

29 Wastewater organic load:

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)			
Chemical oxygen demand (COD)			
Suspended solids (SS)			
Total nitrogen (N)			
Total phosphorus (P)			
<b>Other</b>			

<b>Temperature range</b>	
<b>pH range</b>	

30 **\*Storm water run-off will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer. In the case of such brownfield sites, please indicate if the development intends discharging surface water to the combined wastewater collection system:**

Yes  No

If 'Yes', please give reason for discharge and comment on adequacy of SUDS/attenuation measures proposed.


31 **\*Do you propose to pump the wastewater?** Yes  No

If 'Yes', please include justification for your pumped solution with this application.

32 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?**

6 . 6 5  m

33 **What is the lowest finished floor level on site above Malin Head Ordnance Datum?**

2 . 4 2  m

34 **What is the proposed invert level of the pipe exiting the property to the public road?**

5 . 8 8 9  m

## Section F | Supporting documentation

Please provide the following additional information (all mandatory):

- > Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details:

  - i. The scale shall be clearly indicated on the map.
  - ii. The boundaries shall be delineated in red.
  - iii. The site co-ordinates shall be marked on the site location map.

- > Details of planning and development exemptions (if applicable).
- > Calculations (calculation sheets provided below).
- > Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure.
- > Conceptual design of the connection asset from the proposed development to the existing Irish Water infrastructure, including service conflicts, gradients, pipe sizes and invert levels.
- Any other information that might help Irish Water assess this pre-connection enquiry.

## Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.


I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Any personal data you provide will be stored and processed by Irish Water and may be transferred to third parties for the purposes of the water and/or wastewater connection process. I hereby give consent to Irish Water to store and process my personal data and to transfer my personal data to third parties, if required, for the purposes of the connection process.

If you wish to revoke consent at any time or wish to see Irish Water's full Data Protection Notice, please see <https://www.water.ie/privacy-notice/>

Signature:  Verified by pdfFiller  
10/28/2021

Date:   /   /

Your full name (in BLOCK CAPITALS):

O W E N   S U L L I V A N

Irish Water will carry out a formal assessment based on the information provided on this form. Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to [newconnections@water.ie](mailto:newconnections@water.ie) or alternatively, post to:

**Irish Water**  
**Box 860**  
**South City Delivery Office**  
**Cork City**

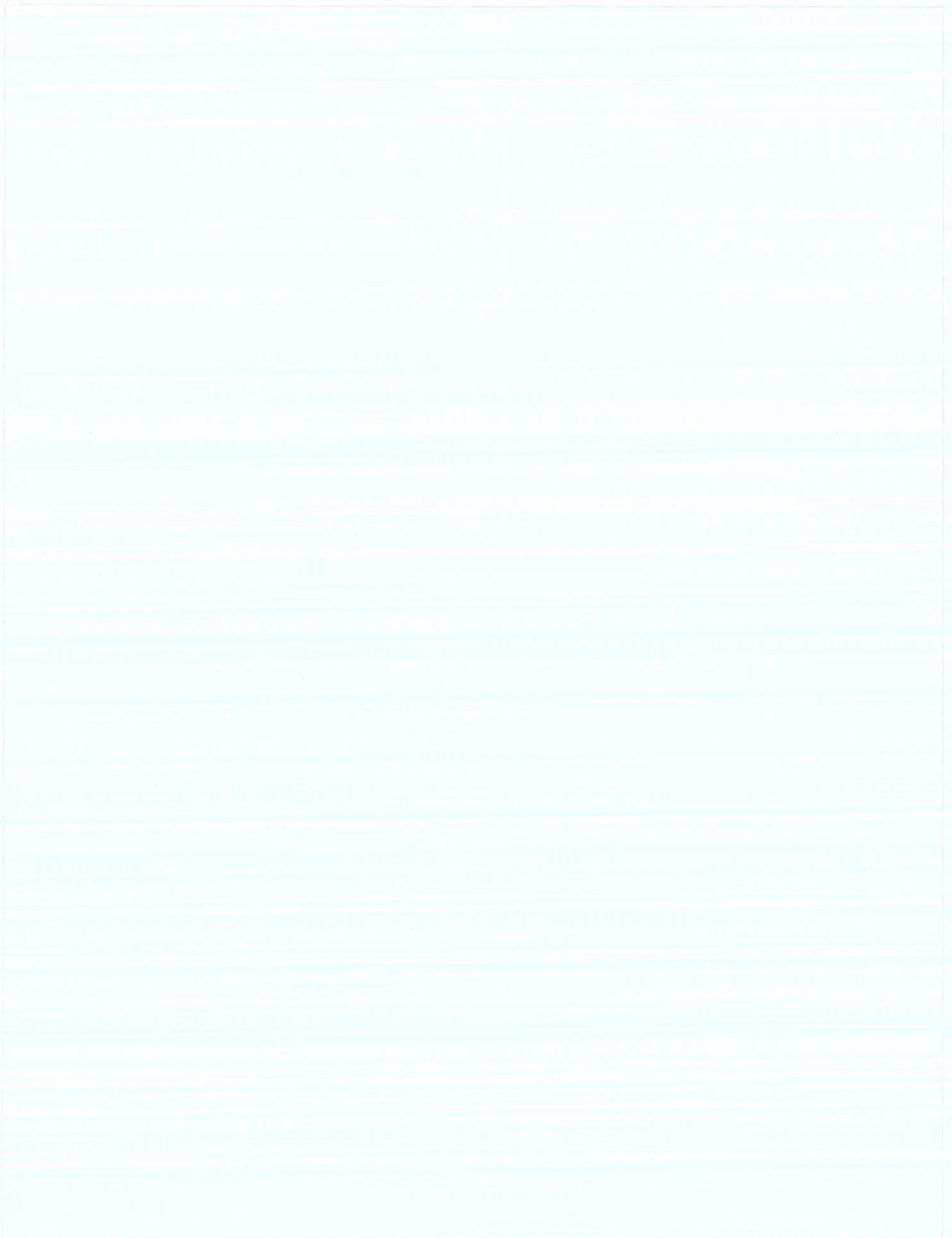
Please note that if you are sending us your application form and any associated documentation by email, the maximum file size that we can receive in any one email is 35MB.

**Please note, if mandatory fields are not completed the application will be returned.**

Irish Water is subject to the provisions of the Freedom of Information Act 2014 ("FOIA") and the codes of practice issued under FOIA as may be amended, updated or replaced from time to time. The FOIA enables members of the public to obtain access to records held by public bodies subject to certain exemptions such as where the requested records may not be released, for example to protect another individual's privacy rights or to protect commercially sensitive information. Please clearly label any document or part thereof which contains commercially sensitive information. Irish Water accepts no responsibility for any loss or damage arising as a result of its processing of freedom of information requests.

## Calculations

Water demand

A large, empty rectangular box with a thin black border, intended for handwritten calculations. The box occupies most of the page below the 'Water demand' label.

**FOUL WASTEWATER DISCHARGE CALCULATIONS**

**IW-CDS-5030-03 (Revision 2 – 2020)**

Flow Rate	60	l/person/day
Infiltration Rate	10%	
sq.m/person	7.5	
Peaking Factor (Average)	1.5	times
Peaking Factor (pipe network)	4.5	times
Office Space	<b>15128</b>	sq.m

Wastewater Discharge = Dwelling x Dry weather flows

No. Person	2017	unit
Dry weather flows	60	l/person/day
<b>Wastewater Discharge</b>	<b>121.02</b>	<b>m3/day</b>
<b>Wastewater Discharge</b>	<b>121024</b>	<b>l/day</b>

1 day	86400	s
Water Demand	1.401	l/s

Peak Discharge = Wastewater Discharge x Peaking Factor

<b>Peak Discharge</b>	<b>6.303</b>	<b>l/s</b>
<b>Average Discharge</b>	<b>1.401</b>	<b>l/s</b>

## WATER DEMAND CALCULATIONS

According to Code of Practice for Water Infrastructure, Water Demand Calculations:

Consumption rate	150	l/person/day
Bedrooms		
Peaking Factor (Average)	1.25	times
Peaking Factor (pipe network)	5	times

Water Demand = Dwelling x Persons per Dwelling x Consumption Rate

Bedrooms	244	unit
Consumption Rate	150	l/person/day
<b>Water Demand</b>	<b>36.60</b>	<b>m<sup>3</sup>/day</b>
<b>Water Demand</b>	<b>36600</b>	<b>l/day</b>

1 day	86400	s
Water Demand	0.424	l/s

Peak Water Demand = Water Demand Average x Peaking Factor

Peak Water Demand	0.530	l/s
<b>Peak Water Demand - Pipe Network</b>	<b>2.118</b>	<b>l/s</b>
<b>Average Water Demand</b>	<b>0.424</b>	<b>l/s</b>

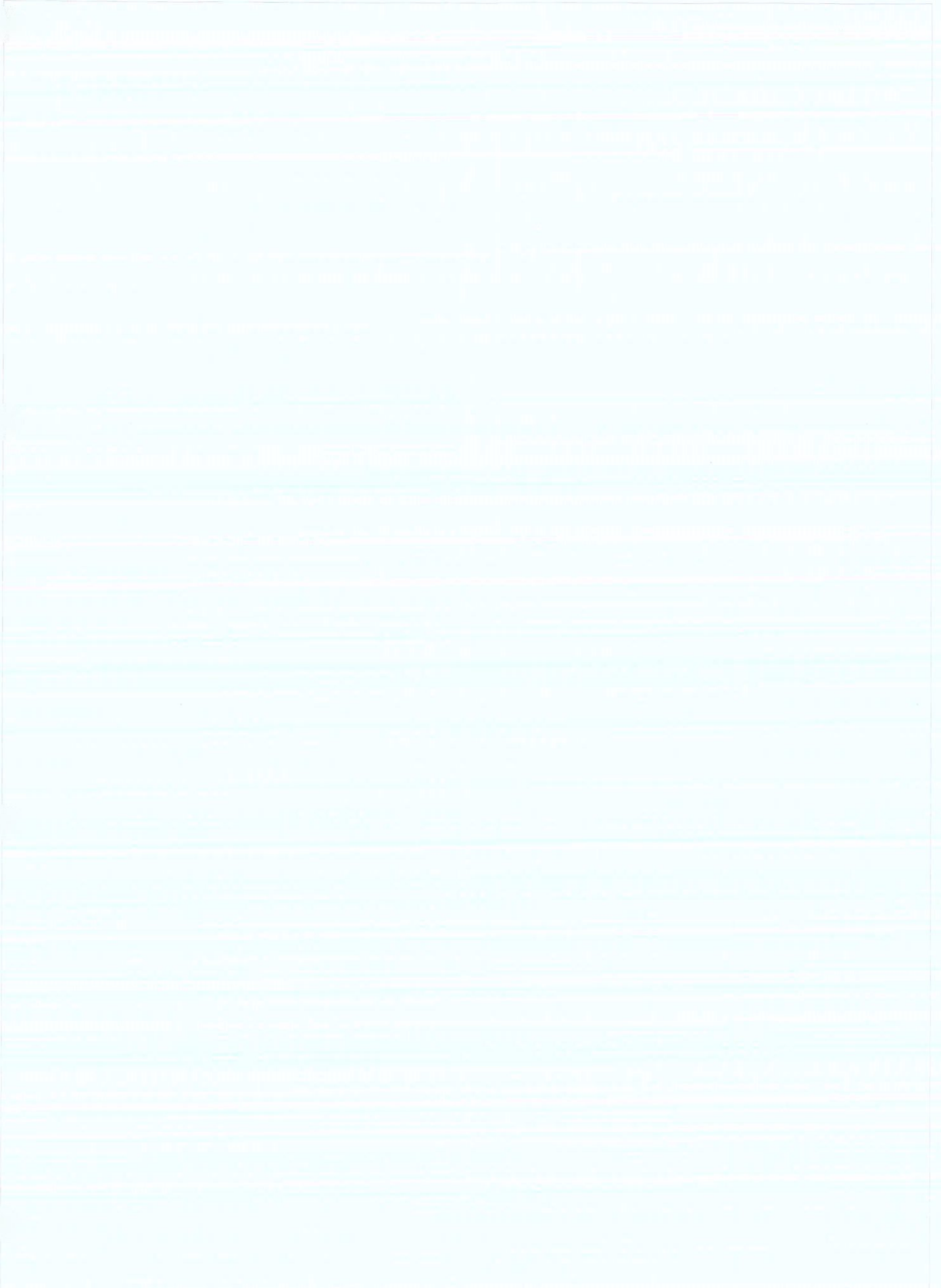
## On-site storage

Hotel – 60,000litres based on 227litres/apt

Office – 64,000litres based on 40litres/person (current 11-storey scheme)

## Fire flow requirements







**FOUL WASTEWATER DISCHARGE CALCULATIONS**  
**IW-CDS-5030-03 (Revision 2 – 2020)**

Flow Rate	60	l/person/day
Infiltration Rate	10%	
sq.m/person	7.5	
Peaking Factor (Average)	1.5	times
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<b>Wastewater Discharge</b>	<b>121024</b>	<b>l/day</b>

1 day	86400	s
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<b>Peak Discharge</b>	<b>6.303</b>	<b>l/s</b>
<b>Average Discharge</b>	<b>1.401</b>	<b>l/s</b>

**FOUL WASTEWATER DISCHARGE CALCULATIONS**

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<b>Wastewater Discharge</b>	<b>121.02</b>	<b>m3/day</b>
<b>Wastewater Discharge</b>	<b>121024</b>	<b>l/day</b>

1 day	86400	s
Water Demand	1.401	l/s

Peak Discharge = Wastewater Discharge x Peaking Factor

<b>Peak Discharge</b>	<b>6.303</b>	<b>l/s</b>
<b>Average Discharge</b>	<b>1.401</b>	<b>l/s</b>



## Guide to completing the pre-connection enquiry form

This form should be completed by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure.

