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ENGINEERING PLANNING REPORT

OMNI PLAZA SHD

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1.0 INTRODUCTION

Permission for a 7 year duration is sought by Serendale Limited for a Strategic Housing Development which comprises the demolition of the existing industrial / warehouse buildings northwest of Omni Park Shopping Centre, Santry, Dublin 9 and the construction of 457 no. apartments across 4 no. blocks, ranging in height from 4-12 storeys (over basement). The proposal includes 2 no. retail/café/restaurant units, 1 no. community building, 1 no. childcare facility, 1no. residential amenity space and 5 no. ESB substations.

The development also provides for a basement carpark of 213 no. spaces and 7 no. motorcycle spaces with 7 no. creche drop-off parking spaces and 6 no. carshare parking spaces located in newly reconfigured surface carpark. The proposal provides for 768 no. bicycle parking spaces.

The proposal includes the provision of a new public open space plaza, with consequential revisions to existing commercial car parking areas, to integrate the proposals with the wider District Centre.

The proposal includes the provision of pedestrian and cycle connections and improvements through Omni Park Shopping Centre, including a plaza and cycle/pedestrian link substantially in the form permitted as part of the Omni Living Strategic Housing Development (Ref. ABP-307011-20).

Access to the proposed 213 no. basement car parking spaces is via the existing Omni Park Shopping Centre. A secondary servicing and emergency access is via the existing service road to the rear of existing retail premises at Omni Park Shopping Centre and accessed from the Swords Road.

The development provides for all associated and ancillary site development, demolition and clearance works, hoarding during construction, revisions to car parking within the Omni Park Shopping Centre, soft and hard landscaping, public realm works, public lighting and signage, ancillary spaces, plant including photovoltaic panels, water infrastructure, utilities and services.

The application is accompanied by an Environmental Impact Assessment Report.

A full description of the development is contained within the public notices, architectural drawings and accompanying application documents.

This report addresses the surface water drainage, foul water drainage and water supply for the proposed development. This report should be read in conjunction with EirEng Consulting Engineers drawings.

2.0 SITE LAYOUT LOCATION

The location of the proposed development is identified in red in Figure 1 below.

Figure 1 - Subject Site Location

The existing site is located in Santry, Dublin. The lands primarily comprise of the former Molloy & Sherry Warehouse premises and lands generally to the north west corner of the Omni Park Shopping Centre including existing carpark. The site is located west of Lidl and to the north and east of the IMC Cinema within the Omni Park Shopping Centre and east of Shanliss Avenue.

The application site includes lands within the existing Omni Park Shopping Centre and the primary access is proposed from same. User access to the site will be via a new ramp into the underground car park from the Omni Park Shopping Centre development.

Fire tender access to the site will be via the existing private industrial road located directly east of the site & from the OMNI shopping centre carpark, both of which connect to the Swords Road.

3.0 SURFACE WATER DRAINAGE AND SUDS

The surface water drainage layout is indicated on EirEng Consulting Engineers drawing 201121-ECE-ZZ-XX-DR-C-0002.

3.1 Existing Surface Water Drainage

The existing industrial/commercial units currently located on site are drained via gravity into 2 No. surface water drainage networks which connect into a private surface water network. The private surface water network flows east where it connects into a public surface water sewer located within Swords Road.

The existing surface water networks and their connections to the private surface water network will be decommissioned.

3.2 Proposed Surface Water Drainage

Surface water run-off from the proposed development will be collected in a new slung surface water drainage network in the basement which will connect to a new external surface water drainage network within the site and fall by gravity to an underground attenuation system located in the communal open space located on the western boundary of the development. The outfall from the attenuation system will be limited to a flow rate of 2 l/s/ha.

It is proposed to connect the surface water outfall to an existing 750mm public surface water sewer located in the loading area to the west of OMNI Shopping Centre. This 750mm public surface water sewer in turn discharges to a culverted section of the river Wad approximately 550m south of the proposed development. Details of the new outfall route are included on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0002.

The proposed surface water drainage network and attenuation system have been designed using WinDes Micro-drainage software in accordance with the "Greater Dublin Strategic Drainage Study (GDSDS)" using the following criteria.

- M5-60 of 17.000 mm and a ratio (R) of 0.300
- Return period of 2 years for pipeline design
- Interception storage of 10mm to be provided across the site using various SUDS features
- Return period of 100 years with an additional allowance of 20% for climate change for attenuation design
- No out of manhole flooding for the 1 in 30-year event
- Surface water outfall flow rate from the site will be limited to 2l/s/Ha. Site development area is 1.549Ha (as per pink line on architects Site Location Map included as part of the planning pack). A restricted outflow rate of 3.1 l/s was used in calculations for the site.
- No internal property flooding and FFL to be minimum 500mm above top attenuation storage level
- Management of overland flood routes (see accompanying Site Specific Flood Risk Assessment report)
- Run-off coefficients as follows The following runoff coefficient were used;
    - Paved Area – 90% (DCC Sustainable drainage design & Evaluation Guide 2021)
    - Roof Area – 95% (DCC Sustainable drainage design & Evaluation Guide 2021)

- Podium – 50% (Conservative assumption taken. Value as per Green roof with 50mm substrate in Green Roof Code of Practice UK 2014 & The GRO Green Roof code 2021, referenced in the DCC Green/Blue roof Guide 2021)
- Green/Blue roofs – 81% (As per Green Roof Code of Practice UK 2014 & The GRO Green Roof code 2021, referenced in the DCC Green/Blue roof Guide 2021)
- Landscape – 25% (Good Practice)
- Permeable Paving – 70% (Good Practice)

MicroDrainage model results in relation to the surface water drainage network are included in Appendix A of this report.

Sustainable Urban Drainage Systems form the core of the surface water drainage design and will be discussed in detail in the following sections. It was reported by ABP during the pre-planning meeting that DCC considered the SUDS strategy as being well designed. This strategy has been refined and improved as part of the detailed application stage.

The drainage network & strategy to the existing carpark and walkways to the south of the development drainage is to be retained. The trapped gullies in the carpark are regularly maintained by the management company of OMNI Shopping Centre as part of the overall maintenance strategy of the surface water drainage network. The pedestrian link plaza to swords road will drain via tree pits and landscaping infiltration.

The development will include a basement level for car parking. The car park will be drained via a separate surface water drainage network which will pass through an petrol interceptor before being pumped to surface level and discharging to the foul water network as per the requirements of the GDSDS.

3.3 Proposed Sustainable Urban Drainage System (SUDS)

In accordance with best practice and Dublin City Council's requirements for SHDs a two stage SUDS treatment approach has been incorporated on site. The proposed two-stage surface water SUDS approach will slow down the rate of surface water runoff from the development, intercept first flush flows and improve the quality of water that is intercepted by the surface water drainage network through biodegradation, pollutant adsorption and settlement and retention of solids.

The SUDS Masterplan layout for the development is indicated on EirEng Consulting Engineers drawing 201121-ECE-ZZ-XX-DR-C-0006

The surface water design approach taken to comply with the key design criteria set out in Section 16.3 of the Greater Dublin Regional Code of Practice for Drainage Works is detailed below for clarity:

Criteria 1 – River Water Quality Protection

- Interception storage for the initial 10mm rainfall has been designed to be provided across the site as detailed above

Criteria 2 – River Regime Protection

- The surface water outfall flow rate has been designed to be limited to 2 l/s/ha

- Both the attenuation storage and surface water drainage network have been designed for the 1 in 100 year event plus 20% allowance for climate change

Criteria 3 – Level of Service (Flooding) for the Site

- The surface water drainage network has been designed so that no out of manhole flooding occurs in the 1 in 30 year event
- The surface water drainage network has been designed so that no internal property flooding occurs on the site
- The finished floor level has been designed to be a minimum of 500mm above the top attenuation tank storage level
- The surface water drainage network has been designed to ensure no flooding of adjacent urban areas. A separate site-specific flood risk assessment has been prepared and is included as part of the planning pack

Criteria 4 – River Flood Protection

- Separate long-term storage cannot be provided on site. As such the maximum surface water outfall flow rate from the site has been designed to be limited to 2 l/s/ha the in accordance with sub-clause 4.3.

As part of the first stage of runoff treatment a significant section of the available roof and podium area will be covered with green roofs and Permavoid podium attenuation systems as can be seen on EirEng drawings 201121-ECE-ZZ-XX-DR-C-0002 & 201121-ECE-ZZ-XX-DR-C-0006 and JFA Architects drawings.

A brief description of all three first stage runoff treatment systems is provided in the following sections;

3.3.1 Green Roof System

Green Roof System

The Green roof systems on the development will be a sedum roof type with substrate. It will have a drainage mat layer and can have a mixture of planted & seeded finishes. Figure 3 below show the typical outlet from a green roof system

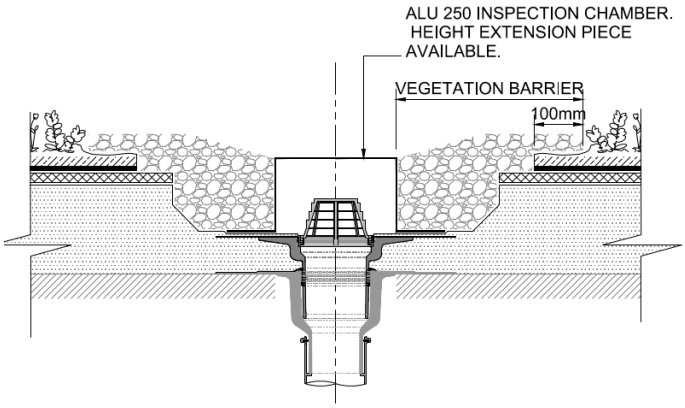

Figure 2 - Green Roof Outlet

Typical details of the proposed sedum green roof system are shown in Figure 4 below.

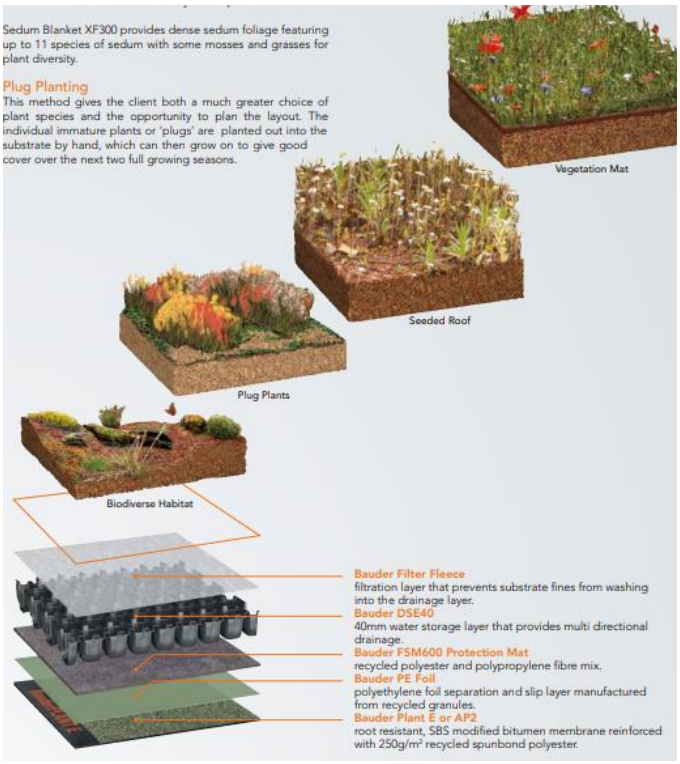

Figure 3 - Sedum Green Roof Build Ups

The green roof areas will capture rainfall events and allow water to slowly filter down through the substrate layer to the bottom drainage layer before draining to an outlet pipe. This will reduce the runoff rate from these areas as well as intercepting smaller rainfall events. Approximately 841m^2 of green roof will be installed on the development.

All surface water runoff from the roof areas will ultimately be collected by slung drainage pipe runs located underneath each building which will connect into the proposed external surface water drainage network as shown on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0002.

3.3.2 Permavoid Podium Attenuation System

At ground level in areas of podium slab that overlay the basement extents, it is proposed to drain the podium via. Permavoid podium attenuation system.

The Permavoid system will consist of an 85mm deep geocellular unit placed on top of the podium waterproofing membrane. This will be overlain by a Type 2 aggregate subbase in accordance with TII Series 800 which will allow water to pass through to the attenuation cells below. As shown in Figure 4 below the outfall downpipe from the attenuation system will include a flow restrictor which will control the outflow and allow an attenuation volume to be stored in the area above the podium. The site wide surface water model has been developed using flow restrictors of 1.0 l/s on the permavoid podium attention areas to ensure the surface water model mimics the real world performance of the designed surface water network.

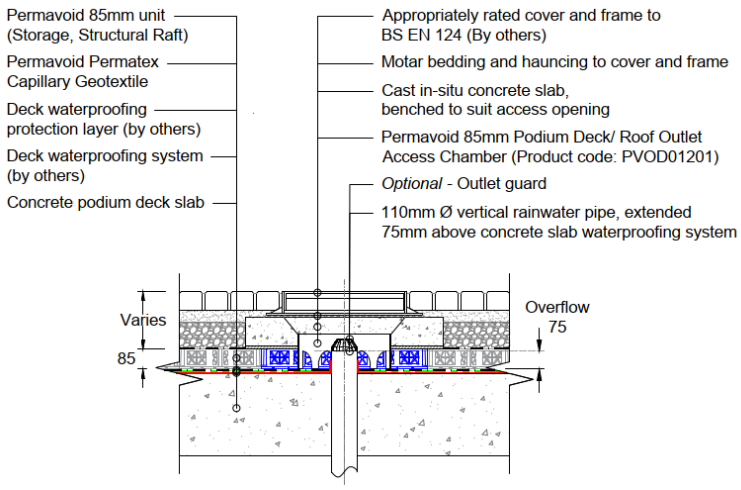

Figure 5 - Permavoid Podium Attenuation Outlet

Approximately 2319m^2 of Permavoid podium attenuation will be installed in the proposed development. A MicroDrainage Source Control model was run to determine the volume of attenuation storage required for a contributing area of 2319m^2 for the 1 in 100-year event plus 20% climate change and a required attenuation volume of 163m^3 was determined which equates to a depth of 74mm in the 85mm attenuation layer. The proposed podium attenuation system will provide approximately 187m^3 of attenuation volume, more than the 163m^3 required.

