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Client	Fingal County Council
Project Title	Proposed Housing at Mayeston, Poppintree, Dublin 11
Report Title	Infrastructure Design Report
Prepared For	O'Briain Beary Architects

Project No.	Originator	Volume	Level	Type	Role	Serial No.	Suitability
21208	DOW	00	XX	RP	CE	0003	AP

Revision	Description	Prepared	Checked	Date
P01	Preliminary Draft	AD		21.09.23
C01	Updated for Section 179a Application	AD	PD	12.10.23
C02	Minor Updates	AD	PD	17.10.23
C03	Report Updated	AD		18.10.23
C04	Report Updated	AD		27.10.23

TABLE OF CONTENTS

1. INTRODUCTION

This Engineering Infrastructure Design Report has been prepared by Downes Associates as part of documentation to be submitted in support of a Section 179A planning application by Fingal County Council for a proposed residential development at Mayeston, Poppintree, Dublin 11. This report sets out in detail proposals for water services and access & traffic management for the development. This report should be read in conjunction with other separate reports prepared by Downes Associates and Roadplan Consulting.

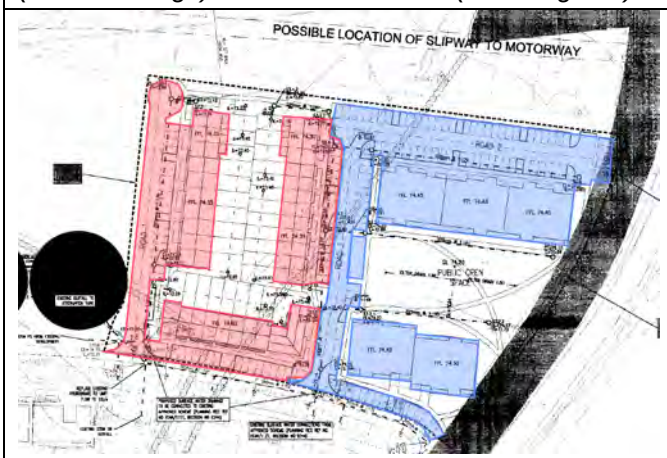
As part of its Housing Programme, Fingal County Council (Housing Department) proposes to construct a number of new dwelling units and a crèche at a site located within the Mayeston estate at Poppintree, Dublin 11. The site, which measures approximately 1.35Ha in area, is located between St Margaret's Rd to the south, the M50 to the north, existing residential development to the east, and a public park to the west (refer to Figure 1a below). The land is zoned RS-Residential: '*Provide for residential development and protect and improve residential amenity'*. The site forms part of the Mayeston estate which has been developed in recent years. The southern part of the current application site forms part of a larger 1.43Ha site for which planning permission was previously granted (planning register ref. F06A/1348) – refer to orange shaded area in Figure 1b. The northern wedge-shaped part of the current application as shaded green in Figure 1b and which measures approximately 0.59Ha did not form part of the previous planning application permitted under F06A/1348. Only the eastern part of the granted development F06A/1348 was constructed – refer to Figure 1c. The remaining site was only partially developed – concrete slabs and foundations are in place for unfinished units as can be seen in Figure 1a.

The proposed development will include for the provision of 119 No. apartment units consisting of 39 No. one-bedroom apartments, 68 No. two-bedroom apartments and 12 No. 3-bedroom apartments ranging from 3-6 No. storeys and will also include for car parking, cycle parking, pedestrian and cycle links, storage, services and plant areas. Landscaping will include for high quality private open space, communal amenity areas and public open space provision.

House Type	**Total Number**
1-bed apartment units	39
2-bed 3-person apartment units	13
2-bed 3-person UD apartment units	20
2-bed 4-person apartment units	35
3-bed 5-person apartment units	6
3-bed 5-person duplex unit	6
Total	**119**

Figure 1a – Proposed site location map with site outlined in red.

Figure 1b -Site Map showing approximate extent of previous planning application F06A/1348 (shaded orange) and additional lands (shaded green) included in the current application.



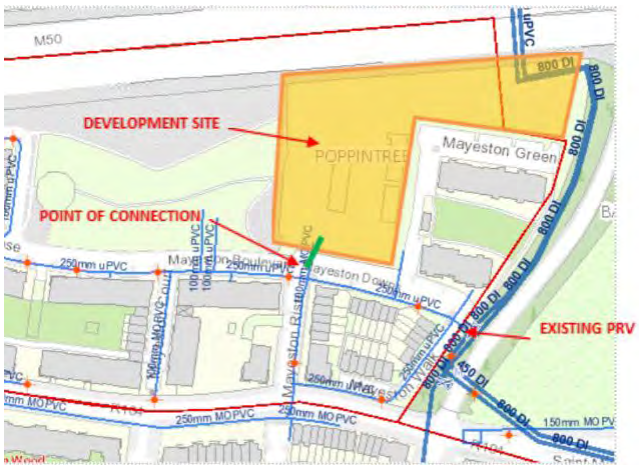
F*igure 1c – Extract of planning drawing for Planning Ref. F06A/1348 showing extent of constructed development (blue) and unconstructed development (red).*

Figure 1 – Site Location Maps

Prior to the preparation of detail proposals for site water services, consultation was held with representatives of the relevant engineering departments of Fingal County Council (FCC) and Uisce Éireann regarding existing water supply and drainage services in the vicinity of the site and the requirements for water supply and drainage services for the new development.
A pre-connection enquiry for the development was submitted to the Uisce Éireann New Connections Team (Connection Enquiry Reference Number CDS23001423). Refer to Appendix A for confirmation of feasibility letter received from Uisce Éireann. In summary, Uisce Éireann has confirmed that the development can be accommodated by the Uisce Éireann network subject to the following requirements:

- ***Water connection – feasible subject to upgrades.***

  Approximately 25 m of existing 100mm mains will need to be upgraded to 200mm for the connection, see green line in image below. These upgrade works are not currently on Uisce Éireann's investment plan therefore, the applicant will be required to fund these local network upgrades. The fee will be calculated at a Connection Application stage.



- ***Wastewater connection – feasible without upgrade by Irish Water***

  The proposed wastewater for this development connects to the Uisce Éireann network via infrastructure that has not been taken in charge by Uisce Éireann (Third Party Infrastructure). Please be advised that at connection application stage and prior to the commencement of any Self-Lay Works, the Applicant shall:

  - *Identify and procure transfer to Uisce Éireann of the arterial infrastructure within the Third-Party Infrastructure*
  - *Demonstrate that the arterial infrastructure is in compliance with requirements of Uisce Éireann Code of Practice and Standard Details and in adequate condition and capacity to cater for the additional load from the Development.*
  - *Provide written permission from the current infrastructure owner to connect.*

"As Built" developer drawings for the Mayeston estate were subsequently received from FCC. The information received regarding existing drainage and water supply services has been confirmed on site as part of topographical and underground utility survey undertaken by Apex Surveys.

There follows details of the engineering infrastructure design proposals for the development. This report should be read in conjunction with the accompanying drawings as per the schedule at the end of this report.

2. DEVELOPMENT PLAN STANDARDS

The current application by Fingal County Council has been prepared with reference to the Fingal County Council Development Plan 2023-2029. The engineering proposals for the development described below endeavour to address the relevant strategic objectives and standards as set out in the current Development Plan, in particular those relating to Climate Action and Infrastructure & Utilities. Where appropriate, reference is made in the report to these objectives to demonstrate compliance, in particular with regard the following specific strategic objectives of the development plan:

Climate Action:

Policy CAP11 – Climate Adaptation Actions in the Built Environment

Development proposals should demonstrate sustainable design principles for new buildings/ services/site. The Council will promote and support development which is resilient to climate change. This would include:

a. Measures such as green roofs and green walls to reduce internal overheating and the urban heat island effect;
b. Ensuring the efficient use of natural resources (including water) and making the most of natural systems both within and around buildings;
c. Minimising pollution by reducing surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems (SuDS);
d. Reducing flood risk, damage to property from extreme events– residential, public and commercial;
e. Reducing risks from temperature extremes and extreme weather events to critical infrastructure such as roads, communication networks, the water/drainage network, and energy supply;
f. Promoting and protecting biodiversity and green infrastructure.

Refer to Section 6 of this report for specific SuDS details being proposed for this development that address Policy CAP11. Refer also to separate Downes Associates site-specific Flood Risk Assessment Report reference 21208-DOW-00-XX-RP-CE-0004 and Surface Water Management Report reference 21208-DOW-00-XX-RP-CE-0005 for further details that address Policy CAP11.

