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CONSULTING ENGINEERS

CIVIL | STRUCTURAL | PROJECT MANAGEMENT

Services Report

Project Number: 0567003

Proposed Development
at Scairt, Greenvally, Douglas, Cork City.

Client :Cetti Limited

Design by: PF & ME

Date: June 2022



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1.0 Proposed Surface Water Design & Discharge

SURFACE WATER ATTENUATION & DESIGN

The purpose of this exercise is to ensure that the runoff from the proposed developed site does not exceed the runoff from the existing site. This will be achieved by means of a storm retention tank on site to limit the outflow from the development. The site is currently not developed.



Site Location

The rainwater runoff from the proposed development is to be attenuated as per standard condition for stormwater detention systems formula.

$$Q_{\bar{a}} = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

Please refer to RKA Proposed Drainage Layout Dwg. 1002-P.

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FOR ALL DEVELOPMENTS UP TO 24 ha IN AREA

$$Qbar = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

Where: Qbar is the mean annual peak flow in m^3/s

AREA is the area of the catchment in km^2

SAAR is the Standard Annual Rainfall in the catchment which shall be taken as 1000mm(for Cork City)

SOIL is the soil index of the catchment, which shall be taken as 0.3.

SITE AREA TO BE ATTENUATED = Area of catchment = 0.00455 km^2

$$Qbar = 0.00108 \times (\text{AREA})^{0.89} \times (\text{SAAR})^{1.17} \times (\text{SOIL})^{2.17}$$

$$Qbar = 0.00108 \times (0.00455)^{0.89} \times (1000)^{1.17} \times (0.3)^{2.17}$$

