Hollystown - Kilmartin SHD Dublin 15

Report Title

Infrastructure Design Report

Client

Glenveagh Homes Limited



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1.0 INTRODUCTION

1.1 Background

The proposed development relates to at a site of c. 25.3 ha at the townlands of Hollystown, Kilmartin, Hollywoodrath, Cruiserath, Yellow Walls, Powerstown, and Tyrrelstown, Dublin 15, which includes lands in the former Hollystown Golf Course and lands identified under the Kilmartin Local Area Plan 2013 (as extended). The lands are bound by the R121 and Hollywoodrath residential development to the east, the under construction Bellingsmore residential development to the south and north, the former Hollystown Golf Course to the north, Tyrrellstown Educate Together National School, St.Luke's National School and Tyrellstown Community Centre to the west and south and the existing Tyrrellstown Local Centre to the south.

The proposed development will consist of the development of 548 no. residential units, consisting of 147 apartments/duplexes and 401 houses, ranging in height from 2 to 5 storeys and including retail/café unit, 2 no. crèches, 1 no. Montessori, 1 no. community hub, car and bicycle parking, open space, public realm and site infrastructure over a site area of c. 25.3 ha. On lands to the north of the application site (referred to as Hollystown Sites 2 & 3) the proposed development includes for 428 units consisting of 401 no. 2 and 3 storey houses and 27 no. apartments set out in 9 no. 3-storey blocks. On lands to the south of the application site and north of the Tyrellstown Local Centre (referred to as Kilmartin Local Centre) the proposed development includes 120 no. apartment/duplex units in 4 no. blocks ranging in height from 3 to 5 storeys. The local centre includes 2 no. crèches (including 1 standalone 2 storey crèche), 1 no. Montessori, a retail/café unit, and 1 no. community hub. The scheme also proposes a new vehicular access onto the R121 and an extension of the existing partially constructed Link Street which currently serves the Le Chéile Secondary School. A pedestrian / cycle linkage has also been provided from Site 2 &3 to Rathoath Road to the north which is zoned as Open Space. A pedestrian / cycle linkage has also been provided from Site 2 &3 to Rathoath Road to the north which is zoned as Open Space. Refer to Figure 1 below.



Figure 1: Site Location Plan (Source: EPA Maps)

The subject site is located on an undeveloped greenfield site with limited hardstanding areas that has an approximate site area of c.25.3 hectares. The site which is located within the administrative area of Fingal County Council and is zoned under 'Zoning Objectives RA – Residential Area' which is described within the Fingal Development Plan 2017 - 2023 as to "Provide for new residential communities subject to the provision of the necessary social and physical infrastructure". The lands which form the northern link towards Ratoath Road are zoned OS-Open Space to "Preserve and provide for open space and recreational amenities". The lands which form the proposed Kilmartin Local Centre are zoned LC-Local Centre to "Protect, provide for and/or improve local centre facilities".



Figure 2: Extract from the Fingal Development Plan 2017-2023 Proposed Development

Site 2&3 part of the development will comprise 428 no. residential units as follows:

- 27 no. 1 bed apartments
- 97 no. 2 bed houses
- 267 no. 3 bed houses
- 37 no. 4 bed houses

Local centre part of the development will comprise 120 no. residential units ranging from 3 to 5 levels high as follows:

- Block A 12 no. units
- Block B 34 no. units
- Block C 44 no. units
- Block D 30 no. units

The development includes 2 no. crèches (including 1 standalone 2 storey crèche), 1 no. Montessori, a retail/café unit, and 1 no. community hub and associated infrastructure including streets, footpaths, cycle paths and water services infrastructure (watermain and below and above ground drainage infrastructure), see Figure 3 below.



Figure 3: Indicative Site Location Plan (Source: ArcGIS)

1.2 Objectives

This report addresses the development's main infrastructure elements, including.

- Access and Roads
- Surface Water Drainage
- Foul Drainage
- Water Supply and Distribution

1.3 Location and Topography and Site Characteristics

<u>Site 2 & 3</u>

Part of the subject site forms the southern part of the grounds of the former Hollystown Golf Club, in the Tyrrelstown area of north west Dublin. The site is circa 5.5km north-west of the M50, and circa 3km west of the N2 and is located to the north of the existing Tyrellstown Local Centre. It is bounded to the north by the former golf glub lands, to the east by Hollywoodrath Road (R121), to the south by "Bellingsmore" Development (constructed by the applicant) and to the west by undeveloped lands.

The site slopes generally in a north-westerly direction. The majority of Site 2 is located within the former golf course lands, which has natural undulations and landscaping features typical of a golf course, including an internal network of open drains and culverts. An open drain forms the boundary between Sites 2 and 3 and continues in a northerly direction where it connects to an open drain along the north eastern and north western boundaries of Site 3. This open drain continues westwards before connecting to the Pinkeen East Stream circa 1200m to the west. There is a dry drain along the western boundary of Site 3.

There are overhead ESB cables traversing the northern portion of the site, with an associated sterilisation zone of 40m (20m either side of the ex 110kV lines).

Local Centre

The site is bound by residential developments to the west and by Tyrrelstown Local Centre, which comprises a mix of retail and commercial units with office and residential above, to the south. To the north is another residential development, Bellingsmore, and north west are several schools while the east of the site is bound by the R121.

The lands are within the jurisdiction of Fingal County Council's Development Plan, 2017-2023. They are zoned 'LC', Local Centre, to 'protect, provide for and/or improve local centre facilities' as well as they are part of the `MP', Masterplan Area, 12.B.

The site is predominantly green-field with a road that connects Tyrrelstown Town Centre and Tyrrelstown Educate Together School currently crossing the site in a north south direction.

There is an existing ditch that meanders from east to west through the local centre site which appears to take road drainage from the R121. The ditch is currently culverted before entering the site from the east and is also culverted under the existing school access roundabout. The ditch flows to the west of the site and connects to field drainage that discharges to the Pinkeen River to the west of the site location as shown in Figure 5 below. It is proposed to culvert an additional section of the ditch to provide a regularised development and the ditch is expected to provide a suitable surface water discharge point for this portion of proposed development.

Overhead ESB cables also traverse this site -220kV with associated 30m setback zone each side of the centreline of the power line.

A topographical survey of the site is provided as a background to the road layout drawings 170182-DBFL-RD-SP-DR-C-1004 to 170182-DBFL-RD-SP-DR-C-1011.

1.4 **Pre-Application Consultation**

As part of the pre-application process, FCC Water Services Section prepared two reports on the pre-application submissions for the Hollystown Sites 2 & 3 (An Bord Pleanála Ref. No. ABP-309926-21) and for the Kilmartin Local Centre (An Bord Pleanála Ref. No. ABP-309783-21). We note the responses to the Transportation Section are included in the TTA report

submitted separately as part of this planning application. The Water Services reports identified a number of items to be addressed in the final submission. The following summarises the items raised within the FCC reports and how these have been addressed within the final planning application:

Hollystown Sites 2 & 3 (ABP Ref. No. ABP-309926-21)

a. The general drainage details exclude individual, private water butts. Although the benefits of water butts are limited, it is generally considered good practice to include these in all new developments

As requested, water butt details have been provided for individual dwellings. Refer to DBFL Drawing 170182-DBFL-CS-SP-DR-C-5301 submitted as part of the application

b. There appears to be a larger scope for roadside swales than presently indicated on the layout drawings. Ditto bio-retention and drainage integrated tree-pits.

We have reviewed the scope of swales and provided as have increased to provide as much as allowable along the link streets while taking into account the location of trees in co-ordination with the Landscape Architect. As requested we have also provided a number of tree pits / bio-retention areas throughout the scheme. Refer to DBFL Drawings 170182-DBFL-CS-SP-DR-C-1004 to 1007 and 170182-DBFL-CS-SP-DR-C-1011 submitted as part of the application.

c. Detention basin inlet and outlet structures should be located as far away from each other in order to maximise natural infiltration, filtration, etc. Unsightly and overbearing in/outlet structures should be avoided where possible.

Noted. Inlet and outlet structures have been amended accordingly. Refer to DBFL Drawings 170182-DBFL-CS-SP-DR-C-1004 to 1007 and 170182-DBFL-CS-SP-DR-C-1011 submitted as part of the application.

d. The applicant should note that Stormtech units are generally not Taken-in-Charge. However it is acknowledged that their use may be justified in certain situations. To this extent the applicant is requested to prepare a comparative review of Stormtech v natural drainage stone with regards to each of the four areas where underground attenuation storage is being proposed. Similarly there may be overshadowing benefits associated with using Stormtech elsewhere in

order to provide for more natural detention depressions. This should be investigated and discussed with Parks and Operations.

Generally detention / infiltration basins, swales, tree pits are provided throughout the vast majority of the scheme as agreed with both FCC Water Services and Parks Departments. As noted above there are 4 areas where underground storage has been provided. We have proposed a stone build-up underneath the 2Nr Swales / Basins along the western boundary of Site 3. This is due to the narrow space available here and the fact that we could provide sufficient storage using the stone build-up in this area. In the other 2 areas we have chosen the 2Nr Stormtech Geo-cellular attenuation systems as opposed to natural drainage stone due to the fact that these systems have a much higher porosity than natural stone and, therefore, require significantly less land take. It is our opinion, that the use of stone for underground storage of surface water in these higher volume areas is not a sustainable method of storing surface water, due to the volume of material to be excavated, disposed of and the volume of material to be imported and the maintenance of same. The volume of stone and area of the system required would be over twice as much for the stone build-up as opposed to Stormtech. The maintenance of the Stormtech Geo-Cellular Attenuation Systems is also much simpler than that of natural drainage stone as outline below. Also, If we were to provide basins in these areas, we would end up with very deep unusable open space areas that would need to be fenced off.

In terms of maintenance, 'Stormtech' units are easily inspected and maintained to assure a properly functioning stormwater system. Inspection is through a manhole or inspection port on the 'Isolator Row'. Inspection ports allow inspection from the surface without the need for confined space entry. If sediments are found to have accumulated to a depth of 76mm, cleanout of the 'isolator row' using 'JetVac' maintenance is required. As noted above, underground storage using stone cannot be inspected or easily maintained, i.e., any build-up of silts is not visible and cannot be removed without excavating and removal of the system.

It should also be noted that 'Stormtech' units are Certified, are used industry wide and are routinely taken in charge by Local Authorities. They are designed to provide treatment of water through the removal of contaminants (CIRIA SuDS Manual 2015) and is a recognised SuDS feature. The Isolator row in the 'Stormtech' unit is a first-flush treatment device and the 'Stormtech' unit itself, is a SuDS Infiltration System as defined in the GDSDS.

e. There is a general concern regarding the shape, depth and proximity of basins to footpaths, roads and structures. The applicant is requested to prepare detailed green/blue drawings and also sections demonstrating the above relationships.

As agreed with FCC Parks and Water Services we have emended the shape of the basins to ensure that the side slopes of the basins are max 1 in 5. As requested, we have also provided a 2m flat area at the top of each basin to allow for grass cutting. Please refer to DBFL Drawings 170182-DBFL-CS-SP-DR-C-1004 to 1007 and 170182-DBFL-CS-SP-DR-C-1011 for plans and DBFL Drawings 170182-DBFL-CS-SP-DR-C-5301 to 5307 for sections which are submitted as part of the planning application.

f. The drainage design does not allow for any storage deduction due to natural infiltration. Although this results in a greater safety margin with regards to storage provision, if may benefit the layout if this is being considered.

To err on the side of caution an infiltration rate of zero has been assumed to ensure no attenuation areas are undersized. Going forward with the scheme additional infiltration tests will be undertaken at attenuation areas prior to construction.

Kilmartin Local Centre (ABP Ref. No. ABP-309783-21)

2. Whilst the surface water drainage strategy is generally acceptable the proposal still incorporates a significant amount of underground attenuation. The use of underground storage should be avoided. The applicant shall consider increasing the capacity of the other SUDS systems elsewhere to reduce further the requirement for underground attenuation.

The Local Centre has been split into 3Nr Catchments, refer to Figure 10 in Section 3.3.2 of this report. Catchment 2 takes up the majority of the subject site and all attenuation is above ground in this location. Green roofs, filter drains, permeable paving, tree pits are also provided here. For Catchment 1 and 3 and element of underground storage is unavoidable. However, we would note that we have maximised the above ground storage throughout the entire subject site, we have provided green roofs for all buildings, we have provided tree pits, permeable paving, petrol interceptors, and flow control devices for all catchments.

3. the applicant is requested to consider the retention of the existing open ditch on the eastern part of the site. There may be an opportunity to better utilise this open ditch for an attenuation feature as well as creating a corridor for bio-diversity and amenity in accordance with the principles of sustainable drainage.

The existing ditch provides an outfall for road drainage from the R121. The ditch is currently culverted before entering the site from the east and is only open for a short distance before

re-entering a culvert under the existing school access roundabout. The ditch then flows to the west of the site and connects to field drainage that discharges to the Pinkeen River to the west of the site. It is proposed to culvert the short section of the open ditch to provide access to Block B and C and provide a regularised development. The existing ditch is unsuitable for attenuation as it is currently taking surface water from upstream which would occupy any attenuation volume. Separate attenuation is provided for the proposed development to mitigate flood risk. We also note that the ditch appears to have been previously diverted as part of previous development works and it noted to have "No Eco Benefit" in Appendix B of the Kilmartin LAP SUDS Strategy.

2.0 ACCESS AND ROADS

2.1 Overall Road and Access Layout

There are three proposed vehicular access points proposed to serve the subject development, as indicated in Figure 4 below. Access Point 1 is provided at the secondary link street connecting site 2 to the R121, and access Point 2 is via an extension of the existing primary link street (referred to as Hollystown Road) into Site 3. The primary link street is continued through Site 3, up to the western boundary, enabling future onward connections to adjacent zoned lands. Access Point 3 is at the new link street extension connecting Local Centre with Hollystown Road.



Figure 4: Proposed Vehicular Access Points

2.2 Road Design

The proposed development's internal streets are designed in accordance with the 'Design Manual for Urban Road and Street (DMURS') and a DMURS Compliance Statement is included with this pre planning submission.

A *Traffic and Transportation Assessment* and *Mobility Management Plan*, have been prepared by DBFL Consulting Engineers and are included as standalone documents.

3.0 SURFACE WATER DRAINAGE

3.1 Existing Surface Water Arrangement

<u>Site 2 & 3</u>

There is an existing surface water network within Site 2 comprising constructed open drains within the former golf club lands which are piped and culverted locally to facilitate crossing points. There is an existing open drain running in a northerly direction between sites 2 and 3 connecting to the open drain along the northern boundary of Site 3. This open drain continues along the boundary of site 3, as indicated in Figure 5 below, towards the Pinkeen River further west. Refer to Figure 6 below for the location of the Pinkeen East River.

Local Centre

The existing site is predominantly greenfield excluding the existing access road, and the topography of the site generally falls from the south-east corner towards the north-west corner. Currently, the site is drained by a surface water ditch which traverses the site from east to west along its northern boundary before connecting to an existing ditch system, which discharges to the Pinkeen River further west (refer to *Figure 6*).

Surface water runoff from the existing road connecting Tyrrelstown Local Centre and Tyrrelstown Educate Together school is collected via road gullies into the existing 225mm diameter pipe running under the road. The planning documents for the school and the road submitted under FW10A/0137, show the runoff from the road being attenuated within the school area and connected to the existing surface network to the north-west of the proposed development site.

There is an existing 600mm diameter surface water sewer running along the western boundary of the site which outfalls to the North West.



Figure 5: Existing Surface Water Flow Paths



Figure 6: Location of Pinkeen East River (EPA)

Within Site 2, the golf course drain as shown in Figure 7, traverses the site from east to west before connecting to the existing ditch system which forms the boundary between Site 2 and Site 3, which discharges to the Pinkeen River further west (refer to Figure 6). This golf course drain accommodates surface water runoff from the subject site (which will be developed as part

of this application), and some road runoff from a section of Church Road / Hollywoodrath Road, via road gullies at the existing gated entrance. The drain also accommodates attenuated surface water runoff from Hollywood Rath development to the south east, currently under construction under FW14A/0108. The planning documents for Hollywood Rath submitted under FW14A/0108, indicate a maximum attenuated flow rate of 83l/s discharging to the ditch. There is also a small water feature associated with the golf course connecting to the drain, with piped controls which will be maintained.



Figure 7: Existing Golf Course Drain - Site 2

The existing surface water detention basin for Bellingsmore Residential Development to the south is also located within Site 3.

3.2 Proposed Surface Water Drainage

3.2.1 General

Site 2&3

To maximise the development potential of Site 2, it is proposed to re-route the existing open channel Golf Course Drain to the north within the ESB sterilisation zone, as indicated on DBFL drawings no. 170182-DBFL-CS-S1-DR-C-1004 to 170182-DBFL-CS-S1-DR-C-1007. Sections of this re-routed drain will be piped and culverted to facilitate crossing points. Refer to Section 3.2.2 for further details.

The existing open drain which forms the boundary between Site 2 and 3 will be maintained with a buffer of circa 10m maintained on both sides.

The existing open drain along the north eastern and north western boundaries of Site 3 will also be maintained with a 10m buffer maintained on the development side.

It is proposed to incorporate the surface water storage requirements for Bellingsmore Residential Development into the scheme design for Site 3, in the form of two interlinked detention basins adjacent to the south east boundary of Site 3. The existing detention basin for Bellingmore will be removed to facilitate this arrangement with the existing storage volume of

circa 810m³ for a 1% AEP event accommodated in the relocated basins as a minimum. A new surface water outfall will be constructed to the same receiving water (the open drain which forms the north eastern boundary of Site 3).

Local Centre

The existing ditch, existing road and the new road divide the site into three surface water catchments (Figure 10 below) for the purposes of surface water management. It is proposed to discharge attenuated surface water runoff from each catchment to the surface water ditch traversing the site from east to west.

3.2.2 Golf Course Drain within Site 2

The existing golf course drain within Site 2 will be treated in two different ways, (i) intercepted and piped and (ii) re-routed to the north to maximise development potential of the site. These scenarios are outlined below;

(i) Intercepting Existing Flows and Culverting of the Drain

Existing pipes outfalling to the golf course drain adjacent to Site 2 development entrance are redirected via a new surface water pipe (600mm diameter) to the re-routed open drain to the north. This piped section is designed to accommodate the existing discharges to it as outlined in Section 3.1 and an attenuated flow rate of 4.3l/sec from Site 1 (currently under consideration for planning permission with Fingal County Council). The section of the existing open drain which is made redundant following re-directing the pipes will be filled in.

Microdrainage calculations confirming the capacity of the 600mm diameter pipe to accommodate flows are included in **Appendix A**.

(ii) Re-Routing of the Golf Course Drain

To optimise the site layout including the public open space, it is proposed to re-route circa 300m of the golf course drain which traverses the site. The re-routed section of the drain would move approximately 60m further north, within the sterilisation zone beneath the overhead ESB power lines.

The re-routed section of the drain will match the existing drain characteristics (to ensure that the existing capacity is maintained) with short, piped sections reinstated to match the existing scenario and to provide crossing points.

The capacity of the existing and the re-routed golf course drain is included in **Appendix A**.

3.2.3 Riparian Corridors

Riparian corridors of 10m are proposed along the existing open drain between Sites 2 and 3 and along the open drains along the northern boundary of Site 3.

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3.3 Proposed Surface Water Drainage

3.3.1 General

Attenuated surface water runoff from Site 2 will discharge to the re-routed golf course drain along the northern boundary of Site 2.

Attenuated surface water runoff from Site 3 will discharge to the existing open drain along the northern boundary of Site 3.

Attenuated surface water runoff from Local Centre will discharge to the existing surface water ditch traversing the site from east to west.

3.3.2 Management of Surface Water Runoff

Site 2 & 3

To manage surface water runoff from Site 2, the site will be split into 2 surface water catchments, Catchment "1" and Catchment "2". Similarly, to manage surface water runoff from Site 3, the site will be split into 5 surface water catchments, Catchments "1" to "5". Refer to Figures 8 and 9 for proposed surface water catchments.



Figure 8: Site 2 Surface Water Catchments



Figure 9: Site 3 Surface Water Catchments

Surface water runoff from Sites 2 and 3 will be attenuated to Qbar "Greenfield Runoff" as required in the GDSDS, with runoff exceeding the allowable outflow stored on site for up to a 1% AEP (Annual Exceedance Probability) event, plus 20% for climate change.

Where possible, detention basins have been shaped to aesthetically fit within the scheme design and incorporated into the landscape design to maximise the usability of open space.

Local Centre

To manage surface water runoff from Local Centre, the site will be split into 3 surface water catchments, Catchment "1" to "3". Catchments "1" to "3". Refer to Figure 10 for proposed surface water catchments.



Figure 10: Local Centre Surface Water Catchments

Surface water runoff from Sites 2 and 3 will be attenuated to Qbar "Greenfield Runoff" as required in the GDSDS, with runoff exceeding the allowable outflow stored on site for up to a 1% AEP (Annual Exceedance Probability) event, plus 20% for climate change.

3.3.3 Sustainable Drainage Systems (SuDS)

SuDS features will be integrated into the surface water drainage network for the proposed development, with the objective of controlling the quantity of surface water runoff, managing the quality of runoff to prevent pollution, and creating and sustaining local ecosystems. The four main categories of benefits that can be achieved by SuDS are water *quantity*, *quality*, *amenity*,

and *biodiversity*. SuDS features can take many forms both above and below ground and can include planting and proprietary / manufactured products.

SuDS features deliver high quality drainage while supporting urban areas to cope better with severe rainfall now and in the future. They also counteract some of the impacts on our water cycle caused by increased urbanisation, such as reduced infiltration, which can result in diminished groundwater supplies. They are used in conjunction with traditional drainage systems, and the use of SuDS features are a requirement of the GDSDS (Greater Dublin Strategic drainage Study).

The SuDs features proposed for the development include the following:

- Swales within the link street grass verges;
- Permeable paving within private curtilage parking;
- Bioretention areas;
- Tree Pits;
- Detention basins;
- 'Hydrobrake' flow controls;
- Petrol Interceptors;

The proposed surface water drainage layout for the scheme is detailed in DBFL drawing nos. 170182-DBFL-CS-SP-DR-C-1004 to 170182-DBFL-CS-SP-DR-C-1011.

3.3.4 Surface Water Attenuation

Surface water runoff volumes from the development is attenuated to flowrates equal to the greenfield runoff (Q_{bar}), in accordance with the recommendations of the GDSDS. Surface water run-off from catchment areas will be attenuated using a vortex flow control device (Hydrobrake or equivalent) within the constructed detention basins.

Q_{bar} is calculated using the *Institute of Hydrology* equation, as recommended in the Greater Dublin Strategic Drainage Study (GDSDS), as follows:

$$Q_{bar [rural]} = 0.00108 x AREA^{0.89} x SAAR^{1.17} x Soil^{2.17}$$

$$Q_{bar[rural][50ha]} = 0.11 \frac{m^3}{sec} = 110 \ l/s \ for \ 50ha = 2.2 \ l/ha$$

Where:

• Q_{bar[rural]} is the mean catchment annual flow from a 50 ha rural catchment in m³/s;

- SAAR is the standard average annual rainfall = 823mm.
- SOIL is the soil index, with 5 soil types used and SPR values (standard percentage runoff) applied to each soil type.

The SPR values for the 5 soil types are as follows:

Soil 1 = 0.1; Soil 2 = 0.3; Soil 3 = 0.37; Soil 4 = 0.47; Soil 5 = 0.53;

A SPR value of 0.3 (Soil Type 2) is applied for the subject site. Soil type 2 is chosen based on site specific conditions, as confirmed using preliminary site investigations. A copy of the "Ground Investigations Report", (by Ground Investigations Ireland) is included in Appendix G.

The calculated allowable outflow rate of 2.2l/s is applied to each surface water catchment with the storage volume calculated using the Source Control of Microdrainage and modelled in the Network module of Microdrainage. A summary of the surface water catchments and their associated Qbar rate and storage requirements are summarised in Table 1 below:

Refer also to *Appendix B* for details of the allowable outflow calculations.

3.3.5 Surface Water Storage

It is proposed to store runoff for a 1% AEP (Annual Exceedance Probability) storm event plus 20% allowance for climate change in detention basins, linear swales and underground Stormtech tanks. The storage requirement has been calculated using the *Source Control* module of *Microdrainage* and modelled using the *Network Module*, taking into consideration the impermeable area of the surface water catchment, design invert levels, ground levels and depth and type of storage system. A summary of the allowable outflow rates and provided storage volumes for each surface water catchment is included in Table 1.

Site 2&3

	Sit	e 2	Site 3				
Sub Catchment Name	2.1	2.2	3.1	3.2	3.3	3.4	3.5
Area (ha)	1.63	4.24	2.61	1.22	0.73	1.03	1.37
Total (ha)	5.	87			6.96		
Q _{bar} (I/sec)	3.6	9.35	5.7	2.69	1.6	2.28	3.03
Q _{bar} (l/sec/ha)	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Q _{bar} Total (I/s)	12	.95	15.3				
Allowable Outflow (I/s)	3.60	9.35	5.70	¹ (4.70 ² 5.) N/A) 30	2.28	² 2.00
Allowable Outflow Total (I/s)	12	.95			15.3		
Total Storage Required (m ³)	433.9	1075.9	723.3	289.5	293.6	318.6	639
Total Storage Provided (m ³)	471.43	1282.64	738.0	328.65	354.92	318.6	846.79
Overground Detention Basin	471.43	1282.64	290.0	107.65	132.92	-	846.79
Underground Structure	х	х	448	221	222	318.6	-
Total Storage Provided (m ³)	175	4.07			2586.96		

Table 1: Surface Water Catchment Summary

¹The allowable outflow from Surface Water Catchment 3.2 is 4.7l/s which flows into the downstream attenuation structure for Surface Water Catchment 3.3 with the hydrobrake flow control for Catchment 3.3 set at 5.3l/s.

²The allowable outflow from Surface Water catchment 3.5 is adjusted to 2l/s instead of 3.03l/s with the additional 1.03l/s applied to Surface Water Catchments 3.2 and 3.3 with the allowable outflow from Catchments 3.2 and 3.3 set at 5.30.

Local Centre

Sub Catchment	1	2	3			
Name						
Area (ha)	0.214	0.710	1.46			
Total (ha)		2.384				
Qbar (I/sec)	0.5	1.6	3.22			
Qbar (l/sec/ha)	2.2	2.2	2.2			
Qbar Total (I/s)		5.32				
Allowable Outflow	2	2	3.22			
(I/s)						
Allowable Outflow	7.22					
Total (I/s)						
Total Storage	45.7	239.1	266.7			
Required (m3)						
Total Storage	57	280	290.0			
Provided (m3)						
Overground	-	-	290.0			
Detention Basin						
Underground	57	280	-			
Structure						
Total Storage	57	280	266.7			
Provided (m3)						

Refer to **Appendix C** for Microdrainage surface water storage Source Control calculations and Network simulation results.

Detention basins will remain unlined to allow for filtration through the wetted base and sides. However, to ensure adequate provision of attenuated volumes within each detention basin, no allowance for infiltration is assumed in the storage calculations. Detention basin side embankments will be constructed to a minimum side slope of 1:5 (V:H) as requested by Fingal County Council.

3.3.6 Surface Water Storage Bellingsmore Development (FCC Ref FW13A/0088 and PL06F.243395

It is proposed to incorporate the surface water storage requirements for Bellingsmore Residential Development into the scheme design for Site 3, in the form of two interlinked detention basins adjacent to the south east boundary of Site 3. The existing detention basin for Bellingmore will be removed to facilitate this arrangement with the existing storage volume of circa 810m³ for a 1% AEP event accommodated in the relocated basins as a minimum. A new surface water outfall will be constructed to the same receiving water (the open drain which forms the northern boundary of Site 3).

3.3.7 Treatment Train

SuDS drainage designs collect and treat surface water runoff as close to source as possible. Surface water runoff is managed using a treatment train approach. This ensures that the quantity and quality of surface water runoff are addressed through the techniques of *Pollution Prevention, Source Control, Site Control and Regional Control.*

The treatment train approach divides the drainage elements of the development into sub catchments with different drainage characteristics and land uses, such as a dwelling with permeable paving.

The treatment train approach applied to the proposed development, include in curtilage SuDS comprising permeable paving in driveways and roof runoff discharging to the stone layer under the permeable paving. A typical detail of curtilage areas is shown in Figure 11.



Figure 11: Typical Section through Permeable Paving

Runoff from roads and other hard surfaces such as paths and cycle paths are directed to swales and tree pits where possible. All runoff enters unlined detention basins with hydrobrakes in which attenuated storm volumes are temporarily stored. Restricted baseflow from detention basins through the hydro brakes enter petrol inceptors and grease traps before finally discharging into natural drainage lines.

3.3.8 Interception Storage

To prevent pollutants or sediments discharging into water courses the GDSDS requires *"interception storage"* to be incorporated into the development. The volume of interception required is based on 5mm of rainfall depth from 80% of the runoff from impermeable areas as

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defined in the GDSDS. Refer to Table 2 below for details of interception required and interception provided.

The interception volume attributable to each SuDs feature consists of the volume of water that can infiltrate to the ground, what will evaporate into the atmosphere and what can transpire through plants and vegetation. Additionally, there will be some loses of water due to absorption and wetting of stone and soil media.

Site Summary								
Site	Site	2			Site 3			
Sub Catchment	2.1	2.2	3.1	3.2	3.3	3.4	3.5	
Impermeable Area (ha)	0.82	2.069	1.287	0.666	0.36	0.553	0.719	
Interception Requirements								
Site	Site	2			Site 3			
Interception Storage Required (m ³)	32.82	82.76	51.48	26.64	14.48	22.12	28.76	
(5mm of 80% Impermeable Area)								
Total Interception Storage Required (m ³)	115.	58	143.48					
Total Interception Storage Required (m ³)				259.06				
		i	nterception Pr	ovided				
Swales 478.3m x 1.2m	In accordance	In accordance with Table 24.6 of CIRIA SuDS Manual 2015, the base of the swale can drain up to 25 x the base area of the swale i.e. 14,349m ² of road area;						
Volume (m ³) Provided in Permeable Paving 790 spaces (300mm Deep with 30%	Interception p property it ser	rovided in pe ves as per Ta	C rmeable paving able 2.4 of CIRI	irca 850m³ is assumed A SuDS Mar	to take itself nual 2015;	and the roof an	ea of the	
Porosity)								

Table 2: Surface Water Interception Storage

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170182-DBFL-XX-XX-RP-C-007

December 2021

Site Summary								
Site		Local Centre						
Sub Catchment	1 2 3							
Impermeable Area (ha)	0.139	0.443	0.537					
	Interception Re	quirements						
Interception Storage Required (m³) (5mm of 80% Impermeable Area)	5.56	17.72	21.48					
Total Interception Storage Required (m ³)	44.76							
	Interception Provided							
Volume (m ³) Provided in Permeable Paving 39 spaces (300mm Deep with 30%	49.05 Interception provided in permeable paving is assumed to take itself and the roof area of the property it serves as per Table 2.4 of CIRIA SuDS Manual 2015;							
Porosity)								

Table 3: Surface Water Interception Storage

3.3.9 Treatment Volume

The GDSDS requires that a "treatment volume" (Vt) be provided to prevent any pollutants or sediments entering river systems. Additionally, a 'treatment train' stormwater runoff management system is required. According to CIRIA document C697 the following treatment train approach is necessary:

- Surface Water Runoff from Roofs 1 Treatment Stage
- Surface Water Runoff from Roads 2 Treatment Stages
- Surface Water Runoff from other Paved Areas excluding Roads 1 Treatment Stage

The treatment volume is based on treatment 15mm of rainfall depth from 80% of the runoff from impermeable areas as defined in the GDSDS. Treatment volumes are summarised in Table 3 below:

	Sit	e 2	Site 3				
Sub Catchment	2.1	2.2	3.1	3.2	3.3	3.4	3.5
Gross Area (ha)	1.63	4.24	2.61	1.22	0.73	1.03	1.37
Impermeable Area (ha)	0.82	2.069	1.287	0.666	0.36	0.553	0.719

December 2021

Treatment Volume Required (m ³) (15mm of 80% Impermeable Area)	98.46	248.28	154.44	79.92	43.20	66.36	86.28
Total Volume Required (m ³)	346	6.74			430.2		

Table 4: Treatment Volume Requirements

Local Centre

Sub Catchment	1	2	3			
Gross Area (ha)	0.214	0.71	1.46			
Impermeable Area	0.139	0.443	0.537			
Treatment Volume	16.68	53.16	64.44			
Required (m3)						
(15mm of 80%						
Impermeable Area)						
Total Volume	134.28					

Table 5: Treatment Volume Requirements

While it is not necessary to provide treatment storage as interception storage is provided as indicated in Table 2, treatment volumes will be provided by infiltration of the unlined detention basins, and below ground stone layers.

3.3.10 Compliance with Surface Water Policy

Surface water management for the proposed development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of Fingal County Council. The guidelines require the following main 4 main criteria to be provided by the development's surface water design.

- Criterion 1: River Water Quality Protection satisfied by providing interception storage, treatment of run-off within the SUDS features. This is satisfied using permeable paving, swales, tree pits and petrol interceptors.
- Criterion 2: River Regime Protection satisfied by attenuating run-off with flow control devices prior to discharge to the outfall.

- Criterion 3: Level of Service (flooding) for the site satisfied by the Site being outside the 1000 year coastal and fluvial flood levels and extents. Pluvial flood risk addressed by development designed to accommodate surface water runoff from a 100-year period storm (1& AEP) plus climate change (20%) as per the recommendations of the GDSDS. Planned flood routing for storms greater than 100-year return period level considered in design and development run-off contained within site.
- Criterion 4: River flood protection attenuation provided within the SuDS features.

3.4 Surface Water Drainage Design Standards

3.5.1 General

Surface water drainage for the development is designed using the recommendations of the GDSDS, EN752 and BS8301:1985. The parameters applied to the design of the surface water drainage system are included in Table 5:

Drainage Design Parameters			
Return period	2 years		
Surcharge Check	1%		
Separation between TWL Storage System 1% Storm event	500mm		
Minimum time of entry	4 minutes		
Pipe Friction (Ks)	0.6 mm		
Minimum Velocity	1.0 m/s		
Standard Average Annual Rainfall	823mm		
M5-60	16.2mm		
Ratio r (M5-60/M5-2D)	0.272		
Climate Change	20% for rainfall intensities.		

Table 5: Drainage Design Parameters

Impermeable areas were calculated for each catchment area by applying the following runoff coefficients as per Table 6 below:

Type of Surface	Runoff Coefficient
Roofs (Traditional)	1.0
Roofs (Suds)	0.6
Roads (Traditional):	1.0
Roads (SuDs)	0.6
Paths (Traditional)	1.0
Permeable Paving (SuDs)	0.5
Public Open Space	0.3
Private Gardens/ hard & soft Landscaping	0.3
Remaining Green Areas	0.3

Table 6: Runoff Coefficients

A breakdown of the impermeable areas contributing to the surface water drainage network is summarised within Table 7. A detailed breakdown for each surface water catchment is included in **Appendix B**.

Catchment Area	Gross Area (ha)	Impermeable Area (ha)	Impermeability Factor
Site 2: 1	1.63	0.82	0.503
Site 2: 2	4.24	2.069	0.488
Site 3: 1	2.61	1.29	0.494
Site 3: 2	1.22	0.67	0.549
Site 3: 3	0.73	0.36	0.493
Site 3: 4	1.03	0.55	0.534
Site 3: 5	1.37	0.72	0.526
Local Centre:1	0.21	0.139	0.648
Local Centre: 2	0.71	0.443	0.623
Local Centre: 3	1.46	0.537	0.368

Table 7: Summary of Impermeable Areas

The surface water drainage network including the surface water storage system has been designed and simulated for a range of storm events (including 1 in 2, 1 in 30 and 1 in 100-year

storm events) using the *Network* module of *Microdrainage*. This is based on the Modified Rational Method. The surface water drainage network is designed in accordance with IS EN 752, BS8301:1985 and the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS). Refer to **Appendix D** for surface water sewer network Microdrainage calculations.

Refer to DBFL drawing numbers 170182-DBFL-CS-SP-DR-C-1004 to 170182-DBFL-CS-SP-DR-C-1011 for the Site Services Layouts.

3.5 Climate Change

Surface water calculations use rainfall values for Hollystown, Dublin 15, provided by Met Eireann. Rainfall intensities were increased by a factor of 20% to take account of climate change, as required by the GDSDS for surface water drainage design included surface water storage design.

Refer to *Appendix C* for rainfall data.

3.6 Flood Risk

Refer to the 'Site Specific flood Risk Assessment' (SSFRA) by DBFL Consulting Engineers, which is included as a separate report within the planning application.

The surface water network, attenuation storage and site levels are designed to accommodate a 1% AEP (Annual Exceedance Probability) storm event and includes climate change provision. Floor levels of houses are set above the 1% AEP flood levels by a minimum of 500mm for protection. All footpaths are falling away from houses.

For storms events, exceeding a 1% AEP (Annual Exceedance Probability) storm event, the development has been designed to provide overland flood routes along the various development roads towards green areas, where possible.

4.0 FOUL DRAINAGE

4.1 General

<u>Site 2&3</u>

It is proposed to construct a new foul outfall sewer to the west of the site which is already permitted under FCC Ref FW21A/0042, approximately 3km in length to connect to the existing 750mm diameter foul sewer to the south of Powerstown Road, as indicated in Figure 12 below. This foul outfall is designed to accommodate foul flows from the subject site, the future development the zoned lands to the west of the subject site (within the ownership of Glenveagh Homes), from Bellingsmore Residential Development to the south and from Site 1 to the north east of the subject site which was recently granted planning permission under with Fingal County Council under LA reference FW21A/0042. It is also designed to facilitate a future reference from Hollystown Park Foul Pumping Station which has also been permitted under FCC Ref FW21A/0042. A breakdown of the hydraulic loadings contributing to the foul sewer are included in Table 6.



Figure 12: Foul Outfall Location

Local Centre

The proposed foul drainage system for the subject site will connect to the existing 225mm foul sewer, at the west of the subject site.

Apartments will connect to a network of 150mm and 225mm diameter foul drains via individual connections, as per Irish Water Code of Practice for Wastewater Infrastructure

A pre-connection enquiry form for the subject site was issued to Irish Water and a copy of the Confirmation of Feasibility from Irish Water is included in **Appendix F**.

A Statement of Design Acceptance (SODA) has also been received from Irish Water for Site 2, 3 and the Local Centre. A copy of the SODA Letters are included in **Appendix F.**

4.2 **Design Calculations**

4.2.1 General

Foul sewers have been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods set out in the DOE "Recommendations for Site Development Works for Housing Areas", IS EN752 (2008), BS8301: 1985, IS EN12056: Part 2 (2000) and the recommendations of the *'Greater Dublin Strategic Drainage Study'*, *(GDSDS)* and the Irish Water Connection and Developer Services, "*Code of Practice for Wastewater Connections*".

The following criteria have been applied:

Hydraulic Loading	446l/dwelling/day
Discharge units	14 units per house (BS8301:1985)
Pipe Friction (Ks) (concrete)	1.5mm
Pipe Friction (Ks) (uPVC)	0.15mm
Minimum Diameter	150mm
Minimum Velocity	0.75 m/s (self-cleansing velocity)
Maximum Velocity	3.0 m/s.

The foul sewer network has been designed using the *Network* module of *Microdrainage*, using methods from BS8301:1985, the results of which are included in **Appendix E.**
4.2.2 Foul Outfall Sewer

The foul outfall sewer is designed to accommodate the following foul loading using Irish Water foul sewer demands are summarised in Table 8 below:

Area	No. of Residential Units	Average Daily Demand (I/s)	Foul Water Loading (6 x DWF) (I/s)
Hollystown Park	283	1.46	8.77
Pumping Station			•
Hollystown: Site 1			
(currently under			
consideration for			
planning permission	69	0.36	2.14
with Fingal County			
Council under LA ref:			
F21A/0042)			
Bellingsmore			
Residential	177	0.91	5.48
Development			
Subject: Hollystown	128	2 21	13.26
Sites 2 & 3	420	2.21	13.20
Total	957	4.94	29.64

Table 8: Foul Sewer Hydraulic Loading

Local Centre

The foul sewer demands are summarised in Table 9 below:

Area	No. of Residential Units	Average Daily Demand (I/s)	Foul Water Loading (6 x DWF) (I/s)
Local Centre - Residential	120	0.6	3.8
Local Centre - Business	Community Hub (154m²), Caffe/Retail (154.7m²),	0.04	0.2

Stand Alone	
Creche (500m ²),	
Creche	
(497.3m ²),	
Montessori	
(274.4 m ²)	

Table 9: Foul Sewer Hydraulic Loading

5.0 WATER SUPPLY AND DISTRIBUTION

<u>Site 2&3</u>

The development's water-main distribution system is indicated on drawings 170182-DBFL-WM-SP-DR-C-1004 to 170182-DBFL-WM-SP-DR-C-1011. It is proposed to connect to the existing 300mm diameter watermain on Hollywoodrath Road (R121). The connection to the public water main will include a bulk meter and sluice valves in accordance with the Irish Water's requirements. The water main layout and details are in accordance with Irish Water Connection and Developer Services, 'Code of Practice for Water Infrastructure' and 'Water Infrastructure Standard Details'.

Area	No. of Residential Units	Average Daily Demand (I/s)	Average Daily Demand (m³/day)	Average Day / Peak Week Demand (m³/day)	Peak Demand (I/s)
Hollystown Sites 2 & 3	428	2.01	173.34	216.68	12.54
Local Centre	124	0.58	50.22	3.63	62.76
Local Centre - Business	Community Hub	0.04	3.47	0.25	4.33

Water demand for the proposed development is summarised in Table 9 below:

Table 9: Water Demand Summary

A pre-connection enquiry form for the subject site was issued to Irish Water and a copy of the Confirmation of Feasibility from Irish Water is included in **Appendix F.**

A Statement of Design Acceptance (SODA) has also been received from Irish Water for Site 2, 3 and the Local Centre. A copy of the SODA Letters are included in **Appendix F.**

APPENDIX A

CAPACITY OF GOLF COURSE DRAIN

The capacity of the existing "Golf Course Drain", is checked for two scenarios as outlined below:

Scenario (i) - Intercepting and Culverting of Drain adjacent to Entrance

The existing drain adjacent to the entrance to site "2" currently accommodates piped discharges to it from gullies on Church Road (R121) and attenuated surface water runoff from Hollywood Rath development to the east. It is proposed to intercept these existing connections and to redirect them via a 600mm diameter pipe to the golf course drain as indicated on DBFL drawing no. 170182-3009.

This is modelled for various storm events up to a 1%AEP event using Microdrainage. Note, the attenuated runoff rate is 83l/s which is entered as a baseflow.

The impermeable area entered in the calculation is 0.287ha or 2870m². This is equivalent to runoff from a 430m length of road circa 6.7m wide.

Calculations are included below and indicate significant available capacity in the pipe even during storm events up to 1 in 100-year return period or 1%AEP.

		2
DBFL Consulting Engineers		Page 1
Ormond House	HOLLYSTOWN GOLF CLUB	
Upper Ormond Quay	DBFL REF 170182	1000
Dublin 7	6000MM CULVERT CHECK	Micco
Date 13/03/2019 10:23	Designed by DCG	Desinance
File CULVERT CHECK.mdx	Checked by DMW	Diamage
Innovyze	Network 2018.1	
STORM SEWER DESIGN)	by the Modified Rational Method	
Pipe Sizes STA	NDARD Manhole Sizes STANDARD	
F3R Rainfall M Return Period (years) M5-60 (mm) Ratio R Maximum Rainfall (mm/hr) Maximum Time of Concentration (mins) Foul Sewage (1/s/ha) Volumetric Runoff Coeff. Designe	Model - Scotland and Ireland 2 PIM 16.100 Add Flow / Climate Chang 0.272 Minimum Backdrop Heigh 100 Maximum Backdrop Heigh 30 Min Design Depth for Optimisation 0.000 Min Vel for Auto Design only 0.750 Min Slope for Optimisation ed with Level Soffits	(P (%) 100 te (m) 0.200 te (m) 1.500 n (m) 1.200 (m/s) 1.00 (1:X) 500
Network D PN Length Fall Slope I.Area T.	esign Table for Storm E. Base k EYD DIA Section	Type Auto
(m) (m) (1:X) (ha) (m) SC1.000 52.600 0.260 202.0 0.287 5	ns) Flow (1/s) (mm) SECT (mm)	Design
SC1.001 15.100 0.040 377.5 0.000 0	0.00 0.0 0.600 o 600 Pipe/Co	nduit 👸
Netwo	rk Results Table	
PN Rain T.C. US/IL E I. (mm/hr) (mins) (m) (h	Area E Base Foul Add Flow Vel C a) Flow (1/s) (1/s) (1/s) (m/s) (1	ap Flow /s) (1/s)
SC1.000 46.40 5.51 72.200 0 SC1.001 45.76 5.71 71.770 0	.287 83.0 0.0 11.9 1.71 48 .287 83.0 0.0 11.9 1.25 35	3.4 131.0 2.7 131.0
Simulatic	n Criteria for Storm	
Volumetric Runoff Coeff (Areal Reduction Factor 1 Hot Start (mins) Hot Start Level (mm) Manhole Headloss Coeff (Global) (Foul Sewage per hectare (1/s) (Number of Input Hydrogr: Number of Online Cont: Number of Offline Cont:	0.750 Additional Flow - % of Total Flow 0.000 MADD Factor * 10m³/ha Storag 0 Inlet Coefficien 0 Flow per Person per Day (1/per/day 0.500 Run Time (mins 0.000 Output Interval (mins 0.000 Output Interval (mins 0.015 0 Number of Storage Structures 0 0.015 0 Number of Real Time Controls 0	w 0.000 e 2.000 t 0.800 t) 0.000 t) 60 t) 1
Synthet	ic Rainfall Details	
Rainfall Model Return Period (years) Region Sc M5-60 (mm) (©198	FSR Ratio R 0.272 2 Profile Type Summer otland and Ireland Cv (Summer) 0.750 16.100 Cv (Winter) 0.840 2-2018 Innovvze	

-

DBFL Consulting Engineers		Page 2
Ormond House	HOLLYSTOWN GOLF CLUB	
Upper Ormond Quay	DBFL REF 170182	
Dublin 7	6000MM CULVERT CHECK	Micco
Date 13/03/2019 10:23	Designed by DCG	
File CULVERT CHECK.mdx	Checked by DMW	Diamage
Innovyze	Network 2018.1	
Synthe	tic Rainfall Details	
Stor	m Duration (mins) 30	
(8)1	82-2018 Innouuze	
01:	02-2010 Innovyze	

DBFL Cor	sulti	ng Engine	ers						Pac	je 3
Ormond H	louse			HOI	LYSTOWN	GOLF (CLUB			
Upper Or	mond	Quay		DBE	L REF 1	70182				
Dublin 7	7			600	OMM CUI	VERT CH	HECK			
Date 13/	/03/202	19 10:23		Des	igned h	DV DCG			M	rio
File CUI	VERT (CHECK.mdx		Che	cked by	DMW			Ur	ainage
Innovyze	•			Net	work 20	018.1				
				10.000						
S	ummary	of Criti	cal Rest	ults b	y Maxim	um Leve	l (Ra	nk 1)	for Stor	cm
				Simulat	ion Crit					
	A	eal Reduct	ion Facto	r 1.000	Addit	ional F1	.ow - *	of Tota	al Flow 0	.000
		Hot St	art (mins) (ADD Fact	or * 1	Om³/ha S	Storage 2	.000
10.7 De		Hot Start	Level (mm) ()		Inle	t Coeff:	iecient 0	.800
Manh	nole Hea	adloss Coef	f (Global) 0.500	Flow pe	er Person	per D	ay (1/pe	er/day) 0	.000
	oul Sewa	ige per nec	tare (1/5) 0.000						
	N	umber of I	nput Hydro	graphs	0 Numbe	r of Sto	rage St	ructure	5 0	
		Number of	Online Co	ontrols	0 Numbe	r of Tim	e/Area	Diagram	.s 0	
		Number of (Offline Co	ontrols	0 Numbe	r of Rea	l Time	Control	5 0	
			Synt	thetic	Rainfall	Details				
		Rainfall	Model			FSR	Ratio	R 0.272		
			Region Sc	otland	and Irel	and Cv (Summer	0.750		
		M5-6	0 (mm.)		16.	100 Cv (Winter) 0.840		
	M	argin for 1	Flood Risk	. Warnin	ng (mm)	300.0	DVD	Status	OFF	
			Anal	ysis T:	imestep	Coarse In	nertia	Status	OFF	
				DTS	Status	ON				
		Pr	ofile(s)				Su	mmer an	d Winter	
		Duration (s) (mins)	15,	30, 60,	120, 180	0, 240,	360, 4	80, 600,	
	Return	Period(s)	(vears)					1,	30, 100	
		Climate Ch	ange (%)					10	, 10, 10	
										Water
	US/ME		Return Cl	limate	First (X) First	(Y) Fi:	rst (S)	Overflow	Level
PN	Name	Storm	Period C	hange	Surcharg	e Floo	d Ov	erflow	Act.	(m)
SC1.000	31	15 Winter	100	+10%						72.473
SC1.001	33	15 Winter	100	+10%						72.182
		Sm	charged 1	Flooded			Pine			
		US/ME	Depth	Volume	Flow /	Overflow	Flow		Level	
	PN	Name	(m)	(m ³)	Cap.	(1/=)	(1/=)	Status	Exceeded	
	801 000		-0 227	0.000	0.42		100 0	OF		
	SC1.00	1 53	-0.188	0.000	0.81		179.6	OK		
			©]	1982-2	018 Inn	ovyze				
1										

Scenario (ii) Open Channel

Calculations are carried out to demonstrate that the capacity of the drain is increased where the drain is re-routed with characteristics to match the existing arrangement. The average gradient of the existing and the re-routed drains are both 1/285. However, the roughness coefficient of the re-routed channel is

Assumptions made in capacity calculations as follows:

The capacity is calculated for an 800mm deep from the bed level of drain. This results in a freeboard between the assumed water level and the top of the bank of various depths between 0.6m – 1.1m across the sections taken.
 Therefore, while the capacity calculations indicate significant capacity, the available capacity is actually larger then that calculated when the freeboard is reduced.

The capacity of the open channel drain is calculated using Manning's Equation as follows:

$$Q = \frac{1 A^{5/3} S_0}{\prod P^{2/3}} e^{1/2}$$

where

Q = discharge (m³/s) $\Pi = Manning's Constant (roughness coefficient)$ A = cross sectional area (m²) P = wetted perimeter (m) $S_0 = bed slope$

Manning's equation is relatively accurate and simple and it provides reasonably accurate results for a large range of natural and artificial channels (*Chadwick and Morfett, Hydraulics in Civil Engineering, 1991*).

The value of the roughness coefficient, (Π) determines the frictional resistance of a channel. This value can be estimated from stage and discharge measurements for a known cross section and slope. However, as this information is not available, it is necessary to rely on documented values obtained from similar channels. The values used for the roughness coefficient, Π along the streams were taken from *Wilson, Engineering Hydrology, 4th Edition, 1992*.

		Cap	oacity of E	xisting	and Prop	osed Sur	face Wat	er Golf co	ourse Drai	n		
Open Channel')	Gradient Bed Slope (1/X)	Gradient Bed Slope	Manning's , no., (n) Pipe Rough, ks	Width of Bed, b (m)	Depth of Stream, y (m)	Width from bed to left bank,X1 (m)	Depth from left bank to bed ,Y1 (m)	Width from bed to right bank,X2 (m)	Depth from right bank to bed ,Y2 (m)	Area A (m²)	Wetted Perimeter P (m)	Capacity, Q (m³/s)
Existing	285	0.0035	0.045	6.00	0.90	0.00	0.90	0.00	0.90	5.40	7.80	5.567
Proposed	285	0.0035	0.025	6.00	0.9	0.00	0.90	0	0.90	5.40	7.80	10.020
Q = The ca n = Roughn A = The cro So = The Bo	$=\frac{1.A^{\frac{5}{2}}.S^{\frac{1}{2}}_{o}}{n.P^{\frac{5}{2}}}$ pacity of thess Coeffic ss-sectionated Slope;	e channel, ient, taken I area of flo	(m ³ /s); as 0.035 for a bw normal to a		aring earth of flow (m ²)	ge	9	1				
P = The leng	gth of the w	etted surface	ce normal to t	he directi	on of flow ((
Where:	$P = b + 2y\sqrt{b}$ b = Bottom	$1 + x^2$ width of the perturbation of the pe	ne channel (m									
	y – Liquiu y – Width f	from bod to	hank (m)									
	x - widuii	ioni beu to	Darik (III).									

	Conduition of the conduction of the conduction of surface	
	Conduit type, surface roughness and channel alignment	n (s/m ^{1/3})
Canals	Earth, straight	
	Earth, meandering	0.018-0.025
	Rock, straight	0.025-0.040
Lined	Perspex	0.025-0.045
channels	Glass	0.009
	Cement mortar	0.009-0.010
	Concrete	0.011-0.015
	Dressed, jointed stone	0.012-0.017
Rivers	Earth, straight	0.013-0.020
	Earth, poor alignment	0.020-0.025
	Earth, with weeds and poor allow-	0.030-0.050
	Stones 75–150 mm diameter statistic	0.050-0.150
	Stones 75–150 mm diameter, straight, good condition	0.030-0.040
	Stones >150 mm, boulders at a	0.040-0.080
Floodplain	Short grass	0.040-0.070
	LODO grass	0.025-0.035
	Medium to denote bruth to the	0.030-0.050
Pipes	Cast iron	0.045-0.110
	Concrete	0.010-0.014
	source(C	0.011-0.015

APPENDIX B

ALLOWABLE OUTFLOW Qbar CALCULATIONS

December 2

	TITLE Developme	ent at	Hollystown - Site	2 - Catchment	1		170182			
Calculations by Contract Control (Control (Contro) (Contro) (Control (Control (Control (Contro) (Contro) (Contro) (SUBJECT QBAR Ca	Icula	tion using IOH Re	port 124 for S	ites < 25 kn	n ²	Calc. Sheet N 1/2	lo.	Œ	£L
Estimation of G&R from IOH Report 124 for catchments less than 25 m² using the 3 variable equation 10 sor = 0.0018* (AREA) ^{3/28} (SARI) ¹⁷⁷ (SOL) ^{3/17} Note in Institue of Hydrology Report No. 124 Egn 3/86 area is less than 50 Ha. calculate Obar for a 50 Ha Site there portation AREA = 0.016 km² 3/86 area is less than 50 Ha. calculate Obar for a 50 Ha Site there portation AREA = 0.016 km² 3/80 L = 0.30 0/90 m = 0.00004 crumecs/Ha 0/90 m = 0.22 U I/8/Ha 0/90 m = 0.00004 crumecs/Ha 0/91 M = 0.00004 crumecs/Ha 0/92 M = 0.00004 crumecs/Ha <	DRAWING N 170182-DE	IUM BE 3FL-C	R S-S1-DR-C-1001	Calculations by GPH		Checked by DMW		Date 07.01.2021		
Image: Note that the institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note to Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image: Note To Institute of Hydrology Regard No. 124 Eqn Image:	Estimatio	n of (QBAR from IOH R	eport 124 for c	atchments	less than 25 l	<u>km² using th</u>	e 3 variable	e equation	
Que The Mean Annual Floot (curres); Site area is less than 50 Ha, calculate Obar for 30 Ha Site thempcortata Area of the calculates Report 1975 SAR Standard Annual Average Resultance Report 1975 Sol Sol Ha Site thempcortata AREA 0.016 km² SAR Standard Annual Average Resultance Resultance Resultance AREA 0.016 km² Sol Classification for Runof Proteinter/SR Maps Sol Classification for Runof Proteinter/SR Maps Sol 1 0.0004 currencs/Ha Ober runotitie 0.0004 currencs/Ha Ober runotitied outlows from site for given return period (assuming) long term storage). Yes (No allowance for standard factorial error) Flood Return From Site 2.23 Flood Return For Missible Outflow from site or global factorial error) Sol 1.60 Vib 1 0.85 10.25 Vib 1 0.85 10.25 Sol 0 3.5 12.5 Maxim un Allowable Castoral error) 9.3 Lines/hace Vib 1 0.85 3.0 Sol 1.5 Sol 1.5 Sol 0 2.3			¹ Q _{bar} = 0.00108 *	(AREA) ^{0.89} (SA	AR) ^{1.17} (SOIL	_) ^{2.17}	Note to Institu	te of Hydrolog	y Report No. 1	124 Eqn
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Bite area is less than 50 Ha, calculate Obar for a 50 Ha Site then pro-rata NEPC Flood Studies Report, 1975 SOL Boil Index Values of Calculare, 1976 SOL Sol Classification for Junoff Potential Potential, Classification of Potential Potential Potential Potential, Classification of Potential Pot				-Site Area =	1.63	На	AREA SAAR	Area of the G Standard Ann	atchment (km- ual Average F) Rainfall (mm)
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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.	hectare = 10 Votes Based on the li 2. For catchment J. Soli index value	Qba giver (No 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 200 1000	ed outlows from suming long terr dard factorial en 5 Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 1.25km ² . 1.25km ² .		(With Allo Is longterm Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	fse = Q' _{bar} = w ance for the storage pr n Period to for = 0 Outflow llow able n site = llow able n site =	1.651 5.92 standard fac ovided? 100 9.3 9.3 9.3 (* 30, 50 or 1	Vs torial error) Years * Litres/sec Litres/sec 00)
b. Iotal Permissible Outriow - UBAR (RUBAL) calculated in accordance with OUSUS - Regional Drainage Policies (Volume 2 - Chapter 6), i.e. UBAR (RUS/S)=0.00106 x(Area) (SAAR) (SUL) 7. Where Total Permissible Outriow - UBAR (RUBAL) calculated in accordance with OUSUS - Regional Drainage Policies (Volume 2 - Chapter 6), i.e. UBAR (RUS/S)=0.00106 x(Area) (SAAR) (SUL) 8. Rainfall depth for 100 year return period, 6 hour duration with additional 10% for climate change. (Value from Dublin Airport) 0 0 9. Interception Volume Vt (m3) = Impermeable Area (ha) x 10mm x 10 (GDSDS, Vol 2, Section 6.3.12.1). 0 0 0	Lhestare = 10 Votes . Based on the li . For catchment J. Soil index valu J. Fse is the star	Qba giver (No (No 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 1000 200 1000 200 1000	ed outlows from suming long terr dard factorial en ⁵ Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 1 1 1.67 2.1 2.1 2.33 2.6 2.85 3.5 1 1 2.1 2.1 2.1 2.1 2.1 2.1	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5 1		(With Allo Is longterm Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maxim um A Outflow from	fse = Q' _{bar} = w ance for the storage pr n Period to for = h) = Outflow llow able n site = llow able n site =	1.651 5.92 standard fac ovided? 100 9.3 9.3 9.3 (* 30, 50 or 1	Vs torial error) Years * Litres/sec Litres/sec 00)
3. Rainfall depth for 100 year return period, 6 hour duration with additional 10% for climate change. (Value from Dublin Airport) Image: Climate change (Value from Dublin Airport) 3. Interception Volume Vt (m3) = Impermeable Area (ha) x 10mm x 10 (GDSDS, Vol 2, Section 6.3.12.1). Image: Climate change (Value from Dublin Airport)	hectare = 10 Votes Based on the la Porticitation of the la Soli Index value For catchment Soli Index value For Soli Index value For Soli Porticitation Soli Porticitation For Soli Porticitation For For For For For For For For For For	Qba giver (No 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 1000 1000	ed outlows from suming long terr dard factorial en ⁵ Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 1.25m ² . 1.25m		(With Allo Is longterm Storm Return be provided QBAR (Growt ⁶ Perm is sible from site = ⁷ Maximum A Outflow from Outflow from er Rainfall Acceptance	fse = Qi _{bar} = w ance for the storage pr n Period to for = th) = Outflow llow able n site = llow able n site = llow able n site = llow able n site =	1.651 5.92 standard fac ovided? 100 9.3 9.3 9.3 (* 30, 50 or 1	Vs torial error) Years * Litres/sec Litres/sec 00)
D. Interception Volume Vt (m3) = Impermeable Area (ha) x 10mm x 10 (GDSDS, Vol 2, Section 6.3.1.2.1).	Lhectare = 10 Votes Based on the la For catchment Soil index value For is the star QBAR multipli Total Permissi Where Total P	Qba giver (No 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 200 1000 200 1000 200 1000 200 1000 200 1000 200 1000 200 2	ed outlows from suming long terr dard factorial en ⁵ Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5		(With Allo Is longterm Storm Return be provided QBAR (Growt ⁶ Perm is sible from site = ⁷ Maxim um A Outflow from A Outflow from er Rainfall Acceptance erts, from GDSDS Fig 2 - Chapter 6), i.e. QE	fse = Qi _{bar} = w ance for the storage pr n Period to for = th) = Outflow llow able n site = llow able llow able n site = llow able llow able llow able n site = llow able llow able ll	1.651 5.92 standard fac ovided? 100 9.3 9.3 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1) (* 30, 50 or 1)	Vs torial error) Years * Litres/sec Litres/sec 00)
		Qba giver (No 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 200 2	ed outlows from suming long terr dard factorial en 5 Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 1 1 1.67 2.1 2.33 2.6 2.85 3.5 1 1 2.1 2.33 2.6 2.85 3.5 1 1 2.1 2.1 2.1 2.1 2.1 2.1 2.	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5 1		(With Alla (With Alla Is longterm Storm Return be provided QBAR (Growt ⁶ Perm is sible from site = ⁷ Maxim um A Outflow from Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁷ Maxim um A Outflow from a continue of the sible from site = ⁸ Continue of the sible from site = ⁸ Continue of the site of	fse = Qi _{bar} = w ance for the storage pr h Period to for = th) = Outflow llow able h site = llow able	1.651 5.92 standard fac ovided? 100 9.3 9.3 9.3 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1) (* 30, 50 or 1)	Vs torial error) Years * Litres/sec Litres/sec 00)
	Lhectare = 10 Vores Based on the li . For catchment I. Soil index valu I. Fse is the star 5 QBAR multipli J. Total Permissi Where Total P J. Rainfall depth J. Interception V	Qba giver (No (No) 	r growth for permitt n return period (ass allowance for stanc Flood Return Event 1 QBAR 10 30 50 100 200 1000 200 1000 200 1000 200 1000 200 1000 200 1000 200 1000 200 2	ed outlows from suming long terr dard factorial en 5 Growth Factor 0.85 1 1.67 2.1 2.33 2.6 2.85 3.5 	n site for n storage). or) Permitted Flow (I/s) 3.0 3.6 6.0 7.5 8.4 9.3 10.2 12.5 1		(With Allo Is longterm Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	fse = Qi _{bar} = w ance for the storage pr h Period to for = th) = Outflow llow able h site = llow able h site = llow able h site = llow able h site = llow able h site =	1.651 5.92 standard fac ovided? 100 9.3 9.3 9.3 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1 (* 30, 50 or 1) (* 30, 50 or 1)	Vs torial error) Years * Litres/sec Litres/sec 00)

December 2

QBAR Cal		Hollystown – Site	2 - Catchment	2		Job Reference 170182	ce	п	Π
DRAWING NU	culat	ion using IOH Re	port 124 for S	ites < 25 kn	n²	2/2	ю.		TL
170182-DB	UM BE	र S-S1-DR-C-1001	Calculations by GPH		Checked by DMW		Date 07.01.2021		
Estimatior	n of C	BAR from IOH R	eport 124 for c	atchments	less than 25 k	am ² using th	e 3 variable	equation	
		$^{1}Q_{bar}$ = 0.00108 *	(AREA) ^{0.89} (SA/	AR) ^{1.17} (SOIL	_) ^{2.17}	Note to Institu	te of Hydrology	Report No. 1	24 Eqn
						Q _{bar}	The Mean Anr	nual Flood (cui	mecs)
			² Site Area =	4.24	На	AREA	Area of the Ca	atchment (km ²)
Site eres is		then EO He, ealauk	to Ohor for a Fi	l Ua Sita tha	n nro roto	SAAR	Standard Ann	ual Average F	Rainfall (mm)
Site area is	siess	than 50 Ha, calcula	ite Qbar for a su	U Ha Site the	n pro-rata	SOIL	Soil Index Valu	ues of Catchr	r, 1975 nent
			AREA =	0.042	km ²	0012	Winter Rain A	Acceptance Po	otential,
							(Supplementa	, ny Report No.	7)
			SAAR =	823	mm				
			30011	0.30		Soil Classificati	on for Runoff Po	otential FSR Ma	aps
			50IL =	0.30]	Soil 2	100	%	
			Q _{bar} =	0.00004	cumecs/Ha	Soil 3	0	%	
						Soil 4	0	%	
			Q _{bar} =	2.2	l/s/Ha	Soil 5	0	%	
			Q _{bar [rural]} =	9.3	l/s				
					J	⁴ QBar from S	ite with Facto	orial Error Al	low ance
Permissib	le Οι	tflow from Site u	<u>ising Growth I</u>	Factor	_		r ² =	0.847	
	Ohar	growth for permitt	ed outlows from	site for	-		n =	71	
	given	return period (ass	suming long terr	n storage).			136 -	1.001	
	(No a	llowance for stand	lard factorial err	or)	_		Q' _{bar} =	15.43	l/s
			5		1	(With Allo	w ance for the	standard fac	torial error)
		Flood Return	[°] Growth	Permitted					
		1	0.85	7.9		ls longterm	storage pr	ovided?	Yes
		QBAR	1	9.3		j	<u></u> 3. b.		
		10	1.67	15.6		Storm Return	n Period to		
		30	2.1	19.6		he provided			
		50		24.0			for =	100	Years *
		100	2.00	21.8 24.3		QBAR (Growt	for = th) =	100 24.3	Years * Litres/sec
		100 200	2.6 2.85	21.8 24.3 26.6		QBAR (Growt ⁶ Permissible from site =	for = h) = Outflow	100 24.3 24.3	Years * Litres/sec Litres/sec
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A	for = h) = Outflow llow able	100 24.3 24.3	Years * Litres/sec Litres/sec
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = th) = Outflow llowable site =	100 24.3 24.3 24.3	Years * Litres/sec Litres/sec
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = th) = Outflow llowable n site =	100 24.3 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow llow able site =	100 24.3 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Growt Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow Now able site =	100 24.3 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		Geprovided GBAR (Growti Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow llow able 1 site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		Geprovided GBAR (Growti Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow llow able 1 site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		GBAR (Growt Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow llow able 1 site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = b) = Outflow llow able n site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		Geprovided QBAR (Growti ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = b) = Outflow llow able a site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		De provideu QBAR (Growti ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = (h) = Outflow Ilow able 1 site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec 00)
		100 200 1000	2.6 2.85 3.5	21.8 24.3 26.6 32.7		De provideu QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = (h) = Outflow Ilowable 0 site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
1 hectare = 10.		100 200 1000	2.6 2.85 3.5 	21.8 24.3 26.6 32.7		De provideu QBAR (Growti ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = h) = Outflow llow able n site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
1 hectare = 10. Notes 1, Based on the Ire		100 200 1000	2.6 2.85 3.5 1km ² - 100 hectare	21.8 24.3 26.6 32.7		De provideu QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = ih) = Outflow Ilow able a site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
1 hectare = 10. Notes 1. Based on the Int 2. For catchments	.000 m ²	100 200 1000	2.6 2.85 3.5 	21.8 24.3 26.6 32.7 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		De provideu QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	for = ih) = Outflow Ilow able a site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
1 hectare = 10. Notes 1. Based on the Int 2. For catchments 3. Soil index value		100 200 1000	2.6 2.85 3.5 1km ² - 100 hectare mall catchments less than rates are linearly interpo	21.8 24.3 26.6 32.7 	eas.	Be provided QBAR (Growti ⁶ Permissible from site = ⁷ Maximum A Outflow from 0 0 0 0 0 0 0 0 0 0 0 0 0	for = Outflow Ilow able n site =	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
		100 200 1000	2.6 2.85 3.5 1km ² - 100 hectare mail catchments less thar rates are linearly interpo Report Vol V Fig 14.18	21.8 24.3 26.6 32.7 	eas.	Be provided QBAR (Growti ⁶ Permissible from site = ⁷ Maximum A Outflow from 0 0 0 0 0 0 0 0 0 0 0 0 0	for = b) = Outflow llow able a site = site = sit	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
1 hectare = 10. Notes 1. Based on the Ins 2. For catchments 3. Soil index value 4. Fseis the stand 5. OBAR multiplie		100 200 1000	2.60 2.85 2.85 3.5 1km ² - 100 hectare mall catchments less thar rates are linearly interpo Report Vol V Fig I 4.18 ; 2.1for 30 year, 2.3 for	21.8 24.3 26.6 32.7 25.0 25.0 25.0 25.0 25.0 25.0 25.0 25.0	eas. ion of Soils from Winter year return period eve	ar Rainfall Acceptance	for = Outflow Illowable 1 site = 	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
1 hectare = 10. Notes 1. Based on the In: 2. For catchments 3. Soil index value 4. Fse is the stand 5. QBAR multiplie 6. Total Permissib 7. Where Total Per		100 200 1000	2.6 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less thar rates are linearly interpo Report Vol V Fig 14.18 ; 2.11or 30 year, 2.3 for in accordance with GDS d) not achievable use 2.1	21.8 24.3 26.6 32.7	eas. ion of Soils from Winte by year return period eve rage Policies (Volume	ar Rainfall Acceptance c Chapter 6), i.e. QE	for = (h) = Outflow IIowable 1 site = 	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
I hectare = 10. Notes I. Based on the Ins Z. For catchments S. Soil index value F.se is the stand S. OBAR multiplie S. OBAR multiplie S. Total Permissib T. Where Total Pe B. Rainfall depth f		100 200 1000	2.60 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less thar rates are linearly interpo Report Vol V Fig 14.18 ', 2.11for 30 year, 2.3 for in accordance with GDS d not achievable, use 2.1 tion with additional 10%	21.8 24.3 26.6 32.7 5 5 125km ² . 1ated for smaller ar (1) - The Classificat r 50 and 2.6 for 100 DS - Regional Drain 0//s. for climate change.	eas. ion of Soils from Winte year return period eve vyear return period eve (Value from Dublin Air)	De provideu QBAR (Growti ⁶ Permissible from site = ⁷ Maxim um A Outflow from Autflow from er Rainfall Acceptance er Rainfall Acceptance ints, from GDSDS Fig 2 - Chapter 6), i.e. QE port)	for = (h) = Outflow IIowable 1 site = 2 s	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
I hectare = 10. Notes I Based on the Ins Z. For catchments Soil index value A. Fse is the stand S. OBAR multiplie Total Permissib Total Permissib Where Total Pe B. Rainfall depth f		100 200 1000	2.60 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less thar rates are linearly interpo Report Vol V Fig 14.18 ; 2.1for 30 year, 2.3 for in accordance with GDS of not achievable, use 2.1 tion with additional 10% (x 10mm x 10 (GDSDS, 1)	21.8 24.3 26.6 32.7	eas. ion of Soils from Winte year return period eve vyear return period eve (Value from Dublin Air ,2.1).	Be provided QBAR (Growti ⁶ Perm issible from site = ⁷ Maxim um A Outflow from er Rainfall Acceptance er Rainfall Acceptance ints, from GDSDS Fig 2 - Chapter 6), i.e. QE port1)	for = (h) = Outflow IIowable 1 site = 1 site = 2 Rate. 2 Rate. 4 R(m3/s)=0.00 108	100 24.3 24.3 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00) - - - - - - - - - - - - -