Infrastructure & Utilities:

Objective IUO10 – SuDS – Nature-Based Solutions

SuDS shall incorporate nature-based solutions and have regard to the objectives set out in Fingal's Guidance Document – *Green/ Blue Infrastructure for Development, as amended* (Appendix 11) and Nature Based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas, Water Sensitive Urban Design Best Practice Interim Guidance Document (November 2021, DHLGH).

Objective IUO11 – SuDS in New Developments

SuDS shall be incorporated into all parts of a development (open spaces, roads, footpaths, private areas), and have regard to the FCC SuDs Guidance Document – *Green/ Blue Infrastructure for Development, as amended* (Appendix 11), and shall ensure:

- That the design of SuDS enhances the quality of open spaces and when included as part of any open space provision, it must contribute in a significant and positive way to the design and quality of the open space.
- Open space areas shall not be dominated by SuDS features.
- Underground tanked systems, whether concrete or plastic, are the least favoured means for surface water management and shall only be used when green solutions have proven not feasible.

See also Appendix 11 (SuDS Guidance Document), and Chapter 14 Development Management Standards (Section 14.20.3 SuDS).

Objective IUO12 – Green Roofs

Require the use of Green Roofs particularly on apartment, commercial, leisure and educational buildings as part of the overall surface water management strategy for each development, where appropriate.

Objective IUO15 – Surface Water Management Plan

Require the preparation of a Surface Water Management Plan as part of all new developments which shall include the following:

- Identify and assess the existing surface water movements through the development before considering and developing a surface water management system using SuDS, having regard to our Fingal Guidance Document – *Green/ Blue Infrastructure for Development, as amended* (Appendix 11).
- Incorporate SuDS along the route of the water movement to enhance the water quality effects of nature-based systems at the different stages – Treatment Train approach from source to discharge.

Refer to Section 6 of this report for specific SuDS details being proposed for this development that address Objective IUO10. Refer also to separate Downes Associates Surface Water Management Report reference 21208-DOW-00-XX-RP-CE-0005 for further details that address Objective IUO10.

3. EXISTING WATER SERVICES

Currently, the site is a partly developed brownfield site with a relatively level topography, and with a number of concrete slabs and spoil heaps associated with previously granted development. There are no existing natural watercourses within the site. Record maps of existing water services in the vicinity of the site were obtained from Uisce Éireann – refer to Figure 2. There are known existing piped water services within and adjacent to the site which were constructed as part of the Mayeston estate, but these are not shown on the record maps as they have not yet been taken in charge by Uisce Éireann or FCC. The wider Mayeston estate was built under planning permission F04A/1127 in 2006/2007, which included a new surface water and foul water drainage infrastructure. The adjacent development immediately to the east of the current application site was subsequently developed under planning permission F06A/1348. This development included proposals for the southern part the current application site that were only partly developed, but which did include construction of the drainage and water supply infrastructure. The details of these water services are shown on developer's "as built" drawings received from FCC.

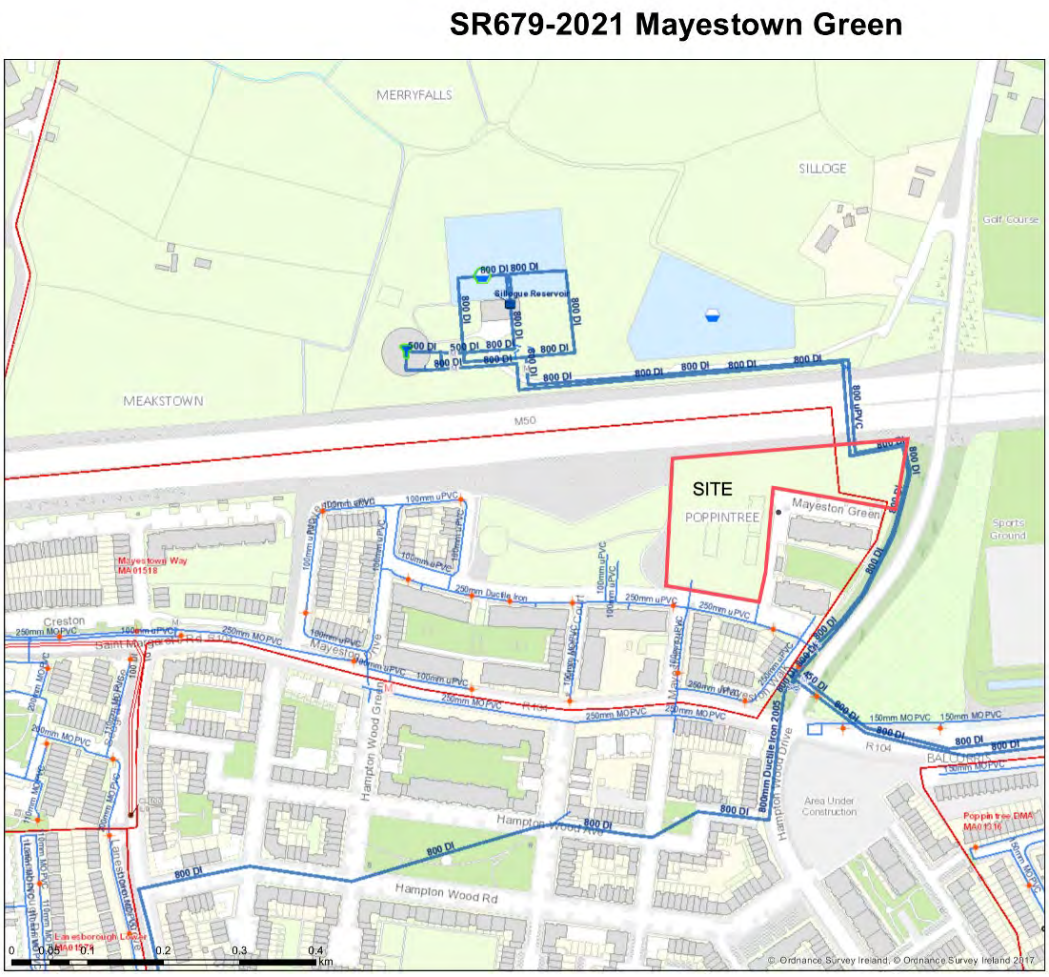


Figure 2 – Irish Water Web Map

The record maps and "as built" drawings were used in conjunction with a topographical and underground utility survey carried out by Apex Surveys to map the existing water services on and adjacent to the site. The survey findings are presented on accompanying Drawings 5000 to 5002 as per the drawing schedule in Section 10.

Water Supply

The existing water supply network is shown in Figure 2 and on Drawings 5000 to 5002. There is an existing 250mm diameter watermain running to the south of the site along the far side of Mayeston Downs, with an existing 100mm diameter spur connection into the site. There is a 100mm diameter watermain running to the east of the site on Mayeston Green, serving the existing development to the east of Mayeston Green. There is also evidence that this watermain extends into the site as an additional looped main for the undeveloped part of the original site development.

Foul Drainage

The existing foul water drainage network is shown on Drawings 5000 to 5002. There is an existing 225mm diameter foul sewer running eastwards on Mayeston Downs. This sewer then runs southwards towards St. Margaret's Road where it connects to the Uisce Éireann network – the exact location of the connection point is subject to confirmation by Uisce Éireann. There is a 150mm diameter foul sewer running to the east of the site on Mayeston Green, serving the existing development to the east of Mayeston Green. There is also evidence of existing (unused) foul drains within the site which were constructed for the undeveloped part of the original site development.

Surface Water Drainage

The existing surface water drainage network is shown on Drawings 5000 to 5002. There is an existing surface water drainage network serving the Mayeston estate. As part of this system, there is an existing 300mm diameter surface water sewer on Mayeston Downs and a 225mm diameter surface water sewer on Mayeston Green. There is also evidence of an existing (unused) surface water drain within the site which was constructed for the undeveloped part of the original site development. Based on the available "as built" developer drawings and DBFL Engineer's design calculations submitted with Planning Application F06A/1348, the existing surface water drainage system is designed in compliance with The Greater Dublin Strategic Drainage Study (GDSDS) and includes attenuation storage within underground storage tanks located in the public open space area immediately to the west of the site. Discharge from the attenuation system is controlled by a Hydrobrake flow control device. The existing attenuation tank system has a total storage capacity of 2,760m^3, designed to cater for the 1 in 100-year storm event for the Mayeston Estate. This capacity includes an allowance for the current Application site as part of the previously proposed development. Based on the design calculations submitted by DBFL, the attenuation system has an allocated capacity for runoff from 9,400m^2 of impermeable area from the recent development on Mayeston Green – refer to Figure 3. The existing Mayeston Green development comprises a total constructed impermeable area of 5,200m^2 (as shown in blue on Figure 3) which leaves a total area allocation of 4,200m^2 for the current development as indicated in pink on Figure 3.

