DALYMOUNT STADIUM REDEVELOPMENT

Dublin City Council

DRAINAGE STRATEGY

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02

Integrated Design Team:

IDOM

GILROYMCMAHON ARCHITECTS

QUALITY INFORMATION

PROJECT INFORMATION

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TABLE OF CONTENTS

DRAINAGE STRATEGY 1
QUALITY INFORMATION 1
PROJECT INFORMATION 2
DOCUMENT INFORMATION 2
DOCUMENT APPROVAL 2
DOCUMENT NUMBER 2
TABLE OF CONTENTS 3
1.0 EXECUTIVE SUMMARY 4
1.1. OVERVIEW 4
1.2. PURPOSE OF REPORT 4
2.0 SITE LOCATION 4
3.0 EXISTING FOUL EFFLUENT 5
4.0 PROPOSED FOUL EFFLUENT 5
4.1. FOUL CONNECTIONS TO PUBLIC FOUL SEWER 5
4.2. SELF-CLEANSING VELOCITY 6
5.0 EXISTING WATER SURFACE 6
6.0 PROPOSED SURFACE WATER 7
6.1. PROJECT DESCRIPTION 7
6.2. CODES AND STANDARDS 7
6.3. SUDS- RAINWATER ATTENUATION 8
6.4. DRAINAGE STRATEGY 10
7.0 FLOOD RISK ASSESSMENT 12
8.0 GENERAL REQUIREMENTS 12

1.0 EXECUTIVE SUMMARY

1.1. OVERVIEW

The Integrated Design Team (IDT), led by IDOM + Gilroy McMahon Architects, have been appointed by Dublin City Council (DCC) for Dalymount Park Stadium Redevelopment.

The works comprise the demolition of the existing stadium and the construction of a new stadium to cater for c. 8,000 patrons and associated facilities (spectators, players and club), with an additional c. 500sqm dedicated for a Community Facility.

Dalymount Park is a football stadium located in Phibsborough (Dublin), and is recognised at both local and national levels for its contribution to Irish Football. It has an important place in the history of Irish football, hosting many international football matches, friendlies, and European ties over its history. IDT have prepared a design proposal for the stadium redevelopment.

1.2. PURPOSE OF REPORT

This report has been prepared to define the overall drainage strategy.

The current document aims to describe the existing drainage system, foul effluent system, and then explain drainage, foul and water supply strategies of Dalymount's Park stadium redevelopment.

2.0 SITE LOCATION

The site is located in a primarily residential area in Phibsborough, Dublin, within St Peter's Rd, Connaught St, Phibsborough Rd, and N Circular Rd. It is constrained to the space available within the centre of the residential block in which it sits.

3.0 EXISTING FOUL EFFLUENT

As indicated on Metroscan utility survey in appendix A, the existing waste water was only discharged from the JODI stand to the public manholes at private lane.

According to Appendix A, the foul water was discharge in 3 points.

(1) One manhole existed in the building, collecting the foul water from west side of the Jodi stand with three numbers 100 Ø PVC pipe and discharged into the public manhole with 150 Ø Clay pipe. Refer to the Appendix A, Sheet 8, Grid A1.
(2) In the middle of the Jodi stand, two numbers of 100 Ø Clay pipes are directly discharged into the public manhole. Refer to the Appendix A, Sheet 8, Grid B6.
(3) At the east corner of the Jodi stand, one 100 Ø Clay pipe directly discharged to the public manhole. Refer to the Appendix A, Sheet 8, Grid B10.

4.0 PROPOSED FOUL EFFLUENT

The proposed foul effluent will include all foul effluent from the whole stadium facility, i.e.
- from all WCs, sinks and urinals in the toilets under the east and west stands, basement area, and from the office area at the first floor,
- from kitchen sinks at concessions units and the VIP area at the first floor,
- from showers at the basement and
- from the sanitary fixtures in the community area.

The estimation is based on 'Building Regulations 2010, *Document H waste water disposal*' and '*Waste Water Infrastructure Standard Details*' Revision 4 by Irish Water.
The calculation of the foul drainage is referenced in Appendix B.

Foul water from the basement plan would be needed to pump with the submersible electric pump with the flow of 24m3/hr and the pressure head of 5 m.c.a. The manhole with the pump would be installed at the basement. The riser main 100 Ø with 1.5% slope from pump would be terminated at the manhole MHW 2 on the ground floor as shown in Appendix D.

Foul water from the west stand is accumulated along the drainage through MHE 1& 2 with 225 Ø with 1% slope. Foul water from the east stand is accumulated along the drainage through MHE 1 to 8 with 225 Ø with 1% slope. Refer to Appendix D, for the drainage design system.

4.1. FOUL CONNECTIONS TO PUBLIC FOUL SEWER

The connection point to the public main is divided in three points as follows:

(1) The final drainage from the west stand and the basement is discharged to the final existing manhole (in the corner of east and south stand) at the public lane behind the south terrace with 225 Ø with 1% slope.
(2) The final drainage from the east stand is discharged to the final existing manhole (in the corner of east and south stand) at the public lane behind the south terrace with 225 Ø with 1% slope.

In both west and east stand, due to the reason of inadequate head of discharge point to the final manhole, the pumping systems are needed for the well-operation of the drainage.

Refer to Appendix D for the Foul Water Drawing and Appendix B for calculation (Highlighted in yellow for the discharge manhole).

4.2. SELF-CLEANSING VELOCITY

According to ISEN 7524(1998) Part 4, Drain and sewer systems outside buildings Hydraulic Design Clause 8, self-cleansing velocity, for the pipe diameter of drains and sewers less than DN300, self-cleansing could be provided by securing a velocity of at least 0.7m/s in daily basic or the gradient of 1: DN is specified.

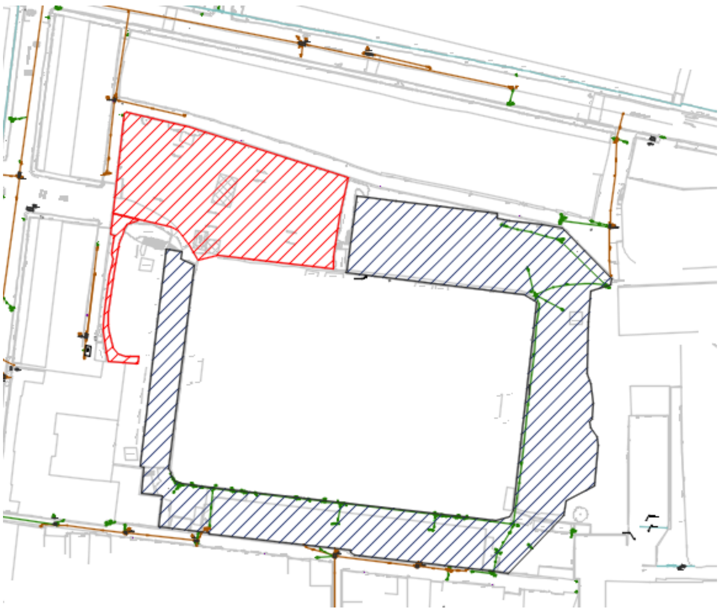
The internal drainage will have a minimum fall of 1:100 with the higher flow rate, so that the self-cleansing velocity will make sure.

5.0 EXISTING WATER SURFACE

The existing site of approximately of 19990m^2, is divided in approximately an impermeable area of 9792m^2 composed by the stands and the parking areas, and green area of 10198 m^2 composed by the pitch and grass & gravel areas.

There are no attenuation storage tanks and the water surface discharges by two methods according to the topography and Metroscan Utility Locating Surveys.

- The parking located on the North-West area (shaded in red in the image) seems to discharge directly to the ground by runoff as there are no manholes/drainage channels at that area.
- The rest of the stands (shaded in blue) seems to discharge the water surface run-off from the site via an 150Ø PVC storm drainage system exiting the site to connect to existing combined sewer on Phisborough Road of 100Ø Clay pipe.



On Appendix A is Metroscan Utility Locating Surveys.

6.0 PROPOSED SURFACE WATER

6.1. PROJECT DESCRIPTION

The redevelopment proposed for the site consists of the demolition of the existing stadium and the construction of a new stadium of c. 8000 patrons and associated facilities (spectators, players and club), with an additional c. 500sqm dedicated for a Community Facility.

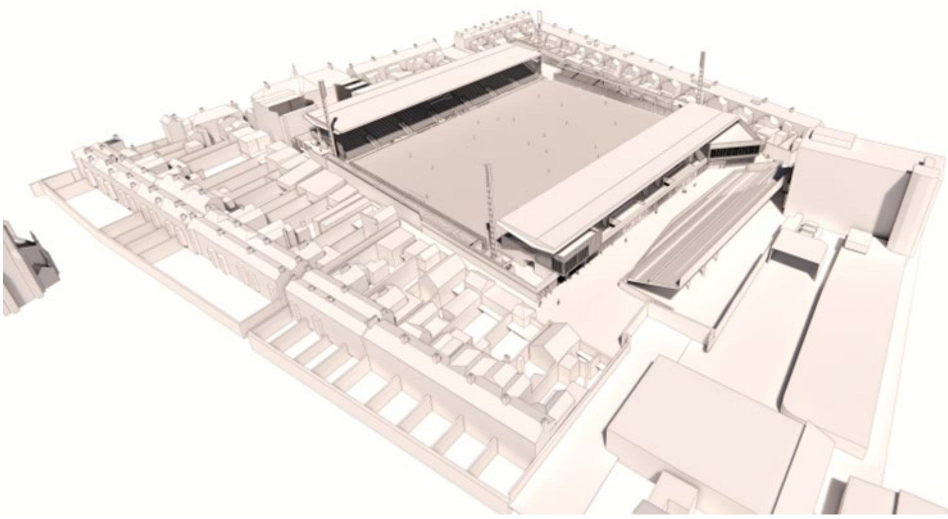
The proposal consists of a new four-sided stadium which features a natural pitch, aligned north-south to meet best practices in stadia design, two main new stands -to the east and west of the site, with a capacity of c. 3000 seats each-, and two terraces to the north and south of the site with a capacity of c. 1000 each.

The proposal also includes a new pedestrian boulevard connecting North circular road and Connaught Street, aiming at creating a new public space.

The scheme is designed to allow for level access on ground floor. To activate the new boulevard and attract movement on non-match days, the east stand features new concessions facing public realm areas, a fully independent community facility building with a gym and multipurpose room and a club shop.

The west stand is dedicated to stadium operations, including a bar on the first floor that can be used on non-match days by club members, and the competition facilities located on a basement below ground to facilitate the patron access on ground floor.

The basement is a single-story structure of c. 630m2, and houses the locker rooms, referee rooms, officials, medical areas, physiotherapy, doping control, stores and plant rooms.



6.2. CODES AND STANDARDS

This document has been prepared on the basis of the following documents

- DCC Sustainable Drainage Design & Evaluation Guide 2021

- Greater Dublin Strategic Drainage Study (GDSDS)
- Regional Drainage policies. Technical Document Volume two (GDSDS)

6.3. SUDS- RAINWATER ATTENUATION

Due to the nature of the new redevelopment and the nature of the side, with a constraint plot, SUDS options are limited. However, the use of SUDS has been maximised.

6.3.1 Green Roofs

A total of 270m2 of green roofs have been included. They are located on the small building of the North West corner and on the Community Facility Centre at the North East side.

6.3.2 Permeable paving

According to the Ground Investigation Report done by Ground Investigation of Ireland, the ground model is as follows:

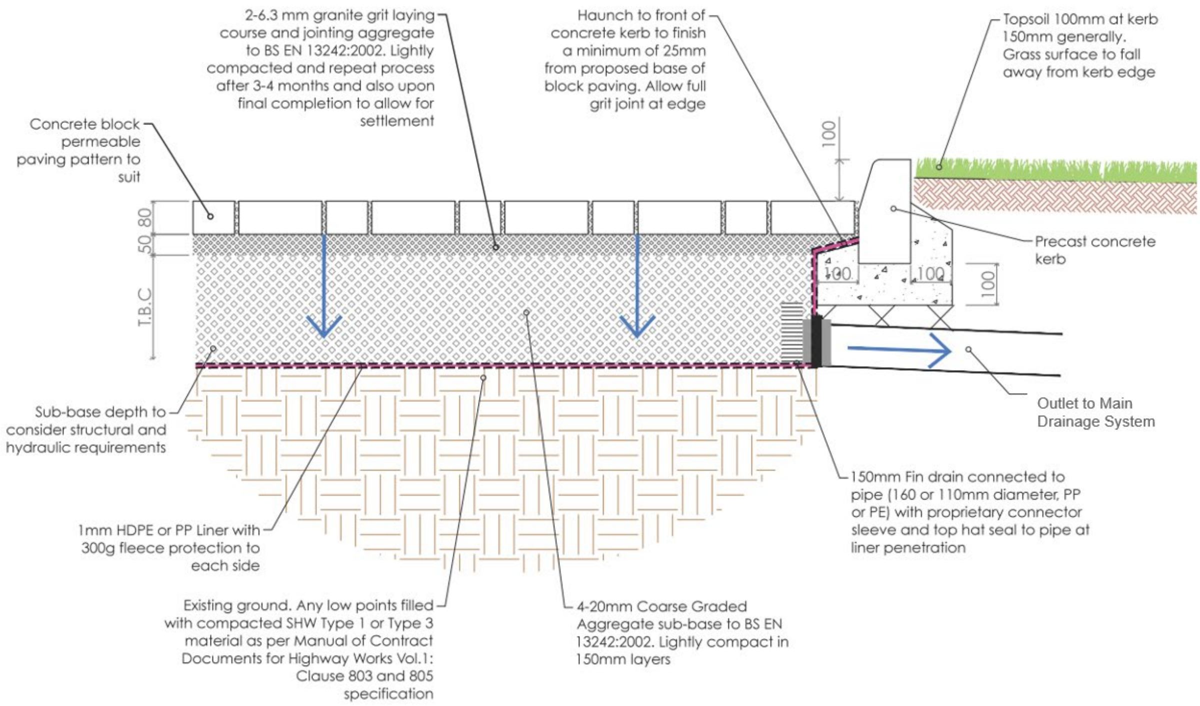
- Made ground
- Cohesive deposits
- Bedrock

Made ground deposits and cohesive deposits are described as brown sandy gravelly clay with occasional fragments of metal, red brick, glass and ceramic or cobbles and boulders.

A total of 4042m2 of permeable paving type C (no infiltration) has been considered at this development for the access areas. Infiltration has not been considered as the permeability of the soil is expected to be low. Once the permeability tests have been completed, infiltration will be considered if possible.

The cross-section of the solution is the following

Detail 3 - Lined Permeable Paving (System C) No Infiltration - with Sealed Outlet to Flow Control



According to “Sustainable Drainage Design &Evaluation Guide 2021 – DCC” and “GDSDS” attenuation storage is required provided to store the stormwater from the Design Storm 100yr, 6hr flood allowing 20% extra for future climate change. Also, the surface run-off from new development will be restricted to 2l/s/ha for the 1 in 100 year rainfall event.

The stormwater from the access areas and roofs are stored on the sub-base layer of the permeable paving of 50cm.

Refer for Appendix C for the calculations.

6.3.3 Harvesting and Attenuation Tanks

Harvesting Tanks

The rainwater collected from the west stand roof and the north terrace roof is collected through the common collector and is discharged to the 52m3 underground rainwater harvesting tank located at the north-west corner. The rainwater collected from the east stand roof and the south terrace roof is collected through the common collector and is discharged to the 52m3 underground rainwater harvesting tank located at the south-east corner.

The overflow water from the harvesting tanks is distributed on the gravels of permeable paving.

A total volume of 104m3 of harvesting tanks is considered.

The sizing of the harvesting tanks is mentioned in Appendix C, and the location of the harvesting tanks and rainwater drainage system are illustrated in Appendix D.

Attenuation Tanks

Both the surface water of the pitch and its perimeter area (i.e. the area between the pitch and the stands), are collected together and stored in two attenuation tanks to control the discharge flow rate limitation. The discharges from the attenuation tanks are connected to the stormwater drainage.

A total volume of two attenuation tanks is 265m3 (2 times 133 m3).

The attenuation tank sizing is mentioned in Appendix C and the surface drainage for around the pitch area is illustrated in Appendix D.

6.4. DRAINAGE STRATEGY

The following sections describe the basis for drainage design.
Refer for Appendix D for the drawings

6.4.1 Material characteristics

The following material will be used for underground networks:

- Storm drainage: Concrete pipes according to GDSDS
- Manholes: In situ concrete according to GDSDS

6.4.2 Maximum velocity in pipes

A maximum flow velocity is to be defined in order to eliminate the risk of erosion in pipes.
The maximum allowable speed in the design of the pipe will be 3 m/s

6.4.3 Minimum velocity in pipes

A minimum flow velocity is to be defined in order to eliminate the risk of sedimentation in pipes. The minimum allowable speed in the design of the pipe will be 1.0 m/s (pipe full). According to GDSDS

6.4.4 Minimum diameter

In order to avoid obstruction problems in pipes, (due to leaves or dirtiness), a minimum diameter of 225mm will be considered (GDSDS)

6.4.5 Minimum pipe slope

Minimum pipe slope of 0.5% is considered.

6.4.6 Maximum distance between manholes

In general, manholes will be disposed in following situations:

- At every direction change
- At every pipe diameter change
- At the connection of several pipe strands
- At every change in the slope of the pipe

- Every 50m. 90m maximum

6.4.7 Rainfall Data

Rainfall Data information has been obtained from:
https://www.met.ie/climate/services/rainfall-return-periods.

Plot location coordinates have been set to obtain the location rainfall data.

Return Period Rainfall Depths for sliding Durations Irish Grid: Easting: 314805, Northing: 235870,

	Interval						Years					
DURATION	6months	1year	2	3	4	5	10	20	30	50	75	100
0,083333333 hours	2,5	3,5	4,1	5	5,6	6,1	7,6	9,4	10,6	12,2	13,7	14,9
0,166666667 hours	3,4	4,9	5,7	7	7,8	8,4	10,6	13,1	14,7	17	19,1	20,7
0,25 hours	4	5,8	6,7	8,2	9,2	9,9	12,5	15,4	17,3	20	22,5	24,4
0,5 hours	5,3	7,5	8,7	10,5	11,8	12,7	15,8	19,3	21,7	25	27,9	30,2
1 hours	7,1	9,8	11,3	13,6	15,1	16,2	20	24,3	27,1	31,1	34,6	37,3
2 hours	9,3	12,8	14,7	17,5	19,3	20,8	25,4	30,6	34	38,7	42,9	46,1
3 hours	11	15	17,1	20,3	22,3	24	29,2	35	38,8	44	48,6	52,2
4 hours	12,3	16,7	19,1	22,5	24,8	26,5	32,2	38,5	42,5	48,2	53,2	57
6 hours	14,5	19,6	22,2	26,1	28,7	30,6	37	44	48,5	54,8	60,3	64,5
9 hours	17,1	22,9	25,8	30,2	33,1	35,4	42,5	50,3	55,4	62,3	68,4	73,1
12 hours	19,2	25,5	28,8	33,6	36,7	39,2	46,9	55,3	60,8	68,3	74,8	79,8
18 hours	22,6	29,8	33,5	38,9	42,5	45,2	53,8	63,3	69,3	77,6	84,8	90,3
24 hours	25,3	33,3	37,3	43,2	47,1	50,1	59,4	69,6	76,1	85	92,8	98,7
48 hours	31,1	40	44,6	51,1	55,3	58,5	68,7	79,6	86,5	95,9	104	110,2
72 hours	35,7	45,5	50,4	57,4	62	65,4	76,3	87,8	95,1	105	113,5	119,9
96 hours	39,7	50,2	55,5	63	67,8	71,4	82,8	95	102,6	112,9	121,7	128,4
144 hours	46,7	58,5	64,3	72,6	77,9	81,9	94,3	107,4	115,6	126,6	136,1	143,1
192 hours	52,9	65,7	72	81	86,7	91	104,2	118,2	126,9	138,6	148,6	156
240 hours	58,6	72,3	79,1	88,6	94,6	99,2	113,3	128	137,1	149,4	159,8	167,6
288 hours	63,9	78,5	85,6	95,6	102	106,8	121,6	137	146,6	159,4	170,2	178,3
384 hours	73,7	89,8	97,6	108,6	115,6	120,8	136,8	153,5	163,8	177,6	189,2	197,8
480 hours	82,7	100,2	108,6	120,5	128	133,6	150,7	168,5	179,4	194	206,3	215,5
600 hours	93,2	112,2	121,4	134,2	142,3	148,3	166,7	185,7	197,4	213	226	235,7

6.4.8 Time of concentration

The time of concentration has been calculated according to Volume 4 Wallington procedure. The time of concentration (tc) is the sum of the time of entry (te) and the time of flow through the pipe (tf).