The Irish Water Codes of Practice are available at [www.water.ie](http://www.water.ie) for reference.

### Section A | Applicant Details

- Question 1:** This question requires the applicant or company enquiring about the feasibility of a connection to identify themselves, their postal address, and to provide their contact details.
- Question 2:** If the applicant has employed a consulting engineer or an agent to manage the enquiry on their behalf, the agent's address and contact details should be recorded here.
- Question 3:** Please indicate whether it is the applicant or the agent who should receive future correspondence in relation to the enquiry.

### Section B | Site details

- Question 4:** This is the address of the site requiring the water/wastewater service connection and for which this enquiry is being made.
- Question 5:** Please provide the Irish Grid co-ordinates of the proposed site. Irish grid positions on maps are expressed in two dimensions as Eastings (E or X) and Northings (N or Y) relative to an origin. You will find these coordinates on your Ordnance Survey map which is required to be submitted with an application.
- Question 6:** Please identify the Local Authority that is or will be dealing with your planning application, for example Cork City Council.
- Question 7:** Please indicate if planning permission has been granted for this application, and if so, please provide the planning permission reference number.

### Section C | Development details

- Question 8:** Please specify the number of different property/premises types by filling in the tables provided.
- Question 9:** Please indicate the approximate commencement date of works on the development.
- Question 10:** Please indicate if a phased building approach is to be adopted when developing the site. If so, please provide details of the phase master-plan and the proposed variation in water demand/wastewater discharge as a result of the phasing of the development.
- Question 11:** Please indicate the type of connection required by ticking the appropriate box and proceed to complete the appropriate section or sections.

### Section D | Water connection and demand details

- Question 12:** Please indicate if a water connection already exists for this site.
- Question 12.1:** Please indicate if this enquiry concerns an additional connection to one already installed on the site.
- Question 12.2:** Please indicate if you are proposing to upgrade the water connection to facilitate an increase in water demand. Irish Water will determine what impact this will have on our infrastructure.
- Question 13:** Please indicate the approximate date that the proposed connection to the water infrastructure will be required.
- Question 14:** Please indicate what diameter of water connection is required to service this development.
- Question 15:** Please indicate if more than one connection is required to service this development. Please note that the connection size provided may be used to determine the connection charge.
- Question 16:** If this connection enquiry concerns a business premises, please provide calculations for the water demand and include your calculations on the calculation sheet provided. Business premises include shops, offices, hotels, schools, etc. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

- Question 17:** If this connection enquiry is for an industrial premises, please calculate the water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litre per second (l/s). The peak demand for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.
- Question 18:** Please specify the ground level at the location where connection to the public water mains will be made. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 19:** Please specify the highest finished floor level on site. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 20:** If storage is required, water storage capacity of 24-hour water demand must usually be provided at the proposed site. In some cases, 24-hour storage capacity may not be required, for example 24-hour storage for a domestic house would be provided in an attic storage tank. Please calculate the 24-hour water storage requirements and include your calculations on the attached sheet provided. Please also confirm that on-site storage is being provided by ticking the appropriate box.
- Question 21:** The water supply system shall be designed and constructed to reliably convey the water flows that are required of the development including fire flow requirements by the Fire Authority. The Fire Authority will provide the requirement for fire flow rates that the water supply system will have to carry. Please note that while flows in excess of your required demand may be achieved in the Irish Water network and could be utilised in the event of a fire, Irish Water cannot guarantee a flow rate to meet your fire flow requirement. To guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development. Please include your calculations on the attached sheet provided, and further provide confirmation of the Fire Authority requirements.
- Question 22:** Please identify proposed additional water supply sources, that is, do you intend to connect to the public water mains or the public mains and supplement from other sources? If supplementing public water supply with a supply from another source, please provide details as to how the potable water supply is to be protected from cross contamination at the premises.

## **Section E | Wastewater connection and discharge details**

- Question 23:** Please indicate if a wastewater connection to a public sewer already exists for this site.
- Question 23.1:** Please indicate if this enquiry relates to an additional wastewater connection to one already installed.
- Question 23.2:** Please indicate if you are proposing to upgrade the wastewater connection to facilitate an increased discharge. Irish Water will determine what impact this will have on our infrastructure.
- Question 24:** Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.
- Question 25:** Please indicate what diameter of wastewater connection is required to service this development.
- Question 26:** Please indicate if more than one connection is required to service this development. Please indicate number required.
- Question 27:** If this enquiry relates to a business premises, please provide calculations for the wastewater discharge and include your calculations on the attached sheet provided. Business premises include shops, offices, hotels, schools, etc. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.
- Question 28:** If this enquiry relates to an industrial premises, please provide calculations for the wastewater discharge and include your calculations on the calculation sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak discharge for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

- Question 29:** Please specify the maximum and average concentrations and the maximum daily load of each of the wastewater characteristics listed in the wastewater organic load table (if not domestic effluent), and also specify if any other significant concentrations are expected in the effluent. Please complete the table and provide additional supporting documentation if relevant. Note that the concentration shall be in mg/l and the load shall be in kg/day. Note that for business premises (shops, offices, schools, hotels, etc.) for which only domestic effluent will be discharged (excluding discharge from canteens/restaurants which would require a Trade Effluent Discharge licence), there is no need to complete this question.
- Question 30:** In exceptional circumstances, such as brownfield sites, where the only practical outlet for storm/surface water is to a combined sewer, Irish Water will consider permitting a restricted attenuated flow to the combined sewer. Storm/surface water will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer and the applicant must demonstrate how the storm/surface water flow from the proposed site is minimised using sustainable urban drainage system (SUDS). This type of connection will only be considered on a case by case basis. Please advise if the proposed development intends discharging surface water to the combined wastewater collection system.
- Question 31:** Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.
- Question 32:** Please specify the ground level at the location where connection to the public sewer will be made. This is required to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 33:** Please specify the lowest floor level of the proposed development. This is required in order to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.
- Question 34:** Please specify the proposed invert level of the pipe exiting the property to the public road.

## **Section F | Supporting documentation**

Please provide additional information as listed.

## **Section G | Declaration**

Please review the declaration, sign, and return the completed application form to Irish Water by email or by post using the contact details provided in Section G.

LEGEND:  
SITE BOUNDARY



SITE LOCATION.  
SCALE 1:500

H087

**INFORMATION ONLY**  
THIS DRAWING HAS BEEN ISSUED FOR INFORMATION PURPOSES ONLY AND MUST NOT BE USED FOR CONSTRUCTION UNDER ANY CIRCUMSTANCES

- NOTES**
1. For setting out refer to Architect's drawings.
  2. This drawing to be read in conjunction with all other Architectural and Engineering drawings and all other relevant drawings and Specifications.
  3. DO NOT SCALE THIS DRAWING. Use figured dimensions only.
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Rev. No.	Date	REVISION NOTE	Drn. By	Chkd. By

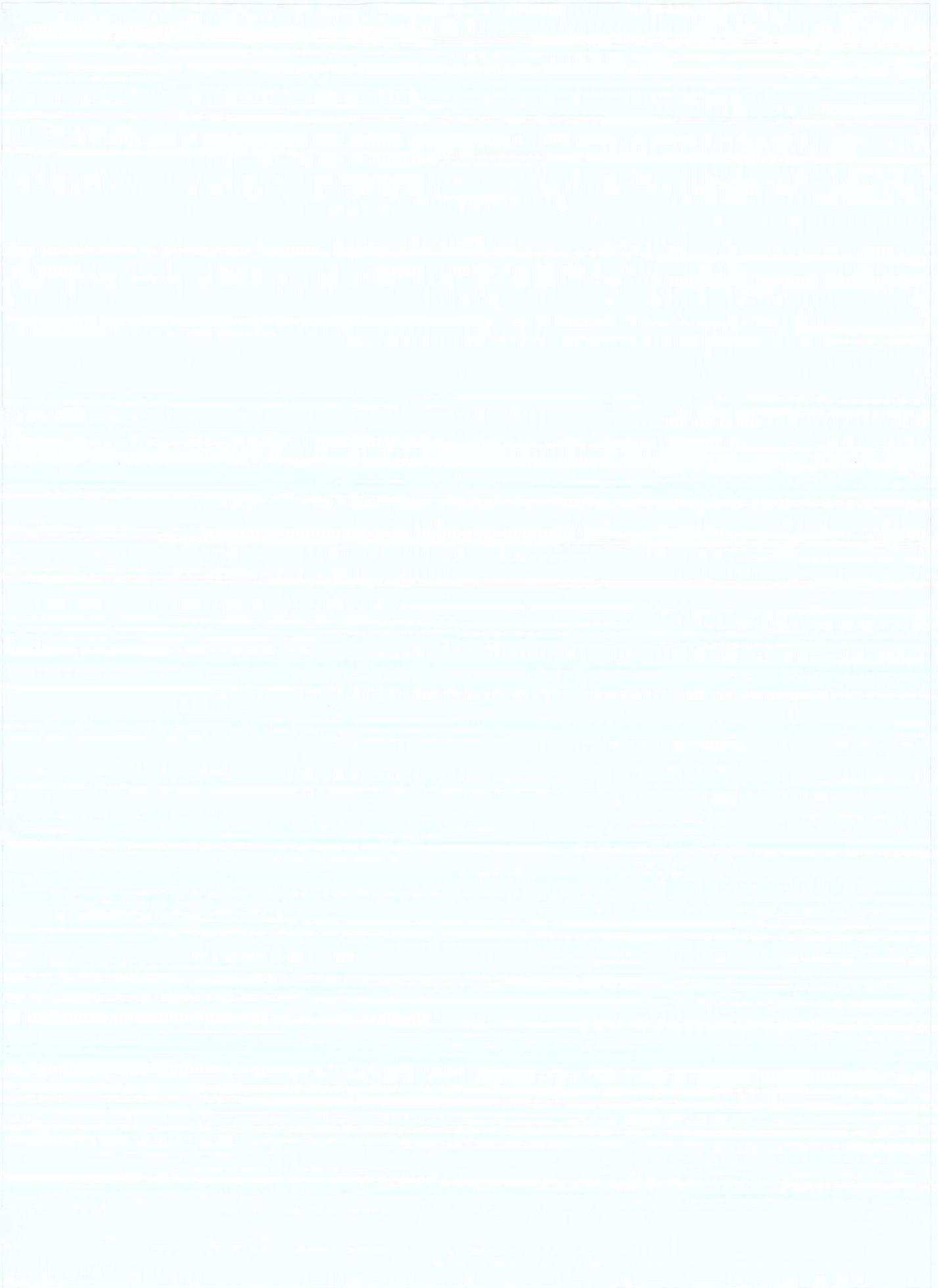
Architect		Reddy Architecture	
Project		HSQ COMMERCIAL SITE DEVELOPMENT.	
Title		SITE LOCATION	
Dwg. No.		HSQ-CSC-XX-XX-SK-C-0012	
Date	Drn. by	Chkd. By	Agred. by
OCT 2021	JS	OS	OS
Scale		1:1000 @ A1	
Revision			

**CS Consulting Group**  
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w: www.csconsulting.ie

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

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

[www.water.ie](http://www.water.ie)

14 December 2021

**Re: CDS21007755 pre-connection enquiry - Subject to contract | Contract denied**

**Connection for Multi/Mixed Use Development of 2 unit(s) at Heuston South Quarter, Saint Johns Road West, Co Dublin**

Dear Sir/Madam,

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

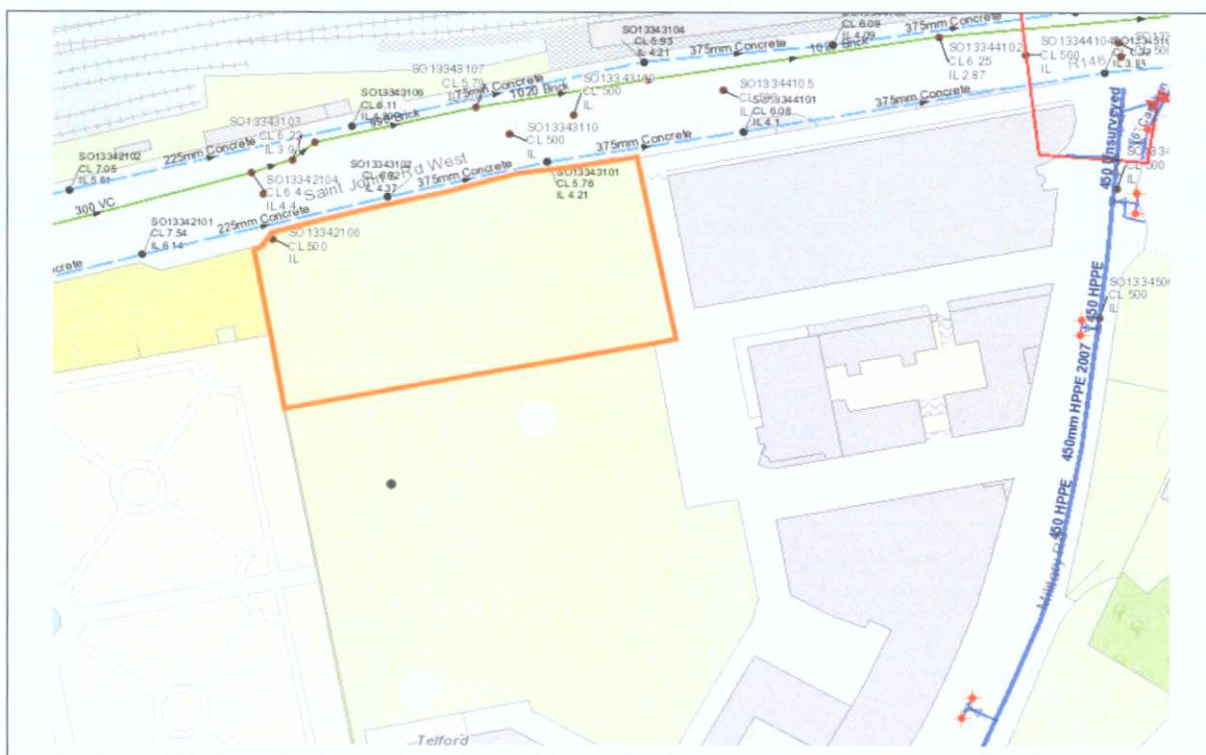
SERVICE	<b>OUTCOME OF PRE-CONNECTION ENQUIRY</b> <u><b>THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.</b></u>
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
<b>SITE SPECIFIC COMMENTS</b>	
Water Connection	<p>This Confirmation of Feasibility to connect to the Irish Water infrastructure also does not extend to your fire flow requirements. Please note that Irish Water can not guarantee a flow rate to meet fire flow requirements and in order to guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development.</p> <p>Please be advised that at connection application stage you have to provide written confirmation from the owner of the private water infrastructure that you have received legal permission to connect to and that the infrastructure has capacity and integrity to cater for the additional load from the Development.</p>

Wastewater Connection

Separate storm and foul water connection services have to be provided for the Development. The surface and storm water from the site must be discharged only into an existing storm water network that does not discharge to an IW combined/foul sewer. The connection arrangement should be agreed with the Local Authority Drainage Division.