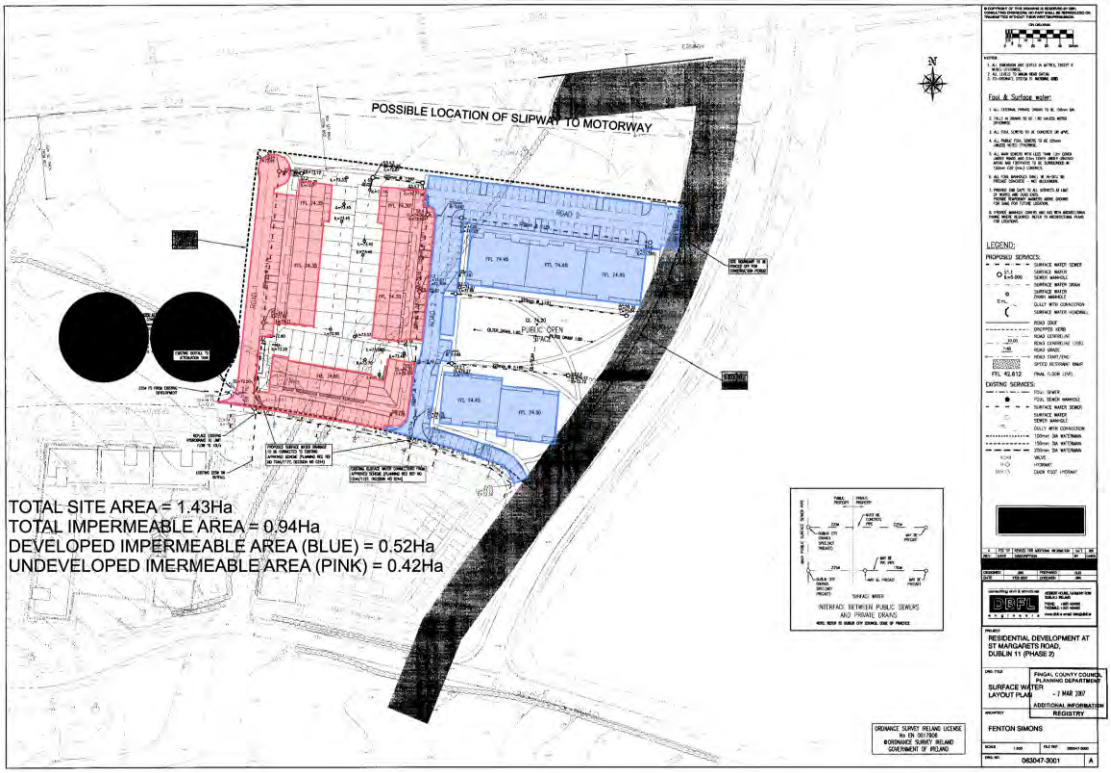


Figure 3 – Existing Attenuation Tank Contributing Areas from DBFL Drawing for F06/1348

With regard to connection to existing services, there is an existing wayleave and right of way agreement between FCC and the owner of Mayeston estate as indicated on the map in Figure 4 below to facilitate the required water services connections.

Figure 4 – Water Services Wayleaves and Right of Way Map

4. PROPOSED FOUL DRAINAGE

The foul water drainage network will be separate to the surface water drainage system and will comply with "Uisce Éireann - Code of Practise of Wastewater Infrastructure: July 2020 IW-CDS-5030-03". The foul water will be collected from the SVP's within each block into external sewers which in turn shall discharge to the existing foul sewer on Mayeston Green as detailed on accompanying Drawing 5004.

A pre-connection enquiry was submitted to Uisce Éireann regarding the proposed development (Uisce Éireann reference CDS23001423), and a confirmation of feasibility has been received (refer to Appendix A) stating that a connection to the Uisce Éireann foul network can be facilitated subject to site specific comments. As the existing Mayeston foul sewer network has not been taken in charge, Uisce Éireann shall require the following as part of any connection application:

1. Identify and procure transfer to Uisce Éireann of the arterial infrastructure within the 3rd party infrastructure.
2. Demonstrate that the arterial infrastructure is in compliance with requirements of Uisce Éireann Code of Practice and Standard Details and in adequate condition and capacity to cater for additional loads from the development.
3. Confirm the connection of the 3rd party infrastructure to the Uisce Éireann Network in 225mm crossing St Margaret's Rd, with a survey before the connection application stage.

The peak wastewater loading for the development has been calculated using guidance from Uisce Éireann Code of Practice for Wastewater. This guidance states that for new dwellings, dry weather flow (DWF) should be taken as 446 litres / dwelling / day with a peaking factor of 6 used to calculate peak flow for a development of this size. This is based on 2.7 persons per dwelling with a base flow of 150l/person/day and a 10% allowance for infiltration. The base flow rate for the proposed crèche is taken as 90/person/day (non-residential school with canteen cooking on site).

(i) Residential:
Total number of residential units = 119
Population/unit = 2.7
Total population = 2.7 x 119 = 321
Flow/person/day = 150 l
Total flow / day = 321 x 150 = 48,150 l
Infiltration allowance = 10%
Dry weather flow (DWF) = 1.1 x 48,150 = 52,965 l/day = 0.61 l/s
Design Peak flow = 6DWF = 6 x 0.61 = 3.7 l/s

(ii) Creche:
Total occupancy of creche = 70 (maximum)
Flow/person/day = 90 l
Total flow / day = 90 x 70 = 6,300 l

Infiltration allowance = 10%
Dry weather flow (DWF) = 1.1 x 6,300 = 6,930 l/day = 0.08 l/s
Design Peak flow = 6DWF = 6 x 0.08 = 0.48 l/s

All foul sewer pipes are designed with a roughness coefficient (ks) of 1.5mm and designed to achieve a minimum self-cleansing velocity of 0.75m/s when flowing half full. Foul sewers for each block are sized in accordance with the recommendations of the Uisce Éireann Code of Practice for multiple properties, i.e., 225mm pipe size with a minimum gradient of 1:150.

5. PROPOSED WATER SUPPLY

A pre-connection enquiry was submitted to Uisce Éireann regarding the proposed development (Uisce Éireann reference CDS23001423), and a confirmation of feasibility has been received stating that a connection to Uisce Éireann's water supply network can be facilitated subject to an upgrade of an existing 100mm watermain adjacent to the site to 200mm over a distance of approximately 25m on Mayeston Downs.

The new watermain network will comply with " Uisce Éireann - Code of Practice for Water Infrastructure: July 2020 IW-CDS-5020-03". As advised by Uisce Éireann, the proposed looped 100mm diameter PE water supply for the development shall be connected to the existing (upgraded) watermain on Mayeston Downs as indicated on accompanying Drawing 5003. As the development will require in excess of $20m^3$ of water per day, the development will require a bulk meter at the connection point for the development. Each apartment block shall be provided with a mains water supply from the looped watermain. Meters for apartments and the crèche will be installed internally within the Premises in accordance with the Building Control Authority's requirements and subject to review by Uisce Éireann. Provision shall be made for meters to be installed in service cupboards along with individual stop valves to isolate the property and meter location. The water service pipe work shall be arranged such that each unit can be individually metered. The meter cupboards shall be installed at a level no higher than 1.50m on each floor level and in a location where a meter reader can be comfortably maintained in the future.

For firefighting purposes, fire hydrants are to be provided within the site off the proposed 100mm diameter watermain to the spacing required by Part B of the Building Regulations including the requirement that hydrants will be provided such that no part of the building elevation shall be more than 46 metres from a hydrant.

The average daily domestic demand (ADDD) is taken as 150 l/day and an average of occupancy of 2.7 persons per dwelling and 90/day for the crèche. The average day / peak week demand is taken as 1.25 times the ADDD. The peak demand is taken as 5 times the average day/peak week.