A time of entry of 3-5 minutes has been considered.
A time of flow of 2 minutes has been considered.
The time of concentration is then 5-7min

6.4.9 Run off Coefficients

Runoff coefficients used in calculations are the following standard/typical ones:

- Roofs, roads, walkways: 1.00
- Pitch: 0.35
- Green roofs: 0.50
- Permeable pavement: 0.7

6.4.10 Discharge rate

Discharge rate has been limited to 2 l/s/ha in each connection to a sewer according to GDSDS. A pump is required in each connection to guarantee this limit.

6.4.11 Flow calculation

The flow to be drained by a pipe stretch is calculated as per rational method formula, as it is a small extension plot:

$$Q = C \cdot I \cdot S$$

Where:

C: run-off coefficient of the contributive area in every sewer

S: contributive area in every sewer

I: maximum rainfall value considered

6.4.12 Pipe sizeing

Pipe's diameter is calculated by Manning's equation:

$$Q = \frac{A\, R^{2/3} S^{1/2}}{n}$$

where:

Q	=	flow rate (m^3/s)
n	=	Manning's coefficient, a roughness coefficient dependent upon the channel characteristics ($m^{-1/3}s$)
S	=	overall slope of the channel (m/m)
R	=	hydraulic radius = A/P, where A is the cross-sectional area (m^2) and P is the wetted perimeter (m)

The Manning coefficient selected for concrete is 0.015

Refer for Appendix C for pipe's calculations

7.0 FLOOD RISK ASSESSMENT

A Flood Risk Assessment was done by IE Consulting (Appendix E).

The site level is between approximately 28.70m and 31.60 m OD.

As indicated on the Flood Risk Assessment file

- The development is not expected to result in an adverse impact to the existing hydrological regime of the area or increase pluvial flood risk elsewhere.
- In the context of 'The Planning System & Flood Risk Management Guidelines – 2009' the site of the proposed development falls within a fluvial and coastal Flood Zone 'C'

Developments in Zone C (Low to Negligible Probability of Flooding) are not considered at risk of fluvial, coastal or tidal flooding.

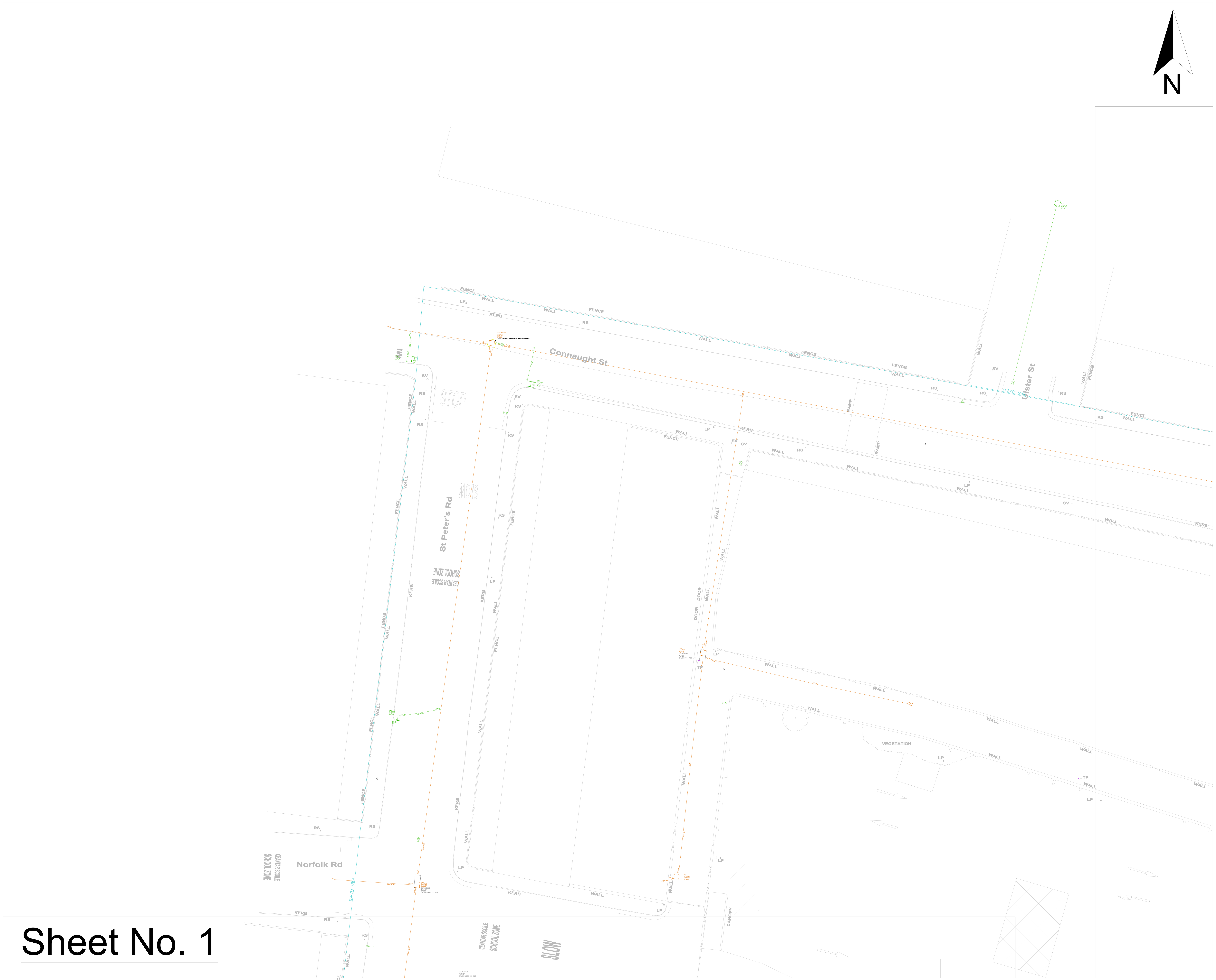
8.0 GENERAL REQUIREMENTS

All elements of sewer system and any connections to public sewer to be constructed in accordance with Dublin City Council requirements.

APPENDIX A

METROSCAN UTILITY SERVICES SURVEY

Sheet No. 1



SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE
ELECTRICAL M/HOLE
OVERHEAD LINE WITH POLE
OVERHEAD ELECTRIC
UNDERGROUND HV ELECTRICITY LINE
6M HIGH STREET LIGHT
MINI PILLAR
U/G ELECTRIC TRAFFIC CONTROL
TRAFFIC CONTROL M/HOLE
EIR
EIR CHAMBER
OVERHEAD LINE WITH POLE
ENET
ENET CHAMBER
COMMS
COMMS CHAMBER
VIRGIN
VIRGIN VIRGIN VIRGIN CHAMBER
FIBRE
FIBRE CHAMBER
AURORA TELECOM
AURORA TELECOM CHAMBER
CATV
CATV CHAMBER
BT/ESAT
BT/ESAT CHAMBER
SIRO FIBRE
SIRO CHAMBER
UNIDENTIFIED SERVICE
UNIDENTIFIED CHAMBER
EARTH LINE AND RODS
TRAFFIC SENSORS
CCTV POLE
UCAB UTILITIES CABNET

FOUL DRAINAGE
FMH FMH FOUL MANHOLE
STORM DRAINAGE
SMH SMH STORM DRAINAGE MANHOLE
COMBINED DRAINAGE
CMH CMH COMBINED DRAINAGE MANHOLE
PRODUCT DRAINAGE
FMH FMH PRODUCT DRAINAGE MANHOLE
CHEMICAL LINE
CHEMICAL MANHOLE
ROAD GULLY
GULLY TRAP
WATER MAIN
SLUICE VALVE
HYD FIRE HYDRANT
WATER METER
SCOUR VALVE
PRESSURE RELEASE VALVE
AIR VALVE
NON-RETURN VALVE
FUEL LINE/TANK
GAS SV
GAS LINE
GAS HIGH PRESSURE LINE
GL 00.00 GROUND LEVEL (METRES - OS DATUM)
CL 10.00 COVER LEVEL (METRES - OS DATUM)
IL 10.00 INVERT LEVEL (METRES - OS DATUM)
DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
DP ON MANHOLES = INVERT LEVEL OF CHAMBER
DP ON DRAINAGE = INVERT LEVEL OF PIPE
UTO UNABLE TO OPEN
OSA OUTSIDE SURVEY AREA
UTT UNABLE TO TRACE
QL-B4 QL-B4 DRAWN FROM RECORDS
SURVEYED AREA

Please note that the absence of services on this drawing is not solid proof that these services are not present in the ground. While every method of underground utility locating has been adhered to in this survey, some services may lie outside the range of the GPR and electro-magnetic locator signal. Poor ground conditions and or services situated underneath other services can also prove impossible to locate. Due to the fact that not all Utility Service Plans were provided to Metroscan by the contractor,Metroscan cannot be held responsible for any services that have not been identified. The contractor should not assume that all services have been identified and must exercise a duty of care when excavating.
Hand / vacuum excavation is advised to determine exact depth and position of service prior to excavation commencing.
Please note that the drawing provided is valid for 60 days from date stated below.
Drawing is intended solely for use of the contractor named below.

Accuracy Levels

In ideal conditions the accuracy levels of the EML is +/-5% whilst the GPR outputs accuracy levels of 10% up to 2.5m depth.
These accuracy levels can vary depending on ground conditions, depths of servcies, congestion of services (may cause signal to bleed on to other services).
Depths noted on drawings should be taken as indicative and hand / vacuum excavation is advised where exact depth are required.
Diameter of services will be given where direct access is available through visual inspection, eg manhole.
All Cover level elevations for Manholes / Inspection Chambers will be taken from topographical survey if supplied

Survey Limitations
Non-conductible services pose a difficult task to identify. Direct buried fibre optic cables are difficult to identify with GPR.
They can easily be traced when placed in a conduit by the means of a sonde or cobra reel.
PE gas mains can also prove difficult to identify.

If Metroscan cannot get an accurate signal from a service, it will be noted on the drawing that the service is 'Taken from records QL-B4'.
If manholes cannot be opened on site, they with be marked on the drawing as UTO (unable to open).
Excluded from the survey unless otherwise stated :
Domestic services, Services above ground, Disconnected services where no signal can be obtained.

Notes

1. GPR scanning frequency 250 and 700 mhz
   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
   Vivax Metrotech VproLoc2 / RD7000
3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
4. All depths stated are an indication of depth
   caution required when excavating.
5. All Utilities are classified QL- B2 unless noted otherwise.

PAS 128

Survey Type		Quality Level	Location Accuracy		Supporting Data
			Hortizonal	vertical	
D	Desktop utility record search	QL-D	Undefined	Undefined	
C	Site Reconnaissance	QL-C	Undefined	Undefined	A segmant of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segmant which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 / QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 / QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 / QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

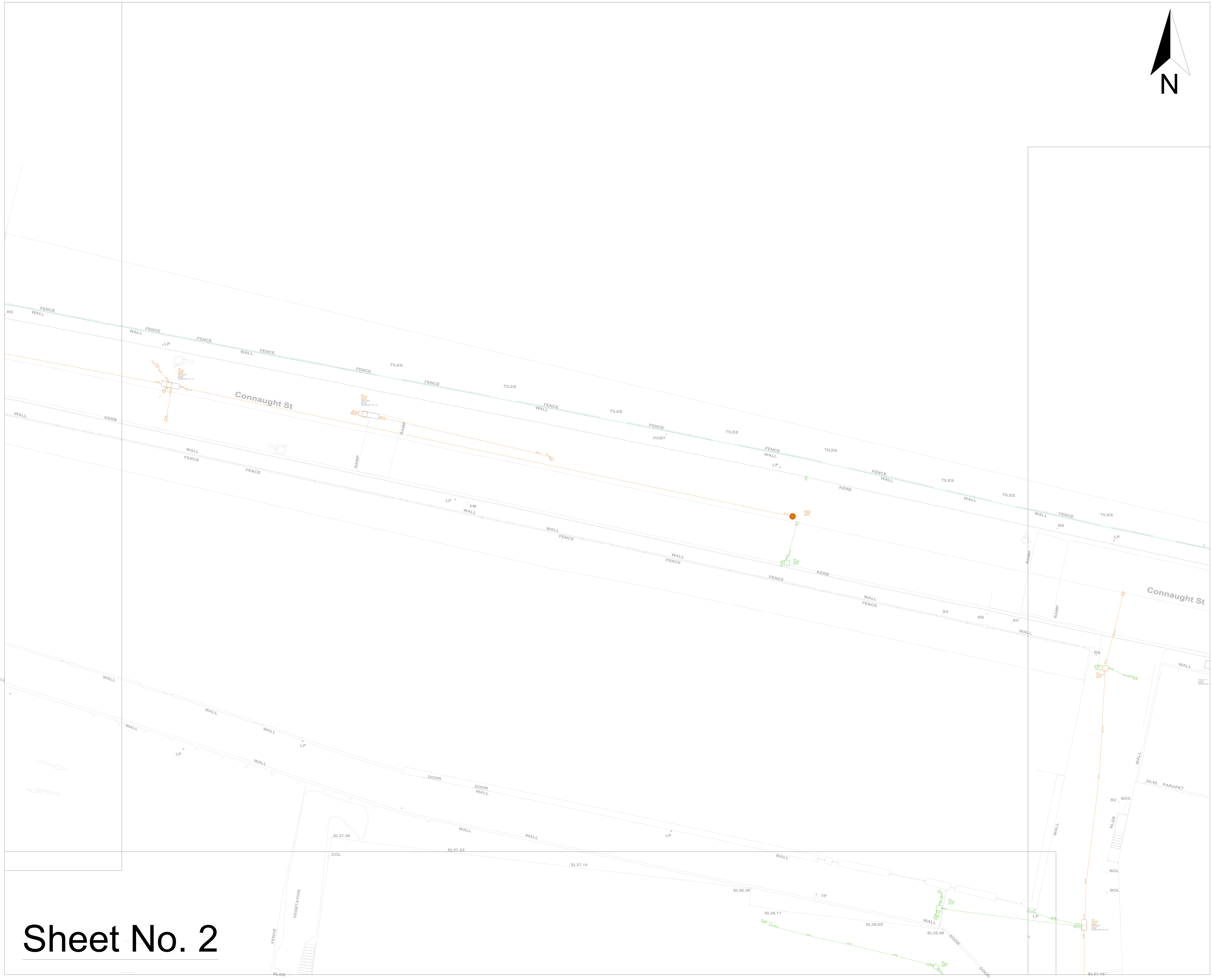
Drawing Title: MUL1006_Dalymount Park
Drwg No: 1
Site Completion Date: 10/02/2022
Sheet No: 1
Scale: 1:200 @ A1
Coordinates: ITM
Revision No:

METROSCAN
UTILITY LOCATING

Address: Rathjarney
Piercestown
Co. Wexford
Tel (086) 8522298
(086) 1935847

Email: john@metroscan.ie
ciaran@metroscan.ie

Website: www.metroscan.ie



Sheet No. 2

SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE
ELECTRICAL M/HOLE
OVERHEAD LINE WITH POLE
OVERHEAD ELECTRIC
UNDERGROUND HV ELECTRICITY LINE
6m HIGH STREET LIGHT
MINI PILLAR
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TRAFFIC CONTROL M/HOLE
EIR
EIR CHAMBER
OVERHEAD LINE WITH POLE
ENET
ENET CHAMBER
COMMS
COMMS CHAMBER
VIRGIN
VIRGIN CHAMBER
FIBRE
FIBRE CHAMBER
AURORA TELECOM
AURORA TELECOM CHAMBER
CATV
CATV CHAMBER
BT/ESAT
BT/ESAT CHAMBER
SIRO FIBRE
SIRO CHAMBER
UNIDENTIFIED SERVICE
UNIDENTIFIED CHAMBER
EARTH LINE AND RODS
TRAFFIC SENSORS
CCTV POLE
UCAB UTILITIES CABNET

FOUL DRAINAGE
FOUL MANHOLE
STORM DRAINAGE
STORM DRAINAGE MANHOLE
COMBINED DRAINAGE
COMBINED DRAINAGE MANHOLE
PRODUCT DRAINAGE
PRODUCT DRAINAGE MANHOLE
CHEMICAL LINE
CHEMICAL MANHOLE
ROAD GULLY
GULLY TRAP
WATER MAIN
SLUICE VALVE
FIRE HYDRANT
WATER METER
SCOUR VALVE
PRESSURE RELEASE VALVE
AIR VALVE
NON-RETURN VALVE
FUEL LINE/TANK
GAS SV
GAS LINE
GAS HIGH PRESSURE LINE
GL 00.00 GROUND LEVEL (METRES - OS DATUM)
CL 10.00 COVER LEVEL (METRES - OS DATUM)
IL 10.00 INVERT LEVEL (METRES - OS DATUM)
DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
DP ON MANHOLES = INVERT LEVEL OF CHAMBER
DP ON DRAINAGE = INVERT LEVEL OF PIPE
UTO UNABLE TO OPEN
OSA OUTSIDE SURVEY AREA
UTT UNABLE TO TRACE
QL-B4 QL-B4 DRAWN FROM RECORDS
SURVEYED AREA

Please note that the absence of services on this drawing is not solid proof that these services are not present in the ground.
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Please note that the drawing provided is valid for 60 days from date stated below.
Drawing is intended solely for use of the contractor named below.

Accuracy Levels

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Diameter of services will be given where direct access is available through visual inspection, eg manhole.
All Cover level elevations for Manholes / Inspection Chambers will be taken from topographical survey if supplied

Survey Limitations

Non-conductible services pose a difficult task to identify. Direct buried fibre optic cables are difficult to identify with GPR.
They can easily be traced when placed in a conduit by the means of a sonde or cobra reel.
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If manholes cannot be opened on site, they with be marked on the drawing as UTO (unable to open).
Excluded from the survey unless otherwise stated :
Domestic services, Services above ground, Disconnected services where no signal can be obtained.

Notes

1. GPR scanning frequency 250 and 700 mhz
   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
   Vivax Metrotech VproLoc2 / RD7000
3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
4. All depths stated are an indication of depth
   caution required when excavating.
5. All Utilities are classified QL- B2 unless noted otherwise.