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TITLE Developme SUBJECT	ent at	Hollystown – Site	3 - Catchment	Area 1		Job Referen 170182 Calc. Sheet N	ce	П	Ŧ
QBAR Ca	Icula	tion using IOH Re	port 124 for S	ites < 25 kn	n²	1/6			
drawing N 170182-De	IUM BE 3FL-C	R S-S1-DR-C-1001	Calculations by GPH		Checked by DMW		Date 22.02.2021		
Estimatio	n of (QBAR from IOH R	eport 124 for c	atchments	less than 25 k	am ² using th	e 3 variable	e equation	
		¹ Q _{bar} = 0.00108 *	(AREA) ^{0.89} (SA	AR) ^{1.17} (SOIL) ^{2.17}	Note to Institu	te of Hydrolog	Report No. 1	124 Eqn
					_	Q _{bar}	The Mean Anr	nual Flood (cu	mecs)
			² Site Area =	2.61	На	AREA	Area of the Ca	atchment (km ²)
Sito aroa i	c 10cc	than 50 Ha, calculs	te Obar for a 5	n Ha Sito the	n nro-rata	SAAR	Standard Ann	ual Average F	Rainfall (mm) rt 1075
Sile alea i	5 1033	inan 50 Ha, calcula			<u>ii pi o-i ata</u>	SOIL	Soil Index Val	ues of Catchr	nent
			AREA =	0.026	km ²		Winter Rain A	Acceptance Po	otential,
							(Supplementa	ry Report No.	7)
			SAAR =	823	mm				
		-	30011	0.30		Soil Classificati	on tor Runoff Po	otential FSR Ma	aps
			301L =	0.00		Soil 2	100	%	
			Q _{bar} =	0.00004	cumecs/Ha	Soil 3	0	%	
						Soil 4	0	%	
			Q _{bar} =	2.2	l/s/Ha	Soil 5	0	%	
			Q _{bar [rural]} =	5.7	l/s				
					J	⁴ QBar from S	ite with Facto	orial Error Al	llow ance
Permissib	<u>ole O</u>	<u>utflow from Site ι</u>	using Growth I	Factor	-		r ² =	0.847	
	Oha	r growth for permitt	ed outlows from	site for	-		n =	71	
	giver	n return period (ass	uming long terr	n storage).			136 -	1.031	
	(No a	allowance for stand	lard factorial er	or)			Q' _{bar} =	9.49	Vs.
			5		1	(With Allo	w ance for the	standard fac	torial error)
		Flood Return	Growth	Permitted					
		1	0.85	4.9		ls longterm	storage pr	ovided?	Yes
			4						
	1	QDAR	1	5.7					
		10	1.67	5.7 9.6		Storm Return	n Period to		
		10 30	1.67 2.1	5.7 9.6 12.1		Storm Return be provided	n Period to for =	100	Years *
		10 30 50	1.67 2.1 2.33 2.6	5.7 9.6 12.1 13.4		Storm Return be provided QBAR (Grown	n Period to for = th) =	100 14.9	Years * Litres/sec
		10 30 50 100 200	1.67 2.1 2.33 2.6 2.85	5.7 9.6 12.1 13.4 14.9 16.4		Storm Return be provided QBAR (Grown ⁶ Permissible from site =	n Period to for = th) = Outflow	100 14.9 14.9	Years * Litres/sec
		QDAR 10 30 50 100 200	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A	n Period to for = th) = Outflow	100 14.9 14.9	Years * Litres/sec Litres/sec
		10 30 50 100 200	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = th) = Outflow llow able a site =	100 14.9 14.9 14.9	Years * Litres/sec Litres/sec Litres/sec
		10 30 50 100 200	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = (h) = 0 Outflow llow able 1 site =	100 14.9 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 200 1000	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = h) = Outflow llowable n site =	100 14.9 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 200	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = (h) = Outflow Note =	100 14.9 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 200	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = th) = Outflow llow able n site =	100 14.9 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 1000	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = h) = Outflow llow able n site =	100 14.9 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 200 1000	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = th) = Outflow llow able 1 site =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec 00)
		10 30 50 100 200 1000	1 1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maxim um A Outflow from	n Period to for = (h) = Outflow Note =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
		10 30 50 100 200 1000	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown °Permissible from site = ⁷ Maximum A Outflow from	n Period to for = h) = Outflow llow able n site =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
		10 30 50 100 200 1000	1 1.67 2.1 2.33 2.6 2.85 3.5 	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = b) = Outflow llow able n site =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec 00)
		UDAR 10 30 50 100 200 1000 1000	1.67 2.1 2.33 2.6 2.85 3.5	5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow fron	n Period to for = b) = Outflow llow able n site =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
L hectare = 10		200 10 30 50 100 200 1000 1000	1 1.67 2.1 2.33 2.6 2.85 3.5 	s. 5.7 9.6 12.1 13.4 14.9 16.4 20.1		Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = b) = Outflow llow able n site =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
1 hectare = 10 Notes		2 2 4 4 4 4 4 4 4 4 4 4 4 4 4	1.67 2.1 2.33 2.6 2.85 3.5 3.5	s		Storm Return be provided QBAR (Growt ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = (h) = Outflow Note =	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
1 hectare = 10 Notes 1. Based on the h 2. For catchment	L.OOOm	2 10 10 30 50 100 200 1000 1000 1000 1000 1000 1000 1000 1000 1000	1 1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mail catchments less that rates are linearly interno	s 125.7 9.6 12.1 13.4 14.9 16.4 20.1 20.1 10.		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maximum A Outflow from	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec Uit
1 hectare = 10 Notes 1. Based on the II 2. For catchment 3. Soil index valu	LOOOM smaller smaller e (SPR)	2 1 10 30 50 100 200 10	1 1.67 2.1 2.33 2.6 2.85 3.5 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6	s 125m ² . 12.1 13.4 14.9 16.4 20.1 5 1 1 1 1 1 1 1 1 1 1 1 1 1	ass.	Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maxim um A Outflow from	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec O0)
1 hectare = 10 Notes 1. Based on the la 2. For catchment 3. Soil index valu 4. Fse is the star	L.000m smaller re (SPR)	2 10 10 30 50 100 200 1000 1	1 1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less that rates are linearly interpo	s 125km ² . 12.1 13.4 14.9 16.4 20.1 5 5 125km ² . 14ted for smaller ar (1) - The Classificat		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maxim um A Outflow from	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec Uit
1 hectare = 10 Notes 1. Based on the la 2. For catchment 3. Soil index valu 4. Fse is the star 5. QBAR multipli	L.000m is smaller e (SPR) vard fac	10 10 30 50 100 200 100	1 1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less that rates are linearly interpo Report Vol V Fig 14.18 .,2.11or 30 year, 2.3 fo	 5.7 9.6 12.1 13.4 14.9 16.4 20.1 s. s. s. 125km ² . lated for smaller and (1) - The Classificat 50 and 2.6 for 100		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maxim um A Outflow from Outflow from ant, from GDSDS Fig	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec Uit
1 hectare = 10 Notes 1. Based on the li 2. For catchment 3. Soli index valu 4. Fse is the star 5. QBAR multipli 6. Total Permissi	LOOOM Institute cost is smaller te (SPR) dard fac	10 10 10 10 10 10 100 200 10	1 1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mail catchments less than rates are linearly interpo Report Vol V Fig I 4.18 . 2.11or 30 year, 2.3 fo in accordance with GDS report with CDS	5.7 9.6 12.1 13.4 14.9 16.4 20.1 20.1 5 25km ² . 125km ² . 125km ² . 125km ² .	as. ion of Solis from Winter year return period ever vage Policies (Volume	Storm Return be provided QBAR (Growth ⁶ Permissible from site = ⁷ Maxim um A Outflow from Outflow from ar Rainfall Acceptance rts, from GDSDS Fig 2 - Chapter 6), i.e. QE	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec Uit
Lhectare = 10 Notes I. Based on the li 2. For catchment 3. Soil index valu 1. Fse is the star 5. QBAR multipli 3. Total Permiss 7. Where Total P 3. Rainfall deoth	LOOOM	CDAR 10 10 30 50 100 200 1000 1000 200 1000 1000 200 1000 1000 1000 200 1000 1	1 1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mail catchments less that rates are linearly interpo Report Vol V Fig 14.18 r, 2.11or 30 year, 2.3 fo in accordance with GDS dn on achievable, use 2.	 5.7 9.6 12.1 13.4 14.9 16.4 20.1 Second State		Storm Return be provided QBAR (Grown ⁶ Permissible from site = ⁷ Maxim um A Outflow from Outflow from a continue continte continue continue continue continue continue continue conti	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1 (* 30, 50 or 1	Years * Litres/sec Litres/sec Uitres/sec Uit
1 hectare = 10 Notes 1. Based on the la 2. For catchment 3. Soil index valu 4. Fse is the star 5. QBAR multipli 6. Total Permissi 7. Where Total P 8. Rainfall depth 9. Interception V	LOOOM ssmiller kooon ssmiller kooon ssmiller kooon ssmiller kooon ssmiller kooon k	10 10 10 10 10 10 100 200 10	1.67 2.1 2.33 2.6 2.85 3.5 3.5 1km ² - 100 hectare mall catchments less that rates are linearly interpo Report Vol V Fig 14.18 rates are linearly interpo Report Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. tion with additional 10% x 10mm x 10 (GDSDs, 1	 5.7 9.6 12.1 13.4 14.9 16.4 20.1 Second State	aas. ion of Soils from Winte year return period eve year policies (Volume (Value from Dublin Air 2.1).	Storm Return be provided QBAR (Growther ⁶ Permissible from site = ⁷ Maxim um A Outflow from Outflow from and the site of the	n Period to for = 	100 14.9 14.9 (* 30, 50 or 1 (* 30, 50 or 1	Years * Litres/sec Litres/sec Litres/sec Uitres/sec Litres/sec Uitres/sec

	TITLE Developme	ent at	Hollystown – Site	3 - Catchment	Area 2		Job Referen 170182	ce			1
	SUBJECT QBAR Cal	cula	tion using IOH Re	port 124 for S	ites < 25 km	1 ²	Calc. Sheet I 2/6	No.	Œ	Ł	
	DRAWING N 170182-DE	UMBE BFL-C	R S-S1-DR-C-1001	Calculations by GPH	,	Checked by DMW		Date 22.02.2021			
	<u>Estimation</u>	n of C	BAR from IOH R	eport 124 for c	atchments	less than 25 k	am ² using th	ne 3 variable	equation		
			¹ Q _{bar} = 0.00108 *	(AREA) ^{0.89} (SA	AR) ^{1.17} (SOIL	.) ^{2.17}	Note to Institu	ite of Hydrology	/ Report No. 1	24 Eqn	
				² Site Area =	1.22	На	AREA	Area of the Ca	atchment (km ²)) Painfall (mm)	
	<u>Site area is</u>	s less	than 50 Ha, calcula	ate Qbar for a 5	0 Ha Site the	n pro-rata	SOIL	NERC Flood Soil Index Valu	Studies Repor	<i>t, 19</i> 75 ent	
				AREA =	0.012	km²		Winter Rain A (Supplementa	cceptance Po ry Report No.	otential, 7)	
				SAAR =	823	mm	0 101 10 1				
				³ SOIL =	0.30		Soil Classificat	0	%	ips	
							Soil 2	100	%		
				Q _{bar} =	0.00004	cumecs/Ha	Soil 3 Soil 4	0	%		
				Q _{bar} =	2.2	l/s/Ha	Soil 5	0	%		
				Q _{bar [rural]} =	2.7	l/s					
	D						⁴ QBar from S	Site with Facto	orial Error Al	low ance	
	Permissib	le Ou	utflow from Site u	using Growth I	Factor			r ² =	0.847		
		Qbar	growth for permitt	ed outlows from	n site for			fse =	1.651		
		giver	return period (ass	uming long terr	m storage).			O'			
			anowance for stand				(With Allo	w ance for the	4.44 standard fact	torial error)	
			Flood Return	⁵Growth	Permitted						
			Event	Factor	Flow (I/s)		le longtorm	etorado pr	ovidod2	Voc	
			QBAR	1	2.7		13 longtern	i storage pr	onacai	105	
			10	1.67	4.5		Storm Retur	n Period to			
			30	2.1	5.6 6.3		be provided QBAR (Grow	tor = th) =	100 7.0	Years * Litres/sec	
			100	2.6	7.0		⁶ Permissible	Outflow	110	211 00,000	
			200	2.85	7.7		from site =		7.0	Litres/sec	
			1000	3.5	9.4		'Maximum A Outflow from	llowable nsite =	7.0	Litres/sec	
									(* 30, 50 or 1	00)	
_	<u>1 hectare = 10</u>	.000m	2	<u>1km² - 100 hectare</u>	<u>s</u>						
	Notes										
	1. Based on the In	nstitute o	f Hydrology Report 124 for s	mall catchments less that	n 25km².						
	O Fee activity	s smaller	man 50 nectares in area, flow	rates are linearly interpo	aueo for smaller are	sas. ion of Soils from Winte	er Rainfall Acceptanc	e Rate			
	 For catchment Soil index value 	e (SPR)	calculated from Flood Studies	Report Vol V Fig I 4.18	(1) - The Classification			o rtaro .			
	 2. For catchment 3. Soil index value 4. Fse is the standard 	e (SPR) dard fac	calculated from Flood Studies	Report Vol V Fig I 4.18	(1) - The Classificati						
	 For catchment Soil index value Fse is the stand QBAR multiplie Total Participation 	e (SPR) dard fac ed by gr	calculated from Flood Studies coal error bowth factors of 0.85 for 1 yea	Report Vol V Fig I 4.18	r 50 and 2.6 for 100	year return period even	nts, from GDSDS Fig	jure C2.	0.89.~)1.17/(0011)2.17	
	 For catchment Soil index valu Fse is the stand QBAR multiplie Total Permissil Where Total Per 	e (SPR) dard fac ed by gro ble Outfl ermissibl	calculated from Flood Studies coial error owth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated e Outflow is less than 2.01/5 a	r, 2.1for 30 year, 2.3 fo in accordance with GDS	(1) - The Classificati r 50 and 2.6 for 100 DS - Regional Drain 0I/s.	year return period even	nts, from GDSDS Fig 2 - Chapter 6), i.e. QI	gure C2. BAR(m3/s)=0.00108	x(Area) ^{0.89} (SAAR) ^{1.17} (SOIL) ^{2.17}	
	 For catchment Soil index valu Fse is the stand QBAR multiplie Total Permissil Where Total Per Rainfall depth 	e (SPR) dard fac ed by gr ble Outfl ermissibl for 100 y	calculated from Flood Studies colal error owth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated e Outflow is less than 2.01/s a rear return period, 6 hour dura	Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ition with additional 10%	(1) - The Classificati r 50 and 2.6 for 100 DS - Regional Drain 0I/s. for climate change.	year return period even age Policies (Volume 2 (Value from Dublin Airp	nts, from GDSDS Fig 2 - Chapter 6), i.e. Ql port)	gure C2. BAR(m3/s)=0.00108	x(Area) ^{0.89} (SAAR) ^{1.17} (SOIL) ^{2.17}	
	 For catchment Soil index valu Fse is the stand OBAR multiplie Total Permissil Where Total Per Rainfall depth Interception Ver 	e (SPR) dard fac ed by gro ble Outfl ermissibl for 100 y olume Vt	calculated from Flood Studies oial error owth factors of 0.85 for 1yea ow - QBAR (RURAL) calculated e Outflow is less than 2.01/s a eaer return period, 6 hour dura (m3) = Impermeable Area (ha	Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ition with additional 10%) x 10mm x 10 (GDSDS,	(1) - The Classificati r 50 and 2.6 for 100 DS - Regional Drain 01/s. .for climate change. Vol 2, Section 6.3.1.	year return period even lage Policies (Volume 2 (Value from Dublin Airp 2.1).	nts, from GDSDS Fig 2 - Chapter 6), i.e. Ql port)	jure C2. BAR(m3/s)=0.00108	ux(Area) ^{0.89} (SAAR	1.17(SOIL) ^{2.17}	

	TITLE Developme	ent at	Hollystown – Site	3 - Catchment	Area 3		Job Referen 170182	ce			
	SUBJECT QBAR Cal	cula	tion using IOH Re	port 124 for S	ites< 25 km	1 ²	Calc. Sheet N 04-Jun	No.	Œ	£L	
	DRAWING N 170182-DE	UMBE BFL-C	R S-S1-DR-C-1001	Calculations by GPH		Checked by DMW		Date 07.01.2021			
	Estimatio	n of (BAR from IOH R	eport 124 for a	atchments	less than 25 k	<u>am ² using th</u>	ne 3 variable	equation		
			¹ Q _{bar} = 0.00108 *	(AREA) ^{0.89} (SA	AR) ^{1.17} (SOIL) ^{2.17}	Note to Institu	ite of Hydrology	/ Report No. 1	24 Eqn	
				² Site Area =	0.73	На		Area of the Ca	atchment (km ²)	ainfall (mm)	
	Site area is	s less	than 50 Ha, calcula	ate Qbar for a 5) Ha Site the	<u>n pro-rata</u>	SAAR	NERC Flood S	Studies Repor	ainfail (mm) t, 1975	
				AREA =	0.007	km²	SOIL	Winter Rain A	icceptance Po	tential,	
_				SAAR =	823	mm		Supplementa	ту кероп №.	/)	
							Soil Classificati	ion for Runoff Po	otential FSR Ma	ps	
				³ SOIL =	0.30		Soil 1	0	%		
							Soil 2	100	%		
				Q _{bar} =	0.00004	cumecs/Ha	Soil 3	0	%		
							Soil 4	0	%		
				Q _{bar} =	2.2	l/s/Ha	Soil 5	0	%		
_				Qbar (rural) =	1.6	l/s					
_							⁴ QBar from S	Site with Facto	orial Error Al	owance	
	Permissib	le O	utflow from Site u	using Growth I	actor			r ² =	0.847		
								n =	71		
		Qba	growth for permitt	ed outlows from	site for			fse =	1.651		
_		giver	return period (ass	suming long terr	n storage).			O'	2.64	1/2	
_			anowance for stand		01)		(With Allo	Q _{bar} =	2.04 standard fact	orial error)	
-			Flood Return	⁵ Growth	Permitted				Stanuaru raci		
			Event	Factor	Flow (I/s)						
			1	0.85	1.4		Is longterm	storage pr	ovided?	Yes	
			QBAR	1	1.6						
			10	1.67	2.7		Storm Retur	n Period to			
_			30	2.1	3.4		be provided	for =	100	Years *	
_			50	2.33	3.7		QBAR (Grow	th) =	4.2	Litres/sec	
_			100	2.6	4.2		⁶ Permissible	Outflow	4.2	Litron/200	
-			1000	3.5	5.6		⁷ Maximum A	llewahle	4.2	Lilles/sec	
							Outflow fron	n site =	4.2	Litres/sec	
									(* 30, 50 or 1	00)	
_											
_											
_											
-											
											-
_											
	<u> 1 hectare = 10</u>	.000m	2	<u>1km² - 100 hectare</u>	<u>\$</u>						
	<u>1 hectare = 10</u> Notes	.000m	2	<u>1km² - 100 hectare</u>	<u>8</u>						
	<u>1 hectare = 10</u> Notes 1. Based on the Ir	.000m	2 1 Hydrology Report 124 for s	<u>1km² - 100 hectare</u>	S 125km ² .						
	<u>1 hectare = 10</u> <u>Notes</u> 1. Based on the Ir 2. For catchment 3. Sali intervent	.000m Institute c	f Hydrology Report 124 for s than 50 hectares in area, flow	1km ² - 100 hectare mall catchments less that rates are linearly interpo	<u>s</u> 125km ² . lated for smaller are (0. The Closetting)	as.	y Daipfell Assesse				
	1 hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soil index valu 4. Essis the stor	.000m Institute constitute of s smaller e (SPR)	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies foial error	1km ² - 100 hectare mall catchments less that rates are linearly interpo Report Vol V Fig I 4.18	 <u>S</u> 25km². lated for smaller are (1) - The Classification 	as.	r Rainfall Acceptance	e Rate.			
	1 hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soil index valu 4. Fse is the stan 5. QBAR multipli	.000m Institute c s smaller e (SPR) dard fac ed by gr	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies ciolal error	1km ² - 100 hectare mail catchments less that rates are linearly interpo Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo	 S. 125km². 1ated for smaller are (1) - The Classificati 50 and 2.6 for 100 	as. ion of Soils from Winte year return period even	r Rainfall Acceptanc	e Rate.			
	1 hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soli index valu 4. Fse is the stan 5. QBAR multipli 6. Total Permissi	.000m Institute c Is smaller e (SPR) dard fac ed by gr ble Outfl	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies toial error owth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated	1km ² - 100 hectare mail catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1 for 30 year, 2.3 fo in accordance with GDS	 S. 125km³. 1ated for smaller are (1) - The Classification 50 and 2.6 for 100 DS - Regional Drain 	as. ion of Soils from Winte year return period even age Policies (Volume 2	r Rainfall Acceptance nts, from GDSDS Fig 2 - Chapter 6), i.e. QB	e Rate . ure C2. 3AR(m3/s)=0.00 108	×(Area) ^{0.89} (SAAR	1.17(SOL) ^{2.17}	
	1 hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soil index valu 4. Fse is the stan 5. QBAR multipli 6. Total Permissi 7. Where Total Pe	.000m astitute o s smaller e (SPR) dard fac ed by gr ble Outfl ermissibl	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies toial error bowth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated e Outflow is less than 2.0/s a	1km ² - 100 hectare mail catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1 for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2.	 S. 125km³. 1ated for smaller are (1) - The Classificati 50 and 2.6 for 100 DS - Regional Draim DI/s. 	as. ion of Soils from Winte year return period eve age Policies (Volume 2	r Rainfall Acceptance nts, from GDSDS Fig 2 - Chapter 6), i.e. Qt	e Rate . ure C2. 3AR(m3/s)=0.00 108	x(Ares) ^{0.89} (SAAR	1.17(SOIL) ^{2.17}	
	1 hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soil index valu 4. Fse is the stan 5. QBAR multipli 6. Total Permissi 7. Where Total Pe 8. Rainfall depth	.000m astitute c s smaller e (SPR) dard fac ed by gr ble Outfl ermissibl for 100 y	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies toial error bwth factors of 0.85 for 1 yea ow - QBAR (RUBAL) calculated e Outflow is less than 2.0//s a rear return period, 6 hour dura	1km ² - 100 hectare mall catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ation with additional 10%	 S. 125km². 1ated for smaller are (1) - The Classificati 50 and 2.6 for 100 DS - Regional Drain DI/s. for climate change. 	as. ion of Soils from Winte year return period even age Policies (Volume 2 Value from Dublin Airp	r Rainfall Acceptano nts, from GDSDS Fig 2 - Chapter 6), i.e. Qt port)	e Rate . Jure C2. 3AR(m3/s)=0.00 108	x(Ares) ^{0.89} (SAAR	1.17 (SOIL) ^{2.17}	
	1.hectare = 10 Notes 1. Based on the Ir 2. For catchment 3. Soil index valu 4. Fse is the stan 5. QBAR multipli 6. Total Permissi 7. Where Total Pe 8. Rainfall depth 9. Interception V.	.000m Institute c s smaller e (SPR) dard fac ed by gr ble Outfl ermissibl for 100 y	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies toial error owth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated e Outflow is less than 2.01/s a rear return period, 6 hour dura (m3) = Impermeable Area (ha	1km ² - 100 hectare imal catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.11or 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ation with additional 10%) 10mm x 10 (GDSDS, 1	 S. 125km². 1ated for smaller are (1) - The Classificati 50 and 2.6 for 100 DS - Regional Drain DVs. for climate change. Vol 2, Section 6.3.1. 	as. ion of Soils from Winte year return period eve age Policies (Volume 2 (Value from Dublin Airp	r Rainfall Acceptance nts, from GDSDS Fig 2 - Chapter 6), i.e. Q2 port)	e Rate . ure C2. 3AR(m3/s)=0.00 108	x(Ares) ^{0.89} (SAAR	1.17 (SOIL) 2.17	

December 2

TITLE Developm SUBJECT	ent at	Hollystown – Site	3 - Catchment	Area 4	2	Job Reference 170182 Calc. Sheet N	ko.	Œ	FL.
QBAR Ca DRAWING N 170182-DI	NUMBE	tion using IOH Re R S-S1-DR-C-1001	Calculations by	ites < 25 kr	n⁻ Checked by DMW	5/6	Date 07.01.2021		
Estimatio	on of (QBAR from IOH R	eport 124 for c	atchments	less than 25 k	<u>t an 2 using th</u>	e 3 variable	equation	
		$^{1}Q_{\text{bar}} = 0.00108 *$	(AREA) ^{0.89} (SA	AR) ^{1.17} (SOII) ^{2.17}	Note to Institu	te of Hydrolog	v Report No. 1	24 Fan
				, (,	Q _{bar}	The Mean Ani	nual Flood (cu	mecs)
			² Site Area =	1.03	Ha	AREA	Area of the C	atchment (km ²)
Site area i	is less	than 50 Ha, calcula	ate Obar for a 5	0 Ha Site the	en pro-rata	SAAR	Standard Ann	ual Average F Studies Repo	Rainfall (mm) rt 1975
						SOIL	Soil Index Val	ues of Catchr	nent
			AREA =	0.010	km ²		Winter Rain A	Acceptance Po	otential,
			SAAR =	823	mm		(Supplementa	nry Report No.	7)
			0/0/07	020		Soil Classificati	on for Runoff P	otential FSR Ma	aps
			³ SOIL =	0.30		Soil 1	0	%	
			~	0.0005.1		Soil 2	100	%	
			Q _{bar} =	0.00004	cumecs/Ha	Soil 3	0	%	
			Q _{ber} =	22	l/s/Ha	Soil 5	0	%	
	-		≪oar =			23110			
			Q _{bar [rural]} =	2.28	l/s				
						⁴ QBar from S	ite with Fact	orial Error Al	low ance
Permissik	ble O	utflow from Site u	using Growth	Factor	_		r ² =	0.847	
	Oba	r arowth for permitt	ed outlows from	site for	_		n =	71	
	giver	n return period (ass	uming long terr	n storage).			130 -	1.001	
	(No	allowance for stand	ard factorial er	or)	_		Q' _{bar} =	3.76	l/s
	_	Elood Poturn	⁵ Growth	Pormittod	1	(With Allo	w ance for the	standard fac	torial error)
		Event	Factor	Flow (I/s)					
		1	0.85	1.9		Is longterm	storage pr	ovided?	Yes
		QBAR	1	2.3	-				_
		30	2.1	3.8 4.8		Storm Return	n Period to for =	100	Years *
		50	2.33	5.3		QBAR (Grow	th) =	5.9	Litres/sec
		100	2.6	5.9		⁶ Permissible	Outflow		
		200	2.85	6.5 8.0		from site =	U	5.9	Litres/sec
		1000	0.0	0.0		Outflow from	n site =	5.9	Litros/soc
						·			LIII 65/360
								(* 30, 50 or 1	00)
								(* 30, 50 or 1	00)
								(* 30, 50 or 1	00)
								(* 30, 50 or 1	00)
								(* 30, 50 or 1	
								(* 30, 50 or 1	
								(* 30, 50 or 1	00)
								(* 30, 50 or 1	
						Image: Constraint of the sector of		(* 30, 50 or 1	
1 bectare - "		2	1 km ² - 100 booter					(* 30, 50 or 1	
1 hectare = 10 Notes	0.000m		1km ² - 100 hectare	<u>\$</u>		Image: Constraint of the sector of		(* 30, 50 or 1	
1 hectare = 10 Notes 1. Based on the I	0.000m	2 2 f Hydrology Report 124 for s	1km² - 100 hectars	<u>\$</u> 125km ² .		Image: Constraint of the sector of		(* 30, 50 or 1	
1 hectare = 10 Notes 1. Based on the 2. For catchmen	0.000m Institute of the smalle	2 1 1 1 1 1 1 1 1 1 1 1 1 1	1km ² - 100 hectare mall catchments less that rates are linearly interpo	S. 125km ² . Lated for smaller ar				(* 30, 50 or 1	
1 hectare = 10 Notes 1. Based on the 1 2. For catchme 2. For catchme 3. Soli index valv 4. Fse is the star	0.000m Institute of its smalle ue (SPR)	2 f Hydrology Report 124 for s than 50 hectares in area, flow caculated from Flood Studies toial error	1km ² - 100 hectare mall catchments less tha rates are linearly interpo Report Vol V Fig 14.18	s. 125km ² . Iated for smaller ar (1) - The Classifica	ees.	r Rainfall Acceptance	Rate .	(* 30, 50 or 1	
1 hectare = 10 Notes 1. Based on the 2. For catchmen 3. Soil index val 4. Fise is the star 5. OBAR multipl	0.000m Institute o Its smalle ue (SPR) Indard fac	2 2 2 5 f Hydrology Report 124 for s r than 50 hectares in area, flow calculated from Flood Studies toial error Towth factors of 0.85 for 1 yea	1km ² - 100 hectare mall catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo	a 125km ² . 14ted for smaller ar (1) - The Classifica r50 and 2.6 for 100	eas.	ar Rainfall Acceptance	s Rate .	(* 30, 50 or 1	
1 hectare = 10 Notes 1. Based on the I 2. For catchmen 3. Soil index vali 4. Fse is the staa 5. OBAR multipi 5. Total Permss	Institute of SPR) and factors	2 2 2 2 2 2 2 2 2 2 2 2 2 2	1km² - 100 hectare mall catchments less that rates are linearly interpo Deport Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS	S 125km ² . 1ated for smaller ar (1) - The Classificat - 50 and 2.6 for 100 DS - Regional Drait	eas. Lion of Soils from Winto 2) year return period even nage Policies (Volume	er Rainfall Acceptance Ints, from GDSDS Fig 2 - Chapter 6), i.e. QE	9 Rate . ure C2.	(* 30, 50 or 1	00)
1 hectare = 10 Notes 1. Based on the I 2. For catchmen 3. Soli index val 4. Fse is the star 5. QB AR multipl 6. Total Permiss 8. Rajnfall dent		2 f Hydrology Report 124 for s t than 50 hectares in area, flow calculated from Flood Studies toial error owth factors of 0.85 for 1 yea low - QBAR (RURAL) calculated le Outflow is less than 2.0 //s a way return prevind. E hour druce	1km ² - 100 hectare mall catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2.	S 125km ² . Iated for smaller ar (η) - The Classifica r 50 and 2.6 for 100 DS - Regional Drai D//s. for climate channel	eas. tion of Soils from Winter Dyear return period ever nage Policies (Volume (Value from Dublin & ir	ar Rainfall Acceptance 	S Rate . 	(* 30, 50 or 1	00)
1 hectare = 10 Notes 1. Based on the I 2. For catchmen 3. Soil index valu 4. Fse is the star 5. QBAR multipl 6. Total Permiss 8. Rainfall dept 8. Rainfall dept 9. Interception V	0.000m Institute of ts smalle ue (SPR) ndard fac tige by gr sible Out	2 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7	1km ² - 100 hectare mall catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ation with additional 10%) x 10mm x 10 (GDSDS,	s 125km ² . Iated for smaller ar (1) - The Classifica r 50 and 2.6 for 100 DS - Regional Drai 0/s. for climate change. /ol 2, Section 6.3 :	eas. tion of Soils from Wintu- page Policies (Volume (Value from Dublin Air 12.1).	er Rainfall Acceptance 1	S Rate . 	(* 30, 50 or 1	00)
1 hectare = 10 Notes 1. Based on the I 2. For catchmen 3. Soil index valu 4. Fse is the star 5. QBAR multipl 6. Total Permiss 7. Where Total F 8. Rainfall depth 9. Interception V	0.000m Institute d ts smalle undard fac lied by gr sible Outf	2 f Hydrology Report 124 for s r than 50 hectares in area, flow calculated from Flood Studies toial error rowth factors of 0.85 for 1 yea low - QBAR (RURAL) calculated le Outflow is less than 2.01/s a year return period, 6 hour dur t (m3) = Impermeable Area (ha	1km ² - 100 hectare mall catchments less that rates are linearly interpo s Report Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS nd not achievable, use 2. ation with additional 10%) x 10mm x 10 (GDSDS,	s. 125km ² . Iated for smaller ar (1) - The Classifica 50 and 2.6 for 100 DS - Regional Drai DVs. for climate change. /ol 2, Section 6.3.	ees. tion of Soils from Wintu version of Soils from Wintu version of Soils (Volume (Value from Dublin Air 12.1).	er Rainfall Acceptance ants, from GDSDS Fig 2 - Chapter 6), i.e. QE port)	9 Rate . ure C2.	(* 30, 50 or 1	00)

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TITLE	ant at	Hollystown Site	3 - Catchmont	Area 5	-	Job Reference	ce		
SUBJECT	ont al	nonystown – oite	o - Gatonnent		2	Calc. Sheet N	lo.	Г	ŦL.
QBAR Ca	Icula	ion using IOH Re	port 124 for S	ites < 25 kn	n²	05-May			
DRAWING N 170182-DE	IUM BE BFL-C	R :S-S1-DR-C-1001	Calculations by GPH		Checked by DMW		Date 22.02.2021		
Estimatio	n of (QBAR from IOH R	Report 124 for a	atchments	less than 25 l	am ² using th	e 3 variable	e equation	
		¹ Q _{bar} = 0.00108 *	(AREA) ^{0.89} (SA	4R) ^{1.17} (SOIL	_) ^{2.17}	Note to Institu	te of Hydrolog	y Report No. 1	24 Eqn
						Q _{bar}	The Mean Anr	nual Flood (cu	mecs)
	_		² Site Area =	1.37	Ha	AREA	Area of the Ca	atchment (km ²)
Site area i	s less	than 50 Ha, calcul	ate Obar for a 5	0 Ha Site the	n pro-rata	SAAR	NERC Flood	ual Average F Studies Repor	aintali (mm) + 1975
					<u>In pro rutu</u>	SOIL	Soil Index Val	ues of Catchr	ient
			AREA =	0.014	km ²		Winter Rain A	Acceptance Po	otential,
			SAAD -	000	mm		(Supplementa	nry Report No.	7)
			SAAN -	023		Soil Classificati	on for Runoff Pe	tential FSR Ma	ips
			³ SOIL =	0.30		Soil 1	0	%	
						Soil 2	100	%	
	_		Q _{bar} =	0.00004	cumecs/Ha	Soil 3	0	%	
	-		0	2.2		Soil 4	0	%	
	-		Q _{bar} =	2.2	i/s/na	3011 5	0	70	
	-		Qbar frurall =	3.03	l/s				
						⁴ QBar from S	ite with Facto	orial Error Al	low ance
Permissib	ole O	utflow from Site	using Growth	Factor	-		r ² =	0.847	
					-		n =	71	
	Qba	growth for permitt	ed outlows from	n site for			fse =	1.651	
	(No a	allowance for stand	dard factorial er	or)			Q' _{bar} =	5.00	l/s
					-	(With Allo	w ance for the	standard fac	torial error)
		Flood Return	[°] Growth	Permitted					
		Lvent 1	0.85	2.6		ls longterm	storage pr	ovided?	Yes
		QBAR	1	3.0		j			
		10	1.67	5.1		Storm Return	n Period to		
		30	2.1	6.4	-	be provided	for =	100 7.9	Years *
		100	2.33	7.1		⁶ Permissible	Outflow	7.9	LIII es/sec
		200	2.85	8.6		from site =	oution	7.9	Litres/sec
		1000	3.5	10.6		⁷ Maximum A	llowable		
						Outflow from	i site =	7.9 (* 30, 50 or 1	Litres/sec
								(50, 50 01 1	
	-								
						-			1
hectare = 10).000m	2	<u>1km² - 100 hectare</u>	<u>s</u>					
l hectare = 10 Notes).000m	2	<u>1km² - 100 hectare</u>	<u>s</u>					
L hectare = 10 Votes L Based on the I	nstitute c	2 f Hydrology Report 124 for s	1km ² - 100 hectare	<u>s</u> 125km ² .					
L hectare = 10 Votes I. Based on the I 2. For catchment 3. Soil index valu	nstitute of ts smaller	r f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Sturlier	1km ² - 100 hectare small catchments less that rates are linearly interpo	S 125km ² . lated for smaller are (1) - The Classific#	eas.	er Rainfall Acceptance	e Rate .		
L hectare = 10 Votes I. Based on the I 2. For catchment 3. Soil index valu 4. Fse is the star	nstitute c ts smaller ue (SPR) ndard fac	r f Hydrology Report 124 for s than 50 hectares in area, flow salculated from Flood Studies solal error	1km ² - 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig I 4.18	S 125km ² . lated for smaller are (1) - The Classificat	aas.	er Rainfall Acceptance	PRate.		
Lhectare = 10 Votes Based on the I Context Soli index valu Fise is the star SolAR multipl	nstitute of ts smaller ue (SPR) ndard fac	r If Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies oial error owth factors of 0.85 for 1 yea	1km ² - 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo	s 125km ² . lated for smaller ar (1) - The Classificat (1) - The Classificat	eas. ion of Soils from Winte	er Rainfall Acceptance	PRate. ure C2.		
L hectare = 10 <u>Votes</u> . Based on the I 2. For catchmeni 3. Soil index valu 4. Fse is the star 5. OBAR multipl 5. Total Permiss	nstitute of ts smaller ue (SPR) ndard fac ied by gr ible Outfil	If Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies toial error owth factors of 0.85 for 1 yea ow - QBAR (RURAL) calculated ow - QBAR (RURAL) calculated output is the start of 0.20 for 0.20 for the start of 0.20 for the st	1km ² - 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 rr, 2.1for 30 year, 2.3 fo lin accordance with GDS	s 125km ² . Lated for smaller are (1) - The Classificat r 50 and 2.6 for 100 DS - Regional Drain U/c	eas. ion of Soils from Wintu year return period eve age Policies (Volume	er Rainfall Acceptance Ints, from GDSDS Fig 2 - Chapter 6), i.e. QE	s Rate . ure C2. iAR(m3/s)=0.0010i	Bx(Area) ^{0.89} (SAAR) ^{1.17} (SOL) ^{2.17}
I hectare = 10 Nofes I. Based on the I 2. For catchment 3. Soil index valu 4. Fse is the star 5. QBAR multipl 5. Total Permiss 7. Where Total P 5. Rainfall depth	D.000m nstitute c ts smaller ue (SPR) ndard fac ied by gr ible Outfl Permissible of or 100 v	I Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studies tolal error owth factors of 0.85 for 1 yea ow - QBAR (RUBAL) calculated o - QUHow is less than 2.01/s a rear return period, 6 hour dur:	1km ² - 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig I 4.18 rr, 2.1for 30 year, 2.3 fo in accordance with GDS and not achievable, use 2. ation with additional 10%	S 125km ² . Iated for smaller are (1) - The Classificat 50 and 2.6 for 1000 DS - Regional Drair 50 and 2.6 for 1000 DS - Regional Drair for climate change.	aas. ion of Soils from Winte vyear return period eve age Policies (Volume (Value from Dublin Air	ar Rainfall Acceptance Ints, from GDSDS Fig 2 - Chapter 6), i.e. QE	9 Rate . ure C2. AR(m3/s)=0.0010/	3x(Area) ^{0.89} (SAAR) ^{1.17} (SOL) ^{2.17}
1 hectare = 10 Notes 1. Based on the I 2. For catchmeni 3. Soil index valu 4. Fse is the star 5. QBAR multipl 5. Total Permiss 7. Where Total P 3. Rainfall depth 9. Interception V	nstitute o ts smaller ue (SPR) ndard fac ied by gr ible Outfl Permissibl of or 100 y olume Vf	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studiet toial error ow - QBAR (RURAL) calculated e Outflow is less than 2.01/s a rear return period , 6 hour d'ura (m3) = Impermeable Area (ha	1km ² 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo in accordance with GDS and not achievable, use 2. ation with additional 10% i) x 10mm x 10 (GDSDS,	S 1 125km ² . Iated for smaller and (1) - The Classificat for and 2.6 for 100 DS - Regional Drain D/S. for climate change. /ol 2, Section 6.3.1	aas. ion of Soils from Winte year return period eve age Policies (Volume (Value from Dublin Air .2.1).	er Rainfall Acceptance Ints, from GDSDS Fig 2 - Chapter 6), i.e. QE	9 Rate . ure C2. 3AR(m3/s)=0.00108	Bx(Area) ^{0.89} (SAAR	1.17(SOIL) ^{2.17}
1 hectare = 10 Notes 1. Based on the I 2. For catchment 3. Soil index valu 4. Fse is the star 5. QBAR multipl 5. Total Permiss 7. Where Total P 3. Rainfall depth 9. Interception V	nstitute of ts smaller ue (SPR) ndard fac ied by gr ible Outfl Permissible of or 100 y folume Vi	f Hydrology Report 124 for s than 50 hectares in area, flow calculated from Flood Studiet toial error owth factors of 0.85 for 1 yea ow - QBAR (RUBAL) calculated e Outflow is less than 2.01/s a rear return period, 6 hour dura (m3) = Impermeable Area (ha	1km ² - 100 hectare small catchments less that rates are linearly interpo s Report Vol V Fig 14.18 r, 2.1for 30 year, 2.3 fo lin accordance with GDS and not achievable, use 2, ation with additional 10% a) x 10mm x 10 (GDSDS,	 S 125km². 1ated for smaller ard (1) - The Classificat r50 and 2.6 for 100 DDS - Regional Drain DD/S. for climate change. /ol 2, Section 6.3.1 	eas. ion of Soils from Winte year return period eve nage Policies (Volume (Value from Dublin Air .2.1).	er Rainfall Acceptance Ints, from GDSDS Fig 2 - Chapter 6), i.e. QE	PRate . ure C2. MR(m3/s)=0.00100	Bx(Area) ^{0.89} (SAAR).1.17(SOIL) ^{2.17}

DBFL Consulting Engineers

SUBJECT Calc. Sheet No. 1 DRAWING NUMBER Calculations by Checked by Data ACM CM 21,10,2021
Drawne manual field from 2000 the part of the contaments less than 20 ms² submatrix (SQU)2 ^{2.17} Description of the part of the
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$
$\label{eq:product} \begin{tabular}{lllllllllllllllllllllllllllllllllll$
$\frac{^{2}\text{Site Area} = 0.214 \text{ Ha}}{\frac{^{2}\text{Site Area} = 0.214 \text{ Ha}}}$ Site area is less than 50 Ha, calculate Qbar for a 50 Ha Site then pro-rata $AREA = 0.002 \text{ km}^{2}$ $AREA = 0.000 \text{ km}^{2}$
Site area is less than 50 Ha, calculate Qbar for a 50 Ha Site then pro-rataAREA = 0.002 km ² AREA = 0.002 km ² SAAR = 823 mm3 SOIL = 0.30 Quere (0.00004 currecs/HaQuere (0.00004 cu
$AREA = 0.002 \text{ km}^{2}$ $SAAR = 823 \text{ mm}$ $^{3}SOL = 0.30$ $^{3}SOL = 0.30$ $^{3}SOL = 0.30$ $^{3}SOL = 0.30$ $^{3}COL =$
$SAAR = \underbrace{823} \text{ mm}$ $^{3}SOIL = \underbrace{0.30}{}^{3}SOIL = \underbrace{0.30}{}^{0}C_{uar} = \underbrace{0.00004}{}^{0}\text{ cumecs}/\text{Ha}$ $C_{uar} = \underbrace{0.00004}{}^{0}\text{ cumecs}/\text{Ha}$ $C_{uar} = \underbrace{22}{}^{1}\text{Vs}/\text{Ha}$ $C_{uar} = \underbrace{0.5}{}^{1}\text{Vs}$ $\underbrace{Permissible Outflow from Site using Growth Factor}{C}C_{uar} = \underbrace{0.5}{}^{1}\text{Vs}$ $\underbrace{Permissible Outflow from Site using Growth Factor}{C}C_{uar} = \underbrace{0.5}{}^{1}\text{Vs}$ $\underbrace{Permissible Outflow from Site using Growth Factor}{C}C_{uar} = \underbrace{0.847}{1 \text{ ms} \text{ - } 71} \text{ ms} \text{ - } 71 \text{ ms} -$
${}^{3}SOIL = \boxed{0.30}$ $Q_{tarr} = \boxed{0.0004} \text{ currecs/Ha}$ $Q_{tarr} = \boxed{0.2} \text{ //s/Ha}$ $Q_{tarr} = \boxed{0.2} \text{ //s/Ha}$ $Q_{tarr} = \boxed{0.5} \text{ //s}$ $Permissible Outflow from Site using Growth Factor$ $Q_{bar growth for permitted outlows from site for given return period (assuming long term storage).$ $(No allowance for standard factorial error)$ $\overline{\frac{Flood Retum}{Factor}} = \boxed{0.5} \text{ //s}}$ $\overline{\frac{Flood Retum}{Pactorial error}} = \boxed{0.5} \text{ //s}}$ $\overline{\frac{Flood Retum}{Pactorial error}} = \boxed{0.5} \text{ //s}}$ $\overline{\frac{10.85}{0.4}} = \underbrace{0.78}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.85} \text{ //s}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.857} \text{ //s}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.857} \text{ //s}_{0.847} \text{ //s}_{0.847} \text{ //s}_{0.857} \text{ //s}_{0.847} \text{ //s}_{0.847}$
$\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} $
$\begin{array}{c} Q_{\text{tarr}} = \boxed{22} l_{\text{S}}/\text{Ha} \\ Q_{\text{tarr}} = \boxed{22} l_{\text{S}}/\text{Ha} \\ Q_{\text{tarr}} = \boxed{0.5} l_{\text{S}} \\ \hline \\$
$\begin{split} & \Box_{\text{ther trunt }} = \underbrace{0.5}_{\text{I} \text{I} \text{S}} \\ & \underline{\text{Permissible Outflow from Site using Growth Factor}}_{\text{Obar growth for permitted outlows from site for given return period (assuming long term storage). (No allowance for standard factorial error) \\ & \underline{\overline{\text{Hood Return } }^{\text{B}} \underline{\text{Growth } \text{Permitted}}_{\text{Factor } \overline{\text{Flow (I/S)}}}_{\text{O} \text{D} 233 & 1.1} \\ & \underline{\overline{\text{O} \text{ BAR } (\text{Growth } 10 & 1.67 & 0.88 \\ \hline \underline{\text{O} \text{ D} 2.33 & 1.1} \\ \hline \underline{\text{O} \text{ D} 2.33 & 1.1} \\ & \underline{\text{O} \text{ D} 2.33 & 1.1} \\ \hline \end{array} \end{split} $
Permissible Outflow from Site using Growth FactorQbar growth for permitted outlows from sile for given return period (æs uming long term storage). (No allowance for standard factorial error)Pood Retum Tood RetumTood Retum TactorFlood Retum Clear Tool (2000)Tood Retum Clear Tool (2000)Tood Retum TactorTood Retum Clear Tool (2000)Tood Retum Clear Tool (2000)Tool (2000) <t< td=""></t<>
Image: Stand of the stand of
Clbar growth for permitted outlows from site for given return period (assuming long term storage). (No allowance for standard factorial error) Image: the standard factorial error is the standard factorial er
Image: Non-All and Standard factorial error) Image: Control and Standard factorial error) Flood Return ³ Growth Permitted Event Factor Flow (I/s) 1 0.85 0.4 QBAR 1 0.5 10 1.87 0.8 30 2.1 1.0 50 2.33 1.1
Flood Return Event *Growth Factor Permitted Flow (I/s) 1 0.85 0.4 QBAR 1 0.5 10 1.67 0.8 30 2.1 1.0 50 2.33 1.1
Event Factor Flow (b) 1 0.85 0.4 QBAR 1 0.5 10 1.67 0.8 30 2.1 1.0 50 2.33 1.1
QBAR 1 0.5 10 1.67 0.8 30 2.1 1.0 50 2.33 1.1 QBAR (Growth) = 1.0 Litres/sec
30 2.1 1.0 provided for = 30 Years * 50 2.33 1.1 QBAR (Growth) = 1.0 Litres/sec
50 2.33 1.1 QBAR (Growth) = 1.0 Litresise:
100 2.6 1.2 ⁴ Permissible Outflow from
200 2.85 1.3 alte = 0.5 Litresised
Outflow from site = 2.0 Litres/sec
(* 30, 50 or 100)
1 hectare = 10,000m ² 1 km ² - 10 0 hectar es
nstana 1. Based on The Institute of Hydrology Report. 124 for erreit calchmente less Teen 25km ² .
 For calchments smaller than 50 backares in area, forenaise and ineerly interpolated for smaller areas. Sol index value (3PR) calculated from Flood Studies Report Vol V Fig 14.18(1) - The Classification of Solid from Winter Reinfold Acceptance Rein.
4. Fisaits the standard factorial error
 GBAR multiplied by growth factors of 0.25 for 1 year, 2.1 for 30 year, 2.3 for 50 and 2.8 for 100 year return period weerld, from GDEDE Figure C2. Total Permissible Cullow - QBAR young calculated in accordance with GDEDE - Regional Drainage Potence (Interne 2 - Chapter 8), Le. QBAR(m:0)=0.0010.8(Anse)¹⁰⁰(SAAR)¹⁰⁰(SOL)²⁰⁷
7. Where Total Permissible Culficer to less Team 2.0% and not achieved in, use 2.0%.
a, reareas original a 100 year haum pantos, onto recursion entracolonidar (De lor contense change, (eales non Aspon) 9. Interception Voterne VI (m3) = Impermentatio Asea(ha) x 10mm x 10. (GDSDS, Vol 2, Section 6.3.12.1).

TITLE Development at	t Hollystown - Local C	Centre - Catch	ment 2		Job Reference 170182	
SUBJECT QBAR Calculat	tion using IOH Rep	ort 124 for Si	tes < 25 km²		Calc. Sheet No. 1	ŒFL
DRA WING NUMBE	R (alculations by ASM		Checked by BCM	Date 21.10.2021	
Estimation of (QBAR from IOH Rej	oort 124 for c	atchments le	ess than 25 k	m² using the 3 variable e	equation
	¹ Q _{bar} = 0.00108 * (A	REA) ^{0.89} (SAA	R) ^{1.17} (SOIL) ²	.17	Note to institute of Hydrology R Q _{bar} The Mean Annu	eport No. 124 Eqn al Flood (currecs)
		² Site Area =	0.710	Ha	AREA Area of the Cate	hment(km²)
<u>Site area is less</u>	than 50 Ha, calculate	Qbarfora 50	Ha Site then p	oro-rata	NERC Flood St	u dies Report, 1 975
		AREA=	0.007	km ²	SOIL Soil Index Value Winter Rain Acc (Supplementary	sof Catchment ceptance Potential (Report No. 7)
		SAAR =	823	m		
		³ SOIL =	0.30]	Soil 1 0 Soil 2 0	entral FSH IVape 96 96
		Q _{tsir} =	0.00004	cumecs/Ha	Soil 3 100	96
		Q _{tar} =	22	l/s/Ha	Soil 4 0 Soil 5 0	96 96
		Q _{bar (rural)} =	1.6)Vs		
Permissible O	utflow from Site usi	ng Growth F	actor	-	*QBar from Site with Factoria r ² =	0.847
050		d outlour from	a ita far		n =	71
give	n return period (assu	ming long terr	n storage).		ise =	1.651
(No	allowance for standa	rd factorial en	ror)	_	(With Allowance for the sta	2.58 I/s ndard factorial error)
	Flood Return	^a Growth Eactor	Permitted Flow (I/s)			
	1	0.85	1.3		Is longterm storage pro	vided? No
	QBAR 10	1 167	1.6		Storm Datura Dariadta ba	
	30	2.1	3.3		provided for =	30 Years*
	50	2.33	3.6		QBAR (Growth) =	3.3 Litres/sec
	200	2.85	4.5		site =	1.6 Litres/sec
	1000	3.5	5.5)	⁷ Maxi mum Allowa ble	2.0 Litmeleac
						(* 30, 50 or 100)
<u>1 hectare = 10,000m²</u>	1	km ² - 100 hectar ea				
Notes 1. Based on the Institute of	Hydrolog y Report 124 for small cs	ichmente less han 29	um².			
2. For calchments smaller	than 50 hectares in area, flowrates	a nel inearly interpolate	el for smaller areas.			
 Soll index value (SPR) of 4. Fisets the standard fack 	alcutated from Flood Studies Repo stat error	rt Vol V Fig 14.18(1) - 1	The Classification of S	ala from Winter Ranfa	d Acceptance Rate.	
5. QBAR multiplied by grou	athfactors of 0.85 for 1 year, 2.1 fo	r30 year, 2.3 for 50 a	nd 2.6 for 100 year rel	tun period events, from	n GDSDS Figure C2.	
6. Total Permissible Outlo 7. Where Total Permissible	 QBAR years; calculated in according to the second se	ntance with GDSDS-1 actematics use 2016	Regional Drainage Pol	ides (Volume2 - Cha	pter 8), i.e. QBAR(m3/s)=0.00108s(Area) ⁵⁷⁷ (5	AAR "(SOL)"
8. Rainfall depth for 100 ye	arrelum period, 6hour duration w	Ihaddilonal 10% for d	male change. (Value	from Dublin Airport)		
9. Interception Volume VI (m3) – Impermeable Area(ha) x 10	mm x 10 (GDSDS, Vo	(2, Sedion 6.3.12.1)	L.		

DBFL Consulting Engineers

TITLE Development at Hollystown - Local C	entre - Catch	ment 3		Job Reference 170182	
SUBJECT QBAR Calculation using IOH Repo	ort 124 for Si	tes < 25 km²		Calc. Sheet No. 1	TER.
DRAWING NUMBER C	alculations by ASM		Checked by BCM	Date 21.10.2021	
Estimation of QBAR from IOH Rep	ort 124 for c	atchments k	ess than 25 k	m² using the 3 variable	equation
¹ Q _{tair} = 0.00108 * (A	REA) ^{0.89} (SAA	R) ^{1.17} (SOIL) ²	. 17	Note to Institute of Hydrology F	Report No. 124 Eqn
	² Site Area =	1.460	Ha	Q _{bar} The Mean Ann AREA Area of the Car SAAR Standard Ann	ual Flood (cumecs) ichment (km²) ial Average Rainfall (mm)
Site area is less than 50 Ha, calculate	Qbarfora 50	Ha Site then p	pro-rata	NERC Flood S	tu dies Report, 1 375
	AREA=	0.015	km ²	SOIL Soil Index Value Winter Bain Av (Supplemental	es of Catchment :coptance Potentia (y Report No. 7)
	SAAR =	823]mm	Sal Charifestian for Dur off De	matial FSD Mass
	³ SOIL =	0.30)	Soil 1 0	96
	Q _{tair} =	0.00004	cumecs/Ha	Soil 2 0 Soil 3 100	96 96
	Q _{tar} =	22]/s/Ha	Soil 4 0 Soil 5 0	96 96
	Q _{bar (rural)} =	3.22	Vs		
Permissible Outflow from Site usi	on Growth E	antor	,	QBar from Site with Factori	al Error Allowance
Permissible Outlow from Site using	ig Growin P	actor		n =	71
Qbar growth for permittee given return period (assu	l outlows from ming long terr	n site for mistorage).		fse =	1.651
(No allowance for standar	d factorial en	ror)		Q _{bar} =	5.31 lk
Flood Return	[°] Growth	Permitted	1	(With Allowance for the st	and ard factorial error)
Event	Factor 0.85	27		Is longterm storage pr	ovided? No
QBAR	1	32		is tongton storage pro	
10	2.1	5.4 6.8		Storm Return Period to be provided for =	30 Years*
50	2.33	7.5		QBAR (Growth) =	6.8 Litres/sec
100	2.6	8.4		⁶ Permissible Outflow from	3.2 Limelear
1000	3.5	11.3	1	⁷ Maximum Allowable Outflow from site =	3.2 Limska:
					(* 30, 50 or 100)
1 bectare = 10.000m ²	m ² - 100 hectar ex				
Notes					
 Based on the Institute of Hydrology Report 124 for small call For natifyments smaller than 50 hardware in one. Inversion 	chmenta less han 29 are linearly intermited	un ² .			
3. Soil index value (SPR) calculated from Flood Studies Report	1 Vol V Fig 14.18(1) - 1	The Classification of S	alla from Winter Ranfa	Acceptance Rate.	
4. Fisets the standard factorial error					
 Covers multipled by growthadors a 0.25 for Tyser, 21 to 6. Total Permissible Outlow - QSAR (runs) calculated in according to the context of the	dance with GDSDS-1	no 2.6 lor 100 year na Regional Drainage Po	iun period evens, iron 80es (Volume2 - Chiq	ster 6), Le. QBAR(m3/x)=0.00108x(Area) ⁵⁸⁸	SAAR 17 (SOIL)27
7. Where Total Permissible Outflow Isless Iban 2.0/s and not	achevable, use 2018.				
 Plainfail depth for 1.00 year return period, 8 hour duration will Interception Volume VI (m3) – Impermeable Area (ha) x 10; 	haddiional 10% ford nm x 10 (GDSDS, Vo	male change. (Value (2, Section 6.3.1.2.1)	from Dublin Airport)		

TITLE Development at Hollystown – Site 2 - C SUBJECT Impermeable Area Calculation	atchment 1		Job Reference 170182 Calc. Sheet No. 1/2	ŒL	
DRAWING NUMBER Calc 170182-DBFL-CS-S1-DR-C-1001 G	culations by PH	Checked by DMW		Date 07.01.2021	
Surface Water Catchment (NEW)		Effe	ctive Area (ha) =	0.820	
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Traditional)	1.00	986.00	0.099	0.099	
Roofs (SuDs)	0.60	2237.50	0.224	0.134	
Roads (Traditional)	1.00	1558.00	0.156	0.156	
Roads and Open Surfaces(SuDs)	0.60	1843.70	0.184	0.111	
Permeable Paving (SuDs)	0.50	1578.00	0.158	0.079	
Private Gardens/ hard & soft Landscap	ing 0.30	7417.60	0.742	0.223	
Public Open Areas	0.30	0.00	0.000	0.000	
Remaining Green Areas	0.30	659.20	0.066	0.020	
Total	0.504	16280.00	1.63	0.820	

TITLE Development at Hollystown – Site 2 - Catc SUBJECT Impermeable Area Calculation	hment 2		Job Reference 170182 Calc. Sheet No. 2/2	ŒL	
DRAWING NUMBER Calculatio	ns by	Checked by		Date 07.01.2021	
170182-DBFL-C3-S1-DR-C-1001 GPH		DIVIVV		07.01.2021	
Surface Water Catchment (NEW)		Effe	ctive Area (ha) =	4.24	
SURFACE TYPE	RUNOFF CO-	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Traditional)	1.00	160.00	0.016	0.016	
Roofs (Suds)	0.60	7870.00	0.787	0.472	
Roads (Traditional)	1.00	4490.00	0.449	0.449	
Roads (SuDs)	0.60	1790.00	0.179	0.107	
Paths (Traditional)	1.00	0.00	0.000	0.000	
Permeable Paving (SuDs)	0.50	9020.00	0.902	0.451	
Private Gardens/ hard & soft Landscaping	0.30	13535.00	1.354	0.406	
Public Open Areas	0.30	510.00	0.051	0.015	
Remaining Green Areas	0.30	5071.60	0.507	0.152	
Total	0.487	42446.60	4.24	2.069	

TITLE Development at Hollystown – Site 3 - Catcl SUBJECT Impermeable Area Calculation	hment Area 1		Job Reference 170182 Calc. Sheet No. 1/6	œ	0
DRAWING NUMBER Calculati 170182-DBFL-CS-S1-DR-C-1001 GPH	ions by	Checked by DMW		Date 22.02.2021	
Surface Water Catchment (NEW)		Effe	ctive Area (ha) =	2.61	
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Traditional)	1.00	2806.40	0.281	0.281	
Roofs (Suds)	0.60	1487.94	0.149	0.089	
Roads (Traditional)	1.00	1905.50	0.191	0.191	
Roads (SuDs)	0.60	1982.00	0.198	0.119	
Paths (Traditional)	1.00	0.00	0.000	0.000	
Permeable Paving (SuDs)	0.50	3476.00	0.348	0.174	
Public Open Space	0.30	2250.00	0.225	0.068	
Private Gardens/ hard & soft Landscaping	0.30	3376.00	0.338	0.101	
Remaining Green Areas	0.30	8819.26	0.882	0.265	
Total	0.493	26103.10	2.61	1.287	

TITLE Developme SUBJECT Impermea	nt at ble /	Hollystown – Site Area Calculation	3 - Catcł	nment Area 2		Job Reference 170182 Calc. Sheet No. 2/6	ŒL	
DRAWING N 170182-DE	UMBE SFL-C	R :S-S1-DR-C-1001	Calculati GPH	ons by	Checked by DMW		Date 22.02.2021	
Surface W	ater	Catchment (NEW)		Effe	ctive Area (ha) =	1.22	
SURFACE	TYP	E		RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Trac	dition	al)		1.00	0.00	0.000	0.000	
Roofs (Suc	ls)			0.60	2479.13	0.248	0.149	
Roads (Tra	ditior	nal)		1.00	2254.00	0.225	0.225	
Roads (Su	Ds)			0.60	1058.00	0.106	0.063	
Paths (Tra	dition	al)		1.00	0.00	0.000	0.000	
Permeable	Pavi	ng (SuDs)		0.50	1824.00	0.182	0.091	
Private Ga	rdens	/ hard & soft Lands	scaping	0.30	3165.00	0.317	0.095	
Open Space	e			0.30	1419.87	0.142	0.043	
Total				0.546	12200.00	1.22	0.666	

TITLE Development at Hollystown – Site 3 - Catch SUBJECT Impermeable Area Calculation	nment Area 3		Job Reference 170182 Calc. Sheet No. 4/6	ŒL
DRAWING NUMBERCalculati170182-DBFL-CS-S1-DR-C-1001GPH	ons by	Checked by DMW		Date 22.02.2021
Surface Water Catchment (NEW)		Effe	ctive Area (ha) =	0.36
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)
Roofs (Traditional)	1.00	0.00	0.000	0.000
Roofs (Suds)	0.60	1652.82	0.165	0.099
Roads (Traditional)	1.00	732.00	0.073	0.073
Roads (SuDs)	0.60	675.40	0.068	0.041
Paths (Traditional)	1.00	0.00	0.000	0.000
Permeable Paving (SuDs)	0.50	1142.00	0.114	0.057
Private Gardens/ hard & soft Landscaping	0.30	2119.00	0.212	0.064
Remaining Green Areas	0.30	942.78	0.094	0.028
Total	0.498	7264.00	0.73	0.362

TITLE Development at Hollystown – Site 3 - Catch SUBJECT Impermeable Area Calculation	nment Area 4		Job Reference 170182 Calc. Sheet No. 4/5	ŒL	
DRAWING NUMBER Calculati 170182-DBFL-CS-S1-DR-C-1001 GPH	ons by	Checked by DMW		Date 22.02.2021	
Surface Water Catchment (NEW)		Effec	ctive Area (ha) =	1.03	
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Traditional)	1.00	0.00	0.000	0.000	
Roofs (Suds)	0.60	1707.91	0.171	0.102	
Roads (Traditional)	1.00	1381.00	0.138	0.138	
Roads (SuDs)	0.60	2456.40	0.246	0.147	
Paths (Traditional)	1.00	0.00	0.000	0.000	
Permeable Paving (SuDs)	0.50	1054.90	0.105	0.053	
Private Gardens/ hard & soft Landscaping	0.30	2143.00	0.214	0.064	
Open Space	0.30	1603.59	0.160	0.048	
Total	0.535	10346.80	1.03	0.553	

	1				
TITLE Development at Hollystown – Site 3 - Catc	hment Area 5		Job Reference 170182		
SUBJECT Impermeable Area Calculation			Calc. Sheet No. 6/6	LEFL	
DRAWING NUMBER Calculati 170182-DBFL-CS-S1-DR-C-1001 GPH	ions by	Checked by DMW		Date 07.01.2021	
				4.27	
Surface Water Catchment (NEW)		Effec	ctive Area (ha) =	1.37	
SURFACE TYPE	RUNOFF CO-	GROSS AREA (m ²)	GROSS AREA (ha)	AREA (ha)	
Roofs (Traditional)	1.00	0.00	0.000	0.000	
Roofs (Traditional) Roofs (Suds)	1.00 0.60	0.00 2809.00	0.000	0.000 0.169	
Roofs (Traditional) Roofs (Suds) Roads (Traditional)	1.00 0.60 1.00	0.00 2809.00 2015.50	0.000 0.281 0.202	0.000 0.169 0.202	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs)	1.00 0.60 1.00 0.60	0.00 2809.00 2015.50 1089.00	0.000 0.281 0.202 0.109	0.000 0.169 0.202 0.065	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional)	1.00 0.60 1.00 0.60 1.00	0.00 2809.00 2015.50 1089.00 0.00	0.000 0.281 0.202 0.109 0.000	0.000 0.169 0.202 0.065 0.000	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional) Permeable Paving (SuDs)	1.00 0.60 1.00 0.60 1.00 0.50	0.00 2809.00 2015.50 1089.00 0.00 2394.00	0.000 0.281 0.202 0.109 0.000 0.239	0.000 0.169 0.202 0.065 0.000 0.120	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional) Permeable Paving (SuDs) Private Gardens/ hard & soft Landscaping	1.00 0.60 1.00 0.60 1.00 0.50 0.30	0.00 2809.00 2015.50 1089.00 0.00 2394.00 4323.50	0.000 0.281 0.202 0.109 0.000 0.239 0.432	0.000 0.169 0.202 0.065 0.000 0.120 0.130	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional) Permeable Paving (SuDs) Private Gardens/ hard & soft Landscaping Open Space	1.00 0.60 1.00 0.60 1.00 0.50 0.30 0.30	0.00 2809.00 2015.50 1089.00 0.00 2394.00 4323.50 1116.00	0.000 0.281 0.202 0.109 0.000 0.239 0.432 0.112	0.000 0.169 0.202 0.065 0.000 0.120 0.130 0.033	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional) Permeable Paving (SuDs) Private Gardens/ hard & soft Landscaping Open Space Total	1.00 0.60 1.00 0.60 1.00 0.50 0.30 0.30 0.523	0.00 2809.00 2015.50 0.00 2394.00 4323.50 1116.00 13747.00	0.000 0.281 0.202 0.109 0.000 0.239 0.432 0.112 1.37	0.000 0.169 0.202 0.065 0.000 0.120 0.130 0.033 0.718	
Roofs (Traditional) Roofs (Suds) Roads (Traditional) Roads (SuDs) Paths (Traditional) Permeable Paving (SuDs) Private Gardens/ hard & soft Landscaping Open Space Total	1.00 0.60 1.00 0.60 1.00 0.50 0.30 0.30 0.523	0.00 2809.00 2015.50 1089.00 0.00 2394.00 4323.50 1116.00 13747.00	0.000 0.281 0.202 0.109 0.000 0.239 0.432 0.112 1.37	0.000 0.169 0.202 0.065 0.000 0.120 0.130 0.033 0.718	

TITLE Development at Hollystown – Loc SUBJECT Impermeable Area Calculation	al Centre - Catchment Area	1	Job Refere 7 170182 Calc. Sheet 1/6	No.
DRAWING NUMBER 170182-DBFL-CS-S1-DR-C-1001	Calculations by ASM	Checked b BCM	y	Date 22.10.2021
Surface Water Catchment (NEW)	Effective	Area (ha) =	0.214
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)
Roads (Traditional)	1.00	220.30	0.022	0.022
Roads (SuDs)	0.60	379.50	0.038	0.023
Paths (Traditional)	1.00	393.00	0.039	0.039
Paths (SuDs)	0.60	332.60	0.033	0.020
Green Areas	0.30	667.90	0.067	0.020
Parking Space (Impermeable)	1.00	146.70	0.015	0.015
Total	0.648	2140.00	0.21	0.139

TITLE Development at Hollystown – Local Centre - SUBJECT Impermeable Area Calculation	Catchment Area	2	Job Reference 170182 Calc. Sheet M 1/6	io.	
DRAWING NUMBER Calculation: 170182-DBFL-CS-S1-DR-C-1001 ASM	s by	Checked by BCM		Date 21.10.2021	
Surface Water Catchment (NEW)		Effective	e Area (ha) =	0.71	
SURFACE TYPE	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	TOTAL IMPERMEABLE AREA (ha)	
Roofs (Traditional)	1.00	1472.00	0.147	0.147	
Roofs (Suds)	0.60	1472.00	0.147	0.088	
Roads (Traditional)	1.00	0.00	0.000	0.000	
Roads (SuDs)	0.60	0.00	0.000	0.000	
Paths (Traditional)	1.00	405.00	0.041	0.041	
Landscaped Podium Slab	0.70	1350.00	0.135	0.095	
Permeable Paving (SuDs)	0.50	0.00	0.000	0.000	
Public Open Space	0.30	2402.00	0.240	0.072	
Private Gardens/ hard & soft Landscaping	0.30	0.00	0.000	0.000	
Remaining Green Areas	0.30	0.00	0.000	0.000	
Total	0.623	7101.00	0.71	0.443	

TITLE Development at Hollystown – Loc	al Centre - (Catchment Area	3	Job Reference 170182	ce		
SUBJECT Impermeable Area Calculation				Calc. Sheet M	lo.	ŒFL	
DRAWING NUMBER 170182-DBFL-CS-S1-DR-C-1001	Calculations ASM	s by	Checked by BCM		Date	21.10.2021	
Surface Water Catchment (NE	V)		Effective	Area (ha) =		1.46	
SURFACE TYPE	·	RUNOFF CO- EFFICIENT	GROSS AREA (m ²)	GROSS AREA (ha)	тот/	AL IMPERMEABLE AREA (ha)	
Roofs (Traditional)		1.00	860.00	0.086		0.086	
Roofs (Suds)		0.60	525.00	0.053		0.032	
Roads (Traditional)		1.00	1410.00	0.141		0.141	
Roads (SuDs)		0.60	0.00	0.000		0.000	
Paths (Traditional)		1.00	0.00	0.000		0.000	
Permeable Paving (SuDs)		0.50	480.00	0.048		0.024	
Public Open Space		0.30	5662.50	0.566		0.170	
Remaining green area		0.15	5662.50	0.566		0.085	
Total		0.368	14600.00	1.46		0.537	

APPENDIX C

MET EIREANN RAINFALL DATA

ATTENUATION STORAGE SUMMARY

SURFACE WATER STORAGE CALCULATIONS (SOURCE CONTROL)

		ц	keturn Per: Irish Gri	lod Rainf 1. Easti	Met Eire Eall Dep Ing: 307	ann oths for (691, No	slidin rthing:	g Durat 242789	ions							
	Inte	rval	_					Years								
DURATION	6months,	lyear,	5	З,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.6,	3.6,	4.2	5.0,	5.6,	6.0,	7.4,	9.0,	10.1,	11.6,	12.9,	13.9,	15.5,	16.7,	17.7,	N/A ,
10 mins	3.6,	5.1,	5.9	7.0,	7.8,	8.4,	10.4,	12.6,	14.1,	16.1,	18.0,	19.4,	21.6,	23.2,	24.6,	N/A ,
15 mins	4.3,	6.0,	6.9	8.2,	9.2,	9.9,	12.2,	14.8,	16.6,	19.0,	21.1,	22.8,	25.4,	27.3,	29.0,	N/A ,
30 mins	5.6,	7.8,	8.9	10.6,	11.7,	12.6,	15.5,	18.6,	20.7,	23.6,	26.2,	28.2,	31.2,	33.6,	35.5,	N/A ,
1 hours	7.5,	10.2,	11.6	13.7,	15.1,	16.1,	19.6,	23.5,	26.0,	29.4,	32.5,	34.8,	38.4,	41.2,	43.5,	N/A ,
2 hours	, 6. 9	13.2,	15.0	17.6,	19.3,	20.6,	24.8,	29.5,	32.5,	36.7,	40.3,	43.1,	47.3,	50.6,	53.2,	N/A ,
3 hours	11.6,	15.5,	17.5	20.4,	22.3,	23.8,	28.5,	33.7,	37.1,	41.7,	45.7,	48.8,	53.4,	57.0,	59.9,	N/A ,
4 hours	13.0,	17.3,	19.5	22.7,	24.8,	26.4,	31.5,	37.1,	40.7,	45.7,	50.0,	53.3,	58.2,	62.0,	65.2,	N/A ,
6 hours	15.3,	20.2,	22.7	26.3,	28.6,	30.4,	36.2,	42.4,	46.4,	51.9,	56.7,	60.3,	65.8,	70.0,	73.4,	N/A ,
9 hours	18.1,	23.6,	26.4	30.5,	33.1,	35.1,	41.6,	48.5,	52.9,	59.0,	64.3,	68.3,	74.3,	78.9,	82.6,	N/A ,
12 hours	20.3,	26.3,	29.4	33.8,	36.7,	38.9,	45.9,	53.4,	58.1,	64.6,	70.3,	74.5,	81.0,	85.9,	89.8,	N/A ,
18 hours	23.9,	30.7,	34.2	39.2,	42.5,	44.9,	52.7,	61.0,	66.3,	73.5,	79.7,	84.4,	91.4,	96.8,	101.1,	N/A ,
24 hours	26.8,	34.3,	38.1	43.5,	47.1,	49.7,	58.1,	67.1,	72.8,	80.5,	87.1,	92.2,	,7.96	105.4,	110.0,	125.7,
2 days	33.3,	41.9,	46.2	52.3,	56.2,	59.2,	68.4,	78.1,	84.2,	92.5,	99.5,	104.9,	112.8,	118.8,	123.6,	139.9,
3 days	38.6,	48.1,	52.7	59.4,	63.6,	66.8,	76.7,	87.1,	93.6,	102.3,	109.8,	115.3,	123.7,	129.9,	135.0,	151.9,
4 days	43.2,	53.4,	58.5	65.5,	70.0,	73.4,	83.9,	94.9,	101.7,	110.9,	118.7,	124.5,	133.2,	139.7,	144.9,	162.5,
6 days	51.4,	62.8,	68.4	76.3,	81.3,	85.0,	96.5,	108.5,	115.9,	125.8,	134.2,	140.5,	149.8,	156.7,	162.3,	181.0,
8 days	58.6,	71.1,	77.2	85.7,	91.1,	95.2,	107.5,	120.4,	128.3,	138.9,	147.8,	154.4,	164.2,	171.5,	177.4,	197.0,
10 days	65.2,	78.7,	85.2	94.3,	100.1,	104.4,	117.5,	131.1,	139.5,	150.6,	160.0,	167.0,	177.3,	184.9,	191.1,	211.6,
12 days	71.3,	85.7,	92.7	102.3,	108.4,	113.0,	126.8,	141.1,	149.9,	161.5,	171.3,	178.6,	189.3,	197.3,	203.7,	225.0,
16 days	82.8,	98.8,	106.4	, 117.0,	123.7,	128.7,	143.8,	159.3,	168.8,	181.4,	192.0,	199.8,	211.3,	219.8,	226.7,	249.4,
20 days	93.4,	110.8,	1.911	, 130.6,	137.8,	143.1,	159.4,	176.0,	186.1,	199.6,	210.8,	219.1,	231.3,	240.3,	247.6,	271.5,
25 days	105.9,	124.9,	133.9	146.3,	154.1,	159.9,	177.4,	195.3,	206.1,	220.5,	232.4,	241.3,	254.3,	263.9,	271.6,	296.9,
NOTES:																
N/A Data nc	t availa	ble	·													
These value	s are de	rived fr	com a Deptl	1 Duratio	on Frequ	tency (D	DF) Mod	el								
For details	refer t	:0														
'Fitzgerald	П D. L. (2007), E	dstimates (of Point	Rainfal	.l Frequ	encies,	Techni	cal Not	e No.	51, Met	Eireann	, Dubli	n',		
Available	for down	load at	www.met.i(e/climate	e/datapı	coducts/	Estimat	ion-of-	Point-F	ainfal.	l-Freque	ncies_T	N61.pdf			

Development at Hollystown – Site 2,3 & Local Centre Infrastructure Design Report

Attenuation Structure Summary							
Site	2						
Catchment Area	1						
Type of Overground Structure	Unlined Detention Basin						
Average Water Depth of Overground Structure (mm)	902						
Overground Structure Base Area (m ²)	740.5						
Base slope (1V:XH)	5						
Overground Volume Provided (m ³)	471.43						
Total Volume	471.43						
Outflow Control	Hydro brake						
Q _{bar} (I/sec)	3.6						
Allowable Outflow (I/sec)	3.6						
Outlet	Site 2: Golf Course Drain (Section 3.22)						

DBFL Consulting Engineers

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December 2021

DBFL Consulting Engineers	Page 1	
Ormond House	Hollystown	
Upper Ormond Quay	Site 2 : 1	
Dublin 7		Mirrn
Date 04/10/2021 14:11	Designed by GPH	Drainago
File Site 2 Catchment 1.SRCX	Checked by DW	Diamage
Innovyze	Source Control 2018.1.1	

Summary of Results for 100 year Return Period (+20%)

Half Drain Time : 1112 minutes.

