwater levels vary with time of year, rainfall, nearby construction and tides.

Pumping tests would be required to determine likely seepage rates and persistence into excavations taken below the groundwater level. Deep trial pits also aid estimation of seepage rates.

As discussed previously, groundwater was recorded in 13 No. boreholes and 12 No. trial pits during the fieldworks. There is always considerable uncertainty as to the likely rates of water ingress into excavations in cohesive soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water. Based on this information at the exploratory hole locations to date, it is considered likely that any shallow ingress (less than 2.00mbgl) into excavations of the CLAY will be slow to medium. If granular soils are encountered in shallow excavations, then the possibility of water ingressing into an excavation increases.

If groundwater is encountered during excavations then mechanical pumps will be required to remove the groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

6.3. Soakaway Test

SA02 and SA03 passed the BRE specification with the water draining from the trial pit. SA02 was completed in fill material, which may not have been compacted as much as the natural soils and SA03 was completed in granular SAND and GRAVEL soils. The f-values were calculated as **7.36 x 10^{-5}m/s** and **2.20 x 10^{-4}m/s.** It would be recommended that any soakaway is placed in the natural granular soils.

The soakaway tests, SA01 and SA04, failed the specification as the water level did not fall sufficiently enough to complete the test. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The tests were terminated at the end of the first (of a possible three) fill/empty cycle since further testing would give even slower fall rates due to increased soil saturation.

6.4. Pavement Design

The CBR test results in Appendix 6 indicate CBR values ranging from 6.4% to 8.9%.

The CBR samples were recovered at 0.40mbgl and inspection of the formation strata should be completed prior to construction of the pavement. Once the exact formation levels are finalised then additional in-situ testing could be completed to assist with the detailed pavement design.

6.5. Contamination

Environmental testing was carried out on seventy samples from the investigation and the results are shown in Appendix 7. For material to be removed from site, Suite I testing was carried out to determine if the material is hazardous or non-hazardous and then the leachate results were compared with the published waste acceptance limits of BS EN 12457-2 to determine whether the material on the site could be accepted as 'inert material' by an Irish landfill.

The Waste Classification report in Appendix 8, created using HazWasteOnline™ software, shows that the material tested can be classified as non-hazardous material.

Following this analysis of the solid test results, the leachate disposal suite results showed 36 No. samples remained within the Inert waste thresholds. 23 No. samples recorded determinands that exceed the Inert threshold but remain below the non-hazardous waste landfill levels whereas 11 samples exceeded these upper levels. It would be recommended that an Environmental Engineer is consulted prior to any earthworks commencing on site.

Seventy samples were tested for analysis but it cannot be discounted that any localised contamination may have been missed. Any MADE GROUND excavated on site should be stockpiled separately to natural soils to avoid any potential cross contamination of the soils. Additional testing of these soils may be requested by the individual landfill before acceptance and a testing regime designed by an environmental engineer would be recommended to satisfy the landfill.

6.6. Aggressive Ground Conditions

The chemical test results in Appendix 6 indicate a general pH value between 7.32 and 8.11, which is close to neutral and below the level of 9, therefore no special precautions are required.

