Hosted Kitchens
Broomhill Industrial Estate
Civil Engineering Report

13.07.2022

22066-TNT-XX-XX-RP-C-00001

TENT ENGINEERING

Site Address:

Unit 55
Broomhill Industrial Estate
Tallaght, Dublin 24

Client:

Hostosix Limited

Unit 1, The Chq Building
North Wall Quay, Dublin 1
D01 Y6h7

TENT ENGINEERING

Revision and Review

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REVISION(S)

Rev.	Description	Date
P01	1st issue	13.07.2022

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TENT ENGINEERING

Contents

TENT ENGINEERING

1 Executive Summary

The proposed development is sited at Unit 55, Broomhill Drive in the Broomhill Industrial Estate, Tallaght. The proposed development includes new kitchen units within an existing building, provided with fresh water and foul sewer discharge. This report validates the development for planning and provides the civil infrastructure required.

From the available information there is a separate sewer to which we propose to tie-in. Parallel to Broomhill Drive a fresh water distribution main is identified. The proposed development is feasible with gravity flow only. A conclusive GI is to confirm existing services (positions, falls and inverts), for main contractor approval.

The development makes use of the existing manhole and connection, with a small increase in foul discharge, and also proposes a new connection (so not to overload the existing foul sewer). The proposed foul network is a typical ø225mm pipe with ø110mm branches, unless noted otherwise, with the capacity to cater the wastewater discharge requirements. The identified averaged peak combined wastewater discharge is 0.33 L/s for the existing foul connection. A new (additional) connection will discharge an averaged daily peak rate of 2.92 L/s. The total combined foul water discharge into the existing public sewer from our proposed development is therefore 3.25 L/s.

The existing storm water network on site is managed via gullies, discharging surface run-off to the public storm sewer. To ensure no added strain is put on the existing surface water network (considering urbanisation, climate change and increased hardstanding area on site during a 1:100 year event) a small soak-away is proposed. The soak-away is to be crates (eco-cell or similar approved) with outer dimensions of 1.23x2.07x0.45m (9no crates), with 0.5m top soil. All new hardstanding area is to be made permeable.

The fresh water demand for the development is determined to be an averaged peak 3.03 L/s. This is to be served via an ø80mm branch on site, which ties into the existing water distribution main below Broomhill Drive.

Each kitchen pod requires to have a grease trap of approximately 135L volume, subject to total sink basin volume. A 50 gallon grease interceptor device (KGB-50 or similar approved) is recommended, prior to discharging waste water into the new foul water network.

An initial flood risk assessment has concluded the site to be in Flood Zone C “lowest risk”. The development site is deemed appropriate for the proposals. At this stage the site can be considered at low or appropriate risk of suffering from any form of flooding. No flood mitigation or further justification tests are needed.

2 Introduction

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Tent Engineering shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations and designs at no additional cost to Tent Engineering Ltd.

2.1 General

The proposed development is sited at Unit 55 on the Broomhill Industrial Estate in Tallaght, Dublin 24. The proposed development creates new compact commercial kitchens in the existing building, and includes a new external dry store modular pod to the rear of the building. All kitchens, toilets, wash room and break room are provided with fresh water and foul sewer discharge. The roof is hardstanding, and the site is partly hardstanding (tarmac) partly landscaped. it is aimed to avoid any added strain to the existing surface water network. The site area is approximated to be 0.137ha of mixed hardstanding and landscaped area.

2.2 Scope of Civil Report

This report documents the proposed Civil aspects required for this development. It contains information regarding the connection of the proposed development to the existing infrastructure (separate sewer) and any additional works required. Most notably, the foul- and surface water drainage systems, the water supply system and flood risk aspects are covered.

Site Location - Unit 55, Broomhill Industrial Estate

2.3 Existing Services

From available information, there is a separate sewer system below Broomhill Drive.

The proposed site is relatively flat, as no visual slope has been identified. According to the cover levels of the foul network, the road level in front of the proposed development is +92.22m. Further topographic interrogation of the area shows a mild slope from West (high ground) to East (low ground). The slope is mild and gradual and does not impact our development.

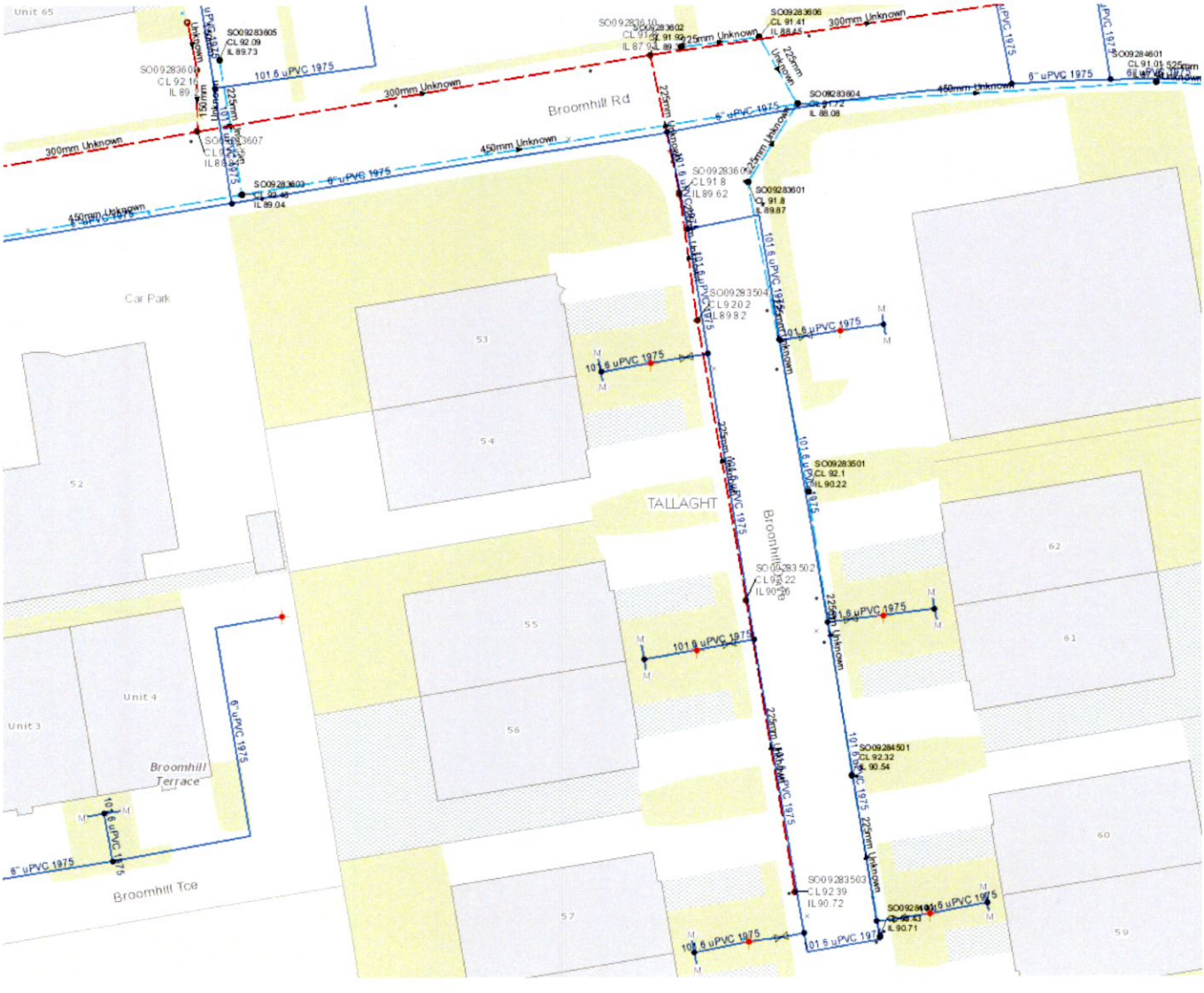
Near the proposed site one existing foul water manholes is identified (reference: 3502). A surface water drainage network is located parallel to the foul sewer pipes. Actual on-site existing civil infrastructure (position, diameters, falls and inverts) are to be confirmed with a site investigation survey prior to construction.