	Storm		Max	Max	Max Infiltration	Max	Max E Outflow	Max	Status
	Lvene		(m)	(m)	(1/s)	(1/s)	(1/s)	(m ³)	
60	min Su	mmer	71.433	0.533	0.0	3.6	3.6	220.8	ОК
120	min Su	mmer	71.530	0.630	0.0	3.6	3.6	272.2	0 K
180	min Su	unmer	71.583	0.683	0.0	3.6	3.6	301.6	0 K
240	min Su	unmer	71.618	0.718	0.0	3.6	3.6	321.7	0 K
360	min Su	unne r	71.661	0.761	0.0	3.6	3.6	346.7	0 K
480	min Su	mmer	71.684	0.784	0.0	3.6	3.6	360.6	O K
600	min Su	unne r	71.697	0.797	0.0	3.6	3.6	368.2	0 K
720	min Su	mmer	71.702	0.802	0.0	3.6	3.6	371.5	O K
960	min Su	unne r	71.700	0.800	0.0	3.6	3.6	370.5	0 K
1440	min Su	mmer	71.692	0.792	0.0	3.6	3.6	365.6	O K
2160	min Su	unmer	71.679	0.779	0.0	3.6	3.6	357.6	O K
2880	min Su	mmer	71.662	0.762	0.0	3.6	3.6	347.3	ОК
60	min Wi	inter	71.482	0.582	0.0	3.6	3.6	246.3	O K
120	min Wi	inter	71.588	0.688	0.0	3.6	3.6	304.5	0 K
180	min Wi	inter	71.647	0.747	0.0	3.6	3.6	338.5	O K
240	min Wi	inter	71.687	0.787	0.0	3.6	3.6	362.1	0 K
360	min Wi	inter	71.736	0.836	0.0	3.6	3.6	392.8	O K
480	min Wi	inter	71.765	0.865	0.0	3.6	3.6	411.2	0 K
600	min Wi	inter	71.783	0.883	0.0	3.6	3.6	422.5	0 K
720	min Wi	inter	71.793	0.893	0.0	3.6	3.6	429.2	ОК

	Stor Ever	m it	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m°)	Time-Peak (mins)
60	min	Summer	38,241	0.0	235.0	88
120	min	Summer	24.215	0.0	297.8	146
180	min	Summer	18.375	0.0	338.9	206
240	min	Summer	15.079	0.0	370.8	264
360	min	Summer	11.378	0.0	419.7	382
480	min	Summer	9.305	0.0	457.8	500
600	min	Summer	7.956	0.0	489.1	618
720	min	Summer	6.998	0.0	516.3	736
960	min	Summer	5.713	0.0	562.0	934
1440	min	Summer	4.292	0.0	552.7	1170
2160	min	Summer	3.222	0.0	713.1	1572
2880	min	Summer	2.626	0.0	775.4	1984
60	min	Winter	38.241	0.0	260.2	86
120	min	Winter	24.215	0.0	329.5	144
180	min	Winter	18.375	0.0	375.1	202
240	min	Winter	15.079	0.0	410.5	260
360	min	Winter	11.378	0.0	464.6	376
480	min	Winter	9.305	0.0	506.6	490
600	min	Winter	7.956	0.0	541.3	604
720	min	Winter	6.998	0.0	569.3	718
		e	1982-20	18 Tnnc	0020	

DBFL Consulting Engineers

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DBFL Consulting Engi	neers							Page 2	
Ormond House			Holl	lystown					
Upper Ormond Quay			Site	2 :	1				
Dublin 7								Micco	
Date 04/10/2021 14:1	1		Desi	ioned b	v GPH				
File Site 2 Catchmen	File Site 2 Catchment 1 SPCX Checked by DW								
Innovyze		~	Sour	ce Con	trol 201	8 1 1			
Summary	of Res	ults f	or 10	00 vear	Return	Period	(+20%)		
								-	
Storm	Маж	Маж	м	aux.	Max	Max	Max	Status	
Event	Level	Depth 1	Infilt	tration (Control E	Outflow	Volume		
	(m)	(m)	(1	/s)	(1/s)	(1/s)	(m³)		
960 min Winter	71.800	0.900		0.0	3.6	3.6	433.9	ок	
1440 min Winter	71.788	0.888		0.0	3.6	3.6	425.6	ОК	
2160 min Winter	71.766	0.866		0.0	3.6	3.6	411.5	O K	
2880 min Winter	71.738	0.838		0.0	3.6	3.6	394.0	O K	
	Stor	P	ain	Flooded	Discharge	Time-D-	ak		
	Event	(777	n/hr)	Volume	Volume	(mins)			
			,,	(m ³)	(m ³)	,,	·		
960	min Win	iter 5	5.713	0.0	566.8	9	38		
2160	min Win	ter 2	2222	0.0	789.2	1 16	72		
2880	min Win	ter 2	.626	0.0	858.1	21	48		
		©198	32-20	18 Inno	ovyze				

DBFL Consulting Engineers		Page 3					
Ormond House	Hollystown						
Upper Ormond Quay	Site 2 : 1						
Dublin 7		Micro					
Date 04/10/2021 14:11	Designed by GPH	Desinance					
File Site 2 Catchment 1.SRCX	File Site 2 Catchment 1.SRCX Checked by DW						
Innovyze	Source Control 2018.1.1	4					
Ra	infall Details						
Rainfall Model	FSR Winter Storms	Yes					
Return Period (years) Perion Scotla	nd and Ireland Cv (Summer) 0	.750					
M5-60 (mm)	16.200 Shortest Storm (mins)	60					
Ratio R	0.272 Longest Storm (mins)	2880					
Summer Storms	Yes Climate Change %	+20					
Tim	ne Area Diagram						
Tota	al Area (ha) 0.820						
Time (mins)	Area Time (mins) Area						
From: To:	(ha) From: To: (ha)						
0 15	0 000 15 20 0 820						
	20 00 01020						
©198	2-2018 Innovyze						

DBFL Consulting Engineers							Page 4			
Ormond House	Hollys	town								
Upper Ormond Quay	Site 2	: 1								
Dublin 7							Micco			
Date 04/10/2021 14:11	Design	ed by	/ GE	Н			Desigore			
File Site 2 Catchment 1.SRCX	Checke	d bv	DW				prainage			
Innovvze	Source	Cont	rol	2018	.1.1					
2	íodel D	etail	s							
Storage is Online Cover Level (m) 72.300										
Infiltra	tion Ba	asin S	Stri	acture	2					
Invert Level (m) 70.900 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00 Infiltration Coefficient Side (m/hr) 0.00000										
Depth (m) Are	a (m²)	Depth	(m)	Area	(m²)					
0.000	328.0	0.	902	63	55.0					
Hydro-Brake®	Optimu	um Out	tflo	ow Cor	ntrol	<u>.</u>				
Unit	Referen	ice MD-	-SHE	-0089-	3600-1	1100-3600				
Desig	n Head ((m.)				1.100				
Design	Flow (1/	(s)				3.6				
	Flush-Fl	.074			C:	alculated				
2	objecti oplicati	on N	1018	ise up	stream	n storage Surface				
Sump	Availab	le				Yes				
Dia	meter (m	m.)				89				
Invert Minimu Outlat Diag Diag	Level ((m)				70.750				
Suggested Manhole Dia	meter (m meter (m	m) m)				1200				
Control Po	ints	Hea	d (n	n) Flow	(1/s	:)				
Design Point (Ca	lculated	a)	1.10	00	3.	6				
E E E E E E E E E E E E E E E E E E E	lush-Flo		0.33	30	3.	.6				
	Kick-Flo	90	0.68	13	2.	9				
Mean Flow over H	lead Rang	je.		-	3.	.1				
The hydrological calculations have b	een base	d on t	the	Head/D:	ischar	rge relatio	onship for the			
Hydro-Brake@ Optimum as specified.	Should a	nother	r ty	pe of	contro	ol device d	other than a			
Hydro-Brake Optimum® be utilised the	n these	stora	je r	outing	calc	ulations wi	ll be			
invalidated										
Depth (m) Flow (1/s) Depth (m) Flow	(1/s)	Depth	(m)	Flow	(1/s)	Depth (m)	Flow (1/s)			
0.100 2.7 1.200	3.7	3.	000		5.7	7.000	8.6			
0.200 3.4 1.400	4.0	3.	500		6.2	7.500	8.9			
0.300 3.6 1.600	4.3	4.	500		6.6	8.000	9.1			
0.500 3.5 2.000	4.8	5	000		7.3	9,000	9.7			
0.600 3.3 2.200	5.0	5.	500		7.6	9.500	9.9			
0.800 3.1 2.400	5.2	6.	000		8.0					
1.000 3.4 2.600 5.4 6.500 8.3										
01.00	2-2019	Inne		~						
0198	2-2018	TUDO	vyz	e						

DBFL Consulting Engineers

170182-DBFL-XX-XX-RP-C-007

Attenuation Structure Summary							
Site	2						
Catchment Area	2						
Type of Overground Structure	Unlined Detention Basin						
Average Water Depth of Overground Structure (mm)	1092						
Overground Structure Base Area (m²)	661.2						
Base slope (1V:XH)	5						
Overground Volume Provided (m ³)	1282.64						
Total Volume	1282.64						
Outflow Control	Hydro brake						
Q _{bar} (I/sec)	9.35						
Allowable Outflow (I/sec)	9.35						
Outlet	Site 2: Golf Course Drain (Section 3.22)						

Ormond House Hollystown Upper Ormond Quay Site 2 : 1 Dublin 7 Designed by GPH File Site 2 Catchment 2.SRCX Checked by DW Innovyre Source Control 2018.1.1 Summary of Results for 100 year Return Period (+20%) Hat Max Max Storm Hax Max Keent Level Depth Infiltratio Control 2018.1.1 Storm Hax Max Max Max	DBFL Consulting Engi	neers							Page 1				
Upper Ormond Quay Site 2 : 1 Date 04/10/2021 14:12 Designed by GPH File Site 2 Catchment 2.SRCX Designed by GPH Innovyze Source Control 2018.1.1 Summary of Results for 100 year Return Period (+20%) Kall State 2 Catchment 2.SRCX Summary of Results for 100 year Return Period (+20%) Kall State 2 Catchment 2.SRCX Summary of Results for 100 year Return Period (+20%) Kall State 2 Catchment 2.SRCX Max Max Max Max Max Max Status Keent Catch 200 (1/2) Catch 200 (1/2) Summary of Results for 100 year Return Period (+20%) Max Max Max Max Max Max Status Max Max Max Max Max Status Summer 70.446 0.659 0.0 9.4 9.4 558.0 0 K 100 min Summer 70.446 0.859 0.0 9.4 9.4 558.0 0 K 100 min Summer 70.446 0.859 0.0 9.4 9.4 558.0 0 K 100 min Summer 70.446 0.859 0.0 9.4 9.4 558.0 0 K <td colsp<="" td=""><td>Ormond House</td><td></td><td></td><td>Holl</td><td>ystown</td><td>1</td><td></td><td></td><td></td><td></td></td>	<td>Ormond House</td> <td></td> <td></td> <td>Holl</td> <td>ystown</td> <td>1</td> <td></td> <td></td> <td></td> <td></td>	Ormond House			Holl	ystown	1						
Publin 7 Designed by GPH Designed by GPH Tincovyre Source Control 2018.1.1 Source Control 2018.1.1 Summary of Results for 100 year Return Period (+204) Half Drain Time : 1066 minutes. Storm Max Max Max Max Max Max Max Max Status Seent Level Depth Infiltration Control 2 Outflow Volume (m) (1/s) (1/s) 60 min Summer 70.446 0.659 0.0 9.4 9.4 555.0 0 K 120 min Summer 70.466 0.777 0.0 9.4 9.4 655.9 0 K 240 min Summer 70.467 0.869 0.0 9.4 9.4 655.8 0 K 240 min Summer 70.474 0.857 0.0 9.4 9.4 655.8 0 K 240 min Summer 70.718 0.974 0.0 9.4 9.4 851.8 0 K 200 min Summer 70.746 0.858 0.0 9.4 9.4 851.8 0 K 200 min Summer 70.750 0.869 0.0 9.4 9.4 852.2 0 K 200 min Summer 70.770 0.862 0.0 9.4 9.4 851.1 0 K 200 min Summer 70.750 0.865	Upper Ormond Quay			Site	2 : 1								
Date 04/10/2021 14:12 Designed by GPH Designed by GPH File Site 2 Catchment 2.SRCX Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Source Control 2018.1.1 Max Max Max Max Status Max Max Max Max Status Max Max Max Status Max Status Source Control 2018.1.1 Source C	Dublin 7								Micco	100			
File Site 2 Catchment 2.SRCX Checked by DN Definition Source Control 2018.1.1 Source 100 year Return Period (+20%) Source 1005 Source 1000 year Return Period (+20%) Source 10.5.4 Max Max Max Max Max Status Source 10.650 Source 10.650 <th col<="" td=""><td>Date 04/10/2021 14:1</td><td>2</td><td></td><td>Desi</td><td>gned b</td><td>V GPH</td><td></td><td></td><td>Design</td><td>-</td></th>	<td>Date 04/10/2021 14:1</td> <td>2</td> <td></td> <td>Desi</td> <td>gned b</td> <td>V GPH</td> <td></td> <td></td> <td>Design</td> <td>-</td>	Date 04/10/2021 14:1	2		Desi	gned b	V GPH			Design	-		
Thnovyze Source Control 2018.1.1 Storm provide the second status of the second s	File Site 2 Catchmen	t 2.SR	CX	Chec	ked bv	- DW			Uraina	ge			
Summary of Results for 100 year Return Period (+204) Half Drain Time: 1066 minutes. Storm Nax Nax Nax Nax Nax Status Event Level Depth Infiltration Control 2 Outflow Volume (m) (m) (1/2) (1/2) (1/2) (m') 60 min Summer 70.446 0.659 0.0 9.4 9.4 558.0 0 K 100 min Summer 70.646 0.777 0.0 9.4 9.4 688.0 0 K 200 min Summer 70.640 0.0 9.4 9.4 687.6 0 K 240 min Summer 70.744 0.591 0.0 9.4 9.4 867.6 0 K 240 min Summer 70.761 0.974 0.0 9.4 9.4 898.8 0 K 2160 min Summer 70.761 0.696 0.0 9.4 9.4 915.1 0 K 2160 min Summer 70.761 0.694 0.0 9.4 9.4 854.1 0 K 2160 min Summer 70.761 0.942 0.0 9.4 9.4 854.1 0 K 2160 min Summer 70.760 0.949 0.0 9.4 9.4 854.1 0 K 2160 min Kinner 70.730 <	Innovvze			Sour	ce Con	trol 201	8.1.1			_			
Summary of Results for 100 year Return Period (+20%) Haif Drain Time : 1066 minutes. Note: The second													
Half Drain Time : 1066 minutes. Form they has has has has has been have been been been been been been been be	Summary	of Res	ults f	or 10	0 year	Return	Period	(+20%))				
Half Drain Time : 1066 minutes. Storm Max Max <th co<="" td=""><td colspan="12"></td></th>	<td colspan="12"></td>												
Storn Event Hax (m) Max (m)		Ha	alf Drai	n Tim	e : 106	6 minutes.							
Event Level Depth Infiltration Control Z Outflow Volume (m) (m) (l/z) (l/z) (l/z) (m') 60 min Summer 70.646 0.685 0.0 9.4 9.4 9.85.0 0 K 120 min Summer 70.646 0.685 0.0 9.4 9.4 885.9 0 K 120 min Summer 70.647 0.840 0.0 9.4 9.4 885.9 0 K 240 min Summer 70.746 0.881 0.0 9.4 9.4 887.6 0 K 360 min Summer 70.756 0.969 0.0 9.4 9.4 887.6 0 K 600 min Summer 70.761 0.974 0.0 9.4 9.4 91.6 0 K 720 min Summer 70.760 0.969 0.0 9.4 9.4 921.2 0 K 960 min Summer 70.760 0.959 0.0 9.4 9.4 921.2 0 K 1240 min Summer 70.770 0.920 0.0 9.4 9.4 921.2 0 K 120 min Winter 70.506 0.719 0.0 9.4 9.4 921.2 0 K 2800 min Winter 70.705 0.918 0.0 9.4 9.4 984.1 0 K 1	Storm	Max	Max	Ма	-	Max	Max	Max	Status				
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60 min Summer 70.546 0.659 0.0 9.4 9.4 685.0 0 K 120 min Summer 70.567 0.840 0.0 9.4 9.4 685.0 0 K 240 min Summer 70.718 0.831 0.0 9.4 9.4 807.6 0 K 360 min Summer 70.718 0.951 0.0 9.4 9.4 807.6 0 K 480 min Summer 70.761 0.974 0.0 9.4 9.4 91.0 N 960 min Summer 70.766 0.969 0.0 9.4 9.4 91.5 0 K 960 min Summer 70.766 0.969 0.0 9.4 9.4 91.5 0 K 960 min Summer 70.764 0.959 0.0 9.4 9.4 91.5 0 K 2180 min Summer 70.764 0.959 0.0 9.4 9.4 92.2 0 K 2680 min Summer 70.707 0.920 0.0 9.4 9.4 851.7 0 K 2160 min Summer 70.705 0.918 0.0 9.4 9.4 851.7 0 K 120 min Winter 70.810 1.023 0.0 9.4 9.4 984.3 0 K 360 min Winter 70.810 1.023 0.0 9.4 9.4 984.3				1									
1:00 min Summer 70.600 0.077 0.0 9.4 9.4 9.4 0.6 0.8 240 min Summer 70.718 0.921 0.0 9.4 9.4 867.6 0.8 260 min Summer 70.718 0.921 0.0 9.4 9.4 867.6 0.8 600 min Summer 70.716 0.966 0.0 9.4 9.4 867.6 0.8 600 min Summer 70.756 0.966 0.0 9.4 9.4 915.8 0.8 720 min Summer 70.756 0.966 0.0 9.4 9.4 902.3 0.8 2160 min Summer 70.729 0.942 0.0 9.4 9.4 902.3 0.8 2160 min Summer 70.701 0.920 0.0 9.4 9.4 902.3 0.8 2180 min Winter 70.703 0.916 0.0 9.4 9.4 861.7 0.8 210 min Winter 70.7032 0.945 0.0 9.4 9.4 861.7 0.8 210 min Winter 70.7032 0.945 0.0 9.4 9.4 84.3 0.8 210 min Winter 70.812 1.056 0.0 9.4 9.4 1024.0 <td>60 min Summer</td> <td>70.446</td> <td>0.659</td> <td></td> <td>0.0</td> <td>9.4</td> <td>9.4</td> <td>558.0</td> <td>OK</td> <td></td>	60 min Summer	70.446	0.659		0.0	9.4	9.4	558.0	OK				
240 min Summer 70.668 0.881 0.0 9.4 9.4 9.4 9.6 0.8 360 min Summer 70.718 0.981 0.0 9.4 9.4 967.6 0.8 400 min Summer 70.756 0.969 0.0 9.4 9.4 915.8 0.8 600 min Summer 70.766 0.969 0.0 9.4 9.4 915.8 0.8 720 min Summer 70.766 0.969 0.0 9.4 9.4 915.8 0.8 960 min Summer 70.766 0.969 0.0 9.4 9.4 915.1 0.8 960 min Summer 70.766 0.969 0.0 9.4 9.4 915.1 0.8 140 min Summer 70.746 0.9559 0.0 9.4 9.4 962.2 0.8 2800 min Summer 70.707 0.920 0.0 9.4 9.4 862.1 0.8 120 min Winter 70.806 0.719 0.0 9.4 9.4 961.7 0.8 120 min Winter 70.810 1.023 0.0 9.4 9.4 961.3 0.8 240 min Winter 70.821.056 0.0 9.4 9.4 10.8 0.0 120 min Winter 70.821.056 0.0 9.4 9.4	120 min Summer 180 min Summer	70.627	0.840		0.0	9.4	9.4	758.4	0 K				
360 min Summer 70.718 0.937 0.0 9.4 9.4 94.867.6 0.8 400 min Summer 70.744 0.957 0.0 9.4 9.4 99.8 0.8 720 min Summer 70.756 0.969 0.0 9.4 9.4 95.8 0.8 960 min Summer 70.756 0.969 0.0 9.4 9.4 95.1 0.8 1440 min Summer 70.756 0.942 0.0 9.4 9.4 95.1 0.8 1440 min Summer 70.776 0.920 0.0 9.4 9.4 95.1 0.8 2160 min Summer 70.700 0.920 0.0 9.4 9.4 862.2 0.8 2160 min Winter 70.705 0.918 0.0 9.4 9.4 862.2 0.8 210 min Winter 70.705 0.918 0.0 9.4 9.4 862.7 0.8 240 min Winter 70.705 0.9465 0.0 9.4 9.4 964.3 0.8 240 min Winter 70.782 0.965 0.0 9.4 9.4 90.9 0.8 360 min Winter 70.873 1.056 0.0 9.4 9.4 1025.0 0.8 240 min Summer 10.1.023 0.0 9.4 <	240 min Summer	70.668	0.881		0.0	9.4	9.4	807.6	O K				
480 min Summer 70.744 0.857 0.0 9.4 9.4 9.4 99.8 0 K 600 min Summer 70.756 0.969 0.0 9.4 9.4 91.5.8 0 K 720 min Summer 70.766 0.969 0.0 9.4 9.4 91.5.1 0 K 940 min Summer 70.766 0.959 0.0 9.4 9.4 90.3 0 K 2160 min Summer 70.776 0.959 0.0 9.4 9.4 90.2 0 K 2160 min Summer 70.707 0.920 0.0 9.4 9.4 864.1 0 K 60 min Winter 70.705 0.920 0.0 9.4 9.4 864.1 0 K 120 min Winter 70.705 0.9218 0.0 9.4 9.4 861.7 0 K 120 min Winter 70.705 0.9218 0.0 9.4 9.4 91.7 0 K 360 min Winter 70.840 1.023 0.0 9.4 9.4 91.0 0 K 360 min Winter 70.842 1.075 0.0 9.4 9.4 1068.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K 120 min Summer 18.375 0.0 955.2 196	360 min Summer	70.718	0.931		0.0	9.4	9.4	867.6	O K				
600 min Summer 70.756 0.969 0.0 9.4 9.4 915.8 0 K 720 min Summer 70.756 0.969 0.0 9.4 9.4 915.1 0 K 960 min Summer 70.756 0.969 0.0 9.4 9.4 915.1 0 K 1440 min Summer 70.728 0.942 0.0 9.4 9.4 962.2 0 K 2860 min Summer 70.707 0.920 0.0 9.4 9.4 854.1 0 K 100 min Winter 70.566 0.719 0.0 9.4 9.4 854.1 0 K 100 min Winter 70.705 0.948 0.0 9.4 9.4 851.7 0 K 120 min Winter 70.705 0.948 0.0 9.4 9.4 851.7 0 K 240 min Winter 70.801 1.023 0.0 9.4 9.4 909.9 0 K 360 min Winter 70.862 1.075 0.0 9.4 9.4 1065.5 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K 720 min Summer 11.378 0.0 1059.2 76 120 <td>480 min Summer</td> <td>70.744</td> <td>0.957</td> <td></td> <td>0.0</td> <td>9.4</td> <td>9.4</td> <td>899.8</td> <td>O K</td> <td></td>	480 min Summer	70.744	0.957		0.0	9.4	9.4	899.8	O K				
720 min Summer 70.761 0.974 0.0 9.4 9.4 9.1.2 0 K 960 min Summer 70.766 0.959 0.0 9.4 9.4 915.1 0 K 1240 min Summer 70.729 0.942 0.0 9.4 9.4 882.2 0 K 2880 min Summer 70.707 0.920 0.0 9.4 9.4 854.1 0 K 60 min Winter 70.506 0.719 0.0 9.4 9.4 622.3 0 K 120 min Winter 70.752 0.965 0.0 9.4 9.4 621.7 0 K 240 min Winter 70.752 0.965 0.0 9.4 9.4 964.3 0 K 360 min Winter 70.7643 1.056 0.0 9.4 9.4 964.3 0 K 400 min Winter 70.862 1.075 0.0 9.4 9.4 964.3 0 K 600 min Summer 10.873 1.086 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1058.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mn/h)	600 min Summer	70.756	0.969		0.0	9.4	9.4	915.8	O K				
940 min Summer 70.756 0.969 0.0 9.4 9.4 91.3 10 K 1440 min Summer 70.729 0.942 0.0 9.4 9.4 882.2 0 K 2880 min Summer 70.707 0.920 0.0 9.4 9.4 854.1 0 K 2880 min Summer 70.707 0.920 0.0 9.4 9.4 854.1 0 K 120 min Winter 70.634 0.847 0.0 9.4 9.4 767.3 0 K 120 min Winter 70.752 0.955 0.0 9.4 9.4 909.9 0 K 240 min Winter 70.752 0.955 0.0 9.4 9.4 909.9 0 K 360 min Winter 70.810 1.022 0.0 9.4 9.4 909.9 0 K 360 min Winter 70.843 1.056 0.0 9.4 9.4 984.3 0 K 60 min Winter 70.873 1.086 0.0 9.4 9.4 1058.5 0 K 70 min Winter 70.873 1.086 0.0 592.5 78 120 min Summer 18.375 0.0 855.2 196 240 min Summer 18.375 0.0 159.2 374 480 min Summer 19.305 0.0 1122.	720 min Summer	70.761	0.974		0.0	9.4	9.4	921.2	O K				
21400 min Summer 70.729 0.942 0.0 9.4 9.4 98.4 9.4 882.2 0 K 2880 min Summer 70.707 0.920 0.0 9.4 9.4 884.1 0 K 120 min Winter 70.506 0.719 0.0 9.4 9.4 622.3 0 K 120 min Winter 70.634 0.847 0.0 9.4 9.4 622.3 0 K 120 min Winter 70.752 0.965 0.0 9.4 9.4 90.9 0 K 240 min Winter 70.810 1.023 0.0 9.4 9.4 90.9 0 K 360 min Winter 70.861 1.023 0.0 9.4 9.4 90.4 0 K 400 min Winter 70.862 1.075 0.0 9.4 9.4 1028.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K 720 min Winter 70.873 1.086 0.0 751.1 128 128 128 128 120 min Summer 18.375 0.0 851.2 186 286 286 188 286 286 188 286 286 286 188 128 128 128 128 128	960 min Summer	70.756	0.969		0.0	9.4	9.4	915.1	OK				
2880 min Summer 70.707 0.920 0.0 9.4 9.4 854.1 0 K 60 min Winter 70.506 0.719 0.0 9.4 9.4 662.3 0 K 120 min Winter 70.634 0.847 0.0 9.4 9.4 856.7 0 K 120 min Winter 70.705 0.918 0.0 9.4 9.4 851.7 0 K 240 min Winter 70.705 0.918 0.0 9.4 9.4 984.3 0 K 360 min Winter 70.810 1.023 0.0 9.4 9.4 984.3 0 K 480 min Winter 70.862 1.075 0.0 9.4 9.4 1024.0 0 K 600 min Winter 70.862 1.075 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1054.0 0 K 720 min Summer 18.375 0.0 855.2 196 240 min Summer 11.376 0.0 1059.2 374 460 min Summer 11.370 0.0 1059.2 374 460 min Summer 1.377 0.1 128 120 min Summer 5.713 0.0 1059.2 374 460 min Summer 1.377 0.1 1256	2160 min Summer	70.729	0.939		0.0	9.4	9.1	882 2	0 K				
60 min Winter 70.506 0.719 0.0 9.4 9.4 622.3 0 K 120 min Winter 70.634 0.847 0.0 9.4 9.4 767.3 0 K 180 min Winter 70.705 0.918 0.0 9.4 9.4 951.7 0 K 240 min Winter 70.752 0.965 0.0 9.4 9.4 984.3 0 K 360 min Winter 70.843 1.056 0.0 9.4 9.4 984.3 0 K 600 min Winter 70.862 1.075 0.0 9.4 9.4 1028.0 0 K 720 min Winter 70.862 1.075 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) (m²) 60 min Summer 28.241 0.0 552.5 78 120 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 925.1 256 360 min Summer 7.956 0.0 1232.7 612 720 612 720 730 960 936 0.0 1302.3 730 </td <td>2880 min Summer</td> <td>70.707</td> <td>0.920</td> <td></td> <td>0.0</td> <td>9.4</td> <td>9.4</td> <td>854.1</td> <td>O K</td> <td></td>	2880 min Summer	70.707	0.920		0.0	9.4	9.4	854.1	O K				
120 min Winter 70.634 0.847 0.0 9.4 9.4 767.3 0 K 180 min Winter 70.752 0.918 0.0 9.4 9.4 851.7 0 K 240 min Winter 70.752 0.965 0.0 9.4 9.4 90.9 0 K 360 min Winter 70.810 1.023 0.0 9.4 9.4 984.3 0 K 400 min Winter 70.843 1.056 0.0 9.4 9.4 1028.0 0 K 600 min Winter 70.862 1.075 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) (m*) O Min Summer 28.241 0.0 592.5 78 120 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 985.2 374 480 min Summer 9.305 0.0 1302.3 730 960 min Summer 7.956 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440	60 min Winter	70.506	0.719		0.0	9.4	9.4	622.3	O K				
180 min Winter 70.705 0.918 0.0 9.4 9.4 9.4 90.9 0 K 240 min Winter 70.810 1.023 0.0 9.4 9.4 909.9 0 K 360 min Winter 70.813 1.023 0.0 9.4 9.4 909.9 0 K 480 min Winter 70.813 1.056 0.0 9.4 9.4 1028.0 0 K 600 min Winter 70.862 1.075 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) (m*) 60 min Summer 24.215 0.0 751.1 128 180 min Summer 15.079 0.0 935.1 256 360 min Summer 15.079 0.0 159.2 374 400 min Summer 7.956 0.0 159.2 374 400 min Summer 7.956 0.0 159.2 70 720 min Summer 7.956 0.0 123.7 612 720 min Summer 3.222 0.0 1447.4 </td <td>120 min Winter</td> <td>70.634</td> <td>0.847</td> <td></td> <td>0.0</td> <td>9.4</td> <td>9.4</td> <td>767.3</td> <td>O K</td> <td></td>	120 min Winter	70.634	0.847		0.0	9.4	9.4	767.3	O K				
240 min Winter 70.810 1.023 0.0 9.4 9.4 909.9 0 K 360 min Winter 70.813 1.036 0.0 9.4 9.4 984.3 0 K 400 min Winter 70.821 1.075 0.0 9.4 9.4 1028.0 0 K 600 min Winter 70.873 1.086 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) (m*) (m*) 60 min Summer 38.241 0.0 592.5 76 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 11.378 0.0 1059.2 374 480 min Summer 11.378 0.0 1059.2 374 480 min Summer 13.00 1059.2 374 480 600 min Summer 14.292 0.0 132.3 612 720 min Summer 3.222 0.0 1440.6 900	180 min Winter	70.705	0.918		0.0	9.4	9.4	851.7	O K				
3800 min Winter 70.843 1.023 0.0 9.4 9.4 1028.0 0 K 480 min Winter 70.842 1.075 0.0 9.4 9.4 1028.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) (m*) (m*) 60 min Summer 28.241 0.0 592.5 78 120 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 1059.2 374 480 min Summer 15.079 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 2.626 0.0 1956.4 1972 600 min Summer 2.626 0.0 1956.4 1972 60 min Summer 2.626 0.0 1956.4 1972 600 min Summer 2.626 0.0	240 min Winter 260 min Winter	70.752	0.965		0.0	9.4	9.4	909.9	OK				
100 min Winter 70.862 1.075 0.0 9.4 9.4 1054.0 0 K 720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Feak Event (mm/hr) Volume (mins) (m*) 60 min Summer 28.241 0.0 592.5 78 120 min Summer 28.241 0.0 592.5 78 120 min Summer 24.215 0.0 755.7 100 592.5 78 120 min Summer 24.215 0.0 855.2 196 240 min Summer 15.079 0.0 1052 240 min Summer 1.378 0.0 132.7 612 20 1440 130.0 1416.6 908 <td>480 min Winter</td> <td>70.810</td> <td>1.028</td> <td></td> <td>0.0</td> <td>9.4</td> <td>9.4</td> <td>1028 0</td> <td>0 K</td> <td></td>	480 min Winter	70.810	1.028		0.0	9.4	9.4	1028 0	0 K				
720 min Winter 70.873 1.086 0.0 9.4 9.4 1068.5 0 K Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) (m*) 60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 196.4 1972 60 min Summer 3.222 0.0 1979.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 260 min Winter 15.079 0.0 1035.4 252 360 min Winter 15	600 min Winter	70.862	1.075		0.0	9.4	9.4	1054.0	0 K				
Storm Rain Flooded Discharge Time-Peak Event (mm/hr) Volume Volume (mins) 60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 13.375 0.0 935.1 256 360 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1202.3 730 960 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1447.4 1972	720 min Winter	70.873	1.086		0.0	9.4	9.4	1068.5	O K				
Storm Rain Flooded Discharge Time-Peak (mins) Event (mm/hr) Volume (m ²) (mins) 60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 18.375 0.0 1059.2 374 480 min Summer 19.376 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1202.3 730 960 min Summer 5.71.3 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1956.4 1972 60 min Summer 38.241 0.0 656.0 78 220 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 <td></td>													
Storm Rain Flooded Discharge Time-Peak (mins) Event (m/hr) Volume Volume (m ²) (mins) 60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 925.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375													
Event (mm/hr) Volume Volume (mins) 60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1233.7 612 720 min Summer 7.956 0.0 1233.7 612 720 min Summer 5.713 0.0 1418.6 908 960 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 28.241 0.0 656.0 78 120 min Winter 28.375 0.0 946.7 194 240 min Winter 18.375 0.0 <td></td> <td>Store</td> <td>D</td> <td></td> <td>landed</td> <td>Discharge</td> <td>Time D</td> <td></td> <td></td> <td></td>		Store	D		landed	Discharge	Time D						
60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0		Event	((hr)	Volume	Volume	(mins	1					
60 min Summer 38.241 0.0 592.5 78 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 9.305 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0				,,	(m ³)	(m ³)							
120 min Summer 24.211 0.0 352.3 76 120 min Summer 24.215 0.0 751.1 138 180 min Summer 18.375 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 <td>50</td> <td></td> <td></td> <td>241</td> <td></td> <td>502 5</td> <td></td> <td>70</td> <td></td> <td></td>	50			241		502 5		70					
180 min Summer 18175 0.0 855.2 196 240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 3.222 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 1035.4 252 360 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	120	min Sun	mer 24	215	0.0	751 1	, I 1	128					
240 min Summer 15.079 0.0 935.1 256 360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 366 10 min Winter 11.378 0.0 1172.0 368	180	min Sun	mer 18	.375	0.0	855.2		196					
360 min Summer 11.378 0.0 1059.2 374 480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 240 min Winter 11.378 0.0 1172.0 368	240	min Sum	mer 15	.079	0.0	935.1		256					
480 min Summer 9.305 0.0 1154.2 494 600 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 18.375 0.0 946.7 194 240 min Winter 18.375 0.0 946.7 194 240 min Winter 11.378 0.0 1172.0 368	360	min Sum	mer 11	.378	0.0	1059.2	2 ;	374					
6000 min Summer 7.956 0.0 1233.7 612 720 min Summer 6.998 0.0 1302.3 730 960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 5.713 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	480	min Sun	mer 9	.305	0.0	1154.2		494					
960 min Summer 5.713 0.0 1418.6 908 1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	600	min Sun	uner 7	.936	0.0	1233.7	,	720					
1440 min Summer 4.292 0.0 1447.4 1152 2160 min Summer 3.222 0.0 1798.5 1548 280 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	960	min Sum	mer 5	.713	0.0	1418.6	5	908					
2160 min Summer 3.222 0.0 1798.5 1548 2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 126 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	1440	min Sum	mer 4	.292	0.0	1447.4	1	152					
2880 min Summer 2.626 0.0 1956.4 1972 60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	2160	min Sum	mer 3	.222	0.0	1798.5	5 18	548					
60 min Winter 38.241 0.0 656.0 78 120 min Winter 24.215 0.0 831.3 136 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	2880	min Sum	mer 2	.626	0.0	1956.4	1 19	972					
120 min Winter 24.215 0.0 031.3 130 180 min Winter 18.375 0.0 946.7 194 240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	60	min Win	iter 38	.241	0.0	656.0		78					
240 min Winter 15.079 0.0 1035.4 252 360 min Winter 11.378 0.0 1172.0 368	120	min Wir	iser 29 iter 18	.215	0.0	946 7	,	194					
360 min Winter 11.378 0.0 1172.0 368	240	min Win	ter 15	.079	0.0	1035.4		252					
	360	min Win	ter 11	.378	0.0	1172.0		368					
480 min Winter 9.305 0.0 1277.7 482	480	min Wir	nter 9	.305	0.0	1277.7	, ,	182					
600 min Winter 7.956 0.0 1366.2 596	600	min Win	iter 7	.956	0.0	1366.2	2	596					
720 min Winter 6.998 0.0 1441.5 710	720	min Win	iter 6	.998	0.0	1441.5		/10					
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DBFL Consulting Engi	neers					Page 2			
Ormond House		Holl	lvstown						
Upper Ormond Quav		Site	2:1						
Dublin 7						Micco			
Date 04/10/2021 14.1	2	Desi	igned b	V GPH		MILIU			
File Site 2 Catchman	+ 2 SDCX	Chev	akad bu	TW		Urainage			
Innouura	10 2.0Kon	Som	rce Con	trol 201	8 1 1				
THHOVYZE		304	ice con	0101 201					
Summary of Results for 100 year Return Period (+20%)									
<u>Demonstraty</u>	-								
Storm	Max Max	н	ax	Max	Max Hax	Status			
Event	Level Dept	h Infilt	tration (Control E	Outflow Volume				
	(m) (m)	(1	/s)	(1/s)	(1/s) (m³)				
960 min Winter	70.879 1.093	2	0.0	9.4	9.4 1075.9	ок			
1440 min Winter	70.858 1.07	1	0.0	9.4	9.4 1047.5	ОК			
2160 min Winter	70.833 1.04	6	0.0	9.4	9.4 1014.6	O K			
2880 min Winter	70.796 1.009	9	0.0	9.4	9.4 966.6	O K			
	Storm	Rain	Flooded	Discharge	Time-Deak				
	Event	(mm/hr)	Volume	Volume	(mins)				
			(m ³)	(m ³)	,,				
960	min Winter	5.713	0.0	1486.9	928				
2160	min Winter	2 222	0.0	1901.0	1656				
2880	min Winter	2.626	0.0	2163.9	2120				
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DBFL Consulting Engineers		Page 3
Ormond House	Hollystown	
Upper Ormond Quay	Site 2 : 1	
Dublin 7		Micro
Date 04/10/2021 14:12	Designed by GPH	Drainago
File Site 2 Catchment 2.SRCX	Checked by DW	Diamage
Innovyze	Source Control 2018.1.1	
Ra	infall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Feriod (years) Region Scotla	nd and Ireland Cv (Summer) 0.	820
M5-60 (mm)	16.200 Shortest Storm (mins)	60
Ratio R	0.272 Longest Storm (mins) 2	880
Summer Storms	Yes Climate Change %	+20
Tir	ne Area Diagram	
Tota	al Area (ha) 2.069	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 10	0.000 10 20 2.069	
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DBFL Consulting Engineers					Page 4				
Ormond House	Hollysto	own							
Upper Ormond Quay	Site 2 :	1							
Dublin 7					Micro				
Date 04/10/2021 14:12	Designed	i by GP	н		Desinado				
File Site 2 Catchment 2.SRCX	Checked	by DW			Diamage				
Innovyze	Source (Control	2018.1.1		4				
1	fodel Det	ails							
Storage is Online Cover Level (m) 71.750									
Infiltra	tion Bas:	in Stru	lcture						
Inver Infiltration Coefficient Infiltration Coefficient	t Level (r Base (m/h) Side (m/h)	n) 69.7 r) 0.000 r) 0.000	87 Safety H 00 Por 00	actor 2.0 cosity 1.00)				
Depth (m) Area (m²) Dep	oth (m) Ar	ea (m²)	Depth (m)	Area (m²)					
0.000 660.0	1.000	1284.0	1.900	2091.0					
Hydro-Brake®	Optimum	Outflo	w Control	<u>.</u>					
Unit	Reference	MD-SHE	-0136-9400-	1400-9400					
Desig	n Head (m)			1.400					
Design	Flow (1/s) Flowb Flow			9.4					
	Objective	Minimi	ise unstrea	alculated					
A	pplication			Surface					
Sump	Available			Yes					
Dia	meter (mm)			136					
Invert Minimum Outlat Pine Dia	Level (m)			69.552					
Suggested Manhole Dia	meter (mm) meter (mm)			1200					
Control Po	ints	Head (m) Flow (1/s	;)					
Design Roint (C	(mainted)	1 40		4					
Design Point (C	lush-Flo ^m	0.41	.0 9.	4					
	Kick-Flo®	0.87	6 7.	5					
Mean Flow over B	lead Range		- 8.	.2					
The hydrological calculations have h	een based	on the l	Head/Discha	rme relatio	anship for the				
Hydro-Brake@ Optimum as specified.	Should and	ther typ	pe of contr	ol device o	other than a				
Hydro-Brake Optimum® be utilised the	n these st	orage ro	outing calc	ulations wi	ill be				
invalidated									
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Dep	pth (m)	Flow (1/s)	Depth (m)	Flow (1/s)				
0.100 4.9 1.200	8.7	3.000	13.5	7.000	20.2				
0.200 8.6 1.400	9.4	3.500	14.5	7.500	20.9				
0.300 9.2 1.600	10.0	4.000	15.4	8.000	21.5				
0.400 9.4 1.800	10.6	4.500	16.3	8.500	22.2				
0.500 9.3 2.000	11.1	5.000	17.2	9.000	22.B				
0.600 9.2 2.200	11.6	5.500	18.0	9.500	23.4				
1.000 8.0 2.600	12.1	6,500	10.7						
	1			I					
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Attenuation Structure Summary						
Site	3					
Catchment Area	1					
Type of Overground Structure	Unlined Detention Basin					
Average Water Depth of						
Overground Structure (mm)	322					
Overground Structure Base Area						
(m²)	845.2					
Base slope (1V:XH)	5					
Overground Volume Provided						
(m³)	290.0					
	Stormtech SC-310 Chamber Subsurface Attenuation					
Type of Underground Structure	Tank					
Underground Volume Provided						
(m³)	448					
Total Volume provided (m ³)	738					
Outflow Control	Hydro brake					
Q _{bar} (I/sec)	5.7					
Allowable Outflow (I/sec)	5.7					
Outlet	Riparian Corridor: Site 3 (Section 3.2.3)					

DBFL Consulting Engineers						Page 1
Ormond House	Holl	ystown				
Upper Ormond Quay						
Dublin 7						Micco
Date 04/10/2021 14:14	Desi	gned b	y ASM			Desinance
File S3C1.SRCX	Chec	ked by	BM			Diamage
Innovvze	Sour	ce Con	trol 3	2018.1	.1	
Summary of Results	for 10	0 vear	Retu	rn Pe	riod (+20%)	
Storm	Max	Max	Max	Max	Status	
Event	Level I	Oepth Co	ontrol	Volume		
	(m)	(m)	(1/s)	(m²)		
60 min Summer	70.225 0	0.554	5.7	353.4	ОК	
120 min Summer	70.356 0	0.685	5.7	437.1	O K	
180 min Summer	70.711 1	1.040	5.7	487.6	O K	
240 min Summer	70.758 1	1.087	5.7	522.8	OK	
480 min Summer	70.817 1	181	5.7	506.3	OK	
600 min Summer	70.874 1	1.203	5.7	613.6	0 K	
720 min Summer	70.887 1	.216	5.7	624.1	O K	
960 min Summer	70.898 1	227	5.7	633.0	о к	
1440 min Summer	70.903 1	1.232	5.7	637.2	O K	
2160 min Summer 2880 min Summer	70.893 1	201	5.7	628.7	OK	
60 min Winter	70.286 0	0.615	5.7	392.6	0 K	
120 min Winter	70.711 1	1.040	5.7	487.4	O K	
180 min Winter	70.786 1	.115	5.7	543.8	O K	
240 min Winter	70.837 1	1.166	5.7	583.7	O K	
480 min Winter	70.903 1	272	5.7	670.2	OK	
600 min Winter	70.970 1	.299	5.7	692.6	0 K	
720 min Winter	70.987 1	1.316	5.7	707.4	O K	
960 min Winter	71.005 1	1.334	5.7	722.8	O K	
Storm	Rain	Flooded	Disch	arge T	ime-Peak	
Event	(mm/hr)	Volume	Volu	me	(mins)	
		(m³)	(m ³)		
60 min 8	28 241			54 O	60	
120 min Summer	24,215	0.0	4	51.2	128	
180 min Summer	18.375	0.0	53	24.8	186	
240 min Summer	15.079	0.0	5'	73.8	246	
360 min Summer	11.378	0.0	6	48.2	364	
480 min Summer	9.305	0.0	70	US.0 50 8	484	
720 min Summer	6.998	0.0	71	38.5	722	
960 min Summer	5.713	0.0	84	41.6	898	
1440 min Summer	4.292	0.0	84	42.6	1142	
2160 min Summer	3.222	0.0	111	14.7	1536	
2000 min Summer 60 min Winter	2.020	0.0	121	0.2	1960	
120 min Winter	24.215	0.0	51	10.3	126	
180 min Winter	18.375	0.0	58	80.4	184	
240 min Winter	15.079	0.0	63	34.3	242	
360 min Winter	11.378	0.0	71	15.7	358	
600 min Winter	7,956	0.0	83	24.0	588	
720 min Winter	6.998	0.0	83	58.9	700	
960 min Winter	5.713	0.0	88	82.3	920	

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DBFL Consulting Engineer	cs			Page 2
Ormond House	Hol	lystown		
Upper Ormond Quay				
Dublin 7				Micro
Date 04/10/2021 14:14	Des	igned by ASM		Drainago
File S3C1.SRCX	Che	cked by BM		Diamade
Innovyze	Sou	rce Control 2018.	.1.1	
Summary of F	Results for 1	00 year Return P	eriod (+20%)	
Sto	rm Max nt Level	nax nax nax Depth Control Volum	Status	
	(m)	(m) (1/s) (m ³)	-	
1440 - 1-				
2160 min	Winter 71.006 Winter 70.990	1.335 5.7 723. 1.319 5.7 709.	3 OK 7 OK	
2880 min	Winter 70.957	1.286 5.7 682.	1 0 K	
_				
Stor	nn Rain	Flooded Discharge	Time-Peak	
LVE	ic (mit/mit)	(m ³) (m ³)	(mins)	
1440 min 2160 min	Winter 4.292 Winter 2.222	0.0 857.5	1296	
2880 min	Winter 2.626	0.0 1338.5	2112	
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DBFL Consulting Engineers		Page 3
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Mirro
Date 04/10/2021 14:14	Designed by ASM	Desinado
File S3C1.SRCX	Checked by BM	Drainage
Innovyze	Source Control 2018.1.1	
Ra	infall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years)	100 Cv (Summer) 0.	.750
M5-60 (mm)	16.200 Shortest Storm (mins)	60
Ratio R	0.272 Longest Storm (mins) 2	2880
Summer Storms	Yes Climate Change 🕏	+20
Tir	ne Area Diagram	
Tot:	al Area (ha) 1.287	
Ti	ime (mins) Area	
I III	om: To: (ha)	
	0 10 1.287	
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DBFL Consultir	ng Engin	neers					Page 4		
Ormond House			Hollys	town					
Upper Ormond (Quay		_						
Dublin 7	-						Micco		
Date 04/10/202	21 14:14	4	Design	ed by AS	M				
File S3C1 SPC3	,	-	Checke	d by BM			Urainage		
Innouvre	•		Source	Control	2018 1 1	1			
Innovyse Source Condici 2010.1.1									
	Model Details								
		Tar	nk or Pond	Structu	ire				
		Ir	overt Level	(m) 69.67	71				
ם	epth (m)	Area (m²)	Depth (m) A	irea (mº)	Depth (m)	Area (m²)			
	0.000	638.0 638.0	0.706	1.0	1.037 1.359	740.0 870.0			
	1	lydro-Brak	e® Optimu	m Outflo	ow Control	1			
	-	•				-			
		0	nit Referen	ce MD-SHE	-0107-5700-	1360-5700			
		Desi	sign Head () on Flow (1/	n) •)		1.360			
		Dest	Flush-Fl	0 ⁷⁸	0	alculated			
			Objecti	ve Minim	ise upstre:	um storage			
			Applicati	on	-	Surface			
		3	ump Availab	le		Yes			
		-	Diameter (m	n))		107			
м	inimum O	utlet Pine	ert Level () Diameter (m	m)		150			
	Suggest	ed Manhole	Diameter (m	m)		1200			
		Control	Points	Head (m	a) Flow (1/	s)			
	De	sign Point	(Calculated	0 1.26	in 5	7			
	20	sign roine	Flush-Flo	., 1.80 ™ 0.40	11 5	.7			
			Kick-Flo	© 0.83	8 4	.5			
	Me	an Flow ove	er Head Rang	e	- 5	.0			
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) Flo	w (l/s)	Depth (m) 1	'low (1/s) [)epth (m)	Flow (1/s)	Depth (m)	Flow (1/s)		
0.100	3.6	1.200	5.4	3.000	8.3	7.000	12.3		
0.200	5.3	1.400	5.8	4,000	8.9 0 E	7.500	12.7		
0.400	5.7	1.800	6.5	4.500	10.0	8.500	13.5		
0.500	5.7	2.000	6.8	5.000	10.5	9.000	13.9		
0.600	5.5	2.200	7.1	5.500	11.0	9.500	14.3		
0.800	4.8	2.400	7.4	6.000	11.5	i			
1.000	4.9	2.600	7.7	6.500	11.9				
			1002 2010	T					
		©	1982-2018	TUNOAAZ	e				

Attenuation Structure Summary					
Site	3				
Catchment Area	2				
Type of Overground Structure	Swale				
Average Swale Water Depth (mm)	350				
Overground Swale Base Area (m ²)	63.1				
Base slope (1V:XH)	5				
Captured Swale Volume (m ³)	107.65				
Type of Underground Structure	Stone Trench Underflow				
Trench Stone Layer Base Area (m ²)	693				
Vol Stone Layer	554				
Pororisty (%)	40				
Volume Voids (m ³)	221				
Underflow Trench Captured Volume (m ³)	221				
Total Volume Provided (m ³)	328.65				
Outflow Control	Hydro brake				
Q _{bar} (I/sec)	2.7				
Allowable Outflow (I/sec)	4.7				
Outlet	Attenuation Structure Site 3: Catchment 3				

DBFL Consulting Eng	jineers						Page 1	
Ormond House								
Upper Ormond Quay								
Dublin 7							Micco	
Date 04/10/2021 14:	18	Desi	aned by	7 ASM			MILLU	
File S2C2 27 09 21	SDCV	Chec	kod by	PCM			Drainage	
File 3362 27.00.21.	SROA	Cnec	neu Dy	Bon 2010				
INNOVYZE		SOUL	ce com	2010				
C		S 10		Determine			• 1	
Summary	OI Results	for 10	0 year	Return .	Perloc	a (+20	8)	
W-16 Desig Time - 501 minutes								
	hall b	rain in	ue : 021	minutes.				
Storm	Max Max	Max	1	Max 1	fax	Max	Status	
Event	Level Depth	Infiltra	ation Com	ntrol Σ Ou	tflow	Volume		
	(m) (m)	(1/s) (1/s) (1	l/s)	(m³)		
15 min Summer	60 257 0 257		0.0	4.9	4.9	00.2	0.8	
30 min Summer	69.491 0.491		0.0	4.8	4.8	136.5	O K	
60 min Summer	69.624 0.624		0.0	4.8	4.8	173.6	O K	
120 min Summer	69.757 0.757		0.0	4.8	4.8	210.5	O K	
180 min Summer	70.022 1.022		0.0	4.8	4.8	229.3	O K	
240 min Summer	70.102 1.102		0.0	4.8	4.8	239.7	Flood Risk	
360 min Summer	70.152 1.152		0.0	4.8	4.8	248.8	Flood Risk	
480 min Summer	70.158 1.158		0.0	4.8	4.8	250.1	Flood Risk	
600 min Summer	70.155 1.155		0.0	4.8	4.8	249.4	Flood Risk	
720 min Summer	70.147 1.147		0.0	4.8	4.0	247.9	Flood Risk	
1440 min Summer	70.078 1.078		0.0	4.8	4 8	236.1	Flood Risk	
2160 min Summer	69.797 0.797		0.0	4.8	4.8	221.6	0 K	
2880 min Summer	69.713 0.713		0.0	4.8	4.8	198.1	O K	
4320 min Summer	69.545 0.545		0.0	4.8	4.8	151.6	O K	
5760 min Summer	69.408 0.408		0.0	4.8	4.8	113.3	O K	
7200 min Summer	69.299 0.299		0.0	4.8	4.8	83.2	O K	
8640 min Summer	69.219 0.219		0.0	4.7	4.7	60.8	O K	
10080 min Summer	69.159 0.159		0.0	4.6	4.6	44.2	OK	
15 min Winter	69.398 0.398		0.0	4.8	4.8	110.6	OK	
	Storm	Rain	Flooded	Discharge	Time-	Peak		
	Event	(mm/hr)	Volume	Volume	(mi)	ns)		
			(m ²)	(m ³)				
1	15 min Summer	84.453	0.0	105.3		24		
	30 min Summer	58.623	0.0	146.2		38		
12	00 min Summer	24 215	0.0	241 2		126		
10	30 min Summer	18.375	0.0	275.3		184		
24	40 min Summer	15.079	0.0	301.1		244		
36	50 min Summer	11.378	0.0	340.7	,	362		
48	80 min Summer	9.305	0.0	371.8	1	452		
60	00 min Summer	7.956	0.0	397.2	2	510		
72	20 min Summer	6.998	0.0	419.5		574		
96	00 min Summer	5.713	0.0	456.4		706		
214	50 min Summer	3 2 2 2 2	0.0	570 4		900		
286	30 min Summer	2.626	0.0	629.2		1824		
432	20 min Summer	1.966	0.0	706.9		2592		
576	60 min Summer	1.600	0.0	767.1		3288		
720	00 min Summer	1.363	0.0	816.7		3968		
864	40 min Summer	1.195	0.0	859.6	5	4672		
1008	80 min Summer	1.070	0.0	897.6		5352		
1	15 min Winter	64.453	0.0	116.5	, ,	24		

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core conserving angunce.	s						Page 2
Ormond House							
Upper Ormond Quay							
Dublin 7							Micco
Date 04/10/2021 14:18		Desi	aned by	ASM			
File S3C2 27.08.21.SRCX		Chec	ked bv	BCM			Urainage
Innovyze		Sour	ce Cont	rol 201	8.1.1		
Summary of F	esults	for 10	0 year	Return	Period	i (+20	8)
Storm Max	Max	Max	1	fax 1	Maac	Max	Status
Event Level	Depth	Infiltre	ation Con	ntrol E O	utflow	Volume	
(m)	(m)	(1/s) (1	L/s) (1	1/s)	(m³)	
30 min Winter 69.54	8 0.548		0.0	4.8	4.8	152.3	ОК
60 min Winter 69.70	0.700		0.0	4.8	4.8	194.6	O K
120 min Winter 70.08	1 1.081		0.0	4.8	4.8	236.6	Flood Risk
180 min Winter 70.19	3 1.193		0.0	4.8	4.8	258.2	Flood Risk
240 min Winter 70.24	3 1.243		0.0	4.8	4.8	271.6	Flood Risk
360 min Winter 70.28	5 1.285		0.0	4.8	4.8	285.2	Flood Risk
480 min Winter 70.29	7 1.297		0.0	4.8	4.8	289.5	Flood Risk
600 min Winter 70.29	5 1.296		0.0	4.8	4.8	289.1	Flood Risk
720 min Winter 70.28	7 1.287		0.0	4.8	4.8	286.0	Flood Risk
960 min Winter 70.27.	1 1.271		0.0	4.0	4.0	260.5	Flood Risk
2160 min Winter 70.02	0 1.220		0.0	4.8	4.8	200.8	Flood Risk
2880 min Winter 69.72	8 0.728		0.0	4.8	4.8	205.2	O K
4320 min Winter 69.46	5 0.465		0.0	4.8	4.8	129.2	O K
5760 min Winter 69.27	6 0.276		0.0	4.8	4.8	76.8	O K
7200 min Winter 69.15	7 0.157		0.0	4.6	4.6	43.7	O K
8640 min Winter 69.08	6 0.086		0.0	4.3	4.3	23.8	O K
10080 min Winter 69.04	2 0.042		0.0	4.0	4.0	11.7	O K
Stor	m	Rain	Flooded	Discharge	e Time-	Peak	
Even	t	(mm/hr)	Volume	Volume	(min	ns)	
			(m ³)	(m ³)			
20 min	Winter	58 622	(m ³)	(m ³)	•	28	
30 min 60 min	Winter Winter	58.623 38.241	(m*) 0.0	(m³) 161.9 211.4	9	38 66	
30 min 60 min 120 min	Winter Winter Winter	58.623 38.241 24.215	(m*) 0.0 0.0 0.0	(m³) 161.9 211.4 267.8	9 4 5	38 66 124	
30 min 60 min 120 min 180 min	Winter Winter Winter Winter	58.623 38.241 24.215 18.375	(m*) 0.0 0.0 0.0	(m³) 161.9 211.4 267.3 304.0	9 4 5 6	38 66 124 182	
30 min 60 min 120 min 180 min 240 min	Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079	(m³) 0.0 0.0 0.0 0.0 0.0	(m²) 161.9 211.4 267.3 304.0 333.3	9 4 5 6 3	38 66 124 182 238	
30 min 60 min 120 min 180 min 240 min 360 min	Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378	(m³) 0.0 0.0 0.0 0.0 0.0 0.0	(m²) 161.9 211.4 267.8 304.0 333.3 377.2	9 4 5 6 3 2	38 66 124 182 238 352	
30 min 60 min 120 min 180 min 240 min 360 min 480 min	Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305	(m ³) 0.0 0.0 0.0 0.0 0.0 0.0	(m ²) 161.9 211.4 267.3 304.0 333.3 377.2 411.0	9 4 5 6 3 2 6	38 66 124 182 238 352 462	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min	Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	(m [*]) 161.4 211.4 267.3 304.0 333.3 377.2 411.0 439.7	9 4 5 6 3 2 6 7	38 66 124 182 238 352 462 566	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min	Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	(m*) 161.9 267.8 304.0 333.3 377.2 411.0 439.7 464.2	9 4 5 6 3 2 6 7 2	38 66 124 182 238 352 462 566 646	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 960 min	Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713	(m ²) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 505.3	9 4 5 6 3 2 6 7 2 3	38 66 124 182 238 352 462 566 646 748	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 960 min 1440 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292	(m ²) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.2 541.2	9 4 5 6 3 2 6 7 2 3 2 2 2	38 66 124 182 238 352 462 566 646 748 1060	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 960 min 1440 min 2160 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626	(m ²) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.3 641.2 604.2	9 4 5 6 3 2 6 7 2 3 2 2 2 2 9	38 66 124 182 238 352 462 566 646 748 1060 1520 1996	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 960 min 1440 min 2160 min 2880 min 4320 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966	(m ²) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.5 641.2 696.9 782.0	9 4 5 6 3 2 6 7 2 3 2 2 2 9 6	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 720 min 960 min 1440 min 2160 min 2880 min 4320 min 5760 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600	(m ²) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.2 641.2 696.9 782.0 848.0	9 4 5 6 3 2 6 7 2 2 2 2 9 6 6 6	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 720 min 960 min 1440 min 2160 min 2880 min 4320 min 5760 min 7200 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.2 641.2 696.9 782.0 848.0 903.0	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400 4040	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 720 min 960 min 1440 min 2160 min 2880 min 4320 min 5760 min 7200 min 8640 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195	(m°) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.8 304.4 333.3 377.2 411.4 439.7 464.2 505.3 569.2 641.2 696.9 782.4 848.4 903.0 951.5	9 4 5 6 3 2 6 7 7 2 3 2 2 9 6 6 6 8 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400 4040 4672	
30 min 60 min 120 min 180 min 240 min 360 min 600 min 720 min 960 min 1440 min 2160 min 4320 min 5760 min 7200 min 8640 min 10080 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m°) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.5 304.4 333.3 377.2 411.4 439.7 464.2 505.3 569.2 641.2 696.9 782.4 848.4 903.0 951.3 993.5	9 4 5 6 3 2 6 7 2 2 2 9 6 6 6 8 5 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400 4040 4672 5344	
30 min 60 min 120 min 180 min 240 min 360 min 600 min 720 min 960 min 1440 min 2880 min 4320 min 5760 min 7200 min 8640 min 10080 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m [*]) 161.9 211.4 267.8 304.0 333.3 377.2 411.0 439.7 464.2 505.3 569.2 641.2 696.9 782.0 848.0 903.8 951.3	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8 5 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400 4040 4672 5344	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 2460 min 2880 min 4320 min 5760 min 7200 min 8640 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.3 304.0 333.3 377.2 411.0 439.7 404.2 505.3 569.2 641.2 696.9 782.0 848.0 903.0 951.3 993.3	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8 5 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1520 1520 1520 2724 3400 4040 4672 5344	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 2400 min 2160 min 2880 min 4320 min 5760 min 7200 min 8640 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.3 304.0 333.3 377.2 411.0 439.7 439.7 404.2 505.2 569.2 641.2 696.9 782.0 848.0 903.0 993.3	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8 5 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1520 1520 1996 2724 3400 4040 4672 5344	
30 min 60 min 120 min 180 min 240 min 360 min 480 min 600 min 720 min 2440 min 2160 min 4320 min 5760 min 7200 min 8640 min 10080 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m [*]) 161.9 211.4 267.3 304.0 333.3 377.2 411.0 439.7 464.5 569.2 569.2 641.2 696.9 782.0 848.0 903.1 993.3	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8 5 5	38 66 124 182 238 352 462 566 646 748 1060 1520 1996 2724 3400 4040 4672 5344	
30 min 60 min 120 min 240 min 360 min 480 min 600 min 720 min 2440 min 2160 min 4320 min 5760 min 7200 min 8640 min	Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter Winter	58.623 38.241 24.215 18.375 15.079 11.378 9.305 7.956 6.998 5.713 4.292 3.222 2.626 1.966 1.600 1.363 1.195 1.070	(m*) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	(m*) 161.9 211.4 267.3 304.0 333.3 377.2 411.0 439.7 464.5 569.2 569.2 641.2 696.9 782.0 848.0 903.1 993.3	9 4 5 6 3 2 6 7 2 3 2 2 9 6 6 8 5 5	38 66 124 182 238 352 462 646 748 1060 1520 1996 2724 3400 4040 4672 5344	

DBFL Consulting Engineers		Page 3
Ormond House		
Upper Ormond Quay		
Dublin 7		Micco
Date 04/10/2021 14:18	Designed by ASM	Designed
File S3C2 27 08 21 SBCX	Checked by BCM	urainage
Innovyze	Source Control 2018 1 1	
THEOLYZE	Source condici zorotiti	
	Dainfall Datails	
£	Alliall Deballs	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years)	100 Cv (Summer) 0	.750
Region Scot	land and Ireland Cv (Winter) O	.830
M5-60 (mm)	16.200 Shortest Storm (mins)	15
Ratio R	U.272 Longest Storm (mins) 1	+20
ounce observe	ies crimete change i	120
т	ime Area Diagram	
-		
Te	otal Area (ha) 0.666	
1	Time (mins) Area From: To: (ha)	
	0 10 0.666	
©1	982-2018 Innovvze	

DBFL Consulting Engineers					Page 4				
Ormond House									
Upper Ormond Quav									
Dublin 7					Micro				
Date 04/10/2021 14:18	Designed	by ASM			MICIO				
File 8202 27 08 21 SDCV	Checked	by BCM			Drainage				
Incourse	Source C	oy Boh	010 1 1						
Imovyze	Source c	ontroi 2	010.1.1						
Model Details									
÷	Jodel Deol								
Storage is On	line Cover	Level (m)	70.350						
Infiltra	tion Basi	n Struct	ure						
Inver Infiltration Coefficient Infiltration Coefficient	t Level (m Base (m/hr Side (m/hr	69.000 0.00000 0.00000	Safety Fact Porosi	tor 2.0 ity 1.00					
Depth (m) Area (m ²) Depth (m) Are	a (m²) Dep	th (m) Are	ea (m²) Dep	th (m) A	rea (mº)				
0.000 278.0 0.801 0.800 278.0 0.900	0.0	0.950 1.300	60.5 366.0	1.350	748.0				
Hydro-Brake®	Optimum	Outflow	Control						
Unit	Reference	MD-SHE-00	98-4800-140	0-4800					
Desig	n Head (m)			1.400					
Design	Flow (1/s)			4.8					
	Flush-Flo ⁿ	Minimina	Calc	ulated					
A	polication	MINIMISE	s apsorean s	urface					
Sump	Available			Yes					
Dia	meter (mm)			98					
Invert Minimum Outlat Dina Din	Level (m)			68.900					
Suggested Manhole Dia	meter (mm)			1200					
Control Po	ints	Head (m) H	'low (l/s)						
Design Point (Ca	(lculated)	1.400	4.8						
I	lush-Flos	0.416	4.8						
	Kick-Flo®	0.855	3.8						
Mean flow over h	lead Range	-	4.2						
The hydrological calculations have b Hydro-Brake® Optimum as specified.	een based o Should anot	on the Head ther type (d/Discharge of control	relation device o	nship for the ther than a				
Hydro-Brake Optimum@ be utilised the invalidated	n these sto	rage rout:	ing calcula	tions wi	ll be				
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Dep	th (m) Flo	ow (1/s) De	pth (m)	Flow (1/s)				
0.100 3.2 1.200	4.5	3.000	6.9	7.000	10.2				
0.200 4.4 1.400	9.8	3.500	7.4	7.500	10.6				
0.400 4.8 1.800	5.4	4.500	8.2	8.500	11.2				
0.500 4.8 2.000	5.7	5.000	8.7	9.000	11.5				
0.600 4.7 2.200	5.9	5.500	9.1	9.500	11.8				
0.800 4.1 2.400	6.2	6.000	9.5						
1.000 4.1 2.600	0.1	0.500	9.9						
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Attenuation Structure Summary						
Site	3					
Catchment Area	3					
Type of Overground Structure	Swale					
Average Swale Water Depth (mm)	395					
Overground Swale Base Area (m ²)	66.5					
Base slope (1V:XH)	5					
Captured Swale Volume (m ³)	132.92					
Type of Underground Structure	Stone Trench Underflow					
Trench Stone Layer Base Area (m ²)	654					
Vol Stone Layer	555.9					
Pororisty (%)	40					
Volume Voids (m³)	222					
Underflow Trench Captured Volume (m ³)	222					
Total Volume Provided (m ³)	354.92					
Outflow Control	Hydro brake					
Q _{bar} (I/sec)	2.7					
	5.3					
Allowable Outflow (I/sec)	$\Sigma Q_{\text{bar}(\text{Site 3})} = 15.3 \text{l/sec}$					
Outlet	Riparian Corridor: Site 3 (Section 3.2.3)					

