# Planning Submission

**Engineering Report for**

**<u>72 units Residential Development</u>**

**O'Leary & O'Sullivan Dev Ltd.**

**Phase 4,**

**Ballincrokig Masterplan,**

**Co. Cork**

**17th January 2022**

**Revision A**

**<u>Job no: 21082</u>**

# Contents

# 1 DOCUMENT CONTROL

Rev A – January 22 – Issued for planning

# 2 INTRODUCTION

O'Leary & O'Sullivan Dev Ltd have applied for planning permission for 72no. Units. Phase 4 of Ballincrokig Masterplan with an area of 2.95ha which will be accessed via the Ballyhooly Road to the East of the site.

The site slopes from Northwest to Southeast towards the Ballyhooly Road (R614).

It is proposed that the Foul Sewer will be directed to the South East of the site and connect with a 225mm foul water sewer from Coppenger Fields, then exiting onto the IW Foul network on the Ballyhooley road.

It is proposed that the Surface water Sewer will also be directed to the South East of the site, pass through a Hydrocarbon interceptor -> Attenuation -> Hydrobrake and then discharge into an open stream running along the Ballyhooley road.

The proposed watermain will connect via existing watermain in Coppenger Fields.

# 3 PROPOSED FOUL SEWER

The 225mm diameter foul sewer for the proposed 72no. Units is a gravity flow system connecting into an existing foul line from Coppenger fields.

The foul sewer network consists of 225mm diameter sewers, the minimum wall thickness is 3.2mm wall thickness and shall be certified to EN 13476. All Pipes are located within the public road and green areas.

## 3.1 FLOW RATES

Flow rates will be taken as 446 litre/house/day as per Irish Water code of practice.
This application will contribute

Population Equivalent: 232 People

Calculated Flow

$$\frac{72x446x2.7}{24x60x60} = 1.00l/s \text{ @ DWF} = 6DWF = 6.0 \text{ l/s}$$

All sewers shall have a minimum cover of 1.2m on roads and 0.9m on footpaths and green areas. Sewer pipes with less than 1.2m cover will be encased in concrete as per Irish Water details.

All foul sewer material is to be un-plasticized polyvinylchloride IPVC-UL pipes and fittings in accordance with IS424.

All sewers and drains designed to BS 5572 'drains and sewer systems outside buildings'.

The DWF for the development is estimated as 32112 l/day (32.11m$^3$/day).

The overall quantity of wastewater for the proposed development is estimated at 32.11m$^3$ per day.

It is proposed that the Foul Sewer will be directed to the South East of the site and connect with a 225mm foul water sewer from Coppenger Fields, then exiting onto the IW Foul network on the Ballyhooley road.

See Appendix A for the pre-connection Enquiry CDS21008672

*'Your enquiry is currently being assessed to confirm it is technically feasible; we will be in touch once this assessment has been completed. A significant level of analysis is required before we can provide a response.'*

# 4 ROADS AND PUBLIC LIGHTING

## 4.1 ROADS

All road layouts have been designed by Deady Gahan Architects and O' Shea Leader Consulting Engineers.

All road gradients are between 0.8% and 9% in compliance with the 'Recommendations for site development works for housing areas' published by the Department of the Environment.

The majority of estate roads within the development which provide access to individual dwellings have a maximum slope of 2.5%(1:40). A cross fall of 2.5% shall be provided for all roads and footpaths.

The first 7m of the entrance road is designed at gradient of 1.6% (1:61) in compliance with the **'Recommendations for Site Development works for Housing Areas'**

Therefore, all the internal road gradients are designed in accordance with the relevant regulations and good design practice.

All driveways will comply with Part M of the Building Regulations.

## 4.2 PARKING

| | |
|---|---|
| Total Car Parking Spaces Within Development | 94 |
| | |
| Total No. Of Units | 72 |
| | |
| No. Of Parking Spaces (Per Apartment) | 1.3 |

### 4.2.1 Compliance with DMURS

The development layout has been designed in accordance with the Design Manual for Urban Roads and Streets (DMURS) as published by the Department of Transport, Tourism and Sport. Integral to the design of the development street network has been ensuring strong pedestrian connectivity, slow vehicle speeds and good visibility for road users.

The development has placed pedestrians at the top of the hierarchy. Footpath widths throughout the site are 2m and additionally a number of shared spaces for pedestrians have been provided in front of a number of houses. On cul-de-sacs in the site, a "shared surface" will be provided on which vehicles, bicycles and pedestrians share the same surface. This will assist in giving pedestrians priority and in reducing vehicle speeds.

The internal roads within the estate have sightlines with 23m with 2.4m setback for a given design speed of 30km/hr is consistent with the forward visibility. I refer to Design Manual for Urban Roads and Streets (DMURS) p107.

*The minimum level of forward visibility required along a street for a driver to stop safely, should an object enter its path, is based on the Stopping Sight Distances (SSD). The SSD has 3 constituent parts:*

- *Perception Distance: The distance travelled before the driver perceives a hazard.*
- *Reaction Distance: The distance travelled following the perception of a hazard until the driver applies the brakes.*
- *Braking Distance: The distance travelled until the vehicle decelerates to a halt.'*

The internal roads within the site have been design for Forward Visibility design speeds of 30km/hr but the speed limit of the internal roads are much less due to the additional traffic management measures that have been incorporated into the site to ensure reduced speeds within the site.

Road widths in the proposed development are 5.5m on the entrance road and reducing further to 4.8m on shared surface on the cul-de-sacs.

### 4.2.2 Turning Bay's

The turning bays have been designed to comply with the Recommendations for Site Development Works for Housing Areas. Please find enclosed Drg. No. *"21082-Coppenger Fields Ph4-07. Autoturn with Refuse Truck Rev A"* showing the of Autoturn tracking of a refuse truck for the turning areas.