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

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



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

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

### General Notes:

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

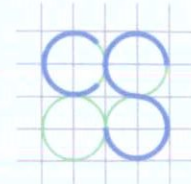
If you have any further questions, please contact Kevin McManmon from the design team at [kmcmanmon@water.ie](mailto:kmcmanmon@water.ie) For further information, visit [www.water.ie/connections](http://www.water.ie/connections).

Yours sincerely,



**Yvonne Harris**

**Head of Customer Operations**



CS CONSULTING  
GROUP

---

## Appendix C

### **Attenuation Calculations**

**Project:** HSQ Commercial  
**Project No.:** H087  
**Calculation:** Attenuation 100-year - overall site  
**Calcs By:** DD  
**Checked By:** GF  
**Date:** 15/11/21



Site Location:	Dublin	
Design Storm Return Period:	100 years	
Climate Change Factor:	20 %	
Soil Type:	4	
Total Site Area:	0.45 ha	
Hardstand Area:	0.45 ha	.....@ 100% Impervious
Softstand Area:	0.00 ha	.....@ 0% Impervious
Effective Impermeable Area:	0.45 ha	

<b>Allowable Outflow</b>	<b>Calculate</b>
IH124: $QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$	
AREA:	0.00 km <sup>2</sup>
SAAR:	727 mm
SOIL:	0.47
QBAR/ha	5.05 l/s/ha
<b>Allowable Outflow</b>	<b>2.27 l/s</b> Smallest Allowable Discharge Rate (2l/s)

<b>Storage required =</b>	<b>341 m<sup>3</sup></b>
---------------------------	--------------------------

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71IA) (l/s)	Proposed Runoff (m <sup>3</sup> )	Contiguous Land Runoff (m <sup>3</sup> )	Total Runoff (m <sup>3</sup> )	Allowable Outflow (m <sup>3</sup> )	Storage Required (m <sup>3</sup> )
5	15.30	18.36	220.32	268.68	80.60	0.00	80.60	0.68	79.92
10	21.30	25.56	153.36	187.02	112.21	0.00	112.21	1.36	110.85
15	25.00	30.00	120.00	146.34	131.71	0.00	131.71	2.04	129.66
30	30.90	37.08	74.16	90.44	162.79	0.00	162.79	4.09	158.70
60	38.20	45.84	45.84	55.90	201.25	0.00	201.25	8.18	193.07
120	47.30	56.76	28.38	34.61	249.19	0.00	249.19	16.35	232.84
180	53.50	64.20	21.40	26.10	281.85	0.00	281.85	24.53	257.33
240	58.50	70.20	17.55	21.40	308.19	0.00	308.19	32.70	275.49
360	66.20	79.44	13.24	16.15	348.76	0.00	348.76	49.05	299.71
540	74.90	89.88	9.99	12.18	394.59	0.00	394.59	73.58	321.01
720	81.80	98.16	8.18	9.98	430.94	0.00	430.94	98.10	332.84
1080	92.60	111.12	6.17	7.53	487.84	0.00	487.84	147.15	340.68
1440	101.20	121.44	5.06	6.17	533.15	0.00	533.15	196.21	336.94
2880	112.60	135.12	2.82	3.43	593.20	0.00	593.20	392.41	200.79
4320	122.20	146.64	2.04	2.48	643.78	0.00	643.78	588.62	55.16
5760	130.70	156.84	1.63	1.99	688.56	0.00	688.56	784.82	-96.26
8640	145.50	174.60	1.21	1.48	766.53	0.00	766.53	1177.23	-410.70
11520	158.30	189.96	0.99	1.21	833.96	0.00	833.96	1569.64	-735.68
14400	170.00	204.00	0.85	1.04	895.60	0.00	895.60	1962.05	-1066.45
17280	180.70	216.84	0.75	0.92	951.97	0.00	951.97	2354.46	-1402.49
23040	200.10	240.12	0.63	0.76	1054.17	0.00	1054.17	3139.29	-2085.11
28800	217.70	261.24	0.54	0.66	1146.90	0.00	1146.90	3924.11	-2777.21
36000	237.90	285.48	0.48	0.58	1253.31	0.00	1253.31	4905.13	-3651.82

**Project:** HSQ Commercial  
**Project No.:** H087  
**Calculation:** Attenuation 100-year - eastern section  
**Calcs By:** DD  
**Checked By:** GF  
**Date:** 15/11/21



Site Location:	Dublin	
Design Storm Return Period:	100 years	
Climate Change Factor:	20 %	
Soil Type:	4	
Total Site Area:	0.22 ha	
Hardstand Area:	0.22 ha	.....@ 100% Impervious
Softstand Area:	0.00 ha	.....@ 0% Impervious
Effective Impermeable Area:	0.22 ha	

Allowable Outflow	Calculate
IH124: $QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$	
AREA:	0.00 km <sup>2</sup>
SAAR:	727 mm
SOIL:	0.47
QBAR/ha	5.05 l/s/ha
<b>Allowable Outflow</b>	<b>1.09 l/s</b> Smallest Allowable Discharge Rate (2l/s)

<b>Storage required =</b>	<b>164 m<sup>3</sup></b>
---------------------------	--------------------------

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71IA) (l/s)	Proposed Runoff (m <sup>3</sup> )	Contiguous Land Runoff (m <sup>3</sup> )	Total Runoff (m <sup>3</sup> )	Allowable Outflow (m <sup>3</sup> )	Storage Required (m <sup>3</sup> )
5	15.30	18.36	220.32	128.97	38.69	0.00	38.69	0.33	38.36
10	21.30	25.56	153.36	89.77	53.86	0.00	53.86	0.65	53.21
15	25.00	30.00	120.00	70.24	63.22	0.00	63.22	0.98	62.24
30	30.90	37.08	74.16	43.41	78.14	0.00	78.14	1.96	76.18
60	38.20	45.84	45.84	26.83	96.60	0.00	96.60	3.92	92.67
120	47.30	56.76	28.38	16.61	119.61	0.00	119.61	7.85	111.76
180	53.50	64.20	21.40	12.53	135.29	0.00	135.29	11.77	123.52
240	58.50	70.20	17.55	10.27	147.93	0.00	147.93	15.70	132.24
360	66.20	79.44	13.24	7.75	167.40	0.00	167.40	23.54	143.86
540	74.90	89.88	9.99	5.85	189.40	0.00	189.40	35.32	154.09
720	81.80	98.16	8.18	4.79	206.85	0.00	206.85	47.09	159.76
1080	92.60	111.12	6.17	3.61	234.16	0.00	234.16	70.63	163.53
1440	101.20	121.44	5.06	2.96	255.91	0.00	255.91	94.18	161.73
2880	112.60	135.12	2.82	1.65	284.74	0.00	284.74	188.36	96.38
4320	122.20	146.64	2.04	1.19	309.01	0.00	309.01	282.54	26.48
5760	130.70	156.84	1.63	0.96	330.51	0.00	330.51	376.71	-46.21
8640	145.50	174.60	1.21	0.71	367.93	0.00	367.93	565.07	-197.14
11520	158.30	189.96	0.99	0.58	400.30	0.00	400.30	753.43	-353.13
14400	170.00	204.00	0.85	0.50	429.89	0.00	429.89	941.79	-511.90
17280	180.70	216.84	0.75	0.44	456.95	0.00	456.95	1130.14	-673.20
23040	200.10	240.12	0.63	0.37	506.00	0.00	506.00	1506.86	-1000.85
28800	217.70	261.24	0.54	0.32	550.51	0.00	550.51	1883.57	-1333.06
36000	237.90	285.48	0.48	0.28	601.59	0.00	601.59	2354.46	-1752.87

**Project:** HSQ Commercial  
**Project No.:** H087  
**Calculation:** Attenuation 100-year - western section  
**Calcs By:** DD  
**Checked By:** GF  
**Date:** 15/11/21



**CS CONSULTING GROUP**  
 DUBLIN · LONDON · LIMERICK

Site Location:	Dublin	
Design Storm Return Period:	100 years	
Climate Change Factor:	20 %	
Soil Type:	4	
Total Site Area:	0.22 ha	
Hardstand Area:	0.22 ha	.....@ 100% Impervious
Softstand Area:	0.00 ha	.....@ 0% Impervious
Effective Impermeable Area:	0.22 ha	

Allowable Outflow	Calculate
IH124: $QBAR = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$	
AREA:	0.00 km <sup>2</sup>
SAAR:	727 mm
SOIL:	0.47
QBAR/ha	5.05 l/s/ha
<b>Allowable Outflow</b>	<b>1.11 l/s</b> Smallest Allowable Discharge Rate (2l/s)

BCC PLAN NO: 4610/22  
 RECEIVED: 04/08/2022

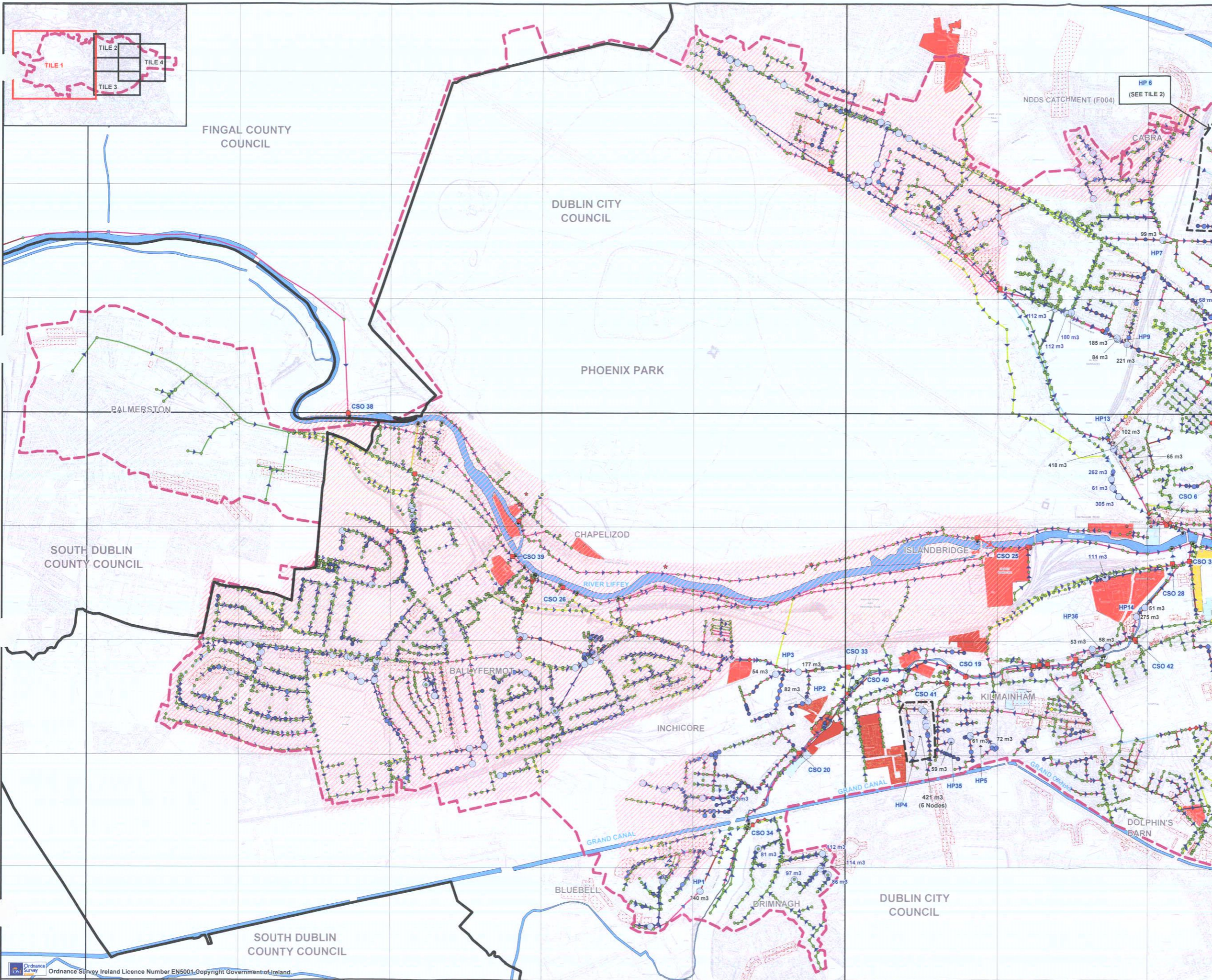
<b>Storage required =</b>	<b>167 m<sup>3</sup></b>
---------------------------	--------------------------