Podium Attenuation Volume Provided = 2319m^2 (approx. Permavoid permeable paving podium area) x 0.085m (attenuation crate depth) x 0.95 (void ratio) = **187m^3**

MicroDrainage Source Control model results in relation to the podium attenuation volumes are enclosed in Appendix B of this report.

The run-off will then drain to slung drainage pipe runs located under the podium slab. The slung drainage runs will connect into the proposed external surface water drainage network as shown on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0002.

3.3.3 Interception Storage

Interception storage is required to ensure the proposed site behaves like a greenfield site in retaining its ability to absorb the first flush (rainfall depth 5mm, preferably 10mm) resulting in no measurable runoff taking place into receiving waters. (GDSDS Volume 2 Appendix 1.1.5). Interception storage has been provided in accordance with GDSDS Volume 2 Appendix E S2.1.1. The interception volume required is calculated using 80% runoff from paved areas and 0% run-off from pervious. This is noted as a conservative figure and is more likely closer to 60% in GDSDS. A resulting volume of **35m³** (0.867ha x 5mm) will be required across the site.

A significantly larger volume than this will be provided for in the areas of green roof, permeable paving, Permavoid podium attenuation system and extensive landscaping (mounding of landscaping on the podium is proposed up to 1.2m in places). A conservative calculation of the interception has been undertaken for the permavoid podium attenuation system item in the SUDS treatment train. Without relying on the storage capacity within the landscaping substrate above the base of the Permavoid podium attenuation system the system will provide a combined 187m³ of interception storage as detailed below:

Interception Storage Provided = 2319m² (approx. Permavoid permeable paving podium area) x 0.085m (attenuation crate depth) x 0.95 (void ratio) = **187m³**

The remaining SUDS features such as green roof, permeable paving, permeable reinforced grass and extensive landscaping will also provide further interception storage.

Evaporation from the green roof areas, as well as any attenuation volume in the green roofs layers and permeable paving were not included in the surface water design for a more robust design approach. However, in reality a volume of runoff will evaporate which will further improve the performance and sustainability of the proposed surface water drainage network.

3.3.4 Underground Attenuation Storage

As part of the second stage of runoff treatment, all surface water runoff collected by the external surface water drainage network will pass through an attenuation tank. The tank will be located under the private open space located along the western boundary of the development and will provide approximately 393m³ of attenuation storage. MicroDrainage Network model results are included in Appendix A of this report.

Discharge from the tank will be restricted to 2 l/s/ha via a Hydrobrake or equivalent flow control device, located in the outlet manhole downstream of the attenuation tank. A restricted outflow rate of 3.1 l/s was used in calculations for the site based off a site development area of 1.54 Ha.

3.3.5 Additional minor SUDS

In areas at ground level, it is proposed to use permeable reinforced grass, permeable paving and tree pits where feasible to drain landscaping and paving areas located outside the footprint of the basement such as the plaza area.

4.0 FOUL WATER DRAINAGE

The foul water drainage layout is indicated on EirEng Consulting Engineers drawing 201121-ECE-ZZ-XX-DR-C-0003 & 201121-ECE-ZZ-XX-DR-C-0004.

Confirmation of Feasibility & Statement of Design Acceptance have been received from Irish Water for the development (Ref: CDS21003688) and is included in Appendix C. Please see Section *4.3 Irish Water* for further expansion on these documents and discussions with Irish Water

4.1 Existing Foul Drainage

The existing industrial/commercial units located on site are drained via gravity into private foul water drainage networks which connect into a public combined sewer located on Swords Road.

The existing private foul water network will be removed to the northeast site boundary at the corner of the LIDL, the existing foul network from the site boundary to the connection to the public foul sewer on Swords Road will remain as part of the foul design.

4.2 Proposed Foul Drainage

Foul water flows from the development will be collected in a new slung foul drainage network located in the basement which will connect to a new external foul water drainage network within the site. The foul water outfall will connect into a private foul water sewer located within the site and then will discharge to a public foul sewer on Swords Road as shown on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0003.

The basement foul drainage network will drain via gravity network to a pump chamber located in the basement. The effluent will then be pumped to ground level and discharge to a stand-off manhole before connecting into the foul drainage network as the requirements of the GDSDS. Basement drainage layout is shown on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0004.

Estimated foul water flows from the site have been calculated in accordance with current Irish Water Code of Practice. According to the Irish Water CoP for Wastewater Infrastructure (Revision 2 July 2020) Dry weather flows (DWF) should be taken as 446 litres per dwelling (2.7 persons per house and a per capita Wastewater flow of 150 litres per head per day along with a 10%-unit consumption).

Use Type	Number of Dwellings	Foul Flow per Dwelling (l/d)	Daily Flow (l/d)	DWF (l/s)	Peak Flow (l/s)
Residential	457	446	203,822	2.36	7.07

Use Type	Daily Loading (l/day) (PG)	Flow Rate (l/s)	DWF (l/s)	Peak Flow (l/s)
Commercial	9060	0.21	0.231	0.966

Table 1 Estimated Foul Flow Calculations

4.3 Irish Water

As noted above, Confirmation of Feasibility & Statement of Design Acceptance have been received from Irish Water for the development.

The Confirmation of Feasibility letter received from Irish Water for the development noted that a foul connection for the proposed site is feasible subject to upgrades (Ref: CDS21003688), which was also noted in the Irish Water submission at pre-application stage for the development, with specific comments as follows;

"In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Irish Water network. Irish Water currently has a project on our current investment plan which will provide the necessary upgrade and capacity. This upgrade project is scheduled to be completed by 2026 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date."

Item 2 of An Bord Pleanala's (ABP) Opinion on the pre-application consultation process requested further clarification in the application on the upgrade works. ABP Opinion wording below;

"Further consideration and/ or justification of the documents as they relate to the proposed wastewater services. In particular, the consideration/clarification should address the contents of the submission from Irish Water concerning the need to for all works and/or agreements necessary to facilitate the connection and/or upgrade of the development to wastewater infrastructure. Clarity is required at application stage as to what upgrade works are required, who is to deliver these works, when are the works to be delivered relative to the completion of the proposed housing development and whether such upgrade works are to be the subject of separate consent processes."

This required clarification is now provided following correspondence with Irish Water and the production of a detailed project timeline for the proposed development by the client and design team.

The projected completion date for the development, subject to a planning grant, is July 2028 and a minimum 1.5 years later than the projected Irish Water upgrade delivery date, which Irish Water have noted in correspondence as being “currently on track for substantial completion of the works in 2026”. A detailed project timeline for the proposed development is included in Appendix E. The earliest expiry date for a grant of planning pursuant to this development (assuming a decision within 16 weeks) is January 2030. This allows a further buffer beyond the delivery date of the Irish Water upgrade delivery if required. Notwithstanding these dates the client has agreed, and as would be expected to be included in a standard condition wording of any planning decision, that first occupation of any unit will not take place until a connection agreement, and subsequent connection, is in place for the development.

In correspondence with Irish Water they have provided the relevant information and clarification to address the queries noted in item 2 of the ABP opinion. A conference call between the design team and Irish Water was also undertaken immediately prior to submission of this application to ensure all information submitted is current. A copy of this correspondence is included in Appendix E and confirms that “Irish Water are delivering the upgrade works at Santry Pump Station. The Santry Pump Station upgrade is (required) due to overflows into the adjacent watercourse. There is no storage at this location. In addition, the diversion of flows to the north fringe will increase capacity to the network in the North Side of Dublin City”. The upgrade works will divert flows from the existing Santry Pumping Station to the North Fringe Sewer including “a complete civil and M&E replacement and relocation of the Santry pump station site. A new emergency overflow tank will also be constructed at the site”. No agreements are necessary between Irish Water and the developer to facilitate the upgrade works with the development only requiring a connection application, as is standard. All agreements and consents required for the upgrade works will be applied for and put in place by Irish Water, “as necessary, in line with the project timeline”. Irish Water confirm in their correspondence they “are currently on track for substantial completion of the works by 2026” which aligns with the project delivery date noted in the Confirmation of Feasibility letter. A conference call between the design team and Irish Water was also undertaken immediately prior to submission of this application to ensure all information submitted is current.

5.0 WATER SUPPLY

The watermain layout is indicated on EirEng Consulting Engineers drawing 201121-ECE-ZZ-XX-DR-C-0005.

Confirmation of Feasibility & Statement of Design Acceptance have been received from Irish Water for the development (Ref: CDS21003688) and are included in Appendix C.

5.1 Existing Water Supply

The existing industrial/commercial units located on site are served by private watermain branches which connect into a private water main within the site.

The existing private watermains will be removed as part of the proposed works and the connection will be made into the existing public watermain on Swords Road.

5.2 Proposed Water Supply

It is proposed to connect into the existing cast iron public watermain located in Swords Road as shown on Irish Water record utility mapping included in Appendix D. It is proposed to provide a new 225mm spur off the public watermain to serve the new development as shown on EirEng drawing 201121-ECE-ZZ-XX-DR-C-0005.

A bulk water meter as per Irish Water requirements will also be installed. A total of 6 new fire hydrants will be located around the development in accordance with the Building Regulations Part B.

Estimated Water demand for the development has been calculated in accordance with current Irish Water Code of Practice.

From IW CoP Section 3.7.2 - "For design purposes the average daily domestic demand shall be based on a per-capita consumption of 150 l/person/day and an average occupancy ratio of 2.7 persons per dwelling. The average day/peak week demand should be taken as 1.25 times the average daily domestic demand. The peak demand for sizing of the pipe network will normally be 5.0 times the average day/ peak week demand."

Type Use	Number of Dwellings	Water Demand per Dwelling (l/d)	Total Daily Water Demand (l/d)	Average Day/Peak Week Demand (l/s) (Average flow x 1.25)	Peak Demand (l/s) (Average Day/Peak Week Demand x 5.0)
Residential	457	405	185,805	2.67	13.375

Type Use	Total Daily Water Demand (l/d)	Daily Average Flow (l/s)	Average Day/peak Week demand (l/s) (Average flow x 1.25)	Peak Demand (l/s) (Average Day/Peak Week Demand x 5.0)
Commercial	9,060	0.210	0.263	1.315

Table 2 Estimate Water Demand Calculations

APPENDIX A – SURFACE WATER DRAINAGE NETWORK MODEL RESULTS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.011	4-8	0.616	8-12	0.279

Total Area Contributing (ha) = 0.906

Total Pipe Volume (m³) = 41.749

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	68.670	0.254	270.4	0.063	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	4.218	0.016	263.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	17.145	0.064	267.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	35.313	0.283	124.8	0.044	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	8.781	0.037	237.3	0.108	4.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	35.258	0.147	239.9	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	31.637	0.133	237.9	0.135	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	44.398	0.156	284.6	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.20	56.050	0.063	0.0	0.0	0.0	0.95	67.2	8.5
1.001	50.00	5.28	55.796	0.063	0.0	0.0	0.0	0.96	68.1	8.5
1.002	49.35	5.57	55.780	0.063	0.0	0.0	0.0	0.96	67.6	8.5
1.003	47.93	5.99	55.716	0.107	0.0	0.0	0.0	1.41	99.4	13.9
2.000	50.00	4.14	55.750	0.108	0.0	0.0	0.0	1.02	71.8	14.6
2.001	50.00	4.73	55.713	0.181	0.0	0.0	0.0	1.01	71.4	24.5
2.002	50.00	5.24	55.566	0.316	0.0	0.0	0.0	1.02	71.7	42.8
1.004	45.47	6.79	55.433	0.423	0.0	0.0	0.0	0.93	65.5	52.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	10.312	0.060	171.9	0.051	4.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	4.994	0.030	166.5	0.095	4.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	5.050	0.030	168.3	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	32.772	0.187	175.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	43.838	0.251	174.7	0.183	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	42.376	0.356	119.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	14.259	0.168	84.9	0.052	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	25.976	0.130	199.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.008	5.335	0.027	197.6	0.029	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	4.296	0.021	204.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	31.849	0.159	200.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.011	86.371	1.727	50.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.012	11.191	0.224	50.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.013	59.834	0.598	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.014	7.936	0.079	100.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	4.14	55.750	0.051	0.0	0.0	0.0	1.20	84.6	6.9
4.000	50.00	4.07	55.750	0.095	0.0	0.0	0.0	1.22	85.9	12.9
4.001	50.00	4.14	55.720	0.168	0.0	0.0	0.0	1.21	85.5	22.7
3.001	50.00	4.60	55.690	0.219	0.0	0.0	0.0	1.19	83.8	29.7
3.002	50.00	5.22	55.530	0.402	0.0	0.0	0.0	1.19	83.9	54.4
1.005	44.41	7.17	55.127	0.825	0.0	0.0	0.0	1.86	296.3	99.2
1.006	44.12	7.28	54.771	0.877	0.0	0.0	0.0	2.21	351.2	104.8
1.007	43.33	7.58	54.603	0.877	0.0	0.0	0.0	1.43	228.2	104.8
1.008	43.17	7.64	54.473	0.906	0.0	0.0	0.0	1.44	229.5	105.9
1.009	42.91	7.74	54.446	0.906	0.0	0.0	0.0	0.70	12.4«	105.9
1.010	41.13	8.50	54.427	0.906	0.0	0.0	0.0	0.71	12.5«	105.9
1.011	38.99	9.51	54.268	0.906	0.0	0.0	0.0	1.43	25.2«	105.9
1.012	38.74	9.64	52.548	0.906	0.0	0.0	0.0	1.43	25.2«	105.9
1.013	36.92	10.63	52.324	0.906	0.0	0.0	0.0	1.00	17.8«	105.9
1.014	36.69	10.76	51.726	0.906	0.0	0.0	0.0	1.00	17.7«	105.9