### 4.2.3 Traffic & Main Junction Design

The proposed development will be served by vehicular access junction to the East of the site. The proposed entrance is located within a residential estate the posted speed limit of 30km/hr.

Visibility sightlines have been provided at the junction of 120m in each direction to the nearest edge of the existing carriageway at a setback of 3m from the edge of the existing road.

#### 4.2.3.1 Sightlines

There for we have provided an adequate visibility envelope in accordance with the relevant standards for the road design speed. The visibility envelope will be kept clear of all obstructions such as walls, fences, signs etc. over the height of 1m.

#### 4.2.3.2 Junction Radius

The junction's radii at the proposed development is to have a radius of 6m which has the capacity to allowed larger vehicles enter and leave the site, The 6m radius is not excessive which will also help reduce the speed of traffic entering and leaving the site therefore reducing the possibility of a collision between traffic leaving the site.

#### 4.2.3.3 Junction Signage

The junction entrance to the site will be provided with a thermoplastic Stop line and metal stop sign. This will alert people leaving the site that all traffic must stop before entering the public road.

#### 4.2.3.4 Public Lighting

The proposed junction will be provided with adequately designed public lighting design that has been carried out by James Molloy Consulting Engineer to the relevant standards.

#### 4.2.3.5 Road Widths

The proposed entrance road width at the junction is 5.5m which has been designed in accordance with the Design Manual for Urban Road and Streets(DMURS) and Traffic Management Guidelines.

#### 4.2.3.6 Dished Kerbs

The provision of dished kerbs has been incorporated at both sides of the development entrance in accordance with the relevant guidelines. These dished kerbs are designed to align with the paving at the opposite side of the entrance in so that it aids pedestrians with disabilities

# 5 SURFACE WATER SYSTEM

The current proposal is to run the storm sewer by gravity to an underground attenuation tank which will discharge via a flow control device to the existing open stream to the South East of the site and running along the Ballyhooley Road. The storm system and attenuation area has been designed taking into account the overall site of 72 units. The system is designed to accommodate a 1:100 year storm event.

A return period of 5, 30 and 100 years was used and shows that the highest water level at the extreme rainfall events is below the finished floor levels of each property to ensure no flooding occurs.

A 50mm/hour rainfall intensity has been used for the Wallingford method of pipe size calculation as attached 5.6.3 Design & Analysis of Urban Drainage – Wallingford Procedure

All sewers shall have a minimum cover of 1.2m on roads and 0.9m on footpaths and green areas but where this is not achieved the pipe will be protected by encasing it in a layer of concrete.

All storm sewers are to be minimum 225mm diameter.

All storm sewer material is to be un-plasticized polyvinylchloride IPVC-UL pipes and fittings in accordance with IS424 or spigot and socket concrete pipes in accordance with the requirements of IS6.

All sewers and drains designed to BS 5572 'drains and sewer systems outside buildings.

The rainfall figures for the storm durations have been obtained from Met Eireann weather data.

All gullies will be positioned and designed in accordance with 'The recommendations for site development works for housing areas' published by the Department of the Environment'.

The revised system has been revised to incorporate an attenuation tank in one area of the site as close to source as reasonable possible within a sloped site to comply with Sustainable Urban Drainage best practice.

## 5.1 ATTENUATION TANK

Proposed Proprietary underground attenuation tank situated at the South East side of the site and is intended to attenuate storm water runoff from Phase 4 of the Ballincrokig master plan.

The calculations for the sizing of the tank are attached. The size of the tank will be 562$m^3$ and will include for climate change (10% increase).

The outflow will be controlled by a hydro break situated in the outlet manhole. This manhole will also be fitted with overflow pipe above the hydro break in the event of a blockage the overflow pipe will discharge directly to the existing stream. A Head wall outfall structure will be built to allow for the discharge of storm water into the stream. This will be placed on a recess into the embankment to avoid having a negative impact on the existing stream.

### 5.1.1 Surface Water Attenuation Design

Determination of storm water runoff and a suitable control system for this site at Phase 4 Ballincrokig Masterplan, is determined in accordance with the requirements of Dublin Corporation's "Storm water Management Policy for Developers" (SMPD). This document outlines the storm water management policy to be applied to surface water discharges to sewers and to adjacent watercourses from new developments in Dublin City Council's administrative area. To date Dublin City Council is the only Local Authority in Ireland to have produced such a document and it was determined that this document be used as a guidance document for the proposed development.

The policy as outlined in the SMPD is "the maximum permitted surface water outflow from any new development is to be restricted to that for the greenfield/brownfield site before the proposed development takes place". This can be basically achieved by reducing runoff by increasing infiltration to subsurface strata, control maximum discharge rates by attenuation the discharge and using a combination of the two.

The specification of a permitted surface water outflow requires an understanding of the river catchment and urban drainage system in which the development site exists. Generally, this information is not available, and an estimation is made of the runoff generated from a site for a storm of specific return period and duration. In the SMPD, the basis for determining the storm water runoff and discharge from the undeveloped greenfield site is based on the scale of the proposed development with developments categorised into the following sizes:

| Category | Area | Outflow Limits |
|---|---|---|
| Small | A < 4 ha | Q < 10 l/s |
| Medium | 4 < A < 24 ha | 10 < Q < 50 l/s |
| Large | A > 24 ha | Q > 50 l/s |

These values are based on estimated outflow rates from typical greenfield sites located in North Dublin, however, the actual discharge for similar sized sites of similar characteristics will vary subject to location in the country and hence the tabulated discharges are of little value outside North Dublin. The table is based on several estimation methods outlined in Dublin Corporation "Storm water Management Policy Technical Guidelines" (SMPTG). In the SMPD (that effectively summarises the SMPTG) it is recommended that the permissible outflow for small and medium sized sites is calculated using the estimation method contained in the Institute of Hydrology Report №124.

