Clifton Scannell Emerson Associates

Our Ref: LTR-22_043-003

Date: 22 December 2022

David Hopkins
59 Northumberland Road
Ballsbridge
Dublin 4
D04 WP89

Re: Planning Application Reg Ref SD22A-0311

Subject: Response to Planning Condition No. 7

Dear David,

Further to the above Grant of Planning we write in response to the above conditions. The conditions and associated responses are outlined as below:

Further to the above Grant of Planning we write in response to the abovementioned planning conditions. The conditions and associated responses are outlined as below:-

Condition No. 7: SUDS (Sustainable Drainage Systems)

A comprehensive SUDS Management Plan shall be submitted to demonstrate that the proposed SUDS features have reduced the rate of run off into the existing surface water drainage network. A maintenance plan shall also be included as a demonstration of how the system will function following implementation. Additional natural SUDS features shall be incorporated into the proposed drainage system for the development such as rain gardens, detention basins, filter drains, swales etc. In addition, the applicant shall provide the following:

- *Demonstrate how the proposed natural SUDS features will be incorporated and work within the drainage design for the proposed development.*
- *A drawing to show how surface water shall be attenuated to greenfield run off rates.*
- *Submit a drawing to show what SuDS are proposed. Examples of SuDS include permeable paving, filter drains, bio-retention tree pits, rains gardens, swales or other such SuDS.*
- *SUDs Management - The applicant is requested to submit a comprehensive SUDS Management Plan to demonstrate that the proposed SUDS features have reduced the rate of run off into the existing surface water drainage network. A maintenance plan should also be included as a demonstration of how the system will function following implementation.*
- *The applicant is referred to the recently published SDCC SuDS Design Guide for further information and guidance.*

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Response

In response to the abovementioned planning conditions, please find the enclosed RPT-22_043-005 Surface Water Management Strategy. We trust that the report provided in response Condition 7 demonstrates the necessary compliance to the outlined requirements of Condition 7.

We trust that the above responses demonstrate compliance with the above conditions.

Should any queries exist please do not hesitate to contact the undersigned.

Yours sincerely,

_____

Conor Doherty
Clifton Scannell Emerson Associates

Enc.

RPT-22_043-005 Surface Water Management Strategy

Clifton Scannell Emerson Associates

Surface Water Management Strategy Report

Proposed K2 Data Centre Development

K2 DATA CENTRES

Client: K2 Strategic Infrastructure Ireland Ltd.

Date: 07th December 2022

Job Number: 22_043

CONSULTING ENGINEERS

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

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Document Control Sheet

Project Name:	Proposed K2 Data Centre Development
Project Number:	22_043
Report Title:	Surface Water Management Strategy Report
Filename:	RPT-22_043-005

Issue No.	Issue Status	Date	Prepared by	Checked by
P01	DRAFT	07/12/2022	KB	CD
P02	PLANNING COMPLIANCE	22/12/2022	KB	CD

Table of Contents

1 Introduction

1.1 Overview

This report outlines the Surface Water Management Strategy in support of the planning application for K2 Strategic Infrastructure Ireland Ltd for the proposed K2 data centre development on a site at Kingswood Drive and Kingswood Road, within the Citywest Business Campus, Naas Road, Dublin 24.

The site is currently subject to the provisions of the South Dublin County Council (SDCC) Development Plan 2022-2028 and the requirements as outlined in the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022).

The above Plans and requirements emphasise the necessity for a SuDS type approach by providing an interconnected drainage system to manage and treat surface water from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site.

The surface water runoff from the proposed development will follow the SuDS and surface water management strategy to provide the necessary processes to control runoff frequency, flow rates and volumes prior to out falling to the Kingswood Stream. (See Figure 1 Extract from Irish Water Mapping Showing Overall Development Site and Existing Drainage Network.)

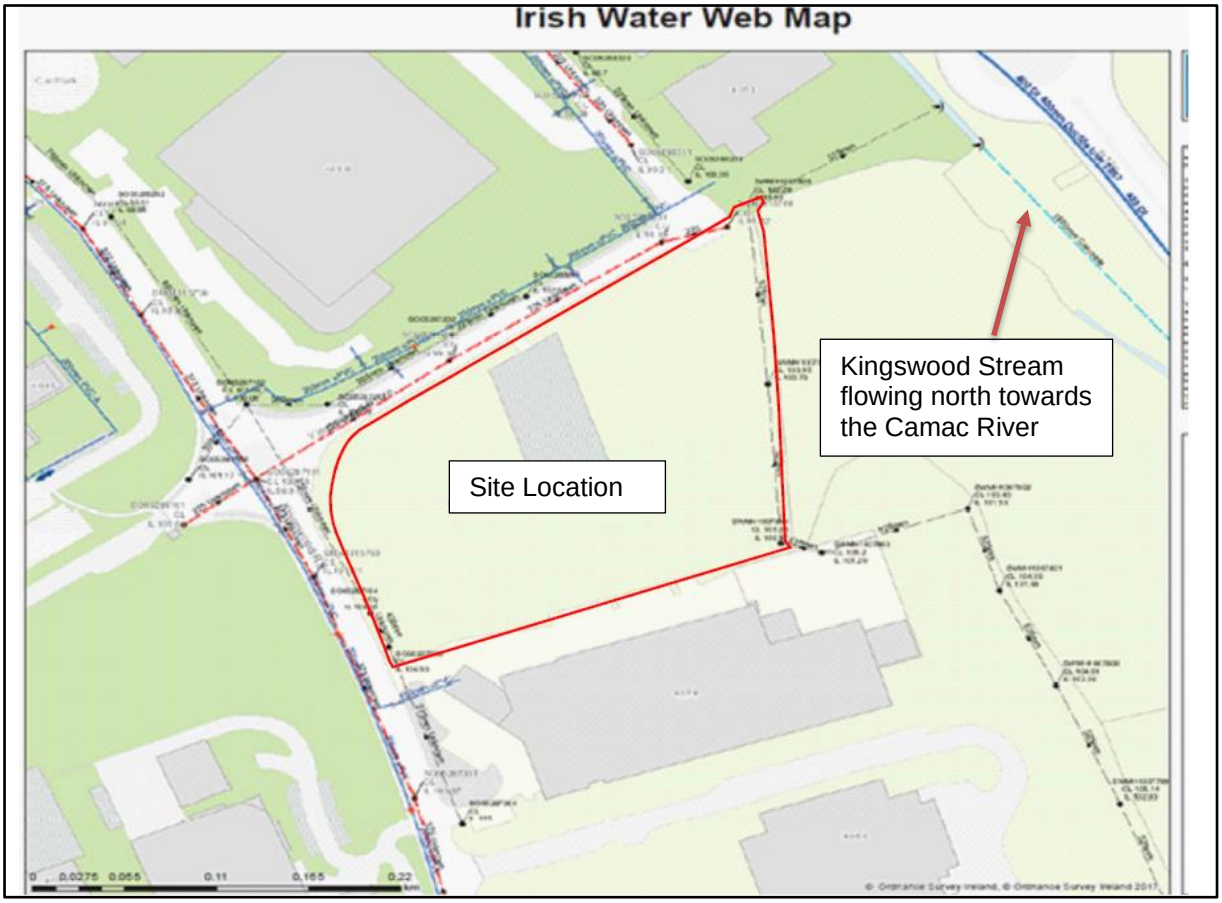


Figure 1 Extract from Irish Water Mapping Showing Overall Development Site and Existing Drainage Network.

1.2 Review of Background Information

The proposed site is located within the district of South Dublin County Council (SDCC) and is therefore subject to the provisions of the SDCC Development Plan 2022-2028. The SuDS strategy is outlined within Section 4.2.2 of the SDCC Development Plan 2022-2028.

Surface water drainage considerations for the site are subject to the requirements of the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022); and Greater Dublin Strategic Drainage Study (GDSDS) Volumes 2, 3 and 5 (March 2005).

2 Existing Site Characteristics

2.1 Existing Land Use

The existing site is a brownfield site with a total area of approximately 1.9 hectares, located within the Citywest Business Campus, Naas Road, Dublin 24. The site is in a cleared state with exception to an existing concrete yard slab in the northern part of the site, as the site was previously used as a construction site compound.

2.2 Geology

The Site Investigation of the existing ground conditions was undertaken by Site Investigations Ltd. Made ground comprising of sandy gravelly clay with medium cobble content and construction waste was generally observed across the site 1.00 metres below ground level (mbgl) or less but did extend to 1.20 and 2.30 mbgl in some areas. Overburden comprising of brown sandy gravelly silty clay with cobbles and boulders extend to a maximum borehole depth of 4.80 mbgl. Bedrock was recorded at depths ranging from 3.40 mbgl to 5.10 mbgl. See Appendix A for Borehole and Trial Pits Logs.

Soakaway tests were conducted in accordance with BRE Special Digest 365. All tests were deemed to have failed the specification at the end of the first cycle as the water level did not fall at a steady rate for the infiltration rate to be calculated at the end of the third cycle. Therefore, the area is unsuitable for storm water drainage and nature-based SuDS infiltration systems. See Appendix B for Infiltration Test Results.

2.3 Topography

The site generally falls from southwestern boundary to northeastern boundary with existing ground levels varying between 108.56 m OD to 102.16 m OD. The existing site topography is shown in Figure 2.

Figure 2 Existing Site Topography.

2.4 Flood Risk

As outlined in Appendix C the Site Specific Flood Risk Assessment report, the site is within Flood Zone C with a low probability of flooding in accordance with the OPW Guidelines, 2009, "The Planning System and Flood Risk Management Guidelines for Planning Authorities".

2.5 Utilities

For the existing surface water drainage network refer to Appendix D (Section 2.3 of the Engineering Services Report Drainage and Water Services report); and Appendix E for drawing no. 22_043-CSE-00-XX-DR-C-2100 Overall Existing Surface Water Drainage Layout Plan.

2.6 Planning Requirements

The following planning requirements constrain SuDS design:

- A planning condition was made on the previous planning application for development on the site (Reg Ref SD18A-0301), which stated the view from northeast of the proposed development would be unsightly. The Conditions of the Grant of Planning for the above application required a landscaping plan which reduced the urban impact of the proposed development. As a result, a landscaping berm with coniferous and deciduous planting is proposed in the northern and western site parts of the site boundary. Adherence to this condition reduces the space requirements for SuDS features.

- In the Confirmation of Feasibility (CoF), reference no. CDS22003496, Irish Water stipulated that storage be provided for all annual cooling needs with a maximum allowable annual demand from the site limited to 2 975m^3. This storage will be filled in winter by agreement with Irish Water operations and used as required during the summer months. Compliance with this condition further reduces the space available for SuDS features.

  Refer to Appendix F for further information of the CoF.

3 Flow Route Analysis

3.1 Existing Flow Route Analysis

The natural hydrology of the existing site is largely informed by the site's topography and geology, where topography determines the existing and future flows and geology indicates whether rainfall will flow from the site as runoff and / or infiltrate into the ground. The existing flow route analysis is shown in Figure 3 below, which demonstrates how the site behaves naturally before the development.

Figure 3 Existing Flow Route Analysis.

3.2 Modified Flow Route Analysis

The modified flow route analysis has been conducted in conjunction with the proposed site layout levels and inform the overall SuDS and surface water management strategy by predicting the flow of runoff within the site area. Figure 4 below, which demonstrates the modified flow route.

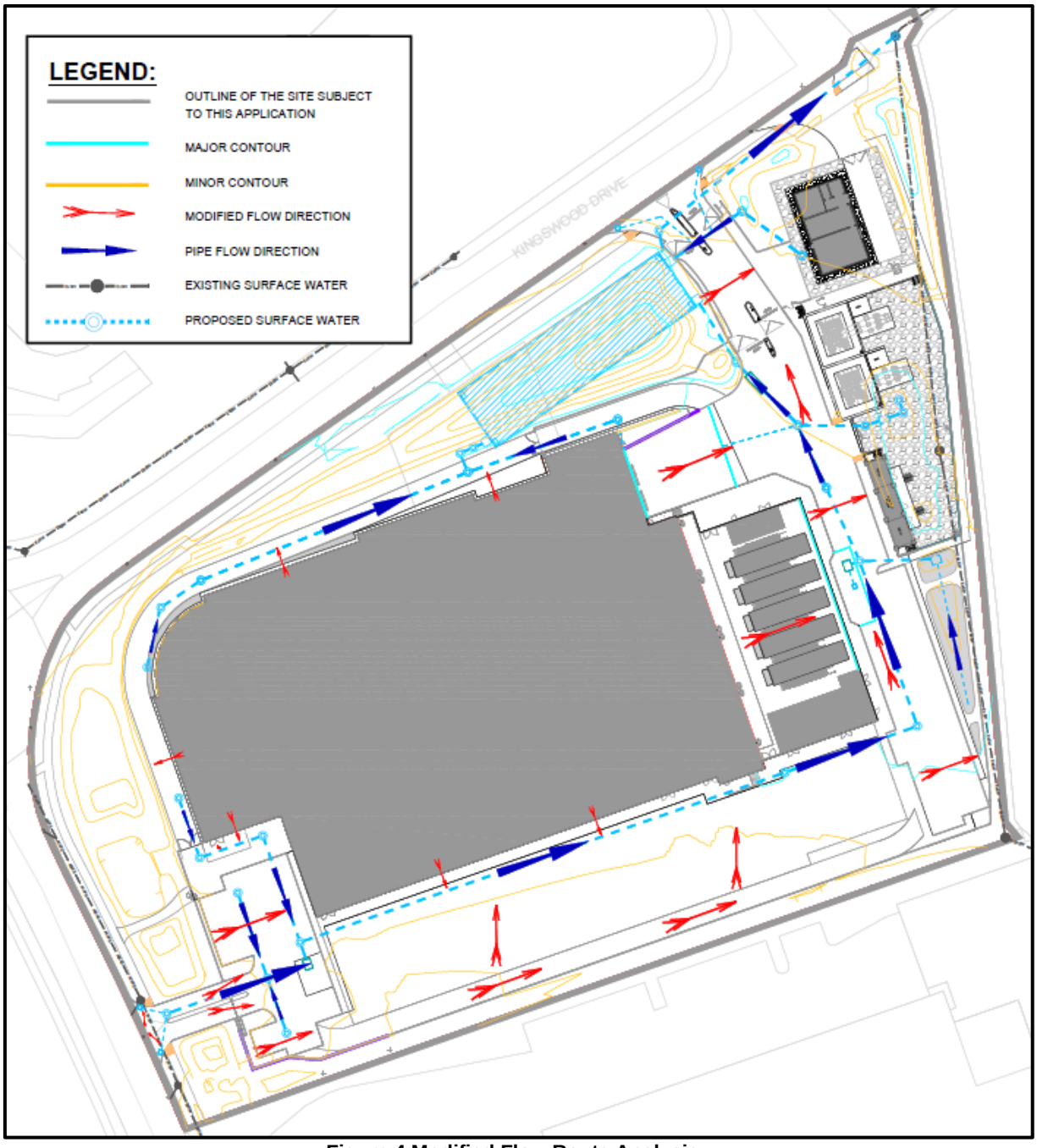


Figure 4 Modified Flow Route Analysis.

4 Overview of Sustainable Urban Drainage Systems (SuDS)

The SuDS Manual C753 (2015) published by CIRIA defines sustainable drainage or SuDS is a way of managing rainfall that minimises the negative impacts on the quantity and quality of runoff whilst maximising the benefits of amenity and biodiversity for people and the environment.

In this section of the report site specific SuDS components are proposed, and the impacts on the quantity and quality of runoff and its associated benefits of amenity and biodiversity are discussed.

4.1 Proposed SuDS Components

SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site (The SuDS Manual C753 (2015) published by CIRIA).

It is important to note that the selection of SuDS components is heavily constrained by the planning requirements identified in Section 2.6, i.e. landscaping berms at the northern and western ends of the site and the provision of a water storage tank approximately 1,122 m^2 in planned area. Furthermore, the total permitted floor area permitted under Reg. Ref.: SD18A/0301 is 11,548.5m^2 and the plan area of the surface water attenuation system 470.4 m^2 (see Appendix D, Section 2.4.5 of the Engineering Services Report Drainage and Water Services report).

As a result, the following proposed SuDS components are provided (see submitted planning drawing no. 22_043-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System Layout Plan):

4.1.1 Swales

Three consecutive swales are provided at the southeastern corner of the site boundary to convey and treat surface water. Swales will incorporate a filter drain under its base in order to promote infiltration during smaller storm events.

4.1.2 Permeable Paving (Grasscrete Roads)

Permeable paving promotes the infiltration of rainwater through the surface and into to the underground storage void system before infiltrating into the ground. This offers an efficient means of intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium close to its source. Grasscrete roads are provided at the southern boundary of the site and north of the data centre building.

4.1.3 Filter Drains

Filter drains, by nature, provide storage capacity and promote infiltration into the ground. During high rainfall events e.g. 1:100 year storm event, surface water runoff will exceed the storage and infiltration capacity of the filter drains resulting in positive flows contributing to the downstream attenuation system.

4.2 Water Quantity

Surface water attenuation is to be provided to manage the volumes of surface water runoff generated within the proposed site such that flood risk is managed and there is no resultant increase in flood risk elsewhere.

4.2.1 Climate Change

In accordance with South Dublin County Council Climate Change Action Plan (2019-2024), a climate change allowance of 20% has been adopted for both attenuation storage and conveyance calculations.

4.2.2 Greenfield Runoff Rates

Criterion 2 of GDSDS Volume 2 (March 2005) specifies that the maximum allowable discharge from the proposed site will be restricted to greenfield runoff rates or 2l/s/ha. As per Appendix D (Section 2.4.5 of the Engineering Services Report Drainage and Water Services report), the maximum allowable discharge rate for the c. 1.9 ha proposed site is 4.00 l/s.

4.2.3 Surface Water Attenuation Storage and Discharge

Surface water runoff is required to be attenuated and contained within the site up to 1 in 100 year rainfall event (or 1% Annual Event Probability) with allowance for climate change. Thus, the resulting surface water attenuation storage provided is c. 941m^3 as outlined in Appendix D (Section 2.4.5 of the Engineering Services Report Drainage and Water Services report).

No storage allowance has been made for infiltration systems due to the Site Investigation concluding that the ground is unsuitable for storm water drainage and nature-based SuDS infiltration systems.

Attenuated flows will discharge at a controlled flow rate of 4.00 l/s by means of an online hydrobrake vortex control (refer to Appendix D, Section 2.4.5 of the Engineering Services Report Drainage and Water Services report).

4.3 Water Quality

4.3.1 Treatment Train Approach

In order to satisfy the Water Quality SuDS Design criterion, a 'Treatment Train' approach is adopted. This requires several SuDS systems in series in order to have sufficient pollutant removal efficiency to treat runoff prior to discharging to the surface water network. This is in accordance with CIRIA SuDS Manual C753.

The following treatment stages have been provided for roof and road runoff:

Road Runoff:

Where practicably possible, road runoff is subjected to no less than a 2-Stage treatment process: Stage 1 – treatment within the swale and Stage 2 – treatment within the bypass petrol inceptor.

Roof Runoff:

Roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator (see Appendix D, Section 2.4.3 of the Engineering Services Report Drainage and Water Services report).

4.3.2 Pollution Prevention Measures

Petrol and oil interceptors are proposed in areas where there is risk of pollution by petrol, oil, silt, or other suspended materials. In accordance with European Standards pr EN 858: Parts 1 & 2 and Pollution Prevention Guidelines PPG3, all surface car parks shall be fitted with a Class I Light Liquid Separator before discharging to the surface water network.

Silt traps are proposed upstream of the attention tank, as a final pollution measure to screen rubbish, debris and sediment. This reduces the risk for a reduction in storage capacity over time, mitigating the potential for flooding.

4.4 Amenity and Biodiversity

Amenity relates to the usefulness and appearance of SuDS features and considers multi-functionality and visual quality. Key amenity elements include:

- Legibility – The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see Appendix G).
- Accessibility – all parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
- Multi-functionality and visual character – The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.

Biodiversity considerations provide habitat and connectivity within and around the proposed development. Surface water conveyance and open SuDS features such as the proposed swales, incorporated into the overall landscape site layout plan, provide topographical diversity and implicitly provide connectivity and habitat opportunities.

5 South Dublin County Council SuDS Checklist

Table 1 – SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide Designer's Checklist

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
1. Data gathering				
1.1	Information to understand site parameters including geology, topography, flood risk, utilities, landscape context, community and wildlife.	To understand site constraints that inform Concept Design.	Yes	The following were conducted: - Site Investigation (See Appendix A for Borehole and Trial Pit Logs and Appendix B for Infiltration Test Results.) - Topographical Survey (See Appendix H for Topographical Survey) - Flood Risk Assessment (See Appendix C for Site Specific Flood Risk Assessment) - 3rd Party Utility Search (inclusive of SDCC services)
1.2	Planning requirements that influence SuDS design.	To be aware of planning constraints that impact SuDS design.	Yes	In Section 2.6 of this report, the following planning constraints were identified: - Citywest Business Campus landscaping requirement (landscaped berms serving as screens are to be provided to the western and northern site boundaries of the proposed site and are to be maintained at the southern site boundary). - Irish Water onsite water storage requirement as per Confirmation of Feasibility CDS22003496 (a volume allowance of 3,257 m^3 is required).
2. Flow route analysis				
2.1	Existing flow routes	To understand site hydrology.	Yes	The site generally falls from southwest to northeast with ground levels varying between 108.56 to 102.16 metres Ordnance Datum (m OD).
2.2	Modified flow routes	To understand the impact of development.	Yes	The modified flow route provides the necessary conveyance, overflow arrangements and exceedance criteria based on the proposed site layout whilst ensuring the natural hydrology of the site is maintained.
3. General SuDS design elements				
3.1	Collection of rainfall runoff	Runoff retained at or near the surface.	Yes	Taking into account the insufficient infiltration outlined in the Site Investigation (See Appendix B) and the planning constraints listed in **Checklist Reference 1.2**, surface water runoff is retained at or near the surface where practicably possible.

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
3.2	Source control	Primary treatment stage to protect the development.	Yes	Permeable surfaces (i.e. grasscrete roads), filter drains and swales have been provided.
3.3	Conveyance	At or near the surface.	Yes	Surface conveyance is used where practicably possible given the planning constraints listed in **Checklist Reference 1.2**.
3.4	Management train	SuDS components in series to manage quantity and quality.	Yes	Where practicably possible, road runoff is subjected to no less than a 2-stage treatment process: stage 1 – treatment within the swale and stage 2 – treatment within the bypass petrol inceptor. Whereas roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator.
3.5	Sub-catchments	Dividing development into discreet parcels of land each with a SuDS component.	Yes	Where practicably possible grasscrete roads, filter drains and swales have been provided given the planning site constraints listed in **Checklist Reference 1.2**. These elements intercept and treat the runoff prior to entering the overall attenuation for the entire catchment
3.6	Storage	Indicate extent and location where runoff is stored.	Partially	Taking into account the planning constraints listed in **Checklist Reference 1.2**, it is not practicably possible to provide a long-term SuDS storage structure with a total volume of 941 m^3 including freeboard (see Appendix D, Section 2.4.5 of the Engineering Services Report Drainage and Water Services report for the volume calculation). In order to attenuate runoff for the 1 in 100 year storm event + 20% climate change, an attenuation storage tank as outlined in Appendix D, Engineering Services Report Drainage and Water Services report.
3.7	Flow control	Location to demonstrate storage location.	Yes	A hydrobrake is provided downstream of the concrete storage tank (see Appendix D, Section 2.4.5 of the Engineering Services Report Drainage and Water Services report).
3.8	Outfall	Locations and method discharge.	Yes	Attenuated flows are discharged from the hydrobrake manhole into the tie-in existing manhole located at the northeast site boundary before outfalling into the Kingswood Stream circa 65m east of the site. (See Appendix D, Section 2 of the Engineering Services Report Drainage and Water Services report).

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
4. Quantity				
4.1	Confirm interception losses will occur.	Demonstrate the use of SuDS components that provide interception losses.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads, filter drains and swales - Non-SuDS related losses: full retention separator and bypass separator (See Appendix D, Section 2 of the Engineering Services Report Drainage and Water Services).
4.2	Confirm how rate of flow from development will be reduced to Greenfield runoff rates	Demonstrate restricted flow rates are achievable. Increase in allowable discharge rates where direct discharge is made to estuary or sea will only be permitted in agreement with SDCC Drainage Department.	Yes	The area for the proposed development site is c.1.9 ha thus the allowable discharge rate to meet Greenfield runoff is 4.00 l/s. Discharge from the site will be controlled by means of an online hydrobrake vortex control (see Appendix D, Section 2.4.3 of the Engineering Services Report Drainage and Water Services report).
4.3	Confirm how runoff will be managed to Greenfield runoff volumes.	Demonstrate that scale of SuDS will be sufficient to deal with volumes generated.	No	Given the planning constraints listed in **Checklist Reference 1.2** and service congestion, there is insufficient space for the proposed SuDS components to sufficiently manage surface water runoff to Greenfield runoff volumes. Therefore, storage and a flow control has been provided as per **Checklist Reference 3.6** and **3.7**.
4.4	Confirm climate change allowance and whether urban creep is applied.	Demonstrate additional volumes to be managed.	Yes	In accordance with South Dublin County Council Climate Change Action Plan (2019-2024), a climate change allowance of 20% has been adopted. See Windes Surface Water Drainage Calculations in Appendix I.
4.5	Confirm 'long term storage'.	Demonstrate no increase in runoff from pre-development status.	Yes	As per **Checklist Reference 3.6** and **3.7**, long term storage with a total volume of 940.957 m^3 and a downstream online hydrobrake vortex control with allowable discharge of 4.00 l/s is provided to ensure that Greenfield runoff rate is not exceeded. See Windes Surface Water Drainage Calculations in Appendix I., demonstrating no increase in runoff during the critical storm.
5. Quality				
5.1	Confirm 'treatment stage' requirements.	Demonstrate SuDS components used in series to mitigate 'pollution hazard level'.	Yes	Where practicably possible, road runoff is subjected to no less than a 2-Stage treatment process: Stage 1 – treatment within the swale and Stage 2 – treatment.

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
5.2	Confirm source control is present.	Demonstrate protection of development to enable amenity and biodiversity benefits.	Yes	Where practicably possible, source control such as permeable surfaces, filter drains and swales provide the first stage of treatment, intercepting primary pollution and reducing runoff flow rates.
5.3	Confirm interception losses.	Demonstrate everyday pollution retained on site.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads, filter drains and swales - Non-SuDS related losses: full retention separator and bypass separator (See Appendix D, Section 2 of the Engineering Services Report Drainage and Water Services report).
6. Amenity				
6.1	Legibility	An understanding of how the SuDS function by people using or managing the site.	Yes	The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see Appendix G).
6.2	Accessibility	All parts of the SuDS easily reached and safe for recreation and maintenance. Safety by design.	Yes	All parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
6.3	Multi-functionality	All parts of the SuDS landscape usable whenever possible.	Yes	The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.
6.4	Visual character	All elements of the SuDS design attractive (or at least visually neutral, e.g., inlets, outlets, and control structures) and safe.	Yes	Refer to **Checklist Reference 6.4**.
7. Biodiversity				
7.1	Clean water	A controlled flow of clean water' within and outside the site using 'source control' and the 'management train'	Yes	Surface water conveyance and open SuDS features such as the proposed swales, incorporated into the overall landscape site layout plan, provide topographical diversity and implicitly provide connectivity and habitat opportunities.

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
7.2	Connectivity	Links to outside and within development to ensure plants and animals can travel between habitat areas.	Yes	Refer to **Checklist Reference 7.1**.
7.3	Topographical diversity	Variable vertical and horizontal structures for complex habitat development.	Yes	Refer to **Checklist Reference 7.1**.
7.4	Habitat creation	Exploit opportunities through ecological design.	Yes	Refer to **Checklist Reference 7.1**.
7.5	Sympathetic management	Create a mosaic of habitat types through maintenance.	No	Due to planning constraints, the site serves as a connector providing habitat opportunities through incorporating the proposed SuDS components into the overall landscaping and provision of applicable maintenance.

6 Conclusion

The existing site characteristics (such as geology, topography, flood risk and utilities) and the applicable planning requirements (i.e. landscaping berms at the northing and western boundaries of the site and provision of a water storage tank approximately 1,122 m^2 in planned area) that influence the overall SuDS strategy and design have been identified. The natural hydrology of the site has been investigated through flow route analysis in order to understand the impact of the proposed development.

Subsequently, the strategy for managing SuDS and surface water runoff was developed. SuDS components have been provided to control runoff frequency, flow rates, volumes and reduce concentrations of contaminants to acceptable levels. The proposed treatment train approach assures that both runoff quantity and quality are addressed through the overall techniques of pollution prevention and source control, whilst maximising the benefits of amenity and biodiversity.

The proposed strategy aligns with the provisions of the South Dublin County Council (SDCC) Development Plan 2022-2028 and the requirements as outlined in the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022) as far as practicably possible.

Appendix A Borehole and Trial Pit Logs

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH01**

Contract:	DUB21 - Citywest	Easting:	705707.820	Date Started:	18/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728193.601	Date Completed:	23/08/2022
Client:	K2 Data Centres	Elevation:	106.07	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.		106.0	105.87						
0.5	0.60	MADE GROUND: light brown grey slightly sandy slightly gravelly silty clay with medium cobble content and some plastic bag fragments.		105.5	105.47						
1.0		Stiff brown grey slightly sandy gravelly silty CLAY with low cobble content.		105.0		N=28 (2,5/6,6,7,9) B / 1.00					
	1.30				104.77						
1.5		Very stiff grey slightly sandy gravelly silty CLAY with low cobble content.		104.5							
2.0				104.0		N=31 (4,6/7,7,9,8) B / 2.00					
2.5				103.5							
	2.80				103.27						
3.0		Very stiff black slightly sandy gravelly silty CLAY with high cobble content.		103.0		N=43 (4,7/10,11,11,11) B / 3.00					
3.5	3.50	Obstruction - boulders.		102.5	102.57	B / 3.50					
	3.80				102.27	50 (25 for 5mm/50 for 5mm)					
4.0		Open hole drilling: driller reports returns of sandy gravelly silty clay with high cobble and boulder content.		102.0							
4.5				101.5							
5.0	5.10			101.0	100.97						
5.5		Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<6mm thick). Fresh weathering state.		100.5		5.10 - 6.10	92	50	16	Ni	
		Discontinuities - non-intact.									
6.0		*Discontinuities - smooth to rough, planar to undulating, tight to open, sub-horizontal and 30-40°, occasionally 70° dip, clean with occasional brown and grey staining.*		100.0							
6.5				99.5		6.10 - 7.10	95	95	73	7	
7.0				99.0							
	7.20				98.87						
7.5		Very strong light grey thickly bedded muddy LIMESTONE with many fossils and some calcite veins (<12mm thick). Fresh weathering state.		98.5		7.10 - 8.10	95	95	56		
8.0	8.10			98.0	97.97						
		End of Corehole at 8.10m									
8.5				97.5							
9.0				97.0							
9.5				96.5							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
3.50	3.80	01:30				18/08	3.80	Dry				0.00	8.10	Arisings	Cable percussive borehole terminated at 3.80mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH02**

Contract:	DUB21 - Citywest	Easting:	705733.750	Date Started:	19/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728169.612	Date Completed:	24/08/2022
Client:	K2 Data Centres	Elevation:	106.08	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.		106.0	105.88						
0.5	0.70	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and trace of plastic bag fragments.		105.5	105.38						
1.0	1.30	Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		105.0	104.78	N=26 (2,5/5,7,7,7) B / 1.00					
1.5		Very stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content.		104.5							
2.0				104.0		N=43 (2,5/9,11,11,12) B / 2.00					
2.5				103.5							
3.0	3.10			103.0	102.98	B / 2.80					
	3.20	Obstruction - boulders. Open hole drilling: driller reports returns of sandy gravelly silty clay with high cobble and boulder content.		102.5	102.88	50 (25 for 85mm/50 for 10mm) 50 (25 for 5mm/50 for 5mm)					
4.0	4.00	Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<15mm thick) and abundant fossils. Fresh to slightly weathered. *Discontinuities - smooth to rough, planar to slightly undulating and stepped, tight to open, sub-horizontal and 20-30° dip, clean with occasional grey staining.*		102.0	102.08	4.00 - 5.00	92	73	51	4 Ni 8	
5.0				101.5							
5.5	5.40	Moderately weak dark grey calcareous MUDSTONE interbedded with strong to very strong light grey muddy LIMESTONE. Fresh to slightly weathered, occasionally highly weathered. *Discontinuities - smooth to rough, planar, occasionally stepped, tight to open, sub-horizontal and 20-30° dip, clean with occasional grey staining.*		101.0	100.68	5.00 - 6.00	91	91	61		
6.0				100.5						7	
6.5				100.0		6.00 - 7.00	94	94	65		
7.0	7.00	End of Corehole at 7.00m		99.5	99.08						
7.5				99.0							
8.0				98.5							
8.5				98.0							
9.0				97.5							
9.5				97.0							
				96.5							

Chiselling:

From:	To:	Time:
3.10	3.20	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
19/08	3.20	Dry

Installations:

From:	To:	Pipe:
0.00	2.00	Solid
2.00	3.20	Slotted

Backfill:

From:	To:	Type:
0.00	1.80	Bentonite
1.80	3.20	Gravel
3.20	4.00	Bentonite
4.00	7.00	Arisings

Remarks:

Cable percussive borehole terminated at 3.20mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH03**
Contract:	DUB21 - Citywest	Easting:	705740.130	Date Started:	22/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728202.095	Date Completed:	23/08/2022
Client:	K2 Data Centres	Elevation:	105.72	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.		105.5	105.52						
0.5		MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic bag fragments.									
	0.80	Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		105.0	104.92	N=17 (2,2/3,4,5,5) B / 1.00					
1.0				104.5							
1.5	1.50	Very stiff brown slightly sandy gravelly silty CLAY with medium cobble content.			104.22						
				104.0		N=30 (5,6/7,7,8,8) B / 2.00					
2.0				103.5							
2.5				103.0							
	2.90	Obstruction - boulders.			102.82	B / 2.90					
3.0	3.00	Open hole drilling: driller reports returns of sandy gravelly silty clay with high cobble and boulder content.		102.5	102.72	50 (25 for 10mm/50 for 5mm)					
	3.40	Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<30mm thick) and abundant fossils. Fresh to slightly weathered.			102.32						
3.5		*Discontinuities - smooth to rough, planar to undulating, tight to open, sub-horizontal, occasionally 60-70° dip, clean with occasional grey staining.*		102.0		3.40 - 4.40	95	93	40	13	
4.0											
4.5		*Discontinuities - smooth to rough, planar to undulating, tight to open, sub-horizontal and 20-30° dip, clean with occasional grey staining.*		101.5							
				101.0		4.40 - 5.40	97	91	59		
5.0				100.5							
5.5				100.0		5.40 - 6.40	96	94	80	6	
6.0				99.5							
	6.40	End of Corehole at 6.40m			99.32						
6.5				99.0							
7.0				98.5							
7.5				98.0							
8.0				97.5							
8.5				97.0							
9.0				96.5							
9.5				96.0							

Chiselling:

From:	To:	Time:
1.80	2.00	01:00
2.90	3.00	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
22/08	3.00	Dry

Installations:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
0.00	6.40	Arisings

Remarks:

Cable percussive borehole terminated at 3.00mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH04**

Contract:	DUB21 - Citywest	Easting:	705756.110	Date Started:	23/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728235.641	Date Completed:	24/08/2022
Client:	K2 Data Centres	Elevation:	104.87	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.10	MADE GROUND: grey silty sandy gravel.			104.77						
0.5	0.60	MADE GROUND: grey brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic fragments.		104.5	104.27						
1.0		Firm brown slightly sandy gravelly silty CLAY with low cobble content.		104.0		N=11 (1,2/2,2,3,4) B / 1.00					
1.5	1.50			103.5	103.37						
2.0		Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		103.0		N=15 (1,2/3,4,4,4) B / 2.00					
2.5				102.5							
	2.80				102.07						
3.0		Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content.		102.0		N=29 (3,5/7,8,7,7) B / 3.00					
3.5				101.5							
4.0	4.00			101.0	100.87	50 (25 for 50mm/50 for 25mm)					
	4.10	Obstruction - weathered bedrock.			100.77						
4.5		Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<20mm thick) and abundant fossils. Fresh to slightly weathered.		100.5		50 (25 for 5mm/50 for 10mm) 4.10 - 5.10	96	68	68	5	
5.0		*Discontinuities - smooth to rough, planar to slightly undulating, tight to open, sub-horizontal, occasionally 70-80° dip, clean with occasional brown and grey staining and clay infill.*		100.0							
5.5		*Discontinuities - smooth to rough, planar to slightly undulating, occasionally stepped, tight to open, 20-30° and 70-80° dip, clean with occasional grey staining and clay infill.*		99.5		5.10 - 6.10	97	75	62	8	
	5.90			99.0	98.97						
6.0		Moderately weak dark grey calcareous MUDSTONE interbedded with strong to very strong light grey muddy LIMESTONE with occasional calcite veins (<1mm thick) and occasional fossils. Fresh to slightly weathered, occasionally moderately weathered.		98.5		6.10 - 7.10	96	95	60		
6.5				98.0							
7.0	7.10				97.77						
		End of Corehole at 7.10m		97.5							
7.5				97.0							
8.0				96.5							
8.5				96.0							
9.0				95.5							
9.5				95.0							

Chiselling:

From:	To:	Time:
2.80	3.00	01:00
4.00	4.10	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
23/08	4.10	Dry

Installations:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
0.00	7.10	Arisings

Remarks:

Cable percussive borehole terminated at 4.10mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH05**

Contract:	DUB21 - Citywest	Easting:	705780.690	Date Started:	22/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728185.757	Date Completed:	26/08/2022
Client:	K2 Data Centres	Elevation:	105.65	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.		105.5	105.45						
0.5	0.70	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and trace of plastic bag fragments.		105.0	104.95						
1.0		Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		104.5		N=15 (1,2/3,4,4,4) B / 1.00					
1.5	1.40	Stiff becoming very stiff brown slightly sandy gravelly silty CLAY with medium cobble content.		104.0	104.25						
2.0				103.5		N=23 (4,4/5,5,6,7) B / 2.00					
2.5				103.0							
3.0				102.5		N=41 (7,8/8,10,11,12) B / 3.00					
3.5	3.60	Obstruction - boulders.		102.0	102.05						
	3.80	Open hole drilling: driller reports returns of sandy gravelly silty clay with high cobble and boulder content.		101.5	101.85	50 (25 for 10mm/50 for 5mm)					
4.0				101.0							
4.5											
5.0	5.00	Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with some calcite veins (<8mm thick) and occasional fossils. Fresh to slightly weathered, occasionally moderatley weathered.		100.5	100.65	5.00 - 6.00	93	41	16	7	
5.5		*Discontinuities - rough, planar to slightly undulating, tight to open, sub-horizontal and 45° dip, surfaces stained grey with some clay infill.*		100.0							
6.0		*Discontinuities - non-intact.*		99.5						Ni	
6.5		*Discontinuities - rough, planar to undulating, tight to open, 45° and subvertical dip, surfaces stained grey with some clay infill.*		99.0		6.00 - 7.00	95	46	42	2	
7.0		*Discontinuities - non-intact.*		98.5						Ni	
7.5		*Discontinuities - rough, planar, tight to open, sub-horizontal dip, surfaces stained brown and grey.*		98.0		7.00 - 8.00	95	54	40	8	
8.0	8.00	End of Corehole at 8.00m		97.5	97.65						
8.5				97.0							
9.0				96.5							
9.5				96.0							