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.014	SADDLE TO 750	53.350	51.647	0.000	0	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: C SLUNG, DS/PN: 2.001, Volume (m³): 0.6

Unit Reference	MD-SHE-0059-1000-0100-1000
Design Head (m)	0.100
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	59
Invert Level (m)	55.713
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.100	1.0	Kick-Flo®	0.094	1.0
Flush-Flo™	0.074	1.0	Mean Flow over Head Range	-	0.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	0.800	2.6	2.000	4.0	4.000	5.6	7.000	7.5
0.200	1.4	1.000	2.8	2.200	4.2	4.500	6.0	7.500	7.7
0.300	1.6	1.200	3.1	2.400	4.4	5.000	6.3	8.000	8.0
0.400	1.9	1.400	3.3	2.600	4.5	5.500	6.6	8.500	8.2
0.500	2.1	1.600	3.5	3.000	4.9	6.000	6.9	9.000	8.5
0.600	2.2	1.800	3.8	3.500	5.3	6.500	7.2	9.500	8.7

Hydro-Brake® Optimum Manhole: C SLUNG, DS/PN: 4.001, Volume (m³): 0.4

Unit Reference	MD-SHE-0059-1000-0100-1000
Design Head (m)	0.100
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	59
Invert Level (m)	55.720
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.100	1.0	Kick-Flo®	0.094	1.0
Flush-Flo™	0.074	1.0	Mean Flow over Head Range	-	0.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	0.400	1.9	0.800	2.6	1.400	3.3	2.000	4.0
0.200	1.4	0.500	2.1	1.000	2.8	1.600	3.5	2.200	4.2
0.300	1.6	0.600	2.2	1.200	3.1	1.800	3.8	2.400	4.4

Hydro-Brake® Optimum Manhole: C SLUNG, DS/PN: 4.001, Volume (m³): 0.4

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.600	4.5	4.000	5.6	5.500	6.6	7.000	7.5	8.500	8.2
3.000	4.9	4.500	6.0	6.000	6.9	7.500	7.7	9.000	8.5
3.500	5.3	5.000	6.3	6.500	7.2	8.000	8.0	9.500	8.7

Hydro-Brake® Optimum Manhole: Tank, DS/PN: 1.009, Volume (m³): 4.1

Unit Reference	MD-SHE-0081-3100-1200-3100
Design Head (m)	1.200
Design Flow (l/s)	3.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	81
Invert Level (m)	54.446
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.1	Kick-Flo®	0.723	2.5
Flush-Flo™	0.356	3.1	Mean Flow over Head Range	-	2.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	0.800	2.6	2.000	3.9	4.000	5.4	7.000	7.1
0.200	2.9	1.000	2.8	2.200	4.1	4.500	5.7	7.500	7.3
0.300	3.0	1.200	3.1	2.400	4.3	5.000	6.0	8.000	7.5
0.400	3.0	1.400	3.3	2.600	4.4	5.500	6.3	8.500	7.7
0.500	3.0	1.600	3.5	3.000	4.7	6.000	6.6	9.000	7.9
0.600	2.8	1.800	3.7	3.500	5.1	6.500	6.8	9.500	8.2

Storage Structures for Storm

Cellular Storage Manhole: C SLUNG, DS/PN: 2.001

Invert Level (m) 55.707 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1160.0	0.0	0.085	1160.0	0.0	0.086	0.0	0.0

Cellular Storage Manhole: C SLUNG, DS/PN: 4.001

Invert Level (m) 55.720 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1160.0	0.0	0.085	1160.0	0.0	0.086	0.0	0.0

Cellular Storage Manhole: Tank, DS/PN: 1.009

Invert Level (m) 54.448 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	345.0	0.0	1.200	345.0	0.0	1.201	0.0	0.0

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales	Ratio R	0.300	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440, 2880
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SMH1	15 minute 2 year Winter I+0%	56.850	56.126	-0.224	0.000	0.13		8.6
1.001	SMH2	15 minute 2 year Winter I+0%	56.850	55.881	-0.215	0.000	0.18		8.6
1.002	SMH3	15 minute 2 year Winter I+0%	56.850	55.857	-0.223	0.000	0.15		8.5
1.003	SMH4	15 minute 2 year Winter I+0%	56.850	55.793	-0.223	0.000	0.15		13.3
2.000	P SLUNG	15 minute 2 year Summer I+0%	56.850	55.854	-0.196	0.000	0.26		16.1
2.001	C SLUNG	2880 minute 2 year Winter I+0%	56.850	55.752	-0.261	0.000	0.01		0.5
2.002	D SLUNG	15 minute 2 year Winter I+0%	56.850	55.666	-0.200	0.000	0.24		15.7
1.004	SMH5	15 minute 2 year Winter I+0%	56.850	55.576	-0.157	0.000	0.46		28.3
3.000	SMH6.1	15 minute 2 year Summer I+0%	56.850	55.820	-0.230	0.000	0.12		7.6
4.000	P SLUNG	15 minute 2 year Summer I+0%	56.850	55.847	-0.203	0.000	0.23		14.1
4.001	C SLUNG	2880 minute 2 year Winter I+0%	56.850	55.759	-0.261	0.000	0.01		0.5
3.001	SLUNG	15 minute 2 year Winter I+0%	56.850	55.750	-0.240	0.000	0.09		7.2
3.002	AB SLUNG	15 minute 2 year Winter I+0%	56.850	55.651	-0.179	0.000	0.34		28.6
1.005	SMH6	15 minute 2 year Winter I+0%	56.850	55.265	-0.312	0.000	0.21		54.4
1.006	SMH6a AB	15 minute 2 year Winter I+0%	56.850	54.927	-0.294	0.000	0.26		59.7
1.007	SMH7	15 minute 2 year Winter I+0%	56.850	54.774	-0.279	0.000	0.31		59.6
1.008	SMH8	960 minute 2 year Winter I+0%	56.850	54.721	-0.202	0.000	0.06		7.5
1.009	Tank	960 minute 2 year Winter I+0%	56.850	54.720	0.124	0.000	0.30		2.9
1.010	SMH9	960 minute 2 year Winter I+0%	56.850	54.477	-0.100	0.000	0.25		2.9
1.011	SMH10	960 minute 2 year Winter I+0%	56.850	54.302	-0.116	0.000	0.12		2.9
1.012	SMH11	960 minute 2 year Winter I+0%	54.000	52.584	-0.114	0.000	0.13		2.9
1.013	SMH12	960 minute 2 year Winter I+0%	54.000	52.365	-0.109	0.000	0.17		2.9
1.014	SMh13	960 minute 2 year Winter I+0%	53.000	51.770	-0.106	0.000	0.19		2.9

PN	US/MH Name	Status
1.000	SMH1	OK
1.001	SMH2	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status
1.002	SMH3	OK
1.003	SMH4	OK
2.000	P SLUNG	OK*
2.001	C SLUNG	OK*
2.002	D SLUNG	OK
1.004	SMH5	OK
3.000	SMH6.1	OK
4.000	P SLUNG	OK*
4.001	C SLUNG	OK*
3.001	SLUNG	OK*
3.002	AB SLUNG	OK*
1.005	SMH6	OK
1.006	SMH6a AB	OK
1.007	SMH7	OK
1.008	SMH8	OK
1.009	Tank	SURCHARGED
1.010	SMH9	OK
1.011	SMH10	OK
1.012	SMH11	OK
1.013	SMH12	OK
1.014	SMh13	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.300	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440, 2880
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SMH1	15 minute 30 year Winter I+0%	56.850	56.156	-0.194	0.000	0.25		16.2
1.001	SMH2	15 minute 30 year Winter I+0%	56.850	55.915	-0.181	0.000	0.33		15.8
1.002	SMH3	15 minute 30 year Winter I+0%	56.850	55.887	-0.193	0.000	0.27		15.9
1.003	SMH4	15 minute 30 year Winter I+0%	56.850	55.825	-0.191	0.000	0.28		25.4
2.000	P SLUNG	15 minute 30 year Summer I+0%	56.850	55.899	-0.151	0.000	0.49		30.2
2.001	C SLUNG	1440 minute 30 year Winter I+0%	56.850	55.774	-0.239	0.000	0.01		0.9
2.002	D SLUNG	15 minute 30 year Winter I+0%	56.850	55.729	-0.137	0.000	0.54		35.7
1.004	SMH5	15 minute 30 year Winter I+0%	56.850	55.667	-0.066	0.000	0.94		57.5
3.000	SMH6.1	15 minute 30 year Summer I+0%	56.850	55.848	-0.202	0.000	0.23		14.3
4.000	P SLUNG	15 minute 30 year Summer I+0%	56.850	55.888	-0.162	0.000	0.43		26.6
4.001	C SLUNG	1440 minute 30 year Winter I+0%	56.850	55.786	-0.234	0.000	0.01		0.6
3.001	SLUNG	15 minute 30 year Winter I+0%	56.850	55.778	-0.212	0.000	0.16		13.5
3.002	AB SLUNG	15 minute 30 year Winter I+0%	56.850	55.728	-0.102	0.000	0.74		62.2
1.005	SMH6	15 minute 30 year Winter I+0%	56.850	55.335	-0.242	0.000	0.43		115.1
1.006	SMH6a AB	960 minute 30 year Winter I+0%	56.850	55.054	-0.167	0.000	0.06		12.9
1.007	SMH7	960 minute 30 year Winter I+0%	56.850	55.053	0.000	0.000	0.07		12.7
1.008	SMH8	960 minute 30 year Winter I+0%	56.850	55.050	0.127	0.000	0.10		13.0
1.009	Tank	960 minute 30 year Winter I+0%	56.850	55.049	0.453	0.000	0.31		3.0
1.010	SMH9	2880 minute 30 year Winter I+0%	56.850	54.478	-0.099	0.000	0.25		3.0
1.011	SMH10	2880 minute 30 year Winter I+0%	56.850	54.303	-0.115	0.000	0.12		3.0
1.012	SMH11	2880 minute 30 year Winter I+0%	54.000	52.584	-0.114	0.000	0.13		3.0
1.013	SMH12	2880 minute 30 year Winter I+0%	54.000	52.366	-0.108	0.000	0.17		3.0
1.014	SMh13	2880 minute 30 year Winter I+0%	53.000	51.771	-0.105	0.000	0.20		3.0

PN	US/MH Name	Status
1.000	SMH1	OK
1.001	SMH2	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status
1.002	SMH3	OK
1.003	SMH4	OK
2.000	P SLUNG	OK*
2.001	C SLUNG	OK*
2.002	D SLUNG	OK
1.004	SMH5	OK
3.000	SMH6.1	OK
4.000	P SLUNG	OK*
4.001	C SLUNG	OK*
3.001	SLUNG	OK*
3.002	AB SLUNG	OK*
1.005	SMH6	OK
1.006	SMH6a AB	OK
1.007	SMH7	SURCHARGED
1.008	SMH8	SURCHARGED
1.009	Tank	SURCHARGED
1.010	SMH9	OK
1.011	SMH10	OK
1.012	SMH11	OK
1.013	SMH12	OK
1.014	SMh13	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 17.000	Cv (Summer) 0.750
Region England and Wales	Ratio R	0.300	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440, 2880
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SMH1	15 minute 100 year Winter I+20%	56.850	56.185	-0.165	0.000	0.39		25.0
1.001	SMH2	15 minute 100 year Winter I+20%	56.850	55.949	-0.147	0.000	0.51		24.3
1.002	SMH3	15 minute 100 year Winter I+20%	56.850	55.918	-0.162	0.000	0.43		24.5
1.003	SMH4	15 minute 100 year Winter I+20%	56.850	55.862	-0.154	0.000	0.42		38.0
2.000	P SLUNG	2880 minute 100 year Summer I+20%	56.850	56.050	0.000	0.000	0.04		2.3
2.001	C SLUNG	2880 minute 100 year Summer I+20%	56.850	56.013	0.000	0.000	0.03		1.8
2.002	D SLUNG	15 minute 100 year Winter I+20%	56.850	55.895	0.029	0.000	0.73		47.9
1.004	SMH5	15 minute 100 year Winter I+20%	56.850	55.808	0.075	0.000	1.23		75.2
3.000	SMH6.1	15 minute 100 year Winter I+20%	56.850	55.898	-0.152	0.000	0.34		21.1
4.000	P SLUNG	2880 minute 100 year Winter I+20%	56.850	56.050	0.000	0.000	0.02		1.5
4.001	C SLUNG	2880 minute 100 year Winter I+20%	56.850	56.020	0.000	0.000	0.03		1.9
3.001	SLUNG	15 minute 100 year Winter I+20%	56.850	55.881	-0.109	0.000	0.25		20.8
3.002	AB SLUNG	15 minute 100 year Summer I+20%	56.850	55.830	0.000	0.000	1.05		88.0
1.005	SMH6	1440 minute 100 year Winter I+20%	56.850	55.641	0.064	0.000	0.05		13.8
1.006	SMH6a AB	1440 minute 100 year Winter I+20%	56.850	55.640	0.419	0.000	0.07		15.0
1.007	SMH7	1440 minute 100 year Winter I+20%	56.850	55.639	0.586	0.000	0.08		15.0
1.008	SMH8	1440 minute 100 year Winter I+20%	56.850	55.638	0.715	0.000	0.12		15.6
1.009	Tank	1440 minute 100 year Winter I+20%	56.850	55.637	1.041	0.000	0.31		3.1
1.010	SMH9	1440 minute 100 year Winter I+20%	56.850	54.478	-0.099	0.000	0.26		3.1
1.011	SMH10	1440 minute 100 year Winter I+20%	56.850	54.303	-0.115	0.000	0.12		3.1
1.012	SMH11	1440 minute 100 year Winter I+20%	54.000	52.584	-0.114	0.000	0.14		3.1
1.013	SMH12	1440 minute 100 year Winter I+20%	54.000	52.366	-0.108	0.000	0.18		3.1
1.014	SMh13	1440 minute 100 year Winter I+20%	53.000	51.771	-0.105	0.000	0.20		3.1