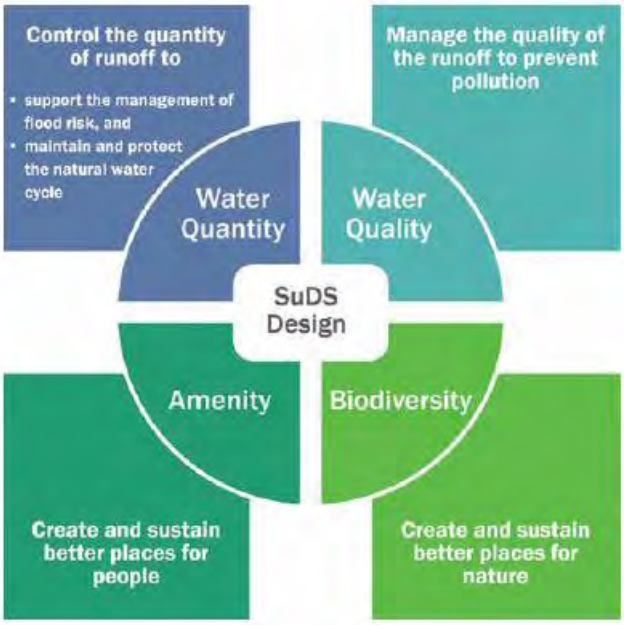
(i) Residential:
Total number of residential units = 119
Population/unit = 2.7
Total population = 2.7 x 119 = 321
Water consumption/person/day = 150 l
Total Average Daily Domestic Demand = 321 x 150 = 48,150 l = 0.56 l/s
Average day/peak week demand = 1.25 x 48,150 = 60,188 l/d = 0.70 l/s
Peak demand = 5 x 0.70 = 3.5 l/s

(ii) Creche:
Total occupancy of creche = 70 (maximum)
Water consumption/person/day = 90 l
Total Average Daily Domestic Demand = 90 x 70 = 6,300 l = 0.07 l/s
Average day/peak week demand = 1.25 x 6,300 = 7,875 l/d = 0.09 l/s
Peak demand = 5 x 0.09 = 0.45 l/s

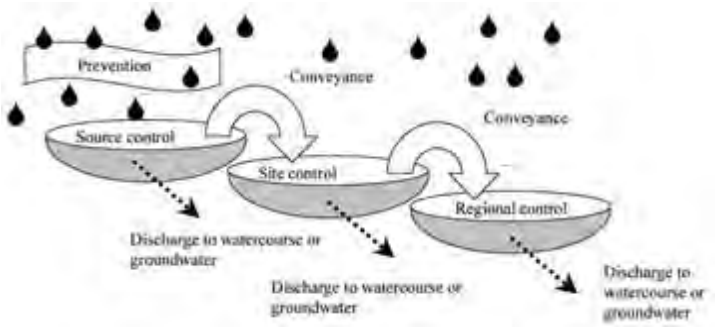
6. PROPOSED SURFACE WATER DRAINAGE AND SUDS PROPOSALS

6.1 Development Guidelines for SuDS

Guidance for Sustainable Urban Drainage Systems (SuDS) for new development is set out in Appendix 11 of the Fingal Development Plan, *"FCC SuDS Guidance Document Green/Blue Infrastructure for Development"*, April 2023. As set out in Appendix 11, SuDS can best be defined as offering a 'total' solution to rainwater management and must be included in all new developments. Ponds, artificial wetlands and water features can make a positive contribution to the provision of SuDS and to the amenity of an area. Properly designed and located SuDS features can be incorporated within and can complement the amenity and aesthetic value of open spaces. The design of SuDS is best addressed at a macro level and consolidated solutions shall be examined which allow for the aggregation of volumes in larger parks and open spaces rather than a fragmented and phased approach.



Drainage systems on developed sites shall seek to mimic natural water cycle processes including infiltration, evaporation, transpiration, reuse and attenuation of rainfall. Drainage systems shall use green, more natural landscaped above ground solutions as opposed to concrete and plastic underground attenuation tanks.



Drainage systems shall be designed to include a treatment train approach using source, site and regional SuDS facilities in accordance with Cira document C753 'The SuDS Manual'. The overarching principle of SuDS design is that surface water runoff should be managed for maximum benefit. The types of benefits that can be achieved by SuDS will be dependent on the site, but fit broadly into four categories water quantity, water quality, amenity, and biodiversity. These four categories are known as the four pillars of SuDS design.

As set out in Section 2 above, there is an existing surface water drainage network serving the Mayeston estate that includes attenuation storage within underground storage tanks located in the public open space area immediately to the west of the site. The existing attenuation tank system includes a storage allowance for runoff from 4,200m^2 of contributing (impermeable) area for the current application site as part of the previously proposed development. Consultation was held with Phillip Grobler of FCC Water Services regarding appropriate SuDS measures to be adopted for the development. Phillip advised that under the current SuDS policies as set out above, it is intended to move away from the use of storage tanks and hard engineered solutions to softer/greener nature-based solutions. In this instance, however, it is considered appropriate to utilise the attenuation storage capacity provided by the already constructed tank. Additional to the attenuation requirement it shall be necessary to address the interception and treatment storage requirements as set out by the GDSDS.

There follows details of the proposed SuDS measures proposed for the development based on a comprehensive evaluation of the site and the guidelines set out above. The proposals should be read in conjunction with the following accompanying Downes Associates reports:

- Report reference 21208-DOW-00-XX-RP-CE-0004 – Flood Risk Assessment
- Report reference 21208-DOW-00-XX-RP-CE-0005 – Surface Water Management Plan

6.2 Existing Water Features & Flow Route Assessment

The current application site is located within an urban area and there are no existing surface watercourses on or immediately adjacent to the site (refer to Downes Associates Report reference 21208-DOW-00-XX-RP-CE-0004 – Flood Risk Assessment for further details of existing surface water features). There is an existing surface water drainage network serving the Mayeston estate that includes attenuation storage within underground storage tanks located in the public open space area immediately to the west of the current application site. Discharge from the attenuation system is controlled by a Hydrobrake flow control device. The existing attenuation tank system has a total storage capacity of 2,760m^3, designed to cater for the 1 in 100-year storm event for the Mayeston Estate. This capacity includes an allowance of 4,200m^2 of contributing area runoff from the current application site as part of the previously proposed development. The current application site includes an additional 0.59Ha of Greenfield site to the north which did not form part of the previous application Ref F06A/1348.

The following contributing areas apply to the current application:

Total site area:	13,389m^2
Total roof area (including crèche play area):	3,445m^2
Total external pavement area:	4,330m^2

Based on the above, the existing attenuation system has adequate capacity to cater for runoff from the roofs of the buildings. Hence, it is proposed discharge runoff from the roofs direct to the existing attenuation system. In order to provide interception and preliminary treatment to roof runoff, extensive green roofs shall be provided where feasible. Runoff from the remaining hardstanding areas (vehicular and pedestrian pavements) shall incorporate additional SuDS measures prior to discharge to the receiving surface water system. These additional SuDS measures shall be designed to: (a) intercept the additional runoff from the new development; (b) provide preliminary treatment to this runoff; and (c) provide an amenity aspect to surface water runoff.

6.3 Examination of Ground Conditions

As part of the site evaluation, a detailed geotechnical site investigation was carried out by Site Investigations Ltd to establish the characteristics of the natural subsoils. The site ground conditions were found to typically comprise MADE GROUND overlying COHESIVE DEPOSITS comprising brown and brown grey sandy gravelly silty CLAY soils, varying from firm to very stiff, becoming stiffer with depth. The MADE GROUND was encountered across the site typically 1.2m to 1.5m depth, but there are deeper spoil heaps to the north of the site. These spoil heaps will need to be removed as part of site clearance/levelling, along with the existing concrete slabs present on the site. The boreholes extended to 15m BGL, and no bedrock was encountered. No groundwater was encountered in the boreholes or trial pits. At two locations on the site, soakaway tests were carried out in accordance with BRE Special Digest 365. The soakaway tests failed the specification as the water level did not fall sufficiently enough to complete the test. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The tests were terminated at the end of the first (of a possible three) fill/empty cycle since further testing would give even slower fall rates due to increased soil saturation. The findings indicate that the subsoils are unsuitable for intensive infiltration solutions. However, extensive infiltration systems such as permeable

pavements are considered feasible to encourage direct infiltration, subject to adequate measures being put in place for exceedance rainfall events.