DBFL Consulting Engi	neers						Page 1	1
Ormond House								
Upper Ormond Quay								
Dublin 7							Micco	
Date 04/10/2021 14:2	0	Des	igned b	v Smieta	maA			J
File S3C3 cascade 27	08 CASX	Che	cked by	,			Urain	lage
The SSCS Cascade 27	. UO. CASA	Crie	cked by	+wel 201	0 1 1			
IMOVYZE		300	rce con	101 201	.0.1.1			
C.	scada Summ	ary of	Decult	e for St	2C2 9DCV			
<u></u>	scade state	ary or	. Nesuli	.5 101 5.	500.0E00			
	Upstre	am	Outflow	To Overf.	low To			
	53C2 27.08.	21.SRCX	(No	ne)	(None)			
	Half (Drain T:	ime : 469	9 minutes.				
6	Man M			Marc	Marc	Marrie	Charter	
Storm	Level Dept	l Tofil	tration	Control E	Datflow	Volume	status	
Byenc	(m) (m)	()	1/s)	(1/s)	(1/s)	(m ²)		
15 min Summer	68.542 0.23	7	0.0	5.0	5.0	61.6	O K	
30 min Summer 60 min Summer	68 722 0 41	3	0.0	5.2	5.2	108.2	OK	
120 min Summer	68.822 0.51	2	0.0	5.3	5.3	134.5	0 K	
180 min Summer	68.890 0.58	5	0.0	5.3	5.3	152.0	O K	
240 min Summer	68.944 0.63	9	0.0	5.3	5.3	166.1	O K	
360 min Summer	69.024 0.71	9	0.0	5.3	5.3	187.1	O K	
480 min Summer	69.086 0.78	1	0.0	5.3	5.3	203.0	O K	
600 min Summer	69.144 0.83	9	0.0	5.3	5.3	218.1	ОК	
720 min Summer	69.336 1.03	4	0.0	5.3	5.3	225.8	OK	
1440 min Summer	69 446 1 14	1	0.0	5.3	5.2	230.1	0 K	
2160 min Summer	69.490 1.18	5	0.0	5.3	5.3	245.7	ОК	
2880 min Summer	69.567 1.26	2	0.0	5.3	5.3	261.8	O K	
4320 min Summer	69.579 1.27	4	0.0	5.3	5.3	264.8	O K	
5760 min Summer	69.551 1.24	6	0.0	5.3	5.3	258.1	OK	
7200 min Summer	69.476 1.17	1	0.0	5.3	5.3	243.3	ОК	
	Storm	Rain	Flooded	Discharg	e Time-Pe	ak		
	Event	(mm/hr)	Volume	Volume	(mins))		
			(m³)	(m*)				
15	min Summer	84,453	0,0	161.	6	35		
30	min Summer	58.623	0.0	224	1	50		
60	min Summer	38.241	0.0	293.	9	80		
120	min Summer	24.215	0.0	372.	4 1	38		
180	min Summer	18.375	0.0	424.0	0 1	98		
240	min Summer	11 278	0.0	524	0 2 7 2	20 78		
480	min Summer	9.305	0.0	572.0	, . 0 5	00		
600	min Summer	7.956	0.0	610.	6 14	22		
720	min Summer	6.998	0.0	644.3	3 7	38		
960	min Summer	5.713	0.0	699.	9 9	76		
1440	min Summer	4.292	0.0	772.3	3 14	54		
2160	min Summer	3.222	0.0	060	= 21 4 20	70		
4220	min Summer	1.966	0.0	1088	- 20 7 24	20		
5760	min Summer	1.600	0.0	1181.	6 40	48		
7200	min Summer	1.363	0.0	1258.	1 47	36		
	~	000.0	010 7					
1	e.	1202-2	ore inn	ovyze				

DBFL Consulting Engi	neers						Page 2
Ormond House							
Upper Ormond Quay							
Dublin 7							Micco
Date 04/10/2021 14:2	0	Des	signed b	y Smieta	naA		Drainage
File S3C3 cascade 27	.08.CASX	Che	ecked by	,			urainage
Innovvze		Sou	arce Con	trol 201	8.1.1		
Ca	scade Sum	nary of	f Result	s for S3	C3.SRCX		
		-					
Storm	Hax Ma	x	Max	Max	Max	Max	Status
Event	Level Dep	th Infi	ltration	Control E	Outflow	Volume	
	(m) (m)	(1/s)	(1/s)	(1/s)	(m²)	
8640 min Summer	69.145 0.8	40	0.0	5.3	5.3	218.5	O K
10080 min Summer	68.992 0.6	87	0.0	5.3	5.3	178.6	O K
15 min Winter	68.565 0.2	60 54	0.0	5.1	5.1	67.5	OK
60 min Winter	68,761 0.4	56	0.0	5.3	5.2	118.4	0 K
120 min Winter	68.877 0.5	72	0.0	5.3	5.3	148.6	O K
180 min Winter	68.956 0.6	51	0.0	5.3	5.3	169.2	ОК
240 min Winter	69.017 0.7	12	0.0	5.3	5.3	185.1	ОК
360 min Winter 480 min Winter	69.117 0.8	12	0.0	5.3	5.3	211.1	OK
600 min Winter	69.472 1.1	67	0.0	5.3	5.3	242.7	0 K
720 min Winter	69.525 1.2	20	0.0	5.3	5.3	252.6	ОК
960 min Winter	69.583 1.2	78	0.0	5.3	5.3	266.0	O K
1440 min Winter	69.623 1.3	18	0.0	5.3	5.3	276.8	ок
2160 min Winter 2880 min Winter	69.599 1.2	94 20	0.0	5.3	5.3	269.9	OK
4320 min Winter	69.676 1.3	29 71	0.0	5.3	5.3	293.6	0 K
5760 min Winter	69.615 1.3	10	0.0	5.3	5.3	274.5	O K
7200 min Winter	69.407 1.1	02	0.0	5.3	5.3	233.2	O K
8640 min Winter	68.925 0.6	20	0.0	5.3	5.3	161.3	O K
10080 min Winter	68.741 0.4	36	0.0	5.3	5.3	113.3	OK
	Storm	Rain	Flooded	i Discharge	e Time-Pe	ak	
	Event	(mm/hr) Volume	Volume	(mins)	
			(m³)	(m°)			
8640	min Summer	1.19	5 0.0	1324.4	4 54	156	
10080	min Summer	1.07	0 0.0	1383.0	0 60	56	
15	min Winter	84.45	3 0.0	178.8	8	35	
30	min Winter	38.52	a 0.0 1 0.0	J 246.0	5	49 78	
120	min Winter	24.21	5 0.0	412.1	i 1	136	
180	min Winter	18.37	5 0.0	469.2	2 1	96	
240	min Winter	15.07	9 0.0	513.3	3 2	256	
360	min Winter	11.37	8 0.0 5 0.4	J 580.3	3 5	510	
600	min Winter	7.95	6 0.0	675.3	3 6	514	
720	min Winter	6.99	8 0.0	712.1	1 7	132	
960	min Winter	5.71	3 0.0	771.8	8 9	964	
1440	min Winter	4.29	2 0.0	0 808.5	5 14	14	
2160	min Winter	3.22	6 0.0	0 1072 4	7 20 4 28	36	
4320	min Winter	1.96	6 0.0	1204.9	9 34	80	
5760	min Winter	1.60	0 0.0	1307.4	4 41	.52	
7200	min Winter	1.36	3 0.0	1392.3	3 48	948	
8640	min Winter	1.19	5 0.0 0 0.0	J 1465.8 1 1520-4	5 54 6 50	12	
10000	min wincer	2.07	0.0	. 1000.0			
	e	1982-2	018 Inn	ovvze			

DBFL Consulting Engineers		Page 3
Ormond House		
Upper Ormond Quay		
Dublin 7		Micco
Date 04/10/2021 14:20	Designed by SmietanaA	Desinado
File S3C3 cascade 27.08.CASX	Checked by	Diamage
Innovyze	Source Control 2018.1.1	•
Cascade Rainf	all Details for S3C3.SRCX	
Rainfall Model Peturn Period (vers)	FSR Winter Storms	Yes 750
Region Scotla	nd and Ireland Cv (Winter) 0	.830
M5-60 (mm.)	16.200 Shortest Storm (mins)	15
Ratio R	0.272 Longest Storm (mins) 1	0080
Summer Storms	les Climate Change 4	+20
Tin	me Area Diagram	
Tota	al Area (ha) 0.360	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 10	0.000 10 20 0.360	
Tin	ne Area Diagram	
Tota	al Area (ha) 0.000	
m-	Te (Tinc) brea	
Ēr	om: To: (ha)	
	0 4 0.000	
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DBFL Consulting Engineers					Page 4	
Ormond House						
Upper Ormond Quay						
Dublin 7					Micro	
Date 04/10/2021 14:20	Designed	by Smie	tanaA		Desinano	
File S3C3 cascade 27.08.CASX	Checked	by			Diamage	
Innovyze	Source C	ontrol 2	018.1.1			
Cascade Mode	el Detail	s for S3	C3.SRCX			
8 martine (a. 00)	1	Terre 1 (m)	70 400			
	Line Cover	Level (m)	/01400			
Infiltra	tion Basi	n Struct	ure			
Inver Infiltration Coefficient	t Level (m Base (m/hr) 68.305) 0.00000	Safety Fac Poros	tor 2.0 ity 1.00		
Infiltration Coefficient	Side (m/hr) 0.00000				
Depth (m) Area (m ²) Depth (m) Are	a (m²) Dep	oth (m) Ar	ea (m²) Dep	pth (m) A	rea (m²)	
0.000 260.0 0.851 0.850 260.0 0.900	0.0	1.000 1.395	70.0 367.0	2.045	691.0	
Hydro-Brake®	Optimum	Outflow	Control			
Unit	Reference	MD-SHE-01	03-5300-140	00-5300		
Desig	n Head (m) Flow (l(c)			1.400		
Design	Flush-Flo ⁿ		Cald	o.s culated		
	Objective	Minimise	upstream :	storage		
A;	pplication		5	Surface		
Dia	neter (mm)			103		
Invert	Level (m)			68.300		
Minimum Outlet Pipe Dia	meter (mm)			150		
Suggested Manhole Dia	meter (mm)			1200		
Control Po:	ints	Head (m)	Flow (1/s)			
Design Point (Ca	lculated)	1.400	5.3			
r i	Kick-Flo®	0.860	4.2			
Mean Flow over H	lead Range	-	4.6			
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 (1/s) Depth (m) Flow	r (l/s) Dep	oth (m) Fl	ow (l/s) De	epth (m)	Flow (1/s)	
0.100 3.4 1.200	4.9	3.000	7.6	7.000	11.3	
0.200 4.8 1.400	5.6	4.000	8.7	8.000	12.1	
0.400 5.3 1.800	6.0	4.500	9.2	8.500	12.4	
0.500 5.3 2.000	6.3	5.000	9.6	9.000	12.8	
0.600 5.2 2.200	6.5	5.500	10.1	9.500	13.1	
0.800 4.6 2.400	6.8	6.000	10.5			
1.000 4.5 2.600	1.1	0.000	10.9			
A100	2-2018 7	00011170				

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Attenuation Structure Summary					
Site	3				
Catchment Area	4				
Type of Underground Structure	Stormtech SC-740 Chamber Subsurface				
Type of Onderground Structure	Attenuation Tank				
Tank Base Dimensions (I x b) (m)	55.4 x 9.0				
No of Chambers	325				
Underground Tank Volume	218.6				
Provided (m ³)	310.0				
Outflow Control	Hydro brake				
Q _{bar} (I/sec)	2.3				
Allowable Outflow (I/sec)	2.3				
Outlet	Riparian Corridor: Site 3 (Section 3.2.3)				

DBFL Consulting Engineers						Page 1
Ormond House	Hol	lystow	n			
Upper Ormond Quay						
Dublin 7						Micco
Date 04/10/2021 14:21	Des	igned }	ov ASM			
File S3C4 - Tank SDCX	Che	cked by	BCM			Urainage
Innouuza	Sou	rce Cor	trol (2018	1 1	
THIOTYZE	504	100 001	10101	2010		
Summary of Desults	for 1	00 1000	r Datu	rn De	riod (+20%)	
Standary of Results	101 1	oo yea	r Recu	In re	1100 (1208)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth C	ontrol	Volume		
	(m)	(m)	(1/s)	(m³)		
15 min Summer 20 min Summer	69.330	0.286	2.2	118 5	OK	
60 min Summer	69.551	0.507	2.2	152.6	OK	
120 min Summer	69.672	0.628	2.2	189.1	O K	
180 min Summer	69.746	0.702	2.2	211.2	O K	
240 min Summer	69.797	0.753	2.2	226.6	OK	
360 min Summer	69.864	0.820	2.2	246.9	O K	
480 min Summer	69.906	0.862	2.2	259.5	O K	
600 min Summer	69.933	0.889	2.2	267.6	O K	
720 min Summer	69.950	0.906	2.2	272.8	O K	
960 min Summer	69.966	0.922	2.2	277.6	OK	
1440 min Summer	69.973	0.929	2.2	279.7	OK	
2100 min Summer 2880 min Summer	60 045	0.920	2.2	277.0	OR	
15 min Winter	69 260	0.316	2.2	95.2	OK	
30 min Winter	69.481	0.437	2.2	131.4	OK	
60 min Winter	69.607	0.563	2.2	169.4	O K	
120 min Winter	69.744	0.700	2.2	210.6	OK	
180 min Winter	69.825	0.781	2.2	235.2	O K	
240 min Winter	69.883	0.839	2.2	252.7	O K	
360 min Winter	69.961	0.917	2.2	276.2	OK	
Storm	Rain	Flooded	l Disch	arge T	ime-Peak	
Event	(mm/hr)	Volume	Volu	me	(mins)	
		(m ³)	(m*)		
15 min Summer	84.453	0.0		84.2	19	
30 min Summer	50.623	0.0	. 1	17.0	34	
60 min Summer	30.241	0.0		00.9	124	
120 min Summer	18,275	0.0	1 2	26.0	182	
240 min Summer	15,079	0.0	2	47.1	242	
360 min Summer	11.378	0.0	2	78.9	362	
480 min Summer	9.305	0.0	3	02.8	482	
600 min Summer	7.956	0.0	0 33	21.4	602	
720 min Summer	6.998	0.0	3	34.7	720	
960 min Summer	5.713	0.0	J 34	41.4	952	
2160 min Summer	9.292	0.0	J 30 1 41	80.0 70.2	1102	
2880 min Summer	2.626	0.0) 5	20.2	1988	
15 min Winter	84.453	0.0		93.3	19	
30 min Winter	58.623	0.0	1 1	29.3	33	
60 min Winter	38.241	0.0	1	73.7	62	
120 min Winter	24.215	0.0	2	19.8	122	
180 min Winter	18.375	0.0	2	49.9	180	
240 min Winter	15.079	0.0	2	73.0	238	
360 min Winter	11.378	0.0	3	07.4	356	
	002-20	110 Tee				

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DBFL Consulting Engineers						Page 2
Ormond House	Hol	lystown				
Upper Ormond Quay		-				
Dublin 7						Micco
Date 04/10/2021 14:21	Des	igned b	V ASM			MILLO
File S2C4 - Tenk SDCV	Che	akad bu	PCM			Urainage
Innorma	Sou	cheu by	trol	2019 1	1 1	
Innovyze	300	rce con	CIUI .	2010.1		
Summary of Decults	for 1	00 week	Detu	rn De	riod (±20%)	
Statutary of Results	101 1	.oo year	Recu	III FE	1100 (1208)	
Storm	Mean	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol	Volume		
	(m)	(m) ((1/s)	(m³)		
480 min Winter	70 012	0.968	2 2	291.2	0 K	
600 min Winter	70.046	1.002	2.2	301.5	0 K	
720 min Winter	70.069	1.025	2.3	308.5	ОК	
960 min Winter	70.095	1.051	2.3	316.3	ок	
1440 min Winter	70.103	1.059	2.3	318.6	OK	
2160 min Winter 2880 min Winter	70.087	1.043	2.3	314.0	OK	
2000 min winder	.0.000			001.0		
Storm	Rain	Flooded	Disch	arge T:	ime-Peak	
Event	(mm/hr)	Volume	Volu	inc.	(mins)	
		(m³)	(m*)		
480 min Winter	9.305	0.0	3	31.7	472	
600 min Winter	7.956	0.0	3	46.2	586	
720 min Winter	6.998	0.0	3	49.8	700	
960 min Winter	5.713	0.0	3	47.2	922	
2160 min Winter	3.222	0.0	5	30.2	1664	
2880 min Winter	2.626	0.0	5	75.2	2132	
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DBFL Consulting Engineers		Page 3
Ormond House	Hollystown	ruge o
Upper Ormond Quay		
Dublin 7		and the second
Date 04/10/2021 14:21	Designed by ASM	MICLO
Eile 0204 Tech CDCV	Charles by ASH	Drainage
File S3C4 - Tank.SRCA	Checked by BCM	
Innovyze	Source Control 2018.1.1	
Ra	infall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years)	100 Cv (Summer) 0	.750
Region Scotla	nd and Ireland Cv (Winter) 0	.830
Ratio R	0.272 Longest Storm (mins)	2880
Summer Storms	Yes Climate Change %	+20
Tir	ne Area Diagram	
Tot:	al Area (ha) 0.553	
Ti	ime (mins) Area om: To: (ha)	
	0 4 0.553	
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DBFL Consulting Engineers			Page 4			
Ormond House	Hollystown					
Upper Ormond Quay	-					
Dublin 7			Micco			
Date 04/10/2021 14:21	Designed by A	SM				
File S3C4 - Tank SBCX	Checked by BC	м	Urainage			
Innouvre	Source Control	1 2018 1 1				
TIMOVYZE	Source contro.	1 2010.1.1				
1	Odel Details					
-						
Storage is On	line Cover Level	(m) 70.700				
Tank	or Pond Struct	ure				
Inver	rt Level (m) 69.0	44				
Depth (m) Area (m ²) Dep	oth (m) Area (m ²)	Depth (m) Area	(m²)			
0.000 301.0	1.060 301.0	1.070	0.0			
Hydro-Brake®	Optimum Outfl	ow Control				
Unit	Reference MD-SHE	2-0071-2300-1060-3	2300			
Desig	n Head (m)	1	.060			
Design	Flow (1/s)		2.3			
	Flush-Flow Minis	Calcul	ated			
	Objective Minis	aise upstream sto:	rage			
3.000	Available	Sur	Yes			
Dia	meter (mm)		71			
Invert	Level (m)	69	.044			
Minimum Outlet Pipe Dia	meter (mm)		100			
Suggested Manhole Dia	meter (mm)	:	1200			
Control Po	ints Head (m) Flow (l/s)				
Design Point (Ca	lculated) 1.0	60 2.3				
F	lush-Flo ^m 0.3	14 2.2				
	Kick-Flo® 0.6	36 1.8				
Mean Flow over H	lead Range	- 2.0				
The hydrological calculations have b Hydro-Brake@ Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	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 (1/s) Depth (m) Flow	(1/s) Depth (m)	Flow (1/s) Dept	h (m) Flow (l/s)			
0.100 1.8 1.200	2.4 3.000	3.7	7.000 5.5			
0.200 2.2 1.400	2.6 3.500	4.0	7.500 5.7			
0.300 2.2 1.600	2.8 4.000	4.2	8.000 5.9			
0.400 2.2 1.800	2.9 4.500	4.5	8.500 6.0			
0.500 2.1 2.000	3.1 5.000	4.7	9.000 6.2			
0.800 2.0 2.400	3.2 5.500	4.9	9.500 6.4			
1.000 2.2 2.600	3.5 6.500	5.2				
	I	, i				
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Attenuatior	Attenuation Structure Summary					
Site	3					
Catchment Area	5					
Type of Overground Structure	Unlined Detention Basin					
Average Water Depth of Overground	880					
Structure (mm)						
Overground Structure Base Area	602 1					
(m²)	002.1					
Base slope (1V:XH)	5					
Overground Volume (m ³)	849.79					
Total Provided Volume	849.79					
Outflow Control	Hydro brake					
Q _{bar} (I/sec)	3.03					
	2.0					
Allowable Outflow (I/sec)	Σ Q bar (Site 3, Catchment 3.1,3.2,3.5 and Bellingmore) =					
	42.3l/sec					
Outlet	Riparian Corridor: Site 3 (Section 3.2.3)					

DBFL Consulting Engin	neers							Page 1	
Ormond House			Holly	stown					
Upper Ormond Quay									
Dublin 7									
Date 04/10/2021 14:2	c		Decid	med by	T ASM			MICLO	
Date 04/10/2021 14.2	0		Desig	med bj	y ASH			Drainago	2
File 5305 27.08.21.5	RUA		Check	ya be	BUM				-
Innovyze			Sour	ce Con	tro1 2018	5.1.1			
					D				
Summary of	DI Kest	alts I	or 10	U year	Recurn 1	Period	(7208)	-	
	,	alf Dra	in Tir	e : 80	minutes.				
	-								
Storm	Max	Max	Me T - C i la		Max	Max	Max	Status	
Event	Level (m)	Jeptn .	Infile	ration	(1/s)	(1/e)	volume (m ²)		
	(111)	(ш)	(1)	2/	(1/5)	(1/5)	(
15 min Summer	68.745	0.275		0.0	41.7	41.7	89.1	о к	
30 min Summer	68.809	0.339		0.0	42.2	42.2	115.7	O K	
60 min Summer	68.852	0.382		0.0	42.3	42.3	134.7	O K	
120 min Summer	68.888	0.418		0.0	42.3	42.3	151.2	O K	
180 min Summer	68.923	0.453		0.0	42.3	42.3	168.1	OK	
240 min Summer	69.010	0.540		0.0	42.3	42.3	213.6	OK	
360 min Summer	69.120	0.650		0.0	42.3	42.3	278.2	OK	
480 min Summer	69.176	0.706		0.0	42.3	42.3	314.4	OK	
600 min Summer	69.200	0.730		0.0	42.3	42.3	330.4	OK	
720 min Summer	69.231	0.761		0.0	42.3	42.3	351.0	OK	
1440 min Summer	60 255	0.792		0.0	42.3	42.3	3/3.0	0 K	
2160 min Summer	68 806	0.226		0.0	42 2	42.0	114 2	0 K	
2880 min Summer	68 714	0.330		0.0	41 1	41 1	77.5	0 K	
4220 min Summer	68 696	0 226		0.0	40.7	40.7	70.5	0 K	
5760 min Summer	68 694	0.224		0.0	40.2	40.2	69.8	0 K	
7200 min Summer	68 692	0 222		0.0	40.2	40.2	69.4	0 K	
8640 min Summer	68,692	0.222		0.0	40.0	40.0	69.2	O K	
10080 min Summer	68.691	0.221		0.0	39.9	39.9	69.0	O K	
15 min Winter	68.770	0.300		0.0	42.0	42.0	99.5	O K	
	Storm			Flooded	Discharge	Time-De	•		
	Event	(m/hr)	Volume	Volume	(mins))		
				(m ³)	(m ³)				
15			4 4 5 2		2251 0		20		
20	min Sur	mer 5	R 622	0.0	2201.0		41		
80	min Ser	mer 2	R 241	0.0	2987 0		60		
120	min Sur	mer 2	4.215	0.0	3042.0		98		
180	min Sur	mer 1	8.375	0.0	3078.1	1	92		
240	min Sur	mer 1	5.079	0.0	3106.1	. 2	52		
360	min Sur	mer 1	1.378	0.0	3149.0	3	72		
480	min Sur	mer	9.305	0.0	3182.2	4	92		
600	min Sur	mer	7.956	0.0	3209.8	6	18		
720	min Sur	mer	6.998	0.0	3233.6	7	38		
960	min Sur	mer	5.713	0.0	3273.7	8	98		
1440	min Sur	mer	4.292	0.0	3336.2	9	16		
2160	min Sur	mer	3.222	0.0	3421.7	9	16		
2880	min Sur	mer	2.626	0.0	3475.7	8	96		
4320	min Sur	mer	1.966	0.0	3559.3	8	56		
5760	min Sur	nne r	1.600	0.0	3625.2	8	50		
7200	min Sur	mer	1.303	0.0	3679.0	8	30		
8040	min Sur	nder	1.195	0.0	3725.4		50		
10080	min Sur	nner .	4 452	0.0	3700.9	. 8	20		
15	man wit	.Ser o	1.106	0.0	2208.1		30		
		©198	2-201	8 Inno	ovvze				
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December 2021

DBFL Consulting Engineers									Page 2
Ormond House Hollystown									
Upper Ormond Quay									
Dublin 7	Dublin 7								
Date 04/10/2021 14:26 Designed by ASM									MICLO
Date 04/10/2021 14:20 Designed by Abn								Drainage	
File S3C5 27.08.21.SRCX Checked by BCM									
Innovyze Source Control 2018.1.1									
					_	_			
Sun	nmary c	of Resu	alts f	or 10	0 year	Return	Period	(+20%)	
									_
Stor	m	Max	Max	М	ALC:	Max	Max	Max	Status
Even	t	Level	Depth (-)	Infilt	ration	Control 2	(1(-)	Volume	
		(m)	(m)	(1)	/s)	(1/5)	(1/5)	(m-)	
30 min	Winter	68.842	0.372		0.0	42.3	42.3	130.0	O K
60 min	Winter	68.885	0.415		0.0	42.3	42.3	150.1	O K
120 min	Winter	68.917	0.447		0.0	42.3	42.3	165.2	O K
180 min	Winter	68.966	0.496		0.0	42.3	42.3	190.2	O K
240 min	Winter	69.052	0.582		0.0	42.3	42.3	237.3	O K
360 min	Winter	69.166	0.696		0.0	42.3	42.3	307.6	O K
480 min	Winter	69.213	0.743		0.0	42.3	42.3	339.0	O K
600 min	Winter	69.236	0.766		0.0	42.3	42.3	355.3	O K
720 min	Winter	69.266	0.796		0.0	42.3	42.3	376.6	O K
960 min	Winter	69.298	0.828		0.0	42.3	42.3	399.8	ОК
1440 min	Winter	69.265	0.795		0.0	42.3	42.3	375.7	O K
2160 min	Winter	68.880	0.410		0.0	42.3	42.3	147.7	O K
2880 min	Winter	68.739	0.269		0.0	41.6	41.6	87.1	O K
4320 min	Winter	68.698	0.228		0.0	40.7	40.7	71.3	O K
5760 min	Winter	68.695	0.225		0.0	40.6	40.6	70.3	O K
7200 min	Winter	68.694	0.224		0.0	40.4	40.4	69.9	O K
8640 min	Winter	68.693	0.223		0.0	40.2	40.2	69.6	O K
10080 min	Winter	68.693	0.223		0.0	40.2	40.2	69.3	O K
		Storm			Flooded	Discharge	Time-De	-	
		Event	(-	m/hr)	Volume	Volume	(mins)	1	
		BYCHC	((m ²)	(m ²)	(, 	
					· /	(
	30	min Wir	nter 5	8.623	0.0	2312.1		42	
	60	min Wir	nter 3	8.241	0.0	3009.0)	64	
	120	min Wir	nter 2	4.215	0.0	3069.8	3 1	.06	
	180	min Wir	nter 1	8.375	0.0	3109.8	1	90	
	240	min Wir	nter 1	5.079	0.0	3140.8	2	50	
	360	min Wir	nter 1	1.378	0.0	3188.2	2 3	66	
	480	min Wir	nter	9.305	0.0	3225.0) 4	78	
	600	min Wir	nter	7.956	0.0	3255.6	6	504	
	720	min Wir	nter	6.998	0.0	3281.9	7	24	
	960	min Wir	nter	5.713	0.0	3326.3		98	
	1440	min Wir	nter	1.292	0.0	3395.5	9 9	20	
	2160	min Wit	ncer	6.222 2.606	0.0	3900.9		20	
	2000	min Win	icer	2.020	0.0	3340.2		20	
	5740	min Wit	icer ter	1 600	0.0	3010.1		48	
	7200	min Wit	ster	1 262	0.0	2772 0		56	
	8640	min Wi-	nter	1 1 05	0.0	2824 4		56	
	10080	min Wie	nter	1.070	0.0	2869 9		56	
	20000			2.070	0.0	0002.3			

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DBFL Consulting Engineers		Page 3
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micco
Date 04/10/2021 14:26	Designed by ASM	MILLO
Eile 0005 07 00 01 000V	Charled by RM	Drainage
File S3C5 27.08.21.SRCX	Unecked by BUM	
Innovyze	Source Control 2018.1.1	
	Rainfall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years)	100 Cv (Summer) 0	.750
M5-60 (mm)	land and ireland CV (Winter) U 16 200 Shortest Storm (mins)	15
Ratio R	0.272 Longest Storm (mins) 1	0080
Summer Storms	Yes Climate Change 🕏	+20
	-	
	'ime Area Diagram	
-		
Т	otal Area (ha) 0.719	
Time (min	ns) Area Time (mins) Area	
From: To	: (ha) From: To: (ha)	
0	10 0.000 10 20 0.719	
(B)	982-2018 Innovvze	
01	the rost summine	

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DBFL Consulting Engineers					Page 4				
Ormond House	Hollystov	m							
Upper Ormond Quay									
Dublin 7									
Date 04/10/2021 14:26	Designed	Desinado							
File S3C5 27.08.21.SRCX	Checked k	by BCM	I		Diamage				
Innovyze	Source Co	ontrol	2018.1.1		4				
Model Details									
Storage is Online Cover Level (m) 70.500									
Infiltration Basin Structure									
Invert Level (m) 68.470 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00 Infiltration Coefficient Side (m/hr) 0.00000									
Depth (m) Area (m ²) Dep	oth (m) Area	x (m²)	Depth (m) A	irea (mº)					
0.000 260.0	0.880	787.0	2.005	1450.0					
Hydro-Brake®	Optimum (Outflo	w Control						
Unit	Reference	MD-SHE-	-0275-4230-0	0900-4230					
Desig	n Head (m)			0.900					
Design	Flow (1/s)			42.3					
	Flush-Flom		. Ci	alculated					
	Objective	Minimi	ise upstread	<pre>% storage % storage</pre>					
Sumo	Available			Yes					
Dia	meter (mm)			275					
Invert	Level (m)			68.430					
Minimum Outlet Pipe Dia	meter (mm)			300					
Suggested Manhole Dia	meter (mm)			1800					
Control Po	ints 1	lead (m) Flow (1/s)					
Design Point (Ca	(lculated)	0.90	0 42.	3					
E	lush-Flom	0.41	1 42.	3					
Mana Elaw aver B	Kick-Flo®	0.71	3 37.	8					
Nean flow over n	lead Kange		- 33.	/					
The hydrological calculations have b	een based o	n the B	lead/Dischar	ge relatio	onship for the				
Hydro-Brake@ Optimum as specified.	Should anot	her typ	e of contro	ol device o	other than a				
Hydro-Brake Optimum® be utilised the	n these sto	rage ro	outing calcu	lations wi	ll be				
invalidated									
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Dept	th (m)	Flow (1/s)	Depth (m)	Flow (1/s)				
0.100 8.7 1.200	48.6	3.000	75.7	7.000	114.4				
0.200 28.3 1.400	52.3	3.500	81.6	7.500	118.3				
0.300 41.4 1.600	55.8	4.000	87.1	8.000	122.1				
0.400 42.3 1.800	59.1	4.500	92.2	8.500	125.8				
0.500 41.9 2.000	62.2	5.000	97.1	9.000	129.3				
0.600 40.7 2.200	65.1	5.500	101.7	9.500	131.9				
0.800 40.0 2.400	67.9	6.000	106.1						
1.000 44.5 2.000	/0.0	0.000	110.8						
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Attenua	Attenuation Structure Summary									
Site	Local Centre									
Catchment Area	1									
	Stormtech SC-740 Chamber Subsurface Attenuation									
Type of Underground Structure	Tank									
No of Chambers	22									
Underground Volume Provided										
(m³)	57									
Volume Required (m ³)	45.7									
Total Volume provided (m ³)	57									
Outflow Control	Hydro brake									
Q _{bar} (I/sec)	0.5									
Allowable Outflow (I/sec)	2									
Outlet	750mm diameter pipe									

DBFL Consulting Engin	neers							Page 1	
Ormond House									
Upper Ormond Quay									
Dublin 7								Micco	
Date 25/02/2021	Desinance								
File Catchment 1 (New	Diamage								
Innovyze			Sour	ce Con	trol 2018	8.1.1			
Summary of Results for 100 year Return Period (+20%)									
								-	
	н	alf Dra	in Tim	ne : 223	minutes.				
Storm	Max	Meax	М	8.00	Status				
Event	Level	Depth	Infilt	ration	Control E	Outflow	Volume		
	(m)	(m)	(1	/=)	(1/s)	(1/s)	(m³)		
15 min Summer	73,433	0.439		0.0	1.8	1.8	20.2	ок	
30 min Summer	73.589	0.595		0.0	1.8	1.8	27.3	O K	
60 min Summer	73.723	0.729		0.0	1.8	1.8	33.5	O K	
120 min Summer	73.817	0.823		0.0	1.8	1.8	37.9	O K	
180 min Summer	73.834	0.840		0.0	1.9	1.9	38.7	O K	
240 min Summer	73.833	0.839		0.0	1.9	1.9	38.6	O K	
360 min Summer	73.824	0.830		0.0	1.8	1.8	38.2	O K	
480 min Summer	73.810	0.816		0.0	1.8	1.8	37.5	O K	
600 min Summer	73.792	0.798		0.0	1.8	1.8	36.7	O K	
720 min Summer	73.771	0.777		0.0	1.8	1.8	35.7	OK	
960 min Summer	73.725	0.731		0.0	1.8	1.8	33.6	OK	
1440 min Summer	73.624	0.630		0.0	1.0	1.8	29.0	OK	
2100 min Summer	73.443	0.997		0.0	1.0	1.0	20.7	OK	
4220 min Summer	73.201	0.207		0.0	1.0	1.0	18.2	0 K	
5760 min Summer	72 028	0.024		0.0	1.0	1.0	1.6	0 K	
7200 min Summer	72 004	0.004		0.0	1.5	1.5	0.0	0 K	
8640 min Summer	72.994	0.000		0.0	1.3	1.3	0.0	O K	
10080 min Summer	72.994	0.000		0.0	1.2	1.2	0.0	O K	
15 min Winter	73.492	0.498		0.0	1.8	1.8	22.9	O K	
	Storm		ain	Flooded	Discharge	Time-Pe	ak		
	Event	(111	m/hr)	Volume	Volume	(mins)			
				(m³)	(m³)				
15	min Sur	mer 8	4.666	0.0	22.0)	18		
30	min Sur	mer 5	8.697	0.0	30.6		33		
60	min Sur	mer 3	8.241	0.0	39.9)	62		
120	min Sug	mmer 2	4.187	0.0	50.3	1	20		
180	min Sur	mer 1	8.342	0.0	57.4	1	72		
240	min Sug	mmer 1	5.045	0.0	62.8	2	02		
360	min Sur	nmer 1	1.345	0.0	70.9	2	66		
480	min Su	mer	9.273	0.0	77.3	3	36		
600	min Sur	mer	7.926	0.0	82.6	4	06		
720	min Sur	mer	0.970	0.0	07.2	4	16		
900	min Sur	uler -	4 270	0.0	106.5	, 0	04		
2160	min Sur	mer	3.202	0.0	1200.1	12	80		
2880	min Sur	mer	2.610	0.0	130.7	16	16		
4320	min Sur	mer	1.953	0.0	146.5	22	88		
5760	min Sur	mer	1.588	0.0	159.0	29	44		
7200	min Sug	mer	1.353	0.0	169.2	36	56		
8640	min Sur	mer	1.186	0.0	178.1		0		
10080	min Sug	mer	1.061	0.0	185.9)	0		
15	min Wi	nter 8	4.666	0.0	24.7		18		
		@199	2-201	18 Tap	ovvze				

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DBFL Consulting Engin	neers						Page 2	
Ormond House								
Upper Ormond Quay								
Dublin 7							Micro	
Date 25/02/2021	Desinae							
File Catchment 1 (New	Digitig	Je						
Innovyze		Sour	ce Con	trol 2018	3.1.1			
Summary of								
Storm	Hax Max	M	leux	Max	Max	Maac	Status	
Event	Level Dept	n Inril	(c)	(1/s)	(1/e)	(m ²)		
	(11) (11)	(-	/-/	(1/2/	(1/2/	(
30 min Winter	73.668 0.67	4	0.0	1.8	1.8	31.0	O K	
60 min Winter	73.828 0.83	4	0.0	1.8	1.8	38.3	OK	
180 min Winter	73.985 0.99	1	0.0	2.0	2.0	45.6	0 K	
240 min Winter	73.987 0.99	3	0.0	2.0	2.0	45.7	O K	
360 min Winter	73.967 0.97	3	0.0	2.0	2.0	44.8	O K	
480 min Winter	73.941 0.94	7	0.0	1.9	1.9	43.6	O K	
720 min Winter	73.872 0.87	9	0.0	1.9	1.9	40.5	OK	
960 min Winter	73.794 0.80	ō	0.0	1.8	1.8	36.8	ок	
1440 min Winter	73.628 0.63	4	0.0	1.8	1.8	29.2	ОК	
2160 min Winter	73.321 0.32	7	0.0	1.8	1.8	15.0	O K	
4220 min Winter	73.135 0.14	1 8	0.0	1.8	1.8	0.5	OK	
5760 min Winter	72.994 0.00	ŏ	0.0	1.3	1.3	0.0	0 K	
7200 min Winter	72.994 0.00	0	0.0	1.1	1.1	0.0	O K	
8640 min Winter	72.994 0.00	0	0.0	1.0	1.0	0.0	ок	
10080 min Winter	72.994 0.00	0	0.0	0.9	0.9	0.0	OK	
	Storm	Rain	Flooded	Discharge	Time-Pea	ık		
	Event	(mm/hr)	Volume (m ²)	Volume (m ²)	(mins)			
			(m-)	(m-)				
30	min Winter	58.697	0.0	34.3	4	32		
60	min Winter	38.241	0.0	44.7		52		
180	min Winter	18.342	0.0	64.2	17	74		
240	min Winter	15.045	0.0	70.2	22	24		
360	min Winter	11.345	0.0	79.5	28	32		
480	min Winter	9.273	0.0	86.7	36	50		
720	min Winter	6.970	0.0	92.0	51	so 14		
960	min Winter	5.688	0.0	106.3	66	54		
1440	min Winter	4.270	0.0	119.7	96	54		
2160	min Winter	3.203	0.0	134.7	132	20		
4320	min Winter	1.953	0.0	140.2	224	18		
5760	min Winter	1.588	0.0	178.0		0		
7200	min Winter	1.353	0.0	189.5		0		
8640	min Winter	1.186	0.0	199.4		0		
10080	min winter	1.001	0.0	200.2				
	©1	982-20	18 Inno	vyze				

DBFL Consulting Engineers		Page 3
Ormond House		
Upper Ormond Quay		
Dublin 7		Micro
Date 25/02/2021	Designed by BCU	Desinado
File Catchment 1 (New Road)	Checked by NCG	Diamage
Innovyze	Source Control 2018.1.1	•
Ra	infall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years) Region Scotla	nd and Ireland Cv (Winter) 0.	.750
M5-60 (mm)	16.200 Shortest Storm (mins)	15
Ratio R	0.274 Longest Storm (mins) 10	0800
Summer Storms	Yes Climate Change %	+20
Tim	ne Area Diagram	
Tot:	al Area (ha) 0.139	
Ti Tr	me (mins) Area om: To: (ha)	
	en	
	0 4 0.139	
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DBFL Consulting Engineers				Page 4					
Ormond House									
Upper Ormond Quay									
Dublin 7				Misso					
Date 25/02/2021	Designed	MILIO							
File Catalwart 1 (New Dead)	Charled	Drainage							
File Catchment I (New Road)	Checked	DY NUG							
Innovyze Source Control 2018.1.1									
Model Details									
Storage is Online Cover Level (m) 74,450									
Cellular Storage Structure									
	I SCOLAG	e Structu	10						
Inver	t Level (n	a) 72.994	Safety Factor	2.0					
Infiltration Coefficient Infiltration Coefficient	Base (m/h) Side (m/h)	r) 0.00000 r) 0.00000	Porosity	1.00					
Depth (m) Area (m ²) Inf Are	na (m²)∐Der	oth (m) àre	a (m²) Inf A	rea (m ²)					
sepen (m/ men (m / m). Alt				···· /					
0.000 46.0	0.0	1.300	0.0	0.0					
0.100 46.0	0.0	1.400	0.0	0.0					
0.200 46.0	0.0	1.500	0.0	0.0					
0.300 46.0	0.0	1.600	0.0	0.0					
0.400 40.0	0.0	1.700	0.0	0.0					
0.500 46.0	0.0	1.000	0.0	0.0					
0.700 46.0	0.0	2 000	0.0	0.0					
0.800 46.0	0.0	2 100	0.0	0.0					
0,900 46.0	0.0	2 200	0.0	0.0					
1 000 46 0	0.0	2 200	0.0	0.0					
1 100 0 0	0.0	2 400	0.0	0.0					
1.200 0.0	0.0	2.500	0.0	0.0					
Hvdro-Brake®	Optimum	Outflow (Control						
Unit	Reference	MD-SHE-00	66-2000-1100-2	000					
Desig	n Head (m)		1.	100					
Design	Flow (1/s)			2.0					
	Flush-Flo*	Mininia	Calculat	ted					
	objective	Minimise	upstream stor:	age					
8,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Available		Surr	NCC Yes					
Dia	meter (mm)			66					
Invert	Level (m)		72	898					
Minimum Outlet Pipe Dia	meter (mm)			100					
Suggested Manhole Dia	meter (mm)		1:	200					
Control Po	ints	Head (m) F	'low (l/s)						
Design Point (Ca	alculated)	1.100	2.0						
1	Flush-Flo ^m	0.289	1.8						
	Kick-Flo®	0.584	1.5						
Mean Flow over H	iead Range	-	1.7						
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									
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DBFL Consul	lting	y Engi	neers								Page 5
Ormond Hous	se										
Upper Ormon	nd Qu	ay									
Dublin 7	Dublin 7									Micco	
Date 25/02/2021 Designed by BCU									Desinado		
File Catchment 1 (New Road) Checked by NCG									Diamage		
Innovyze Source Control 2018.1.1											
			Hydro-Bra	akeØ	Optim	um Out	tflo	ow Co	ntrol	-	
Depth (m)	Flow	(1/s)	Depth (m)	Flow	r (1/s)	Depth	(m)	Flow	(1/s)	Depth (m)	Flow (1/s)
0.100		1.6	1.200		2.1	3.	000		3.2	7.000	4.7
0.200		1.8	1.400		2.2	3.	500		3.4	7.500	4.9
0.300		1.8	1.600		2.4	4.	000		3.6	8.000	5.0
0.400		1.8	1.800		2.5	4.	500		3.8	8.500	5.1
0.500		1.7	2.000		2.0		500		4.0	9.000	5.4
0.800		1.7	2.400		2.9	6.	000		4.4	5.000	0.1
1.000		1.9	2.600		3.0	6.	500		4.5		
			•			•					
				©198	2-201	3 Inno	vyz	e			

Attenuation Structure Summary								
Site	Local Centre							
Catchment Area	2							
Type of Underground Structure	Concrete tank							
Tank Base Dimensions (I x b) (m)	20.0 x 17.5							
Depth (mm)	800							
Underground Volume Provided (m ³)	280							
Volume Required (m ³)	239.1							
Total Volume provided (m ³)	280							
Outflow Control	Hydro brake							
Q _{bar} (I/sec)	1.6							
Allowable Outflow (I/sec)	2							
Outlet	750mm diameter pipe							

DBFL Consulting Engin	neers							Page 1	L	
Ormond House									_	
Upper Ormond Quay										
Dublin 7								Minor		
Date 25/02/2021			Desi	aned by	v BCU			MILLI	J	
File Catchment 2 (Un		Urain	age							
The catchinent 2 (on	aegrou		Sour	ce Con	trol 2019	2 1 1				
Innovyze			Sour	ce con	0101 2010					
Summary of Deculte for 100 year Deturn Deriod (+20%)										
Summery	JI NES	1105 1	01 10	o year	Recuint	reriou	(1208)			
	Ha	alf Drai	in Tim	e : 1034	minutes.					
Storm	Max Level	Max Depth	M Tofili	ax	Max Control E	Max Max		Status		
livenc	(m)	(m)	(1	/s)	(1/s)	(1/s)	(m ³)			
				/-/			/			
15 min Summer	73.872	0.222		0.0	2.0	2.0	67.6	O K		
30 min Summer	73.955	0.305		0.0	2.0	2.0	93.2	OK		
120 min Summer	74 122	0.482		0.0	2.0	2.0	147 2	0 1		
180 min Summer	74,186	0.536		0.0	2.0	2.0	162.5	0 K		
240 min Summer	74.222	0.572		0.0	2.0	2.0	174.6	ОК		
360 min Summer	74.268	0.618		0.0	2.0	2.0	188.4	O K		
480 min Summer	74.293	0.643		0.0	2.0	2.0	196.3	ОК		
600 min Summer	74.308	0.658		0.0	2.0	2.0	200.7	ОК		
720 min Summer	74.316	0.666		0.0	2.0	2.0	203.0	O K		
960 min Summer	74.317	0.667		0.0	2.0	2.0	203.6	ОК		
1440 min Summer	74.310	0.660		0.0	2.0	2.0	201.3	O K		
2160 min Summer	74.293	0.643		0.0	2.0	2.0	196.1	OK		
2000 min Summer	74.272	0.622		0.0	2.0	2.0	174 0	OK		
5760 min Summer	74 165	0.573		0.0	2.0	2.0	157.0	0 10		
7200 min Summer	74 092	0.313		0.0	2.0	2.0	125.2	0 K		
8640 min Summer	74.031	0.381		0.0	2.0	2.0	116.2	O K		
10080 min Summer	73.976	0.326		0.0	2.0	2.0	99.4	ОК		
15 min Winter	73.899	0.249		0.0	2.0	2.0	76.0	ОК		
	Store			Flooded	Discharge	Time-De	k			
	Event	(m/hr)	Volume	Volume	(mins)	ia.c			
	DVCHC	1		(m ³)	(m ³)	(, 			
		-								
15	min Su	nmer 8	4.666	0.0	70.2		26			
30	min Su	nmer 5	0.697	0.0	97.4		41			
120	min Su	mmer 3	4 187	0.0	120.9		20			
120	min Su	mer 1	8.242	0.0	182 7	1	88			
240	min Su	mer 1	5.045	0.0	199.8	2	48			
360	min Su	mer 1	1.345	0.0	226.0) a	66			
480	min Su	mer	9.273	0.0	246.3	4	84			
600	min Su	mer	7.926	0.0	263.2	: 6	502			
720	min Su	mer	6.970	0.0	277.8	1 7	22			
960	min Su	mer	5.688	0.0	302.2	-	16			
1440	min Su	nner	1.270	0.0	304.1	. 11	52			
2160	min Su	mer	2 610	0.0	416 1	. 15	168			
4220	min Su	mer	1,952	0.0	467.0	. 13	12			
5760	min Su	mer	1.588	0.0	506.5	36	540			
7200	min Su	mer	1.353	0.0	539.1	44	100			
8640	min Su	mer	1.186	0.0	567.3	51	12			
10080	min Su	mer	1.061	0.0	592.3	58	48			
15	min Wi	nter 8	4.666	0.0	78.6	5	26			
		0100	0.00	10 7						
1		©138	2-20	18 Inno	ovyze					

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DBFL Consulting Engin	neers						Page 2	
Ormond House								
Upper Ormond Quay								
Dublin 7							Micco	
Date 25/02/2021	Desinago							
File Catchment 2 (Un	Drainage							
Innovyze	-	Sour	ce Con	trol 2018	3.1.1			
Summary (of Results	for 10	00 year	Return 1	Period	(+20%)	_	
Storm	Max Max	c 1	Max Max Max Ma				Status	
Event	Level Dept	th Infil	tration (-)	Control E	Outflow (1/c)	Volume (m ²)		
	(m) (m)	(1	/>/	(1/5)	(1/5)	(m-)		
30 min Winter	73.994 0.34	4	0.0	2.0	2.0	105.0	O K	
60 min Winter	74.093 0.44	13	0.0	2.0	2.0	135.0	OK	
120 min Winter 180 min Winter	74.259 0.60	19	0.0	2.0	2.0	185.7	0 K	
240 min Winter	74.301 0.65	51	0.0	2.0	2.0	198.7	O K	
360 min Winter	74.357 0.70	17	0.0	2.0	2.0	215.5	о к	
480 min Winter	74.390 0.74	10	0.0	2.0	2.0	225.7	ок	
600 min Winter 720 min Winter	74.411 0.70	51	0.0	2.0	2.0	232.1	OK	
960 min Winter	74.434 0.76	4	0.0	2.0	2.0	239.1	0 K	
1440 min Winter	74.423 0.71	73	0.0	2.0	2.0	235.9	O K	
2160 min Winter	74.398 0.74	8	0.0	2.0	2.0	228.3	O K	
2880 min Winter	74.364 0.71	14	0.0	2.0	2.0	217.7	O K	
5760 min Winter	74.204 0.00	5 m 1 1	0.0	2.0	2.0	165.0	OK	
7200 min Winter	74.073 0.42	3	0.0	2.0	2.0	128.9	0 K	
8640 min Winter	73.976 0.32	26	0.0	2.0	2.0	99.6	O K	
10080 min Winter	73.898 0.24	8	0.0	2.0	2.0	75.7	0 K	
	Storm	Rain	Flooded	Discharge	Time-Pe	ak		
	Event	(mm/hr)	Volume	Volume	(mins)		
			(m*)	(m³)				
30	min Winter	58.697	0.0	109.1		40		
60	min Winter	38.241	0.0	142.2	2	70		
120	min Winter	24.187	0.0	179.8	1	28		
180	min Winter	18.342	0.0	204.7		42		
360	min Winter	11.345	0.0	253.2		58		
480	min Winter	9.273	0.0	275.9) 4	74		
600	min Winter	7.926	0.0	294.8	5	88		
720	min Winter	6.970	0.0	311.1	. 7	00		
960	min Winter	4,270	0.0	315.2	12	10		
2160	min Winter	3.203	0.0	428.9	16	52		
2880	min Winter	2.610	0.0	465.9	21	32		
4320	min Winter	1.953	0.0	523.0) 30	36		
7200	min Winter min Winter	1.352	0.0	603.6	. 35	88		
8640	min Winter	1.186	0.0	635.4	53	68		
10080	min Winter	1.061	0.0	663.3	60	56		
	©.	1982-20	18 Inno	ovyze				
				-				
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DBFL Consulting Engineers	Page 3	
Ormond House		_
Upper Ormond Quay		
Dublin 7		100
Date 25/02/2021	Designed by BCU	
File Catabrant 2 (Undeground	Checked by NCC	IQ6
Tracenter 2 (ondeground	Source Control 2019 1 1	
Innovyze	Source Control 2010.1.1	
Ra	infall Details	
Rainfall Model	FSR Winter Storms Yes	
Return Period (years)	100 Cv (Summer) 0.750	
Region Scotla	and and Ireland Cv (Winter) 0.840	
M5-60 (mm)	16.200 Shortest Storm (mins) 15 0.274 Jacobs Storm (mins) 10080	
Summer Storms	Yes Climate Change \$ +20	
Tin	me Area Diagram	
Tota	al Area (ha) 0.443	
Time (mins) Area Ti From: To: (ha) Fr	ime (mins) Area Time (mins) Area com: To: (ha) From: To: (ha)	
0 4 0.163	4 8 0.140 8 12 0.140	
©198	82-2018 Innovyze	

DBFL Consulting Engineers				Page 4				
Ormond House								
Upper Ormond Quay								
Dublin 7				Micco				
Date 25/02/2021	Designed	by BCU		MILIU				
File Catchment 2 (Undeground	Checked	by NCC		Urainage				
Innounze	Source C	optrol :	2019 1 1					
111100920	Source o	oncioi 7	2010.1.1					
1	fodel Det	ails						
Storage is Online Cover Level (m) 75.200								
C-11-1-		C						
Cellula	r storage	struct	ure					
Inver	t Level (m) 73.650	Safety Factor 2.0	0				
Infiltration Coefficient	Base (m/hr) 0.00000) Porosity 1.0	0				
Infiltration Coefficient	Side (m/hr) 0.00000)					
Depth (m) Area (m ²) Inf Area	na (m≊)∐Der	th (m) 2.	rea (m ²) Inf Area	(m²)				
Jepen (m) men (m / mi. m				(
0.000 305.0	0.0	1.300	0.0	0.0				
0.100 305.0	0.0	1.400	0.0	0.0				
0.200 305.0	0.0	1.500	0.0	0.0				
0 400 205 0	0.0	1 700	0.0	0.0				
0.500 305.0	0.0	1 800	0.0	0.0				
0.600 305.0	0.0	1,900	0.0	0.0				
0.700 305.0	0.0	2.000	0.0	0.0				
0.800 305.0	0.0	2.100	0.0	0.0				
0.900 0.0	0.0	2.200	0.0	0.0				
1.000 0.0	0.0	2.300	0.0	0.0				
1.100 0.0	0.0	2.400	0.0	0.0				
1.200 0.0	0.0	2.500	0.0	0.0				
Hydro-Brake®	Optimum	Outflow	Control					
-								
Unit	Reference	MD-SHE-0	069-2000-0900-2000					
Design	n nead (m) Flow (l/s)		2.0					
Design	Flush-Flom		Calculated					
	Objective	Minimis	e upstream storage					
A	pplication		Surface					
Sump	Available		Yes					
Dia	meter (mm)		69					
Invert	Level (m)		73.586					
Minimum Outlet Pipe Dia	meter (mm)		100					
Suggested Manhole Dia	meter (mm)		1200					
Control Po	ints	Head (m)	Flow (1/s)					
Design Point (Ca	alculated)	0.900	2.0					
I	Flush-Flos	0.278	2.0					
	Kick-Flo®	0.568	1.6					
Mean Flow over H	iead Range	-	1.8					
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based Should ano n these st	on the He ther type orage rou	ad/Discharge relati of control device ting calculations w	onship for the other than a ill be				

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Ormond House Upper Ormond Quay Designed by BCU Official State Date 25/02/2021 Elsecked by NCC Source Control 2018.1.1 Hydro-Brake& Optimum Outflow Control Dept (n) Flow (L/s) Depth (n) Flow (L/s) Depth (n) Flow (L/s) Depth (n) Flow (L/s) 0.100 1.7 1.200 2.3 3.000 3.8 7.000 5.2 0.200 2.0 1.400 2.4 3.500 4.7 7.500 5.3 0.400 1.9 1.800 2.7 4.500 4.2 3.600 5.7 0.600 1.7 2.200 3.01 5.500 4.6 9.500 6.0 0.600 1.7 2.200 3.2 6.800 5.0 4.6 9.500 6.0 1.000 2.1 2.600 3.2 6.800 5.0 4.6 9.500 6.0	DBFL Consultir	ng Engine	ers					Page 5
Upper Ormond Quay Designed by BCU Designed	Ormond House							
Dublin 7 Designed by BCU Checked by NCC Designed by BCU Checked by NCC Designed by BCU Designed by BCU <thdesigned bcu<="" by="" th=""> Designed by BCU</thdesigned>	Upper Ormond (Quay						
Date 25/02/2021 Designed by BCU Checked by NCG Designed by BCU Checked by NCG Source Control 2018.1.1 Hydro-Brake® Optimum Outflow Control Depth (n) Flow (1/z) Depth (n	Dublin 7							Micco
File Catchment 2 (Undeground) Checked by NGG Undegree Innovyre Source Control 2018.1.1 Hydro-Brake@ Optimum Outflow Control Depth (n) Flow (1/2) 0.100 1.7 1.200 2.4 3.000 3.5 7.000 5.2 0.200 2.0 1.600 2.7 4.800 4.1 8.500 8.7 0.400 1.9 1.000 2.7 4.800 4.4 9.500 8.7 0.600 1.7 2.200 3.1 5.800 4.6 9.500 8.0 1.000 2.1 2.400 3.2 6.500 5.0 4.6 9.500 6.0 1.000 2.1 2.400 3.2 6.500 5.0 5.0 5.0	Date 25/02/202	21		Desig	ned by BO	:0		
Innovyre Source Control 2018.1.1 Hydro-Brake® Optimum Outflow Control Depth (a) Flow (1/z) De	File Catchment	2 (Unde	around	Check	ed by NCO	1		Urainage
Human part Hydro-Brake& Optimum Outflow Control Depth (n) Flow (1/s) 0.100 1.7 1.200 2.8 3.000 3.5 7.000 5.3 0.300 2.0 1.400 2.4 4.000 4.0 8.000 5.3 0.300 2.0 1.400 2.4 4.000 4.2 8.000 5.3 0.300 2.0 1.400 2.4 4.000 4.2 8.000 5.7 0.500 1.8 2.000 2.9 5.000 4.4 9.000 5.8 0.500 1.8 2.400 3.1 6.000 5.5 5.00 5.0 5.0 1.000 2.1 2.600 3.2 6.500 5.0 5.0 5.0	Innovyze		9200000000	Sourc	e Control	2018 1 1		
<u>Pytho-Brake& Optimum Outflow Control</u>	1			00420				
Depth (n) Flow (1/z) Depth (n) Depth Depth Depth De		Hv	dro-Brake®	Optim	um Outflo	ow Control		
Depth (a) Flow (1/z) Depth (a) Flow Flow (a)<							-	
0.100 1.7 1.200 2.3 3.000 3.5 7.000 5.2 0.200 2.0 1.600 2.6 4.000 4.0 8.000 5.7 0.400 1.9 1.8 2.000 2.7 5.000 4.2 8.000 5.7 0.500 1.7 2.200 3.0 5.000 4.8 9.000 6.0 1.000 2.1 2.600 3.2 6.000 5.0	Depth (m) Flo	w (1/s) De	epth (m) Flow	(1/s)	Depth (m)	Flow (1/s)	Depth (m)	Flow (1/s)
0.200 2.0 1.600 2.4 4.500 4.7 7.500 5.3 0.400 1.9 1.800 2.7 4.500 4.2 8.500 5.8 0.600 1.7 2.200 3.0 5.500 4.6 9.500 5.0 0.600 1.9 2.400 3.1 6.000 4.8 1.000 2.1 2.600 3.2 6.500 5.0	0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200 2.0 1.600 2.7 4.500 4.2 8.000 5.5 0.500 1.8 2.000 2.9 5.000 4.4 5.000 5.8 0.600 1.7 2.200 3.1 6.000 4.8 1.000 2.1 2.600 3.2 6.500 5.0	0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.400 1.9 1.000 2.7 4.800 4.2 9.000 5.8 0.600 1.7 2.200 3.0 5.800 4.6 9.500 6.0 1.000 2.1 2.600 3.2 6.800 5.0	0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.500 1.6 2.400 3.1 6.000 4.6 9.500 6.0 0.800 1.9 2.400 3.1 6.000 4.8 1.000 2.1 2.600 3.2 6.500 5.0	0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
	0.500	1.0	2.000	2.9	5.500	4.6	9.000	5.0
1.000 2.1 2.600 3.2 6.500 5.0	0.800	1.9	2.400	3.1	6,000	4.8	5.000	0.0
	1.000	2.1	2.600	3.2	6.500	5.0		
01902-2010 Taxones					•			
19192-2018 Tapourse								
19192-2018 Tapourse								
19192-2018 Tapourse								
01002-2010 Tapange								
01002-2010 Tapange								
8192-2018 Tanatata								
8192-2019 Tanatas								
@192_2018 Tangange								
@192_2018 Tanautes								
01922-2018 Tanature								
Ø1992-2018 Tanaguge								
01922-2018 Tanange								
01922-2018 Tananga								
01992-2018 Tapourse								
6192-2018 Tanawas								
6192-2018 Tanawa								
8192-2018 Tancinge								
81982-2018 Tancause								
01982-2018 Tanawas								
01982-2018 Innowers								
01992-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
8192-2018 Tanouuze								
@192-2018 Tanouuze								
@192-2018 Tanouuze								
@1922-2018 Tanouuze								
@1982-2018 Tanouure								
@1982-2018 Tanouves								
@1982-2018 Tanouvra								
@1982-2018 Innouves								
			@190	2-201	8 Innour	-		

Attenuation Structure Summary								
Site	Local Centre							
Catchment Area	3							
Type of Overground Structure	Unlined Detention Basin							
Average Water Depth of Overground Structure (mm)	900							
Overground Structure Base Area (m ²)	197							
Base slope (1V:XH)	5							
Volume required (m ³)	266.7							
Total Provided Volume	XXX							
Outflow Control	Hydro brake							
Q _{bar} (I/sec)	3.3							
Allowable Outflow (I/sec)	3.3							
Outlet	750mm diameter pipe							

DBFL Consulting Engin	neers							Page 1		
Ormond House										
Upper Ormond Quay										
Dublin 7								Micco		
Date 25/02/2021			Desi	med b	MILLI	J				
File Catchment 3 (Day	rk) er	~~	Chec	ked by	NCG			Urain	age	
Innouvre	14/.31		Sour	neu by	trol 2018	211			<u> </u>	
Source control 2010.1.1										
Summery of Deculte for 100 year Deturn Deriod (1208)										
							(1200)			
	н	alf Dra	in Tim	e : 705	minutes.					
					-					
Storm	Hax	Denth	n T-Sila		Max Control 5	Max Out 61 out	Max	Status		
Lvent	(m)	(m)	(1	ration (s)	(1/s)	(1/s)	(m ²)			
		(<u> </u>		-,	(-/-/	(-/-/				
15 min Summer	73.564	0.340		0.0	3.3	3.3	81.8	O K		
30 min Summer	73.673	0.449		0.0	3.3	3.3	112.8	OK		
120 min Summer	73.177	0.003		0.0	3.3	3.3	177.1	0 1		
120 min Summer	72 622	0.000		0.0	3.3	3.3	105 1	0 8		
240 min Summer	72 966	0.742		0.0	2.2	2.2	206.8	0 K		
360 min Summer	74 002	0 778		0.0	2.2	2 2	220 1	0 K		
480 min Summer	74.019	0.795		0.0	3.3	3.3	226.3	O K		
600 min Summer	74.025	0.801		0.0	3.3	3.3	228.4	O K		
720 min Summer	74.027	0.803		0.0	3.3	3.3	229.1	O K		
960 min Summer	74.025	0.801		0.0	3.3	3.3	228.6	ОК		
1440 min Summer	74.014	0.790		0.0	3.3	3.3	224.2	O K		
2160 min Summer	73.986	0.762		0.0	3.3	3.3	214.0	ОК		
2880 min Summer	73.951	0.727		0.0	3.3	3.3	201.7	0 K		
4320 min Summer	73.867	0.643		0.0	3.3	3.3	173.2	0 K		
5760 min Summer	73.759	0.535		0.0	3.3	3.3	138.5	0 K		
7200 min Summer	73.666	0.442		0.0	3.3	3.3	110.5	O K		
8640 min Summer	73.587	0.363		0.0	3.3	3.3	87.9	0 K		
10080 min Summer	73.521	0.297		0.0	3.3	3.3	70.2	ОК		
15 min Winter	73.601	0.377		0.0	3.3	3.3	92.0	ОК		
	Storm	F	lain	Flooded	l Discharge	Time-Pe	ak			
	Event	(m	m/hr)	Volume	Volume	(mins)			
				(m")	(m³)					
15	min Sur	mmer 8	4.666	0.0	83.9		26			
30	min Sur	mer 5	8.697	0.0	116.5	i i	40			
60	min Sur	mer 3	8.241	0.0	153.3		70			
120	min Sur	mer 2	4.187	0.0	194.0) 1	28			
180	min Sur	mer 1	8.342	0.0	220.7	1	86			
240	min Sur	mmer 1	5.045	0.0	241.4	2	46			
360	min Sur	mer 1	1.345	0.0	273.1	. 3	364			
480	min Sur	mer	9.273	0.0	297.6	4	82			
600	min Sur	nner	7.926	0.0	317.9		000			
720	min Sur	mer	0.970 5.688	0.0	264.6		166			
1440	min Sur	mer	4.270	0.0	400.0	1 10	30			
2160	min Sur	mer	3.203	0.0	463 9	14	52			
2880	min Sur	mer	2.610	0.0	503.9	18	72			
4320	min Sur	mer	1.953	0.0	565.3	26	592			
5760	min Sur	mer	1.588	0.0	613.8	34	16			
7200	min Sur	mer	1.353	0.0	653.4	41	12			
8640	min Sur	mer	1.186	0.0	687.4	48	340			
10080	min Sur	mer	1.061	0.0	717.3	54	56			
15	min Wi	nter 8	4.666	0.0	94.0		26			
		01.00	0.00	0.7						
		©138	52-20.	18 Inno	ovyze					

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DBFL Consulting Engin	neers						Page 2		
Ormond House									
Upper Ormond Quay									
Dublin 7							Micco		
Date 25/02/2021		Desi	igned b	y BCU			Desin	200	
File Catchment 3 (Pa:	rk).srcx	Chec	ked by	NCG			DIGIU	age	
Innovvze		Sour	ce Con	trol 2010	8.1.1				
Summary	of Results	for 1	00 vear	Return	Period	(+20%)			
Storm	Max Max	c 1	faac	Status					
Event	Level Dept	h Infil	tration	Control E	Outflow	Volume			
	(m) (m)	(1	./s)	(1/s)	(1/s)	(m³)			
30 min Winter	73.721 0.49	97	0.0	3.3	3.3	126.9	ОК		
60 min Winter	73.836 0.61	2	0.0	3.3	3.3	163.1	O K		
120 min Winter	73.947 0.72	23	0.0	3.3	3.3	200.3	O K		
180 min Winter	74.006 0.78	32	0.0	3.3	3.3	221.2	O K		
240 min Winter	74.043 0.81	.9	0.0	3.3	3.3	235.2	O K		
360 min Winter	74.086 0.80	52	0.0	3.3	3.3	252.1	O K		
480 min Winter	74.108 0.88	14	0.0	3.3	3.3	260.9	O K		
720 min Winter	74.119 0.89	19	0.0	3.3	3.3	265.2	OK		
960 min Winter	74 118 0 89	14	0.0	2.2	2.2	264 7	0 K		
1440 min Winter	74.101 0.81	7	0.0	3.3	3.3	258.1	0 K		
2160 min Winter	74.058 0.83	34	0.0	3.3	3.3	241.2	ОК		
2880 min Winter	74.004 0.78	30	0.0	3.3	3.3	220.6	O K		
4320 min Winter	73.868 0.64	14	0.0	3.3	3.3	173.6	ОК		
5760 min Winter	73.690 0.40	56	0.0	3.3	3.3	117.7	O K		
7200 min Winter	73.554 0.33	80	0.0	3.3	3.3	79.1	0 K		
8640 min Winter	73.456 0.23	32	0.0	3.3	3.3	53.5	ОК		
10080 min Winter	73.391 0.10	57	0.0	3.1	3.1	38.2	ОК		
	Storm	Rain	Flooded	Discharge	Time-Pe	ak			
	Event	(mm/hr)	Volume	Volume	(mins)			
			(m ³)	(m²)					
30	min Winter	28 241	0.0	130.6	2	40			
120	min Winter	24 187	0.0	217.3	, 1 1	26			
180	min Winter	18.342	0.0	247.3	1	84			
240	min Winter	15.045	0.0	270.4	2	40			
360	min Winter	11.345	0.0	305.8	3 3	56			
480	min Winter	9.273	0.0	333.2	2 4	68			
600	min Winter	7.926	0.0	355.9) 5	680			
720	min Winter	6.970	0.0	375.4	1 6	86			
960	min Winter	5.688	0.0	408.0	3 (72			
1440	min Winter	4.270	0.0	456.2	(11 	02			
2160	min winter	3.203	0.0	0 519.0		24			
4220	min Winter	1.952	0.0	622 1	. 20	40			
5760	min Winter	1.588	0.0	687.5	5 35	84			
7200	min Winter	1.353	0.0	731.9	9 42	56			
8640	min Winter	1.186	0.0	770.0	0 48	48			
10080	min Winter	1.061	0.0	803.5	5 54	48			
	©.	1982-20	18 Inn	ovyze					

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DBFL Consulting Engineers		Page 3
Ormond House		
Upper Ormond Quay		
Dublin 7		Micco
Date 25/02/2021	Designed by BCU	
File Catchment 3 (Park) srcx	Checked by NCG	Urainage
Innovyze	Source Control 2018 1 1	
Ra	infall Details	
Rainfall Model	FSR Winter Storms	Yes
Return Period (years)	100 Cv (Summer) 0	.750
Region Scotla	nd and Ireland Cv (Winter) 0	.840
Ratio R	0.274 Longest Storm (mins) 1	0080
Summer Storms	Yes Climate Change *	+20
Tir	ne Area Diagram	
Tota	al Area (ha) 0.537	
Time (mins) Area Ti	me (mins) Area Time (mins) Area	
From: To: (ha) Fr	om: To: (ha) From: To: (ha)	
0 4 0.200	4 8 0.167 B 12 0.170	
©198	2-2018 Innovyze	

DBFL Consulting End	gineers				Page 4				
Ormond House	-								
Upper Ormond Ouav									
Dublin 7									
Date 25/02/2021		Designed	Designed by BCU						
File Catchment 2 /1		Chaolead	Charled by BCC						
File Catchment 3 ()	Fark).SICX	Checked	by NCG	2010 1 1	_				
Innovyze		source u	ontrol 2	2018.1.1					
Model Dataila									
INVER DEVELLS									
Storage is Online Cover Level (m) 74.900									
Cellular Storage Structure									
	Inver	t Level (m	1) 73.224	Safety Factor	2.0				
Infiltrat Infiltrat	tion Coefficient	Base (m/hr Side (m/hr	:) 0.00000 :) 0.00000	Porosity	1.00				
Depth (m) Ar	ea (m²) Inf. Are	ea (m²) Dep	pth (m) Ar	rea (m²) Inf. Ar	ea (m²)				
0.000	220.0	0.0	1.300	0.0	0.0				
0.100	230.0	0.0	1.400	0.0	0.0				
0.200	237.0	0.0	1.500	0.0	0.0				
0.300	265.0	0.0	1.600	0.0	0.0				
0.400	285.0	0.0	1.700	0.0	0.0				
0.500	305.0	0.0	1.800	0.0	0.0				
0.600	320.0	0.0	1.900	0.0	0.0				
0.700	342.0	0.0	2.000	0.0	0.0				
0.000	410.0	0.0	2.100	0.0	0.0				
1 000	0.0	0.0	2 200	0.0	0.0				
1,100	0.0	0.0	2.400	0.0	0.0				
1.200	0.0	0.0	2.500	0.0	0.0				
	Hydro-Brake®	Optimum	Outflow	Control					
	Unit	Reference	MD-SHE-0	086-3300-1000-33	00				
	Desig	n Head (m)		1.0	00				
	Design	Flow (1/s)		3	.3				
		Flush-Flo ^m	L. C.	Calculat	ed				
		Objective	Minimis	e upstream stora	ige				
	A	pplication		Surfa	ce				
	Sump	Available		Y	es				
	Dia	meter (mm)			00				
Minimu	Invert Outlet Dime Dim	Level (m)		73.2	00				
Sugge	sted Manhole Dia	meter (mm)		12	00				
	Control Po:	ints	Head (m)	Flow (1/s)					
	Design Point (Ca	alculated)	1.000	3.3					
	E	lush-Flor	0.296	3.3					
		Kick-Flo®	0.624	2.7					
	Mean Flow over H	iead Range	-	2.9					
The hydrological cal	culations have b	een based	on the He	ad/Discharge rel	ationship for the				
Hydro-Brake@ Optimum	as specified.	Should ano	ther type	of control devi	ce other than a				
Hydro-Brake Optimum	be utilised the	n these st	orage rou	ting calculation	s will be				
invalidated			-	-					
	©198	32-2018 T	nnovvze						
	0170								