PAS 128

Survey Type		Quality Level	Location Accuracy		Supporting Data
			Hortizonal	vertical	
D	Desktop utility record search	QL-D	Undefined	Undefined	
C	Site Reconnaissance	QL-C	Undefined	Undefined	A segmant of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segmant which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 / QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 / QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 / QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park
Drwg No: 1
Site Completion Date: 10/02/2022
Sheet No: 2
Scale: 1:200 @ A1
Coordinates: ITM
Revision No:

METROSCAN
UTILITY LOCATING

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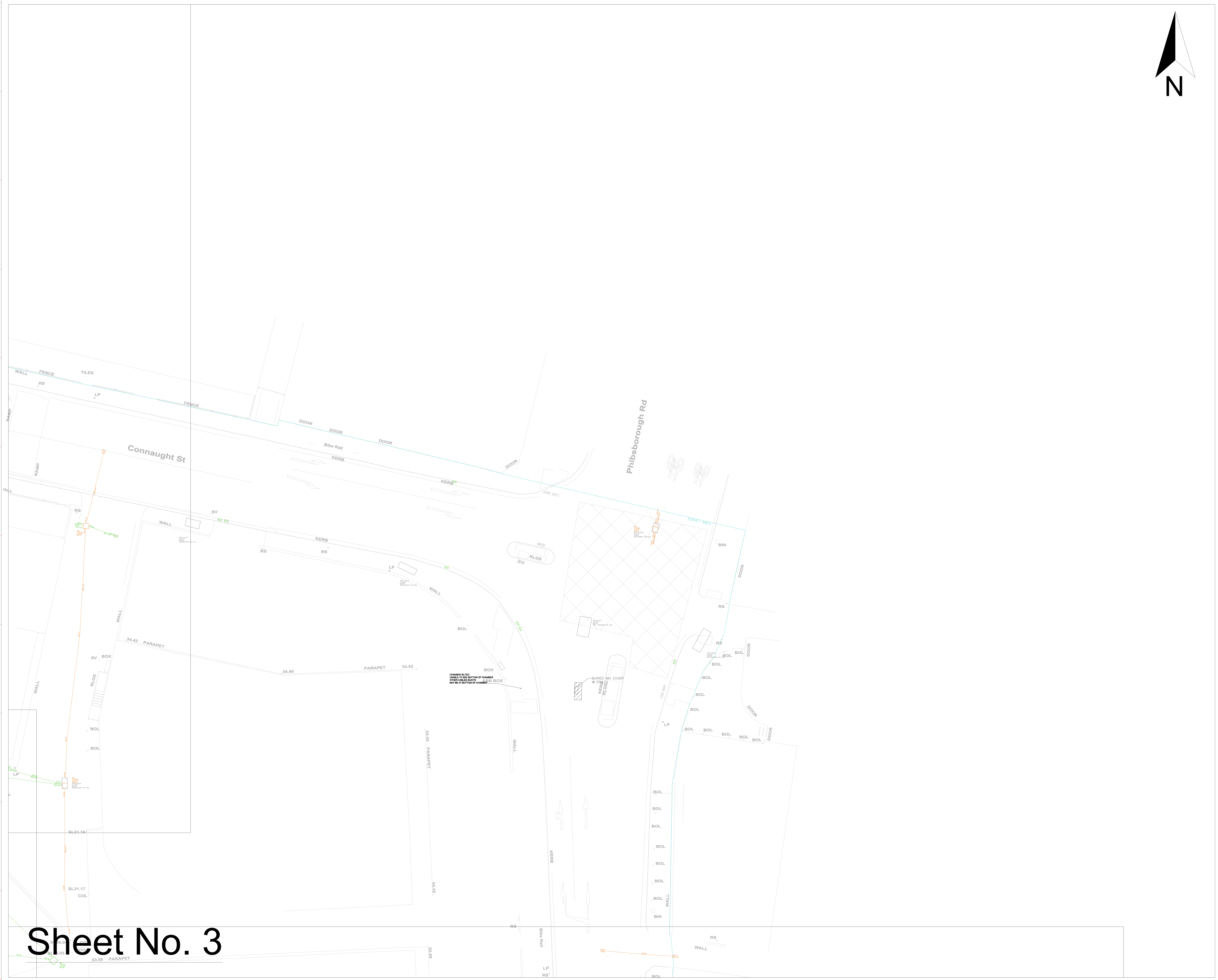
(086) 1935847

Email: john@metroscan.ie
ciaran@metroscan.ie

Website: www.metroscan.ie



SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE	FOUL DRAINAGE
ELECTRICAL M/HOLE	FMH FMH FOUL MANHOLE
OVERHEAD LINE WITH POLE	STORM DRAINAGE
OVERHEAD ELECTRIC	SMH SMH STORM DRAINAGE MANHOLE
UNDERGROUND HV ELECTRICITY LINE	COMBINED DRAINAGE
6M HIGH STREET LIGHT	CMH CMH COMBINED DRAINAGE MANHOLE
MINI PILLAR	PRODUCT DRAINAGE
U/G ELECTRIC TRAFFIC CONTROL	PMH PMH PRODUCT DRAINAGE MANHOLE
TRAFFIC CONTROL M/HOLE	CHEMICAL LINE
EIR	CHEMICAL MANHOLE
EIR CHAMBER	ROAD GULLY
OVERHEAD LINE WITH POLE	GULLY TRAP
ENET	WATER MAIN
ENET CHAMBER	SLUICE VALVE
COMMS	HYD FIRE HYDRANT
COMMS CHAMBER	WATER METER
VIRGIN	SCOUR VALVE
VIRGIN VIRGIN VIRGIN CHAMBER	PRESSURE RELEASE VALVE
FIBRE	AIR VALVE
FIBRE CHAMBER	NON-RETURN VALVE
AURORA TELECOM	FUEL LINE/TANK
AURORA TELECOM CHAMBER	GAS SV
CATV	GAS LINE
CATV CHAMBER	GAS HIGH PRESSURE LINE
BT/ESAT	GL 00.00 GROUND LEVEL (METRES - OS DATUM)
BT/ESAT CHAMBER	CL 10.00 COVER LEVEL (METRES - OS DATUM)
SIRO FIBRE	IL 10.00 INVERT LEVEL (METRES - OS DATUM)
SIRO CHAMBER	DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
UNIDENTIFIED SERVICE	DP ON MANHOLES = INVERT LEVEL OF CHAMBER
UNIDENTIFIED CHAMBER	DP ON DRAINAGE = INVERT LEVEL OF PIPE
EARTH LINE AND RODS	UTO UNABLE TO OPEN
TRAFFIC SENSORS	OSA OUTSIDE SURVEY AREA
CCTV POLE	UTT UNABLE TO TRACE
	QL-B4 QL-B4 DRAWN FROM RECORDS
UCAB UTILITIES CABNET	SURVEYED AREA

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Notes

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2. Radio detection equipment:
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3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
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   caution required when excavating.
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PAS 128

Survey Type		Quality Level	Location Accuracy		Supporting Data
			Hortizonal	vertical	
D	Desktop utility record search	QL-D	Undefined	Undefined	
C	Site Reconnaissance	QL-C	Undefined	Undefined	A segmant of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segmant which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park	**Drwg No:** 1
Site Completion Date: 10/02/2022	**Sheet No:** 3
Scale: 1:200 @ A1 / **Coordinates:** ITM	**Revision No:**

METROSCAN UTILITY LOCATING

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(086) 1935847

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ciaran@metroscan.ie

Website: www.metroscan.ie

Sheet No. 4

SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE
ELECTRICAL M/HOLE
OVERHEAD LINE WITH POLE
OVERHEAD ELECTRIC
UNDERGROUND HV ELECTRICITY LINE
6M HIGH STREET LIGHT
MINI PILLAR
U/G ELECTRIC TRAFFIC CONTROL
TRAFFIC CONTROL M/HOLE
EIR
EIR CHAMBER
OVERHEAD LINE WITH POLE
ENET
ENET CHAMBER
COMMS
COMMS CHAMBER
VIRGIN
VIRGIN VIRGIN VIRGIN CHAMBER
FIBRE
FIBRE CHAMBER
AURORA TELECOM
AURORA TELECOM CHAMBER
CATV
CATV CHAMBER
BT/ESAT
BT/ESAT CHAMBER
SIRO FIBRE
SIRO CHAMBER
UNIDENTIFIED SERVICE
UNIDENTIFIED CHAMBER
EARTH LINE AND RODS
TRAFFIC SENSORS
CCTV POLE
UCAB UTILITIES CABNET

FOUL DRAINAGE
FMH FMH FOUL MANHOLE
STORM DRAINAGE
SMH SMH STORM DRAINAGE MANHOLE
COMBINED DRAINAGE
CMH CMH COMBINED DRAINAGE MANHOLE
PRODUCT DRAINAGE
PMH PMH PRODUCT DRAINAGE MANHOLE
CHEMICAL LINE
CHEMICAL MANHOLE
ROAD GULLY
GULLY TRAP
WATER MAIN
SLUICE VALVE
HYD FIRE HYDRANT
WATER METER
SCOUR VALVE
PRESSURE RELEASE VALVE
AIR VALVE
NON-RETURN VALVE
FUEL LINE/TANK
GAS SV
GAS LINE
GAS HIGH PRESSURE LINE
GL 00.00 GROUND LEVEL (METRES - OS DATUM)
CL 10.00 COVER LEVEL (METRES - OS DATUM)
IL 10.00 INVERT LEVEL (METRES - OS DATUM)
DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
DP ON MANHOLES = INVERT LEVEL OF CHAMBER
DP ON DRAINAGE = INVERT LEVEL OF PIPE
UTO UNABLE TO OPEN
OSA OUTSIDE SURVEY AREA
UTT UNABLE TO TRACE
QL-B4 QL-B4 DRAWN FROM RECORDS
SURVEYED AREA

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Excluded from the survey unless otherwise stated :
Domestic services, Services above ground, Disconnected services where no signal can be obtained.

Notes

1. GPR scanning frequency 250 and 700 mhz
   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
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3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
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PAS 128

Survey Type		Quality Level	Location Accuracy Hortizonal	Location Accuracy vertical	Supporting Data
D	Desktop utility record search	QL-D	Undefined	Undefined	
C	Site Reconnaissance	QL-C	Undefined	Undefined	A segmant of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segmant which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 / QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 / QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 / QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park	**Drwg No:**	**1**
Site Completion Date: 10/02/2022	**Sheet No:**	**4**
Scale: 1:200 @ A1	**Coordinates:** ITM	**Revision No:**

METROSCAN
UTILITY LOCATING

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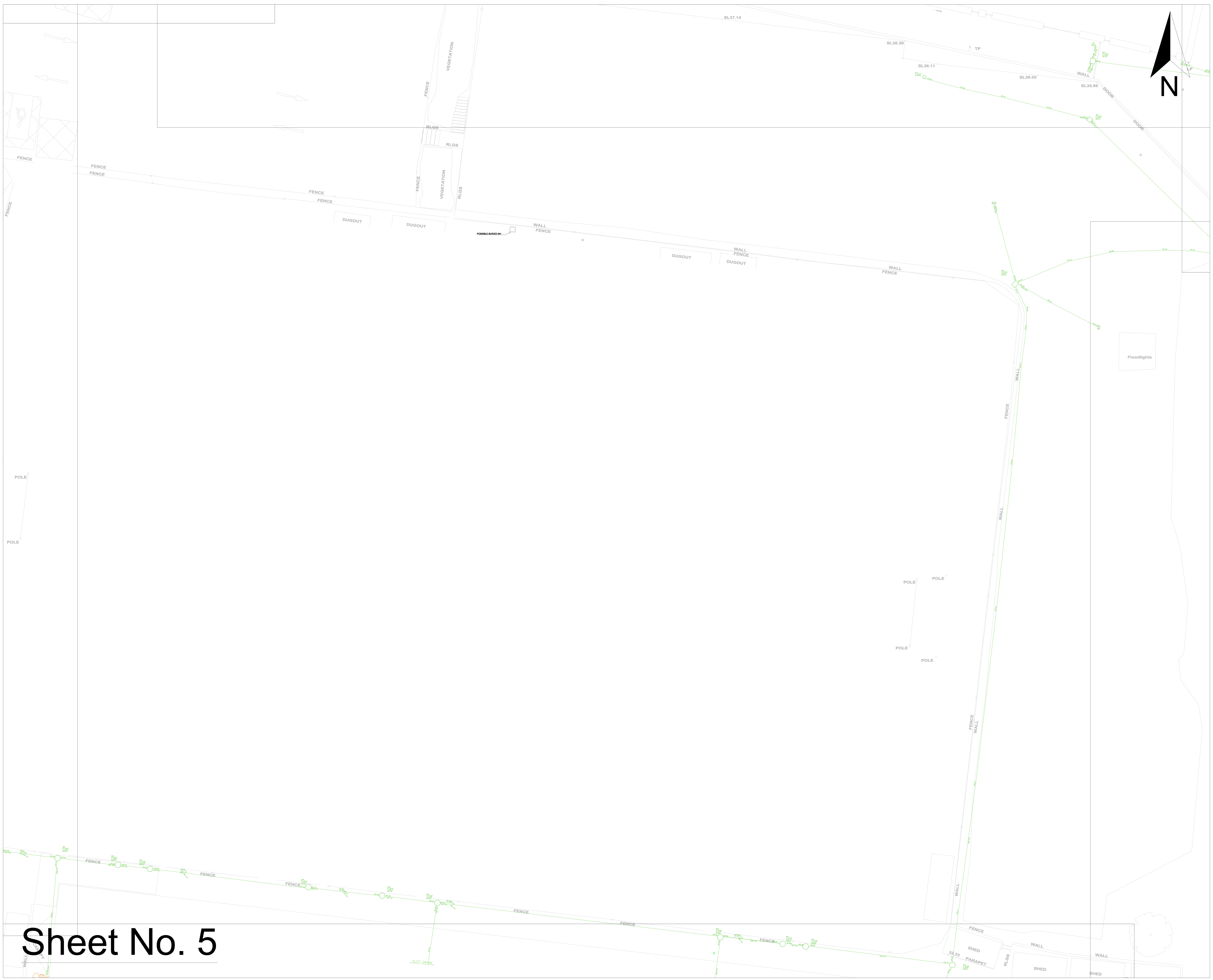

SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE	FOUL DRAINAGE
ELECTRICAL M/HOLE	FOUL MANHOLE
OVERHEAD LINE WITH POLE	STORM DRAINAGE
OVERHEAD ELECTRIC	STORM DRAINAGE MANHOLE
UNDERGROUND HV ELECTRICITY LINE	COMBINED DRAINAGE
6M HIGH STREET LIGHT	COMBINED DRAINAGE MANHOLE
MINI PILLAR	PRODUCT DRAINAGE
U/G ELECTRIC TRAFFIC CONTROL	PRODUCT DRAINAGE MANHOLE
TRAFFIC CONTROL M/HOLE	CHEMICAL LINE
EIR	CHEMICAL MANHOLE
EIR CHAMBER	ROAD GULLY
OVERHEAD LINE WITH POLE	GULLY TRAP
ENET	WATER MAIN
ENET CHAMBER	SLUICE VALVE
COMMS	FIRE HYDRANT
COMMS CHAMBER	WATER METER
VIRGIN	SCOUR VALVE
VIRGIN CHAMBER	PRESSURE RELEASE VALVE
FIBRE	AIR VALVE
FIBRE CHAMBER	NON-RETURN VALVE
AURORA TELECOM	FUEL LINE/TANK
AURORA TELECOM CHAMBER	GAS SV
CATV	GAS LINE
CATV CHAMBER	GAS HIGH PRESSURE LINE
BT/ESAT	GL 00.00 GROUND LEVEL (METRES - OS DATUM)
BT/ESAT CHAMBER	CL 00.00 COVER LEVEL (METRES - OS DATUM)
SIRO FIBRE	IL 00.00 INVERT LEVEL (METRES - OS DATUM)
SIRO CHAMBER	DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
UNIDENTIFIED SERVICE	DP ON MANHOLES = INVERT LEVEL OF CHAMBER
UNIDENTIFIED CHAMBER	DP ON DRAINAGE = INVERT LEVEL OF PIPE
EARTH LINE AND RODS	UTO UNABLE TO OPEN
TRAFFIC SENSORS	OSA OUTSIDE SURVEY AREA
CCTV POLE	UTT UNABLE TO TRACE
	QL-B4 QL-B4 DRAWN FROM RECORDS
UCAB UTILITIES CABNET	SURVEYED AREA

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Notes

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   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
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3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
4. All depths stated are an indication of depth
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PAS 128

Survey Type		Quality Level	Location Accuracy		Supporting Data
			Hortizonal	vertical	
D	Desktop utility record search	QL-D	Undefined	Undefined	
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A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park
Drwg No: 1
Site Completion Date: 10/02/2022
Sheet No: 5
Scale: 1:200 @ A1
Coordinates: ITM
Revision No:

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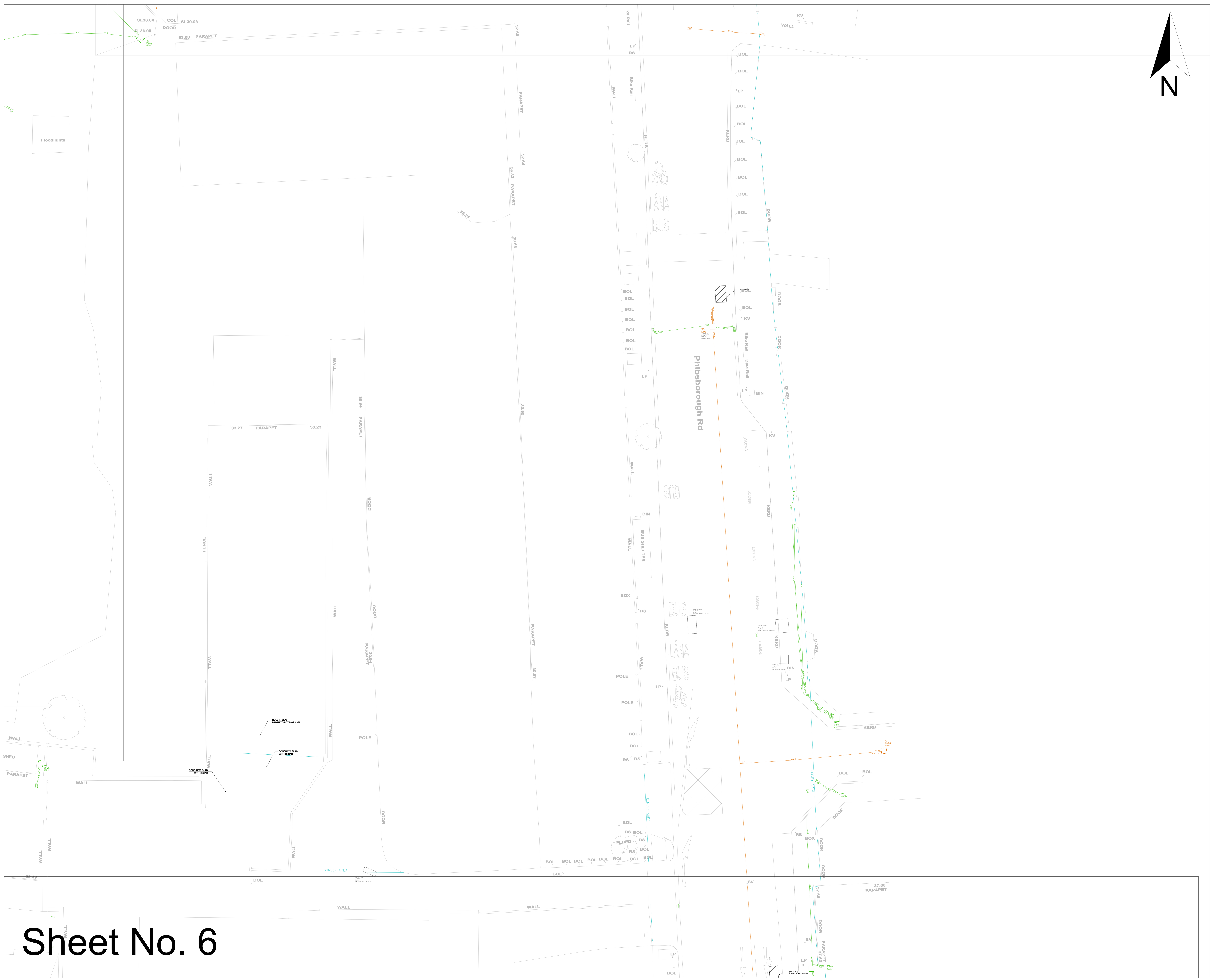