6.4 Proposed SuDS Components

Runoff from the roof areas of the development shall be directed to the existing attenuation system serving the Mayeston estate. Sustainable drainage systems (SuDS) typically include a variety of components, each having different approaches to managing flows, volumes, water quality and providing amenity and biodiversity benefits. SuDS are a suite of components working in different ways that can be used to drain a variety of sites. SuDS components work in several ways: they can infiltrate (soak) into the ground, convey (flow) into a watercourse (or if necessary, a sewer), and they can also provide storage on site and attenuate (slow down) the flows of water. Often SuDS schemes use a combination of these processes and components may use a number of mechanisms, in what is termed a management train. The selection of SuDS components for this project was based on an analysis of the site opportunities and constraints, and an appropriate combination of approaches was developed to maximise the sustainability of the system within the constraints of the site. Each of the following SuDS components or approaches was examined and where appropriate for the site the component or approach has been adopted (as highlighted in green).

Source Controls
Maximise permeability within a site to promote attenuation, treatment and infiltration reducing the need for offsite conveyance.

Ref	Measure	Suitable	Comment	Adopted
A.1	Green roofs	Yes	Green roofs are proposed to the two external bike sheds to provide visual benefit, ecological value, enhanced building performance, and the reduction of surface water run-off, in line with Section 3.6.7 of FCC's Green/ Blue Infrastructure for Development: Guidance Note, Fingal County Development Plan– April 2023. Green roofs are not proposed to the apartment blocks, and these are considered exempt as outlined in the above guidance document, due to the inclusion of a significant suite of alternative green infrastructure proposals wholly addressing the interception, treatment and attenuation volumes across the site.	Yes
A.2	Permeable paving	Yes	Permeable paving is to be adopted for all external paved areas of the development. Due to the poor infiltration characteristics of the subsoils, a partial infiltration system is proposed, with exceedance events catered for by provision of a collector drain within the paved areas.	Yes

Ref	Measure	Suitable	Comment	Adopted
A.3	Grass	Yes	Extensive green areas are to be provided.	Yes
A.4	Reinforced grass	Yes	A reinforced grass pavement is to be provided for maintenance vehicles along the western boundary of the site.	Yes
A.5	Gravelled areas	No	Not suitable for the end users of this development.	No
A.6	Rainwater harvesting	No	Not suitable for the end users of this development.	No
A.7	Rain Trap	Yes	Not considered for this development.	No
A.8	Water Butt	No	Individual water butts are not suitable for this type of apartment development.	No

Swales and conveyance channels

Ref	Measure	Suitable	Comment	Adopted
B.1	Swales	Yes	Dry conveyance swales are provided within the central courtyard area as part of the landscaping proposals. The swales shall provide conveyance for exceedance runoff from the permeable pavements.	Yes
B.2	Canals and rills	Yes	Swales are preferred as the means of conveyance.	No

Filtration

Ref	Measure	Suitable	Comment	Adopted
C.1	Permeable pavements	Yes	The granular layers of the permeable pavements are considered appropriate to reduce runoff and treat pollutants adjacent to roadways where there is low pollution loading.	Yes
C.2	Bioretention areas	Yes	Tree pits are proposed adjacent to paved areas in the car park and access road to intercept exceedance runoff. Swales are proposed in the courtyard area to intercept exceedance runoff. The tree pits and swales are considered appropriate to reduce runoff rate and to treat pollutants.	Yes

Infiltration

Capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

Ref	Measure	Suitable	Comment	Adopted
D.1	Soakaways	No	Not suitable for site subsoils.	No

Ref	Measure	Suitable	Comment	Adopted
D.2	Infiltration basin	Yes	The granular layers of the proposed permeable paving shall allow for direct infiltration to the subsoils over an extensive area. The swales and tree pits shall also allow natural infiltration.	Yes
D.3	Rain garden	Yes	Permeable paving, tree pits and swales are preferred means of infiltration to suit the landscaping proposals.	No

Retention and Detention

Designed to either provide storage through the retention of surface water runoff, or attenuation through the detention of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
E.1	Detention basins	Yes	The granular layer under the permeable paving and the swale depressions shall provide temporary detention for exceedance events.	Yes
E.2	Retention ponds/ Wetland	Yes	Suitable, but the permeable paving and swales are preferred for this development.	No
E.3	Attenuation Tank/Oversized Pipes	Yes	The existing Mayeston estate attenuation system shall be used for runoff from the roofs.	Yes
E.4	Throttle device	Yes	Hydrobrake throttle adopted to restrict outflow from SuDS device.	Yes

Proprietary Treatment Systems

Densely vegetated water bodies that use sedimentation and filtration to provide treatment of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
F.1	Proprietary bioretention system	Yes	Tree pits and swales are adopted as part of bioretention systems (see above).	Yes
F.2	Treatment Channels	No	Not suitable for this development.	No
F.3	Hydrodynamic vortex separators	No	Proprietary system to remove sediments by gravity not deemed necessary. Achieved in tree pits, permeable paving, and swales.	No
F.4	Proprietary filtration system	No	Not suitable for this development.	No
F.5	Oil separator	Yes	Low hydrocarbon pollutant loading. Proprietary system to remove hydrocarbons not deemed necessary.	No

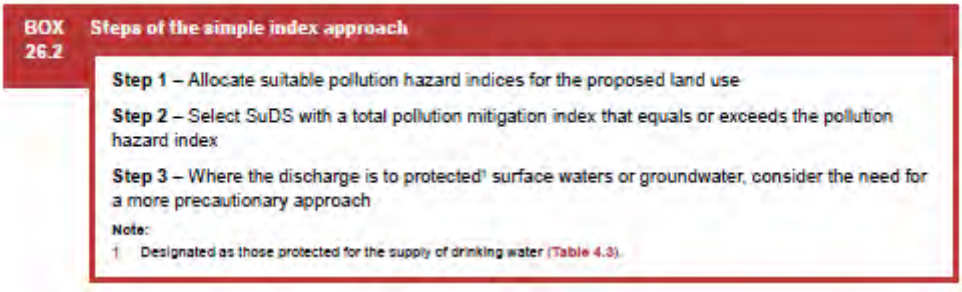
Ref	Measure	Suitable	Comment	Adopted
			Achieved in permeable paving, bioretention, and swales.	
F.6	Multi process	No	Complex bespoke system not suitable to this type of development	No

The proposed SuDS solution is detailed on the enclosed Drawings 5004 and 5005.

The water quality, amenity and biodiversity properties of the proposed systems are summarised below.

SuDS Components		
Water Quality	Runoff collection	Standard downpipes shall convey roof rainwater to the underground surface water drainage system. Collector drains comprising a perforated drainage pipe shall convey exceedance runoff from permeable pavements and swales to the receiving surface water sewer.
	Interception	Permeable paving/swales/tree pits/green roof all intercept critical first run-off from impermeable hardstanding and bicycle store.
	Storage	Detention area attenuation volume - 1:100 year, including allowance for climate change.
	Conveyance	Pipes and swales direct water to detention systems and discharge to watercourse.
	Exceedance	Existing topography allows exceedance flows to be intercepted by the watercourse.
	Groundwater protection measures	Roof and carparking area – hazard is low. Permeable paving/swale/tree pits provide protection measures.
Amenity	Open spaces, and bioretention areas provide high amenity spaces	
Biodiversity	Tree pits, green roof, and swales provide ecological area and habitat for a range of species.	

Analysis of the effectiveness of the chosen SuDS components to achieve water quality criteria follows the “simple index approach” as set out in Chapter 26 of CIRIA C753 The SuDS Manual, as follows:


BOX 26.2 Steps of the simple index approach

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected[1] surface waters or groundwater, consider the need for a more precautionary approach

Note:
1 Designated as those protected for the supply of drinking water (Table 4.3).

From Table 26.2 of C753, the pollution hazard indices for the proposed land uses are as follows:

Land Use	Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential car parks; low traffic roads	Low	0.5	0.4	0.4

For the selected SuDS components, from Table 26.3 of C753, the pollution mitigation indices are as follows for the site:

SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Swale	0.5	0.6	0.6
Permeable paving	0.7	0.7	0.6
TOTAL	**1.2**	**1.3**	**1.2**

The individual mitigation indices are greater than the risk indices, so water quality requirements are deemed to be satisfied.