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DBFL Consulting Engineers									Page 5		
Ormond Hous	se										
Upper Ormon											
Dublin 7							Micco				
Date 25/02	/2021	L			Desig	ned by		Designed			
File Catch	ment	3 (Pa	rk).srcx		Check	ed by	NCG	;			Diamaye
Innovyze		-	-		Sourc	e Cont	trol	201	8.1.1		
			Hydro-Bra	ke©	Optim	um Ou	tflo	ow Co	ntrol		
										•	
Depth (m)	Flow	(1/s)	Depth (m)	Flow	(1/s)	Depth	(m)	Flow	(1/s)	Depth (m)	Flow (1/s)
0.100		2.6	1.200		3.6	3.	000		5.5	7.000	8.2
0.200		3.2	1.400		3.9	3.	500		5.9	7.500	8.5
0.300		3.3	1.600		4.1	4.	.000		6.3	8.000	8.7
0.400		3.2	1.800		4.3	4.	500		6.6	8.500	9.0
0.500		3.1	2.000		4.5	5.	.000		7.0	9.000	9.2
0.600		2.8	2.200		4.8	5.	.500		7.3	9.500	9.5
0.800		3.0	2.400		4.9	0.	500		7.6		
1.000		3.3	2.600		5.1	0.	500		7.9		
			(B198	2-201	8 Inno	vvz	e			

APPENDIX D

SURFACE WATER NETWORK CALCULATIONS

Site 2: Catchment Area 1

Surface Water Network

Impermeability Factor (%): 50.3

		Page 1					
Ormond House	Hollystown						
Upper Ormond Quay							
Dublin 7		Mirrn					
Date 04/10/2021 14:50	Designed by Grant Humphrey	Drainago					
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage					
Innovyze	Network 2018.1.1						
Innovyze Network 2018.1.1 <u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for Site 2 : Catchment 1</u> Fipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 PIMP (%) 75 M5-60 (mm) 16.200 Add Flow / Climate Change (%) 20 Ratio R 0.272 Minimum Backdrop Height (m) 0.200 Maximum Rainfall (mm/hr) 100 Maximum Backdrop Height (m) 1.200 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.200 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (1:X) 500 Designed with Level Inverts <u>Time Area Diagram for Site 2 : Catchment 1</u> <u>Time Area Time Area Time Area (mins) (ha)</u> 0-4 0.470 4-8 0.777 B-12 0.097 Tetal Area Contribution (h) = 1.242							
	4-0 0.777 0-12 0.097						
Total Area Total Pij	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635						
Total Area Total Pij Network Design Ta	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1						
Total Area Total Pij <u>Network Design Ta</u>	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1						
Total Area Total Pij <u>Network Design Ta</u> PN Length Fall Slope I.Area T.1	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 <u>able for Site 2 : Catchment 1</u> E. Base k EYD DIA Section	Type Auto					
Total Area Total Pig <u>Network Design Ta</u> PN Length Fall Slope I.Area T.1 (m) (m) (1:X) (ha) (min	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm)	Type Anto Design					
Total Area Total Pij <u>Network Design Ta</u> PN Length Fall Slope I.Area T.1 (m) (m) (1:X) (ha) (mi) 1.000 27.209 0.160 170.1 0.134 4	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (nmn) SECT (nmn) .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit					
Total Area Total Piy <u>Network Design Ta</u> PN Length Fall Slope I.Area T.1 (m) (m) (1:X) (ha) (min 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (num) SECT (num) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design nduit					
Total Area Total Area Total Piy <u>Network Design Ta</u> (m) (m) (1:X) (ha) (mix 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.0000 0	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (num) SECT (num) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design nduit nduit nduit					
Total Area Total Pij <u>Network Design Ta</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.0000 0 1.003 14.721 0.087 170.0 0.0000 0 1.004 37.401 0.115 325.2 0.059 0	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k EYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 275 Pipe/Cor .00 0.0 0.600 o 275 Pipe/Cor	Type Auto Design nduit d nduit d nduit d nduit d					
Total Area Total Area Total Pip <u>Network Design T2</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (mix</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Con .00 0.0 0.600 o 225 Pipe/Con	Type Auto Design aduit d aduit d aduit d aduit d aduit d aduit d aduit d					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (mix</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u>	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit d aduit d aduit d aduit d aduit d aduit d					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL FIA</u>	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k EYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit d aduit d aduit d aduit d aduit d aduit d aduit d					
Total Area Total Area Total Pip <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL E I.A</u> <u>(mm/hr) (mins) (m) (has</u>	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit d aduit d					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL E I.A</u> <u>(mm/hr) (mins) (m) (ha</u>	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit aduit aduit aduit aduit aduit aduit ap Flow /s) (1/s)					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL E I.A</u> <u>(mm/hr) (mins) (m) (ha</u> 1.000 50.47 4.45 72.380 0. 1.001 49.54 4.69 72 220 0	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k HYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit aduit aduit aduit aduit aduit aduit aduit ap Flow /s) (1/s) 9.7 29.2 9.8 29.6					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL E I.A</u> <u>(mm/hr) (mins) (m) (ha</u> 1.001 49.54 4.69 72.220 0. 1.002 46.36 5.62 72.135 0.	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k EYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit aduit aduit aduit aduit aduit aduit aduit ap Flow /s) (1/s) 9.7 29.2 9.8 39.6 9.8 39.6					
Total Area Total Area Total Pij <u>Network Design Ta</u> <u>PN Length Fall Slope I.Area T.1</u> <u>(m) (m) (1:X) (ha) (min</u> 1.000 27.209 0.160 170.1 0.134 4 1.001 14.423 0.085 169.7 0.051 0 1.002 55.370 0.326 170.0 0.000 0 1.003 14.721 0.087 170.0 0.000 0 1.004 37.401 0.115 325.2 0.059 0 2.000 54.735 0.771 71.0 0.019 4 <u>Netwo</u> <u>PN Rain T.C. US/IL E I.A</u> <u>(mm/hr) (mins) (m) (ha</u> 1.001 49.54 4.69 72.220 0. 1.002 46.36 5.62 72.135 0. 1.003 45.59 5.86 71.809 0.	Contributing (ha) = 1.343 pe Volume (m ³) = 50.635 able for Site 2 : Catchment 1 E. Base k EYD DIA Section ns) Flow (1/s) (mm) SECT (mm) .00 0.0 0.600 o 225 Pipe/Cor .00 0.0 0.600 o 225 Pipe/Cor	Type Auto Design aduit aduit aduit aduit aduit aduit aduit aduit ap Flow /s) (1/s) 9.7 29.2 9.8 39.6 9.8 39.6 9.8 39.6					
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						Netwo	rk	Resu	ilts 1	able					
Pl	N I	Rain	Ţ	.C.	US/IL	E I.Ar	ea	EI	Base	Foul	Add 1	Flow	Vel	Cap	Flow
	(m	m/nr)	(m	ins)	(m)	(na)		FIOW	(1/5)	(1/5)	(1)	s)	(m/s)	(1/5)	(1/5)
3.0	00	51.55		4.19	72.275	0.0	62		0.0	0.0		2.3	1.00	39.9	13.9
3.0	01	51.17		4.28	72.209	0.0	83		0.0	0.0		3.1	1.85	73.5	18.5
2.0	01	49.29		4.76	72.004	0.1	02		0.0	0.0		3.6	1.00	39.8	21.8
2.0	02	46.12		5.69	71.942	0.1	02		0.0	0.0		3.6	1.01	40.1	21.8
1.0	05	43.46	i	6.60	71.457	0.3	45		0.0	0.0	1	10.8	1.08	119.8	65.0
		40.00		4	71 000								1.00	40.0	15.0
4.0	00	49.23		4.77	/1.900	0.0	11		0.0	0.0		2.5	1.00	42.0	10.2
1.0	06	41.33		7.45	71.354	0.5	59		0.0	0.0	1	16.7	1.01	160.5	100.1
1.0	07	40.91		7.62	71.227	0.5	59		0.0	0.0	1	16.7	1.01	160.7	100.1
5.0	00	48.63 48.24		4.94	71.557	0.0	97 54		0.0	0.0		1.6	1.00	70.7	9.8
5.0	01	10.30		0.02	/1.620	0.0			0.0	010		1.5	1.00	19.1	11.0
1.0	80	39.23		8.39	71.200	0.7	40		0.0	0.0	:	21.0	1.01	160.6	125.8
1.0	09	38.72		8.63	71.084	0.7	95		0.0	0.0	1	22.2	1.01	160.7	133.4
1.0	10	38.31		8.84	71.047	0.8	50		0.0	0.0	-	23.5	1.02	161.5	141.1
1.0	12	a7.68 27.50		9.27	70,940	1.0	07		0.0	0.0		27.4	1.00	215.6 216.8	164.5
									0.0						
						©198	2-2	2018	Innov	yze					

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Comond House Upper Ormond Quay Dublin 7 Date 04/10/2021 14:50 File Network Site 2 and 3 20 Designed by Grant Humphrey Checked by Deirdre Walsh Innovyze Network Coll 1.1 Network Design Table for Site 2 : Catchment 1 PN Length Fall Slope I.Area T.E. Base & ETD DIA Section Type Auto (m) (m) (1:X) (ha) (mins) Flow (1/s) (m) SECT (m) Design 1.013 5.000 0.001 5000.0 0.000 0.00 0.00 0.00	DBFL Consulting Engineers	Page 3
Upper Ormond Quay Dublin 7 Date 04/10/2021 14:50 File Network Site 2 and 3 20 Innovyze Detected by Crant Humphrey Checked by Deirdre Walsh Network 2018.1.1 Network Design Table for Site 2 : Catchment 1 Network 2018.1.1 Network 000 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Ormond House Hollyst	own
Dublin 7 Designed by Grant Humphrey Designed by Grant Humphrey Innovyre Network 2018.1.1 Design Table for Site 2 : Catchment 1 Network Design Table for Site 2 : Catchment 1 Network 2018.1.1 Network 101 (n) (n) (1:X) (ha) (kins) Flow (1/s) (m) SECT (m) DESign Design 1.013 5.000 0.015 5000.0 0.000 0.00 0.00 0.00	Upper Ormond Quay	
Date 04/10/2021 14:50 Designed by Grant Humphrey Designed by Deirdre Walsh File Network Site 2 and 3 20 Network 2018.1.1 Network 2018.1.1 Network Design Table for Site 2 : Catchment 1 Innovyre Network Design Table for Site 2 : Catchment 1 File Number 2018.1.1 Network Design Table for Site 2 : Catchment 1 Innovyre Network Design Table for Site 2 : Catchment 1 File Name Table for Site 2 : Catchment 1 Innovyre Network (Jable for Site 2 : Catchment 1 Innovyre Network (Jable for Site 2 : Catchment 1 Innovyre Network (Jable for Site 2 : Catchment 1 Innovyre Network (Jable for Site 2 : Catchment 1 Innovyre Network (Jable for Site (Jable for Site 2) Network Results Table PN Rein T.C. US/IL I Larce E Base Foul Add Flow Vel Cap Flow (mmathefaithe	Dublin 7	Mirco
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PN Length Fall Slope I.Area T.E. Base k ETD DIA Section Type Auto 1.013 5.000 0.001 5000 0.000 0.00 0.000 o 750 Pipe/Conduit Image: Conduit Conduct Image: Conduit Conduct Image: Con	Network Design Table for	Site 2 : Catchment 1
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PN Rain T.C. US/IIL I LArea I Base Foul Add Flow Vel Cap Flow (mm/hr) (mins) (m) (ha) Flow (l/s) (l/s) (l/s) (m/s) (l/s) (l/s) 1.013 07.10 9.40 70.809 1.007 0.0 0.0 27.4 0.39 170.5 164.5	Network Decul	te Table
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(1018 27018 Traceres	PN Rain T.C. US/IL E I.Area E Ba	ise Foul Add Flow Vel Cap Flow
1.013 37.10 9.48 70.889 1.007 0.0 0.0 27.4 0.39 170.5 164.5	(nm/nr) (mins) (m) (na) Flow	11/3) (1/5) (1/5) (1/5) (1/5)
	1.013 37.10 9.48 70.889 1.007	0.0 0.0 27.4 0.39 170.5 164.5
19192-2018 Taxaura		
8192-2018 Taxanze		
0102-2010 Tapanze		
0102-2010 Tapanga		
8192-2018 Tananas		
8192-2019 Tananas		
@1922-2018 Tananase		
@192_2018 Tananase		
0192-2018 Tracense		
01992-2018 Tananne		
01902-2018 Tanatura		
0192-2018 Tanonuse		
0192-2018 Tanonura		
0192-2018 Tanonuze		
@1982-2018 Tancinge		
81982-2019 Tanonaza		
01982-2018 Tanange		
01992-2018 Tanawas		
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@1992-2018 Tanouwee		
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@1992-2018 Tanowyze		
@1992-2018 Innouvre		
	@1992_2010_1	0000070

DBFL	Consul	lting	Engi		Page	4							
Ormon	nd Hous	se .			Hol	lysto	wn						
Upper	r Ormor	nd Qua	чy										
Dubl:	in 7									Micro			
Date	04/10/	/2021	14:5	0	Des	igned	by Gran	t Humphr	еу	Drain	ane		
File	Networ	ck Sit	;e 2	and 3 2	0 Che	cked	by Deird	re Walsh		Dian	iuge_		
Innov	vyze				Net	work	2018.1.1						
			Mart						1				
Manhole Schedules for Site 2 : Catchment 1													
MH	MH	MH	I	МН	MH	I	Pipe Out			Pines In		I	
Name	CL (m)	Depth	Con	nection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	Diamet	er	Backdrop
		(m)			(mm)		Level (m)	(mm)		Level (m)	(mm)		(mm)
<u> </u>													
SA11	73.838	1.458	Open	Manhole	1200	1.000	72.380	225					
SA10	73.556	1.336	Open	Manhole	1200	1.001	72.220	225	1.000	72.220	2	25	
SA9-1	73.429	1.294	Open	Manhole	1200	1.002	72.135	225	1.001	72.135	2	25	
SA9	72.933	1.124	Open	Manhole	1200	1.003	71.809	225	1.002	71.809	2	25	
SA8	72.904	1.332	Open	Manhole	1350	1.004	71.572	375	1.003	71.722	2	25	
SA7-5	74.200	1.425	Open	Manhole	1200	2.000	72.775	225					
SA7-4	73.785	1.510	Open	Manhole	1200	3.000	72.275	225					
3A7-3	73.771	1.562	Open	Manhole	1200	3.001	72.209	225	3.000	72.209	2	25	
3A7-2	73.664	1.660	Open	Manhole	1200	2.001	72.004	225	2.000	72.004	2	25	
937-1	70 594	1 642	0	Manhala	1200	2 002	71 042	225	2 001	72.004	1	25	
937	72 201	1 744	Open	Manhole	1200	1 005	71.992	220	1 004	71.992	1	20	
	/0.201	1./11	open		1000	1.000	/1.10/	0/0	2.002	71.607	2	25	
SA6-1	73.954	2.054	Open	Manhole	1200	4.000	71.900	225			1		
SA6	73.247	1.893	Open	Manhole	1350	1.006	71.354	450	1.005	71.429	a	75	
			-						4.000	71.579	2	25	
SA5	73.130	1.903	Open	Manhole	1350	1.007	71.227	450	1.006	71.227	4	50	
SA4-2	72.607	1.050	Open	Manhole	1200	5.000	71.557	300					
SA4-1	73.015	1.689	Open	Manhole	1200	5.001	71.326	300	5.000	71.326	3	00	
SA4	73.011	1.811	Open	Manhole	1350	1.008	71.200	450	1.007	71.200	4	50	
									5.001	71.308	3	00	
SA3	72.434	1.350	Open	Manhole	1350	1.009	71.084	450	1.008	71.084	4	50	
SA2	72.000	0.953	Open	Manhole	1350	1.010	71.047	450	1.009	71.047	4	50	
SA1	72.000	1.060	Open	Manhole	1500	1.011	70.940	525	1.010	71.015	4	50	
SAO	72.000	1.099	Open	Manhole	1500	1.012	70.901	525	1.011	70.901	5	25	
BASIN	72.000	1.111	Open	Manhole	1800	1.013	70.889	750	1.012	70.889	5	25	
SA00	72.400	1.512	Open	Manhole	300		OUTFALL		1.013	70.888	7	50	
<u> </u>					©1982-2	018 7	nnovvze						

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DBFL Consul	ting	Engine	eers							Page 5
Ormond Hous	e	-			Hollvst	own				
Upper Ormon	d Qua	v			-					
Dublin 7		-								Micco
Date 04/10/	2021	14:50			Designe	d by Gr	ant	Humphre	v	
File Networ	k Sit	e 2 au	nd 3 2	20	Checked	bv Dei	rdre	Walsh	-	Urainage
Innovyze					Network	2018 1	1			
		PIPEL	INE S	CHEDUL	ES for	Site 2	: Ca	tchment	1	
									_	
				Ups	tream M	(anhole				
PN	Byd	Diam	MH (C.Level	I.Level	D.Depth		ME	ME DIAM.	, L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Cont	nection	(mm)	
1.000	。 (225	SA11	73.838	72.380	1.233	Open	Manhole		1200
1.001	L 0	225	SA10	73.556	72.220	1.111	Open	Manhole		1200
1.002	2 0	225 3	3A9-1	73.429	72.135	1.069	Open	Manhole		1200
1.003	8 0	225	SA9	72.933	71.809	0.899	Open	Manhole		1200
1.004	÷ 0	375	SA8	72.904	71.572	0.957	Open	Manhole		1350
2.000	•	225	3A7-5	74.200	72.775	1.200	Open	Manhole		1200
							~			1000
3.000		225 3	SA7-9	73.765	72.275	1.265	Open	Manhole		1200
3.001		220 .	A/-0	/0.//1	12.205	1.00/	open	Mannoie		1200
2.001		225 \$	3A7-2	73.664	72.004	1.435	Open	Manhole		1200
2.002	2 0	225 \$	3A7-1	73.584	71.942	1.417	Open	Manhole		1200
1.005	5 0	375	SA7	73.201	71.457	1.369	Open	Manhole		1350
4.000	0 0	225 3	8A6-1	73.954	71.900	1.829	Open	Manhole		1200
1.006	5 o	450	SA6	73.247	71.354	1.443	Open	Manhole		1350
1.007	7 0	450	SA5	73.130	71.227	1.453	Open	Manhole		1350
				Down	istream	Manhol	e			
	_									
PN	Length	Slope	MH	C.Leve	1 I.Level	1 D.Dept	h _	MH	MH DIAM	L., L*₩
	(m)	(1:X)	Name	(m)	(m)	(m)	Co	nnection	(m	1)
1.000	27.209	170.1	SA10	73.55	6 72.22	0 1.11	1 Ope	n Manhole		1200
1.001	14.423	169.7	SA9-1	73.42	9 72.13	5 1.06	9 Ope	n Manhole		1200
1.002	55.370	170.0	SA9	72.93	3 71.80	9 0.89	8 Ope	n Manhole		1200
1.003	14.721	170.0	SA8	72.90	4 71.72	2 0.95	7 Ope	n Manhole		1350
1.004	37.401	325.2	SA7	73.20	1 71.45	7 1.36	9 Ope	n Manhole		1350
2.000	54.735	71.0	SA7-2	73.66	4 72.00	4 1.43	5 Ope	n Manhole		1200
3.000	11.146	168.9	SA7-3	73.77	1 72.20	9 1.33	7 Ope	n Manhole		1200
3.001	10.322	50.4	SA7-2	73.66	4 72.00	9 1.43	5 Ope	n Manhole		1200
2 001	10 577	170.0	937-1	72 58	4 71 04	2 1 41	7 000	n Manhale		1200
2.001	56,111	167.5	SA7	73.20	1 71.60	7 1.26	9 Ope	n Manhole		1350
2.002			0.001			. 1.50	- Spe			
1.005	7.743	276.5	SA6	73.24	7 71.42	9 1.44	3 Ope	n Manhole		1350
4.000	48.923	152.4	SA6	73.24	7 71.57	9 1.44	3 Ope	n Manhole		1350
					_					
1.006	50.921	401.0	SA5	73.13	0 71.22	7 1.45	3 Ope	n Manhole		1350
1.007	10.649	400.0	SA4	73.01	1 71.20	J 1.36	U Ope	n Manhole		1350
				©198	2-2018	Innovvz	e			

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DBFL Consult	ing	Engin	eers							Page 6		
Ormond House					Hollysto	wn						
Upper Ormond	One	v										
Dublin 7	2000	2										
Date 04/10/2	021	14.50			Designed	ber Cr	ont Unm	hrow		MICLO		
Date 04/10/2	021	14.50			Designed	DY GI	ant nung	mrey		Drainage		
File Network	Sit	e 2 a:	nd 32	0	Checked	by Dei	rdre Wa.	lsh				
Innovyze					Network	2018.1	.1					
		PIPEL	INE SC	CHEDUL	ES for S:	lte 2	: Catchm	ent l				
TAT	ME	DTAM	T +W									
EN .	Sect	(mm)	Name	(=)	(m)	(=)	Connecti		(, 11-W		
	Deee	(arcune.	1	()	()	connecer		(
5.000	0	300	SA4-2	72.607	71.557	0.750	Open Manh	ole		1200		
5.001	0	300	SA4-1	73.015	71.326	1.389	Open Manh	ole		1200		
1 008		450	93.4	72 011	71 200	1 261	Onen Manh	-1-		1250		
1.000		450	582	72 424	71 084	0 900	Open Manh	ole		1250		
1.010	ő	450	SA2	72.000	71.047	0.503	Open Manh	ole		1350		
1.011	0	525	SA1	72.000	70.940	0.535	Open Manh	ole		1500		
1.012	0	525	SA0	72.000	70.901	0.574	Open Manh	ole		1500		
1.013	0	750 1	BASIN	72.000	70.889	0.511	Open Manh	ole		1800		
				-								
Downstream Manhole												
PN Length Slope MR C Level I Level D Depth MR MR DIAM LIN												
PN Le	(m)	(1.X)	Name	(m)	el l.Level	U.Dept	n na	tion		1., L*W		
	()	(2		()	()	()	connec		(,		
5.000 56	5.598	245.0	0 SA4-1	73.0	15 71.326	1.38	9 Open Ma	nhole		1200		
5.001 4	1.475	245.0	0 SA4	73.0	11 71.308	1.40	3 Open Ma	nhole		1350		
1 000 44		400		-						1050		
1.000 40	1 840	400.0	D 3A3 0 932	72.1	34 71.004	0.90	о Open Ma 2 Open Ma	nhole		1250		
1.010 12	2.672	396.0	0 SA1	72.0	00 71.015	0.53	5 Open Ma 5 Open Ma	nhole		1500		
1.011 19	9.466	499.3	1 SA0	72.0	00 70.901	0.57	4 Open Ma	nhole		1500		
1.012 5	5.924	493.1	7 BASIN	72.0	00 70.889	0.58	6 Open Ma	nhole		1800		
1.013 5	5.000	5000.0	0 SAOO	72.4	00 70.888	0.91	2 Open Ma	nhole		300		
				©198	2-2018 In	novyz	e					

DBFL Consulting Engineers	5				Page 7
Ormond House		Hollystown			
Upper Ormond Quay					
Dublin 7					Micro
Date 04/10/2021 14:50		Designed b	y Grant H	lumphrey	Drainago
File Network Site 2 and 3	3 20	Checked by	Deirdre	Walsh	Diamage
Innovyze		Network 20	18.1.1		•
Area	Summary	for Site 2	: Catchm	ent 1	
Dies DIM		100 C	T	Dies Batal	
Number Type	e Name (3	hr Gross	Area (ha)	(ha)	
		., ,,		·,	
1.000 -		75 0.178	0.134	0.134	
1.001		75 0.000	0.001	0.000	
1.003		75 0.000	0.000	0.000	
1.004 -		75 0.078	0.059	0.059	
2.000 -		75 0.025	0.019	0.019	
3.000 -		75 0.083	0.062	0.062	
3.001 -	-	75 0.028	0.021	0.021	
2.001		75 0.000	0.000	0.000	
1.005		75 0.000	0.000	0.000	
4.000 -		75 0.095	0.071	0.071	
1.006 -		75 0.190	0.143	0.143	
1.007 -	-	75 0.000	0.000	0.000	
5.000 -		75 0.062	0.047	0.047	
5.001 -		75 0.010	0.008	0.008	
1.000		75 0.170	0.126	0.128	
1.010	_	75 0.073	0.055	0.055	
1.011 -	-	75 0.210	0.158	0.158	
1.012 -	-	75 0.000	0.000	0.000	
1.013 -	-	75 0.000	0.000	0.000	
		Total	Total	Total	
		1.343	1.007	1.007	
Free Flowing (Outfall	Details for	r Site 2	· Catchment 1	
Outfall (Dutfall C	. Level I. Le	evel Min	D,L W	
Pipe Number	Name	(m) (m) I.Lev	el (mm) (mm)	
			(m)		
1.013	SA00	72.400 70.	.888 0.0	00 200 0	
Simulatio	n Crite	ria for Sit	e 2 : Cat	tchment 1	
Value a la companya de la companya d	e Conte a	940 9444		A set manual an	
Areal Reduction	Factor 1	Addit	ADD Factor	 * 10m³/ba Stora 	ae 2.000
Hot Start	(mins)	0		Inlet Coeffiecie	nt 0.800
Hot Start Lev	el (mm)	0 Flow pe	r Person pe	er Day (l/per/da	y) 0.000
Manhole Headloss Coeff (Global) (0.500	_	Run Time (min	s) 60
Foul Sewage per hectar	e (1/s) (0.000	Outpu	ut Interval (min	s) 1
Number of Incut	t Hydrogra	aphs 0 Number	of Stores	e Structures 1	
Number of Onl	line Cont:	rols 1 Number	of Time/A	rea Diagrams O	
Number of Offi	line Cont:	rols 0 Number	of Real T	ime Controls 0	
	Synthet.	ic Rainfall	. Details		
	@199	2-2018 Tpp	ovvze		
	0200				

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DBFL Consulting Engineers		Page 8
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micro
Date 04/10/2021 14:50	Designed by Grant Humphrey	Drainage
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage
Innovyze	Network 2018.1.1	4
Synthet	ic Rainfall Details	
Rainfall Model	FSR Profile Type Wi	inter
Region Scotla	nd and Ireland Cv (Winter) (0.840
M5-60 (mm)	16.200 Storm Duration (mins)	30
Ratio R	0.272	
010	82-2018 Tanouure	
(619)	oz-zoro runovyze	

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DBFL Consulting Engineers		Page 9
Ormond House	Hollystown	
Upper Ormond Quay	-	
Dublin 7		Micro
Date 04/10/2021 14:50	Designed by Grant Hum	phrey
File Network Site 2 and 3 20	Checked by Deirdre Wa	lsh Urainage
Innovyze	Network 2018.1.1	
-		
Online Control	s for Site 2 : Catchme	nt 1
Hydro-Brake© Optimum Manhol	e: BASIN, DS/PN: 1.013	, Volume (m³): 3.8
Unit	; Reference MD-SHE-0091-360 m Head (m)	0 920
Design	Flow (1/s)	3.6
-	Flush-Flo ⁿ	Calculated
	Objective Minimise upstr	eam storage
2 R	Application Available	Jurrace Yes
Di	umeter (mm)	91
Invert	Level (m)	70.889
Minimum Outlet Pipe Di;	ameter (mm)	150
Suggested Manhole Di:	ameter (mm)	1200
Control Po	ints Head (m) Flow (1/s)
Design Point (C	alculated) 0.920	3.6
	Flush-Flo ^{ss} 0.271	3.6
	Kick-Flo® 0.584	2.9
Mean Flow over	Head Range -	3.1
The hydrological calculations have b	een based on the Head/Disc	harge relationship for the
Hydro-Brake® Optimum as specified.	Should another type of con	trol device other than a
Hydro-Brake Optimum® be utilised the	en these storage routing ca	lculations will be
invalidated		
Depth (m) Flow (1/s) Depth (m) Flo	w (l/s) Depth (m) Flow (l/	s) Depth (m) Flow (1/s)
0 100 2 9 1 200	4 1 3 000 6	2 7 000 9 2
0.200 3.5 1.400	4.4 3.500 6	.7 7.500 9.6
0.300 3.6 1.600	4.6 4.000 7	.1 8.000 9.9
0.400 3.5 1.800	4.9 4.500 7	.6 8.500 10.2
0.500 3.3 2.000	5.2 5.000 7	.9 9.000 10.5
0.600 3.0 2.200	5.4 5.500 8	.3 9.500 10.8
1.000 3.7 2.600	5.8 6.500 9	.0
(P) 9	82-2018 Innouve	
017	JE LOID IMMOVYZE	

Site 2: Catchment Area 2

Surface Water Network

Impermeability Factor (%): 48.8

DBFL Consulting Engineers		Page 1								
Ormond House	Hollystown									
Upper Ormond Quay										
Dublin 7		Micco								
Date 04/10/2021 14:53	Designed by Grant Humphrey	Desinado								
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Drainage								
Innovyze	Network 2018.1.1									
STORM SEWER DESIGN	by the Modified Rational Method									
Design Criteria for Site 2 : Catchment 2										
Pipe Sizes STA	NDARD Manhole Sizes STANDARD									
FSR Rainfall)	Nodel - Scotland and Ireland									
Return Period (years)	2 PI	MP(%) 75								
Ratio R	0.272 Minimum Backdrop Heid	ge (≼) 0.200								
Maximum Rainfall (mm/hr)	100 Maximum Backdrop Heigi	ht (m) 1.500								
Maximum Time of Concentration (mins)	30 Min Design Depth for Optimisati	on (m) 1.200								
Foul Sewage (1/s/ha)	0.000 Min Vel for Auto Design only 1.000 Min Slove for Optimisation	(m/s) 1.00 (1-X) 500								
volumebric Ranori Coerr.	1.000 Min biope for oppimiseoion	(21.11) 0000								
Designe	ed with Level Soffits									
Time Area Diagram for Site 2	: Catchment 2 at outfall SCO (pig	e 8.004)								
Time	Area Time Area									
(mins)	(ha) (mins) (ha)									
0-4	0.276 4-8 0.129									
Total Area	Contributing (ha) = 0.405									
Total Pi	pe Volume (m³) = 7.638									
Time Area Diagram	a at outfall SBO (pipe 9.012)									
Time Area (mins) (ha)	Time Area Time Area (mins) (ha) (mins) (ha)									
0-4 1.442	4-8 1.982 8-12 0.354									
Total Area	Contributing (ha) = 3.778									
Republic Res	Values (ml) = 06 065									
lotal Fij	Se volume (m*) = 90.905									
<u>Network Design Ta</u>	able for Site 2 : Catchment 2									
‡ - Indicates pipe	length does not match coordinates									
PN Length Fall Slope I.Area T.E. (m) (m) (1:X) (ha) (mins	Base k HYD DIA Section Ty) Flow (1/s) (mm) SECT (mm)	pe Auto Design								
Netwo	ork Results Table									
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DBFL Co	meul	ting	Engine	are							Dar	1 0 3
Ormand	Vene		angane		He.	llustown					ray	10.0
Ummen (nous	-			no.	LIYSCOWN						
upper c	/rmon	a yua	Y									
Dublin	7										Mi	cro
Date 04	4/10/	2021	14:53		Des	signed by	Grant	: Hump	phre	Y	Dr	ainano
File Ne	etwor	k Sit	e 2 an	id 3 20.	Ch	ecked by I)eirdr	e Wal	lsh			annage
Innovyz	e				Net	twork 2018	3.1.1				_	
		N	[etwor]	k Design	n Table	e for Site	2 :	Catch	ment	5 2		
		-										
PN	Lengt	h Fal	1 Slop	e I.Area	T.E.	Base	k	HYD	DIA	Secti	on Typ	e Auto
	(m)	(m)	(1:X) (ha)	(mins)	Flow (1/s)	(mm)	SECT	(mm)			Design
0.000	22.02		10.170		4 00		0 600	-	2.25	Dime	Caralita	
8 001	2 3.02	SB 0.14	21 170.	0 0.000	0.00	0.0	0.600		225	Pipe/	Condui	- <u>-</u>
8,002	74.29	2 0.4	37 170.	0 0.071	0.00	0.0	0.600	š	225	Pipe/	Condui	
8.003	45.86	52 0.18	37 245.	0 0.199	0.00	0.0	0.600		300	Pipe/	Condui	
8.004	5.00	0.02	28 178.	6 0.000	0.00	0.0	0.600	0	300	Pipe/	Condui	5 🚺
												-
9.000	64.49	95 0.31	79 170.	2 0.170	4.00	0.0	0.600	•	225	Pipe/	Conduit	t 💣
9.001	9.76	51 0.03	30 325.	0 0.257	0.00	0.0	0.600	0	375	Pipe/	Condui	t 🔮
9.002	68.24	4 0.21	10 325.	0 0.083	0.00	0.0	0.600	•	375	Pipe/	Condui	÷ و ا
9.003	12.50	12 0.08	0 248.	2 0.173	0.00	0.0	0.600	•	375	Fipe/	Condui	5 🔮
10,000	28.14	7 0 24	4 170	0 0 000	4 00	0.0	0.600	-	225	Dine	Conduct	- <u>-</u>
10.000	00.15			0.000	4.00	0.0	5.800		220	ripe/	condul	- U
9,004	69.91	2 0.21	18 320.	7 0.029	0.00	0.0	0.600	•	375	Pipe/	Condui	t 🛷
9.005	5.27	78 0.01	16 329.	9 0.000	0.00	0.0	0.600		375	Pipe/	Condui	
9.006	79.04	0 1.22	28 64.	4 0.173	0.00	0.0	0.600	0	375	Pipe/	Condui	= 💑 -
												-
11.000	18.72	20 0.12	22 153.	4 0.108	4.00	0.0	0.600	•	225	Pipe/	Condui	ະ 🗗
9.007	72.92	24 0.33	36 217.	3 0.099	0.00	0.0	0.600	•	450	Pipe/	Condui	t 🗗
12 000	64 60	12 0 20	170	0 0 021	4 00	0.0	0 600	-	225	Dine	Conduit	
12.000	04.00	12 0.30	50 170.	0 0.031	4.00	0.0	0.000		220	Fipe/	Condui	
				Ne	twork	Deculte T	able					
PN	I I	Rain	T.C.	US/IL E	I.Area	Σ Base	Foul	Add 1	low	Vel	Сар	Flow
	(m	m/hr)	(mins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/	s)	(m/s)	(1/s)	(1/s)
8.0	00	50.69	4.40	70.720	0.000	0.0	0.0		0.0	1.00	39.7	0.0
8.0	01	50.46	4.46	70.580	0.034	0.0	0.0		0.0	1.00	39.8	0.1
8.0	02	40.11	5.70	70.559	0.105	0.0	0.0		0.0	1.00	39.8	48.3
8.0	04	42 66	6.52	69.860	0.304	0.0	0.0		0.0	1 17	82 0	48 1
			0.00		0.001	0.0	0.0		0.0			
9.0	00	48.16	5.08	72.975	0.170	0.0	0.0		0.0	1.00	39.7	29.5
9.0	01	47.60	5.24	72.446	0.427	0.0	0.0		0.0	1.00	110.4	73.4
9.0	02	44.09	6.38	72.416	0.509	0.0	0.0		0.0	1.00	110.4	81.1
9.0	03	43.59	6.56	72.206	0.682	0.0	0.0		0.0	1.15	126.5	107.3
10.0	00	49.76	4.64	72.530	0.000	0.0	0.0		0.0	1.00	39.8	0.0
	0.4	40 70		72 154	0.710				0.0	1 . 01		107.0
9.0	05	40.70	7.92	71 028	0.710	0.0	0.0		0.0	0.90	100 6	107.3
9.0	06	39.22	8.29	71.922	0.882	0.0	0.0		0.0	2.26	249 B	125.0
						0.0	0.0					
11.0	00	51.10	4.30	70.966	0.108	0.0	0.0		0.0	1.05	41.9	19.9
9.0	07	37.49	9.27	70.619	1.090	0.0	0.0		0.0	1.38	218.7	147.5
12.0	00	48.16	5.08	71.630	0.031	0.0	0.0		0.0	1.00	39.8	5.3
				6	91982-2	2018 Innov	yze					

DDDT C-											Dee	
DRET CO	nsulti	Ing E	ngine	ers							Pag	e 4
Ormond	House				Hol	llystown						
Upper O	rmond	Quay										
Dublin	7										1.41	
Date 04		121 1/	4 - 5 2		Dec	igned by	Grant	United	ahrai			uu –
Date 04	/10/20	21 1.	1.55		Des	signed by	Grant	, ritang	onre:	Y	Dra	ainade
File Ne	twork	Site	2 an	d 3 20.	Che	ecked by I	eirdr)	e Wa.	lsh			
Innovyz	e				Net	twork 2018	1.1.1					
		Ne	twork	c Design	Table	for Site	2 :	Catch	ment	: 2		
PN	Length	Fall	Slope	e I.Area	T.E.	Base	k	HYD	DIA	Secti	on Type	Auto
	(m)	(m)	(1:X) (ha)	(mins)	Flow (1/s)	(mm)	SECT	(mm)			Design
												_
12.001	66.614	0.272	245.0	0 0.308	0.00	0.0	0.600	•	300	Pipe/	Conduit	· و ا
12.002	8.468	0.035	245.0	0 0.236	0.00	0.0	0.600	•	375	Pipe/	Conduit	· 🖉
12,000	42 662	0 222	114	0 160	4 00		0 600	-	225	Dime		
12.000	12 208	0.372	170.0	0.109	4.00	0.0	0.600	ŝ	220	Pipe/	Conduit	<u>y</u>
10.001	12.050	0.078	170.0	0.000	0.00	0.0	0.000		220	ripe/	conduit	• •
12.003	5.381	0.054	99	6 0.000	0.00	0.0	0.600		375	Pipe/	Conduit	
								-				
9.008	56.403	0.113	500.0	0.202	0.00	0.0	0.600	•	600	Pipe/	Conduit	· •
9.009	18.059	0.060	301.0	0.184	0.00	0.0	0.600		600	Pipe/	Conduit	· 7
												-
14.000	51.877	0.305	170.3	1 0.100	4.00	0.0	0.600	•	225	Pipe/	Conduit	÷ 🖑
14.001	33.040	0.135	245.0	0 0.161	0.00	0.0	0.600	•	300	Pipe/	Conduit	÷ 🖑
14.002	80.547	0.329	245.0	0 0.137	0.00	0.0	0.600	•	300	Pipe/	Conduit	÷ 🖑
14.003	6.600	0.020	325.0	0 0.124	0.00	0.0	0.600	0	375	Pipe/	Conduit	° 🖑
										.		-
9.010	7.540#	0.015	502.	7 0.094	0.00	0.0	0.600	•	675	Pipe/	Conduit	, a di a d
9.011	12 699	0.008	400	5 0.000	0.00	0.0	0.600	°.	750	Pipe/	Conduit	<u> </u>
9.012	12.900	0.026	199.0	5 0.000	0.00	0.0	0.000		/30	Fipe/	Conduit	· •
				Me	tuork	Decults T	abla					
				INC.	OWDIA	Results 1	abie					
PN	Rat	in 1	r c	US/IL E	І. Атеа	E Base	Foul	Add 1	low	Ve1	Cap	Flow
-	(mm/	hт) (т	nins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/	s)	(m/s)	(1/s)	(1/s)
			,						- /			
12.0	01 44	.63	6.19	71.175	0.338	0.0	0.0		0.0	1.00	70.7	54.5
12.0	02 44	.28	6.31	70.828	0.575	0.0	0.0		0.0	1.15	127.4	91.9
13.0	00 49	.98	4.58	71.007	0.169	0.0	0.0		0.0	1.22	48.6	30.5
13.0	01 49	.20	4.79	70.635	0.169	0.0	0.0		0.0	1.00	39.8	30.5
12.0	00 44	14	6 96	20 412	0.740					1 00	200 5	110 5
12.0	03 11	.14	0.30	/0.412	0.743	0.0	0.0		0.0	1.02	200.5	110.5
9.0	08 25	95 1	0.14	70 122	2 025	0.0	0.0		0.0	1 08	206.0	264 2
9.0	09 35	60 1	10.35	70.020	2.219	0.0	0.0		0.0	1.40	395.4	285.2
14.0	00 48	.91	4.86	71.124	0.100	0.0	0.0		0.0	1.00	39.7	17.6
14.0	01 47	.01	5.42	70.744	0.261	0.0	0.0		0.0	1.00	70.7	44.3
14.0	02 43	.05	6.76	70.609	0.398	0.0	0.0		0.0	1.00	70.7	61.8
14.0	03 42	.76	6.87	70.205	0.521	0.0	0.0		0.0	1.00	110.4	80.5
9.0	10 35	.42 1	10.46	69.885	2.834	0.0	0.0		0.0	1.16	415.9	362.4
9.0	11 35	.30 1	10.54	69.795	2.834	0.0	0.0		0.0	1.14	501.5	362.4
9.0	12 35	.03 1	10.71	69.787	2.834	0.0	0.0		0.0	1.25	550.1	362.4

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DBFL (Consult	ting E		Page 5								
Ormone	d House	5			Holl	lystowr	1					
Upper	Ormone	i Quay	7									
Dublin	n 7									Mirrn		
Date (04/10/2	2021 1	14:53	3	Desi	igned k	oy Grant	Humphrey	7	Drainar	ar	
File 1	Network	k Site	e 2 a	and 3 20) Cheo	ked by	7 Deirdre	Walsh		Digitiq	JC_	
Innovy	yze				Net	work 20	018.1.1					
			Manh	ole Sch	edules f	or Site	e 2 : Cat	chment 2	2			
		I	ı		ı			1				
MH	MH CT. (=)	MH Denth	C	MH	MH Diem L+W	DM	Pipe Out	Dienster	DM	Pipes In	Dienster	Beakdron
average.	C2 (11)	(m)	001	neccion	(mm)		Level (m)	(mm)		Level (m)	(mm)	(mm)
304	72 007	1 287	Onen	Manhole	1200	8 000	70 720	225				Τ
802	72 260	1 680	Onen	Manhole	1200	8 001	70.580	225	8 000	70 580	225	
3C2	72.310	1.751	Open	Manhole	1200	8.002	70.559	225	8.001	70.559	225	
SC1	71.485	1.438	Open	Manhole	1200	8.003	70.047	300	8.002	70.122	225	
BASIN1	71.400	1.540	Open	Manhole	1200	8.004	69.860	300	8.003	69.860	300	
SCO	70.911	1.079	Open	Manhole	1200		OUTFALL		8.004	69.832	300	
SB11	74.385	1.410	Open	Manhole	1200	9.000	72.975	225				
SB10	74.096	1.650	Open	Manhole	1350	9.001	72.446	375	9.000	72.596	225	i
SB9	73.909	1.493	Open	Manhole	1350	9.002	72.416	375	9.001	72.416	375	i
SB8	73.405	1.199	Open	Manhole	1350	9.003	72.206	375	9.002	72.206	375	i
SB8-1	73.259	0.729	Open	Manhole	1200	10.000	72.530	225				
SB7	73.491	1.336	Open	Manhole	1350	9.004	72.156	375	9.003	72.156	375	5
									10.000	72.306	225	i i
SB6	73.576	1.638	Open	Manhole	1350	9.005	71.938	375	9.004	71.938	375	5
SB5	73.615	1.693	Open	Manhole	1350	9.006	71.922	375	9.005	71.922	375	i
SB4-1	72.391	1.425	Open	Manhole	1200	11.000	70.966	225				
SB4	72.542	1.923	Open	Manhole	1350	9.007	70.619	450	9.006	70.694	375	i
									11.000	70.844	225	i -
SB3-6	73.055	1.425	Open	Manhole	1200	12.000	71.630	225				
SB3-5	73.033	1.858	Open	Manhole	1200	12.001	71.175	300	12.000	71.250	225)
SB3-4	72.345	1.517	Open	Manhole	1350	12.002	70.828	375	12.001	70.903	300)
383-3	72.432	1.425	Open	Manhole	1200	13.000	71.007	225	10.000			
383-2	72.254	1.619	Open	Manhole	1200	13.001	70.635	225	13.000	70.635	225	
583-1	72.307	1.695	Open	Manhole	1350	12.003	70.412	375	12.002	70.794	375	381
920	72 247	2 114	0	Manhala	1500	0.000	70,100	600	0.007	70.302	450	1
353	12.241	2.114	open	Hannoite	1000	5.000	/0.100	600	12 002	70.208	275	<u></u>
3B2	71 426	1 406	Onen	Manhole	1500	9.009	70 020	600	9 008	70.020	600	
SB1-5	72.442	1.218	Open	Manhole	1200	14.000	71.124	225	2.000	101020		`
SB1-4	72.058	1.314	Open	Manhole	1200	14.001	70.744	300	14.000	70.819	225	
SB1-3	72.030	1.421	Open	Manhole	1200	14.002	70,609	300	14.001	70,609	300	
SB1-2	71.362	1.156	Open	Manhole	1350	14.003	70.205	375	14.002	70.280	300	5
SB1	71.282	1.397	Open	Manhole	1500	9.010	69.885	675	9.009	69.960	600	0
									14.003	70.185	375	i
SBO	71.409	1.614	Open	Manhole	1800	9.011	69.795	750	9.010	69.870	675	i
BASIN	71.400	1.613	Open	Manhole	1800	9.012	69.787	750	9.011	69.787	750)
SBO	71.000	1.239	Open	Manhole	1500		OUTFALL		9.012	69.761	750)
		•			1				•			
<u> </u>					©1982-20	18 Tpp	ovvze					

DBFL Consul	ting l	Engine	eers							Page 6			
Ormond Hous	e				Hollysto	own							
Upper Ormon	d Qua	Y											
Dublin 7										Micro			
Date 04/10/	2021	14:53			Designed	d by Gra	ant l	Humphre	y	Desinar			
File Networ	k Site	e 2 az	nd 3 2	0	Checked	by Dei	rdre	Walsh	-	Uldiildi	ye		
Innovvze					Network	2018.1	.1				_		
		PIPEL	INE SC	HEDUL	ES for S	Site 2 :	Cat	chment	2				
Upstream Manhole													
# - Indicates nine length does not watch coordinates													
# - Indicates pipe length does not match coordinates													
PN Hyd Diam MH C.Level I.Level D.Depth MH MH DIAM., L*W													
	Sect	(mm)	Name	(m)	(m)	(m)	Con	nection	(100	., <u>ມ</u> ິສ			
8.00	0 0	225	SC4	72.007	70.720	1.062	Open	Manhole		1200			
8.00	1 0	225	SC3	72.260	70.580	1.455	Open	Manhole		1200			
8.00	20	225	SC2 8C1	72.310	70.559	1.526	Open	Manhole		1200			
8.00	a 0 4 0	200 7	RASTNI	71 400	69 860	1 240	Open	Manhole		1200			
0.00							open						
9.00	0 o	225	SB11	74.385	72.975	1.185	Open	Manhole		1200			
9.00	1 0	375	SB10	74.096	72.446	1.275	Open	Manhole		1350			
9.00	2 0	375	SB9	73.909	72.416	1.118	Open	Manhole		1350			
9.00	3 0	375	SB8	73.405	72.206	0.824	Open	Manhole		1350			
10.00		225	SB8-1	73.259	72.530	0.504	Open	Manhole		1200			
9.00	4 o	375	SB7	73.491	72.156	0.961	Open	Manhole		1350			
9.00	5 0	375	SB6	73.576	71.938	1.263	Open	Manhole		1350			
9.00	6 0	375	385	73.615	71.922	1.318	Open	Manhole		1350			
11.00	0 0	225	3B4-1	72.391	70.966	1.200	Open	Manhole		1200			
							•						
				Down	stream]	Manhole							
DM	Length	Slope	MH	C. Leve	-1 T T	1 D Dent	2	ME	ИН ПТА	м т.+W			
	(m)	(1:X)	Name	(m)	(m)	(m)		nnection		an., 2 mn)			
8.000	23.825	170.2	SCa	72.2	60 70.58	0 1.45	5 Ope	n Manhol	e	1200			
8.001	3.568	170.0	SC2	72.3	10 70.55	9 1.52	6 Ope	n Manhol	e	1200			
8.002	74.292	170.0	SCI	. 71.4	85 70.12	2 1.13	8 Ope	n Manhol	-	1200			
8.003	45.002	245.0	DASINI	71.4	00 09.00	0 1.24	o ope	n Manhol	-	1200			
0.004	5.000	1/0.0	act	/0.9	11 09.03	2 0.77	s ope	n Mannol	-	1200			
9.000	64.495	170.2	SB10	74.0	96 72.59	6 1.27	5 Ope	n Manhol	e	1350			
9.001	9.761	325.0	SBS	73.9	09 72.41	6 1.11	8 Ope	n Manhol	e	1350			
9.002	68.244	325.0	SB6	73.4	05 72.20	6 0.82	4 Ope	n Manhol	e	1350			
9.003	12.502	248.2	SB7	73.4	91 72.15	6 0.96	1 Ope	n Manhol	e	1350			
10,000	28 147	170.0	0.01	72.4	01 72 20	e 0.0e	1 0	- Manhal		1250			
10.000	30.14/	170.0	201	/3.1	51 12.30	0.30	1 ope	a Mannol	-	1990			
9.004	69.912	320.7	SB6	5 73.5	76 71.93	8 1.26	3 Ope	n Manhol	e .	1350			
9.005	5.278	329.9	SBS	73.6	15 71.92	2 1.31	8 Ope	n Manhol	e	1350			
9.006	79.040	64.4	SB4	72.5	42 70.69	4 1.47	3 Ope	n Manhol	e	1350			
11,000	18 790	152.4			42 70 84	4 1 45	2 0-	m Manhal		1950			
11.000	10.720	106.4	201	12.5	12 /0.04	- 1.4/	a ope	mannol	-	1300			
				0100	0.0010.7								
				001983	z=2018 T	nnovvze							

DBFL Consulting Engineers Dage 7											
Ormand Neuro	ing is	ang 110			Vellusta			raye /	_		
Urmond House	~····				HOILYSU	JWII					
Upper Ormond	Quay										
Dublin 7								Micro			
Date 04/10/20	021 1	4:53			Designed	i by Gr	ant Humphre	y Drainar	D		
File Network	Site	e 2 a:	nd 3 2	20	Checked	by Dei	rdre Walsh	Diamaç	JC.		
Innovyze					Network	2018.1	.1				
	2										
	-							_			
				Ups	stream Ma	anhole					
PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	ME	MH DIAM., L*W			
	Sect	(mm)	Nane	(m)	(m)	(m)	Connection	(mm)			
9.007		450	984	72 542	70 610	1 472	Onen Manhala	1250			
9.007	•	430	201	12.042	/0.019	1.4/3	open Manhole	1350			
12.000	•	225	SB3-6	73.055	71.630	1.200	Open Manhole	1200			
12.001	0	300	SB3-5	73.033	71.175	1.558	Open Manhole	1200			
12.002	0	375	SB3-4	72.345	70.828	1.142	Open Manhole	1350			
13.000	•	225	SB3-3	72.432	71.007	1.200	Open Manhole	1200			
13.001	0	225	SB3-2	72.254	70.635	1.394	Open Manhole	1200			
12.003	•	375	SB3-1	72.307	70.412	1.520	Open Manhole	1350			
9 008	~	600	982	72 247	70 122	1 514	Open Manhole	1500			
9,009	š	600	SB2	71.426	70.020	0.806	Open Manhole	1500			
	-										
14.000	•	225	SB1-5	72.442	71.124	1.093	Open Manhole	1200			
14.001	0	300	SB1-4	72.058	70.744	1.014	Open Manhole	1200			
14.002	0	300	SB1-3	72.030	70.609	1.121	Open Manhole	1200			
14.003	•	375	SB1-2	71.362	70.205	0.781	Open Manhole	1350			
			_								
9.010	•	675	3B1	71.282	69.885	0.722	Open Manhole	1500			
9.011	•	750	SBO	71.409	69.795	0.864	Open Manhole	1800			
				Dowr	nstream l	Manhole	<u>.</u>				
PN L	ength ()	Slope	e Min	C. Leve	<pre>L 1.Level (-)</pre>	L D.Dept	n ma	ME DIAM., L*W			
	(m)	(1:A)	Nome	(m)	(m)	(m)	Connection	(mm)			
9.007 7	2.924	217.3	SB3	72.24	17 70.283	1.51	4 Open Manhole	1500			
							-				
12.000 6	4.602	170.0) SB3-5	5 73.03	33 71.250	1.55	8 Open Manhole	1200			
12.001 6	6.614	245.0) SB3-4	72.34	15 70.903	3 1.14	2 Open Manhole	1350			
12.002	8.468	245.0	3B3-1	72.30	07 70.794	1.13	8 Open Manhole	1350			
12 000 4	2 552	114			4 70 605	1 00	4 Onen Manhall	1200			
12 001 1	2.352	170.0	1 SB2-1	72.23	17 70 563	2 1.39	- open Mannole 0 Open Manhole	1200			
10.001 1	2.050	270.0				1.02	e open mennote	1000			
12.003	5.381	99.6	5 SB3	72.24	47 70.358	1.51	4 Open Manhole	. 1500			
9.008 5	6.403	500.0) SB2	71.42	26 70.020	0.80	6 Open Manhole	e 1500			
9.009 1	8.059	301.0) SB1	71.28	69.960	0.72	2 Open Manhole	1500			
14.000 5	1.877	170.1	1 SB1-4	72.03	58 70.819	1.01	4 Open Manhole	1200			
14.001 3	3.040	245.0) SB1-3	72.03	30 70.609	1.12	1 Open Manhole	1200			
14.002 8	0.547	245.0	SB1-2	71.30	52 70.280	0.78	1 Open Manhole	1350			
14.003	6.600	325.0	J 3B1	71.28	52 70.185	0.72	2 Open Manhole	1500			
0.010.7	5404	502.5		71.44	10 60 974	0.00	4 Onen Manhal	1900			
9.010 7	000#	600 0	, 300 1 BASTN	71 40	10 60 785	7 0.00	3 Open Manhold 3 Open Manhold	1800			
5.011 0							o open mennore				
				©198	2-2018 I	nnovyze	e				

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DBFL Consulting Engineers		Page 8
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Mirro
Date 04/10/2021 14:53	Designed by Grant Humphrey	Drainage
File Network Site 2 and 3 20	Checked by Deirdre Walsh	bidinidge.
Innovyze	Network 2018.1.1	
PIPELINE SCHEDUI	ES for Site 2 : Catchment 2	
Up	stream Manhole	
PN Hyd Diam MH C.Level	I.Level D.Depth MH MH DIAM.	, L*W
9.012 o 750 BASIN 71.400	(m) (m) Connection (mm) 69.787 0.863 Open Manhole	1800
Dow	nstream Manhole	
PN Length Slope MH C.Leve (m) (1:X) Name (m)	1 I.Level D.Depth MH MH DIAM (m) (m) Connection (mm	., L*W 1)
9.012 12.988 499.5 SB0 71.00	0 69.761 0.489 Open Manhole	1500
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DBFL Consulting Engineers		Page 9
Ormond House	Hollystown	
Upper Ormond Quay	-	
Dublin 7		Micco
Date 04/10/2021 14:53	Designed by Grant Humphrey	
File Network Site 2 and 3 20.	Checked by Deirdre Walsh	urainage
Innovvze	Network 2018.1.1	
Area Summary	for Site 2 : Catchment 2	
Pipe PIMP PIMP F	IMP Gross Imp. Pipe Total	
Number Type Name	(%) Area (ha) Area (ha) (ha)	
8.000	75 0.000 0.000 0.000	
8.001	75 0.045 0.034 0.034	
8.002	75 0.095 0.071 0.071	
8.004	75 0.000 0.000 0.000	
9.000	75 0.226 0.170 0.170	
9.001	75 0.343 0.257 0.257	
9.002	75 0.110 0.083 0.083	
9.003	75 0.230 0.173 0.173	
9 004	75 0.028 0.029 0.029	
9.005	75 0.000 0.000 0.000	
9.006	75 0.230 0.173 0.173	
11.000	75 0.144 0.108 0.108	
9.007	75 0.132 0.099 0.099	
12.000	75 0.041 0.031 0.031	
12.001	75 0.410 0.308 0.308	
13.000	75 0.225 0.169 0.169	
13.001	75 0.000 0.000 0.000	
12.003	75 0.000 0.000 0.000	
9.008	75 0.269 0.202 0.202	
9.009	75 0.245 0.104 0.104	
14.000	75 0.215 0.161 0.161	
14.002	75 0.182 0.137 0.137	
14.003	75 0.165 0.124 0.124	
9.010	75 0.125 0.094 0.094	
9.011	75 0.000 0.000 0.000	
9.012	Total Total Total	
	4.183 3.137 3.137	
Free Flowing Outfall	Details for Site 2 : Catchment 2	
Dutrall Outrall Ding Number Name	(m) (m) T Level (mm) (mm)	
ripe number name	(m) (m) I. DEVEL (mm) (mm)	
	·	
8.004 SC0	70.911 69.832 69.503 1200 0	
Free Flowing Outfall	Details for Site 2 - Catchment 2	
rice riowing outland	. Secaris for Sive 2 . Catchellent 2	
Outfall Outfall	C. Level I. Level Min D.L W	
Pipe Number Name	(m) (m) I. Level (mm) (mm)	
	(m)	
9 012 SB0	71,000 69,761 71 500 1500 0	
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DBFL Consulting Engineers		Page 10
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micro
Date 04/10/2021 14:53	Designed by Grant Humphrey	Drainago
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage
Innovyze	Network 2018.1.1	4
Simulation Crite	ria for Site 2 : Catchment 2	
Volumetrie Russff Coaff (1940 Idditional Flow - & of Total Fl	
Areal Reduction Factor 1	1.000 MADD Factor * 10m ³ /ha Stora	ge 2.000
Hot Start (mins)	0 Inlet Coeffiecie	nt 0.800
Hot Start Level (mm)	0 Flow per Person per Day (1/per/da	y) 0.000
Manhole Headloss Coeff (Global) (Foul Service per bestare (1/s) (0.500 Run Time (min 0.000 Output Interval (min	s) 60 •)]
roui sewage per nectare (1/s) (5.000 Output Interval (Min	5) 1
Number of Input Hydrogr	aphs 0 Number of Storage Structures 2	
Number of Online Cont	rols 2 Number of Time/Area Diagrams 0	
Number of Offline Cont	rols 0 Number of Real Time Controls 0	
Sunthat	ic Rainfall Details	
Synthet	at maintait PEVALLS	
Rainfall Model	FSR Profile Type Wi	nter
Return Period (years)	2 Cv (Summer) 0	.750
Region Scotlas MS-60 (mm)	nd and Ireland Cv (Winter) (20
Ratio R	0.272	30
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DBFL Consulting E	ngineers					Page 11				
Ormond House		Hollysto	wn							
Upper Ormond Ouav										
Dublin 7										
Date 04/10/2021 1/	1.52	Decimped	ber Cross	+ Uumphr		MICLO				
File Network Site	2.00	Charles	by Gran	ic Humphi due Meleb	eγ	Drainage				
Tile Network Site	2 and 3 20	Meteral	2010 1 1	ile waish						
Innovyze		Network	2018.1.1							
Hydro-Brake® (Online Control Optimum Manhole	s for Sit : BASIN1,	DS/PN:	atchment 8.004, V	<u>2</u> olume (m	³): 4.9				
	Unit	Reference	MD-SHE-0	142-9400-10	000-9400					
	Desig	n Head (m)			1.000					
	Design	Flush-Flor		Cal	2.3 culated					
		Objective	Minimis	e upstream	storage					
	Α	pplication		-	Surface					
	Sump	Available			Yes					
	Dia	meter (mm)			142					
Minim	invert m Outlet Pine Dia	Level (m)			225					
Sug	gested Manhole Dia	meter (nm)			1200					
	Control Po	ints	Head (m)	Flow (1/s)						
	Design Point (Ca	alculated)	1.000	9.4						
	E	flush-Flos	0.302	9.4						
	Mana El au aura 1	Kick-Flo®	0.672	7.8						
	Mean flow over f	iead Kange	-	0.1						
The hydrological ca	alculations have b	een based	on the He	ad/Discharg	e relation	nship for the				
Hydro-Brake® Optim	um as specified.	Should ano	ther type	of control	device o	ther than a				
Hydro-Brake Optimur	n® be utilised the	n these st	orage rou	ting calcul	ations wi	11 be				
invalidated										
Depth (m) Flow (1/	s) Depth (m) Flow	(1/s) Dep	th (m) Fl	low (1/s) [epth (m)	Flow (1/s)				
		10.0		15.0						
0.100 3	1 1 400	11.0	2.500	15.0	7.000	23.7				
0.300	9.4 1.600	11.7	4.000	18.1	8.000	25.3				
0.400 9	9.3 1.800	12.4	4.500	19.2	8.500	26.1				
0.500 9	2.000	13.0	5.000	20.2	9.000	26.8				
0.600 8	3.6 2.200	13.6	5.500	21.1	9.500	27.5				
0.800 8	3.5 2.400	14.2	6.000	22.0						
1.000 9	9.4 2.600	14.8	6.500	22.9						
Hudro-Brake®	Optimum Manhole	- BASTN	DS/DN-	9 012 W	ວໄນຫລ (ຫ					
nydro Brakeo	opolindar Haimolt	e. bhoin,	20/24.	J.012, V	or came (m	7. 0.0				
	Unit	Reference	MD-SHE-0	140-9300-10	050-9300					
	Desig	n Head (m)			1.050					
	Design	Flow (1/s)			9.3					
		Flush-Flow	Mininia	Cal	culated					
	A	pplication	Manimi 5	e upscream	Surface					
	Sump	Available			Yes					
	Dia	meter (mm)			140					
Invert Level (m) 69.787										
Minim	um Outlet Pipe Dia	meter (mm)			225					
Sugg	jested Mannole Dia	meter (mm)			1200					
	01.07	2-2010 7								
	@198	52-2018 I:	nnovyze							

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DBFL Consulting Enginee	rs					Page 12
Ormond House		Hollyst	own			
Upper Ormond Quay						
Dublin 7						Micco
Date 04/10/2021 14:53		Designe	d by Gra	nt Humph	rey	Desinago
File Network Site 2 and	3 20	Checked	l by Deir	dre Wals	h	Diamaye
Innovyze		Network	2018.1.	1		
Hydro-Brake® Optimu	um Manhole	e: BASIN	, DS/PN:	9.012, 1	/olume (m	3): 5.5
	Control Po	ints	Head (m)	Flow (1/s)	
Desig	n Point (Ca	alculated)	1.050	9.	3	
_	F	lush-Flo	× 0.317	9.	3	
Vern	Flow over B	Kick-Flog	0.698	7.	7	
mean	llow over n	.eau Kange	-	٥.		
The hydrological calculat	ions have b	een based	on the He	ad/Dischar	rge relatio	nship for the
Hydro-Brake@ Optimum as sy Hydro-Brake Optimum as sy	pecified.	Should an	other type	of contro	ol device o	ther than a
nyaro-brane Optimuma be u invalidated	tillsed the	n these s	corage rou	teing calcu	HACIONS WI	ii De
Depth (m) Flow (1/s) Dep	th (m) Flow	(1/s) D	epth (m) F	low (1/s)	Depth (m)	Flow (1/s)
0.100 5.1	1.200	9.9	3.000	15.3	7.000	22.9
0.200 9.0	1.400	10.6	3.500	16.4	7.500	23.7
0.300 9.3	1.600	11.3	4.000	17.5	8.000	24.4
0.400 9.2	2 000	12.0	5.000	10.5	9,000	25.2
0.600 8.6	2.200	13.2	5.500	20.4	9.500	26.6
0.800 8.2	2.400	13.7	6.000	21.3		
1.000 9.1	2.600	14.3	6.500	22.1		
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Site 3: Catchment Area 1

Surface Water Network

Impermeability Factor (%): 49.4

DBFL Con	Pag	e 1											
Ormond H	ouse			Ho	llystown								
Upper Or	mond Qu	ay									.		
Dublin 7										Mir			
Date 04/	10/2021	14:5	3	De	signed by	Gran	t Hum	phre	Υ	Dr:	inane		
File Net	DIC	mage											
Innovyze													
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 1 Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 PIMP (%) 75 MS-60 (mm) 16.200 Makimum Backdrop Height (m) 0.300 Maximum Rainfall (mm/hr) 100 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.200 Foul Sewage (1/s/ha) 0.000 Min Vel for Auto Design only (m/s) 1.00 Designed with Level Inverts Time Area (mins) (ha)													
	(mins) (ha) 0-4 0.788 4-8 0.932 Total Area Contributing (ha) = 1.720												
					(m)								
		Netwo	rk Desig	yn Tabl	e for Site	e 3 :	Cate	hmen	t 1				
PN Le	ngth Fa (m) (r	11 Slo n) (1:	pe I.Area X) (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	а Туре	Anto Design		
5.000 71	.705 0.2	293 245	.0 0.000	4.00	0.0	0.600	•	300	Pipe/C	onduit	٠		
5.001 12	.000 0.0	37 324	.3 0.113	0.00	0.0	0.600	•	375	Pipe/C	onduit	٥		
6.000 42	.433 0.2	250 169	.7 0.000	4.00	0.0	0.600	۰	225	Pipe/C	onduit			
5.002 20	.386 0.0	063 323	.6 0.011	0.00	0.0	0.600	۰	375	Pipe/C	onduit	٠		
	Network Results Table												
PN	Rain	T.C.	US/IL 1	E I.Area	Σ Base	Foul	Add 1	low	Vel	Cap	Flow		
	(mm/hr)	(mins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/	s)	(m/s) ((l/s) (1/s)		
5.000 5.001	47.75 47.07	5.20	70.560 70.192	0.000	0.0	0.0		0.0	1.00 1.00 1	70.7 10.5	0.0 19.1		
6.000	49.50	4.71	70.555	0.000	0.0	0.0		0.0	1.00	39.8	0.0		
5.002	45.99	5.78	70.155	0.124	0.0	0.0		0.0	1.00 1	10.6	20.5		
				@1000	2010 7								
				@1982-	2018 Innot	vyze							

December 2021

DBFL Co	onsulti	ing Er	nginee	rs							Pag	e 2
Ormond	House				Ho	llystown						
Upper C	Ormond	Quay										- I
Dublin	7										N/II	CCO
Date 04	1/10/20	021 14	1:53		De	signed by	Grant	: Hum	phre	v		LIU
File Ne	twork	Site	2 and	3 20.	Ch	ecked by I	Deirdr	re Wal	lsh	-	Ulo	ainage
Innouve		0200		20.	Ne	twork 2018	1 1 1					
						0.01.1 2010						
		Net	twork	Design	Table	e for Site	3 :	Catch	ment	: 1		
										_		
PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Secti	on Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow (1/s)	(mm)	SECT	(mm)			Design
	14 601		160.0	0.056	4							
7.000	14.901	0.000	109.3	0.056	4.00	0.0	0.600	•	225	Fipe/	Conduit	•
5.003	26.151	0.064	408.6	0.152	0.00	0.0	0.600	0	450	Pipe/	Conduit	
5.004	26.651	0.054	493.5	0.234	0.00	0.0	0.600	0	525	Pipe/	Conduit	: 🧵
											_	
8.000	18.583	0.109	170.5	0.184	4.00	0.0	0.600	°	225	Pipe/	Conduit	2 👖 -
0.001	24.000	0.100	240.7	0.127	0.00	0.0	0.000		300	ripe/	conduit	· •
9.000	23.975	0.141	170.0	0.068	4.00	0.0	0.600	0	225	Pipe/	Conduit	:
9.001	51.663	0.211	244.8	0.049	0.00	0.0	0.600	•	300	Pipe/	Conduit	s 🧯 -
9.002	2.681	0.011	243.7	0.062	0.00	0.0	0.600	•	300	Pipe/	Conduit	s 📋
10.000	27.243	0.160	170.3	0.032	4.00	0.0	0.600		225	Pine/	Conduit	
								-				•
8.002	25.507	0.078	327.0	0.034	0.00	0.0	0.600	•	375	Pipe/	Conduit	s 📋 🗌
8.003	13.203	0.032	412.6	0.129	0.00	0.0	0.600	•	450	Pipe/	Conduit	۰ <u>ا</u>
8.004	49.333	0.120	411.1	0.000	0.00	0.0	0.600	•	450	Pipe/	Conduit	5 <mark>8</mark>
5.005	30.181	0.052	585.0	0.024	0.00	0.0	0.600		600	Pipe/	Conduit	
												-
11.000	15.161	0.097	156.2	0.017	4.00	0.0	0.600	•	225	Pipe/	Conduit	s 📋
				Ne	twork	Deculte T	able					
				110	OWOIA	Nesuros 1	abie					
PN	Rai	in T	.c. 1	US/IL E	I.Area	Σ Base	Foul	Add 1	Flow	Vel	Сар	Flow
	(mm/	hr) (m	ins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/	s)	(m/s)	(1/s)	(1/s)
7.0	00 51	.30	4.25 7	0.330	0.056	0.0	0.0		0.0	1.00	39.8	10.4
5.0	03 44	.68	6.17 7	0.017	0.332	0.0	0.0		0.0	1.00	159.0	53.6
5.0	04 43	.44	6.61 6	9.878	0.566	0.0	0.0		0.0	1.00	216.8	88.8
8.0	00 51	.04	4.31 7	0.475	0.184	0.0	0.0		0.0	1.00	39.7	33.9 55 A
0.0	01 49		4.72 1	0.231	0.311	0.0	0.0		0.0	1.00	10.0	00.4

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 9.000
 50.68
 4.40
 70.629
 0.068
 0.0
 0.0
 0.0
 1.00
 39.8
 12.4

 9.001
 47.52
 5.26
 70.413
 0.116
 0.0
 0.0
 0.0
 1.00
 70.7
 19.9

 9.002
 47.37
 5.31
 70.202
 0.178
 0.0
 0.0
 0.0
 1.00
 70.9
 30.4

 8.002
 45.99
 5.73
 70.116
 0.554
 0.0
 0.0
 0.0
 1.00
 110.1
 92.1

 8.003
 45.32
 5.95
 69.963
 0.683
 0.0
 0.0
 0.0
 0.99
 158.2
 111.8

 8.004
 43.00
 6.78
 69.931
 0.683
 0.0
 0.0
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 1.00
 158.5
 111.8

