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Engineering Report

Proposed 13Unit Housing Development at

30-32 North Street, Swords Co. Dublin

Project Ref: P3626
Issued By: P McGinnity
Checked By: M Kerr
Date: 01.09.22
Rev: B

Comhairle Contae Fhine Gall
Fingal County Council

Document Control Sheet

Client	**Fingal County Council (FCC)**
Project Title	Proposed 13Unit Housing Development at 30-32 North Street, Swords, Co. Dublin
Document Title	Engineering Report
Document No.	P3626

Rev.	Status	Author(s)	Reviewed By	Approved By	Issue Date
-	Approval	PM	MK	PMcM	04.08.22
A	Planning	PM	MK	PMcM	26.08.22
B	Planning	PM	MK	PMcM	01.09.22

McMahon Associates

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1.0 Introduction

McMahon Associates have prepared this Engineering Report to address the following;

- Foul & Surface Water Drainage
- SuDS
- Flood Risk Identification
- Water supply Strategy
- Strategy for vehicular access to the site

for the proposed development at 30-32 North Street, Swords, Co. Dublin. The proposed development will consist of the construction of 13No residential apartment units and associated infrastructure.

This report is to be read in conjunction with the engineering & architectural planning drawings to provide a high level overview of the drainage strategy for this development. It is envisaged that at detailed design stage the methodology and rationale outlined in this report will be adhered to ensure a consistency in the final design.