Sheet No. 6

SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE	FOUL DRAINAGE
ELECTRICAL M/HOLE	FMH FMH FOUL MANHOLE
OVERHEAD LINE WITH POLE	STORM DRAINAGE
OVERHEAD ELECTRIC	SMH SMH STORM DRAINAGE MANHOLE
UNDERGROUND HV ELECTRICITY LINE	COMBINED DRAINAGE
6M HIGH STREET LIGHT	CMH CMH COMBINED DRAINAGE MANHOLE
MINI PILLAR	PRODUCT DRAINAGE
U/G ELECTRIC TRAFFIC CONTROL	PMH PMH PRODUCT DRAINAGE MANHOLE
TRAFFIC CONTROL M/HOLE	CHEMICAL LINE
EIR	CHEMICAL MANHOLE
EIR CHAMBER	ROAD GULLY
OVERHEAD LINE WITH POLE	GULLY TRAP
ENET	WATER MAIN
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VIRGIN	SCOUR VALVE
VIRGIN VIRGIN VIRGIN CHAMBER	PRESSURE RELEASE VALVE
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CCTV POLE	UTT UNABLE TO TRACE
	QL-B4 QL-B4 DRAWN FROM RECORDS
UCAB UTILITIES CABNET	SURVEYED AREA

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PAS 128

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C	Site Reconnaissance	QL-C	Undefined	Undefined	A segmant of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works.
B	Detection	QL-B4	Undefined	Undefined	A utility segmant which is suspected to exist but has not been detected and is therefor shown as an assumed route
		QL-B3 QL-B3P	plus/minus 500mm	Undefined (no reliable depth)	Horizontal location only of the utility detected by one of the geophysical techniques used
		QL-B2 QL-B2P	plus/minus 250mm of the detected depth	Plus/minus 40% of the detected depth	Horizontal and vertical location of the utility detected by one of the geophysical techniques used
		QL-B1 QL-B1P	plus/minus 150mm of the detected depth	plus/minus 15% of the detected depth	Horizontal and vertical location of the utility detected by multiple geophysical techniques used
A	Verification	QL-A	plus/minus 50mm	plus/minus 15mm	Horizontal and vertical location of the top and/or bottom of the utility through trial holes/slit trench method

Client : Dublin City Council
Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park	**Drwg No:** 1
Site Completion Date: 10/02/2022	**Sheet No:** 6
Scale: 1:200 @ A1 / **Coordinates:** ITM	**Revision No:**

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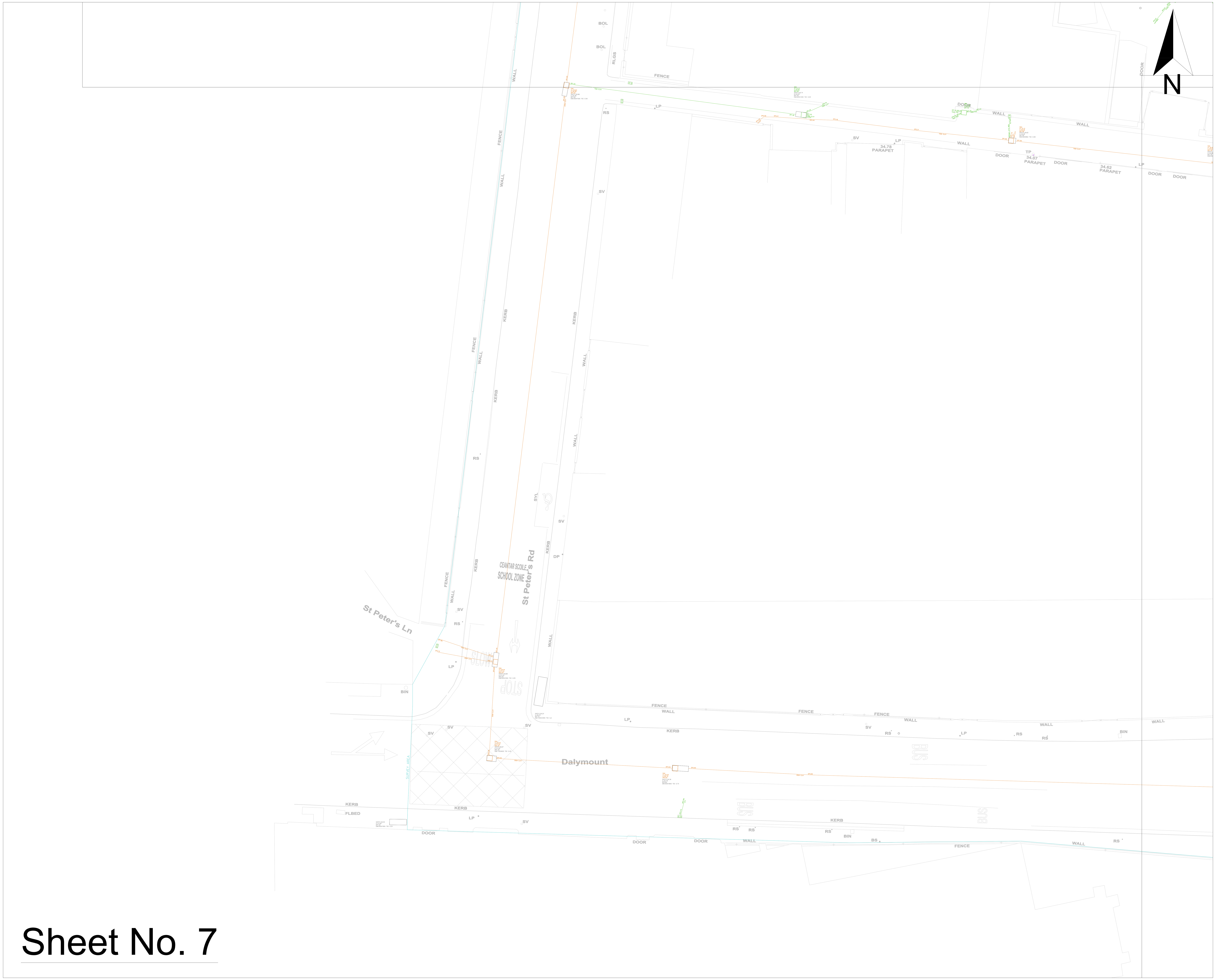

Sheet No. 7

SERVICES LEGEND

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Depths noted on drawings should be taken as indicative and hand / vacuum excavation is advised where exact depth are required.
Diameter of services will be given where direct access is available through visual inspection, eg manhole.
All Cover level elevations for Manholes / Inspection Chambers will be taken from topographical survey if supplied

Survey Limitations

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They can easily be traced when placed in a conduit by the means of a sonde or cobra reel.
PE gas mains can also prove difficult to identify.

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Domestic services, Services above ground, Disconnected services where no signal can be obtained.

Notes

1. GPR scanning frequency 250 and 700 mhz
   Depth of investigation 2.5m, self calibrating.
2. Radio detection equipment:
   Vivax Metrotech VproLoc2 / RD7000
3. GPR scanning limited to smooth surfaces only no obstruction.
   Survey area marked on drawing
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PAS 128

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Site Address : Dalymount Park,

Drawing Title: MUL1006_Dalymount Park		**Drwg No:**	1
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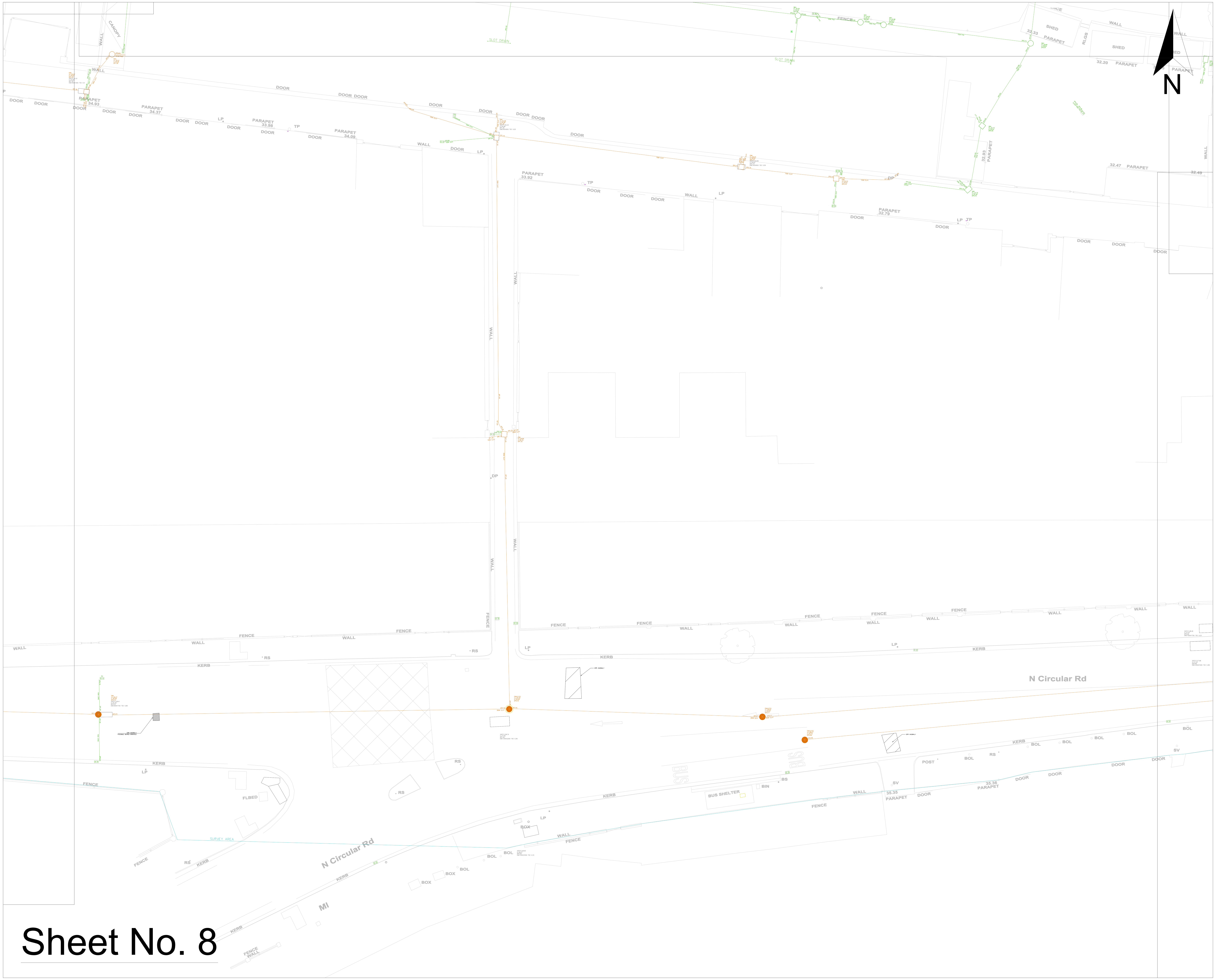

Sheet No. 8

SERVICES LEGEND

UNDERGROUND ELECTRICITY LINE	FOUL DRAINAGE
ELECTRICAL M/HOLE	FMH FMH FOUL MANHOLE
OVERHEAD LINE WITH POLE	STORM DRAINAGE
OVERHEAD ELECTRIC	SMH SMH STORM DRAINAGE MANHOLE
UNDERGROUND HV ELECTRICITY LINE	COMBINED DRAINAGE
6M HIGH STREET LIGHT	CMH CMH COMBINED DRAINAGE MANHOLE
MINI PILLAR	PRODUCT DRAINAGE
U/G ELECTRIC TRAFFIC CONTROL	PMH PMH PRODUCT DRAINAGE MANHOLE
TRAFFIC CONTROL M/HOLE	CHEMICAL LINE
EIR	CHEMICAL MANHOLE
EIR CHAMBER	ROAD GULLY
OVERHEAD LINE WITH POLE	GULLY TRAP
ENET	WATER MAIN
ENET CHAMBER	SLUICE VALVE
COMMS	HYD FIRE HYDRANT
COMMS CHAMBER	WATER METER
VIRGIN	SCOUR VALVE
VIRGIN VIRGIN VIRGIN CHAMBER	PRESSURE RELEASE VALVE
FIBRE	AIR VALVE
FIBRE CHAMBER	NON-RETURN VALVE
AURORA TELECOM	FUEL LINE/TANK
AURORA TELECOM CHAMBER	GAS SV
CATV	GAS LINE
CATV CHAMBER	GAS HIGH PRESSURE LINE
BT/ESAT	GL 00.00 GROUND LEVEL (METRES - OS DATUM)
BT/ESAT CHAMBER	CL 10.00 COVER LEVEL (METRES - OS DATUM)
SIRO FIBRE	IL 10.00 INVERT LEVEL (METRES - OS DATUM)
SIRO CHAMBER	DP1.50 DEPTH TO TOP OF SERVICE DUCT OR CABLE
UNIDENTIFIED SERVICE	DP ON MANHOLES = INVERT LEVEL OF CHAMBER
UNIDENTIFIED CHAMBER	DP ON DRAINAGE = INVERT LEVEL OF PIPE
EARTH LINE AND RODS	UTO UNABLE TO OPEN
TRAFFIC SENSORS	OSA OUTSIDE SURVEY AREA
CCTV POLE	UTT UNABLE TO TRACE
	QL-B4 QL-B4 DRAWN FROM RECORDS
UCAB UTILITIES CABNET	SURVEYED AREA

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PAS 128

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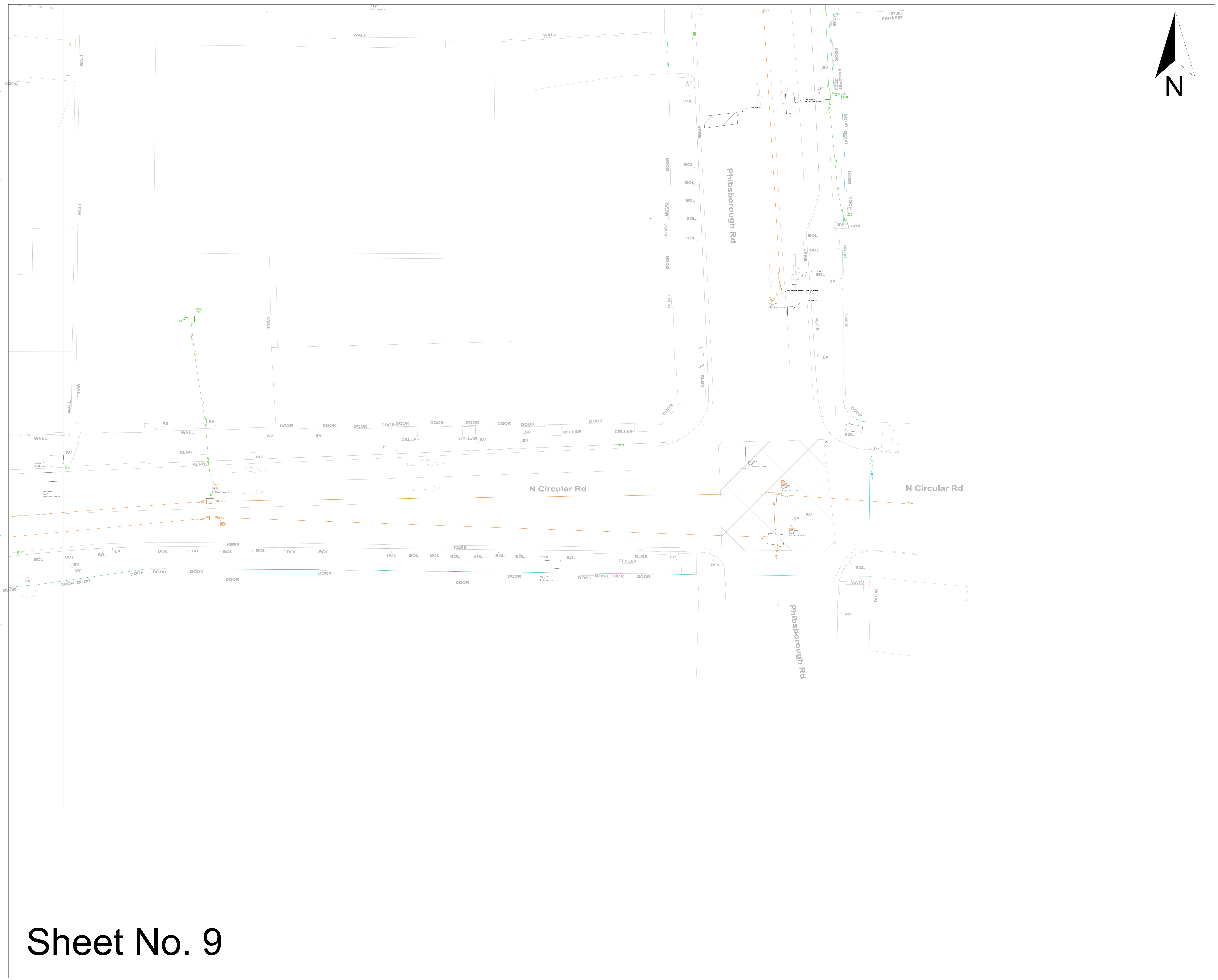

Sheet No. 9

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ELECTRICAL M/HOLE
OVERHEAD LINE WITH POLE
OVERHEAD ELECTRIC
UNDERGROUND HV ELECTRICITY LINE
6M HIGH STREET LIGHT
MINI PILLAR
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FOUL DRAINAGE
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APPENDIX B

FOUL DRAINAGE STRATEGY CALCULATIONS

SANITARY PIPEWORK, LAYOUT AND CALCULATION. BS-EN 12056-2

Table 0

System types

SYSTEM I	Single discharge stack system with partly filled branch discharge pipes. Filling degree of 0.5 (50 %)
SYSTEM II	Single discharge stack system with small bore discharge branch pipes. Filling degree of 0.7 (70 %)
SYSTEM III	Single discharge stack system with full bore branch discharge pipes. Filling degree of 1.0 (100 %)
SYSTEM IV	Separate discharge stack system.