Chiselling:

From:	To:	Time:
2.30	2.50	01:00
3.60	3.80	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
22/08	3.80	Dry

Installations:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
0.00	8.00	Arisings

Remarks:

Cable percussive borehole terminated at 2.80mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH06**
Contract:	DUB21 - Citywest	Easting:	705795.161	Date Started:	23/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728213.880	Date Completed:	25/08/2022
Client:	K2 Data Centres	Elevation:	105.35	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.			105.15						
0.5		MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and some rope and plastic bag fragments.		105.0							
	0.90			104.5	104.45						
1.0		Stiff brown slightly sandy gravelly silty CLAY with low cobble content.				N=18 (2,2/4,5,4,5) B / 1.00					
1.5				104.0							
	1.80			103.5	103.55						
2.0		Stiff becoming very stiff brown slightly sandy gravelly silty CLAY with medium cobble content.				N=24 (2,4/5,6,6,7) B / 2.00					
2.5				103.0							
				102.5							
3.0						50 (25 for 35mm/50 for 30mm) B / 3.00					
3.5				102.0							
	3.80			101.5	101.55						
	3.90	Obstruction - boulders.			101.45	50 (25 for 5mm/50 for 5mm)					
4.0		Open hole drilling: driller reports returns of sandy gravelly silty clay with high cobble and boulder content.									
	4.20			101.0	101.15						
4.5		Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<12mm thick) and occasional fossils. Fresh to slightly weathered.				4.20 - 5.20	94	83	49	8	
5.0		*Discontinuities - smooth to rough, planar to slightly undulating and stepped, tight to open, sub-horizontal and 30-40°, occasionally sub-vertical dip, surfaces stained grey or brown, occasionally clean.*		100.5							
5.5				100.0		5.20 - 6.20	90	86	70		
6.0				99.5							
	6.10				99.25						
6.5		Moderately weak dark grey calcareous MUDSTONE interbedded with strong to very strong light grey muddy LIMESTONE with occasional calcite veins (<3mm thick). Fresh to slightly weathered.		99.0		6.20 - 7.20	97	97	31	12	
7.0		*Discontinuities - smooth to rough, planar to slightly undulating, tight to open, sub-horizontal, occasionally 70° dip, clean with occasional grey staining.*		98.5							
	7.20	End of Corehole at 7.20m			98.15						
7.5				98.0							
8.0				97.5							
8.5				97.0							
9.0				96.5							
9.5				96.0							
				95.5							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
3.00	3.20	01:00				23/08	3.90	Dry				0.00	7.20	Arisings	Cable percussive borehole terminated at 3.90mbgl.
3.80	3.90	01:30													

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH07**

Contract:	DUB21 - Citywest	Easting:	705807.060	Date Started:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728247.645	Date Completed:	25/08/2022
Client:	K2 Data Centres	Elevation:	103.60	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.		103.5	103.40						
0.5		MADE GROUND: brown slightly sandy slightly gravelly silty clay with high cobble and low boulder content and some concrete blocks and plastic bottle fragments.		103.0							
1.0	1.00	Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		102.5	102.60	N=22 (2,4/5,5,6,6) B / 1.00					
1.5	1.60	Very stiff brown slightly sandy gravelly silty CLAY with medium cobble content.		102.0	102.00						
2.0				101.5		N=36 (3,4/7,9,9,11) B / 2.00					
2.5				101.0							
3.0	2.80	Very stiff black slightly sandy gravelly silty CLAY with high cobble content.		100.5	100.80	50 (4,7/50 for 125mm) B / 3.00					
3.5				100.0							
4.0	3.80	Obstruction - weathered bedrock.			99.80						
	3.90	Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<1mm thick) and occasional fossils. Fresh to slightly weathered.		99.5	99.70	~~50 (25 for 10mm/50 for 5mm)~~ B / 4.00 3.90 - 4.90	97	92	74	6	
4.5		*Discontinuities - smooth to rough, planar to slightly undulating, tight to open, sub-horizontal, occasionally 70° dip, clean with occasional grey staining.*		99.0							
5.0		*Discontinuities - smooth to rough, planar to undulating, tight to open, sub-horizontal and 20-30°, occasionally sub-vertical dip, clean with occasional grey staining.*		98.5		4.90 - 5.90	95	84	60	12	
5.5				98.0							
6.0				97.5		5.90 - 6.90	95	89	72		
6.5				97.0							
7.0	6.90	End of Corehole at 6.90m		96.5	96.70						
7.5				96.0							
8.0				95.5							
8.5				95.0							
9.0				94.5							
9.5				94.0							

Chiselling:

From:	To:	Time:
3.30	3.40	01:00
3.80	3.90	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
25/08	3.90	Dry

Installations:

From:	To:	Pipe:
0.00	0.50	Solid
0.50	3.10	Slotted

Backfill:

From:	To:	Type:
0.00	0.20	Bentonite
0.20	3.10	Gravel
3.10	3.90	Bentonite
3.90	6.90	Arisings

Remarks:

Cable percussive borehole terminated at 3.90mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH08**

Contract:	DUB21 - Citywest	Easting:	705799.100	Date Started:	24/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728287.035	Date Completed:	26/08/2022
Client:	K2 Data Centres	Elevation:	103.25	Drilled By:	J. O'Toole / MEDL
Engineer:	Mitchell McDermott	Rig Type:	Dando 150 / Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
	0.20	TOPSOIL.			103.05						
0.5	0.70	MADE GROUND: dark grey slightly sandy slightly gravelly silty clay with high cobble content and some plastic fragments.		103.0	102.55						
1.0		Stiff brown slightly sandy gravelly silty CLAY with low cobble content.		102.5		N=18 (2,2/4,4,5,5) B / 1.00					
1.5				102.0							
2.0				101.5		N=15 (2,3/3,4,4,4) B / 2.00					
2.5				101.0							
	2.80	Stiff brown slightly sandy gravelly silty CLAY with medium cobble content.		100.5	100.45						
3.0				100.0		N=24 (4,5/7,5,5,7) B / 3.00					
3.5				99.5							
4.0	4.00	Very stiff black slightly sandy gravelly silty CLAY with high cobble content.		99.0	99.25	N=31 (4,5/6,8,9,8) B / 4.00					
4.5				98.5							
	4.80	Very strong light grey thickly bedded muddy LIMESTONE interbedded with moderately weak dark grey thinly laminated calcareous MUDSTONE with frequent calcite veins (<3mm thick) and occasional fossils. Fresh to slightly weathered.			98.45	~~50 (25 for 5mm/50 for 10mm)~~ B / 4.80 4.80 - 5.80	90	49	15	12	
5.0		*Discontinuities - smooth to rough, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal and sub-vertical dip, clean with occasional grey and brown staining.*		98.0							
5.5		*Discontinuities - smooth to rough, planar, occasionally stepped, tight to open, sub-horizontal, 20-30° and sub-vertical dip, clean with occasional grey and brown staining.*		97.5							
6.0				97.0		5.80 - 6.80	94	85	68		
6.5				96.5						5	
7.0				96.0		6.80 - 7.80	95	83	83		
7.5				95.5							
	7.80	End of Corehole at 7.80m			95.45						
8.0				95.0							
8.5				94.5							
9.0				94.0							
9.5				93.5							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
4.80	4.80	01:30				24/08	4.80	Dry				0.00	7.80	Arisings	Cable percussive borehole terminated at 4.80mbgl.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP01**
Contract:	DUB21 - Citywest	Easting:	705712.270	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728142.056	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	107.18	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.20 x 0.50 x 1.30	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	MADE GROUND: light brown grey slightly sandy slightly gravelly silty clay with medium cobble content and some plastic fragments.			107.08				
0.5				107.0		0.50	ES	MK07	
				106.5					
	0.80	Firm brown slightly sandy gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			106.38				
1.0						1.00	B	MK08	
						1.00	19mm	76kPa	
						1.00	19mm	86kPa	
				106.0		1.00	19mm	98kPa	
	1.30	Obstruction - possible boulders.			105.88				
		Pit terminated at 1.30m							
1.5									
				105.5					
2.0									
				105.0					
2.5									
				104.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP02**
Contract:	DUB21 - Citywest	Easting:	705708.870	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728179.278	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	106.26	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.90 x 0.50 x 2.10	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
	0.10	TOPSOIL.			106.16				
		MADE GROUND: light brown grey slightly sandy slightly gravelly silty clay with high cobble content and some timber fragments.		106.0					
0.5						0.50	ES	MK04	
	0.80			105.5	105.46				
		Firm becoming stiff brown slightly sandy gravelly clayey SILT with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).				1.00	B	MK05	
1.0						1.00	19mm	40kPa	
						1.00	19mm	62kPa	
						1.00	19mm	84kPa	
				105.0					
1.5									
				104.5					
2.0						2.00	B	MK06	
	2.10	Obstruction - possible boulders.			104.16				
		Pit terminated at 2.10m		104.0					
2.5									
				103.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP03**
Contract:	DUB21 - Citywest	Easting:	705700.720	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728211.285	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	106.19	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.90 x 0.50 x 2.20	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
	0.10	TOPSOIL.			106.09				
		MADE GROUND: light brown grey slightly sandy slightly gravelly silty clay with medium cobble content and some plastic bag fragments.		106.0					
0.5						0.50	ES	MK01	
						0.50	19mm	108kPa	
						0.50	19mm	114kPa	
				105.5		0.50	19mm	120kPa	
	0.80	Firm brown slightly sandy gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			105.39				
1.0						1.00	B	MK02	
				105.0					
1.5									
	1.70	Stiff brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		104.5	104.49				
2.0						2.00	B	MK03	
	2.20	Obstruction - possible boulders.		104.0	103.99				
		Pit terminated at 2.20m							
2.5									
				103.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP04**
Contract:	DUB21 - Citywest	Easting:	705749.590	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728179.967	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	105.93	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.60 x 0.50 x 2.20	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
	0.10	TOPSOIL.			105.83				
		MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and trace of plastic bag fragments.		105.5					
0.5						0.50	ES	MK09	
	0.70	Stiff brown sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			105.23				
				105.0					
1.0						1.00	B	MK10	
						1.00	19mm	66kPa	
						1.00	19mm	84kPa	
						1.00	19mm	92kPa	
				104.5					
1.5									
				104.0					
2.0						2.00	B	MK11	
	2.20	Obstruction - possible boulders. **Pit terminated at 2.20m**			103.73				
				103.5					
2.5									
				103.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP05**
Contract:	DUB21 - Citywest	Easting:	705732.080	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728221.237	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	105.51	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.40 x 0.50 x 1.80	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic bag fragments.			105.41				
0.5				105.0		0.50	ES	MK12	
	0.90	Stiff brown sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			104.61				
1.0				104.5		1.00 1.00 1.00 1.00	B 19mm 19mm 19mm	MK13 104kPa 110kPa 118kPa	
1.5				104.0					
	1.80	Obstruction - possible boulders.			103.71				
		Pit terminated at 1.80m							
2.0				103.5					
2.5				103.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP06**
Contract:	DUB21 - Citywest	Easting:	705776.100	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728196.737	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	105.65	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.90 x 0.50 x 1.70	Status:	FINAL

Level (mbgl) Depth	Stratum Description	Legend	Level (mOD) Depth	Samples / Field Tests Depth	Type	Result	Water Strike
0.10	TOPSOIL.		105.55				
	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and trace of plastic bag fragments.			0.50	ES	MK17	
0.70	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		104.95	1.00 1.00 1.00 1.00	B 19mm 19mm 19mm	MK18 44kPa 56kPa 62kPa	
1.20	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		104.45				
1.70	Obstruction - possible boulders. **Pit terminated at 1.70m**		103.95				

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP07**
Contract:	DUB21 - Citywest	Easting:	705760.850	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728232.054	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	104.91	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.60 x 0.50 x 2.10	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
	0.05	MADE GROUND: grey silty sandy gravel underlain by geotextile.			104.86				
		MADE GROUND: grey brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic fragments.		104.5					
0.5						0.50	ES	MK14	
	0.60				104.31				
		Firm becoming stiff brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).		104.0					
1.0						1.00	B	MK15	
						1.00	19mm	108kPa	
						1.00	19mm	110kPa	
						1.00	19mm	116kPa	
				103.5					
1.5									
				103.0					
2.0						2.00	B	MK16	
	2.10	Obstruction - possible boulders.			102.81				
		Pit terminated at 2.10m							
				102.5					
2.5									
				102.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP08**
Contract:	DUB21 - Citywest	Easting:	705825.280	Date:	26/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728184.271	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	105.24	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.80 x 0.50 x 2.50	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	MADE GROUND: brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic fragments.			105.14				
0.5				105.0		0.50	ES	MK30	
	0.60	Firm becoming stiff brown grey slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			104.64				
1.0				104.5		1.00	B	MK31	
						1.00	19mm	104kPa	
						1.00	19mm	110kPa	
				104.0		1.00	19mm	118kPa	
1.5									
				103.5					
2.0						2.00	B	MK32	
				103.0					
2.5	2.50	Obstruction - possible boulders.			102.74				
		Pit terminated at 2.50m		102.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP09**
Contract:	DUB21 - Citywest	Easting:	705804.620	Date:	26/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728202.527	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	104.94	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.30 x 0.50 x 1.10	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			104.84				
0.5				104.5		0.50	ES	MK33	
						0.50	19mm	112kPa	
						0.50	19mm	112kPa	
						0.50	19mm	116kPa	
1.0				104.0		1.00	B	MK34	
	1.10	Obstruction - possible boulders.			103.84				
		Pit terminated at 1.10m							
1.5				103.5					
2.0				103.0					
2.5				102.5					
				102.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP10**
Contract:	DUB21 - Citywest	Easting:	705782.260	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728210.036	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	105.84	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.90 x 0.50 x 2.10	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with medium cobble content and some rope and plastic bag fragments.			105.74				
0.5				105.5		0.50	ES	MK27	
						0.70	19mm	42kPa	
						0.70	19mm	58kPa	
				105.0		0.70	19mm	62kPa	
1.0									
	1.20	Firm grey brown sandy gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			104.64	1.20	B	MK28	
1.5				104.5					
				104.0					
	1.90	Stiff brown sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			103.94	2.00	B	MK29	
2.0	2.10	Obstruction - possible boulders.			103.74				
		Pit terminated at 2.10m							
				103.5					
2.5									
				103.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP11**
Contract:	DUB21 - Citywest	Easting:	705795.210	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728239.340	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	104.47	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	2.10 x 0.50 x 1.70	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.40	MADE GROUND: grey brown slightly sandy slightly gravelly silty clay with medium cobble content and some plastic bag, glass, timber and scrap metal fragments.			104.07				
0.5				104.0		0.50	ES	MK25	
1.0	1.00	Stiff brown sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).		103.5	103.47	1.10	19mm	54kPa	
						1.10	19mm	68kPa	
						1.10	19mm	72kPa	
1.5				103.0		1.50	B	MK26	
	1.70	Obstruction - possible boulders.			102.77				
		Pit terminated at 1.70m							
2.0				102.5					
2.5				102.0					
				101.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP12**
Contract:	DUB21 - Citywest	Easting:	705795.060	Date:	26/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728274.001	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	103.09	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.80 x 0.50 x 2.00	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
	0.10	TOPSOIL.		103.0	102.99				
		MADE GROUND: light brown slightly sandy slightly gravelly silty clay with low cobble content and some plastic bag fragments.							
0.5						0.50	ES	MK35	
	0.60	Firm becoming stiff brown slightly sandy gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).		102.5	102.49				
1.0						1.00	B	MK36	
						1.00	19mm	108kPa	
				102.0		1.00	19mm	86kPa	
						1.00	19mm	98kPa	
1.5									
				101.5					
2.0	2.00	Obstruction - possible boulders.			101.09	2.00	B	MK37	
		Pit terminated at 2.00m		101.0					
2.5									
				100.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP13**
Contract:	DUB21 - Citywest	Easting:	705817.510	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728234.002	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	104.46	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	2.70 x 0.50 x 2.80	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.10	MADE GROUND: brown slightly sandy slightly gravelly silty clay with high cobble and low boulder content and some concrete blocks and plastic bottle fragments.			104.36				
0.5				104.0		0.50	ES	MK21	
						0.50	19mm	62kPa	
						0.50	19mm	74kPa	
						0.50	19mm	88kPa	
1.0				103.5		1.00	B	MK22	
1.5				103.0					
2.0				102.5					
	2.30	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			102.16				
2.5	2.50	Stiff grey slightly sandy gravelly silty CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).		102.0	101.96	2.50	B	MK23	
						2.70	B	MK24	
	2.80	Obstruction - possible boulders.			101.66				
		Pit terminated at 2.80m		101.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP14**
Contract:	DUB21 - Citywest	Easting:	705812.790	Date:	25/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728256.914	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	103.15	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	4.10 x 0.50 x 1.20	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.		103.0					
	0.40	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			102.75	0.50	ES	MK19	
0.5						0.50	19mm	106kPa	
	0.60	Firm becoming stiff brown sandy gravelly clayey SILT with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 400mm diameter).			102.55	0.50	19mm	112kPa	
				102.5		0.50	19mm	86kPa	
1.0						1.00	B	MK20	
	1.20	Obstruction - possible boulders.		102.0	101.95				
		Pit terminated at 1.20m							
1.5				101.5					
2.0				101.0					
2.5				100.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6031	**Trial Pit Log**				Trial Pit No: **TP15**
Contract:	DUB21 - Citywest	Easting:	705810.810	Date:	26/08/2022
Location:	Kingswood Road, Cheeverstown, Dublin 24	Northing:	728282.723	Excavator:	JCB 3CX
Client:	K2 Data Centres	Elevation:	102.59	Logged By:	M. Kaliski
Engineer:	Mitchell McDermott	Dimensions (LxWxD) (m):	3.40 x 0.50 x 1.90	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.		102.5					
	0.10	MADE GROUND: dark brown grey silty very sandy gravel with high cobble content.			102.49				
	0.20	MADE GROUND: dark grey slightly sandy slightly gravelly silty clay with high cobble content and some plastic fragments.			102.39				
0.5				102.0		0.50	ES	MK38	
	0.70	Firm becoming stiff brown sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			101.89	0.80	19mm	78kPa	
						0.80	19mm	82kPa	
						0.80	19mm	86kPa	
1.0						1.00	B	MK39	
				101.5					
1.5				101.0					
	1.90	Obstruction - possible boulders.			100.69				
2.0		**Pit terminated at 1.90m**		100.5					
2.5				100.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Appendix B Infiltration Test Results

SOAKAWAY TEST

Project Reference:	6031
Contract name:	DUB21 - Citywest
Location:	Cheeverstown, Dublin 24
Test No:	SK01
Date:	24/08/2022

Ground Conditions

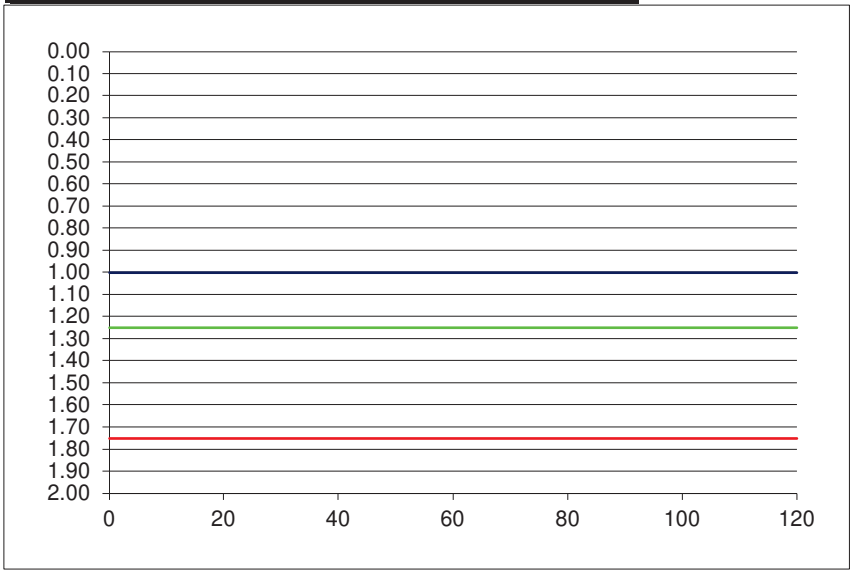
From	To	
0.00	0.10	TOPSOIL.
0.10	0.90	MADE GROUND: light brown slightly sandy slightly gravelly silty clay with low cobble content and some rope and plastic fragments.
0.90	2.00	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content.

Remarks:

Obstruction at 2.00mbgl - pit terminated and test undertaken.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.00
3.5	1.00
4	1.00
4.5	1.00
5	1.00
6	1.00
7	1.00
8	1.00
9	1.00
10	1.00
12	1.00
14	1.00
16	1.00
18	1.00
20	1.00
25	1.00
30	1.00
40	1.00
50	1.00
60	1.00
75	1.00
90	1.00
120	1.00

Pit Dimensions (m)		
Length (m)	2.50	m
Width (m)	0.50	m
Depth	2.00	m
Water		
Start Depth of Water	1.00	m
Depth of Water	1.00	m
75% Full	1.25	m
25% Full	1.75	m
75%-25%	0.50	m
Volume of water (75%-25%)	**0.63**	m3
Area of Drainage	**12.00**	m2
Area of Drainage (75%-25%)	**4.25**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

Project Reference:	6031
Contract name:	DUB21 - Citywest
Location:	Cheeverstown, Dublin 24
Test No:	SK02
Date:	24/08/2022

Ground Conditions

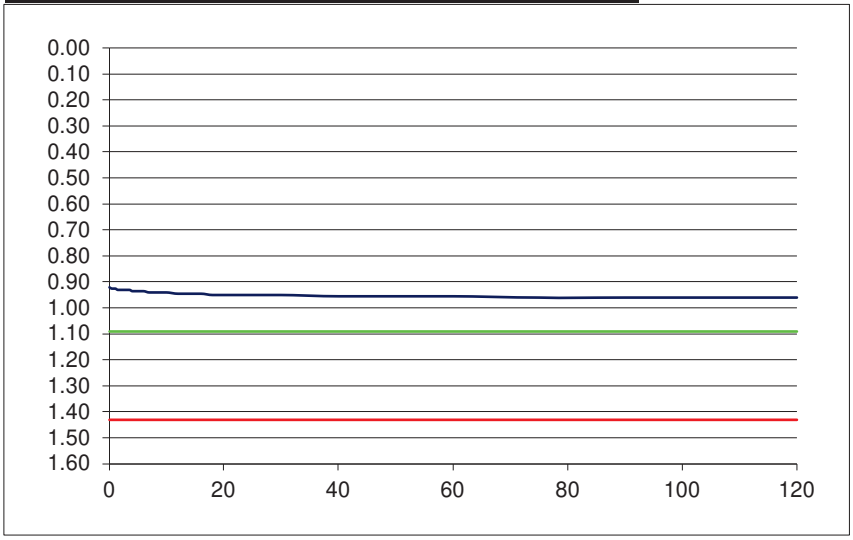
From	To	
0.00	0.30	TOPSOIL.
0.30	0.70	MADE GROUND: brown silty gravelly sand with medium cobble content and some plastic, timber, scrap metal and bottle fragments.
0.70	1.20	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.20	1.60	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content.

Remarks:

Obstruction at 1.60mbgl - pit terminated and test undertaken.

Elapsed Time (mins)	Fall of Water (m)
0	0.92
0.5	0.93
1	0.93
1.5	0.93
2	0.93
2.5	0.93
3	0.93
3.5	0.93
4	0.94
4.5	0.94
5	0.94
6	0.94
7	0.94
8	0.94
9	0.94
10	0.94
12	0.95
14	0.95
16	0.95
18	0.95
20	0.95
25	0.95
30	0.95
40	0.96
50	0.96
60	0.96
75	0.96
90	0.96
120	0.96

Pit Dimensions (m)		
Length (m)	2.90	m
Width (m)	0.65	m
Depth	1.60	m
Water		
Start Depth of Water	0.92	m
Depth of Water	0.68	m
75% Full	1.09	m
25% Full	1.43	m
75%-25%	0.34	m
Volume of water (75%-25%)	**0.64**	m3
Area of Drainage	**11.36**	m2
Area of Drainage (75%-25%)	**4.30**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

Project Reference:	6031
Contract name:	DUB21 - Citywest
Location:	Cheeverstown, Dublin 24
Test No:	SK03
Date:	24/08/2022

Ground Conditions

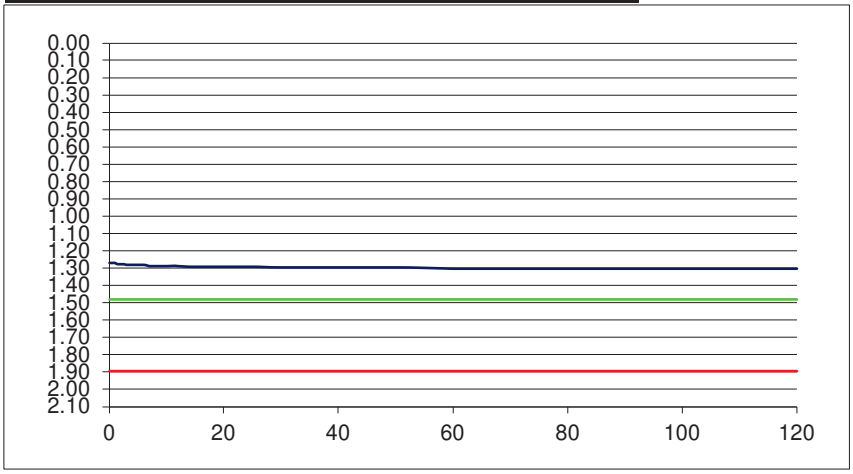
From	To	
0.00	0.10	TOPSOIL.
0.10	0.80	MADE GROUND: light brown sandy gravelly silty clay with high cobble and medium boulder content and some plastic fragments.
0.80	1.20	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content and some rootlets.
1.20	1.40	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.40	2.10	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content.

Remarks:

-

Elapsed Time (mins)	Fall of Water (m)
0	1.27
0.5	1.27
1	1.27
1.5	1.28
2	1.28
2.5	1.28
3	1.28
3.5	1.28
4	1.28
4.5	1.28
5	1.28
6	1.28
7	1.29
8	1.29
9	1.29
10	1.29
12	1.29
14	1.29
16	1.29
18	1.29
20	1.29
25	1.29
30	1.30
40	1.30
50	1.30
60	1.30
75	1.30
90	1.30
120	1.30

Pit Dimensions (m)		
Length (m)	3.10	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.27	m
Depth of Water	0.83	m
75% Full	1.48	m
25% Full	1.89	m
75%-25%	0.42	m
Volume of water (75%-25%)	**0.77**	m3
Area of Drainage	**15.54**	m2
Area of Drainage (75%-25%)	**4.93**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** m/min or **Fail** m/s

SOAKAWAY TEST

Project Reference:	6031
Contract name:	DUB21 - Citywest
Location:	Cheeverstown, Dublin 24
Test No:	SK04
Date:	24/08/2022

Ground Conditions

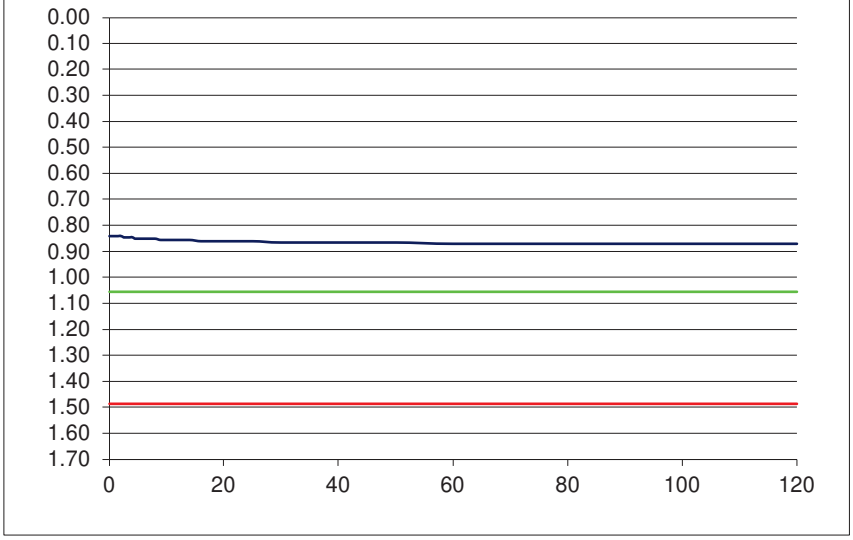
From	To	
0.00	0.30	TOPSOIL.
0.30	1.20	Firm light brown slightly sandy slightly gravelly silty CLAY with high cobble content.
1.20	1.70	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with high cobble and medium boulder content.

Remarks:

Obstruction at 1.70mbgl - pit terminated and test undertaken.

Elapsed Time (mins)	Fall of Water (m)
0	0.84
0.5	0.84
1	0.84
1.5	0.84
2	0.84
2.5	0.85
3	0.85
3.5	0.85
4	0.85
4.5	0.85
5	0.85
6	0.85
7	0.85
8	0.85
9	0.86
10	0.86
12	0.86
14	0.86
16	0.86
18	0.86
20	0.86
25	0.86
30	0.87
40	0.87
50	0.87
60	0.87
75	0.87
90	0.87
120	0.87

Pit Dimensions (m)		
Length (m)	2.70	m
Width (m)	0.60	m
Depth	1.70	m
Water		
Start Depth of Water	0.84	m
Depth of Water	0.86	m
75% Full	1.06	m
25% Full	1.49	m
75%-25%	0.43	m
Volume of water (75%-25%)	**0.70**	m3
Area of Drainage	**11.22**	m2
Area of Drainage (75%-25%)	**4.46**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = **Fail** **m/min** or **Fail** **m/s**

Appendix C Site Specific Flood Risk Assessment

Clifton Scannell Emerson Associates

Site Specific Flood Risk Assessment

Proposed K2 Data Centre Development

Client: K2 Strategic Infrastructure Ireland Ltd.

Date: 23rd May 2022

Job Number: 22_043

K2 DATA CENTRES

CONSULTING ENGINEERS

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

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Document Control Sheet

Project Name:	Proposed K2 Data Centre Development
Project Number:	22_043
Report Title:	Site Specific Flood Risk Assessment
Filename:	RPT-22_043-003 Site Specific Flood Risk Assessment

Issue No.	Issue Status	Date	Prepared by	Checked by
P01	DRAFT	23/05/2022	KB	CD
P02	PLANNING	14/07/2022	CD	CD

Table of Contents

1 Introduction

1.1 Background

CSEA was requested to undertake a Site Specific Flood Risk Assessment (SSFRA) to support the submission of a planning application by K2 Strategic Infrastructure Ireland Ltd for the proposed K2 data centre development at the junction of Kingswood Drive and Kingswood Road within Citywest Business Campus, Naas Road, Dublin 24.

The proposed development of a brownfield site of approximately 1.9 Hectares. The subject site is located at the junction of Kingswood Drive and Kingswood Road, within Citywest Business Campus, Naas Road, Dublin 24 which lies approximately 11km southwest of Dublin's city centre and is accessed from the N7, Old Naas Road and Kingswood Drive.

1.2 Development Description

The proposed development permitted under Reg. Ref.: SD18A/0301 comprises of the development of a two storey data centre with two storey administration spaces and associated plant spaces with a total permitted floor area of 11,548.5m^2, all associated site development works, landscaping, car parking and two vehicular entrances of Kingswood Drive and Kingswood Road.

The proposed development comprises amendments to the development permitted under Reg. Ref.: SD18A/0301. The proposed amendments comprise the following:

- Alterations to the permitted two storey data centre building including internal reconfiguration, alterations to finished floor levels, alterations to the building footprint to provide for the relocation of an internal staircore to the south of the building, and the replacement of the enclosed first floor level with an open screened roof mounted plant space (resulting in a reduction of 4,091 sq.m in the gross floor area (GFA) of the building).

- Associated alterations to the façade of the data centre building, including alterations to fenestration, cladding, step-out in the southern façade to accommodate a staircore, and a reduction in the eastern building parapet height of c. 2 metres.

- The provision of a canopy over the loading docks on the east facade.

- Alterations to the permitted generator compound, generators, and flues, including a reduction in the number of generators (5 no. now proposed), and provision of MV rooms within the generator compound.

- Provision of an ESB substation compound in the northeastern portion of the site, comprising a single storey substation building (with a GFA of c. 125 sq.m), 2 no. transformers, client control building (with a GFA of c. 47 sq.m), and associated access arrangements within a 2.6 metre high security fence. The ESB substation compound will be accessed from Kingswood Drive.

- Omission of the permitted sprinkler tank, pump room and 10kV Substation, reconfiguration of the permitted car parking, and revisions to permitted boundary treatments.

- Associated alterations to landscaping, access and internal road arrangements, services, lighting, and layout, and all associated and ancillary works.

The extent of the site layout is highlighted in Figure 1 below:-

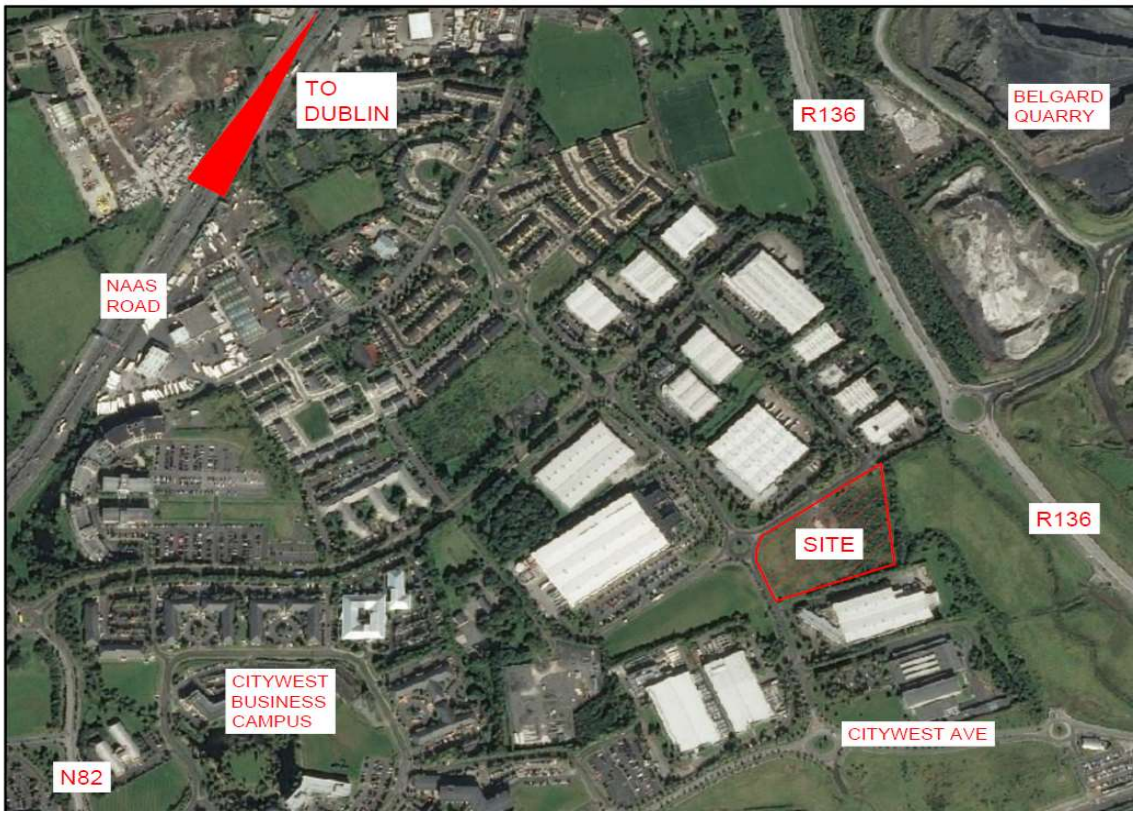


Figure 1 – Proposed Site Location Plan

1.3 Background Information

1.3.1 Catchment-based Flood Risk Assessment and Management

Catchment-based Flood Risk Assessment and Management (CFRAM) program has been implemented by the Office of Public Works (OPW) as a competent authority in Ireland for the EU floods directive. Over 29 Flood Risk Management Plans (FRMPs) have been prepared in coordination with the implementation of the Water Framework Directive (WFD). The FRMPs involved undertaking detailed engineering assessment and producing flood protection measures. The assessment addressed the potential impact of the proposed measures on waterbodies hydromorphology and quality status.

1.3.2 OPW Flood Guidelines for Planning Authorities

The purpose of The Planning System and Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009 (OPW Guidelines) is to introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process.

1.3.3 Objectives of OPW Guidelines

Floods can have broad range of impact on people, property, infrastructure and the environment. Flood can cause damage to the infrastructure including electricity and other utilities with significant detrimental impacts on local and regional economies. This may also cause long-term closure of businesses leading to economic loss other than the damage caused during the event. The core objectives of the OPW Guidelines include:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

1.3.4 Flood Risk Assessment FRA Key Concepts

For carrying out a Site-specific Flood Risk Assessment (SSFRA), the OPW Guidelines recommend using Source-Path-Receptor concept model to identify where the flood originates from, what is the floodwaters path and the areas in which assets and people might be affected by such flooding (section 2.18 of the OPW Guidelines, 2009). Figure 2 show a schematic representation of S-P-R model.

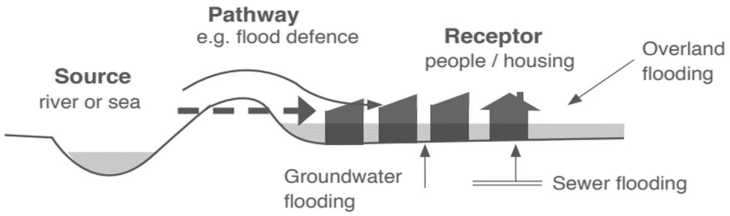


Figure 2 Source-Path-Receptor Model (extracted from OPW Guidelines, 2009)

The other key concept in flood management is the “Flood Risk”. it is “the combination of the likelihood of flooding and the potential consequences arising”. Consideration of flood risk must be addressed in terms of:

- The likelihood of flooding. Expressed as percentage probability or exceedance each year; and;
- The consequences of flooding as the associated hazard e.g. flood depth and velocity.

Flood risk is then expressed with the relationship:

Flood Risk = Likelihood of flooding x Consequences of flooding.

1.3.5 Flood Zones

Flood Zone is the spatial inundation area that fall within a range of likelihood of flooding. The OPW Guidelines specified three levels of flood zones:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% Annual Exceedance Probability (AEP) or 1 in 100 for river flooding or 0.5% AEP or 1 in 200 for coastal flooding);
Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 for coastal flooding);
Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in Zones A or B.