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71IA) (l/s)	Proposed Runoff (m <sup>3</sup> )	Contiguous Land Runoff (m <sup>3</sup> )	Total Runoff (m <sup>3</sup> )	Allowable Outflow (m <sup>3</sup> )	Storage Required (m <sup>3</sup> )
5	15.30	18.36	220.32	131.35	39.41	0.00	39.41	0.33	39.07
10	21.30	25.56	153.36	91.43	54.86	0.00	54.86	0.67	54.19
15	25.00	30.00	120.00	71.54	64.39	0.00	64.39	1.00	63.39
30	30.90	37.08	74.16	44.21	79.59	0.00	79.59	2.00	77.59
60	38.20	45.84	45.84	27.33	98.39	0.00	98.39	4.00	94.39
120	47.30	56.76	28.38	16.92	121.83	0.00	121.83	7.99	113.83
180	53.50	64.20	21.40	12.76	137.79	0.00	137.79	11.99	125.80
240	58.50	70.20	17.55	10.46	150.67	0.00	150.67	15.99	134.68
360	66.20	79.44	13.24	7.89	170.50	0.00	170.50	23.98	146.52
540	74.90	89.88	9.99	5.95	192.91	0.00	192.91	35.97	156.94
720	81.80	98.16	8.18	4.88	210.68	0.00	210.68	47.96	162.72
1080	92.60	111.12	6.17	3.68	238.50	0.00	238.50	71.94	166.56
1440	101.20	121.44	5.06	3.02	260.65	0.00	260.65	95.92	164.73
2880	112.60	135.12	2.82	1.68	290.01	0.00	290.01	191.85	98.17
4320	122.20	146.64	2.04	1.21	314.74	0.00	314.74	287.77	26.97
5760	130.70	156.84	1.63	0.97	336.63	0.00	336.63	383.69	-47.06
8640	145.50	174.60	1.21	0.72	374.75	0.00	374.75	575.54	-200.79
11520	158.30	189.96	0.99	0.59	407.71	0.00	407.71	767.38	-359.67
14400	170.00	204.00	0.85	0.51	437.85	0.00	437.85	959.23	-521.38
17280	180.70	216.84	0.75	0.45	465.41	0.00	465.41	1151.07	-685.66
23040	200.10	240.12	0.63	0.37	515.37	0.00	515.37	1534.76	-1019.39
28800	217.70	261.24	0.54	0.32	560.70	0.00	560.70	1918.45	-1357.75
36000	237.90	285.48	0.48	0.28	612.73	0.00	612.73	2398.07	-1785.33



## Appendix D

### Greater Dublin Strategic Drainage Study 2031 Performance Map



**Legend**

- Wastewater Treatment Works
- County Council Boundaries
- Catchment Boundary
- Rising Main (Coloured as sewer)
- Sewer not included in hydraulic model
- Direction of Flow (on sewer line)
- River/Watercourse
- Culverted River/Watercourse
- 1:1000 OS Grid Line Boundaries
- 1:5000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul/Combined Pumping Station
- Foul/Combined Bifurcation
- Foul/Combined Apex Manhole
- Foul/Combined Flow Management Chamber
- Storm Water Overflow to Foul/Combined
- Storm Water Bifurcation
- Storm Water Apex Manhole

**Flooding Performance Key**

- Flooding greater than 50m<sup>3</sup> Volume for 5yr Return Period Event (Volume m<sup>3</sup>)
- Flooding between 25m<sup>3</sup> and 50m<sup>3</sup> Volume for 5yr Return Period Event
- Flooding less than 25m<sup>3</sup> Volume for 5yr Return Period Event
- Modelled Manhole does not flood for 5 year Return Period Event
- 75m<sup>3</sup> 1:5 year Foul/Combined flood volume
- 75m<sup>3</sup> 1:5 year Storm flood volume
- Historically Reported Flooding Incidents caused by Hydraulic Overloading
- Outfall

**Foul/Combined Hydraulic Performance Key**

- Foul/Combined Sewer floods for 30 year return period or less.
- Foul/Combined Sewer surcharges for 1 or 2 year return period events
- Foul/Combined Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)

**Storm Hydraulic Performance Key**

- Storm Sewer floods for 30 year return period or less.
- Storm Sewer surcharges for 1 or 2 year return period events
- Storm Sewer does not surcharge for 1 or 2 year return period events and does not flood for a 30 year return period event or below. (eg 1,2,5,10,20)

**Area Covered by EDS/DCC Asset Survey**

**Important Hydraulic Considerations**

- Location of Known Basements
- Zoned Residential Land
- Zoned Science/Technology Parks/Land
- Zoned Industrial Land
- Zoned Commercial Land
- Zoned Land for Mixed Development
- Recently Completed Developments

**Catchment Deficiency Reference Key**

- HP 1 Hydraulic Deficiency Reference No (Foul/Combined) (Not included for EDS/DCC Asset Survey area).
- CSO 1 CSO Deficiency Reference No. (Hydraulic or Environmental)
- OP 1 Operational Deficiency Reference No.

**Notes**

- Results are based on assessment of sewer system under 1, 2, 5, 10, 20, 30, 50 and 100 year return period rainfall events.
- For colour coding, flooding takes priority over surcharging.
- Levels referenced in meters to Ordnance Survey Datum, which is Mean Sea Level at Malin Head, Co. Donegal (1976 Adjustment).

**GREATER DUBLIN STRATEGIC DRAINAGE STUDY**

**CITY CENTRE/DOCKLANDS CATCHMENT**

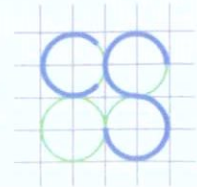
**PHASE 3 - 2031 System Performance Assessment**

**GSDSD/MAR3079/F001/P3-003\_Tile1**

Author	JGA	Check	MCB
Reviewer	MCB	Drawn	N.T.S.
Date	7/5/04	Scale	A

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Dublin Drainage  
A member of the Dublin City Council



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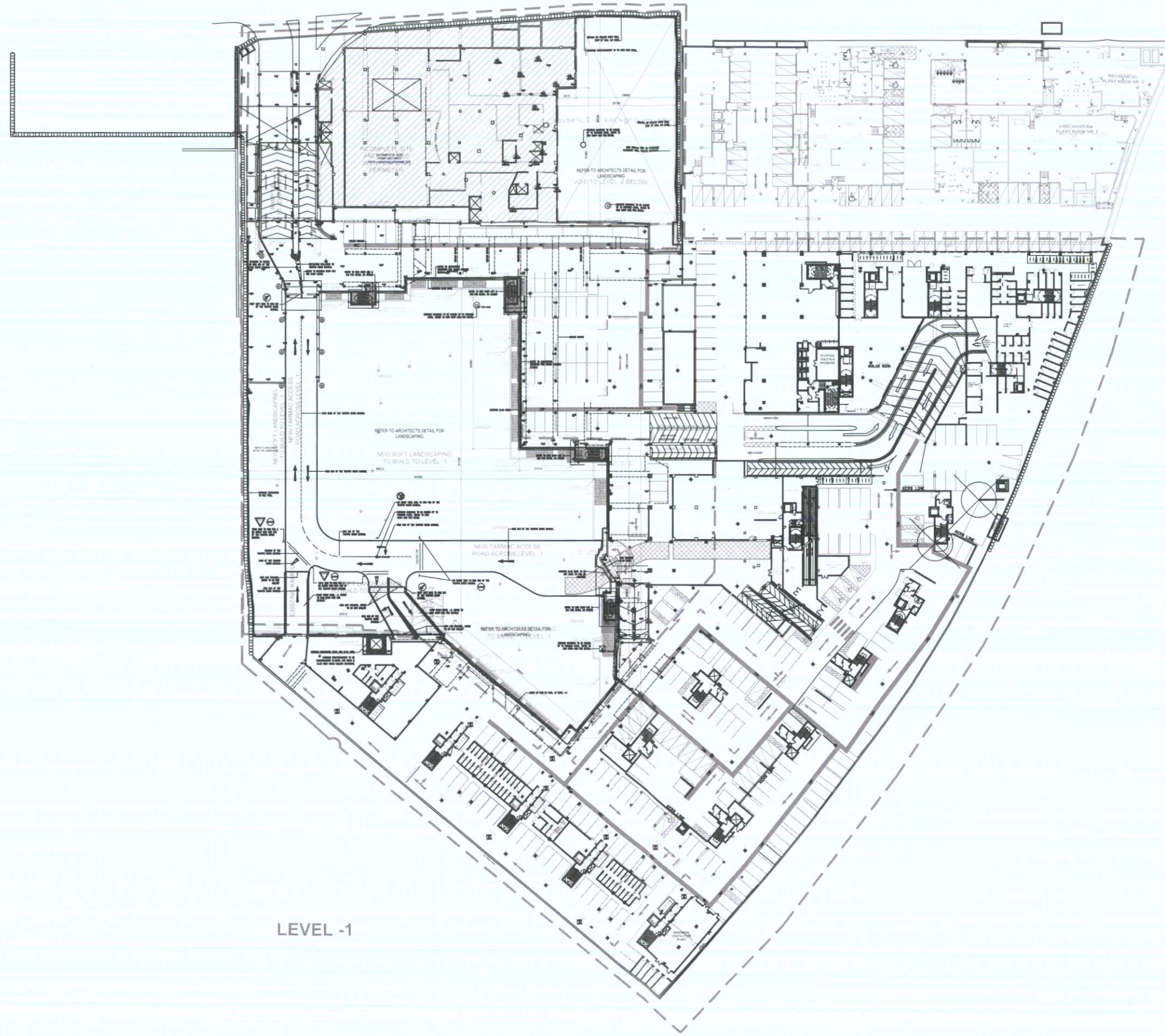
## Appendix E

### Indicative Existing Infrastructure



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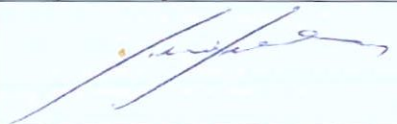



LEVEL -1

**APPENDIX 7A**  
**SITE INVESTIGATIONS REPORT**

Chartered Land
Heuston South Quarter
<b>Subsoil, Groundwater and Air Quality Investigation (some results awaited)</b>
Minerex Work Item A1
Minerex Doc. Ref: 2921-031 (Report - Rev 1)
Date: Friday, October 6, 2017

<b>Document submitted by:</b>	<b>Document To:</b>
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<b>Prepared by :</b>	<b>Reviewed by:</b>
	
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**REPORT TO**

Chartered land

Heuston South Quarter

**Subsoil, groundwater and air quality investigation**

Doc Ref 2921-031 (Report - Rev 1)



## **WORK AND REPORT LIMITATIONS**

***IMPORTANT: This section should be read before reliance is placed on any of the opinions, advice, interpretations, conclusions or recommendations in the following report.***

1. Minerex Environmental Limited (MEL) has prepared this document for the sole use of its client in accordance with the work authorised.
2. No warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by MEL. However, MEL does carry Professional Indemnity (PI) Insurance.
3. This report may not be relied upon by any other party without the prior and express written permission from MEL.
4. Interpretations contained in this report are derived from available information of the site conditions, the likely environmental responses and the experience of the company.
5. MEL has prepared this report in line with best current practice and with all reasonable professional judgement, skill, care and diligence in consideration of the limits imposed by materials, equipment and methodologies used, and the time constraints and resources devoted to it as agreed with the client.
6. The interpretative basis of the conclusions contained in this report should be taken into account in any future use of this report. If the scope of the works includes drilling, pitting, sampling, or interpretation of such information, the client's attention is drawn to the fact that special risks occur whenever hydrogeological and related disciplines are applied to identify subsurface conditions.
7. The environmental, geological, geotechnical, geochemical, hydrological and hydrogeological conditions etc. that MEL interprets to exist between sampling points may differ from those that actually exist. Trial pitting and drilling, for example, exposes the subsoils over typically <1% of a site and in sites with long histories with several owners and business practices, interpretations and interpolations can be very different to the actual site conditions. Even a comprehensive sampling and testing programme, implemented in accordance with a professional Standard of Care considering Industry Standard Guidance, may fail to detect certain physical conditions, geology, geochemistry and hydrochemistry etc only discovered later on during bulk excavations for example.
8. Also, the passage of time, natural occurrences, and activities within and in the adjacent sites to the site, may substantially alter the discovered conditions at any time after the Site Investigations and interpretations are carried out by MEL.
9. Changes in the legislation, industry standards and guidance may cause opinion, advice, conclusions and recommendations set out in MEL reports to become out of date, inappropriate or incorrect. Once a report has been issued to a Client, MEL will have no obligation to advise the Client of any such changes, or their repercussions.
10. While MEL endeavours to take reasonable effort to assess data in hand at the time of writing and give the best advice possible, MEL will accept no responsibility for how the information within this report is interpreted and used. Where elements of this report are based upon information provided by others, it is assumed that all the relevant information has been supplied to MEL in full and is reliable, accurate and representative.
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**REPORT TO**

Chartered land  
Heuston South Quarter

**Subsoil, groundwater and air quality investigation**

Doc Ref 2921-031 (Report - Rev 1)

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## Appendices

Appendix	Title	Pages	Minerex Document Reference
Appendix A	Location Map – Dublin context	1 x A4	2921-008
Appendix B	Location Map – Site specific	1 x A4	2921-008
Appendix C	Services scan	5 x A4	2921-008
Appendix D	Borehole logs	5 x A4	2921-024
Appendix E	Soil, water and air results	307 x A4	2921-010
Appendix F	SOIL CLASSIFICATION (Waste classification categories, Haz tool classification report, WAC classification report, Certificates of analysis and references) (3 Asbestos results awaited Monday)	307 x A4	2921-032

## REPORT TO

Chartered land

Heuston South Quarter

### Subsoil, groundwater and air quality investigation

Doc Ref 2921-031 (Report - Rev 1)