## 5.2 SYSTEM ANALYSIS/APPRAISAL

Attenuation Ponds/Basins-The most suitable location of such a technique would be on a low lying relatively flat plan none of which is available within the site boundaries of the application. As stated in the guidance document of the Irish Suds.ie website the application of ponds/basins is not suitable for high density residential area, Furthermore the application of ponds/basins was ruled out on health and safety grounds due to the presence of children in a large residential area and the increased risk of a drowning accident. To create any such facility within the site boundaries would require large volumes of excavation and the construction of embankments due to the sloping topography of the site, all of which would contravene SuDS policies.

Soakaways/ Permeable Paving (Infiltration Method)-The disposal of surface water via soakaways or pervious pavements (Infiltration method) was ruled out due to the underlying ground conditions and the likelihood that discharging of surface water to the substrata could cause future subsidence and subsequent damage dwellings and services.

Swales- It would be extremely difficult if not impossible to include swales within the development due to the lack of suitable open/green spaces due to the hight density of the proposed development.

Rainwater Harvesting- In relation to rainwater harvesting an option is to provide a water butt with each individual dwelling. This would be located to the rear of each unit. This was ruled out as the benefit is negligible. It would only have the ability to catch the rear sloping side of the dwelling and the reuse would be for watering plants.

Attenuation Tank System- In conclusion the system that we are proposing is a reinforced concrete attenuation tank. This system will attenuate the roofs, public roads and footpaths within the development. The method for calculating the system is shown below.

## 5.3 RUNOFF ESTIMATION METHOD

The estimation method contained in the Institute of Hydrology Report №124 and recommended for estimation of the runoff from small and medium sites in the SMPD is as indicated below.

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

*$Q_{BAR}$ ($m^3/s$) is the mean annual peak flow*

*AREA ($km^2$) is the area of the catchment*

*SAAR (mm) is the Standard Annual Average Rainfall and*

*SOIL is a soil index value*

The values for SAAR and SOIL are taken from maps and tables prepared by the Institute of Hydrology and presented in the "Flood Study Report" (FSR). The size of the site is determined by physically measuring the site on a suitable scaled map or in this case from physical survey data. The runoff estimation for the lands is indicated in 5.6 Attenuation Design Criteria.

## 5.4 STORAGE REQUIREMENTS

Once the discharge is determined for the site the storage volume for the storm water runoff needs to be determined. Due to recent flood events attenuation capacities are being designed for 1 in 100 years with a Global Warming Factor being applied of 10%. Therefore, giving a storage volume to be retained within the site.

In order to quantify the rainfall associated with the maximum storm water storage required a series of storm durations for the 1 in 100 year return period are chosen. Although the amount of water discharge is increased (as more storm water runoff is generated on the developed site), the aim is to maintain the $Q_{BAR}$ discharge as the maximum discharge.

Initially the discharge from the storage area will be less than the maximum discharge of $Q_{BAR}$ resulting in a variable discharge becoming constant at $Q_{BAR}$ with respect to time. As the storm duration increases and the discharge approaches a constant value the initial variable discharge has less significance and is essentially ignored. This is considered as a reasonable assumption as the storage area will continue to discharge at a constant rate until the level of water in the storage area returns to the outflow control's minimum active water head and this can be substantially longer than the storm duration. Additionally, most storm events have a variable intensity where the total rainfall is constant, but the intensity is variable throughout the duration of the storm event and the storm water pipe network will move water to the storage area faster than over ground flow.

To determine the volume of storage required the volume of storm water generated on the site is first determined. Considering the constant discharge of $Q_{BAR}$ from the storm water storage area the volume of water discharged from the system over the duration of the storm is estimated. The estimated storage volume required for a storm event is the difference between the storm water volume generated and the discharged volume of storm water. A series of volumes generated and discharges for specific durations are plotted on a graph and the peak volume from the graph is taken as the maximum required storm water storage.
Once the volume of storm water storage is determined the storm water generated from a series of storm durations for the 1 in 100 year return period is estimated using the same numerical system and the results are compared to ensure that there is sufficient storage within the site to retain this additional storm water. In this situation, the storm water pipe network is assumed to backup providing additional storage volume and localised flooding of the road network within the site may occur. The discharge from the attenuated area is controlled via a flow control mechanism as shown in **5.8 Hydro Brake Detail**

## 5.5 RAINFALL INTENSITY

The method used for calculating rainfall intensities for urban drainage design was developed by the British Meteorological Office as a simplified version of a computerised method. The manual method permits the calculation of rainfall intensities for durations between 5 minutes and 48 hours and return period between 1 year and 100 years. The storms considered for this site is 1 in 100 year's return periods with durations as indicated in the calculations. Figures and tables referred to are published as by Natural Environment Research Council in the U.K. and are described in the Institute of Hydrology publication "Flood Studies Report".

## 5.6 ATTENUATION DESIGN CRITERIA

*SOIL (Soil Index from FSR)*

Fig I 4.18 (I) Winter Rain Acceptance Potential (WRAP) = 2 (low runoff)

SOIL = $(0.15\ S_1 + 0.3\ S_2 + 0.4\ S_3 + 0.45\ S_4 + 0.5\ S_5)/(1 - S_U)$

Where

$S_n$ is the fraction of site of particular soil type (n is the soil type from Fig I 4.18 (I))

$S_U$ is the fraction of the site of an undefined soil type such as the detention pond

| SOIL = 0.3(1) / (1 - 0) = 0.3 |
|---|

*Site Characteristics and General Information*

Area = 29561 **m²**

Buildings 2620 **m²**

Hard standings 6073 **m²**

Runoff coefficient for surfaces are

- Dwellings at 1.0
- Hardstanding, roads and footpaths at 0.8

Calculated Contributing Runoff Area **=1(2620) + 0.8(6073)**

**= 7478.4m²**

Average Volumetric Runoff Coefficient **$C_v$** **= .75** (Average value is 0.75 ranging from about 0.6 on catchments with rapidly draining soils)