0.0 0.0

0.0 0.0

0.0 0.0

0.0 1.00 39.7 5.9

0.0 1.00 282.6 191.9

0.0 1.04 41.5 3.1

10.000 50.47 4.45 70.426 0.032

5.005 41.72 7.28 69.749 1.274

11.000 51.32 4.24 70.267 0.017

DBFL (Cons	ult	ing E	ngine	eers								Pa	age 3	3
Ormon	d Ho	use					Ho	llystown							
Upper	Orm	ond	Quay											-	
Dubli	n 7												Ν	lico	
Date	04/1	0/2	021 1	4:53			De	signed by	Grant	t Hum	phre	У			
File 1	Netw	ork	Site	2 a:	nd 3 2	0	Ch	ecked by	Deird	ce Wa	lsh			ЛОШ	aye
Innov	yze						Ne	twork 201	8.1.1						
			Ne	etwor	k Desi	ign Ta	ble	e for Site	a 3 :	Catel	hmen	t 1			
PN	Len	gth	Fall	Slop	e I.Ar	ea T.I	Е.	Base	k	EYD	DIA	Sect	ion Ty	me 1	luto
	(1	1)	(m)	(1:1) (ha) (m1)	ns)	FIOW (1/5)	(mm)	SECT	(mm)			De	esign
5.006	15.	111	0.026	581.	2 0.0	00 0	.00	0.0	0.600	0	600	Pipe,	/Condu	it	
5.007	1.	792	0.001	1792.	4 0.0	00 0	.00	0.0	0.600	•	600	Pipe,	/Condu	it	đ
								Decules (
						NetWo)ľK	Results .	erder						
	PN	Rat	in 1	P.C.	US/IL	E I.A	rea	Σ Base	Foul	Add 1	low	Vel	Сар	Flo	w
		(mm/	hr) (r	nins)	(m)	(ha))	Flow (1/s)	(1/s)	(1/	s)	(m/s)	(1/s)	(1/:	;)
-			1.0									1			
5.	006	41	11	4 05	69.697	1.1	290	5.7	0.0		0.0	0.57	283.0	5 191. 1 5	7
								0.17	0.0						· *
						@1.00	2	2010 7							
						0138	2-4	2018 Inno	vyze						

170182-DBFL-XX-XX-RP-C-007

DBFL (Consult	ting E	Ingin	eers						Page 4			
Ormone	d House	2			Holi	lystown	1						
Upper	Ormone	i Quay	7										
Dublir	n 7									Micro			
Date (04/10/2	2021 1	4:53		Des:	igned k	oy Grant	Humphrey		Desinar	10		
File N	Network	c Site	e 2 a	nd 3 20	Cheo	ked by	Deirdre	Walsh		Digitio	Je j		
Innovy	/ze				Net	ork 20	18.1.1						
			Manh	ole Sch	edules f	or Site	e 3 : Cat	chment 1	<u>.</u>				
		ı			ı								
MH	MH CT (-)	MH		MH	MH Dian I+M	-	Pipe Out	Diamater	-	Pipes In			Beelstere
Name	сь (т)	(m)	Conr	nection	(mm)	20	Level (m)	(mm)	PR	Level (m)	Ulane	iter 1)	(mm)
								,,				·	
SD6	71.610	1.050	Open	Manhole	1200	5.000	70.560	300					
SD5	71.720	1.528	Open	Manhole	1350	5.001	70.192	375	5.000	70.267		300	
SD4-1	71.604	1.049	Open	Manhole	1200	6.000	70.555	225					
SD4	71.500	1.345	Open	Manhole	1350	5.002	70.155	375	5.001	70.155		375	
									6.000	70.305		225	
SD3-1	71.780	1.450	Open	Manhole	1200	7.000	70.330	225					
SD3	71.350	1.333	Open	Manhole	1350	5.003	70.017	450	5.002	70.092		375	
									7.000	70.242		225	
SD2	71.315	1.437	Open	Manhole	1500	5.004	69.878	525	5.003	69.953		450	
SD1-10	71.450	0.975	Open	Manhole	1200	8.000	70.475	225					
SD1-9	71.460	1.169	Open	Manhole	1200	8.001	70.291	300	8.000	70.366		225	
SD1-8	71.960	1.331	Open	Manhole	1200	9.000	70.629	225					
SD1-6	71.814	1.401	Open	Manhole	1200	9.001	70.413	300	9.000	70.488		225	
SD1-5	71.560	1.358	Open	Manhole	1200	9.002	70.202	300	9.001	70.202		300	
SD1-4	71.450	1.024	Open	Manhole	1200	10.000	70.426	225					
SD1-3	71.610	1.494	Open	Manhole	1350	8.002	70.116	375	8.001	70.191		300	
									9.002	70.191		300	
001-0	71 150	1 105	~~~~	Verbele	1250	0.000	60.060	450	0.000	70.266		225	75
SD1-2 SD1-1	71 124	1 102	Open	Manhole	1350	8 004	60 001	450	8.002	60 001		450	/3
SD1	71 350	1 601	Open	Manhole	1500	5 005	69 749	600	5 004	69 824		525	
									8.004	69.811		450	
SD0-1	71.403	1.136	Open	Manhole	1200	11.000	70.267	225					
SDO	71.550	1.853	0pen	Manhole	1500	5,006	69.697	600	5,005	69.697		600	
			· · ·						11.000	70.170		225	98
BASIN	71.200	1.529	Open	Manhole	1500	5.007	69.671	600	5.006	69.671		600	
SD00	71.300	1.630	Open	Manhole	300		OUTFALL		5.007	69.670		600	
	1	I			I	I							
					©1982-20	18 Inn	ovyze						

DDEL Communit									Dama F
DBFL Consul	uing E	ingine	ers						Page 5
Ormond House	e				Hollysto	own			
Upper Ormon	d Quay	7							
Dublin 7									Micro
Date 04/10/2	2021 1	4:53			Designed	i by Gra	ant Humphre	У	Drainano
File Network	k Site	e 2 an	d 3 2	0	Checked	by Deir	dre Walsh		Diamage
Innovyze					Network	2018.1.	.1		
	1	PIPELI	INE SC	CHEDUL	ES for S	ite 3 :	Catchment	1	
				Ups	stream Ma	anhole			
TN	Red	D:	мя	C T	T T1		ME		T.+W
20	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm))
				()					
5.000	•	300	SD6	71.610	70.560	0.750	Open Manhole		1200
5.001	•	375	3D5	71.720	70.192	1.153	Open Manhole		1350
6.000		225	3D4-1	71.604	70.555	0.824	Open Manhole		1200
5.002	•	375	SD4	71.500	70.155	0.970	Open Manhole		1350
5 ,000	-	225	800.1	21 201	70.000	1 005	Onen Markala		1200
7.000	•	225	203-1	/1./80	/0.330	1.225	open Mannole		1200
5.003	•	450	SD3	71.350	70.017	0.883	Open Manhole		1350
5.004	•	525	SD2	71.315	69.878	0.912	Open Manhole		1500
		005 Ø	D1 10	21.450		0.750	One Markela		1200
8.000		225 5	SD1-10	71.450	70.475	0.794	Open Manhole		1200
							open mannoire		
9.000	0	225	3D1-8	71.960	70.629	1.106	Open Manhole		1200
9.001	•	300	3D1-6	71.814	70.413	1.101	Open Manhole		1200
9.002	•	300	3D1-5	71.500	70.202	1.058	Open Manhole		1200
10.000	0	225	SD1-4	71.450	70.426	0.799	Open Manhole		1200
				Deres					
				DOWL	istream i	annoie			
PN	Length	Slope	MH	C.Leve	1 I.Level	D.Depth	ME	ME DIAM	1., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(m	m)
5.000	71.705	245.0	3D5 3D4	71.72	20 70.267	7 1.153	Open Manhole		1350
0.001	12.000	017.0	001	.1.00			open mennor	-	1000
6.000	42.433	169.7	SD4	71.50	0 70.305	0.970	Open Manhole	•	1350
		000 0							1050
5.002	20.386	323.6	3D3	71.35	50 70.092	2 0.883	Open Manhole	•	1350
7.000	14.901	169.3	SD3	71.35	0 70.242	0.883	Open Manhole		1350
5.003	26.151	408.6	SD2	71.31	.5 69.953	0.912	Open Manhole	•	1500
5.004	26.651	493.5	301	71.35	69.824	1.001	Open Manhole		1500
8.000	18.583	170.5	SD1-9	71.46	0 70.366	0.869	Open Manhole		1200
8.001	24.565	245.7	SD1-3	71.61	0 70.191	1.044	Open Manhole		1350
9.000	23.975	170.0	SD1-6	71.81	4 70.488	3 1.101	Open Manhole		1200
9.001	2,681	242.7	SD1-5 SD1-2	71.61	0 70.191	1.119	Open Manhold	-	1200
5.002	2.001							-	
10.000	27.243	170.3	SD1-3	71.61	0 70.266	5 1.119	Open Manhol	•	1350
				©198	2-2018 I	nnovyze	•		

DBFL Consul	lting 1	Engine	ers					Page 6
Ormond Hous	se	-			Hollysto	wn		
Upper Ormor	nd Quar	~						
Dublin 7		•						Micro
Date 04/10/	/2021	14:53			Designed	by Gr	ant Humphrey	MILLO
File Networ	rk Site	a 2 av	nd 3 2	0	Checked	by Dei	rdre Walsh	Urainage
Innovyze			.u o 2	••••	Network	2018 1	1	
							-	
		PIPEL	INE SC	HEDUL	ES for S	ite 3	: Catchment :	1
								-
				Ups	stream Ma	anhole		
PN	Hyd. Sect	(mm)	MH C	(m)	(m)	U.Depth (m)	Connection	(mm)
	beec	(1111)	and the	(ш)	()	(ш)	connección	(mar)
8.00	02 0	375	SD1-3	71.610	70.116	1.044	Open Manhole	1350
8.00	J3 0 14 0	450	SD1-2 SD1-1	71.158	69.963	0.745	Open Manhole Open Manhole	1250
		100			00.002	0.710	open mannore	2000
5.00	05 0	600	SD1	71.350	69.749	1.001	Open Manhole	1500
11.04		205	800-1	71 400	70.947	0.011	Onen Manhala	1200
11.00	00 0	225	300-1	/1.403	70.207	0.911	open Mannole	1200
5.00	06 0	600	SDO	71.550	69.697	1.253	Open Manhole	1500
5.00	07 0	600	BASIN	71.200	69.671	0.854	Open Manhole	1500
						(
				DOM	istream i	annoie	<u> </u>	
PN	Length	Slope	MH	C.Lev	el I.Leve	1 D.Dept	th MH	MH DIAM. L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
								1050
8.002	25.507	412.	6 SD1-2	71.1	24 69.93	1 0.74	70 Open Mannole 43 Open Manhole	1350
8.004	49.333	411.	1 SD1	71.3	50 69.81	1 1.08	9 Open Manhole	1500
5.005	30.181	585.	0 300	71.5	50 69.69	7 1.23	53 Open Manhole	1500
11.000	15.161	156.3	2 3D0	71.5	50 70.17	0 1.15	55 Open Manhole	1500
5.006	15.111	581.3	2 BASIN 4 SDOO	71.2	00 69.67	1 0.92	29 Open Manhole	1500
3.007	1.752	1/52.	1 3000	/1	00 05.07	0.50	55 Open Mannole	300
				@198	2-2018 T	nnovyz	a .	
DBFL Consulting Engineers		Page 7						
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Ormond House	Hollystown							
Upper Ormond Quay								
Dublin 7		Micco						
Date 04/10/2021 14:53	Designed by Grant Humphrey							
File Network Site 2 and 3 20	Checked by Deirdre Walsh	urainage						
Innovyze	Network 2018.1.1							
Area Summary	for Site 3 : Catchment 1							
Pipe PIMP PIMP PI	IMP Gross Imp. Pipe Total							
Number Type Name (Area (ha) Area (ha) (ha) 							
5.000	75 0.000 0.000 0.000							
5.001	75 0.150 0.113 0.113							
6.000	75 0.000 0.000 0.000							
5.002	75 0.015 0.011 0.011							
5.003	75 0.203 0.152 0.152							
5.004	75 0.312 0.234 0.234							
8.000	75 0.245 0.184 0.184							
8.001	75 0.169 0.127 0.127							
9.000	75 0.090 0.068 0.068							
9.002	75 0.082 0.062 0.062							
10.000	75 0.043 0.032 0.032							
8.002	75 0.045 0.034 0.034							
8.003	75 0.172 0.129 0.129							
8.004	75 0.000 0.000 0.000							
5.005	75 0.022 0.024 0.024							
5.006	75 0.000 0.000 0.000							
5.007	75 0.000 0.000 0.000							
	Total Total Total							
	1.720 1.290 1.290							
Free Flowing Outfall	Details for Site 3 : Catchment 1							
rice riowing outrail	Deballs for sive 5 . Cabelment 1							
Outfall Outfall O	. Level I. Level Min D,L W							
Pipe Number Name	(m) (m) I. Level (mm) (mm)							
	(m)							
5.007 SD00	71.300 69.670 0.000 300 0							
Simulation Crite	ria for Site 3 : Catchment l							
Volumetric Runoff Coeff	0.840 Additional Flow - % of Total Fl	ow 0.000						
Areal Reduction Factor Bot Start (mine)	1.000 MADD Factor * 10m³/ha Stora 0 Inlat Coefficie	ge 2.000 nt 0.800						
Hot Start Level (mm)	0 Flow per Person per Day (1/per/da	y) 0.000						
Manhole Headloss Coeff (Global)	0.500 Run Time (min	s) 60						
Foul Sewage per hectare (1/s)	0.000 Output Interval (min	s) 1						
Number of Torut Hudson	unha () Number of Stores Structures 1							
Number of Online Cont	rols 1 Number of Time/Area Diagrams 0							
Number of Offline Cont	rols 0 Number of Real Time Controls 0							
Synthet	ic Rainfall Details							
Rainfall Model	FSR Region Scotland and Ireland							
Return Period (years)	2 33-00 (mm) 10.200							
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DBFL Consulting Engineers						
Ormond House	Hollystown					
Upper Ormond Quay						
Dublin 7		Micro				
Date 04/10/2021 14:53	Designed by Grant Humphrey	Desinance				
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage				
Innovyze	Network 2018.1.1	4				
Synthet	<u>ic Rainfall Details</u>					
Ratio R 0.1	272 Cv (Winter) 0.840					
Cv (Summer) 0.7	ter Storm Duration (mins) 30 750					
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DBFL Consulting Engineers		Page 9
Ormond House	Hollystown	-
Upper Ormond Quay	-	
Dublin 7		Micco
Date 04/10/2021 14:53	Designed by Grant Humphrey	Designed
File Network Site 2 and 3 20	Checked by Deirdre Walsh	urainage
Innovyze	Network 2018.1.1	
Online Control	s for Site 3 : Catchment 1	
Hydro-Brake@ Optimum Manhole	e: BASIN, DS/PN: 5.007, Volume (mª): 6.6
Unit	Peference MD_SHE_0106_5700_1400_5700	
Desig	n Head (m) 1.400	
Design	Flow (1/s) 5.7	
	Flush-Flo ⁿ Calculated	
د	objective Minimise upstream storage pulication Surface	
Sump	Available Yes	
Dia	meter (mm) 106	
Invert	Level (m) 69.671	
Minimum Outlet Fipe Dia Suggested Manhole Dia	meter (mm) 150 meter (mm) 1200	
Control Po	ints Head (m) Flow (1/s)	
Design Point (Ca	lculated) 1.400 5.7	
E	lush-Flo ^{ns} 0.417 5.7	
	Kick-Flo@ 0.861 4.5	
Mean Flow over h	iead Range - 5.0	
The hydrological calculations have b	een based on the Head/Discharge relation	ship for the
Hydro-Brake® Optimum as specified.	Should another type of control device of	her than a
Hydro-Brake Optimum® be utilised the	n these storage routing calculations wil	l be
invallaabed		
Depth (m) Flow (1/s) Depth (m) Flow	<pre>(1/s) Depth (m) Flow (1/s) Depth (m) 1</pre>	'low (l/s)
0.100 3.6 1.200	5.3 3.000 8.1 7.000	12.2
0.200 5.2 1.400	5.7 3.500 8.8 7.500	12.6
0.300 5.6 1.600	6.1 4.000 9.3 8.000	13.0
0.400 5.7 1.800	6.4 4.500 9.9 8.500	13.4
0.600 5.5 2.000	7.0 5.500 10.9 9.500	14.1
0.800 4.9 2.400	7.3 6.000 11.3	
1.000 4.9 2.600	7.6 6.500 11.8	
91.00	2-2018 Innouvre	

Site 3: Catchment Area 2

Surface Water Network

Impermeability Factor (%): 54.9

DBFL Consulting Engineers		Page 1					
Ormond House	Hollystown						
Upper Ormond Quay							
Dublin 7		Micro					
Date 04/10/2021 14:54	Designed by Grant Humphrey	Drainage					
File Network Site 2 and 3 20	Checked by Deirdre Walsh	brainiage_					
Innovyze	Network 2018.1.1						
STORM SEWER DESIGN	by the Modified Rational Method						
Design Criteri	a for Site 3 : Catchment 2						
Pipe Sizes STA	NDARD Manhole Sizes STANDARD						
FSR Rainfall 1	fodel - Scotland and Ireland						
Return Period (years) M5-60 (mm)	2 PIN 16.200 Add Flow / Climate Chanc	(P(\$) 57 n=(\$) 20					
Ratio R	0.272 Minimum Backdrop Heigh	nt (m) 0.200					
Maximum Rainfall (mm/hr)	50 Maximum Backdrop Heigh 20 Min Davion Danth for Ontinizatio	nt (m) 1.500					
Foul Sewage (1/s/ha)	0.000 Min Vel for Auto Design only	(m/s) 1.00					
Volumetric Runoff Coeff.	1.000 Min Slope for Optimisation	(1:X) 500					
Design	ed with Level Inverts						
Time Area Diagr	am for Site 3 : Catchment 2						
Time Area	Time Area Time Area						
(mins) (ha)	(mins) (ha) (mins) (ha)						
0_4 0 202	4_0_0_005 0_12_0_055						
0-4 0.297 4-8 0.806 8-12 0.066							
Total Area	Contributing (ha) = 1.169						
Total Pij	pe Volume (m³) = 39.771						
Network Design 7	ble for Size 2 - Construct 2						
Network Design Ta	apie for Site 3 : Catchment 2						
« - Indica	tes pipe capacity < flow						
PN Length Fall Slope I.Area T.E (m) (m) (1:X) (ha) (min:	Base k n HYD DIA Section () Flow (1/s) (mm) SECT (mm)	Type Auto Design					
2.000 45.708 0.269 169.9 0.029 4	0 0.0 0.600 a 225 Pine/Ca	nduit 🔒					
2.001 15.000 0.067 223.9 0.103 0.0	00 0.0 0.600 o 300 Pipe/Co	nduit					
3.000 50.294 0.296 169.9 0.058 4.0 3.001 32.593 0.133 245.1 0.029 0.0	00 0.0 0.600 o 225 Pipe/Co 00 0.0 0.600 o 300 Pipe/Co	nduit 💼					
Netw	ork Results Table	-					
PN Rain T.C. US/IL E I.A (mm/hr) (mins) (m) (ha	rea E Base Foul Add Flow Vel Ca) Flow (1/s) (1/s) (1/s) (m/s) (1/	ap Flow /s) (l/s)					
2.000 49.29 4.76 69.555 0. 2.001 48.42 5.00 69.211 0.	029 0.0 0.0 1.0 1.00 39 132 0.0 0.0 4.6 1.05 74	9.8 6.1 4.0 27.6					
3.000 49.01 4.84 70.189 0.	058 0.0 0.0 2.0 1.00 39	9.8 12.2					
3.001 47.12 5.38 69.818 0.	087 0.0 0.0 2.9 1.00 70	0.7 17.7					
©198	2-2018 Innovyze						

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DBFT.	Consul	ting	Engine	aare								Da	ae 2	
Ormon	nd Hous	se	2			Hol	llvstown						.g	
Upper	r Ormor	nd Qua	y				-							
Dubli	in 7											M	licro	
Date	04/10/	/2021	14:54			Des	signed by	y Gran	nt Hu	mphre	У	۳'n	cainar	
File	Networ	ck Sit	;e 2 a:	nd 3 20		Che	ecked by	Deird	ire W	alsh		U		IJС.
Innov	vyze					Net	twork 201	18.1.1						
		,	Vetuor	k Deci	m Tai	bla	for Sit		Cat	ahman	+ 2			
		-	NEDWOI	A Desi	gii Ia.	DIG	101 510	жэ.	Cau	cimien	62			
PN	Length	Fall	Slope	I.Area	T.E.	_	Base	k	n	HYD	DIA	Sectio	on Type	Au
	(m)	(m)	(1:X)	(ha)	(mins) F	low (1/s)	(mm)		SECT	(mm)			Des
3.002	6.440	0.026	247.7	0.070	0.0	0	0.0	0.600		0	300	Pipe/0	Conduit	6
3.003	90.950	0.280	324.8	0.080	0.0	0	0.0	0.600		0	375	Pipe/(Conduit	4
4.000	54.809	0.322	170.0	0.032	4.0	0	0.0	0.600		0	225	Pipe/0	Conduit	6
4.001	65.426	0.331	197.7	0.105	0.0	0	0.0	0.600		•	300	Pipe/(Conduit	-
3.004	77.234	0.235	328.7	0.085	0.0	0	0.0	0.600		۰	375	Pipe/(Conduit	4
2.002	22.023	0.055	400.4	0.076	0.0	0	0.0	0.600		0	525	Pipe/0	Conduit	
2.003	5.000	0.001	5000.0	0.000	0.0	0	0.0	0 600	0.045		675	Pipe/(Conduit	
2.004	0.000	0.020	200.0	0.000	0.0	·	0.0	0.000			220	ripe/\	-ondar o	
				1	Netwo	rk	Results	Table						
	PN B	Rain	T.C.	US/IL	E I.Ar	ea	Σ Base	Foul	Add	Flow	Vel	Cap	Flow	
	(=	m/hr)	(mins)	(m)	(ha)		Flow (1/s) (1/s) (1	/s)	(m/s)	(1/s)	(1/s)	
3	.002	46.77 42.41	5.49	69.685 69.584	0.1	.56 37	0.	0 0.	0	5.3	0.99	70.3	31.6 43.5	
4	.000	48.74 45.50	4.91 5.89	70.100 69.713	0.0	32 37	0. 0.	0 0.	0	1.1 4.5	1.00	39.8 78.8	6.7 27.0	
з	.004	39.41	8.30	69.304	0.4	58	0.	0 0.	0	13.0	0.99	109.8	78.3	
2	.002	38.73	8.63	69.069	0.6	66	0.	0 0.	0	18.6	1.11	241.0	111.8	
2	.003	37.07	9.50	69.000	0.6	66	0.	0 0.	0	18.6	0.10	34.3*	111.8	
2	.004	36.91	9.59	68.900	0.6	00	0.	0 0.0	0	18.6	0.92	30.0«	111.8	
					©198	2-2	018 Inno	vyze						

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DBFL Consulting Engineers	Page 3	
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micro
Date 04/10/2021 14:54	Designed by Grant Humphrey	Drainago
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage
Innovyze	Network 2018.1.1	

Manhole Schedules for Site 3 : Catchment 2

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Dianeter (nm)	Backdrop (mm)
SE2	70.700	1.145	Open Manhole	1200	2.000	69.555	225				
SE1	71.150	1.939	Open Manhole	1200	2.001	69.211	300	2.000	69.286	225	
SE0-7	71.250	1.061	Open Manhole	1200	3.000	70.189	225				
SE0-6	71.187	1.369	Open Manhole	1200	3.001	69.818	300	3.000	69.893	225	
SE0-5	70.840	1.155	Open Manhole	1200	3.002	69.685	300	3.001	69.685	300	
SE0-4	70.820	1.236	Open Manhole	1350	3.003	69.584	375	3.002	69.659	300	
SE0-3	71.600	1.500	Open Manhole	1200	4.000	70.100	225				
SE0-2	71.600	1.887	Open Manhole	1200	4.001	69.713	300	4.000	69.778	225	
SE0-1	70.940	1.636	Open Manhole	1350	3.004	69.304	375	3.003	69.304	375	
								4.001	69.382	300	3
SEO	71.230	2.161	Open Manhole	1500	2.002	69.069	525	2.001	69.144	300	
								3.004	69.069	375	
BASIN	71.230	2.230	Open Manhole	1500	2.003	69.000	675	2.002	69.014	525	
OUTFLOW	71.230	2.330	Open Manhole	1500	2.004	68.900	225	2.003	68.999	675	549
BASIN	71.230	2.355	Open Manhole	1900		OUTFALL		2.004	68.875	225	

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DBFL	Const	ulting	Engir	neers							Page 4	
Ormo	nd Hou	use .				Hollyst	own					_
Uppe:	r Orma	ond Qu	ay			-						
Dublin 7										Micco	100	
Date 04/10/2021 14:54 Designed by Grant Humphrev										V	Desing	
File	Netw	ork Si	ite 2 a	and 3 2	0	Checked	by Dei	rdre	Walsh	-	Uldillo	IYe .
Inno	vvze					Network	2018.1	.1				
	-											
			PIPE	LINE SC	HEDUL	ES for S	ite 3	: Cat	chment	2		
					Ups	stream M	anhole					
	PN	Hvd	Diam	мн	Level	L Level	D.Depth		МН	MH DIAM	L*W	
		Sect	(mm)	Name	(m)	(m)	(m)	Con	nection	(111	ı)	
	2.00	00 0	225	SE2	70.700	69.555	0.920	Open	Manhole		1200	
	2.00)1 d	300	SE1	71.150	69.211	1.639	Open	Manhole		1200	
	2.00		225	920-7	71 250		0 926	0	Manhala		1200	
	3.00)0 0)1 d	300	SE0-6	71.181	7 69.818	1.069	Open	Manhole		1200	
	3.00	02 0	300	SE0-5	70.840	69.685	0.855	Open	Manhole		1200	
	3.00	03 d	375	SE0-4	70.820	69.584	0.861	Open	Manhole		1350	
	4.00		225	SE0-3	71.600	70,100	1.275	Open	Manhole		1200	
	4.00	01 d	300	SE0-2	71.600	69.713	1.587	Open	Manhole		1200	
	3.00)4 c	375	SE0-1	70.940	69.304	1.261	Open	Manhole		1350	
					-		1 606	~	W		1500	
	2.00	12 0	675	BASIN	71.230	69.009	1.555	Open	Manhole		1500	
	2.00	04 d	225 (DUTFLOW	71.230	68.900	2.105	Open	Manhole		1500	
					Dowr	nstream l	Manhole					
	PN	Length	Slope	MH	C.Let	zel I.Leva	1 D.Dept	th	МН	MH DI	AM. L*W	
		(m)	(1:X)	Name	(m)	(m)	(m)	C	onnection		(mm)	
	2.000	45.708	169.9	SE:	1 71.1	150 69.28	6 1.6	39 Op	en Manhol	le	1200	
	2.001	15.000	223.9	SE(71.2	230 69.14	4 1.7	86 Op	en Manhol	le	1500	
		50.004	160.0								1000	
	3.000	32.593	245.1	SE0-	5 70.8	140 69.68	95 0.8	сэ Ор 55 Ор	en Manhol en Manhol	le	1200	
	3.002	6.440	247.1	SE0-	70.8	20 69.6	59 0.8	61 Op	en Manhol	le	1350	
	3.003	90.950	324.8	SE0-1	1 70.9	940 69.30	04 1.2	61 Op	en Manhol	le	1350	
	4 000	54 804	170 (870-4	, ,,,,	500 60 T	78 1 5	07 Or-	m Manhal		1200	
	4.001	65.426	5 197.7	SE0-1	1 70.9	940 69.38	1.2	58 Op	en Manhol	le	1350	
	3.004	77.234	328.1	SE(71.3	230 69.00	59 1.7	56 Op	en Manhol	Le	1500	
	2.002	22.023	400.4	BASI	71.4	230 69.01	14 1.6	91 Op	en Manhol	le	1500	
	2.003	5.000	200.0	BAST	V 71.2	230 68.81	99 1.50 75 2.10	30 Op	en Manhol en Manhol	Le Le	1900	
								00 Op				
					@192	2-2018 7	nnouver					
					0400			-				

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DBFL Consulting Engineers		Dage 5					
Ormond House	Hollwstown	raye o					
Upper Ormond Quar	norryscown						
Dublin 7							
Date 04/10/2021 14:54	Designed by Crent Wymphysy	MICLO					
Date 04/10/2021 14:54	Designed by Grant Humphrey	Drainage					
File Network Site 2 and 3 20	Checked by Deirdre Walsh						
Innovyze	Network 2018.1.1						
Area Summary	for Site 3 : Catchment 2						
Area Statulary	Tor side 5 : Catchment 2						
Pipe PIMP PIMP PI	IMP Gross Imp. Pipe Total						
Number Type Name (area (ha) Area (ha) (ha)						
2.000	57 0.050 0.029 0.029						
2.001	57 0.181 0.103 0.103						
3.000	57 0.101 0.058 0.058						
3.001	57 0.051 0.029 0.029						
3.002	57 0.122 0.070 0.070						
3.003	57 0.141 0.080 0.080						
4.000	57 0.056 0.032 0.032						
2 004	57 0.149 0.085 0.085						
2 002	57 0 134 0 076 0 076						
2.003	57 0.000 0.000 0.000						
2.004	57 0.000 0.000 0.000						
	Total Total Total						
	1.169 0.666 0.666						
Free Flowing Outfall Details for Site 3 : Catchment 2 Outfall Outfall C. Level I. Level Min D.L W							
Pipe Number Name	(m) (m) I. Level (mm) (mm)						
	(m)						
2.004 BASIN	71.230 68.875 0.000 1900 0						
Simulation Crite	ria for Site 3 : Catchment 2						
Volumetric Rupoff Coeff	0.840 Additional Flow - % of Total Fl	ow 0.000					
Areal Reduction Factor	1.000 MADD Factor * 10m³/ha Stora	ge 2.000					
Hot Start (mins)	0 Inlet Coeffiecie	nt 0.800					
Hot Start Level (mm)	0 Flow per Person per Day (1/per/da	y) 0.000					
Manhole Headloss Coeff (Global)	0.500 Run Time (min	s) 60					
roul sewage per hectare (1/s)	0.000 Output Interval (min	5) 1					
Number of Input Hydrogr	aphs 0 Number of Storage Structures 1						
Number of Online Cont	rols 1 Number of Time/Area Diagrams 0						
Number of Offline Cont	rols 1 Number of Real Time Controls 0						
a	in Deinfall Dessile						
Synthet	ic kainfall Details						
Rainfall Model	FSR Profile Type Wi	nter					
Return Period (years)	2 Cv (Summer) 0	.750					
Region Scotla	nd and Ireland Cv (Winter) 0	.840					
M5-60 (mm)	16.200 Storm Duration (mins)	30					
Ratio R	0.272						
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DBFL Consulting Engineers			Page	6
Ormond House	Hollystown			
Upper Ormond Quay				
Dublin 7			Mice	
Date 04/10/2021 14:54	Designed by	Grant Humphi	ey Deal	0
File Network Site 2 and 3 20	Checked by I	Deirdre Walsh	Digi	nage
Innovyze	Network 2018	3.1.1		
Online Control	ls for Site 3	: Catchment	2	
Hydro-Brake@ Optimum Manhol	e: BASIN, DS/	PN: 2.003, V	olume (m³): 8	.4
II- i	Peference MD-	RE-0000-4800-1	200-4800	
Desi	yn Head (m)	5112-0033-4000-1	1.300	
Design	Flow (1/s)		4.8	
	Flush-Flom	Ca	lculated	
	Objective Min Application	nimise upstream	Surface	
Sum	o Available		Yes	
Di	ameter (mm)		99	
Inver	t Level (m)		69.000	
Minimum Outlet Pipe Di.	ameter (mm)		150	
Suggested Mannole Di	Ameter (mm)		1200	
Control P	oints Head	(m) Flow (1/s))	
Design Point (C	alculated) 1	.300 4.1	8	
-	Flush-Flo ^m 0	.388 4.	8	
	Kick-Flo® 0	.799 3.	8	
Mean Flow over	Head Range	- 4.3	2	
The hydrological calculations have	been based on th	he Head/Dischar	ge relationship	for the
Hydro-Brake@ Optimum as specified.	Should another	type of contro	l device other t	han a
Hydro-Brake Optimum® be utilised th	en these storage	e routing calcu	lations will be	
invalidated				
Depth (m) Flow (1/s) Depth (m) Flo	w (1/s) Depth (m) Flow (1/s)	Depth (m) Flow ((1/s)
0,100 0,0 1,000	4.6 2.0		7.000	10.6
0.200 4.4 1.400	5.0 3.5	00 7.6	7.500	10.9
0.300 4.7 1.600	5.3 4.0	00 8.1	8.000	11.3
0.400 4.8 1.800	5.6 4.5	00 8.6	8.500	11.6
0.500 4.7 2.000	5.9 5.0	00 9.0	9.000	11.9
0.600 4.6 2.200	6.1 5.5	00 9.4	9.500	12.2
1 000 4 2 2 600	6.6 6.5	00 9.8		
1.000 4.2 2.000	0.0	10.2		
	02_2010 Tamar			
619	oz-zuis innov	VZE		

Site 3: Catchment Area 3

Surface Water Network

Impermeability Factor (%): 49.3

DBFL Consulting Engineers Pa								Page 1	1
Ormond House	1		Hol	lystown					
Upper Ormond	Quay								
Dublin 7								Miccr	
Date 04/10/2	021 14:55	5	Des	igned by	Grant	t Humphr	ey	Drain	
File Network	Site 2 a	nd 3 20	. Che	cked by I	Deirdr	ce Walsh		DIGIL	lage
Innovyze			Net	work 2018	3.1.1			-	
Network Forstand STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 3 Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 PIMP (%) 50 M5-60 (mm) 16.200 Add Flow / Climate Change (%) 20 Ratio R 0.272 Minimum Backdrop Height (m) 0.200 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.200 Foul Sewage (1/s/ha) 0.000 Min Slope for Optimisation (1:X) 500 Volumetric Runoff Coeff. 1.000 Min Slope for Optimisation (1:X) 500 Designed with Level Inverts Time Area Time Area (mins) (ha) 0-4 0.382 0-4 0.382 4-8 0.338									
			0-4 0.3	82 4-8	0.338				
		Total Are	a Conta	ributing (h	ha) = 0	0.720			
		Tetel	Dine Ve	1	- 16 6	5.4			
		IOCAL	Fipe vo	Tume (m*)	- 10.0				
	Networ	rk Design	Table	for Site	3 :	Catchmer	it 3		
PN Length	Fall Slop	pe I.Area	T.E.	Base	k	HYD DIA	Section	Туре А	uto
(m)	(m) (1:)	() (ha) (mins) F	'low (l/s)	(mm)	SECT (mm)		De	sign
1.000 30.562	0.180 169	.8 0.040	4.00	0.0	0.600	o 223	Pipe/Cor	nduit	۰.
2.000 30.328	0.178 170	.4 0.045	4.00	0.0	0.600	o 225	Pipe/Cor	nduit	•
1.001 34.642	0.107 323	.8 0.145	0.00	0.0	0.600	o 375	Pipe/Cor	nduit	
1.002 32.112	0.099 324	.4 0.036	0.00	0.0	0.600	o 375	Pipe/Cor	nduit	ō.
		Net	work H	Results T	able				
PN Ra	in T.C. (hr) (mins)	US/IL E I	(.Area (ba) J	Σ Base	Foul (1/s)	Add Flow	Vel C (m/s) (1	ap Flo	w =)
1.000 5	0.00 4.51	68,914	0.040	0.0	0.0	1.4	1.00 3	9.8 8.	.7
2 000	0.00	60.075	0.045		0.0	1.6	1.00.0		-
2.000 50		09.375	0.045	0.0	0.0	1.6	1.00 3	9.7 9.	
									. /
1.001 4	3.13 5.09 5.24 5.69	68.659	0.230	0.0	0.0	8.0	1.00 11	0.6 48.	.0
1.001 40 1.002 40	8.13 5.09 5.34 5.62	68.659 68.552	0.230 0.266	0.0	0.0	8.0 8.9	1.00 11 1.00 11	0.6 48. 0.5 53.	.0 .3
1.001 4 1.002 4	8.13 5.09 5.34 5.62	68.659 68.552	0.230	0.0	0.0	8.0 8.9	1.00 11 1.00 11	0.6 48. 0.5 53.	.0 .3

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DBFL Consulting En	ngineers			Page 2
Ormond House	_	Hollystown		
Upper Ormond Quay		-		
Dublin 7				Micco
Date 04/10/2021 14	4:55	Designed by Grant	Humphrey	Desinano
File Network Site	2 and 3 20	Checked by Deirdr	e Walsh	Diamage
Innovyze		Network 2018.1.1		
Net	twork Design Ta	able for Site 3 :	Catchment 3	
		.		
PN Length Fall	Slope I.Area T. (1:X) (ba) (mi	E. Base k	HYD DIA Section	Type Auto Decim
(m) (m)	(1.1.7) (114) (114		buci (mil)	Design
3.000 38.885 0.229	170.0 0.087 4	.00 0.0 0.600	o 225 Pipe/Com	nduit 🚦
1.003 20.993 0.065	323.0 0.008 0	0.0 0.0 0.600	o 375 Pipe/Com	nduit 🛢
1.004 14.320 0.044	325.5 0.000 0	.00 0.0 0.600	o 375 Pipe/Com	nduit
1.005 5.000 0.001 \$	5000.0 0.000 0	.00 0.0 0.600	o 600 Pipe/Co	nduit 🚦
	Netwo	ork Results Table		
PN Rain T	.C. US/IL E I.A	rea E Base Foul	Add Flow Vel Ca	ap Flow
(mm/hr) (mi	ins) (m) (ha) Flow (1/s) (1/s)	(1/s) (m/s) (1	/s) (1/s)
3.000 49.72 4	4.65 68.900 0.	087 0.0 0.0	3.1 1.00 3	9.8 18.6
1.003 45.27 8	5.97 68.453 0.	360 0.0 0.0	11.8 1.00 110	0.7 70.6
1.004 44.57	6.21 68.388 0.	360 0.0 0.0	11.8 1.00 110	0.3 70.6
1.005 50.00 4	4.25 68.305 0.	000 5.3 0.0	0.9 0.33 94	4.6 5.3
	©198	32-2018 Innovyze		

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DBFL	DBFL Consulting Engineers Page 3												
Ormor	rmond House Hollystown												
Upper	c Ormor	nd Qua	ΥY										
Dubli	in 7									Micro			
Date	04/10/	2021	14:5	5	Des	signed	by Gran	t Humphr	еу	Drain	lane		
File	File Network Site 2 and 3 20 Checked by Deirdre Walsh												
Innov	/yze				Net	work	2018.1.1						
			Maria										
			nan	noie sc	nedules	tor 51	.te 3 : C	atchment					
MH	MH	MH		MH	MH	I	Pipe Out		I	Pipes In		1	
Name	CL (m)	Depth	Con	nection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	Diamete	r Backdrop	
		(m)			(mm)		Level (m)	(mm)		Level (m)	(mm)	(mm)	
SF5	70.350	1.436	Open	Manhole	1200	1.000	68.914	225					
SF4	70.350	0.975	Open	Manhole	1200	2.000	69.375	225					
SF3	70.100	1.441	Open	Manhole	1350	1.001	68.659	375	1.000	68.734	22	5	
									2.000	69.197	22	5 388	
SF2	69.970	1.418	Open	Manhole	1350	1.002	68.552	375	1.001	68.552	37	5	
SF1-1	70.510	1.610	Open	Manhole	1200	3.000	68.900	225					
SF1	70.296	1.843	Open	Manhole	1350	1.003	68.453	375	1.002	68.453	37	5	
									3.000	68.671	22	5 68	
SFO	70.300	1.912	Open	Manhole	1350	1.004	68.388	375	1.003	68.388	37	5	
DADIN	70.300	1.176	Open	Manhole	1000	1.005	00.305	600	1.004	60.344	1	5 0	
DROIN	69.460	1.1/6	open	Mannoie	1900	I	OUTFALL		1.005	00.304	٩	•	
<u> </u>					@1982-2	018 7	nnovvze						
					01001 1								

Development at Hollystown – Site 2,3 & Local Centre Infrastructure Design Report

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December 2021

DBFL Consu	lting	Engine	ers					Page 4			
Ormond Hou	se			Hollysto	own						
Upper Ormo	nd Qua	y									
Dublin 7	-	-						Micco			
Date 04/10	/2021	14:55		Designed	i by Gr	ant Humphrey	,	Designed			
File Netwo	rk Sit	e 2 an	d 3 20	Checked	by Dei	rdre Walsh		urainage			
Innovvze				Network	2018.1	.1					
• • • • • • • • • • • • • • • • • • • •											
		PIPELI	NE SCHEDU	LES for S	ite 3 :	: Catchment	3				
Upstream Manhole											
PN	Byd	Diam 1	MH C.Leve	l I.Level I	0.Depth	ME M	H DIAM.	, L*W			
	Sect	(mm) N	ame (m)	(m)	(m)	Connection	(mm)				
1.0	00 0	225	SF5 70.35	0 68.914	1.211	Open Manhole		1200			
2.0	00 0	225	SF4 70.35	0 69.375	0.750	Open Manhole		1200			
1.0	01 0	375	SF3 70.10	0 68.659	1.066	Open Manhole		1350			
1.00	12 0	3/0	512 09.97	00.002	1.043	open Hannole		1350			
3.0	00 o	225 51	21-1 70.51	0 68.900	1.385	Open Manhole		1200			
1.0	03 0	375	SF1 70.29	6 68.453	1.468	Open Manhole		1350			
1.00	04 o	375 600 B3	SF0 70.30	0 68.388	1.537	Open Manhole Open Manhole		1350			
1.00		000 12	101A 70.80	00.000	1.050	open namore		1000			
Downstream Manhole											
PN	PN Length Slope MH C.Level I.Level D.Depth MH MH DIAM. L*W										
	(m)	(1:X)	Name (m) (m)	(m)	Connection	(m	m)			
1.000	30.562	169.8	SF3 70.	100 68.734	4 1.14	1 Open Manhole		1350			
2.000	30.328	170.4	SF3 70.	100 69.197	0.67	8 Open Manhole		1350			
1.001	34.642	323.8	SF2 69.	970 68.552	2 1.04	3 Open Manhole		1350			
1.002	32.112	324.4	SF1 70.3	296 68.453	3 1.46	8 Open Manhole		1350			
3.000	38.885	170.0	SF1 70.	296 68.671	1.40	0 Open Manhole		1350			
1.003	20.993	323.0	SF0 70.	300 68.388	3 1.53	7 Open Manhole		1350			
1.004	14.320	325.5	BASIN 70.	300 68.344	4 1.58	1 Open Manhole		1500			
1.005	5.000	5000.0	BASIN 69.	480 68.304	4 0.57	6 Open Manhole		1900			
			@19	82-2018 T	nnouvze	<u> </u>					

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DBFL Consulting Engineers		Page 5
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micco
Date 04/10/2021 14:55	Designed by Grant Humphrey	Desinado
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage
Innovyze	Network 2018.1.1	
Area Summary	for Site 3 : Catchment 3	
Number Type Name (8	MP Gross Imp. Pipe Total	
induce all the induce of	, <u>incl</u> (in, <u>inc</u> (in, (in))	
1.000	50 0.080 0.040 0.040	
1 001	50 0.090 0.045 0.045	
1.002	50 0.071 0.026 0.026	
3.000	50 0.173 0.087 0.087	
1.003	50 0.016 0.008 0.008	
1.004	50 0.000 0.000 0.000	
1.005	50 0.000 0.000 0.000	
	Total Total Total	
	0.720 0.360 0.360	
Ence Elevine Outfall	Depuile for Size 2 . Combrane 2	
Free Flowing Outrail	Details for Site 3 : Catchment 3	
Outfall Outfall C	Level I. Level Min D.L W	
Pipe Number Name	(m) (m) I. Level (mm) (mm)	
	(m)	
1 005 83873	69 480 68 204 0 000 1000 0	
1.005 BASIN	63.400 60.204 0.000 1900 0	
Simulation Crite:	ria for Site 3 : Catchment 3	
Volumetric Runoff Coeff 0	.840 Additional Flow - % of Total Fl	ow 0.000
Areal Reduction Factor 1		ge 2.000
Hot Start (mins)	0 Inlet Coeffiecie	nt 0.800
Hot Start Level (nm)	0 Flow per Person per Day (1/per/da	y) 0.000
Manhole Headloss Coeff (Global) U) 000 Run Time (min	s) 60 -) 1
Tour bewage per nectare (1/5) t	Output interval (min	3/ 1
Number of Input Hydrogra	aphs 0 Number of Storage Structures 1	
Number of Online Contr	rols 1 Number of Time/Area Diagrams 0	
Number of Offline Cont:	rols 0 Number of Real Time Controls 0	
Sunthat	ic Dainfall Datails	
synthet.	at maintain DEVALLS	
Rainfall Model	FSR Profile Type Wi	nter
Return Period (years)	2 Cv (Summer) 0	.750
Region Scotlan	nd and Ireland Cv (Winter) 0	.840
M5-60 (mm)	16.200 Storm Duration (mins)	30
Ratio R	0.272	
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DBFL Consulting Engineers					Page 6				
Ormond House	Hollysto	wn							
Upper Ormond Quay									
Dublin 7					Micro				
Date 04/10/2021 14:55	Designed	by Gra	nt Humph	rey	Drainago				
File Network Site 2 and 3 20	Checked	by Deir	dre Wals	h	Diamage				
Innovyze	Network	2018.1.	1						
Online Controls for Size 2 - Controls 2									
Online Control	s for Sit	e3:0	atchment	3					
Hudro-Brokot Ontinum Manhal	- PASTM	DC /DM-	1 005 1	Zelume /m	31 - 4 9				
hydro-Brakes optimum Hannoi	e. BASIN,	DS/PN.	1.005,	vorume (m	-7. 4.5				
Unit	Reference	MD-SHE-0	0103-5300-	1400-5300					
Desig	yn Head (m)			1.400					
Design	Flow (1/s)			5.3					
	Objective	Minimis	se upstrea	alculated m storage					
3	Application		•	Surface					
Sung	Available			Yes					
Dia	meter (mm)			68 205					
Minimum Outlet Pipe Dia	ameter (mm)			150					
Suggested Manhole Dia	ameter (mm)			1200					
Control Po	oints	Head (m)	Flow (1/s	:)					
Design Point (C	alculated)	1.400	5.	3					
ş	Flush-Flo ^m	0.419	5.	3					
	Kick-Flo®	0.860	4.	2					
Mean flow over 1	Head Range	-	4.	.0					
The hydrological calculations have h	een based o	on the He	ad/Dischar	rge relatio	onship for the				
Hydro-Brake® Optimum as specified.	Should anot	ther type	e of contro	ol device o	other than a				
Hydro-Brake Optimum® be utilised the	en these sto	orage rou	ting calc	ulations wi	.11 be				
Depth (m) Flow (1/s) Depth (m) Flo	w (l/s) Dep	th (m) I	low (1/s)	Depth (m)	Flow (1/s)				
0.100 3.4 1.200	4.9	3.000	7.6	7.000	11.3				
0.200 4.8 1.400	5.3	3.500	8.1	7.500	11.7				
0.300 5.2 1.600	5.6	4.000	8.7	8.000	12.1				
0.400 5.3 1.800	6.0	4.500	9.2	9,000	12.4 12.8				
0.600 5.2 2.200	6.5	5.500	10.1	9.500	13.1				
0.800 4.6 2.400	6.8	6.000	10.5						
1.000 4.5 2.600	7.1	6.500	10.9						
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Site 3: Catchment Area 4

Surface Water Network

Impermeability Factor (%): 53.4

Ormond House Upper Ormond Quay Dublin 7 Date 04/10/2021 14:54 File Network Site 2 and 3 20 Checked by Deirdre Walsh Innovyre STORM SEMER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Fipe Sizes STAUDADD Manhole Sizes STAUDADD FSR Rainfall Model - Scoland and Ireland Return Period (years) 2 Maximum Rainfall (mg/h) 100 Maximum Static 0 0.272 Maximum Time of Concentration (min) 1000 Maximum Time Area (min) (ha) (Li) (ha) (min) 100 Maximum Time Area (min) (ha) (Li) (ha) (min) File (Li) (min) (m	DBFL Consulting Engineers		Page 1
Upper Ormond Quay Dublin 7 Date 04/10/2021 14:54 File Network Site 2 and 3 20 Innovyre STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Fipe Sizes STANDARD Manhole Sizes STANDARD TSR Rainfall Model - Scooland and Ireland Return Period (years) 2 Mariaum Rainfall (mm/hr) 100 Maximum Fine 60 Concentration (ml 0.200 Maximum Rime 60 Concentration (ml 0.200 Designed with Level Inverts Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram at outfall (pipe 4.002) Time Area Contributing (ha) = 0.600 Total Area Contributing (ha) = 0.600 Total Area Contributing (ha) = 0.006 Total Area Contributing (ha) = 0.000 Total Pipe Volume (m ²) = 1.807 Metwork Design Table for Site 3 : Catchment 4 PN Length Fall Slope I.Area T.E. Base k EffD DIA Section Type Anto (ml (m) (1:X) (ha) (min) Flow (1/s) (mn) SECT (mn) Design 2.000 42.344 0.374 113.2 0.068 4.00 0.00 0.600 o f25 Pipe/Conduit Network Results Table PN Rain T.C. US/HI J I.Area T.E. Base k EffD DIA Section Type Anto (ml (m) (ml C):X) (ha) (min) Flow (1/s) (L/s)	Ormond House	Hollystown	
Dublin 7 Designed by Grant Humphrey The Network Site 2 and 3 20 Checked by Deirdre Walsh Innovyre Network 2018.1.1 Metwork 2018.1.1 STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Fipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (versc) 2 FNP (%) 75 Marium Rainfall (mn/h) 100 Matimum Backdrep Reight (m) 0.000 Maximum The of Concentration (mine) 30 Min Design Depth for Optimisation (m) 1.000 Fold Severge (1/s/h) 0.000 Min Wei for Auto Design on Min Slope for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Wei for Auto Design on Min Slope for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Wei for Auto Design on Min Slope for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Min Slope for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Min Slope for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Min Slope for Optimisation (m) 1.000 Design Table for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram at outfall (pipe 4.002) <td>Upper Ormond Quay</td> <td></td> <td></td>	Upper Ormond Quay		
Date 04/10/2021 14:54 File Network Site 2 and 3 20 Checked by Deirdre Walsh Network 2018.1.1 STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Fipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (mm/Ar) 100 Maximum Time of Concentration (min 0.200 Namium Rainfall (mm/Ar) 100 Maximum Time of Concentration (min 0.200 Namium Rainfall (mm/Ar) 100 Maximum Time of Concentration (min 10, 200 Namium Rainfall (mm/Ar) 100 Maximum Time of Concentration (min 10, 200 Namium Time of Concentration (min 10, 200 Maximum Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram Table for Site 3 : Catchment 4 FN Length Fall Slope I.Area T.E. Base k EDD DIA Section Type Anto (min (m) (1:X) (ha) (min) Flow (L/z) (mm) SECT (mm) Design 2.000 42.344 0.374 113.2 0.068 4.00 0.0 0.00 0.600 o 223 Pipe/Conduit Network Results Table FN Rain T.C. US/HL ZI Area T.E. Base k EDD DIA Section Type Anto (m) (m) (1:X) (ha) (min) Flow (L/z) (L/z) (L/z) (L/z) (L/z) (L/z) (L/z) (m/z) (m/z) (m) (m/z) (m) SECT (mm) SECT (mm) Design 2.000 42.344 0.374 113.2 0.068 4.00 0.0 0.0 0.600 o 223 Pipe/Conduit Metwork Results Table FN Rain T.C. US/HL ZI Area T.E. Base Flow Mid Flow Vel Cap Flow (m/m) (m) (m) (m) (m) (m) (m) (m) Flow (L/z) (L/z	Dublin 7		Micro
File Network Site 2 and 3 20 Checked by Deirdre Walsh Network 2018.1.1 STORM SENER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Fipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (model - Scotland and Ireland Return Period (years) 2 Maximum Rainfall (min) 1000 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.000 Foul Bayes (1/s/Ma) 0.000 Min Vel for Auto Design only (m/s) 10.00 Foul Bayes (1/s/Ma) 0.000 Min Slope for Optimisation (1:X) 800 Designed with Level Inverts Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram at outfall (pipe 4.002) Time Area Diagram to the Area (mins) (ha) 0-4 0.034 0-4 0.034 4-8 0.006 Total Area Contributing (ha) = 0.060 Total Area Contributing (ha) = 0.060 Network Design Table for Site 3 : Catchment 4 PM Length Fall Slope I.Area T.E. Base k END DIA Section Type Auto (m) (m) (1:X) (ha) (mins) Flow (1/s) (m) SECT (m) 2.000 42.344 0.374 113.2 0.068 4.00 0.0 0.0 2.25 Fipe/	Date 04/10/2021 14:54	Designed by Grant Humphrey	Drainago
Innovyre Network 2018.1.1 STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Figs Rainfall Model - Scotland and Ireland FIMP (%) 75 Design Criteria for Site 3 : Catchment 4 Figs Rainfall Model - Scotland and Ireland Return Period (years)	File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Pipe Sizes STAUDARD Manhole Sizes STAUDARD TSR Rainfall Modi - Scoland and Ireland Return Period (years) 2 Marinam Rainfall (mm/hr) NS-60 (mm) 16.200 Maximum Rainfall (mm/hr) Maximum Rainfall (m	Innovyze	Network 2018.1.1	
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Site 3 : Catchment 4 Pipe Sizes STANDAD Manhole Sizes STANDAD TSR Rainfall Model - Scotland and Ireland Return Period (years) 2 FIMP (%) 75 Ms-50 (um) 16.200 Add Flow / Climate Change (%) 20 Ratio R 0.722 Minimum Backdrop Height (m) 0.200 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.000 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Volumetric Runoff Coeff. 1.000 Min Vel for Auto Design only (m/s) 1.00 Designed with Level Inverts Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Diagram at outfall (pipe 4.002) Time Area [mins] (ha] 0-4 0.084 4-8 0.006 Total Area Contributing (ha) = 0.000 Total Fipe Volume (m ³) = 1.807 Metwork Design Table for Site 3 : Catchment 4 PM Length Fall Slope IArea T.E. Base k EVD DIA Section Type Auto (m) (m) (1.2) (ha) (mins) Flow (L/s) (m) SECT (m) Design 2.000 42.344 0.374 113.2 0.068 4.00 0.0 0.00 0 225 Pipe/Conduit Metwork Results Table PM Rain T.C. US/HL E I.Area E Base Foul Add Flow Vel Cap Flow (m/Ar) (mins) (m) (ha) Flow (L/s) (L/s) (L/s) (L/s) (L/s) (L/s) 2.000 50.00 4.87 68.815 0.068 0.0 0.0 0.2 4 1.23 48.8 14.6 @1982-2018 Innovvre			
Design Criteria for Site 3 : Catchment 4 Fipe Sizes STANDARD Manhole Sizes STANDARD FIRE Fainfall Model - Scotland and Ireland FIRE Fainfall Model - Scotland and Ireland Return Period (years) 2 Mis-60 (mm) 16.000 Maximum Rainfall (mm/hr) 100 Maximum Rainfall (mm/hr) 1000 Maximum Rainfall (mm/hr) 1000 Maximum Rainfall (mm/hr) 100 Maximum Rainfall (mm/hr) 1000 Maximum Rainfall (mm/hr) Interno Maximum Rainfall for Site 3 : Catchment 4 at outfall (pipe 2.004) Time Area Maximum Rainfall for Site 3 : Catchment 4 at outfall (pipe 2.004	STORM SEWER DESIGN	by the Modified Rational Method	
Fipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - Scotland and Ireland Return Period (years) 2 Masimum Rainfall (mm/hr) 100 Maximum Backdrop Height (m) 0.200 Maximum Time of Concentration (mins) 30 Min Design Depth for Optimisation (m) 1.000 Foul Sewage (1/s/ha) 0.000 Min Nel for Auto Design only (m/s) 1.000 Volumetric Runoff Coff. 1.000 Min Nel for Auto Design only (m/s) 1.000 Designed with Level Inverts Time Area Diagram for Site 3 : Catchment 4 at outfall (pipe 2.004) Maximum Time of Concentration (m) (mins) (ha) 0-4 0.524 4-8 0.149 Total Area Contributing (ha) = 0.673 Total Fipe Volume (m ³) = 13.596 Time Area Diagram at outfall (pipe 4.002) Time Area Diagram at outfall (pipe 4.002) Total Area Contributing (ha) = 0.060 Total Area Contributing (ha) = 0.060 Total Area Contributing (ha) = 0.060 Total Area Contributing (ha) = 0.000 Total Pipe Volume (m ³) = 1.887 Metwork Design Table for Site 3 : Catchment 4 PN Length Fall Slope LArea 7.E. Base k END DIA Section Type Anto (m) (m) (1:X) (ha) (mins) Flow (L/s) (m) SECT (m) Design 2.000 42.344 0.374 113.2 0.068 4.00 0.00 0.00 0.225 Fipe/Conduit Metwork Results Table PN Rain 7.C. US/H E LArea F Base Foul Add Flow Vel Cap Flow (m/Ar) (mins) (m) (ha) Flow (L/s) (L/	Design Criteri	a for Site 3 : Catchment 4	
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Network Results Table PN Rain T.C. US/IL E I.Area E Base Foul Add Flow Vel Cap Flow (mm/hr) (mins) (m) (ha) Flow (1/s)	2.000 42.344 0.374 113.2 0.068 4	.00 0.000.000 o 225 Pipe/Con	duit o
PN Rain T.C. US/IL E I.Area E Base Foul Add Flow Vel Cap Flow (mm/hr) (mins) (m) (ha) Flow (l/s) (l/s) (m/s) (l/s) (l/s) <td>Netwo</td> <td>ork Results Table</td> <td></td>	Netwo	ork Results Table	
(mm/hr) (mins) (m) (ha) Flow (1/s) (1/s) (1/s) (m/s) (1/s) (1/s) 2.000 50.00 4.57 69.815 0.068 0.0 0.0 2.4 1.23 48.8 14.6 ©1982-2018 Innovvze	PN Rain T.C. US/IL E I.A	rea E Base Foul Add Flow Vel Ca	ap Flow
2.000 50.00 4.57 69.815 0.068 0.0 0.0 2.4 1.23 48.8 14.6 ©1982-2018 Innovvze	(mm/hr) (mins) (m) (ha) Flow (1/s) (1/s) (1/s) (m/s) (1	/s) (l/s)
©1982-2018 Innovvze	2.000 50.00 4.57 69.815 0.	068 0.0 0.0 2.4 1.23 4	8.8 14.6
	©198	2-2018 Innovyze	

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December 2021

/0102-001													
DBFL C	onsult:	ing E	ngine	ers								Pag	je 2
Ormond	House				1	Hollys	town						
Upper (Ormond	Quay											-
Dublin	7											M	CCO.
Date 0	4/10/2	021 1	4:54		1	Design	ed by	Grant	t Hum	phre	Y		
File No	etwork	Site	2 an	d 3 20		Checke	d by	Deird	re Wa	lsh	_	U	amaye
Innovy	ze				1	Networ	k 201	8.1.1					
		Ne	tworl	c Desig	yn Tak	le fo	r Site	: 3	Catel	hmen	t 4		
PN	Length	Fall	Slope	I.Area	T.E.	в	ase	k	HYD	DIA	Secti	on Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins) Flow	(1/s)	(mm)	SECT	(mm)			Design
2.001	16.204	0.066	245.5	0.151	0.0	0	0.0	0.600		300	Pipe/	Conduit	
2.002	14.408	0.044	327.5	0.069	0.0	0	0.0	0.600	0	375	Pipe/	Conduit	i 🚺
											_	_	-
3.000	23.292	0.137	240 0	0.041	4.0	0	0.0	0.600	°.	225	Pipe/	Conduit Conduit	1 👖 🗌
3.002	70.501	0.287	245.6	0.065	0.0	0	0.0	0.600	ő	300	Pipe/	Conduit	i 🛔
											-		-
2.003	8.639	0.062	139.3	0.074	0.0	0	0.0	0.600	•	450	Pipe/	Conduit Conduit	: 🛔 –
2.004	0.010	0.005	354.0	0.000	0.0		0.0	0.000		400	ripe/	Conduin	
4.000	8.192	0.048	170.7	0.012	4.0	0	0.0	0.600	۰	225	Pipe/	Conduit	•
5.000	14.100	0.083	169.9	0.030	4.0	0	0.0	0.600	۰	225	Pipe/	Conduit	•
4.001	10.414	0.043	242.2	0.003	0.0	0	0.0	0.600	0	300	Pipe/	Conduit	÷ 🍦 –
4.002	3.742	0.016	240.1	0.000	0.0	0	0.0	0.600	0	300	Pipe/	Conduit	° 🗗
				1	Vetwor	k Res	ults 1	Table					
Pl	Rai	in T	.c.	US/IL	E I.Are	ea Σ	Base	Foul	Add 1	low	Vel	Сар	Flow
	(mm/	hr) (m	ins)	(m)	(ha)	Flow	(1/s)	(1/s)	(1/	s)	(m/s)	(1/s)	(1/s)
2.0	01 49	68	4 85	60 266	0.2	18					1 00	70.6	46.2
2.0	02 48	.12	5.09	69.225	0.2	87	0.0	0.0	1	10.0	1.00	110.0	59.9
3.0	00 50	.73	4.39	69.911 60 600	0.0	41 70	0.0	0.0		1.5	1.00	39.8	9.1
3.0	02 45	.55	5.88	69.621	0.14	43	0.0	0.0		4.7	1.00	70.6	28.3
2.0	03 45	.30	5.96	69.106	0.5	05	0.0	0.0	1	16.5	1.72	273.6	99.1
2.0	04 40	.13	0.02	09.044	0.5	5	0.0	0.0		.0.5	1.02	101.9	99.1
4.0	00 51	.76	4.14	69.210	0.0	12	0.0	0.0		0.4	1.00	39.7	2.7
5.0	00 51	.35	4.23	69.245	0.0	30	0.0	0.0		1.1	1.00	39.8	6.7
4.0	01 50	.65	4.41	69.087	0.04	45	0.0	0.0		1.6	1.01	71.1	9.9
4.0	02 50	.41	4.47	69.044	0.04	45	0.0	0.0		1.6	1.01	71.4	9.9

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DBFL C	onsult	ing E	ngine	ers						Page 3			
Ormond	House				Holly	ystowr	1						
Upper (Ormond	Quay											
Dublin	7									Micco	100		
Date 0	4/10/2	021 14	4:54		Desig	gned k	oy Grant	Humphrey		Draina	no.		
File No	etwork	Site	2 an	d 3 20.	Check	ked by	7 Deirdre	Walsh		Digitic	ЧĽ.		
Innovy	ze				Netwo	ork 20	018.1.1						
		1	íanho.	le Sche	edules fo	r Site	e 3 : Cat	chment 4					
			I			I			I				
Name	CL (m)	Denth	Cont	nn	Diam LtW	DN	Towert	Diameter	DN	Towert	Dier		Backdron
areanc.	C12 (11)	(m)		ice citon	(mm)		Level (m)	(mm)		Level (m)	(п	m)	(mm)
											-		
3G3	71.540	1.725	Open	Manhole	1200	2.000	69.815	225					
SG2	71.012	1.646	Open	Manhole	1200	2.001	69.366	300	2.000	69.441		225	
SG1	70.560	1.335	Open	Manhole	1350	2.002	69.225	375	2.001	69.300		300	
3G0-4	71.397	1.486	Open	Manhole	1200	3.000	69.911	225					
3G0-2	71.290	1.591	Open	Manhole	1200	3.001	69.699	300	3.000	69.774		225	
3G0-1	71.460	1.839	Open	Manhole	1200	3.002	69.621	300	3.001	69.621		300	
SG0	71.400	2.294	Open	Manhole	1350	2.003	69.106	450	2.002	69.181		375	
									3.002	69.334		300	78
TANK	70.600	1.556	Open	Manhole	300	2.004	69.044	450	2.003	69.044		450	
	70.600	1.565	Open	Manhole	0		OUTFALL		2.004	69.035		450	
3G0-1-3	70.620	1.410	Open	Manhole	1200	4.000	69.210	225					
SG0-1-2	70.780	1.535	Open	Manhole	1200	5.000	69.245	225					
SG0-1-1	70.800	1.713	Open	Manhole	1200	4.001	69.087	300	4.000	69.162		225	
									5.000	69.162		225	75
TANK	70.600	1.556	Open	Manhole	300	4.002	69.044	300	4.001	69.044		300	
	70.600	1.572	Open	Manhole	0		OUTFALL		4.002	69.028		300	
	-	-	-			-			-				

December 2021

DBFL C	onsu	lting	Engi	neers					Page 4		
Ormond	Drmond House Hollystown										
Upper Ormond Quay											
Dublin	Micco										
Date 0											
File N	urainage										
Innovy	Innovyze Network 2018.1.1										
			PIPE	LINE SC	HEDULA	ES for Si	te 3 :	Catchment	4		
									-		
					Ups	tream Ma	nhole				
	DM	Head	Diem	MH (Level	T Level I	Denth	ME	MEDIAM L+W		
	20	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)		
		_									
	2.00	0 0	225	SG3	71.540	69.815	1.500 (Open Manhole	1200		
	2.00	2 0	375	3G1	70.560	69.225	0.960 (Open Manhole Open Manhole	1250		
	3.00	0 0	225	3G0-4	71.397	69.911	1.261 (Open Manhole	1200		
	3.00	1 0	300	3G0-2	71.290	69.699	1.291 (Open Manhole	1200		
	3.00	2 0	300	3G0-1	71.460	69.621	1.539 (Open Manhole	1200		
	2.00	3 0	450	3G0	71.400	69.106	1.844 (Open Manhole	1350		
	2.00	4 o	450	TANK	70.600	69.044	1.106 (Open Manhole	300		
	4.00	0 0	225	3G0-1-3	70.620	69.210	1.185 (Open Manhole	1200		
	5.00	0 0	225	3G0-1-2	70.780	69.245	1.235 (Open Manhole	1200		
	4.00	1 0 2 0	300	3G0-1-1 TANK	70.800	69.087	1.413 (Open Manhole Open Manhole	300		
					Down	istream M	anhole				
	PN	Length	Slope	e MH	C.Leve	el I.Level	D.Depth	MH	MH DIAM., L*W		
		(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)		
2	.000	42.344	113.3	2 3G2	71.0	12 69.441	1.346	Open Manhole	1200		
2	.001	16.204	245.8	5 3G1	70.5	60 69.300	0.960	Open Manhole	1350		
2	.002	14.408	327.3	5 3G0	71.4	69.181	1.844	Open Manhole	1350		
	000	22 202	170 (860-2	71.94	00 60 774	1 201	Onen Manhala	1200		
3	.001	18,787	240.0	9 SG0-1	71.4	60 69.621	1.5291	Open Manhole	1200		
3	.002	70.501	245.0	5 3G0	71.4	00 69.334	1.766	Open Manhole	1350		
2	.003	8.639	139.3	s TANK	70.6	00 69.044	1.106	Open Manhole	300		
²	.004	0.090	054.1		70.0	05.035	1.115	open Mannole	, u		
4	.000	8.192	170.1	7 SG0-1-1	70.8	00 69.162	1.413	Open Manhole	1200		
5	.000	14.100	169.9	9 SG0-1-1	70.8	00 69.162	1.338	Open Manhole	1200		
4	.001	10.414	242.2	2 TANK	70.6	69.044	1.256	Open Manhole	300		
4	.002	3.742	240.1	1	70.6	69.028	1.272	Open Manhole	: 0		
					©1983	2-2018 Ir	novyze				

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DBFL Consulting Engineers		Page 5							
Ormond House	Hollystown								
Upper Ormond Quay									
Dublin 7		Micco							
Date 04/10/2021 14:54	Designed by Grant Humphrey	Desinado							
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage							
Innovyze	Network 2018.1.1								
-									
Area Summary	for Site 3 : Catchment 4								
Pipe PIMP PIMP PI	MP Gross Imp. Pipe Total								
Number Type Name (t) Area (ha) Area (ha) (ha)								
2.000	75 0.090 0.068 0.068								
2.001	75 0.201 0.151 0.151								
2.002	75 0.092 0.069 0.069								
3.000	75 0.055 0.041 0.041								
3.001	75 0.086 0.065 0.065								
2 002	75 0.099 0.074 0.074								
2.004	75 0.000 0.000 0.000								
4.000	75 0.016 0.012 0.012								
5.000	75 0.040 0.030 0.030								
4.001	75 0.004 0.003 0.003								
4.002	75 0.000 0.000 0.000								
	Total Total Total								
	0.733 0.550 0.550								
Erec Flouing Outfall	Details for Site 2 . Catabrant 4								
Free Flowing Outlail	becalls for site 3 . Catchment 4								
Outfall Outfall C	Level I Level Min D L W								
Dine Number Name	(m) (m) T Level (mm) (mm)								
ripe number nume	(m) (m) (mm) (mm)								
	()								
2.004	70.600 69.035 0.000 0 0								
The Station Control									
Free Flowing Outfall	Details for Site 3 : Catchment 4								
Outfall Outfall (Level I Level Min D L W								
Dine Number Name	(m) (m) T Level (mm) (mm)								
ripe number mane	(m) (m) (mm) (mm)								
	()								
4.002	70.600 69.028 0.000 0 0								
Simulation Crite	ria for Site 3 : Catchment 4								
Malumateria Durante C. C.		0.000							
Volumetric Runoff Coeff	0.050 Additional Flow - % of Total Flo 1 000 MADD Factor % 10m3/ba Stores	aw 0.000							
Hot Start (mins)	0 Inlet Coefficier	at 0.800							
Hot Start Level (mm)	0 Flow per Person per Dav (1/per/dav	7) 0.000							
Manhole Headloss Coeff (Global)	0.500 Run Time (mins	s) 60							
Foul Sewage per hectare (1/s)	0.000 Output Interval (mins	s) 1							
Number of Input Hydrogr	apns U Number of Storage Structures 2								
Number of Online Cont	rols 2 Number of Time/Area Diagrams 0								
Manber of Offline Cont	1015 C Munder Of Next Time Controls 0								
Sunthet	ic Rainfall Details								
Synthetic Rainfall Details									
Rainfall Model FSR Region Scotland and Ireland									
Return Period (years) 2 M5-60 (mm) 16.200									
-									
(B1 Q)	82-2018 Innovyze								
010									

