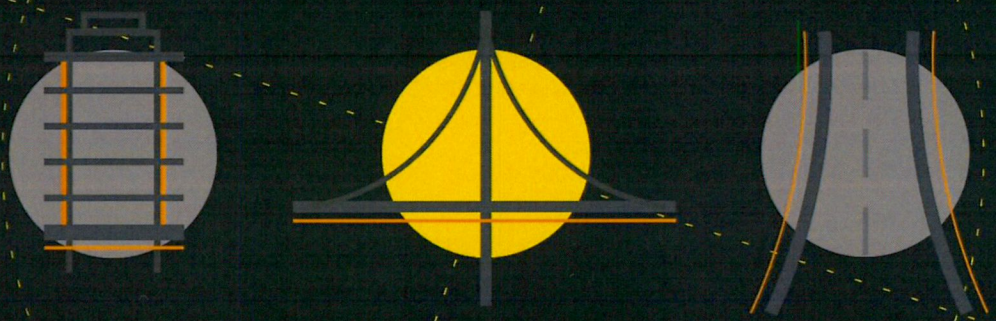
Clonburris T2

Preliminary Construction & Environmental Managment Plan

CLB-T2-ZZZ-SW-DTM-RP-DBFL-CE-0002

INFRASTRUCTURE



December 2022

DBFL CONSULTING ENGINEERS

Project Title:	**Clonburris T2**		
Document Title:	**Preliminary Construction & Environmental Managment Plan**		
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Rev.	Date	Description	Prepared	Reviewed	Approved
0	08/12/22	Issued for Planning	Dieter Bester	John Carr	John Carr

Contents

Figures

1 INTRODUCTION

1.1 Background

This PCMP has been prepared by DBFL Consulting Engineers in support of the planning application for the Clonburris T2 Development. The proposed Clonburris T2 Development is part of the Clonburris Strategic Development Zone (SDZ) within the administrative area of South Dublin County Council (SDCC).

The project is currently at planning stage and as such input from the contractor has not been incorporated into the plan. On appointment of a contactor this preliminary document will be issued to them to be further developed into their final construction management plan for the project. The final construction management plan would be submitted by the contractor to be agreed with the planning authority prior to commencement of development.

The outline plan seeks to demonstrate how works can be delivered in a logical sensible and safe sequence with the incorporation of specific measures to mitigate the potential impact on people and the surrounding environment, particularly the residential areas adjacent the site.

Nothing stated in this document shall supersede or be taken to replace the terms of the Contract or the detailed design description issued with the Contract tender or the conditions of planning. Similarly, the issues covered within this document may be amended or added to by the main contractors or in accordance with their specific works proposals, sequencing and procedures.

When read by the contractor, this document should be read carefully in conjunction with all drawings, specifications and survey information provided.

Any consequences that result through failure to implement measures in this construction plan, or inadequate development of this plan by the contractor are the responsibility of the contractor and not DBFL.

1.2 Site Location

The overall Clonburris SDZ lands, of approximately 280 Ha, is located to the west of Dublin City Centre and the M50, between the N4 and N7 national primary routes. The Kildare/Cork railway line bisects the lands centrally and the Grand Canal forms the southern boundary.

The subject site for this planning application is situated in the southern area of the SDZ lands to the south of the Kildare/Cork railway adjacent to the R113, the R136 Grange Castle Road is situated approximately 1.2km west of the subject site. The Clonburris South Link Street which links the

R113 to the R136 will provide access to the subject site. The Adamstown SDZ is located to the north-west of the subject site as shown in *Figure 1-1*.

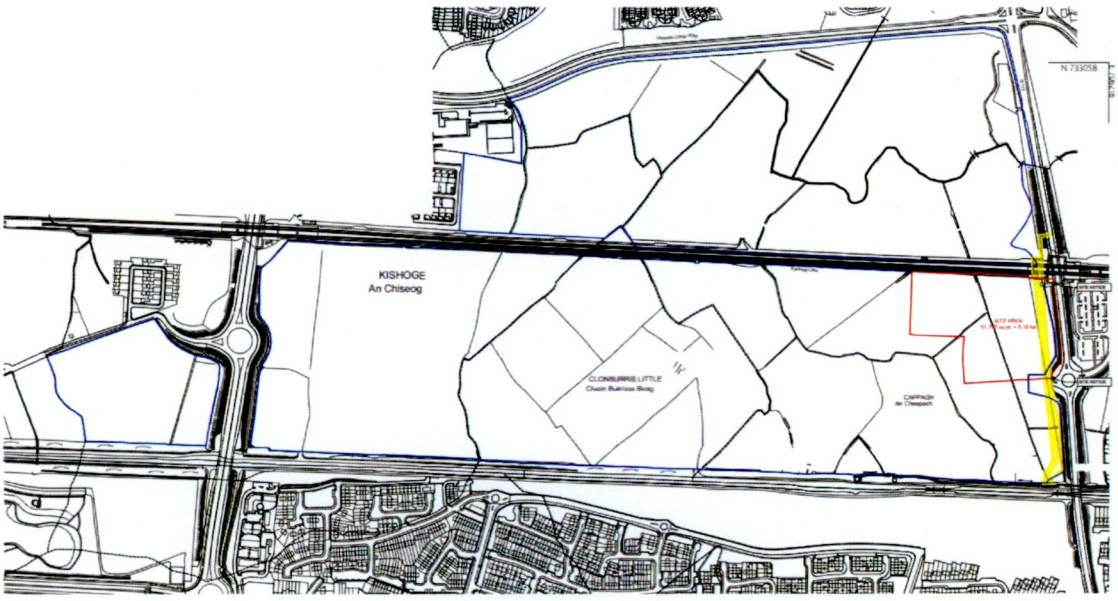


Figure 1-1 Clonburris T2 Site Location

The future Clonburris Southern Link Street borders the proposed development to the south. North of the CSLS, the site is within sub sector CUC S3 as shown in *Figure 1-2* below.

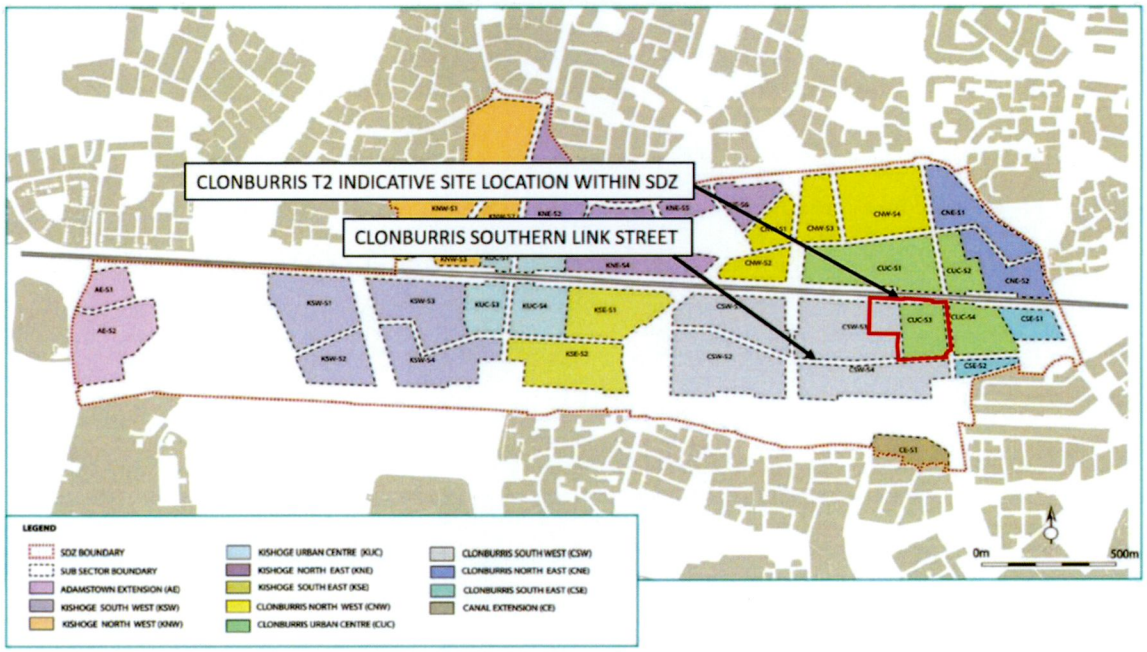


Figure 1-2 Clonburris SDZ (Boundary Indicative)

The proposed site will benefit from trunk infrastructure proposed as part of the Clonburris Southern Link Street (CSLS) for which planning has been granted in August 2021 under planning reference SDZ20A/0021. The CSLS includes trunk road, drainage, watermain and utility infrastructure to serve the Clonburris Strategic Development Zone lands to the south of the Kildare/Cork Railway Line which includes the subject site.