Table 1

Nominal pipe diameters (DN)

NOMINAL Diameter DN	Minimum internal D di min (mm)
30	26
40	34
50	44
56	49
60	56
70	68
80	75
90	79
100	96
125	113
150	146
200	184
225	207
250	230
300	290

Table 2 (simplified)

Discharge units (DU)

Appliance	SYSTEM I	SYSTEM II	SYSTEM III	SYSTEM IV
	DU (l/s)	DU (l/s)	DU (l/s)	DU (l/s)
Wash basin, bidet	0.5	0.3	0.3	0.3
Shower without plug	0.6	0.4	0.4	0.4
Urinal with flushing valve	0.5	0.3	-	0.3
Bath	0.8	0.6	1.3	0.5
Kitchen sink	0.8	0.6	1.3	0.5
Dishwasher (household)	0.8	0.6	0.2	0.5
Washing machine up to 12 kg*	1.5	1.2	1.2	1.0
WC with 9,0 l cistern	2.5	2.0	1.8	2.5
Floor gully DN 50	0.8	0.9	-	0.6
Floor gully DN 70	1.5	0.9	-	1.0
Floor gully DN 100	2.0	1.2	-	1.3
Others	0			

Table 3

Typical frequency factors (K)

Usage of appliances	K
Intermittent use, e.g. in dwelling, guesthouse, office	0.5
Frequent use, e.g. in hospital, school, restaurant, hotel	0.7
Congested use, e.g. in toilets and/or showers open to public	1.0
Special use, e.g. laboratory	1.2

Table 11

Primary ventilated discharge stacks

Stack and stack vent	System I, II, III, IV Q max (l/s)	
DN (mm)	Square entries	Swept entries
60	0.5	0.7
70	1.5	2.0
80	2.0	2.6
90	2.7	3.5
100	4.0	5.2
125	5.8	7.6
150	9.5	12.4
200	16.0	21.0

Table 12

Secondary ventilated discharge stacks

Stack and stack vent	Secondary vent	System I, II, III, IV Q max (l/s)	
DN (mm)	DN (mm)	Square entries	Swept entries
60	50	0.7	0.9
70	50	2.0	2.6
80	50	2.6	3.4
90	50	3.5	4.6
100	50	5.6	7.3
125	70	7.6	10.0
150	80	12.4	18.3
200	100	21.0	27.3

Table B.1

Capacities of drains (L/S)

filling degree 50 %

SLOPE	DN100	DN125	DN150	DN 200	DN225	DN250	DN300
%							
0.5	1.8	2.8	5.4	10.0	15.9	18.9	34.1
1.0	2.5	4.1	7.7	14.2	22.5	26.9	48.3
1.5	3.1	5.0	9.4	17.4	27.6	32.9	59.2
2.0	3.5	5.7	10.9	20.1	31.9	38.1	68.4
2.5	4.0	6.4	12.2	22.5	35.7	42.6	76.6
3.0	4.4	7.1	13.3	24.7	38.2	46.7	83.9
3.5	4.7	7.6	14.4	26.6	42.3	50.4	90.7
4.0	5.0	8.2	15.4	28.5	45.2	53.9	96.9
4.5	5.3	8.7	16.3	30.2	48.0	57.2	102.8
5.0	5.6	9.1	17.2	31.9	50.6	60.3	108.4

CAPACITIES OF DRAINS

filling degree 50 %, (h/d = 0,5)

DRAIN	SUBDRAIN	Total flow	K	Flow rate	BS-EN 12056	
					DRAIN SLOPE	DIAMETER DRAIN
N°	N°	(l/s)	table 3	(l/s)	% (0,5-5)	INTERIOR MM
West Drainage	Final Public MH	326,50	1,00	18,07	1	DN225
East Drainage	Final Public MH	268,50	1,00	16,39	1	DN225

APPENDIX C

DRAINAGE STRATEGY CALCULATIONS

PERMEABLE PAVING STORAGE CAPACITY CALCULATION

Dalymount Storage Estimation: West

Impermeable area		Green Roof		Permeable Paving		Soft Landscaping	
Zone	*Area (m2)*	*Zone*	*Area (m2)*	*Zone*	*Area (m2)*	*Zone*	*Area (m2)*
Roof	3090,43	North-West	100	Parking/Access	2113	West	360
C	1	C	0,5	C	0,7	C	0,35

ATTENUATION TANK

Total Area (km2)	Total Contributing Area (km²)	SOIL	SAAR (mm)		Estimated Q_{bar} (m³/s)	Permissible Greenfield Runoff (PGR) (l/s/ha)	Estimated Greenfield Runoff "GR" (l/s)	Treatment Volume (m³)	Attenuation Volume (m3)	Maximum Storage Required (m³)
0,0057	0,0047	0,47	931	0,3370	0,008316	2,00	0,95	0	342,70	**343**

	INPUT	
Total Area to be Drained	5.663	Sq m
Allow able Discharge **per hectare**	2,00	l/s
Attenuation tank contributing Area	4.746	Sq m
Allow able Discharge Attenuation tank	0,06	Cu m/min

Attenuation Tank

Time of Storm TS	**Time of Storm D**	**Rainfall Depth T 100**	**Rainfall Intensity**	**Discharge to Storage**	**Discharge to Storage Q**	**Storage Required C**
Minutes	Hours	mm	mm/hr	l/s	Cu.m/min	Cu. m
5	0,083	14,900	178,800	235,695	14,142	70,42
10	0,167	20,700	124,200	163,721	9,823	97,66
15	0,250	24,400	97,600	128,657	7,719	114,94
30	0,500	30,200	60,400	79,619	4,777	141,61
60	1,000	37,300	37,300	49,169	2,950	173,59
120	2,000	46,100	23,050	30,385	1,823	211,94
180	3,000	52,200	17,400	22,937	1,376	237,47
240	4,000	57,000	14,250	18,784	1,127	256,83
360	6,000	64,500	10,750	14,171	0,850	285,59

MAXIMUM STORAGE REQUIRED (Cu. M) = 342,70

Climate change allowance factor 1,2

Dalymount Storage Estimation: East

Impermeable area		Green Roof		Permeable Paving	
Zone	***Area (m2)***	***Zone***	***Area (m2)***	***Zone***	***Area (m2)***
Roof	2993,93	North-East	170	Park/Access	1929,7
C	1	C	0,5	C	0,7

ATTENUATION TANK

Total Area (km2)	Total Contributing Area (km^2)	SOIL	SAAR (mm)		Estimated Q_{bar} (m^3/s)	Permissible Greenfield Runoff (PGR) (l/s/ha)	Estimated Greenfield Runoff "GR" (l/s)	Treatment Volume (m^3)	Attenuation Volume (m3)	Maximum Storage Required (m^3)
0,0051	0,0044	0,47	931	0,3370	0,007763	2,00	0,89	0	319,90	**320**

INPUT

Total Area to be Drained	5.094	Sq m
Allow able Discharge **per hectare**	2,00	l/s
Attenuation tank contributing Area	4.430	Sq m
Allow able Discharge Attenuation tank	0,05	Cu m/min

Attenuation Tank

Time of Storm TS	Time of Storm D	Rainfall Depth T 100	Rainfall Intensity	Discharge to Storage	Discharge to Storage Q	Storage Required C
Minutes	Hours	mm	mm/hr	l/s	Cu.m/min	Cu. m
5	0,083	14,900	178,800	220,009	13,201	65,74
10	0,167	20,700	124,200	152,825	9,170	91,16
15	0,250	24,400	97,600	120,095	7,206	107,29
30	0,500	30,200	60,400	74,321	4,459	132,18
60	1,000	37,300	37,300	45,897	2,754	162,04
120	2,000	46,100	23,050	28,363	1,702	197,83
180	3,000	52,200	17,400	21,410	1,285	221,66
240	4,000	57,000	14,250	17,534	1,052	239,74
360	6,000	64,500	10,750	13,228	0,794	266,58

MAXIMUM STORAGE REQUIRED (Cu. M) = 319,90

Climate change allowance factor 1,2

ATTENUATION TANK FOR THE SURROUNDINGS OF THE PITCH AND PITCH

Dalymount Storage Estimation For Around Pitch Area

Impermeable area		Permeable Paving		Pitch	
Zone	*Area (m2)*	*Zone*	*Area (m2)*	*Zone*	*Area (m2)*
Path	922	Parking/Acces	354	West	7140
C	1	C	0,7	C	0,35

ATTENUATION TANK

Total Area (km2)	Total Contributing Area (km²)	SOIL	SAAR (mm)		Estimated Q_{bar} (m³/s)	Permissible Greenfield Runoff (PGR) (l/s/ha)	Estimated Greenfield Runoff "GR" (l/s)	Treatment Volume (m³)	Attenuation Volume (m3)	Maximum Storage Required (m³)
0,0084	0,0037	0,47	931	0,3370	0,006429	2,00	0,73	0	264,95	**265**

INPUT		
Total Area to be Drained	8.416	Sq m
Allow able Discharge **per hectare**	2,00	l/s
Attenuation tank contributing Area	3.669	Sq m
Allow able Discharge Attenuation tank	0,04	Cu m/min

Attenuation Tank

Time of Storm TS	Time of Storm D	Rainfall Depth T 100	Rainfall Intensity	Discharge to Storage	Discharge to Storage Q	Storage Required C
Minutes	Hours	mm	mm/hr	l/s	Cu.m/min	Cu. m
5	0,083	14,900	178,800	182,217	10,933	54,44
10	0,167	20,700	124,200	126,574	7,594	75,50
15	0,250	24,400	97,600	99,465	5,968	88,86
30	0,500	30,200	60,400	61,554	3,693	109,48
60	1,000	37,300	37,300	38,013	2,281	134,20
120	2,000	46,100	23,050	23,491	1,409	163,85
180	3,000	52,200	17,400	17,733	1,064	183,59
240	4,000	57,000	14,250	14,522	0,871	198,56
360	6,000	64,500	10,750	10,955	0,657	220,79

MAXIMUM STORAGE REQUIRED (Cu. M) = 264,95

Climate change allowance factor 1,2

PIPE DIAMETER CALCULATIONS

WEST AREA					
Flow Discharged					
Sub-catchments	I (mm/h)	Global warming coefficient	Surface (m^2)	C	Flow (m^3/s)
T1	150	1,2	181,5	0,7	0,006
T2	150	1,2	257,5	0,7	0,009
T3	150	1,2	552	0,7	0,019
T4	150	1,2	355,5	0,7	0,012
Roof	150	1,2	2993	1	0,150

Pipes Diamaters					
Sub-catchment	Q	n	S	θ	D (mm)
Pipe_1	0,006	0,015	0,01	3,96	225
Pipe_2	0,020	0,015	0,01	3,96	225
Pipe_3	0,039	0,015	0,01	3,96	300
Pipe_4	0,162	0,015	0,01	3,96	450
Pipe_5	0,201	0,015	0,01	3,96	450

NORTH EAST AREA					
Flow Discharged					
Sub-catchments	I (mm/h)	Global warming coefficient	Surface (m^2)	C	Flow (m^3/s)
T1	150	1,2	304	0,7	0,011
T2	150	1,2	247	0,7	0,009

Pipes Diameters					
Sub-catchment	Q	n	S	θ	D (mm)
Pipe_1	0,011	0,015	0,01	3,96	225
Pipe_2	0,019	0,015	0,01	3,96	225

SOUTH EAST AREA					
Flow Discharged					
Sub-catchments	I (mm/h)	Global warming coefficient	Surface (m^2)	C	Flow (m^3/s)
T1	150	1,2	401	0,7	0,014
T2	150	1,2	629	0,7	0,022
Roof	150	1,2	2994	1	0,150

Pipes Diameters					
Sub-catchment	Q	n	S	θ	D (mm)
Pipe_1	0,014	0,015	0,01	3,96	225
Pipe_2	0,186	0,015	0,01	3,96	450

PITCH AREA AND SURROUNDINGS					
Flow Discharged					
Sub-catchments	**I (mm/h)**	**Global warming coefficient**	**Surface (m^2)**	**C**	**Flow (m^3/s)**
T1	150	1,2	54	0,7	0,002
T2	150	1,2	162	1	0,008

Pipes Diameters					
Sub-catchment	**Q**	**n**	**S**	**θ**	**D (mm)**
Pipe_1	0,010	0,015	0,01	3,96	225

RAINWATER HARVESTING TANKS CALCULATIONS

Rainwater harvesting tanks are designed to hold enough water to irrigate the pitch and flush toilets for 1.5 matchdays.

Specific Utilization of RWH system	Estimated Water Demand
For 1.5 match-day toilet and urinal flushing	34 m^3
For 1.5 days of pitch irrigation	70 m^3
Total Water Demand for Pitch Irrigation and Toilet Flushing	70 + 34 = 104 m^3

APPENDIX D

DRAINAGE STRATEGY DRAWING

GENERAL NOTES:

1. All dimensions are in millimeters. All vertical levels in metres and referenced to MSL datum unless noted otherwise.
2. All Architecture drawings to be read in conjunction with all relevant specifications, Structural Engineer's drawings, Services Engineer's and other Specialist's drawings.
3. Any discrepancies between graphic and written information must be immediately reported to the Architect in writing.

LEGEND

- Stormwater Manhole
- Stormwater pipes
- Foul Manhole
- Foul pipes
- Existing Public Manhole
- Rainwater Manhole
- Rainwater Pipes
- RWH Tank
- Around Pitch Surface Water Drainage
- Attenuation Tank

A1: 1/500 0 5 10 20
A3: 1/1000

N

Ver	Date	Issue Details	Dwn	Chd	App
02	04/08/2023	Draft For Planning	AE	VB	VB
01	24/07/2023	Draft For Planning	AE	VB	VB

Client

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Project

Dalymount Park
Stadium Redevelopment

Dwg Title

Drainage System Strategy

Scale	Date	Client Project No.	Origin. Project No.
A1 1:500 A3 1:1000	04/08/2023	-	P - 102025
	Drawn AE	Checked VB	Approved VB

Drawing No.	Status	Revision
102025-IDO-DR-A-8001-ZZ-ZZ	S4	02

Architects & Engineers

IDOM GILROYMCMAHON ARCHITECTS

APPENDIX E

FLOOD RISK ASSESSMENT

Site Specific Flood Risk Assessment

Dalymount Stadium Redevelopment, Phibsborough, Dublin 7

DRAFT



February 2022

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Site Specific Flood Risk Assessment

DRAFT

Client: IDOM

Location: Dalymount Stadium Redevelopment, Phibsborough, Dublin 7

Date: 07th February 2022

Document Control

PROJECT NUMBER: IE2438		DOCUMENT REF: IE2438_Report_5274			
2.0	DRAFT-02	LMc	PMS	JK	22-02-2022
1.0	DRAFT-01	LMc	PMS		07-02-2022
Revision	Purpose Description	Originated	Checked	Reviewed	Date

Contents

1.	**Introduction**	**1**
2.	**Proposed Site Description**	**2**
2.1.	General	2
2.2.	Existing Topography Levels at Site	3
2.3.	Local Hydrology, Landuse & Existing Drainage	3
3.	**Initial Flood Risk Assessment**	**4**
3.1.	Possible Flooding Mechanisms	4
4.	**Screening Assessment**	**5**
4.1.	OPW/EPA/Local Authority Hydrometric Data	5
4.2.	OPW PFRA Indicative Flood Mapping	6
4.3.	OPW Flood Maps Website	7
4.4.	Ordnance Survey Historic Mapping	8
4.5.	Geological Survey of Ireland Mapping	10
4.6.	Geological Survey of Ireland Groundwater Flood Mapping	11
4.7.	Eastern CFRAM Study	12
4.8.	Dublin Pluvial Study	13
5.	**Scoping Assessment**	**17**
6.	**Assessing Flood Risk**	**18**
6.1.	Assessment of Pluvial Flood Risks	18
7.	**Development in the Context of the Guidelines**	**23**
8.	**Summary Conclusions and Recommendations**	**25**

Appendices

Appendix A. Drawings

1. Introduction

IE Consulting was requested by IDOM to undertake a Site Specific Flood Risk Assessment (SSFRA) in support of a planning application for the proposed redevelopment of the existing Dalymount Stadium Phibsborough, Dublin 7.

The purpose of this SSFRA is to assess the potential flood risk to the site of the proposed development and to assess the impact that the development as proposed may or may not have on the hydrological regime of the area.

A hydrological engineer from IE Consulting undertook a survey of the site area and surrounding catchment on 8th December 2021.

Quoted ground levels or estimated flood levels relate to Ordnance Datum (Malin) unless stated otherwise.

This flood risk assessment study has been undertaken in consideration of the following guidance document:-

'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009.

2. Proposed Site Description

2.1. General

The site of the proposed development is located at Dalymount Stadium, Phibsborough, Dublin 7. The site is bounded to the north, west and south by existing residential properties, to the south-west by a national school and to the east by a commercial property. The total area of the site of the proposed development is approximately 1.82 hectares.

The location of the development site is illustrated on *Figure 1* below and shown on *Drawing Number IE2438-001-A.Appendix A*.

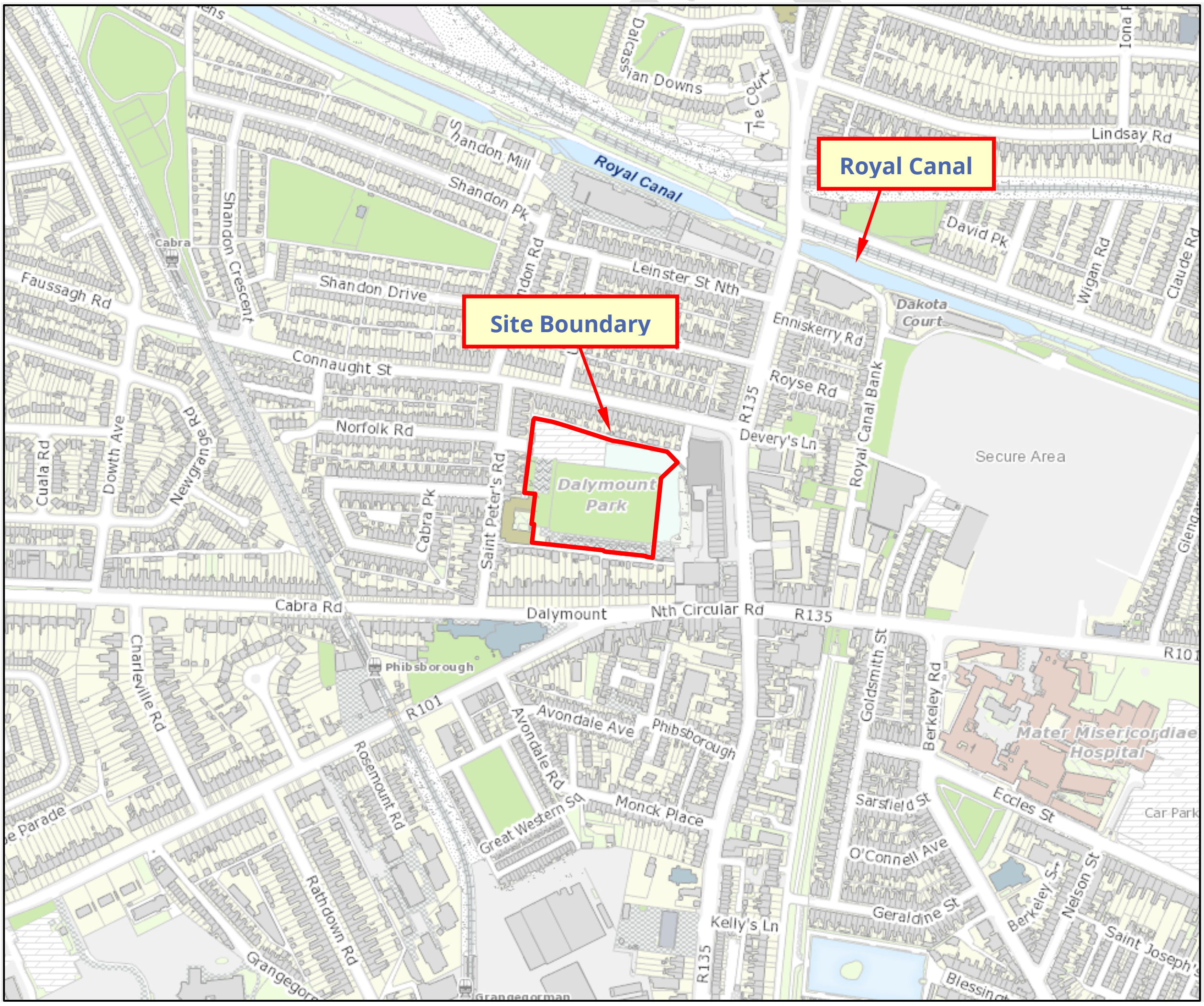


Figure 1 – Site Location

2.2. Existing Topography Levels at Site

The site of the proposed development site slopes very gently in a north-west to south-east direction at a gradient of approximately 1.372% (1 in 72.9).

Existing ground elevations range from approximately 31.60m OD (Malin) in the north-west corner of the site to 28.70m OD (Malin) at the south-east corner of the site.

2.3. Local Hydrology, Landuse & Existing Drainage

On the day of the site survey the development site appeared to be well drained and free from any standing water.

There are no significant surface hydrological features or natural fluvial water bodies located in the vicinity of the site of the proposed development. As illustrated in *Figure 1* above the Royal Canal is located approximately 267m beyond the northern boundary of the site.

3. Initial Flood Risk Assessment

The flood risk assessment for the site of the proposed development is undertaken in three principal stages, these being 'Step 1 – Screening', 'Step 2 – Scoping' and 'Step 3 – Assessing'.

3.1. Possible Flooding Mechanisms

Table 1 below summarises the possible flooding mechanisms in consideration of the site:

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	The site is not located within a coastal or tidally influenced region.
Fluvial	No	There are no significant hydrological features or fluvial water bodies located in the vicinity of the development site.
Pluvial (urban drainage)	Possible	There is urban drainage and water supply infrastructure located in the immediate vicinity of the site.
Pluvial (overland flow)	No	The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands.
Blockage	No	There are no significant or restrictive hydraulic structures located in the vicinity of the development site.
Groundwater	No	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site.

