

Woodquay Park Enhancement

Engineering Planning Report

231101-PUNCH-XX-XX-RP-C-0005

September 2024

Document Control

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C01	A0	Planning Issue	26/09/2024	P. Troy	A. O'Donoghue	D. Gallery
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1 Introduction

1.1 Background

PUNCH Consulting Engineers were engaged to prepare an Engineering Planning Report to accompany a planning application for the proposed development on a site located at Woodquay Park, Galway City Centre, Co Galway.

1.2 Existing Site

The subject site is located 450 meters to the North of Galway City Centre. The site is approximately 0.15 hectares in size and is located within Galway City Council's remit. The site area is a brownfield site with lawns and benches and is currently known as Water's Edge Garden.

The proposed site is bordering Corrib Terrace to the south-west and Galway rowing club to the north. Riverside housing estate is bordering the northeast site boundary, and a public car park borders the southern site boundary. The river Corrib runs adjacent to the north boundary. The location of the site is shown in Figure 1-1.



Figure 1-1: Location of the Proposed development (site boundary indicated in red)

1.3 Nature of the Proposed Development

The proposed Woodquay Park Enhancement consists of enhancement measures to existing park to include highways improvements, parking, new paths and paving, seating, lighting, public art, sustainable urban drainage, and new biodiverse planting. An extract from LUC Architect's site layout drawing is included in Figure 1-2.

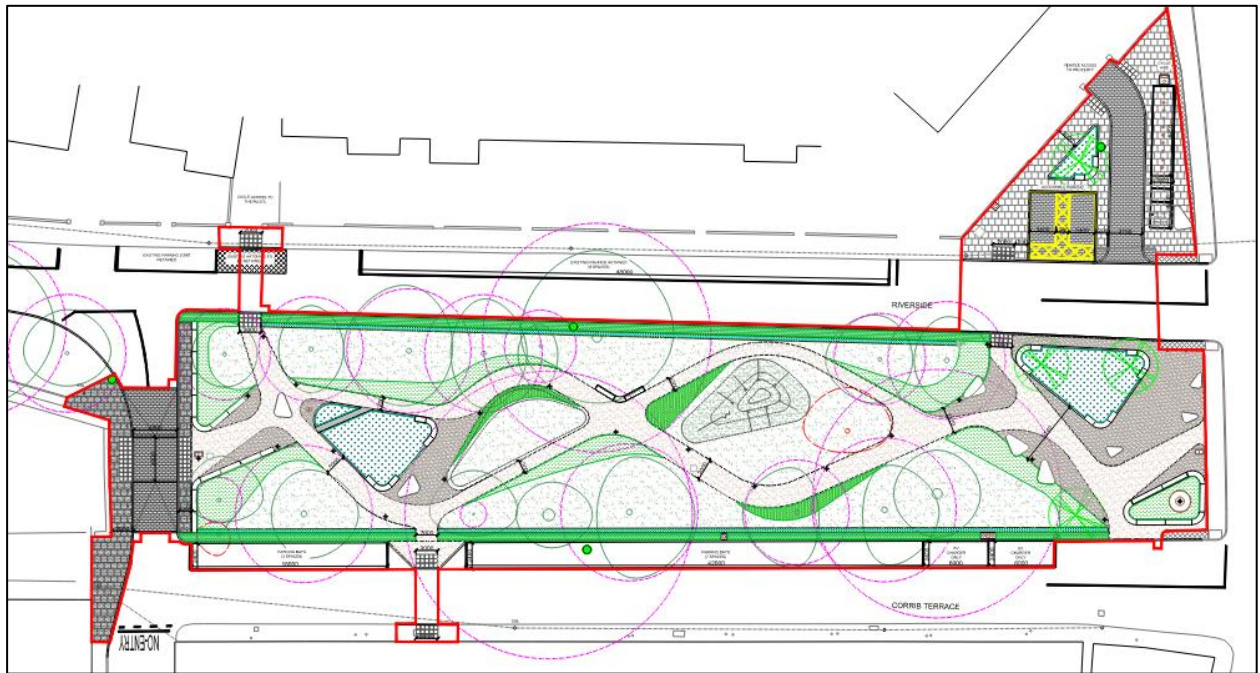


Figure 1-2: Proposed Site Layout (Ref: LUC Architects)

2 Stormwater Drainage Design

2.1 Existing Stormwater Drainage

2.1.1 Local Authority Records

Figure 2-1 below shows the combined sewer drainage within the site. A 225mm vitrified clay pipe heads in a south westerly direction through the site which connects to a 375mm uPVC pipe that connects to a 300mm vitrified clay pipe which runs along Vincents Avenue.

The roads surrounding the park are drained with gully traps at their low points and these connect into the Uisce Éireann combined sewer pipe. The park itself drains to ground via infiltration through the soil.

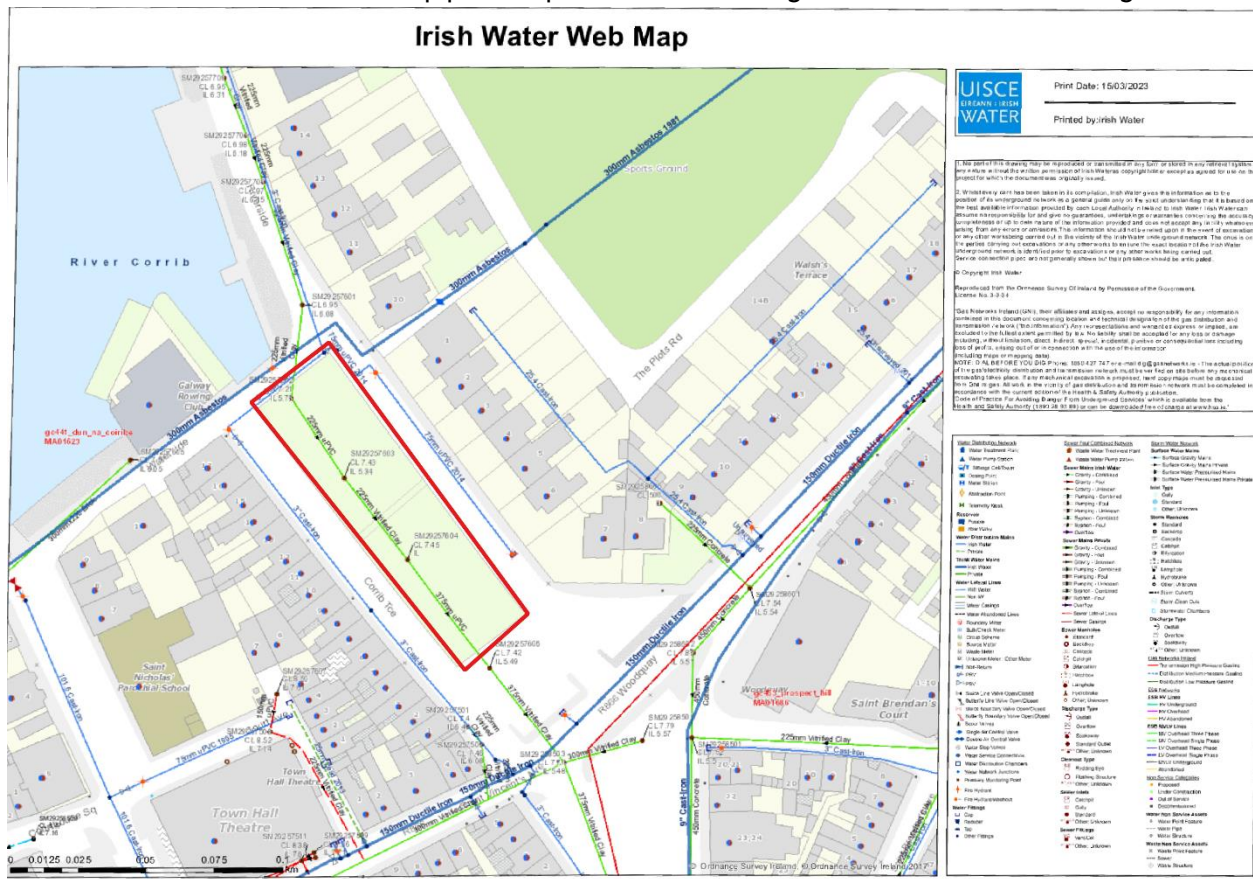


Figure 2-1: Existing Combined Sewer and Watermain

2.2 Topographical Survey

A topographical survey was undertaken in May 2023 and an underground utility survey was undertaken in July 2023. These surveys are attached in Appendices A and B respectively. The topographical survey shows the ground sloping from southeast to northwest.

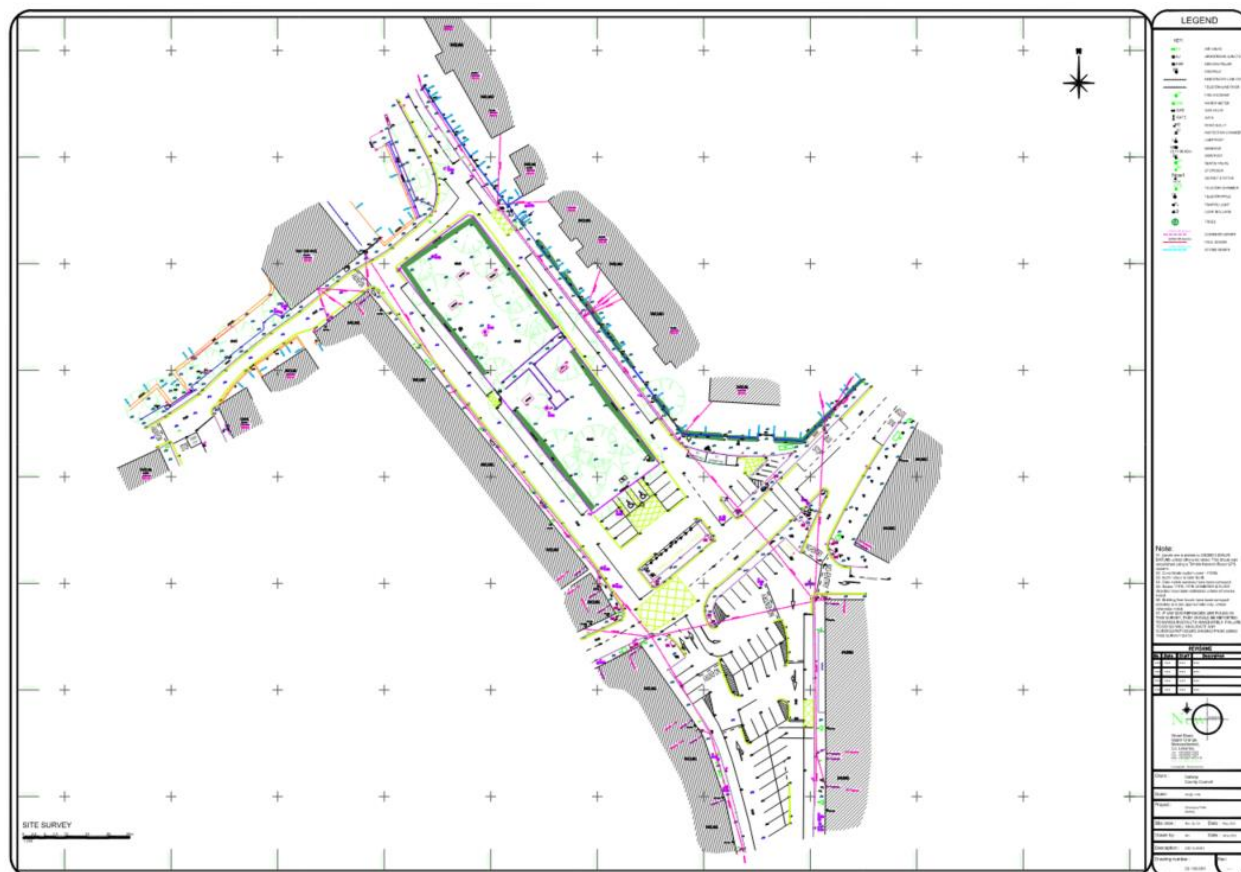


Figure 2-2: Topographical Survey Extract

2.3 Ground Infiltration Test

A Ground Infiltration Test was conducted in-situ in May 2024 in accordance with the Building Research Establishment (BRE 365) guidelines. It was determined that the existing soil had good soakage and that infiltration to ground as a means of stormwater disposal would be possible. These measured results align with expectations based on site observations and the existing site conditions. Refer to Appendix C for Infiltration test report.