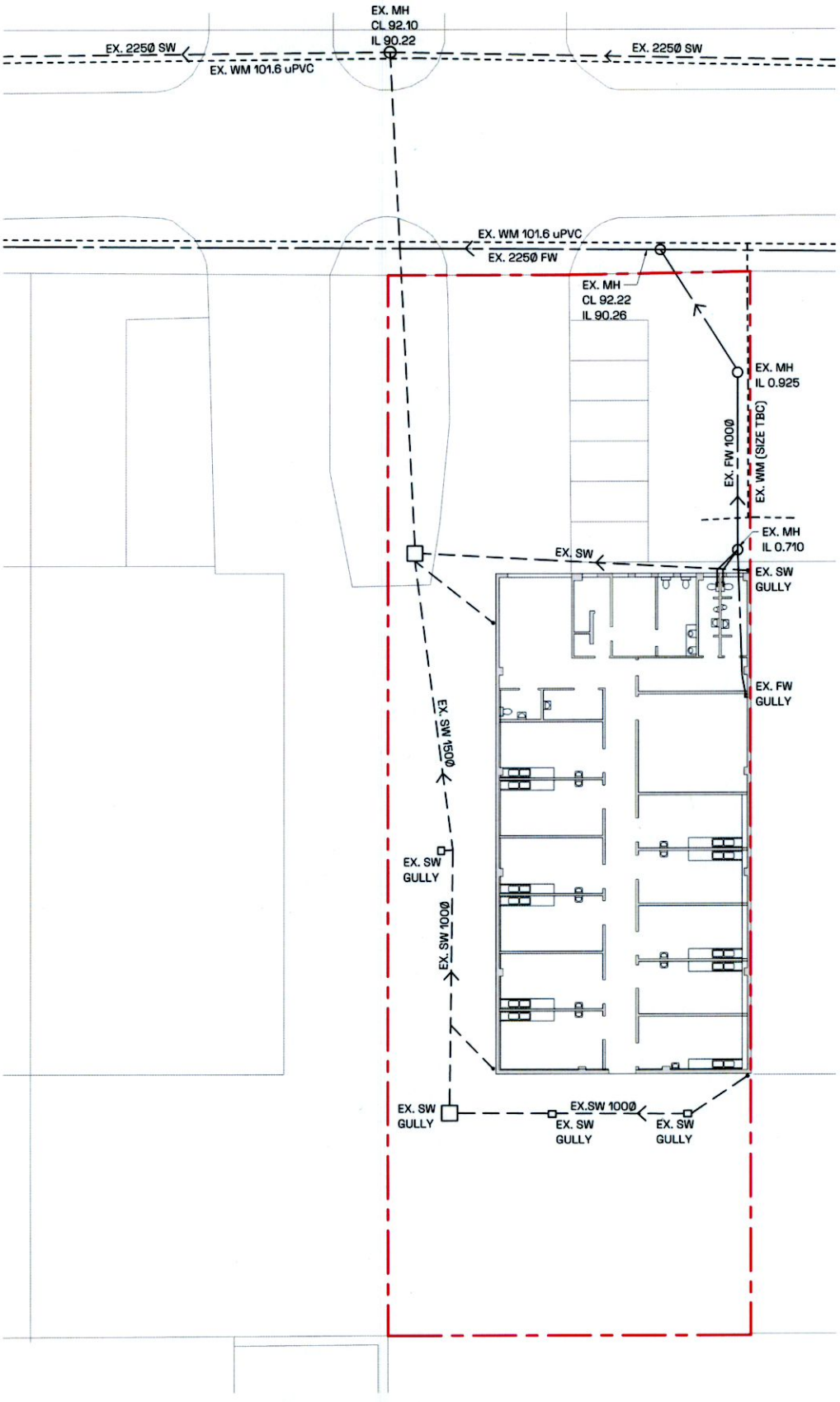
The area is served by an existing water distribution main.

Currently site drainage is facilitated through gullies, directing the surface water to the main storm sewers.

No past flood event on the site has been identified, therefore the existing drainage system is deemed adequate to the current requirements.