Table 1: Flooding Mechanisms

The primary potential flood risk to the site of the proposed development can be attributed to potential pluvial flooding due to blockage/surcharge of the urban drainage and/or water supply infrastructure located in the vicinity of the site.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' the potential flood risk to the site of the proposed development is analysed in the subsequent 'Screening Assessment' and "Scoping Assessment" section of this study report.

4. Screening Assessment

The purpose of the screening assessment is to establish the level of flooding risk that may or may not exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

If there is a potential flood risk issue then the flood risk assessment procedure should move to 'Step 2 – Scoping Assessment' or if no potential flood risk is identified from the screening stage then the overall flood risk assessment can end at 'Step 1'.

The following information and data was collated as part of the flood risk screening assessment for the site of the proposed development.

4.1. OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 2* below, this assessment has determined that there are no hydrometric gauging stations located in the vicinity of the site of the proposed development.

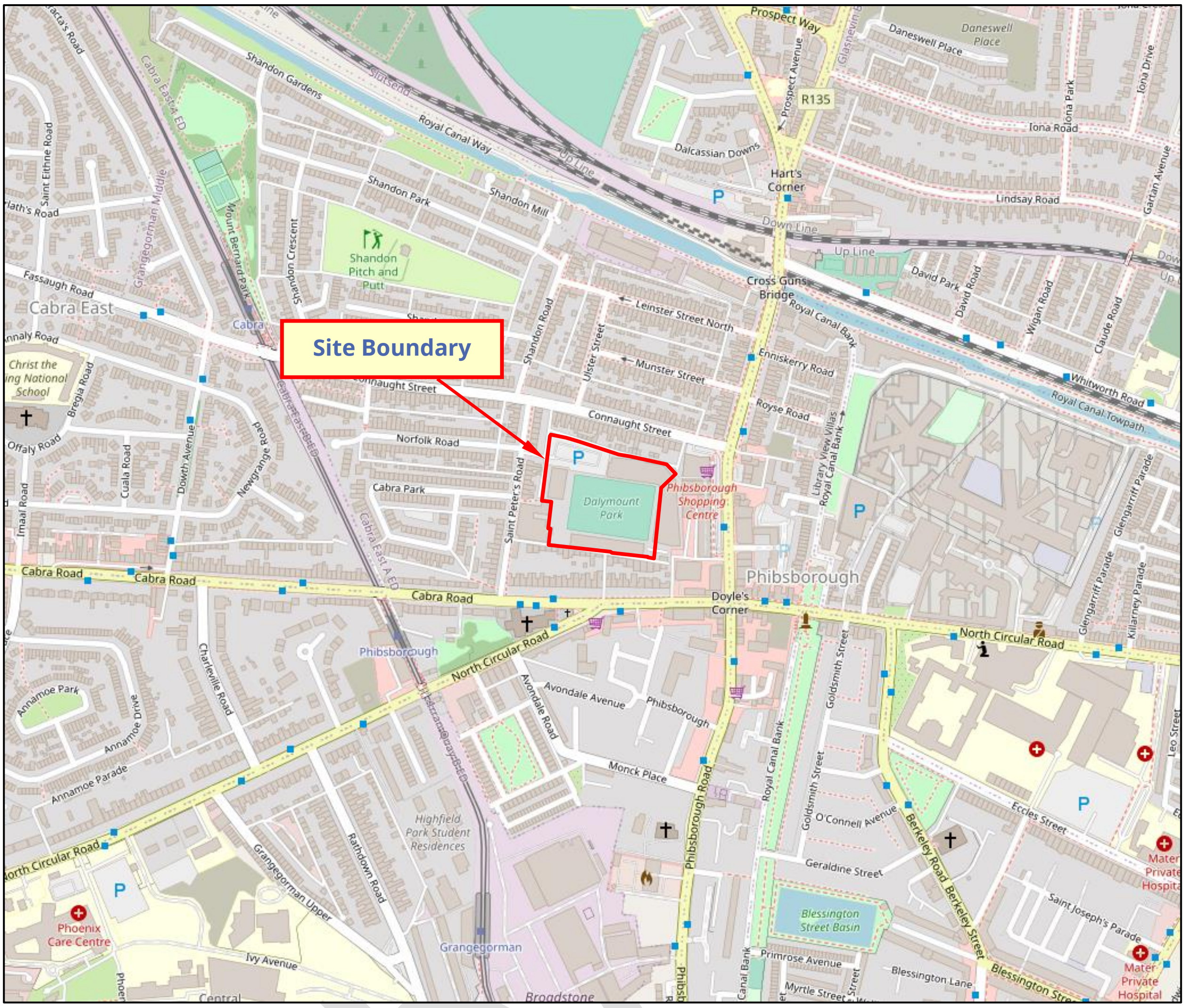


Figure 2 - Hydrometric Gauging Stations

4.2. OPW PFRA Indicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA flood map number 2019/MAP/238/A illustrates indicative flood zones within this area of Dublin.

Figure 3 below illustrates an extract from the above indicative flood map in the vicinity of the site of the proposed development.

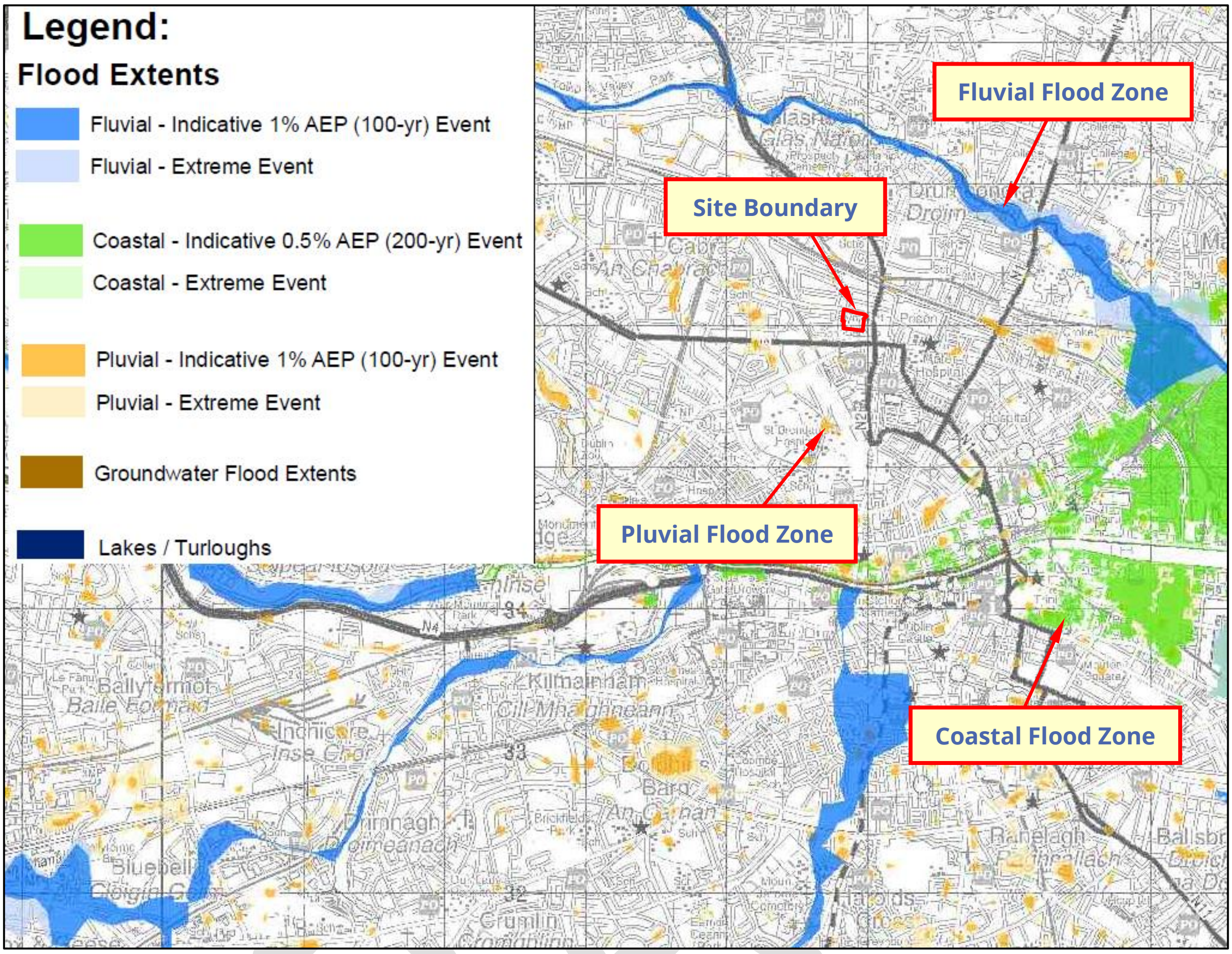


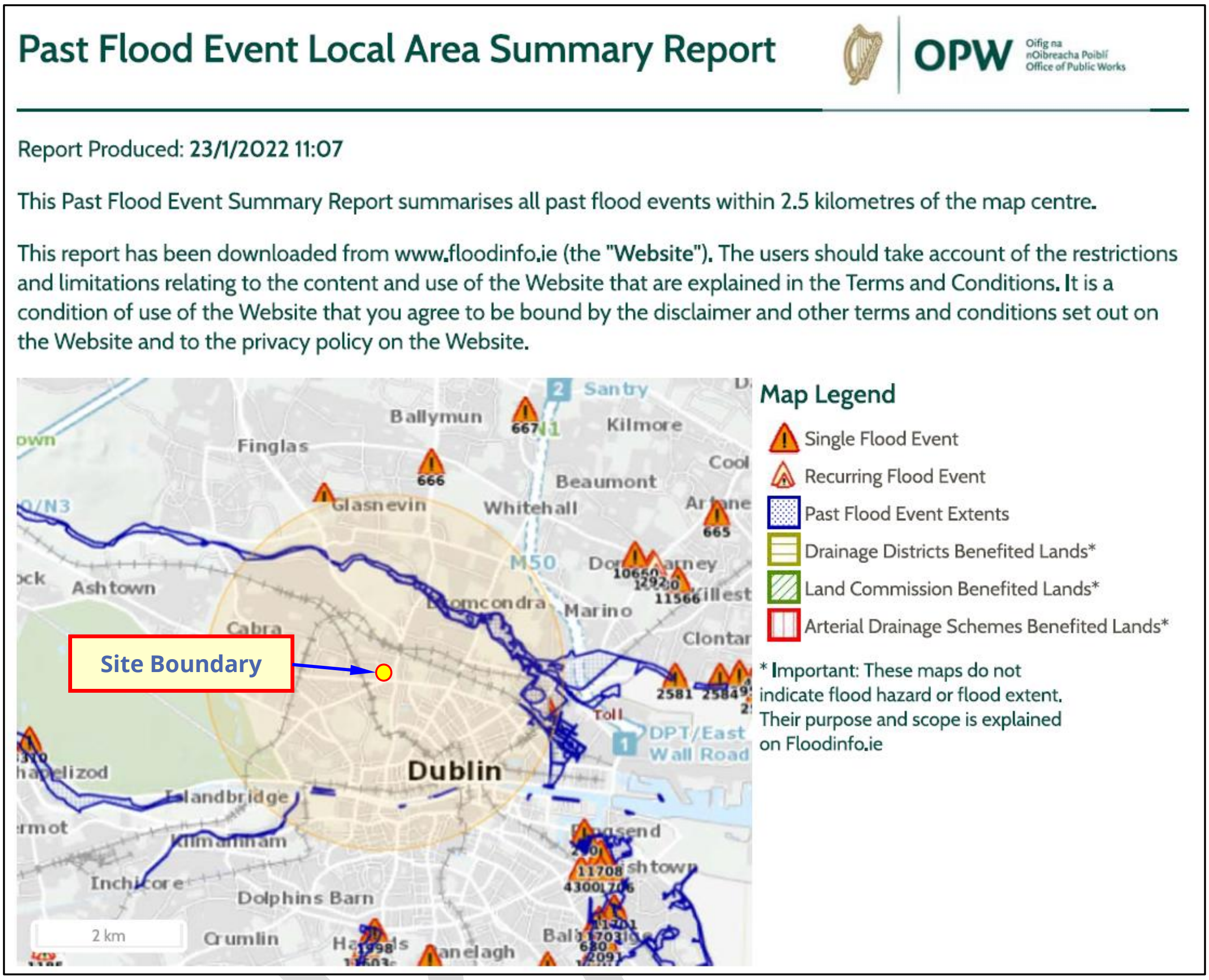
Figure 3 - OPW PFRA Mapping

Figure 3 above indicates that the site of the proposed development does not fall within an indicative fluvial, pluvial, coastal or groundwater flood zone.

It should also be noted that the indicated extent of flooding illustrated on these maps was developed using a low resolution digital terrain model (DTM) and illustrated flood extents are intended to be indicative only. The flood extents mapped on the PFRA maps are not intended to be used on a site specific basis.

4.3. OPW Flood Maps Website

The OPW Flood Maps Website (www.floods.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the site of the proposed development. *Figure 4* below illustrates mapping from the Flood Maps website in the vicinity of the site.


Past Flood Event Local Area Summary Report

Report Produced: 23/1/2022 11:07

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.

Figure 4 - OPW Flood Maps

Figure 4 above reports no incidents of anecdotal or historical flooding recorded in the general vicinity of the site.

4.4. Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted, as this can provide evidence of historical flooding incidences or occurrences. The maps that were consulted were the historical 6-inch maps (pre-1900), and the historic 25-inch map series. *Figure 5* and *Figure 6* below show the historic mapping for the area of the site of the proposed development.

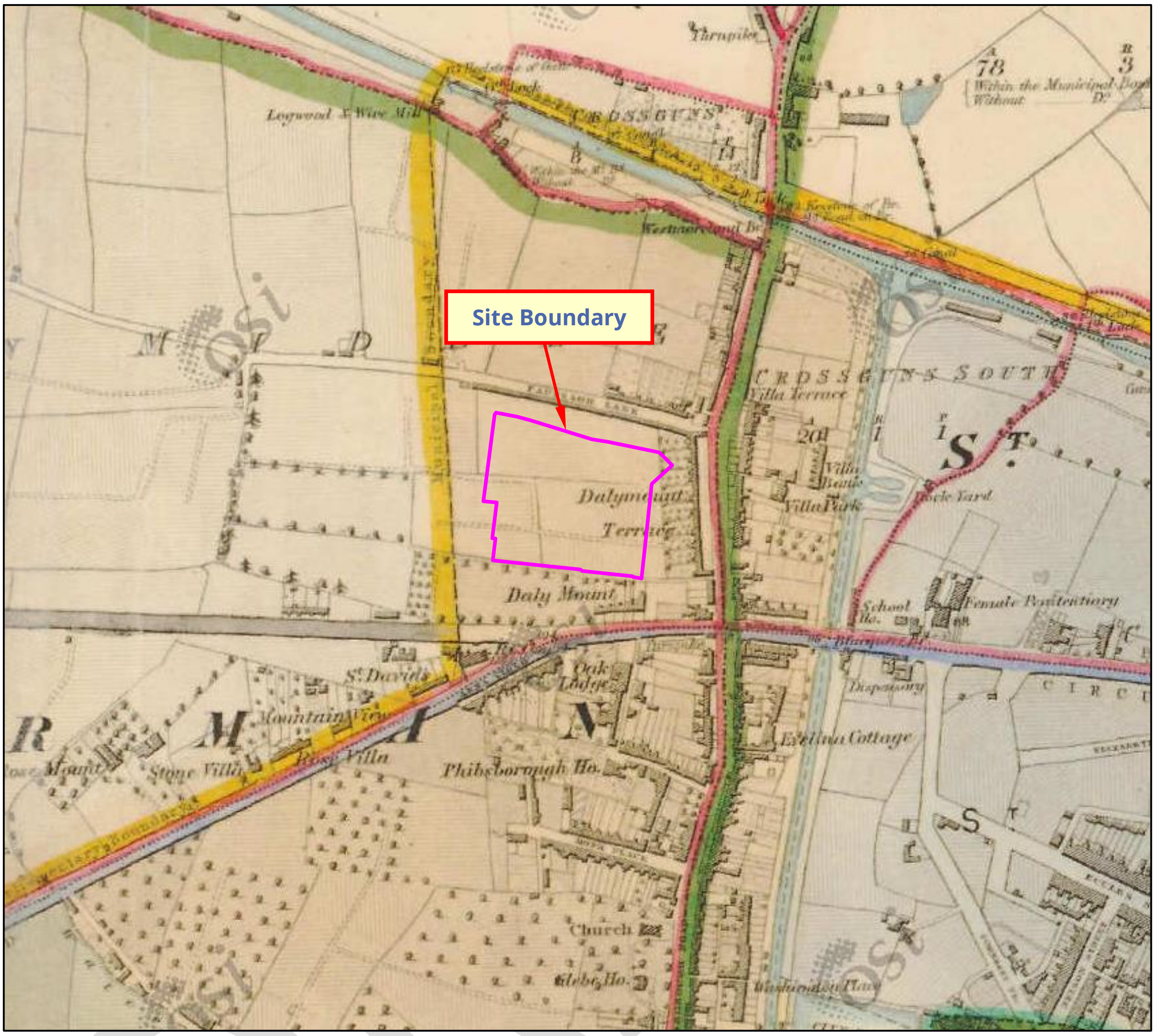


Figure 5 - Historic 6 Inch Mapping

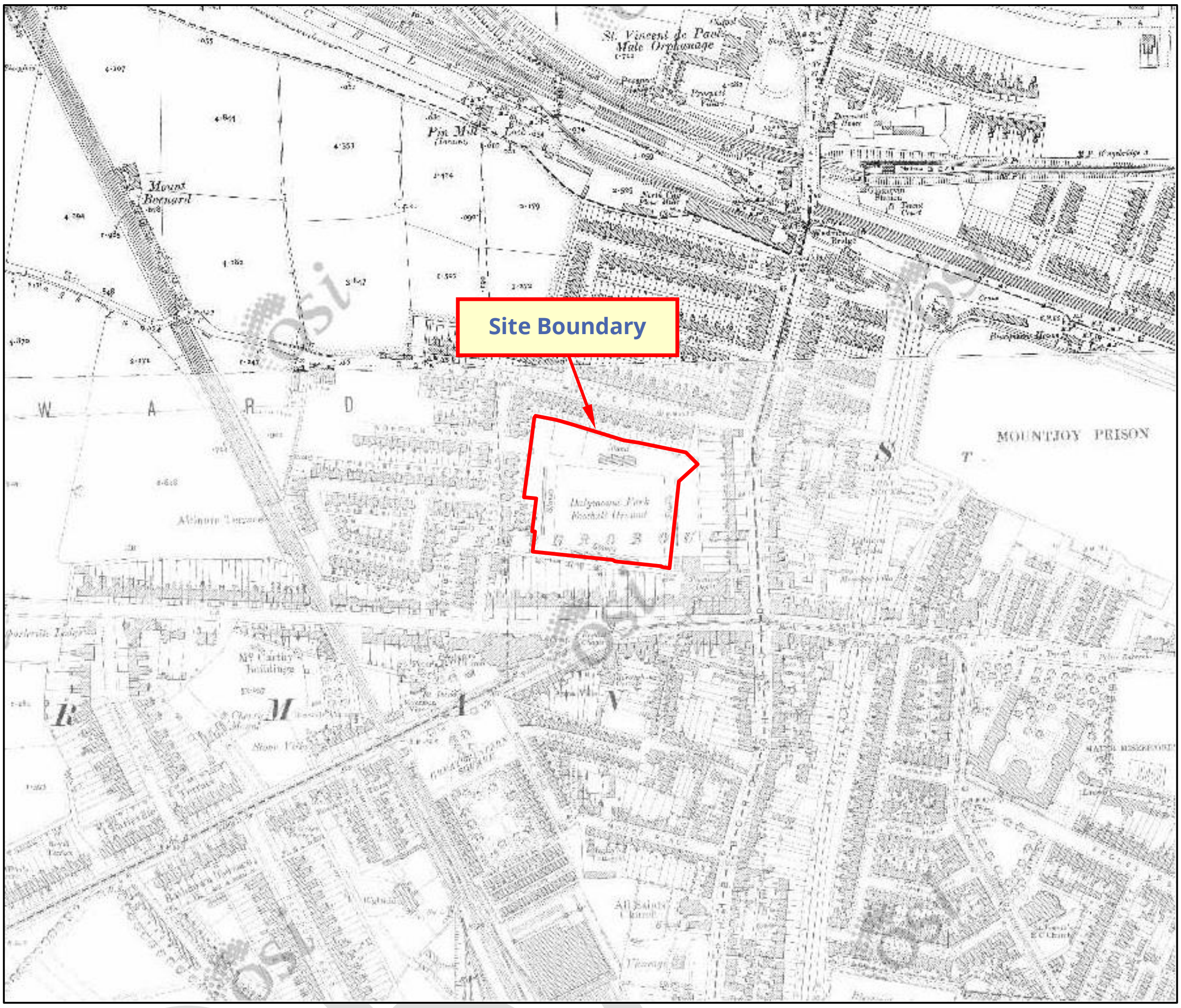


Figure 6 - Historic 25 Inch Mapping

The historic 6 inch and 25 inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the site of the proposed development.