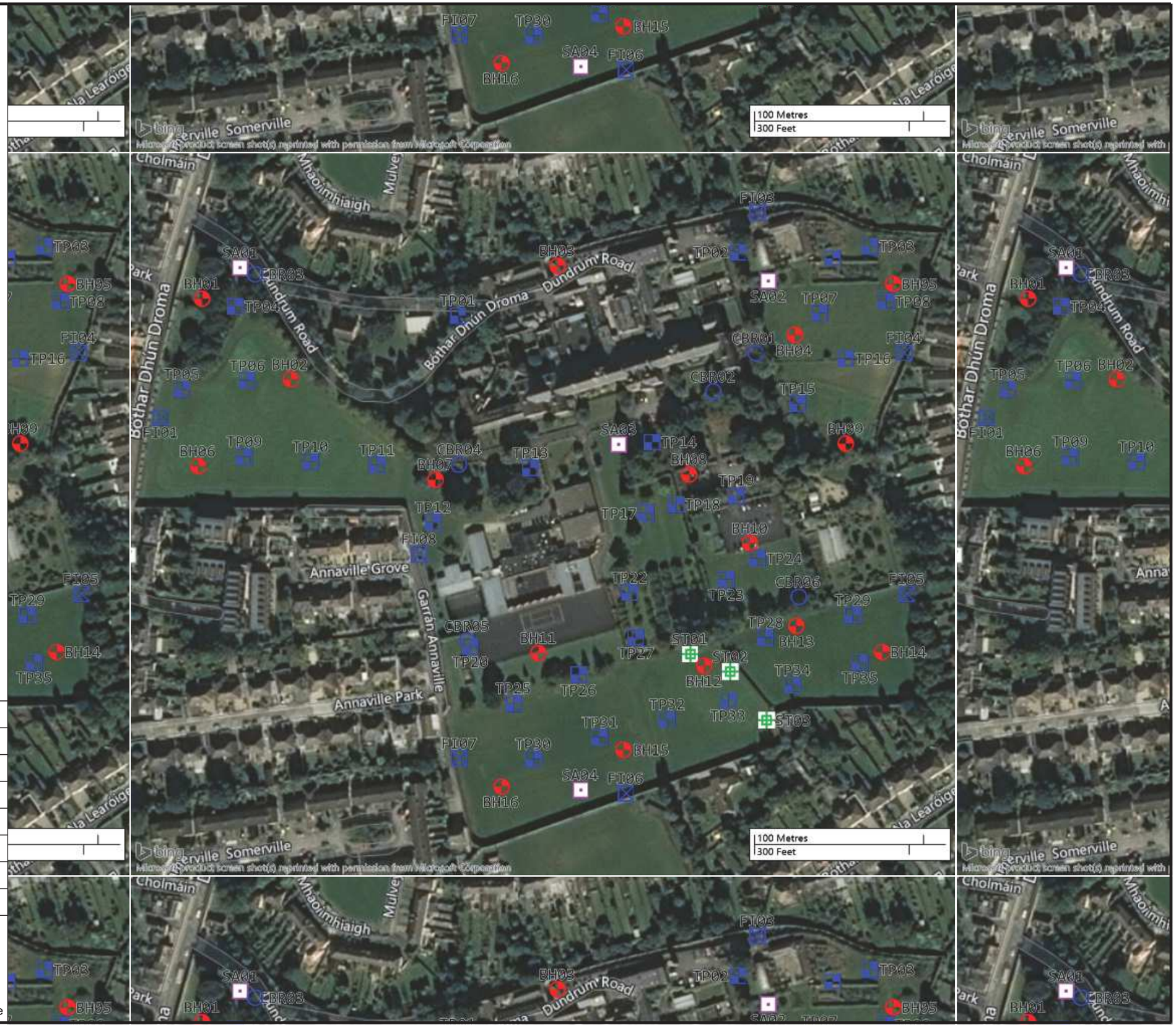
The maximum value obtained for water soluble sulphate was 127mg/l as SO_3. The BRE Special Digest 1:2005 – '*Concrete in Aggressive Ground'* guidelines require SO_4 values and after conversion ($SO_4 = SO_3 \times 1.2$), the maximum value of 152mg/l shows Class 1 conditions and no special precautions are required.

Legend Key

- Locations By Type - CP
- Locations By Type - DP
- Locations By Type - ICBR
- Locations By Type - IP
- Locations By Type - OP
- Locations By Type - TP