6.5 Surface Water Drainage Design for Roofs

It is proposed to discharge surface water from the roofs of the development to the existing attenuation storage system within the park adjacent to the southwest of the site. Pipes carrying surface water from the roof areas of the site to the existing attenuation system are sized to cater for a rainfall intensity of 50mm per hour applied to all impermeable roof surfaces. Surface water runoff from impermeable areas is calculated using the Modified Rational Method as follows:

$Q = 2.78C_vC_riA$ (where Q is in l/s, i is in mm/hr and A is in Ha)

$C_v = 0.75$ and $C_r = 1.3$

$Q = 2.78iA$

A roughness coefficient, k_s of 0.6mm is used for surface water drains. Pipe size and gradient for each run are determined using the Wallingford hydraulic design tables.

Attenuation Storage Assessment

Based on the design calculations prepared by DBFL Engineers for the previous development (Planning Register Ref. F06/1348), the attenuation system has an allocated capacity for runoff from 9,400m^2 of impermeable area from development on Mayeston Green. The existing attenuation tank system has a total storage capacity of 2,760m^3, designed to cater for the 1 in 100-year storm event for the Mayeston Estate. This capacity includes an allowance of 4,200m^2 of contributing area runoff from the current application site as part of the previously proposed development. The total contributing roof area of the current application is 3,445m^2, which is within the previously calculated reserve capacity of 4,200m^2.

The surface water pipework layout and details are provided on Drawing 5004.

6.6 Surface Water Drainage Design for External Pavements

Surface water design for the proposed additional SuDS components for external pavements is carried out in accordance with the recommendations of the Greater Dublin Strategic Development Study (GDSDS), Regional Drainage Policies Volume 2 – New Development. The surface water drainage system is designed using *Causeway Flow+* hydraulic modelling drainage design software. Pipes carrying surface water are initially sized to cater for a 1 in 5-year return period rainfall intensity applied to all impermeable surfaces.

Rainfall Characteristics

Site data for the return period rainfall depths for sliding durations was obtained from Met Eireann as follows:

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 306714, Northing: 240208,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.6,	4.1,	5.0,	5.6,	6.0,	7.5,	9.2,	10.3,	11.9,	13.3,	14.4,	16.0,	17.3,	18.4,	N/A ,
10 mins	3.5,	5.0,	5.8,	6.9,	7.8,	8.4,	10.4,	12.8,	14.3,	16.5,	18.5,	20.0,	22.3,	24.2,	25.7,	N/A ,
15 mins	4.1,	5.8,	6.8,	8.2,	9.1,	9.9,	12.3,	15.0,	16.9,	19.4,	21.7,	23.5,	26.3,	28.4,	30.2,	N/A ,
30 mins	5.4,	7.6,	8.8,	10.5,	11.7,	12.6,	15.6,	18.9,	21.1,	24.2,	27.0,	29.1,	32.4,	34.9,	37.0,	N/A ,
1 hours	7.2,	9.9,	11.4,	13.5,	15.0,	16.1,	19.7,	23.8,	26.4,	30.2,	33.4,	36.0,	39.8,	42.8,	45.3,	N/A ,
2 hours	9.5,	13.0,	14.8,	17.4,	19.2,	20.6,	25.0,	29.9,	33.1,	37.6,	41.5,	44.5,	49.0,	52.6,	55.5,	N/A ,
3 hours	11.2,	15.1,	17.2,	20.2,	22.2,	23.8,	28.7,	34.2,	37.8,	42.7,	47.0,	50.3,	55.4,	59.3,	62.4,	N/A ,
4 hours	12.6,	16.9,	19.2,	22.5,	24.6,	26.3,	31.7,	37.6,	41.5,	46.8,	51.4,	55.0,	60.4,	64.5,	67.9,	N/A ,
6 hours	14.8,	19.7,	22.3,	26.0,	28.5,	30.4,	36.4,	43.0,	47.3,	53.2,	58.3,	62.2,	68.2,	72.7,	76.5,	N/A ,
9 hours	17.4,	23.1,	26.0,	30.2,	33.0,	35.1,	41.8,	49.2,	54.0,	60.5,	66.1,	70.4,	77.0,	82.0,	86.1,	N/A ,
12 hours	19.6,	25.8,	28.9,	33.5,	36.5,	38.8,	46.2,	54.1,	59.2,	66.2,	72.3,	76.9,	83.9,	89.3,	93.6,	N/A ,
18 hours	23.0,	30.1,	33.7,	38.9,	42.3,	44.8,	53.0,	61.9,	67.6,	75.3,	82.0,	87.1,	94.8,	100.6,	105.4,	N/A ,
24 hours	25.9,	33.6,	37.5,	43.2,	46.8,	49.7,	58.5,	68.1,	74.2,	82.5,	89.7,	95.1,	103.3,	109.6,	114.6,	132.0,
2 days	32.2,	40.9,	45.3,	51.6,	55.7,	58.8,	68.5,	78.7,	85.2,	94.1,	101.6,	107.3,	115.9,	122.3,	127.6,	145.3,
3 days	37.3,	46.9,	51.7,	58.5,	62.9,	66.2,	76.5,	87.5,	94.3,	103.6,	111.5,	117.5,	126.4,	133.1,	138.5,	156.8,
4 days	41.7,	52.1,	57.2,	64.5,	69.2,	72.7,	83.6,	95.1,	102.3,	112.0,	120.2,	126.4,	135.6,	142.6,	148.2,	167.0,
6 days	49.6,	61.2,	66.9,	75.0,	80.1,	84.0,	95.9,	108.3,	116.1,	126.5,	135.3,	141.9,	151.7,	159.1,	165.0,	184.9,
8 days	56.6,	69.3,	75.5,	84.2,	89.7,	93.8,	106.6,	119.9,	128.1,	139.2,	148.5,	155.4,	165.8,	173.5,	179.7,	200.5,
10 days	63.0,	76.6,	83.2,	92.5,	98.4,	102.8,	116.3,	130.4,	139.1,	150.6,	160.4,	167.7,	178.5,	186.5,	193.0,	214.6,
12 days	68.9,	83.5,	90.5,	100.3,	106.5,	111.2,	125.4,	140.1,	149.2,	161.2,	171.4,	179.0,	190.2,	198.5,	205.3,	227.6,
16 days	80.0,	96.1,	103.9,	114.6,	121.4,	126.5,	141.9,	157.8,	167.6,	180.6,	191.5,	199.6,	211.6,	220.4,	227.6,	251.2,
20 days	90.3,	107.8,	116.2,	127.8,	135.1,	140.5,	157.1,	174.0,	184.5,	198.2,	209.8,	218.3,	230.9,	240.3,	247.8,	272.6,
25 days	102.4,	121.4,	130.5,	143.1,	150.9,	156.8,	174.6,	192.8,	203.9,	218.5,	230.8,	239.9,	253.2,	263.1,	271.1,	297.2,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

From the above data:
M5-60 = 16.1mm
M5-2day = 58.8mm
R = M5-60/M5-2day = 16.1/58.8 = 0.274

Greenfield Runoff Rate Calculation

The runoff from the proposed SuDS measures shall be limited to the equivalent Greenfield rate for the additional 0.59Ha of the previously undeveloped northern part of the site. The Greenfield rate, QBAR, is estimated using the HR Wallingford estimation tool (www.uksuds.com) that refers to the Institute of Hydrology Report No. 124 – Flood Estimation for Small Catchments. The input used in the calculation is as follows:

Total Site Area:	0.59Ha
SAAR:	831mm (source: HR Wallingford)
SPR (Soil Type 3):	0.37 (source: HR Wallingford)

$QBAR = 0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$

Where QBAR is the mean annual flood flow from a rural catchment in m^3/s.

The formula for determining the peak Greenfield runoff rate should theoretically not be applied to areas less than 50 hectares. As many developments are smaller than this size this constraint

is avoided by calculating $QBAR_{rural}$ for 50 hectares and linearly interpolating flow rates for smaller areas.

QBAR = 0.00108 x (0.01 x 50) $^{0.89}$ x $831^{1.17}$ x $0.37^{2.17}$ = 0.176 m^3/s or 176 l/s for 50 Ha

Therefore, QBAR = 176 / 50 = **3.52 l/s/Ha**

For the site area, $QBAR_{SITE}$ = 3.52 x 0.59 = 2.1l/s

Infiltration Characteristics

The soakaway tests to BRE 365 carried out as part of the recent site investigation failed to provide a reliable infiltration rate, indicating the subsoils are unsuitable for intensive infiltration solutions. However, extensive infiltration systems such as permeable pavements are considered feasible to encourage direct infiltration, subject to adequate measures being put in place for exceedance rainfall events. The permeable pavements are therefore designed as a partial infiltration system, with the infiltration rate conservatively taken as zero for the purposes of storage design.