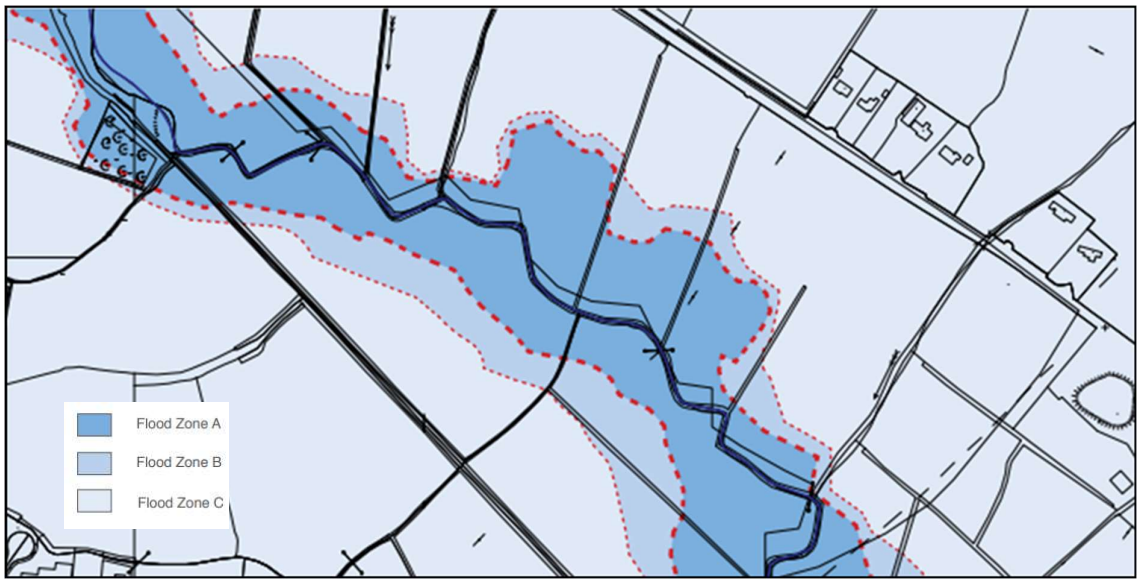


Figure 3 Example of the three flood risk zones (extracted from OPW Guidelines, 2009)

According to the OPW Guidelines, the planning implication of each of the zones mentioned above are:
Zone A - High probability of flooding. Most types of development would be considered inappropriate in this zone.
Zone B - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone
Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

1.3.6 Sequential Approach

Sequential approach is an important tool used in the planning process which gives preference to locate a new development in the Low Flood Risk Zone and ensures that it does not have an adverse impact of flooding.

According to the sequential approach, If the development lies within a Flood Zone, it is required to consider measures for mitigating flood impact to an acceptable level. It is also required to provide justifications and strategic reasons for locating a proposed development on a higher risk flood zone (see Figure 4 and 5 below).

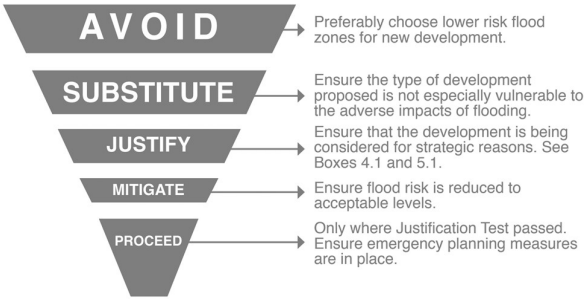


Figure 4 FRA Sequential Approach (extracted from OPW Guidelines, 2009)

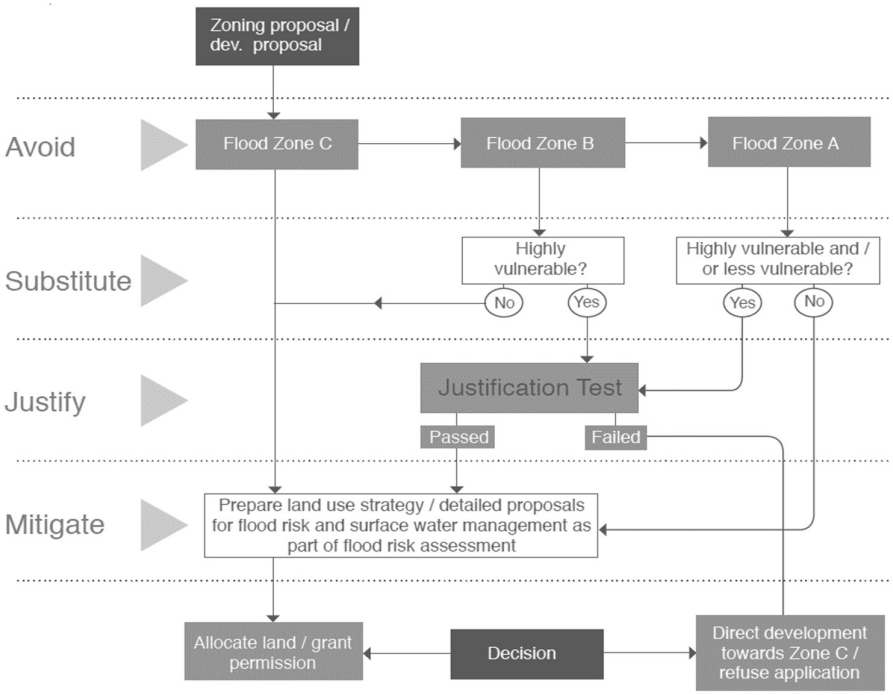


Figure 5 Sequential approach mechanism in the planning process (extracted from OPW Guidelines, 2009)

1.3.7 Development Classification

The OPW Guidelines provided three vulnerability categories based on the type of development which are:

- **Highly vulnerable:** This includes essential infrastructure, such as primary transport and utilities distribution, electricity generating power stations and sub-stations

- **Less vulnerable:** This category includes Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;
- **Water compatible:** Includes water-based flood control and recreational developments and other amenity open space, outdoor sports and recreation and essential facilities such as changing rooms.

The OPW Guidelines, as described in Section 2.2.4 of this report, sets out a sequential approach which makes use of flood risk assessment and classifies vulnerability of flooding of different types of development.

Table 3.2 of the OPW Guidelines illustrates those types of development that would be appropriate to each flood zone (reproduced in Table 1 below) and those that would be required to meet a Justification Test in accordance to Box. 5.1 in the Guidelines.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 1 Matrix of vulnerability versus flood zone (extracted from OPW Guidelines, 2009.

2 Stage 1 - Flood Risk Identification

2.1 General

In this stage of the FRA, we use the existing information to identify any flooding issues related to the site that may require any further investigation.

2.2 Source of Information

Information source reviewed for flood risk identification are listed in table 2 below:

	Information Source	Remarks
1	Information on watercourse and streams in the study area such as those available from OS Maps, EPA and GeoHive	An extract from EPA map viewer https://gis.epa.ie/PAMaps/; with active *stream* and *flow direction* layers in Figure 6 shows the Kingswood Stream running to the north east of the proposed site.
2	Irish Water Mapping	An extract from Irish Water mapping indicates the Kingswood Stream is culverted in an 1800mmø pipe to the east of the site which discharges to the ditch flowing north (See Figure 6A for details).
2	Predictive fluvial, coastal, pluvial and groundwater flood maps available on CFRAMS mapping obtained for the site from https://www.floodinfo.ie/map/floodmaps/	The proposed development is located outside the extents of the 1 in 1000 year (0.1% AEP). Refer to CFRAMS mapping in Appendix B.
3	Previous SDD Site Investigation Report (Information only)	Groundwater seepages identified in the Gravel Strata at depths ranging from 2.7m to 3.3m, locally 0.8m.

Table 2 Information Source Consulted

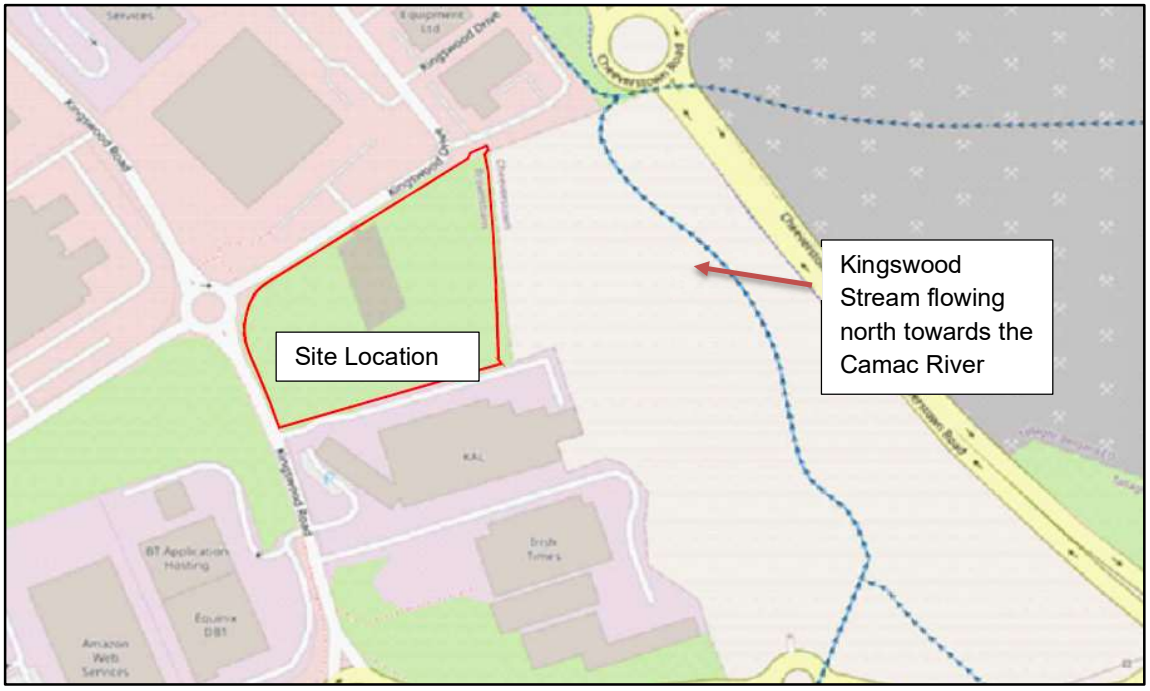


Figure 6 – Extract from EPA Mapping indicating location of Drainage Network adjacent to site

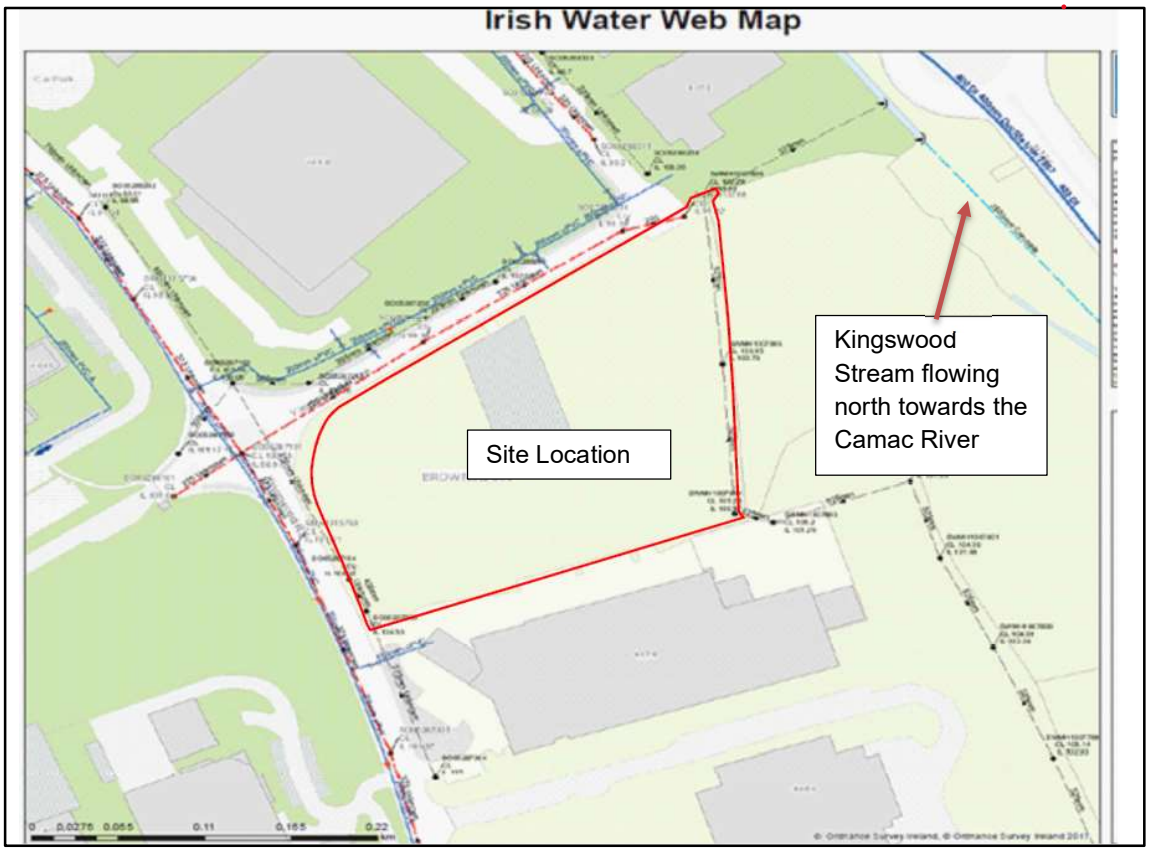


Figure 6A – Extract from Irish Water Mapping indicating location of Drainage Network adjacent to site

2.3 Source-Path Receptor

A Source-Pathway-Receptor model has been produced to assess the possible sources of floodwater and their likelihood, the pathways by which flood water reaches receptors and the receptors that could be affected by potential flooding, as summarized in Table 2 below.

Source	Path	Receptor	Likelihood	Impact	Risk
Tidal	Tidal flooding from coasts 6.5 km away from the site	People and Property (the proposed development).	Remote	High	Very Low
Fluvial	Flooding from the Santry River.	People and Property (the proposed development).	Remote - is not subject to flooding in the 1:1000 year event.	High	Very Low
Fluvial	Flooding from the existing ditches running through the site	People and Property (the proposed development).	Remote	High	Very Low
Pluvial/Surface Water	Flooding from surcharging of the development's proposed surface water network	People and Property (the proposed development).	Possible	High	Moderate
Pluvial/Surface Water	Flooding from rise in water levels in the attenuation basins'	People and Property (the proposed development).	Possible	High	Moderate
Ground Water	Rising GWL on the site	People and Property (the proposed development).	Possible	High	Moderate
Other Source	Flooding due to human or mechanical error in sizing of Petrol interceptor or the hydrobrake/ blockage at any drainage system component.	People and Property (the proposed development).	Possible	High	Moderate

Table 2 Source-Path-Receptor analysis

From the SPR analysis presented above, it is noted that the proposed development site is not subject to tidal (Coastal) or fluvial flooding and therefore very low risk of flooding. However, Moderate risk remains from internal drainage system service to the development.

3 Stage 2: Initial Flood Risk Assessment

3.1 Fluvial Flooding

OPW flood mapping for the site was reviewed – See extract from CFRAMS mapping (Refer to Appendix B) in Fig 7 below.

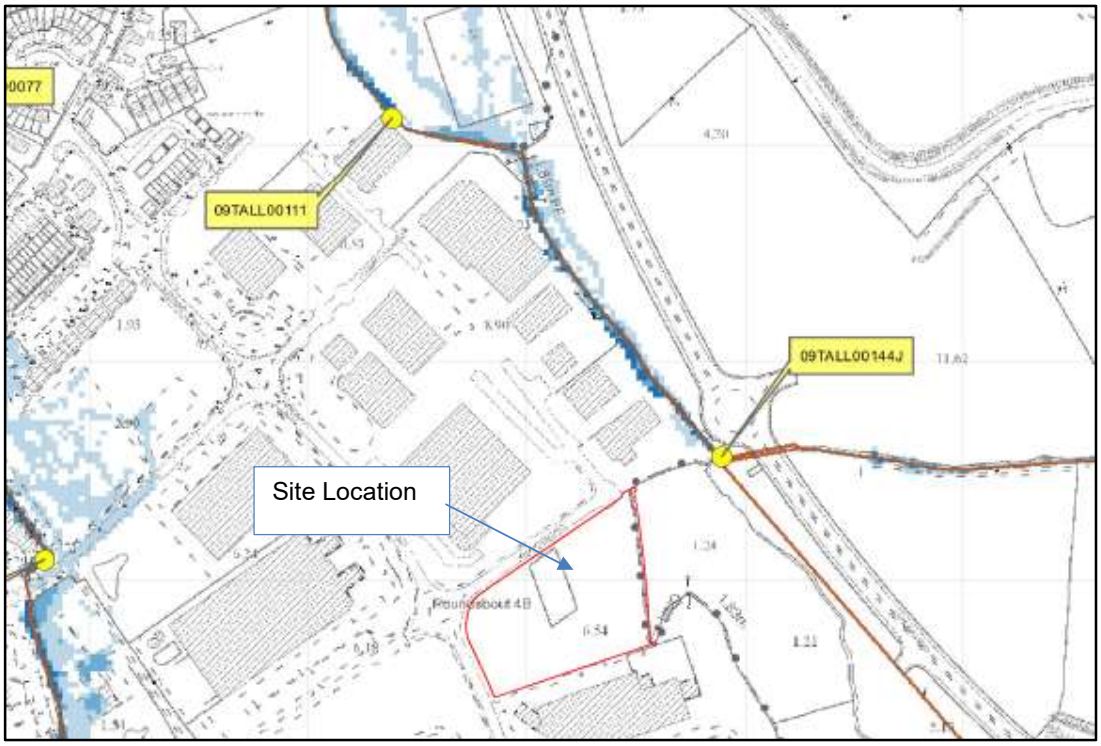


Fig 7 – OPW Flood Mapping CFRAMS

As can be seen above the site is not subject to flood in the 1:1000 year event (0.1% AEP) and falls within Flood Zone C.

There is no history of flood on the site. See extract from The Past Flood Event Local Area Summary Report in Fig 8 below which is included in Appendix C to this report.

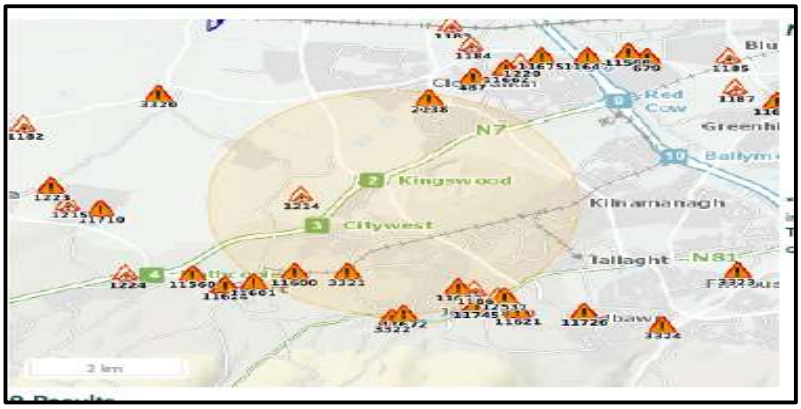


Fig 8 – Past Flood Events

3.2 Pluvial Flooding from Surface Water Drainage

The Source-Pathway-Receptor model presented in Stage 1 indicated the likelihood of Fluvial and Pluvial flooding types within the site. The identified risk of flooding in the study area is primarily associated with the future drainage networks service to the proposed development (see Figure 8).

The drainage system has a potential to cause local flooding unless it is designed in accordance with the regulations e.g. Greater Dublin Strategic Drainage Study (GDSDS) and to take account of flood 100-year storm return periods plus 20% allowance for climate change.

Proper operation and maintenance of the drainage system should be implemented to reduce the pluvial flood risk due to human/ mechanical error. Appendix A presents a proposed Operation and Maintenance O&M Plan for the drainage system in the development.

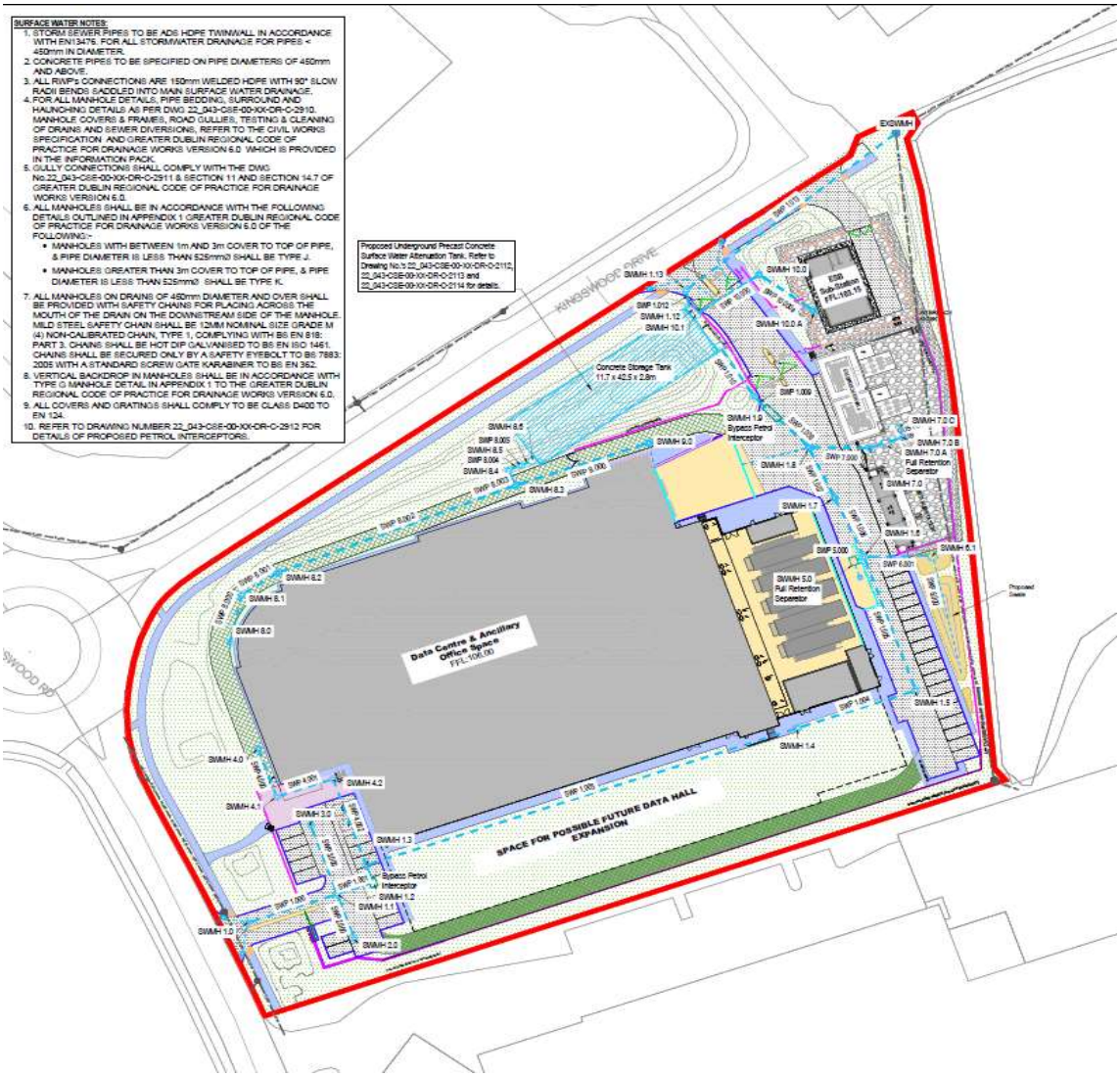


Fig 9 – Proposed Site Drainage Network

3.3 Ground Water Flooding

Based on historical preliminary geotechnical investigation on the site, ground water seepages identified in the Gravel Strata at depths ranging from 2.7m to 3.3m, locally at 0.8m. It should be noted that the FFL of Building is 106.00m, circa 1m above existing ground level at the eastern part of the building. During the site walkover survey, no marshy ground was observed. No groundwater wells or marsh areas are located within the site (based on review of information available on EPA and OSI websites). Therefore, the risk of groundwater flooding occurring at the site is considered negligible.

3.4 Flood Zone Category

Following the assessment of the flood risks to the site and the available information it is considered that the proposed site is located within Flood Zone C as per the OWP Guidelines and as indicated by the CFRAMS maps – refer to Appendix B. Therefore, the proposed development on the subject site is appropriate for this flood zone category, and a justification test is not required.

4 Conclusion

This Flood Risk Assessment for the proposed development was undertaken to the requirements of the OPW Guidelines, 2009, “Planning System and Flood Risk Management Guidelines for Planning Authorities”. Following the flood risk assessment stages, it was determined that the site is within Flood Zone C as defined by the Guidelines and based on the CFRAMS mapping. Therefore, the development on the subject site is appropriate for the site’s flood zone category and a justification test as outlined in the Guidelines is not required. The Guidelines sequential approach is met with the ‘Justify’ & ‘Mitigate’ principals being achieved. A regularly maintained drainage system would ensure that the network remains effective and in good working order should a large pluvial storm occur.

Appendix A Surface Water Operation and Maintenance (O&M) Activities

All operation and maintenance activities should be in accordance to the following guidelines:

- Greater Dublin Strategic Drainage Study GDSDS- Volume 3 – Environmental Management
- CIRIA 2015SuDS Manual, Part E - Chapter 32

Considerations for surface water O&M:

Requirement	Assessment/Action
***Maintenance access* – ensuring appropriate and long-term access to all points in the system where future maintenance may be required**	A standard minimum of 600mm diameter opening is provided for all manhole, chambers and treatment system. Removable gullies grate opening with a minimum size of 450mm X 320mm.
Forebays and/or appropriate pre-treatment structures to facilitate the sediment management process.	Service manholes are proposed upstream and downstream of the attenuation system. Road gullies and the petrol interceptor will also facilitate sediment management process.
Bypass systems or appropriate temporary drainage infrastructure for use if required during sediment management or other maintenance activities.	Not required
The availability of disposal areas for organic arisings (green waste) and sediments.	To be included as part of maintenance contract of the development.

Types of SuDS systems used that require O&M activities:

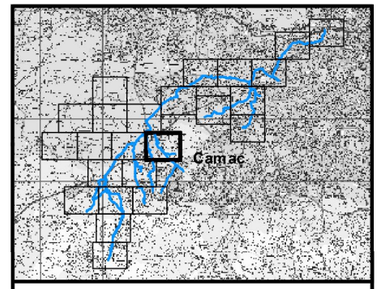
- **Detention Pond:** 3no. of proposed ponds.
- **Soakaway:** N/A.
- **Pervious Paving:** proposed permeable paving areas proposed within the development area
- **Treatment system:** proposed petrol interceptor as part of road and parking drainage system

O&M activities required as following:

Operation and maintenance activities	SuDS Component			
O&M Activities	Attenuation Tank	Soakaway	Pervious Paving	Treatment System
Regular maintenance				
Inspection	■	■	■	■
Litter/debris removal	■		■	
Grass cutting			■	
Weed/invasive plant control	■		■	
Shrub management			■	■
Shoreline vegetation management				
Aquatic vegetation management				
Occasional maintenance				
Sediment management	■	■	■	■
Vegetation/plant replacement				
Vacuum sweeping and brushing			■	
Remedial maintenance				
Structure rehabilitation/repair	□	□		□
Infiltration surface reconditioning		□		
■ Will be required				
□ May be required				

Appendix B CFRAMS Mapping

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09FORT00125	97.27	N/A	97.44	N/A	97.58	N/A
09FORT00077	92.89	N/A	93.1	N/A	93.26	N/A
09FORT00026	86.38	N/A	86.44	N/A	86.45	N/A
09TALL00017J	83.62	N/A	83.84	N/A	84.08	N/A
09TALL00068J	89.84	N/A	90.04	N/A	90.27	N/A
09TALL00144J	100.16	0.10	100.43	0.18	100.76	0.31
09TALL00111	94.41	N/A	94.71	N/A	95	N/A
09CHEE00051J	103.05	1.83	103.24	3.37	103.51	5.97



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Wall
- Defended Area
- 1% AEP — Standard of Protection of Flood Defence (Walls / Embankments)
- Node Point
- Node ID — Node Label
- Outline of the Site Subject to this application

FINAL

REV:	NOTE	DATE:
01	SOP label updated (Pg 21) Removal of Def. Area (Pg 21)	13/11/2017

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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Map:
Camac Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	C.McG. Date : 13 November 2017
Checked By :	A.S. Date : 13 November 2017
Approved By :	S.P. Date : 13 November 2017
Drawing No. :	E09CAM_EXFCD_F1_11
Map Series :	Page 11 of 24
Drawing Scale :	1:5,000 @A3

0 50 100 200 300 400 500 Metres

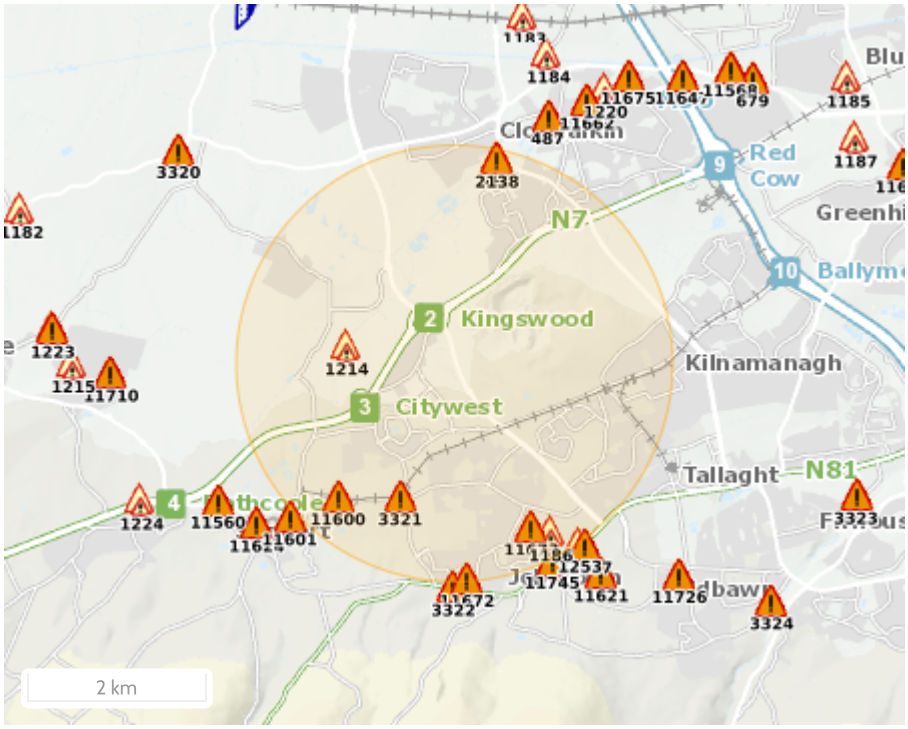
Appendix C Past Flood Event Summary

Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **13/4/2022 10:20**

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



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

9 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Camac Cherrywood Nov 1982 (ID-2138)	05/11/1982	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Camac Cherrywood June 1993 (ID-488)	11/06/1993	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Killinarden Stream Jobstown recurring (ID-1186)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (1)		
4.	Baldonnell Barneys Lane Recurring (ID-1214)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
5.	Camac Cherrywood Feb 1994 (ID-1271)	04/02/1994	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Fortunestown Lane Nov 2000 (ID-3321)	06/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Flooding at Fortunestown Lane, Citywest, Co. Dublin on 24th Oct 2011 (ID-11600) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
8.	Flooding at Belfry Drive/De Selby Park, Dublin 24on 24th Oct 2011 (ID-11672) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
9.	Flooding at Bawnlea Crescent and Avenue, Tallaght, Co. Dublin on 24th Oct 2011 (ID-11673) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point

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Appendix D Engineering Services Report

Clifton Scannell Emerson Associates

Engineering Services Report Drainage and Water Services
Proposed K2 Data Centre Development

K2 DATA CENTRES

Client: K2 Strategic Infrastructure Ireland Ltd.

Date: 23rd May 2022

Job Number: 22_043

CONSULTING ENGINEERS

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

Clifton Scannell Emerson Associates

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Document Control Sheet

Project Name:	Proposed K2 Data Centre Development
Project Number:	22_043
Report Title:	Engineering Services Report Drainage and Water Services
Filename:	RPT-22_043-002 Engineering Services Report

Issue No.	Issue Status	Date	Prepared by	Checked by
P01	DRAFT	23/05/2022	KB	CD
P02	PLANNING	14/07/2022	CD	CD

Table of Contents

1 Introduction

1.1 Background

The following report is being submitted as part of the planning application for K2 Strategic Infrastructure Ireland Ltd for the proposed K2 data centre development on a site at Kingswood Drive and Kingswood Road, within the Citywest Business Campus, Naas Road, Dublin 24. The site is bound to the north by Kingswood Drive, to the west by Kingswood Road, to the east by greenfield lands, and to the south by existing commercial development. The proposed development of a brownfield site with a total area of approximately 1.9 Hectares. The report outlines the proposals for drainage services and water supply for the development.

1.2 Development Description

The proposed development permitted under Reg. Ref.: SD18A/0301 comprises of the development of a two storey data centre with two storey administration spaces and associated plant spaces with a total permitted floor area of 11,548.5m^2, all associated site development works, landscaping, car parking and two vehicular entrances of Kingswood Drive and Kingswood Road.

The proposed development comprises amendments to the development permitted under Reg. Ref.: SD18A/0301. The proposed amendments comprise the following:

- Alterations to the permitted two storey data centre building including internal reconfiguration, alterations to finished floor levels, alterations to the building footprint to provide for the relocation of an internal staircore to the south of the building, and the replacement of the enclosed first floor level with an open screened roof mounted plant space (resulting in a reduction of 4,091 sq.m in the gross floor area (GFA) of the building).

- Associated alterations to the façade of the data centre building, including alterations to fenestration, cladding, step-out in the southern façade to accommodate a staircore, and a reduction in the eastern building parapet height of c. 2 metres.

- The provision of a canopy over the loading docks on the east facade.

- Alterations to the permitted generator compound, generators, and flues, including a reduction in the number of generators (5 no. now proposed), and provision of MV rooms within the generator compound.

- Provision of an ESB substation compound in the northeastern portion of the site, comprising a single storey substation building (with a GFA of c. 125 sq.m), 2 no. transformers, client control building (with a GFA of c. 47 sq.m), and associated access arrangements within a 2.6 metre high security fence. The ESB substation compound will be accessed from Kingswood Drive.

- Omission of the permitted sprinkler tank, pump room and 10kV Substation, reconfiguration of the permitted car parking, and revisions to permitted boundary treatments.

- Associated alterations to landscaping, access and internal road arrangements, services, lighting, and layout, and all associated and ancillary works.

The extent of the site layout is highlighted in Figure 1.1 below:-

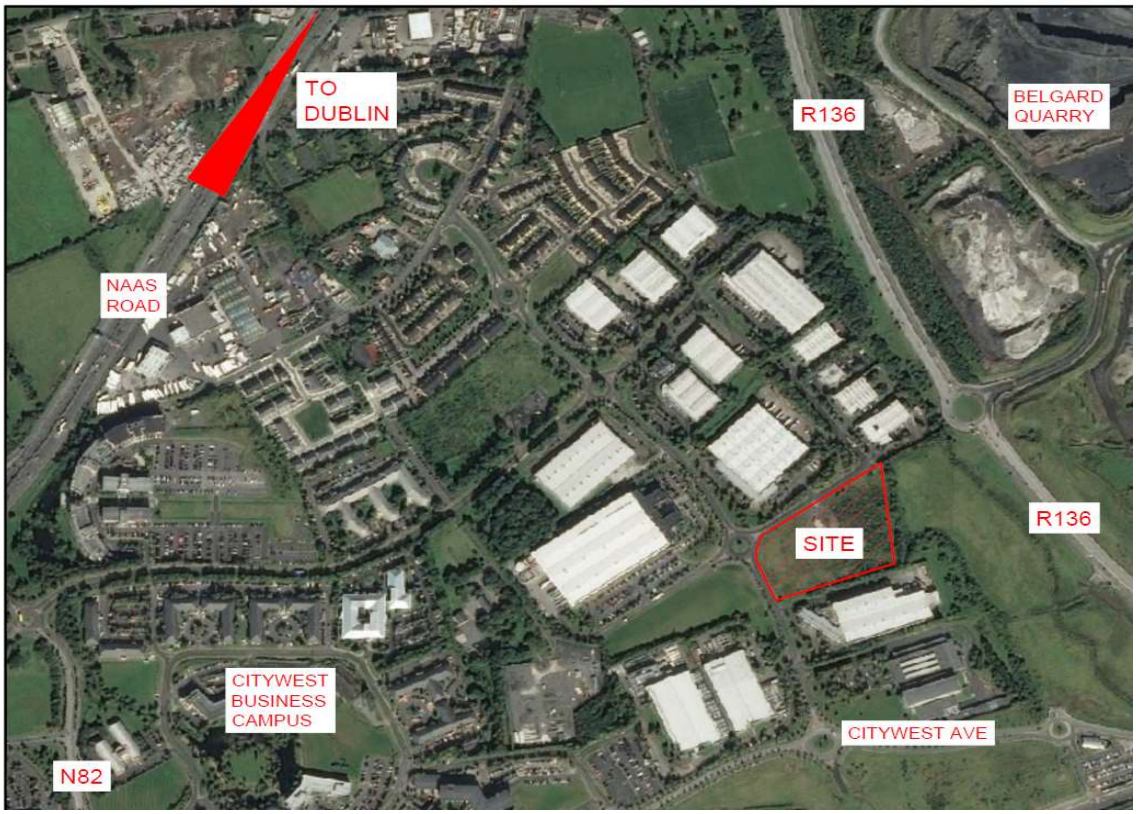


Figure 1.1 – Proposed Site Location Plan

1.3 Existing Land Use

The existing site is currently a brownfield site which was previously used as a construction site compound. It is located within Citywest Business Park as a serviced site. The site is in a cleared state with the exception of existing concrete yard slab in the northern part of the site.

2 Surface Water Drainage

2.1 General

The proposed development will provide attenuation in compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). The following section outlines the surface water drainage proposals for the development. All SUDS elements have been designed as per the recommendation of the SuDS Manual 2015. The design also takes account of the draft South Dublin County Council (SDCC) Sustainable Drainage Explanatory Design & Evaluation Guide (2022).

All surface water works including connections will be carried out in accordance with the Greater Dublin Regional Code of Practice for Development Works – Drainage.

The documentation provided in support of that application addressed pre-development greenfield run-off rates for 1.9 ha catchment area.

2.2 Drawings

The following drawings provided in support of this planning application are applicable to surface water drainage:

- 22_043-CSE-00-XX-DR-C-2100 Overall Existing Surface Water Drainage Layout Plan
- 22_043-CSE-00-XX-DR-C-2110 Overall Proposed Surface Water Drainage Layout Plan
- 22_043-CSE-00-XX-DR-C-2111 Proposed Permeable and Impermeable Areas
- 22_043-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System Layout Plan
- 22_043-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System Cross-Sections
- 22_043-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement
- 22_043-CSE-00-XX-DR-C-2910 Proposed Standard Trench Details
- 22_043-CSE-00-XX-DR-C-2911 Proposed Services Details Sheet 1
- 22_043-CSE-00-XX-DR-C-2912 Proposed Services Details Sheet 2

2.3 Existing Surface Water Drainage Network

There is an existing 525mm diameter pipe located in the centre of the existing Citywest Business Park Estate Road which runs along the eastern boundary of the site. The 525mm diameter pipe flows in a easterly direction from the north east corner of the site before out falling to the Kingswood Stream circa 65m east of the site. The invert levels of existing manhole is 99.82m OD which is 3.0m deep.