Existing Underground Networks





EXISTING DRAINAGE INFRASTRUCTURE

1 : 200

3 Surface Water Drainage

3.1 General

The surface water drainage design philosophy has been prepared in accordance with the requirements from the following technical documents:

- The Greater Dublin Strategic Drainage Study
- Building Regulation Part H
- BS-EN 752-2019 - Gravity Drainage Systems outside Buildings
- Ciria Report C753 - The SuDS manual
- EPA Wastewater Treatment Manual 'Treatment Systems for Small Communities, Businesses, Leisure Centres and Hotels'
- IW Code of Practice for Water Infrastructure

The introduction of additional hardstanding area to the rear of the building will increase the surface water run-off. It is proposed to include a relative small soak-away in the landscaped area of the site to account for the added hardstanding area, while also including for 20% climate change.

It is proposed to keep using the existing storm drainage system at ground floor of the site. This is currently managed through rainwater pipes diverting into underground gullies. Any local site run-off is also collected and diverted via the same gully network.

The underground storm water infrastructure from our site is ultimately discharged into the existing surface water network below Broomhill Drive.

The development makes use of mobile modular units (pods), on an existing landscaped site. The pods are presumed to be placed on a rigid base with adequate load spread and bearing capacity.

3.2 SUDs and Compliance

To ensure the development will minimise any added strain to the public system, the surface water infrastructure on this site is designed according to the Principles of SUDs. The GDSDS embodies these principles in its recommendations. The scheme requires designs to comply with a set of drainage criteria mimicking the run-off characteristics of a greenfield site. Thereby minimising the impact of Urbanisation on the area. The criteria provide a consistent approach to addressing both the rate and volume of runoff, as well as ensuring the environment is protected from pollutions that are washed off roads and buildings.

The requirements of SUDs are typically addressed by provision of the following:

- Interception storage (not adopted)
- Treatment storage (not required)
- Attenuation storage (soak-away)
- Long term storage* (not required)

* Long term storage is not required when growth factors are applied to Q_{bar} when designing and allowing for attenuation tank storage

To the rear of the building it is assumed that the currently landscaped area will be (partially) made hardstanding to allow for routing and bin stores. Our proposal includes all new hardstanding area to be permeable paving, reducing surface water run-off and further alleviating the existing storm network.

Conservatively it is assumed that approximately of 60m^2 of currently landscaped area will be constructed as permeable paving to the rear of the building. Any significant increase as per architect intent may impact the existing storm network and/or the new proposed soak-away requirements.

Remaining existing hardstanding areas on site continue to make unchanged use of their current drainage solutions (gullies), classified as conventional positive drainage systems with vertical falls, including gradients sufficient to allow any rainfall run-off to be collected by beams of road gullies, drains and kerbs etc.

3.3 Proposed Infrastructure

The design for the proposed development allows for unchanged use of the existing storm gullies and rain water pipes. The new modular pod will have a rain water pipe which directs all roof run-off from the pod towards a new soak-away

The proposed soak-away is:

- Crates with 95% porosity
- Eco-cell or similar approved
- 500mm top soil
- 1230 (3) x 2070 (3) x 450 (1) mm (9 crates)
- Excavation depth is 950mm

The soak away ensures no added strain is imposed on the existing surface network, with additional site considerations of climate change (20%) and urbanisation (10%). This approach avoids an increased surface water discharge of the site, reducing future risk and impact of flooding.

All new hardstanding area (assumed 60m^2) to the rear of the building is to be permeable. Landscaped and permeable area has an assumed run-off rate of 20%. Hardstanding (tarmac and roof) has an assumed run-off rate of 100%.

3.4 Basis of Surface Water

Below are assumptions outlined, considered in the surface water design.

- The proposed surface water drainage to be discharged (unchanged) into the existing storm water sewer below Broomhill Drive
- Additional strain on the existing network due to our proposed development is mitigated via a new soak-away
- Local and up to date rainfall data has been used for this model
- The pipe network is to be sized to accommodate a 1 in 2 year return period storm event in compliance with the requirements of EN 752
- Time of entry of 4 minutes is to be applied
- A pipe roughness co-efficient of (ks) 0.006 is applied for PVC drainage pipes
- Maximum flow velocity 3 m/s
- Pipe gradients not to be flatter than the pipe diameter itself. i.e. 1:ø
- A climate change factor of 20% is applied
- An urbanisation factor of 10% is applied
- The system is to ensure that the network does not flood during a 1:100 year event
- Drainage infrastructure is developed with the latest architectural layouts at time of writing. For further information, refer to Architectural drawings
- At bends, junctions and extraordinarily long runs of surface water pipes an inclusion for Access Joints (AJs) are made

3.5 Validation

The surface water contribution to the total discharge into the existing combined sewer network, discharge rate, flow and system capacities are deemed acceptable in the proposed drainage system layout, as there is no added strain on the network, avoiding increased risk of local flooding due to storm events. This is under the assumption that the existing network is fully compliant and functions accordingly.

The added soak-away allows the implementation of the above-mentioned strategy.

4 Foul Drainage

4.1 General

The foul drainage design philosophy has been developed in accordance with the requirements from the following technical documents:

- BS-EN 752-2019 - Gravity Drainage Systems Outside Buildings
- BS-EN 12056-2 2000 - Gravity Drainage Systems Inside Buildings
- Building Regulations Part H
- EPA Wastewater Treatment Manual - Treatment Systems for Small Communities, Businesses, Leisure Centres and Hotels
- IW Code of Practice for Wastewater Infrastructure
- Standard PDI-G101 rev2017

The Landlord has noted that they will NOT allow any alterations to the floor slab (such as the cutting of channels, coring and/or penetrations).

The above requirement results in a foul water network strategy which is aboveground when in the building, which then penetrates through the external wall to the outside. Once outside the foul water pipes are vertically directed underground to tie into the underground network.

The proposed drainage system has the capacity to cater the wastewater requirements. The wastewater gets discharged into the existing foul network, either via an existing connection (manhole reference 3502) or a new foul connection. The foul infrastructure flows by gravity, and all invert levels are deemed acceptable.

KGB-50 (or similar) Grease Interceptor

4.2 Basis of Foul Water

Below are assumptions outlined, considered in the foul water design.