SAAR Standard Annual Average Rainfall From

Met Eireann Extreme Rainfall Return Periods, **SAAR = 1147mm**

*Permitted Runoff ($Q_{BAR}$)*

***Calculation based on sites less than 50Ha***

Based on guidance from Dublin Corporation's Storm Water Management Policy

the maximum allowable discharge rate from Proposed development to the existing Storm Sewer Ex Storm Manhole is

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

$Q_{BAR\ Rural/Urban} = 0.00108 \times (0.5)^{0.89} \times (1147)^{1.17} \times (0.3)^{2.17} \ast (29561/500000)$

| | | |
|---|---|---|
| $Q_{BAR\ Rural/Urban}$ | $=0.0096 m^3/s$ | = 9.60 L/s |
| Site Area | | = 2.956 hectares |
| **$Q_{BAR}$ per hectare** | **= 9.60 l/s / 2.956 hectares = 3.25L/hec** | |

***1 in 100 Year Storage Volume***

Volume into lagoon ($V_{in}$) = AREA x $C_v$ x R

Volume out of lagoon ($V_{out}$) = $Q_{BAR}$ x D(seconds)

Volume of Storage $V_s$ = $V_{in}$ - $V_{out}$

The position size and construction of the storm water storage area is as indicated in the drawings accompanying the Planning Permission Application drawings.