1.3 Proposed Development

The development will consist of the construction of a mixed-use development comprising 594 no. apartments, office floorspace, 4 no. retail units, a creche and urban square in the Clonburris Development Areas CUCS3 & CSW-S3 of the Clonburris SDZ Planning Scheme 2019 as follows:

A. 594 no. apartments (255 no. 1 bedroom apartments, 307 no. 2 bedroom apartments and 32 no. 3 bedroom apartments (all apartments to have terrace or balcony; ancillary communal amenity spaces in Block D and Block F for residents) as follows; Block A (4 and 6 storeys with undercroft) comprises 96 no. apartments consisting of 36 no. 1-bedroom apartments, 48 no. 2-bedroom apartments and 12 no. 3-bedroom apartments (with creche c. 609 sq. m at ground and first floor as well as play area; Block B (6 storeys) comprises 77 no. apartments consisting of 44 no. 1-bedroom apartments, 28 no. 2-bedroom apartments and 5 no. 3-bedroom apartments; Block D (5 and 7 storeys) comprises 71 no. apartments consisting of 39 no. 1-bedroom apartments and 32 no. 2-bedroom apartments; Block E (6 storeys) comprises 100 no. apartments consisting of 47 no. 1-bedroom apartments, 48 no. 2-bedroom apartments and 5 no. 3-bedroom apartments; Block F (5 and 7 storeys) comprises 124 no. apartments consisting of 57 no. 1-bedroom apartments, 61 no. 2-bedroom apartments and 6 no. 3-bedroom apartments; Block G (1, 2 and 4 storeys) comprises 65 no. apartments consisting of 16 no. 1-bedroom apartments, 45 no. 2-bedroom apartments and 4 no. 3-bedroom apartments; Block H (4 storeys) comprises 61 no. apartments consisting of 16 no. 1-bedroom apartments and 45 no. 2-bedroom apartments.
B. Mixed use development comprising, commercial office development in Block C of 7 no. storeys (c. 4,516 sq.m), 1 no. retail unit at ground floor of Block B (c.147.5 sq. m) and 3 no. retail units at ground floor of Block E as follows (c.106.2 sq.m, c.141.6 sq.m and c.492.2 sq.m respectively) as well as a creche (c. 609 sq. m) at ground floor and first floor of Block A;

C. Vehicular access will be from the permitted Clonburris Southern Link Street (SDZ20A/0021) and R113 to the east;

D. Public Open Space/landscaping of c. 0.5047 hectares (to include urban square) as well as a series of communal open spaces to serve apartments over undercroft level and surface level.

E. The development will also provide for all associated works and infrastructure to facilitate the development to include all ancillary site development works including footpaths, landscaping boundary treatments, public, private open space areas, car parking (396 no. spaces in a mixture of undercroft spaces Block A, Block B&D and Block E&F) and bicycle parking (1,232 no. spaces at undercroft and surface levels), single storey ESB substations/bike/bin stores, green roofs, solar panels at roof level of apartments, plant areas within blocks and all ancillary site development/construction works;

F. Permission is also sought for connection to water supply, and provision of foul drainage infrastructure.

2 CONSTRUCTION PROGRAMME AND PHASING

2.1 PHASING

The project is currently at planning stage and subject to approval. It is estimated that the works would be tendered in the third quarter of 2023 with commencement expected in the fourth quarter of 2023. The development would have an estimated site program of 36 - 48 months, depending on phasing. The preliminary phasing plan is indicated in Figure 2-1 below.

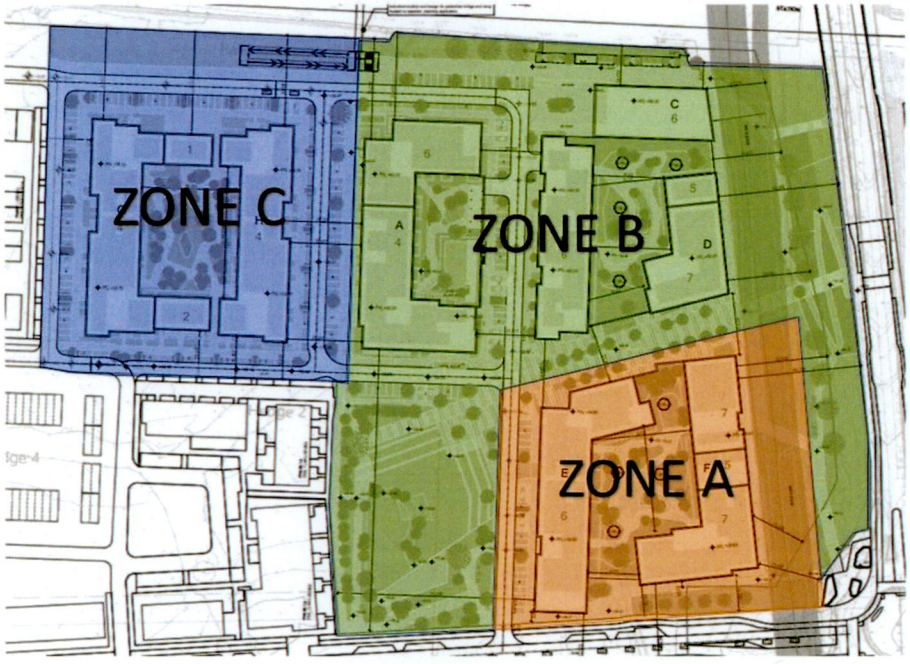


Figure 2-1 Indicative Phasing Plan

2.2 CO-ORDINATION AND INTERACTIONS

The proposed development is likely to be constructed in parallel with the CSLS works and the adjacent Clonburris T3 development west of the subject site. Construction of the permitted T1A to the west and south-west of the subject site will likely overlap with construction of the subject site, though only for a limited period of time during the fourth quarter 2023. Therefore, interactions will be required between the developments throughout the works. The adjacent Clonburris phases T1A and T3 have the same applicant, Cairn Homes Properties Ltd, as the subject site.

In order to manage interactions between the sites a Project Liaison Group will be established. This group will have regular meetings to ensure a co-ordinated approach to design interfaces, works programmes and environmental management activities for all sites. The group will consist of the

Construction Project Manager for each site and the sites' PSCS, PSDP and key design staff as required.

As part of the southern SDZ planning scheme, the infrastructure and services of the proposed development are to connect into those provided by the CSLS works at certain locations. Co-ordination is required between the developments to ensure a programme detailing an accurate sequence of works for each infrastructure and services element of the CSLS is established. The following elements need to be co-ordinated prior to commencement of the works:

- Works programmes. Activities which may impact the adjoining site will be co-ordinated. For example where road construction works or service installation affect access along the CSLS to the residential development, the works shall be phased so that alternative access routes are maintained via haul routes or second site access. Likewise key residential development phases such as bulk material import/export shall be co-ordinated with CSLS so that arrangements can be made to maintain this traffic through the CSLS site
- Site Levels- Permanent access to the proposed development is to be via the Clonburris Southern Link Street. All road, footpath and floor levels are to be finalised and co-ordinated with the CSLS levels prior to construction of the internal roads network.
- Attenuation/Surface Water Drainage – Stormwater run-off generated on the proposed site is to be collected, attenuated and discharged to the CSLS surface water network at a controlled rate as required by the SDZ for urban core developments. After the surface water from the proposed site is discharged into the CSLS surface water network, it would be stored and controlled via the attenuation structures provided as part of the separately approved CSLS. The necessary receiving surface water sewer constructed as part of the CSLS should be constructed prior to final connection from the proposed development. All drainage works for the proposed development to be carried out in accordance with the Clonburris "Surface Water Management Plan".
- Foul Sewer – The necessary receiving foul sewers constructed as part the CSLS to be completed prior to final connection from the proposed development. The necessary receiving foul water sewers of the adjacent Clonburris T1A and T3 development's to be completed before final connection of the subject site to the site's outfall point as the site's foul water will be partially received by the Clonburris T1A development via T3 and convey foul water to the CSLS bulk foul sewer. All connections and discharge points to be approved by Irish Water.