The existing surface water drainage network within Citywest Business Park is private and is the responsibility of Davy Hickey Properties, Citywest.

2.4 Proposed Surface Water Drainage Network

2.4.1 Overview

The proposed surface water network for the development collects runoff from roofs, roads and other hard standing areas in a sealed system of pipes and gullies. The surface water drainage pipe network follows the proposed site topography and falls west at an average gradient of approximately 0.5 – 1.0%.

The pipe network outfalls to a surface water attenuation storage tank located in the north east adjacent to the site entrance. The proposed attenuation system outfalls via a carrier drain which discharges attenuated flows to the existing surface water drainage system as described in Section 2.3 of this report.

2.4.2 Surface Water Network Design

The pipe network is designed in accordance with the requirement of Table 6.4 of the Greater Dublin Strategic Drainage Study (GDSDS) – See Fig 2.1 below.

Parameter	Surface Water Sewers
Minimum depth	1.2m cover under highways 0.9m elsewhere
Maximum depth	Normally 5m
Minimum sewer size	225mm
Runoff factors for pipe sizing	100% paved and roof surfaces 0% off pervious surfaces
Rainfall for initial pipe sizing	50mm/hr rainfall intensity
Minimum velocity (pipe full)	1.0m/s
Flooding	Checks made for adequate protection * No flooding for return period less than 30 years except where explicitly planned Simulation modelling is required for sites greater than 24ha**
Roughness – ks	0.6mm

Fig 2.1 – GDSDS Pipe Design Criteria

Manholes shall be provided at junctions in the network, at changes of direction and gradient and at no more than 90m centres.

The surface water pipe network has been modelled using WinDes™ software and the results are contained in **Appendix B**.

2.4.3 Pollution Control Measures

Three different types of pollution control elements will be implemented as part of surface water infrastructure in the development as following:

A. It is proposed to provide a Class 1 full retention separators (Klargestor Model No. NSFP003 or equivalent) downstream of any used in high risk spillage areas in accordance with Section 20 of the Greater Dublin Regional Code of Practice. The full retention separator is designed to treat the full design flow that can be delivered in the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 50mm/hour. This is provided at the fuel unloading area.

B. It is proposed to provide a Class 1 bypass interceptor (Klargestor Model No. NSBP003 or equivalent) downstream of the main car park. The bypass separator is designed to fully treat all flows generated by rainfall rates up to 5mm/hour. This covers 99% of all rainfall events and is a requirement for car parking areas with 10 spaces or more as outlined in Section 20.1 of the Greater Dublin Regional Code of Practice.

C. It is proposed to provide a Class 1 bypass interceptor (Klargestor Model No. NSBE030 or equivalent) upstream of the Attenuation Tank.

D. Two hydrodynamic solid separators are provided upstream of the connections to the Attenuation Tank to screen rubbish, debris and sediment from the surface water runoff before it enters the attenuation tank. At manhole SWMH 8.5 a Contech Model No. CDS 0606/01 or equivalent is proposed whilst at manhole SWMH 1.10 a Contech Model No. CDS 0806 or equivalent is proposed.

E. It is proposed to provide a Class 1 full retention separators (Klargestor Model No. NSFP003 or equivalent) downstream of the electrical transformers in the Client's MV compound.

Details of the full retention and bypass interceptors proposed are provided in **Appendix C** to this report.

Details of the hydrodynamic solid separator proposed are provided in **Appendix D** to this report.

2.4.4 SuDS Implementation

A number of measures are proposed in order to ensure the proposed scheme is complaint with Sustainable Urban Drainage System (SuDS) the measures outlined in Table 2.1 are proposed in accordance with Table 6.3 of the GDSDS:-

Criterion	Return Period (Years)	Design Objective	Design Measures Provided
River Water Quality Protection	<1	Provision of between 5mm and 10mm interception storage where rainfall runoff to receiving water can be prevented.	Provision of swales where possible.

Criterion	Return Period (Years)	Design Objective	Design Measures Provided
		Provision of treatment volume of volume (minimum pool volume equivalent to 15mm of rainfall)	
River Regime Protection	1 and 100	Discharge rate equal to greenfield runoff rate	Provision of attenuation ponds with flow control device to regulate outflow from site to greenfield runoff rates during peak storm events.
Level of Service (Flooding) for the site	30 and 100	No flooding on site	Site is located outside the 1:1000-year flood zone and the proposed drainage system is designed to cater for the 1:100 year storm event.
	100	No internal property flooding	Finished floor levels are at least 500mm above maximum river levels and on-site storage ponds. The lowest building on the site is the ESB Substation which has a finished floor level of **103.15m** thus the highest allowable water level in the storage tank is **102.65m**.
		No flooding of adjacent urban areas	The proposed surface water scheme for the development manages the 1:100 year flood event within the development.
River Flood Protection	100	'Long-term' storage with temporary flood storage drained by infiltration	Due to site constraints associated with landscape screening there is insufficient space available on site for 'Long-term' storage.

Criterion	Return Period (Years)	Design Objective	Design Measures Provided
		Maximum discharge rate of QBAR or 2 l/s/ha (whichever is greater) for attenuation storage where separate 'long-term' storage cannot be provided.	Discharge rates from the proposed scheme will be controlled in accordance with this requirement.

Table 2.1 – Summary of SuDS Implementation Measures

As noted in Chapter 16 of the Greater Dublin Regional Drainage Code of Practice SuDS area a mandatory requirement of each Local Sanitary Authority. Due to the constrained nature of the site and high level of underground services required to service the buildings limited options are available in terms of SuDS devices.

The objectives of the SDCC Sustainable Drainage Explanatory Design & Evaluation Guide are noted in relation to the selection the proposed attenuation storage device. The Design Note provided in Section 7.7.1 of the document notes the following:-

> "*Ideally runoff should be stored in shallow landscaped features or within permeable surfaces. Where this is not possible, deeper tanks or pipe storage must be robustly justified".*

A number of options were assessed in relation to the Surface Water Attenuation System to be used however the site drainage system outfalls to the existing network in the northeast corner of the site. A planning submission was made on the previous planning application for development on the site (Reg Ref SD18A-0301) which stated the view from northeast of the proposed development would be unsightly. The Conditions of the Grant of Planning for the above application required a landscaping plan which reduced the urban impact of the proposed development. As a result, a landscaping berm with coniferous and deciduous planting is proposed in the northern section of the site adjacent to the surface water drainage outfall. As such, the Attenuation System needs to be structurally capable of supporting the landscape berm and, also, not be impacted by the roots of the planting proposed. Accordingly, a precast concrete attenuation tank is the only technically feasible solution which can be installed within the landscaped area without impacting on the berm and planting required.

A fully landscaped swale has been incorporated into the design in the southeastern corner of the site. The swale will be designed with sympathetic contours and landscape planting in accordance with the requirements of SDDCC Sustainable Drainage Explanatory Design & Evaluation Guide.

2.4.5 Surface Water Attenuation

The surface water network has been designed to provide sufficient capacity to contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding. This is in compliance with Criterion 3 of Table 6.3 of Volume 2 the GDSDS.

All calculations have allowed for an additional allowance of 20% in rainfall intensities to allow for climate change as per Section 8.4.6.4 of SDDCC Sustainable Drainage Explanatory Design & Evaluation Guide which exceeds the requirements of Table 6.1 of Volume 2 of the GDSDS (10%).

The area for the proposed development site is c.1.9 ha thus the allowable discharge rate for the scheme to be 4.00 l/s. Discharge from the site will be controlled by means of an online hydrobrake vortex control (Unit Reference SHE-0082-4000-2000-4000). Details of the hydrobrake proposed are provided in **Appendix E** to this report

Analysis of the Windes™ results for the data storage facility's drainage network identified the 1440 minute winter storm during the 1 in 100 year return period as the critical storm in terms of attenuation storage volume. The attenuation system design information is outlined below. See **Appendix B** for details of the Windes™ calculations.

- System Invert Level = 100.656m OD
- Proposed Ground Level at Attenuation Tank = 103.631 m approx.
- System Plan Area = 470.4 m^2
- Discharge Rate = 4.0 l/s
- Design Head = 2.00 m
- Critical Storm Event = 1440 Minute Winter Event during 1 in 100 year event.
- High Water Level during 1 in 100 year event = 102.648 m (see page 12 of Windes Calculations). As noted on Table 2.1 the highest allowable water level in the tank in the 1:100 year is 102.650m).
- Depth of Water in Attenuation Tank in 1 in 100 year event = 1.767m
- Storage Volume required for proposed development = 831.2 m^3
- Freeboard = 0.233m
- Storage Volume provided (including freeboard)= 940.957 m^3

Details of the proposed Attenuation System are indicated on 22_043-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System Layout Plan, 22_043-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System Cross-Sections and 22_043-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement.

3 Foul Wastewater Drainage

3.1 General

A pre-connection enquiry (PCE) form was submitted to Irish Water on 12th of May 2022 which addressed water and wastewater demand for the development (IW Reference Number: CDS22003496). The PCE Application form is included in **Appendix F**. Irish Water provided a Confirmation of Feasibility (CoF) for the development on 1st July 2022 (IW Reference Number: CDS22003496), which is included in **Appendix G** which indicated that the scheme would be connected to the Irish Water network without requirement for upgrades to the network.

3.2 Drawings

The following drawings provided in support of this planning application are applicable to wastewater drainage:-

- 22_043-CSE-00-XX-DR-C-2200 Existing Foul Wastewater Drainage Layout
- 22_043-CSE-00-XX-DR-C-2210 Proposed Foul Wastewater Drainage Layout
- 22_043-CSE-00-XX-DR-C-2910 Proposed Standard Trench Details
- 22_043-CSE-00-XX-DR-C-2911 Proposed Services Details Sheet 1
- 22_043-CSE-00-XX-DR-C-2912 Proposed Services Details Sheet 2

3.3 Existing Infrastructure

There is an existing 225mmø foul sewer which flows in an westerly direction along the northern boundary of the site towards the junction of Kingswood Road and Kingswood Drive. At the roundabout junction of Kingswood Road and Kingswood Drive the 225mmø pipe connects to an existing 375mmø which flows in a northerly direction along Kingswood Road.

3.4 Proposed Foul Wastewater Drainage Network

3.4.1 Overview

The proposed wastewater drainage network collects domestic foul wastewater flows from the administration block of the proposed building which are collected by pop-ups which connect to 100mmø internal pipework which discharge to a 150mmø foul sewer external to the proposed building. The external foul sewer flows in a northerly direction to connect to the existing 225mm diameter foul sewer which is located at the northern boundary of the site as described in Section 3.3 of this report.

In addition to domestic foul wastewater flows, cooling water discharge from Air Handling Units (AHU's) (Discussed in Section 3.4.2 of this report) and rainwater which collects in the exhaust stacks of the generators (Discussed in Section 3.4.2 of this report) will discharge to the foul sewer.

Internal pop-ups will be provided to serve the AHU's which will discharge to the external 150mmø foul wastewater sewer in the generator compound to the east of the building. External gullies will be provided at each generator exhaust stacks which will serve the above ground drain points. The foul sewer will flow north from generator compound and a full

retention hydrocarbon separator will be provided on the sewer to provide hydrocarbons entering the Irish Water Network.

3.4.2 Domestic Wastewater Demand

The average campus occupancy is 45 persons thus the wastewater loading for the proposed development is calculated as follows:-

- Average Campus Occupancy (P) = 45 persons
- Daily consumption (G) = 50 litres per head per day (Irish Water Wastewater Code of Practice, Appendix C, Office without canteen)
- Daily Demand (PG) => 45 x 50 = 2,250 l/day
- Infiltration = >10% of Daily Demand = (2,250) x 0.1 = 225
- Trade Flows (E) = 0 l/s
- Average Wastewater Discharge (Dry Weather Flow – DWF) => PG +I+E = ((2,2250 + 225 +0) / (12 x 60 x 60)) = **0.03 l/s**

The peak daily domestic discharge is calculated as follows:-

- Peaking Factor $Pf_{(dom, Ind)}$ = 4.5 (as per Table 2.7 of Appendix B to IW-CDS-5030-03)
- Design Foul Flow (Peak) => $Pf_{(dom, Ind)}$ x PG + I + E = 4.5 x (2,250 / (24 x 60 x 60)) + (225 / 24 x 60 x 60) + 0 = **0.12 l/s**

3.4.3 Cooling Wastewater Discharge

To reduce both energy and water use in its data storage facilities, the Operator utilises direct evaporative cooling systems, which predominately utilises outside air to cool servers. This means that for most of the year there is no Cooling Water Discharge to the foul wastewater sewer. Evaporative cooling is required when the temperature exceeds 22°C. Cooling water demand is discussed in further detail in Section 4 of this report.

Average Cooling Wastewater Discharge is calculated as follows:-

- Average Process Water Demand = 6.63 l/s (Refer to Section 4.4.3 for Details)
- Efficiency Rate = 85% Evaporation
- Discharge of non-absorbed water to Drain => 6.63 l/s x (1-0.85) = 0.99 l/s
- Additional 30% Diversification across 68 No. AHU's => 0.99 l/s x (1-0.3) = 0.69 l/s
- Average Cooling Wastewater Discharge = **0.69 l/s**

Peak Cooling Wastewater Discharge is calculated as follows:-

- Peak Process Water Demand = 10.2 l/s (Refer to Section 4.4.3 for Details)
- Efficiency Rate = 80% Evaporation
- Discharge of non-absorbed water to Drain => 10.2 l/s x (1-0.80) = 2.04 l/s
- Additional 30% Diversification across 68 No. AHU's => 2.04 l/s x (1-0.2) = 1.63 l/s
- Average Cooling Wastewater Discharge = **1.63 l/s**

3.4.4 Wastewater Pipe Design

The network has been designed to ensure that the foul discharge maintains a self-cleansing velocity. The proposed network adheres to the minimum pipe gradients set out in Table 6 of the "Building Regulations Technical Guidance Document H". It is proposed to take all foul drainage from the buildings by means of 100mmø pipes with minimum gradients of 1:60 which connect to 150mmø pipes laid at minimum gradients of 1:100. The key design parameters are summarised as follows:-

Roughness Co-efficient

Roughness Co-Efficient for Gravity Sewer (k_s) = 1.5mm

Self-Cleansing Velocity

The design is based on the requirements of Table 6 of Part H of the Building Regulations. The DC building has 45 staff which equates to a domestic population of 15 persons. Irish Water guidance indicates that population of a domestic dwelling should be estimated based on 2.7 persons per unit thus the DC buildings is equivalent to 5 Dwellings in terms of foul flow. Table 6 of the Part H of the building regulations permits a 150mm @1:150 to serve between 3 and 8 dwellings once 5 WC's are connected (see below). Thus the design provides self-cleansing which is within the acceptable limits of the building regulations.

Capacity

Based on the Colebrook-White Equation a 150mmø pipe at a gradient of 1:100 has a capacity of 15 l/s and a velocity of 0.875 m/s when flowing full. Thus the pipe network has adequate capacity to convey the design peak flows and has a self-cleansing velocity in excess of 0.75 m/s.

3.4.5 Pollution Control Measures on Wastewater Network

The drainage from sprinkler pumphouse is to pass into a Class 1 full retention separator Model NSFP003 located upstream at proposed Manhole FWMH 7. Details of the full retention separator are provided in **Appendix C**.

4 Water Supply

4.1 General

A pre-connection enquiry (PCE) form was submitted to Irish Water on 12th of May 2022 which addressed water and wastewater demand for the development (IW Reference Number: CDS22003496). The PCE Application form is included in **Appendix F**. Irish Water provided a confirmation of feasibility (CoF) for the development on 1st July 2022 (IW Reference Number: CDS22003496), which is included in **Appendix G** which indicated that the scheme would be connected to the Irish Water network subject to the upgrade of the existing road crossing to the north of the site.

4.2 Existing Infrastructure

The site is served by a 200mmø uPVC water main that is located on the northside of Kingswood Drive to the north of the site. Irish Water record drawings indicate two 150mmø road crossing of Kingswood Drive which connect to the 200mmø water main and terminate in the verge on the northern boundary of the site. As noted in Section 4.1 Irish Water have indicated that they require the road crossing serving the site to be upgraded to 200mmø.

4.3 Drawings

The following drawings provided in support of this planning application are applicable to water supply

- 22_043-CSE-00-XX-DR-C-2300 Existing Water Supply Layout Plan
- 22_043-CSE-00-XX-DR-C-2310 Proposed Water Supply Layout Plan
- 22_043-CSE-00-XX-DR-C-2910 Proposed Standard Trench Details
- 22_043-CSE-00-XX-DR-C-2911 Proposed Services Details Sheet 1

4.4 Proposed Water Supply

4.4.1 Overview

It is proposed to take a 150mmø connection from the external watermain on the north side of the site to connect to the Data Centre. A connection for domestic purposes will be provided to the administration area and a connection will be provided to the water treatment room. The ESB substation building will be served by a 50mmø watermain.

4.4.2 Domestic Water Supply Demand

The proposed domestic demand has been calculated in accordance with the Irish Water Code of Practice for Water Infrastructure (Document No. IW-CDS-5020-03).

- Population = 45 persons
- In accordance with Section 3.28 of IW-CDS-5020-03 the demand per head is 45 litres per person.

- Average Day / Peak Week Demand = 1.25 x 0.023 = 0.029 l/s (as per Section 3.7.2 of IW-CDS-5020-03)
- Peak Demand = 0.029 x 5.0 = **0.146 l/s** (as per Section 3.7.2 of IW-CDS-5020-03)

4.4.3 Industrial Water Demand

Average Demand

The proposed data centre has a total of 68 No. Air Handling Units. Between the temperatures 20°C and 24°C the water flow rate required per AHU is 0.097 l/s. Thus the average demand to serve the AHU's is calculated as follows:-

- 0.097 l/s x 68 units = 6.63 l/s.

We have estimated that this average flow would be required for a maximum of 5 hours on any hot day (ASHRAE n-20). Estimated storage is calculated as follows:-

- 5 hours x 60 x 60 x 6.63 = 119,340 litres for one day.

The average demand on the Irish Water Network is calculated based on the demand required to fill the storage tanks. Using 1 day cycle, and a water consumption of 119,340 litres, to fill this water volume over 19 hours, implies the average demand is calculated as follows:-

- 119,340 litres / (19 hours x 60 x 60) = **1.74 l/s**

Peak Demand

The proposed data centre has a total of 68 No. Air Handling Units. These use water to increase their cooling capacity when the ambient temperature rises above 24°C. The maximum water flow rate required per AHU is 0.15 l/s. Thus peak demand is calculated as follows:-

- 0.15 l/s x 68 AHU's = 10.2 l/s.

. We have estimated that a peak flow would be required for a maximum of 5 hours on any hot day (ASHRAE n-20). Estimated storage that the peak flow is as follows:-

- 5 hours x 60 x 60 x 10.2 l/s = 183,600 litres for one day.

The peak demand on the Irish Water Network is calculated based on the demand required to fill the storage tanks. Using 1 day cycle, and a water consumption of 183,600 litres to fill this water volume over 19 hours, implies the peak demand is calculated as follows:-

- 183,600 litres / (19 hours x 60 x 60) = **2.68 l/s**

4.4.4 Industrial Water Storage

As noted in Section 4.4.3 our client requires 48 hour storage. We have estimated that peak flow will be required over a 10 hour duration during the warmest 48 hour period. Water storage required is thus calculated as follows:-

- 10 hours x 60 x 60 x 10.2 l/s = 367,200 litres (367.2 m^3) ~ 400 m^3

- Allowance for Domestic Usage = 3 m^3
- Total Storage Required = 403 m^3

4.4.5 Maximum Annual Industrial Demand

The Irish Water CoF indicates that maximum allowable demand from the site will be limited to 2,975 m^3

4.4.6 Fire Hydrant Main

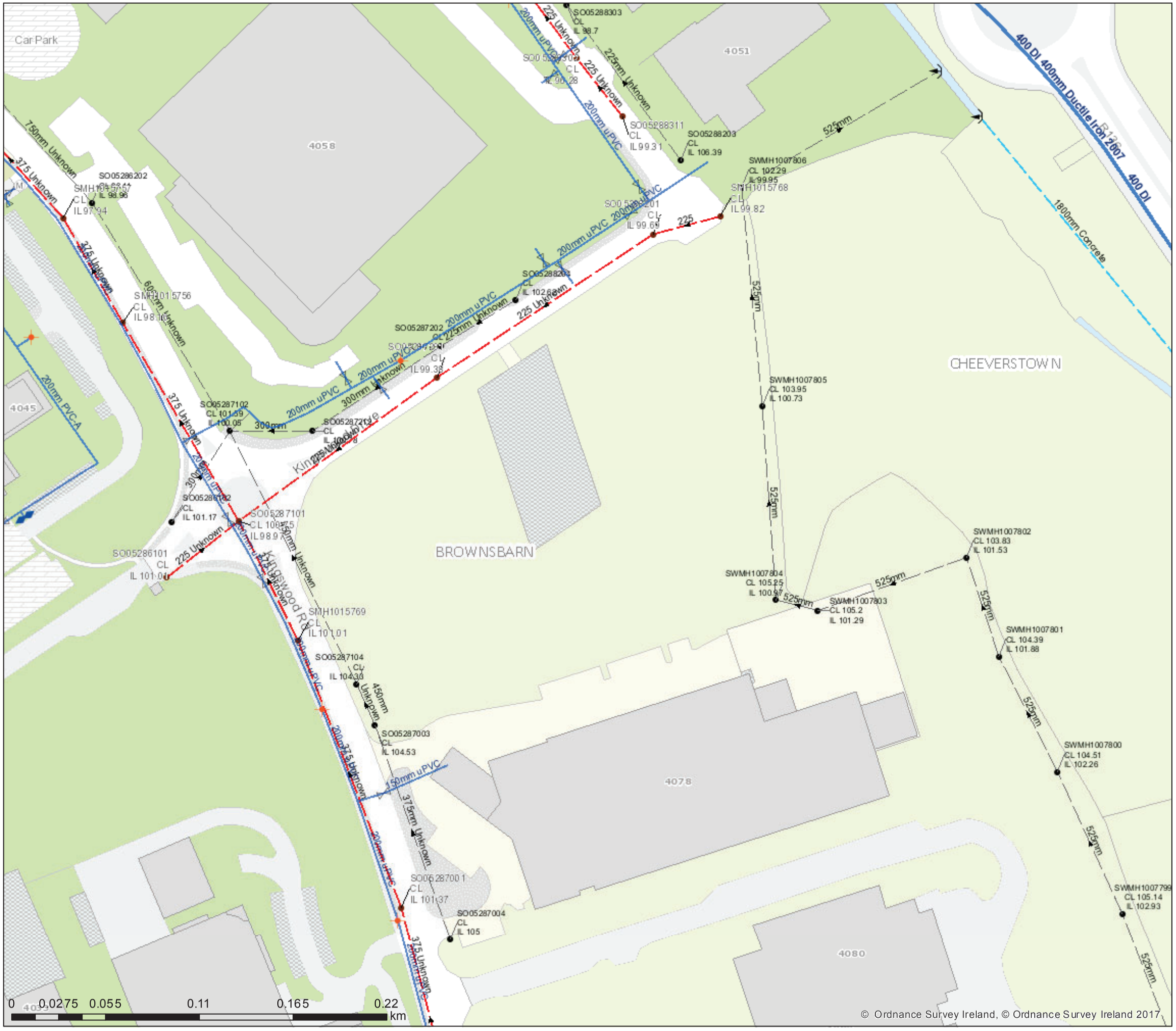
The proposed development will be served by a 150mmø fire hydrant main (final size to be confirmed by specialist designer) which is connected to the external Irish Water Network at the site entrance.

Required fire hydrant flow rates will be 25 l/s in accordance with IS 391:2000. In addition a small flow rate for filling a water mist fire suppression tank is required and is captured within the Industrial flow rate calculations. The fire hydrants will be provided at appropriate locations in accordance with the specialist fire protection contractors design and South Dublin County Council requirements.

Appendices

Appendix A – Record Drawings

Irish Water Web Map



UISCE ÉIREANN : IRISH WATER

Print Date: 19/04/2022

Printed by:Irish Water

Water Distribution Network
- Water Treatment Plant
- Water Pump Station
- Storage Cell/Tower
- Dosing Point
- Meter Station
- Abstraction Point
- Telemetry Kiosk

Reservoir
- Potable
- Raw Water

Water Distribution Mains
- Irish Water
- Private

Trunk Water Mains
- Irish Water
- Private

Water Lateral Lines
- Irish Water
- Non IW
- Water Casings
- Water Abandoned Lines
- Boundary Meter
- Bulk/Check Meter
- Group Scheme
- Source Meter
- Waste Meter
- Unknown Meter ; Other Meter
- Non-Return
- PRV
- PSV
- Sluice Line Valve Open/Closed
- Butterfly Line Valve Open/Closed
- Sluice Boundary Valve Open/Closed
- Butterfly Boundary Valve Open/Closed
- Scour Valves
- Single Air Control Valve
- Double Air Control Valve
- Water Stop Valves
- Water Service Connections
- Water Distribution Chambers
- Water Network Junctions
- Pressure Monitoring Point
- Fire Hydrant
- Fire Hydrant/Washout

Water Fittings
- Cap
- Reducer
- Tap
- Other Fittings

Sewer Foul Combined Network
- Waste Water Treatment Plant
- Waste Water Pump station

Sewer Mains Irish Water
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Mains Private
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow
- Sewer Lateral Lines
- Sewer Casings

Sewer Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type
- Outfall
- Overflow
- Soakaway
- Standard Outlet
- Other; Unknown

Cleanout Type
- Rodding Eye
- Flushing Structure
- Other; Unknown

Sewer Inlets
- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Fittings
- Vent/Col
- Other; Unknown

Storm Water Network

Surface Water Mains
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Inlet Type
- Gully
- Standard
- Other; Unknown

Storm Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Storm Culverts

Storm Clean Outs

Stormwater Chambers

Discharge Type
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Gas Networks Ireland
- Transmission High Pressure Gasline
- Distribution Medium Pressure Gasline
- Distribution Low Pressure Gasline

ESB Networks

ESB HV Lines
- HV Underground
- HV Overhead
- HV Abandoned

ESB MVLV Lines
- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV Underground
- Abandoned

Non Service Categories
- Proposed
- Under Construction
- Out of Service
- Decommissioned

Water Non Service Assets
- Water Point Feature
- Water Pipe
- Water Structure

Waste Non Service Assets
- Waste Point Feature
- Sewer
- Waste Structure

Appendix B – Windes Surface Water Drainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Pr SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	15.900	Add Flow / Climate Change (%)	0
Ratio R	0.267	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Pr SW

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.711	0.281	66.7	0.005	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	10.197	0.068	150.0	0.003	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	15.853	0.079	200.0	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	7.469	0.037	200.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	4.066	0.020	200.0	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	11.095	0.055	201.7	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	11.727	0.059	200.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.002	19.785	0.099	200.0	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	90.000	0.900	100.0	0.442	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	24.568	0.164	150.0	0.052	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	33.673	0.224	150.0	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	37.93	5.19	104.760	0.005	0.0	0.0	0.0	1.60	63.8	0.5
2.000	38.03	5.16	104.548	0.003	0.0	0.0	0.0	1.07	42.4	0.3
3.000	37.68	5.29	104.559	0.010	0.0	0.0	0.0	0.92	36.6	1.0
1.001	37.33	5.42	104.480	0.030	0.0	0.0	0.0	0.92	36.6	3.0
1.002	37.15	5.50	104.442	0.064	0.0	0.0	0.0	0.92	36.6	6.4
4.000	37.91	5.20	104.535	0.013	0.0	0.0	0.0	0.92	36.5	1.3
4.001	37.35	5.41	104.480	0.019	0.0	0.0	0.0	0.92	36.6	1.9
4.002	36.47	5.77	104.421	0.028	0.0	0.0	0.0	0.92	36.6	2.7
1.003	34.37	6.73	104.247	0.534	0.0	0.0	0.0	1.57	111.1	49.7
1.004	33.81	7.00	103.272	0.586	0.0	0.0	0.0	1.48	163.1	53.7
1.005	33.09	7.38	103.109	0.603	0.0	0.0	0.0	1.48	163.1	54.1

Network Design Table for Pr SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	3.795	0.038	100.0	0.101	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	26.625	0.266	100.0	0.033	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	14.577	0.146	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	11.169	0.074	150.0	0.006	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	12.084	0.081	150.0	0.012	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.000	11.153	0.056	200.0	0.094	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	15.178	0.101	150.0	0.043	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	12.962	0.086	150.0	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	20.337	0.025	813.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	8.028	0.080	100.0	0.048	5.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	8.472	0.085	100.0	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	51.908	0.519	100.0	0.204	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.000	26.384	0.264	100.0	0.115	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.003	4.082	0.041	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.004	4.674	0.047	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.005	5.410	0.081	66.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.006	20.337	2.132	9.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	13.851	0.069	200.7	0.076	5.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	20.032	0.100	200.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	38.33	5.05	103.071	0.101	0.0	0.0	0.0	1.31	52.0	10.4
6.000	37.55	5.34	103.445	0.033	0.0	0.0	0.0	1.31	52.0	3.3
6.001	37.07	5.53	103.179	0.033	0.0	0.0	0.0	1.31	52.0	3.3
1.006	32.86	7.51	102.883	0.742	0.0	0.0	0.0	1.48	163.1	66.1
1.007	32.64	7.63	102.734	0.755	0.0	0.0	0.0	1.66	263.6	66.7
7.000	37.91	5.20	102.934	0.094	0.0	0.0	0.0	0.92	36.6	9.7
1.008	32.37	7.78	102.653	0.892	0.0	0.0	0.0	1.66	263.6	78.1
1.009	32.14	7.91	102.552	0.941	0.0	0.0	0.0	1.66	263.6	81.9
1.010	30.91	8.67	100.681	0.941	0.0	0.0	0.0	0.45	17.9«	81.9
8.000	38.18	5.10	104.590	0.048	0.0	0.0	0.0	1.31	52.0	5.0
8.001	37.89	5.21	104.510	0.061	0.0	0.0	0.0	1.31	52.0	6.3
8.002	36.50	5.76	104.350	0.265	0.0	0.0	0.0	1.57	111.1	26.2
9.000	37.70	5.28	104.095	0.115	0.0	0.0	0.0	1.57	111.1	11.8
8.003	36.40	5.80	103.831	0.381	0.0	0.0	0.0	1.57	111.1	37.5
8.004	36.28	5.85	103.790	0.381	0.0	0.0	0.0	1.57	111.1	37.5
8.005	36.17	5.90	103.743	0.381	0.0	0.0	0.0	1.93	136.2	37.5
8.006	35.99	5.98	100.681	0.381	0.0	0.0	0.0	4.26	169.5	37.5
10.000	37.78	5.25	101.775	0.076	0.0	0.0	0.0	0.92	36.5	7.8
10.001	36.86	5.61	101.706	0.076	0.0	0.0	0.0	0.92	36.6	7.8

Network Design Table for Pr SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.011	20.337	0.025	813.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.012	4.046	0.079	51.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.013	53.594	1.042	51.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.011	29.79	9.42	100.656	1.397	0.0	0.0	0.0	0.45	17.9«	112.7
1.012	29.74	9.45	100.631	1.397	0.0	0.0	0.0	1.83	72.8«	112.7
1.013	29.07	9.94	100.573	1.397	0.0	0.0	0.0	1.83	72.7«	112.7

Manhole Schedules for Pr SW

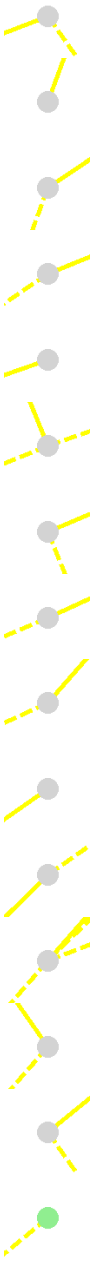
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SWMH 1.0	106.534	1.774	Open Manhole	1200	1.000	104.760	225				
SWMH 2.0	105.785	1.237	Open Manhole	1200	2.000	104.548	225				
SWMH 3.0	105.784	1.225	Open Manhole	1200	3.000	104.559	225				
SWMH 1.1	105.954	1.474	Open Manhole	1200	1.001	104.480	225	1.000	104.480	225	
								2.000	104.480	225	
								3.000	104.480	225	
SWMH 1.2	105.881	1.439	Open Manhole	1200	1.002	104.442	225	1.001	104.442	225	
SWMH 4.0	105.810	1.275	Open Manhole	1200	4.000	104.535	225				
SWMH 4.1	105.808	1.328	Open Manhole	1200	4.001	104.480	225	4.000	104.480	225	
SWMH 4.2	105.814	1.393	Open Manhole	1200	4.002	104.421	225	4.001	104.421	225	
SWMH 1.3	105.737	1.490	Open Manhole	1200	1.003	104.247	300	1.002	104.422	225	100
								4.002	104.322	225	
SWMH 1.4	104.789	1.517	Open Manhole	1200	1.004	103.272	375	1.003	103.347	300	
SWMH 1.5	105.434	2.325	Open Manhole	1200	1.005	103.109	375	1.004	103.109	375	
SWMH 5.0	105.160	2.089	Open Manhole	1200	5.000	103.071	225				
SWMH 6.0	105.124	1.679	Open Manhole	1200	6.000	103.445	225				
SWMH 6.1	105.090	1.911	Open Manhole	1200	6.001	103.179	225	6.000	103.179	225	
SWMH 1.6	105.072	2.189	Open Manhole	1200	1.006	102.883	375	1.005	102.884	375	1
								5.000	103.033	225	
								6.001	103.033	225	
SWMH 1.7	105.015	2.281	Open Manhole	1200	1.007	102.734	450	1.006	102.809	375	
SWMH 7.0	104.000	1.066	Open Manhole	1200	7.000	102.934	225				
SWMH 1.8	104.838	2.185	Open Manhole	1200	1.008	102.653	450	1.007	102.653	450	
								7.000	102.878	225	
SWMH 1.9	104.724	2.172	Open Manhole	1200	1.009	102.552	450	1.008	102.552	450	
SWMH 1.10	104.090	3.409	Open Manhole	1200	1.010	100.681	225	1.009	102.466	450	2010
SWMH 8.0	105.815	1.225	Open Manhole	1200	8.000	104.590	225				
SWMH 8.1	105.784	1.274	Open Manhole	1200	8.001	104.510	225	8.000	104.510	225	
SWMH 8.2	105.783	1.433	Open Manhole	1200	8.002	104.350	300	8.001	104.425	225	
SWMH9.0	105.785	1.690	Open Manhole	1200	9.000	104.095	300				
SWMH 8.3	105.758	1.927	Open Manhole	1200	8.003	103.831	300	8.002	103.831	300	
								9.000	103.831	300	
SWMH 8.4	105.486	1.696	Open Manhole	1200	8.004	103.790	300	8.003	103.790	300	
SWMH 8.5	105.174	1.431	Open Manhole	1200	8.005	103.743	300	8.004	103.743	300	
SWMH 8.6	104.849	4.168	Open Manhole	1200	8.006	100.681	225	8.005	103.662	300	3056
SWMH 10.0	103.500	1.725	Open Manhole	1200	10.000	101.775	225				
SWMH 10.1	103.793	2.087	Open Manhole	1200	10.001	101.706	225	10.000	101.706	225	
SWMH 1.11	104.366	5.817	Open Manhole	1200	1.011	100.656	225	1.010	100.656	225	
								8.006	98.549	225	
								10.001	101.606	225	950
SWMH 1.12	103.781	3.150	Open Manhole	1200	1.012	100.631	225	1.011	100.631	225	
SWMH 1.13	103.685	3.133	Open Manhole	1200	1.013	100.573	225	1.012	100.552	225	
EXSWMH	102.330	2.799	Open Manhole	1200		OUTFALL		1.013	99.531	225	

Manhole Schedules for Pr SW

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH 1.0	705691.622	728139.919	705691.622	728139.919	Required	
SWMH 2.0	705712.628	728136.505	705712.628	728136.505	Required	
SWMH 3.0	705704.057	728161.104	705704.057	728161.104	Required	
SWMH 1.1	705709.272	728146.133	705709.272	728146.133	Required	
SWMH 1.2	705716.325	728148.588	705716.325	728148.588	Required	
SWMH 4.0	705693.719	728177.703	705693.719	728177.703	Required	
SWMH 4.1	705697.385	728167.231	705697.385	728167.231	Required	
SWMH 4.2	705708.454	728171.103	705708.454	728171.103	Required	
SWMH 1.3	705714.988	728152.428	705714.988	728152.428	Required	
SWMH 1.4	705799.932	728182.169	705799.932	728182.169	Required	
SWMH 1.5	705823.120	728190.287	705823.120	728190.287	Required	
SWMH 5.0	705810.881	728218.435	705810.881	728218.435	Required	
SWMH 6.0	705832.123	728193.576	705832.123	728193.576	Required	
SWMH 6.1	705826.346	728219.567	705826.346	728219.567	Required	
SWMH 1.6	705811.985	728222.066	705811.985	728222.066	Required	
SWMH 1.7	705806.164	728231.599	705806.164	728231.599	Required	
SWMH 7.0	705812.697	728246.688	705812.697	728246.688	Required	
SWMH 1.8	705802.170	728243.003	705802.170	728243.003	Required	
SWMH 1.9	705793.181	728255.234	705793.181	728255.234	Required	

Manhole Schedules for Pr SW

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH 1.10	705785.745	728265.850	705785.745	728265.850	Required	
SWMH 8.0	705687.818	728203.548	705687.818	728203.548	Required	
SWMH 8.1	705690.588	728211.083	705690.588	728211.083	Required	
SWMH 8.2	705697.605	728215.829	705697.605	728215.829	Required	
SWMH9.0	705770.628	728244.006	705770.628	728244.006	Required	
SWMH 8.3	705745.716	728235.317	705745.716	728235.317	Required	
SWMH 8.4	705744.176	728239.097	705744.176	728239.097	Required	
SWMH 8.5	705748.478	728240.926	705748.478	728240.926	Required	
SWMH 8.6	705753.393	728243.186	705753.393	728243.186	Required	
SWMH 10.0	705792.384	728280.513	705792.384	728280.513	Required	
SWMH 10.1	705781.040	728272.566	705781.040	728272.566	Required	
SWMH 1.11	705766.786	728258.490	705766.786	728258.490	Required	
SWMH 1.12	705780.179	728273.794	705780.179	728273.794	Required	
SWMH 1.13	705777.858	728277.108	705777.858	728277.108	Required	
EXSWMH	705819.238	728311.166			No Entry	