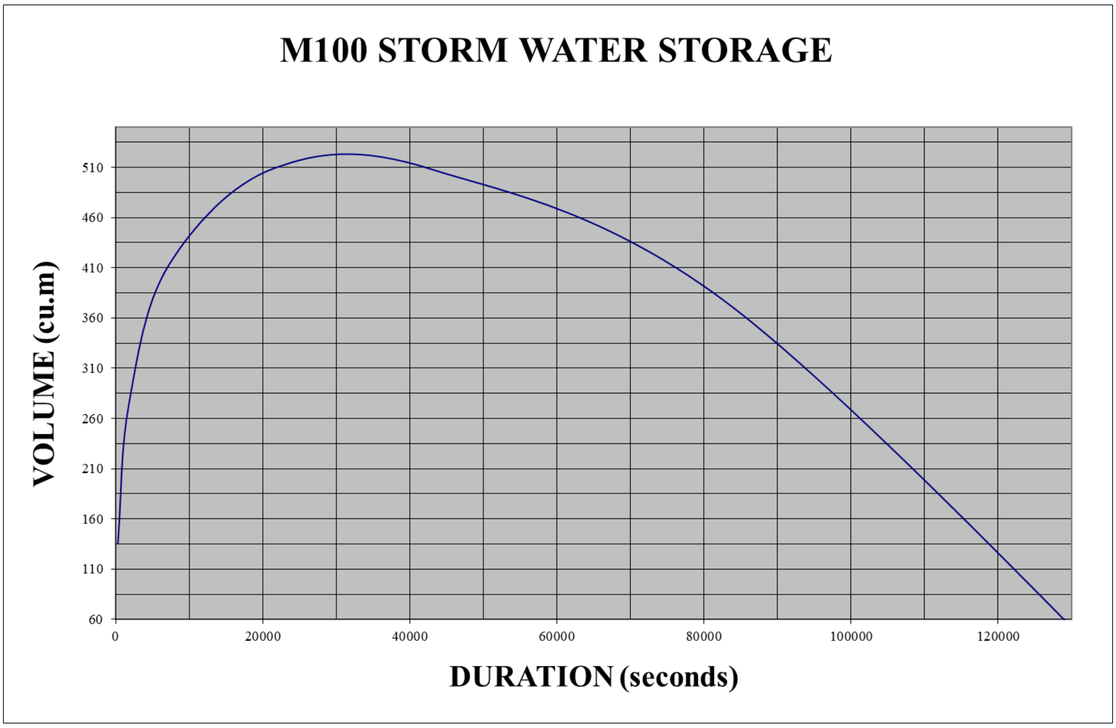
### 5.6.1 Met Eireann Rainfall Depths

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 168825, Northing: 75470,

| | Interval | | Years | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DURATION | 6months | 1year | 2 | 3 | 4 | 5 | 10 | 20 | 30 | 50 | 75 | 100 | 150 | 200 | 250 | 500 |
| 5 mins | 3.3 | 4.3 | 4.8 | 5.5 | 6.0 | 6.3 | 7.5 | 8.7 | 9.5 | 10.6 | 11.5 | 12.2 | 13.2 | 14.0 | 14.7 | N/A |
| 10 mins | 4.6 | 6.0 | 6.7 | 7.7 | 8.3 | 8.8 | 10.4 | 12.1 | 13.2 | 14.7 | 16.0 | 17.0 | 18.5 | 19.6 | 20.5 | N/A |
| 15 mins | 5.4 | 7.0 | 7.8 | 9.0 | 9.8 | 10.4 | 12.3 | 14.3 | 15.6 | 17.3 | 18.8 | 20.0 | 21.7 | 23.0 | 24.1 | N/A |
| 30 mins | 7.2 | 9.3 | 10.3 | 11.8 | 12.8 | 13.6 | 16.0 | 18.5 | 20.1 | 22.3 | 24.2 | 25.7 | 27.8 | 29.5 | 30.8 | N/A |
| 1 hours | 9.6 | 12.3 | 13.6 | 15.6 | 16.8 | 17.8 | 20.8 | 24.0 | 26.0 | 28.8 | 31.2 | 33.0 | 35.7 | 37.7 | 39.4 | N/A |
| 2 hours | 12.8 | 16.2 | 18.0 | 20.4 | 22.0 | 23.3 | 27.1 | 31.1 | 33.7 | 37.1 | 40.1 | 42.4 | 45.7 | 48.3 | 50.3 | N/A |
| 3 hours | 15.1 | 19.1 | 21.1 | 24.0 | 25.8 | 27.2 | 31.6 | 36.2 | 39.2 | 43.1 | 46.5 | 49.1 | 52.9 | 55.8 | 58.1 | N/A |
| 4 hours | 17.0 | 21.5 | 23.7 | 26.9 | 28.9 | 30.5 | 35.3 | 40.4 | 43.6 | 47.9 | 51.7 | 54.5 | 58.6 | 61.8 | 64.4 | N/A |
| 6 hours | 20.1 | 25.3 | 27.9 | 31.5 | 33.9 | 35.7 | 41.2 | 47.0 | 50.7 | 55.7 | 59.9 | 63.1 | 67.8 | 71.4 | 74.3 | N/A |
| 9 hours | 23.8 | 29.8 | 32.8 | 37.0 | 39.7 | 41.8 | 48.1 | 54.8 | 59.0 | 64.7 | 69.5 | 73.1 | 78.5 | 82.6 | 85.9 | N/A |
| 12 hours | 26.8 | 33.5 | 36.8 | 41.5 | 44.5 | 46.7 | 53.7 | 61.1 | 65.7 | 71.9 | 77.2 | 81.2 | 87.1 | 91.5 | 95.1 | N/A |
| 18 hours | 31.8 | 39.5 | 43.3 | 48.7 | 52.1 | 54.7 | 62.7 | 71.2 | 76.4 | 83.5 | 89.5 | 94.1 | 100.8 | 105.8 | 109.9 | N/A |
| 24 hours | 35.8 | 44.4 | 48.6 | 54.5 | 58.3 | 61.2 | 70.1 | 79.3 | 85.1 | 92.9 | 99.5 | 104.4 | 111.8 | 117.3 | 121.8 | 136.7 |
| 2 days | 45.2 | 55.2 | 60.1 | 66.9 | 71.2 | 74.5 | 84.5 | 94.9 | 101.4 | 110.0 | 117.2 | 122.7 | 130.7 | 136.7 | 141.6 | 157.7 |
| 3 days | 52.9 | 64.1 | 69.5 | 77.1 | 81.9 | 85.5 | 96.5 | 107.8 | 114.8 | 124.2 | 132.0 | 137.9 | 146.5 | 153.0 | 158.2 | 175.4 |
| 4 days | 59.8 | 72.1 | 78.0 | 86.2 | 91.4 | 95.2 | 107.1 | 119.3 | 126.8 | 136.7 | 145.1 | 151.3 | 160.5 | 167.4 | 172.9 | 191.1 |
| 6 days | 72.2 | 86.2 | 92.9 | 102.2 | 108.1 | 112.5 | 125.8 | 139.4 | 147.8 | 158.9 | 168.2 | 175.1 | 185.2 | 192.7 | 198.8 | 218.8 |
| 8 days | 83.3 | 98.9 | 106.3 | 116.6 | 123.1 | 127.9 | 142.5 | 157.4 | 166.5 | 178.6 | 188.6 | 196.1 | 207.1 | 215.2 | 221.8 | 243.3 |
| 10 days | 93.6 | 110.6 | 118.7 | 129.9 | 136.9 | 142.1 | 157.8 | 173.9 | 183.7 | 196.6 | 207.4 | 215.4 | 227.1 | 235.8 | 242.8 | 265.7 |
| 12 days | 103.3 | 121.7 | 130.4 | 142.4 | 149.9 | 155.4 | 172.3 | 189.4 | 199.8 | 213.5 | 225.0 | 233.5 | 245.9 | 255.1 | 262.4 | 286.6 |
| 16 days | 121.7 | 142.4 | 152.2 | 165.7 | 174.1 | 180.3 | 199.1 | 218.2 | 229.7 | 244.9 | 257.6 | 266.9 | 280.6 | 290.7 | 298.7 | 325.2 |
| 20 days | 139.0 | 161.9 | 172.7 | 187.5 | 196.7 | 203.6 | 224.1 | 244.9 | 257.5 | 274.0 | 287.7 | 297.9 | 312.7 | 323.6 | 332.3 | 360.8 |
| 25 days | 159.5 | 184.9 | 196.9 | 213.2 | 223.4 | 230.9 | 253.5 | 276.3 | 290.1 | 308.1 | 323.1 | 334.1 | 350.2 | 362.0 | 371.5 | 402.4 |

### 5.6.2 Storage tank Design - Phase 4

**M100 Storm, Flooding Potential Estimated from the Met Eireann Rainfall Data**



Storage Volume Required for 100 year event = 509m$^3$

Storm water Runoff generated from M100 Storm is estimated as **509m$^3$**.

The proposed attenuation storage allowing 10% for climate change is **560m$^3$**

The tank is proposed to be an attenuation tank which will receive storm water into the tank via Hydro carbon interceptors, Grit sumps & discharge via a Hydro brake flow control device to the existing open stream along the Ballhooley road.

It is proposed to accommodate the Attenuation storage area in the South Eastern side of the site.

**Area of Attenuation = 562.5m$^3$ (30m x 12.5 x 1.5m )**

### 5.6.3 Design & Analysis of Urban Drainage – Wallingford Procedure

#### Modified Rational Method

The method gives the peak discharge from the equation:

$$Q_p = CiA \qquad \ldots\ldots(1)$$

where $Q_p$ is the peak discharge

C is a dimensionless coefficient

i is the average rainfall intensity during the time of concentration

and A is the contributing catchment area.