2.4 Proposed Stormwater Drainage

The aim of the proposed surface water drainage system is to use the current infrastructure and disposal means and enhance it by incorporating SuDS features. The SUDS features will add amenity and biodiversity as well as improve stormwater quality and reduce stormwater volumes entering the public network.

For all ground water vulnerabilities please refer to the Ecology Report.

2.4.1 Storm Water Drainage Network

All surface water run-off from the surrounding road is currently drained with road gullies, and these will be retained and continue to discharge stormwater into the combined sewer. The stormwater in the park itself will continue to infiltrate to ground as the main means of disposal. The use of permeable materials for the hardstand and paths will provide interception reduction in stormwater volumes and the use of biofiltration and bioretention, by means of planted raingardens, will improve stormwater quality prior to discharge via infiltration to ground.

Additional road gullies have been included into the design to reduce the risk of surface ponding at crossing locations. These new gullies will discharge directly into the biofiltration areas for treatment prior to discharging to ground.

The proposed raingardens have been designed using Causeway Flow software. Table 2-1 describes the stormwater drainage design parameters used and detailed calculations are enclosed in Appendix D.

Table 2-1: Raingarden Design Parameters

Description	Value
Total Impervious Site area	0.246 ha
Return period target	Pipe Design 1 in 5 year + CC + UC. Network Design 1 in 30 year + CC + UC. Check 1 in 100 year + CC + UC for flooding.
Climate Change	20%
Urban Creep	10%
M5-60	15.7
Ratio R	0.270
Raingarden Storage Volume	Raingarden 1 = 21.369 m ³ Raingarden 2 = 22.641 m ³ Raingarden 3 = 2.2221 m ³
Infiltration Rate	67.20 mm/hr
Porosity of Storage Structure	0.35

The raingardens have been sized to attenuate stormwater up to the 1 in 30 year storm events. These biofiltration areas have been sized to also accommodate the surrounding road hardstand areas. It is anticipated that these areas will be reticulated to the raingardens at a future stage, so the proposed design allows for this.

The proposed drainage design for the park does not include any modifications to the existing Uisce Éireann combined sewer, which runs under the park from the north to the southeast.

2.5 SUDs Proposals

The proposed development has been assessed in relation to Sustainable Urban Drainage Systems (SuDS). A variety of SuDS measures may be adopted to comply with Council recommendations. All SuDS measures are to be implemented with reference to the UK Suds Manual and Galway City Council drainage requirements.

The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases. Regular maintenance of the SuDS proposals is required to ensure they are operating to their optimal level throughout their design life.

The proposed SuDS measures will provide interception for rainfall events up to 5 mm, reducing the total volume of stormwater generated by the development.

The specific measures adopted for the proposed development have been agreed in principle with Galway City Council and comprise the following:

2.5.1 Permeable Pavements

The hard landscaping and paths within the park are proposed as permeable pavements. Refer to LUC architectural plans for details.

The treatment processes that occur within permeable pavements include:

- I. Filtration of silt and the attached pollutants - the majority of silt is trapped within the top 30mm of the jointing material between the blocks
- II. Biodegradation of organic pollutants, such as petrol and diesel within the pavement construction
- III. Adsorption of pollutants (pollutants attach or bind to surfaces within the construction) which depends on factors such as texture, aggregate structure and moisture content
- IV. Settlement and retention of solids.

The use of permeable pavements for this purpose is supported by the treatment processes outlined above. CIRIA C753 (The SuDS Manual) notes that regarding interception design of pervious pavements, studies have shown that runoff typically does not occur from pervious pavements for rainfall events up to 5 mm.

2.5.2 Bio Retention Areas/Modified Planters

The bio-retention areas/modified planters will incorporate drainage stone/subsoil and will provide a level of additional attenuation within the bio-retention areas/modified planters. Bioretention systems allow the stormwater to filter downwards through a filter medium removing finer contaminants along the way. Depending on the particle size of the filter media different qualities can be achieved from the bioretention system. The infiltration rates recorded on site will allow for disposal of stormwater to ground after it has been treated via filtration.

CIRIA C753 (The SuDS Manual) Table 24.6 notes that regarding interception design of bio retention areas/modified planters, pavements drained by bio retention areas/modified planters can be considered to provide Interception, i.e. it can be assumed that there will be zero runoff from the first 5 mm rainfall for 80% of events during the summer and 50% in winter.

These biofiltration and raingarden areas will also provide additional attenuation storage at surface level above the filter media.

2.6 Flooding

A Site-Specific Flood Risk Assessment (SSFRA), reference 231101-PUNCH-XX-XX-RP-C-0004 SSFRA, has been prepared by PUNCH Consulting Engineers for the development which accompanies this planning submission.

3 Roads and Access

3.1 Proposed Roads & Access

The proposed development is bounded by Corrib Terrace to the southwest, the Headford Road to the southeast, Riverside Road to the northeast and Waterside Road to the northwest. Headford Road is one of the main arteries into the city centre and is proposed to for a Bus Corridor as part of the BusConnects Cross City Link Scheme.

The proposed roads layout was designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) and the Recommendations for Site Development Works. DMURS aims to aid the design of safer, more attractive and vibrant streets which will generate and sustain communities and neighbourhoods. As well as cars and other vehicles this encompasses pedestrians, cyclists and those using public transport.

Sight lines at junctions and pedestrian crossing points were designed in accordance with DMURS based on existing speed limits on the main road.

Autotrack assessments were carried out on the surrounding road network and demonstrate that fire tender, bus, refuse lorry and a standard car can safely negotiate the road network safely.

3.1.1 Road Safety and Quality Audit

A number of measures are proposed as part of the scheme to improve safety on the roads surrounding the park. The current site conditions create unsafe areas for pedestrians due to poor sight lines. The inclusion of additional signage and road markings have been proposed with the expectation of being constructed before the Cross City Link Scheme and to ensure it remains safe once this has been implemented. Dedicated pedestrian crossing points are being proposed with improved sightlines, by removing parking where required to do so.

As part of the design process a Stage 1 & 2 Road Safety Audit and Quality Audit were undertaken by PMCE Consultants LTD. All items have been reviewed by the design team and client and signed off by the Audit team. These reports are included in the planning application package.

3.2 Parking

A number of parking bays are to be removed as part of the proposed scheme to accommodate the extended park and pedestrian areas. The reduction of parking in some areas was to allow great pedestrian sightlines for existing crossings into the park and improve the overall safety for the development.

Table 3-1: Parking Changes

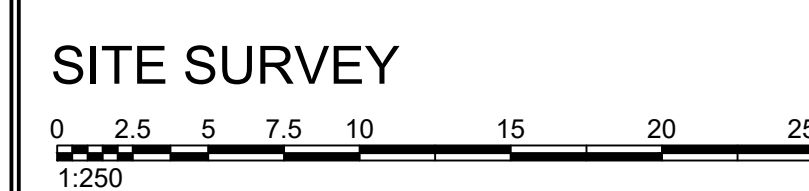
Location	Existing No. Spaces	Proposed No. Spaces
Riverside	9	9
Corrib Terrace	12	10
Headford Road	8	0
Total	29	19

Electric Vehicle charging and motorcycle parking are to be relocated within the scheme boundary. Extensive stakeholder engagement was carried out by the client and design team as part of the design process. For more information, please see LUC design plans and architectural report.

3.3 Active Travel

The enhancement to the park aims to encourage greater pedestrian use. The site currently consists of 20 bike share stations. These stations are to be relocated and the number reduced to 10 as part of the proposed scheme. The new location will align them closer to the existing bus stop on the Headford Road to promote multimodal travel and the numbers proposed have been agreed in principle with the National Transport Authority (NTA).

Appendix A Topographical Survey



LEGEND

KEY:

- AV AIR VALVE
- AJ ARMSTRONG JUNCTION
- ESB ESB MINI PILLAR
- EP ESB POLE
- EL ELECTRICITY LINE OVER
- FH FIRE HYDRANT
- WM WATER METER
- GV GAS VALVE
- GATE GATE
- RG ROAD GULLY
- IC INSPECTION CHAMBER
- LP LAMP POST
- MH CL=100.00m MANHOLE
- SP SIGN POST
- SV SLUICE VALVE
- SC STOPOCK
- Now1 SURVEY STATION
- 100.00 TELECOM CHAMBER
- NOTE TELECOM POLE
- TL TRAFFIC LIGHT
- LB LIGHT BOLLARD
- TREES TREES
- 225mm@ Approx. COMBINED SEWER
- 225mm@ Approx. FOUL SEWER
- 150mm@ Approx. STORM SEWER

Note:

01. Levels are in metres to OSGM15 (MALIN DATUM) unless otherwise noted. This datum was established using a Trimble Network Rover GPS system.

02. Co-ordinate system used - ITM95.

03. North refers to Grid North.

04. Only visible services have been surveyed.

05. Sewer TYPE, PIPE DIAMETER & FLOW direction have been estimated unless otherwise noted.

06. Building floor levels have been surveyed remotely and are approximate only, unless otherwise noted.

07. IF ANY DISCREPANCIES ARE FOUND IN THIS SURVEY, THEY SHOULD BE REPORTED TO NCWSURVEYS LTD IMMEDIATELY. FAILURE TO DO SO WILL INVALIDATE ANY SUBSEQUENT ISSUES ARISING FROM USING THIS SURVEY DATA.