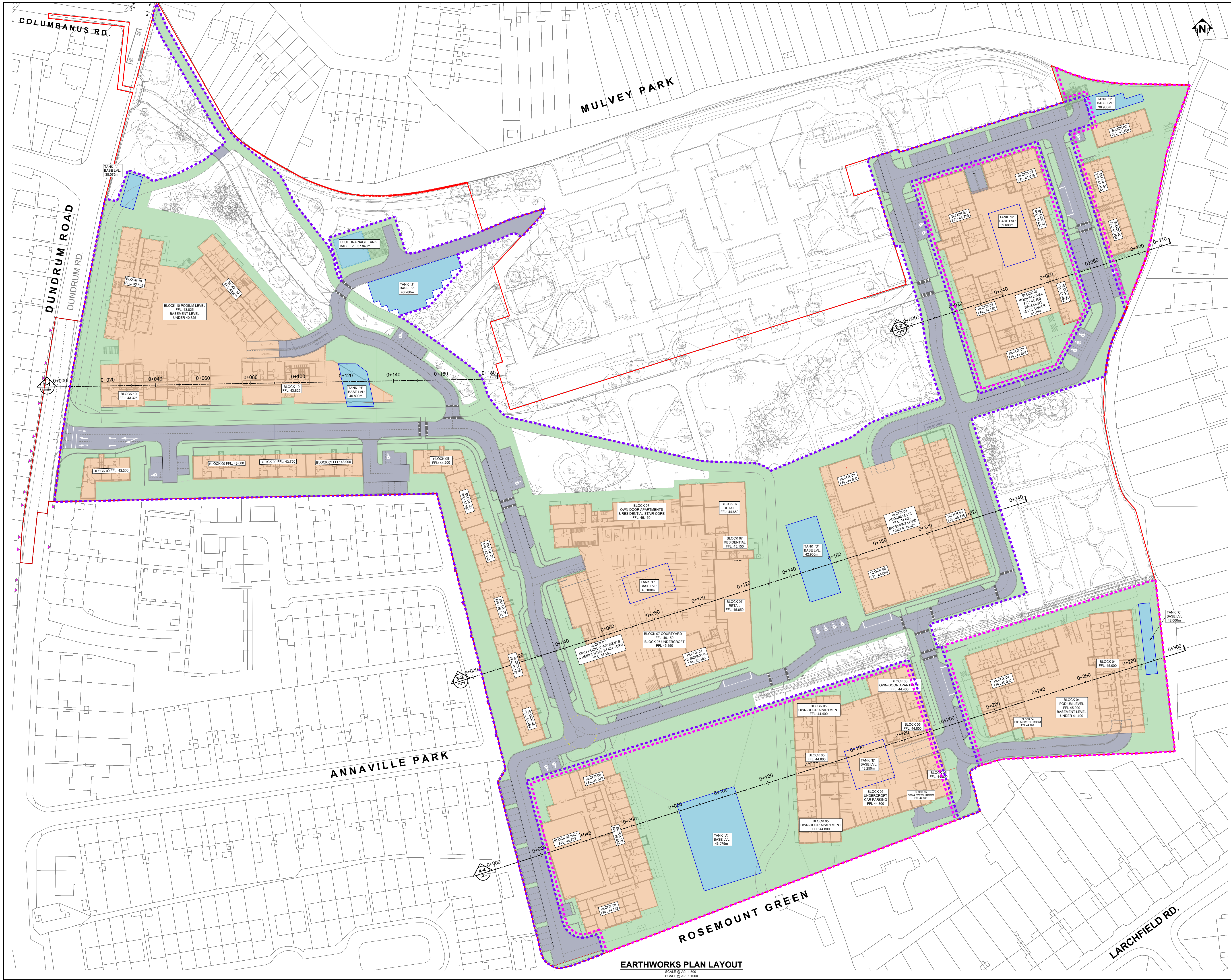
Contract No:	5811
Contract Name:	Dundrum Central Development
Location:	Dundrum, Dublin 14
Client:	Land Development Agency
Engineer:	Barrett Mahony
Title:	Site Plan
Scale:	1:2250
Drawn By:	SL

Site Investigations Ltd
The Grange
12th Lock Road
Lucan
Co. Dublin
T: 01 6108768
e: info@siteinvestigations.ie



Appendix 2

Earthworks Drawings



EARTHWORKS PLAN LAYOUT

SCALE @ A0: 1:500
SCALE @ A2: 1:1000

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - `ASK`.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.