$$Qbar = 0.0021 \text{ m}^3/\text{sec.} = 2.1 \text{ l/sec.}$$

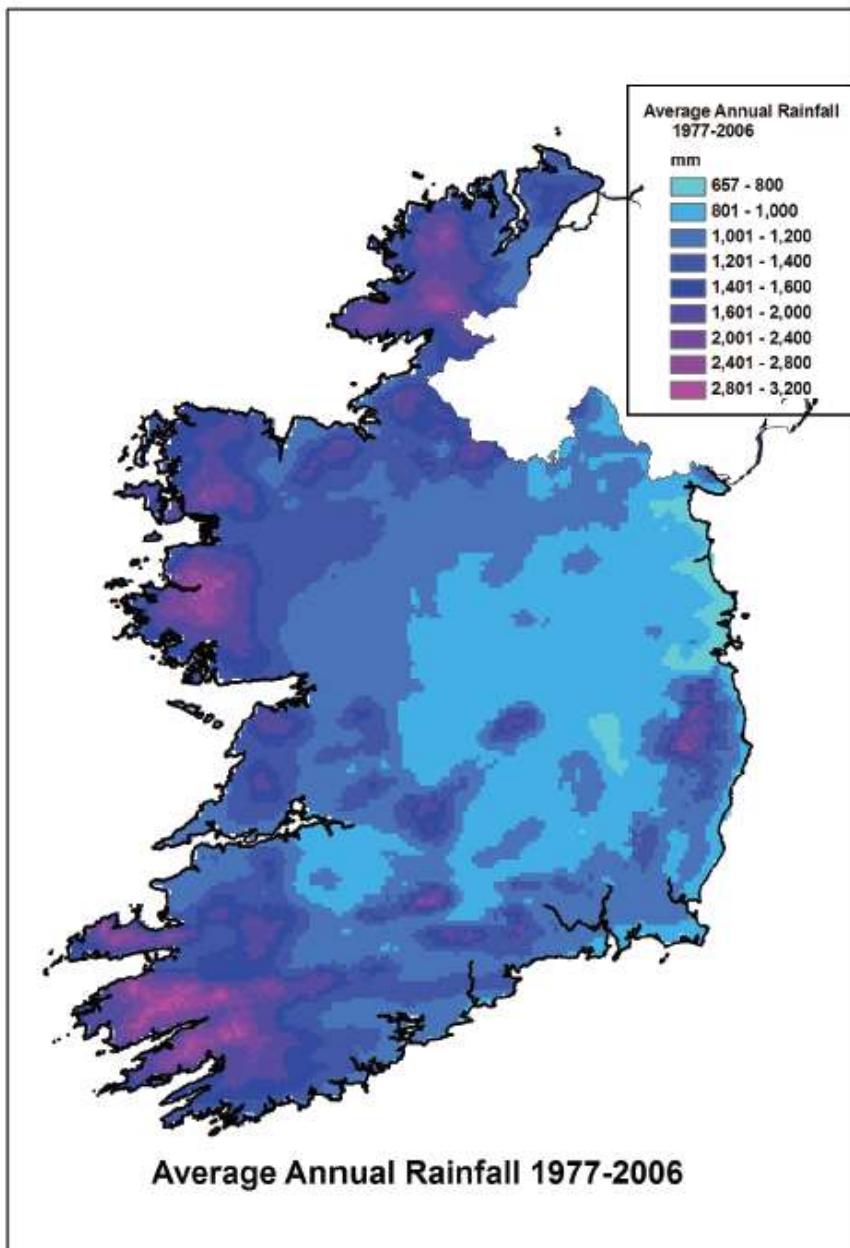


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Standard Average Annual Rainfall (SAAR)

This data is available from Met Eireann.

For Cork City a value of 1000mm is taken.



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Design of the Attenuation System

Exercise in looking at surface water drainage “effective area” runoff for each storm water pipe length. Areas to be included in the “effective area” are surface areas of roofs, paths, roads, parking bays, lawns, gardens & green surfaces.

An Impermeability Factor is used for each surface:

Surface	Impermeability Factor		
Roofs	95%	or	0.95
Roads /Parking Bays/Footpaths/Hard landscape	75%	or	0.75
Landscaped area	10%	or	0.10

Please refer to RKA Proposed Drainage Layout Dwg. 1002-P for the location of each pipe network run.

Runoff Rates to Tank

Manhole sections	Dwelling Roof Block Areas	Public Road/Paved Areas/Paths/Parking Bay	Green Space Areas	Total Effective Runoff Area
S01-S02	$566(0.95) = 538 \text{ m}^2$	$883(0.75) = 662 \text{ m}^2$	-	1200 m^2
S04-S02	$141(0.95) = 134 \text{ m}^2$	$232(0.75) = 174 \text{ m}^2$	-	308 m^2
S02-S05	-	$194(0.75) = 146 \text{ m}^2$	$382(0.10) = 38 \text{ m}^2$	184 m^2
S07-S08	$333(0.95) = 316 \text{ m}^2$	$263(0.75) = 197 \text{ m}^2$	-	513 m^2
S08-S03	-	-	-	-
S10-Tank	$134(0.95) = 127 \text{ m}^2$	$90(0.75) = 68 \text{ m}^2$	-	195 m^2
S05-S03 Tank	-	-	-	-
Tank-S06	-	-	-	-
S06-Existing	-	-	-	-
	-			

Overall Effective Runoff For Area A

= Total Impermeable area = $A_p = 2400 \text{ m}^2$



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1 in 100 Year Storm Event Design

Storage capacity is given by the Billam Formula as follows

$$S = \frac{640 (AP)^{1.4} - 2.54A}{(N)(P)^{0.4}}$$

Where S = Critical storage volume (m³)
 A = Impermeable Area (Ha)
 N = No. of storms in a 10 year period
 P = Permitted outflow (l/sec)

$$\begin{aligned} S &= \text{Critical storage volume (m}^3\text{)} \\ A &= 0.240 \text{ Ha} \\ N &= 0.10(100 \text{ yr. storm}) \\ P &= 2.1 \text{ l/sec} \end{aligned}$$

$$S = \frac{640 (0.24)^{1.4} - (25.4)(0.24)}{((0.1)(2.1))^{0.4}}$$

$$= 150.6 \text{ m}^3 \quad 10\% \text{ factor for climate change} = 151 \times 1.1 = 166 \text{ m}^3$$

$$\text{Tank size } 13.8 \times 6 \times 2 = 167 \text{ m}^3$$

Please refer to:

RKA Proposed Drainage Layout Dwg. 1002-P

RKA Proposed Attenuation Tank Details Dwg. 1005-P

Note prior to discharge to the existing surface water sewer, the rainwater runoff from the proposed overall development is attenuated and the surface water goes through a hydrobreak vortex which permits (2.1l/s) which equates to pre-development runoff.