REVISIONS			
No	Date	Staff	Description

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Fax: +353(0)93 77827
Mob: +353(0)87 8702145
Email: info@newsurveys.ie

Client : Galway County Council

Scale: A0 @ 1:250

Project : Woodquay Park, Galway

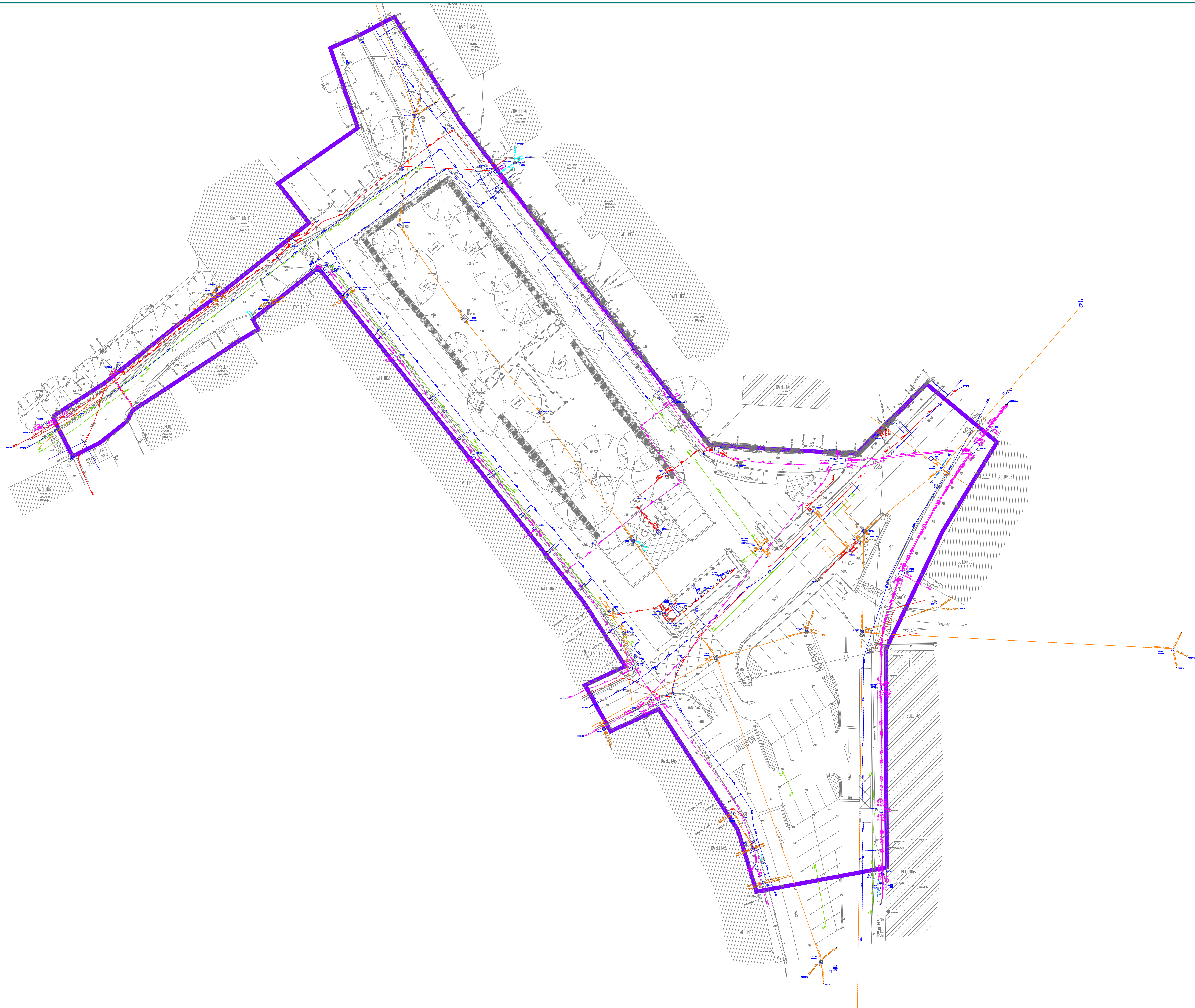
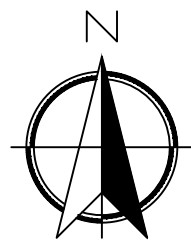
Site crew : Mr. G. Ch. Date : May 2023

Drawn by : Bin Date : June 2023

Description : SITE SURVEY

Drawing number : 23-136-001 Rev: ---

Appendix B Utilities Survey



Notes

- Topographical information has been taken from drawing "23-136-001 - TOPO SURVEY" & OS/MD15 datum, some information may have been removed for clarity. Please refer to original drawing for full details.
- This drawing should be read in conjunction with the utility survey report.
- All depths are taken to top of service, unless "TL" is indicated, in this instance the depth is to the invert of the pipe. This is for drainage pipes at manholes only.
- As this is a non-intrusive survey only, all utilities should be visually verified by safe digging practices to confirm depths and alignments of survey.
- Non-intrusive surveys cannot guarantee every possible service under the ground is located. Care must be taken when site work begins, as services that are not locatable through non-intrusive methods may exist on site.

DISCLAIMER

This drawing and information contained within is issued in confidence and is the copyright of Precision Utility Mapping. If the topographical information or base mapping has been supplied by a Third Party, Precision Utility Mapping is not liable for any inaccuracies contained therein. If inaccuracies to supplied mapping have been identified and Precision Utility Mapping have not been commissioned to rectify, these inaccuracies shall be highlighted in the accompanying report. Disclosure of this information to Third Parties and unauthorised copying or replication of this data without approval is forbidden.

The data presented in this drawing have been collected using a combination of the following: consultation of utility asset information, visual survey & inspection of manholes and inspection chambers; electromagnetic location techniques; ground penetrating radar; and, where applicable, trial hole excavations. These techniques have been deployed in accordance with the BS1 PAS128 Specification for Underground Utility Detection, Verification and Location using the search methodologies indicated below and described in the accompanying report. This drawing should be used in conjunction with the accompanying report which details the limitations of these techniques and any hindering factors encountered during this survey.

Unless otherwise stated, all utilities shown on this plan have been surveyed using approved detectors and the correlation between inspection chambers & unable to be detected are generally assumed to be direct unless there are indications to the contrary. The detection confidence for each utility segment is depicted in line with the PAS128 scheme outlined below. Information depicted as QL-C or QL-D cannot be guaranteed as it is based on historic utility records which can be inaccurate and incomplete.

The utility routes depicted may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface linear features therefore it is possible that some features shown are not utility related, and due to the limitations of electromagnetic techniques, all utility identifications should be treated with caution and verified prior to use during design/building works.

If the location or depth of utilities and features is of particular importance to a project then it is recommended that discussions are held with Precision Utility Mapping regarding any possible limitations or anomalies.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate. Where an area of utilities is likely to affect client project requirements, it is strongly recommended that a PAS128 Quality Level A verification survey is carried out.

No utility mapping survey can be considered a 100% accurate depiction of the sub-surface environment, and the use of these drawings does not remove the requirement for the use of safe digging techniques at all times, in line with the requirements of HSG47 and current CDM regulations.

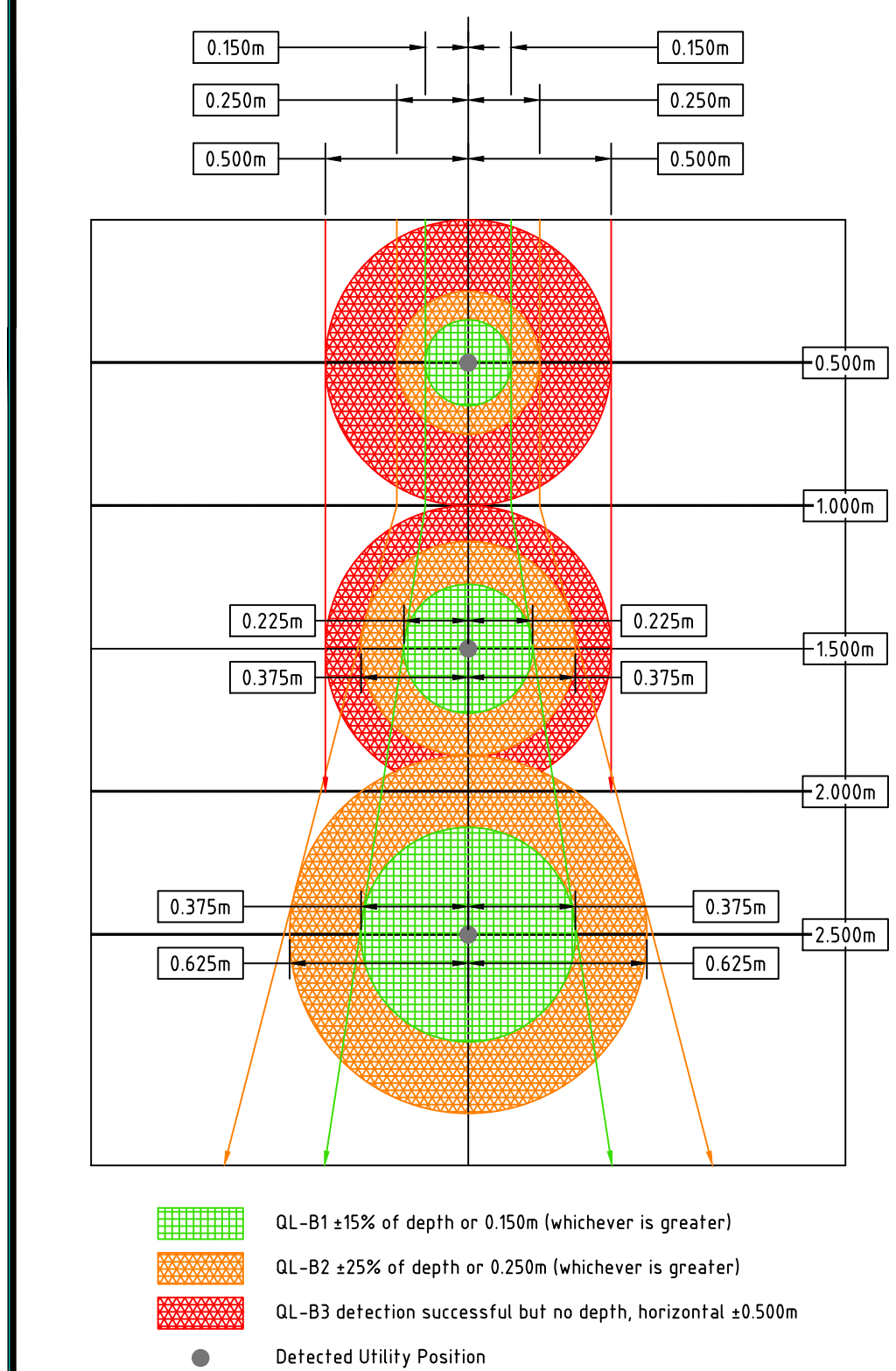
SUB-SURFACE KEY

COMBINED HEATING AND POWER	
DISTRICT HEATING	
DRAINAGE COMBINED *	
DRAINAGE FOAT	
DRAINAGE SURFACE *	
DRAINAGE UNIDENTIFIED	
FLOW DIRECTION INDICATED BY ARROW (N) or (S) (IF KNOWN)	
ELECTRIC	
ELECTRIC LV	
ELECTRIC HV	
ELECTRIC STREET LIGHTING	
GAS	
OUTFALL PIPELINE	
STREET FURNITURE CABLES	
TELECOMS	
TELECOMS - FIBRE OPTIC	
TELECOMS - BT	
TELECOMS - VIRGA MEDIA	
UNKNOWN	
TRAFFIC CONTROL	
WATER	
UNIDENTIFIED UTILITY	
UNIDENTIFIED CABLES	
UNIDENTIFIED EMPTY DUCT	
GPR LINEAR FEATURE	
RAIL LINEAR FEATURE	
GPR AREA ANOMALY	
GPR AREA ANOMALY - REBAR	
CHAMBER EXTENTS	
MEASURED DEPTH (G) TO PIPE/CABLE DUCT	0.15m
INVERT LEVEL OF PIPE/CABLE DUCT (TO OS DATUM)	0.12-0.24
SOFT LEVEL (TO OS DATUM)	0.12-0.24
COVER LEVEL OF INSPECTION CHAMBER (TO OS DATUM)	0.12-0.24
DIAMETER OF PIPE/DUCT IN MILLIMETERS	1000
AREA UNABLE TO BE SURVEYED DUE TO SURFACE OBSTRUCTIONS, VEG/VEGETATION OR LACK OF ACCESS	
TRENCH SCAR / SURFACE SCAR	
EXTENT OF SURVEY - BOUNDARY	