KEYPLAN CUT AND FILL

SCALE @ A0: 1:5000
SCALE @ A2: 1:10000

TOTAL VOLUMES

	BUILDINGS AVERAGE FOUNDATION/GROUND FLOOR: 700mm CUT VOLUME: 39,305m³ FILL VOLUME: 3,552m³
	ROADS AND CAR PARKING BUILDUP: 500mm CUT VOLUME: 5,695m³ FILL VOLUME: 555m³
	ATTENUATION TANKS AND FOUL DRAINAGE TANK BASE LEVEL AS SHOWN CUT VOLUME: 5,036m³ FILL VOLUME: 0m³
	FOOTPATHS AND LANDSCAPING BUILDUP: 300mm CUT VOLUME: 6,296m³ FILL VOLUME: 2,941m³
	BOUNDARY LINE
	PHASE 1
	PHASE 2

SITE STRIP = EXISTING TOPOGRAPHY LESS 300mm TOP SOIL DEPTH.
BULK EXCAVATION VOLUMES
SITE STRIP CUT VOLUME = 22,177m³
PHASE 1 = 14,500m³
PHASE 2 = 7,677m³

THESE ARE MEASURED BELOW SITE STRIP LEVELS

TOTAL FILL VOLUME = 7,048m³
TOTAL CUT VOLUME = 56,332m³
NET CUT VOLUME = 49,284m³

PHASE 1:
FILL VOLUME = 2,368m³
CUT VOLUME = 40,953m³
NET CUT VOLUME = 38,585m³

PHASE 2:
FILL VOLUME = 4,681m³
CUT VOLUME = 15,379m³
NET CUT VOLUME = 10,699m³

NOTE:
FFL: FINISHED FLOOR LEVEL

ISSUE	DATE	DESCRIPTION	BY
P1	10.05.24	ISSUED FOR COMMENT	AO

Project Engineer: Peter O'Dwyer | Project Director: John Considine

BM STAGE
PRELIMINARY

BM BARRETT MAHONY
Dublin Office: Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland. Tel: (01) 677 3200 Fax: (01) 677 3164
London Office: 12 Mill Street, London SE1 2AY, United Kingdom Tel: (0044) 084 5413 2722
Consulting Engineers, Civil . Structural . Project Management.E-mail: bmce@bmce.ie Web: www.bmce.ie
The Institution of Structural Engineers ACEI International Federation of Consulting Engineers

CLIENT: THE LAND DEVELOPMENT AGENCY

PROJECT TITLE: DUNDRUM CENTRAL

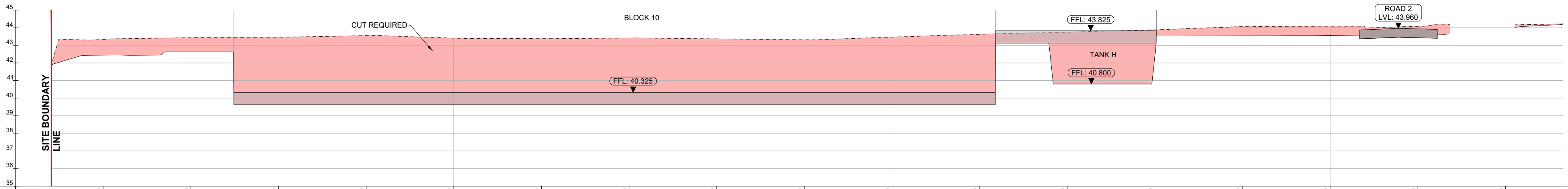
BM PROJECT No.: 20.170

MODEL REFERENCE: DCD-BMD-00-00-DR-C-(11500-11510) | SUITABILITY | REVISION

DRAWING TITLE: EARTHWORKS PLAN LAYOUT

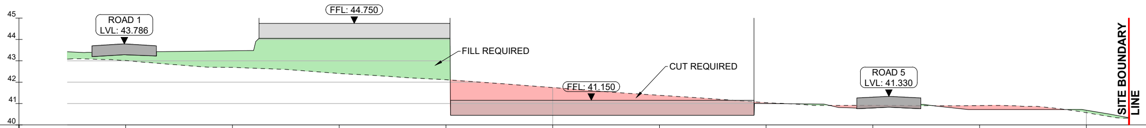
DWG DRAWING REFERENCE: DCD-BMD-00-00-DR-C-11500 | STATUS | REVISION: P1

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS & ARCHITECT'S DRAWINGS.FIGURED DIMENSIONS ONLY (NOT SCALING) TO BE USED. WHERE A CONFLICT OF INFORMATION EXISTS OR IF IN ANY DOUBT - `ASK'.
2. CONSULTANTS TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.