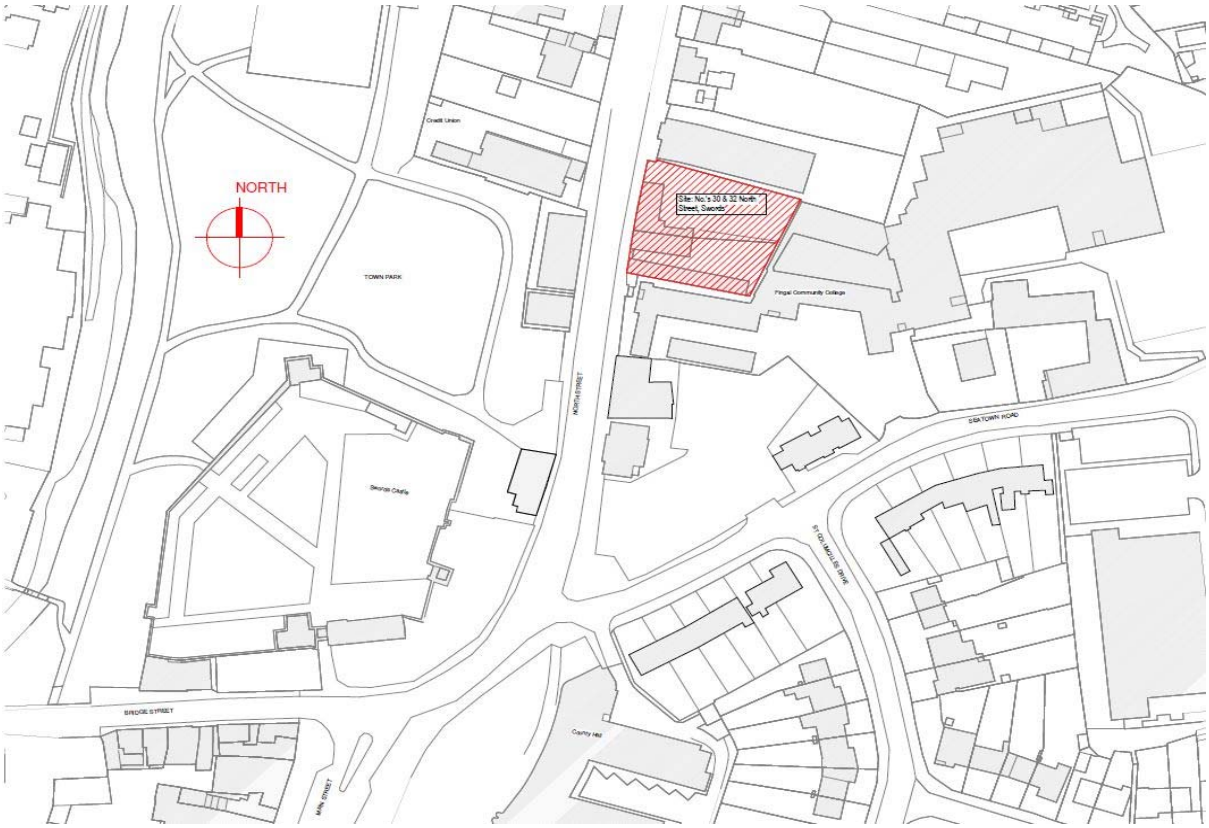

Figure 1: Site Location

2.0 Existing Site and Services

The proposed development site is located on North Street in Swords. It is bounded to the west by North Street, to the south and east by Fingal Community College and by a commercial property (Des Kelly Interior's) to the north. The site is brownfield and currently has 2No. 2-storey properties and single storey outbuildings within the site. As part of the works the outbuildings will be demolished and a portion of the existing 2-storey buildings, with the remaining buildings being incorporated into the proposed development.

The topography of the site is sloping from east to west with a level difference of approximately 1.0m between the east and west boundaries falling at a gradient of approximately 1:40. Given the nature of the development as apartment units with access to the upper units from an external terrace, the finished levels of the Units will all be set at the same level for practical & aesthetic reasons. This will result I, level reductions on the eastern and northern boundaries, below their existing levels, requiring portions of the existing eastern and northern boundary walls to either be underpinned or reconstructed.

A site investigation has been procured & due to be complete by the end of August. It will establish the ground conditions within the site in terms of strength and stability and will also establish if any environmental contamination has occurring during its previous use. Infiltration testing will be carried out to establish the suitability for certain Sustainable Urban Drainage System (SuDS) features that will form a key part of the drainage strategy.

Topographical and Ground Penetrating Radar Surveys were carried out and made available to us to ascertain the location and quantity of existing services currently located in the site and along North Street.

2.1 Foul Water

The foul wastewater from the existing dwelling is carried by a 100mm diameter connection and discharges into an existing 600mm diameter concrete foul sewer in North Street. This 100mm sewer is a combined sewer and conveys foul & surface water from the site.

2.2 Surface Water

The runoff from the roofs of the existing properties discharges to the combined sewer onsite before discharging to the existing 600mm diameter concrete foul sewer in North Street.

2.3 Watermain

Fingal County Council provided record mapping of Irish Water infrastructure which is located around the site. It indicated that there is an existing Irish Water watermain infrastructure available within North Street. There is a 510mm diameter trunk main which was confirmed by GPR survey and a 150mm diameter ductile iron watermain on the opposite side of North Street. This was picked up in places by the GPR survey but not along the full expected route shown by the record mapping.

3.0 Foul Water Strategy

As part of this development the foul water drainage network for the proposed apartment units will be separated from the surface water sewers, and will comply with the latest *"Technical Guidance Document H - Drainage and Waste Water Disposal"*.

A proposed 150mm diameter foul gravity sewer will collect the wastewater via soil vent pipes and inspection chambers from the proposed units and discharge into the existing 600mm concrete foul sewer within North Street. A foul demarcation manhole chamber will be provided at the entrance to the site within 1m of the boundary. Given the brownfield nature of the development and the desire to retain existing walls and properties the current layout does not provide sufficient distance at the site entrance to satisfy Irish Water's wayleave requirements as set out in the "*Code of Practise for Wastewater Infrastructure*" . The size & extent of the wayleave is shown on drawing C-02. A total of 6.225m is required and only 4.0m provided. This will require agreement from Irish Water.

The 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. Details of the foul drainage pipe design can be found in Appendix B.

All drainage pipes will need to be supported off firm bearing. This may require all soft material to be excavated underneath the pipe runs and backfilled with stone. The depth of this will vary depending on location and invert level of pipe. A geotextile membrane should also be incorporated into the drainage trenches and also to the hardstanding areas.

4.0 Surface Water Strategy

The proposed drainage strategy has been designed to ensure surface water is captured and controlled on site and ensure the proposed development will not have a detrimental impact on Flood Risk on and offsite.

The surface water strategy follows the principle of Sustainable Drainage Systems (SuDS), whereby surface water is collected at source and the rate, volume and quality of runoff controlled and improved. The use of SuDS is discussed further in the sections below.

In accordance with the hierarchy for discharging surface water, infiltration testing will be undertaken to establish the viability of discharging surface water generated by the development directly to the ground. The soakaway testing will be completed to the requirements of BRE Digest 365. From information available on the Geological Survey Ireland website, it is envisaged that the there will be approximately 3-4m of overburden of made ground and clay with poor infiltration potential, before encountering shallow limestone bedrock. This will be confirmed by the Site Investigation.