- The proposed foul drainage is discharged into the existing foul sewer network below Broomhill Drive
- The foul water network has been designed adequately
- Maximum flow velocity 3 m/s
- Drainage infrastructure is developed with the latest architectural layouts at time of writing. For further information, refer to Architectural drawings
- Pipe gradients comply with the table below

No. units	Minimum pipe gradient
1	ø100mm at 1:60 fall or self-cleansing gradient
2-9	ø150-225mm at 1:60 fall or self-cleansing gradient ø225mm at 1:200 minimum fall
10-20	ø150-225mm at 1:150 fall ø225mm at 1:200 minimum fall or self-cleansing gradient
21-210	ø225mm at 1:200 fall or self-cleansing gradient

A typical fall of 1:80 is proposed and not to be exceeded.

4.3 Grease Interceptor

Due to the proposed function of the building units (commercial kitchens), grease traps are to be allowed for within the units, to ensure no grease and fat build-up occurs in the new and existing civil infrastructure.

An odourless and low-maintenance self-serviced solution is proposed. Based on an assumed maximum double sink basin volume of 180L, the grease interceptor is to accommodate a minimum of 135L free drain volume, considering a 1 minute drain. A 50 gallon or equivalent interceptor of KGB-50 (or similar) is recommended, which complies with the requirements.

4.4 Wall Penetrations

All pipe wall penetrations are to comply with the Building Regulations - Part L. Our proposed pipe penetrations are from an internal environment to an external environment, and therefore requires an appropriate seal for air tightness, thermal performance and animal barrier.

For the foul water pipe penetrations, the use of Pipesnug (or similar approved) cores and seals are proposed.

4.5 Protection of Pipes

The foul pipes are aboveground in the building as no slab alterations may be made. The internal foul pipes are to be boarded up to protect them from accidental damages and to mitigate undesired sounds. The boarded up pipes (using plasterboard or equivalent) are recommended to be insulated with rockwool or similar to improve acoustics.

Where the foul pipes penetrate the external wall, they are fully exposed and in multiple locations subject to both vehicle impacts and vandalism. Protection covers are to be placed around the exposed pipes to minimise risk of damages.

4.6 Proposed Infrastructure

Foul drainage from the development is generated by toilets, wash hand basins and kitchen sinks. The identified averaged peak combined wastewater discharge is 0.33 L/s for the existing foul connection. A new (additional) connection will discharge an averaged daily peak rate of 2.92 L/s. Therefore, the total combined foul water discharge into the existing public sewer is 3.25 L/s. The typical internal foul pipes are ø110mm. Once the multiple branches combine outside the building, the main run is to be a ø225mm pipe.

The site is relatively flat and a gravity system is implemented. The new foul network is proposed at a typical 1:80 fall unless noted otherwise.

Note that there is an existing connection to the foul network, therefore the increased strain on the existing public sewer is less than the total discharge, to be confirmed acceptable by Irish Water.

Example Soil Stack at External Wall Penetration

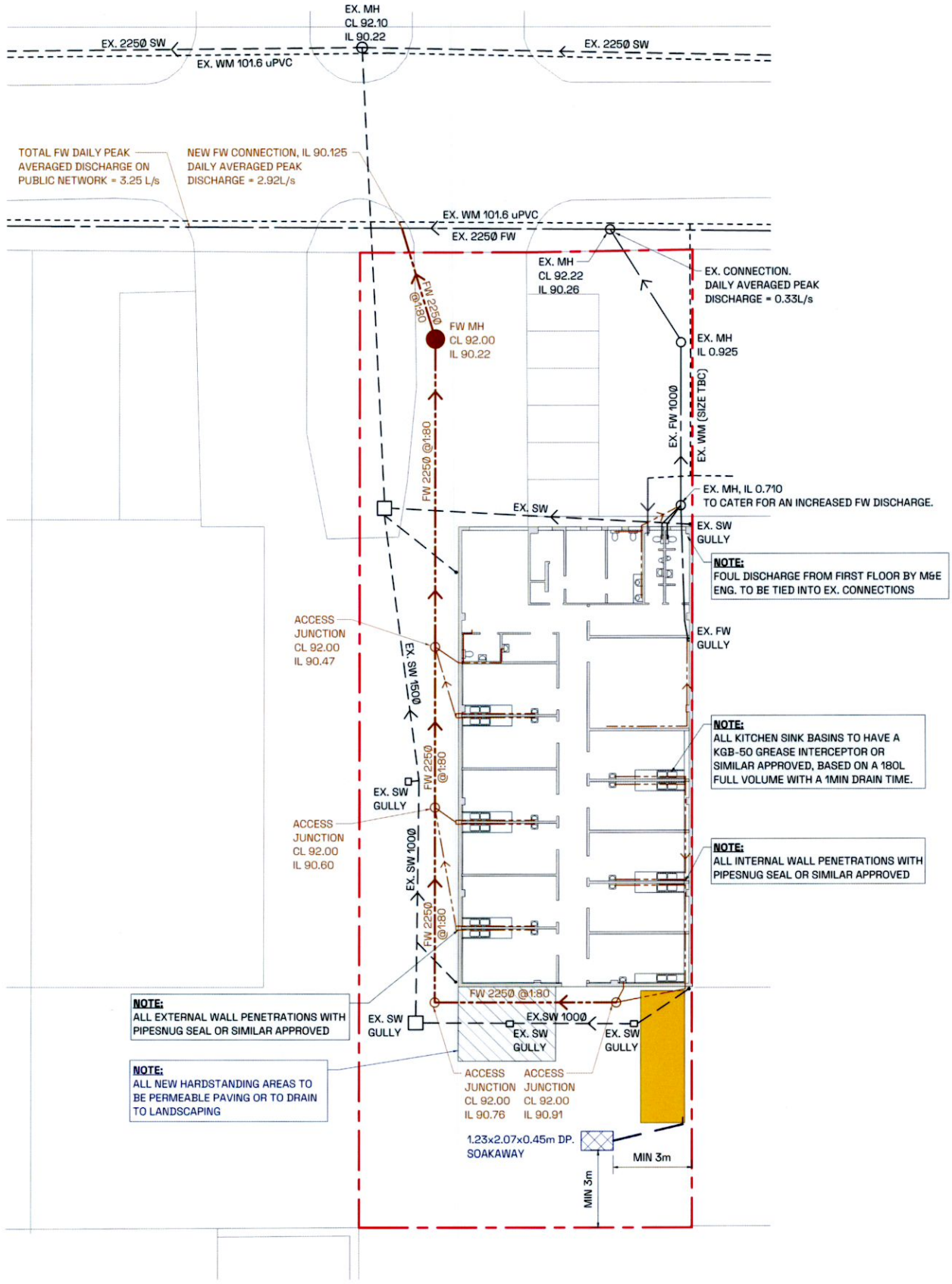
Pipesnug Seal (or similar) - External Wall Penetration