UTILITY CONFIDENCE LEVELS (Listed from High to Low)

- (A) HORIZONTAL AND VERTICAL POSITION VERIFIED VISUALLY
(Accuracy: Horizontal $\pm 25mm$ Vertical $\pm 50mm$)
- (B1P) HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS WITH POST PROCESSING OF GPR DATA
(Estimated Accuracy: $\pm 150mm$ OR $\pm 15\%$ of detected depth)
- (B1) HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS
(Estimated Accuracy: $\pm 150mm$ OR $\pm 15\%$ of detected depth)
- (B2P) HORIZONTAL AND VERTICAL POSITION DETECTED VIA POST-PROCESSED GPR
(Estimated Accuracy: $\pm 250mm$ OR $\pm 40\%$ of detected depth)
- (B2) HORIZONTAL AND VERTICAL POSITION DETECTED BY A SINGLE METHOD
(Estimated Accuracy: $\pm 250mm$ OR $\pm 40\%$ of detected depth)
- (B3P) HORIZONTAL POSITION DETECTED VIA POST-PROCESSED GPR
(Estimated Accuracy: $\pm 500mm$ in the horizontal - Depth is undefined)
- (B3) HORIZONTAL POSITION DETECTED BY A SINGLE METHOD
(Estimated Accuracy: $\pm 500mm$ in the horizontal - Depth is undefined)
- (B4) A utility segment which is suspected to exist (either on QL-D or QL-C records) but has not been detected and is therefore shown as an assumed route.

Horizontal & Vertical Accuracy Illustration

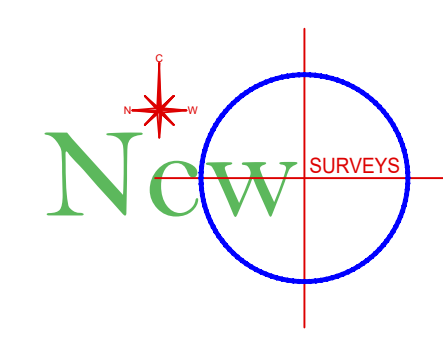


MPP - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS - GPR SURVEY GRID AT 0.5m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M1 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS - GPR SURVEY GRID AT 0.5m INTERVALS - GPR MARK-UP ON SITE
MSP - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS - GPR SURVEY GRID AT 1m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M2 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS - GPR SURVEY GRID AT 1m INTERVALS - GPR MARK-UP ON SITE
MSP - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 2m INTERVALS - GPR SURVEY GRID AT 2m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M3 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 2m INTERVALS - GPR SURVEY GRID AT 2m INTERVALS - GPR MARK-UP ON SITE
MTP - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS - GPR SURVEY AS APPROPRIATE - POST PROCESSING OF GPR DATA	M4 - EML SEARCH TRANSECT AT 10m INTERVALS - TRACED AT 5m INTERVALS - GPR SURVEY AS APPROPRIATE - GPR MARK-UP ON SITE

PRECISION
UTILITY MAPPING

3c Langlands Square
ADDRESS2
ADDRESS3
ADDRESS4
TELEPHONE

01	25/07/2023	LM	Survey Completed	K.S.	J.H.
Rev	Date	Drawn	Description	Chkd	Appd



Title
Woodquay Park
23-136-002
UTILITY SURVEY

Surveyor	F.MALLPAN	F.M.	Eng check	K.SHEEHAN	K.S.
Drawn	L.MOREIRA	L.M.	Coordination	K.SHEEHAN	K.S.
Dwg check	K.SHEEHAN	K.S.	Approved	J.MARKHAM	J.M.
Scale of A0	1:250	Status	COMPLETED	Rev	01
Drawing Number	PUM-11310-U-DR-0001-01				

Appendix C Infiltration Test results

IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND



CONTRACT DRILLING
SITE INVESTIGATION

Phone: (091) 841 274

Fax: (091) 847 687

email: info@irishdrilling.ie

WOODQUAY SOAKAGE TESTS

GROUND INVESTIGATION CONTRACT FACTUAL REPORT

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Limerick,
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	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	13 TH June 2024	24 _G _115/01
<u>Signature</u>				

FOREWORD

The trial pit records have been compiled from an examination of the samples by a Geotechnical Engineer and from the Drillers' descriptions.

The report presents an opinion on the configuration of the strata within the site based on the trial pit results. The assumptions, though reasonable, are given for guidance only and no liability can be accepted for changes in conditions not revealed by the trial pits.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Ground Investigations with precedence given to IS EN 1997-2 where applicable.

Contents:

1	Introduction
2	The Site & Geology
3	Fieldwork

Appendix 1	Soil Infiltration Test Records
Appendix 2	Trial Pit Records
Appendix 3	Photographs (Trial Pits)
Appendix 4	Site Plan

1 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Punch Consulting Engineers, on behalf of Galway City Council, to carry out a site investigation at the site of the proposed Woodquay Park Development.

This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions at the site.

The fieldwork was carried out on May 27th 2024.

2 Site & Geology

The site is located at Woodquay, Galway.

The fieldwork was carried out at Woodquay Park.

Site Plans, prepared by the client's representatives and amended by IDL to show approximate 'As-Built' fieldwork locations, are included with this report as Appendix 4.

The following were the main published information sources used:
Geological Map of Ireland: 1:500,000 scale map series.

Site investigation data is available as point source data along the proposed route, and the majority of the ground in between the points can only be assumed to follow the characteristics of the nearest available data.

Overview of Subsoil Geology

Glacial Till:

Glacial Till is what was often referred to as Boulder Clay. It is a diverse material that is largely deposited sub-glacially and has a wide range of characteristics due to the variety of parent materials and different processes of deposition. Tills are tightly packed, unsorted, heterogeneous, unbedded, and can have a wide range of particle sizes and types, which are often but not exclusively angular or sub-angular.

The type of parent material plays a critical role in providing the particles that create different subsoil permeability with sandstones giving rise to a high proportion of sand sized grains in the till matrix.

Made Ground:

Made Ground is material which has been purposefully emplaced by humans.

Solid Geology

The Geological Map of Ireland: (GSI 1:100,000 scale map series) indicate that the site is predominantly underlain by Metagabbro & Orthogneiss Suite Rock Formations.

3 Fieldwork.

3.1 Fieldwork Plant:

The following plant was mobilised to site by IDL to carry out fieldwork operations:

- 1nr. Hitachi 3T Tracked Excavator.
- 1nr. Honda Water Supply Pump.

Fieldwork carried out to date has included the following:

3.2 Fieldwork Operations:

A general summary of fieldwork operations carried out to date includes the following:

- Excavation of 2nr Trial Pits.
- Completion of 2nr Soil Infiltration Tests.

3.3 Trial Pits / Soil Infiltration Tests:

Two trial pits (PT-01 and PT-02) were excavated on site using a 3T tracked excavator.

The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability, water ingress and services encountered. The pits were excavated to depths ranging from 2.20m to 2.30m below ground level.

Soil infiltration tests, in accordance with BRE Digest 365, were carried out at the 2nr trial pit locations and the records of these tests are included with this report as Appendix 1.

Detailed engineering logs for the trial pits completed are included with this report in Appendix 2.

3.4 General Summary:

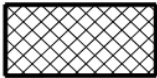






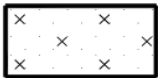
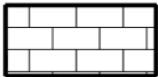
The trial pit locations were set out on site using a Trimble CU Bluetooth GPS Surveying Unit and the co-ordinates are included on the logs presented in the appendices.

All fieldwork co-ordinates are reported to Irish Transverse Mercator (ITM) with Reduced Levels recorded relative to Malin Head Datum and with an accuracy level of + or – 0.10m.

Ground conditions encountered during the completion of the fieldwork were typical and as expected for this region and predominantly consisted of Topsoil over Made Ground.

For detailed descriptions of ground conditions encountered please refer to the engineering logs included in the appendices of this report.

The following Key Legend Table details the symbology used on the engineering logs to describe ground conditions encountered:

Legend:	
	Made ground=mg
	Clay=cl
	Boulders and cobbles=b/c
	Gravel=g
	Sand=s
	Silt=si
	Peat=p
	Silty sand=s/si
	Rock=r

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

The records of all fieldwork and photographs are included in the appendices of this Factual Report.

Ronan Killeen
Chartered Engineer
Irish Drilling Limited
June 13th 2024

APPENDIX 1

SOIL INFILTRATION TEST RESULTS

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274 Fax: (091) 880861

Contract: Woodquay
Client: Galway City Council
Engineer: Punch
Date: 10.06.2024
Tested by: DOR



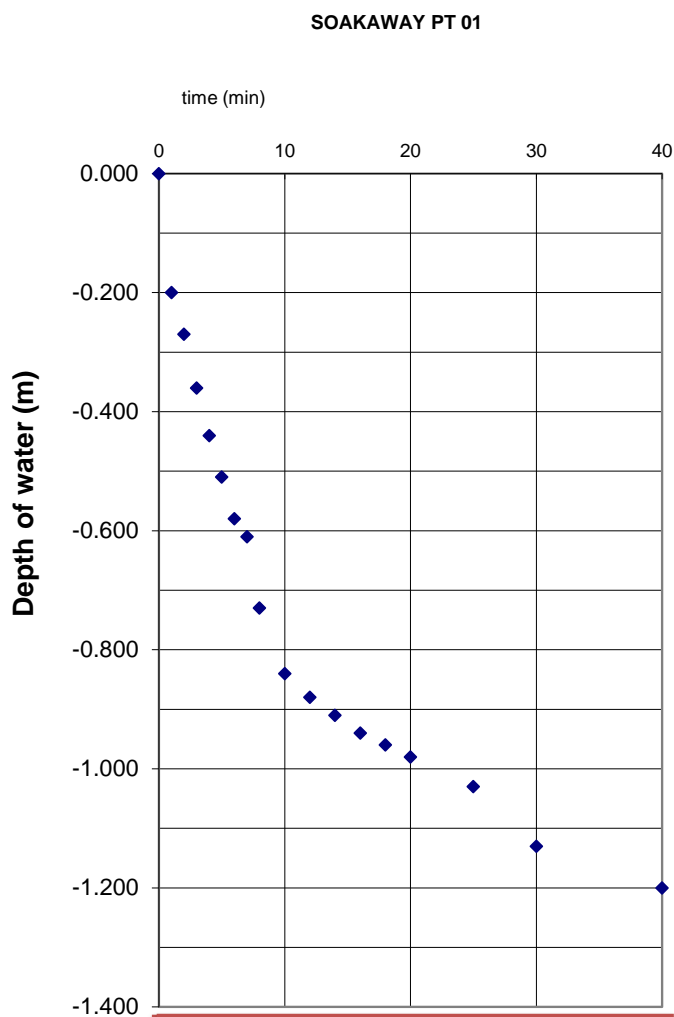
INFILTRATION TEST - to BRE 365

SOAKAWAY:

PT 01

Top of water level: 0.00 m
Base of trial pit: 1.20 m
Dims. of trial pit: 1.1 x 0.3

time min	WL m
0	0.000
1	-0.200
2	-0.270
3	-0.360
4	-0.440
5	-0.510
6	-0.580
7	-0.610
8	-0.730
10	-0.840
12	-0.880
14	-0.910
16	-0.940
18	-0.960
20	-0.980
25	-1.030
30	-1.130
40	-1.200



Result:

Soil Infiltration Rate = 1.79×10^{-4} m/s

Co-Ordinates:

Easting: 529721.40
Northing: 725693.50
R.L. 7.27mOD

IRISH DRILLING LTD.
Loughrea Co. Galway
Tel: (091) 841274 Fax: (091) 880861

Contract: Woodquay
Client: Galway City Council
Engineer: Punch
Date: 27.05.2024
Tested by: DOR



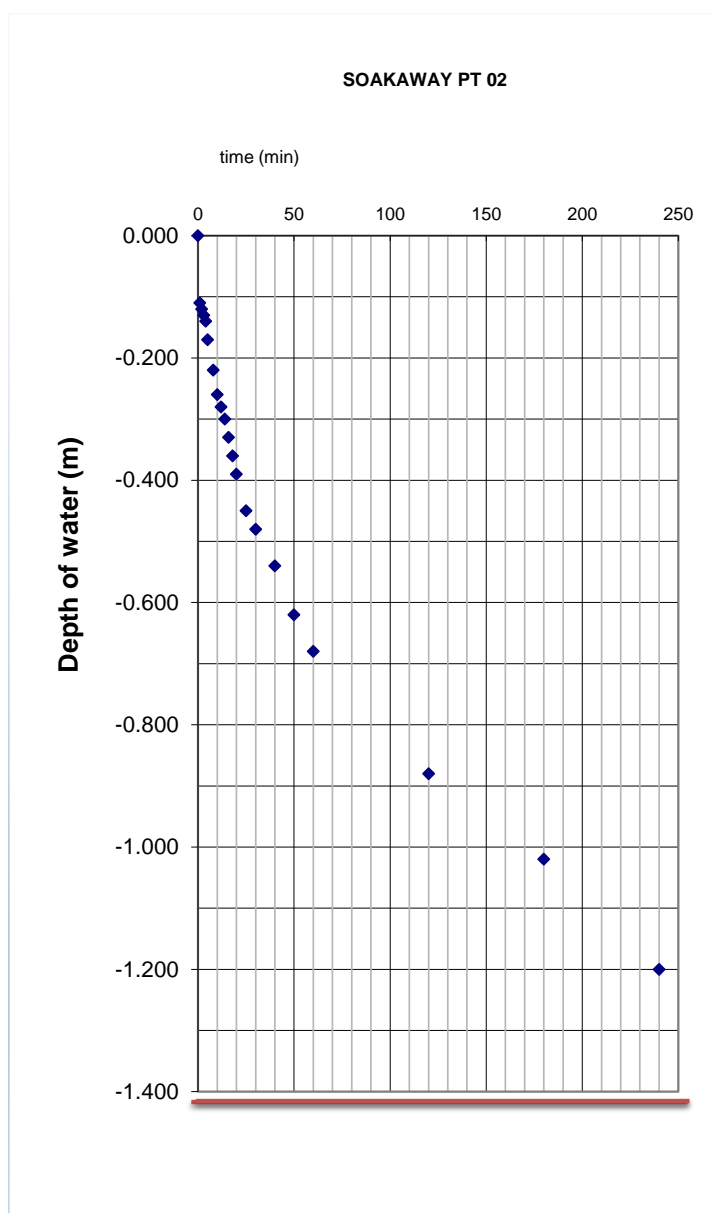
INFILTRATION TEST - to BRE 365

SOAKAWAY:

PT 02

Top of water level: 0.00 m
Base of trial pit: 1.20 m
Dims. of trial pit: 1.3 x 0.3

time min	WL m
0	0.000
1	-0.110
2	-0.120
3	-0.130
4	-0.140
5	-0.170
8	-0.220
10	-0.260
12	-0.280
14	-0.300
16	-0.330
18	-0.360
20	-0.390
25	-0.450
30	-0.480
40	-0.540
50	-0.620
60	-0.680
120	-0.880
180	-1.020
240	-1.200



Result:

Soil Infiltration Rate = 1.77×10^{-5} m/s

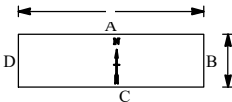


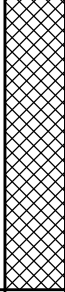
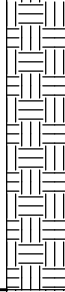



Co-Ordinates:

Easting: 529744.30
Northing: 725663.60
R.L. 7.46mOD

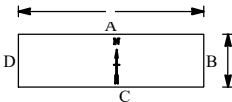

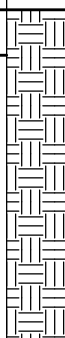

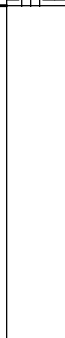

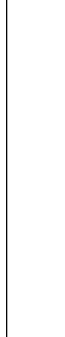
APPENDIX 2

TRIAL PIT RECORDS

TRIALPIT WOODQUAY GALWAY TPS FILE 1 JUNE 4 2024.GPJ ID GINT AGS 4 0 4.GDT 12/6/24

PROJECT: Woodquay										TRIALPIT: PT-01	
LOCATION: Galway										Sheet 1 of 1	
CLIENT: Galway City Council							Co-ordinates: E 529,721.4 N 725,693.5			Rig: Hitachi 3 tonne	
ENGINEER: Punch										Rev: DRAFT	
Ground level: 7.27m O.D.										DATE: 27.5.24	
GROUNDWATER Water strikes: 1st: 2.10m Rose to after: 20min 2.10m 2nd: 3rd:							PIT DIRECTION: 90° PIT DIMENSION: 1.10m * 0.30 LOGGED BY: DOR			 Shoring/Support: N/A Stability: Pit slightly unstable.	
Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill	
0							6.97	0.30	Soft dark brown gravelly SILT with roots.		
1									MADE GROUND: Soft brown gravelly SILT with occasional cobbles and timber glass leather and slates. Cobbles are subangular to subrounded of limestone.		
2							4.97	2.30			
3						END					
4											
5											
6											
7											
8											
9											
10											
Remarks: Ingress of water at 2.10m bgl. TP terminated at 2.30m bgl. Unable to progress TP - maximum reach of excavator. TP backfilled with arisings. TP carried out on completion of soil infiltration test.										Scale: 1:50	
Irish drilling LTD										Ph. Fax	

TRIALPIT WOODQUAY GALWAY TPS FILE 1 JUNE 4 2024.GPJ ID GINT AGS 4 0 4.GDT 12/6/24

PROJECT: Woodquay										TRIALPIT: PT-02	
LOCATION: Galway										Sheet 1 of 1	
CLIENT: Galway City Council							Co-ordinates: E 529,744.3 N 725,663.6			Rig: Hitachi 3 tonne	
ENGINEER: Punch										Rev: DRAFT	
Ground level: 7.46m O.D.										DATE: 27.5.24	
GROUNDWATER Water strikes: 1st: 2.00m Rose to after: 20min 2.00m 2nd: 3rd:							PIT DIRECTION: 90° PIT DIMENSION: 1.30m * 0.30 LOGGED BY: DOR			<div></div> <div>Shoring/Support: N/A Stability: Pit unstable.</div>	
Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill	
0							7.16	0.30	Soft dark brown gravelly SILT with roots.		
1									MADE GROUND: Soft brown gravelly SILT with occasional cobbles and timber glass slates and steel. Cobbles are subangular to subrounded of limestone.		
2						END	5.26	2.20			
3											
4											
5											
6											
7											
8											
9											
10											
Remarks: Ingress of water at 2.00m bgl. TP terminated at 2.20m bgl. Unable to progress TP - maximum reach of excavator. TP backfilled with arisings. TP carried out on completion of soil infiltration test.										Scale: 1:50	
Irish drilling LTD										Ph. Fax	

APPENDIX 3

TRIAL PIT PHOTOGRAPHS

Irish Drilling Ltd: Trial Pit Photos:



Figure 1 H:\24G115 Woodquay Galway\PT 01 Fill No 2(2).jpg



Figure 3 H:\24G115 Woodquay Galway\PT 01 Fill No.1(2).jpg



Figure 2 H:\24G115 Woodquay Galway\PT 01 Fill No.1(1).jpg



Figure 4 H:\24G115 Woodquay Galway\PT 01 Fill No.2(1).jpg



Figure 5 H:\24G115 Woodquay Galway\PT 01 Fill No.3(1).jpg



Figure 7 H:\24G115 Woodquay Galway\PT 01 Water Table.jpg



Figure 6 H:\24G115 Woodquay Galway\PT 01 Fill No.3(2).jpg



Figure 8 H:\24G115 Woodquay Galway\PT 02 (1).jpg



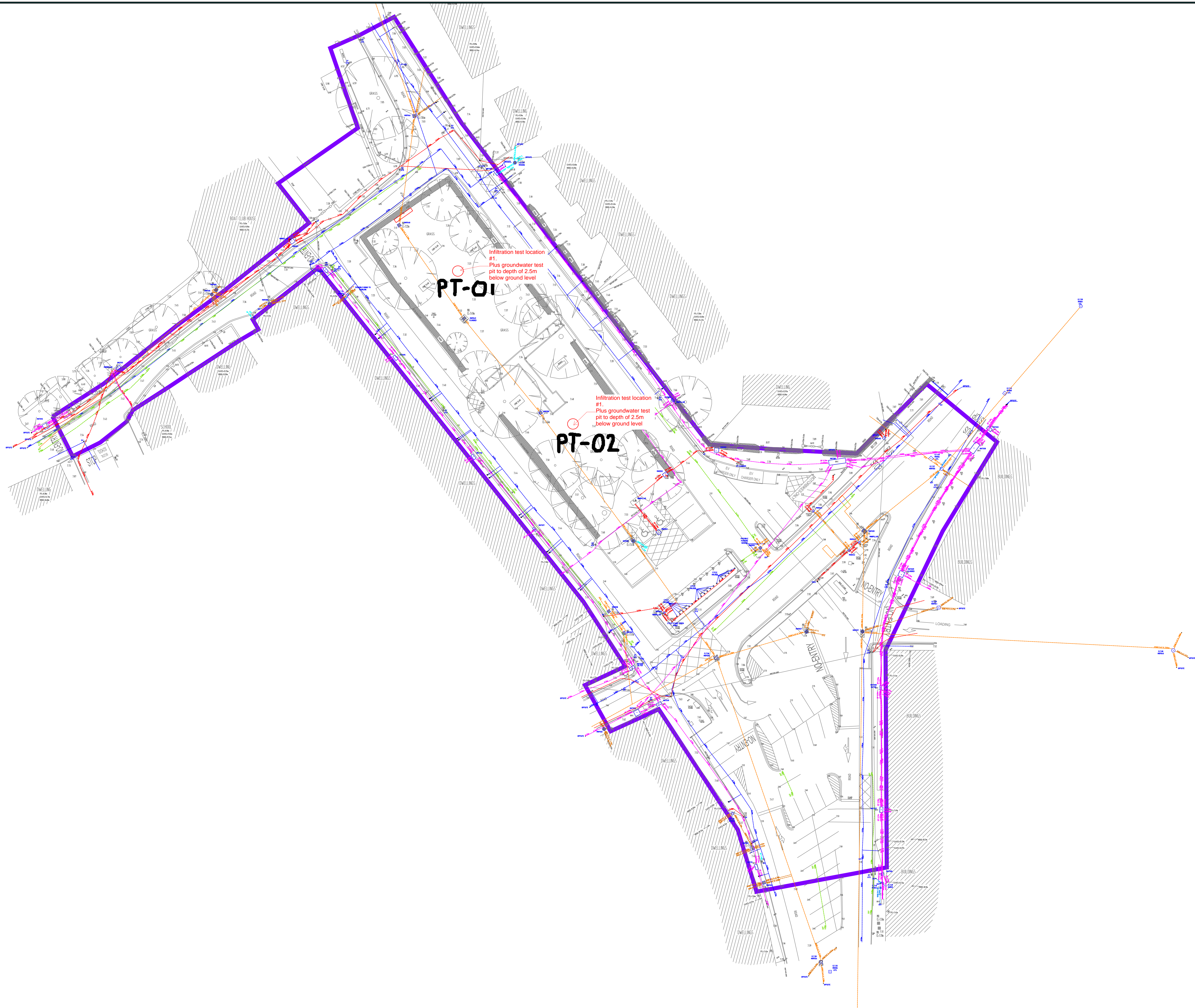
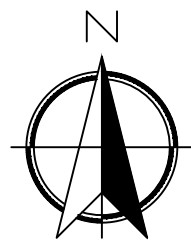
Figure 9 H:\24G115 Woodquay Galway\PT 02 (2).jpg



Figure 10 H:\24G115 Woodquay Galway\PT 02 Water Table .jpg

APPENDIX 4

SITE PLAN



Notes

- Topographical information has been taken from drawing "23-136-001 - TOPO SURVEY" & "TMPS & OSOASIS datum", some information may have been removed for clarity. Please refer to original drawing for full details.
- This drawing should be read in conjunction with the utility survey report.
- All depths are taken to top of service, unless "L.L." is indicated, in this instance the depth is to the invert of the pipe. This is for drainage pipes at manholes only.
- As this is a non-intrusive survey only, all utilities should be visually verified by safe digging practices to confirm depths and alignments of survey.
- Non-intrusive surveys cannot guarantee every possible service under the ground is located. Care must be taken when site work begins, as services that are not locatable through non-intrusive methods may exist on site.

DISCLAIMER

This drawing and information contained within is issued in confidence and is the copyright of Precision Utility Mapping. If the topographical information or base mapping has been supplied by a Third Party, Precision Utility Mapping is not liable for any inaccuracies contained therein. If inaccuracies to supplied mapping have been identified and Precision Utility Mapping have not been commissioned to rectify, these inaccuracies shall be highlighted in the accompanying report. Disclosure of this information to Third Parties and unauthorised copying or replication of this data without approval is forbidden.

The data presented in this drawing have been collected using a combination of the following: consultation of utility asset information, visual survey & inspection of manholes and inspection chambers; electromagnetic location techniques; ground penetrating radar; and, where applicable, trial hole excavations. These techniques have been deployed in accordance with the BS1 PAS128 Specification for Underground Utility Detection, Verification and Location using the search methodologies indicated below and described in the accompanying report. This drawing should be used in conjunction with the accompanying report which details the limitations of these techniques and any rendering factors encountered during this survey.

Unless otherwise stated, all utilities shown on this plan have been surveyed using approved detectors and the correlation between inspection chambers is unable to be detected. The detection confidence for each utility segment is depicted in line with the PAS128 scheme outlined below. Information depicted as Q-L-C or Q-L-D cannot be guaranteed as it is based on historic utility records which can be inaccurate and incomplete.

The utility routes depicted may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface linear features therefore it is possible that some features shown are not utility related, and due to the limitations of electromagnetic techniques, all utility identifications should be treated with caution and verified prior to use during design/building works.

If the location or depth of utilities and features is of particular importance to a project then it is recommended that discussions are held with Precision Utility Mapping regarding any possible limitations or anomalies.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate. Where an area of utilities is likely to affect client project requirements, it is strongly recommended that a PAS128 Quality Level A verification survey is carried out.

No utility mapping survey can be considered a 100% accurate depiction of the subsurface environment, and the use of these drawings does not remove the requirement for the use of safe digging techniques at all times, in line with the requirements of HSG47 and current CDM regulations.

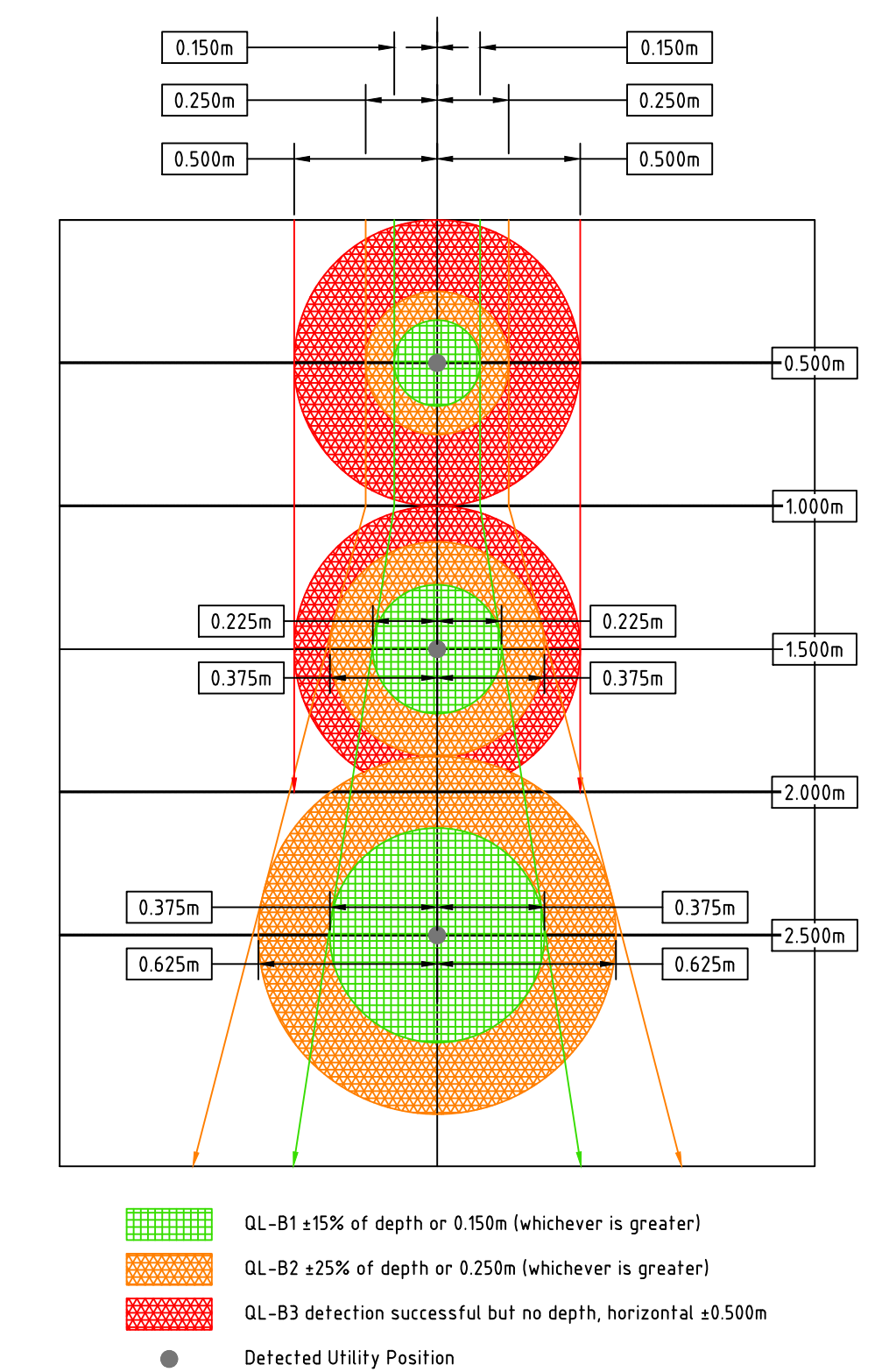
SUB-SURFACE KEY

COMBINED HEATING AND POWER	
DISTRICT HEATING	
DRAINAGE COMBINED	
DRAINAGE FOAT	
DRAINAGE SURFACE	
DRAINAGE UNIDENTIFIED	
FLOW DIRECTION INDICATED BY ARROW (N) or (S) (IF KNOWN)	
ELECTRIC	
ELECTRIC LV	
ELECTRIC HV	
ELECTRIC STREET LIGHTING	
GAS	
OUTFALL PIPELINE	
STREET FURNITURE CABLES	
TELECOMS	
TELECOMS - FIBRE OPTIC	
TELECOMS - BT	
TELECOMS - VIRGA MEDIA	
TRONICAM	
TRAFFIC CONTROL	
WATER	
UNIDENTIFIED UTILITY	
UNIDENTIFIED CABLES	
UNIDENTIFIED EMPTY DUCT	
QPL LINEAR FEATURE	
QPL LINEAR FEATURE	
QPL AREA ANOMALY	
QPL AREA ANOMALY - REBAR	
CHAMBER EXTENTS	
MEASURED DEPTH (M) TO PIPE/CABLE/DUCT	0.15m
INVERT LEVEL OF PIPE/CABLE/DUCT (TO OS DATUM)	0.12-0.34
SOFT LEVEL (TO OS DATUM)	0.12-0.34
COVER LEVEL OF INSPECTION CHAMBER (TO OS DATUM)	0.12-0.34
DIAMETER OF PIPE/DUCT IN MILLIMETERS	1000
AREA UNABLE TO BE SURVEYED DUE TO SURFACE OBSTRUCTIONS, VEGITATION OR LACK OF ACCESS	
TRENCH SCAR / SURFACE SCAR	
EXTENT OF SURVEY - BOUNDARY	

UTILITY CONFIDENCE LEVELS (Listed from High to Low)

- (A) HORIZONTAL AND VERTICAL POSITION VERIFIED VISUALLY
(Accuracy: Horizontal $\pm 25mm$ Vertical $\pm 50mm$)
- (B1P) HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS WITH POST PROCESSING OF GPR DATA
(Estimated Accuracy: $\pm 150mm$ OR $\pm 15\%$ of detected depth)
- (B1) HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS
(Estimated Accuracy: $\pm 150mm$ OR $\pm 15\%$ of detected depth)
- (B2P) HORIZONTAL AND VERTICAL POSITION DETECTED VIA POST-PROCESSED GPR
(Estimated Accuracy: $\pm 250mm$ OR $\pm 40\%$ of detected depth)
- (B2) HORIZONTAL AND VERTICAL POSITION DETECTED BY A SINGLE METHOD
(Estimated Accuracy: $\pm 250mm$ OR $\pm 40\%$ of detected depth)
- (B3P) HORIZONTAL POSITION DETECTED VIA POST-PROCESSED GPR
(Estimated Accuracy: $\pm 500mm$ in the horizontal - Depth is undefined)
- (B3) HORIZONTAL POSITION DETECTED BY A SINGLE METHOD
(Estimated Accuracy: $\pm 500mm$ in the horizontal - Depth is undefined)
- (B4) A utility segment which is suspected to exist (either on Q-L-D or Q-L-C records) but has not been detected and is therefore shown as an assumed route.