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It is proposed to use a Type NSBD4.5 Bypass Separator (see attached drawing) prior to connection to the Attenuation Tank.

Bypass Separator

NSBD Range

Application

Bypass separators are used when it is considered an acceptable risk not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.

- Surface car parks
- Roadways
- Lightly contaminated commercial areas

Performance

Klargester were one of the first UK manufacturers to have separators tested to EN 858-1. Klargester have now added the NSBD bypass range to their portfolio of certified and tested models. The NSBD number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Klargester full retention separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of BS EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

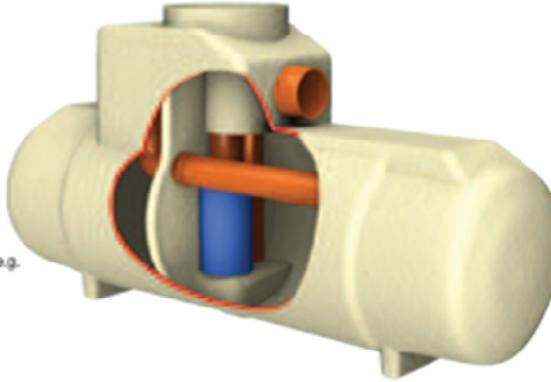
Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity
- Oil storage volume
- Silt storage capacity
- Coalescer

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 NSB = 0.0018A(m²).

Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.



Class II separators are designed to achieve a concentration of 100mg/litre of oil under standard test conditions.

Features

- Light and easy to install
- Class I and Class II designs
- Inclusive of silt storage volume
- Fitted inlet/outlet connectors
- Vent points within necks
- Oil alarm system available (required by BS EN 868-1 and PPG3)
- Extension access shafts for deep inverts
- Maintenance from ground level

To specify a nominal size Bypass Separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped
- The required discharge standard. This will decide whether a Class I or Class II unit is required
- The drain invert inlet depth
- Pipework type, size and orientation

Sizes & Specifications:

Nominal Size	Flow (l/s)	Peak Flow Rate (l/s)	Drainage Area (m ²) PPG3 (0.0018)	Silt Storage Capacity Litres	Oil Storage Capacity Litres	Length	Dia.	Access Shaft Diameter	Base to Inlet	Base to Outlet Invert	Standard Fall Across Unit	Min. Inlet Invert	Standard Pipework Diameter
NSBD3	3	30	1670	300	45	1765	1225	750	1450	1350	100	500	160
NSBD4	4.5	45	2500	450	68	1765	1225	750	1450	1350	100	500	200
NSBD6	6	60	3335	600	90	1765	1225	750	1450	1350	100	500	200
NSBD8	8	80	4445	800	120	3065	1225	750	1450	1350	100	500	250
NSBD10	10	100	5560	1000	150	3065	1225	750	1450	1350	100	500	315
NSBD12	12	120	6670	1200	180	3915	1225	750	1450	1350	100	500	315
NSBD15	15	150	8335	1500	225	3915	1225	750	1450	1350	100	500	315
NSBD18	18	180	10000	1800	270	3200	2012	600	2110	2010	100	1000	375
NSBD24	24	240	13340	2400	360	3200	2012	600	2110	2010	100	1000	375
NSBD30	30	300	16670	3000	450	3915	2012	600	2110	2010	100	1000	450
NSBD36	36	360	20000	3600	540	3915	2012	600	2110	2010	100	1000	525
NSBD55	55	550	30560	5500	825	5085	2820	600	2310	2060	250	1000	600
NSBD72	72	720	40000	7200	1080	5820	2820	600	2310	2060	250	1000	675
NSBD84	84	840	46670	8400	1260	6200	2820	600	2310	2010	300	1000	750
NSBD96	96	960	53340	9600	1440	7375	2820	600	2310	2010	300	1000	825
NSBD110	110	1100	61110	11000	1650	7925	2820	600	2360	2010	350	1000	825
NSBD130	130	1300	72225	13000	1950	8725	2820	600	2360	2010	350	1000	825



