Civil Engineering Report (Planning Application)

Project:

Housing at Boherclogh St.,
Cashel,
Co. Tipperary

Client:

Tipperary County Council

Date of Report:

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Project Ref. No.:

21075

Directors:
Austin Dennany BA BAI DipProjMgmt PGDipABRC CEng MIEI
John Reidy BE DipProjMgmt DipConstLaw&CA CEng MIEI MCIArb
Barry McGinn BSc (Eng) DipEng DipProjMgmt DipConstLaw&CA CEng MIEI

Associate Directors:
Brian Healy BE CEng MIEI
Robert Power BEng BSc CEng MIEI
Conor McDonagh BE MSc CEng MIEI

VAT No IE 9652275 I • Company Registration No. 435811
DRA Consulting Engineers is a trading name of Dennany Reidy Associates Limited • Registered Address: The Park, Lord Edward Street, Limerick.

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1.0 Introduction

The following report outlines the civil engineering design elements for a proposed residential development at Bohercloghe Street, Cashel, Co. Tipperary. The applicant, Tipperary County Council, intend to apply for Planning Permission for a development of 9 No. residential units on a corner site at Bohercloghe Street. There are a number of derelict buildings currently on the site which will be demolished to facilitate the development.

2.0 Civil Engineering Elements

2.1 Overview

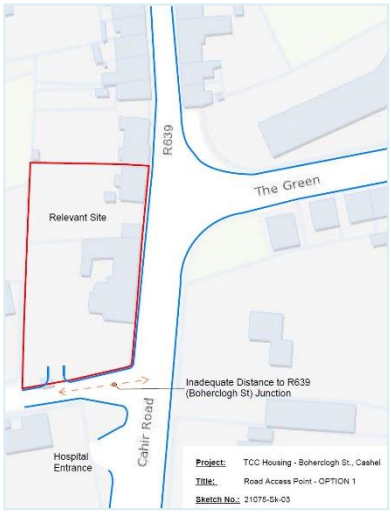
This report should be read in conjunction with the Architectural drawings prepared by Kenneth Hennessy Architects and the DRA Consulting Engineers drawings listed below:

DRA Consulting Engineers Planning Drawings:

- Drawing no. 21075-130: *Proposed Mini-Roundabout*
- Drawing no. 21075-131: Vehicle Swept Path Analysis
- Drawing no. 21075-150: *Proposed Drainage Plan*
- Drawing no. 21075-160: *Proposed Watermain Layout*
- Drawing no. 21075-170: *Proposed Internal Road Layout & Sections*

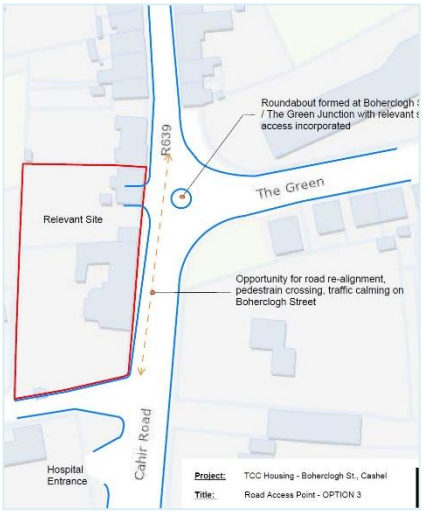
2.2 Proposed Site Access

The following 3 No. options were considered to provide vehicular access to the proposed development:



Option 1 *– Deerpark Road*

Option 2 *– Bohercloghe St*



Option 3 *– Roundabout*

Option 1 *– Deerpark Road*, was deemed unsuitable as it would result in inadequate distance from the new entrance to the existing Deerpark Road / Bohercloghe Street junction.

Option 2 *– Bohercloghe Street*, was deemed unsuitable as it would result in a 'left / right' staggered junction with the 'The Green' Road opposite the site. The junction would also have inadequate separation distances.

Option 3 *– Roundabout*, was deemed to be the most suitable solution to provide vehicular access to the site. This option consists of moving the vehicular access point to the site to the North, opposite 'The Green' road junction. A new mini-roundabout can then be formed at this aligned junction. Full details of the proposed roundabout & associated vehicular access to the proposed development can be seen on DRA Consulting Engineers Drawing No. 21075-130.

As a result of this exercise, the 'red-line' site has been increased in size to accommodate the required road realignment and roundabout works.

2.3 Roads & Footpaths

Drawing No. 21075-130 *Proposed Mini-Roundabout* shows the full details of the proposed mini-roundabout together with traffic calming measures, pedestrian crossing and re-alignment / widening of public footpaths to a minimum of 1.8m. The roundabout has been designed in accordance with Section 4.8.4.2 of the National Cycle Manual.

The pedestrian crossing has been designed in accordance with diagram 6.34 of Traffic Management Guidelines. All associated signage, tactile surfacing and thermoplastic road-markings are illustrated on the relevant drawing also.

Vehicle swept path analysis for the proposed roundabout has been carried out and is illustrated on our drawing No. *21075-131 Vehicle Swept Path Analysis.*

Footpaths shall have a minimum width of 1.8 metres and be constructed in accordance with the TII publications *Footway Design* and *Volume 1 Specification for Road Works Series 1100 Kerbs, Footways and Paved Areas*.