Additional factors may be necessary to allow for the dimensions used. If $Q_p$, i and A are expressed in l/s, mm/hr and ha respectively, equation 1 becomes

$$Q_p = \frac{CiA}{0.36} = 2.78\,CiA \qquad \ldots\ldots(2)$$

#### Scope of the Method

The method may be used either to size diameters of pipes for a specified return period of flow in a storm sewer system of given layout and gradients, or to estimate peak discharges in an existing system for given rainfall conditions. It provides only a value of the peak runoff discharge; the hand calculation presented here cannot deal with sewer structures such as storm overflows. A computer version which can deal with storm overflows is available as part of the larger procedure. Networks incorporating more complex features such as storage tanks or pumping stations should be analysed using one of the hydrograph methods available.

Tests have shown[3] that the Modified Rational Method is as accurate for the determination of peak runoff discharge as some more sophisticated urban runoff methods. These tests were limited to urban catchments up to 150ha in area with times of concentration up to about 30 minutes and outfall pipe diameters up to about one metre. The slope and distribution of impervious area in these catchments were reasonably uniform. The accuracy of the method when applied to larger or more irregular catchments is not known, and therefore the method cannot be positively recommended outside these limits.

## 5.7 STORM SEWER DESIGN FOR 72NO UNITS:

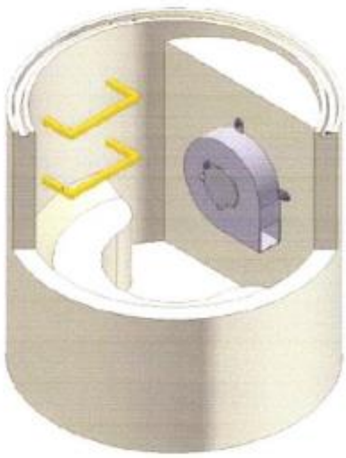
| Manholes | | Contributing Area | | Pipe | | | Full | | Time (mins) | | | Rainfall | Total | Prop. | Prop. | Design |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Area | Cum. Area | Dia | Length | Gradient | Velocity | Capacity | Entry | Flow | Conc. | Intensity | Runoff | Depth | Velocity | Velocity |
| | | (ha) | (ha) | (mm) | (m) | (1in X) | (m/s) | (l/s) | | | | (mm/hr) | (l/s) | | | (m/s) |
| S11 | S12 | 0.2780 | 0.2780 | 250 | 86.700 | 149 | 1.142 | 56.066 | 4.00 | 1.27 | 5.27 | 50 | 50.235 | 0.739 | 1.131 | 1.292 |
| S12 | S8 | 0.0001 | 0.2781 | 250 | 9.400 | 149 | 1.142 | 56.066 | 5.27 | 0.14 | 5.40 | 50 | 50.253 | 0.739 | 1.131 | 1.292 |
| S1 | S2 | 0.1319 | 0.1319 | 225 | 51.800 | 148 | 1.071 | 42.574 | 4.00 | 0.81 | 4.81 | 50 | 23.834 | 0.535 | 1.028 | 1.101 |
| S2 | S3 | 0.0439 | 0.1758 | 225 | 36.800 | 33 | 2.284 | 90.795 | 4.81 | 0.27 | 5.07 | 50 | 31.767 | 0.408 | 0.911 | 2.080 |
| S3 | S4 | 0.0350 | 0.2108 | 225 | 31.200 | 40 | 2.073 | 82.415 | 5.07 | 0.25 | 5.33 | 50 | 38.092 | 0.477 | 0.980 | 2.032 |
| S4 | S5 | 0.1066 | 0.3174 | 225 | 50.600 | 44 | 1.976 | 78.553 | 5.33 | 0.43 | 5.75 | 50 | 57.354 | 0.634 | 1.091 | 2.156 |
| S5 | S6 | 0.0238 | 0.3412 | 300 | 9.500 | 149 | 1.284 | 90.761 | 5.75 | 0.12 | 5.88 | 50 | 61.655 | 0.605 | 1.075 | 1.380 |
| S6 | S7 | 0.2026 | 0.5438 | 300 | 83.600 | 147 | 1.293 | 91.383 | 5.88 | 1.08 | 6.95 | 50 | 98.265 | 0.926 | 1.112 | 1.437 |
| S7 | S8 | 0.0709 | 0.6147 | 375 | 30.200 | 149 | 1.480 | 163.495 | 6.95 | 0.34 | 7.29 | 50 | 111.076 | 0.605 | 1.075 | 1.592 |
| S8 | S9 | 0.8928 | 0.8928 | 375 | 9.000 | 153 | 1.461 | 161.323 | 12.70 | 0.10 | 12.80 | 50 | 161.329 | 0.820 | 1.140 | 1.665 |

## 5.8 HYDRO BRAKE DETAIL

Hydro International CPM

stormwater

Hydro-Brake® Chamber User Manual



**Hydro-Brake® Chamber
and
Hydro-Brake® Flow Control**

*turning water around ...*

# The Hydro-Brake® Flow Control

## What is it?

The Hydro-Brake® Flow Control is a device for controlling liquid flow. It is self-activating, utilising the upstream hydraulic head to generate an air filled vortex within the centre of the casing.

## How it Works

The Hydro-Brake® Flow Control is a self-activating vortex flow control device that provides superior hydraulic performance over conventional flow regulators with patented features that reduce maintenance requirements.

Because Hydro-Brake® Flow Controls harness the energy inherent in the flow field they have no moving parts and no energy requirements. With clear openings up to 600% larger than conventional flow control devices, the risk of blocking is reduced to an absolute minimum.

In addition, the unique head/discharge characteristics can reduce storage volume requirements, lowering project costs.

The design consists of an intake, a volute and an outlet. The configuration is critical to ensure precise discharge control. Flow is directed tangentially into a volute to form a vortex. High peripheral velocities induce an air filled core with a resulting back pressure that reduces the discharge.