PN	US/MH Name	Status
1.000	SMH1	OK
1.001	SMH2	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status
1.002	SMH3	OK
1.003	SMH4	OK
2.000	P SLUNG	SURCHARGED*
2.001	C SLUNG	SURCHARGED*
2.002	D SLUNG	SURCHARGED
1.004	SMH5	SURCHARGED
3.000	SMH6.1	OK
4.000	P SLUNG	SURCHARGED*
4.001	C SLUNG	SURCHARGED*
3.001	SLUNG	OK*
3.002	AB SLUNG	SURCHARGED*
1.005	SMH6	SURCHARGED
1.006	SMH6a AB	SURCHARGED
1.007	SMH7	SURCHARGED
1.008	SMH8	SURCHARGED
1.009	Tank	SURCHARGED
1.010	SMH9	OK
1.011	SMH10	OK
1.012	SMH11	OK
1.013	SMH12	OK
1.014	SMh13	OK

APPENDIX B – PERMAVOID PODIUM ATTENUATION MODEL RESULTS

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 2089 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.018	0.018	0.0	0.2	0.2	39.7	Flood Risk
30 min Summer	0.024	0.024	0.0	0.3	0.3	53.9	Flood Risk
60 min Summer	0.031	0.031	0.0	0.4	0.4	68.5	Flood Risk
120 min Summer	0.038	0.038	0.0	0.5	0.5	84.5	Flood Risk
180 min Summer	0.043	0.043	0.0	0.5	0.5	94.4	Flood Risk
240 min Summer	0.046	0.046	0.0	0.5	0.5	101.6	Flood Risk
360 min Summer	0.051	0.051	0.0	0.6	0.6	111.9	Flood Risk
480 min Summer	0.054	0.054	0.0	0.6	0.6	118.9	Flood Risk
600 min Summer	0.056	0.056	0.0	0.7	0.7	124.1	Flood Risk
720 min Summer	0.058	0.058	0.0	0.7	0.7	128.1	Flood Risk
960 min Summer	0.061	0.061	0.0	0.7	0.7	133.5	Flood Risk
1440 min Summer	0.063	0.063	0.0	0.7	0.7	138.8	Flood Risk
2160 min Summer	0.065	0.065	0.0	0.8	0.8	143.5	Flood Risk
2880 min Summer	0.066	0.066	0.0	0.8	0.8	146.2	Flood Risk
4320 min Summer	0.067	0.067	0.0	0.8	0.8	147.7	Flood Risk
5760 min Summer	0.067	0.067	0.0	0.8	0.8	146.7	Flood Risk
7200 min Summer	0.066	0.066	0.0	0.8	0.8	144.4	Flood Risk
8640 min Summer	0.064	0.064	0.0	0.8	0.8	141.5	Flood Risk
10080 min Summer	0.063	0.063	0.0	0.7	0.7	138.4	Flood Risk
15 min Winter	0.020	0.020	0.0	0.2	0.2	44.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	91.990	0.0	14.6	27
30 min Summer	62.658	0.0	19.8	42
60 min Summer	39.995	0.0	41.4	72
120 min Summer	24.904	0.0	51.3	130
180 min Summer	18.717	0.0	57.4	190
240 min Summer	15.262	0.0	62.0	250
360 min Summer	11.412	0.0	68.6	368
480 min Summer	9.274	0.0	73.3	486
600 min Summer	7.890	0.0	76.8	606
720 min Summer	6.913	0.0	79.5	724
960 min Summer	5.608	0.0	83.2	962
1440 min Summer	4.175	0.0	86.2	1314
2160 min Summer	3.107	0.0	150.1	1648
2880 min Summer	2.518	0.0	156.0	2028
4320 min Summer	1.870	0.0	156.9	2856
5760 min Summer	1.512	0.0	234.7	3688
7200 min Summer	1.283	0.0	243.4	4472
8640 min Summer	1.121	0.0	247.6	5280
10080 min Summer	1.000	0.0	246.8	6064
15 min Winter	91.990	0.0	16.4	27

Summary of Results for 100 year Return Period (+20%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	0.027	0.027	0.0	0.3	0.3	60.4	Flood Risk
60 min Winter	0.035	0.035	0.0	0.4	0.4	76.7	Flood Risk
120 min Winter	0.043	0.043	0.0	0.5	0.5	94.7	Flood Risk
180 min Winter	0.048	0.048	0.0	0.6	0.6	105.8	Flood Risk
240 min Winter	0.052	0.052	0.0	0.6	0.6	113.9	Flood Risk
360 min Winter	0.057	0.057	0.0	0.7	0.7	125.5	Flood Risk
480 min Winter	0.061	0.061	0.0	0.7	0.7	133.5	Flood Risk
600 min Winter	0.063	0.063	0.0	0.7	0.7	139.4	Flood Risk
720 min Winter	0.065	0.065	0.0	0.8	0.8	144.0	Flood Risk
960 min Winter	0.068	0.068	0.0	0.8	0.8	150.3	Flood Risk
1440 min Winter	0.071	0.071	0.0	0.8	0.8	156.7	Flood Risk
2160 min Winter	0.073	0.073	0.0	0.9	0.9	160.8	Flood Risk
2880 min Winter	0.074	0.074	0.0	0.9	0.9	162.8	Flood Risk
4320 min Winter	0.074	0.074	0.0	0.9	0.9	161.9	Flood Risk
5760 min Winter	0.072	0.072	0.0	0.8	0.8	158.2	Flood Risk
7200 min Winter	0.070	0.070	0.0	0.8	0.8	153.4	Flood Risk
8640 min Winter	0.067	0.067	0.0	0.8	0.8	148.2	Flood Risk
10080 min Winter	0.065	0.065	0.0	0.8	0.8	143.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	62.658	0.0	22.2	41
60 min Winter	39.995	0.0	46.4	70
120 min Winter	24.904	0.0	57.4	128
180 min Winter	18.717	0.0	64.3	186
240 min Winter	15.262	0.0	69.5	244
360 min Winter	11.412	0.0	76.8	362
480 min Winter	9.274	0.0	82.0	478
600 min Winter	7.890	0.0	86.0	594
720 min Winter	6.913	0.0	89.0	708
960 min Winter	5.608	0.0	93.1	932
1440 min Winter	4.175	0.0	96.6	1362
2160 min Winter	3.107	0.0	168.1	1696
2880 min Winter	2.518	0.0	174.7	2164
4320 min Winter	1.870	0.0	175.6	3072
5760 min Winter	1.512	0.0	262.9	3936
7200 min Winter	1.283	0.0	272.5	4824
8640 min Winter	1.121	0.0	277.2	5624
10080 min Winter	1.000	0.0	276.2	6464

Model Details

Storage is Online Cover Level (m) 0.085

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	2319.0	0.0	0.086	0.0	0.0
0.085	2319.0	0.0			

Depth/Flow Relationship Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.085	1.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000
0.100	1.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000
0.300	0.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000
0.400	0.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000
0.500	0.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000
0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000
0.700	0.0000	1.500	0.0000	2.300	0.0000		
0.800	0.0000	1.600	0.0000	2.400	0.0000		

APPENDIX C - IRISH WATER COF AND SDA STATEMENTS

Thomas Byrne

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2 Rogans Court
Patrick Street
Dun Laoghaire
Co Dublin

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

1 December 2021

Re: CDS21003688 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 484 unit(s) at Lands at Northwest of Omni Park Shopping Centre, Swords Road, Dublin

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Lands at Northwest of Omni Park Shopping Centre, Swords Road, Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	In order to connect the development, the connection must be made to the existing 12" watermain on Swords Road. A DMA meter will need to be installed on the service connection.
Wastewater Connection	In order to accommodate the proposed connection at the Premises, upgrade works are required to increase the capacity of the Irish Water network. Irish Water currently has a project on our current investment plan which will provide the necessary upgrade and capacity. This upgrade project is scheduled to be completed by 2026 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date.

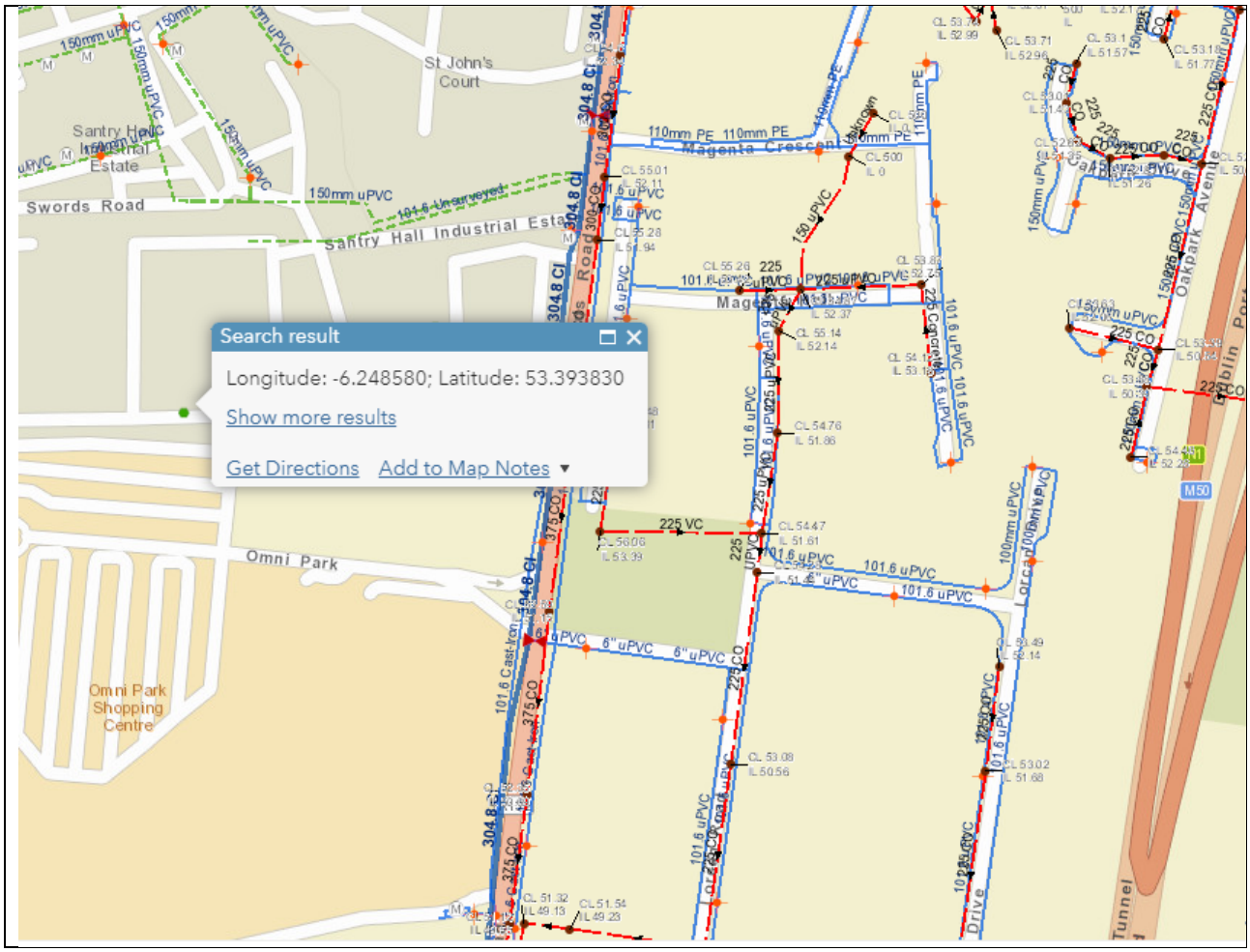
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

Strategic Housing Development

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. Therefore:

A. In advance of submitting your full application to An Bord Pleanala for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.
B. You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed and appropriate connection fee paid at a later

The map included below outlines the current Irish Water infrastructure adjacent to your site:



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the

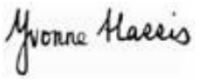
information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Paul Fuller from the design team on (087) 718-6226 or email PFuller@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

Thomas Byrne
Eireng Consulting Eng
2 Rogans Court
Patrick Street
Dun Laoghaire, Co Dublin

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
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Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

7 July 2022

Re: Design Submission for Lands at Northwest of Omni Park Shopping Centre, Swords Road, Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS21003688

Dear Thomas Byrne,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: Dario Alvarez
Email: dalvarez@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

- 201121-C1010-Proposed Watermain Layout
- 201121-C1000-Proposed Foul Water Drainage Layout
- 201121-C1001-Longitudinal Sections Sheet 1
- 201121-C1002-Longitudinal Sections Sheet 2
- 201121-C1003-Proposed Basement Drainage Layout