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## 1. Introduction

The following was requested by Jamie McLoughlin of Lafferty Project Managers on 09.10.17:

1. Drilling, logging and sampling of 3 Boreholes (BH) to 4m (areas 1 and 2). Conducted on 22.09.2017)
2. Drilling, logging and sampling of 1 BH to 8m in NW (area 3). Conducted on 22.09.2017.
3. Drilling, logging and sampling of 4 BHs (with 2 samples per BH = 8 soil samples) for WAC analysis. Conducted on 22.09.2017.
4. Cable avoidance tool (CAT) scan at each drill location. Conducted on 15.09.2017.
5. Ground Penetrating Radar (GPR) survey at each drill location. Conducted on 15.09.2017.
6. Lifting and survey of all accessible service manholes in the vicinity of proposed boreholes. Conducted on 15.09.2017.
7. Each borehole location to be hand-excavated to a depth of 1.2m below ground level (mbGL). Conducted on 15.09.2017.
8. 50mm diameter HDPE pipe with a nominal 2m screened length across the observed groundwater surface to be installed in 3 BHs. Wells were finished with traffic-rated well covers completed flush with ground level. Conducted on 22.09.2017. As AECOM understands that the site is surrounded by a secant piled wall there may be limited groundwater encountered within the site. Groundwater was encountered.
9. GW sampling x 3 No. of parameters below (see Section 2.10). Conducted on 22.09.2017.
10. Basement Inspection and Hydrocarbon Sampling: It is proposed that that basement level -2, in the northeast corner of the site, will be inspected as access was not available to this area during the initial Phase 1 assessment. In addition to the visual inspection and to assess levels of volatile ionisable compounds, field readings will be undertaken using a portable photo-ionisation detector (PID) and thermal desorption tubes were left in situ on 03.10.2017 for a period of 1 week followed by laboratory analysis of tubes.
11. Data Assessment & Reporting: A report will be prepared in accordance with the EPA Stage 1: Site Characterisation & Assessment Guideline for Detailed Site Assessment. A draft electronic report will be issued for review. Following the receipt of one set of consolidated comments, a final electronic report would be issued on 06.10.2017 pending laboratory results.
12. On behalf of Chartered Land (GAC, GQRA, Waste Soil Classification) and based on laboratory results for both air, soil and groundwater quality and the respective geotechnical borehole logs, MEL will tabulate and assess the results against published generic assessment criteria (GAC) and will assess the results in terms of waste soil classification in order to identify preliminary disposal type routes for future waste soil material that may arise from future site redevelopment. Scheduled for 06.10.2017 pending laboratory results.
13. Reporting: MEL will produce a combined generic risk assessment (GQRA) and preliminary waste soil classification report based on the data received from site investigation and site observations. The report will include a comment on the potential risks (if any) associated with either the removal or not of imported fill material at the site in the context of the proposed redevelopment as far as it is currently known. This report should be appended to the Phase 1 ESA report. Scheduled for 06.10.2017 pending laboratory results.

\*GAC= *Generic Assessment Criteria*

\*\*GQRA= *Generic Quantitative Risk Assessment*

## REPORT TO

Chartered land

Heuston South Quarter

**Subsoil, groundwater and air quality investigation**

Doc Ref 2921-031 (Report - Rev 1)

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## **2. Methods, equipment and materials**

### **2.1 Health and safety**

MEL employed their standard health and safety procedures in all aspects of the work. There were no near misses or accidents during project.

### **2.2 Services scan and hand digging**

MEL Geophysics Limited (MGX) was chosen by MEL to scan the proposed borehole locations for underground services (CAT scan, GPR and manhole survey) prior to exploration. MEL carried out the manual excavation of the upper 1.2m at each location.

### **2.3 Drilling**

Geotechnical Environmental Services Limited (GES Ltd.) was chosen by MEL to drill the exploration wells. The drilling was carried out using a tracked GEOPROBE 6620DT Drill Rig with percussion and rotary drilling capability. The first 1.2m of each borehole was dug manually as an additional safety measure at each drill location. The soil material was logged, sampled and placed on polythene sheeting to protect the grass cover. The exploration boreholes were then drilled using 110mm and 76mm drill bits and several meters (approx. 4 and 8m as specified) into the subsoil. The installation of the casing (as required) reduced the risk of collapse of the boreholes as drilling proceeded. The drilling was carried out between 20- 22. September 2017. The ground at that time was sufficiently dry to enable the drilling rig to drive freely to each predetermined drill location.

### **2.4 Subsoil logging**

Subsoil samples were taken at intervals reflecting the layers detected during drilling. The samples were laid out on the ground for every meter drilled on plywood and beside the drilling rig. The samples acquired on site were single channel samples and discrete samples for asbestos only. Later on composite samples were made from these as necessary. The subsoil layers were logged (see Appendix D) as per MEL in-house protocol. PID readings were taken from each layer logged, also odour, colour, moisture levels and percentages of non-natural materials were recorded. Whether or not the ground is filled or natural was recorded on the log sheets (Appendix D).

### **2.5 Monitoring well design**

Black coloured uPVC casing (ID=50mm; OD= 63mm) was installed following the drilling to allow groundwater monitoring to be conducted. It was made sure that the screen was installed opposite the groundwater table. Pea gravel was installed around the screen and bentonite pellets were used to create a seal to prevent surface water entering the well.

### **2.6 Borehole water levels**

A water level recorder ('dipper') was used to obtain the static water levels in the boreholes were recorded during the pre-sampling water borehole purging exercise and are reported in Appendix E.

### **2.7 Wellhead protection and reinstatement**

A concrete surround was constructed at the top of the five (5) wells (Appendix D). A steel cover, circular in shape, was placed in the concrete to protect and secure the wells. The low elevation of the wellhead surface ensures that the wells cannot be damaged by most machinery (e.g. grass cutting). The plinth is surrounded by some coarse crushed stone and will reduce the weed growth which should make the wells easily located again and noted by machine operators, for example, during lawn mowing. Sections of the lawn area which have been impacted by the drill operations were reinstated where possible by application of grass seeds.

**REPORT TO**

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Heuston South Quarter

**Subsoil, groundwater and air quality investigation**

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**2.8 Levelling and positional survey**

The ground level at each borehole location has not been reduced to ordnance survey datum. Irish Transverse Mercator (ITM) coordinates was obtained using hand held GPS for the BHs and are considered accurate to within 10m.

**2.9 Basement inspection and air sampling**

The existing basement was visually inspected on 03.10.2017 by MEL staff and the VOC (volatile organic compounds) measured (15 no. locations) using a handheld PID (photo ionisation detector). Air quality test tubes were installed at two locations (north and east away from ventilated areas) for the required testing period of 1 week.

**2.10 Water sampling and laboratory analytical hydrochemistry**

MEL staff carried out pre-sampling purging of the wells using new 32mm bailers. Sample containers were filled from the bailers directly. The required work and chemical parameters requested are outlined below in italics.

***Groundwater Well Installation & Groundwater Sampling***

*If groundwater is encountered during drilling, it is proposed that three boreholes at the site will be converted to groundwater monitoring wells to facilitate collection of shallow groundwater samples. The wells will be constructed using narrow diameter 50 mm diameter HDPE pipe with a nominal 2m screened length across the observed groundwater surface. Wells will be finished with traffic-rated well covers completed flush with ground level. As AECOM understands that the site is surrounded by a secant piled wall there may be limited groundwater encountered within the site.*

*If encountered, one water sample will be collected from each groundwater monitoring well and up to three samples will be submitted for the following suite of analyses. The groundwater samples will be analysed at an accredited laboratory on a standard 10 working day turnaround and will be transported to the laboratory under standard 'Chain of Custody' conditions.*

<b>Water Analysis</b>	<b>No. of Samples</b>
<i>Total Petroleum Hydrocarbons (TPH) Criteria Working Group (CWG) Analysis EC5-EC44</i>	3
<i>Benzene, Toluene, Ethylbenzene, Xylene (BTEX) Compounds</i>	3
<i>Methyl Tert-Butyl Ether (MTBE)</i>	3

In the end MEL decided to sample and have analysed 5 no. samples due to the occurrence of hydrocarbon content of the groundwater in site 2 (Appendix B)

The sampling containers were provided by ALS Laboratory. MEL staff filled the sampling containers and Aramex collected and transported the samples for analysis. The chain of custody for the water samples was completed by MEL.

**REPORT TO**

Chartered land  
Heuston South Quarter

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## **2.11 Soil sampling**

The required work and chemical parameters requested are outlined below in italics.

### ***Borehole Investigation and Soil Sampling***

*In order to assess quality of soil backfilled in basement level -2 it is proposed to drill up to three boreholes to a target depth of up to 4.0m bgl across the landscaped area of the site. In order to investigate natural soil below basement level -2 it is proposed that one borehole will be drilled in the northwest corner to a depth of 6 to 8 metres below ground level. It is envisaged that borehole drilling will take two days to complete.*

*The purpose of the boreholes is to examine ground conditions and obtain samples of soil and groundwater underlying the sites. An AECOM field scientist will be responsible for logging boreholes, including a description of the subsurface soils and an inspection for visual evidence of contamination. It is proposed that two soil samples will be collected from each borehole.*

*Soil samples will be analysed for the following parameters. It is envisaged that two soil samples will be analysed per borehole*

<b>Soil Analysis</b>	<b>No. of Samples</b>
<i>Analysis of criteria for landfill waste acceptance (WAC)</i>	8

The sampling containers and the chain of custody for the water samples were provided by ALS Laboratory. MEL staff filled the sampling containers and Aramex collected and transported the samples for analysis.

## **2.12 Wellhead hydrochemistry**

pH, conductivity and temperature of the groundwater was recorded on site during well purging prior to sampling (Appendix E).

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### **3. Results, interpretation and conclusions**

#### **3.1 Groundwater observation during sampling and chemistry**

The water samples were taken for analysis between 2 hours and 1 day after the boreholes had been installed. Water from BH 1 was cloudy, but without colour. BH 2 was very cloudy and brown. BH 4 was moderately cloudy and brown in colour with slightly tarry odour. Sampled water from BH 5 was very cloudy and brown with strong diesel odours detected.

Of note is that hydrocarbons were detected in BH4 and 5 at concentrations which in the case of BH5 (closer to northern boundary) breach the normal Irish water discharge limit to foul sewer so treatment is required prior to disposal during any dewatering future operations.

#### **3.2 Air quality**

The PID readings all registered zero in the basement.

The air sampling tubes are due to be removed from site on Monday 9/10/17, sent to the lab same day with results expected by Friday 13/10/17 and will be incorporated into the next revision of the report.

#### **3.3 Overburden geology, soil geochemistry & classification, and disposal routes**

The fill (1.8 to 3.5m thick) with geomembrane at approximately 0.3m, is dominated by clay and the natural ground comprises clay over gravel (Appendix D). No bedrock was encountered. The fill has various quantities of non-natural components with concrete and tarmac dominating.

Black staining and hydrocarbon odours were commonly observed in the made ground in BH4 and 5 from approximately 3m depth onwards and up to effectively 6m in BH5.

No subsoils detected asbestos although some results are still awaited.

All soils are classified as inert with exception of Hazardous soil in BH2 fill from 0.3 to 2m due to pH and in BH5 from 2.6 to 6m due to Mineral oil.

The disposal facilities / routes finally to be chosen for receiving any waste subsoil from the site will be decided upon once the area and depth being excavated, the sequential dig plan and the associated tonnage is tied down. Additional lab analyses for composite soil samples that reflect the dig plan geometry should be conducted when the plan is decided upon in order to maximise the potential for inert volumes and minimise needless expensive disposal costs.

#### **3.4 Generic quantitative risk assessment and potential risks**

Hydrocarbons in the soil and water are the main subsurface related risks however none exceed the appropriate GAC concentrations therefore the risk is considered low. No more is written on this as the final construction plan is not known.

#### **3.5 Water disposal during construction works**

Any groundwater encountered during construction works that requires to be pumped out is subject to a Dublin City Council or Irish Water discharge licence. On this site, hydrocarbons have been detected in site 2. Rain water falling on the construction site that entrains solids or becomes contaminated with concrete dust and results in elevated pH (>10 for foul sewer discharge), requires treatment. This is generally achieved by installing a settlement tank prior to discharge with or without an acid dosing system or similar. Two months should be allowed to achieve a discharge licence.