- Water Supply – The subject site's water will be supplied by the CSLS bulk water pipeline. All connections and discharge points to be approved by Irish Water.

2.3 SITE ACCESS

The primary site access is to be from the R113 where an existing stubbed access has been formed from the Roundabout. This location coincides with the intended location for the junction of the CSLS with the R113.

Figure 2-2: Access location from R113

As outlined above, there may be certain times when access from this location is constrained due to works as part of the CSLS, for example during works to modify the existing roundabout to a signalised junction. However, this junction is expected to be constructed before the commencement of the subject development. Alternative routes to access the site are provided via haul routes from the west as part of the separately approved Clonburris T1A development. The haul routes initially follow the route of the permitted CSLS from the R136 before diverging to provide a route to both the northern and southern development parcels. The routes are generally designed to follow the future road network identified in the SDZ to minimise environmental impacts. Refer to *Figure 2-3* for the location of these haul roads.

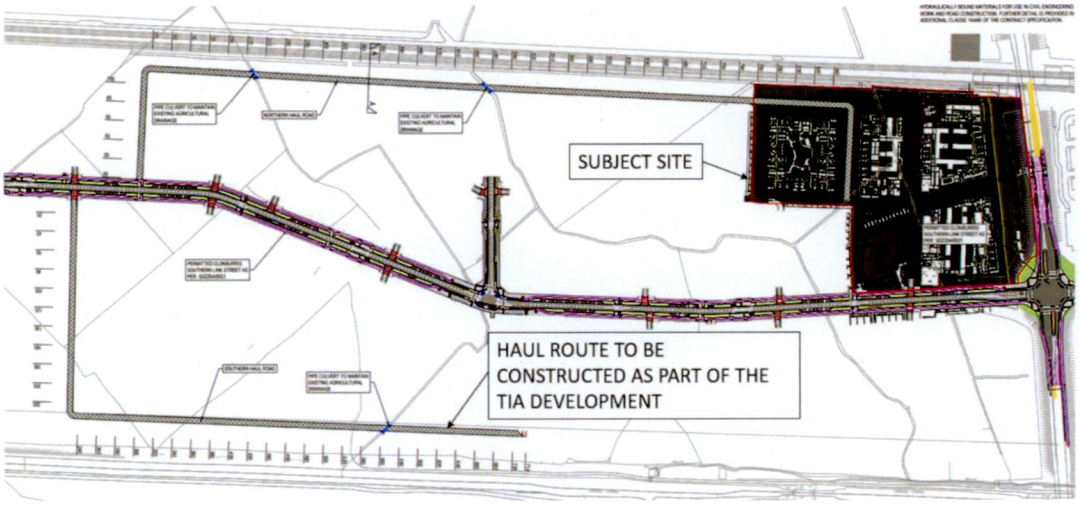


Figure 2-3: Site Access

2.4 SITE COMPOUND FACILITIES AND PARKING

The exact location of the construction compound is to be confirmed in advance of commencement of the works.

The location of the construction compound may be relocated during the course of the works.

- The construction compound will include adequate welfare facilities such as washrooms, drying rooms, canteen and first aid room as well as foul drainage and potable water supply
- The proposed construction compound is to be located in an area with easy access to the CSLS and the two permitted haul routes. Indicative location shown in Figure 2-3.
- Foul drainage discharge from the construction compound will be transported off site to a licensed facility until a connection to the public foul drainage network has been established
- The construction compound's potable water supply shall be protected from contamination by any construction activities or materials
- The construction compound will be enclosed by a security fence
- Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure
- A permeable hardstand area will be provided for staff carparking
- A separate permeable hardstand area will be provided for construction machinery and plant
- The construction compound will include a designated construction material recycling area

- A series of way finding signage will be provided to direct staff, visitors and deliveries as required
- All construction materials, debris, temporary hardstands etc. in the vicinity of the site compound will be removed off-site on completion of the works
- Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary.

2.5 WORKING HOURS

For the duration of the proposed works, the working hours shall be in compliance with those identified in the planning permission for the works.

No working will be allowed on Sundays and Public Holidays.

Subject to the agreement of the local authority, out of hours working may be required for water main connections, foul drainage connections etc.

3 TRAFFIC AND TRANSPORTATION

A construction stage Traffic Management Plan (TMP) will be prepared for the works by the main contractor. The principal objective of the TMP is to ensure that the impacts of all building activities generated during the construction of the proposed development upon both the public (off-site) and internal (on-site) workers environments, are fully considered and proactively managed / programmed respecting key stakeholders thereby ensuring that both the public's and construction workers safety is maintained at all time, disruptions minimised and undertaken within a controlled hazard free / minimised environment. The TMP shall be prepared in accordance with the principles outlined above and shall comply at all times with the requirements of:

- Department of Transport Traffic Signs Manual 2010 – Chapter 8 Temporary Traffic Measures and Signs for Roadworks
- Department of Transport Guidance for the Control and Management of Traffic at Road Works (2010)
- Any additional requirements detailed in the Design Manual for Roads and Bridges (DMRB) & Design Manual for Urban Roads & Streets (DMURS)

In general, the impact of the construction period will be temporary in nature and less significant than the operational stage of the proposed development (HGV vehicle movements not expected to exceed 5 vehicles per hour during the busiest period of construction works).

Construction Traffic will consist of the following categories:

- Private vehicles owned and driven by site staff and management
- Construction vehicles e.g. excavation plant, dump trucks
- Materials delivery vehicles involved in site development works (including trucks for delivery of imported fill to site).

On-site employees will generally arrive before 08:00, thus avoiding morning peak hour traffic. These employees will generally depart after 16:00.

Excavated material will be reused as part of the site development works (e.g. use as non-structural fill under green areas) in order to minimise truck movements to and from the site.

4 SOILS AND GEOLOGY

Site development works will include stripping of topsoil, excavation of subsoil layers and importation of fill. These activities have potential to expose the soils and geological environment to pollution.

The Contractor shall implement appropriate erosion and sediment control measures prior to commencing works on site.

The following measures are to be implemented in order to mitigate against erosion.

Stripping of Topsoil

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the vicinity of active work areas
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains
- Topsoil stockpiles will also be located so as not to necessitate double handling. Stockpile locations should be located so that they can be maintained separate from those used by the CSLS works
- The Contractor shall co-ordinate the transport of soils to and from the site with the CSLS works to limit traffic flow onto the R113.

Excavation of Subsoil Layers

- The duration that subsoil layers are exposed to the effects of weather will be minimized
- Disturbed subsoil layers will be stabilized as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping)
- Stockpiles of excavated subsoil material will be protected for the duration of the works, stockpiles of subsoil material will be located separately from topsoil stockpiles
- Subsoil stockpiles will also be located so as not to necessitate double handling. Stockpile locations should be located so that they can be maintained separate from those used by the CSLS works

Excavation of Rock

- Where bedrock is encountered in excavations, it will be assessed for viability of use within the designed works to reduce the volume of material required to be taken off site.
- Rock will typically be excavated using rock breakers or blasting where adequate separation distance can be achieved to existing properties.
- The duration that bedrock is exposed to the effects of weather shall be minimised. Disturbed bedrock layers shall be backfilled as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of foundations and completion of landscaping).
- Excavated rock stockpiles will also be located so as not to necessitate double handling.

Weather Conditions

- Typical seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations with an objective of minimizing soil erosion

5 WATER – HYDROLOGY & HYDROGEOLOGY

The following measures are to be implemented during the construction phase to mitigate risks to the water and hydrogeological environment.