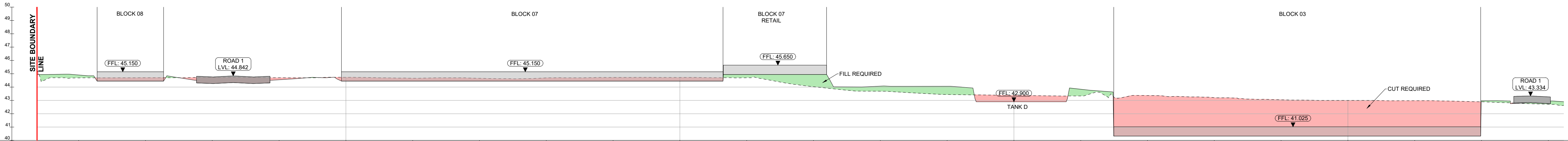
Chainage	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180
Site Strip Levels		43.336	43.430	43.463	43.549	43.405	43.381	43.412	43.367	43.315	43.468	43.626	43.747	43.880	44.064	44.081	44.078		
Formation Levels		42.443	42.625	39.625	39.625	39.625	39.625	39.625	39.625	39.625	39.625	39.625	40.800	42.403	43.535	43.553	43.431		
Level difference		-0.893	-0.805	-3.838	-3.924	-3.780	-3.756	-3.787	-3.742	-3.690	-3.843	-4.001	-2.947	-1.477	-0.529	-0.528	-0.647		

SECTION 1-1
SCALE @ A0 H= 1:250; V=1:125



Chainage	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110
Site Strip Levels		43.011	42.692	42.407	42.112	41.744	41.383	41.039	40.911	40.901	40.571	
Formation Levels		43.283	43.467	44.050	44.050	40.450	40.450	40.998	40.792	40.718	40.682	
Level difference		0.272	0.775	1.643	1.938	-1.294	-0.933	-0.041	-0.119	-0.184	0.112	

SECTION 2-2
SCALE @ A0 H= 1:250; V=1:125

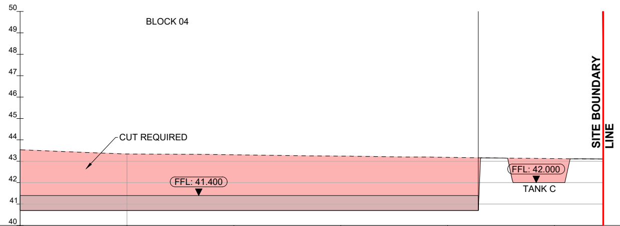


Chainage	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180	0+190	0+200	0+210	0+220	0+230	0+240
Site Strip Levels		44.690	44.707	44.734	44.705	44.739	44.670	44.665	44.697	44.728	44.727	44.700	44.031	43.692	43.446	43.380	43.336	43.368	43.207	43.052	43.002	42.981	42.900	42.711	
Formation Levels		44.910	44.450	44.269	44.550	44.450	44.450	44.450	44.450	44.450	44.450	44.950	44.950	44.073	44.064	42.900	43.840	40.325	40.325	40.325	40.325	40.325	42.975	42.767	
Level difference		0.220	-0.257	-0.466	-0.156	-0.289	-0.220	-0.215	-0.247	-0.278	-0.277	0.250	0.919	0.381	0.619	-0.480	0.504	-3.043	-2.882	-2.727	-2.677	-2.656	0.076	0.056	