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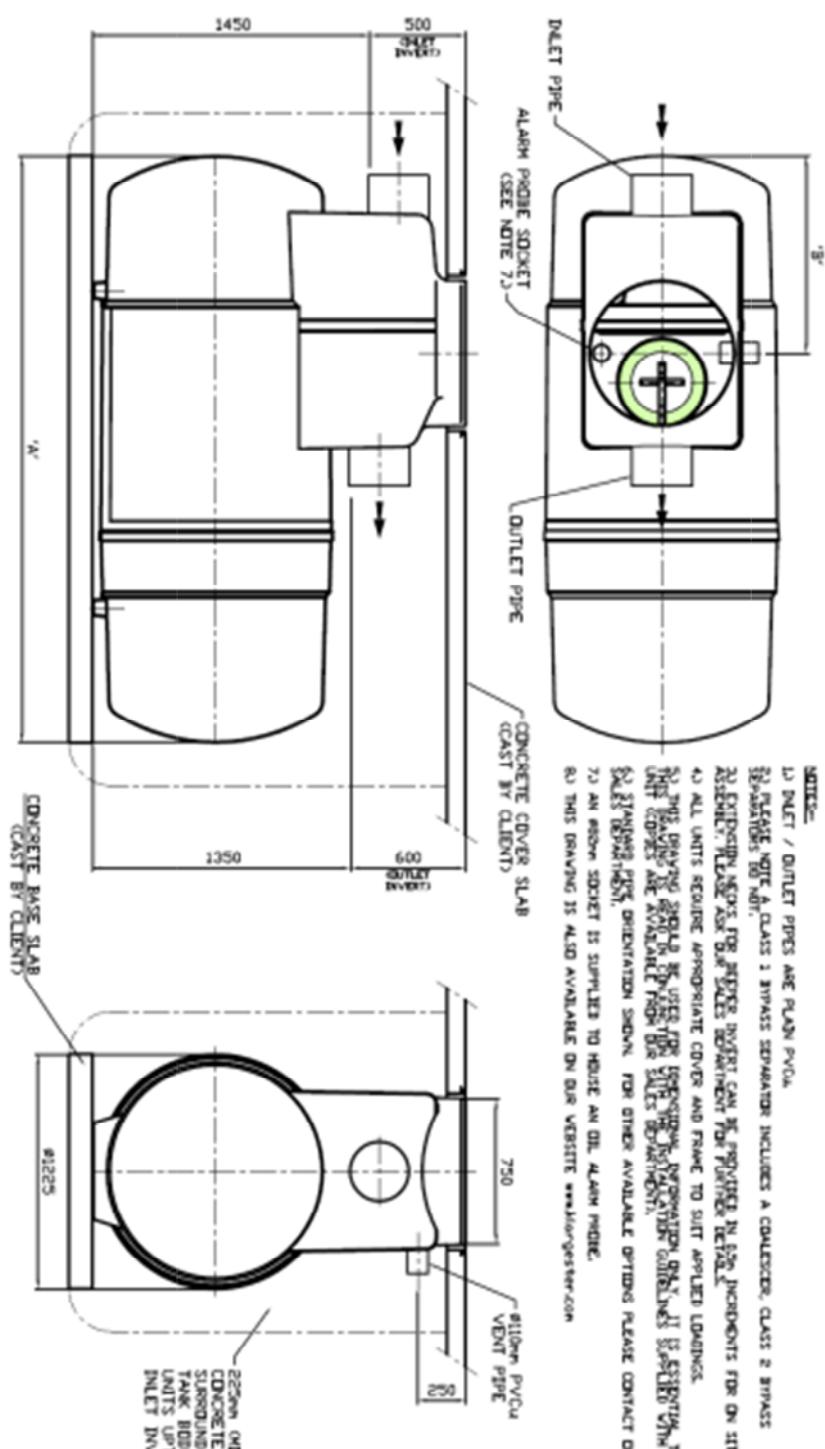
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DIMENSIONS						
UNIT	INTERNAL DIM	OUTER DIM	PIPE	SEPARATOR	APPROX. FALL	FALLS
NSB001	3 L/S	6925	260	245	100	UNITS
NSB002	4 L/S	1765	6925	260	160	100
NSB004	5 L/S	1765	6925	260	160	100
NSB006	6 L/S	1765	6925	260	160	100
NSB008	8 L/S	2065	15920	250	210	100
NSB010	10 L/S	2065	15920	315	210	100
NSB012	12 L/S	2065	15920	315	240	100
NSB015	15 L/S	2065	15920	315	240	100