PIPELINE SCHEDULES for Pr SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SWMH 1.0	106.534	104.760	1.549	Open Manhole	1200
2.000	o	225	SWMH 2.0	105.785	104.548	1.012	Open Manhole	1200
3.000	o	225	SWMH 3.0	105.784	104.559	1.000	Open Manhole	1200
1.001	o	225	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
1.002	o	225	SWMH 1.2	105.881	104.442	1.214	Open Manhole	1200
4.000	o	225	SWMH 4.0	105.810	104.535	1.050	Open Manhole	1200
4.001	o	225	SWMH 4.1	105.808	104.480	1.103	Open Manhole	1200
4.002	o	225	SWMH 4.2	105.814	104.421	1.168	Open Manhole	1200
1.003	o	300	SWMH 1.3	105.737	104.247	1.190	Open Manhole	1200
1.004	o	375	SWMH 1.4	104.789	103.272	1.142	Open Manhole	1200
1.005	o	375	SWMH 1.5	105.434	103.109	1.950	Open Manhole	1200
5.000	o	225	SWMH 5.0	105.160	103.071	1.864	Open Manhole	1200
6.000	o	225	SWMH 6.0	105.124	103.445	1.454	Open Manhole	1200
6.001	o	225	SWMH 6.1	105.090	103.179	1.686	Open Manhole	1200
1.006	o	375	SWMH 1.6	105.072	102.883	1.814	Open Manhole	1200
1.007	o	450	SWMH 1.7	105.015	102.734	1.831	Open Manhole	1200
7.000	o	225	SWMH 7.0	104.000	102.934	0.841	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.711	66.7	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
2.000	10.197	150.0	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
3.000	15.853	200.0	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
1.001	7.469	200.0	SWMH 1.2	105.881	104.442	1.214	Open Manhole	1200
1.002	4.066	200.0	SWMH 1.3	105.737	104.422	1.090	Open Manhole	1200
4.000	11.095	201.7	SWMH 4.1	105.808	104.480	1.103	Open Manhole	1200
4.001	11.727	200.0	SWMH 4.2	105.814	104.421	1.168	Open Manhole	1200
4.002	19.785	200.0	SWMH 1.3	105.737	104.322	1.190	Open Manhole	1200
1.003	90.000	100.0	SWMH 1.4	104.789	103.347	1.142	Open Manhole	1200
1.004	24.568	150.0	SWMH 1.5	105.434	103.109	1.950	Open Manhole	1200
1.005	33.673	150.0	SWMH 1.6	105.072	102.884	1.813	Open Manhole	1200
5.000	3.795	100.0	SWMH 1.6	105.072	103.033	1.814	Open Manhole	1200
6.000	26.625	100.0	SWMH 6.1	105.090	103.179	1.686	Open Manhole	1200
6.001	14.577	100.0	SWMH 1.6	105.072	103.033	1.814	Open Manhole	1200
1.006	11.169	150.0	SWMH 1.7	105.015	102.809	1.831	Open Manhole	1200
1.007	12.084	150.0	SWMH 1.8	104.838	102.653	1.735	Open Manhole	1200
7.000	11.153	200.0	SWMH 1.8	104.838	102.878	1.735	Open Manhole	1200

PIPELINE SCHEDULES for Pr SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.008	o	450	SWMH 1.8	104.838	102.653	1.735	Open Manhole	1200
1.009	o	450	SWMH 1.9	104.724	102.552	1.722	Open Manhole	1200
1.010	o	225	SWMH 1.10	104.090	100.681	3.184	Open Manhole	1200
8.000	o	225	SWMH 8.0	105.815	104.590	1.000	Open Manhole	1200
8.001	o	225	SWMH 8.1	105.784	104.510	1.049	Open Manhole	1200
8.002	o	300	SWMH 8.2	105.783	104.350	1.133	Open Manhole	1200
9.000	o	300	SWMH9.0	105.785	104.095	1.390	Open Manhole	1200
8.003	o	300	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
8.004	o	300	SWMH 8.4	105.486	103.790	1.396	Open Manhole	1200
8.005	o	300	SWMH 8.5	105.174	103.743	1.131	Open Manhole	1200
8.006	o	225	SWMH 8.6	104.849	100.681	3.943	Open Manhole	1200
10.000	o	225	SWMH 10.0	103.500	101.775	1.500	Open Manhole	1200
10.001	o	225	SWMH 10.1	103.793	101.706	1.862	Open Manhole	1200
1.011	o	225	SWMH 1.11	104.366	100.656	3.485	Open Manhole	1200
1.012	o	225	SWMH 1.12	103.781	100.631	2.925	Open Manhole	1200
1.013	o	225	SWMH 1.13	103.685	100.573	2.887	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.008	15.178	150.0	SWMH 1.9	104.724	102.552	1.722	Open Manhole	1200
1.009	12.962	150.0	SWMH 1.10	104.090	102.466	1.174	Open Manhole	1200
1.010	20.337	813.5	SWMH 1.11	104.366	100.656	3.485	Open Manhole	1200
8.000	8.028	100.0	SWMH 8.1	105.784	104.510	1.049	Open Manhole	1200
8.001	8.472	100.0	SWMH 8.2	105.783	104.425	1.133	Open Manhole	1200
8.002	51.908	100.0	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
9.000	26.384	100.0	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
8.003	4.082	100.0	SWMH 8.4	105.486	103.790	1.396	Open Manhole	1200
8.004	4.674	100.0	SWMH 8.5	105.174	103.743	1.131	Open Manhole	1200
8.005	5.410	66.8	SWMH 8.6	104.849	103.662	0.887	Open Manhole	1200
8.006	20.337	9.5	SWMH 1.11	104.366	98.549	5.592	Open Manhole	1200
10.000	13.851	200.7	SWMH 10.1	103.793	101.706	1.862	Open Manhole	1200
10.001	20.032	200.3	SWMH 1.11	104.366	101.606	2.535	Open Manhole	1200
1.011	20.337	813.5	SWMH 1.12	103.781	100.631	2.925	Open Manhole	1200
1.012	4.046	51.2	SWMH 1.13	103.685	100.552	2.908	Open Manhole	1200
1.013	53.594	51.4	EXSWMH	102.330	99.531	2.574	Open Manhole	1200

Free Flowing Outfall Details for Pr_SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013	EXSWMH	102.330	99.531	0.000	1200	0

Simulation Criteria for Pr SW

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 1	Number of Storage Structures 1	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.900	Storm Duration (mins)	30
Ratio R	0.267		

Online Controls for Pr SW

Hydro-Brake® Optimum Manhole: SWMH 1.11, DS/PN: 1.011, Volume (m³): 6.5

Unit Reference	MD-SHE-0082-4000-2000-4000
Design Head (m)	2.000
Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	100.656
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	4.0	Kick-Flo®	0.729	2.5
Flush-Flo™	0.356	3.1	Mean Flow over Head Range	-	3.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	2.6	2.000	4.0	4.000	5.5	7.000	7.2
0.200	3.0	1.000	2.9	2.200	4.2	4.500	5.8	7.500	7.4
0.300	3.1	1.200	3.2	2.400	4.3	5.000	6.1	8.000	7.7
0.400	3.1	1.400	3.4	2.600	4.5	5.500	6.4	8.500	7.9
0.500	3.1	1.600	3.6	3.000	4.8	6.000	6.7	9.000	8.1
0.600	2.9	1.800	3.8	3.500	5.2	6.500	6.9	9.500	8.3

Storage Structures for Pr SW

Tank or Pond Manhole: SWMH 1.11, DS/PN: 1.011

Invert Level (m) 100.656

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	470.4	2.000	470.4	2.001	0.0

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	SWMH 1.0	2.006	0.696	0.000	2.702
2.000	SWMH 2.0	1.399	0.358	0.000	1.757
3.000	SWMH 3.0	1.385	0.583	0.000	1.968
1.001	SWMH 1.1	1.667	0.249	0.000	1.917
1.002	SWMH 1.2	1.627	0.114	0.000	1.741
4.000	SWMH 4.0	1.442	0.393	0.000	1.835
4.001	SWMH 4.1	1.502	0.419	0.000	1.920
4.002	SWMH 4.2	1.575	0.739	0.000	2.314
1.003	SWMH 1.3	1.685	6.277	0.000	7.962
1.004	SWMH 1.4	1.715	2.581	0.000	4.296
1.005	SWMH 1.5	2.630	3.587	0.000	6.216
5.000	SWMH 5.0	2.362	0.103	0.000	2.465
6.000	SWMH 6.0	1.898	1.011	0.000	2.909
6.001	SWMH 6.1	2.161	0.532	0.000	2.693
1.006	SWMH 1.6	2.475	1.101	0.000	3.576
1.007	SWMH 1.7	2.580	1.731	0.000	4.311
7.000	SWMH 7.0	1.205	0.396	0.000	1.601
1.008	SWMH 1.8	2.471	2.223	0.000	4.694
1.009	SWMH 1.9	2.456	1.871	0.000	4.327
1.010	SWMH 1.10	3.855	0.761	0.000	4.616
8.000	SWMH 8.0	1.385	0.272	0.000	1.657
8.001	SWMH 8.1	1.441	0.289	0.000	1.730
8.002	SWMH 8.2	1.621	3.584	0.000	5.205
9.000	SWMH9.0	1.912	1.780	0.000	3.692
8.003	SWMH 8.3	2.179	0.204	0.000	2.383
8.004	SWMH 8.4	1.918	0.246	0.000	2.164
8.005	SWMH 8.5	1.618	0.298	0.000	1.916
8.006	SWMH 8.6	4.714	0.761	0.000	5.475
10.000	SWMH 10.0	1.951	0.503	0.000	2.454
10.001	SWMH 10.1	2.360	0.749	0.000	3.109
1.011	SWMH 1.11	4.196	0.761	940.957	945.914
1.012	SWMH 1.12	3.563	0.113	0.000	3.676
1.013	SWMH 1.13	3.520	2.083	0.000	5.603
Total		72.476	37.365	940.957	1050.798

Summary of Critical Results by Maximum Level (Rank 1) for Pr SW

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	15.900
Region	Scotland and Ireland	Ratio R	0.267
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	20, 20, 20

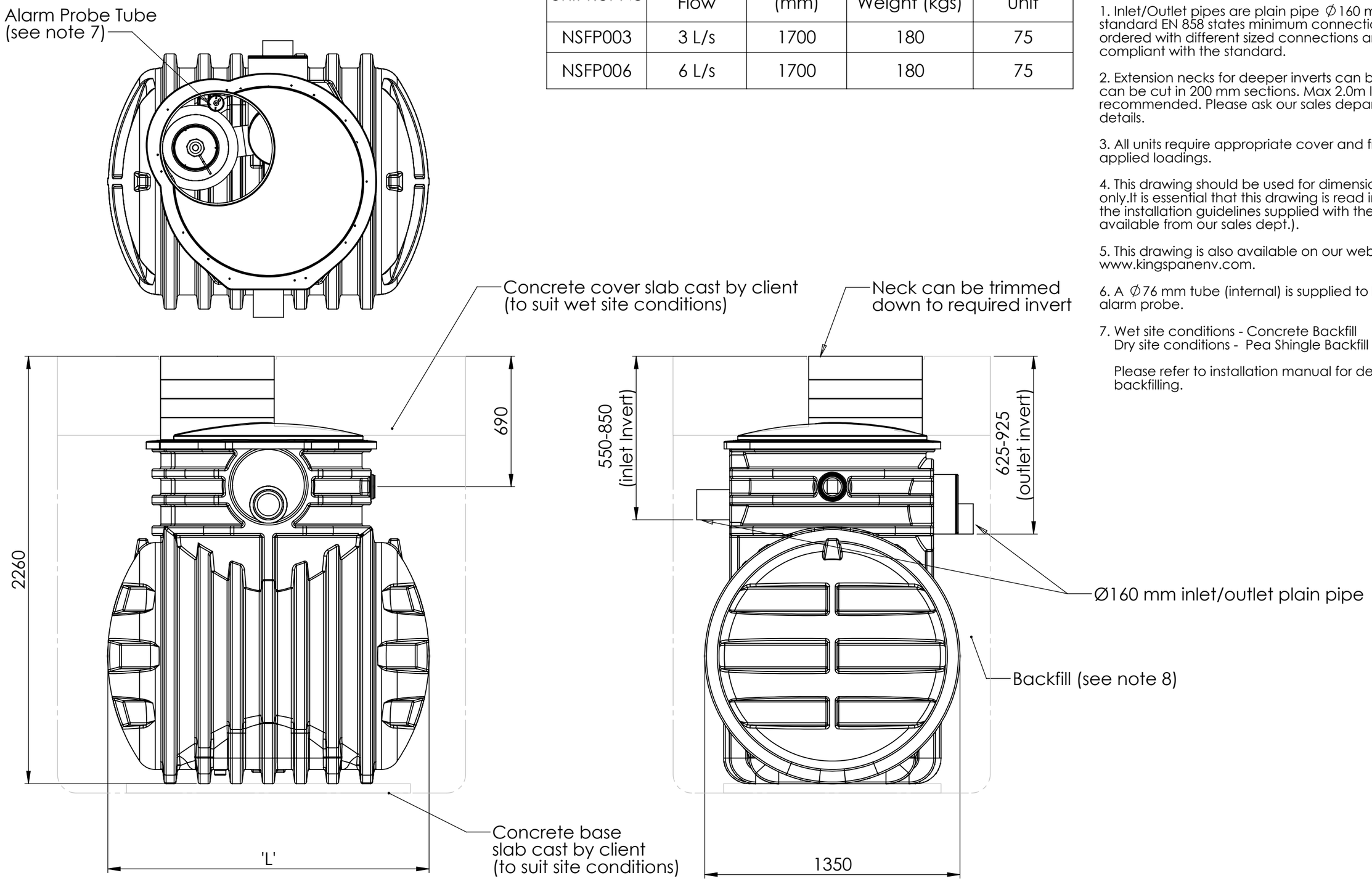
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	SWMH 1.0	15 Winter	100	+20%	100/15 Summer				105.327	0.342
2.000	SWMH 2.0	15 Winter	100	+20%	30/15 Summer				105.326	0.554
3.000	SWMH 3.0	15 Winter	100	+20%	30/15 Summer				105.330	0.546
1.001	SWMH 1.1	15 Winter	100	+20%	30/15 Summer				105.327	0.622
1.002	SWMH 1.2	15 Winter	100	+20%	30/15 Summer				105.322	0.655
4.000	SWMH 4.0	15 Winter	100	+20%	30/15 Summer				105.333	0.573
4.001	SWMH 4.1	15 Winter	100	+20%	30/15 Summer				105.329	0.624
4.002	SWMH 4.2	15 Winter	100	+20%	30/15 Summer				105.325	0.678
1.003	SWMH 1.3	15 Winter	100	+20%	30/15 Summer				105.314	0.767
1.004	SWMH 1.4	30 Winter	100	+20%	30/15 Summer				104.288	0.641
1.005	SWMH 1.5	30 Winter	100	+20%	30/15 Summer				104.184	0.701
5.000	SWMH 5.0	30 Winter	100	+20%	30/15 Summer				104.055	0.759
6.000	SWMH 6.0	30 Winter	100	+20%	100/15 Summer				104.066	0.395
6.001	SWMH 6.1	30 Winter	100	+20%	30/15 Summer				104.053	0.649
1.006	SWMH 1.6	30 Winter	100	+20%	30/15 Summer				104.044	0.786
1.007	SWMH 1.7	30 Winter	100	+20%	30/15 Summer				103.919	0.735
7.000	SWMH 7.0	30 Winter	100	+20%	30/15 Summer				103.900	0.741
1.008	SWMH 1.8	30 Winter	100	+20%	30/15 Summer				103.877	0.773
1.009	SWMH 1.9	30 Winter	100	+20%	30/15 Summer				103.812	0.809
1.010	SWMH 1.10	30 Winter	100	+20%	1/15 Summer				103.730	2.824
8.000	SWMH 8.0	15 Winter	100	+20%	100/15 Summer				104.945	0.130
8.001	SWMH 8.1	15 Winter	100	+20%	100/15 Summer				104.929	0.194
8.002	SWMH 8.2	15 Winter	100	+20%	100/15 Summer				104.909	0.259
9.000	SWMH9.0	15 Winter	100	+20%	30/15 Summer				104.640	0.246
8.003	SWMH 8.3	15 Winter	100	+20%	30/15 Summer				104.596	0.465
8.004	SWMH 8.4	15 Winter	100	+20%	30/15 Summer				104.376	0.286
8.005	SWMH 8.5	15 Winter	100	+20%	30/15 Summer				104.160	0.117
8.006	SWMH 8.6	1440 Winter	100	+20%	1/60 Summer				102.650	1.744
10.000	SWMH 10.0	1440 Winter	100	+20%	30/960 Winter				102.649	0.649
10.001	SWMH 10.1	1440 Winter	100	+20%	30/480 Winter				102.648	0.717
1.011	SWMH 1.11	1440 Winter	100	+20%	1/30 Winter				102.648	1.767
1.012	SWMH 1.12	1440 Winter	100	+20%					100.678	-0.178
1.013	SWMH 1.13	1440 Winter	100	+20%					100.607	-0.191

Summary of Critical Results by Maximum Level (Rank 1) for Pr SW

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH 1.0	0.000	0.06			3.7	SURCHARGED	
2.000	SWMH 2.0	0.000	0.10			3.6	SURCHARGED	
3.000	SWMH 3.0	0.000	0.14			4.6	SURCHARGED	
1.001	SWMH 1.1	0.000	0.77			22.3	SURCHARGED	
1.002	SWMH 1.2	0.000	1.12			28.4	SURCHARGED	
4.000	SWMH 4.0	0.000	0.17			5.2	SURCHARGED	
4.001	SWMH 4.1	0.000	0.35			11.1	SURCHARGED	
4.002	SWMH 4.2	0.000	0.49			16.4	SURCHARGED	
1.003	SWMH 1.3	0.000	1.21			130.5	SURCHARGED	
1.004	SWMH 1.4	0.000	0.87			122.1	SURCHARGED	
1.005	SWMH 1.5	0.000	0.81			118.3	SURCHARGED	
5.000	SWMH 5.0	0.000	0.92			27.4	SURCHARGED	
6.000	SWMH 6.0	0.000	0.20			9.8	SURCHARGED	
6.001	SWMH 6.1	0.000	0.26			12.1	SURCHARGED	
1.006	SWMH 1.6	0.000	1.34			143.2	SURCHARGED	
1.007	SWMH 1.7	0.000	0.83			140.2	SURCHARGED	
7.000	SWMH 7.0	0.000	0.85			26.2	FLOOD RISK	
1.008	SWMH 1.8	0.000	0.91			163.9	SURCHARGED	
1.009	SWMH 1.9	0.000	1.01			170.1	SURCHARGED	
1.010	SWMH 1.10	0.000	14.26			169.1	SURCHARGED	
8.000	SWMH 8.0	0.000	0.40			16.2	SURCHARGED	
8.001	SWMH 8.1	0.000	0.55			22.5	SURCHARGED	
8.002	SWMH 8.2	0.000	0.79			82.6	SURCHARGED	
9.000	SWMH9.0	0.000	0.37			36.6	SURCHARGED	
8.003	SWMH 8.3	0.000	1.89			116.0	SURCHARGED	
8.004	SWMH 8.4	0.000	1.89			116.2	SURCHARGED	
8.005	SWMH 8.5	0.000	1.63			116.0	SURCHARGED	
8.006	SWMH 8.6	0.000	0.06			9.5	SURCHARGED	
10.000	SWMH 10.0	0.000	0.06			1.9	SURCHARGED	
10.001	SWMH 10.1	0.000	0.06			1.9	SURCHARGED	
1.011	SWMH 1.11	0.000	0.33			4.0	SURCHARGED	
1.012	SWMH 1.12	0.000	0.10			4.0	OK	
1.013	SWMH 1.13	0.000	0.06			4.0	OK	

Appendix C – Petrol Interceptor Details

Unit Ref No	Nominal Flow	Dim L (mm)	Approx Empty Weight (kgs)	Fall across unit
NSFP003	3 L/s	1700	180	75
NSFP006	6 L/s	1700	180	75



Notes:-

1. Inlet/Outlet pipes are plain pipe ∅160 mm PVCu. The standard EN 858 states minimum connection sizes, units ordered with different sized connections are not fully compliant with the standard.

2. Extension necks for deeper inverts can be provided. These can be cut in 200 mm sections. Max 2.0m Invert recommended. Please ask our sales department for further details.

3. All units require appropriate cover and frame to suit applied loadings.

4. This drawing should be used for dimensional information only.It is essential that this drawing is read in conjunction with the installation guidelines supplied with the unit.(Copies are available from our sales dept.).

5. This drawing is also available on our website www.kingspanenv.com.

6. A ∅76 mm tube (internal) is supplied to house an oil alarm probe.

7. Wet site conditions - Concrete Backfill
   Dry site conditions - Pea Shingle Backfill

   Please refer to installation manual for details of correct backfilling.

Please check with Kingspan Environmental that this drawing is the latest issue				
Issue	Date	Drawn by	Approved by	Description
04	15/12/10	S.Gill		CC934
03	24/02/10	S. Gill		CC794
02	23/09/09	S.Gill		Drawing Description Changed/Table Corrected
01	19/03/09	S.Gill		Initial Release

All dimensions in mm

Scale: Not to scale

Y:\engineering\Drawing Data\02 - Sales Drawings\DS\DS - 09\DS0992 NSFP003-NSFP006 Full retention Seperators Sales Drawing

Material : n/a	Tolerance : n/a
Finish : n/a	Thickness : n/a
Weight : Kgs n/a	Surface Area : n/a

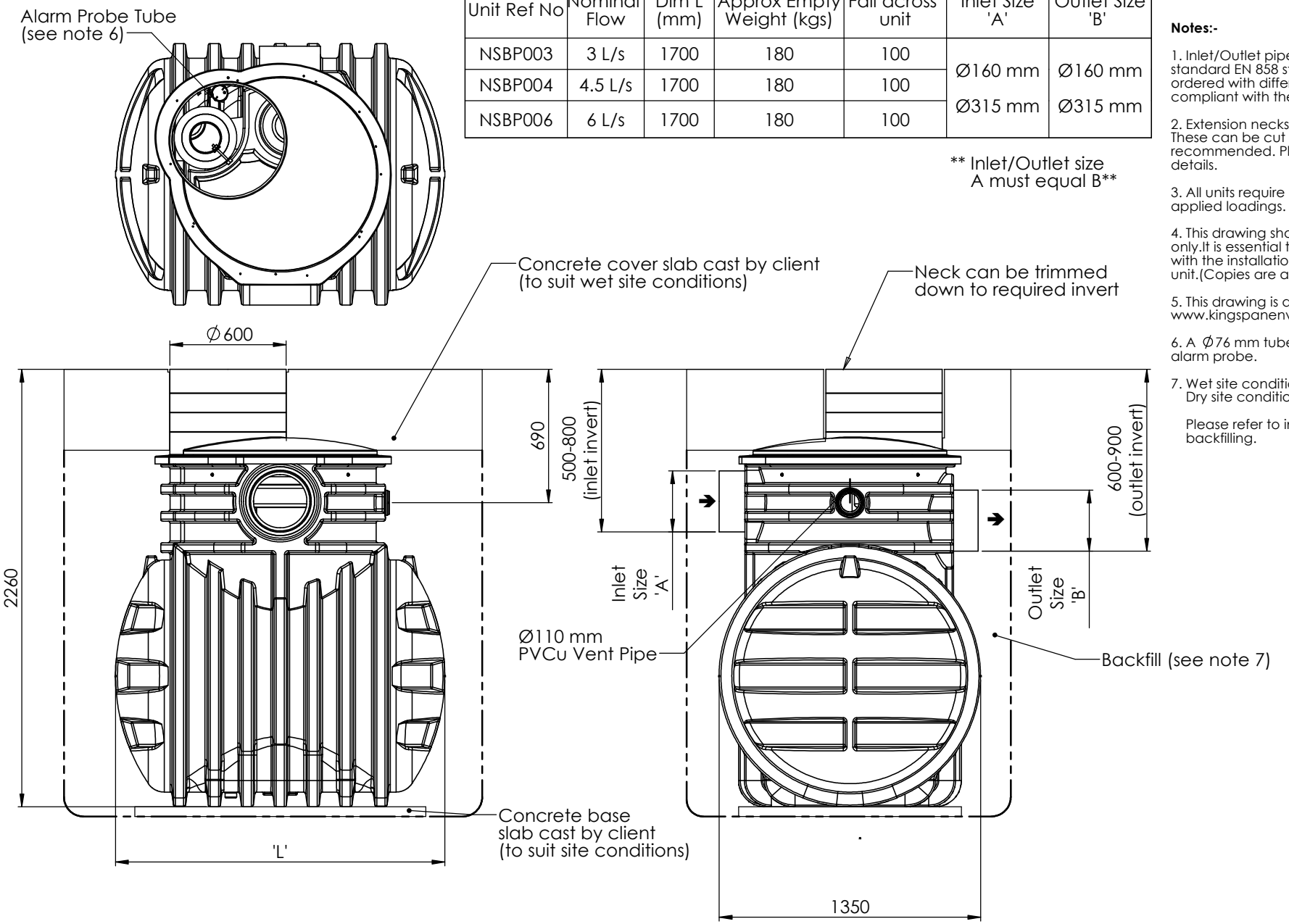
Drawing : NSFP 003-006 Sales Drawing

Drg No - DSO992

Kingspan Environmental

Unit Ref No	Nominal Flow	Dim L (mm)	Approx Empty Weight (kgs)	Fall across unit	Inlet Size 'A'	Outlet Size 'B'
NSBP003	3 L/s	1700	180	100	Ø160 mm	Ø160 mm
NSBP004	4.5 L/s	1700	180	100	Ø315 mm	Ø315 mm
NSBP006	6 L/s	1700	180	100		

** Inlet/Outlet size
A must equal B**



Notes:-

1. Inlet/Outlet pipes are plain pipe Ø315 mm PVCu. The standard EN 858 states minimum connection sizes, units ordered with different sized connections are not fully compliant with the standard.

2. Extension necks for deeper inverts can be provided. These can be cut in 200 mm sections. Max 2.0m Invert recommended. Please ask our sales department for further details.

3. All units require appropriate cover and frame to suit applied loadings.

4. This drawing should be used for dimensional information only.It is essential that this drawing is read in conjunction with the installation guidelines supplied with the unit.(Copies are available from our sales dept.).

5. This drawing is also available on our website www.kingspanenv.com.

6. A Ø76 mm tube (internal) is supplied to house an oil alarm probe.

7. Wet site conditions - Concrete Backfill
Dry site conditions - Pea Shingle Backfill

Please refer to installation manual for details of correct backfilling.

Please check with Kingspan Environmental that this drawing is the latest issue

Issue	Date	Drawn by	Approved by	Description
08	23.06.20	T.Kelly		CC1526 - NSBP004 Nominal Flow Rate Corrected
07	15/12/11	S.Gill		CC1020
06	15/12/10	S.Gill		CC 934

Material : n/a | Tolerance : n/a
Finish : n/a | Thickness : n/a
Weight : Kgs n/a | Surface Area : n/a

Drawing : NSBP003,004 & 006 Sales Drawing

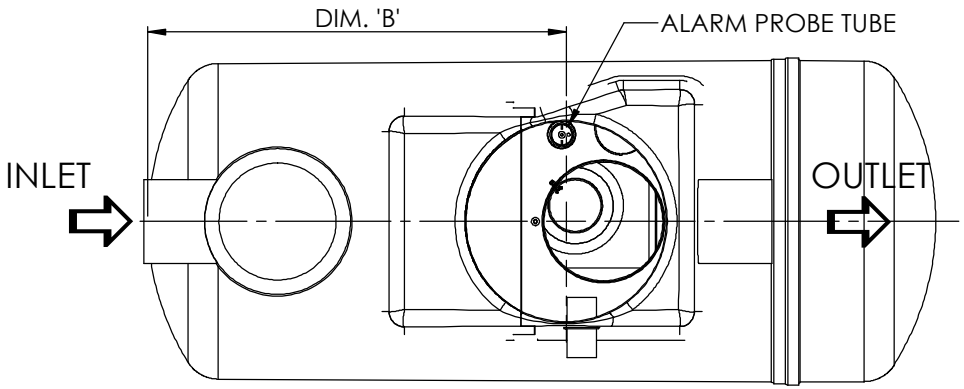
Drg No: DSO993

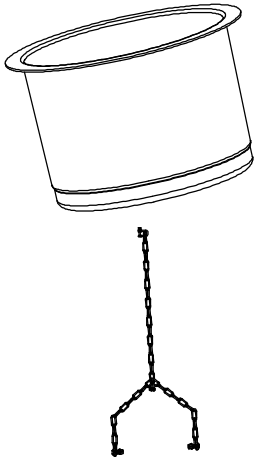
All dimensions in mm

Scale: Not to scale

Z:\Drawing Data\02 - Sales Drawings\DS\DS - 09\DS0993 NSBP003-NSBP006 Class 1 Bypass Seperator Sales Drawing

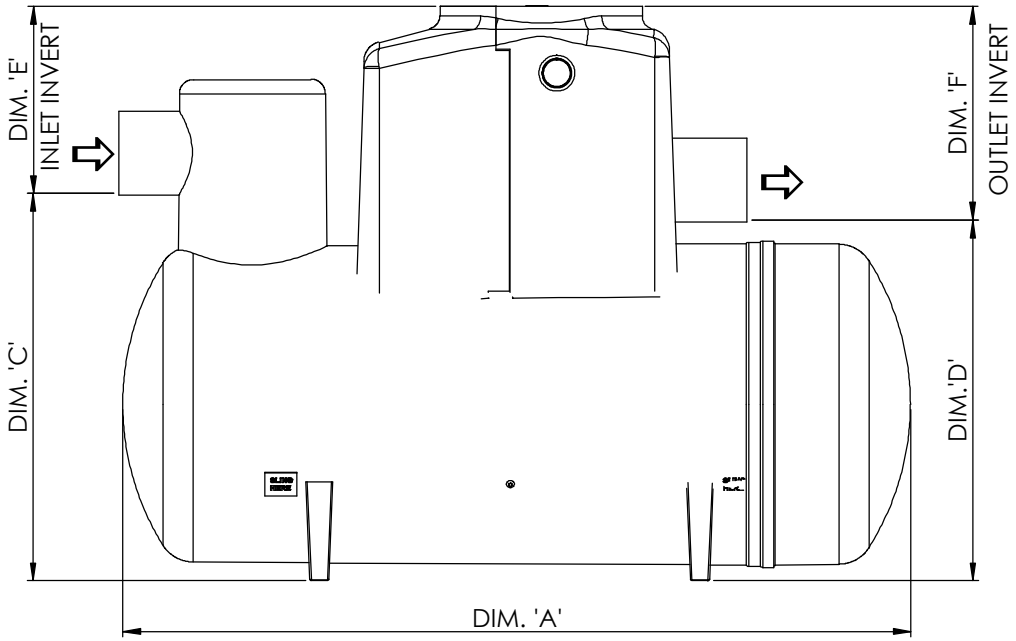
Kingspan Environmental

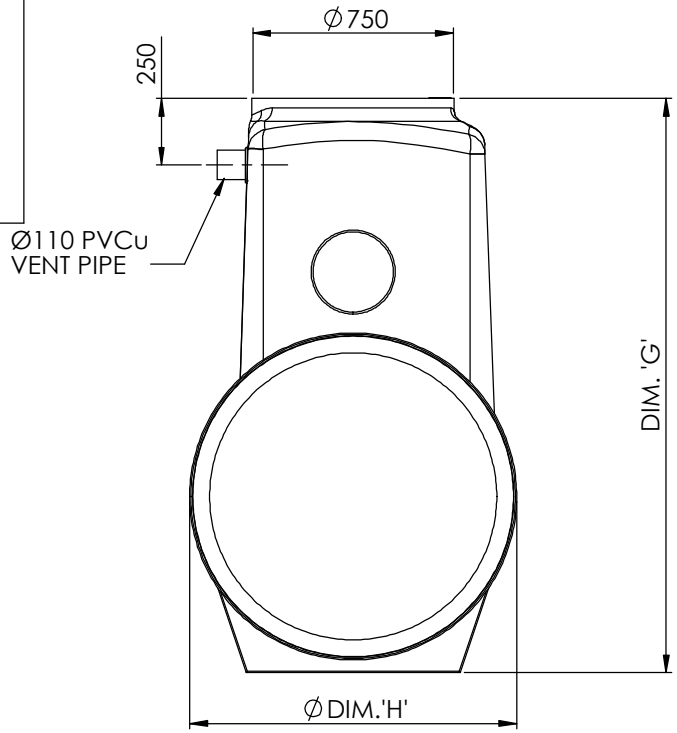




EXTENSION PARTS (IF REQUIRED) INCLUDED IN PRODUCT CODE

NOTES
1. UNITS ARE SUPPLIED WITH THE STANDARD (MINIMUM) PIPEWORK SIZE, AND ORIENTATION SHOWN ON THE DRAWING. THE STANDARD EN858-1 STATES MINIMUM CONNECTION SIZES, UNITS ORDERED WITH DIFFERENT SIZE CONNECTIONS MAY NOT BE FULLY COMPLIANT WITH THE STANDARD. PLEASE CONSULT OUR SALES DEPARTMENT FOR DETAILS OF AVAILABLE OPTIONS, BUT PLEASE NOTE WE DO NOT ALTER INTERNAL PIPEWORK.
2. ALL UNITS SUPPLIED ARE CLASS 1 AND INCLUDE A COALESCER.
3. EXTENSION PARTS FOR DEEPER INVERTS CAN BE PROVIDED FOR ON SITE ASSEMBLY.
4. ALL UNITS REQUIRE APPROPRIATE CONCRETE BASE, COVER AND FRAME TO SUIT APPLIED LOADINGS.
5. THIS DRAWING SHOULD BE USED FOR DIMENSIONAL INFORMATION ONLY.
6. A Ø76mm TUBE IS SUPPLIED TO HOUSE AN OIL ALARM PROBE.





UNIT	NOMINAL FLOW (l/sec.)	DIM.'A'	DIM.'B'	DIM.'C'	DIM.'D'	DIM.'E'	DIM.'F'	DIM.'G'	DIM.'H'	STD. PIPE Ø	APPROX. EMPTY WEIGHT (kg)	FALL ACROSS UNIT
NSBE010	10.0	2070	1095	1450	1350	700	800	2150	1220	315	160	100
NSBE015	15.0	2950	1560	1450	1350	700	800	2150	1220	315	200	100
NSBE020	20.0	3893	2016	1450	1350	700	800	2150	1220	375	220	100
NSBE025	25.0	3575	1900	1680	1580	700	800	2380	1420	375	300	100
NSBE030	30.0	4265	2263	1680	1580	700	800	2380	1420	450	325	100

Please check with Kingspan Environmental that this drawing is the latest issue

Issue	Date	Drawn by	Approved by	Description
07	14.2.18	T.Kelly		CC1405 - Coalescer Extension Chains were Pipe
06	11.11.14	T.Kelly		CC1191 - Alarm Probe Tube Re-Positioned

Material : Various	Tolerance :
Finish :	Thickness : n/a
Weight :	Surface Area :

Drawing : DS1155

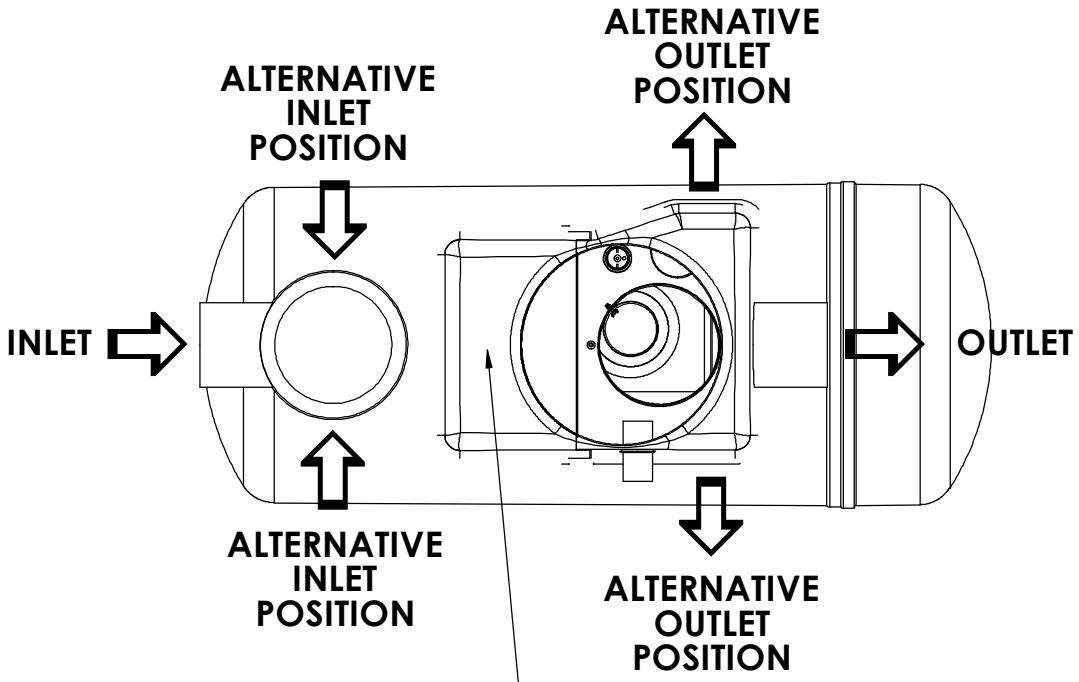
NSBE010 - NSBE030 Bypass Separators

All dimensions in mm

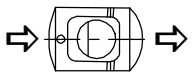
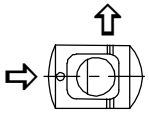
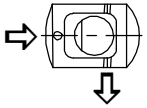
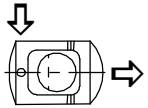
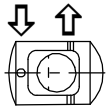
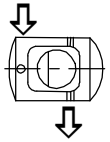
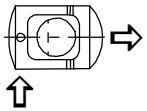
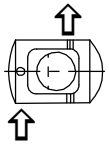
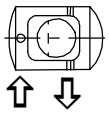
Scale: Not to scale

Kingspan Environmental

R:\Drawing Data\02 - Sales Drawings\DS\DS - 11\DS1155



Please Note:-
Due to the physically small size of the NSBE010, the inlet pipe, all orientation options, is fitted directly into this turret.

Pipe Orientation Options		
OPTION A 	OPTION B 	OPTION C 
OPTION D 	OPTION E 	OPTION F 
OPTION G 	OPTION H 	OPTION K 

Material : Various	Tolerance (unless stated) :	**Drawing : DS1155**	Page 2 of 2
Finish :	Thickness : n/a		
Weight : 226.56 Kg	Surface Area : m²	NSBE010 - 030 BYPASS SEPARATORS	
Modelled By :			

All Dimensions In mm	Scale: Do Not Scale	Third Angle Projection	Kingspan Environmental reserve the right to alter the details of this drawing without prior notice. This drawing is copyright and may not be reproduced or used without the written permission of Kingspan Environmental

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Kingspan Environmental

Appendix D – Hydrodynamic Solid Separator Details

SWMH 8.5

SWMH 1.10

CDS Dimensions (mm)

	CDS10404	CDS0604	CDS0606	CDS0804	CDS0806	CDS0808	CDS1010	CDS1012	CDS1015
A	370	370	370	370	370	370	500	500	500
B	444	815	615	810	830	810	800	800	830
C	1250	1985	1985	2080	2300	2480	2800	3000	3330
D	800	1200	200	1500	1500	1500	2000	2000	2000
E	1112	1665	1665	1966	1966	1966	2475	2475	2475
F	400	700	700	700	700	800	1000	1000	1000
G (dia)	400	600	600	800	800	800	1000	1000	1000
H	400	400	600	400	600	800	1000	1200	1500

Selection Table — CDS Polypropylene Manhole Units

Model Reference	Hydraulic Peak Flow Rate l/s	Treatment Flow Rate l/s	Drainage Area — Impermeable m²	Chamber Diameter (mm)	Internal Pipe Diameter (mm)
CDS 0404	30	12.5	2,000	900	150/225
CDS 0604	70	23	5,000	1200	225
CDS 0606/01	140	38	10,000	1200	225-375
CDS 0606/02	200	38	15,000	1200	225-375
CDS 0806	350	49	25,000	1500	450
CDS 0808	400	72	30,000	1500	450
CDS 1010	480	116	35,000	2000	450
CDS 1012	550	152	40,000	2000	450/750
CDS 1015	700	211	50,000	2000	450/750
CDS 0804	275	31	20,000	1500	300

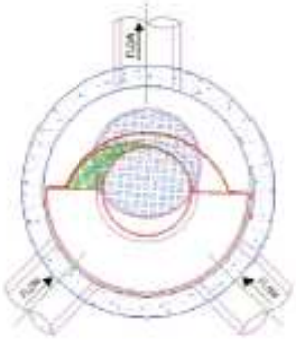
Proposed Peak Flow Rate for each model calculated using Rational Lloyd Davis with a rainfall intensity of 50mm/hr. For greater flows — special design/ construction required.