Horizontal & Vertical Accuracy Illustration

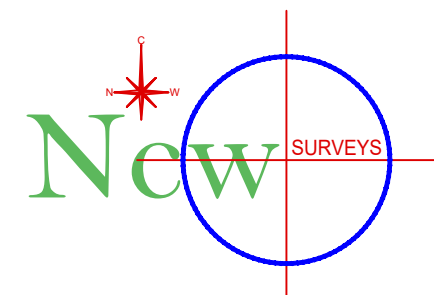


MPP - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS - GPR SURVEY GRID AT 0.5m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M1 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 0.5m INTERVALS - GPR SURVEY GRID AT 0.5m INTERVALS - GPR MARK-UP ON SITE
M2P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS - GPR SURVEY GRID AT 1m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M2 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 1m INTERVALS - GPR SURVEY GRID AT 1m INTERVALS - GPR MARK-UP ON SITE
M3P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 2m INTERVALS - GPR SURVEY GRID AT 2m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M3 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 2m INTERVALS - GPR SURVEY GRID AT 2m INTERVALS - GPR MARK-UP ON SITE
M4P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 5m INTERVALS - GPR SURVEY GRID AT 5m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M4 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 5m INTERVALS - GPR SURVEY GRID AT 5m INTERVALS - GPR MARK-UP ON SITE
M5P - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 10m INTERVALS - GPR SURVEY GRID AT 10m INTERVALS OR HIGH DENSITY ARRAY - POST PROCESSING OF GPR DATA	M5 - EML SEARCH TRANSECT AT 2m INTERVALS - TRACED AT 10m INTERVALS - GPR SURVEY GRID AT 10m INTERVALS - GPR MARK-UP ON SITE

PRECISION
UTILITY MAPPING

30 Langlands Square
ADDRESS2
ADDRESS3
ADDRESS4
TELEPHONE

01	25/07/2023	LM	Survey Completed	K.S.	J.H.
Rev	Date	Drawn	Description	Chkd	Appd



Title
Woodquay Park
23-136-002
UTILITY SURVEY

Surveyor	F.MALLPAN	F.M.	Eng check	K.SHEEHAN	K.S.
Drawn	L.MOREIRA	L.M.	Coordination	K.SHEEHAN	K.S.
Dwg check	K.SHEEHAN	K.S.	Approved	J.MARKHAM	J.M.
Scale of A0	1:250	Status	COMPLETED	Rev	01
Drawing Number	PUM-11310-U-DR-0001-01				

Appendix D Causeway Flow

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	20	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	15.700	Minimum Backdrop Height (m)	0.200
Ratio-R	0.270	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
3		5.00	0.000	1200	529786.040	725648.880	1.300
RG-3	0.021		0.000	1200	529782.505	725655.908	1.433

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	3	RG-3	7.867	0.600	-1.300	-1.433	0.133	59.2	100	5.13	50.0
	Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)	
1.000		1.003	7.9	0.0	1.200	1.333	0.000	0.0	0	0.000	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	7.867	59.2	100	Circular	0.000	-1.300	1.200	0.000	-1.433	1.333

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	3	1200	Manhole	Adoptable	RG-3	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	Scotland and Ireland	Drain Down Time (mins)	240
M5-60 (mm)	15.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
5	20	10	0
30	20	10	0
100	20	10	0

Node RG-3 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.06720	Invert Level (m)	-1.433	Depth (m)	1.300
Side Inf Coefficient (m/hr)	0.06720	Time to half empty (mins)	96	Inf Depth (m)	
Safety Factor	1.0	Pit Width (m)	2.000	Number Required	1
Porosity	0.35	Pit Length (m)	4.000		

Results for 5 year +20% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	3	132	-0.911	0.389	0.3	0.4394	0.0000	SURCHARGED
180 minute summer	RG-3	132	-0.911	0.522	1.5	2.2221	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute summer	3	1.000	RG-3	-0.3	-0.036	-0.034	0.0616
180 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	3	172	-0.620	0.680	0.3	0.7687	0.0000	SURCHARGED
240 minute summer	RG-3	172	-0.620	0.813	1.9	3.4628	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute summer	3	1.000	RG-3	-0.3	-0.044	-0.044	0.0616
240 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	3	148	-0.344	0.956	0.5	1.0817	0.0000	SURCHARGED
180 minute summer	RG-3	148	-0.344	1.089	2.9	4.6418	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute summer	3	1.000	RG-3	-0.5	-0.070	-0.070	0.0616
180 minute summer	RG-3	Infiltration		0.4			

Results for 5 year +20% CC +10% A 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	3	18	-1.085	0.215	1.6	0.2426	0.0000	SURCHARGED
15 minute summer	RG-3	18	-1.086	0.347	4.6	1.4800	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	3	1.000	RG-3	-1.6	-0.243	-0.205	0.0616
15 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	3	33	-1.004	0.296	1.1	0.3349	0.0000	SURCHARGED
30 minute summer	RG-3	33	-1.004	0.429	4.1	1.8282	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
30 minute summer	3	1.000	RG-3	-1.1	-0.188	-0.144	0.0616
30 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	3	60	-0.942	0.358	0.6	0.4052	0.0000	SURCHARGED
60 minute summer	RG-3	60	-0.942	0.491	3.1	2.0933	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
60 minute summer	3	1.000	RG-3	-0.6	-0.089	-0.077	0.0616
60 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	3	100	-0.915	0.385	0.4	0.4350	0.0000	SURCHARGED
120 minute summer	RG-3	100	-0.915	0.518	2.0	2.2054	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
120 minute summer	3	1.000	RG-3	-0.4	-0.048	-0.047	0.0616
120 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	3	132	-0.911	0.389	0.3	0.4394	0.0000	SURCHARGED
180 minute summer	RG-3	132	-0.911	0.522	1.5	2.2221	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute summer	3	1.000	RG-3	-0.3	-0.036	-0.034	0.0616
180 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	3	168	-0.918	0.382	0.2	0.4319	0.0000	SURCHARGED
240 minute summer	RG-3	168	-0.918	0.515	1.3	2.1939	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute summer	3	1.000	RG-3	-0.2	-0.032	-0.029	0.0616
240 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	3	232	-0.931	0.369	0.2	0.4175	0.0000	SURCHARGED
360 minute summer	RG-3	232	-0.931	0.502	1.0	2.1397	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
360 minute summer	3	1.000	RG-3	-0.2	-0.021	-0.021	0.0616
360 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	3	304	-0.968	0.332	0.1	0.3751	0.0000	SURCHARGED
480 minute summer	RG-3	304	-0.968	0.465	0.8	1.9800	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
480 minute summer	3	1.000	RG-3	-0.1	-0.017	-0.016	0.0616
480 minute summer	RG-3	Infiltration		0.3			

Results for 5 year +20% CC +10% A 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	3	375	-1.042	0.258	0.1	0.2912	0.0000	SURCHARGED
600 minute summer	RG-3	375	-1.042	0.391	0.6	1.6640	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600 minute summer	3	1.000	RG-3	-0.1	-0.014	-0.012	0.0616
600 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	3	450	-1.021	0.279	0.1	0.3155	0.0000	SURCHARGED
720 minute summer	RG-3	450	-1.021	0.412	0.6	1.7548	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
720 minute summer	3	1.000	RG-3	-0.1	-0.013	-0.011	0.0616
720 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	3	570	-1.071	0.229	0.1	0.2585	0.0000	SURCHARGED
960 minute summer	RG-3	570	-1.071	0.362	0.5	1.5406	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
960 minute summer	3	1.000	RG-3	-0.1	-0.013	-0.009	0.0616
960 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	3	810	-1.145	0.155	0.1	0.1756	0.0000	SURCHARGED
1440 minute summer	RG-3	810	-1.145	0.288	0.4	1.2281	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
1440 minute summer	3	1.000	RG-3	-0.1	-0.009	-0.007	0.0616
1440 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 2160 minute summer. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	3	1200	-1.195	0.105	0.0	0.1191	0.0000	SURCHARGED
2160 minute summer	RG-3	1200	-1.195	0.238	0.3	1.0153	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2160 minute summer	3	1.000	RG-3	0.0	-0.006	-0.004	0.0616
2160 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
2880 minute summer	RG-3	1560	-1.311	0.122	0.2	0.5212	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2880 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0308
2880 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 4320 minute summer. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
4320 minute summer	RG-3	2220	-1.355	0.078	0.2	0.3345	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
4320 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0259
4320 minute summer	RG-3	Infiltration		0.2			

Results for 5 year +20% CC +10% A 5760 minute summer. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
5760 minute summer	RG-3	2700	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
5760 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
5760 minute summer	RG-3	Infiltration		0.1			

Results for 5 year +20% CC +10% A 7200 minute summer. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
7200 minute summer	RG-3	3420	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
7200 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
7200 minute summer	RG-3	Infiltration		0.1			

Results for 5 year +20% CC +10% A 8640 minute summer. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
8640 minute summer	RG-3	4080	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
8640 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
8640 minute summer	RG-3	Infiltration		0.1			

Results for 5 year +20% CC +10% A 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	RG-3	4800	-1.402	0.031	0.1	0.1323	0.0000	OK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	
10080 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081	
10080 minute summer	RG-3	Infiltration		0.1				