**REPORT TO**

Chartered land  
Houston South Quarter

**Subsoil, groundwater and air quality investigation**

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**4. Guidance considered**

<b>No.</b>	<b>Description</b>	<b>Minerex Doc Ref</b>
1.	BS 5930: 1999 + A2: 2010 (Code of practice for site investigations)	F1742
2.	Model Procedures for the Management of Land Contamination - CLR 11 (CLR11)	F1627
3.	Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites FINAL	F1945
4.	Technical Guidance WM3 Guidance on the classification and assessment of waste 1st Ed. (Environment Agency UK, 2015)	F1856
5.	British Standard (Investigation of potentially contaminated sites - Code of practice) BS10175:2011+A1:2013	F1726
6.	Sampling and Testing of Waste for Landfill – EA UK, 2013	F1900
7.	HazToolOnline, August 2016	
8.	Commission Decision of 18 December 2014, amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European parliament and of the Council (2014/955/EEC)	F1857
9.	Commission Regulation (EU) No 1357/2014 of 18 December 2014, replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives	F1858
10.	COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)	F586

## Appendix A



Riverpark Apartments

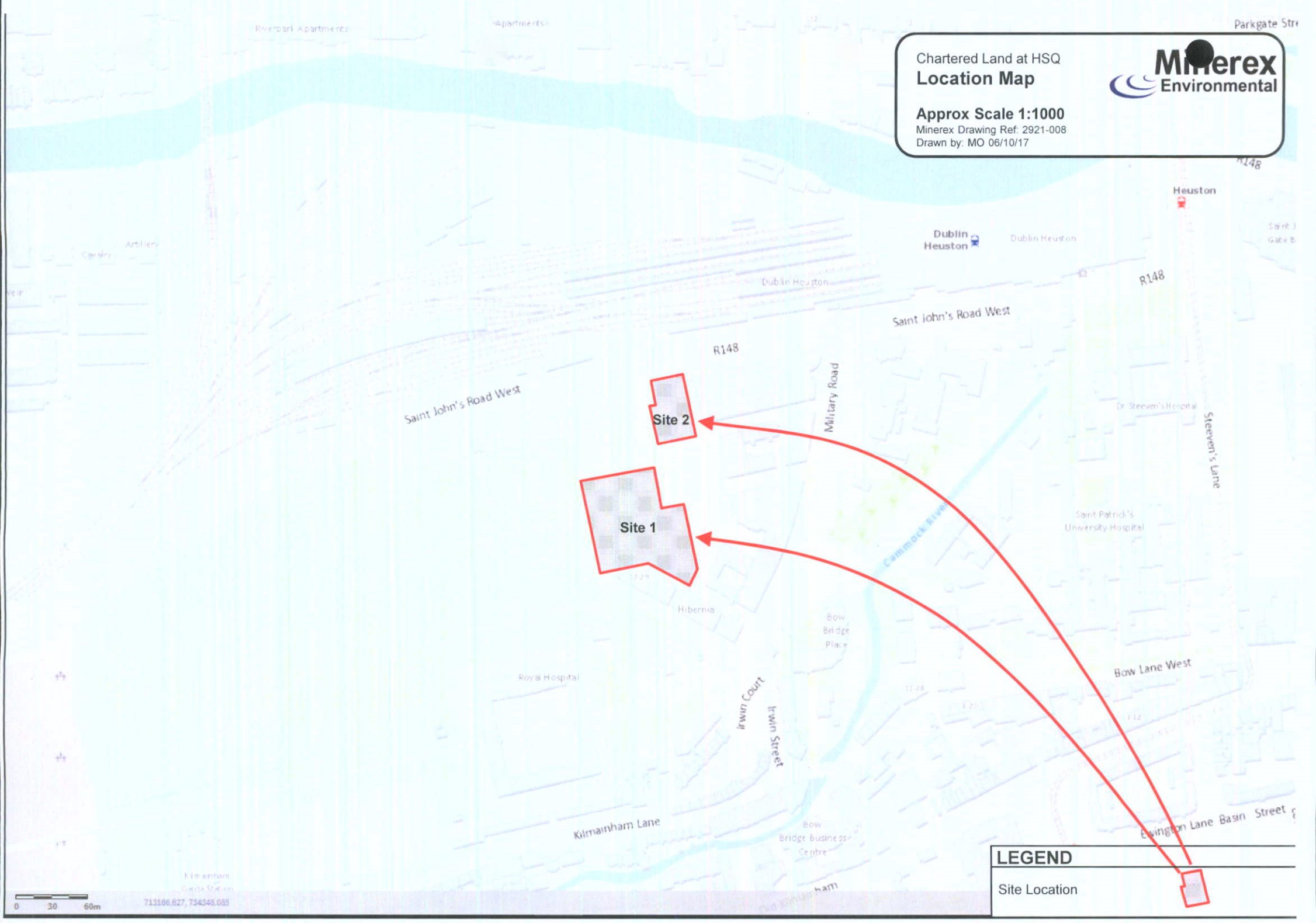
Apartment

Parkgate Str

# Chartered Land at HSQ Location Map



**Approx Scale 1:1000**  
Minerex Drawing Ref: 2921-008  
Drawn by: MO 06/10/17



### LEGEND

Site Location

## Appendix B



BH1

Site 1

BH2

BH3

BH4

Site 2

BH5

Basement Area

● Air sampling Location 2

● Air sampling Location 1

BH5  
(up to 8m)



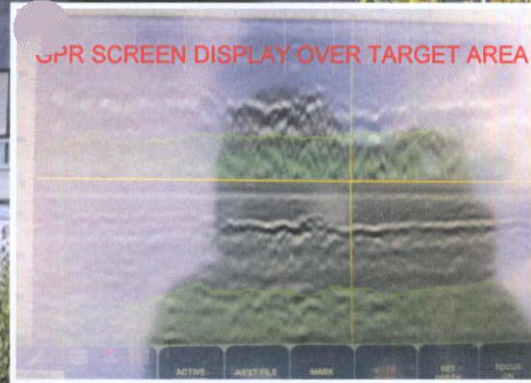
## Appendix C

Chartered Land

## Services Location of BH1 Location

Minerex Drawing Ref: 2921-008

Drawn by: AM & CS 14/9/17



### Summary:

1. MGX conducted a GPR survey of the area above marked in brown and found nothing indicative of a service above between ground level and 2m below ground level
2. The area was also CAT scanned for electrical services which proved negative using both radio and power frequencies.
3. A manhole located to the right of the picture was probed using probe rod and jenny scanner where two drainage lines were traced heading in westerly and south westerly direction as shown above; both these lines appear to be well clear of proposed location above.
4. A manhole located to the west of the green area was found to be a double manhole which was inaccessible as there was no access ladder but is assumed to be part of the drainage network and does not link up with the proposed location for BH1.
5. BH1 was pegged in a low lying area of green scape and is best fit based on distance from services and protecting the grassed area.
6. Disclaimer Survey for Underground Services: Underground services are surveyed using approved detectors (Cable Avoidance Tools, Ground Penetrating Radar) and visual observations. Locational accuracy is determined by referring to manufacturers guidelines for the detectors used. The limitations of the detectors, methods and observations must be considered. No guarantee can be given that all services will be found, that the horizontal or vertical position will be accurate and that services types will be accurately identified. Active or disused services may exist anywhere under the site even if not detected by the survey. Due to the non-intrusive, indirect and non-destructive nature of the survey, followed by interpretation, the information shown may not be accurate. Excavations in the vicinity of detected services and elsewhere should be carried out with due diligence and by using the guidelines of the utility providers. Minerex Geophysics Ltd. will not accept any liabilities from the survey.
7. In order to completely rule out the possibility of services lying beneath BH1 position, Minerex will have to dig an inspection pit to 1.2m below ground prior to allowing drilling rig to setup and drilled from 1.2m to target depth of 4m.

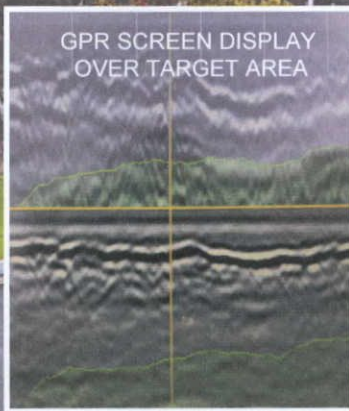
Chartered Land at HSQ

## Services scan of BH2 Location



Minerex Drawing Ref. 2921-008

Drawn by: AM & CS 14/9/17



BH2



Electrical duct for lighting

150mm Drainage Line

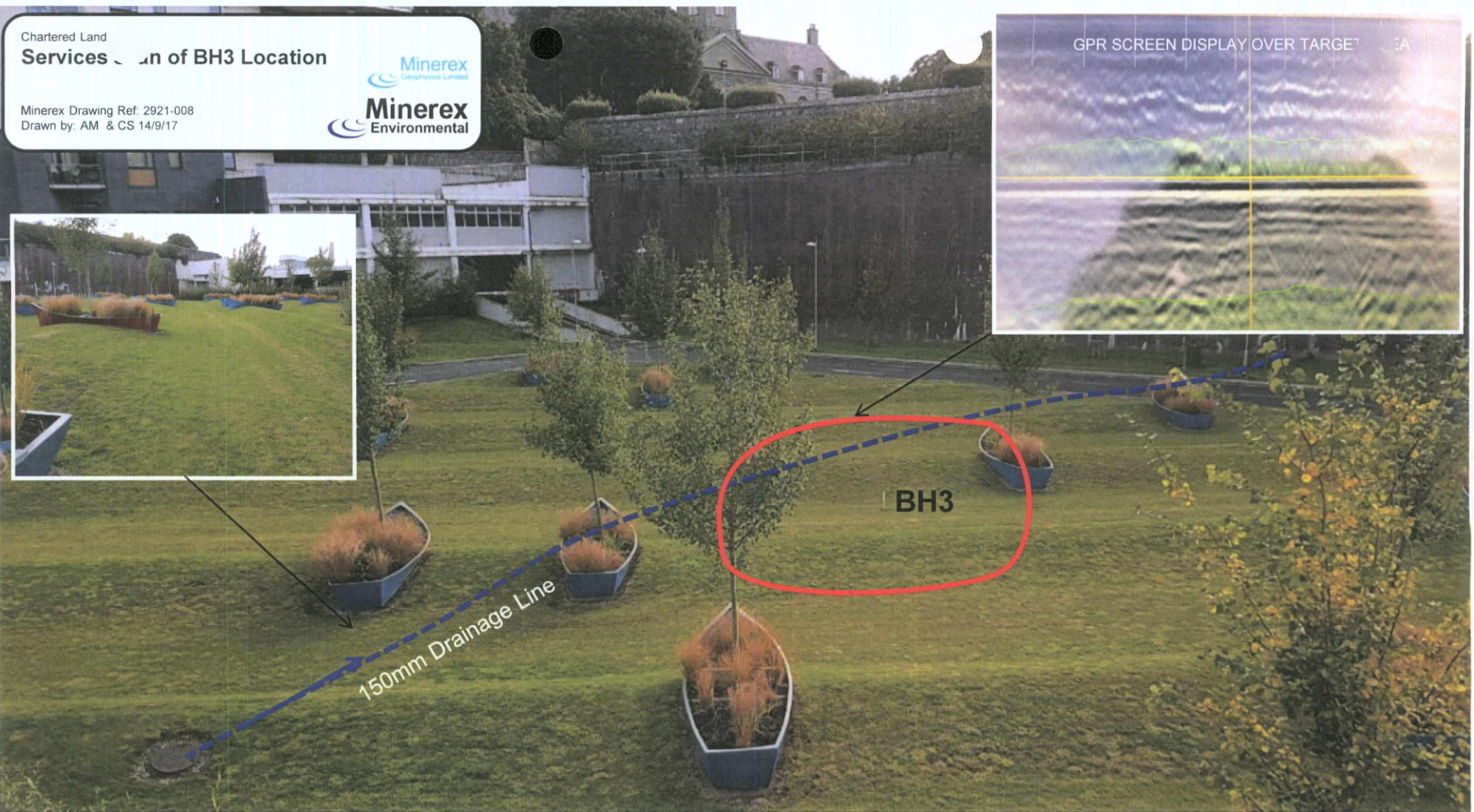
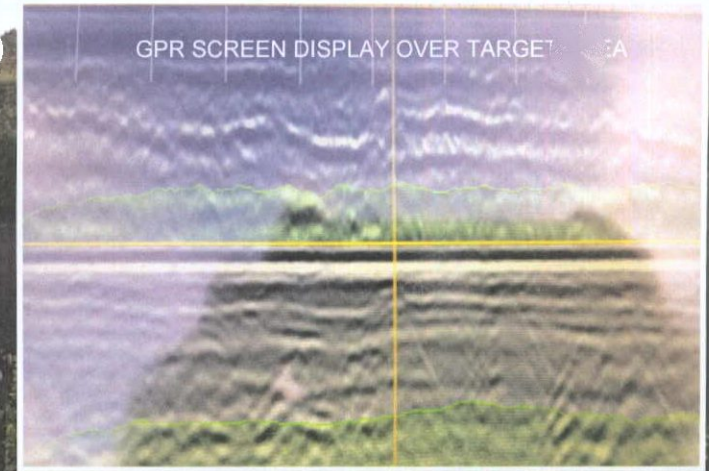
### Summary:

1. MGX conducted a GPR survey of the area above marked in brown and found nothing indicative of a service above between ground level and 2m below ground level
2. The area was also CAT scanned for electrical services which proved negative beneath the location but the cable duct to lighting pole run within 1m of location and is easy to trace.
3. BH1 was pegged in an area just off the main access road and is best fit based on distance from services and protecting the grassed area.
4. Disclaimer Survey for Underground Services: Underground services are surveyed using approved detectors (Cable Avoidance Tools, Ground Penetrating Radar) and visual observations. Locational accuracy is determined by referring to manufacturers guidelines for the detectors used. The limitations of the detectors, methods and observations must be considered. No guarantee can be given that all services will be found, that the horizontal or vertical position will be accurate and that services types will be accurately identified. Active or disused services may exist anywhere under the site even if not detected by the survey. Due to the non-intrusive, indirect and non-destructive nature of the survey, followed by interpretation, the information shown may not be accurate. Excavations in the vicinity of detected services and elsewhere should be carried out with diligence and by using the guidelines of the utility provider. Minerex Geophysics Ltd. will not accept any liabilities for the survey.
5. In order to completely rule out the possibility of services lying beneath the BH2 position, Minerex will have to dig an inspection pit to a depth below ground prior to allowing drilling rig to setup and drilled from 1.2m to target depth of 4m.

Chartered Land

## Services Location of BH3

Minerex Drawing Ref: 2921-008  
Drawn by: AM & CS 14/9/17



### Summary:

1. MGX conducted a GPR survey of the area above marked in brown and found nothing indicative of a service above between ground level and 2m below ground level
2. The area was also cat scanned for electrical services which proved negative for both radio and power frequencies.
3. BH3 was pegged in an area of low lying grass close to the proposed location on the drawing and away from all know services.
4. Disclaimer Survey for Underground Services: Underground services are surveyed using approved detectors (Cable Avoidance Tools, Ground Penetrating Radar) and visual observations. Locational accuracy is determined by referring to manufacturers guidelines for the detectors used. The limitations of the detectors, methods and observations must be considered. No guarantee can be given that all services will be found, that the horizontal or vertical position will be accurate and that services types will be accurately identified. Active or disused services may exists anywhere under the site even if not detected by the survey. Due to the non-intrusive, indirect and non-destructive nature of the survey, followed by interpretation, the information shown may not be accurate. Excavations in the vicinity of detected services and elsewhere should be carried out with due diligence and by using the guidelines of the utility providers. Minerex Geophysics Ltd. will not accept any liabilities from the survey.
5. In order to completely rule out the possibility of services lying beneath BH3 position, Minerex will have to dig an inspection pit to 1.2m below ground prior to allowing drilling rig to setup and drilled from 1.2m to target depth of 4m.