Simulation Modelling

A detailed simulation modelling of the network has been carried out using *Flow+* to enable an assessment of the flood risk for extreme events. The following recommended design criteria for level of service (flooding) have been adopted:

- For 1 in 30-year return period, no flooding should occur on site except where specifically planned flooding is approved.
- For 1 in 100-year return period, no internal property flooding should occur on site; planned flood routing and temporary flood storage should be accommodated on site for short high intensity storms; floor levels should be at least 500mm above maximum water level and adjacent onsite storage retention; and no flooding should occur of adjacent urban areas.

Detailed simulation modelling calculations have been carried out for the 5-year, 30-year and 100-year return period, and the results are enclosed in Appendix B. For the 30-year and 100-year storm events, an additional allowance of 20% is included for the effects of climate change. The results demonstrate compliance with the above level of service (flooding) requirements.

Details of the proposed drainage system and SuDS features for the external pavements are provided on Drawing 5005.

6.7 Maintenance of SuDS

To ensure best practice design is adopted and for practicality of operation and maintenance, all SuDS measures adopted for the development shall be designed in accordance with the CIRIA SUDS Manual C753 as required by the GDSDS. Refer to Downes Associates Report reference 21208-DOW-00-XX-RP-CE-0005 – Surface Water Management Plan for further details regarding the maintenance of the adopted SuDS features. For plant-based SuDS features, these maintenance details should be read in conjunction with plans and specifications prepared by the Landscape Architect.

7. FLOOD RISK ASSESSMENT

A site-specific Flood Risk Assessment (FRA) has been carried out for the proposed development – please refer to separate Downes Associates Report reference 21208-DOW-00-XX-RP-CE-0004. Based on the FRA undertaken, the development is considered to be located in Zone C, i.e., an area subject to a low probability of flooding. Detailed proposals for surface water management SuDS associated with the development to mitigate any on- and off-site pluvial flooding are provided in Section 5 above and on the accompanying drawings.

8. ACCESS AND TRAFFIC MANAGEMENT

As part of the current application, separate traffic and transportation related reports have been prepared by Roadplan Consulting, as follows:

1. Traffic Report
2. Mobility Management Plan
3. Parking Assessment & Management Strategy
4. Public Transport Capacity Assessment
5. DMURS Design Statement
6. Road Safety Audit (combined Stage 1/2)

Access to the development from the existing road network shall be as indicated on the accompanying Architect's drawings and Downes Associates Drawing 5008. No new road infrastructure is required as part of the development. The proposed development will have pedestrian and cycle access from the existing roads on Mayeston Downs and Mayeston Green via Mayeston Rise onto St Margaret's Road. Vehicular access to the development is via the existing roads on Mayeston Rise and the R104 St Margaret's Road. The M50 motorway nearby is accessed either from the Ballymun or the Finglas junctions, each approximately 1km from the development. Specific details for access along with public transport connectivity are provided in the Parking Assessment and Management Strategy Report prepared by Roadplan Consulting.

All new internal roadways and footpaths have been designed according to the standards set out in Design Manual for Urban Roads and Streets (DMURS) – refer to Roadplan's DMURS Design Statement. As part of the current proposal, swept path analyses have been carried out to verify a refuse vehicle and fire tender can safely manoeuvre into, around and out of the site – refer to Downes Associates drawings 5006 and 5007.

9. CONSTRUCTION & ENVIRONMENTAL MANAGEMENT

A site-specific Surface Water Management Plan has been prepared for the proposed development – please refer to separate Downes Associates Report reference 21208-DOW-00-XX-RP-CE-0005.

A separate site-specific Construction & Environmental Management Plan has been prepared for the proposed development – please refer to separate report prepared by Brady Shipman Martin.

10. DRAWING SCHEDULE

The following drawings should be read in conjunction with this report:

4000: Details	
DOW-00-XX-DR-C-4000	Manhole Details Sheet 1
DOW-00-XX-DR-C-4001	Manhole Details Sheet 2
DOW-00-XX-DR-C-4002	Pipe Bedding Details
DOW-00-XX-DR-C-4003	Gully Details
DOW-00-XX-DR-C-4004	Watermain Details
DOW-00-XX-DR-C-4005	Paving Details
DOW-00-XX-DR-C-4006	Road Surface Details
5000: Civils	
DOW-00-XX-DR-C-5000	Existing Site Survey
DOW-00-XX-DR-C-5001	Existing Utility Survey
DOW-00-XX-DR-C-5002	Existing Site Layout & Water Services
DOW-00-XX-DR-C-5003	Proposed Site Levels & Watermain Layout
DOW-00-XX-DR-C-5004	Proposed Foul & Surface Water Drainage Layout
DOW-00-XX-DR-C-5005	Proposed Drainage to External Pavements
DOW-00-XX-DR-C-5006	Swept Path for Fire Tender
DOW-00-XX-DR-C-5007	Swept Path for Refuse Vehicle
DOW-00-XX-DR-C-5008	Proposed Road Layout

APPENDIX A – UISCE ÉIREANN CONFIRMATION OF FEASIBILITY

CONFIRMATION OF FEASIBILITY

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

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

www.water.ie

Andrew Dixon

Cashel Business Centre
Cashel Road
Kimmage
Dublin 12
D12ET25

13 March 2023

Our Ref: CDS23001423 Pre-Connection Enquiry
Mayeston, Poppintree, Dublin, Dublin

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

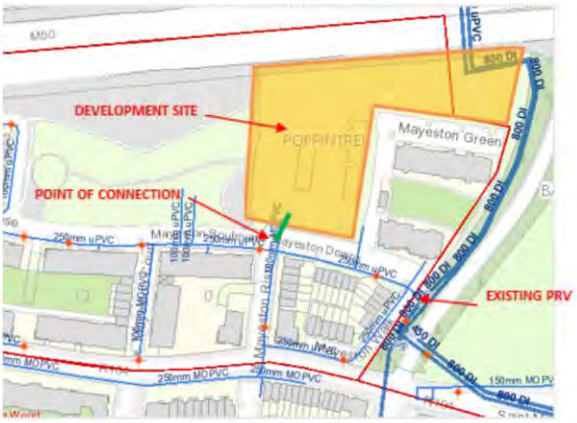
Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 122 unit(s) at Mayeston, Poppintree, Dublin, Dublin, (the **Development)**.

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

- **Water Connection** - Feasible Subject to upgrades

  Approximately 25 m of existing 100mm mains will need to be upgraded to 200mm for the connection, see green line.

  These upgrade works are not currently on Irish Water investment plan therefore, the applicant will be required to fund these local network upgrades. The fee will be calculated at a Connection Application stage.



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 assets 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 assets that are not located within the Public Space. For design submissions and queries related to diversion/build near or over, please contact IW Diversion Team via email address diversions@water.ie

- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

The proposed wastewater/water connection for this development connects to the Irish Water network via infrastructure that has not been taken in charge by Irish Water (Third Party Infrastructure). Please be advised that at connection application stage and prior to the commencement of any Self-Lay Works, you have to:

- Identify and procure transfer to Irish Water of the arterial infrastructure within the Third-Party Infrastructure
- Demonstrate that the arterial infrastructure is in compliance with requirements of Irish Water Code of Practice and Standard Details and in adequate condition and capacity to cater for the additional load from the Development.

- Provided written permission from the current infrastructure owner to connect.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections**, **email** **newconnections@water.ie** or contact 1800 278 278.