In-Line CDS

For small catchment, these units are used within the drainage system in-line and are supplied as BBA Approved* complete manhole polypropylene units from the selection table above.

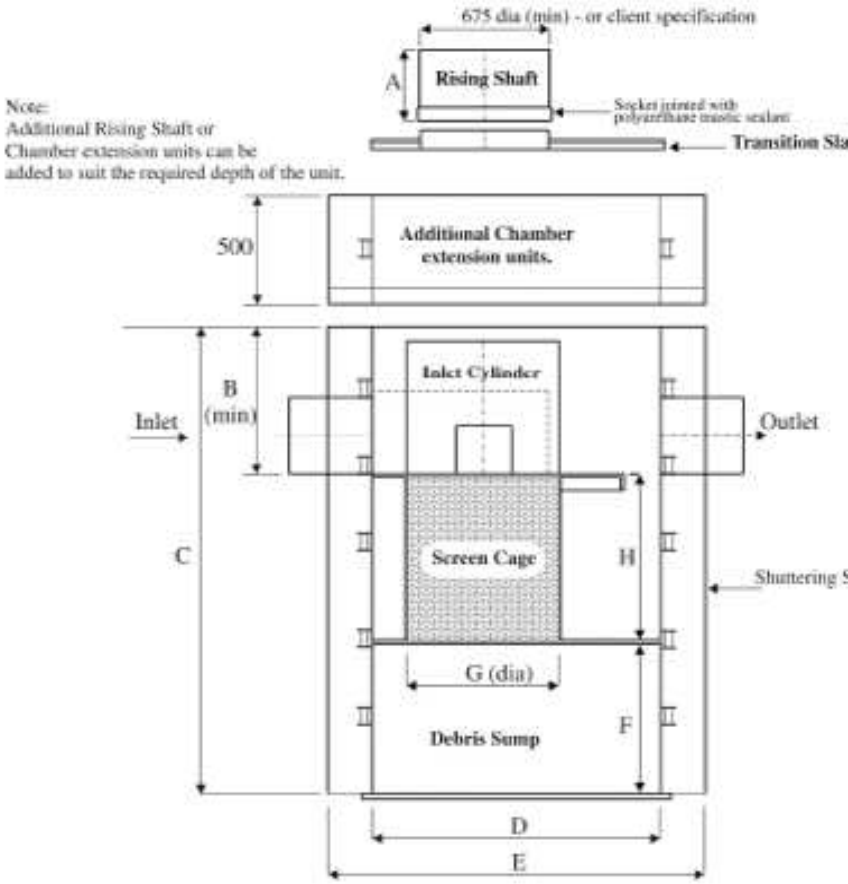
Off-Line CDS

Larger catchment areas and retrofit projects designed with larger surface runoff conveyance capacity can receive treatment using a CDS unit placed adjacent to the storm pipeline. Water is channeled to these offline CDS configurations using a diversion structure. The diversion structure and its weir send the water quality flow to the offline CDS unit and also ensure larger flow events from less frequent storm events properly bypass the offline unit without cause flooding upstream of the unit.



Model Designation

A four digit number representing the screen diameter and screen height then follows to give the standard model designation for a CDS screen for installation into standard commercially available pre-fabricated manhole chambers. Example: CDS 0806 designates a separation screen dia. 0.8 m and screen height of 0.6m.



Appendix E – Flow Control Device Details

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	4.000
Flush-Flo™	0.357	3.143
Kick-Flo®	0.730	2.520
Mean Flow		3.103

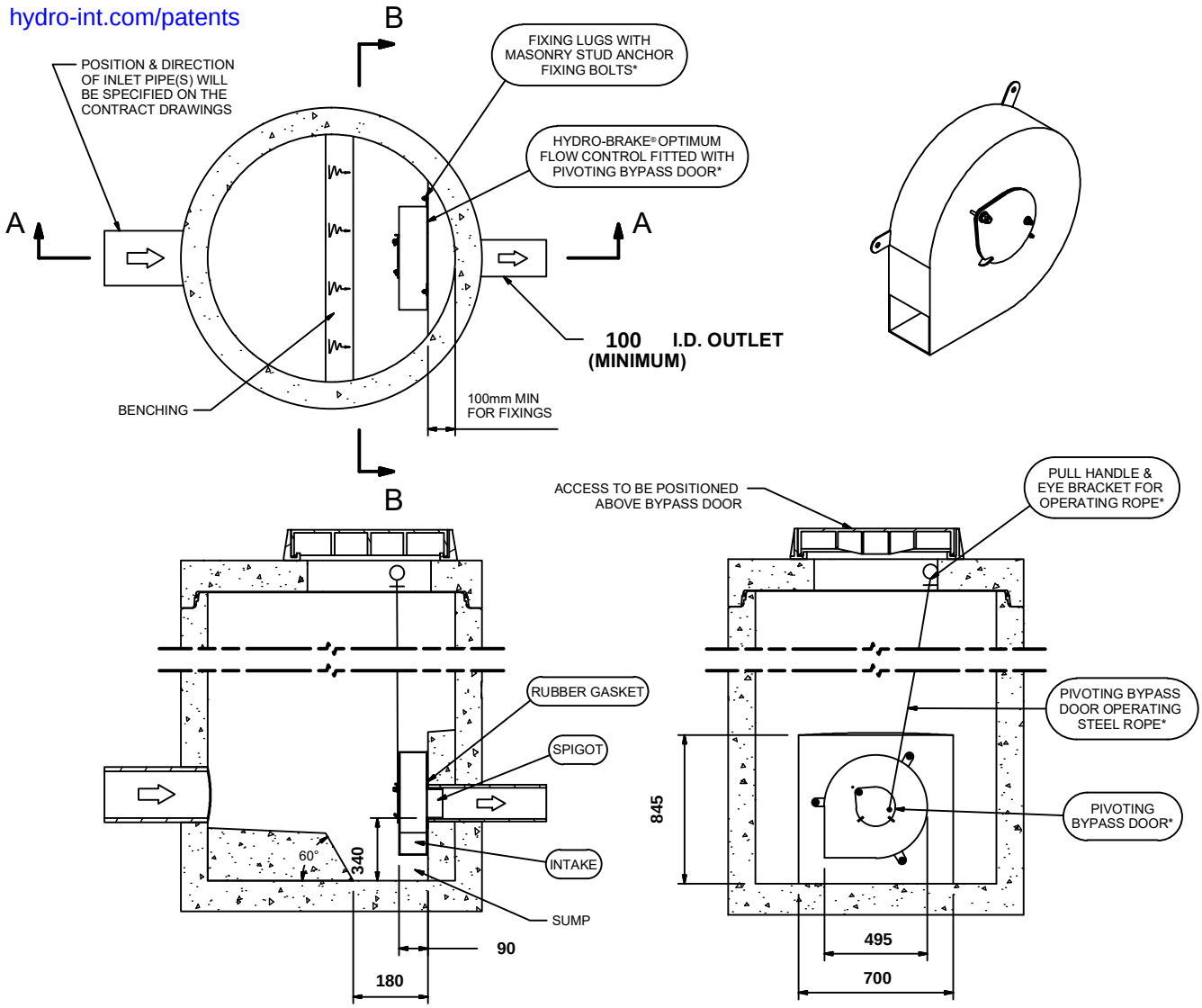
Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 115 kg

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

WRc Approved PT/329/0412

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0082-4000-2000-4000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	6/7/2022 12:07 PM
SITE	
DESIGNER	Steven Waters
REF	

SHE-0082-4000-2000-4000
Hydro-Brake® Optimum

swaters@hydro-int.com

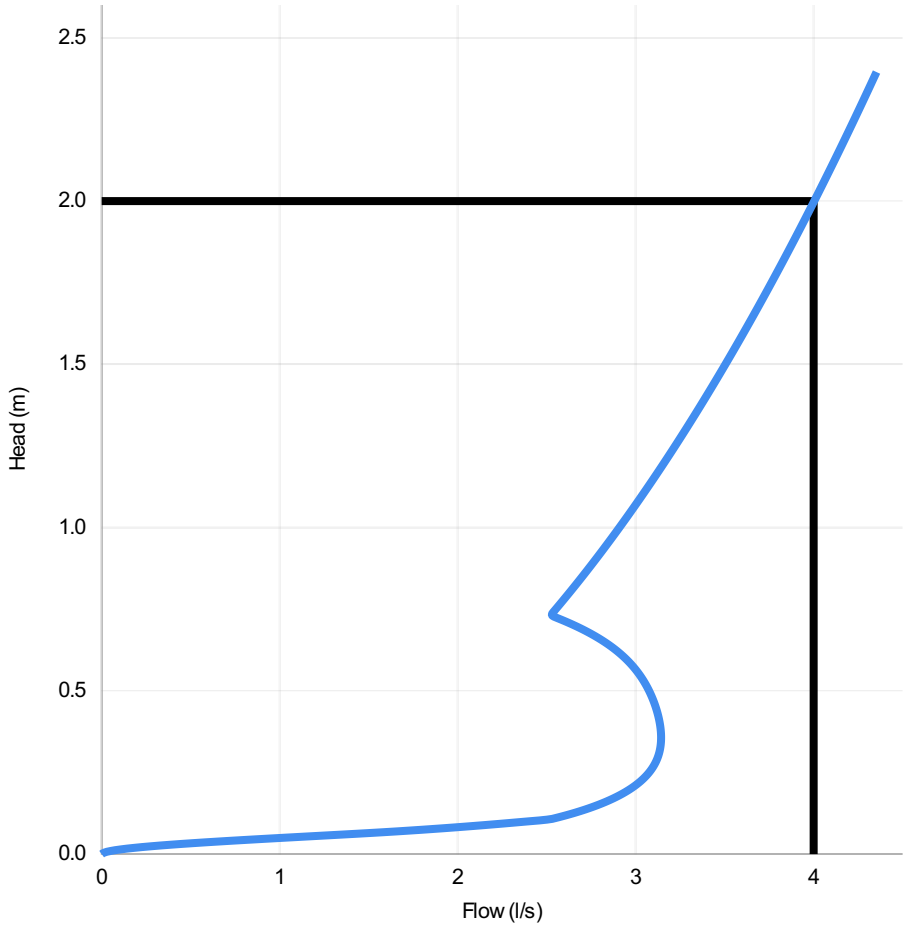
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	4.000
Flush-Flo	0.357	3.143
Kick-Flo®	0.730	2.520
Mean Flow		3.103

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.069	1.640
0.138	2.724
0.207	2.989
0.276	3.107
0.345	3.142
0.414	3.131
0.483	3.090
0.552	3.019
0.621	2.898
0.690	2.697
0.759	2.564
0.828	2.668
0.897	2.767
0.966	2.862
1.034	2.954
1.103	3.042
1.172	3.128
1.241	3.212
1.310	3.292
1.379	3.371
1.448	3.448
1.517	3.523
1.586	3.596
1.655	3.667
1.724	3.737
1.793	3.805
1.862	3.873
1.931	3.938
2.000	4.003

DESIGN ADVICE

The head/flow characteristics of this SHE-0082-4000-2000-4000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International®

DATE	07/06/2022 12:07
Site	
DESIGNER	Steven Waters
Ref	

SHE-0082-4000-2000-4000

Hydro-Brake Optimum®

Appendix F – Irish Water Pre-Connection Enquiry (PCE)

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.
Please note that this is a digital PDF form and can be filled in electronically

Please refer to the **Guide to completing the pre-connection enquiry form** on page 14 of this document when completing the form.

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

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable): K2 STRATEGIC INFRASTURCTURE IRELAND LTD.

Trading name (if applicable):

Company registration number (if applicable): 639779

Parent company registered company name (if applicable):

Parent company registration number (if applicable):

If you are not a registered company/business, please provide the applicant's name:

*Contact name: FRED MITCHELL

*Postal address: 6TTH FLOOR, RIVERPOINT LOWER MALLOW STREET, LIMERICK

*Eircode: V94WC6A

Please provide either a landline or a mobile number

Landline:

*Mobile: 0873397845

*Email: PROJECTCORE@K2DATACENTRES.COM

2 Agent details (if applicable):

The fields marked with * in this section are mandatory if using an agent

*Contact name: CONOR DOHERTY

Company name (if applicable): CSEA

*Postal address: 3RD FLOOR, THE HIGHLINE

BAKERS POINT, POTTERY ROAD,

DUN LAOGHAIRE, CO. DUBLIN

*Eircode: A96KW29

Please provide either a landline or a mobile number

Landline: 0128850060

*Mobile 0857716511

*Email: CONOR.DOHERTY@CSEA.IE

3 *Please indicate whether it is the applicant or agent who should receive future correspondence in relation to the enquiry:

Applicant ○ Agent ◉

Section B | Site details

4 *Site address 1 (include Site name/Building name/Building number):

SITE AT JUNCTION OF KINGSWOOD

***Address 2** ROAD AND KINGSWOOD DRIVE

***Address 3** CITYWEST BUSINESS PARK

***City/Town** TALLAGHT

***County** DUBLIN 24 **Eircode** D24YX53

5 *Irish Grid co-ordinates (proposed connection point):

Eastings (X) 305759 Northings (Y) 228162

Note: Values for Eastings must be between 015,900 and 340,000. Northings, between 029,000 and 362,000
Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 *Local Authority where proposed development is located:

SOUTH DUBLIN COUNTY COUNCIL

7 *Has full planning permission been granted? Yes ☑ No ☐

If 'Yes', please provide the current or previous planning reference number:

SD18A/0301

8 ***Is this development affiliated with a government body/agency?** Yes ☐ No ☑

If 'Yes', please specify the body/agency:

Eg. IDA, HSE, LDA, etc.

Section C | Development details

9 ***Please outline the domestic and/or industry/business use proposed:**

Domestic:

Property type	Number of units	Property type	Number of units
House		Apartments	
Duplex		Number of Apartment Blocks	

Industry/business:

Property type	Number of units	Property type	Number of units
Agricultural		Brewery / Distillery	
Restaurant / Café / Pub		Car Wash / Valeting	
Creche		Data Centre	
Fire Hydrant		Fire Station	
Food Processing		Hotel Accommodation	
Industrial / Manufacturing		Laundry / Laundrette	
Office		Primary Care Centre	
Residential / Nursing Care Home		Retail	
School		Sports Facility	
Student Accommodation		Warehouse	

Other (please specify type)	DATA CENTRE & ELECRICITY SUBSTATION	No. of Units	2

9.1 Please provide additional details if your proposed business use are in the Food Processing, Industrial unit/ Manufacturing, Sports Facility or Other Categories.

DATA CENTRE WITH INDUSTRIAL

WATER DEMAND FOR SEASONAL

COOLING PURPOSES

9.2 Please provide the maximum expected occupancy in number of people, according to the proposed development you selected, e.g. Number of office workers, number of nursing home residents, maximum pub occupancy, number of hotel beds, number of retail workers:

4	5				

10 ***Approximate start date of proposed development:**

0	1	/	0	6	/	2	0	2	2

11 ***Is the development multi-phased?** Yes ☐ No ☑

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

12 ***Please indicate the type of connection required by ticking the appropriate box below:**

Both Water and Wastewater ◉ Please complete both Sections D and E

Water only ○ Please go to Section D

Wastewater only ○ Please go to Section E

Reason for only applying for one service (if applicable):

Section D | Water connection and demand details

13 ***Is there an existing connection to public water mains at the site?** Yes ☐ No ☑

13.1 If yes, is this enquiry for an additional connection to one already installed? Yes ☐ No ☐

13.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☐

14 **Approximate date water connection is required:** 01 / 06 / 2023

15 ***What diameter of water connection is required to service the development?** 150 mm

16 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many? ☐☐

17 **Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak hour water demand	0.146	**l/s**
Post-development average hour water demand	0.023	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

18 **Please indicate the industrial water demand (industry-specific water requirements):**

Post-development peak hour water demand	2.68	**l/s**
Post-development average hour water demand	1.74	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

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

103.5 m

20 **What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?**

106.0 m

21 **Is on-site water storage being provided?** Yes ☑ No ☐

Please include calculations on the attached sheet provided.

22 **Are there fire flow requirements?** Yes ☑ No ☐

Additional fire flow requirements over and above those identified in Q17-18	25	**l/s**

Please include calculations on the attached sheet provided, and include confirmation of requirements from the Fire Authority.

23 **Do you propose to supplement your potable water supply from other sources?** Yes ☐ No ☑

If 'Yes', please indicate how you propose to supplement your potable water supply from other sources (see **Guide to completing the application form** on page 15 of this document for further details):

Section E | Wastewater connection and discharge details

24 ***Is there an existing connection to a public sewer at the site?** Yes ☐ No ☑

24.1 If yes, is this enquiry for an additional connection to the one already installed? Yes ☐ No ☐

24.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☐

25 ***Approximate date that wastewater connection is required:** 01 / 06 / 2023

26 ***What diameter of wastewater connection is required to service the development?** 150 mm

27 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many?

28 **Please indicate the commercial wastewater hydraulic load (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak discharge	0.12	**l/s**
Post-development average discharge	0.03	**l/s**

Please include calculations on the attached sheet provided.

29 **Please indicate the industrial wastewater hydraulic load (industry-specific discharge requirements):**

Post-development peak discharge	1.63	**l/s**
Post-development average discharge	0.69	**l/s**

Please include calculations on the attached sheet provided.

30 Wastewater organic load:

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)	450	150	360
Chemical oxygen demand (COD)			
Suspended solids (SS)	500	150	
Total nitrogen (N)	100	60	
Total phosphorus (P)	16	7	
Other			

Temperature range	10-25 deg C
pH range	7

31 *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.

Please submit detailed calculations on discharge volumes, peak flows and attenuation volumes with this application

32 *Do you propose to pump the wastewater? Yes ☐ No ☑

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

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

104.9 m

34 What is the lowest finished floor level on site above Malin Head Ordnance Datum? 106.0 m

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

99.38 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: _____ Date: 12 / 05 / 2022

Your full name (in BLOCK CAPITALS):

CONOR DOHERTY

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** or alternatively, post to:

Irish Water
PO 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

See Domestic Water Demand calculation below:-

The total proposed population of the development is 45 which is outlined as follows:-

In accordance with Section 3.28 of IW-CDS-5020-03 the demand per head is 45 litres per person.

Total average demand is 45 x 45 / (24 x 60X 60) = 0.023 l/s

Average Day / Peak Week Demand = 1.25 x 0.023 = 0.029 l/s (as per Section 3.7.2 of IW-CDS-5020-03)

Peak Demand = 0.029 x 5.0 = 0.146 l/s (as per Section 3.7.2 of IW-CDS-5020-03)

See Industrial Water Demand Calculation below:-

Peak Demand

We have 68 No. Air Handling Units. These use water to increase their cooling capacity when the ambient temperature rises above 22°C. The maximum water flow rate required per AHU is 0.15L/s. Therefore 0.15 x 68 units = 10.2 L/s. We have estimated that a peak flow would be required for a maximum of 5 hours on any hot day (ASHRAE n-20). Estimated storage that the peak flow is therefore 5 x 3600 x 10.2 = 183,600 Litres for one day. As our Client requests 48 hour storage we will be designing tank capacity of 367,200 Litres. Using 1 day cycle, and a water consumption of 183,600 Litres to fill this water volume over 19 hours, implies: 183,600/(19x3600)= 2.68 L/s

Average Demand

We have 68 No. Air Handling Units. Between the temperatures 22°C and 24°C the water flow rate required per AHU is 0.097L/s. Therefore 0.097 x 68 units = 6.63 L/s. We have estimated that this average flow would be required for a maximum of 5 hours on any hot day (ASHRAE n-20). Estimated storage used up would be 5 x 3,600 x 6.63 = 119,340 litres for one day. Using 1 day cycle, and a water consumption of 119,340 Litres, to fill this water volume over 19 hours, implies: 119,340/(19x3,600)= 1.74 L/s

Following feedback from Irish Water on other Data Centre applications the following calculations are provided in order to assist the assessment of the application.

Maximum Annual Industrial Water Demand

Summer Flow rate between 20-24°C = 100 hours x 6.63 l/s x 3,600 = 2,386,800 Litres (= 2387 m^3). Summer Flow rate above 24°C = 16hours x 10.2 L/s x 3,600 = 587,520 Lit (=588 m^3). Total Annual Use = 2,387 + 588 = 2,975 m^3.

Maximum Daily Demand

Peak process flow rate (10.2 x 5 x 3600) = 183,600 Litres (=184 m^3). Peak Office Water use in 24 hours = 2,784 Litres (2.78 m^3). Maximum daily demand is 184 + 2.78 = 187 m^3

On-site storage

We have 68 No. Air Handling Units. These use water to increase their cooling capacity when the ambient temperature rises above 22°C using evaporative cooling. The maximum water flow rate required per AHU is 0.15L/s. Therefore 0.15 x 68 units = 10.2 L/s. Estimated storage that the peak flow is therefore 5 x 3600 x 10.2 = 183,600 Litres for one day. As our Client requests 48 hour storage we will be designing tank capacity of 367,200 Litres This has been rounded up to 400 m^3 of stored water. In addition 3 m^3 of storage is provided for domestic purposes.

Fire flow requirements

Hydrant flow rates as per IS391:2000. A small flowrate is also needed for filling a Water Mist Fire Suppression tank. This is included within the industrial flow rate.

See domestic foul wastewater demand calculations below-

The total proposed population of the development is 45 (P) :-

As per Appendix C of IW-CDS-5030-03;
Consumption for Data Centres (G) = 50 l/person/day

Average Demand

PG = 45 x 50 = 2,250 l/day
I = 2,250 x 0.1 = 225 l/day (as per Table 2.4 of Appendix B to IW-CDS-5030-03)
E = 0
Dry Weather Flow = PG+I+E => 2,250 + 225 + 0 / 24 x 60 x 60 = 0.03 l/s

Peak Demand

Pf (dom, ind) = 4.5 as per Table 2.7 of Appendix B to IW-CDS-5030-03).

Design Foul (Peak) Flow = Pf (dom, ind) x PG + I + E => 4.5 x (2,250 / 24 x 60 x60) + (225 / 24 x 60 x60) + 0 = 0.12 l/s

See Industrial waste water demand calculation below:-

Peak Demand

Based on the maximum peak flow rate of 10.2 l/s and an efficiency rate of 80% evaporation = 2.04l/s non-absorbed water. With diversification over 68 AHUs a further 20% diversification is applied = 1.63 l/s.

Average Demand

Based on the average process flow rate of 6.63 L/s and an efficiency rate of 85% evaporation = 0.99 l/s non-absorbed water. With diversification over 68 AHUs a further 30% diversification is applied = 0.69 l/s.

N/A

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** 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.

Question 8: Please indicate if this development is affiliated with a government body/agency, and if so, specify

Section C | Development details

Question 9: Please specify the number of different property/premises types by filling in the tables provided.

Question 9.1: Please provide additional details if your proposed business use are in the Food Processing, Industrial unit/ Manufacturing, Sports Facility or Other Categories.

Question 9.2: Please indicate the maximum expected occupancy in numbers of people according to the proposed development you selected.

Question 10: Please indicate the approximate commencement date of works on the development.

Question 11: 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 12: 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 13: Please indicate if a water connection already exists for this site.

Question 13.1: Please indicate if this enquiry concerns an additional connection to one already installed on the site.

Question 13.2: 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 14: Please indicate the approximate date that the proposed connection to the water infrastructure will be required.

Question 15: Please indicate what diameter of water connection is required to service this development.

Question 16: 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 17: 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 18: 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 litres 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 19: 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 20: 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 21: 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 22: 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 23: 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 24: Please indicate if a wastewater connection to a public sewer already exists for this site.

Question 24.1: Please indicate if this enquiry relates to an additional wastewater connection to one already installed.

Question 24.2: 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 25: Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.

Question 26: Please indicate what diameter of wastewater connection is required to service this development.

Question 27: Please indicate if more than one connection is required to service this development. Please indicate number required.

Question 28: 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 29: 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 30: 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 31: 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 32: Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.

Question 33: 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 34: 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 35: 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.

Notes

Notes

Appendix G – Irish Water Confirmation of Feasibility (CoF)

CONFIRMATION OF FEASIBILITY

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

Conor Doherty

3rd Floor, The Highline Bakers Point
Pottery Road
Dun Laoghaire
Co. Dublin
A96 KW29

30 June 2022

Our Ref: CDS22003496 Pre-Connection Enquiry
Site at Junction of Kingswood Road, and Kingswood Drive, Tallaght, Dublin 24

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Business Connection of 2 unit(s) at Site at Junction of Kingswood Road, and Kingswood Drive, Tallaght, Dublin 24, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection**

  - Feasible without infrastructure upgrade by Irish Water

  The development can proceed on the proviso that the customer provides storage for all annual cooling needs with a maximum allowable annual demand from the site limited to 2 975m^3.

  This storage will be filled in winter by agreement with Irish Water operations and used as required during the summer months.

  Approximately 20m of new 200mm ID pipe main to be laid to connect the site development to the existing 200mm uPVC main in

		Kingswood Drive. Bulk meter must be installed on this connection.
• **Wastewater Connection**	-	Feasible without infrastructure upgrade by Irish Water

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

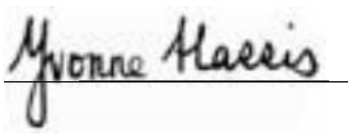
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections, email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

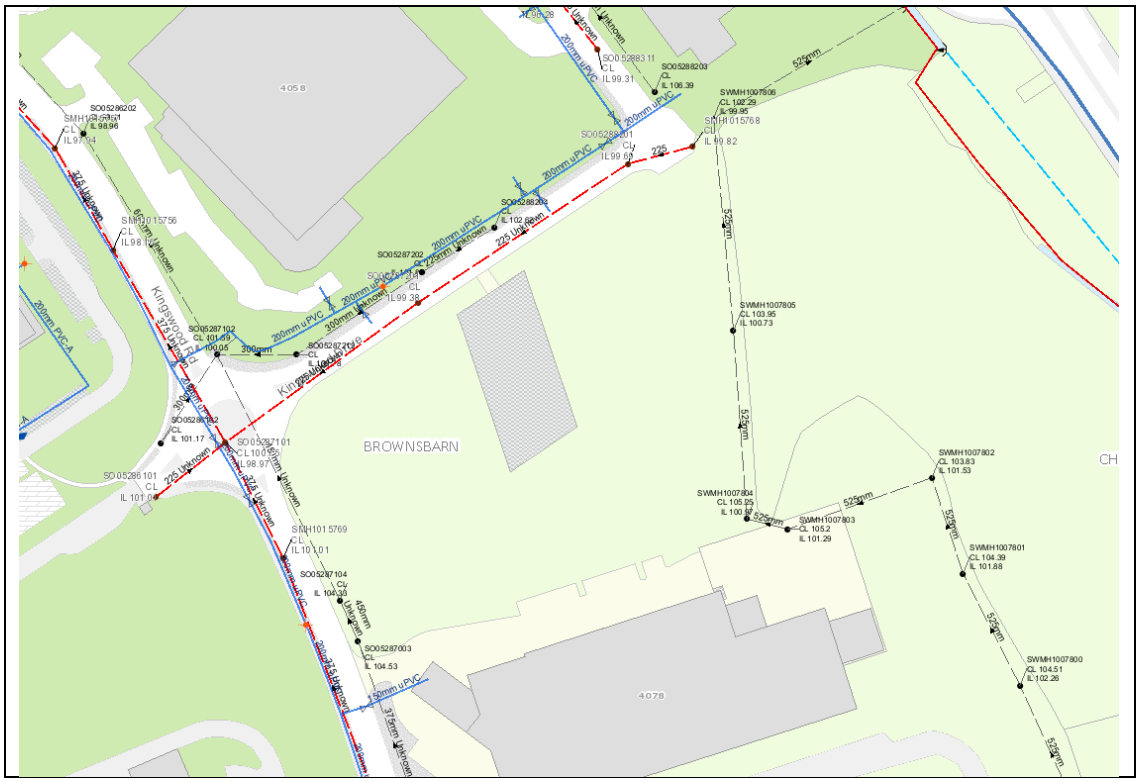
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• 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,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



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

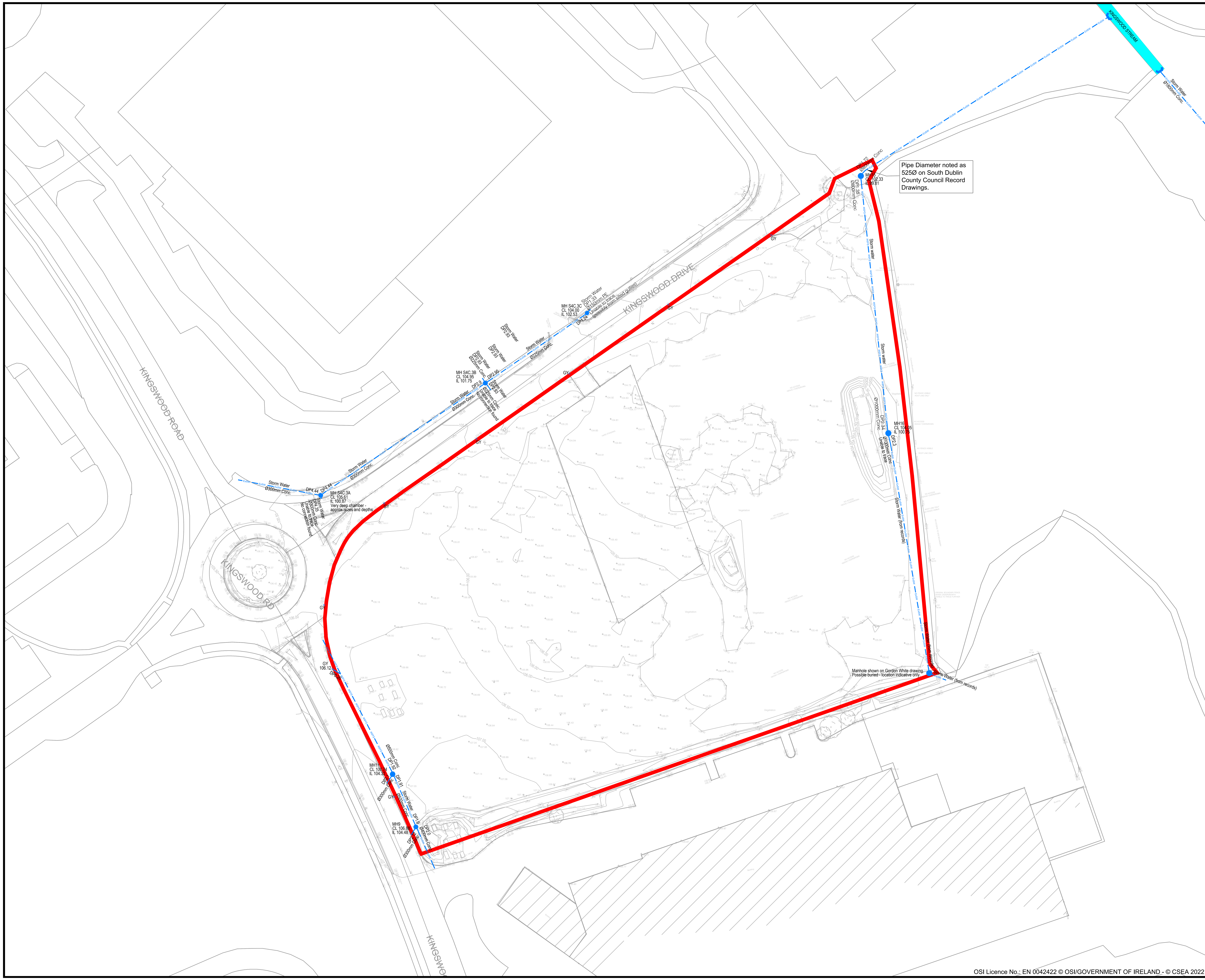
Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) 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.

Clifton Scannell Emerson Associates Limited, Civil & Structural Consulting Engineers
Seafort Lodge, Castledawson Avenue, Blackrock, Co. Dublin, Ireland.

T. +353 1 288 5006 F. +353 1 283 3466 E. info@csea.ie W. www.csea.ie

Appendix E Planning Drawings



DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

A1

N

LEGEND

- OUTLINE OF THE SITE SUBJECT TO THIS APPLICATION
- EXISTING SURFACE WATER PIPE
- EXISTING SURFACE WATER MANHOLE
- EXISTING SURFACE WATER HEADWALL
- EXISTING WATERCOURSE

NOTE:

EXISTING SURFACE WATER DRAINAGE INFORMATION BASED ON MURPHY SURVEYS DRAWING NO. MSG47014_U DATED ON 22ND APRIL 2022 AND SOUTH DUBLIN COUNTY COUNCIL RECORD DRAWINGS.

Rev	Description	Drawn	Checked	Date
P02	PLANNING ISSUE	LT	CD	14/07/22
P01	DRAFT PLANNING	LT	CD	21/06/22

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Client: K2 STRATEGIC INFRASTRUCTURE IRELAND LTD.

Project: K2 DATACENTRE

Dwg. Title: EXISTING SURFACE WATER DRAINAGE LAYOUT PLAN

Drawn By	LT	Date	09/05/22
Checked By	CD	Scale	1:500 @ A1
CSEA Job No.	22_043		

Project Code	Originator	Zone/ Phase	Level	Type	Role	Dwg. No.
22_043	CSE	00	XX	DR	C	2100

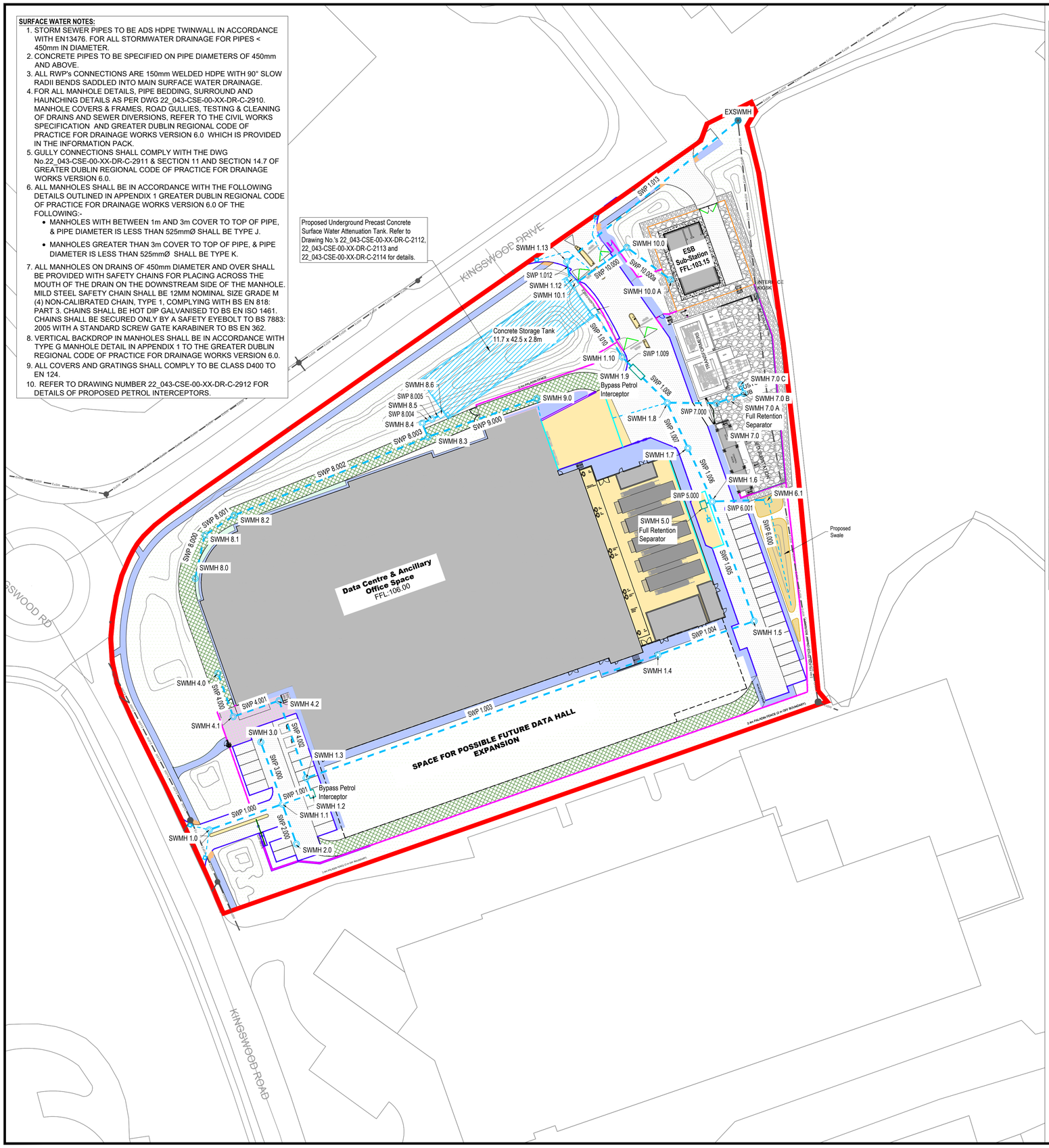
22_043 - CSE - 00 - XX - DR - C - 2100

Status Code: S0 — Suitability Description: WORK IN PROGRESS

Revision: P02 — Project Status: PRELIMINARY

SURFACE WATER NOTES:

1. STORM SEWER PIPES TO BE ADS HDPE TWINWALL IN ACCORDANCE WITH EN13476. FOR ALL STORMWATER DRAINAGE FOR PIPES < 450mm IN DIAMETER.
2. CONCRETE PIPES TO BE SPECIFIED ON PIPE DIAMETERS OF 450mm AND ABOVE.
3. ALL RWP's CONNECTIONS ARE 150mm WELDED HDPE WITH 90° SLOW RADII BENDS SADDLED INTO MAIN SURFACE WATER DRAINAGE.
4. FOR ALL MANHOLE DETAILS, PIPE BEDDING, SURROUND AND HAUNCHING DETAILS AS PER DWG 22_043-CSE-00-XX-DR-C-2910. MANHOLE COVERS & FRAMES, ROAD GULLIES, TESTING & CLEANING OF DRAINS AND SEWER DIVERSIONS, REFER TO THE CIVIL WORKS SPECIFICATION AND GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0 WHICH IS PROVIDED IN THE INFORMATION PACK.
5. GULLY CONNECTIONS SHALL COMPLY WITH THE DWG No.22_043-CSE-00-XX-DR-C-2911 & SECTION 11 AND SECTION 14.7 OF GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0.
6. ALL MANHOLES SHALL BE IN ACCORDANCE WITH THE FOLLOWING DETAILS OUTLINED IN APPENDIX 1 GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0 OF THE FOLLOWING:-
   - MANHOLES WITH BETWEEN 1m AND 3m COVER TO TOP OF PIPE, & PIPE DIAMETER IS LESS THAN 525mmØ SHALL BE TYPE J.
   - MANHOLES GREATER THAN 3m COVER TO TOP OF PIPE, & PIPE DIAMETER IS LESS THAN 525mmØ SHALL BE TYPE K.
7. ALL MANHOLES ON DRAINS OF 450mm DIAMETER AND OVER SHALL BE PROVIDED WITH SAFETY CHAINS FOR PLACING ACROSS THE MOUTH OF THE DRAIN ON THE DOWNSTREAM SIDE OF THE MANHOLE. MILD STEEL SAFETY CHAIN SHALL BE 12MM NOMINAL SIZE GRADE M (4) NON-CALIBRATED CHAIN, TYPE 1, COMPLYING WITH BS EN 818: PART 3. CHAINS SHALL BE HOT DIP GALVANISED TO BS EN ISO 1461. CHAINS SHALL BE SECURED ONLY BY A SAFETY EYEBOLT TO BS 7883: 2005 WITH A STANDARD SCREW GATE KARABINER TO BS EN 362.
8. VERTICAL BACKDROP IN MANHOLES SHALL BE IN ACCORDANCE WITH TYPE G MANHOLE DETAIL IN APPENDIX 1 TO THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS VERSION 6.0.
9. ALL COVERS AND GRATINGS SHALL COMPLY TO BE CLASS D400 TO EN 124.
10. REFER TO DRAWING NUMBER 22_043-CSE-00-XX-DR-C-2912 FOR DETAILS OF PROPOSED PETROL INTERCEPTORS.