Pipesnug Seal (or similar) - Internal Wall Penetration

Example Pipe Protection (1)

Example Pipe Protection (2)

Proposed Infrastructure (Foul and Surface)



PROPOSED DRAINAGE INFRASTRUCTURE

1 : 200

5 Water Supply

5.1 Existing Water Supply

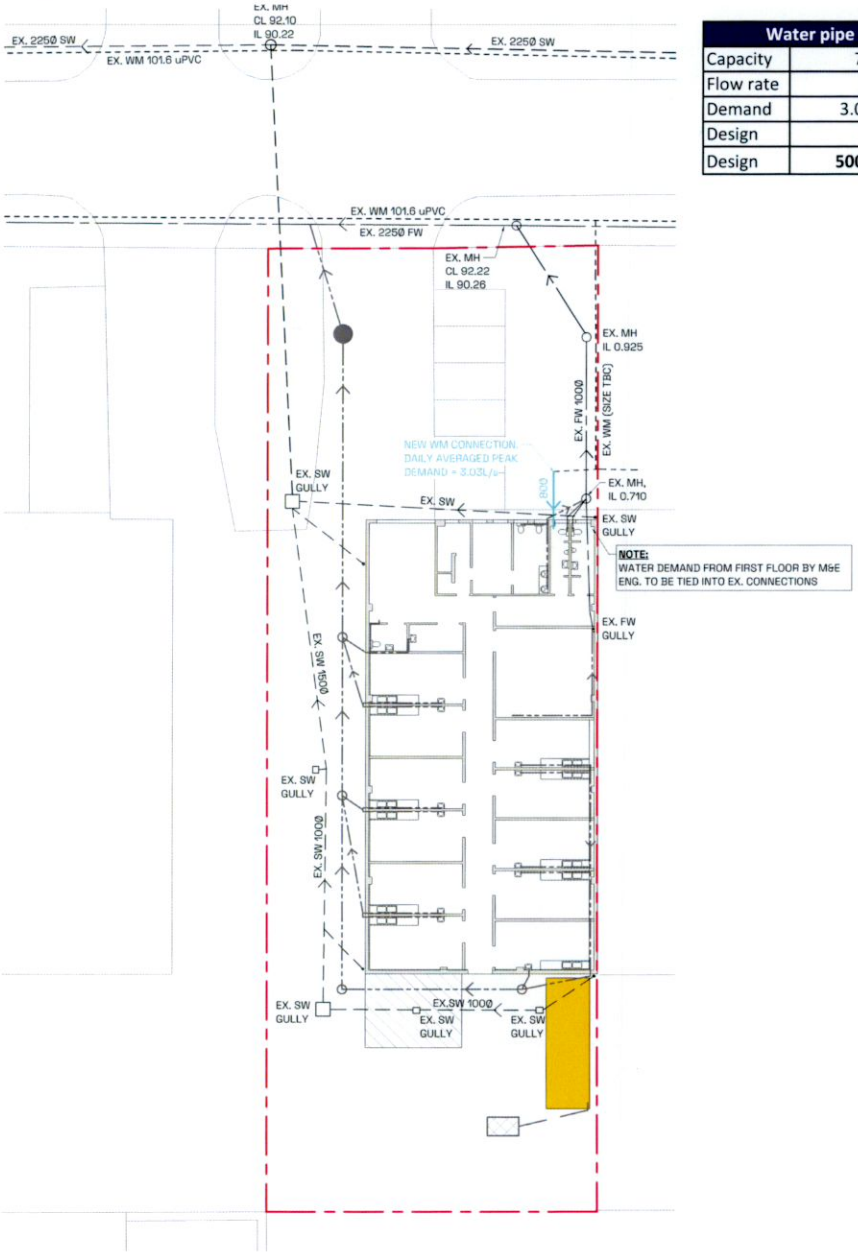
An existing watermain branches off from Broomhill Drive towards and onto our proposed site.

5.2 Proposed Water Supply

The averaged peak water demand for the site is 3.03 L/s, based on Irish Water requirements. The proposed development is to be served by a ø80mm watermain.

Due to the existing water connection, ultimately the new increased strain on the existing water network is lower than the total demand, which is subject to Irish Water acceptance.

Proposed Water Distribution Network



Water pipe sizing		
Capacity	75 %	
Flow rate	1 m/s	(conservatively low)
Demand	3.03 L/s	
Design	5 L/s	(rounded up)
Design	**5000** mm^2	

Pipe diameters		
25	491	
32	804	
50	1963	
63	3117	
80	5027	PASS
100	7854	
120	11310	

6 Flood Risk Assessment

6.1 General

The proposed development lies within an area classified as Flood Zone C "lowest risk". This initial flood risk assessment is undertaken by taking cognisance of the guidance given in the Office of Public Works (OPW) and the Department of Environment, Heritage and Local Government (DEHLG) document titled 'The planning system and flood risk management' (2009).

6.2 Potential Flood Sources

A review of all potential sources of flooding at the subject site concludes the following:

Flood Source	Risk of Flood after development
On-site drainage system	Low (Designed with adequate capacity and allowing for climate change)
Local Authority drainage system	Low
Sea and Rivers	Low
Groundwater	Low

6.3 Historic Flood

The OPW provides records for predictive and historic flood maps. These land maps have been consulted and interrogated regarding documented flood events in the vicinity of the subject site. No historic flood events at time of writing have been identified to have occurred on our proposed site.