Results for 30 year +20% CC +10% A 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	3	19	-0.922	0.378	2.2	0.4277	0.0000	SURCHARGED
15 minute summer	RG-3	19	-0.922	0.511	6.7	2.1772	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	3	1.000	RG-3	-2.2	-0.318	-0.275	0.0616
15 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	3	33	-0.784	0.516	1.2	0.5840	0.0000	SURCHARGED
30 minute summer	RG-3	33	-0.784	0.649	6.1	2.7666	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
30 minute summer	3	1.000	RG-3	-1.2	-0.177	-0.156	0.0616
30 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	3	62	-0.677	0.623	0.9	0.7043	0.0000	SURCHARGED
60 minute summer	RG-3	62	-0.677	0.756	4.6	3.2200	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
60 minute summer	3	1.000	RG-3	-0.9	-0.116	-0.116	0.0616
60 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	3	104	-0.632	0.668	0.6	0.7552	0.0000	SURCHARGED
120 minute summer	RG-3	104	-0.632	0.801	3.0	3.4120	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
120 minute summer	3	1.000	RG-3	-0.6	-0.074	-0.073	0.0616
120 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	3	136	-0.631	0.669	0.4	0.7568	0.0000	SURCHARGED
180 minute summer	RG-3	136	-0.631	0.802	2.2	3.4179	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute summer	3	1.000	RG-3	-0.4	-0.052	-0.052	0.0616
180 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	3	172	-0.620	0.680	0.3	0.7687	0.0000	SURCHARGED
240 minute summer	RG-3	172	-0.620	0.813	1.9	3.4628	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute summer	3	1.000	RG-3	-0.3	-0.044	-0.044	0.0616
240 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	3	240	-0.685	0.615	0.2	0.6950	0.0000	SURCHARGED
360 minute summer	RG-3	240	-0.685	0.748	1.4	3.1852	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
360 minute summer	3	1.000	RG-3	-0.2	-0.031	-0.031	0.0616
360 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	3	312	-0.699	0.601	0.2	0.6797	0.0000	SURCHARGED
480 minute summer	RG-3	312	-0.699	0.734	1.1	3.1275	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
480 minute summer	3	1.000	RG-3	-0.2	-0.023	-0.023	0.0616
480 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	3	390	-0.721	0.579	0.1	0.6553	0.0000	SURCHARGED
600 minute summer	RG-3	390	-0.721	0.712	0.9	3.0354	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600 minute summer	3	1.000	RG-3	-0.1	-0.018	-0.018	0.0616
600 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	3	450	-0.748	0.552	0.1	0.6245	0.0000	SURCHARGED
720 minute summer	RG-3	450	-0.748	0.685	0.8	2.9196	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
720 minute summer	3	1.000	RG-3	-0.1	-0.015	-0.015	0.0616
720 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	3	585	-0.836	0.464	0.1	0.5247	0.0000	SURCHARGED
960 minute summer	RG-3	585	-0.836	0.597	0.7	2.5435	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
960 minute summer	3	1.000	RG-3	-0.1	-0.013	-0.013	0.0616
960 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	3	840	-0.951	0.349	0.1	0.3946	0.0000	SURCHARGED
1440 minute summer	RG-3	840	-0.951	0.482	0.5	2.0534	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
1440 minute summer	3	1.000	RG-3	-0.1	-0.008	-0.008	0.0616
1440 minute summer	RG-3	Infiltration		0.3			

Results for 30 year +20% CC +10% A 2160 minute summer. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	3	1260	-0.999	0.301	0.0	0.3407	0.0000	SURCHARGED
2160 minute summer	RG-3	1260	-0.999	0.434	0.4	1.8502	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2160 minute summer	3	1.000	RG-3	0.0	-0.006	-0.005	0.0616
2160 minute summer	RG-3	Infiltration		0.2			

Results for 30 year +20% CC +10% A 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	3	1560	-1.182	0.118	0.0	0.1334	0.0000	SURCHARGED
2880 minute summer	RG-3	1560	-1.182	0.251	0.3	1.0692	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2880 minute summer	3	1.000	RG-3	0.0	-0.005	-0.004	0.0616
2880 minute summer	RG-3	Infiltration		0.2			

Results for 30 year +20% CC +10% A 4320 minute summer. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute summer	3	2400	-1.266	0.034	0.0	0.0382	0.0000	OK
4320 minute summer	RG-3	2400	-1.266	0.167	0.2	0.7104	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
4320 minute summer	3	1.000	RG-3	0.0	0.005	0.003	0.0399
4320 minute summer	RG-3	Infiltration		0.2			

Results for 30 year +20% CC +10% A 5760 minute summer. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute summer	3	3060	-1.284	0.016	0.0	0.0179	0.0000	OK
5760 minute summer	RG-3	3060	-1.284	0.149	0.2	0.6340	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
5760 minute summer	3	1.000	RG-3	0.0	-0.001	-0.001	0.0339
5760 minute summer	RG-3	Infiltration		0.2			

Results for 30 year +20% CC +10% A 7200 minute summer. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
7200 minute summer	RG-3	3660	-1.355	0.078	0.2	0.3345	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
7200 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0259
7200 minute summer	RG-3	Infiltration		0.2			

Results for 30 year +20% CC +10% A 8640 minute summer. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
8640 minute summer	RG-3	3840	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
8640 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
8640 minute summer	RG-3	Infiltration		0.1			

Results for 30 year +20% CC +10% A 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100.

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	RG-3	4500	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
10080 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
10080 minute summer	RG-3	Infiltration		0.1			

Results for 100 year +20% CC +10% A 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	3	19	-0.767	0.533	1.8	0.6028	0.0000	SURCHARGED
15 minute summer	RG-3	19	-0.767	0.666	8.7	2.8369	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	3	1.000	RG-3	-1.8	-0.298	-0.227	0.0616
15 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	3	33	-0.579	0.721	1.6	0.8151	0.0000	SURCHARGED
30 minute summer	RG-3	33	-0.579	0.854	7.9	3.6373	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
30 minute summer	3	1.000	RG-3	-1.6	-0.205	-0.203	0.0616
30 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	3	62	-0.430	0.870	1.2	0.9839	0.0000	SURCHARGED
60 minute summer	RG-3	62	-0.430	1.003	6.0	4.2733	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
60 minute summer	3	1.000	RG-3	-1.2	-0.153	-0.152	0.0616
60 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	3	120	-0.359	0.941	0.8	1.0646	0.0000	SURCHARGED
120 minute summer	RG-3	120	-0.359	1.074	3.9	4.5776	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
120 minute summer	3	1.000	RG-3	-0.8	-0.097	-0.096	0.0616
120 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	3	148	-0.344	0.956	0.5	1.0817	0.0000	SURCHARGED
180 minute summer	RG-3	148	-0.344	1.089	2.9	4.6418	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute summer	3	1.000	RG-3	-0.5	-0.070	-0.070	0.0616
180 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	3	180	-0.358	0.942	0.4	1.0659	0.0000	SURCHARGED
240 minute summer	RG-3	180	-0.358	1.075	2.4	4.5824	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
240 minute summer	3	1.000	RG-3	-0.4	-0.056	-0.056	0.0616
240 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	3	248	-0.373	0.927	0.3	1.0480	0.0000	SURCHARGED
360 minute summer	RG-3	248	-0.373	1.060	1.8	4.5150	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
360 minute summer	3	1.000	RG-3	-0.3	-0.040	-0.040	0.0616
360 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	3	312	-0.408	0.892	0.2	1.0091	0.0000	SURCHARGED
480 minute summer	RG-3	312	-0.408	1.025	1.4	4.3684	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
480 minute summer	3	1.000	RG-3	-0.2	-0.030	-0.030	0.0616
480 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	3	390	-0.426	0.874	0.2	0.9883	0.0000	SURCHARGED
600 minute summer	RG-3	390	-0.426	1.007	1.2	4.2903	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600 minute summer	3	1.000	RG-3	-0.2	-0.025	-0.025	0.0616
600 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	3	450	-0.505	0.795	0.2	0.8986	0.0000	SURCHARGED
720 minute summer	RG-3	450	-0.505	0.928	1.0	3.9522	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
720 minute summer	3	1.000	RG-3	-0.2	-0.020	-0.020	0.0616
720 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	3	585	-0.528	0.772	0.1	0.8733	0.0000	SURCHARGED
960 minute summer	RG-3	585	-0.528	0.905	0.9	3.8567	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
960 minute summer	3	1.000	RG-3	-0.1	-0.017	-0.017	0.0616
960 minute summer	RG-3	Infiltration		0.4			

Results for 100 year +20% CC +10% A 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	3	870	-0.721	0.579	0.1	0.6551	0.0000	SURCHARGED
1440 minute summer	RG-3	870	-0.721	0.712	0.6	3.0348	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
1440 minute summer	3	1.000	RG-3	-0.1	-0.010	-0.010	0.0616
1440 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A 2160 minute summer. 2400 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	3	1260	-0.935	0.365	0.0	0.4124	0.0000	SURCHARGED
2160 minute summer	RG-3	1260	-0.935	0.498	0.4	2.1203	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2160 minute summer	3	1.000	RG-3	0.0	-0.005	-0.005	0.0616
2160 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	3	1620	-0.926	0.374	0.0	0.4232	0.0000	SURCHARGED
2880 minute summer	RG-3	1620	-0.926	0.507	0.4	2.1610	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
2880 minute summer	3	1.000	RG-3	0.0	-0.006	-0.005	0.0616
2880 minute summer	RG-3	Infiltration		0.3			

Results for 100 year +20% CC +10% A 4320 minute summer. 4560 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute summer	3	2280	-1.171	0.129	0.0	0.1455	0.0000	SURCHARGED
4320 minute summer	RG-3	2280	-1.171	0.262	0.3	1.1147	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
4320 minute summer	3	1.000	RG-3	0.0	-0.005	-0.004	0.0616
4320 minute summer	RG-3	Infiltration		0.2			

Results for 100 year +20% CC +10% A 5760 minute summer. 6000 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute summer	3	3180	-1.253	0.047	0.0	0.0536	0.0000	OK
5760 minute summer	RG-3	3180	-1.253	0.180	0.2	0.7687	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
5760 minute summer	3	1.000	RG-3	0.0	0.004	0.003	0.0452
5760 minute summer	RG-3	Infiltration		0.2			

Results for 100 year +20% CC +10% A 7200 minute summer. 7440 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute summer	3	3840	-1.266	0.034	0.0	0.0382	0.0000	OK
7200 minute summer	RG-3	3840	-1.266	0.167	0.2	0.7104	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
7200 minute summer	3	1.000	RG-3	0.0	0.005	0.003	0.0399
7200 minute summer	RG-3	Infiltration		0.2			

Results for 100 year +20% CC +10% A 8640 minute summer. 8880 minute analysis at 60 minute timestep. Mass balance: 100.0

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
8640 minute summer	RG-3	4440	-1.311	0.122	0.2	0.5212	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
8640 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0308
8640 minute summer	RG-3	Infiltration		0.2			

Results for 100 year +20% CC +10% A 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	3	60	-1.300	0.000	0.0	0.0000	0.0000	OK
10080 minute summer	RG-3	4320	-1.402	0.031	0.1	0.1323	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
10080 minute summer	3	1.000	RG-3	0.0	0.000	0.000	0.0081
10080 minute summer	RG-3	Infiltration		0.1			