Erosion and Sediment Control

- Measures shall be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection, fencing and signage around specific exclusion zones and earth bunding adjacent to open drainage ditches) prior to discharge of surface water at a controlled rate.
- Groundwater pumped from excavations shall be directed to on-site settlement ponds.
- Discharge from any vehicle wheel wash areas shall be directed to on-site settlement ponds.
- On-site settlement ponds shall include geotextile liners and riprapped inlets and outlets to prevent scour and erosion
- Weather conditions and seasonal weather variations shall be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The duration that bedrock layers are exposed to the effects of weather shall be minimized by back filling excavations as soon as practicable after construction of the drainage network.

Accidental Spills and Leaks

- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals shall be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery shall take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles shall be controlled in an appropriate facility to prevent contamination.

Concrete

- Concrete batching will take place off site and any excess concrete is not to be disposed of on site.
- Pumped concrete will be monitored to ensure there is no accidental discharge.
- Mixer washings are not to be discharged into surface water drains.

Wheel Wash Areas

- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.

6 ECOLOGY

The following measures are to be implemented during the construction phase in order to mitigate risks to flora and fauna.

- Ensure that invasive species (e.g. Japanese Knotweed) are treated appropriately (consult specialist invasive species contractor for suitable methods dependent upon the species) and avoid spreading these species during any works/activities.

The contractor shall also refer to particular mitigation measures for ecology as set out in Ecology report.

7 WASTE MANAGEMENT

The following measures are to be implemented during the construction phase in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle waste in such a manner as to minimise the effect on the environment:

- Building materials should be chosen with an aim to 'design out waste'
- On-site segregation of non-hazardous waste materials into appropriate categories
- On-site segregation of hazardous waste materials into appropriate categories
- All wastes segregated at source where possible
- All waste material will be stored in skips or other suitable receptacles in a designated area of the site
- Left over materials (e.g. timber off-cuts) shall be re-used on site where possible
- All waste leaving the site will be recycled, recovered or reused where possible
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licensed facilities
- All waste leaving the site will be recorded and copies of relevant documentation maintained

8 NOISE AND VIBRATION

During the works the contractor shall comply with the requirements of BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 (Code of Practice for Noise and Vibration Control on Construction and Open Sites) as well as Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 5 Noise and Vibration.

In particular, the following practices are to be implemented during the construction phase:

- Limiting the hours during which site activities that are likely to create high levels of noise and vibration are permitted
- Erection of a barrier along site boundary (e.g. Standard 2.4m high construction hoarding) to remove direct line of sight between noise source and receiver when construction works are being carried out in proximity to noise sensitive receivers
- Establishing channels of communication between the contractor, local authority residents and contractors involved with the CSLS works
- Appointing a site representative responsible for matters relating to noise
- Selection of plant with low inherent potential for generation of noise
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints and implementation of noise reduction measures such as acoustic enclosures
- Avoid unnecessary revving of engines and switch off plant when idle
- All vehicles and mechanical plant used for the purpose of the Works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order. In addition, all diesel engine powered plant shall be fitted with effective air intake silencers.
- All ancillary pneumatic percussive tools shall be fitted with mufflers or silences of the type recommended by the manufacturers, and where commercially available, dampened tools and accessories shall be used

Noise Limits

Noise Limits to be applied for the duration of construction works are as set out in the National Roads Authority (NRA) Guidelines for Treatment of Noise and Vibration in National Roads Schemes

(summarised below in *Figure 8-1*) and BS 5228-1:2009+A1:2014 (Code of Practice for Noise Control on Construction and Open Sites).

Days & Times	$L_{Aeq\ (1hr)}$ dB	$L_{pA(max)slow}$ dB
Monday to Friday 07:00 to 19:00hrs	70	80[2]
Monday to Friday 19:00 to 22:00hrs	60[2]	65[2]
Saturday 08:00 to 16:30hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60[2]	65[2]

2. Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority

Figure 8-1 NRA Guidelines for Maximum Permissible Noise Levels at the Façade of Dwellings During Construction.

BS 5228 applies a noise limit of 70 dBA between 07:00 am and 19:00 pm outside the nearest window of the occupied room closest to the site boundary in suburban areas away from main road traffic and industrial noise.

For the duration of construction works, a daytime noise limit (07:00 am to 19:00 pm) of 70 dBA shall apply (in accordance with the requirements of BS 5228 and generally in agreement with the NRA guidelines).

Vibration Limits

Vibration Limits to be applied for the duration of construction works are as set out in BS 5228-2:2009+A1:2014 (Code of Practice for Vibration Control on Construction and Open Sites) and BS 7385: 1993 (Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration). Allowable vibration during the construction phase is summarised below in *Figure 8-2*

Days & Times	$L_{Aeq\ (1hr)}$ dB	$L_{pA(max)slow}$ dB
Monday to Friday 07:00 to 19:00hrs	70	80[2]
Monday to Friday 19:00 to 22:00hrs	60[2]	65[2]
Saturday 08:00 to 16:30hrs	65	75
Sundays and Bank Holidays 08:00 to 16:30hrs	60[2]	65[2]

Figure 8-2 NRA Guidelines for Allowable Vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration

9 AIR QUALITY AND CLIMATE

The primary air quality impact during the construction phase relates to nuisance dust emissions.

The following dust suppression practices are to be implemented during the construction phase:

- The Contractor shall prepare a dust minimisation plan which shall be communicated to all site staff
- Establishing channels of communication between the contractor, local authority residents and contractors involved with the CSLS work
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly (on any un-surfaced site road, this will be 20 kph and on hard surfaced roads as site management dictates)
- Vehicles delivering material with dust potential (soil, aggregates, imported fill etc.) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust
- Public roads outside the site will be inspected on a daily basis for cleanliness and cleaned as necessary
- Debris, sediment, grit etc. captured by road sweeping vehicles is to be disposed off-site at a licensed facility
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate prior to entering onto public roads
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions

Monitoring of dust deposition levels (via the Bergerhoff method) shall take place at a number of locations at the site boundary of the proposed development to ensure that dust nuisance is not occurring at nearby sensitive receptors. This monitoring aims to ensure that the dust mitigation measures outlined above remain effective.

10 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Proposed construction phase mitigation measures are summarised below:

- Site hoarding will be erected to restrict views of the construction activity e.g. standard 2.4m high construction hoarding
- Site hoarding to be co-ordinated with CSLS works
- Establishment of tree protection measures as required (no-dig construction zones, tree protection fencing and existing hedgerow retention). Any trees which are not to be taken down shall remain undisturbed and undamaged
- Tree protection fences if required are to be constructed in accordance with BS 5837:2012 "Trees in Relation to Design, Demolition and Construction - Recommendations"
- A 'Construction Exclusion Zone' notice shall be placed on tree protection fencing at regular intervals
- Tree Protection Zones are not to be used for car parking, storage of plant, equipment or materials
- A post construction re-assessment of any retained trees shall be carried out

11 ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

It is recommended that monitoring of ground disturbances associated with the proposed development be carried out in accordance with the direction of the project Archaeologist.

Full provision should be made for the resolution of any archaeological features / deposits that may be discovered, should that be deemed the most appropriate manner in which to proceed.

12 MATERIAL ASSETS: SITE SERVICES

Existing Underground Services

- The location of all existing underground services are to be confirmed by the contractor prior to commencing any works on site. Special care should be taken to locate and mark the location of the gas main within the gas wayleave on the eastern side of the proposed development.