SECTION 3-3
SCALE @ A0 H= 1:250; V=1:125

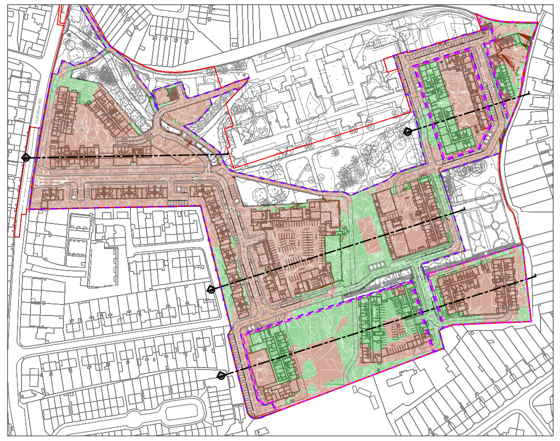
Chainage	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180	0+190	0+200	0+210	0+220	0+230	0+240
Site Strip Levels		45.215	44.824	44.788	44.683	44.603	44.489	44.435	44.388	44.315	44.228	44.161	44.101	43.984	43.911	43.923	43.935	43.916	43.934	43.883	43.780	43.739	43.637	43.541	43.537
Formation Levels		45.307	44.066	44.082	44.082	44.842	44.842	44.432	44.388	43.075	43.075	44.183	44.150	44.051	44.100	44.100	43.250	43.250	44.100	44.100	44.150	44.081	40.700	40.700	40.700
Level difference		0.093	-0.759	-0.706	-0.601	0.239	0.353	-0.003	0.000	-1.240	-1.153	0.022	0.049	0.067	0.189	0.177	-0.685	-0.666	0.166	0.217	0.369	0.342	-2.937	-2.841	-2.837

SECTION 4-4
SCALE @ A0 H= 1:250; V=1:125



Chainage	0+240	0+250	0+260	0+270	0+280	0+290	0+300
Site Strip Levels	43.537	43.339	43.303	43.242	43.180	43.124	
Formation Levels	40.700	40.700	40.700	40.700	40.700	42.000	
Level difference	-2.837	-2.639	-2.603	-2.542	-2.480	-1.124	

SECTION 4-4
SCALE @ A0 H= 1:250; V=1:125



KEYPLAN CUT AND FILL

SCALE @ A0: 1:2500
SCALE @ A2: 1:5000

LEGEND

(red fill)	CUT REQUIRED
(green fill)	FILL REQUIRED
- - - - - -	EXISTING GROUND PROFILE
————	FORMATION LEVELS PROFILE

EARTHWORKS LONGITUDINAL SECTIONS

SCALE @ A0: 1:500
SCALE @ A2: 1:1000

ISSUE	DATE	DESCRIPTION	BY
P1	10.05.24	ISSUED FOR COMMENT	AO

Project Engineer: Peter O'Dwyer | Project Director: John Considine

BM STAGE
PRELIMINARY

BM BARRETT MAHONY
Dublin Office:
Sandwith House, 52-54 Lower Sandwith Street, Dublin 2, Ireland.
Tel: (01) 677 3200 Fax: (01) 677 3164
London Office:
12 Mill Street, London SE1 2AY, United Kingdom
Tel: (0044) 084 5413 2722
Consulting Engineers, Civil . Structural . Project Management.E-mail: bmce@bmce.ie Web: www.bmce.ie

CLIENT
THE LAND DEVELOPMENT AGENCY

PROJECT TITLE
DUNDRUM CENTRAL

BM PROJECT No.
20.170

MODEL REFERENCE
DCD-BMD-00-00-DR-C-(11500-11510)

SUITABILITY | REVISION

DRAWING TITLE
EARTHWORKS LONGDITUDINAL SECTIONS

DWG DRAWING REFERENCE
DCD-BMD-00-00-DR-C-11510

STATUS | REVISION
P1

Barrett Mahony Consulting Engineers

Dublin:
Sandwith House,
52-54 Lower Sandwith Street,
Dublin 2,
D02 WR26, Ireland.
Tel: +353 1 677 3200

London:
12 Mill Street,
London, SE1 2AY,
United Kingdom
Tel: +44 203 750 3530.

Sofia:
19 Yakubitsa Street,
Lozenets,
Sofia 1164,
Bulgaria
Tel: +359 2 494 9772

WWW.BMCE.IE