Surface Water Manhole Schedule							
Manhole Name	Cover Level	Upstream Invert Level	Downstream Invert Level	Manhole Type	Manhole Diameter (mm)	Manhole Depth	Comments
SWMH 1.0	CL = 106.534		SWP 1.000 = 104.760	J	1.2	1.774	
SWMH 2.0	CL = 105.785		SWP 2.000 = 104.548	J	1.2	1.237	
SWMH 3.0	CL = 105.784		SWP 3.000 = 104.559	J	1.2	1.225	
SWMH 1.1	CL = 105.954	SWP 3.000 = 104.480 SWP 1.000 = 104.480 SWP 2.000 = 104.480	SWP 1.001 = 104.480	J	1.2	1.509	
SWMH 1.2	CL = 105.881	SWP 1.001 = 104.442	SWP 1.002 = 104.322	J		1.539	Klargester Bypass Separator - NSBP003
SWMH 4.0	CL = 105.810		SWP 4.000 = 104.535	J	1.2	1.275	
SWMH 4.1	CL = 105.808	SWP 4.000 = 104.479	SWP 4.001 = 104.479	J	1.2	1.329	
SWMH 4.2	CL = 105.814	SWP 4.001 = 104.421	SWP 4.002 = 104.421	J	1.2	1.393	
SWMH 1.3	CL = 105.737	SWP 4.002 = 104.322 SWP 1.002 = 104.322	SWP 1.003 = 103.247	J	1.2	1.490	
SWMH 1.4	CL = 104.789	SWP 1.003 = 103.347	SWP 1.004 = 103.272	J	1.2	1.517	
SWMH 1.5	CL = 104.625	SWP 1.004 = 103.108	SWP 1.005 = 103.108	J	1.2	1.517	
SWMH 6.1	CL = 103.400	SWP 6.000 = 103.187	SWP 6.001 = 103.187				Catchpit
SWMH 5.0	CL = 104.421		SWP 5.000 = 103.054			1.349	Klargester Full Retention Separator - NSFP003
SWMH 1.6	CL = 103.734	SWP 1.005 = 102.904 SWP 6.001 = 103.054 SWP 5.000 = 103.054	SWP 1.006 = 102.904	J	1.2	1.536	
SWMH 1.7	CL = 103.754	SWP 1.006 = 102.809	SWP 1.007 = 102.734	J	1.2	1.540	
SWMH 7.0 C	CL = 104.000		SWP 7.000c = 103.060	J	1.2	0.995	
SWMH 7.0 B	CL = 104.000	SWP 7.000c = 103.049	SWP 7.000b = 103.049	J	1.2	0.995	
SWMH 7.0 A	CL = 104.000	SWP 7.000b = 103.031	SWP 7.000a = 102.956			1.048	Klargester Full Retention Separator - NSFP003
SWMH 7.0	CL = 104.000	SWP 7.000a = 103.938	SWP 7.000 = 102.938	J	1.2	1.066	
SWMH 1.8	CL = 104.213	SWP 1.007 = 102.654 SWP 7.000 = 102.879	SWP 1.008 = 102.654	J	1.2	1.560	
SWMH 1.9	CL = 104.270	SWP 1.008 = 102.526	SWP 1.009 = 102.426			1.822	Klargester Bypass Separator - NSBE020
SWMH 1.10	CL = 104.435	SWP 1.009 = 102.362	SWP 1.010 = 102.362			2.136	Hydrodynamic Separator CDS 0806
SWMH 1.11	CL = 104.090	SWP 1.010 = 102.201	SWP 1.011 = 102.201	K	1.2	3.409	Tank Inlet 1
SWMH 8.0	CL = 105.815		SWP 8.000 = 104.590	J	1.2	1.225	
SWMH 8.1	CL = 105.784	SWP 8.000 = 104.510	SWP 8.001 = 104.510	J	1.2	1.274	
SWMH 8.2	CL = 105.783	SWP 8.001 = 104.425	SWP 8.002 = 104.350	J	1.2	1.468	
SWMH 9.0	CL = 105.785		SWP 9.000 = 104.095	J	1.2	1.690	
SWMH 8.3	CL = 105.758	SWP 8.002 = 103.831 SWP 9.000 = 103.831	SWP 8.003 = 103.831	J	1.2	1.982	
SWMH 8.4	CL = 105.486	SWP 8.003 = 103.790	SWP 8.004 = 103.790	J	1.2	1.696	
SWMH 8.5	CL = 105.319	SWP 8.004 = 103.765	SWP 8.005 = 102.421			2.898	Hydrodynamic Separator CDS 0606
SWMH 8.6	CL = 103.151	SWP 8.005 = 102.396	SWP 8.005 = 102.396	J	1.2	2.505	Tank Inlet 2
SWMH 10.0 A	CL = 103.000		SWP 10.000a = 101.841	J	1.2	1.159	
SWMH 10.0	CL = 103.000	SWP 10.000a = 101.775	SWP 10.000 = 101.775	J	1.2	1.225	Tank Inlet 3
SWMH 10.1	CL = 103.793	SWP 10.000 = 101.706	SWP 10.001 = 101.706	K	1.2	3.147	
SWMH 1.12	CL = 103.781		SWP 1.012 = 100.631	K	1.2	3.184	Tank Outlet & Hydrobrake Manhole - Refer to drawing number 22_043-CSE-00-XX-C-2911
SWMH 1.13	CL = 103.685	SWP 1.012 = 100.592	SWP 1.013 = 100.592	K	1.2	3.146	
EXSWMH	CL = 102.330	SWP 1.013 = 100.110	ExSWP = 99.810			2.520	

Surface Water Pipe Schedule							
Pipe Number	Pipe Diameter (mmØ)	Length (m)	Upstream Invert Level	Downstream Invert Level	Slope	Pipe Backfill / Surround Information	Pipe Materials
SWP 1.000	225	18.711	104.760	104.480	1:67	DG 2	HDPE TWINWALL
SWP 2.000	225	10.197	104.548	104.480	1:150	DG 3	HDPE TWINWALL
SWP 3.000	225	15.853	104.559	104.480	1:200	DG 3	HDPE TWINWALL
SWP 1.001	225	7.469	104.480	104.442	1:200	DG 2	HDPE TWINWALL
SWP 1.002	225	4.066	104.342	104.322	1:200	DG 2	HDPE TWINWALL
SWP 4.000	225	11.095	104.535	104.479	1:200	DG 3	HDPE TWINWALL
SWP 4.001	225	11.727	104.479	104.421	1:200	DG 3	HDPE TWINWALL
SWP 4.002	225	19.785	104.421	104.322	1:200	DG 3	HDPE TWINWALL
SWP 1.003	300	90.000	104.247	103.347	1:100	DG 3	HDPE TWINWALL
SWP 1.004	375	24.568	103.272	103.108	1:150	DG 2	HDPE TWINWALL
SWP 1.005	375	30.612	103.108	102.904	1:150	DG 2	HDPE TWINWALL
SWP 6.000	225	26.625	103.453	103.187	1:100	DG 4	HDPE TWINWALL
SWP 6.001	225	13.354	103.187	103.054	1:100	DG 2	HDPE TWINWALL
SWP 5.000	225	2.243	103.069	103.054	1:150	DG 2	HDPE TWINWALL
SWP 1.006	375	11.169	102.883	102.809	1:150	DG 2	HDPE TWINWALL
SWP 1.007	450	12.035	102.734	102.654	1:150	DG 2	CONCRETE
SWP 7.000c	225	2.250	103.060	103.049	1:200	DG 3	HDPE TWINWALL
SWP 7.000b	225	3.543	103.049	103.031	1:200	DG 3	HDPE TWINWALL
SWP 7.000a	225	3.500	102.956	102.938	1:200	DG 3	HDPE TWINWALL
SWP 7.000	225	11.153	102.938	102.879	1:200	DG 3	HDPE TWINWALL
SWP 1.008	450	10.434	102.654	102.526	1:80	DG 2	CONCRETE
SWP 1.009	450	5.095	102.426	102.362	1:80	DG 2	CONCRETE
SWP 1.010	450	12.844	102.362	102.201	1:80	DG 2	CONCRETE
SWP 8.000	225	8.028	104.590	104.510	1:100	DG 3	HDPE TWINWALL
SWP 8.001	225	8.472	104.510	104.425	1:100	DG 2	HDPE TWINWALL
SWP 8.002	300	51.908	104.350	103.831	1:100	DG 2	HDPE TWINWALL
SWP 9.000	300	26.384	104.095	103.831	1:100	DG 2	HDPE TWINWALL
SWP 8.003	300	4.082	103.831	103.790	1:100	DG 2	HDPE TWINWALL
SWP 8.004	300	2.500	103.790	103.765	1:100	DG 1	HDPE TWINWALL
SWP 8.005	300	2.504	102.421	102.396	1:100	DG 1	HDPE TWINWALL
SWP 10.000a	225	13.106	101.841	101.775	1:200	DG 2	HDPE TWINWALL
SWP 10.000	225	13.851	101.775	101.706	1:200	DG 2	HDPE TWINWALL
SWP 1.012	225	4.046	100.631	100.595	1:111	DG 2	HDPE TWINWALL
SWP 1.013	225	53.594	100.595	100.110	1:111	DG 2	HDPE TWINWALL

SURFACE WATER SCHEDULE NOTE:

1. REFER TO DRAWING 22_043-CSE-00-XX-DR-C-2910 FOR STANDRARD TRENCH DETAILS.
2. REFER TO SURFACE WATER NOTE 6 REGARDING MANHOLE TYPES.

DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

A1

N

SURFACE WATER LEGEND

- Proposed Surface Water
- Proposed Surface Water Manhole
- Proposed Road Gully
- Existing Surface Water
- Existing Surface Water Manhole
- ACO Drain
- Proposed Swale
- Proposed Surface Water Attenuation Tank

SITE LEGEND

- Proposed Soft Landscape
- Proposed Concrete Pavement
- Proposed Footpath
- Proposed Roads
- Proposed Building
- Granite Paving (Refer to Architects Details)
- Space for Future Data Hall Expansion
- Grasscrete (Permeable Surface)
- Proposed Gravel Surface
- Outline of the Site Subject to this application
- Proposed 2.6 m Palisade Fence
- Proposed 2.4 m Paladin Fence
- Proposed Security Gates/Barriers to Architects Details
- Proposed Kerb
- Proposed Retaining Wall
- Proposed Tactile Paving & Drop Kerb. Refer to Drawing No. 2900 for Details.

Rev	Description	Drawn	Checked	Date
P02	PLANNING ISSUE	LT	CD	14/07/22
P01	FOR INFORMATION	KB	CD	23/05/22

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Client: K2 STRATEGIC INFRASTRUCTURE IRELAND LTD.

Project: K2 DATACENTRE

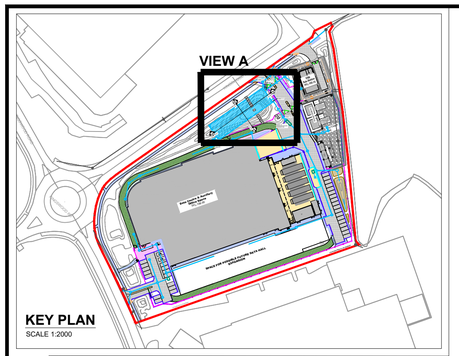
Dwg. Title: PROPOSED SURFACE WATER DRAINAGE LAYOUT PLAN

Drawn By	Date	CSEA Job No.
LT	09/05/22	22_043
Checked By	Scale	
CD	1:500 @ A1	

Project Code	Originator	Zone/ Phase	Level	Type	Role	Dwg. No.
22_043	CSE	00	XX	DR	C	2110

S0 — WORK IN PROGRESS (Status Code / Suitability Description)

P02 — PRELIMINARY (Revision / Project Status)



HYDROBRAKE MANHOLE (REFER TO DRAWING 22_043-CSE-00-XX-DR-C-2911 FOR DETAILS.)
ALLOWABLE DISCHARGE RATE = 4.0 l/s
DESIGN HEAD = 2.0m

PROPOSED ATTENUATION TANK:
- STORAGE VOLUME = 840m³
- INVERT LEVEL = 100.631mOD
- TOP WATER LEVEL IN 1 IN 100 YEAR STORM EVENT = 102.648mOD

1200 x 675mm 1200F ACCESS OPENING (REFER TO DRAWING 22_043-CSE-00-XX-DR-C-2114 FOR DETAILS.)

SWMH 1.13
SWMH 1.12
SWMH 10.1
SWMH 10.0
SWMH 1.11
SWMH 1.10
SWMH 1.9
PROPOSED BYPASS INTERCEPTOR
SWMH 8.6
SWMH 8.5
EXSW
CH 0
CH 44.50
CH 18
0+44.50
106
107
108
109
110
111
112
STOP

Notes:

1. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2110 for proposed surface water drainage layout plan.
2. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2113 for proposed surface water attenuation system cross-section.
3. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2114 for proposed surface water attenuation system structural engineering general arrangement.

VIEW A
SCALE 1:100

DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

A1

N

SURFACE WATER LEGEND

- Proposed Surface Water Pipe
- Proposed Surface Water Manhole
- Proposed Road Gully
- Flow Arrows
- ExSW — Existing Surface Water
- Existing Surface Water Manhole
- ACO Drain
- Proposed Swale
- Proposed Surface Water Attenuation Tank
- 108 — Proposed Landscape Contours

SITE LEGEND

- Proposed Soft Landscape
- Proposed Concrete Pavement
- Proposed Footpath
- Proposed Roads
- Proposed Building
- Granite Paving (Refer to Architects Details)
- Grasscrete (Permeable Surface)
- Proposed Gravel Surface
- Outline of the Site Subject to this application
- Proposed 2.6 m Palisade Fence
- Proposed 2.4 m Paladin Fence
- Proposed Security Gates/Barriers to Architects Details
- Proposed Kerb
- Proposed Tactile Paving & Drop Kerb. Refer to Drawing No. 2900 for Details.

Rev	Description	Drawn	Checked	Date
P02	PLANNING ISSUE	LT	CD	14/07/22
P01	DRAFT PLANNING	KB	CD	21/06/22

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Client: K2 STRATEGIC INFRASTRUCTURE IRELAND LTD.

Project: K2 DATACENTRE

Dwg. Title: PROPOSED SURFACE WATER ATTENUATION SYSTEM LAYOUT PLAN

Drawn By	Date	CSEA Job No.
KB	10/06/2022	22_043
Checked By	Scale	
CD	AS SHOWN @ A1	

Project Code	Originator	Zone/ Phase	Level	Type	Role	Dwg. No.
22_043	CSE	00	XX	DR	C	2112

S0 — WORK IN PROGRESS (Status Code / Suitability Description)

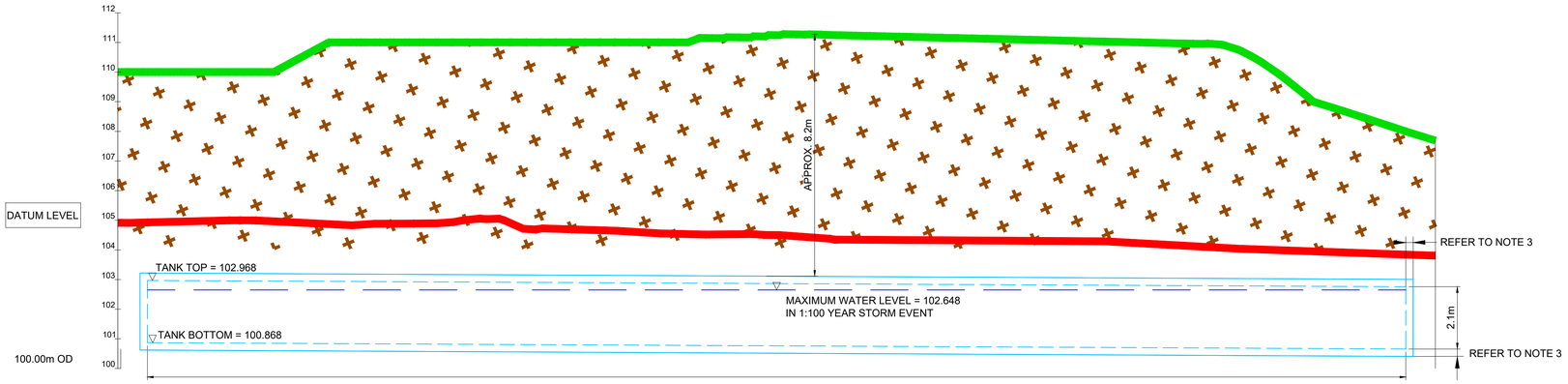
P02 — PRELIMINARY (Revision / Project Status)

Notes:

1. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2110 for proposed surface water drainage layout plan.
2. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2112 for proposed surface water attenuation system layout plan.
3. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2114 for proposed surface water attenuation system structural engineering general arrangement.

DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

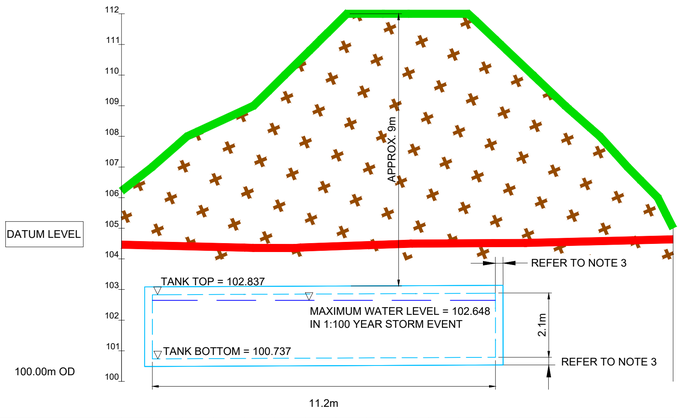
A1



SECTION CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	44.50
EXISTING GROUND LEVEL		104.926			104.997						104.830																																				103.841	103.806
PROPOSED LANDSCAPE LEVEL		110.000		110.000		110.000					110.971	111.000	111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		111.000		108.278	107.690
TANK TOP		102.968																																											102.756	
TANK BOTTOM		100.868																																											100.656	

1 (2112 2113)

SECTION1 -1
SCALE: H 1:100,V 1:100



SECTION CHAINAGE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
EXISTING GROUND LEVEL		104.441			104.367		104.353				104.500			104.514					104.640
PROPOSED LANDSCAPE LEVEL		107.004	108.000		109.000	110.000	111.000	112.000	112.000			112.000	111.000	110.000	109.000	108.000		106.565	105.002
TANK TOP		102.837																	
TANK BOTTOM		100.737											100.787	102.887					

2 (2112 2113)

SECTION 2 - 2
SCALE: H 1:100,V 1:100

LEGEND

- Proposed SW Tank Walls
- Maximum Water Level in 1:100 Year Storm Event
- Existing Ground Level
- Proposed Ground Level (refer to Landscape Architects drawings for details.)
- Proposed Landscaping Berm Fill (refer to Landscape Architects drawings for details.)

Rev	Description	Drawn	Checked	Date
P02	PLANNING ISSUE	LT	CD	14/07/22
P01	DRAFT PLANNING	KB	CD	21/06/22

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Clifton Scannell Emerson Associates

Client: K2 STRATEGIC INFRASTRUCTURE IRELAND LTD.

Project: K2 DATACENTRE

Dwg. Title: PROPOSED SURFACE WATER ATTENUATION SYSTEM CROSS-SECTIONS

Drawn By: KB | Date: 13/06/2022 | CSEA Job No.: 22_043

Checked By: CD | Scale: AS SHOWN @ A1

Project Code	Originator	Zone/ Phase	Level	Type	Role	Dwg. No.
22_043	CSE	00	XX	DR	C	2113

Status Code: S0 — WORK IN PROGRESS

Revision: P02 — PRELIMINARY

GENERAL NOTES
Drawings and Specifications: This drawing to be read in conjunction with all relevant architects, engineers and specialist drawings together with the specification
All dimensions in millimeters
All levels in meters AOD Unless Noted Otherwise
Do not scale off drawings, use figured dimensions only

Curing of Base Slab:
Curing agent to be applied immediately upon disappearance of surface water.

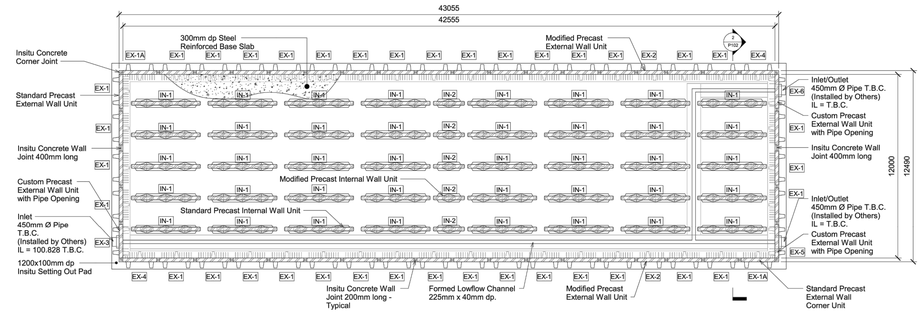
Surface Finishes

Internal	Fair
External	Fair
Base Slab Surface	Steel Float
Roof Screed Surface	Steel Float

ALL SURFACE FINISH REFERENCES ARE TO 'CESWI 7th EDITION'

Design Assumptions

Design Life:	50 Years
Exposure Classification	XC4/XD1
Design Chemical Class	DC-1
Imposed Loading	Greater of • 38 tonne, five axle articulated - designation 5A-H Table NA5 from NA to BS EN 1991-2:2003 • Accidental vehicle in line with cl. 5.6.3 in BS EN 1991-2:2003 (Traffic Loads on bridges) • 10kN/m²



1 Floor Plan
1 : 100

Estimated Storage Volume = 1000m³ (provided tank reaches maximum capacity)

Denotes Structural Slab Level
Denotes Lowflow Channel Level

Placement & Cast of Inlet / Outlet Pipes by Others

Allow for 5% Wastage for Insitu Concrete

Precast Schedule

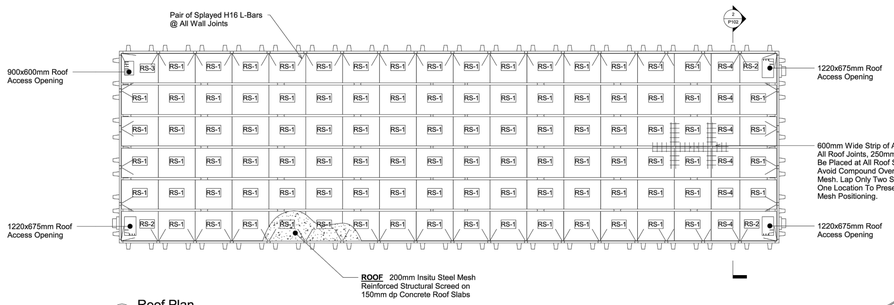
Type	Count	Description	Material: Volume	Total Volume	Unit Weight	Total Weight
EX-1	37	Standard Precast External Wall Unit 2200mm long	1.49 m³	55.19	3.73	137.99
EX-1A	2	Standard Precast External Wall Unit @ Corner 2200mm long	1.49 m³	2.98	3.73	7.46
EX-2	2	Modified Precast External Wall Unit 1755mm long	1.20 m³	2.41	3.01	6.02
EX-3	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	1.33 m³	1.33	3.32	3.32
EX-4	2	Standard Precast External Wall Unit @ Corner 2200mm long	1.49 m³	2.98	3.73	7.46
EX-5	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	1.32 m³	1.32	3.30	3.30
EX-6	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	1.32 m³	1.32	3.30	3.30
IN-1	40	Standard Precast Internal Wall Unit 4600mm long	1.71 m³	68.56	4.28	171.39
IN-2	5	Modified Precast Internal Wall Unit 2120mm long	0.75 m³	3.76	1.88	9.39
Grand total: 91				139.85		349.63

In-situ Schedule

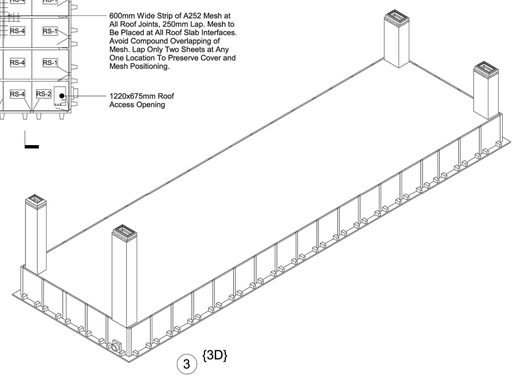
Type	Count	Description	Material: Volume	Total Volume	Unit Weight	Total Weight
40mm Pad	3	Base Floor	<varies>	2.01	<varies>	4.83
100mm Pad	1	Setting Out Pad	13.21 m³	13.21	31.71	31.71
300mm Slab	1	Base Floor	152.68 m³	152.68	366.43	366.43
EX-3	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	0.19 m³	0.19	0.45	0.45
EX-5	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	0.20 m³	0.20	0.47	0.47
EX-6	1	Custom Precast External Wall Unit with Pipe Opening 2200mm long	0.20 m³	0.20	0.47	0.47
J-2	40	Wall Joint 2, 200mm long - Typical	0.13 m³	5.15	0.31	12.36
J-4	4	Corner Wall Joint 4	0.17 m³	0.67	0.40	1.60
J-8	2	Wall Joint 8, 400mm long	0.26 m³	0.52	0.62	1.24
Roof Screed	1	150mm dp Roof Screed	85.25 m³	85.25	204.59	204.59
Grand total: 55				260.06		624.15

Design Assumptions

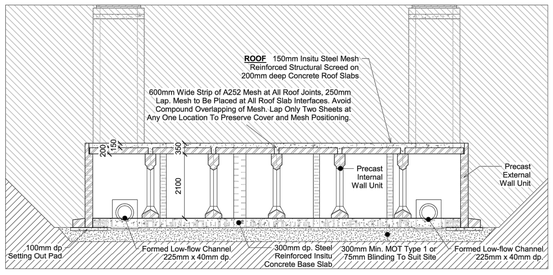
	Base Slab	Pads	Wall Joints / Roof Screed	Walls / Roof Slabs
Design Chemical Class	DC-1	DC-1	DC-1	DC-1
Exposure Classification	XC4/XD1	XC4/XD1	XC4/XD1	XC4/XD1
Design Life	50 Years	50 Years	50 Years	50 Years
Concrete Grade	C35/45	C35/45	C35/45	C50/60
Cement Type	CEM II /A-L	CEM II /A-L	CEM II /A-L	CEM II /A-L
Min Cement Content	340kg/m³	340kg/m³	380kg/m³	380kg/m³
Max W/C Ratio	0.50	0.50	0.50	0.45
Max Aggregate Size	20mm	20mm	10mm	14mm
Aggregate Type	Limestone	Limestone	Limestone	Limestone
Required Slump	S4	S3	S4	N/A
Fibre Dosage	N/A	N/A	N/A	N/A
Fibre Type	N/A	N/A	N/A	N/A



1 Roof Plan
1 : 100



3 {3D}



Roof Slab Schedule

Type	Count	Description	Material: Volume	Total Volume	Unit Weight	Total Weight
RS-1	98	Standard Precast Roof Slab 1910x2400x200mm dp	0.92 m³	89.85	2.29	224.62
RS-2	3	Custom Precast Roof Slab 2400x2400x200mm dp with Access Opening	0.73 m³	2.20	1.83	5.50
RS-3	1	Custom Precast Roof Slab 2400x2400x200mm dp with Access Opening	0.81 m³	0.81	2.02	2.02
RS-4	6	Modified Precast Roof Slab 1910x1865x200mm dp	0.71 m³	4.27	1.78	10.69
Grand total: 108				97.13		242.83

DRAWING IS PRODUCED USING THE IRISH TRANSVERSE MERCATOR (ITM) GEOGRAPHIC COORDINATE SYSTEM

A1

Notes:

1. This Drawing provide for information purposes only in order to in form the Planning Application.
2. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2110 for proposed surface water drainage layout plan.
3. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2112 for proposed surface water attenuation system layout plan.
4. Refer to Drawing No. 22_043-CSE-00-XX-DR-C-2113 for proposed surface water attenuation system cross-section.

PROPOSAL DRAWING

Rev	Description	Drawn	Checked	Date
P02	PLANNING ISSUE	LT	CD	14/07/22
P01	DRAFT PLANNING	KB	CD	21/06/22

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3rd Floor The Highline,
Bakers Point, Pottery Road,
Dun Laoghaire, Co. Dublin,
Ireland, A96 KW29

T. +353 1 288 5006
F. +353 1 283 3466
E. info@csea.ie
W. www.csea.ie

Clifton Scannell Emerson Associates

Client: K2 STRATEGIC INFRASTRUCTURE IRELAND LTD.

Project: K2 DATACENTRE

Dwg. Title: PROPOSED SURFACE WATER ATTENUATION SYSTEM GENERAL ARRANGEMENT

Drawn By: KB | Date: 20/06/2022 | 22_043
Checked By: CD | Scale: NTS @ A1 | CSEA Job No.

Project Code	Originator	Zone/ Phase	Level	Type	Role	Dwg. No.
22_043	CSE	00	XX	DR	C	2114

S0 — WORK IN PROGRESS
Status Code — Suitability Description

P02 — PRELIMINARY
Revision — Project Status

Appendix F Confirmation of Feasibility (CoF)

CONFIRMATION OF FEASIBILITY

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

Conor Doherty

3rd Floor, The Highline Bakers Point
Pottery Road
Dun Laoghaire
Co. Dublin
A96 KW29

30 June 2022

Our Ref: CDS22003496 Pre-Connection Enquiry
Site at Junction of Kingswood Road, and Kingswood Drive, Tallaght, Dublin 24

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Business Connection of 2 unit(s) at Site at Junction of Kingswood Road, and Kingswood Drive, Tallaght, Dublin 24, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection**

  - Feasible without infrastructure upgrade by Irish Water

  The development can proceed on the proviso that the customer provides storage for all annual cooling needs with a maximum allowable annual demand from the site limited to 2 975m^3.

  This storage will be filled in winter by agreement with Irish Water operations and used as required during the summer months.

  Approximately 20m of new 200mm ID pipe main to be laid to connect the site development to the existing 200mm uPVC main in

		Kingswood Drive. Bulk meter must be installed on this connection.
• **Wastewater Connection**	-	Feasible without infrastructure upgrade by Irish Water

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

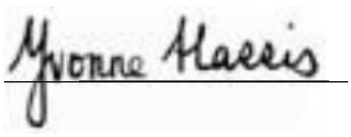
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections, email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

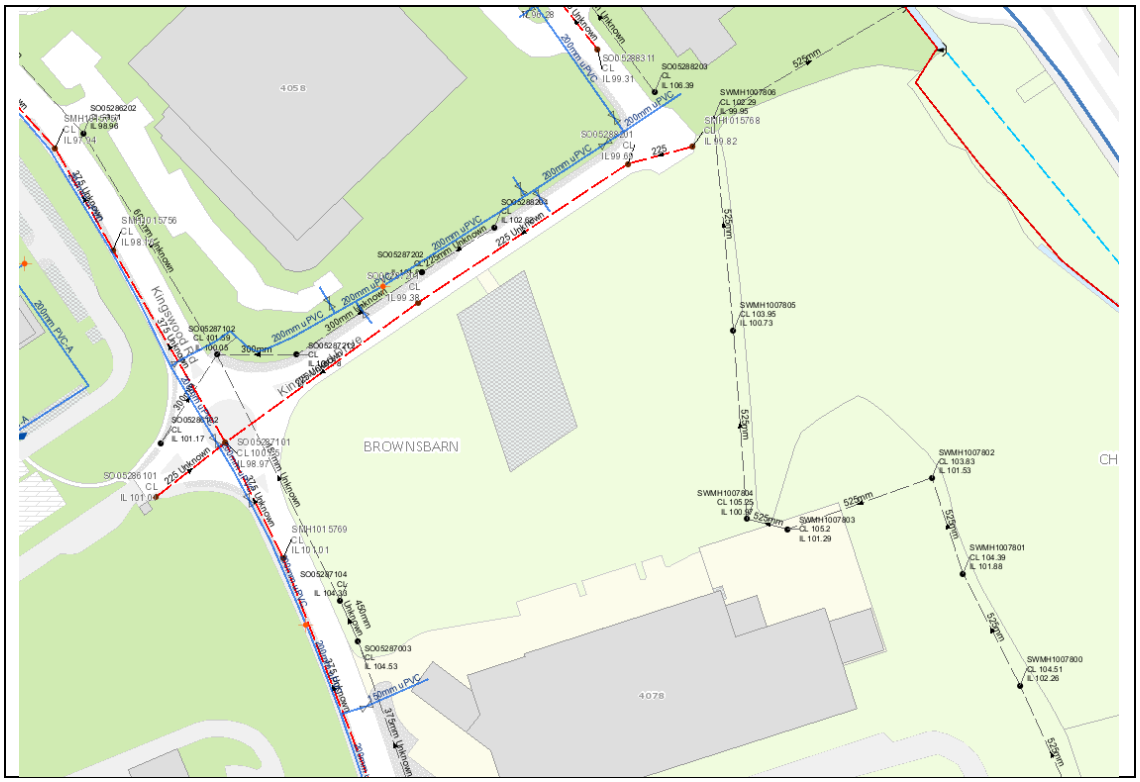
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• 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,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



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

Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) 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.

Appendix G SuDS O&M Plan

Surface Water Operation and Maintenance (O&M) Activities

All operation and maintenance activities should be in accordance to the following guidelines:

- Greater Dublin Strategic Drainage Study GDSDS- Volume 3 – Environmental Management
- CIRIA 2015SuDS Manual, Part E - Chapter 32

Considerations for surface water O&M:

Requirement	Assessment/Action
Maintenance access – ensuring appropriate and long-term access to all points in the system where future maintenance may be required	A standard minimum of 600mm diameter opening is provided for all manhole, chambers and treatment system. Removable gullies grate opening with a minimum size of 450mm X 320mm.
Bypass systems or appropriate temporary drainage infrastructure for use if required during sediment management or other maintenance activities.	Not required
The availability of **disposal areas** for organic arisings (green waste) and sediments.	To be included as part of maintenance contract of the development

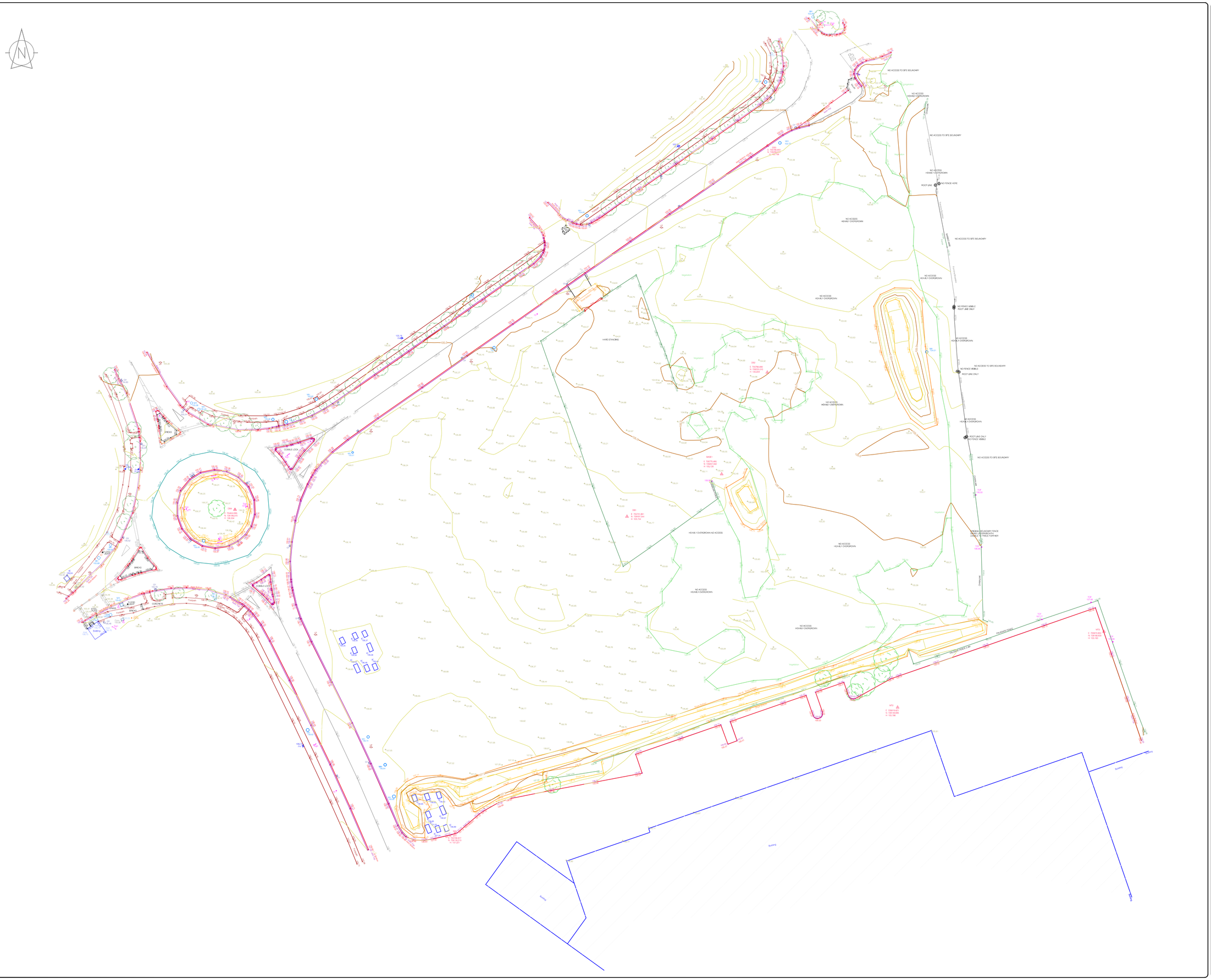
Types of SuDS systems used that require O&M activities:

- **Swale**
- **Permeable Paving**
- **Filter Drain**

O&M activities required as following:

Operation and maintenance activities	SuDS Component		
O&M Activities	Swale	Permeable Paving	Filter Drain
Regular maintenance			
Inspection	■	■	■
Litter/debris removal	■	■	■
Grass cutting	■	□	■
Weed/invasive plant control		□	□
Shrub management	□	□	
Shoreline vegetation management			
Aquatic vegetation management			
Occasional maintenance			
Sediment management	■	■	■
Vegetation/plant replacement	□		
Vacuum sweeping and brushing		■	
Remedial maintenance			
Structure rehabilitation/repair	□	□	□
Infiltration surface reconditioning	□	□	□
	■ Will be required □ May be required		

Appendix H Topographical Survey



LEGEND

Street furniture & Services

- Over Head Wires (LUAS) - Pylon ESB
- Flowerbed
- Pipe
- Lift
- Barrier
- Pump
- Trial Pit
- Bus/Tram Shelter
- Postbox
- Valve - General
- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Road Sign
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement MH. Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point

Built Features

Roads & Road Markings

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Tracked
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang
- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track

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The user or recipient of this survey data understands and acknowledges this data may be inaccurate or contain errors or omissions and the user or recipient assumes full responsibility for any risks or damages resulting from, arising from, or in connection with any use of or reliance upon data displayed herein. Although significant care has been exercised to produce surveys that satisfy survey accuracy standards, these surveys are only as accurate as the source data from which they were compiled. Although all reasonable steps have been taken to locate all features visible at the time of the survey, there is no guarantee that all will be shown on the drawing, as some above ground features may have obstructed the survey. Wherever possible, areas unable to be surveyed will be labelled as "UTS".