CSLS Underground Services

- The Contractor shall co-ordinate the construction of the underground services of the proposed development with those constructed as part of the CSLS prior to final connection

APPENDIX 2 – Trial Pit Records

Appendix B : SITE DISCHARGE CALCULATIONS

TITLE	Job Reference
Clonburris T2	210124
SUBJECT	**Calc. Sheet No.**
QBAR Calculation using IOH Report 124 for Sites < 25 km^2 Catchment 1	1

DRAWING NUMBER	Calculations by	Checked by	Date
	DCB	JPC	11/30/2022

Estimation of QBAR from IOH Report 124 for catchments less than 25 km^2 using the 3 variable equation

$$^1Q_{bar} = 0.00108 * (AREA)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$$

^{2}Site Area = 4.300 Ha

Site area is less than 50 Ha, calculate Qbar for a 50 Ha Site then pro-rata

AREA =	0.043	km^2
SAAR =	773	mm
^{3}SOIL =	0.37	
Q_{bar} =	0.00006	cumecs/Ha
Q_{bar} =	3.23	l/s/Ha
9.95 (SDZ) $Q_{bar\ [rural]}$ =	13.88	l/s

Note to Institute of Hydrology Report No. 124 Eqn

Q_{bar}	The Mean Annual Flood (cumecs)
AREA	Area of the Catchment (km^2)
SAAR	Standard Annual Average Rainfall (mm) *NERC Flood Studies Report, 1975*
SOIL	Soil Index Values of Catchment *Winter Rain Acceptance Potential, (Supplementary Report No. 7)*

Soil Classification for Runoff Potential FSR Maps

Soil 1	0	%
Soil 2	0	%
Soil 3	100	%
Soil 4	0	%
Soil 5	0	%

^{4}QBar from Site with Factorial Error Allowance

r^2 =	0.847
n =	71
fse =	1.651

Q'_{bar} = 22.92 l/s

(With Allowance for the standard factorial error)

Permissible Outflow from Site using Growth Factor

Qbar growth for permitted outlows from site for given return period (assuming long term storage). (No allowance for standard factorial error)

Flood Return Event	^{5}Growth Factor	Permitted Flow (l/s)
1	0.85	11.8
QBAR	1	13.9
10	1.67	23.2
30	2.1	29.1
50	2.33	32.3
100	2.6	36.1
200	2.85	39.6
1000	3.5	48.6

Is longterm storage provided?	No	
Storm Return Period to be provided for =	30	Years *
QBAR (Growth) =	29.1	Litres/sec
^{6}Permissible Outflow from site =	13.88	Litres/sec
^{7}Maximum Allowable Outflow from site =	13.88	Litres/sec

(* 30, 50 or 100)

1 hectare = 10,000m^2 **1km^2 - 100 hectares**

Notes

1. Based on the Institute of Hydrology Report 124 for small catchments less than 25km^2.
2. For catchments smaller than 50 hectares in area, flow rates are linearly interpolated for smaller areas.
3. Soil index value (SPR) calculated from Flood Studies Report Vol V Fig I 4.18(1) - The Classification of Soils from Winter Rainfall Acceptance Rate .
4. Fse is the standard factoial error
5. QBAR multiplied by growth factors of 0.85 for 1 year, 2.1 for 30 year, 2.3 for 50 and 2.6 for 100 year return period events, from GDSDS Figure C2.
6. Total Permissible Outflow - QBAR $_{(RURAL)}$ calculated in accordance with GDSDS - Regional Drainage Policies (Volume 2 - Chapter 6), i.e. $QBAR(m3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$
7. Where Total Permissible Outflow is less than 2.0l/s and not achievable, use 2.0l/s.
8. Rainfall depth for 100 year return period, 6 hour duration with additional 10% for climate change. (Value from Dublin Airport)
9. Interception Volume Vt (m3) = Impermeable Area (ha) x 10mm x 10 (GDSDS, Vol 2, Section 6.3.1.2.1).

Appendix C : SURFACE WATER NETWORK CALCULATIONS FOR THE 100 YEAR ANNUAL EXCEEDANCE PROBABILITY

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW_1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	20
Ratio R	0.277	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 Inverts

Time Area Diagram for SW_1

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.038	4-8	2.445	8-12	0.118

Total Area Contributing (ha) = 3.600

Total Pipe Volume (m³) = 153.687

Network Design Table for SW_1

« - 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
S1.000	46.012	0.161	285.8	0.174	4.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	44.624	0.161	277.2	0.174	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.000	38.566	0.193	199.8	0.050	4.00	0.0	0.600	o	300	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)
S1.000	50.00	4.83	58.200	0.174	0.0	0.0	4.7	0.92	65.4	28.3
S1.001	50.00	5.52	58.039	0.348	0.0	0.0	9.4	1.08	119.7	56.5
S2.000	50.00	4.58	58.072	0.050	0.0	0.0	1.4	1.11	78.4	8.1

Network Design Table for SW_1

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
S1.002	6.340	0.023	275.7	0.174	0.00	0.0	0.600	o	600	Pipe/Conduit	
S3.000	31.867	0.159	200.4	0.174	4.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	54.380	0.272	199.9	0.174	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	48.791	0.175	278.8	0.174	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.000	25.995	0.130	200.0	0.174	4.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	23.381	0.081	288.7	0.174	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	39.249	0.200	196.2	0.438	0.00	0.0	0.600	o	1000	Pipe/Conduit	
S5.000	45.984	0.137	335.6	0.100	4.00	0.0	0.600	o	300	Pipe/Conduit	
S5.001	48.481	0.137	353.9	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.002	45.153	0.144	313.6	0.100	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.003	6.958	0.021	331.3	0.270	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.004	11.765	0.035	336.1	0.250	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.005	20.769	0.062	335.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.006	17.409	0.052	334.8	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.007	4.395	0.013	338.1	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.006	19.629	0.142	138.2	0.000	0.00	0.0	0.600	o	525	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)
S1.002	50.00	5.59	57.879	0.572	0.0	0.0	15.5	1.46	413.3	92.9
S3.000	50.00	4.48	58.344	0.174	0.0	0.0	4.7	1.11	78.2	28.3
S3.001	50.00	5.19	58.128	0.348	0.0	0.0	9.4	1.28	141.1	56.5
S1.003	50.00	6.15	57.856	1.094	0.0	0.0	29.6	1.45	411.0	177.8
S4.000	50.00	4.30	57.811	0.174	0.0	0.0	4.7	1.43	228.1	28.3
S1.004	50.00	6.42	57.681	1.442	0.0	0.0	39.1	1.43	403.8	234.3
S1.005	50.00	6.69	57.600	1.880	0.0	0.0	50.9	2.38	1872.1	305.5
S5.000	50.00	4.90	58.000	0.100	0.0	0.0	2.7	0.85	60.3	16.2
S5.001	50.00	5.74	57.863	0.200	0.0	0.0	5.4	0.96	105.7	32.5
S5.002	50.00	6.40	57.726	0.300	0.0	0.0	8.1	1.14	181.7	48.7
S5.003	50.00	6.51	57.582	0.570	0.0	0.0	15.4	1.11	176.7	92.6
S5.004	50.00	6.68	57.561	0.820	0.0	0.0	22.2	1.10	175.5	133.2
S5.005	50.00	7.00	57.526	0.820	0.0	0.0	22.2	1.11	175.8	133.2
S5.006	50.00	7.26	57.464	0.820	0.0	0.0	22.2	1.11	175.8	133.2
S5.007	50.00	7.33	57.412	0.820	0.0	0.0	22.2	1.10	175.0	133.2
S1.006	50.00	7.50	57.400	2.700	0.0	0.0	73.1	1.90	412.0«	438.7

Network Design Table for SW_1

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
S1.007	18.585	0.136	136.7	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.008	14.809	0.095	155.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.009	66.708	0.148	450.7	0.150	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.010	31.537	0.097	325.1	0.150	0.00	0.0	0.600	o	525	Pipe/Conduit	
S6.000	58.353	0.397	147.0	0.150	4.00	0.0	0.600	o	300	Pipe/Conduit	
S6.001	7.450	0.051	146.1	0.150	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.002	54.179	0.368	147.2	0.150	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.003	45.849	0.309	148.4	0.150	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.011	15.282	0.034	449.5	0.000	0.00	0.0	0.600	o	525	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)
S1.007	50.00	7.66	57.258	2.700	0.0	0.0	73.1	1.91	414.4«	438.7
S1.008	50.00	7.80	57.122	2.700	0.0	0.0	73.1	1.79	387.8«	438.7
S1.009	50.00	8.86	57.028	2.850	0.0	0.0	77.2	1.05	227.0«	463.1
S1.010	50.00	9.28	56.880	3.000	0.0	0.0	81.2	1.24	267.7«	487.5
S6.000	50.00	4.75	57.906	0.150	0.0	0.0	4.1	1.29	91.5	24.4
S6.001	50.00	4.85	57.510	0.300	0.0	0.0	8.1	1.30	91.8	48.7
S6.002	50.00	5.54	57.460	0.450	0.0	0.0	12.2	1.29	91.4	73.1
S6.003	50.00	6.00	57.092	0.600	0.0	0.0	16.2	1.67	265.1	97.5
S1.011	50.00	9.53	56.783	3.600	0.0	0.0	97.5	1.05	227.3«	585.0