DBFL Consulting Engineers		Page 6
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micco
Date 04/10/2021 14:54	Designed by Grant Humphrey	MILIU
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Drainage
Innouvea	Network 2018 1 1	
Innovyze	Network 2010.1.1	
Complete	ic Dainfall Details	
Synchec	ic Rainiall Decalls	
Ratio R 0 2	72 Cv (Winter) 0.840	
Profile Type Wint	ter Storm Duration (mins) 30	
Cv (Summer) 0.1	750	
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DBFL Consul	ting Engi	neers					Page 7				
Ormond Hous	e		Hollvst	own							
Upper Ormon	d Ouav										
Dublin 7	a gaay										
Dabiin /	2021 14-5	4	Decimo	d ber Cro	nt Uumph		MICLO				
Date 04/10/	2021 14.5	7	Charlend	u by Gra	nt Humph	rey	Drainage				
File Networ	x Site 2	and 3 20	Checked	by Deir	dre Wals	n					
Innovyze			Network	2018.1.	1						
Hydro-	Online Controls for Site 3 : Catchment 4 Hydro-Brake® Optimum Manhole: TANK, DS/PN: 2.004, Volume (m³): 1.4										
		Uni	t Referenc	e MD-SHE-0	072-2300-1	1000-2300					
		Desi	.gn Head (m)		1.000					
		Design	Flush-Flo) 54	C	alculated					
			Objectiv	. Minimis	e upstread	a storage					
			Applicatio	n -		Surface					
		Sur	mp Availabl	•		Yes					
		Di	ameter (mm)		72					
	Minimum O	Inver Dine Dine Di	t Level (m			69.044					
	Suggest	ed Manhole Di	ameter (mm			1200					
				·							
		Control P	oints	Head (m)	Flow (1/s)					
	De	sign Point ((Calculated)	1.000	2.	3					
		-	Flush-Flo [®]	0.307	2.	3					
			Kick-Flo®	0.625	1.	9					
	Me	ean Flow over	Head Range	-	2.	0					
The hydrolo Hydro-Brake Hydro-Brake invalidated	gical calcu © Optimum a : Optimum® b 	lations have s specified. e utilised th	been based Should an Men these s	on the He other type torage rou	ad/Dischar of contro ting calcu	rge relatio ol device o xlations wi	nship for the ther than a 11 be				
Depth (m)	Flow (1/s)	Depth (m) Flo	ow (1/s) De	pth (m) F	low (1/s)	Depth (m)	Flow (1/s)				
0 100	1.9	1 200	2.5	2 000	2.8	7 000	5.7				
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9				
0.300	2.3	1.600	2.9	4.000	4.4	8.000	6.0				
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2				
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4				
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6				
1.000	2.1	2.400	3.9	6.000	5.3						
1.000	2.0	2.000	0.0	0.000	0.0						
Hydro-	Brake@ Op	timum Manho	le: TANK,	DS/PN:	4.002, V	olume (m³): 0.8				
		Uni	t Referenc	e MD-SHE-0	072-2300-1	1000-2300					
		Design	gn nead (m Flow (l/e			2.2					
		Design	Flush-Flo	54	C	alculated					
			Objectiv	. Minimis	e upstread	a storage					
			Applicatio	n	-	Surface					
	Sump Available Yes										
Diameter (mm) 72											
Invert Level (m) 69.044											
	Suggested Manhole Diameter (mm) 100 1200										
				-							
		@1.0	982-2019	Innource							
		81.					I				

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DBFL Consultin	ng Engin	neers					Page 8
Ormond House			Holly	stown			
Upper Ormond (Quay						
Dublin 7							Micco
Date 04/10/202	21 14:54	4	Desig	ned by Gr	ant Humph	rey	Desinado
File Network S	Site 2 a	and 3 20.	Check	ed by Dei	rdre Wals	h	Diamage
Innovyze			Netwo	rk 2018.1	1		
Hydro-Bra	ake© Opt	imum Man	hole: TAN	K, DS/PN:	: 4.002, V	olume (m	3): 0.8
		Contro.	I Points	nead (r	a) Flow (1/3	.)	
	De	sign Point	(Calculate	ed) 1.00	10 2.	.3	
			Flush-Fl	lo™ 0.30	07 2. 25 1	.3	
	Me	an Flow ov	er Head Ran	1040 0.02 1040	- 2.	.0	
				-			
The hydrologic	al calcu	lations ha	ve been bas	ed on the	Head/Discha	rge relatio	onship for the
Hydro-Brake Op	timum@ b	s specifie e utilised	then these	storage r	pe or contr outing calc	ulations wi	ill be
invalidated				-	-		
			-	D	-	D	
Depth (m) Flo	W (1/s)	Depth (m)	Flow (1/s)	Depth (m)	Flow (1/s)	Depth (m)	Flow (1/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.6
1 000	2.1	2.400	3.4	6.000	5.3		
1.000		2.000	0.0	0.000	0.0		
			21.000 000				
		0	91982-2010	s Innovyz	e		

Site 3: Catchment Area 5

Surface Water Network

Impermeability Factor (%): 52.6

DBFL Consulting Engineers		Page 1										
Ormond House	Hollystown											
Upper Ormond Quay												
Dublin 7		Micro										
Date 04/10/2021 14:54	Designed by Grant Humphrey	Drainago										
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Diamage										
Innovyze	Network 2018.1.1											
STORM SEWER DESIGN	by the Modified Rational Method											
Design Criter	ia for Site 3 : Catchment 5											
Pipe Sizes STANDARD Manhole Sizes STANDARD												
FSR Rainfall Model - Scotland and Ireland												
Return Period (years) 2 PIMP (%) 75 M5-60 (mm) 16 200 Add Flow (Climate Change (%) 20												
Ratio B	0.272 Minimum Backdrop Heigh	tt (m) 0.200										
Maximum Rainfall (mm/hr)	100 Maximum Backdrop Heigh	t (m) 2.000										
Maximum Time of Concentration (mins) Foul Server (1/s/ba)	30 Min Design Depth for Optimisatio	(m(m) 1.200)										
Volumetric Runoff Coeff.	1.000 Min Slope for Optimisation	(1:X) 500										
Desig	ed with Level Inverts											
Time Area Diag	ram for Site 3 : Catchment 5											
Time Area Time Area (mins) (ha) (mins) (ha)												
(mens) (nuch (nuch												
0-4 0.441 4-8 0.523												
Total Brea Contribution $(h_{2}) = 0.064$												
Total P	ipe Volume (m³) = 75.928											
Network Design 1	able for Site 3 : Catchment 5											
		_										
PN Length Fall Slope I.Area T	E. Base k HYD DIA Section !	Type Auto Design										
(m) (m) (1.x) (ma) (m	uis) Flow (1/s) (num) SECI (num)	Design										
2.000 24.576 0.376 65.4 0.106	1.00 0.0 0.600 o 225 Pipe/Cond	duit 💧										
2.001 30.342 0.124 244.7 0.064	0.00 0.0000 0 300 Pipe/Cond	duit duit										
2.003 19.073 0.078 244.5 0.057	0.00 0.000.600 o 300 Pipe/Cond	duit a										
	•	-										
3.000 14.598 0.058 251.7 0.000	1.00 5.7 0.600 o 300 Pipe/Cond	duit 👸										
3.001 43.303 0.173 230.0 0.000	0.0 0.000 0 200 Fipe/com											
Netv	ork Results Table											
PN Rain TC US/IL T	Area E Base Foul Add Flow Vel C-	n Flow										
(mm/hr) (mins) (m) (h	a) Flow (1/s) (1/s) (1/s) (m/s) (1/	(1/s)										
2 000 51 27 4 25 40 440 0	106 00 00 28 1 62 64	4 22 5										
2.001 49.30 4.76 69.189 0												
2.002 46.62 5.54 69.065 0	.243 0.0 0.0 8.2 1.00 70	.7 49.1										
2.003 45.62 5.85 68.875 0	.300 0.0 0.0 9.9 1.00 70	.8 59.3										
	000 57 0.0 1.1 0.00 00											
3.001 48.51 4.98 69.612 0	.000 5.7 0.0 1.1 0.99 69	0.0 6.8										
(B) 9	82-2018 Innovyze											

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DEFT		ting 1	Inging							Day	20.2
DBEL	Jonsult	ang i	sngine	ers						Fa	ge 2
Ormond	1 House	•			но	llystown					
Upper	Ormono	1 Quay	7								
Dublir	n 7									M	icro
Date (04/10/2	2021 1	14:54		De	signed by	Grant	: Humphr	еу	Dr	ainane
File 1	Networl	c Site	e 2 an	d 3 20.	Ch	ecked by I)eird:	ce Walsh			uniuge
Innovy	/ze				Ne	twork 2018	3.1.1				
		N	etworl	c Desig	n Table	e for Site	3 :	Catchmer	nt 5		
PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD DIA	Sect:	ion Typ	e Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow (1/s)	(mm)	SECT (mm)		Design
3.002	21.200	0.085	250.	0.000	0.00	0.0	0.600	o 30	0 Pipe,	/Condui	t 💣
3.003	39.758	0.098	405.	0.000	0.00	32.3	0.600	o 45	0 Pipe,	/Condui	t 🗗 🛛
3.004	40.569	0.100	405.	0 0.000	0.00	0.0	0.600	o 45	0 Pipe,	/Condui	ិ 💆 🛛
3.005	25.558	0.063	405.	0 0.000	0.00	0.0	0.600	0 45	0 Pipe, 0 Dipe	/Condui /Condui	· •
3.007	22.864	0.056	405.	0.000	0.00	0.0	0.600	o 45	0 Pipe	/Condui	
3.008	22.366	0.056	400.	0.000	0.00	0.0	0.600	o 45	0 Pipe	/Condui	t 👸
3.009	5.911	0.058	101.	9 0.000	0.00	0.0	0.600	o 45	0 Pipe	/Condui	* 谢 -
3.010	91.209	0.222	410.	9 0.132	0.00	2.3	0.600	o 45	0 Pipe,	/Condui	t 🚺
2.004	21,924	0.046	481.	7 0.000	0.00	0.0	0.600	o 45	0 Pipe	/Condui	t
2.005	45.302	0.111	408.	1 0.074	0.00	0.0	0.600	o 45	0 Pipe	/Condui	t 🚺
									-		-
4.000	22.859	0.093	245.	0 0.056	4.00	0.0	0.600	o 30	0 Pipe,	/Condui	.t. 🖠
4.001	8 876	0.207	245.	0 0.000 0 0 000	0.00	0.0	0.600	0 30	0 Pipe, 0 Dine	/Condui /Condui	5
4.003	21.423	0.088	242.	6 0.021	0.00	0.0	0.600	0 30	0 Pipe	/Condui	
											•
2.006	5.281	0.020	264.	0 0.041	0.00	0.0	0.600	o 45	0 Pipe,	/Condui	t 🔋
2.007	5.000	0.001	5000.	0 0.000	0.00	0.0	0.600	o 45	0 Pipe,	/Condui	t 🗗
				м	otuork	Peculte T	able				
					COWOLA	10550205 1	CONTE				
1	PN Re	in	T.C.	US/IL E	I.Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow
	(mm	/hr) (mins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/s)	(m/s)	(1/s)	(1/s)
2	002 4		5 00	60.400	0.000				0.00	70.0	e 0
3.	002 4	5.20	5.99	69.354	0.000	38.0	0.0	7.6	1.00	159.7	45.6
3.	004 4	3.30	6.67	69.256	0.000	38.0	0.0	7.6	1.00	159.7	45.6
3.	005 4	2.20	7.09	69.156	0.000	38.0	0.0	7.6	1.00	159.7	45.6
3.	006 4	1.32	7.45	69.093	0.000	38.0	0.0	7.6	1.00	159.7	45.6
3.	007 4	0.44	7.83	69.039	0.000	38.0	0.0	7.6	1.00	159.7	45.6
3.	008 3	9.03	8.24	68 927	0.000	30.0	0.0	7.0	2 01	220.2	45.6
3.	010 3	6.59	9.77	68.869	0.132	40.3	0.0	11.5	1.00	158.5	69.3
2.	004 3	5.91	10.17	68.647	0.432	40.3	0.0	19.3	0.92	146.3	115.6
2.	005 3	4.70	10.92	68.601	0.506	40.3	0.0	20.7	1.00	159.1	124.4
4	000 5	0.76	4 28	69 050	0.056	0.0	0.0	2 1	1 00	70 7	12 4
4.	001 4	7.64	5.23	68.957	0.056	0.0	0.0	2.1	1.00	70.7	12.4
4.	002 4	7.20	5.36	68.749	0.155	0.0	0.0	5.3	1.15	81.5	31.8
4.	003 4	6.06	5.71	68.701	0.176	0.0	0.0	5.9	1.00	71.0	35.2
	0.06 2	4 50	10 00	68 490	0 799	40.0	0.0	24.1	1 95	109.2	156.7
2.	007 5	1.08	4.30	68.470	0.000	42.3	0.0	7.1	0.28	44.2	42.3
					81002-1	2010 Tanar					

DBFL Co	nsulti	ng En		Page 3							
Ormond	House			Holly	stown						
Upper O	rmond	Quay									
Dublin	7								Micco		
Date 04	/10/20	21 14	:54	Desig	ned by	7 Grant H	umphrey		Desinat		
File Ne	twork	Site 3	2 and 3 20.	Check	ed by	Deirdre	Walsh		Digition	je	
Innovyz	e			Netwo	rk 201	18.1.1				_	
										-	
		Ma	anhole Sched	dules for	Site	3 : Cato	hment 5				
MH	MH	MH	ME	MH		Pipe Out			Pipes In		
Name	CL (m)	Depth	Connection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	Diamete	er Backdrop
		(m)		(mm)		Level (m)	(mm)		Devel (m)	(1111)	(mm)
				1000							
510	71.140	1.500	Open Manhole	1200	2.000	09.040	225				
385	70.950	1.761	Open Manhole	1200	2.001	69.189	300	2.000	69.264	21	25
584	70.780	1.715	Open Manhole	1200	2.002	69.065	300	2.001	69.065	3	10
313	70.935	1.000	Open Manhole	1200	2.003	68.875	300	2.002	08.875	3	
33-C1-12 82-C1-11	71.054	1.304	Open Manhole	1200	3.000	69.670	300	2 000	60 610		10
53-CI-II	71.394	1.702	Open Manhole	1200	3.001	69.012	200	3.000	69.012	3	20
82-01-0	71.393	1.955	Open Manhole	1200	3.002	60 254	450	2 002	60 254	2	20
00 01 0	71.200	2 224	Open Manhole	1050	3.003	60.054	450	2.002	60.054		
82-C1-0	71.400	2.223	Open Manhole	1350	2 005	60 156	450	2 004	60 156		50
82-C1-6	71 140	2.056	Open Manhole	1250	2 006	60 000	450	2 005	60 002	4	50
32-C1-5	71 242	2 202	Open Manhole	1250	2 007	69.039	450	2 006	60 020	4	50
53-C1-4	71 066	2 082	Open Manhole	1350	3 008	68 982	450	3 007	68 982	4	50
53-C1-3	71.046	2.119	Open Manhole	1350	3.009	68,927	450	3.008	68.927	4	50
SH2-1	70.850	1.981	Open Manhole	1350	3.010	68.869	450	3.009	68.869	4	50
SH2	70.081	1.434	Open Manhole	1350	2.004	68.647	450	2.003	68.797	3	00
			-					3.010	68.647	43	50
SH1	70.240	1.639	Open Manhole	1350	2.005	68.601	450	2.004	68.601	43	50
SH0-4	70.467	1.417	Open Manhole	1200	4.000	69.050	300				
SH0-3	70.620	1.663	Open Manhole	1200	4.001	68.957	300	4.000	68.957	3	00
SH0-2	70.510	1.761	Open Manhole	1200	4.002	68.749	300	4.001	68.749	3	00
SH0-1	70.450	1.749	Open Manhole	1200	4.003	68.701	300	4.002	68.701	3	00
SHO	69.372	0.882	Open Manhole	1350	2.006	68.490	450	2.005	68.490	4	50
								4.003	68.613	3	00
BASIN	70.240	1.770	Open Manhole	1350	2.007	68.470	450	2.006	68.470	4	50
	70.280	1.811	Open Manhole	0		OUTFALL		2.007	68.469	4	50
	1	1	1	I	1			I			I
			C	1982-2018	3 Inno	vyze					

DBFL Consu	lting	Engi	neers						Page 4
Ormond Hou	se			1	Hollysto	wn			
Upper Ormo	nd Qu	ay							
Dublin 7									Micco
Date 04/10	/2021	14:5	4		Designed	by Gra	nt Humphrey	,	MILLU
File Netwo	-1- 04	2	- 		Chaolead	her Daie	dwa Walab		Drainage
File Netwo:	rk Si	te z	and 3 20		Unecked	by Deir	dre walsn		
Innovyze					Network	2018.1.	1		
		PIPE	LINE SCH	EDUL	ES for S	ite 3 :	Catchment	5	
				Ups	tream Ma	nhole			
PN	Hyd	Diam	ин с	Level	l I.Level	D.Depth	MH	MH DIAM	., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(ma	ı)
2 000		225	396	71 14	n eo ean	1 275	Open Manhole		1200
2.001	š	300	SH5	70.95	0 69.189	1.461	Open Manhole		1200
2.002		300	SH4	70.78	69.065	1.415	Open Manhole		1200
2.003		300	SH3	70.43	5 68.875	1.260	Open Manhole		1200
							-		
3.000	0	300	53-C1-12	71.05	69.670	1.084	Open Manhole		1200
3.001	0	300	53-C1-11	71.39	4 69.612	1.482	Open Manhole		1200
3.002	0	300	53-C1-10	71.39	3 69.439	1.655	Open Manhole		1200
3.003	0	450	33-C1-9	71.28	8 69.354	1.484	Open Manhole		1350
3.004	0	450	33-C1-8	71.48	0 69.256	1.774	Open Manhole		1350
3.005	0	450	S3-C1-7	71.69	8 69.156	2.092	Open Manhole		1350
3.006	0	450	33-C1-6	71.14	9 69.093	1.606	Open Manhole		1350
3.007	0	450	33-C1-5	71.24	2 69.039	1.752	Open Manhole		1350
3.008	0	450	33-C1-4	71.06	6 68.983	1.633	Open Manhole		1350
3.009	•	450	53-CI-3	71.040	6 68.927	1.669	Open Manhole		1350
3.010	•	400	542-1	/0.05	0 00.009	1.081	open Mannole		1350
2.004		450	SH2	70.08	1 68 647	0.984	Open Manhole		1350
2.005		450	SH1	70.24	0 68,601	1.189	Open Manhole		1350
	-						•		
4.000	•	300	SH0-4	70.46	7 69.050	1.117	Open Manhole		1200
				Down	stream M	lanhole			
PN 1	Gength	Slope	MH	C.Lev	el I.Leve	1 D.Dept	h MH	MH DIA	M., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	6	mm)
2 000		e = 1	075	70.0	50 60 26	4 1 46	1 Onen Manhal	_	1200
2.000 2	24.3/0	244 7	984	70.3	00 69.20 180 60 06	5 1 41	1 Open Manhol 5 Open Manhol	-	1200
2 002	46 590	245 2	5H2	70.4	25 68 87	5 1 26	0 Open Manhol	-	1200
2.003	19.073	244.5	382	70.0	81 68.79	7 0.98	4 Open Manhol		1350
3.000	14.598	251.7	33-C1-11	71.3	94 69.61	2 1.48	2 Open Manhol		1200
3.001	43.305	250.0	53-C1-10	71.3	93 69.43	9 1.65	5 Open Manhol	e	1200
3.002 3	21.200	250.0	53-C1-9	71.2	88 69.35	4 1.63	4 Open Manhol	e	1350
3.003	39.758	405.0	53-C1-8	71.4	80 69.25	6 1.77	4 Open Manhol	•	1350
3.004 4	40.569	405.0	33-C1-7	71.6	98 69.15	6 2.09	2 Open Manhol	e	1350
3.005 1	25.558	405.0	53-C1-6	71.1	49 69.09	3 1.60	6 Open Manhol	•	1350
3.006	21.499	405.0	33-C1-5	71.2	42 69.03	9 1.75	Z Open Manhol	e	1350
3.007 2	22.004	405.0	53-C1-4	71.0	00 08.98	a 1.63	3 Open Manhol	-	1350
3.008 3	22.366	400.0	53-C1-3	71.0	HO 68.92	7 1.66	9 Open Manhol	-	1350
3.009	0.911	410.0	302-1	70.8	00 00.00	9 1.53 7 0.09	4 Open Manhol 4 Open Manhol	-	1350
3.010	51.209	410.9	odz	70.0	00.04	/ 0.90	 open Mannol 	-	1990
2.004	21.924	481.7	SH1	70.2	40 68.60	1 1.18	9 Open Manhol		1350
2.005	45.302	408.1	SHO	69.3	72 68.49	0 0.43	2 Open Manhol	•	1350
4.000 2	22.859	245.0	SH0-3	70.6	20 68.95	7 1.36	3 Open Manhol	e	1200
				@1.0.01	2_2010 7				
				@T387	2-2018 1	nnovyze			

170182-DBFL-XX-XX-RP-C-007

December 2021

DBFL Consult	ing l	Engine	eers						Page 5			
Ormond House					Hollysto	wn.						
Upper Ormond	l Qua	Y										
Dublin 7									Micco			
Date 04/10/2	2021	14:54			Designed	by Gra	ant Humphre	У	Desinant			
File Network	Sit	e 2 ai	nd 3 2	0	Checked	by Dei	rdre Walsh		Diamari			
Innovyze					Network	2018.1	.1					
		PIPEL	INE SC	HEDUL	ES for Si	ite 3 :	: Catchment	5				
				Ups	stream Ma	nhole						
PN	Byd	Diam	ин с	Level	I.Level D	.Depth	ME 1	ME DIAM.,	L*W			
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)				
4.001	0	300 \$	3H0-3	70.620	68.957	1.363 (Open Manhole		1200			
4.002	•	300 3	3H0-2	70.510	68.749	1.461 (Open Manhole		1200			
4.003	•	300 3	580-1	70.450	68.701	1.449 (open Mannole		1200			
2.006	•	450	SHO	69.372	68.490	0.432 (Open Manhole		1350			
2.007	•	450 B	BASIN	70.240	68.470	1.320 (Open Manhole		1350			
				Down	nstream M	anhole						
PN L	ength (m)	Slope (1:X)	Name	C.Leve (m)	el I.Level (m)	D.Depti (m)	h MH Connection	MH DIAN (m	1., L≠W m)			
4 001 5	0 706	245.0		20 51	10 69 740	1 461	Onen Manhali		1200			
4.002	8.876	184.9	9 SH0-1	70.43	50 68.701	1.449	9 Open Manhold		1200			
4.003 2	1.423	242.6	5 SHO	69.3	72 68.613	0.460	0 Open Manhol	•	1350			
2,006	5.281	264.0	BASIN	70.24	40 68.470	1.320	Open Manholy		1250			
2.007	5.000	5000.0		70.28	80 68.469	1.36	1 Open Manhol		0			
				©198	2-2018 In	novyze	•					

DBFL Consulting Engin	eers					Page 6					
Ormond House		He	ollystown	1							
Upper Ormond Quay											
Dublin 7						Micro					
Date 04/10/2021 14:54		De	esigned b	v Grant	Humphrev	Designed					
File Network Site 2 a	nd 3 20	C	hecked by	- Deirdre	Walsh	urainage					
Innovyze		Ne	etwork 20	18 1 1							
1		-									
Δ.	ea Summ	arv fo	or Site 3	· Catchr	ment 5						
			2 0200 0								
Pipe	PIMP PIM	P PIMP	Gross	Imp.	Pipe Total						
Number	Type Nam	e (%)	Area (ha)	Area (ha)	(ha)						
2.000	-	- 75	0.141	0.106	0.106						
2.001	-	- 75	0.085	0.064	0.064						
2.002	_	- 75	0.076	0.057	0.057						
3.000	-	- 75	0.000	0.000	0.000						
3.001	-	- 75	0.000	0.000	0.000						
3.002	-	- 75	0.000	0.000	0.000						
3.003	-	- 75	0.000	0.000	0.000						
3.004	-	- 75	0.000	0.000	0.000						
3.005	-	- 75	0.000	0.000	0,000						
3.007	-	- 75	0.000	0.000	0.000						
3.008	-	- 75	0.000	0.000	0.000						
3.009	-	- 75	0.000	0.000	0.000						
3.010	-	- 75	0.176	0.132	0.132						
2.004	-	- 75	0.000	0.000	0.000						
2.005	-	- 75	0.098	0.074	0.074						
4.000	-	- 75	0.000	0.000	0.000						
4.002	-	- 75	0.132	0.099	0.099						
4.003	-	- 75	0.028	0.021	0.021						
2.006	-	- 75	0.055	0.041	0.041						
2.007	-	- 75	0.000	0.000	0.000						
			Total 0 064	Total 0 722	Total 0.722						
			0.504	0.728	0.728						
Free Flowi	ng Outf	all De	etails fo	r Site 3	: Catchment	5					
						-					
Outfall	1 Outfa	11 C. I	Gevel I. Le	evel Min	D,L W						
Pipe Num	ber Name	: 0	m) (m) I.Le	vel (mm) (mm)						
				(m)							
2 1	007	70	1 280 68	469 0 0	000 0 0						
Simul	ation Cr	iteri	a for Sit	:e 3 : Ca	tchment 5						
Volumetric F	Runoff Coe	ff 0.8	40 Addit	ional Flow	- % of Total F	'low 0.000					
Areal Reduc	tion Fact	or 1.0	00 M	ADD Factor	* 10m ³ /ha Stor	age 2.000					
Hot 3	Start (mir	15)	0	-	Inlet Coeffieci	ent 0.800					
Manhole Hendlore Con	ff (Globe	un) 1) 0 =	0 riow pe	r rerson p	er Day (1/per/d Run Time /~:	ay) 0.000 ns) 60					
Foul Sewage per he	ctare (1/	(s) 0.0	00	Outo	ut Interval (mi	ns) 1					
Tour bewaye per necoure (1/5) 0.000 Output interval (min5) 1											
Number of Input Hydrographs 0 Number of Storage Structures 1											
Number o	f Online	Control	ls 1 Number	r of Time/A	Area Diagrams O						
Number of	Offline	Control	.s U Number	r of Real 1	lime Controls 0						
	Com t	hatic	Dainfall	Dataila							
	aynt	metic	Aarmali	. Decaris							
	(B1982-	-2018 Inn	ovyze							
				-							

DBFL Consulting Engineers		Page 7
Ormond House	Hollystown	
Upper Ormond Quay		
Dublin 7		Micro
Date 04/10/2021 14:54	Designed by Grant Humphrey	Designation
File Network Site 2 and 3 20	Checked by Deirdre Walsh	Drainage
Innovyze	Network 2018.1.1	
Sunthet	ic Rainfall Details	
<u></u>		
Rainfall Model	FSR Profile Type Wi	nter
Return Period (years)	2 Cv (Summer) 0	.750
Region Scotlar	nd and Ireland Cv (Winter) 0	.840
M5-60 (mm)	16.200 Storm Duration (mins)	30
Katio K	0.272	
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DBFL Consulting Engineers					Page 8					
Ormond House	Hollysto	wn								
Upper Ormond Quay										
Dublin 7					Micco					
Date 04/10/2021 14:54	Designed	by Gra	nt Humph	rey	Desinano					
File Network Site 2 and 3 20	Checked	by Deir	dre Wals	h	Diamade					
Innovyze	Network	2018.1.	1		4					
Online Contro	ls for Sit	e 3 : 0	latchment	5						
Western Darahat Oraciana Marka		D.C. (1911)								
Hydro-Brakes Optimum Manno.	Le: BASIN,	DS/PN:	2.007,	/olume (m	13): 3.2					
Ini	t Reference	MD-SHE-0	1275-4220-1	1880-4220						
Desi	gn Head (m)			0.880						
Design	Flow (1/s)			42.3						
	Flush-Flo ^m	Minimi	C:	alculated						
	Application			Surface						
Sur	mp Available			Yes						
Di	ameter (mm)			275						
Minimum Outlet Pipe Di	ameter (mm)			300						
Suggested Manhole Di	ameter (mm)			1800						
Control P	oints	Head (m)	Flow (1/s	;)						
Design Point ()	Calculated)	0.880	42.	3						
	Flush-Flos	0.410	42.	2						
	Kick-Flo®	0.701	37.	9						
Mean flow over	Mean Flow over Head Range - 33.6									
The hydrological calculations have	been based	on the He	ad/Dischar	ge relatio	onship for the					
Hydro-Brake@ Optimum as specified.	Should ano	ther type	e of contro	ol device (other than a					
Hydro-Brake Optimum® be utilised th	en these st	orage rou	ting calc	alations wa	ill be					
Depth (m) Flow (1/s) Depth (m) Flo	ow (l/s) Dep	oth (m) I	low (l/s)	Depth (m)	Flow (1/s)					
0.100 8.7 1.200	49.1	3.000	76.5	7.000	115.6					
0.200 28.4 1.400	52.9	3.500	82.4	7.500	119.5					
0.300 41.4 1.600	56.4	4.000	88.0	8.000	123.4					
0.500 41.8 2.000	62.8	5.000	98.1	9.000	129.7					
0.600 40.6 2.200	65.8	5.500	102.7	9.500	133.3					
0.800 40.4 2.400	68.6	6.000	107.2							
1.000 45.0 2.600	71.3	6.500	111.5							

Local Centre: Catchment Area 1,2 and 3

Surface Water Network

Impermeability Factor (%): 46.9

Ormond House Hollystown Local Centre Dublin 7 Designed by ASM Dublin 7 Designed by ASM Date 21/10/2021 Designed by ASM Throwyze Network 2018.1.1 STORM SEWER DESIGN by the Modified Rational Method Designed by ASM Innovyze STORM SEWER DESIGN by the Modified Rational Method Designe Criteria for SN 2 FIP Sizes STANDARD Manhole Sizes STANDARD FIR Rainfall Model - Scotland and Ireland Reion Criteria for SN 2 FIMP (%) 100 Maximum Rainfall (m/hr) 100 Maximum Rainfall (m/hr) 100 Maximum Rainfall (m/hr) 100 Network Design Diph for Optimisation (%) 1.200 Network Design Table for SW 2 PM (%) 100 Network Design Table for SW 2 Network Design Table for SW 2 Network Design Table for SW 2 Network Design Opt Mod Pipe/Conduit 2 Network Results Atter Network Design Opt Mod Pipe/Conduit	DBFL Consulting Engineers		Page 1											
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PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Sect	ion Typ	e Au	to
	(m)	(m)	(1:X)	(ha)	(mins)	Flow (1/s)	(mm)	SECT	(mm)			Des	ign
										-			
1.002	31.032	0.041	756.9	0.000	0.00	0.0	0.600	0	750	Pipe	/Condui	t I	
1.003	32.331	0.043	750.0	0.000	0.00	0.0	0.600	0	750	Pipe	/ Condui	E I	r
4,000	12,700	0.075	169.3	0,113	4.00	0.0	0,600	0	225	Pipe	/Condui	t -	•
4.001	47.544	0.280	169.8	0.000	0.00	0.0	0.600	0	225	Pipe	/Condui	t	í.
4.002	28.133	0.147	191.4	0.026	0.00	0.0	0.600	0	225	Pipe	/Condui	t	í.
4.003	2,962	0.018	164.5	0.000	0.00	0.0	0.600	0	225	Pipe	/Condui	t	é l
4.004	12.447	0.005	2489.4	0.000	0.00	0.0	0.600	0	300	Pipe	/Condui	t 🕴	6
1.004	17.286	0.022	785.7	0.000	0.00	0.0	0.600	0	750	Pipe	/Condui	t	
				Ne	twork	Results 1	able						
1 1	'N R	ain	T.C.	US/IL E	I.Area	Σ Base	Foul	Add F	low	Vel	Cap	Flow	
	(mr	1/hr) (mins)	(m)	(ha)	Flow (1/s)	(1/s)	(1/)	s)	(m/s)	(1/s)	(1/s)	
1.0	002 4	0.20	8.00 7	2.949	0.980	0.0	0.0	2	1.3	1.01	445.9	128.0	
1.	003 3	9.06	8.53 7	2,908	0,980	0.0	0.0	2	1.3	1.01	448.0	128.0	
4.	000 5	1.65	4.21 7	3.588	0.113	0.0	0.0		3.2	1.00	39.8	19.0	
4.	001 4	8.60	5.00 7	3.513	0.113	0.0	0.0		3.2	1.00	39.8	19.0	
4.	002 4	6.90	5.50 7	3.233	0.139	0.0	0.0		3.5	0.94	37.4	21.2	
4.	003 4	6.74	5.55 7	3.086	0.139	0.0	0.0		3.5	1.02	40.4	21.2	
4.	004 4	4.67	6.23 7	2,994	0.139	0.0	0.0		3.5	0.31	21.6	21.2	
1.	004 3	8.47	8.82	2.862	1.119	0.0	0.0	2	3.3	0.99	437.5	139.9	
1													
1													
				0	1982-2	2018 Innov	yze						

DBFL C	onsult	ing E	ngine	ers						Page 3		1	
Ormond	House				Holl	ystown	Local C	entre				1	
Upper	Ormond	Quay											
Dublin	7									Micro			
Date 2	1/10/2	021			Desig	gned b	by ASM			Deaina	ao		
File L	ocal C	entre	.mdx		Check	ked by	BCM			Digitic	iye		
Innovy	ze				Netwo	ork 20	018.1.1					1	
				Mani	Manhole Schedules for SW 2								
MH Name	MH CL (m)	MH Depth (m)	Con	MH	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Dias (s	eter m)	Backdrop (mn)
SB5	75.200	1.614	Open	Manhole	1200	1.000	73.586	300					
SB4	75.200	2.240	Open	Manhole	1800	1.001	72,960	750	1.000	73,410		300	
SB3-6	75.079	0.975	Open	Manhole	1200	2.000	74,104	225					
SB3-5	75.340	1,471	Open	Manhole	1200	2.001	73.869	300	2,000	73.944		225	
SB3-4	74.990	1.347	Open	Manhole	1200	2.002	73.643	300	2,001	73.643		300	
SB3-3-1	74.950	1.303	Open	Manhole	1200	3.000	73.647	225					
SB3-3	74.650	1.378	Open	Manhole	1350	2.003	73,272	375	2.002	73.347		300	
									3.000	73,422		225	
SB3-2	74.700	1.476	Open	Manhole	1350	2.004	73,224	375	2.003	73.224		375	
SB3-1	74,910	1.811	Open	Manhole	1350	2.005	73.099	375	2.004	73.099		375	
SB3	75.000	2.051	Open	Manhole	1800	1.002	72,949	750	1.001	72,949		750	
									2.005	73.010		375	
SB2	74.725	1.817	Open	Manhole	1800	1.003	72,908	750	1.002	72,908		750	
881-5	75.209	1.621	open	Mannole	1200	4.000	73.588	225		72 812			
001-2	75.100	2 517	Open	Manhole	1200	4.001	73.013	220	4.000	73.313		225	
001-0	75.750	2.517	Open	Manhole	1200	4.002	73.006	223	4.001	73 006		223	
981-1	74 547	1 553	Open	Manhole	1200	4 004	72 994	300	4 003	73.068		225	
SB1	74 450	1 588	Open	Manhole	1800	1 004	72 862	750	1 003	72 865		750	3
			-1						4,004	72,989		300	-
	74.000	1.160	Open	Manhole	0		OUTFALL		1.004	72.840		750	
					01982-201	8 Inn	ovyze						

2227 Q.									Dense 4
DBFL Consu.	lting	Engine	ers						Page 4
Ormond Hous	se				Hollysto	own Loca	al Centre	:	
Upper Ormon	nd Qua	iy		I					
Dublin 7				I					Micco
Date 21/10	/2021				Designed	WILLIO			
File Local	Centr	when an			Checked	by BCM	-		Drainage
File bocar	centra	C. Max			uncuncu	Dy ben			
Innovyze					Network	2018.1.	.1		
			PII	PELINE Ups	SCHEDUL	ES for	SW 2		
PN	Hyd Sect	Diam (mm) 1	MH (ane	C.Level (n)	I.Level (m)	D.Depth (m)	MH Connectio	MH DIJ	MM., L*W mm)
1.000	0	300	SB5	75.200	73.586	1.314	Open Manho	ole	1200
1.001	. 0	750	554	/5.200	12.960	1.490	open Manno	016	1800
2.000	0	225	SB3-6	75.079	74,104	0,750	Open Manho	le	1200
2,001	0	300	SB3-5	75.340	73.869	1.171	Open Manho	le	1200
2.002	0	300	SB3-4	74.990	73.643	1.047	Open Manho	ole	1200
							-		
3.000) 0	225 SB	3-3-1	74.950	73.647	1.078	Open Manho	ole	1200
2.003	0	375	SB3-3	74.650	73,272	1.003	Open Manho	le	1350
2.004	0	375	SB3-2	74.700	73.224	1,101	Open Manho	ole	1350
2.005	i o	375	SB3-1	74,910	73.099	1.436	Open Manho	ole	1350
1.002	0	750	SB3	75.000	72.949	1.301	Open Manho	ole	1800
1.003	0	750	SB2	74.725	72,908	1.067	Open Manho	ole	1800
4 000		225	SB1-5	75 209	73 588	1 396	Open Manhy		1200
4 001		225	SB1-4	75 100	73 513	1 362	Open Manho	10	1200
4.002		225	SB1-3	75,750	73,233	2,292	Open Manho	le	1200
4.003	0	225	SB1-2	75.650	73.086	2.339	Open Manho	ole	1200
4.004	0	300	SB1-1	74.547	72,994	1.253	Open Manho	ole	1200
				Down	istream 1	Manhole			
PN	Length	Slope	MH	C.Leve	1 I.Level	D.Depth	MH	MH DI	LAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connecti	Lon	(mm)
1,000	18,184	103.3	SB4	75.20	0 73,410	1,490	Open Mant	ole	1800
1.001	8.017	750.0	SB3	75.00	0 72.949	1.301	Open Manh	nole	1800
2.000	27,175	170.0	SB3-5	75.34	0 73.944	1,171	Open Mani	nole	1200
2.001	55.421	245.0	SB3-4	74.99	0 73.643	3 1.047	Open Mani	hole	1200
2.002	49.935	168.7	SB3-3	74.65	0 73.347	1.003	Open Mani	hole	1350
3.000	38.315	170.3	SB3-3	74.65	0 73.422	1.003	Open Mani	nole	1350
									1050
2.003	40 617	325.0	083-1	74.70	0 73.000	1 1 4 2 6	Open Mani	lole	1350
2.004	28.697	323.0	SB3-1	75.00	0 73.010	1.430	Open Mani	ole	1800
2.000	20.021		والعالية				apon nam		
1.002	31.032	756.9	SB2	74.72	5 72,908	1.067	Open Mani	nole	1800
1.003	32.331	750.0	SB1	74.45	0 72.865	0.835	Open Mant	ole	1800
4.000	12,700	169.3	SB1-4	75.10	0 73.513	1.362	Open Mani	nole	1200
4.001	47.544	169.8	SB1-3	75.75	73.233	2,292	Open Mani	nole	1200
4.002	28.133	191.4	SB1-2	75.65	0 73.086	2.339	Open Mani	nole	1200
4.003	2.962	164.5	SB1-1	74.54	73.068	1.254	Open Mani	hole	1200
4.004	12.447	2489.4	SB1	/4.45	12.985	, 1,161	open Mani	1016	1800

DBFL Consulting Engineers		Page 5					
Ormond House	Hollystown Local Centre						
Upper Ormond Quay							
Dublin 7		Micco					
Date 21/10/2021	Designed by ASM	Desinage					
File Local Centre.mdx	Checked by BCM	brainage					
Innovyze	Network 2018.1.1						
PIPELINE SCHEDULES for SW 2							
Upstream Manhole							
PN Hyd Diam MH C.Level	I.Level D.Depth MH MH DIAM.,	L*W					
Sect (mm) Name (m)	(m) (m) Connection (mm)						
1.004 o 750 SB1 74.450	72.862 0.838 Open Manhole	1800					
Downstream Manhole							
PN Length Slope MH C.Leve	l I.Level D.Depth MH MH DIAM	., L*W					
(m) (1:X) Name (m)	(m) (m) Connection (mm	a)					
1.004 17.286 785.7 74.00	0 72.840 0.410 Open Manhole	0					
Simulation Criteria for SW 2							
Volumetric Runoff Coeff (0.840 Additional Flow - % of Total Fl	ow 0.000					
Areal Reduction Factor 1.000 MADD Factor * 10m ³ /ha Storage 2.000							
Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000							
Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 2880							
Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 24							
Number of Territ Understands & Number of Streets Streets							
Number of Input Hydrographs 0 Number of Storage Structures 3 Number of Opline Controls 3 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 Wi	nter					
Return Period (years)	100 Cv (Summer) 0	.750					
Region Scotlar	nd and Ireland Cv (Winter) 0	.840					
Ratio R	0.274 storm puration (mins)	1440					
ETHE CARD IN							
©1982-2018 Innovvze							
#1902-2010 INDVY26							
DBFL Consultin	g Engine	eers					Page 6
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Ormond House			Hollyst	own Local	1 Centre		
Upper Ormond Q	uay						
Dublin 7	-						Micco
Date 21/10/202	1		Designed	i by ASM			
File Local Cen	tre.mdx		Checked	by BCM			urainage
Innovyze			Network	2018.1.1	1		
					-		
		Online	Control	s for SW	2		
Hydro-Bra	ike© Opt	imum Manho	le: SB4,	DS/PN: 1	.001, Vol	ume (m³): 6.9
		Unit	Reference	MD-SHE-0	067-2000-10	00-2000	
		Desig	n Head (m)			1.000	
		Design	Flow (1/s)			2.0	
			Flush-Flos		Cal	culated	
			Objective	Minimis	e upstream	storage	
		Sumo	Available			Yos	
		Dia	meter (mm)	-		67	
		Invert	Level (m)			72,960	
Mi	inimum Out	tlet Pipe Dia	meter (mm)			100	
	Suggested	d Manhole Dia	meter (mm)			1200	
		Control Po	ints	Head (m)	Flow (1/s)		
	Des	ign Point (Ca	alculated)	1.000	2.0		
		1	Flush-Flo*	0.296	1.9		
			Kick-Flo®	0.599	1.6		
	Mea	n Flow over 1	Head Range	-	1.7		
The hydrologics	1 calcul:	ations have h	based need	on the He	ad/Discharg	e relatio	nshin for the
Hydro-Brake® Or	otimum as	specified.	Should and	ther type	of control	device o	ther than a
Hydro-Brake Opt	imum® be	utilised the	in these st	orage rou	ting calcul	ations wi	11 be
invalidated							
Depth (m) Flow	(1/s) D	epth (m) Flow	(1/s) De	pth (m) F	low (1/s) D	epth (m)	Flow (1/s)
0,100	1.6	1,200	2.2	3.000	3.3	7.000	4.9
0.200	1.9	1.400	2.3	3.500	3.5	7.500	5.1
0.300	1.9	1.600	2.5	4.000	3.8	8.000	5.2
0.400	1.9	1.800	2.6	4.500	4.0	8.500	5.4
0.500	1.8	2.000	2.7	5.000	4.2	9.000	5.5
0.600	1.6	2.200	2.9	5.500	4.4	9.500	5.7
1.000	2.0	2.600	3.1	6.500	4.7		
Hydro-Brak	te® Opti	mum Manhole	e: SB3-2,	DS/PN:	2.004, Vo	lume (m	³): 3.7
		Unit	Reference	MD-SHE-0	086-3300-10	00-3300	
		Desig	m Head (m)			1.000	
		Design	Flow (1/s)			3.3	
			Objective	Minimis	cal e upstream	storage	
		А	pplication		- opecaeum	Surface	
		Sump	Available	1		Yes	
		Dia	meter (mm)			86	
		Invert	Level (m)			73.224	
M	Inimum Out	tlet Pipe Dia	meter (mm)			100	
	suggester	a Mannole Dia	meter (mm)			1200	
			22_2019 7	nnomine			
1		PT 30	22-20IO 1	movyze			

DBFL Consulting	g Engir	neers	_				Page 7
Ormond House			Hollysto	wn Local	Centre		
Upper Ormond Or	uav						
Dublic 7							
Dublin /							MICLO
Date 21/10/202	1		Designed	by ASM			Drainago
File Local Cent	tre.mdx	c	Checked	by BCM			Drainage
Innovyze			Network	2018.1.1			
Undro-Drak	en ont	imum Manhol	e. CD3_2	DC/DM. 2	004 12		31. 3.7
Hydro-Brak	eo opu	THUN Mannor	e. aba-z,	DO/FN: 2	.004, V	orume (m	1: 3.7
		Control Po	oints	Head (n) F	low (1/s))	
	De	alan Bolat /C	algulated	1 000			
	De	sign Foinc (c	Flush-FloB	0.296	2.1	2	
			Kick-Flo®	0.624	2	7	
	Me	an Flow over	Head Range		2.9	, 9	
			near nange			-	
The hydrologica	l calcul	lations have 1	been based	on the Head	i/Dischar	me relatio	nship for the
Hvdro-Brake@ Op	timum as	s specified.	Should ano	ther type of	f contro	1 device o	ther than a
Hydro-Brake Opt	imum® be	e utilised th	en these st	orage routi	ng calcu	lations wi	11 be
invalidated							
Depth (m) Flow	(1/s)	Depth (m) Flo	w (1/s) Dep	th (m) Flo	w (1/s)	Depth (m)	Flow (1/s)
-	I	-			I	-	
0.100	2.6	1.200	3.6	3.000	5.5	7.000	8.2
0.200	3.2	1.400	3.9	3.500	5.9	7.500	8.5
0.300	3.3	1.600	4.1	4.000	6.3	8.000	8.7
0.400	3.2	1.800	4.3	4.500	6.6	8.500	9.0
0.500	3.1	2.000	4.5	5.000	7.0	9.000	9.2
0.600	2.8	2,200	4.8	5.500	7.3	9.500	9.5
0.800	3.0	2.400	4.9	6.000	7.6		
1.000	3.3	2.600	5.1	6.500	7.9		
Hydro-Brak	e® Opt	imum Manhol	e: SB1-1,	DS/PN: 4	.004, V	olume (m	³): 1.8
		Unit	t Reference	MD-SHE-006	7-2000-1	000-2000	
		Desi	gn Head (m)			1.000	
		Design	Flow (1/s)			2.0	
			Flush-Flom		Ca	lculated	
			Objective	Minimise	upstream	storage	
		1	Application			Surface	
		Sum	p Available			Yes	
		D13	ameter (nn)			67	
		Inver	t Level (m)			72.994	
Mi	nimum Ot	utlet Pipe Di	ameter (mm)			100	
	suggeste	ed Manhole Dia	ameter (nn)			1200	
		Control D		Read (-) R	1 (1 /)		
		Control P	DINCS	Head (n) F	10W (1/s)	•	
	De	sign Point (C	alculated)	1,000	2.0)	
			Flush-Flos	0.296	1.9	9	
			Kick-Flo®	0.599	1.6	5	
	Me	an Flow over	Head Range	-	1.1	7	
The hydrologica	1 calcul	lations have h	been based	on the Head	i/Dischar	ge relatio	nship for the
Hydro-Brake® Op	timum as	s specified.	Should ano	ther type o	of contro	l device c	ther than a
Hydro-Brake Opt	imum® be	e utilised th	en these st	orage routi	ng calcu	lations wi	11 be
invalidated							
Depth (m) Flow	(1/s)	Depth (m) Flo	w (1/s) Dep	oth (m) Flo	w (1/s)	Depth (m)	Flow (1/s)
0.100	1 4	0.200	1 0	0.500	1 0	0.000	1.0
0.200	1 9	0.400	1 0	0.600	1.6	1 000	2.0
		0.400			1.0		A
		019	82-2018 I	nnovvze			

DDDT O		a a Re								Deces D
DBLT CO	onsulti	ng Er	igineei	rs						Page 9
Ormond	House				Holl	ystown 1	Local	Centre		
Upper (Ormond	Quay								
Dublin	7									Micco
Date 21	1/10/20	21			Desi	gned by	ASM			Designment
File Lo	ocal Ce	ntre	mdx		Chec	ked by I	BCM			urainage
Teee					Note	ank 201	0 1 1			
TUPOAA	te.				Netv	OFK 2010	5.1.1			
Ма	Summar A nhole He Foul Sew	y of real H Hot S adloss age po Number Numb Ra:	Critic Reductio Hot Stan Start La s Coeff er hecta of Inp er of O r of Of infall N Re M5-60	cal Res on Facto ct (mins avel (mm (Global are (1/s ut Hydro nline Co fline Co fline Co Syni dodel agion Sc (mm)	Simulati r 1.000) 0) 0.500) 0.500) 0.000 ographs ontrols thetic R otland a	y Maximu lon Criter Additic MAI Flow per 0 Number (0 Number (0 Number (ainfall D FS und Irelan 16.20	m Leve ia mal Flo D Facto Person of Stor of Time of Real atails R F d Cv (1 0 Cv (1)	<pre>el (Rank : ow - % of % or * 10m³/F Inlet Comper Day (1) age Struct /Area Diag Time Cont Ratio R 0.2 Summer) 0.7 (inter) 0.8</pre>	1) for Cotal Flo a Storag ffiecier /per/day ures 3 rams 0 rols 0 274 250 240	SW 2 ww 0.000 ge 2.000 ut 0.800 /) 0.000
			20-00	(ana)		10.20	0 0 0	dincer/ 0.0		
	Return	Durat Durat Clima	Prof Frof ion(s) lod(s) (ite Char	lood Ris Ana (ile(s) (mins) (years) ige (%)	k Warnin lysis Ti DTS 15, 72	g (mm) 30 mestep F Status 30, 60, 1: 0, 960, 1:	0.0 'ine Ine ON 20, 180 440, 21	DVD Statu artia Statu Summer , 240, 360, 60, 2880, - 7200, 1 , 20,	and Win , 480, 6 4320, 57 8640, 10 5, 30, 2 20, 20,	ter 00, 60, 080 100 20
	US/MH			Return	Climate	First	(X)	First (Y)	First (Z) Overflow
PN	Name	81	torm	Period	Change	Surcha	irge	Flood	Overflo	w Act.
1 000	SBS	15	Winter	100	+205	30/15	Sumor			
1.001	SB4	2160	Winter	100	+20%	100/1440	Winter			
2.000	SB3-6	15	Winter	100	+20%	100/15	Summer			
2.001	SB3-5	15	Winter	100	+20%	30/15	Summer			
2.002	SB3-4	15	Winter	100	+20%	30/15	Summer			
3.000	SB3-3-1	720	Winter	100	+20%	30/360	Winter			
2.003	SB3-3	720	Winter	100	+20%	5/180	Winter			
2.004	883-2	720	Winter	100	+20%	5/120	Winter			
2.005	SB3-1	600	Summer	1	+20%					
1.002	383	4320	Summer	100	+20%					
4 000	SB1-5	15	Winter	100	+20%	100/15	Summer			
4,001	SB1-4	15	Winter	100	+20%	100/15	Summer			
4.002	SB1-3	15	Winter	100	+20%	30/15	Summer			
4.003	SB1-2	360	Winter	100	+20%	30/15	Summer			
4.004	SB1-1	360	Winter	100	+20%	30/60	Winter			
1.004	SB1	1440	Summer	100	+20%					
				0	1982-20	18 Innov	/vze			

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DBFL Con	sulting	r Engin	eers						Page 10
Ormond H	ouse			Holly	ystown	Local C	entre		
Upper Or	mond Qu	ay							
Dublin 7		-							Micco
Date 21/	10/2021			Desig	ned b	y ASM			NILIU
File Loc	al Cent	re.mdx	:	Check	ked by	BCM			urainage
Innovyze				Netwo	ork 20	18.1.1			
S	ummarv	of Cri	tical Resu	lts by	Maxim	um Level	(Ran	k 1) for	SW 2
-							1	-,	
		Water	Surcharged	Flooded			Pipe		
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m)	(m)	(m ³)	Cap.	(1/s)	(1/s)	Status	Exceeded
1 000			0.430	0.000	1.04				
1.000	385	74.325	0.439	0.000	1.84		1/3.2	SURCHARGED	
2,000	003-6	74 686	0.014	0.000	0.01		5.0	SUBCUARCED	
2.000	003-0	74.030	0.327	0.000	0.10		5.9	SUNCHARGED	
2.001	003-4	74.601	0.482	0.000	1 40		110.0	SURCHARGED	
2.002	003-3-1	74.420	0.462	0.000	0.11		4.2	SURCHARGED	
2 003	003-3-1	74.110	0.467	0.000	0.21		10 7	SUBCUARCED	
2.003	SB3-3	74 112	0.514	0.000	0.03		3 3	SUBCHARGED	
2.005	003-1	72 142	-0.330	0.000	0.03		2.2	OF	
1 002	983	73 031	-0.550	0.000	0.03		5.2	OK	
1 003	SB2	72 992	-0.666	0 000	0.02		5.2	OK	
4,000	SB1-5	73,988	0,175	0.000	1.23		42.3	SURCHARGED	
4,001	SB1-4	73.894	0,156	0.000	1.03		39.1	SURCHARGED	
4,002	SB1-3	73,615	0,157	0.000	1.26		43.8	SURCHARGED	
4.003	SB1-2	73.546	0.235	0.000	0.32		8.7	SURCHARGED	
4.004	SB1-1	73.545	0.251	0.000	0.08		1.9	SURCHARGED	
1.004	SB1	72.959	-0.653	0.000	0.04		7.1	OK	

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APPENDIX E

FOUL DRAINAGE MICRODRAINAGE CALCULATIONS

Site 2 & 3

Foul Network

DBFL Co	nsulti	ng Eng	gineer	s								Pa	ge 1	
Ormond	House				H	ollys	town							
Upper O	rmond (Quay												
Dublin	7											M	licro	
Date 05	/10/20	21 08:	:57		D	esign	ed by	Gra	nt H	umphr	еу	- H	rainago.	
File Ne	twork :	Site 2	and 2	3 20.	c	hecke	d by	Deir	dre 1	Walsh			lanage	
Innovyz	e				N	etwor	k 201	8.1.	1					
			De	<u>F</u>	OUL S Crite	EWERA	GE DE	SIGN	etwo	rk				
			Pipe	Siges	STAND	ARD Ma	nhole	Sizes	STAI	IDARD				
				-	Indus	strial	Flow	(1/s/)	na)	0.00				
				In	dustri	Calcu Calcu	ur rion lation	v Fact h Meth	or od B	0.00 5 8201				
						Fre	quency	7 Fact	tor	0.00				
						Dome	stic	(1/s/)	na)	0.00				
					Domest	ic Pea	ak Flor	/ Fact	or	6.00				
				Add	Flow /	Clima Rechd	te Ch	ange	(*) ()	0 200				
				Ma	mimum	Backdr	op He:	ight	(m) (m)	1.500				
			Min De	sign D	epth f	for Opt	imisat	tion	(m)	1.200				
			Min	. Vel f	or Aut	o Desi	ign on	Ly (m/	(5)	0.75				
			M	(in Slo	pe for	Coptin	isati	on (1:	:X)	500				
Designed with Level Soffits														
Network Design Table for Foul Network														
		÷ -	Indic	ates p	tpe ie	ngth d	oes no	t mat	cn co	orain	ates			
PN	Length	Fall	Slope	Area	Units	Ba	se	k	EYD	DIA	Secti	ion Type	e Auto	
	(m)	(m)	(1: 1)	(na)		FLOW	(1/5)	(mm)	SEC	r (mm)			Design	
F1.000	24.726	0.412	60.0	0.000	966.0		0.0	1.500) (o 150	Pipe,	/Conduit	5 💧 -	
F1.001	13.266	0.221	60.0	0.000	28.0		0.0	1.500		 150 	Pipe,	/Conduit	े 🍦	
F1.002	52.392	1.191	44.0	0.000	56.0		0.0	1.500		6 150 6 150	Pipe,	Conduit	S 🙀 🛛	
F1 004	13 800	0.070	196 0	0.000	0.0		0.0	1 500		150	Pipe,	Conduit/	ž 🖁	
													-	
F2.000	38.808	0.647	60.0	0.000	28.0		0.0	1.500) (150 	Pipe,	/Conduit	5 🛑 -	
F2.001	9.288	0.155	59.9	0.000	0.0		0.0	1.500) (150	Pipe,	/Conduit	5 🧕 -	
				Ne	twor	k Rest	ults	Table	2					
P	N US/	IL E A	Area	Σ Base	Σ	Units	Add F1	ow P.	Dep 1	P.Vel	Vel	Cap	Flow	
	(1	n) (1	ha) Fl	low (1/	's)		(1/s) (1	nm)	(m/s)	(m/s)	(1/s)	(1/s)	
51	000 22	250 0	000			0.66 0				1.07	1 12	20.0	7 0	
F1.	001 71	938 N	.000		.0	994.0		.0	66	1.07	1.13	20.0	8.0	
F1.	002 71.	690 0	.000	i i	.0 1	050.0	õ	.0	61	1.21	1.32	23.4	8.2	
F1.	003 70.	490 0	.000	0	.0 1	050.0	0	.0	92	0.72	0.67	11.8	8.2	
F1.	004 70.4	430 0.	.000	0	.0 1	050.0	0	.0	97	0.68	0.62	11.0	8.2	
F2	000 71	247 0	000			28.0		0	20	0.81	1 12	20.0	2.0	
E2	001 70	600 N	.000			28.0		.0	39	0.81	1.12	20.0	3.0	
				6	01982	-2018	Inno	vyze						

DBFL Cor	nsulti	ng End	ineer	s								Pa	ae 2
Ormond H	louse					Hollvs	town						
Upper 01	mond (Duav											
Dublin 7	7												in the second
Date 05/	/10/20:	21 08	57			Design	ed by	Gran	t. Hu	mphre	ev	M	itio
File Net	work	Site 2	and	3 20		Checke	d by	Deird	ire W	alch	-1		rainage
Innovyze	-			0 20.	•••	Networ	k 201	8 1 1					
2	-												
			Netwo	ork De	esig	n Tabl	e for	Foul	Net	ork			
PN	Length	Fall	Slope	Area	Uni	ts Ba	se	k	HYD	DIA	Secti	ion Type	e Auto
	(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)			Design
F1 005	28 680	0.151	102.0	0.000			0.0	1 500		225	Dime	(Candud)	
F2 000	44 024	1 101	40.0	0.000	20		0.0	0.150		150	Pipe,	(Conduit)	•
13.000	11.001	1.101	40.0	0.000	10		0.0	0.100		100	ripe,	condui	-
F1.006	9.552	0.053	180.0	0.000	0	.0	0.0	1.500	0	225	Pipe,	/Conduit	
F4.000	36.344	1.211	30.0	0.000	112	.0	0.0	0.150	•	150	Pipe,	/Conduit	• d
F1.007	60.743	0.351	173.0	0.000	140	.0	0.0	1.500	•	225	Pipe,	/Conduit	•
F5.000	12.000	0.200	60.0	0.000	14	.0	0.0	0.150	°	150 150	Pipe, Pipe	/Conduit	1
E1 000	67.004	0.000	200.0	0.000	140		0.0	1 500	Ĭ	200	Dime.	(Candui)	
	67.224	0.330	200.0	0.000	140		0.0	1.500	0		Fipe,	Conduit	
F6.000	56.798	0.947	60.0	0.000	70	.0	0.0	0.150	•	150	Pipe,	/Conduit	•
F1.009 F1.010	7.533 22.234	0.038	198.2 200.3	0.000	0 70	.0	0.0	1.500	0	225 225	Pipe, Pipe,	/Conduit /Conduit	
F7.000 F7.001	62.522 64.448	1.042 0.537	60.0 120.0	0.000	126 112	.0	0.0	0.150	0	150 225	Pipe, Pipe,	/Conduit /Conduit	e 👌
				Ne	etwo	rk Res	ults (Table					
DA	а пе/	TL 7 1		E Bara	. ,	- Unite	144 F1		Den P	Vel	Vel	Cen	Flow
	(п	i) (1	ha) Fl	low (1/	/s)	5 One CS	(1/s)) (=	m) (n	1/s)	(m/s)	(1/s)	(1/s)
F1.0	005 70.3	360 0.	.000	C	0.0	1134.0	0	.0	78 0	.69	0.83	32.9	8.5
F3.0	000 72.0	000 0.	.000	0	0.0	70.0	0	.0	33 1	.25	1.89	33.4	3.6
F1.0	006 70.3	209 0.	.000	C	0.0	1204.0	0	.0	78 0	.72	0.85	34.0	8.8
F4.0	000 72.3	150 0.	.000	C	0.0	112.0	0	.0	32 1	43	2.19	38.6	4.0
F1.0	07 70.3	156 0.	.000	c	0.0	1456.0	0	.0	81 (.75	0.87	34.7	9.6
F5.0	00 70.9	930 0.	.000	0	0.0	14.0	0	.0	31 0	.97	1.53	27.1	2.6
F5.0	JUL 70.	/30 0.	.000	0		84.0	0	.0	30]	9	1.53	27.1	a.0
F1.0	008 69.1	805 0.	.000	0	0.0	1680.0	0	.0	88 (.72	0.81	32.2	10.3
F6.0	00 70.0	635 0.	.000	C	0.0	70.0	0	.0	37 1	.08	1.53	27.1	3.6
F1.0	009 69.4	469 0.	.000	0	0.0	1750.0	0	.0	88 0	.73	0.81	32.4	10.5
F1.0	010 69.4	1 31 0.	.000	0	1.0	1820.0	0	.0	89 (1.73	0.81	32.2	10.8
F7.0	000 72.	600 0.	.000	0	0.0	126.0	0	.0	39 1	.12	1.53	27.1	4.1
F7.0	JOI 71.4	483 0.	.000	0	1.0	238.0	0	.0	45 (1.87	1.39	55.3	4.9
				(0198	2-2018	Inno	vvze					

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DBFL Cor	enlti	og End	rineer									Da	ae 3
Ormond I	louse					Hollys	town						ye o
Upper 01	mond (011017				norrys	COWII						
Dublin 7	7	guay											
Dublin	1	21.00				Dest		-				M	icro
Date 05,	10/202	21 08:	:57			Design	ied by	Gra	nt Hu	mphr	ey	D	rainage
File Net	twork :	Site 2	2 and	3 20.	• •	Checke	ed by	Deir	dre V	Valsh			- <u>- Les</u>
Innovyze	2					Networ	:k 201	8.1.	1				
			Netwo	ork De	sig	m Tabl	e for	Foul	l Net	work			
													• •
PN	Length (m)	Fall	(1.Y)	Area (ba)	Uni	ts B	(1/-)	к ()	EYD		Sect	ion Type	e Auto
	(m)	()	(1	(na)		FIOW	(1/5)	(1111)	2501	(1111)			Design
F7.002	9.781	0.065	150.5	0.000	14	.0	0.0	0.150) o	225	Pipe,	/Conduit	- đ
F7.003	68.358	0.456	149.9	0.000	112	.0	0.0	0.150) 0	225	Pipe	/Conduit	្លី
F7.004	7.741	0.052	148.9	0.000	0	.0	0.0	0.150) 0	225	Pipe,	/Conduit	• 🐨
F8.000	33.444	0.557	60.0	0.000	70	.0	0.0	0.150) 。	150	Pipe	/Conduit	
F7.005	76.141	0.452	168.5	0.000	98	.0	0.0	0.150) o	225	Pipe	/Conduit	÷ 🔮
F7.006	5.426	0.037	146.6	0.000	0	.0	0.0	0.150) 0	225	Pipe	/Conduit	e 🔮
17.007	82.227	0.489	168.2	0.000	182	.0	0.0	0.150		225	Fipe,	/Conduit	° 🗗
F1.011	53.585	0.268	199.9	0.000	238	.0	0.0	1.500) 。	225	Pipe	/Conduit	• ••
F1.012	14.317	0.072	198.8	0.000	14	.0	0.0	1.500) o	225	Pipe	/Conduit	s 🎽
													-
F9.000	56.985	0.950	60.0	0.000	126	.0	0.0	0.150) 0	150	Pipe,	/Conduit	<u>d</u>
F9.001	10.263	0.060	171 1	0.000	56	0	0.0	0.150		225	Pipe	/Conduit	
F9.002	51.662	0.371	139.3	0.000	168	.0	0.0	0.150		225	Pipe	/Conduit	
F9.004	9.839	0.072	136.7	0.000	0	.0	0.0	0.150) 0	225	Pipe	/Conduit	
													-
F1.013	78.499	0.334	235.0	0.000	182	.0	0.0	1.500) 0	300	Pipe	/Conduit	ď
F1.014	51.063	0.216	234.0	0.000	120	.0	0.0	1.500) 0	200	Pipe,	/Conduit	
													•
				Ne	two	rk Res	ults	Table	2				
P	∎ US/	ILEI	Area	E Base		E Units	Add F1	Low P.	Dep P	.Vel	Vel	Cap	Flow
	(1	0 0	na) r.	10W (1/	s)		(1/5) (mm.) (m/s)	(m/s)	(1/5)	(1/5)
F7.0	002 70.9	946 0	.000	0	0.0	252.0	0	0.0	48	0.80	1.24	49.2	5.0
F7.0	003 70.0	881 0	.000	0	0.0	364.0	0	0.0	51	0.83	1.24	49.3	5.5
F7.0	004 70.4	425 0	.000	0	0.0	364.0	0	0.0	51	0.83	1.24	49.4	5.5
FR (100 71 .	749 0	000		0	70.0		0	27	1 08	1.52	27 1	3.6
													0.0
F7.0	005 70.3	373 0	.000	0	0.0	532.0	0	0.0	56	0.82	1.17	46.4	6.3
F7.0	006 69.	921 0	.000	0	0.0	532.0	0	0.0	54	0.87	1.25	49.8	6.3
F7.0	007 69.1	884 0	.000	0	0.0	714.0	0	0.0	59	0.85	1.17	46.4	7.0
F1 (111 69 3	320 0	000		0	2772 0		0	102	0 78	0.81	22.2	12.7
F1.0	012 69.0	052 0	.000	0		2786.0	i i	0.0	103	0.78	0.81	32.3	13.7
F9.0	000 70.1	750 0	.000	0	0.0	126.0	0	0.0	39	1.12	1.53	27.1	4.1
F9.0	001 69.	725 0	.000	0	1.0	168.0	0	0.0	47	0.74	1.16	46.2	4.4
F9.0	JUZ 69.	581 0.	.000	0	1.0	224.0	0	0.0	49	0.76	1.16	46.0	4.8
F9.0	103 69.3	521 0. 150 0.	000	0		392.0			50	0.06	1.29	51.2	5.7
19.0	.04 09	130 0	.000			692.0			50	0.00	1.30	51.7	9.7
F1.0	013 68.	905 0	.000	0	0.0	3360.0	0	0.0	101	0.75	0.90	63.8	15.5
F1.0	014 68.8	571 0	.000	0	0.0	3486.0	0	0.0	102	0.75	0.90	64.0	15.9
F1.0	015 68.3	235 0	.000	0	0.0	3486.0	0	0.0	102	0.75	0.90	63.6	15.9
				6	11 6 6	2 - 2010	Tanan						

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DBFL Cor	nsulti	ng Eng	neer	s								Pa	are 4
Ormond 1	House		-		Ho	llvst	own						
Upper O	rmond (Ouav											
Dublin	7												line of the
Date 05	, /10/20;	21 08	- 57		De	sime	d by	Grant	E H	mphr	917	W	iicio
File Net	tuork (2 and	2 20	Ch	ocked	her T	laird:		da l ch	- 2		rainage
The Me	CWOIR .	Site .	anu	5 20.	Un	tuork	2019	2 1 1	Lei	arsn			-
THHOVYZ	-				ne	OWDER	2010						
			Netwo	ork De	esign (Table	for	Foul	Net	work			
PN	Length	Fall	Slope	Area	Units	Bas	se (1.(-)	k	HY		Sect	ion Ty	pe Auto
F1.016	(m) 34.966	(m)	(1:A) 260.9	(na)	0.0	FTOM	0.0	(mm)	SEL	л (mm) O Pine	./Condu	Design
F10.000	62.503	0.368	169.8	0.000	2478.0		0.0	1.500		0 22	5 Pipe	/Condu	it 🕅
F1.017	64.674	0.203	318.6	0.000	0.0		0.0	1.500		o 30	0 Pipe	/Condu	it 🛔
F1.018	12.606	0.037	340.7	0.000	0.0		0.0	1.500		o 30	0 Pipe	e/Condu	it 🧴
F11.000	24.367	0.406	60.0	0.000	28.0		0.0	0.150		o 15	0 Pipe	/Condu	it 🚺
F12.000	8.310	0.139	59.8	0.000	14.0		0.0	0.150		o 15	0 Pipe	:/Condu	it 👸
F11.001 F11.002	47.555 6.447	0.793 0.107	60.0 60.3	0.000	42.0 0.0		0.0	0.150		o 15 o 15	0 Pipe 0 Pipe	e/Condu e/Condu	it 🗗 it 💣
F13.000	18.472	0.308	60.0	0.000	70.0		0.0	0.150		o 15	0 Pipe	/Condu	it 👸
F13.001	22.221	0.370	60.1	0.000	14.0		0.0	0.150		0 15	0 Pipe	/Condu	10 💣
F14.000	26.738	0.446	60.0	0.000	42.0		0.0	0.150		0 15	O Pipe	Condu	10
F1 019	40 202	0.100	242 2	0.000	20.0		0.0	1 500		0 10	0 Pipe	/Condu	10 U
	10.002		012.0	Me		Pecul	о + с. Т	able		0 00	o rape	., conda	
					- CWOLK	Kesus		abre D D					
21	N US, (1	/1L 2 m) ((ha) F	low (1	e 20 /s)	nits A	(1/s)	ow P.1	лер m)	(m/s)	vei (m/s)	(1/s)	(1/s)
F1.	016 68.	019 0	.000		0.0 34	86.0	0	.0	91	0.88	1.12	79.0	15.9
F10.	000 70.	294 (.000		0.0 24	78.0	0	.0	94	0.81	0.88	35.0	12.8
F1. F1.	017 67. 018 67.	885 0 682 0	0.000		0.0 59 0.0 59	64.0 64.0	0	.0 1 .0 1	36 39	0.74	0.77	54.8 52.9	23.1 23.1
F11.	000 70.	369 0	.000		0.0	28.0	0	.0	33	1.02	1.53	27.1	3.0
F12.	000 70.	102 0	.000		0.0	14.0	0	.0	31	0.97	1.54	27.1	2.6
F11	93 100	962 0	000		0.0	84 0	0	0	28	1 09	1.52	27 1	2.8
F11.	002 69.	170 0	.000		0.0	84.0	ŏ	.0	38	1.09	1.53	27.0	3.8
							-			1	1.50		
F13.	001 69.	681 0	.000		0.0	84.0	0	.0	38	1.08	1.53	27.1	3.8
F14.	000 69.	996 0	.000		0.0	42.0	0	.0	35	1.04	1.53	27.1	3.3
F11.	003 69.	063 0	.000		0.0 2	38.0	0	.0	55	0.83	0.96	16.9	4.9
F1.	019 67.	644 (.000		0.0 62	02.0	0	.0 1	41	0.73	0.75	52.8	23.7
				6	a1992-	2019 1	maar						

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December 2021

													-
DBFL Con	sultin	g Eng	ineer	5								Pag	e 5
Ormond H	louse					Hollys	town						
Upper Or	mond Q	uay											· · · · ·
Dublin 7												Mi	
Date 05/	10/202	1 08:	57			Design	ed by	Gran	t Hun	phre	ΥY	Dr	ainann
File Net	work S	ite 2	and	3 20.		Checke	d by l	Deird	re Wa	lsh			an age
Innovyze						Networ	k 201	8.1.1					
			Netwo	rk De	sig	n Tabl	e for	Foul	Netw	ork			
PN	Length	Fall	Slope	Area	Unit	ts B	ase	k	HYD	DIA	Secti	on Type	Auto
	(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)			Design
													-
F15.000	59.563	0.993	60.0	0.000	112	. 0	0.0	0.150	•	150	Pipe/	Conduit	ô
F16.000	43.973	0.733	60.0	0.000	84	.0	0.0	0.150	•	150	Pipe/	Conduit	ð
F17.000	15.771	0.263	60.0	0.000	28.	. 0	0.0	0.150	•	150	Pipe/	Conduit	ð
F18.000	15.457	0.258	59.9	0.000	28	. 0	0.0	0.150	•	150	Pipe/	Conduit	ð
F17.001	23.941	0.399	60.0	0.000	14	. 0	0.0	0.150	•	150	Pipe/	Conduit	ð
T 1 C 001													_
F16.001	89.982	0.529	170.1	0.000	196	.0	0.0	0.150		225	Pipe/	Conduit	<u> </u>
									-				
F19.000	45.200	0.753	60.0	0.000	84.	. 0	0.0	0.150	•	150	Pipe/	Conduit	Ö
F19.001	21.824	0.363	60.1	0.000	42	. 0	0.0	0.150	0	150	Pipe/	Conduit	d
F19.002	51.830	0.341	152.0	0.000	70.	.0	0.0	0.150	•	225	Pipe/	Conduit	0 "
F20.000	49.069	0.491	99.9	0.000	168	. 0	0.0	0.150	۰	225	Pipe/	Conduit	0
F19.003	6.822	0.040	170.6	0.000	0	. 0	0.0	0.150	۰	225	Pipe/	Conduit	
				17-		-la Dala							
				Ne	CWO:	rk kes	uits i	labie					
PN	US/	IL E A	Area	Σ Base	- 1	C Units	Add F1	low P.I	Dep P.	Vel	Vel	Cap 1	low
	(m	a) (1	ha) Fl	low (1/	(s)		(1/s) (п	m) (n	1/s)	(m/s)	(1/s) (1/s)
F15 (100 70 1	205 0	000			112 0			20 1	11	1 52	27 1	4.0
											2.00		
F16.0	000 70.4	921 0	.000	0	0.0	84.0	0	0.0	38 1	09	1.53	27.1	3.8
F17.0	000 69.9	994 0	.000	0	0.0	28.0	0	0.0	33 1	02	1.53	27.1	3.0
F18.0	000 69.9	989 0	.000	C	0.0	28.0	0	0.0	33 1	02	1.53	27.1	3.0
F17.0	001 69.1	731 0	.000	0	0.0	70.0	0	.0	37 1	08	1.53	27.1	3.6
F16.0	001 69.3	332 0	.000	0	0.0	154.0	0	0.0	52 0	0.80	0.95	16.8	4.4
F16.0	002 69.1	179 0	.000	0	0.0	350.0	0	0.0	52 0	0.79	1.16	46.2	5.5
F19.0	000 70.8	500 0	.000	0	0.0	84.0	0	0.0	38 1	09	1.53	27.1	3.8
F19.0	001 69.1	747 0	.000	0	0.0	126.0	0	0.0	39 1	.12	1.53	27.1	4.1
F19.0	JUZ 69.3	309 0	.000	0	1.0	196.0	0	1.0	46 0	1.78	1.23	48.9	4.6
F20.0	000 70.7	750 0	.000	0	0.0	168.0	0	0.0	41 0	.90	1.53	60.7	4.4