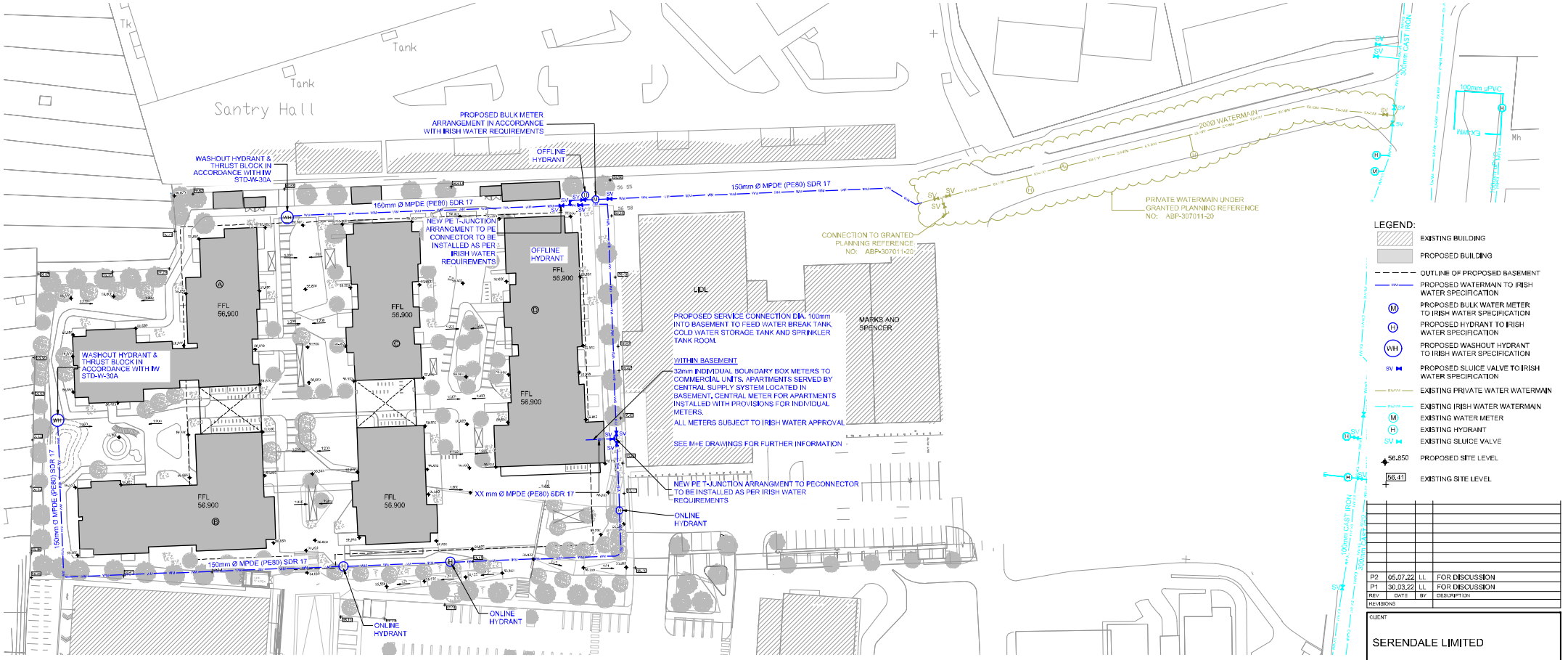
Standard Details/Code of Practice Exemption:
While Irish Water notes that the water and wastewater services infrastructure will remain private and not be vested, we have the following comments:

- *It is recommended that the watermain is laid within 3 m of the proposed structure (between the basement and the substation).*

For further information, visit ***www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

1. If this drawing has been received electronically it is the recipients responsibility to print the document to the correct scale.
2. All dimensions are in (m) unless otherwise noted.
3. All levels are in meters above datum unless otherwise noted.
4. This drawing is to be read in conjunction with all the relevant Engineers', Services Engineers, Manufacturers & Architects drawings and specifications.



LEGEND:

- EXISTING BUILDING
- PROPOSED BUILDING
- OUTLINE OF PROPOSED BASEMENT
- PROPOSED WATERMAIN TO IRISH WATER SPECIFICATION
- PROPOSED BULK WATER METER TO IRISH WATER SPECIFICATION
- PROPOSED HYDRANT TO IRISH WATER SPECIFICATION
- PROPOSED WASHOUT HYDRANT TO IRISH WATER SPECIFICATION
- PROPOSED SLUICE VALVE TO IRISH WATER SPECIFICATION
- EXISTING PRIVATE WATER WATERMAIN
- EXISTING IRISH WATER WATERMAIN
- EXISTING WATER METER
- EXISTING HYDRANT
- EXISTING SLUICE VALVE
- 56.850 PROPOSED SITE LEVEL
- 56.41 EXISTING SITE LEVEL

WATERMAIN NOTES:

1/ ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING OUT JUNCTION BOXES, CHAMBERS, MANHOLES, GULLIES TO ENSURE NO CLASHES WITH SERVICE DUCTS AND PIPES.

2/ ALL LEVELS ARE IN METRES ABOVE DATUM UNLESS OTHERWISE NOTED.

3/ THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND MANUFACTURERS' DRAWINGS AND SPECIFICATIONS

4/ ALL PIPE DIAMETERS ARE NOMINAL.

5/ THE CONTRACTOR MUST CONTACT THE RELEVANT AUTHORITIES PRIOR TO CONSTRUCTION WORK, AND SATISFY HIMSELF IN RESPECT TO THE LOCATION OF ALL EXISTING SERVICES.

6/ ALL ROCKER PIPES SHALL BE NO MORE THAN 150mm FROM THEIR ASSOCIATED MANHOLE, PUMPING STATION, CONCRETE ENCASED SECTION OR VALVE CHAMBER.

7/ WHERE PIPE RUNS PASS UNDER FOUNDATIONS, PIPE TRENCH TO BE BACKFILLED TO FORMATION LEVEL WITH CLASS 15/20 CONCRETE.

8/ PROVIDE ANCHOR/THRUST BLOCKS ON ALL BENDS EQUAL TO OR IN EXCESS OF 22.5°, DEAD ENDS AND TEES ON ALL PIPES. ANCHOR/THRUST BLOCKS TO BE IN ACCORDANCE WITH SECTION 4.5 OF IRISH WATER CODE OF PRACTICE.

9/ FIRE HYDRANT LOCATIONS TO BE CONFIRMED WITH FIRE OFFICER AND DETAILED TO COMPLY WITH FIRE CERTIFICATE.

10/ FURTHER INVESTIGATION TO BE CARRIED OUT ON SITE TO TRACE AND LOCATE EXISTING WATER MAIN. LAYOUT AS DETAILED TO BE CONSIDERED INDICATIVE.

11/ ALL EXISTING HYDRANTS WILL BE RELOCATED OUTSIDE PARKING BAYS AND LOCATED IN ACCORDANCE WITH THE BUILDING REGULATIONS TECHNICAL GUIDANCE DOCUMENT B.

NOTES:
ALL WATERMAIN CONNECTIONS SHOWN INDICATIVELY ONLY. EXACT CONNECTION TO BE DETERMINED DURING IRISH WATER CONNECTION APPLICATION.

ALL WATERMAIN WORKS TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WATER SUPPLY AND ASSOCIATED STANDARD DETAILS

NOTES:
FINAL FIRE STRATEGY AND SERVICE CONNECTIONS TO BE CONFIRMED DURING DETAILED DESIGN.

FINAL LOCATION AND NUMBER OF FIRE HYDRANTS TO BE IN ACCORDANCE WITH THE REQUIREMENT OF THE BUILDING REGULATIONS PART B

NOTE:
THE PROPOSED DEVELOPMENT CONSISTS OF 480 APARTMENT UNITS.

REV	DATE	BY	DESCRIPTION
P2	05.07.22	LL	FOR DISCUSSION
P1	30.03.22	LL	FOR DISCUSSION

REVISIONS

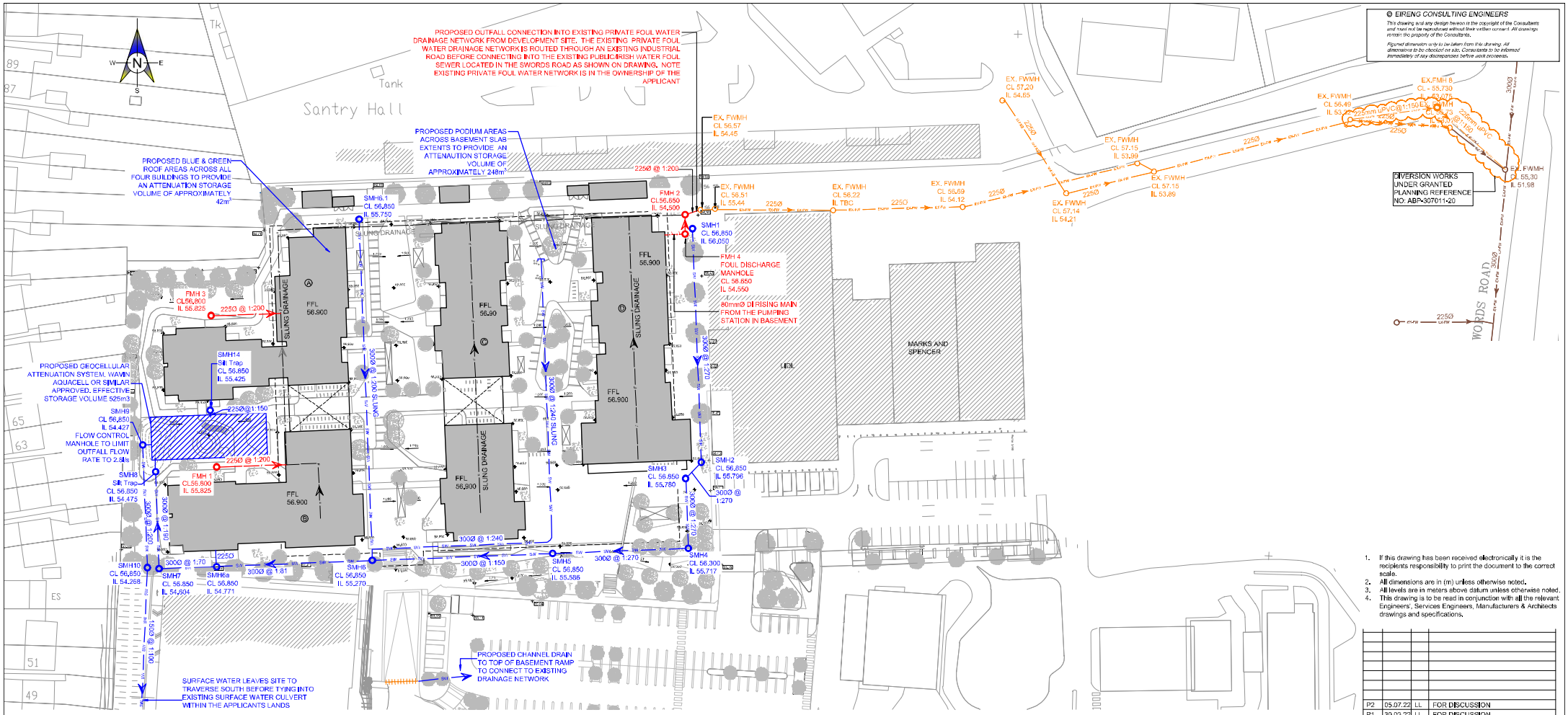
CLIENT
SERENDALE LIMITED

PROJECT TITLE
MIXED USE DEVELOPMENT
SITE LOCATED TO THE NORTH WEST CORNER OF THE OMNI PARK SHOPPING CENTRE, SANTRY AND AT SANTRY HALL INDUSTRIAL ESTATE.

DRAWING TITLE
PROPOSED WATERMAIN LAYOUT

eIReNG
CONSULTING ENGINEERS
2 Rogan's Court, Dun Laoghaire, Co.Dublin, Ireland.
Tel: +353 1 6638957 Email: info@eireng.ie

DRAWN BY: L Lonergan	DATE: 25.06.2021
ENG CHECK: T Byrne	DATE: 25.06.2021
APPROVED: E Deasy	DATE: 25.06.2021
SCALE: 1:500	SHEET: A1
STATUS: PRELIMINARY	
JOB NO.: 201121	DWG NO.: C1010
REVISION: P2	



DRAINAGE NOTES

1/ ALL DIMENSIONS ARE IN (mm.) UNLESS OTHERWISE NOTED. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING OUT JUNCTION BOXES, CHAMBERS, MANHOLES, GULLIES TO ENSURE NO CLASHES WITH SERVICE DUCTS AND PIPES.

2/ ALL LEVELS ARE IN METRES ABOVE DATUM UNLESS OTHERWISE NOTED.

3/ THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND MANUFACTURERS' DRAWINGS AND SPECIFICATIONS.

4/ ALL PIPE DIAMETERS ARE NOMINAL.

5/ THE CONTRACTOR MUST CONTACT THE RELEVANT AUTHORITIES PRIOR TO CONSTRUCTION WORK, AND SATISFY HIMSELF IN RESPECT TO THE LOCATION OF ALL EXISTING SERVICES.

6/ ALL STORMWATER PIPES TO BE POLYPIPE RIGIDRAIN OR SIMILAR APPROVED. ALL FOUL PIPES TO BE WAVIN UPVC PIPES OR SIMILAR APPROVED IN ACCORDANCE WITH WIS 4-35-01 AND IS EN 13476

7/ ALL ROAD GULLY DRAINS ARE 150mm.

8/ 600mm MAX. LENGTH ROCKER PIPES ARE TO BE PROVIDED ON SEWERS WHERE:
(A). A PIPE ENTERS A MANHOLE OR PUMPING STATION.
(B). A PIPE LEAVES A MANHOLE.
(C). A PIPE ENTERS CONCRETE ENCASEMENT.
(D). A PIPE LEAVES CONCRETE ENCASEMENT.
(E). ANY OTHER LOCATION AS DIRECTED BY THE ENGINEER.

9/ ALL SEWER ROCKER PIPES ARE TO BE FORMED BY CUTTING AND TRIMMING A LENGTH OF SPIGOT & SOCKET PIPE TO FORM A SPIGOT AT THE CUT END, THEREBY FORMING SPIGOT & SOCKET JOINTS AT BOTH ENDS OF THE ROCKER PIPE.

10/ ALL ROCKER PIPES SHALL BE NO MORE THAN 150mm FROM THEIR ASSOCIATED MANHOLE, PUMPING STATION, CONCRETE ENCASED SECTION OR VALVE CONNECTION.

11/ WHERE SEWER PIPES, RISING MAINS OR ROAD GULLY DRAINS CROSS EXISTING ROADS, THE CONTRACTOR IS REQUIRED TO:
(A) CONTACT THE RELEVANT AUTHORITIES PRIOR TO COMMENCING WORK.
(B) MAKE GOOD THE EXISTING ROAD TO ITS ORIGINAL SPECIFICATION AS APPROVED BY THE ENGINEER.
(C) UNDERTAKE WORK TO THE STANDARDS OF THE RELEVANT LOCAL AUTHORITY SPECIFICATION.