4.5. Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the site of the proposed development. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 7 below illustrates the sub-soils mapping for the general area of the site.

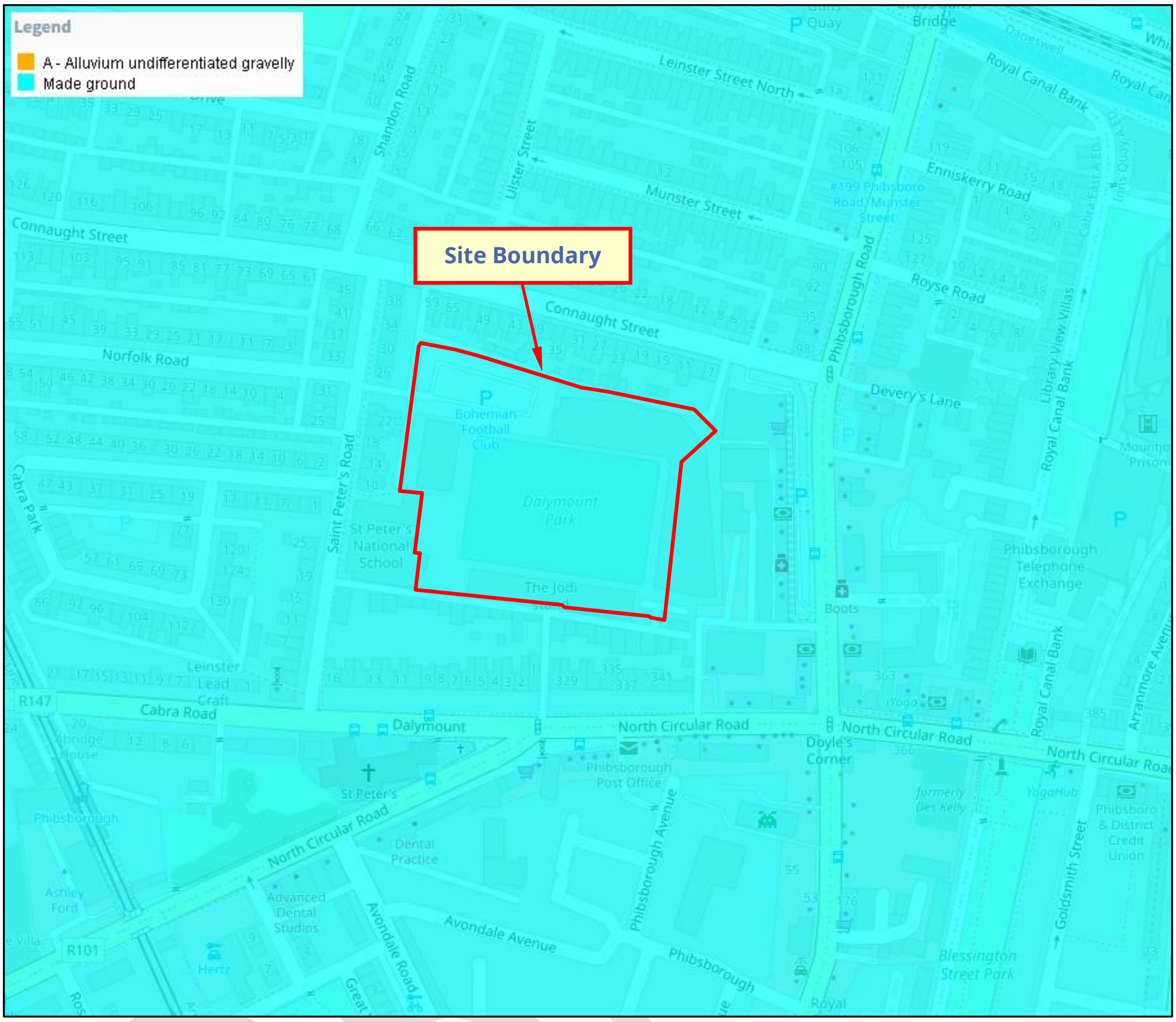


Figure 7 - GSI Subsoil Mapping

Figure 7 above indicates that the site of the proposed development is entirely underlain by Made Ground. There are no Alluvium deposits mapped within or in the immediate vicinity of the site.

4.6. Geological Survey of Ireland Groundwater Flood Mapping

Historic and Predictive Groundwater Mapping for Ireland was prepared by the GSi Department of Communication, Climate Action and Environment in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Figure 8 below illustrates an extract from the above groundwater flood mapping in the vicinity of the site of the proposed development.

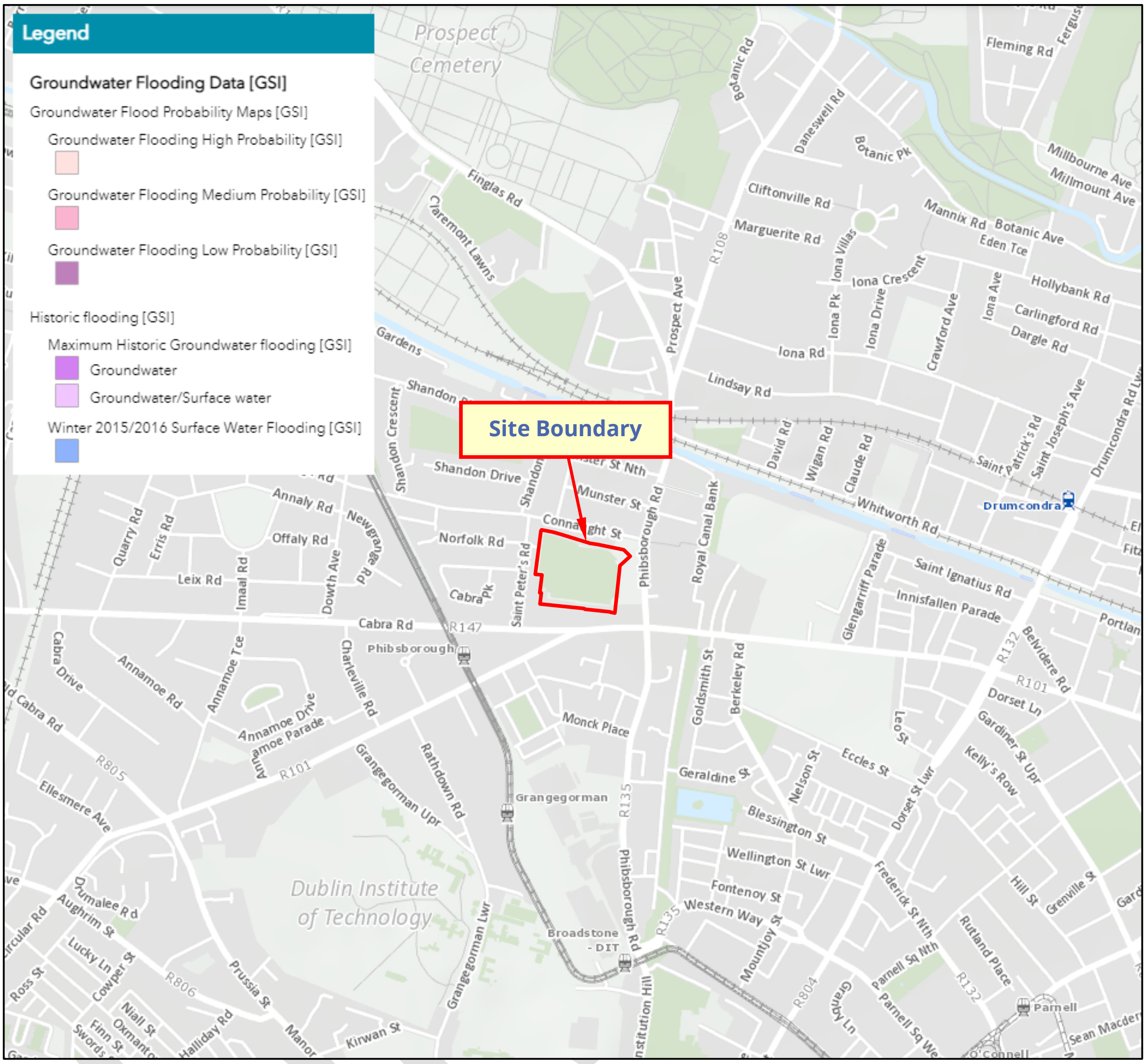


Figure 8 - GSI Groundwater Flood Mapping

The above GSi Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located in the vicinity of the site.

4.7. Eastern CFRAM Study

This area of Dublin City has not been included as an Area of Further Assessment as part of the OPW Eastern CFRAM study

4.8. Dublin Pluvial Study

The Dublin Pluvial Study has been undertaken by the OPW and current scenario pluvial flood maps were issued in August 2016. Pluvial flood risk extent and depth maps for the Dublin environs have been produced. The Pluvial Study flood map number *E09DCC_EXPCD_F0_02* illustrates predictive pluvial flood extents in the vicinity of the site of the proposed development.

As illustrated in *Figure 9* below (extracted from Pluvial Study flood map *E09DCC_EXPCD_F0_02*) areas of indicative extreme pluvial flood zone are mapped adjacent to the northern, southern, eastern and western boundaries of the site.

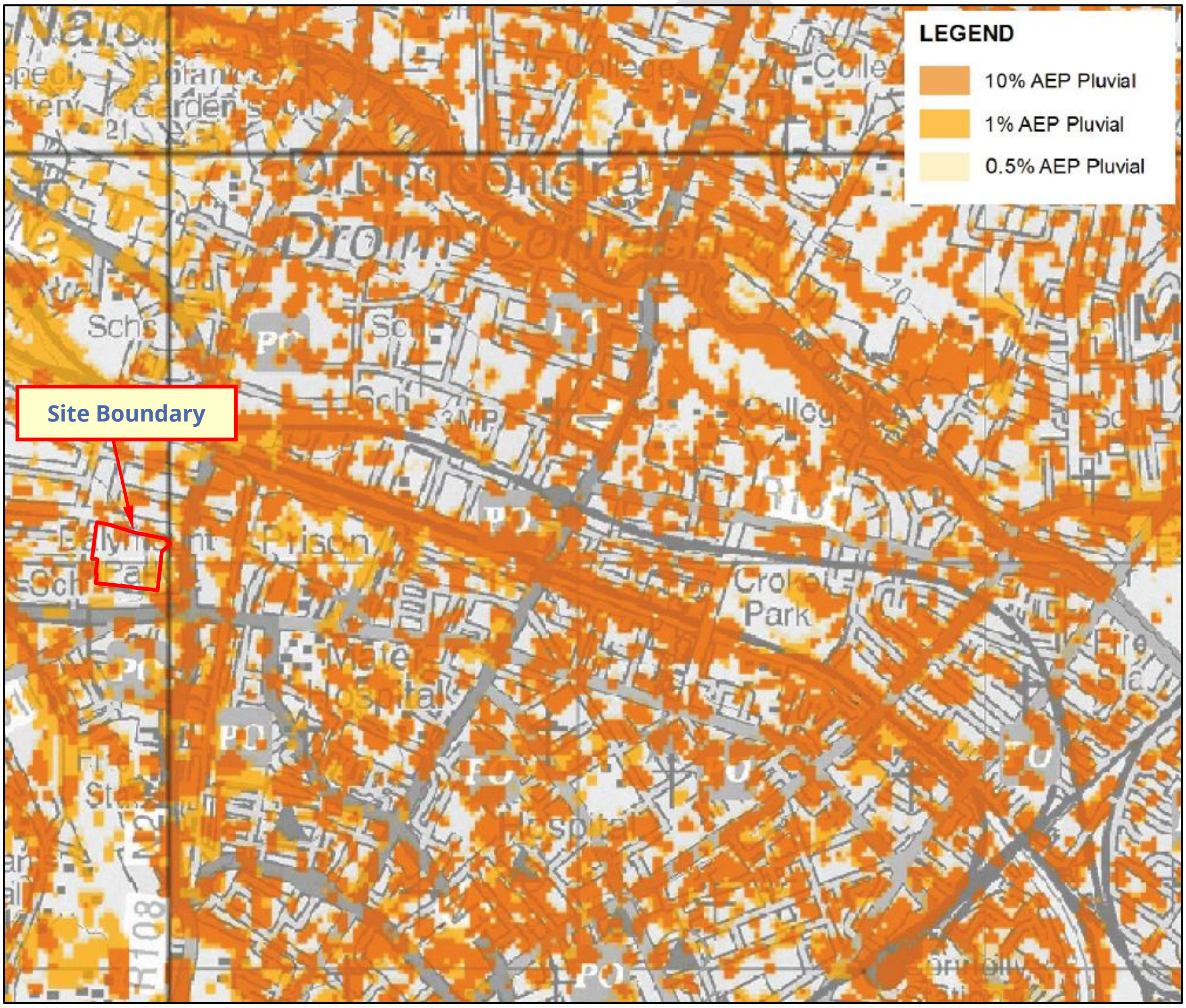


Figure 9 – Dublin Pluvial Study - Pluvial Flood Map

The Dublin Pluvial Study mapping also provides information and data on indicative pluvial flood depths in the general area of the site of the proposed development in consideration of the extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.5% AEP (1 in 200 year) pluvial flood events.

Figure 10, Figure 11 and *Figure 12* below (extracted from Pluvial Study flood map numbers *E09DCC_DPPCD100_F0_02, E09DCC_DPPCD010_F0_02* and *E09DCC_DPPCD005_F0_02*) illustrate the indicative 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.5% AEP (1 in 200 year) pluvial flood depths in the general vicinity of the site of the proposed development.

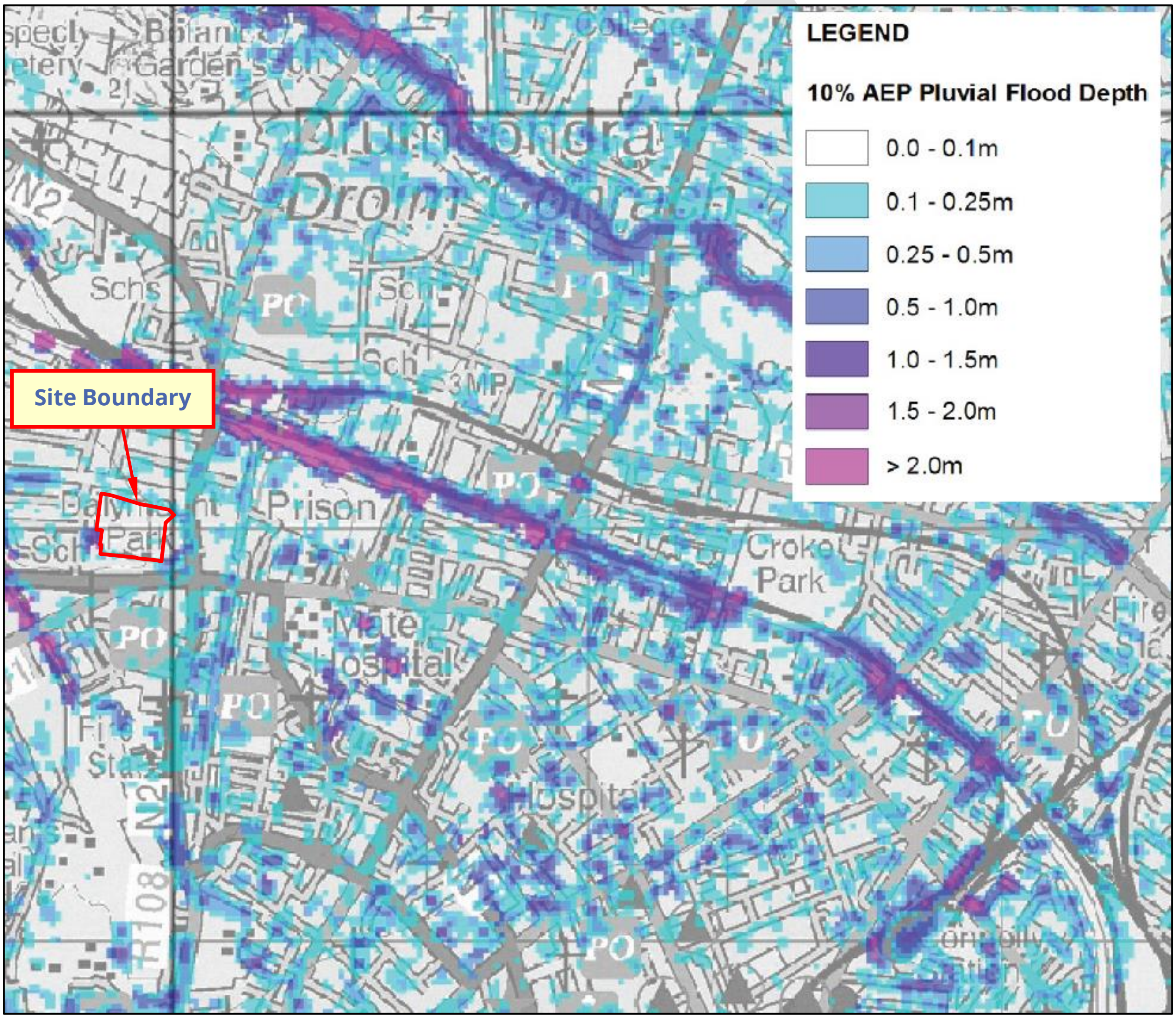


Figure 10 – Dublin Pluvial Study 10% AEP Pluvial Flood Depth Map

Figure 10 above indicates that the site of the proposed development would not be significantly impacted during the occurrence of a 10% AEP (1 in 10 year) pluvial flood event.