The Company shall not be liable for any inaccuracy of the data provided beyond the specified scale or accuracy, or for any matters resulting from their use for purposes other than that stated in the Contract. No liability shall attach to the Surveyor in respect of any consequential loss or damages suffered by the Client.

The Client must promptly notify the Company of any errors in mapping of which it becomes aware. If misleading, inaccurate or otherwise inappropriate information is brought to the Company's attention or the Company itself identifies any such imprecision or error in a survey, it shall use its reasonable endeavours to fix or remove it and if necessary in certain instances, the Company being on notice of any such misleading, inaccurate or otherwise inappropriate information, it will re-conduct the survey and reproduce the data to within the specified scale or accuracy.

North

Site Location

Map Sheet Layout:

Surveyed by : ZVH	Date: May 2022	Datum:	Main Head:
Drawn by : CN	Date: June 2022	Grid System:	
Checked by : PK	Date: 08.06.2022	Irish National Grid ☐ ITM15 ☑	

Revisions

No	Date	Description
0	08.06.2022	First Drawing

Murphy GEOSPATIAL

Topographic surveys, Measured Building Surveys, Setting-Out, As-Built Surveys, Hydrographic Surveys, Legal Mapping, Pipeline Surveys, Services Location, Ground Penetrating Radar, Laser Scanning, Rectified Photography

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Phone: (+353) 045 484040
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Email: info@murphysurveys.ie

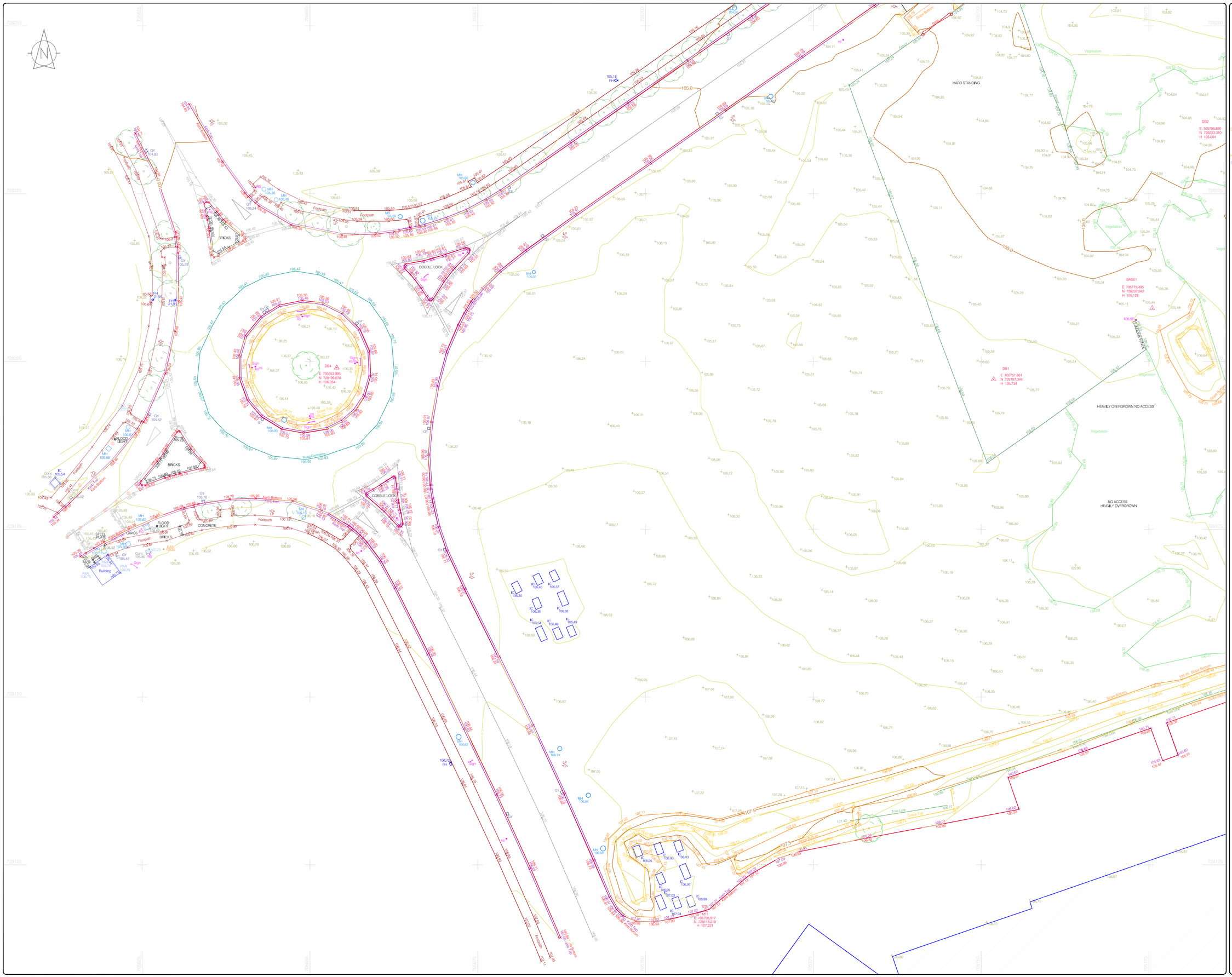
Client : Clifton Scannell Emerson Associates

Project : K2 – DUB 6 Topo Survey City West

Date : 08.06.2022 **Scale :** NTS@A1

Description : Topographical Survey

Drawing Number : MGS47370_T_ITM_Rev0_00



LEGEND

Street furniture & Services

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- Bus/Tram Shelter
- Postbox
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- Water Valve
- Gas Valve
- Sluice Valve
- Air Valve
- Stop Cock
- C P Post
- Marker Post
- Traffic light
- Parking Meter
- Plane Aerial Mark
- Smart Card Validator
- Unknown Valve
- Bus Stop
- Bollard
- Beacon
- Coalhole Cover
- Bore Hole
- Electricity Pole
- Telegraph pole
- OCS Pole
- CCTV Camera Pole
- Lamp Post
- Foul Manhole
- Surface Water MH
- Manholes
- Air Conditioning Vents
- Services Inspection Cover
- Traffic Inspection Cover
- Cable TV Inspection Cover
- ESAT Inspection Cover
- NTL Inspection Cover
- Eircom Inspection Cover
- Rodding Eye
- Road Sign
- Bench Seat
- Kiosk
- Gully
- Waste Bin
- Hydrant
- Fire Hydrant
- ESB Box
- ESB Inspection Cover
- Traffic Control Box
- LUAS Technical Cubicle
- Ticket Vending Machine
- Water Meter Cover
- Telecom Inspection Cover
- Monument / Toilets
- Tank Storage
- Basement: MH, Cover & Pipe
- Dished Aerial Mark
- Stay for pole
- Pipe Protection
- Washout
- Phone Box
- Duct
- Gas Cover
- C P Box
- U/G Car Park Vent

Natural Features

- Surface Change
- Land Drain
- Bottom of Slope
- Top of Slope
- Ditch
- Water Edge / Lake / Pond
- Hedge / Trees Drip Line / Vegetation
- Tree Coniferous
- Tree Deciduous
- Water Level
- Crown Level
- Invert level
- Bed Level
- Spotheight

Golf

- Fair Way
- Green
- Tee Box

Other

- Survey Station
- Photo point
- Top of Tree

Built Features

- Building
- Edge of Road
- Kerb Bottom
- Kerb Top
- Bridge Abutment
- Bridge Deck
- Bridge Parapet
- Building Façade
- Footpath / Platform Train & Tram
- Damp Proof Course / Verge
- Bridge Pier / Wall & Gate Pillar / LUAS Trackbed
- Cycleway / Private Landing Area
- Fence
- Gate
- Road Centreline
- Top of Wall
- Hoarding
- Property Line
- Road Scar
- Top of Fence
- Wall / Retaining Wall
- Railway / Tram Rail / Grating / Ramp
- Building Canopy / Roof / Overhang

Roads & Road Markings

- Floor Level
- Apex Height
- Eaves Height
- Parapet Height
- Soffit Elevation
- Step Level
- Concrete Pad
- Track

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North

Site Location

Map Sheet Layout:

Surveyed by : ZVH	Date: May 2022	Datum : Main Head	
Drawn by : CN	Date: June 2022	Grid System:	
Checked by : PK	Date: 08.06.2022	Irish National Grid ☐ ITM:15 ☑	

Revisions

No	Date	Description
0	08.06.2022	First Drawing

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Email: info@murphysurveys.ie

Client : Clifton Scannell Emerson Associates

Project : K2 – DUB 6 Topo Survey City West

Date : 08.06.2022 **Scale :** 1:250@A1

Description : Topographical Survey

Drawing Number : MGS47370_T_ITM_Rev0_01

Appendix I Windes Surface Water Drainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Pr SW

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	15.900	Add Flow / Climate Change (%)	0
Ratio R	0.267	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Pr SW

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.711	0.281	66.7	0.005	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	10.197	0.068	150.0	0.003	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	15.853	0.079	200.0	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	7.469	0.037	200.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	4.066	0.020	200.0	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	11.095	0.055	201.7	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	11.727	0.059	200.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.002	19.785	0.099	200.0	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	90.000	0.900	100.0	0.442	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	24.568	0.164	150.0	0.052	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	33.673	0.224	150.0	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	37.93	5.19	104.760	0.005	0.0	0.0	0.0	1.60	63.8	0.5
2.000	38.03	5.16	104.548	0.003	0.0	0.0	0.0	1.07	42.4	0.3
3.000	37.68	5.29	104.559	0.010	0.0	0.0	0.0	0.92	36.6	1.0
1.001	37.33	5.42	104.480	0.030	0.0	0.0	0.0	0.92	36.6	3.0
1.002	37.15	5.50	104.442	0.064	0.0	0.0	0.0	0.92	36.6	6.4
4.000	37.91	5.20	104.535	0.013	0.0	0.0	0.0	0.92	36.5	1.3
4.001	37.35	5.41	104.480	0.019	0.0	0.0	0.0	0.92	36.6	1.9
4.002	36.47	5.77	104.421	0.028	0.0	0.0	0.0	0.92	36.6	2.7
1.003	34.37	6.73	104.247	0.534	0.0	0.0	0.0	1.57	111.1	49.7
1.004	33.81	7.00	103.272	0.586	0.0	0.0	0.0	1.48	163.1	53.7
1.005	33.09	7.38	103.109	0.603	0.0	0.0	0.0	1.48	163.1	54.1

Network Design Table for Pr SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	3.795	0.038	100.0	0.101	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	26.625	0.266	100.0	0.033	5.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	14.577	0.146	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	11.169	0.074	150.0	0.006	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	12.084	0.081	150.0	0.012	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.000	11.153	0.056	200.0	0.094	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	15.178	0.101	150.0	0.043	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	12.962	0.086	150.0	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	20.337	0.025	813.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	8.028	0.080	100.0	0.048	5.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	8.472	0.085	100.0	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	51.908	0.519	100.0	0.204	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.000	26.384	0.264	100.0	0.115	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.003	4.082	0.041	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.004	4.674	0.047	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.005	5.410	0.081	66.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.006	20.337	2.132	9.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	13.851	0.069	200.7	0.076	5.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	20.032	0.100	200.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	38.33	5.05	103.071	0.101	0.0	0.0	0.0	1.31	52.0	10.4
6.000	37.55	5.34	103.445	0.033	0.0	0.0	0.0	1.31	52.0	3.3
6.001	37.07	5.53	103.179	0.033	0.0	0.0	0.0	1.31	52.0	3.3
1.006	32.86	7.51	102.883	0.742	0.0	0.0	0.0	1.48	163.1	66.1
1.007	32.64	7.63	102.734	0.755	0.0	0.0	0.0	1.66	263.6	66.7
7.000	37.91	5.20	102.934	0.094	0.0	0.0	0.0	0.92	36.6	9.7
1.008	32.37	7.78	102.653	0.892	0.0	0.0	0.0	1.66	263.6	78.1
1.009	32.14	7.91	102.552	0.941	0.0	0.0	0.0	1.66	263.6	81.9
1.010	30.91	8.67	100.681	0.941	0.0	0.0	0.0	0.45	17.9«	81.9
8.000	38.18	5.10	104.590	0.048	0.0	0.0	0.0	1.31	52.0	5.0
8.001	37.89	5.21	104.510	0.061	0.0	0.0	0.0	1.31	52.0	6.3
8.002	36.50	5.76	104.350	0.265	0.0	0.0	0.0	1.57	111.1	26.2
9.000	37.70	5.28	104.095	0.115	0.0	0.0	0.0	1.57	111.1	11.8
8.003	36.40	5.80	103.831	0.381	0.0	0.0	0.0	1.57	111.1	37.5
8.004	36.28	5.85	103.790	0.381	0.0	0.0	0.0	1.57	111.1	37.5
8.005	36.17	5.90	103.743	0.381	0.0	0.0	0.0	1.93	136.2	37.5
8.006	35.99	5.98	100.681	0.381	0.0	0.0	0.0	4.26	169.5	37.5
10.000	37.78	5.25	101.775	0.076	0.0	0.0	0.0	0.92	36.5	7.8
10.001	36.86	5.61	101.706	0.076	0.0	0.0	0.0	0.92	36.6	7.8

Network Design Table for Pr SW

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.011	20.337	0.025	813.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.012	4.046	0.079	51.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.013	53.594	1.042	51.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.011	29.79	9.42	100.656	1.397	0.0	0.0	0.0	0.45	17.9«	112.7
1.012	29.74	9.45	100.631	1.397	0.0	0.0	0.0	1.83	72.8«	112.7
1.013	29.07	9.94	100.573	1.397	0.0	0.0	0.0	1.83	72.7«	112.7

Manhole Schedules for Pr SW

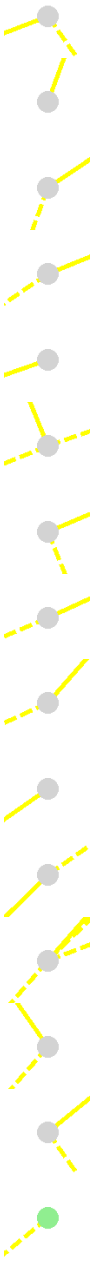
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SWMH 1.0	106.534	1.774	Open Manhole	1200	1.000	104.760	225				
SWMH 2.0	105.785	1.237	Open Manhole	1200	2.000	104.548	225				
SWMH 3.0	105.784	1.225	Open Manhole	1200	3.000	104.559	225				
SWMH 1.1	105.954	1.474	Open Manhole	1200	1.001	104.480	225	1.000	104.480	225	
								2.000	104.480	225	
								3.000	104.480	225	
SWMH 1.2	105.881	1.439	Open Manhole	1200	1.002	104.442	225	1.001	104.442	225	
SWMH 4.0	105.810	1.275	Open Manhole	1200	4.000	104.535	225				
SWMH 4.1	105.808	1.328	Open Manhole	1200	4.001	104.480	225	4.000	104.480	225	
SWMH 4.2	105.814	1.393	Open Manhole	1200	4.002	104.421	225	4.001	104.421	225	
SWMH 1.3	105.737	1.490	Open Manhole	1200	1.003	104.247	300	1.002	104.422	225	100
								4.002	104.322	225	
SWMH 1.4	104.789	1.517	Open Manhole	1200	1.004	103.272	375	1.003	103.347	300	
SWMH 1.5	105.434	2.325	Open Manhole	1200	1.005	103.109	375	1.004	103.109	375	
SWMH 5.0	105.160	2.089	Open Manhole	1200	5.000	103.071	225				
SWMH 6.0	105.124	1.679	Open Manhole	1200	6.000	103.445	225				
SWMH 6.1	105.090	1.911	Open Manhole	1200	6.001	103.179	225	6.000	103.179	225	
SWMH 1.6	105.072	2.189	Open Manhole	1200	1.006	102.883	375	1.005	102.884	375	1
								5.000	103.033	225	
								6.001	103.033	225	
SWMH 1.7	105.015	2.281	Open Manhole	1200	1.007	102.734	450	1.006	102.809	375	
SWMH 7.0	104.000	1.066	Open Manhole	1200	7.000	102.934	225				
SWMH 1.8	104.838	2.185	Open Manhole	1200	1.008	102.653	450	1.007	102.653	450	
								7.000	102.878	225	
SWMH 1.9	104.724	2.172	Open Manhole	1200	1.009	102.552	450	1.008	102.552	450	
SWMH 1.10	104.090	3.409	Open Manhole	1200	1.010	100.681	225	1.009	102.466	450	2010
SWMH 8.0	105.815	1.225	Open Manhole	1200	8.000	104.590	225				
SWMH 8.1	105.784	1.274	Open Manhole	1200	8.001	104.510	225	8.000	104.510	225	
SWMH 8.2	105.783	1.433	Open Manhole	1200	8.002	104.350	300	8.001	104.425	225	
SWMH9.0	105.785	1.690	Open Manhole	1200	9.000	104.095	300				
SWMH 8.3	105.758	1.927	Open Manhole	1200	8.003	103.831	300	8.002	103.831	300	
								9.000	103.831	300	
SWMH 8.4	105.486	1.696	Open Manhole	1200	8.004	103.790	300	8.003	103.790	300	
SWMH 8.5	105.174	1.431	Open Manhole	1200	8.005	103.743	300	8.004	103.743	300	
SWMH 8.6	104.849	4.168	Open Manhole	1200	8.006	100.681	225	8.005	103.662	300	3056
SWMH 10.0	103.500	1.725	Open Manhole	1200	10.000	101.775	225				
SWMH 10.1	103.793	2.087	Open Manhole	1200	10.001	101.706	225	10.000	101.706	225	
SWMH 1.11	104.366	5.817	Open Manhole	1200	1.011	100.656	225	1.010	100.656	225	
								8.006	98.549	225	
								10.001	101.606	225	950
SWMH 1.12	103.781	3.150	Open Manhole	1200	1.012	100.631	225	1.011	100.631	225	
SWMH 1.13	103.685	3.133	Open Manhole	1200	1.013	100.573	225	1.012	100.552	225	
EXSWMH	102.330	2.799	Open Manhole	1200		OUTFALL		1.013	99.531	225	

Manhole Schedules for Pr SW

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH 1.0	705691.622	728139.919	705691.622	728139.919	Required	
SWMH 2.0	705712.628	728136.505	705712.628	728136.505	Required	
SWMH 3.0	705704.057	728161.104	705704.057	728161.104	Required	
SWMH 1.1	705709.272	728146.133	705709.272	728146.133	Required	
SWMH 1.2	705716.325	728148.588	705716.325	728148.588	Required	
SWMH 4.0	705693.719	728177.703	705693.719	728177.703	Required	
SWMH 4.1	705697.385	728167.231	705697.385	728167.231	Required	
SWMH 4.2	705708.454	728171.103	705708.454	728171.103	Required	
SWMH 1.3	705714.988	728152.428	705714.988	728152.428	Required	
SWMH 1.4	705799.932	728182.169	705799.932	728182.169	Required	
SWMH 1.5	705823.120	728190.287	705823.120	728190.287	Required	
SWMH 5.0	705810.881	728218.435	705810.881	728218.435	Required	
SWMH 6.0	705832.123	728193.576	705832.123	728193.576	Required	
SWMH 6.1	705826.346	728219.567	705826.346	728219.567	Required	
SWMH 1.6	705811.985	728222.066	705811.985	728222.066	Required	
SWMH 1.7	705806.164	728231.599	705806.164	728231.599	Required	
SWMH 7.0	705812.697	728246.688	705812.697	728246.688	Required	
SWMH 1.8	705802.170	728243.003	705802.170	728243.003	Required	
SWMH 1.9	705793.181	728255.234	705793.181	728255.234	Required	

Manhole Schedules for Pr SW

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH 1.10	705785.745	728265.850	705785.745	728265.850	Required	
SWMH 8.0	705687.818	728203.548	705687.818	728203.548	Required	
SWMH 8.1	705690.588	728211.083	705690.588	728211.083	Required	
SWMH 8.2	705697.605	728215.829	705697.605	728215.829	Required	
SWMH9.0	705770.628	728244.006	705770.628	728244.006	Required	
SWMH 8.3	705745.716	728235.317	705745.716	728235.317	Required	
SWMH 8.4	705744.176	728239.097	705744.176	728239.097	Required	
SWMH 8.5	705748.478	728240.926	705748.478	728240.926	Required	
SWMH 8.6	705753.393	728243.186	705753.393	728243.186	Required	
SWMH 10.0	705792.384	728280.513	705792.384	728280.513	Required	
SWMH 10.1	705781.040	728272.566	705781.040	728272.566	Required	
SWMH 1.11	705766.786	728258.490	705766.786	728258.490	Required	
SWMH 1.12	705780.179	728273.794	705780.179	728273.794	Required	
SWMH 1.13	705777.858	728277.108	705777.858	728277.108	Required	
EXSWMH	705819.238	728311.166			No Entry	



PIPELINE SCHEDULES for Pr SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SWMH 1.0	106.534	104.760	1.549	Open Manhole	1200
2.000	o	225	SWMH 2.0	105.785	104.548	1.012	Open Manhole	1200
3.000	o	225	SWMH 3.0	105.784	104.559	1.000	Open Manhole	1200
1.001	o	225	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
1.002	o	225	SWMH 1.2	105.881	104.442	1.214	Open Manhole	1200
4.000	o	225	SWMH 4.0	105.810	104.535	1.050	Open Manhole	1200
4.001	o	225	SWMH 4.1	105.808	104.480	1.103	Open Manhole	1200
4.002	o	225	SWMH 4.2	105.814	104.421	1.168	Open Manhole	1200
1.003	o	300	SWMH 1.3	105.737	104.247	1.190	Open Manhole	1200
1.004	o	375	SWMH 1.4	104.789	103.272	1.142	Open Manhole	1200
1.005	o	375	SWMH 1.5	105.434	103.109	1.950	Open Manhole	1200
5.000	o	225	SWMH 5.0	105.160	103.071	1.864	Open Manhole	1200
6.000	o	225	SWMH 6.0	105.124	103.445	1.454	Open Manhole	1200
6.001	o	225	SWMH 6.1	105.090	103.179	1.686	Open Manhole	1200
1.006	o	375	SWMH 1.6	105.072	102.883	1.814	Open Manhole	1200
1.007	o	450	SWMH 1.7	105.015	102.734	1.831	Open Manhole	1200
7.000	o	225	SWMH 7.0	104.000	102.934	0.841	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.711	66.7	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
2.000	10.197	150.0	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
3.000	15.853	200.0	SWMH 1.1	105.954	104.480	1.249	Open Manhole	1200
1.001	7.469	200.0	SWMH 1.2	105.881	104.442	1.214	Open Manhole	1200
1.002	4.066	200.0	SWMH 1.3	105.737	104.422	1.090	Open Manhole	1200
4.000	11.095	201.7	SWMH 4.1	105.808	104.480	1.103	Open Manhole	1200
4.001	11.727	200.0	SWMH 4.2	105.814	104.421	1.168	Open Manhole	1200
4.002	19.785	200.0	SWMH 1.3	105.737	104.322	1.190	Open Manhole	1200
1.003	90.000	100.0	SWMH 1.4	104.789	103.347	1.142	Open Manhole	1200
1.004	24.568	150.0	SWMH 1.5	105.434	103.109	1.950	Open Manhole	1200
1.005	33.673	150.0	SWMH 1.6	105.072	102.884	1.813	Open Manhole	1200
5.000	3.795	100.0	SWMH 1.6	105.072	103.033	1.814	Open Manhole	1200
6.000	26.625	100.0	SWMH 6.1	105.090	103.179	1.686	Open Manhole	1200
6.001	14.577	100.0	SWMH 1.6	105.072	103.033	1.814	Open Manhole	1200
1.006	11.169	150.0	SWMH 1.7	105.015	102.809	1.831	Open Manhole	1200
1.007	12.084	150.0	SWMH 1.8	104.838	102.653	1.735	Open Manhole	1200
7.000	11.153	200.0	SWMH 1.8	104.838	102.878	1.735	Open Manhole	1200

PIPELINE SCHEDULES for Pr SW

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.008	o	450	SWMH 1.8	104.838	102.653	1.735	Open Manhole	1200
1.009	o	450	SWMH 1.9	104.724	102.552	1.722	Open Manhole	1200
1.010	o	225	SWMH 1.10	104.090	100.681	3.184	Open Manhole	1200
8.000	o	225	SWMH 8.0	105.815	104.590	1.000	Open Manhole	1200
8.001	o	225	SWMH 8.1	105.784	104.510	1.049	Open Manhole	1200
8.002	o	300	SWMH 8.2	105.783	104.350	1.133	Open Manhole	1200
9.000	o	300	SWMH9.0	105.785	104.095	1.390	Open Manhole	1200
8.003	o	300	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
8.004	o	300	SWMH 8.4	105.486	103.790	1.396	Open Manhole	1200
8.005	o	300	SWMH 8.5	105.174	103.743	1.131	Open Manhole	1200
8.006	o	225	SWMH 8.6	104.849	100.681	3.943	Open Manhole	1200
10.000	o	225	SWMH 10.0	103.500	101.775	1.500	Open Manhole	1200
10.001	o	225	SWMH 10.1	103.793	101.706	1.862	Open Manhole	1200
1.011	o	225	SWMH 1.11	104.366	100.656	3.485	Open Manhole	1200
1.012	o	225	SWMH 1.12	103.781	100.631	2.925	Open Manhole	1200
1.013	o	225	SWMH 1.13	103.685	100.573	2.887	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.008	15.178	150.0	SWMH 1.9	104.724	102.552	1.722	Open Manhole	1200
1.009	12.962	150.0	SWMH 1.10	104.090	102.466	1.174	Open Manhole	1200
1.010	20.337	813.5	SWMH 1.11	104.366	100.656	3.485	Open Manhole	1200
8.000	8.028	100.0	SWMH 8.1	105.784	104.510	1.049	Open Manhole	1200
8.001	8.472	100.0	SWMH 8.2	105.783	104.425	1.133	Open Manhole	1200
8.002	51.908	100.0	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
9.000	26.384	100.0	SWMH 8.3	105.758	103.831	1.627	Open Manhole	1200
8.003	4.082	100.0	SWMH 8.4	105.486	103.790	1.396	Open Manhole	1200
8.004	4.674	100.0	SWMH 8.5	105.174	103.743	1.131	Open Manhole	1200
8.005	5.410	66.8	SWMH 8.6	104.849	103.662	0.887	Open Manhole	1200
8.006	20.337	9.5	SWMH 1.11	104.366	98.549	5.592	Open Manhole	1200
10.000	13.851	200.7	SWMH 10.1	103.793	101.706	1.862	Open Manhole	1200
10.001	20.032	200.3	SWMH 1.11	104.366	101.606	2.535	Open Manhole	1200
1.011	20.337	813.5	SWMH 1.12	103.781	100.631	2.925	Open Manhole	1200
1.012	4.046	51.2	SWMH 1.13	103.685	100.552	2.908	Open Manhole	1200
1.013	53.594	51.4	EXSWMH	102.330	99.531	2.574	Open Manhole	1200

Free Flowing Outfall Details for Pr_SW

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013	EXSWMH	102.330	99.531	0.000	1200	0

Simulation Criteria for Pr SW

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 1	Number of Storage Structures 1	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	15.900	Storm Duration (mins)	30
Ratio R	0.267		

Online Controls for Pr SW

Hydro-Brake® Optimum Manhole: SWMH 1.11, DS/PN: 1.011, Volume (m³): 6.5

Unit Reference	MD-SHE-0082-4000-2000-4000
Design Head (m)	2.000
Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	100.656
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	4.0	Kick-Flo®	0.729	2.5
Flush-Flo™	0.356	3.1	Mean Flow over Head Range	-	3.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	0.800	2.6	2.000	4.0	4.000	5.5	7.000	7.2
0.200	3.0	1.000	2.9	2.200	4.2	4.500	5.8	7.500	7.4
0.300	3.1	1.200	3.2	2.400	4.3	5.000	6.1	8.000	7.7
0.400	3.1	1.400	3.4	2.600	4.5	5.500	6.4	8.500	7.9
0.500	3.1	1.600	3.6	3.000	4.8	6.000	6.7	9.000	8.1
0.600	2.9	1.800	3.8	3.500	5.2	6.500	6.9	9.500	8.3

Storage Structures for Pr SW

Tank or Pond Manhole: SWMH 1.11, DS/PN: 1.011

Invert Level (m) 100.656

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	470.4	2.000	470.4	2.001	0.0

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
1.000	SWMH 1.0	2.006	0.696	0.000	2.702
2.000	SWMH 2.0	1.399	0.358	0.000	1.757
3.000	SWMH 3.0	1.385	0.583	0.000	1.968
1.001	SWMH 1.1	1.667	0.249	0.000	1.917
1.002	SWMH 1.2	1.627	0.114	0.000	1.741
4.000	SWMH 4.0	1.442	0.393	0.000	1.835
4.001	SWMH 4.1	1.502	0.419	0.000	1.920
4.002	SWMH 4.2	1.575	0.739	0.000	2.314
1.003	SWMH 1.3	1.685	6.277	0.000	7.962
1.004	SWMH 1.4	1.715	2.581	0.000	4.296
1.005	SWMH 1.5	2.630	3.587	0.000	6.216
5.000	SWMH 5.0	2.362	0.103	0.000	2.465
6.000	SWMH 6.0	1.898	1.011	0.000	2.909
6.001	SWMH 6.1	2.161	0.532	0.000	2.693
1.006	SWMH 1.6	2.475	1.101	0.000	3.576
1.007	SWMH 1.7	2.580	1.731	0.000	4.311
7.000	SWMH 7.0	1.205	0.396	0.000	1.601
1.008	SWMH 1.8	2.471	2.223	0.000	4.694
1.009	SWMH 1.9	2.456	1.871	0.000	4.327
1.010	SWMH 1.10	3.855	0.761	0.000	4.616
8.000	SWMH 8.0	1.385	0.272	0.000	1.657
8.001	SWMH 8.1	1.441	0.289	0.000	1.730
8.002	SWMH 8.2	1.621	3.584	0.000	5.205
9.000	SWMH9.0	1.912	1.780	0.000	3.692
8.003	SWMH 8.3	2.179	0.204	0.000	2.383
8.004	SWMH 8.4	1.918	0.246	0.000	2.164
8.005	SWMH 8.5	1.618	0.298	0.000	1.916
8.006	SWMH 8.6	4.714	0.761	0.000	5.475
10.000	SWMH 10.0	1.951	0.503	0.000	2.454
10.001	SWMH 10.1	2.360	0.749	0.000	3.109
1.011	SWMH 1.11	4.196	0.761	940.957	945.914
1.012	SWMH 1.12	3.563	0.113	0.000	3.676
1.013	SWMH 1.13	3.520	2.083	0.000	5.603
Total		72.476	37.365	940.957	1050.798

Summary of Critical Results by Maximum Level (Rank 1) for Pr SW

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	15.900
Region	Scotland and Ireland	Ratio R	0.267
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	20, 20, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	SWMH 1.0	15 Winter	100	+20%	100/15 Summer				105.327	0.342
2.000	SWMH 2.0	15 Winter	100	+20%	30/15 Summer				105.326	0.554
3.000	SWMH 3.0	15 Winter	100	+20%	30/15 Summer				105.330	0.546
1.001	SWMH 1.1	15 Winter	100	+20%	30/15 Summer				105.327	0.622
1.002	SWMH 1.2	15 Winter	100	+20%	30/15 Summer				105.322	0.655
4.000	SWMH 4.0	15 Winter	100	+20%	30/15 Summer				105.333	0.573
4.001	SWMH 4.1	15 Winter	100	+20%	30/15 Summer				105.329	0.624
4.002	SWMH 4.2	15 Winter	100	+20%	30/15 Summer				105.325	0.678
1.003	SWMH 1.3	15 Winter	100	+20%	30/15 Summer				105.314	0.767
1.004	SWMH 1.4	30 Winter	100	+20%	30/15 Summer				104.288	0.641
1.005	SWMH 1.5	30 Winter	100	+20%	30/15 Summer				104.184	0.701
5.000	SWMH 5.0	30 Winter	100	+20%	30/15 Summer				104.055	0.759
6.000	SWMH 6.0	30 Winter	100	+20%	100/15 Summer				104.066	0.395
6.001	SWMH 6.1	30 Winter	100	+20%	30/15 Summer				104.053	0.649
1.006	SWMH 1.6	30 Winter	100	+20%	30/15 Summer				104.044	0.786
1.007	SWMH 1.7	30 Winter	100	+20%	30/15 Summer				103.919	0.735
7.000	SWMH 7.0	30 Winter	100	+20%	30/15 Summer				103.900	0.741
1.008	SWMH 1.8	30 Winter	100	+20%	30/15 Summer				103.877	0.773
1.009	SWMH 1.9	30 Winter	100	+20%	30/15 Summer				103.812	0.809
1.010	SWMH 1.10	30 Winter	100	+20%	1/15 Summer				103.730	2.824
8.000	SWMH 8.0	15 Winter	100	+20%	100/15 Summer				104.945	0.130
8.001	SWMH 8.1	15 Winter	100	+20%	100/15 Summer				104.929	0.194
8.002	SWMH 8.2	15 Winter	100	+20%	100/15 Summer				104.909	0.259
9.000	SWMH9.0	15 Winter	100	+20%	30/15 Summer				104.640	0.246
8.003	SWMH 8.3	15 Winter	100	+20%	30/15 Summer				104.596	0.465
8.004	SWMH 8.4	15 Winter	100	+20%	30/15 Summer				104.376	0.286
8.005	SWMH 8.5	15 Winter	100	+20%	30/15 Summer				104.160	0.117
8.006	SWMH 8.6	1440 Winter	100	+20%	1/60 Summer				102.650	1.744
10.000	SWMH 10.0	1440 Winter	100	+20%	30/960 Winter				102.649	0.649
10.001	SWMH 10.1	1440 Winter	100	+20%	30/480 Winter				102.648	0.717
1.011	SWMH 1.11	1440 Winter	100	+20%	1/30 Winter				102.648	1.767
1.012	SWMH 1.12	1440 Winter	100	+20%					100.678	-0.178
1.013	SWMH 1.13	1440 Winter	100	+20%					100.607	-0.191

Summary of Critical Results by Maximum Level (Rank 1) for Pr SW

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH 1.0	0.000	0.06			3.7	SURCHARGED	
2.000	SWMH 2.0	0.000	0.10			3.6	SURCHARGED	
3.000	SWMH 3.0	0.000	0.14			4.6	SURCHARGED	
1.001	SWMH 1.1	0.000	0.77			22.3	SURCHARGED	
1.002	SWMH 1.2	0.000	1.12			28.4	SURCHARGED	
4.000	SWMH 4.0	0.000	0.17			5.2	SURCHARGED	
4.001	SWMH 4.1	0.000	0.35			11.1	SURCHARGED	
4.002	SWMH 4.2	0.000	0.49			16.4	SURCHARGED	
1.003	SWMH 1.3	0.000	1.21			130.5	SURCHARGED	
1.004	SWMH 1.4	0.000	0.87			122.1	SURCHARGED	
1.005	SWMH 1.5	0.000	0.81			118.3	SURCHARGED	
5.000	SWMH 5.0	0.000	0.92			27.4	SURCHARGED	
6.000	SWMH 6.0	0.000	0.20			9.8	SURCHARGED	
6.001	SWMH 6.1	0.000	0.26			12.1	SURCHARGED	
1.006	SWMH 1.6	0.000	1.34			143.2	SURCHARGED	
1.007	SWMH 1.7	0.000	0.83			140.2	SURCHARGED	
7.000	SWMH 7.0	0.000	0.85			26.2	FLOOD RISK	
1.008	SWMH 1.8	0.000	0.91			163.9	SURCHARGED	
1.009	SWMH 1.9	0.000	1.01			170.1	SURCHARGED	
1.010	SWMH 1.10	0.000	14.26			169.1	SURCHARGED	
8.000	SWMH 8.0	0.000	0.40			16.2	SURCHARGED	
8.001	SWMH 8.1	0.000	0.55			22.5	SURCHARGED	
8.002	SWMH 8.2	0.000	0.79			82.6	SURCHARGED	
9.000	SWMH9.0	0.000	0.37			36.6	SURCHARGED	
8.003	SWMH 8.3	0.000	1.89			116.0	SURCHARGED	
8.004	SWMH 8.4	0.000	1.89			116.2	SURCHARGED	
8.005	SWMH 8.5	0.000	1.63			116.0	SURCHARGED	
8.006	SWMH 8.6	0.000	0.06			9.5	SURCHARGED	
10.000	SWMH 10.0	0.000	0.06			1.9	SURCHARGED	
10.001	SWMH 10.1	0.000	0.06			1.9	SURCHARGED	
1.011	SWMH 1.11	0.000	0.33			4.0	SURCHARGED	
1.012	SWMH 1.12	0.000	0.10			4.0	OK	
1.013	SWMH 1.13	0.000	0.06			4.0	OK	

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