12/ ALL EXISTING FOUL & SURFACE WATER RUNS SERVING THE BUILDING THAT BECOMES REDUNDANT DUE TO THE NEW DEVELOPMENT TO BE BROKEN OUT AND TRENCH/MANHOLES TO BE BACKFILLED WITH CL16/20 LEAN MIX CONCRETE

13/ WHERE PIPES PASS UNDER FOUNDATIONS PIPE TRENCH TO BE BACKFILLED TO FORMATION LEVEL WITH CL16/20 CONCRETE.

14/ WHERE PIPES ARE LOCATED WITHIN 3m OF PAD FOUNDATIONS CONCRETE SURROUND CL16/20 REQUIRED TO A LEVEL ABOVE THE PAD FOUNDATIONS. WHERE PIPES PASS UNDER FLOOR SLABS, PIPES TO BE SURROUND WITH 150mm CONCRETE +50mm COMPRESSIBLE FILL BOARD/SAND SHOULD DIVIDE UNDERSIDE OF SLAB & TOP OF CONCRETE SURROUND (DETAIL TO BE AGREED WITH STRUCTURAL ENGINEER)

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17/ ALL COVERS OF EXISTING MANHOLES TO BE BUILT TO FINAL FINISHED PAVEMENT OR DRAINAGE LEVELS.

18/ COVER LEVELS DETAILED ARE INDICATIVE. COVER LEVELS TO TIE IN FLUSH WIT PROPOSED PAVEMENT & LANDSCAPING LEVELS.

19/ INTERNAL DRAINAGE TO ARCHITECT & M&E DETAILS

20/ GULLY LAYOUT TO BE CONFIRMED WITH ARCHITECT PRIOR TO DETAILED DESIGN

21/ RODDING EYES REQUIRED ON ALL SUSPENDED DRAINAGE RUNS AT MAX 22m INTERVALS AND AT ALL JUNCTIONS OR CHANGES IN PIPE DIRECTIONS.

22/ LEVELS ON ALL EXISTING DRAINAGE TO BE CONFIRMED ONSITE.

23/ ALL EXISTING DRAINS TO BE INVESTIGATED FOR LIVE CONNECTIONS PRIOR TO CONSTRUCTION, LIVE CONNECTIONS TO BE MAINTAINED TO SEWERS

24/ ALL SURFACE WATER MANHOLE COVER TO BE SQUARE IN SHAPE. ALL FOUL WATER MANHOLES TO BE CIRCULAR IN SHAPE.

25/ CONTRACTOR TO COORDINATE ALL ROOF DRAINAGE AND DOWNPIPES LOCATIONS TO BE AGREED WITH THE ENGINEER AND ARCHITECT.

26/ CONTRACTOR TO PROVIDE IL, PIPE DIAMETER AND DIRECTION OF FLOW IN EXISTING MANHOLE ON COMMENCEMENT OF THE WORKS TO DESIGN ENGINEER.

27/ ALL SLUNG GRAVITY DRAINAGE PIPEWORK TO WIS 4-35-01 AND IS EN 13476. SLUNG DRAINAGE, PROPRIETARY CONNECTIONS, SEALING AND FIXINGS TO BE DESIGNED BY OTHERS TO MANUFACTURERS REQUIREMENTS. DETAILS TO BE SUBMITTED TO ENGINNER FOR APPROVAL PRIOR TO WORKS COMMENCING.

28/ PUMPED RISING MAIN TO BE DUCTILE IRON PIPE WORK AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 598

29/ FOUL SEWER MANHOLES TO BE PRE-CAST, ALL SURFACE WATER AND COMBINED MANHOLES TO BE BLOCKWORK AS PER GDSDS V6.0

30/ ALL MANHOLE COVERS LOCATED IN PAVING AREAS TO BE RECESSED TYPE WITH GALVINISED STEEL TRIMMING ALLOWING FOR PAVING INSERTS TO LANDSCAPE ARCHITECTS DETAIL. MANHOLE COVER LOADINGS TO COMPLY WITH RELEVANT MANHOLE BUILDUP.

31/ ALL DRAINAGE PIPEWORK & MANHOLE CONSTRUCTION TO BE WATERTIGHT. ALL PIPEWORK MUST BE TESTED TO THE APPROPRIATE AIR TIGHTNESS TEST AND TEST RESULTS SUBMITTED TO ENGINEER FOR APPROVAL.

NOTES:
ALL FOUL WATER WORKS TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER SUPPLY AND ASSOCIATED STANDARD DETAILS.

NOTE:
THE PROPOSED DEVELOPMENT CONSISTS OF 480 APARTMENT UNITS.

NOTE
EXTENTS OF GREEN ROOF, BLUE ROOF AND PERMAVOID PODIUM ATTENUATION AREAS ARE NOT SHOWN ON THIS DRAWING FOR CLARITY PURPOSES

LEGEND:
- EXISTING BUILDING
- PROPOSED BUILDING
- OUTLINE OF PROPOSED BASEMENT
- PROPOSED FOUL SEWER
- PROPOSED FOUL SEWER MANHOLE
- PROPOSED FOUL SEWER RISING MAIN
- PROPOSED SLUNG DRAINAGE TO M&E DESIGN
- EXISTING PUBLIC FOUL SEWER
- EXISTING PUBLIC FOUL SEWER MANHOLE
- EXISTING PRIVATE FOUL SEWER
- EXISTING PRIVATE FOUL SEWER MANHOLE
- PROPOSED SURFACE WATER SEWER (SHOWN INDICATIVELY)
- PROPOSED SURFACE WATER SEWER MANHOLE (SHOWN INDICATIVELY)
- PROPOSED SURFACE WATER CHANNEL (SHOWN INDICATIVELY)
- EXISTING SURFACE WATER SEWER (SHOWN INDICATIVELY)
- PROPOSED BASEMENT OUTLINE
- 56.850 PROPOSED SITE LEVEL
- 56.41 EXISTING SITE LEVEL

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LICENCE NO. EN0073622 ©
ORDNANCE SURVEY IRELAND

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3. All levels are in meters above datum unless otherwise noted.
4. This drawing is to be read in conjunction with all the relevant Engineers', Services Engineers, Manufacturers & Architects drawings and specifications.

REV	DATE	BY	DESCRIPTION
P2	05.07.22	LL	FOR DISCUSSION
P1	30.03.22	LL	FOR DISCUSSION
REVISIONS			

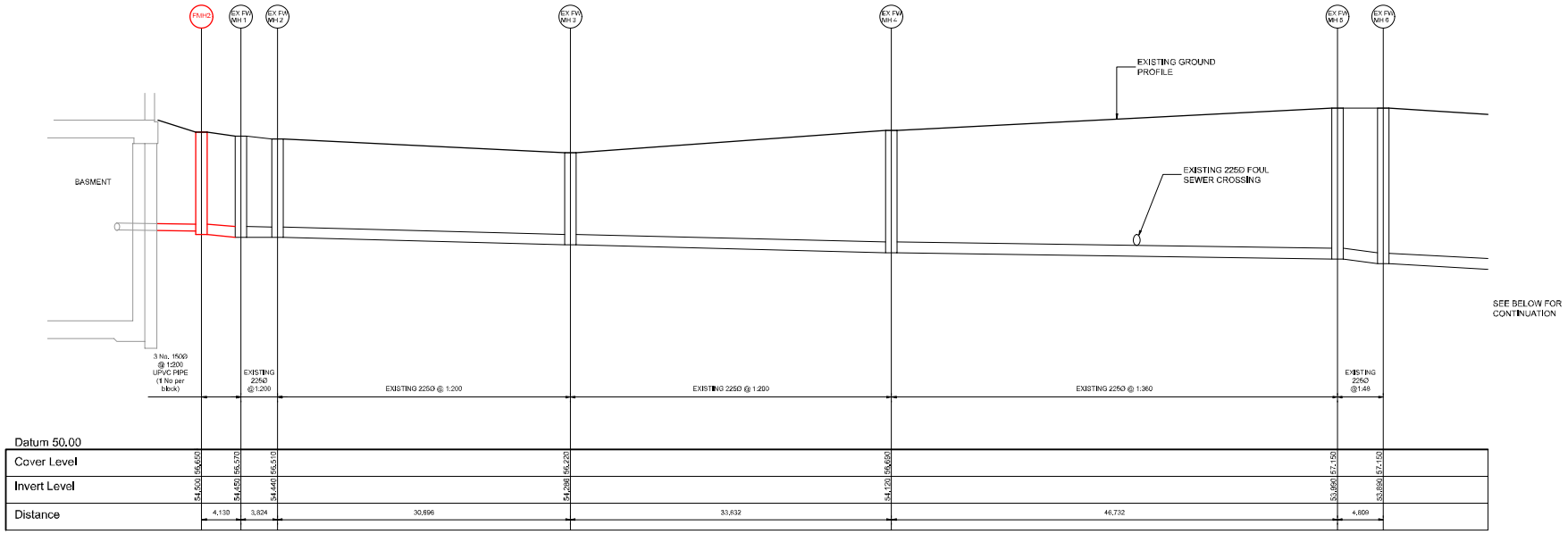
CLIENT
SERENDALE LIMITED

PROJECT TITLE
MIXED USE DEVELOPMENT
SITE LOCATED TO THE NORTH WEST CORNER OF THE OMNI PARK SHOPPING CENTRE, SANTRY AND AT SANTRY HALL INDUSTRIAL ESTATE.

DRAWING TITLE
PROPOSED FOUL WATER DRAINAGE LAYOUT

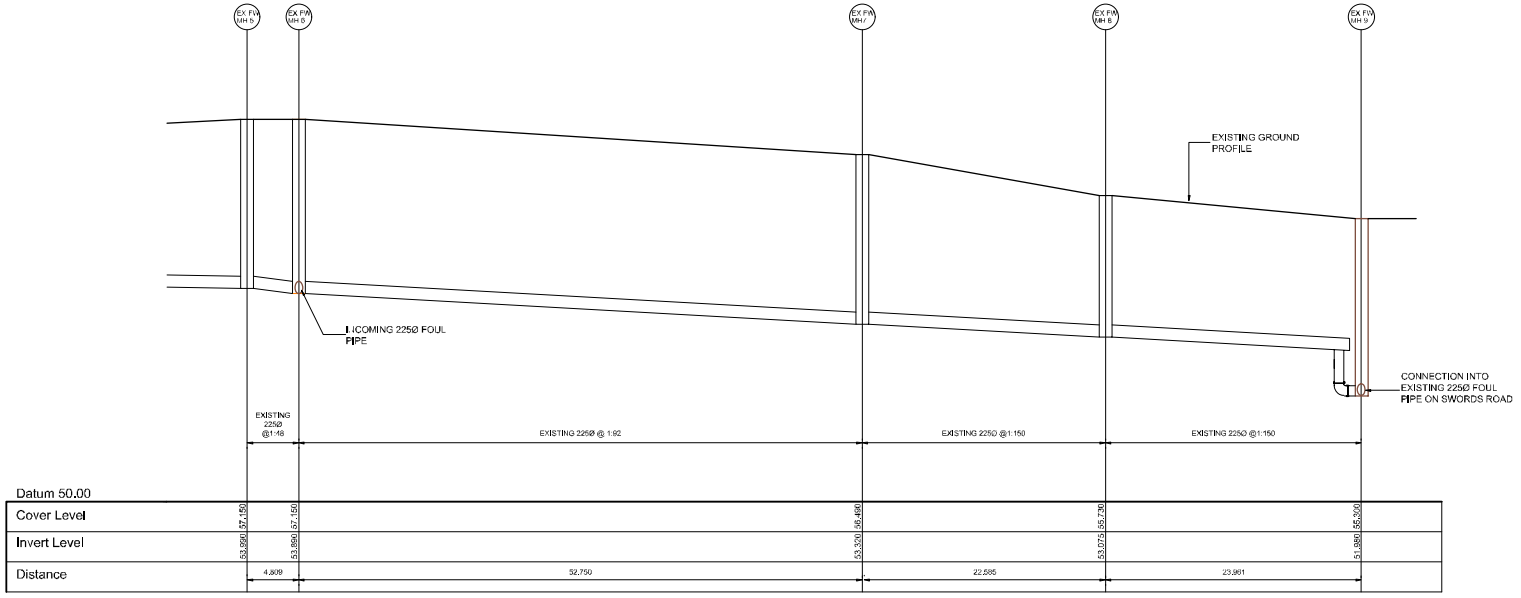
eIReNG
CONSULTING ENGINEERS
2 Rogan's Court, Dun Laoghaire, Co.Dublin, Ireland.
Tel: +353 1 6638957 Email: info@eireng.ie

DRAWN BY: L Lonergan	DATE: 25.06.2021
ENG CHECK: T Byrne	DATE: 25.06.2021
APPROVED: E Deasy	DATE: 25.06.2021
SCALE: 1:500	SHEET: A1
STATUS: PRELIMINARY	
JOB NO.: 201121	DWG NO.: C1000
REVISION: P2	



FOUL LONGITUDINAL SECTION FMH2 TO EX FMH 6

Scale Horizontal 1/250, Vertical 1/50



FOUL LONGITUDINAL SECTION EX FMH 6 TO EX FMH 9

Scale Horizontal 1/250, Vertical 1/50

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REV	DATE	BY	DESCRIPTION
P2	05.07.22	LL	FOR DISCUSSION
P1	30.03.22	LL	FOR DISCUSSION

REVISIONS

CLIENT

SERENDALE LIMITED

PROJECT TITLE

MIXED USE DEVELOPMENT

SITE LOCATED TO THE NORTH WEST CORNER OF THE OMNI PARK SHOPPING CENTRE, SANTRY AND AT SANTRY HALL INDUSTRIAL ESTATE.