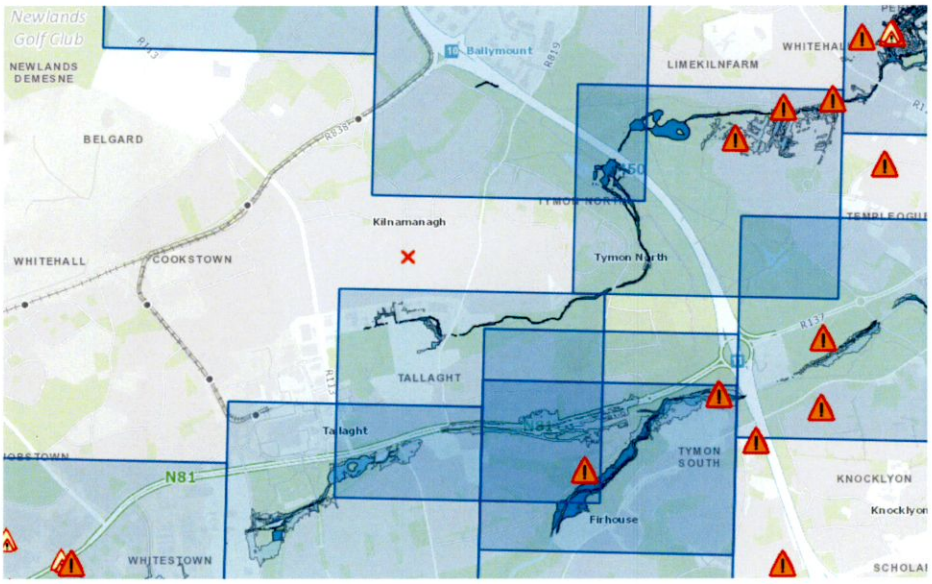
6.4 Validation

The project is considered a '*less vulnerable development*' in compliance with The Planning System and Flood risk Management planning guideline. According to the OPW flood maps, the site is located within Flood Zone C, which is defined as an area with the lowest risk of flooding from rivers and the sea. Therefore the site does not require additional flood prevention measures at this stage. A further justification test is not needed.

The flood risk assessment has concluded the following:

- The site is located in Flood Zone C
- There is low risk of flooding from any source
- A satisfactory degree of confidence exists that the subject site is not prone to potential flood issues
- The proposed drainage network is not to cause or increase flood risk to the public network and adjacent buildings
- A stage 2 Initial Flood Assessment is not required