PIPELINE SCHEDULES for SW_1

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)
S1.000	o	300	SM2	59.668	58.200	1.168	Open Manhole	1200
S1.001	o	375	SM2	59.759	58.039	1.345	Open Manhole	1200
S2.000	o	300	SM3	59.707	58.072	1.335	Open Manhole	1200
S1.002	o	600	SM3	59.517	57.879	1.038	Open Manhole	1500
S3.000	o	300	SM9	59.600	58.344	0.956	Open Manhole	1200
S3.001	o	375	SM10	59.600	58.128	1.097	Open Manhole	1200
S1.003	o	600	SM4	59.485	57.856	1.029	Open Manhole	1500
S4.000	o	450	SM12	59.020	57.811	0.759	Open Manhole	1200
S1.004	o	600	SM5	59.503	57.681	1.222	Open Manhole	1500
S1.005	o	1000	SM6	59.458	57.600	0.858	Open Manhole	1900
S5.000	o	300	SM11	59.660	58.000	1.360	Open Manhole	1200
S5.001	o	375	SM12	59.240	57.863	1.002	Open Manhole	1200
S5.002	o	450	SM13	58.966	57.726	0.790	Open Manhole	1200
S5.003	o	450	SM14	59.512	57.582	1.480	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)
S1.000	46.012	285.8	SM2	59.759	58.039	1.420	Open Manhole	1200
S1.001	44.624	277.2	SM3	59.517	57.878	1.264	Open Manhole	1500
S2.000	38.566	199.8	SM3	59.517	57.879	1.338	Open Manhole	1500
S1.002	6.340	275.7	SM4	59.485	57.856	1.029	Open Manhole	1500
S3.000	31.867	200.4	SM10	59.600	58.185	1.115	Open Manhole	1200
S3.001	54.380	199.9	SM4	59.485	57.856	1.254	Open Manhole	1500
S1.003	48.791	278.8	SM5	59.503	57.681	1.222	Open Manhole	1500
S4.000	25.995	200.0	SM5	59.503	57.681	1.372	Open Manhole	1500
S1.004	23.381	288.7	SM6	59.458	57.600	1.258	Open Manhole	1900
S1.005	39.249	196.2	SM7	59.316	57.400	0.916	Open Manhole	1900
S5.000	45.984	335.6	SM12	59.240	57.863	1.077	Open Manhole	1200
S5.001	48.481	353.9	SM13	58.966	57.726	0.865	Open Manhole	1200
S5.002	45.153	313.6	SM14	59.512	57.582	1.480	Open Manhole	1200
S5.003	6.958	331.3	SM15	59.556	57.561	1.545	Open Manhole	1200

PIPELINE SCHEDULES for SW_1

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)
S5.004	o	450	SM15	59.556	57.561	1.545	Open Manhole	1200
S5.005	o	450	SM16	59.618	57.526	1.642	Open Manhole	1200
S5.006	o	450	SM17	59.477	57.464	1.563	Open Manhole	1200
S5.007	o	450	SM18	59.269	57.412	1.407	Open Manhole	1200
S1.006	o	525	SM7	59.316	57.400	1.391	Open Manhole	1900
S1.007	o	525	SM8	59.397	57.258	1.614	Open Manhole	1500
S1.008	o	525	SM9	59.560	57.122	1.913	Open Manhole	1500
S1.009	o	525	SM10	58.788	57.028	1.235	Open Manhole	1500
S1.010	o	525	SM23	59.240	56.880	1.835	Open Manhole	1500
S6.000	o	300	SM24	59.191	57.906	0.985	Open Manhole	1200
S6.001	o	300	SM25	59.214	57.510	1.404	Open Manhole	1200
S6.002	o	300	SM26	59.500	57.460	1.740	Open Manhole	1200
S6.003	o	450	SM27	59.463	57.092	1.921	Open Manhole	1200
S1.011	o	525	SM24	59.130	56.783	1.822	Open Manhole	1500

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)
S5.004	11.765	336.1	SM16	59.618	57.526	1.642	Open Manhole	1200
S5.005	20.769	335.0	SM17	59.477	57.464	1.563	Open Manhole	1200
S5.006	17.409	334.8	SM18	59.269	57.412	1.407	Open Manhole	1200
S5.007	4.395	338.1	SM7	59.316	57.399	1.467	Open Manhole	1900
S1.006	19.629	138.2	SM8	59.397	57.258	1.614	Open Manhole	1500
S1.007	18.585	136.7	SM9	59.560	57.122	1.913	Open Manhole	1500
S1.008	14.809	155.9	SM10	58.788	57.027	1.236	Open Manhole	1500
S1.009	66.708	450.7	SM23	59.240	56.880	1.835	Open Manhole	1500
S1.010	31.537	325.1	SM24	59.130	56.783	1.822	Open Manhole	1500
S6.000	58.353	147.0	SM25	59.214	57.509	1.405	Open Manhole	1200
S6.001	7.450	146.1	SM26	59.500	57.459	1.741	Open Manhole	1200
S6.002	54.179	147.2	SM27	59.463	57.092	2.071	Open Manhole	1200
S6.003	45.849	148.4	SM24	59.130	56.783	1.897	Open Manhole	1500
S1.011	15.282	449.5	SM	59.265	56.749	1.991	Open Manhole	0

Area Summary for SW_1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.174	0.174	0.174
1.001	-	-	100	0.174	0.174	0.174
2.000	-	-	100	0.050	0.050	0.050
1.002	-	-	100	0.174	0.174	0.174
3.000	-	-	100	0.174	0.174	0.174
3.001	-	-	100	0.174	0.174	0.174
1.003	-	-	100	0.174	0.174	0.174
4.000	-	-	100	0.174	0.174	0.174
1.004	-	-	100	0.174	0.174	0.174
1.005	-	-	100	0.438	0.438	0.438
5.000	-	-	100	0.100	0.100	0.100
5.001	-	-	100	0.100	0.100	0.100
5.002	-	-	100	0.100	0.100	0.100
5.003	-	-	100	0.270	0.270	0.270
5.004	-	-	100	0.250	0.250	0.250
5.005	-	-	100	0.000	0.000	0.000
5.006	-	-	100	0.000	0.000	0.000
5.007	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.150	0.150	0.150
1.010	-	-	100	0.150	0.150	0.150
6.000	-	-	100	0.150	0.150	0.150
6.001	-	-	100	0.150	0.150	0.150
6.002	-	-	100	0.150	0.150	0.150
6.003	-	-	100	0.150	0.150	0.150
1.011	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				3.600	3.600	3.600

Free Flowing Outfall Details for SW_1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.011	SM	59.265	56.749	0.000	0	0

Simulation Criteria for SW_1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.277		

Online Controls for SW_1

Hydro-Brake® Optimum Manhole: SM7, DS/PN: S1.006, Volume (m³): 35.2

Unit Reference	MD-SHE-0164-1330-1100-1330
Design Head (m)	1.100
Design Flow (l/s)	13.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	164
Invert Level (m)	57.400
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	13.3
Flush-Flo™	0.339	13.3
Kick-Flo®	0.746	11.1
Mean Flow over Head Range	-	11.4

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)
0.100	5.9	1.200	13.8	3.000	21.4	7.000	32.2
0.200	12.7	1.400	14.9	3.500	23.1	7.500	33.3
0.300	13.2	1.600	15.9	4.000	24.6	8.000	34.3
0.400	13.2	1.800	16.8	4.500	26.0	8.500	35.4
0.500	13.0	2.000	17.6	5.000	27.4	9.000	36.3
0.600	12.6	2.200	18.5	5.500	28.7	9.500	37.3
0.800	11.4	2.400	19.3	6.000	29.9		
1.000	12.7	2.600	20.0	6.500	31.1		