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

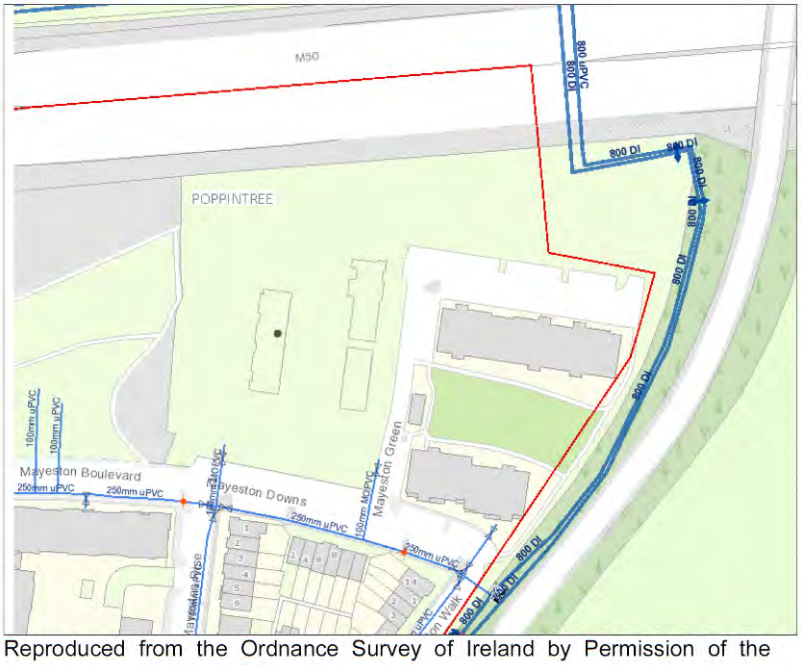
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Irish Water Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



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

Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

APPENDIX B – SURFACE WATER DESIGN CALCULATIONS FOR EXTERNAL PAVEMENTS

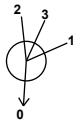
Design Settings

Rainfall Methodology	FSR
Return Period (years)	5
Additional Flow (%)	0
FSR Region	Scotland and Ireland
M5-60 (mm)	16.100
Ratio-R	0.274
CV	0.750
Time of Entry (mins)	10.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	0.90
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	✓
Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Carpark 1	0.303	10.00	74.250		28.146	44.256	1.100
1	0.031	10.00	75.000	1200	27.109	16.045	1.990
2	0.018	10.00	75.250	1200	7.450	8.283	2.250
3	0.046	10.00	74.250	1200	28.805	-12.191	1.250
4	0.035	10.00	74.850	1200	10.551	-20.244	2.040
5			74.750	1200	8.987	-44.853	2.430

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
Carpark 1	74.250	1.100			0	1.000	73.150	225
1	75.000	1.990	1200		1	1.000	73.010	225
					0	1.001	73.010	225
2	75.250	2.250	1200		0	2.000	73.000	225
3	74.250	1.250	1200		0	3.000	73.000	225
4	74.850	2.040	1200		1	3.000	72.810	225
					2	2.000	72.810	225
					3	1.001	72.810	225
					0	1.002	72.810	225

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
5	74.750	2.430	1200	1	1	1.002	72.320	225

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	Scotland and Ireland	Additional Storage (m³/ha)	20.0
M5-60 (mm)	16.100	Check Discharge Rate(s)	✓
Ratio-R	0.274	5 year (l/s)	2.9
Summer CV	0.750	30 year (l/s)	4.0
Winter CV	0.840	100 year (l/s)	4.8
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

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

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

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.65
Greenfield Method	IH124	Growth Factor 100 year	1.96
Positively Drained Area (ha)	0.590	Betterment (%)	0
SAAR (mm)	831	QBar	2.5
Soil Index	3	Q 5 year (l/s)	2.9
SPR	0.40	Q 30 year (l/s)	4.0
Region	11	Q 100 year (l/s)	4.8
Growth Factor 5 year	1.20		

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	72.810	Product Number	CTL-SHE-0069-2100-0990-2100
Design Depth (m)	0.990	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.1	Min Node Diameter (mm)	1200

Node Carpark 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	73.500	Slope (1:X)	9000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	345	Depth (m)	
Safety Factor	2.0	Width (m)	16.000	Inf Depth (m)	
Porosity	0.30	Length (m)	160.000		

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	0.900
Node Losses	x	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	x
Minimum Diameter (mm)	150	Surcharged Depth	x
Link Length	✓	Flooding	✓
Maximum Length (m)	100.000	Return Period (years)	100
Coordinates	✓	Time to Half Empty	✓
Accuracy (m)	1.000	Return Period (years)	100
Crossings	✓	Discharge Rates	✓
Cover Depth	x	5 year (l/s)	2.9
Backdrops	✓	30 year (l/s)	4.0
Minimum Backdrop Height (m)	0.200	100 year (l/s)	4.8
Maximum Backdrop Height (m)	1.500	Discharge Volume	x
Full Bore Velocity	✓		

Approval Results

The network has been designed for a 1 in 5 year storm using FSR rainfall
It contains 6 nodes (1 outfall) and 5 links
The total impermeable area is 0.433 ha
1 online control has been defined
1 structure has been defined, providing 339m³ of storage below the flood risk level
Infiltration has not been utilised
Simulations have been completed using FSR summer and winter storms from 15 to 1440 minute duration

No manholes are smaller than that required by the library

The node losses test has not been completed

No circular links have diameters < 150mm

No links have lengths > 100.000m

No links have lengths that differ from their coordinated length by more than 1.000m

No links cross one or more other links

The cover depth test has not been completed

No nodes have backdrops outside the range 0.200-1.500m

No links have full bore velocity outside the range 0.900-3.000m/s

The proportional velocity test has not been completed

The surcharged depth test has not been completed

No nodes flood during the 100 year return period

No infiltrating structures failed to half empty in 1440 minutes during the 100 year return period

No outfalls have a discharge rate greater than 2.9l/s during the 5 year return period

No outfalls have a discharge rate greater than 4.0l/s during the 30 year return period

No outfalls have a discharge rate greater than 4.8l/s during the 100 year return period

The discharge volume test has not been completed

Results for 5 year Critical Storm Duration. Lowest mass balance: 95.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	Carpark 1	480	73.593	0.443	7.6	66.9543	0.0000	SURCHARGED
600 minute winter	1	480	73.593	0.583	3.5	0.8410	0.0000	SURCHARGED
15 minute summer	2	12	73.595	0.595	11.6	0.7658	0.0000	SURCHARGED
30 minute winter	3	17	73.598	0.598	5.2	1.1138	0.0000	SURCHARGED
600 minute winter	4	480	73.592	0.782	2.9	1.1526	0.0000	SURCHARGED
15 minute summer	5	1	72.320	0.000	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	Carpark 1	1.000	1	25.9	0.934	0.711	1.1227	
15 minute summer	1	1.001	4	18.1	0.579	0.493	1.5864	
15 minute summer	2	2.000	4	-10.0	-0.303	-0.237	1.1412	
15 minute summer	3	3.000	4	-7.4	0.301	-0.145	0.7935	
15 minute summer	4	Hydro-Brake®	5	2.1				27.8

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 95.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Carpark 1	690	73.704	0.554	12.0	152.6757	0.0000	SURCHARGED
720 minute winter	1	690	73.704	0.694	2.5	1.0008	0.0000	SURCHARGED
720 minute winter	2	690	73.703	0.703	0.6	0.9050	0.0000	SURCHARGED
720 minute winter	3	690	73.703	0.703	1.5	1.3108	0.0000	SURCHARGED
720 minute winter	4	690	73.703	0.893	3.2	1.3157	0.0000	SURCHARGED
15 minute summer	5	1	72.320	0.000	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	Carpark 1	1.000	1	31.2	0.972	0.855	1.1227	
15 minute summer	1	1.001	4	19.7	0.620	0.536	1.5864	
15 minute winter	2	2.000	4	-9.0	-0.245	-0.214	1.1412	
15 minute winter	3	3.000	4	10.6	0.397	0.210	0.7935	
600 minute winter	4	Hydro-Brake®	5	2.1				95.4

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 95.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Carpark 1	915	73.779	0.629	12.4	210.6259	0.0000	SURCHARGED
960 minute winter	1	915	73.778	0.768	2.3	1.1089	0.0000	SURCHARGED
960 minute winter	2	915	73.778	0.778	0.6	1.0013	0.0000	SURCHARGED
30 minute winter	3	22	73.787	0.787	12.1	1.4671	0.0000	SURCHARGED
960 minute winter	4	915	73.778	0.968	3.2	1.4259	0.0000	SURCHARGED
15 minute summer	5	1	72.320	0.000	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	Carpark 1	1.000	1	30.9	0.958	0.849	1.1227	
30 minute winter	1	1.001	4	-23.0	0.593	-0.626	1.5864	
15 minute winter	2	2.000	4	-9.9	-0.274	-0.234	1.1412	
30 minute winter	3	3.000	4	11.7	0.362	0.231	0.7935	
15 minute summer	4	Hydro-Brake®	5	2.1				71.2