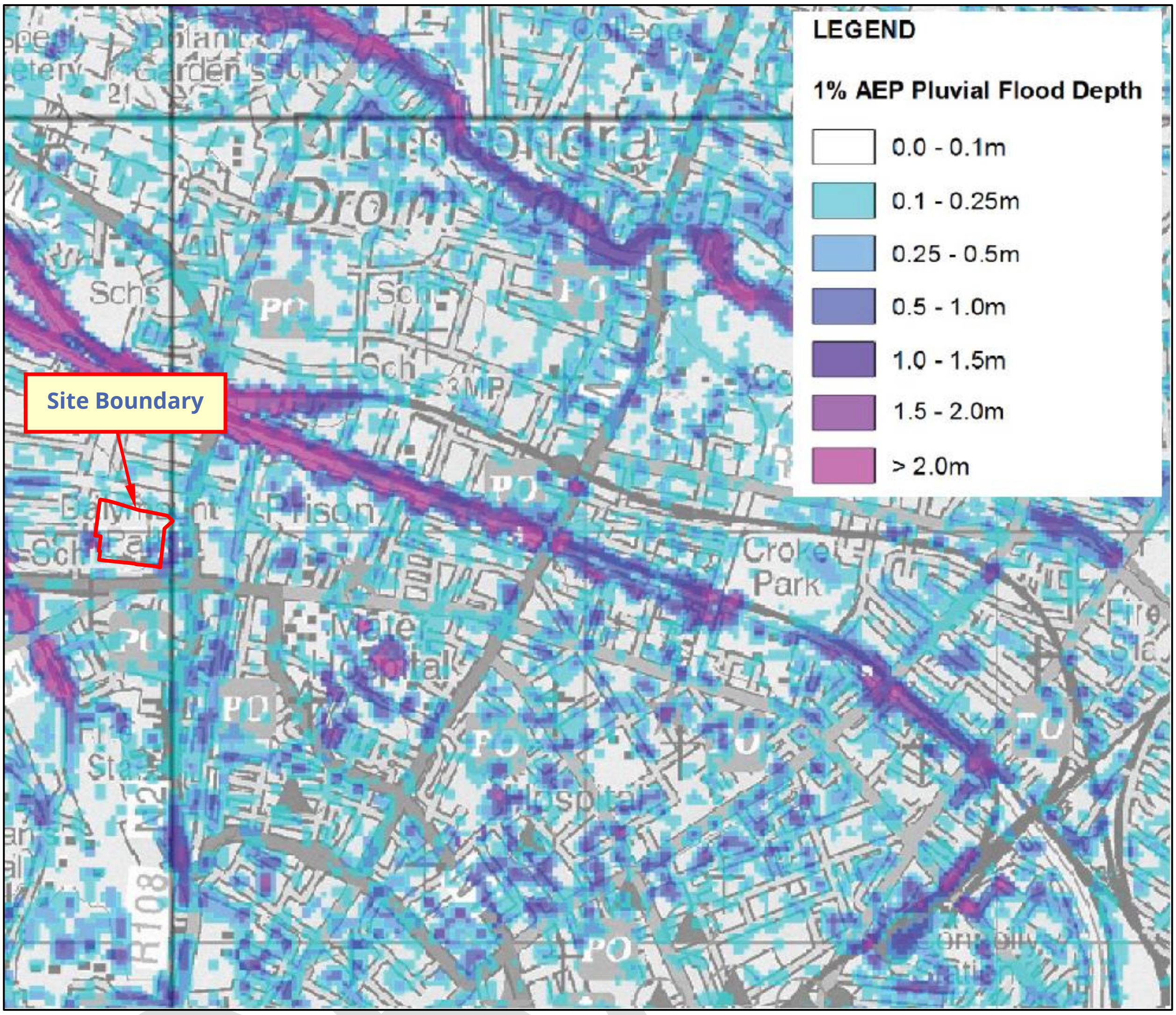


Figure 11 – Dublin Pluvial Study 1% AEP Pluvial Flood Depth Map

Figure 11 above indicates that indicative 1% AEP (1 in 100 year) pluvial flood zones are mapped adjacent to the western and eastern boundaries of the site with potential pluvial flood depths in the range of 0.1m – 0.5m.

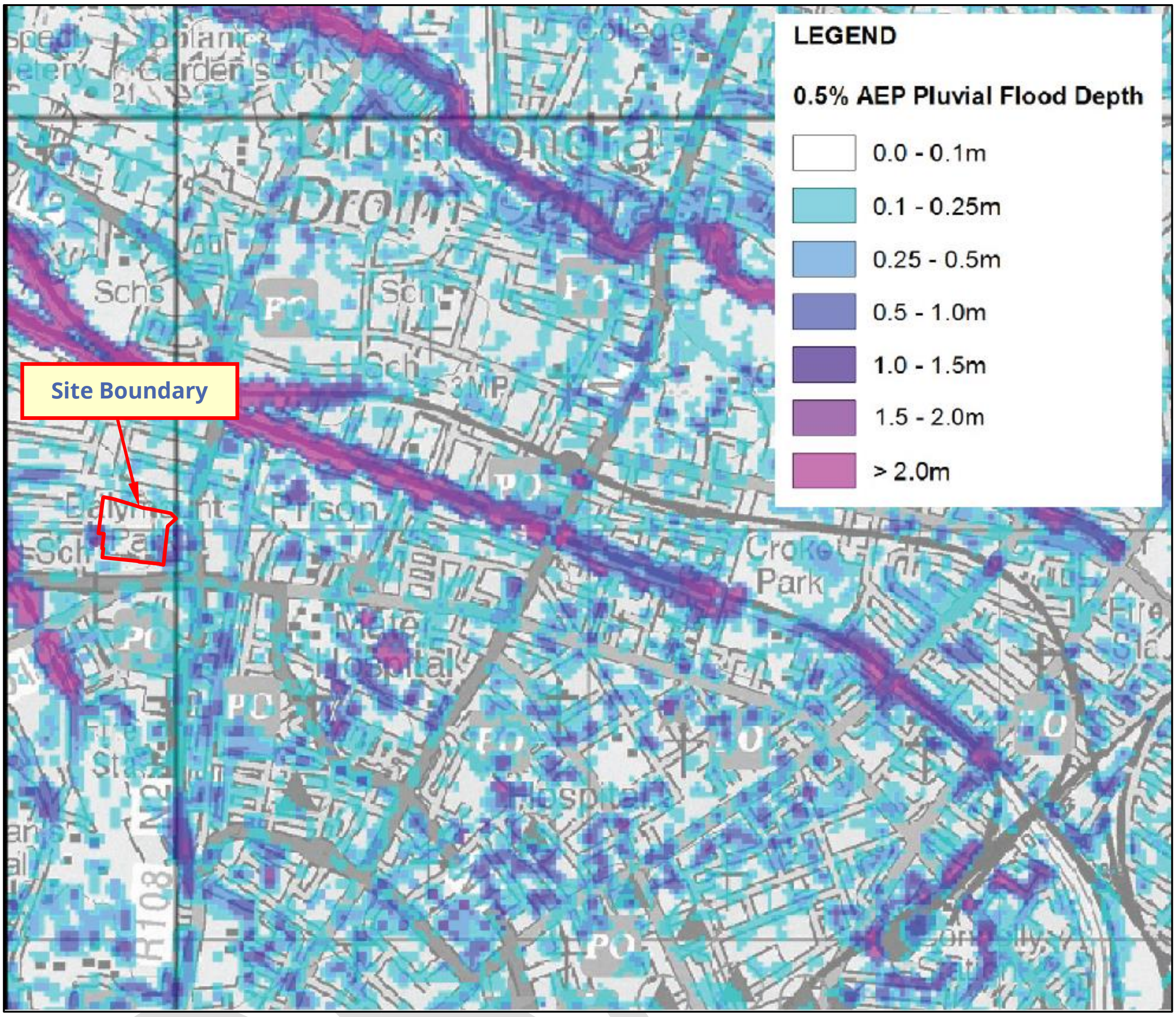


Figure 12 – Dublin Pluvial Study 0.5% AEP Pluvial Flood Depth Map

Figure 12 above indicates that indicative 0.5% AEP (1 in 200 year) pluvial flood zones are mapped adjacent to the western and eastern boundaries of the site with potential pluvial flood depths in the range of 0.1m – 1.0m.

Table 2 below summarises the indicative pluvial flood depths within the vicinity of the site of the proposed development for the current scenario 10% AEP, 1% AEP and 0.5% AEP pluvial flood events.

Scenario	Extreme Pluvial Flood Depth		
	10% AEP Depth (m)	1%AEP Depth (m)	0.5% AEP Depth (m)
Current	0	0.1-0.50	0.1-0.1.0

Table 2: Pluvial Flood Water Depth

5. Scoping Assessment

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail and assessment to assess these possible risks, and to ensure these can be adequately addressed in the flood risk assessment. The scoping exercise should also identify that sufficient quantitative information is already available to complete a flood risk assessment appropriate to the scale and nature of the development proposed.

The above screening assessment indicates that the site of the proposed development site is not at risk of primary and direct fluvial, pluvial, coastal or groundwater flooding. The above screening assessment indicates that the primary flood risk to the proposed development site can be attributed to a potential pluvial flooding from the existing urban drainage/water supply infrastructure within the vicinity of the site boundary.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the proposed development site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment can be derived from the information collated as part of the screening exercise alone.

The specific pluvial flood risk to and from the site of the proposed development is assessed in the subsequent 'Assessing Flood Risk' stage of this study report.

6. Assessing Flood Risk

The screening undertaken as part of this Site Specific Flood Risk Assessment indicates that the site of the proposed development site is not at risk of primary and direct fluvial, pluvial, coastal or groundwater flooding. The screening assessment indicates that the primary flood risk to the site can be attributed to a potential pluvial flooding from the existing urban drainage/water supply infrastructure within the vicinity of the site boundary.

The following section assesses the pluvial flood risk to and from the site of the proposed development.

6.1. Assessment of Pluvial Flood Risks

The Dublin Pluvial Study pluvial flood mapping illustrated in *Figure 10, Figure 11*and *Figure 12* above indicate that areas within the site of the proposed development adjacent to the western and eastern boundaries fall within indicative pluvial flood zone.

In order to assess the impact to and impact from the development as proposed with respect to these indicative pluvial flood zones, the indicative pluvial flood depths illustrated in *Figure 10, Figure 11* and *Figure 12* above have been thematically mapped onto the proposed development layout.

Figure 13 below illustrates the indicative 10% AEP (1 in 10 year) pluvial flood extents and depths mapped onto the proposed development layout.

Figure 14 below illustrates the indicative 1% AEP (1 in 100 year) pluvial flood extents and depths mapped onto the proposed development layout.

Figure 15 below illustrates the indicative 0.5% AEP (1 in 200 year) pluvial flood extents and depths mapped onto the proposed development layout.

Figure 13 – Dublin Pluvial Study - 10% AEP (1 in 10 year) Pluvial Flood Extent Depth Mapping Overlaid onto Proposed Site Layout

As illustrated in *Figure 13* above, the development as proposed would not be significantly impacted during the occurrence of a 10% AEP (1 in 10 year) pluvial flood event.

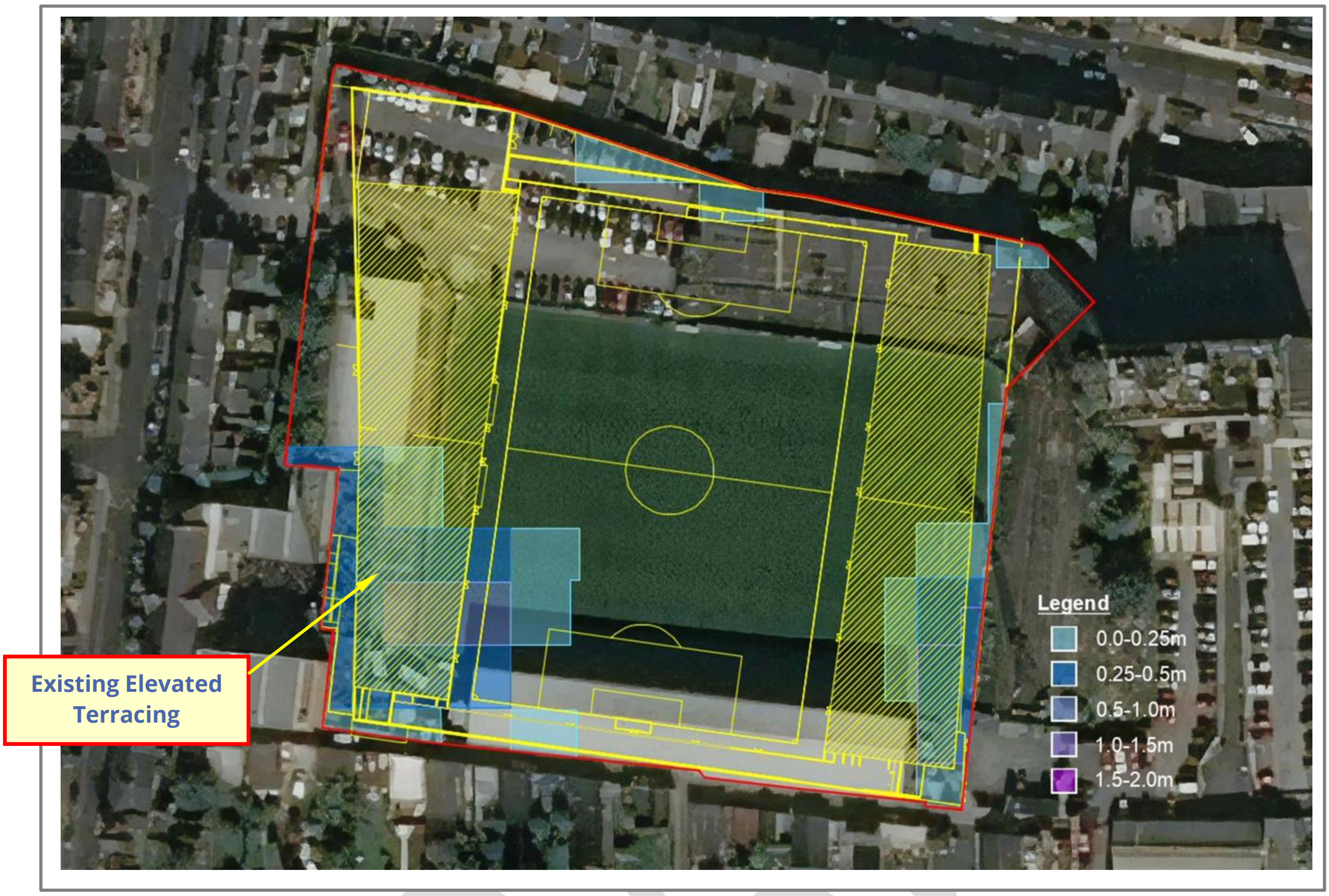


Figure 14 – Dublin Pluvial Study - 1% AEP (1 in 100 year) Pluvial Flood Extent Depth Mapping Overlaid onto Proposed Site Layout

As illustrated in *Figure 14* above, and indicate 1% AEP (1 in 100 year) pluvial flood zone is mapped adjacent to the western boundary of the site, with a maximum potential depth of 0.5m. However, this area of the existing site comprises elevated terracing, therefore it is unrealistic to assume that any potential pluvial may impact this area of the site.

The indicative pluvial flood extents illustrated in the Dublin Pluvial Study maps are based on a strategic level pluvial modelling exercise, the results of which are displayed in pluvial flood extent block cells of a particular dimensional resolution. Therefore areas of elevated terracing within the existing site area indicated as falling within a pluvial flood zone are simply as a result of the indicative pluvial flood block cells from lower elevated areas to the west overlapping the area of existing elevated terracing. This does not imply that these areas of the existing site would be impacted by or subject to pluvial inundation.

Figure 15 – Dublin Pluvial Study – 0.5% AEP (1 in 200 year) Pluvial Flood Extent Depth Mapping Overlaid onto Proposed Site Layout

As illustrated in *Figure 15* above, indicate 0.5% AEP (1 in 200 year) pluvial flood zones are mapped adjacent to the western and eastern boundaries of the site, with maximum potential depth of 1.0m. However, these areas of the existing site comprises elevated terracing, therefore it is unrealistic to assume that any potential pluvial may impact this area of the site.

The indicative pluvial flood extents illustrated in the Dublin Pluvial Study maps are based on a strategic level pluvial modelling exercise, the results of which are displayed in pluvial flood extent block cells of a particular dimensional resolution. Therefore areas of elevated terracing within the existing site area indicated as falling within a pluvial flood zone are simply as a result of the indicative pluvial flood block cells from lower elevated areas to the west overlapping the area of existing elevated terracing. This does not imply that these areas of the existing site would be impacted by or subject to pluvial inundation.

In summary, the assessment and analysis presented above indicates that the development as proposed is not expected to result in an adverse impact to the existing hydrological regime of the area or increase pluvial flood risk elsewhere.

The new proposed spectator stands along the western and eastern boundaries of the site shall primarily be constructed within area of existing development and areas of existing elevated terracing, therefore these proposed structures shall not result in any significant displacement of potential extreme pluvial flood waters. In addition the reconfigured playing pitch shall be constructed at or close to the ground level of the existing playing pitch, which shall not result in any adverse impact.

As illustrated in *Figure 14* and *Figure 15* above, during the occurrence of an extreme 1% AEP (1 in 100 year) or 0.5% AEP (1 in 200 year) pluvial flood event, maximum potential pluvial flood depths in the range of 0.5m – 1.0m may occur adjacent to the western and eastern boundaries of the site of the proposed development. It is therefore recommended that consideration be given to the feasibility of implementing pluvial flood risk mitigation measures for any structures such as spectator stands or critical infrastructure associated with development at these locations. For example access and egress doorways for the spectator stands may need to implement appropriate finished floor levels or flood barriers (e.g. flood gates) and critical infrastructure such as electrical cabinets, heating and ventilation systems, etc. may need to be of flood proof construction or fitted within an elevated position of at least 1.0m above existing external ground levels.

The need and requirement or not to implement pluvial flood risk mitigation measures will depend on the potential risk of occurrence of an extreme pluvial flood event that the developer or promoter of the proposal is prepared to accept and the vulnerability of the development and users of the development in the context of potential pluvial flood risk.

7. Development in the Context of the Guidelines

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' three flood zones are designated in consideration of flood risk to a particular development site.

Flood Zone 'A' – where the probability of flooding from rivers and watercourses is the highest (greater than 1% or 1 in 100 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'B' – where the probability of flooding from rivers and watercourses is moderate (between 0.1% or 1 in 1000 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'C' – where the probability of flooding from rivers and watercourses is low or negligible (less than 0.1% of 1 in 1000 year for both river and watercourse and coastal flooding). Flood Zone 'C' covers all areas that are not in Zones 'A' or 'B'.

The 'Planning System and Flood Risk Management Guidelines' list the planning implications for each flood zone, as summarised below:-

Zone A – High Probability of Flooding. Most types of development would not be considered in this zone. Development in this zone should be only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the 'Planning System and Flood Risk Management Guidelines' justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and reaction would be considered appropriate in this zone.

Zone B – Moderate Probability of Flooding. Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone 'C' and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

Zone C – Low to Negligible Probability of Flooding. Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' this Site Specific Flood Risk Assessment indicates that the site of the proposed development does not falls within a delineated fluvial or coastal Flood Zone 'A' or Flood Zone 'B'. The development as proposed falls within a Fluvial Flood Zone 'C'

In accordance with the 'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009' the development as proposed is not subject to the requirements of the Justification Test.

8. Summary Conclusions and Recommendations

In consideration of the findings of this Site Specific Flood Risk Assessment and analysis the following conclusions and recommendations are made in respect of the development as proposed:

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The site of the proposed development has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risk to the development site can be attributed to potential pluvial flooding flood event. The site is not at risk of fluvial, coastal or groundwater flooding.*
- *During the occurrence of an extreme 1% AEP (1 in 100 year) or 0.5% AEP (1 in 200 year) pluvial flood event, maximum potential pluvial flood depths in the range of 0.5m – 1.0m may occur adjacent to the western and eastern boundaries of the site of the proposed development.*
- *It is therefore recommended that consideration be given to the feasibility of implementing pluvial flood risk mitigation measures for any structures such as spectator stands or critical infrastructure associated with development at these locations.*
- *In the context of 'The Planning System & Flood Risk Management Guidelines – 2009' the site of the proposed development falls within a fluvial and coastal Flood Zone 'C'.*
- *The assessment and analysis undertaken as part of this SSFRA indicates that the development as proposed is not expected to result in an adverse impact to the existing hydrological regime of the area or increase pluvial flood risk elsewhere.*

Appendices

Appendix A. Drawings

IE2438-001-A Site Location

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IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title:	FLOOD RISK ASSESSMENT
Project Address:	DALYMOUNT STADIUM, PHIBSBOROUGH, DUBLIN 7
Client:	IDOM
Drg. Title:	SITE LOCATION MAP

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1:50,000	06/02/22	IE2438-001	IE2438	A	LMc