Storage Structures for SW_1

Tank or Pond Manhole: SM7, DS/PN: S1.006

Invert Level (m) 57.400

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1400.0	1.110	2250.0	1.410	0.0
1.100	1400.0	1.400	2250.0		

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.303
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	17.200	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 720, 1440, 2880, 7200, 10080
Return Period(s) (years)	30, 100
Climate Change (%)	20, 20

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.000	SM2	15 minute 100 year Winter I+20%	15	59.668	59.074	0.574	0.000
S1.001	SM2	15 minute 100 year Winter I+20%	15	59.759	58.898	0.484	0.000
S2.000	SM3	15 minute 100 year Winter I+20%	15	59.707	58.701	0.329	0.000
S1.002	SM3	15 minute 100 year Winter I+20%	15	59.517	58.676	0.197	0.000
S3.000	SM9	15 minute 100 year Winter I+20%	15	59.600	59.042	0.398	0.000
S3.001	SM10	15 minute 100 year Winter I+20%	15	59.600	58.916	0.413	0.000
S1.003	SM4	15 minute 100 year Winter I+20%	15	59.485	58.655	0.199	0.000
S4.000	SM12	15 minute 100 year Winter I+20%	15	59.020	58.552	0.291	0.000
S1.004	SM5	15 minute 100 year Winter I+20%	15	59.503	58.438	0.157	0.000
S1.005	SM6	720 minute 100 year Winter I+20%	720	59.458	58.371	-0.229	0.000
S5.000	SM11	15 minute 100 year Winter I+20%	15	59.660	59.088	0.788	0.000
S5.001	SM12	15 minute 100 year Winter I+20%	15	59.240	59.028	0.790	0.000
S5.002	SM13	15 minute 100 year Winter I+20%	15	58.966	58.958	0.782	0.000
S5.003	SM14	15 minute 100 year Winter I+20%	15	59.512	58.863	0.831	0.000
S5.004	SM15	15 minute 100 year Winter I+20%	15	59.556	58.753	0.742	0.000
S5.005	SM16	15 minute 100 year Winter I+20%	15	59.618	58.512	0.536	0.000
S5.006	SM17	720 minute 100 year Winter I+20%	720	59.477	58.368	0.454	0.000
S5.007	SM18	720 minute 100 year Winter I+20%	720	59.269	58.366	0.504	0.000
S1.006	SM7	720 minute 100 year Winter I+20%	720	59.316	58.366	0.441	0.000
S1.007	SM8	120 minute 100 year Summer I+20%	120	59.397	57.499	-0.284	0.000
S1.008	SM9	120 minute 100 year Summer I+20%	120	59.560	57.495	-0.152	0.000

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S1.000	SM2	1.04		0.983	63.6	SURCHARGED
S1.001	SM2	1.14		4.133	124.8	SURCHARGED
S2.000	SM3	0.25		0.706	17.9	SURCHARGED
S1.002	SM3	0.92		8.811	206.5	SURCHARGED
S3.000	SM9	0.90		0.784	64.1	SURCHARGED
S3.001	SM10	0.95		3.053	124.6	SURCHARGED
S1.003	SM4	1.08		8.629	386.7	SURCHARGED
S4.000	SM12	0.34		0.832	65.3	SURCHARGED
S1.004	SM5	1.60		18.540	502.7	SURCHARGED
S1.005	SM6	0.06		8.301	71.1	OK
S5.000	SM11	0.55		1.225	31.3	SURCHARGED
S5.001	SM12	0.63		4.477	61.7	FLOOD RISK
S5.002	SM13	0.57		6.610	93.8	FLOOD RISK
S5.003	SM14	1.70		8.434	179.9	SURCHARGED
S5.004	SM15	2.25		2.258	270.6	SURCHARGED
S5.005	SM16	1.86		2.790	265.8	SURCHARGED
S5.006	SM17	0.24		4.129	33.1	SURCHARGED
S5.007	SM18	0.28		3.652	33.0	SURCHARGED
S1.006	SM7	0.05		1381.796	13.2	SURCHARGED
S1.007	SM8	0.06		1.487	15.8	OK
S1.008	SM9	0.09		2.823	21.6	OK

REQUIRED ATTENUATION VOLUME WITHIN ATTENUATION POND

Summary of Critical Results by Maximum Level (Rank 1) for SW_1

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
S1.009	SM10	60 minute 100 year Summer I+20%	60	58.788	57.491	-0.062	0.000
S1.010	SM23	30 minute 100 year Summer I+20%	30	59.240	57.409	0.004	0.000
S6.000	SM24	15 minute 100 year Winter I+20%	15	59.191	59.027	0.821	0.000
S6.001	SM25	15 minute 100 year Winter I+20%	15	59.214	58.892	1.082	0.000
S6.002	SM26	15 minute 100 year Winter I+20%	15	59.500	58.731	0.971	0.000
S6.003	SM27	15 minute 100 year Winter I+20%	15	59.463	57.588	0.046	0.000
S1.011	SM24	15 minute 100 year Winter I+20%	15	59.130	57.380	0.072	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S1.009	SM10	0.20		3.174	42.2	OK
S1.010	SM23	0.36		13.503	80.6	SURCHARGED
S6.000	SM24	0.56		1.263	49.1	FLOOD RISK
S6.001	SM25	1.62		5.599	99.6	SURCHARGED
S6.002	SM26	1.73		1.874	149.4	SURCHARGED
S6.003	SM27	0.81		3.802	192.9	SURCHARGED
S1.011	SM24	1.98		13.999	273.2	SURCHARGED

Appendix D : IRISH WATER CONFIRMATION OF FEASIBILITY

Carin Homes PLC C/O John Carr
DBFL Consulting,
Ormond House,
Upper Ormond Quay,
Dublin 7,
Dublin

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

04 February 2020

Dear Sir/Madam,

Re: Customer Reference No 2512559856 pre-connection enquiry - Subject to contract | Contract denied
Connection for Housing Development of 1500 Units at Clonburris Little, Clondalkin, Co Dublin

Irish Water has reviewed your pre-connection enquiry in relation to water and wastewater connections at Clonburris Little, Clondalkin, Co Dublin
. Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

In the case of wastewater connections this assessment does not confirm that a gravity connection is achievable. Therefore a suitably sized pumping station may be required to be installed on your site. All infrastructure should be designed and installed in accordance with the Irish Water Code of Practice.

All infrastructure should be designed and installed in accordance with
- the Clonburris Master Plan approved by Irish Water
- the Development phasing and connection timelines of each phase agreed with Irish Water
- the Irish Water Codes of Practice and Standard Details.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. Prior to submitting your planning application, you are required to submit these detailed design proposals to Irish Water for review.

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact James O'Sullivan from the design team on 022 52269 or email jameosull@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

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

Dieter Bester
DBFL Consulting Engineers Ltd.
Ormond House
Ormond Quay Upper
Dublin

23 September 2022

Our Ref: CDS22005723 Pre-Connection Enquiry
Clonburris Little, Clondalkin, Dublin

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 Housing Development of 468 unit(s) at Clonburris Little, Clondalkin, Dublin, (the **Development)**.

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

- **Water Connection**
  - Feasible Subject to upgrades.
  -
  - The Development is within Clonburris Strategic Development Zone. All relevant core water infrastructure within the Zone has to be completed, of adequate capacity and integrity, connected to the Irish Water networks and in operation prior the connection. The infrastructure will be delivered by Clonburris Infrastructure Limited developers.
  - A bulk meter will be required on the connection main.