Chartered Land at HSQ

## Services scan of BH4 Location

Minerex  
Geophysics Limited

Minerex  
Environmental

Minerex Drawing Ref: 2921-008

Drawn by: AM & CS 14/9/17

Minor Access Manhole

100mm Drainage Pipe

BH4

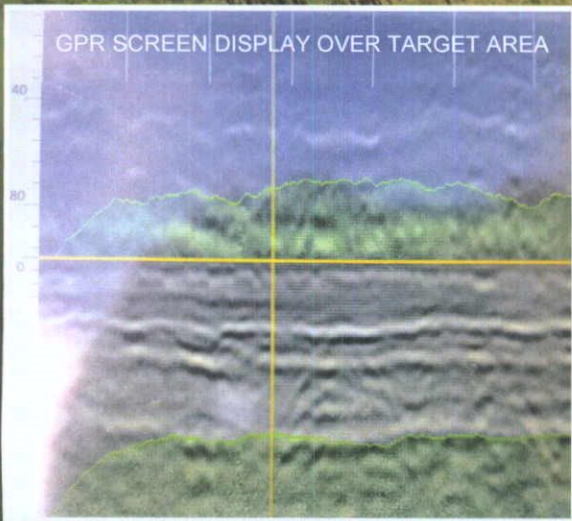
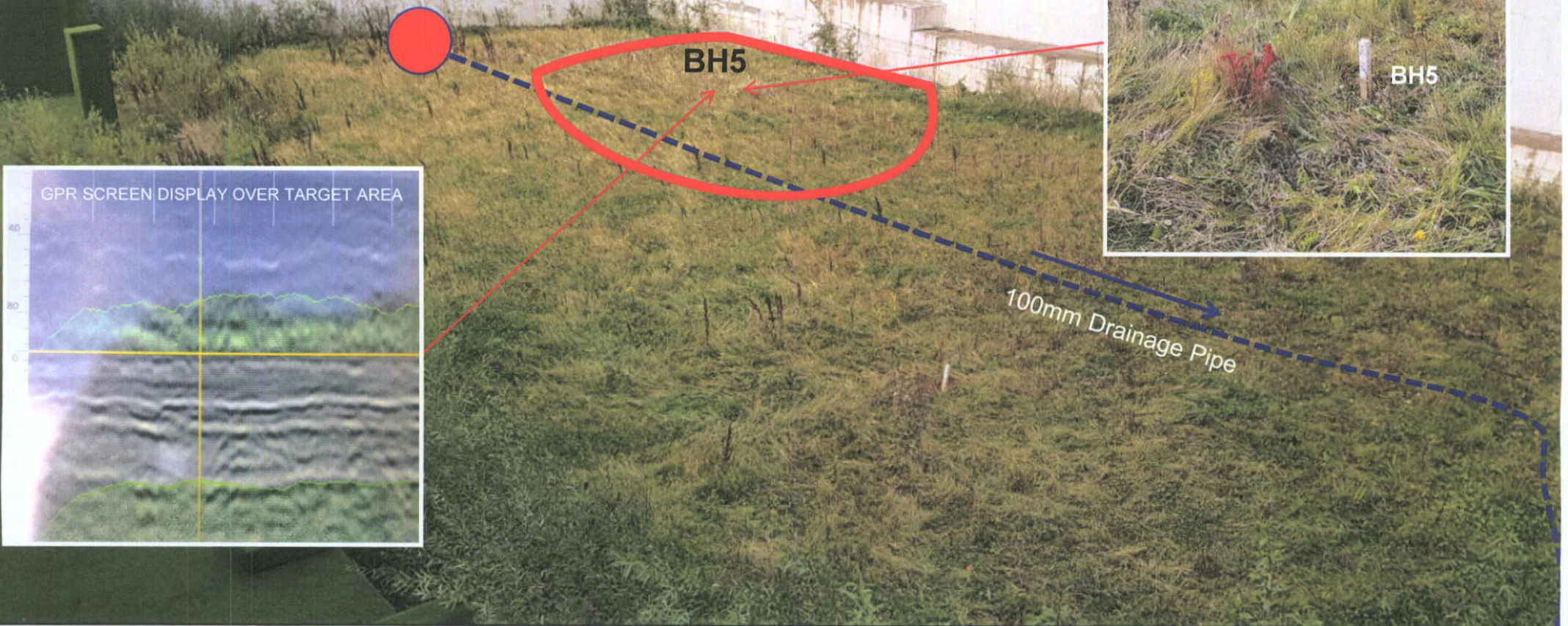
PUMP CHAMBER & DRAINAGE SUMP

GPR SCREEN DISPLAY OVER TARGET AREA

### Summary:

1. MGX conducted a GPR survey of the area above marked in Brown and found nothing indicative of a service above between ground level and 2m below ground level
2. The area was also cat scanned for electrical services which proved negative for both radio and power frequencies.
3. BH3 was pegged in an area of open grass/scrub away from known services.
4. Disclaimer Survey for Underground Services: Underground services are surveyed using approved detectors (Cable Avoidance Tools, Ground Penetrating Radar) and visual observations. Locational accuracy is determined by referring to manufacturers guidelines for the detectors used. The limitations of the detectors, methods and observations must be considered. No guarantee can be given that all services will be found, that the horizontal or vertical position will be accurate and that services types will be accurately identified. Active or disused services may exist anywhere under the site even if not detected by the survey. Due to the non-intrusive, indirect and non-destructive nature of the survey, followed by interpretation, the information shown may not be accurate. Excavations in the vicinity of detected services and elsewhere should be carried out with due diligence and by using the guidelines of the utility providers. Minerex Geophysics Ltd. will not accept any liabilities from the survey.
5. In order to completely rule out the possibility of services lying beneath BH4 position, Minerex will have to dig an inspection pit to 1.2m below ground prior to allowing drilling rig to setup and drilled from 1.2m to target depth of 4m.





### Summary:

1. MGX conducted a GPR survey of the area above marked in green and found nothing indicative of a service above between ground level and 2m below ground level
2. The area was also CAT scanned for electrical services which proved negative for both radio and power frequencies.
3. BH5 was pegged in an area of open grass/scrub away from known services
4. Disclaimer Survey for Underground Services: Underground services are surveyed using approved detectors (Cable Avoidance Tools, Ground Penetrating Radar) and visual observations. Locational accuracy is determined by referring to manufacturers guidelines for the detectors used. The limitations of the detectors, methods and observations must be considered. No guarantee can be given that all services will be found, that the horizontal or vertical position will be accurate and that services types will be accurately identified. Active or disused services may exist anywhere under the site even if not detected by the survey. Due to the non-intrusive, indirect and non-destructive nature of the survey, followed by interpretation, the information shown may not be accurate. Excavations in the vicinity of detected services and elsewhere should be carried out with due diligence and by using the guidelines of the utility providers. Minerex Geophysics Ltd. will not accept any liabilities from the survey.
5. In order to completely rule out the possibility of services lying beneath BH5 position, Minerex will have to dig an inspection pit to 1.2m below ground prior to allowing drilling rig to setup and drilled from 1.2m to target depth of 8m.

## Appendix D

Borehole/ Trial Pit Design & Completion	Soil (S) / Water (W) / Vapour (V) Sampling					Depth in metres below ground level (mbGL) & thickness (m)	Geology - graphical log	INVESTIGATION POINT LOG NUMBER	
	Sample number & interval (mbGL) <i>(Sample 10 kg minimum)</i> Red = Hazardous Yellow = Non-Haz Green = Inert	Made ground %s (see * below)	PID (ppm) Banned sample (BS); Trial Pit Wall (TPW); Soil Core (SC); BH Arisings (BHA); Trial Pit Clumps (TPC)	Odour strength & description (none, weak, moderate, strong)	Groundwater occurrence (See legend for symbols used for dry, damp and wet)			Client, Project, Location	BH1
<p>Ground level</p> <p>Drilled 0.11m diameter</p> <p>Black coloured 50mm ID / 63mm OD uPVC casing</p> <p>Black coloured 50mm ID / 63mm OD uPVC screen with 2mm slots wrapped in nylon sock</p> <p>3.9 = End of Installation (EOI)</p>	0.0 to 0.2	S1	1 = 1%, 6 = 1%	(2%)	0	None	[0.3]	CLAY - Grass cover; geomembrane present at base.	1 Top soil
	0.4 to 0.55	S2	(0%)	0	None		[0.3]	COBBLE deposit - Clay matrix with geomembrane at base	2 Fill
	0.70 to 1.20	S3	(10%) 10 = 40%	0	None	Dry	[0.7]	CLAY - Tarmacadam present	3 Fill
	1.40 to 1.70	S4	(0%)	0	None		[0.5]	COBBLE (50%) deposit - Gravelly, Clayey	4 Fill
	1.90 to 4.0	S5	(0%)	0	None		[2.2]	CLAY - very stiff, brown, cobbly - Driller used auger to penetrate this layer between 3.4 – 4.0 due to stiffness.	5 Natural.
						Wet			
								4.0 m End of borehole	
<p>Water level taken 15 minutes after the drilling to 4.0mbgl was <b>1.70</b></p> <p>Water level taken 1 day later after installation was <b>1.60</b></p> <p>The <b>last reading</b> is considered to be the most suitable reading to be used in interpretations because it is considered to represent the 'static' water level after the drilling event.</p>									
<p><b>General notes / Well Head Protection / Plan &amp; Section Sketches</b></p> <ol style="list-style-type: none"> <li>Location of borehole was surveyed for services &amp; hand dug prior to drilling (see 2921-008 ppt).</li> <li>Borehole filled with gravel between 2.5 to 4.0 which required driller to redrill twice</li> <li>Unable to install piezo pipe to 4.0m due to collapse between 3.9m to 4.0m.</li> <li>Flush cover installed at ground level with lockable steel cover.</li> <li>On 21/9/17 at 15:00 MEL staff measured base of well to be 3.7m i.e. 20cm of sediment had built up on base of well within 24 hours. This is not considered to be significant and was not removed</li> <li>MS = Minerex Sampling Suite</li> </ol>								<p><b>* Made ground %s. Total in ( )</b></p> <p>1 - Brick, 2 - Concrete, 3 - Glass, 4 - Metal, 5 - Plastic, 6 - Wood / Organic / Leaves / Twigs / Peat, 7 - Ash &amp; Clinker, 8 - Charcoal, 9 - Ceramic tiles, 10 - Tarmacadam, 11 - Leather, 12 - ACMs (asbestos containing materials such as roof tiles, piping).</p> <p>% total Inert and total non-inert can be stated also as helpful</p>	
<p>Tel: 01-2964435, Web: www.minerex.ie</p>									

Borehole/ Trial Pit Design & Completion	Soil (S) / Water (W) / Vapour (V) Sampling						Depth in metres below ground level (mbGL) & thickness (m)	Geology - graphical log	INVESTIGATION POINT LOG NUMBER	
	Sample number & interval (mbGL) (Sample 10 kg minimum) Red = Hazardous Yellow = Non-Haz Green = Inert	Made ground %s (see * below)	PID (ppm) Blagged sample (BS); Trial Pit Wall (TPW); Soil Core (SC); BH Arisings (BHA); Trial Pit Clumps (TPC)	Odour strength & description (none, weak, moderate, strong)	Groundwater occurrence (See legend for symbols used for dry, damp and wet)	Investigation Point Log Number			BH2	
<p>Ground level</p> <p>0.1</p> <p>0.5</p> <p>1.0</p> <p>1.2</p> <p>2.4</p> <p>3.0</p> <p>4.0</p> <p>2.4 = End of Installation (EOI)</p> <p>Drilled 0.11m diameter</p> <p>Black coloured 50mm ID / 63mm OD uPVC casing</p> <p>Black coloured 50mm ID / 63mm OD uPVC screen with 2mm slots wrapped in nylon sock</p> <p>Drilled 0.076m diameter</p>	0.0 to 0.2	SS1	(1%) 6 = 1%	0.1	None	[0.3]	CLAY - Grass cover, geomembrane present at base.	1	Top soil	
	0.2 to 1.40	SS2	(12%) 1 = 1% 2 = 3% 5 = 1% 6 = 1% 9 = 1% 10 = 5%	0	None	Dry	[1.2]	GRAVEL, - Cobbly (25%) - Tarmacadam present	6	Fill
	1.40 to 1.70	SS3	(71%) 2 = 70%, 4 = 1%	0	None	[0.2]	CONCRETE - Gravelly, crème coloured	7	Fill	
	1.70 to 2.10	SS4	(0%)	0	None	[0.3]	GRAVEL - Cobbly (20%), clay also present	10	Fill	
	2.10 to 4.0	SS5	(0%)	0.2	None	[2.0]	GRAVEL, - Sand = 20% - Clay staining present - Poorly sorted layer - Gravel is subangular to rounded, fine to coarse	8	Natural.	
					Wet		Water level taken just prior to redrilling and before installation was 1.81 Water level taken 1 day later after installation was 1.61 The last reading is considered to be the most suitable reading to be used in interpretations because it is considered to represent the 'static' water level after the drilling event.			
							4.0 m End of borehole			

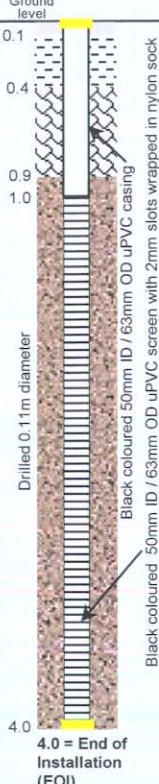
**General notes / Well Head Protection / Plan & Section Sketches**

- Location of borehole was surveyed for services & hand dug prior to drilling (see 2921-008.ppt).
- Borehole infilled with gravel between 2.4m to 4.0mbgl despite being redrilled twice.
- Drill diameter lowered to 76mmOD between 3 - 4mbgl due to difficult drilling conditions.
- Unable to install piezo pipe to 4.0m due to gravel infill between 2.4m to 4.0mbgl.
- Flush cover installed at ground level with lockable steel cover.
- MS = Minerex Sampling Suite
- On 21/9/17 at 18:00 MEL staff measured base of well to be 2.35m i.e. 5cm of sediment had built up on base of well within 24 hours. This is not considered to be significant and was not removed.