Drawing no. 21075-170 *Proposed Internal Road Layout & Sections* shows the proposed internal road and footpath / shared surfaces layout. Cross-sectional details of the construction build-up for the proposed roads and footpaths have been prepared and are included on the drawing.

Roads shall be 5.5 metres in width. Their construction shall be in accordance with *Recommendations for Site Development Works for Housing Areas*. The bituminous layers that form part of the build-up shall be in accordance with the Transport Infrastructure Ireland (TII) publication *Specification for Road Works Series 900 - Road Pavements - Bituminous Materials*.

2.4 Traffic Calming

Drawing no. *21075-130 Proposed Mini Roundabout* shows the revised road incorporating traffic calming features as necessary. Traffic calming on Bohercloghe Street will include a Pedestrian Crossing to the South of the proposed roundabout and speed cushions to the North of the proposed roundabout.

On 'The Green' Road, a flat top ramp (raised platform) constructed in accordance with *Diagram 6.34* of the document titled *Traffic Management Guidelines* published by the Department of Transport will be provided.

2.5 Car Parking

The proposed car parking area has been redesigned so as to ensure that drivers can comfortably manoeuvre their vehicles within the designated area. A turning bay has been incorporated into the revised site layout to facilitate refuse truck access to the development.

2.6 Surface Water

Drawing no. 21075-150 *Proposed Drainage Plan* has been prepared to show the surface water layout for the proposed residential development. This drawing includes details for proposed and existing pipework, road gullies and manholes.

Surface water attenuation is proposed to limit the discharge to the public surface water sewer from the site to a greenfield run-off rate. Surface water calculations are included in Appendix A of this report.

All site drainage works shall be carried out in accordance with the Irish Water document, *Wastewater Infrastructure Standard Details* and *Code of Practice for Wastewater Infrastructure.*

2.7 Foul Water

Drawing no. 21075-150 *Proposed Drainage Plan* has been prepared to show the foul water layout for the proposed residential development. This drawing includes details for proposed and existing pipework, manholes and inspection chambers.

A pre-connection enquiry has been issued to Irish Water for the proposed foul water connections.

Foul water calculations are included in Appendix A of this report. All site drainage works shall be carried out in accordance with the Irish Water document, *Wastewater Infrastructure Standard Details and Code of Practice for Wastewater Infrastructure*.

2.8 Watermains

Drawing No. 21075-160 *Proposed Watermain Layout* has been prepared to show the watermain layout for the proposed residential development. This drawing includes details for proposed and existing pipework together with thrust and support blocks, hydrants, air valves, sluice valves and scour valves. Boundary boxes are also shown indicatively in the footpath at individual service connections.

A pre-connection enquiry has been issued to Irish Water in respect of the proposed watermain connection.

3.0 Appendix A – Drainage Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	sandra torrico
Site name:	Boherclogh Stree
Site location:	Cashel

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	52.51302° N
Longitude:	7.89091° W
Reference:	2323013210
Date:	May 20 2021 16:52

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1905

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	1076	1076
Hydrological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Growth curve factor 200 years:	2.15	2.15

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.57	0.57
1 in 1 year (l/s):	0.49	0.49
1 in 30 years (l/s):	0.95	0.95
1 in 100 year (l/s):	1.12	1.12
1 in 200 years (l/s):	1.23	1.23

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	0.80
FSR Region	Scotland and Ireland	Connection Type	Level Inverts
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SW MH 1.0	0.061	5.00	107.790	1200	-5053.639	6350.010	1.430
SW MH 2.0	0.062	5.00	107.800	1200	-5036.789	6348.684	1.600
SW MH FCD 3.0	0.005	5.00	107.850	1200	-5029.169	6348.075	1.710
SW MH 4.0	0.000		107.170	1200	-5029.924	6331.343	1.430
SW MH 2.1	0.000	5.00	107.530	1200	-5037.716	6337.276	0.980
ATT.TANK		5.00	107.800	1200	-5036.553	6351.524	1.590

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW MH 1.0	SW MH 2.0	16.902	0.600	106.360	106.200	0.160	105.6	225	5.22	50.0
1.001	SW MH 2.0	SW MH FCD 3.0	7.644	0.600	106.200	106.140	0.060	127.4	225	5.33	50.0
1.002	SW MH FCD 3.0	SW MH 4.0	16.749	0.600	106.140	105.740	0.400	41.9	225	5.47	50.0
2.000	SW MH 2.1	SW MH 2.0	11.446	0.600	106.550	106.480	0.070	163.5	225	5.19	50.0
3.000	ATT.TANK	SW MH 2.0	2.850	0.600	106.210	106.200	0.010	285.0	300	5.05	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.271	50.6	8.3	1.205	1.375	0.061	0.0
1.001	1.157	46.0	16.7	1.375	1.485	0.123	0.0
1.002	2.027	80.6	17.3	1.485	1.205	0.128	0.0
2.000	1.020	40.5	0.0	0.755	1.095	0.000	0.0
3.000	0.926	65.5	0.0	1.290	1.300	0.000	0.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Node SW MH FCD 3.0 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	106.140	Product Number	CTL-SHE-0097-5000-1600-5000
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node ATT.TANK Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	106.210	Pit Length (m)	10.000
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	81	Depth (m)	0.800
Safety Factor	2.0	Ring Diameter (m)	1.200	Inf Depth (m)	
Porosity	0.75	Pit Width (m)	3.000	Number Required	1