• **Wastewater Connection**	- Feasible Subject to upgrades. - The Development is within Clonburris Strategic Development Zone. All relevant core wastewater infrastructures within the Zone has to be completed, of adequate capacity and integrity, connected to the Irish Water networks and in operation prior the connection. The infrastructure will be delivered by Clonburris Infrastructure Limited developers only. Pumping Station PS01 will be delivered by Irish Water, and it is scheduled to be completed by Q3/2025 (this may be subject to change)

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

Yvonne Harris
Head of Customer Operations

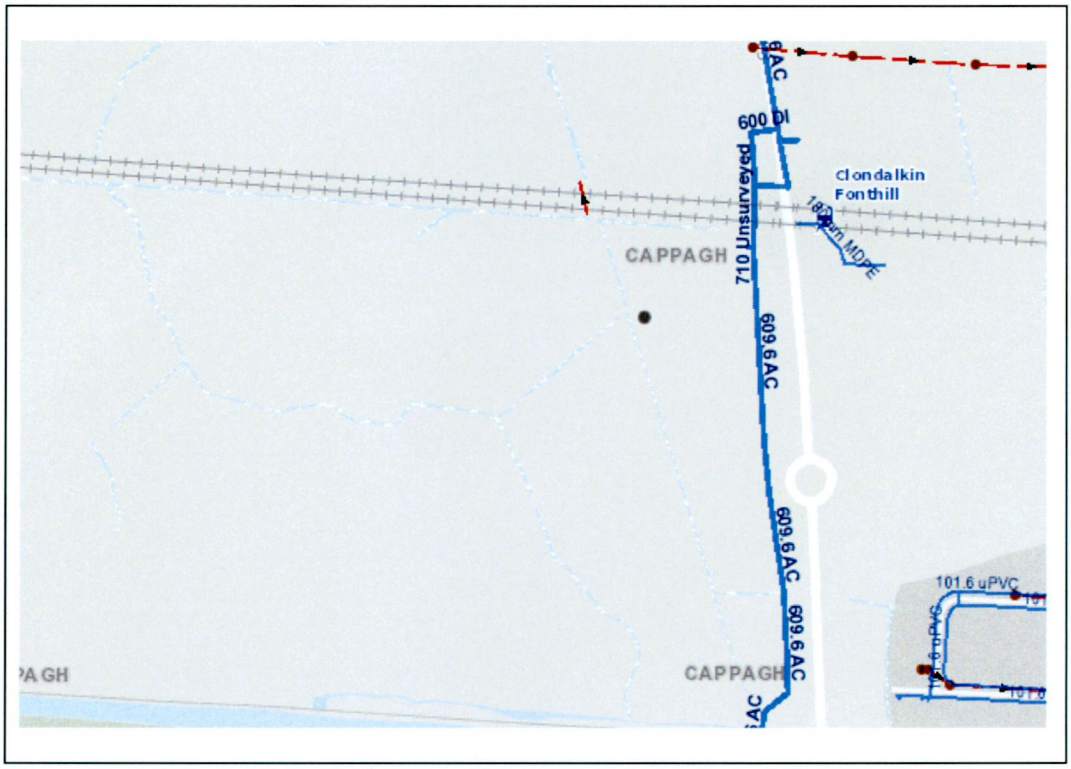
Section A - What is important to know?

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 E : FOUL NETWORK CALCULATIONS [SITE NETWORK DRAINAGE]

FOUL SEWERAGE DESIGN

Design Criteria for FS 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.800
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	300

Designed with Level Inverts

Network Design Table for FS 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	92.400	1.155	80.0	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F1.001	4.961	0.025	198.4	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F1.002	70.039	0.350	200.1	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F2.000	59.225	0.296	200.1	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F2.001	50.318	0.252	199.7	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F2.002	52.436	0.262	200.1	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F3.000	21.880	0.146	149.9	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F3.001	49.030	0.236	207.8	0.000	43	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	57.655	0.000	0.0	43	0.0	30	0.62	1.28	51.1	2.0
F1.001	56.500	0.000	0.0	86	0.0	53	0.55	0.81	32.3	4.0
F1.002	56.475	0.000	0.0	129	0.0	66	0.62	0.81	32.2	6.0
F2.000	57.800	0.000	0.0	43	0.0	38	0.45	0.81	32.2	2.0
F2.001	57.504	0.000	0.0	86	0.0	53	0.55	0.81	32.2	4.0
F2.002	57.252	0.000	0.0	129	0.0	66	0.62	0.81	32.2	6.0
F3.000	57.800	0.000	0.0	43	0.0	36	0.49	0.94	37.2	2.0
F3.001	57.654	0.000	0.0	86	0.0	54	0.54	0.79	31.6	4.0

Network Design Table for FS 1

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.003	79.592	0.398	200.0	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F4.000	56.532	0.283	199.8	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F4.001	48.417	0.242	200.1	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F4.002	52.176	0.261	199.9	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F4.003	30.879	0.549	56.2	0.000	43	0.0	1.500	o	225	Pipe/Conduit	
F5.000	65.747	0.341	192.8	0.000	35	0.0	1.500	o	225	Pipe/Conduit	
F4.004	39.380	0.555	71.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.003	56.125	0.000	0.0	387	0.0	120	0.83	0.81	32.2	17.9
F4.000	58.393	0.000	0.0	43	0.0	38	0.45	0.81	32.2	2.0
F4.001	58.110	0.000	0.0	86	0.0	53	0.55	0.81	32.2	4.0
F4.002	57.868	0.000	0.0	129	0.0	66	0.62	0.81	32.2	6.0
F4.003	57.607	0.000	0.0	172	0.0	55	1.06	1.53	60.9	8.0
F5.000	57.400	0.000	0.0	35	0.0	34	0.42	0.83	32.8	1.6
F4.004	57.059	0.000	0.0	207	0.0	64	1.03	1.36	54.2	9.6

PIPELINE SCHEDULES for FS 1

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)
F1.000	o	225	F1	59.086	57.655	1.206	Open Manhole	1200
F1.001	o	225	F2	58.794	56.500	2.069	Open Manhole	1200
F1.002	o	225	F3	58.742	56.475	2.042	Open Manhole	1200
F2.000	o	225	F4	59.678	57.800	1.653	Open Manhole	1200
F2.001	o	225	F5	59.400	57.504	1.671	Open Manhole	1200
F2.002	o	225	F6	59.751	57.252	2.274	Open Manhole	1200
F3.000	o	225	F7	0.000	57.800		Open Manhole	1200
F3.001	o	225	F8	0.000	57.654		Open Manhole	1200
F1.003	o	225	F4	59.552	56.125	3.202	Open Manhole	1200
F4.000	o	225	F10	59.280	58.393	0.662	Open Manhole	1200
F4.001	o	225	F11	59.050	58.110	0.715	Open Manhole	1200
F4.002	o	225	F12	59.398	57.868	1.305	Open Manhole	1200
F4.003	o	225	F13	59.140	57.607	1.308	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)
F1.000	92.400	80.0	F2	58.794	56.500	2.069	Open Manhole	1200
F1.001	4.961	198.4	F3	58.742	56.475	2.042	Open Manhole	1200
F1.002	70.039	200.1	F4	59.552	56.125	3.202	Open Manhole	1200
F2.000	59.225	200.1	F5	59.400	57.504	1.671	Open Manhole	1200
F2.001	50.318	199.7	F6	59.751	57.252	2.274	Open Manhole	1200
F2.002	52.436	200.1	F4	59.552	56.990	2.337	Open Manhole	1200
F3.000	21.880	149.9	F8	0.000	57.654		Open Manhole	1200
F3.001	49.030	207.8	F4	59.552	57.418	1.909	Open Manhole	1200
F1.003	79.592	200.0	F5	59.009	55.727	3.057	Open Manhole	1200
F4.000	56.532	199.8	F11	59.050	58.110	0.715	Open Manhole	1200
F4.001	48.417	200.1	F12	59.398	57.868	1.305	Open Manhole	1200
F4.002	52.176	199.9	F13	59.140	57.607	1.308	Open Manhole	1200
F4.003	30.879	56.2	F14	59.173	57.058	1.890	Open Manhole	1200

PIPELINE SCHEDULES for FS 1

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)
F5.000	o	225	F14	58.778	57.400	1.153	Open Manhole	1200
F4.004	o	225	F14	59.173	57.059	1.889	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)
F5.000	65.747	192.8	F14	59.173	57.059	1.889	Open Manhole	1200
F4.004	39.380	71.0	F	58.848	56.504	2.119	Open Manhole	0

Free Flowing Outfall Details for FS 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F1.003	F5	59.009	55.727	0.000	1200	0

Free Flowing Outfall Details for FS 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
F4.004	F	58.848	56.504	0.000	0	0