The Hydro-Brake® Flow Control out-performs conventional flow control devices. Its unique S-shaped head/discharge curve, which has been devised from extensive systematic modelling and field testing, comprises two distinct phases (see figure below). As the head increases a transition takes place from free flow (lower portion of the curve) to vortex controlled flow (upper portion of the curve).

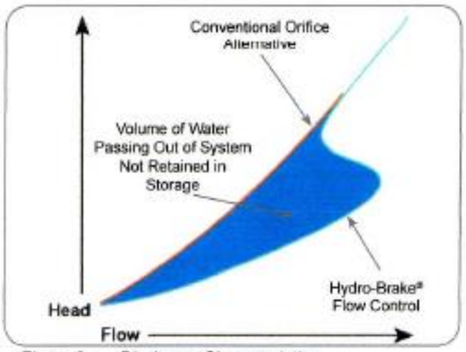



*Figure 3 - Discharge Characteristics*

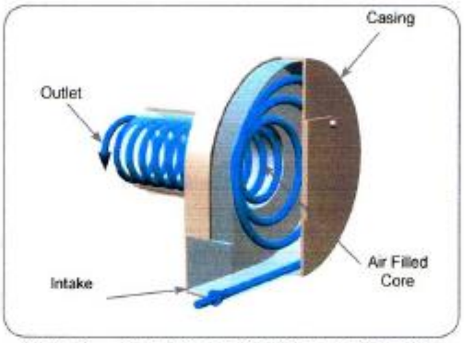



*Figure 4 - Flow Pattern within 'S' Type Unit Head/Flow Relationship*

The Hydro-Brake® Flow Control thereby achieves maximum design discharge rates at lower heads than conventional controls. As a result, storage requirements can be reduced by up to 30% (as shown below), significantly reducing project costs.

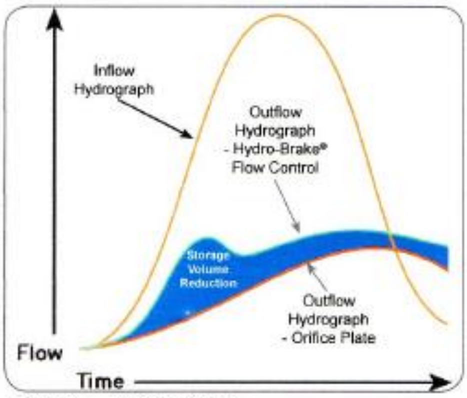



*Figure 5 - Storage Routing*

Head/discharge curves are available for every model type and size. In addition, the Hydro-Brake® Flow Control sizing engine is built into Micro Drainage - the industry-standard drainage design suite (WinDes) and the drainage area planning suite (WinDap). This allows the designer full control over unit selection ensuring the most efficient Hydro-Brake® Flow Controls are used on any given project.

4

# 6 APPENDIX A – HYDRO CARBON INTERCEPTOR

## The Conder Range of Bypass Separators

The Conder Range of Bypass Separators are used to fully treat all flows generated by rainfall rates of up to 6.5 mm/hr. Bypass Separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where only small spillages occur and the risk of spillage is small.

### Typical Applications

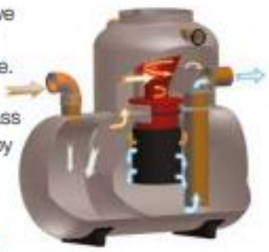
- Car parks
- Roadways and major trunk roads
- Light industrial and goods yards

### Features and Benefits

- Innovative design
- Compact and easy to handle/install
- Fully compliant to the Environment Agency's PPG3 guidelines
- Low product and install costs
- Full BSI certification
- Exceeds industry standards
- Easy to service
- Fully tested and verified with a range from CNSB 3 to CNSB 1000 (Class 1)

## Performance

Conder Bypass Separators have been designed to treat all flow up to the designed nominal size. Any flow in excess of the nominal size is allowed to bypass the separation chamber, thereby keeping the separated and trapped oil safe.



## How it Works

### Step 1

During the early part of a rain storm, which is a time of high oil contamination, all of the contaminated water flow passes through the sediment collection chamber and enters the separation chamber through a patented oil skimming and filter device.

### Step 2

All of the oil then proceeds to the separation chamber where it is separated to the Class 1 standard of 5 mg/L and safely trapped.

### Step 3

As the rainstorm builds up to its maximum and the level of oil contamination reduces significantly, the nominal size flow continues to pass through the separation chamber and any excess flow of virtually clean water is allowed to bypass directly to the outlet.

## Specifications

Larger models up to CNSB 1000 are available.

| Area Drained (m²) | Tank Code including Silt | Length including Silt (mm) | Silt Capacity (L) | Oil Storage Capacity (L) | Diameter (mm) | Height (mm) | Base to Inlet Invert (mm) | Base to Outlet Invert (mm) | Access (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 1667 | CNSB3s/21 | 1400 | 300 | 45 | 1026 | 2200 | 1730 | 1680 | 750 |
| 2500 | CNSB4.5s/21 | 1785 | 450 | 67.5 | 1026 | 1875 | 1270 | 1220 | 600 |
| 3333 | CNSB6s/21 | 1975 | 600 | 90 | 1026 | 1875 | 1270 | 1220 | 600 |
| 4444 | CNSB8s/21 | 2165 | 800 | 120 | 1026 | 1875 | 1270 | 1220 | 600 |
| 5555 | CNSB10s/21 | 2485 | 1000 | 150 | 1026 | 1875 | 1270 | 1220 | 600 |
| 8333 | CNSB15s/21 | 2670 | 1500 | 225 | 1210 | 2150 | 1450 | 1400 | 600 |
| 11111 | CNSB20s/21 | 3115 | 2000 | 300 | 1210 | 2150 | 1450 | 1400 | 600 |
| 13889 | CNSB25s/21 | 3555 | 2500 | 375 | 1210 | 2150 | 1450 | 1400 | 600 |
| 16667 | CNSB30s/21 | 3470 | 3000 | 450 | 1510 | 2690 | 1770 | 1720 | 750 |
| 22222 | CNSB40s/21 | 4040 | 4000 | 600 | 1510 | 2690 | 1770 | 1720 | 750 |
| 27778 | CNSB50s/21 | 4655 | 5000 | 750 | 1510 | 2690 | 1770 | 1720 | 750 |
| 33333 | CNSB60s/21 | 4415 | 6000 | 900 | 1880 | 3300 | 2025 | 1975 | 2 x 600 |
| 44444 | CNSB80s/21 | 5225 | 8000 | 1200 | 1880 | 3300 | 2025 | 1975 | 2 x 600 |
| 55556 | CNSB100s/21 | 6010 | 10,000 | 1500 | 1880 | 3300 | 2025 | 1975 | 2 x 600 |