DRAWING TITLE

LONGITUDINAL SECTIONS SHEET 1

eIReNG
CONSULTING ENGINEERS
2 Rogan's Court, Dun Laoghaire, Co.Dublin, Ireland.
Tel: +353 1 6638957 Email: info@eireng.ie

DRAWN BY	L Lonergan	DATE	04.02.2022
ENG CHECK	T Byrne	DATE	04.02.2022
APPROVED	E Deasy	DATE	04.02.2022
SCALE	AS SHOWN	SHEET	A1
STATUS	PRELIMINARY		
JOB NO.	201121	DWG NO.	C1001
REVISION	P2		

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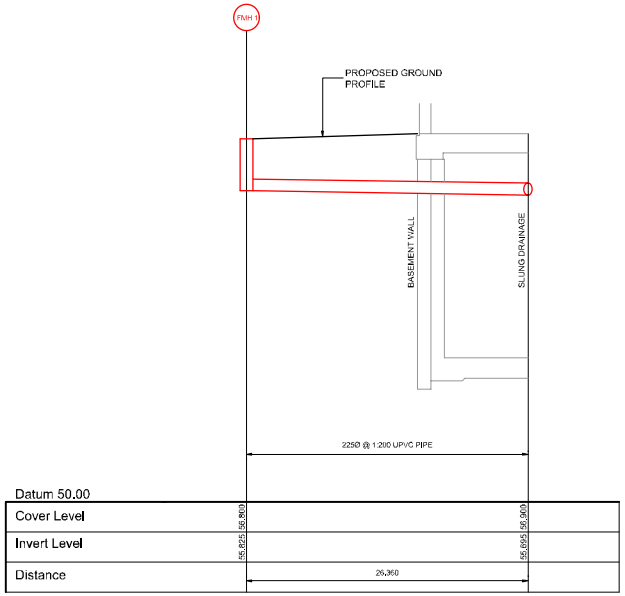
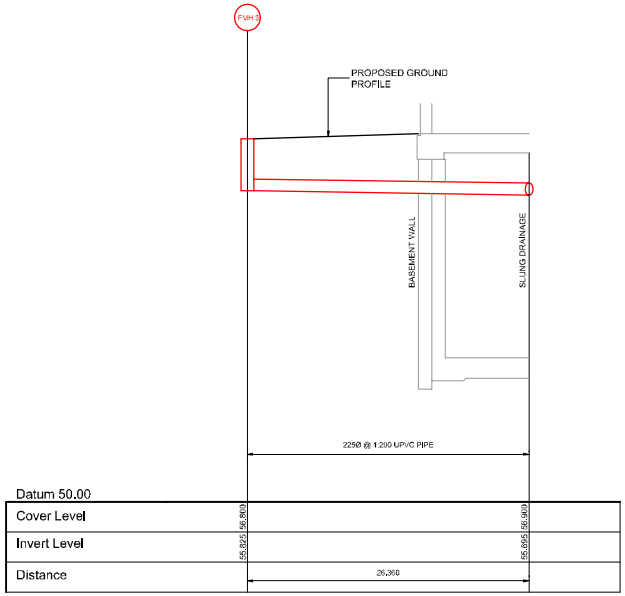


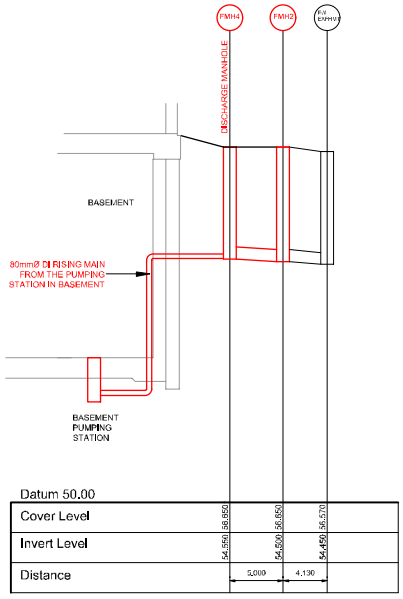
FOUL LONGITUDINAL SECTION FMH 1 TO SLUNG DRAINAGE

Scale Horizontal 1:250, Vertical 1:50



FOUL LONGITUDINAL SECTION FMH 3 TO SLUNG DRAINAGE

Scale Horizontal 1:250, Vertical 1:50



FOUL RISING MAIN LONGITUDINAL BASEMENT TO EX FMH 1

Scale Horizontal 1:250, Vertical 1:50

REV	DATE	BY	DESCRIPTION
P2	05.07.22	LL	FOR DISCUSSION
P1	30.03.22	LL	FOR DISCUSSION

REVISIONS

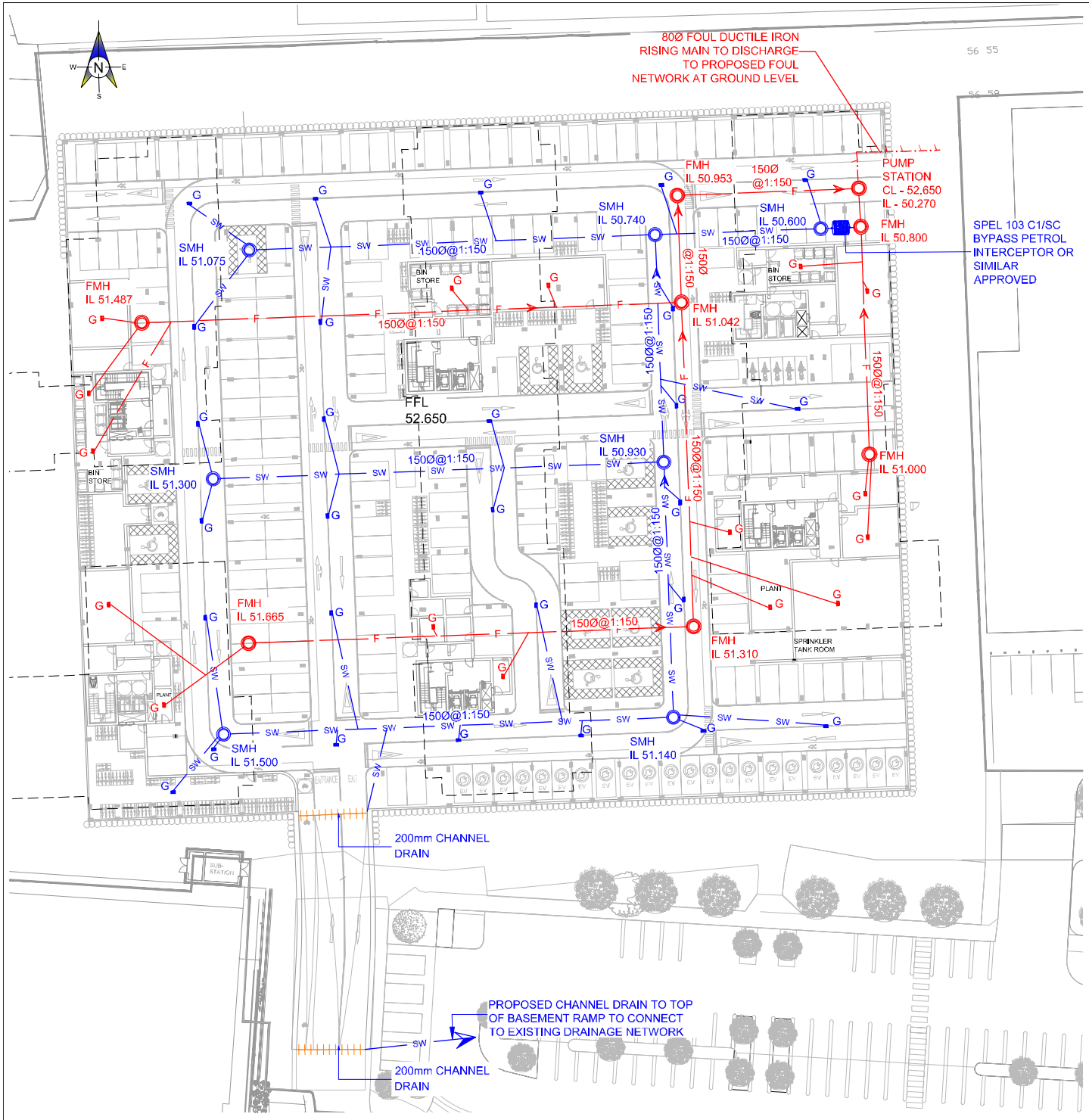
CLIENT
SERENDALE LIMITED

PROJECT TITLE
MIXED USE DEVELOPMENT
SITE LOCATED TO THE NORTH WEST CORNER OF THE OMNI PARK SHOPPING CENTRE, SANTRY AND AT SANTRY HALL INDUSTRIAL ESTATE.

DRAWING TITLE
LONGITUDINAL SECTIONS SHEET 2

eIReNG
CONSULTING ENGINEERS
2 Rogan's Court, Dun Laoghaire, Co.Dublin, Ireland.
Tel: +353 1 6638957 Email: info@eireng.ie

DRAWN BY: L Lonergan	DATE: 04.02.2022
ENG CHECK: T Byrne	DATE: 04.02.2022
APPROVED: E Deasy	DATE: 04.02.2022
SCALE: AS SHOWN	SHEET: A1
STATUS: PRELIMINARY	
JOB NO.: 201121	DWG NO.: C1002
REVISION: P2	



DRAINAGE NOTES

1/ ALL DIMENSIONS ARE IN (mm,) UNLESS OTHERWISE NOTED. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING OUT JUNCTION BOXES, CHAMBERS, MANHOLES, GULLIES TO ENSURE NO CLASHES WITH SERVICE DUCTS AND PIPES.

2/ ALL LEVELS ARE IN METRES ABOVE DATUM UNLESS OTHERWISE NOTED.

3/ THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND MANUFACTURERS' DRAWINGS AND SPECIFICATIONS.

4/ ALL PIPE DIAMETERS ARE NOMINAL.

5/ THE CONTRACTOR MUST CONTACT THE RELEVANT AUTHORITIES PRIOR TO CONSTRUCTION WORK, AND SATISFY HIMSELF IN RESPECT TO THE LOCATION OF ALL EXISTING SERVICES.

6/ ALL STORMWATER PIPES TO BE POLYPIPE RIGIDRAIN OR SIMILAR APPROVED. ALL FOUL PIPES TO BE WAVIN UPVC PIPES OR SIMILAR APPROVED IN ACCORDANCE WITH WIS 4-35-01 AND IS EN 13476

7/ ALL ROAD GULLY DRAINS ARE 150mm.

8/ 600mm MAX. LENGTH ROCKER PIPES ARE TO BE PROVIDED ON SEWERS WHERE:
(A). A PIPE ENTERS A MANHOLE OR PUMPING STATION.
(B). A PIPE LEAVES A MANHOLE.
(C). A PIPE ENTERS CONCRETE ENCASEMENT.
(D). A PIPE LEAVES CONCRETE ENCASEMENT.
(E). ANY OTHER LOCATION AS DIRECTED BY THE ENGINEER.

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NOTES:
ALL FOUL WATER WORKS TO BE IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER SUPPLY AND ASSOCIATED STANDARD DETAILS.

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LEGEND:

- SW / SWH1.0 — PROPOSED SURFACE WATER SEWER
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED FOUL WATER SEWER
- FMH1.0 — PROPOSED FOUL WATER MANHOLE
- PROPOSED FOUL RISING MAIN
- G — PROPOSED SURFACE WATER GULLY
- G — PROPOSED FOUL WATER GULLY
- PROPOSED SURFACE WATER CHANNEL DRAIN
- PROPOSED BUILDING OUTLINE ABOVE

REV	DATE	BY	DESCRIPTION
P1	05.07.22	LL	FOR DISCUSSION

REVISIONS

CLIENT: SERENDALE LIMITED

PROJECT TITLE: MIXED USE DEVELOPMENT
SITE LOCATED TO THE NORTH WEST CORNER OF THE OMNI PARK SHOPPING CENTRE, SANTRY AND AT SANTRY HALL INDUSTRIAL ESTATE.

DRAWING TITLE: PROPOSED BASEMENT DRAINAGE LAYOUT

eIReNG CONSULTING ENGINEERS
2 Rogan's Court, Dun Laoghaire, Co.Dublin, Ireland.
Tel: +353 1 6638957 Email: info@eireng.ie

DRAWN BY	L Lonergan	DATE	25.06.2021
ENG CHECK	T Byrne	DATE	25.06.2021
APPROVED	E Deasy	DATE	25.06.2021
SCALE	1:250	SHEET	A1
STATUS	PRELIMINARY		
JOB NO.	201121	DWG NO.	C1003
		REVISION	P1

27.06.2022

To whom it may concern,
Irish Water

RE: Development at Molloy and Sherry Site, OMNI Park, Santry, Dublin 9

This letter is to confirm that where the proposed watermains pass within 3 metres of proposed or existing trees that the Irish Water standards in relation to the construction of watermains in proximity to existing and proposed trees will be adhered to, namely:

Water Infrastructure Standard Details
Code of Practice for Water Infrastructure

Yours sincerely,

John Ward

John Ward, Director
For & on behalf of Murray & Associates

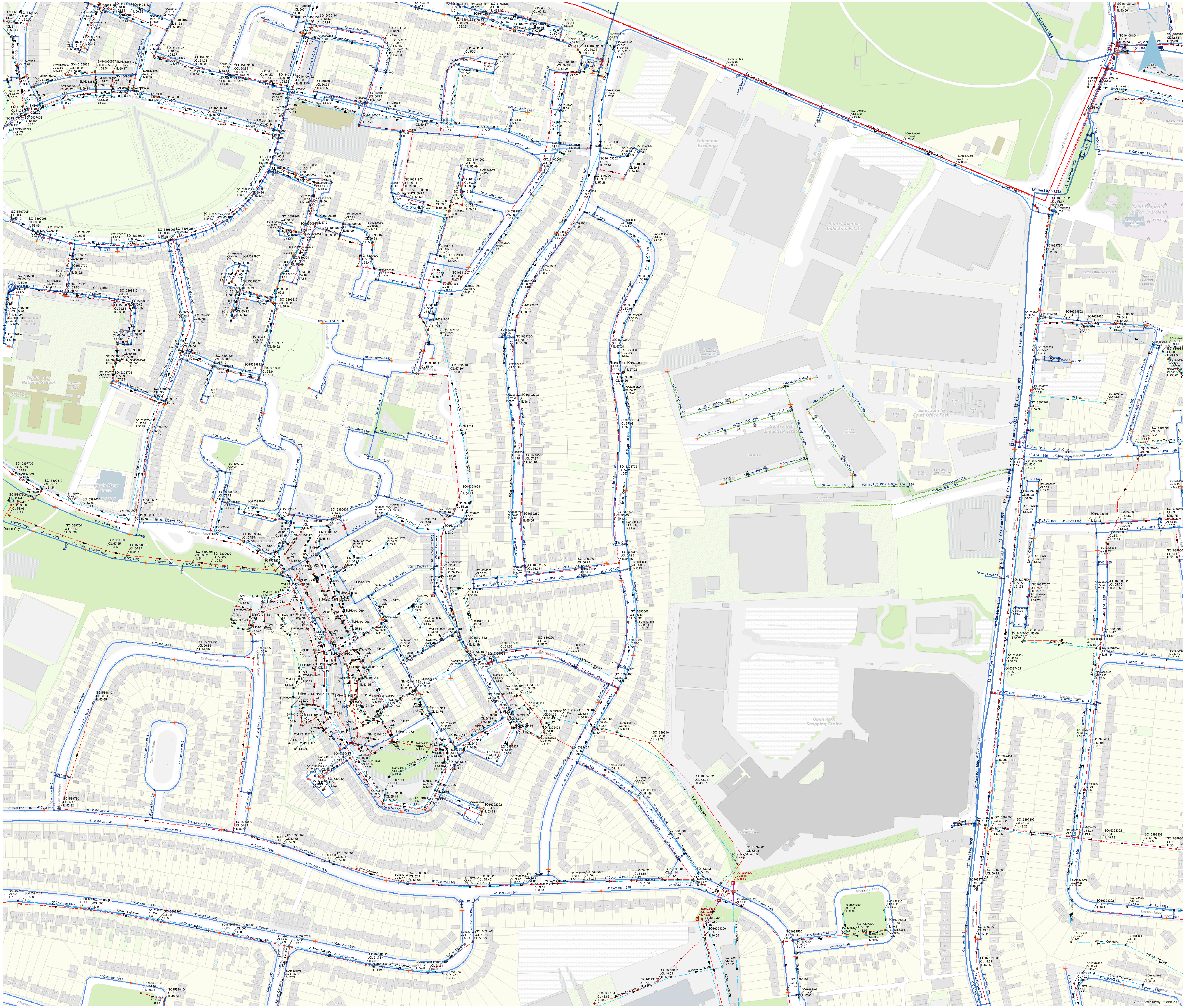
murray & associates
landscape architecture

16 The Seapoint Building
44-45 Clontarf Road
Dublin 3, Ireland

t: +353 1 854 0090
f: +353 1 854 0095

e: mail@murray-associates.com
www.murray-associates.com

APPENDIX D - RECORD UTILITY MAPPING



Legend

Boundary Meter
Bulk Meter
Unknown Meter ; Other Meter
Non-Return
Sluice Valve Open
Sluice Valve Closed
Sluice Valve Open
Sluice Valve Closed
Double Air Control Valve

Water Hydrants

Hydrant Function

Fire Hydrant
Water Pump Stations
Water Kiosk
Cap
Other Fittings
Tap

Water Distribution Mains

Owned By

Irish Water
Private
Irish Water
Irish Water

Sewer Manholes

Manhole Type

Standard
Other; Unknown
Waste Water Pump station

Sewer Inlets

Inlet Type

Catchpit
Sewer Chambers
Gravity - Foul
Gravity - Overflow
Pumping - Foul
Surface Gravity Mains

Storm Manholes

Manhole Type

Standard
Catchpit
Other; Unknown

Storm Discharge Points

Discharge Type

Overflow

Storm Inlets

Inlet Type

Gully

1:1,250 at A0

Last edited: 07/05/2021

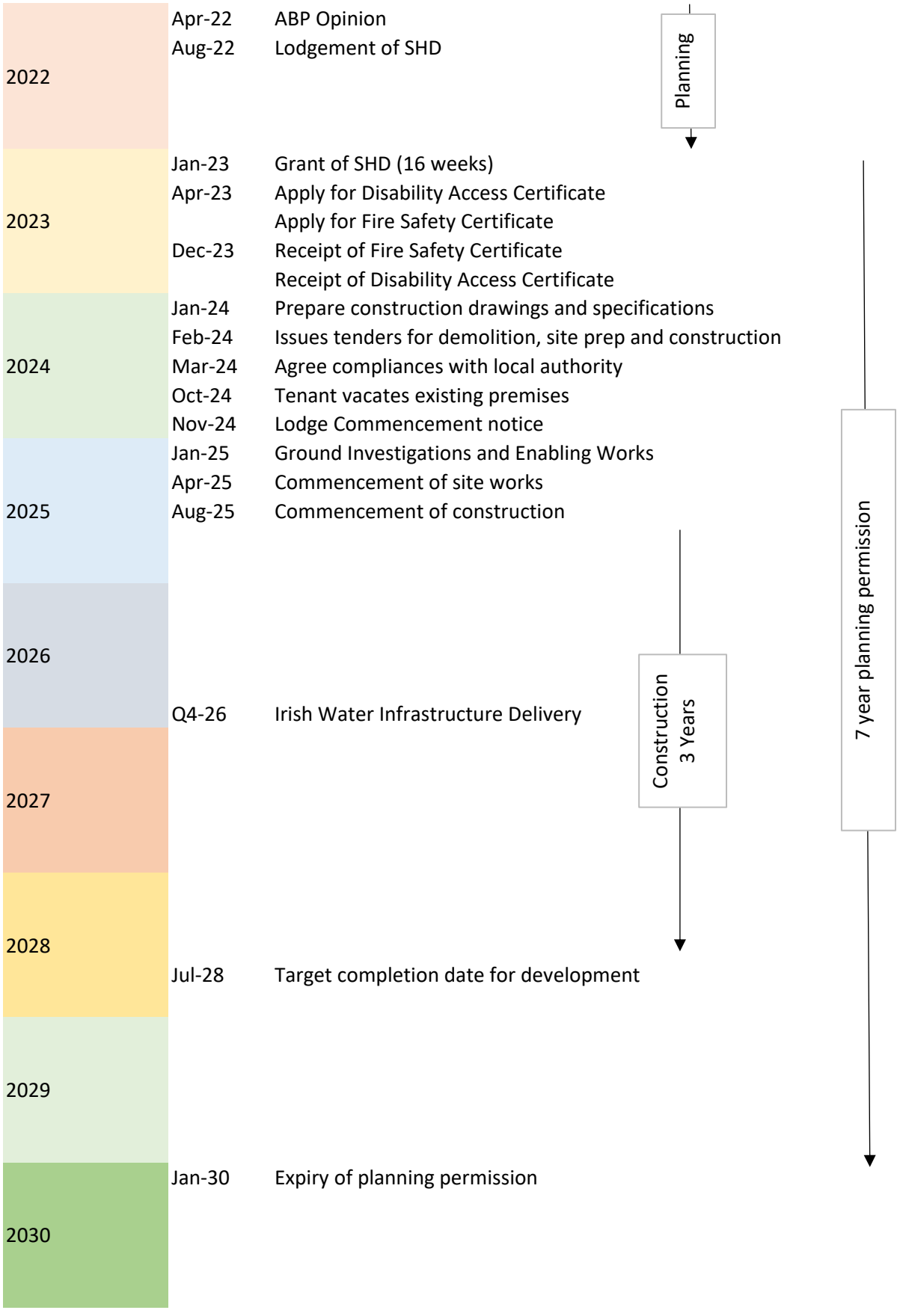
Metres

012.525 50

APPENDIX E – PROJECT TIMELINE & IRISH WATER CORRESPONDANCE

Example proposed development timeline

(for ilustrative purposes only)



Thomas Byrne

From:	Paul Fuller <PFuller@water.ie>
Sent:	Wednesday 8 June 2022 08:15
To:	Thomas Byrne
Cc:	Maxine Hickey
Subject:	201121 - Mixed Use Development at North west corner of Omni Park, Swords Road Ref: CDS21003688

Thomas,

See below further clarifications in green. I trust this is acceptable.

If you wish to discuss further, please do not hesitate to contact me.

Regards,

Paul Fuller
Senior Design Engineer
Connections and Developer Services- Greater Dublin Region
Asset Management

Irish Water
Colvill House | 24-26 Talbot Street | Dublin 1
T: 01 8230382 | E: PFuller@water.ie

Paul,

Thank you for providing the below information on the upgrade works. ABP issued their Opinion on Friday last which has a specific item in relation to clarification of information on the upgrade works mentioned in Irish Waters submission on the application. Some of this information you have provided in your previous email and some we seek further info from you in order to cover these items off for the main submission as requested by ABP. For clarity I have created a bullet point list below and commented in red;

- Need for all works necessary to facilitate the connection. I understand the works are required due to capacity issues at Santry Pumping Station, please confirm or provide comment. The Santry Pump Station upgrade is due to overflows into the adjacent watercourse. There is no storage at this location. In addition the diversion of flows to the north fringe will increase capacity to the network in the North Side of Dublin City.
- Agreements necessary to facilitate the connection. Connection Agreement for development with IW will be required. Please confirm or provide comment. A Connection Agreement and other Agreements as considered necessary at the time of connection application will be required.
- Agreements necessary to facilitate the upgrade of the development to wastewater infrastructure. Please provide comment. This is an Irish Water funded project and is due for completion in 2026 (subject to change). A review will be carried out at connection application stage. No Agreements are necessary with the customer to facilitate the upgrades.
- Clarity on what upgrade works are required. Provided by IW in previous email on 11/05, no further comment required.
- Who is to deliver these works. Please provide comment. Irish Water are delivering these upgrade works at Santry Pump Station.

- When are the works to be delivered relative to the completion of the proposed housing development. IW have confirmed in previous email that the works are on track to substantial completion by 2026, no further comment required.
- Are the upgrade works subject of separate consent processes. Please provide comment. Irish Water will apply separately for planning and possibly a compulsory purchase order for new land for a new pump station, as necessary, in line with the project timeline.

Regards

Thomas Byrne
Senior Engineer|Civils | m: +353871849949 | e: tbyrne@eireng.com| w: www.eireng.com

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IRE - 3 Rogan's Court, Patrick Street, Dun Laoghaire, County Dublin, A96 T0H2 | T: +353 1 6638957
UK - Cambridge House, Henry Street, Bath, BA1 1BT | T: +44 1 225 618222

From: Paul Fuller <PFuller@water.ie>
Sent: Wednesday 11 May 2022 13:14
To: Thomas Byrne <tbyrne@eireng.ie>
Cc: Maxine Hickey <mhickey@water.ie>
Subject: RE: 201121 - Mixed Use Development at North west corner of Omni Park, Swords Road Ref: CDS21003688

Thomas,

Irish Water have a project to divert existing flows at the Santry Pump Station heading south to Santry to the North Fringe Sewer, heading west from the Pump Station.

The upgrades works include a complete civil and M&E replacement and relocation of the Santry pump station site. A new emergency overflow tank will also be constructed at the site.

We are currently on track for substantial completion of the works in 2026.

If you require any further information, please do not hesitate to contact me.

Regards,

Paul Fuller
Senior Design Engineer
Connections and Developer Services- Greater Dublin Region
Asset Management

Irish Water
Colvill House | 24-26 Talbot Street | Dublin 1
T: 01 8230382 | E: PFuller@water.ie

From: Thomas Byrne <tbyrne@eireng.ie>
Sent: Monday 9 May 2022 17:34
To: Paul Fuller <PFuller@water.ie>
Subject: 201121 - Mixed Use Development at North west corner of Omni Park, Swords Road Ref: CDS21003688

Paul,

I hope you are well. Maxine Hickey has recommended that I direct a query I have on the above development to you. Is it possible to give me some information on the proposed upgrade works due for completion in 2026 required prior to our connection? At the moment the only information our team has is that there is an upgrade required. As the completion date of 2026 currently aligns with our completion date in 2026 our team wishes to have a high level knowledge of the works involved in the upgrade to facilitate the development. i.e. Brief description of works involved in the upgrade, is it still on track for 2026 etc.

I would appreciate if you can facilitate a response to this query?

Regards

Thomas Byrne
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19th August 2022

Re: CDS21003688 pre-connection enquiry - Subject to contract | Contract denied
Connection for Multi/Mixed Use Development of c.457 unit(s) plus commercial floorspace at Lands at North west corner of Omni Park Shopping Centre, Santry Hall Industrial Estate, Swords Road, Dublin 9.

Dear Mr. Deasy,

Further to your recent correspondence with Irish Water on the subject forthcoming Strategic Housing Development planning application, IW would like to provide the following letter to clarify our upcoming infrastructure upgrade works in the area. Specifically, the Santry Wastewater Pump Station Upgrade project, that (on completion) would serve the subject development, subject to planning permission.

IW can confirm the following details regarding the Santry Wastewater Pump Station Upgrade project, which is presently at detailed design stage.

- The Santry Wastewater Pump Station Upgrade project is part of Irish Water's Capital Works Programme and shall be funded by Irish Water to cater for growth and development in the wider Santry area, Co Dublin.

- The upgrade works include a complete civil and M&E replacement and relocation of the pump station site. A new emergency overflow tank will also be constructed at the site. A new rising main will divert existing flows away from the current discharge point to a new connection point with the North Fringe Sewer.

- The detailed design phase has commenced, and Irish Water's programme is currently for substantial completion of such upgrade works by 2026, subject to change. All agreements and consents, as necessary to complete the works will be put in place in line with the current project timeline

If you have any further questions, please contact Paul Fuller from the design team at PFuller@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

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