Klargester
Septic Environmental
Sewage Solutions

ALL DIMENSIONS ARE IN MILLIMETRES - 30 MM TOLERANCE

NSB001-3 - NSB015

CLASS 1 & 2

SEPARATORS

BYPASS

VENT

PIPE

INLET

PIPE

OUTLET

PIPE

VENT

PIPE

INLET

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2.0 Proposed Foul Water Design and Discharge

25 No. Units in this development are proposed to connect to the existing sewer in the Bramble Hill, Greenvalley Estate. Please refer to RKA Proposed Drainage Layout Dwg. 1002-P & Irish Water Pre-Connection Confirmation Letter of Feasibility for Foul Water Connection and Water Connection Reference No. CDS21004451 (This pre-connection was for a previous layout for 27 No. Units).

Sewers carrying domestic wastewater from this proposed housing developments should be designed to carry a minimum wastewater volume of six times dry weather flows (6DWF).

Dry weather flows (DWF) is taken as 600 litres per dwelling (three persons per house and a per capita wastewater flow of 200 litres per head per day.)

$$\text{Total Dry weather flow (DWF)} = 25 \times 600 / 24/60/60 = 0.17 \text{ l/s}$$

$$\text{Peak flow taken as 5DWF} = 5 \times 0.17 = 0.85 \text{ l/s}$$

Foul Pipe Network is designed to carry a minimum wastewater volume of six times dry weather flows (6DWF).

$$6 \text{ DWF} = 6 \times 0.17 = 1.02 \text{ l/s}$$

Please refer to the Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03) for wastewater requirements.



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3.0 Proposed Water and Firefighting Supply

25 No. Units in this development are proposed to connect to the existing watermain in the Bramble Hill housing development. Please refer to RKA Proposed Watermain Layout Dwg.1003-P & Irish Water Pre-Connection Confirmation Letter of feasibility for Foul Water Connection and Water Connection Reference No. CDS21004451 (This pre-connection was for a previous layout for 27 No. Units).

Water Demand

The water demand includes: Average domestic daily demand in the development is established based on daily per-capita consumption, house occupancy, number of properties. For design purposes the average daily domestic demand is based on a per-capita consumption of 150 l/person/day and an average occupancy ratio of 2.7 persons per dwelling.

25 properties : $25 \times 150 \times 2.7 = 10,125 \text{ l/day}$

Total Average Daily Demand = 10,125 l/day

Average Daily Demand per hour = $10,125 / 24 = 421 \text{ litres/hour}$

The average day/peak week demand should be taken a 1.25 times the Average Daily Domestic Demand.

Total average day/peak demand = $10,125 \times 1.25 = 12,656 \text{ l/day}$ (peak demand)

Post-development peak hour water demand = $12,656 / 24 = 527 \text{ litres/hour}$

The peak demand for sizing of the pipe network will normally be 5 times the average day, peak week demand.

Peak Demand = $12,656 \times 5 = 2,635 \text{ litres/hour}$

Fire Fighting Requirements

Pressure and flow to be determined on site to meet the requirements of Irish Water/Cork City Council Water and Fire Department.

The flows (l/s) and pressure (dynamic – bar) from the existing/adjacent/extended fire water main hydrants, will be tested and if required, storage and a variable speed booster pump will be installed.



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4.0 Irish Water Confirmation of Feasibility Letter



Dan Twohig

RKA Engineers, 2 Clogheen Business Park
Blarney Road
Co. Cork
T23X70V

Uisce Éireann
Bosca CP 448
Ofiig Sheachadta na
Cathrach Theas
Cathair Chorcaí

2 July 2021

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.
www.water.ie

Re: CDS21004451 pre-connection enquiry - Subject to contract | Contract denied

Connection for Housing Development of 27 unit(s) at Greenvalley, Castletreasure, Cork

Dear Sir/Madam,

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

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY
	<u>THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.</u>
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
<p>The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.</p>	



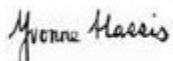
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General Notes:

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

If you have any further questions, please contact Tim O'Connor from the design team on 022 52299 or email timoconnor@water.ie. For further information, visit www.water.ie/connections.