Note: It is a requirement of PPG3 that you have a silt capacity either in your tank or in an upstream catch pit.

# 7 APPENDIX B – PRE CONNECTION ENQUIRY

**Irish Water Pre Connection Enquiry Ref Number: CDS21008672**

**Dear Customer,**

Thank you for submitting your Pre-connection Enquiry Form for Ballincroking, Dublin Pike, Cork. Your Irish Water reference number for your application is CDS21008672, which you can keep for your records.

## Next steps in your enquiry:

**Assessment of Enquiry:** Your enquiry is currently being assessed to confirm it is technically feasible; we will be in touch once this assessment has been completed. A significant level of analysis is required before we can provide a response. Two of a number of considerations are:

- A review of the available capacity in Irish Water infrastructure versus your requirements.
- The location for connection versus the distance to/from our network.

Where your requirements are of a significant nature for example, multiple properties or commercial/industrial developments, this work may take a period of time to complete.

**Getting a Confirmation of Feasibility:** If your application is technically feasible, we will issue you with a letter of "Confirmation of Feasibility". This will outline what capital works if any, may be required to upgrade the public infrastructure to cater for your development. **From receipt of your Pre-connection Enquiry, it takes on average 16 weeks to issue a Confirmation of Feasibility.**

**Design Layout Approval:** Where you are proposing to apply for a housing development (two or more properties), a **Statement of Design Acceptance** to your proposal will be required from Irish Water before applying for Planning Permission. Please therefore submit your designs for assessment to Irish Water to ensure they comply with our requirements, in advance of applying for Planning Permission.

**Connection Application:** Your Confirmation of Feasibility; which is a specific requirement to apply for Planning Permission through the Strategic Housing Development process, will assist you in obtaining your Planning Permission following which you may apply for your connection immediately.

If you have any further queries please contact us on **1800 278 278** or **+353 1 707 2828;** alternatively, you can visit www.water.ie/connections for more information. **Please note that the rates charged for 1850 numbers may vary across different service providers. Calls from mobiles may be more expensive.**

Please do not amend this subject line as it will help us deal with your response.

Yours sincerely,

Customer Service Advisor

# 8 APPENDIX C – DRAWING REGISTER

## Drawing Register.

**O'Shea Leader.**
38 Eastgate Drive
Little Island, Cork.
Tel: (021) 4297672

**Job Number:** 21-082

**Job Name:** Planning Permission at Coppenger Fields Phase 4, Ballincrokig, Co. Cork

**This Issue:** For Planning

| Site drawings: | Drawing Number: | Drawing Size; | Drawing Scale; | Current Revision: | 19 Jan 2022 |
|---|---|---|---|---|---|
| **Planning drawings:** | | | | | |
| **OSL Engineering Services** | | | | | |
| Site Layout with Levels | 21082-GA-01 | A1 | 1:500 | **A** | A |
| Site Layout with Foul Sewer | 21082-GA-02 | A1 | 1:500 | **A** | A |
| Site Layout with Storm Sewer | 21082-GA-03 | A1 | 1:500 | **A** | A |
| Site Layout with Watermain | 21082-GA-04 | A1 | 1:500 | **A** | A |
| Site Layout with Traffic Calming | 21082-GA-05 | A1 | 1:500 | **A** | A |
| Autoturn with Fire Tender | 21082-GA-06 | A1 | 1:500 | **A** | A |
| Autoturn with Refuse Truck | 21082-GA-07 | A1 | 1:500 | **A** | A |
| Foul Longitudinal Sections | 21082-GA-08 | A1 | As Shown | **A** | A |
| Storm Longitudinal Sections | 21082-GA-09 | A1 | As Shown | **A** | A |
| Attenuation Tank | 21082-GA-10 | A1 | 1:50 | **A** | A |
| Foul Details | 21082-GA-11 | A1 | NTS | **A** | A |
| Watermain Details (1 of 2) | 21082-GA-12 | A1 | NTS | **A** | A |
| Watermain Details (2 of 2) | 21082-GA-13 | A1 | NTS | **A** | A |
| Stream Crossing at Entrance | 21082-GA-14 | A1 | As Shown | **A** | A |
| Stream Crossing at Walkway | 21082-GA-15 | A1 | As Shown | **A** | A |
| Sight Lines | 21082-GA-16 | A1 | NTS | **A** | A |
| **Molloy Consulting Engineers** | | | | | |
| Outdoor Lighting Layout | PL2202-E-100-10 | A1 | 1:500 | **A** | A |
| Outdoor Lighting Report | | | | **A** | A |
| **Other documentation:** | TYPE | | | PAGES | |
| Engineering Planning Report | | | | 22 | A |
| Construction & Waste Management Plan | | | | 23 | A |
| **Issued to:** | | | | | |
| Cork City Council. | Planning Dept. | | Delivered By: | DA | x6 |