Data from Floodinfo.ie

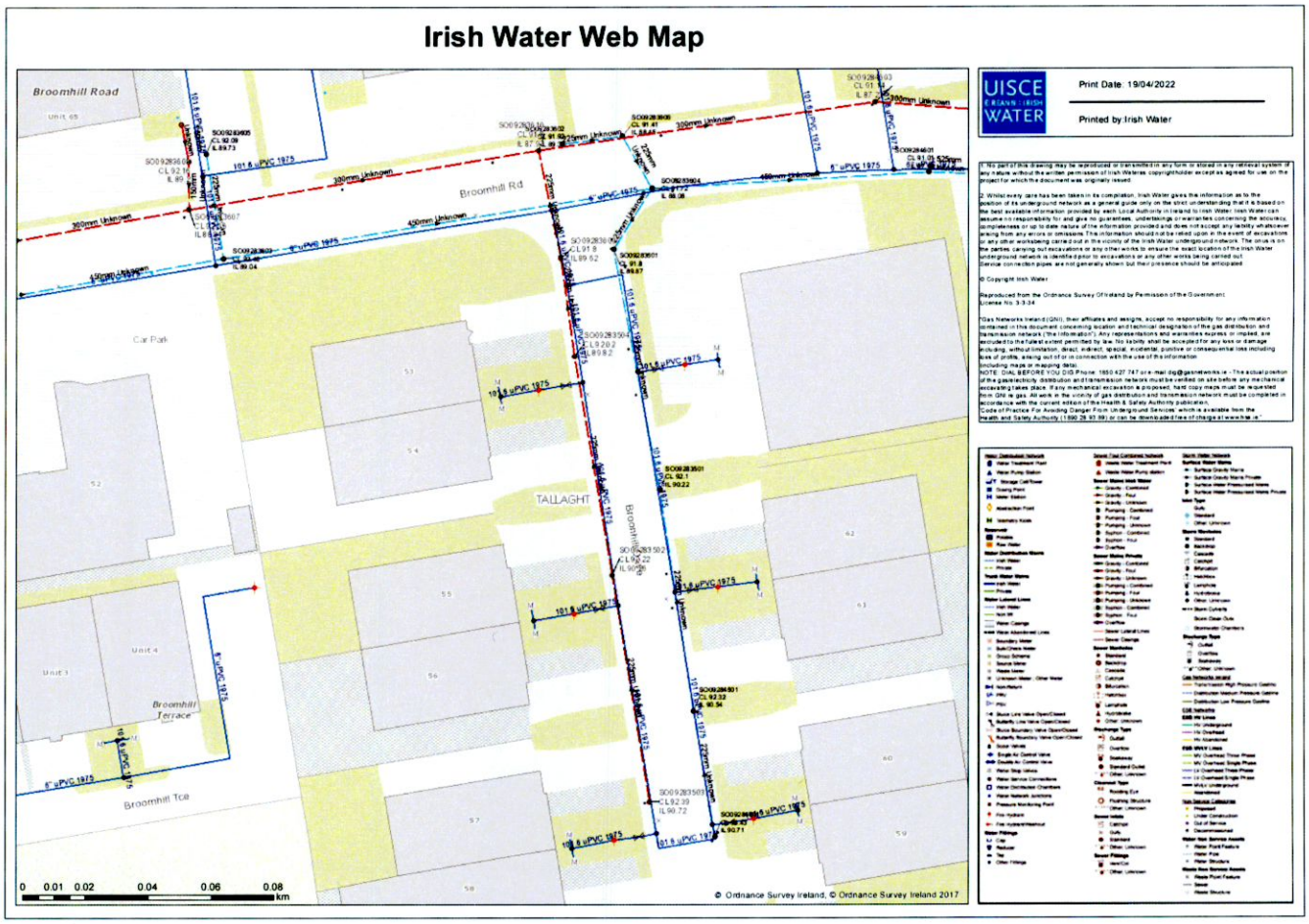


Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

	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

7 Appendix - Irish Water Map



8 Appendix - Rainfall and Building Data

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 309341, Northing: 228544,

DURATION	Interval 6months,	1year,	Years 2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.8,	4.4,	5.5,	6.2,	6.7,	8.6,	10.8,	12.2,	14.3,	16.2,	17.7,	20.0,	21.8,	23.3,	N/A ,
10 mins	3.6,	5.3,	6.2,	7.6,	8.6,	9.4,	12.0,	15.0,	17.0,	19.9,	22.6,	24.6,	27.9,	30.4,	32.5,	N/A ,
15 mins	4.2,	6.2,	7.3,	9.0,	10.1,	11.0,	14.1,	17.6,	20.0,	23.5,	26.6,	29.0,	32.8,	35.8,	38.2,	N/A ,
30 mins	5.5,	8.0,	9.4,	11.6,	13.0,	14.2,	18.0,	22.4,	25.3,	29.5,	33.3,	36.3,	40.9,	44.6,	47.6,	N/A ,
1 hours	7.2,	10.5,	12.2,	14.9,	16.8,	18.2,	22.9,	28.4,	32.0,	37.2,	41.9,	45.5,	51.1,	55.6,	59.2,	N/A ,
2 hours	9.5,	13.6,	15.9,	19.2,	21.5,	23.3,	29.3,	36.0,	40.5,	46.9,	52.6,	57.0,	63.9,	69.2,	73.7,	N/A ,
3 hours	11.2,	15.9,	18.5,	22.3,	25.0,	27.0,	33.7,	41.4,	46.5,	53.7,	60.1,	65.1,	72.8,	78.8,	83.8,	N/A ,
4 hours	12.5,	17.8,	20.6,	24.8,	27.7,	30.0,	37.3,	45.7,	51.2,	59.1,	66.0,	71.4,	79.8,	86.3,	91.7,	N/A ,
6 hours	14.7,	20.7,	24.0,	28.8,	32.1,	34.7,	43.0,	52.5,	58.8,	67.6,	75.4,	81.5,	90.9,	98.2,	104.2,	N/A ,
9 hours	17.3,	24.2,	27.9,	33.5,	37.2,	40.1,	49.6,	60.4,	67.4,	77.4,	86.2,	93.0,	103.5,	111.7,	118.5,	N/A ,
12 hours	19.3,	27.0,	31.1,	37.2,	41.3,	44.5,	54.9,	66.6,	74.3,	85.1,	94.7,	102.2,	113.6,	122.4,	129.7,	N/A ,
18 hours	22.7,	31.5,	36.2,	43.2,	47.9,	51.5,	63.3,	76.6,	85.3,	97.5,	108.2,	116.6,	129.3,	139.2,	147.4,	N/A ,
24 hours	25.4,	35.1,	40.3,	48.0,	53.1,	57.1,	70.0,	84.5,	94.0,	107.3,	119.0,	128.0,	141.9,	152.6,	161.4,	192.3,
2 days	32.0,	43.1,	48.9,	57.4,	63.0,	67.3,	81.2,	96.6,	106.5,	120.2,	132.3,	141.5,	155.5,	166.3,	175.1,	205.7,
3 days	37.3,	49.5,	55.7,	64.9,	71.0,	75.6,	90.3,	106.4,	116.8,	131.0,	143.4,	152.9,	167.3,	178.2,	187.2,	218.1,
4 days	41.9,	55.0,	61.7,	71.5,	77.9,	82.7,	98.2,	115.0,	125.7,	140.5,	153.2,	163.0,	177.7,	188.8,	198.0,	229.3,
6 days	50.1,	64.7,	72.2,	82.9,	89.8,	95.1,	111.8,	129.8,	141.2,	156.8,	170.3,	180.4,	195.8,	207.4,	216.9,	249.1,
8 days	57.3,	73.3,	81.3,	92.8,	100.3,	106.0,	123.7,	142.7,	154.7,	171.0,	185.0,	195.6,	211.5,	223.5,	233.3,	266.5,
10 days	63.9,	81.1,	89.6,	101.9,	109.8,	115.8,	134.5,	154.3,	166.9,	183.8,	198.4,	209.3,	225.7,	238.1,	248.1,	282.1,
12 days	70.1,	88.3,	97.4,	110.2,	118.6,	124.8,	144.4,	165.1,	178.1,	195.6,	210.6,	221.9,	238.8,	251.5,	261.8,	296.5,
16 days	81.6,	101.7,	111.6,	125.6,	134.6,	141.4,	162.4,	184.6,	198.4,	217.0,	232.9,	244.7,	262.5,	275.8,	286.5,	322.7,
20 days	92.2,	114.0,	124.7,	139.7,	149.3,	156.6,	178.9,	202.3,	216.9,	236.4,	253.0,	265.4,	283.8,	297.7,	308.8,	346.2,
25 days	104.7,	128.3,	139.8,	156.0,	166.3,	174.1,	197.9,	222.7,	238.0,	258.6,	276.0,	289.0,	308.2,	322.7,	334.3,	373.1,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Cold Store		
Foul water discharge is assumed due to condensation and humidity of rooms.		
All cold room design is to M&E engineer specifications in coordination with the Architect		
Conservative assumptions show a condensation per day of:	20 mm/m² (TBC)	
Cold Store Specifications (TBC)		
Width	2.0	m
Length	2.8	m
Height	2.5	m
Count	3	no.
Wall area	46	m²
Foul Water Discharge (approximate)		
Volume	0.92	m3/day
Litres/day	920	L/day

Kitchen Units		New	
WATER DEMAND			
Number of units		11	no
Number of meals	350	3850	no
Average usage	12	46200	L
Dry weather flow	1.0	46200	L
Avg daily discharge l/s		0.53	L/s
Peak daily discharge l/s	5.0	2.67	L/s

Kitchen Units		New	
WASTE WATER DISCHARGE			
Number of units		11	no
Number of meals	350	3850	no
Average usage	12	46200	L
Unit Consumption	1.1	42000	L
Avg daily discharge l/s	1.0	0.49	L/s
Peak daily discharge l/s	6.0	2.92	L/s

Foul Water Discharge						
	Units	People	uses	L/use	L	
Toilets	11	5	3	10	1650	
Urinals	11	5	3	5	825	
Sinks	11	5	3	4	660	
Kitchenette	1	55	2	10	1100	
Cold store	To M&E engineer specifications - TBC				920	
	1.1	Unit consumption		Total	4686	L
	1.0	Dry flow		Total	0.05	L/s
	6.0	Peak factor		Peak	0.33	L/s

Grease Trap Interceptor Size	Data	
In compliance with PDI-G101 rev2017		
Assumed Sink Basin Volume	180	L
Drain time (1min recommended)	1	min
Drainage Load (75%)	135	L
Flow Rate Draining	135	L/min
Minimum Interceptor Size	135	Litres
Minimum Interceptor Size	36	Gallons