**\* Made ground %s. Total in ( )**

1 - Brick, 2 - Concrete, 3 - Glass, 4 - Metal, 5 - Plastic, 6 - Wood / Organic / Leaves / Twigs / Peat, 7 - Ash & Clinker, 8 - Charcoal, 9 - Ceramic tiles, 10 - Tarmacadam, 11 - Leather, 12 - ACMs (asbestos containing materials such as roof tiles, piping).  
% total Inert and total non-inert can be stated also as helpful

Borehole/ Trial Pit Design & Completion	Soil (S) / Water (W) / Vapour (V) Sampling					Depth in metres below ground level (mbGL) & thickness (m)	Geology - (graphical log)	INVESTIGATION POINT LOG NUMBER	BH3
	Sample number & interval (mbGL) (Sample 10 kg minimum) Red = Hazardous Yellow = Non-Haz Green = Inert	Made ground %s (see * below)	PID (ppm) Background sample (BS); Trial Pit Wall (TPW); Soil Core (SC); BH Arisings (BHA); Trial Pit Clumps (TPC)	Odour, strength & description (none, weak, moderate, strong)	Groundwater occurrence (See legend for symbols used for dry, damp and wet)			Client, Project, Location	Chartered Land, HSQ, Dublin
 <p>Drilled 0.11m diameter Black coloured 50mm ID / 63mm OD uPVC casing Black coloured 50mm ID / 63mm OD uPVC screen with 2mm slots wrapped in nylon sock 4.0 = End of Installation (EOI)</p>	0.0 to 0.2 S1	(0%)	0.2	None	Dry	0.3	<b>CLAY</b> - Grass cover; geomembrane present at base	<b>1</b> Top soil	
	0.4 to 0.6 S2	(1%) 1 = 1%	0.1	None	Dry	0.4	<b>CLAY</b> - Cobbly (30%) with gravels (20%), sand (10%) & Boulders (5%)	<b>9</b> Fill	
	0.80 to 1.30 S3	(5%) 1 = 2% 2 = 1% 6 = 1% 9 = 1%	0.6	None	Dry	0.7	<b>CLAY</b> - Brown to grey in colour & becoming darker with depth - Firm to stiff - Gravels (20%) - Sand (10%) (coarse)	<b>9</b> Fill	
	1.50 to 2.50 S4	(4%) 1 = 2% 2 = 1% 6 = 1% (3%) 2 = 1% 6 = 1% 9 = 1%	1.1	None	Damp	1.2	<b>CLAY</b> - Dark grey in colour - Firm to stiff - Gravels (15%) - Slightly Sand (5%) - Concrete fragment present at 2.15mbgl - Ceramic fragment present at 2.35mbgl	<b>9</b> Fill	
	2.70 to 4.0 S5	(0%)	0	None	Wet	2.6	<b>GRAVEL</b> - Gravel (70%) - Sandy (20%) - Clay staining on gravels (5-10%)	<b>8</b> Natural.	
4.0 m End of borehole								<p>Water level taken 20 minutes after installation to 4.0mbgl was <b>2.59</b> Water level taken 2 hours later after installation was <b>2.58</b> The <b>last reading</b> is considered to be the most suitable reading to be used in interpretations because it is considered to represent the 'static' water level after the drilling event.</p>	



**General notes / Well Head Protection / Plan & Section Sketches**

- Location of borehole was surveyed for services & hand dug prior to drilling (see 2921-008.ppt).
- Casing was installed to 4.0mbgl to prevent any potential inflow. This was removed prior to installing piezo pipe.
- Flush cover installed at ground level with lockable steel cover.
- MS = Minerex Sampling Suite
- On 22/9/17 at 14:00 MEL staff measured base of well to be 3.91m i.e. 9cm of sediment had built up on base of well within 2 hours. This is not considered to be significant and was not removed.

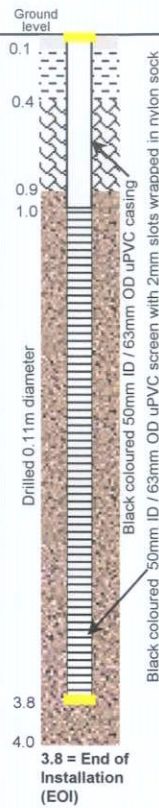


**\* Made ground %s. Total in ( )**

- 1 - Brick, 2 - Concrete, 3 - Glass, 4 - Metal, 5 - Plastic, 6 - Wood / Organic / Leaves / Twigs / Peat, 7 - Ash & Clinker, 8 - Charcoal, 9 - Ceramic tiles, 10 - Tarmacadam, 11 - Leather, 12 - ACMs (asbestos containing materials such as roof tiles, piping).  
% total Inert and total non-inert can be stated also as helpful



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Borehole/ Trial Pit Design & Completion	Soil (S) / Water (W) / Vapour (V) Sampling					Depth in metres below ground level (mbGL) & [thickness (m)]	Geology - (graphical log)	INVESTIGATION POINT LOG NUMBER	BH4
	Sample number & interval (mbGL) (Sample 10 kg minimum) Red = Hazardous Yellow = Non-Haz Green = Inert	Made ground %s (see * below)	PID (ppm)	Odour strength & description (none, weak, moderate, strong)	Groundwater occurrence (See legend for symbols used for dry, damp and wet)			Client, Project, Location	Chartered Land, HSQ, Dublin
 <p>Ground level</p> <p>0.1</p> <p>0.4</p> <p>0.9</p> <p>1.0</p> <p>1.7</p> <p>1.90 to 2.90</p> <p>3.8</p> <p>4.0</p> <p>3.8 = End of Installation (EOI)</p> <p>Drilled 0.11m diameter</p> <p>Black coloured 50mm ID / 63mm OD uPVC casing</p> <p>Black coloured 50mm ID / 63mm OD uPVC screen with 2mm slots wrapped in nylon sock</p> <p>SS1 (NO Asbestos)</p> <p>SS2 (MS Composite (S2, S3, S4 &amp; S5))</p> <p>SS3 (NO Asbestos)</p> <p>SS4 (MS Composite (S2, S3, S4 &amp; S5))</p> <p>SS5 (MS Composite (S7 &amp; S8))</p> <p>SS6 (MS Composite (S2, S3, S4 &amp; S5))</p> <p>SS7 (MS Composite (S7 &amp; S8))</p>	0.0 to 0.2 S1	(0%)	0	None	Dry	[0.3]	CLAY - Grass cover; geomembrane present at base.	1	Top soil
	0.4 to 0.7 S2	(1%) 5 = 1%	0	None	Dry	[0.5]	CLAY - Cobbly (30%) - Firm to stiff	2	Fill
	0.8 to 0.9 S3	(100%) 5 = 100%	0	None	Dry	[0.7]	CONCRETE	7	Fill
	1.0 to 1.60 S4	(0%)	0.1		Dry	[0.8]	CLAY - Stiff and brown in colour - Cobbly (20%)	9	Fill
	1.7 to 1.8 S5	(100%) 2 = 100%	0		Dry	[1.0]	CONCRETE	7	Fill
	1.90 to 2.90 S6	(3%) 1 = 1% 6 = 1% 8 = 1%	0.1		Mod Wet	[1.15]	CLAY - Brown colour - Stiff - Cobbly (15%)	9	Fill
	3.10 to 4.0 S7	(3%) 5 = 1% (fabric) 6 = 2%	3.9	Mod	Wet	[1.0]	GRAVEL - Clay matrix present (15%) - Sand (20%) - Slightly oily / diesel smell present throughout this layer with slight sheen noted also - Sample was also compressed when retrieved from core	10	Fill
						4.0 m End of borehole			
									Water level taken 10 minutes after the drilling to 4.0mbgl was <b>2.41</b> Water level taken 20 minutes after the drilling to 4.0mbgl was <b>2.46</b> Water level taken 1 day later after installation was <b>2.41</b> The <b>last reading</b> is considered to be the most suitable reading to be used in interpretations because it is considered to represent the 'static' water level after the drilling event.



**General notes / Well Head Protection / Plan & Section Sketches**

- Location of borehole was surveyed for services & hand dug prior to drilling (see 2921-008.ppt).
- Casing added to 3mbgl during drilling in order to prevent borehole from collapsing
- Unable to install piezo pipe to 4.0m due to collapse between 3.8m to 4.0m.
- Fuel odour first observed at 2.8mbgl but PID values were low here.
- Flush cover installed at ground level with lockable steel cover.
- MS = Minerex Sampling Suite
- On 22/9/17 at 11:00 MEL staff measured base of well to be 3.73m i.e. 7cm of sediment had built up on base of well within 24 hours. This is not considered to be significant and was not removed.



\* Made ground %s. Total in ( )

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% total Inert and total non-inert can be stated also as helpful

Borehole/ Trial Pit Design & Completion	Soil (S) / Water (W) / Vapour (V) Sampling					Depth in metres below ground level (mbGL) & thickness (m)	Geology - (graphical log)	INVESTIGATION POINT LOG NUMBER	BH5	
	Sample number & interval (mbGL) (Sample 10 kg minimum) Red = Hazardous Yellow = Non-Haz Green = Inert	Made ground %s (see * below)	PID (ppm) Bagged sample (BS); Trial Pit Wall (TPW); Soil sample (SC); BH - Airings (BHA); Trial Pit Clumps (TPC)	Odour, strength & description (none, weak, moderate, strong)	Groundwater occurrence (See legend for symbols used for dry, damp and wet)			Client, Project, Location	Chartered Land, HSO, Dublin	
						Description (& layer number)		Interpretation		
	0.0 to 0.2	S1	(0%)	0	None	Dry	0.3	CLAY - Grass cover; geomembrane present at base	1 Top soil	
	0.4 to 0.5	S2	(0%)	0	None	Dry	0.3	CLAY - Gravelly (20%), sandy (10%) - Firm to stiff	2 Fill	
	0.6 to 1.0	S3	(0%)	0	None	Dry	1.0	CLAY - Firm to stiff & brown in colour - Cobbly (15%) - Sample was compressed and drilling was very soft according to drillers - Boundary at 2.5mbgl is approximate	9 Fill	
	1.8 to 2.0				None	Wet	1.9	Water level taken 20 minutes after the installation to 5.1 mbgl was 1.97 Water level taken 1 day later after installation was 2.23 The last reading is considered to be the most suitable reading to be used in interpretations because it is considered to represent the 'static' water level after the drilling event.		
	2.6 to 3.0	S3	(0%)	0	None	Wet	2.0			
	3.0 to 3.5			(2%) 6 = 2%	0.5	Mod	Wet	2.5	GRAVEL - Clay matrix - Occasional gravelly clay lenses present - Moderate to strong diesel fuel odour between 2.6 to 6.0mbgl - Slight oily sheen present - Timber fragment present at 3.4mbgl	10 Fill
	3.8 to 4.0	S4	(0%)	12.0	30.3	Mod	Wet	3.0		
	4.0 to 5.1	S4	(0%)	44.8	44.8	Strong	Wet	3.5	GRAVEL - Clay matrix - Occasional gravelly clay lenses present - Moderate to strong diesel fuel odour between 2.6 to 6.0mbgl - Strongest diesel smell present is between 3.8 to 4.0mbgl. - Slight oily sheen present - Boundary between natural & non natural layers was retrospectively added at about 3.5mbgl given the lack of non natural material present below this level. However a sample was already bagged between 2.6 to 5.9m, therefore separate samples were not possible.	8 Natural
	5.1 to 6.0	S4	(0%)	24.3	25.5	Mod	Wet	4.0		
	6.0 to 7.6	S5	(0%)	4.2	25.5	Mod	Wet	5.0		
7.0 to 7.6	S5	(0%)	3.1	4.2	Mod	Wet	6.0			
7.6 to 8.0					No Info	No	7.0	NO RECOVERY - Closed system used to obtain deep sample, therefore driller had to pump inner casing between 6 - 7mbgl whereby no sample could be recovered - Driller advised that medium present here is likely to be gravel given similar drilling conditions above and below this level.	Natural	
7.6 to 8.0					No Info	No	7.6	GRAVEL - Clay staining - Moderate fuel/ diesel smell present;	8 Natural	
5.1 = End of Installation (EOI)								8.0	7.6 m End of borehole	

**General notes / Well Head Protection / Plan & Section Sketches**

- Location of borehole was surveyed for services & hand dug prior to drilling (see 2921-008.ppt).
- Unable to advance to 8m using conventional sampler given difficult drilling, therefore closed system chosen to obtain sample below 6mbgl.
- Unable to install piezo pipe to 7.6m due to collapse between 5.1m to 7.6m.
- MS = Minerex Sampling Suite
- Flush cover installed at ground level with lockable steel cover.
- On 22/9/17 at 12:25 MEL staff measured base of well to be 4.94m i.e sediment had built up on base of well within 24 hours. This is not considered significant and was not removed.



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