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0.0 52 0.79 1.16 46.1 5.5

0.0 364.0

F19.003 68.968 0.000

DBFL Consulting Engineers P													re 6
Ormond H	louse					Hollvs	town						
Upper Or	mond Q	uav				-							
Dublin 7		-											
Date 05/	10/202	1 08:	57			Design	ed by	Gran	t Hu	mphre	v		uu
File Net	work S	lite 2	and	3 20		Checke	d by	Deird	re W	alsh	-	U	ainage
Innovvze						Networ	k 201	8.1.1					
			Netwo	rk De	sig	n Tabl	e for	Foul	Net	ork			
PN	Length	Fall	Slope	Area	Uni	ts B	ase	k	HYD	DIA	Sect:	ion Type	a Auto
	(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(mm)	SECT	(mm)			Design
F21.000	24.464	0.408	60.0	0.000	28	.0	0.0	0.150		150	Pipe,	/Conduit	: 🗗
													-
F19.004	10.441	0.061	170.0	0.000	14	.0	0.0	0.150		225	Pipe, Dime	/Conduit	1 🖞 –
119.003	10.172	0.202	200.4	0.000			0.0	0.130		225	ripe,	/ Conduin	
F22.000	34.794	0.570	61.0	0.000	84	.0	0.0	0.150	•	150	Pipe,	/Conduit	s 👩
F22.001	23.179	0.386	60.0	0.000	14	.0	0.0	0.150	0	150	Pipe,	/Conduit	° 💣
F19.006	12,182	0.066	199.7	0.000	42	0	0.0	0.150		225	Pipe	/Conduit	
F19.007	17.592	0.088	199.9	0.000	28	.0	0.0	0.150		225	Pipe	/Conduit	i 👔 🗌
F19.008	32.539	0.163	199.6	0.000	98	.0	0.0	0.150	0	225	Pipe	/Conduit	s 🧯 🗌
F22 000	22 214	0 571	56.4	0.000	70	0	0.0	0 150		150	Dime	(Conduit	
F23.001	20.952	0.262	80.0	0.000	14	.0	0.0	0.150		150	Pipe	/Conduit	i 🕌
													-
F24.000	6.734	0.114	59.1	0.000	28	.0	0.0	0.150	0	150	Pipe,	/Conduit	5 👸
F23.002	46.891	0.212	149.8	0.000	168	0	0.0	0.150		150	Pipe	/Conduit	
F23.003	56.429	0.282	200.1	0.000	196	.0	0.0	0.150		225	Pipe	/Conduit	- -
													-
F19.009	43.403	0.217	200.0	0.000	126	.0	0.0	0.150		225	Pipe, Dime	/Conduit	1
115.010	12.410	0.002	200.0	0.000			0.0	0.100		220	ripe,	/ conduir	-
				Ne	two	rk Res	ults 3	Table					
PN	US/	ILEI	Area	Σ Base		E Units	Add Fl	Low P.	Dep P	.Vel	Vel	Cap	Flow
	(=	u) (1	ha) F.	LOW (1/	(5)		(1/s) (1	mm) (m/s)	(m/s)	(1/s)	(1/s)
F21.0	000 70.2	260 0	.000	0	0.0	28.0	0	0.0	33	1.02	1.53	27.1	3.0
E10			000						5.0		1.16	46.0	
F19.0	004 60.3	926 U 867 O	.000		0.0	406.0		0.0	56	0.00	1.10	40.2	5.7
F22.0	000 69.0	696 0	.000	0	0.0	84.0	9	0.0	38	1.08	1.52	26.9	3.8
F22.0	001 69.1	126 0	.000		0.0	98.0		0.0	38	1.10	1.53	27.1	3.9
F19.0	006 68.4	665 0	.000	0	0.0	546.0		0.0	58	0.77	1.07	42.5	6.3
F19.0	007 68.8	599 0	.000	0	0.0	574.0	0	0.0	59	0.78	1.07	42.5	6.5
F19.0	008 68.9	511 0	.000	0	0.0	672.0		0.0	61	0.79	1.07	42.5	6.9
F23.0	000 70.0	015 0	.000	0	0.0	70.0		0.0	36	1.10	1.58	28.0	3.6
F23.0	001 69.4	444 0	.000	0	0.0	84.0	0	0.0	41	0.98	1.32	23.4	3.8
204	000 60 1	199 0	000			28.0			22	1.02	1 55	27.0	2.0
124.0	00 09.1	182 0	.000			20.0			66	1.02	1.00	21.5	a.u
F23.0	002 69.0	018 0	.000	0	0.0	280.0	(0.0	56	0.84	0.96	16.9	5.1
F23.0	003 68.0	630 0	.000	0	0.0	476.0	(0.0	57	0.76	1.07	42.4	6.0
F19 (83 60	348 n	.000		0.0	1274.0		0.0	70	0.85	1.07	42.4	9.0
F19.0	010 68.1	131 0	.000	, i	0.0	1274.0	, i	0.0	70	0.85	1.07	42.4	9.0
				e	198	2-2018	Inno	vvze					

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DBFL Cor	nsultin	g Eng	ineers	5						Pa	ge 7
Ormond H	House				Holl	lystown					
Upper On	rmond Q	uay				-					
Dublin 1	7 -	-									
Date 05/	/10/202	1 08-	57		Desi	igned by	Grant	Hump	hrev	M	itio
File Not	mork C	i+a 2	and 3	20	Chor	akad by I	loirdr.	- Mal	ch.		rainage
Tunormer	WOIR 5.	ILE 2	anu s	20	. Criec	ineu by 1		e war	511		
THHOVY26	-				Netv	WOIK 2010					
			Netwo:	rk Des	ign Ta	ble for	Foul N	Netwoi	rk		
PN	Length	Fall (m)	Slope	Area (ba)	Units ,	Base	k (mm)	EYD I SECT (DIA Sec	tion Typ	pe Auto Design
	()	()	(2)	()	-	104 (1/2/	(0001	(besign
F19.011	16.793	0.084	199.9	0.000	28.0	0.0	0.150	•	225 Pip	e/Condui	it 🚦
F19.012	48.242	0.241	200.2	0.000	140.0	0.0	0.150	•	225 Pip	e/Condu	10
F16.003	28.389	0.142	199.9	0.000	28.0	0.0	0.150	۰	225 Pip	e/Condui	it 🚦
F1.020	59.972#	0.193	310.7	0.000	98.0	0.0	1.500	۰	375 Pip	e/Condui	it 💧
F25.000	24.883	0.415	60.0	0.000	70.0	0.0	0.150	0	150 Pip	e/Condui	it 🔒
F25.001	9.816	0.164	59.9	0.000	0.0	0.0	0.150	•	150 Pip	e/Condui	it 🦉
F26.000	26.663	0.406	65.7	0.000	28.0	0.0	0.150	•	150 Pip	e/Condui	it 👩
F25.002	59.635	0.398	149.8	0.000	112.0	0.0	0.150	•	150 Pip	e/Condui	it 💣
F27.000	53.603	0.357	150.1	0.000	196.0	0.0	0.150	•	150 Pip	e/Condui	
F25.003	31.116	0.249	125.0	0.000	98.0	0.0	0.150		225 Pir	e/Condui	
F25.004	12.693	0.094	135.0	0.000	42.0	0.0	0.150	•	225 Pip	e/Condui	it 💣
F25.005	24.542	0.175	140.2	0.000	42.0	0.0	0.150	•	225 Pip	e/Condui	t 🗗
F25.006	57.032	0.393	145.1	0.000	112.0	0.0	0.150	•	225 Pip	e/Condui	it 🕐
F28.000	15.707	0.262	60.0	0.000	28.0	0.0	0.150	۰	150 Pip	e/Condui	it 👸
				Net	work R	esults T	able				
	(m)) (1	a) Fl	ow (1/:	2 Uni ;)	(1/s)	ow P.De (mm)) (m/:	s) (m/s)) (1/s)	(1/s)
F19.	011 68.0	69 0.	000	0.	0 1302	2.0 0	.0 7	0 0.8	86 1.0 [°]	7 42.5	9.1
F19.	012 67.9	85 0.	000	0.	.0 1442	2.0 0	.0 7	2 0.8	87 1.0	7 42.4	9.5
F16.	003 67.7	44 0.	000	0.	.0 1820	0.0 0	.0 7	7 0.9	90 1.0	7 42.5	10.8
F1.	020 67.4	52 0.	000	0.	.0 8232	2.0 0	.0 13	6 0.1	78 0.9	1 100.2	28.4
F25	000 69 9	14 0	000	0	.0 70	0.0 0	.0 2	7 1.0	08 1.5	3 27.1	3.6
F25.	001 69.4	99 0.	000	Ū.	.0 70	0.0 0	.0 3	7 1.0	08 1.5	4 27.1	3.6
F26.	000 69.7	41 0.	000	0.	.0 28	3.0 0	.0 3	4 0.9	98 1.4	6 25.9	3.0
F25.	002 69.3	35 0.	000	0.	.0 210	0.0 0	.0 5	4 0.8	82 0.9	6 16.9	4.7
F27	000 69.2	94 0	000	0	0 196	5.0 0	.0 5	4 0.0	82 0 9	5 16 9	4.6
F25.	003 68.8	12 0.	000	0.	0 504	1.0 0 5.0 0	.0 5	2 0.9	au 1.3	0 54.1	6.2
F25	005 68 5	19 0	000	0	0 588	3.0 0	.0 5	4 0.4	89 1.2	8 51.0	6.5
F25.	006 68.3	44 0.	000	0.	.0 700	0	.0 5	6 0.9	90 1.2	6 50.1	7.0
	000 60 0	20 0	000								2.0
F28.	000 69.8	70 0.	000	0.	.0 28	5.0 0	.0 3	14 I.U	02 1.5	s 27.1	3.0
				©1	982-20	18 Innov	yze				

DBFL Co	nsu	ltin	ig Eng	ineer	s									Pa	age 8	
Ormond	Hou	se					Hollys	town							-	_
Upper 0	rmo	nd 0	Juav				-									
Dublin	7															144
Dubiin	(10)	1000	1 00			\rightarrow	Denting		-					N	licro	
Date 05	/10	/202	1 08:	5/			Design	ea by	Gr	an	сни	umphre	₽Y		Iraina	10e
File Ne	two	rk S	ite 2	and	3 20.		Checke	d by	Dei	.rd	re V	alsh				··J-
Innovyz	e						Networ	k 201	8.1	1						
				Netwo	rk De	sig	n Table	e for	Fo	ul	Net	work				
PN	Le	ngth	Fall	Slope	Area	Unit	ts Bo	ase	1	k	HYD	DIA	Sect	ion Ty	pe Au	to
		(m)	(m)	(1:X)	(ha)		Flow	(1/s)	(m	m)	SEC	r (mm)			Des	ign
F28.00	69	448	1.157	60.0	0.000	42	0	0.0	0.1	150		- 150	Pipe	/Condu	it d	
F28.00	2 20	.069	0.334	60.1	0.000	14	.0	0.0	0.1	150		150	Pipe	/Condu	it 🖌	
F28.003	3 5	.384	0.090	59.8	0.000	0	. 0	0.0	0.1	150		150	Pipe	/Condu	it 🖥	
F25.00'	7 92	.167	0.542	170.0	0.000	140	.0	0.0	0.1	150		225	Pipe	/Condu	it 💧	
F29 000	1 40	684	0 824	60.2	0 000	56	0	0.0	1.9	500		150	Dime	/Condu		
F29.001	27	.028	0.181	149.3	0.000	84	.0	0.0	0.1	150		150	Pipe	/Condu	it i	
F29.00	2 7	.216	0.036	200.4	0.000	140	.0	0.0	0.1	150		225	Pipe	/Condu	it	
F29.003	8 90	.774	0.534	170.0	0.000	0	. 0	0.0	0.1	150		225	Pipe	/Condu	it 🛛	Þ
															_	
F1.02	23	.363	0.064	365.0	0.000	0	.0	0.0	1.3	500	(375	Pipe	/Condu	it (
					Ne		nie Deer		T - 1-	1-						
					Ne	GWO.	rk kes	uits	lap	ite						
Network Results Table																
-		03/	A 0	hiea hal W	L Dase	- · ·	5 Units	(1/s	101	2.1	n) m)	r.vel (m/c)	ver (m/c)	(1/e)	(1/e)	
		(4	4 0	uaj E.		-/		(1/3		(111	,	(ш/ 5)	(ш/ 5)	(1/5/	(1/5)	
F28	.001	69.	608 0	.000	0	0.0	70.0		0.0		37	1.08	1.53	27.1	3.6	
F28	.002	68.4	451 0	.000	0	0.0	84.0		0.0		38	1.09	1.53	27.1	3.8	
F28	.003	68	117 0	.000	(0.0	84.0		0.0		38	1.09	1.54	27.1	3.8	
F25	007	67	951 0	000		0	924 0		0 0		62	0.87	1.16	46.2	78	
F29	.000	69.0	825 0	.000	0	0.0	56.0		0.0		42	0.84	1.13	20.0	3.5	
F29	.001	69.0	001 0	.000	0	0.0	140.0		0.0		51	0.80	0.96	16.9	4.3	
F29	.002	68.	745 0	.000			280.0		0.0		52	0.73	1.07	42.4	5.1	
125	.008	00.	/03 0				200.0		0.0		50	0.77	1.10	40.2	0.1	
F1	021	67.3	259 0	.000	0	0.0	9436.0		0.0	1	150	0.76	0.84	92.4	31.0	
					e	198	2-2018	Inno	vvz	e						

DBFL Co	nsulti	ng En	ginee	ers					1	Page 9	1	
Ormond	House				Holly	stown			[1	
Upper O	rmond	Quay										
Dublin	7									Micro		
Date 05	/10/20	21 08	:57		Desig	ned by	Grant Hu	mphrey		Desinado		
File Ne	twork	Site	2 and	1 3 20.	Check	ed by 1	Deirdre W	lalsh		Diamage		
Innovyz	e				Netwo	rk 201	8.1.1				1	
											1	
			Ma	nhole (Schedules	for F	oul Netwo	ork				
			I			I			I			I
Name	CL (m)	Denth	Con	nection	Diam L*W	PN	Invert	Diameter	PN	Tipes In Invert	liameter	Backdre
	,,	(m)			(mm)		Level (m)	(mm)		Level (m)	(mm)	(mm)
FF148	73.843	1.493	Open	Manhole	1200	F1.000	72.350	150				
FF147	73.565	1.627	- Open	Manhole	1200	F1.001	71.938	150	F1.000	71.938	150	
FF146	73.454	1.764	Open	Manhole	1200	F1.002	71.690	150	F1.001	71.717	150	:
FF145A	72.992	2.502	Open	Manhole	1200	F1.003	70.490	150	F1.002	70.499	150	
FF145	72.889	2.459	Open	Manhole	1200	F1.004	70.430	150	F1.003	70.430	150	
FF144-2	72.400	1.153	Open	Manhole	1200	F2.000	71.247	150				
FF144-1	73.000	2.400	Open	Manhole	1200	F2.001	70.600	150	F2.000	70.600	150	
FF144	72.958	2.599	Open	Manhole	1200	F1.005	70.360	225	F1.004	70.360	150	
									F2.001	70.445	150	:
FF143A-1	73.429	1.429	Open	Manhole	1200	F3.000	72.000	150				
FF143A	73.186	2.977	Open	Manhole	1200	F1.006	70.209	225	F1.005	70.209	225	
									F3.000	70.899	150	6.
FF143-1	73.584	1.434	Open	Manhole	1200	F4.000	72.150	150				
FF143	73.240	3.084	Open	Manhole	1200	F1.007	70.156	225	F1.006	70.156	225	
		0.040	~		1000		-	150	P4.000	70.939	150	7
FF142-2	71.176	0.240	Open	Mannole	1200	25.000	70.930	150			1.50	
FF142-1	72.404	2 214	Open	Manhole	1200	F1 008	F0.730	225	E3.000	60 805	225	
11142	/8.019	8.214	open	Mannoie	1200	11.000	69.000	225	F5 001	69.880	150	
FF141A-1	72.072	1.437	Open	Manhole	1200	F6.000	70.635	150	10.001		100	
FF141A	72.537	3.068	Open	Manhole	1200	F1.009	69,469	225	F1.006	69,469	225	
									F6.000	69.688	150	1.
FF141	72.432	3.001	Open	Manhole	1200	F1.010	69.431	225	F1.009	69.431	225	
FF140A-9	73.743	1.143	Open	Manhole	1200	F7.000	72.600	150				
FF140A-8	74.370	2.887	Open	Manhole	1200	F7.001	71.483	225	F7.000	71.558	150	
FF140A-7	74.180	3.234	Open	Manhole	1200	F7.002	70.946	225	F7.001	70.946	225	
FF140A-6	74.060	3.179	Open	Manhole	1200	F7.003	70.881	225	F7.002	70.881	225	
FF140A-5	73.401	2.976	Open	Manhole	1200	F7.004	70.425	225	F7.003	70.425	225	
FF140A-4	73.437	1.688	Open	Manhole	1200	F8.000	71.749	150				
FF140A-3	73.468	3.095	Open	Manhole	1200	F7.005	70.373	225	F7.004	70.373	225	
									F8.000	71.192	150	7.
FF140A-2	73.580	3.659	Open	Manhole	1200	F7.006	69.921	225	F7.005	69.921	225	
FF140A-1	73.594	3.710	Open	Manhole	1200	F7.007	69.884	225	F7.006	69.884	225	
FF140A	72.561	3.241	Open	Manhole	1200	F1.011	69.320	225	F1.010	69.320	225	
PP140	72 242	2 200	0	Manhal -	1200	F1 010	60.050	0.05	E7.007	60.050	225	· ·
FF100.5	72.042	1 251	open	Manhala	1200	FR 000	09.002	150	21.011	09.002	220	
FF100-4	71 485	1.201	Open	Manhole	1200	F9 001	60.700	205	F9 000	69 800	150	
11105-4	/1.405	1.100	open		1200	19:001	05.720	220	13.000		100	l I
				C	1982-2018	Innov	/yze					

DBFL Consulting Engineers									e 10		
Ormond H	ouse										
Upper Or	mond Q	uay							~		
Dublin 7								Mir	TO TO		
Date 05/	10/202	1 08:	57	Design	ed by G	rant Hum	phrey	Dca	inago		
File Net	work S	ite 2	and 3 20	. Checke	d by De	irdre Wal	lsh	DIG	mage		
Innovyze				Networ	k 2018.	1.1					
			Manhole So	chedules	for Fou	l Networ	k				
MH	MH	MH	MH	MH		Pipe Out			Pipes In	•	
Name	CL (m)	Depth	Connection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	Diameter	Bac
		(m)		(mm)		Devel (m)	(mm)		never (u	/ (mm)	v
EE100.0		1 051	One Markela	1000	F0.000	60, 501	0.05	E0.001	60.50		
FF139-3	71.332	1.751	Open Manhole	1200	F9.002	69.581	225	19.001	09.50	1 225	
FF139-2	71.411	1.890	Open Manhole	1200	F9.003	69.521	225	F9.002	69.52	1 225	
FF139-1	72.154	3.004	Open Manhole	1200	F9.004	69.150	225	F9.003	69.13	0 225	
11139	72.331	3.420	Open Mannole	1200	11.013	00.903	300	F1.012	60.90	0 220	
FF128	72 022	4 461	Onen Manhala	1200	E1 014	69 571	20.0	F1 012	69.07	0 220	
FF100	72 649	4 412	Open Manhole	1200	F1.014	69 225	200	F1.013	60.07	L 300	
FF126	71 267	2 248	Open Manhole	1200	F1 016	69 010	200	F1 015	68.01	a 200	
PP105_1	71 710	1 425	Open Manhole	1200	F10 000	20.204	200	11.010	00.01	5 600	
FF105-1	71 722	2 828	Open Manhole	1200	E1 017	67 005	220	F1 016	67 00	5 200	
11100	/1./28	0.000	open nannore	1200	11.01/	07.000	300	F10 000	60.00	a auu a auu	
FF124	71 280	2 707	Open Manhale	1200	E1 018	67 682	20.0	F1 017	67.68	2 200	
FF1228-8	71 869	1 500	Open Manhole	1200	F11 000	70 269	150		07.00		
FF122A-7	71 806	1 704	Open Manhole	1200	F12 000	70 102	150				
FF122A-6	71 810	1 847	Open Manhole	1200	F11 001	69 962	150	F11 000	69 96	a 150	
								F12.000	69.96	2 150	
FF1228-5	71.522	2.252	Open Manhole	1200	F11.002	69.170	150	F11.001	69.17	0 150	
FF133A-4	71.639	1.650	Open Manhole	1200	F13.000	69.989	150				
FF133A-3	71.556	1.875	Open Manhole	1200	F13.001	69.681	150	F13.000	69.68	1 150	
FF133A-2	71.346	1.350	Open Manhole	1200	F14.000	69.996	150				
FF133A-1	71.580	2.517	Open Manhole	1200	F11.003	69.063	150	F11.002	69.06	3 150	
			-					F13.001	69.31	1 150	
								F14.000	69.55	0 150	
FF133A	71.317	3.673	Open Manhole	1200	F1.019	67.644	300	F1.018	67.64	5 300	
								F11.003	68.89	7 150	
FF133-27	71.555	1.350	Open Manhole	1200	F15.000	70.205	150				
FF133-26	71.633	1.212	Open Manhole	1200	F16.000	70.421	150				
FF133-25	71.399	1.405	Open Manhole	1200	F17.000	69.994	150				
FF133-24	71.387	1.398	Open Manhole	1200	F18.000	69.989	150				
FF133-23	71.323	1.592	Open Manhole	1200	F17.001	69.731	150	F17.000	69.73	1 150	
								F18.000	69.73	1 150	
FF133-22	71.502	2.170	Open Manhole	1200	F16.001	69.332	150	F16.000	69.68	8 150	
								F17.001	69.33	2 150	
FF133-21	71.830	2.651	Open Manhole	1200	F16.002	69.179	225	F16.001	69.25	4 150	
FF133-20	71.300	0.800	Open Manhole	1200	F19.000	70.500	150				
FF133-19	71.493	1.746	Open Manhole	1200	F19.001	69.747	150	F19.000	69.74	7 150	
FF133-18A	71.632	2.323	Open Manhole	1200	F19.002	69.309	225	F19.001	69.38	4 150	
FF133-18	72.200	1.450	Open Manhole	1200	F20.000	70.750	225				
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DBFL Cons	DBFL Consulting Engineers								11			
Ormond Ho	use			Hollyst	own							
Upper Orm	nond Qu	ay										
Dublin 7								Mic				
Date 05/1	0/2021	08:5	7	Designe	d by Gr	ant Humpl	hrey	Dcai				
File Netw	ork Si	te 2	and 3 20	Checked	by Dei	rdre Wals	sh	Uldi	nage			
Innovyze				Network	2018.1	.1						
			Manhole Sc	hedules f	for Foul	Network						
ME	MH	MH	MH	ME		Pipe Out			Pipes I	n		
Name	CL (m)	Depth	Connection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	: 1	Diameter	Ba
		(m)		(mm)		PeAst (W)	(mm)		TeAst 0	m)	(mm)	
FF133-17	72.306	3.338	Open Manhole	1200	F19.003	68.968	225	F19.002	68.9	68	225	
								F20.000	70.2	59	225	
FF133-16	71.988	1.728	Open Manhole	1200	F21.000	70.260	150					
FF133-15	72.216	3.288	Open Manhole	1200	F19.004	68.928	225	F19.003	68.9	28	225	
	_							F21.000	69.8	52	150	
FF133-14	72.011	3.145	Open Manhole	1200	F19.005	68.867	225	F19.004	68.8	67	225	
FF133-13	70.930	1.234	Open Manhole	1200	F22.000	69.696	150					
FF133-12	71.130	2.004	Open Manhole	1200	F22.001	69.126	150	F22.000	69.1	26	150	
FF133-11	71.150	2.485	Open Manhole	1200	F19.006	65.665	225	F19.005	68.6	65	225	
				1000				F22.001	68.7	90	150	
FF133-10	71.269	2.670	Open Manhole	1200	F19.007	66.599	225	F19.006	00.3	99	225	
FF100 0	71.231	2.720	Open Manhole	1200	222.000	00.011	220	119.007	00.3		220	
FF133-0	70.915	0.900	Open Manhole	1200	F23.000	70.015 60 444	150	F22 000	60.4	a a	150	
FF122-6-1	70.200	1 006	Open Manhole	1200	F24 000	60 102	150	128.000	05.5		100	
FF122_6	70.085	1 067	Open Manhole	1200	F22 002	69 018	150	F22 001	69.1	82	150	
11100-0	10.000	1.007	open namore		120.002	05.010	100	F24 000	60.0	18	150	
FF122-5	70 558	1 928	Onen Manhale	1200	F22 002	68 620	2.25	F22 002	68.7	05	150	
FF122-4	70 982	2 624	Open Manhole	1200	F10 000	68 248	225	F19 008	68.2	4R	225	
	10.002	2.001	open namore		110.000	00.010		F23.003	68.3	48	225	
FF133-3	70.691	2.560	Open Manhole	1200	F19.010	68.131	225	F19.009	68.1	31	225	
FF133-2A	70.610	2.541	Open Manhole	1200	F19.011	68.069	225	F19.010	68.0	69	225	
FF133-2	70.752	2.767	Open Manhole	1200	F19.012	67.985	225	F19.011	67.9	85	225	
FF133-1	71.495	3.751	Open Manhole	1200	F16.003	67.744	225	F16.002	68.6	50	225	
								F19.012	67.7	44	225	
FF133	71.584	4.132	Open Manhole	1350	F1.020	67.452	375	F1.019	67.5	26	300	
			-					F15.000	69.2	12	150	
								F16.003	67.6	02	225	
FF131A-17	70.660	0.746	Open Manhole	1200	F25.000	69.914	150					
FF132A-16	70.491	0.992	Open Manhole	1200	F25.001	69.499	150	F25.000	69.4	99	150	
FF132-15-1	70.400	0.659	Open Manhole	1200	F26.000	69.741	150					
FF131A-15	70.442	1.107	Open Manhole	1200	F25.002	69.335	150	F25.001	69.3	35	150	
								F26.000	69.3	35	150	
FF131A-14	70.029	0.735	Open Manhole	1200	F27.000	69.294	150					
FF131A-13	70.083	1.221	Open Manhole	1200	F25.003	68.862	225	F25.002	68.9	37	150	
								F27.000	68.9	37	150	
FF131A-12	70.349	1.736	Open Manhole	1200	F25.004	68.613	225	F25.003	68.6	13	225	
FF131A-11	70.528	2.009	Open Manhole	1200	F25.005	68.519	225	F25.004	68.5	19	225	
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DBFL Con	sultin	g Eng	ineers					Page	e 12		
Ormond H	ouse										
Upper Or	mond Q	uay							<u>~</u>		
Dublin 7								Mir			
Date 05/	10/202	1 08:	57	Design	ed by G	rant Hum	phrey	Des	in ann		
File Net	work S	ite 2	and 3 20	. Checke	d by De	irdre Wal	lsh	UIC	maye		
Innovyze				Networ	k 2018.	1.1					
			Manhole S	chedules	for Fou	1 Networ	k				
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m	Diameter) (mm)	Bac (
FF131A-10	70.744	2.400	Open Manhole	1200	F25.006	68.344	225	F25.005	68.34	4 225	
FF131A-9	70.550	0.680	Open Manhole	1200	F28.000	69.870	150				
FF131A-8	70.500	0.892	Open Manhole	1200	F28.001	69.608	150	F28.000	69.60	8 150	
FF131A-7	70.404	1.953	Open Manhole	1200	F28.002	68.451	150	F28.001	68.45	1 150	
FF131A-6	71.152	3.035	Open Manhole	1200	F28.003	68.117	150	F28.002	68.11	7 150	
FF131A-5	71.099	3.148	Open Manhole	1200	F25.007	67.951	225	F25.006	67.95	1 225	
								F28.003	68.02	7 150	
FF131A-4	71.230	1.405	Open Manhole	1200	F29.000	69.825	150				
FF131A-3	71.127	2.126	Open Manhole	1200	F29.001	69.001	150	F29.000	69.00	1 150	
FF131A-2	70.829	2.084	Open Manhole	1200	F29.002	68.745	225	F29.001	68.82	0 150	
FF131A-1	70.777	2.068	Open Manhole	1200	F29.003	68.709	225	F29.002	68.70	9 225	
FF131A	70.945	3.686	Open Manhole	1350	F1.021	67.259	375	F1.020	67.25	9 375	
								F25.007	67.40	9 225	
								F29.003	68.17	5 225	
FF131	70.432	3.237	Open Manhole	300		OUTFALL		F1.021	67.19	5 375	
			©1	982-2018	Innovy	ze					

Development at Hollystown – Site 2,3 & Local Centre Infrastructure Design Report

Local Centre

Foul Network

DRET CO	nsulti	ng En	ginee	rs								P	age 1
Ormond	House				Н	lollys	stown	Loca	1 Ce	entre		0	
Upper O	rmond	Quay											
Dublin	7												Micro
Date 21	/10/20	21			I	esign)	ied by	y ASM					Irainan
File Lo	cal Ce	entre.	mdx		C	hecke	ed by	BCM					Juniog
Innovyz	e				N	letwor	ck 201	18.1.	1				
				I	SOUL S	SEWERJ	AGE DI	ESIGN	[
				Des	ign (Crite	ria f	or FS	3				
			Pipe	Sises	STAND	ARD M	anhole	Sises	ST?	INDARD			
				T	Indu: ndustr	strial ial Pe	Flow at Flo	(l/s/l w Fact	ha) tor	0.0	0		
				-		Calc	ulatio	on Metl	hod 1	BS 830	ĩ		
						Fr	equenc	y Fact	tor	0.2	0		
					Domest	Dom tic Pe	ak Flo	w Fact	tor	6.0	0		
				Add	Flow	/ Clim	ate Ch	ange	(*)		0		
				M:	inimum	Backd	rop He	ight	(m) (0.20	0		
			Min D	esign l	Depth :	for Op	timisa	tion	(m) (m)	1.20	0		
	Min Design Depth for Optimisation (m) 1.200 Min Vel for Auto Design only (m/s) 0.75												
	Min Slope for Optimisation (1:X) 500												
	Designed with Level Soffits												
Network Design Table for FS 3													
Network Design Table for FS 3													
PN	Length	Fall	Slope	Area	Units	sign Ba	ise	k 101	EYI		Sect	ion Typ	e Auto
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Units	Ba Flow	(1/s)	k (mm)	EM	<u> </u>	Sect	ion Typ	pe Auto Design
PN 1.000	Length (m) 29.577	Fall (m)	Slope (1:X) 129.7	Area (ha)	Units 658.0	Ba Flow	(1/s)	k (mm) 1.500	EYI SEC	<u>5</u> D DIA T (mm) 0 223	Sect Pipe	ion Typ	pe Auto Design
PN 1.000 1.001 1.002	Length (m) 29.577 31.130 9.584	Fall (m) 0.228 0.239 0.130	Slope (1:X) 129.7 130.0 74.0	Area (ha) 0.000 0.000 0.000	Units 658.0 0.0 0.0	Ba Ba Flow	(1/s) 0.0 0.0 0.0	k (mm) 1.500 1.500 1.500	EYI	0 DIA T (mm) 0 225 0 225 0 225	Sect Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui	pe Auto Design it 6 it 6
PN 1.000 1.001 1.002	Length (m) 29.577 31.130 9.584	Fall (m) 0.228 0.239 0.130	Slope (1:X) 129.7 130.0 74.0	Area (ha) 0.000 0.000 0.000	Units 658.0 0.0 0.0	Ba Flow	(1/s) (1/s) 0.0 0.0	k (mm) 1.500 1.500 1.500	EYI	0 DIA T (mm) 0 228 0 228 0 228	Sect Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui	pe Auto Design it 0 it 1
PN 1.000 1.001 1.002 2.000	Length (m) 29.577 31.130 9.584 30.063 22.677	Fall (m) 0.228 0.239 0.130 0.231 0.265	Slope (1:X) 129.7 130.0 74.0 130.1 64.7	Area (ha) 0.000 0.000 0.000	Units 658.0 0.0 700.0	Ba Flow	(1/s) 0.0 0.0 0.0 0.0	k (mm) 1.500 1.500 1.500 1.500	EYI	J DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui	e Auto Design it g it d it d
PN 1.000 1.001 1.002 2.000 2.001	Length (m) 29.577 31.130 9.584 30.063 23.677	Fall (m) 0.228 0.239 0.130 0.231 0.231	Slope (1:X) 129.7 130.0 74.0 130.1 64.7	Area (ha) 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 0.0 700.0 0.0	Ba Flow	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0	k (mm) 1.500 1.500 1.500 1.500	EYI	J DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui	e Auto Design it gr it gr it gr it gr
PN 1.000 1.001 1.002 2.000 2.001 1.003	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440	Fall (m) 0.228 0.239 0.130 0.231 0.231 0.366 0.187	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 0.0 700.0 0.0 0.0	Ba Flow	(1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k (mm) 1.500 1.500 1.500 1.500 1.500	EYI	3 D DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui	pe Auto Design it of it of it of it of it of
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.545	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.274	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 700.0 700.0 0.0 462.0	Ba Flow	(1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500	EXIS	3 D DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui /Condui	be Auto Design it of it of it of it of it of it of
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0	Ba Flow	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500	EYI	3 D DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe	/Condui /Condui /Condui /Condui /Condui /Condui /Condui	e Auto Design it B it B it B it B it B it B
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 etwor	Ba Flow	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 Table	EVI	J DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui /Condui	e Auto Design it of it of it of it of it of it of
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 etwor	<u>Ba</u> Ba Flow	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 Table	EYI SEC	D DIA T (mm) 0 228 0 228 0 228 0 228 0 228 0 228 0 228 0 228	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Tyj /Condui /Condui /Condui /Condui /Condui	e Auto Design it of it of it of it of it of
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 20.05, (r	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 (Π_Σ_n) (Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 Area ha) F	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000 0.000 <u>Ν</u> Σ Base low (1/	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 etwor (s)	<u>Ba</u> Flow Dnits	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 (nm) (nm)	e Dep mn)	D DIA T (mm) 0 225 0 225	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Vel (m/s)	ion Typ /Condui /Condui /Condui /Condui /Condui /Condui /Condui	Flow (1/s)
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 F 1.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 20 US, (r 000 74.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 /IL E. n) (200 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 188.0 Area ha) F.	Area (ha) 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 <u>N</u> E Base low (1)	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 etwor (s) 0.0	<u>Ba</u> Flow Units 658.0	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 Table (mm) (mm)	EVI SEC Dep mn) 63	D DIA T (mm) 0 228 0 200 0 200 0 200 0 20000000000	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui	Flow (1/s)
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 I.005	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 2N US, (r 000 74. 001 73.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 /IL E . n) () 200 0 972 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 188.0 Area ha) F.	Area (ha) 0.0000 0.000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.000000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 462.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k Res ba ba ba ba ba ba ba ba ba ba ba ba ba	12010 10	k (mm) 1.500 1	EVI SEC Dep mn) 63	D DIA T (mm) 0 228 0 275 0 275 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	/Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui	Flow (1/s) 6.8 6.8 6.8
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 I.1. 1.1. 1.1.	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 2N US, (r 000 74. 001 73. 002 73.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 (Π_Σ. n) (200 0 972 0 733 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 Nea ha) F.	Area (ha) 0.0000 0.000 0.000 0.0000 0.0000 0.000000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 462.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<u>k Res</u> Flow Dnits 658.0 658.0	Iable (1/s) 0.0	k (mm) 1.500 1	EVI SEC mm) 63 54	D DIA T (mm) 0 228 0 229 0 229 0 0 229 0 0 0 229 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui /Condui	Flow (1/s) 6.8 6.8 6.8 6.8
PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 P 1.01 1.01 1.01 2.01 1.01 1.02 2.000 2.001 1.002 2.000 2.001 1.002 2.000 2.001 1.002 2.000 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.002 2.001 1.003 1.005 1	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 2N US, (r 000 74. 001 73. 002 73.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 /IL E (a) (200 0 972 0 733 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 Area ha) F. .000 .000	Area (ha) 0.0000 0.0000 0.0000 0.0000 0.000000	Units 658.0 0.0 700.0 700.0 0.0 462.0 0.0 462.0 0.0 462.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	<u>sign</u> Be Flow Flow 658.0 658.0 658.0 700.0	(1/s) (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1	EVI SEC Dep m) 63 63 54 64	<pre> D DIA T (mm) 0 228 0 275 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75</pre>	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condu	Pe Auto Design it it it it it it it it it it
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PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 F 1. 1. 1. 2. 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 2N US, (r 000 74. 001 73. 000 74. 001 73. 000 74. 001 73.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 (IL E n) () 200 0 972 0 733 0 200 0 969 0 847 0 660 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 188.0 Xrea ha) F. .000 .000 .000 .000 .000	Area (ha) 0.0000 0.000 0.000 0.0000 0.0000 0.000000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 462.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k Res Flow Flow 658.0 658.0 658.0 700.0 700.0 700.0 858.0 820.0	Iable (1/s) 0.0	k (mm) 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 1.500 0.0 0.0 0.0 0.0 0.0 0.0 0.0	EVI SEC Dep mn) 63 63 64 53 64 53 79 88	D DIA T (mm) 0 228 0 275 0 .75 0.975 0.975 0.975 0.975	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	ion Typ /Condui /Condu	Flow (1/s) 6.8 6.8 7.0 7.0 9.3 10.8
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PN 1.000 1.001 1.002 2.000 2.001 1.003 1.004 1.005 I.01 1.01 1.02 I.02 1.02 1.003 I.004 1.005 I.01 I.02 I.02 I.01 I.02 I.02 I.02 I.001 I.02 I.001 I.002 I.001 I.002 I.001 I.002 I.001 I.002 I.001 I.003 I.003 I.004 I.005 I.00	Length (m) 29.577 31.130 9.584 30.063 23.677 31.440 51.451 59.542 2N US, (r 000 74. 001 73. 002 73. 000 74. 001 73. 002 72.	Fall (m) 0.228 0.239 0.130 0.231 0.366 0.187 0.274 0.317 /IL 2. a) (200 0 972 0 733 0 200 0 969 0 847 0 386 0	Slope (1:X) 129.7 130.0 74.0 130.1 64.7 168.1 188.0 188.0 188.0 188.0 188.0 188.0 188.0 188.0 188.0 1000 .000	Area (ha) 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	Units 658.0 0.0 0.0 700.0 0.0 462.0 0.0 462.0 0.0 462.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	k Res Flow Flow 658.0 658.0 658.0 700.0 700.0 700.0 820.0 820.0	Labie (1/s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	k (mm) 1.500 1.0000 1.00000 1.0000 1.0000 1.0000 1.00000 1.00000 1.00000 1.000000 1	E E Dep mn) 63 54 53 79 88 88	<pre> D DIA T (mm) 0 228 0 275 0.75 0.92 0.75 0.97 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75</pre>	Sect Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe 1.01 1.01 1.34 0.88 0.84 0.84	ion Typ /Condui /Condu	Pe Auto Design it 0 it 0 it 0 it 0 it 0 it 0 it 0 it 0

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December 2021

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DBFL Co	nsu	lti	ng En	ginee	rs								1	Page :	2
Ormond	Hou	se	-	-		Н	ollve	stown	Loca	a1 C	entre		r		_
Upper 0	rmo	nd (Onev												
Dublin	7														<u> </u>
Date 21	/10	/20	21				acim	ad by	. 19	w				MICU	ו
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					Network	De	sign	Table	foi	r FS	3				
PN	Len (r	gth N	Fall (m)	Slope	Area Un (ha)	nits	Be Flow	(1/s)	k (mm)	EY SE(Secti	ion Ty	pe Au Des	ito ion
3.000	25	769	0.596	60.0	0.000	14.0		0.0	1.50	0	0 150) Pine	/Condu	it.	a .
1 005		022	0.200	100.0	0.000			0.0	1 50	- -	- 225	Dine.	Candu		
1.007	67.	837	0.361	188.0	0.000	0.0		0.0	1.50	ō	0 225	5 Pipe/	/Condu	it	a
1.008	60.	223	0.320	188.0	0.000	0.0		0.0	1.50	0	o 225	Pipe/	/Condu	it	
					Nee		In Dee		Tabl					-	
					Net	WOT.	K Kes	ults	lap.	Le					
P	N	US/ (m	IL Σ 3) (1	Area ha) F	Σ Base low (l/s)	Σι	Units	Add Fl (1/s	.ow P) (.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (1/s)	Flow (1/s)	
3.0	000	73.6	50 0	.000	0.0)	14.0	C	0.0	36	0.77	1.13	20.0	2.6	
1.0	006	72.0	70 0	.000	0.0	18	334.0	0	.0	88	0.75	0.84	33.2	10.8	
1.0	007	71.7	61 0	.000	0.0	18	334.0	0	0.0	88	0.75	0.84	33.2	10.8	
1.0	800	71.4	00 0	.000	0.0	18	334.0	0	0.0	88	0.75	0.84	33.2	10.8	
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DBFL	Consul	lting	Engi	neers						Page	3	
Ormor	nd Hous	se			Hol	lysto	wn Local	Centre				
Upper	c Ormor	nd Qua	чy									
Dubli	in 7									Micro		
Date	21/10	/2021			Des	igned	by ASM			Drair	hane	
File	Local	Centr	ce.md	x	Che	cked	by BCM			Dian	iuge	
Innov	/yze				Net	work	2018.1.1					
				Ma	nhole Sch	nedule	s for FS	3				
MH	МН	MH	I	MH	MH	I	Pipe Out		I	Pipes In		I
Name	CL (m)	Depth	Con	nection	Diam.,L*W	PN	Invert	Diameter	PN	Invert	Diameter	Backdrop
		(m)			(mm)		Level (m)	(mm)		Level (m)	(mm)	(mm)
FC9	75.200	1.000	Open	Manhole	1200	1.000	74.200	225				
FC8	75.200	1.228	Open	Manhole	1200	1.001	73.972	225	1.000	73.972	225	2
FC7	75.200	1.467	Open	Manhole	1200	1.002	73.733	225	1.001	73.733	225	'n
FC6-2	75.200	1.000	Open	Manhole	1200	2.000	74.200	225	2 000	70.000		
200-1	75.200	2 252	Open	Manhole	1200	1.002	73.969	225	1.002	73.909	225	754
100	75.200	2.000	open	Mannoie	1200	1.008	/2.04/	220	2 001	72 602	220	756
EC.S.	75 240	2 680	0	Manhala	1200	1 004	72 660	225	1 002	72 660	225	
FC4	75.062	2 676	Open	Manhole	1200	1 005	72.000	225	1 004	72.000	225	,
FC2-1	74 950	1 200	Open	Manhole	1200	3 000	72.650	150	1.001	/2.000		·
FCa	74.586	2.516	Open	Manhole	1200	1.006	72.070	225	1.005	72.070	225	
									3.000	73.054	150	909
FC2	74.263	2.502	Open	Manhole	1200	1.007	71.761	225	1.006	71.761	225	5
FC1	73.352	1.952	Open	Manhole	1200	1.008	71.400	225	1.007	71.400	225	5
	0.000		Open	Manhole	0		OUTFALL		1.008	71.080	225	5
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DBFL Consult		Page 4											
Ormond House				3	Hollyst	own Loca	al Centre						
Upper Ormond	Quay	7											
Dublin 7									Micco				
Date 21/10/2	021			1	Designe	d by ASM	1						
File Local C	entre	e.mdx			Checked	by BCM			urainage				
Innovyze					Network	2018.1	1						
							-						
			PT	PELINE	SCHEDU	ES for	FS 3						
				Ups	tream M	anhole							
PN	Byd	Diam	ME (C.Level	I.Level	D.Depth	ME	ME DIAM.	. L*W				
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)					
1													
1.000	°	225	FC9 FC8	75.200	74.200	0.775 0	pen Manhole		1200				
1.002		225	FC7	75 200	72 722	1 242 0	pen Manhole		1200				
	Ŭ												
2.000	•	225 1	FC6-2	75.200	74.200	0.775 0	pen Manhole		1200				
2.001	0	225 B	FC6-1	75.200	73.969	1.006 0	pen Manhole		1200				
1.003	0	225	FC6	75.200	72.847	2.128 0	pen Manhole		1200				
1.004	°	225	PC5	75.340	72.000	2.455 0	pen Manhole		1200				
1.005		220	104	75.062	12.800	2.451 0	pen Mannole		1200				
3.000	۰	150 H	FC3-1	74.950	73.650	1.150 0	pen Manhole		1200				
1.006	•	225	FC3	74.586	72.070	2.291 0	pen Manhole		1200				
1.007	0	225	FC2	74.263	71.761	2.277 0	pen Manhole		1200				
1.008	0	225	FC1	73.352	71.400	1.727 0	pen Manhole		1200				
				Down	stream	Manhole							
PN L	ength	Slope	ME	C.Level	I.Level	D.Depth	ME	MH DIAM	., ь *W				
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(m	n)				
1 000 2	0 577	129 7	ECS	75 200	72 973	1 002	Open Manhale		1200				
1 001 2	1 1 20	120.0	FC7	75 200	72 723	1 242	Open Manhole		1200				
1.002	9.584	74.0	FC6	75.200	73,603	1.372	Open Manhole		1200				
2.000 3	0.063	130.1	FC6-1	75.200	73.969	1.006	Open Manhole		1200				
2.001 2	3.677	64.7	FC6	75.200	73.603	1.372	Open Manhole		1200				
1 000 0	1 440	160 1	POS	75 040	-	0.455	One Markela		1200				
1.003 3	1 451	100.1	FC3	75.061	72.000	2.400	Open Manhole		1200				
1.005 5	9.542	188.0	FC3	74.586	72.070	2.291	Open Manhole		1200				
3.000 3	5.769	60.0	FC3	74.586	73.054	1.382	Open Manhole		1200				
1.006 5	8.023	168.0	FC2	74.263	71.761	2.277	Open Manhole		1200				
1.007 6	0 222	188 0	rei	0.000	1 71 080	1.727	Open Manhole		1200				
1.000 0	J.226	100.0		0.000	, ,1.000	·	open Ashnole		× ·				
				owing (Outfall	Details	for FS 3						
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		Fr	ee ri	oning o									
	c	<u>Fr</u> hutfall	ee ri Out	fall C.	Level I	. Level	Min D,L	w					
	0 Pip	<u>Fr</u> hutfall e Numb	ee ri Out er N	fall C.	Level I (m)	. Level (m) I	Min D,L . Level (mm)	¥ (mm)					
	0 Pip	<u>Fr</u> hutfall e Numb	ee ri l Out er N	fall C.	Level I (m)	. Level (m) I	Min D,L . Level (mm) (m)	¥ (mm)					
	0 Pip	<u>Fr</u> hutfall e Numb	ee ri L Out er N	fall C. ame	Level I (m)	. Level (m) I	Min D,L . Level (mm) (m)	¥ (mm)					
	0 Pip	<u>Fr</u> hutfall e Numb 1.0	ee ri L Out Mer N	fall C. ame	Level I (m) 0.000	. Level (m) I 71.080	Min D,L . Level (mm) (m) 71.080 0	₩ (mm) 0					
	0 Pip	<u>Fr</u> hutfall e Numb 1.0	ee ri L Out er N	fall C.	Level I (m) 0.000	. Level (m) I 71.080	Min D,L . Level (mm) (m) 71.080 0	₩ (mm.) 0					

APPENDIX F

IRISH WATER CORRESPONDENCE



Aneta Smietana

Ormond House Upper Ormond Quay Dublin 7 D07W704 Uisce Éireann Bosca OP 448 Oifig Sheachadta na Cathrach Theas Cathair Chorcal

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

www.water.ie

15 January 2021

Re: CDS20003676 pre-connection enquiry - Subject to contract | Contract denied Connection for Multi/Mixed Use Development of 591 units at Lands at Hollystown, Dublin 15, Co. Dublin

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Lands at Hollystown, Dublin 15, Co. Dublin (the Premises). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.								
Water Connection	Feasible without infrastructure upgrade by Irish Water								
Wastewater Connection	Feasible Subject to upgrades								
	SITE SPECIFIC COMMENTS								
Water Connection	A new 200mm ID connection pipe, with installed bulk meter and associated telemetry system, should be connected to the existing 300mm uPVC main.								

Stitúrbilirí / Directors: Cathal Marley (Chairman), Niall Glescon, Eamon Gallen, Yvonne Harris, Ilrendan Murphy, Maria O'Dwyer Offig Chláraithe / Registered Office: Teach Colvil, 24-26 Sráid Thalbóid, Baile Árna Cliath 1, D01 NP86 / Colvill House, 24-26 Talboi Street, Dubin 1, D01 NP86 Is scudeachta giniomhaíochta ainmrithe atá fooi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares. Ulmhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

REV012

Wastewater Connection

Completion of 9C Duplication Project is required prior the connection. The Project is currently at construction phase and is scheduled to be completed by Irish Water in Q3/2022 (this may be subject to change)

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:

Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network 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.

General Notes:

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

If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,

Gronne Massis

Yvonne Harris

Head of Customer Operations

General Notes:

- The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. The availability of capacity may change at any date after this assessment.
- This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
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If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,

Guonne Massis

Yvonne Harris Head of Customer Operations

Local Centre Confirmation of Feasibility





Brendan Curran

Ormond House Ormond Quay Upper Dublin 7 Co. Dublin D07N5YH

Uisce Éireann Bosca OP 448 Oifig Sheachadta na Cathrach Theas Cathair Chorcaí

> ish Water O Box 448, outh City elivery Offic ork City.

> > w.water.ie

19 November 2020

Re: CDS20003562 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 301 units at Town Centre Development, Tyrellstown, Dublin 15, Co. Dublin

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Town Centre Development, Tyrellstown, Dublin 15, Co. Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY <u>THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A</u> <u>CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH</u> <u>TO PROCEED.</u>
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
	SITE SPECIFIC COMMENTS
Water Connection	The proposed development indicates that Irish Water assets are present on the site. The Developer has to demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the infrastructure during and after the works. Drawings (showing clearance distances, changing to ground levels) and Method Statements should be included in the Detailed Design of the Development. A wayleave in favour of Irish Water will be required over the infrastructure that is not located within the Public Space.
Wastewater Connection	Completion of 9C Duplication Project is required prior the connection. The Project is currently at construction phase and is scheduled to be completed by Irish Water in Q3/2022 (this may be subject to change)

Stlürthölrf / Directors: Cathal Marley (Chairman), Nall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer Offig Chläraithe / Registered Office: Teach Colvill, 24-26 Sräid Thalböid, Bale Atha Clath 1, DOI NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, DOI NP86 Is cuideachta ghniomhaiochta ainmnithe asă faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares. Uimhir Chláraithe in Éirinn / Registered in Ireland No: 530363

REV012

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network 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.

General Notes:

- The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. The availability of capacity may change at any date after this assessment.
- This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
- The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
- A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at <u>https://www.water.ie/connections/get-connected/</u>
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- Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
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- 9) To access Irish Water Maps email datarequests@water.ie
- All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marina Byrne from the design team via email mzbyrne@water.ie For further information, visit www.water.ie/connections.

Yours sincerely,

Myonne Maesis

Yvonne Harris

Head of Customer Operations

Aneta Smietana DBFL Consulting Ormond House

Upper Ormond Quay

Dublin 7 D07W704

15 December 2021

Site 2&3 Statement of Design Acceptance



Llisce Éireann Bosca OP 448 Oifig Sheachadta na Cathrach Theas

> Irish Water PC Box 448, South City Delivery Office, Cork City,

Cathair Chorcal

www.water.ie

Re: Design Submission for Lands at Hollystown, Dublin 15, Co. Dublin (the "Development")

(the "Design Submission") / Connection Reference No: CDS20003676

Dear Aneta Smietana,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at <u>www.water.ie/connections</u>. 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 (CRU)(<u>https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/</u>).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "Self-Lay Works"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative: Name: Dario Alvarez Email: dalvarez@water.ie

Yours sincerely,

Gronne Massis Yvonne Harris Head of Customer Operations

Stiürthóirí / Directors: Cathal Mariey (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer Oifig Chiáraithe / Registered Office: Teach Colvill, 24-26 Sráid Thaibóid, Baile Átha Cliach 1, D01 NP86 / Colvill House, 24-26 Taibot Street, Dublin 1, D01 NP86 Is cuideachta giniomhaíochta ainmnithe atá faoi theorainn scaireanna é Use Éireann / Irish Water is a designated activity company, Imited by shares. Uimhir Chiáraithe in Éirean / Registered in Ireland Noc 530063

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Appendix A

Document Title & Revision

- 170182-DBFL-CS-SP-DR-C-1004 Site 2 Site Services Sheet 1
- 170182-DBFL-CS-SP-DR-C-1005 Site 2 Site Services Sheet 2
- 170182-DBFL-CS-SP-DR-C-1006 Site 3 Site Services Sheet 1
- 170182-DBFL-CS-SP-DR-C-1007 Site 3 Site Services Sheet 2
- 170182-DBFL-FW-SP-DR-C-3001 Longitudinal Sections Through Foul Sewer Sheet 1
- 170182-DBFL-FW-SP-DR-C-3002 Longitudinal Sections Through Foul Sewer Sheet 2
- 170182-DBFL-FW-SP-DR-C-3003 Longitudinal Sections Through Foul Sewer Sheet 3
- 170182-DBFL-FW-SP-DR-C-3004 Longitudinal Sections Through Foul Sewer Sheet 4
- 170182-DBFL-FW-SP-DR-C-3005 Longitudinal Sections Through Foul Sewer Sheet 5
- 170182-DBFL-FW-SP-DR-C-3006 Longitudinal Sections Through Foul Sewer Sheet 6
- 170182-DBFL-FW-SP-DR-C-3007 Longitudinal Sections Through Foul Sewer Sheet 7
- 170182-DBFL-WM-SP-DR-C-1004 Site 2 Proposed Watermain Layout Sheet 1
 170182-DBFL-WM-SP-DR-C-1005 Site 2 Proposed Watermain Layout Sheet 2
- 170182-DBFL-WM-SP-DR-C-1005 Site 2 Proposed Watermain Layout Sheet 2
 170182-DBFL-WM-SP-DR-C-1006 Site 2 Proposed Watermain Layout Sheet 1
- 170182-DBFL-WM-SP-DR-C-1007 Site 2 Proposed Watermain Layout Sheet 2

For further information, visit www.water.ie/connections

Standard Details/Code of Practice Exemption: N/A

<u>Notwithstanding any matters listed above, the Customer (including any appointed</u> designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay <u>Works</u>. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

Local Centre - Statement of Design Acceptance

Brendan Curran Ormond House Ormond Quay Upper Dublin 7, Co. Dublin D07N5YH

15 December 2021



Uisce Éireann Bosca OP 448 Oifig Sheachadta na Cathrach Theas Cothair Chorcaí

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

www.water.ie

Re: Design Submission for Town Centre Development, Tyrellstown, Dublin 15, Co. Dublin (the "Development") – East Section of the Development. (the "Design Submission") / Connection Reference No: CDS20003562

Dear Brendan Curran,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at <u>www.water.ie/connections</u>. 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 (CRU)(<u>https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/</u>).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "Self-Lay Works"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative: Name: Dario Alvarez Email: dalvarez@water.ie

Yours sincerely,

Muture Hassis Yvonne Harris Head of Customer Operations

Stiúrthóirí / Directors: Cathal Marley (Chairman), Niall Gleeson, Eamon Gallen, Yvonne Harris, Brendan Murphy, Maria O'Dwyer Offig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thaibóid, Baíle Átha Cliach 1, D01 NP86 / Colvill House, 24-26 Taibot Street, Dublin 1, D01 NP86 Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é úlsce Éireann / Irish Water is a designated activity company, Imited by shares. Uimhir Chláraithe in Eirinn / Registered in Ireland Noc 530363

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Appendix A

Document Title & Revision

- 170182-DBFL-WM-SP-DR-C-1011 Local Centre Proposed Watermain Layout
- 170182-DBFL-CS-SP-DR-C-1011 Local Centre Proposed Site Services
- 170182-DBFL-FW-SP-DR-C-3007 Longitudinal Sections Through Foul Sewer Sheet 7

Standard Details/Code of Practice Exemption:

While Irish Water notes that the wastewater services infrastructure in Block C and Block B area will remain private and not be vested, we have the following comments:

• It is recommended that the foul sewer should be 3m distance from the building

For further information, visit www.water.ie/connections

<u>Notwithstanding any matters listed above, the Customer (including any appointed</u> <u>designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay</u> <u>Works.</u> Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

APPENDIX G

SITE INVESTIGATION



Ground Investigations Ireland Ltd., Catherinestown House, Hazelhatch Road, Newcastle, Co Dublin, Tel: 01 601 5175 / 5176 | Fax: 01 601 5173 Email: info@gii.ie | Web: gii.ie

Ground Investigations Ireland

Development at Hollystown Golf Club

Ground Investigation Report

DOCUMENT CONTROL SHEET

Project	Project Title Development at Hollystown Golf Club										
Engineer DBFL											
Project No 7929-07-18											
Docum	ent Title	Ground Investig	gation Report								
		-									
Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date					
Α	Final	S Mclaughlin F McNamara F McNamara Dublin 29 Augus									
December 2021



Ground Investigations Ireland Ltd., Catherinestown House, Hazelhatch Road, Newcastle, Co Dublin. Tel: 01 601 5175 / 5176 | Fax: 01 601 5173 Email: info@gii.ie | Web: gii.ie

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2.0	Overview
2.1.	Background
2.2.	Purpose and Scope
3.0	Subsurface Exploration
3.1.	General
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5.0	Recommendations & Conclusions
5.1.	General
5.2.	Soakaway Design

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Appendix 1	Site Location Plan
Appendix 2	Trial Pitting Records
Appendix 3	Trial Pitting Photographs
Appendix 4	Soakaway Testing Results

Hollystown Golf Club Draft Report

Ground Investigation Report

1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd. in July 2018 at the site of the proposed development at Hollystown Golf Club, Hollystown, Co. Dublin.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services and car parking at the proposed site. The site is currently an active golf course and is situated in Hollystown, North Dublin. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Carry out 4 No. Trial Pit to a maximum depth of 2.00m BGL
- · Carry out 4 No. Soakaway to determine a soil infiltration value to BRE digest 365
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and insitu testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling. The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.1. Trial Pits

The trial pits were excavated using a 3.5T tracked excavator at the location shown in the exploratory hole location plan in Appendix 1. The location was checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pit was sampled, logged and photographed by a

Hollystown Golf Club Draft Report

Ground Investigation Report

Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 with associated photographs in Appendix 3 of this Report.

3.2. Soakaway Testing

The soakaway testing was carried out the trial pit at the location shown in the exploratory hole location plan in Appendix 1. The pit was carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pit was allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pit was logged prior to completing the soakaway test and was backfilled with arising's upon completion. The soakaway test result is provided in Appendix 4 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

- Topsoil
- Made Ground
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.15m BGL.

MADE GROUND: Made Ground deposits were encountered in SA03 beneath the Topsoil and was present to a depth of 0.30m BGL. These deposits were described generally as brown slightly sandy slightly gravelly Clay with occasional cobbles and contained occasional fragments of plastic.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and Made Ground and were described typically as grey or brown slightly sandy slightly gravelly CLAY with occasional cobbles .The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm or firm to stiff below 1.5m BGL in the majority of the exploratory holes. These deposits had occasional, some or many cobble content where noted on the exploratory hole logs.

Ground Investigation Report

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Soakaway Design

Infiltration rates of 1.980 x 10⁻⁶ and 1.955 x 10⁻⁶ m/s respectively were calculated for the soakaway locations SA02 and SA03. At the locations of SA01 and SA04 the water level dropped too slowly to allow calculation of 'f the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

Ground Investigation Report

APPENDIX 1 - Site Location Plan



Hollystown Golf Club Draft Report

Ground Investigation Report

APPENDIX 2 - Trial Pitting Records

	Grou	nd In	vestigatio www.gii.	ie Ire	land	Ltd		Site Development at Holystow	n Golf Club		Trial Pit Number SA01	
Machine :	3.5T Excavator Trial Pit	Dimens 2.10m	ilons X 0.50m X 1.70m		Ground	Level (m0	00)	Client DBFL		1	Job Number 7929-07-	r 18
		Locatio	n		Dates 01	1/08/2018		Project Contractor Ground Investigations Irela	and		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Reo	ords	Level (mOD)	Depth (m) (Thicknes	(33	D	escription	I	Legend	Water
		(m)					50 50 50 50 50 50 50 50 50 50 50 50 50 5	Brown slightly sandy slight rootels. Stiff brown slightly sandy i sub-angular to sub-round grante. Gravel is sub-ang limestone and granite. Stiff greyish brown slightly sub-angular to sub-round grante. Gravel is sub-ang limestone and granite. Trial pit completed at sch Complete at 1.50m	ty gravely TOPBOIL with gr slighty gravely CLAY with ra- d cobbles of limestone and ular to sub-rounded fine to c sandy gravely CLAY with ra- d cobbles of limestone and ular to sub-rounded fine to c heduled depth.	are i oarse i		s
Plan						<u> </u>	F	Remarks				\neg
				-	-			No Groundwater encountere Trial pit stable. Soakaway completed in trial Trial pit backfilled on comple	ed. pit. tion on of soakaway test.			
		-										
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		-			-		8	oale (approx)	Logged By	Figure	No.	-
								1:25	Tmcl	7929-0	17-18.SAD	11

GROUND	Ground Investigations Ireland Ltd www.gii.ie Stee			nd Investigations Ireland Ltd www.gii.ie				Trial Pit Number SA02	
Machine : 3 Method : T	ST Excavator rial Pit	Dimensi 2.10m 3	lons X 0.50m X 1.70m		Ground	Level (mOD) Client DBFL		Job Number 7929-07-18
		Location	n		Dates 01	1/08/2018	Project Contractor Ground Investigations Irei	and	Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Reco	rds	Level (mOD)	Depth (m) (Thickness	D	ecoription	Legend
Pian .		5(E)				(Thiokineese (0.10) - (0.20) - (0.20) - (0.20) - (0.50) - (0	Brown slightly sandy slight rootets. Firm brown slightly sandy sub-angular cobies of in sub-angular fine to coarse Firm to stiff dark brown slightly occasional sub-angular fine to coarse Firm to stiff dark brown sa Trial pit completed at sci Complete at 1.70m Remarks No Groundwater encounter	ty gravely TOPSOL with gr gravely CLAY with rare isstone. Carvel is angular to ilmestone. / sandy gravely CLAY with ibles of limestone. Gravel i ilmestone.	
			• •	-			Soakaway completed in trial Trial pit backfilled on completed	i pit. etion on of soakaway test.	
				-					
· ·	· ·		· ·	-		· ·			
				-			Soale (approx)	Logged By	Figure No.
							1:25	Tmcl	7929-07-18.8A02

CROUND BELAND	Ground Investigations Ireland Ltd www.gii.ie			Trial Pit Number SA03					
Machine : 3 Method : 7	.ST Excavator Itial Pit	Dimensi 2.10m 3	lons X 0.50m X 1.70m		Ground	Level (mOD) Client DBFL		Job Number 7929-07-18
		Locatio	n		Dates	1/08/2018	Project Contractor Ground Investigations Irei	and	Sheet 1/1
Depth (m)	Sample / Tects	Water Depth (m)	Field Re	oords	Level (mOD)	Depth (m) (Thiokness	.)	ecoription	Legend
Plan							FILL: Dark grey slightly sa angular to sub-angular fin MADE (GRUND: Brown Clay with rare sub-angula fragments of plastic. Otti forown slightly sandy ; occasional sub-rounded II Firm to stiff grey motiled to CLAY. Gravel Is sub-angular cocasional sub-angular to sub-angular to sub-rounded Trial pit completed at sci Complete at 1.70m	ndy gravelly Clay. Gravel is to coarse limestone. slightly sandy slightly cavel illinestone cobbies and ram slightly gravelly CLAY with mestone cobbies. rown slightly gravelly CLAY with into sub-rounded limeston add slightly gravelly CLAY with bobies of limestone. Gravel ed limestone.	
							Groundwater encountered a Trial pit stable. Soakaway completed in tria	at 1.65m BGL - slight seepa; I pit.	ge.
							Trial pit backfilled on comple	etion on of soakaway test.	
				-					
							Soale (approx)	Logged By	Figure No.
							1:25	Tmcl	7929-07-18.8A03

GROUND RELAND		Ground Investigations Ireland Ltd www.gii.ie		Trial Pit Number SA04									
Machine	: 3.5	ST Excavator	Dimensi 2.30m	ions X 0 50m X 1	1.60m	Ground	Leve	l (mOD)	Client			Job Number	,
Method	: Tri	al Pit							DBFL		7	7929-07-	18
			Locatio	'n		Dates D1	1/08/2	018	Project Contractor Ground Investigations Irel:	and		Sheet 1/1	
Depth (m)		Sample / Tests	Water Depth (m)	Fle	id Records	Level (mOD)	D (Thi	lepth (m) okness)	D	escription		Legend	Water
								(0.15) 0.15	Dark brown slightly sandy grass rootiets.	slightly gravelly TOPSOIL w	th		
								(0.35)	Firm to stiff greyish brown CLAY. Gravel is sub-angul limestone.	slightly sandy slightly gravel ar to sub-rounded fine to co	lly arse		
							Ē	0.50	Firm to still brown slightly occasional angular to sub-	sandy gravely CLAY with angular cobbles of limeston		n <u>17 -</u> 07	
								(0.40)	Gravel is sub-angular to su limestone.	ub-rounded fine to coarse	1	2 <u>7</u> 77	
								0.90	Firm grey mottled brown s CLAY with rare cobbles of sub-angular to sub-rounde	lightly sandy slightly gravely sub-rounded limestone. Gra d fine to coarse limestone.	wells	2 19 0 2 19 0 2 19 0 2 19 0	
							E	(0.70)			200	2 <u>10</u> 3 3 3 4 7 7 7 7 7 7	
											1 100		
							Ē	1.60	Trial pit completed at sch Complete at 1.60m	heduled depth.	ť	1 - 20 - 4 -	
							Ē						
							Ē						
							E						
							E						$ \downarrow$
Plan	-					-	-	•	Remarks No Groundwater encountere	ed.			
						-	-	•	That pit stable. Soakaway completed in trial Trial pit backfilled on comple	plt. tion on of soakaway test.			
	-					-	-						
	-					-	-						
						-	-						
						-	-	- 8	oale (approx)	Logged By	Figure	No.	-
									1:25	Tmcl	7929-0	7-18.8AD	14

Hollystown Golf Club Draft Report

Ground Investigation Report

APPENDIX 3 - Trial Pitting Photographs

Hollystown Golf Course – Trial Pit Photographs









SA03



SA04

Development at Hollystown – Site 2,3 & Local Centre Infrastructure Design Report

APPENDIX 4 - Soakaway Testing Results

Hollystown golf course

Ground Investigations Ireland Soakaway Test Report

SA01 Soakaway Test to BRE Digest 365 Trial Pit Dimensions: 2.10m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)	
02/08/2018	0	-0.470	
02/08/2018	33	-0.570	
02/08/2018	104	-0.660	
02/08/2018	129	-0.680	
02/08/2018	205	-0.710	
02/08/2018	299	-0.750	
02/08/2018	350	-0.770	
		*Soakaway failed - Pit bag	ckfil

		*Soakaway failed - Pit	backfilled	
Start depth	Depth of Pit	Diff	75% full	25%full
0.47	1.500	1.030	0.7275	1.2425





Hollystown Gold Course	Ground Investigations	Soakaway Test Report
	Ireland	

SA02 Soakaway Test to BRE Digest 365 Trial Pit Dimensions: 2.30m x 0.50m x 1.70m (L x W x D)

Date	Time	Water level (m bgl)
02/08/2018	0	-0.470
02/08/2018	115	-0.660
02/08/2018	190	-0.730
02/08/2018	239	-0.780
02/08/2018	289	-0.810
02/08/2018	341	-0.840

Start depth 0.47	Depth of Pit 1.700		Diff 1.230	75% full 0.7775	25%full 1.3925
Length of pit (m) 2.300	Width of pit (m) 0.500			75-25Ht (m) 0.615	Vp75-25 (m3) 0.71
Tp75-25 (from g	raph) (s)	77750		50% Eff Depth 0.615	ap50 (m2) 4.594
f =	1.980E-06	m/s			





SA03 Soakaway Test to BRE Digest 365 Trial Pit Dimensions: 2.10m x 0.50m x 1.70m (L x W x D)

Date	Time	Water level (m bgl)
02/08/2018	0	-0.470
02/08/2018	137	-0.760
02/08/2018	190	-0.850
02/08/2018	239	-0.900
02/08/2018	289	-0.970
02/08/2018	341	-1.030

Start depth 0.47	Depth of Pit 1.700		Diff 1.230	75% full 0.7775	25%full 1.3925
Length of pit (m) 2.100) Width of pit (m) 0.500			75-25Ht (m) 0.615	Vp75-25 (m3) 0.65
Tp75-25 (from graph) (s)		77750		50% Eff Depth 0.615	ap50 (m2) 4.248
f =	1.955E-06	m/s			





Hollystown Golf Course

0.33

Ground Investigations Ireland

Soakaway Test Report

SA04 Soakaway Test to BRE Digest 365

1.600

Trial Pit Dimensions: 2.30m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)			
02/08/2018	0	-0.330			
02/08/2018	60	-0.410			
02/08/2018	88	-0.410			
02/08/2018	171	-0.420			
02/08/2018	205	-0.430			
02/08/2018	247	-0.440			
Start depth	Depth of Pit	*Soakaway	failed - Pit Diff	t backfilled 75% full	25%full

1.270

0.6475

1.2825

			SA01			
0.000	50	100	150	200	250	300
-0.400		•			-	
-0.600						
1.000						
-1.200						
1.400						
1.800						
2.000						



Development at Hollystown – Site 2,3 & Local Centre Infrastructure Design Report