Results for 5 year Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	SW MH 1.0	26	106.467	0.107	8.8	0.2114	0.0000	OK
30 minute winter	SW MH 2.0	26	106.465	0.265	17.8	0.5058	0.0000	SURCHARGED
30 minute winter	SW MH FCD 3.0	26	106.464	0.324	5.1	0.3858	0.0000	SURCHARGED
15 minute summer	SW MH 4.0	1	105.740	0.000	4.5	0.0000	0.0000	OK
15 minute summer	SW MH 2.1	1	106.550	0.000	0.0	0.0000	0.0000	OK
30 minute winter	ATT.TANK	26	106.465	0.255	11.6	6.1053	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	SW MH 1.0	1.000	SW MH 2.0	8.8	0.593	0.174	0.4925	
30 minute winter	SW MH 2.0	1.001	SW MH FCD 3.0	4.5	0.456	0.098	0.3040	
30 minute winter	SW MH FCD 3.0	Hydro-Brake®	SW MH 4.0	4.7				14.5
15 minute summer	SW MH 2.1	2.000	SW MH 2.0	0.0	0.000	0.000	0.0000	
30 minute winter	ATT.TANK	3.000	SW MH 2.0	-11.6	-0.703	-0.177	0.1850	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SW MH 1.0	48	106.671	0.311	9.0	0.6177	0.0000	SURCHARGED
60 minute winter	SW MH 2.0	48	106.671	0.471	17.5	0.8981	0.0000	SURCHARGED
60 minute winter	SW MH FCD 3.0	48	106.670	0.530	5.2	0.6305	0.0000	SURCHARGED
15 minute summer	SW MH 4.0	1	105.740	0.000	4.7	0.0000	0.0000	OK
60 minute winter	SW MH 2.1	48	106.672	0.121	1.0	0.1374	0.0000	OK
60 minute winter	ATT.TANK	48	106.671	0.461	11.6	11.0296	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	SW MH 1.0	1.000	SW MH 2.0	8.6	0.504	0.171	0.6722	
60 minute winter	SW MH 2.0	1.001	SW MH FCD 3.0	4.6	0.430	0.099	0.3040	
60 minute winter	SW MH FCD 3.0	Hydro-Brake®	SW MH 4.0	4.7				27.5
60 minute winter	SW MH 2.1	2.000	SW MH 2.0	-1.0	-0.137	-0.024	0.3310	
60 minute winter	ATT.TANK	3.000	SW MH 2.0	-11.6	-0.417	-0.177	0.2007	

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SW MH 1.0	58	107.503	1.143	14.0	2.2675	0.0000	FLOOD RISK
60 minute winter	SW MH 2.0	58	107.505	1.305	26.6	2.4877	0.0000	FLOOD RISK
60 minute winter	SW MH FCD 3.0	58	107.502	1.362	5.7	1.6192	0.0000	SURCHARGED
15 minute summer	SW MH 4.0	1	105.740	0.000	4.7	0.0000	0.0000	OK
60 minute winter	SW MH 2.1	58	107.502	0.952	3.0	1.0768	0.0000	FLOOD RISK
60 minute winter	ATT.TANK	56	107.503	1.293	18.7	19.6998	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	SW MH 1.0	1.000	SW MH 2.0	12.4	0.493	0.246	0.6722	
60 minute winter	SW MH 2.0	1.001	SW MH FCD 3.0	5.1	0.438	0.111	0.3040	
60 minute winter	SW MH FCD 3.0	Hydro-Brake®	SW MH 4.0	4.7				42.9
60 minute winter	SW MH 2.1	2.000	SW MH 2.0	-3.0	-0.212	-0.075	0.4552	
60 minute winter	ATT.TANK	3.000	SW MH 2.0	-18.7	-0.503	-0.286	0.2007	

Design Settings

Frequency of use (kDU)	0.60	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	4000	Connection Type	Level Inverts
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	x

Nodes

Name	Cover Level (m)	Manhole Type	Easting (m)	Northing (m)	Depth (m)
FOUL MH 1.0	107.710	Adoptable	-5051.654	6348.663	1.440
FOUL MH 2.0	107.750	Adoptable	-5031.083	6346.915	1.820
FOUL MH 3.0	107.280	Adoptable	-5032.042	6328.161	1.530

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	FOUL MH 1.0	FOUL MH 2.0	20.645	1.500	106.270	105.930	0.340	60.7	150
1.001	FOUL MH 2.0	FOUL MH 3.0	18.779	1.500	105.930	105.750	0.180	104.3	150

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (ha)
1.000	1.125	19.9	0.2	1.290	1.670	0.000	0.0
1.001	0.857	15.1	0.3	1.670	1.380	0.000	0.0