Yours sincerely,



Yvonne Harris
Head of Customer Operations



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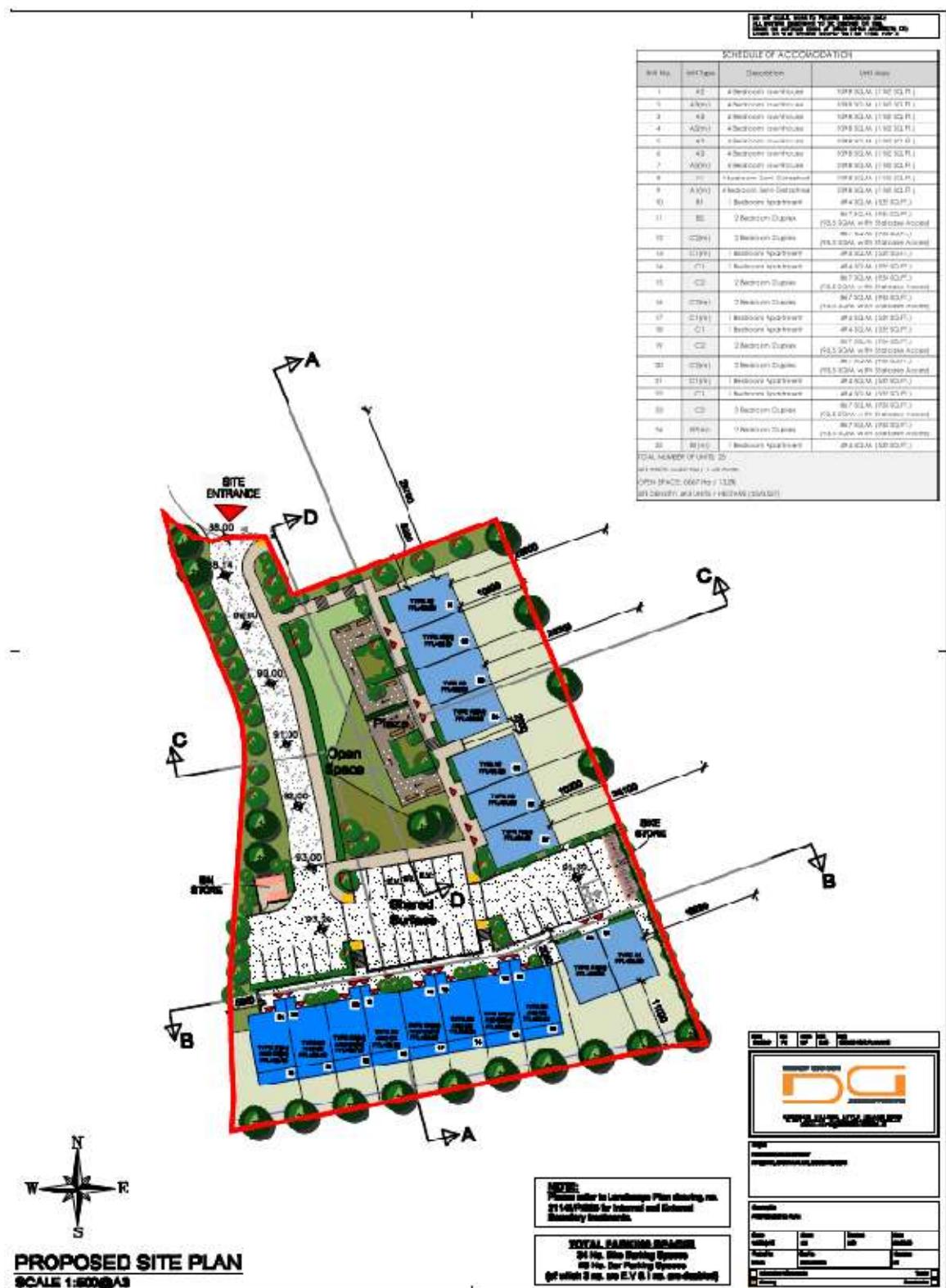
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5.0 Proposed Site Layout



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