Water Demand				
FW x 1.1				
		Total	6075	L
		Total	0.07	L/s
5.0	Peak factor	Peak	0.35	L/s

Typical Interceptor Sizes (in gallons)
10
15
20
25
35
50
75
100

Foul
Total discharge 3.24 l/s

Water
Total demand 3.03 l/s

9 Appendix - Soak-away Design

TENT ENGINEERING	Project: Broomhill - Planning Infrastructure				Job no.: 22066	
	Calcs for: Soak Away				Start page no./Revision: 1	
	Calcs by: EH	Calcs date: 6 July 2022	Checked by:	Checked date:	Approved by:	Approved date:

SOAKAWAY DESIGN

In accordance with CIRIA C753 SUDS

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **40.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.270**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.2** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Width of pit	w = **1230** mm
Length of pit	l =**2070** mm
Percentage free volume	V_{free} = **95** %
Soil infiltration rate	f = **44.0**×**10**$^{-6}$ m/s
Base area	$A_b = w \times l$ = **2546100** mm^2
Perimeter	$P = 2 \times (w + l)$ = **6600** mm
Coefficient b	$b = P \times f / (A_b \times V_{free})$ = **0.43** hr^{-1}

Table equations (Eq. 25.4)

Rainfall intensity	i = M100 / D
Coefficient a	$a = A_b / P - (A \times i / (P \times f))$
Minimum depth required	$H = a \times (e^{(-bD)} - 1)$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Intensity, i (mm/hr)	a (mm)	Min depth req (mm)
5	0.33;	7.2;	1.91;	13.8;	165.14;	-5933;	210
10	0.48;	10.5;	1.97;	20.7;	124.01;	-4359;	303
15	0.58;	12.7;	1.98;	25.0;	100.11;	-3445;	353
30	0.76;	16.6;	1.96;	32.6;	65.21;	-2109;	410
60	1.00;	21.8;	1.92;	41.8;	41.83;	-1215;	426
120	1.27;	27.7;	1.87;	51.8;	25.90;	-605;	350
240	1.64;	35.8;	1.80;	64.6;	16.14;	-232;	191
360	1.88;	41.0;	1.76;	72.4;	12.07;	-76;	70
600	2.24;	48.9;	1.73;	84.4;	8.44;	63;	0
1440	3.10;	67.6;	1.65;	111.5;	4.65;	208;	0

Minimum depth of soakaway	H_{max} = **426** mm
Time to empty soakaway to half vol. - Eq.24.6(2)	$t_{s50} = V_{free} \times A_b / (f \times P) \times Ln((H_{max} + A_b / P) / (H_{max} / 2 + A_b / P))$ = 42min 16s

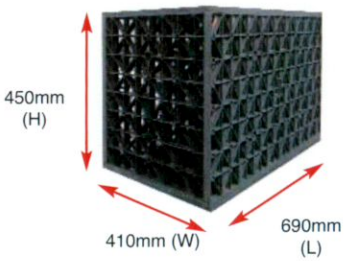
PASS - Soakaway discharge time less than or equal to 24 hours

10 Appendix - Eco-Cell Soak Away Crates

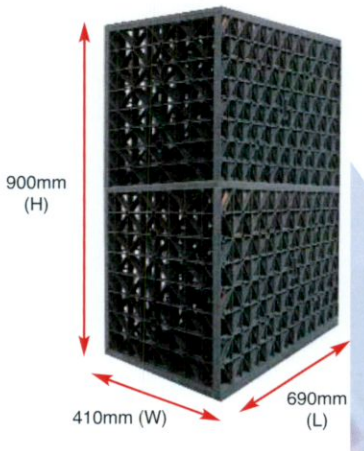
Protecting the Environment

Stormwater Storage Tank

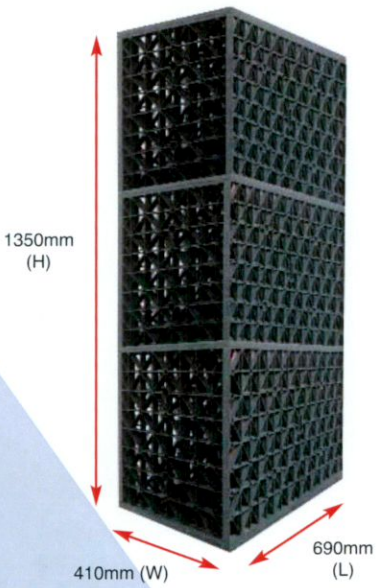
SUITABLE FOR USE UNDER:
- Roadways
- Car parks
- Green areas



Single
8 Modules/m³
Flowrate - 2300 l/min



Double
4 Modules/m³
Flowrate - 4600 l/min



Triple
2.6 Modules/m³
Flowrate - 6900 l/min

Notes:
Blocks must be positioned in the correct orientation.
See opposite above

SPECIFICATION (SINGLE)

Weight (maximum)		9.17kg
Crush Strength (up to)		400kN/m²
Lateral Strength		80kN/m²
Minimum Cover	(green areas)	500mm
	(trafficked areas)	650mm
Maximum Cover		3m
Material		Polypropylene
Void Ratio (Internal)		>95%

Design Requirements:

Tank storage capacity (m³)
Depth restrictions
Location (Road, Car Park, Green Area)
Design constraints on site

A set of loading calculations specific to the site requirement will be done by ESS and submitted on all tanks

DESIGN CRITERIA

The attenuation tank is constructed using matrix module blocks. These blocks can take passing loads of up to 40 tonnes/m². The void ratio of each block is 95%. The blocks are made from polypropylene.

The tank is sealed with a layer of Tuflex membrane, which is fully welded together to form a 100% seal. All pipe penetrations are fully sealed to the membrane. The Tuflex membrane is protected by a layer of heavy duty protection geotextile, to prevent damage from construction or backfilling. A number of air extraction vents/flushing points are placed in the roof of the tank.

Note:
It is vital that the underground tanks are fully sealed, otherwise ground water and silt particles may enter the void space and use up capacity. Preferably, the base of the tank should be 500mm above the ground water level. Otherwise ground water relief measures should be implemented.

TENT ENGINEERING

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