The next preferred means of discharging surface water is to a watercourse. The proposed site is not located close to any watercourse or ditches. Therefore, the discharge from the site will need to be via an existing surface water sewer located to the west of the proposed development within North Street. Record mapping indicates that there is a 750mm diameter concrete storm sewer that flows in a northern direction. A ground penetrating radar (GPR) survey provided by FCC confirmed the presence of same. On the assumption that infiltration potential within the site will be limited at best, it it is proposed to connect into this existing storm sewer in North Street

The proposed discharge rate is outlined in Section 4.1 below.

4.1 Surface Water Runoff Rate

As outlined above, the proposed development site was formerly residential units with outbuildings. The hardstanding area associated with same is still in place and currently runs off without attenuation. The site is therefore considered brownfield and considered to have a peak runoff rate as outlined overleaf.

Based on the Modified Rational Method: Qp = 2.78 CiA

where,
Qp = Peak Discharge Rate (l/s)
C = Dimensionless coefficient, assumed to be 1
i = Intensity (mm/hr), typically assumed to be 50mm/hr
A = Area of catchment (ha)

Therefore, for the existing buildings on the site which currently have 382m^2 of hardstanding, the brownfield runoff rate is as follows:

Qp = 2.78 x 1 x 50 x 0.0382

Qp = 5.31 l/s

The total overall site area is 1,400m^2; therefore a total of 1,008m^2 of the site is considered to be greenfield. This equates to 0.101ha of greenfield area.

Using the IH 124 method for calculating QBar which is as follows;

$QBar_{urban} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

Where,
Area = 50 hectares
SAAR = 741 (Taken from historic Met Eireann Data for Grid Reference 318000, 247000 http://archive.met.ie/climate/IE_AAR_8110_V1.txt)
SOIL = 0.3 (based on ground investigations and to be confirmed)

$QBar_{urban}$ =97.4 l/s (for 50 hectares, see Appendix B for calculation)

Therefore QBar for the greenfield part of the site is (97.4/50)*0.101 = 0.197 l/s. = 0.2 l/s

Based on this, the existing runoff rate from the site is 5.5 l/s (the sum of brownfield and greenfield runoff rates).

However, in order to provide an overall betterment for the site in terms of the rate of runoff leaving the proposed development, it is proposed to reduce the runoff from the site by over 50%. Therefore, runoff leaving the development will be restricted to 2.5 l/s.

By reducing the runoff rate leaving the site by over 50%, the proposed development will provide a significant reduction in the rate of runoff leaving the development and consequently provide a significant betterment in terms of flood risk offsite, in accordance with local and national guidance.

4.2 Attenuation Storage Calculation

The volume of attenuation storage to be provided within the site has been calculated using Microdrainage software, which models the individual drainage elements such as manhole, pipes and attenuation tanks as an entire system using site specific rainfall data.

The rainfall data for the site has been accessed from the Met Eireann website and is included with Appendix B. From this rainfall data, the M5-60 (5 Year, 60 minute event) and R value (ratio of the M5-60 to the M5 – 2day) are calculated and inputted into the software. From this information, Microdrainage scales the values to run multiple rainfall simulation for a range of events and durations, identify the critical storm duration for the site.

The contributing area for the proposed development was calculated and a runoff coefficient applied to each surface type with 10% urban creep added as required by the Greater Dublin regional Code of Practise for Drainage Works. The runoff for each surface type and the applied runoff coefficient is summarised below.

Table 1: Proposed Development Contributing Area

Area Description	Area (ha)	Runoff Coefficient	Contributing Area (ha)
Roof	0.058	0.950	0.055
Landscape	0.023	0.100	0.003
Permeable Paving	0.022	0.600	0.013
Paved Area (Footway, terrace, paved areas)	0.037	0.900	0.033
Total	0.140	-	0.104
Total + 10% urban creep			0.114

Based on the above contributing areas, the attenuation storage to be provided for the 1 in 100 year event plus 10% climate change is 30m^3. The Microdrainage calculations are included in Appendix B.

The attenuation will be provided within the permeable stone layer under the permeable paving. This stone has 30% void ratio which is sufficient to attenuate the 1 in 100year flood event + 10% climate change.

The proposed surface water strategy drawings are shown in Appendix A.

4.2 SuDS Selection

In accordance with local and national guidance, the use of SuDS have been considered as part of the development and implemented where possible.

An important consideration when evaluating the suitability of the various SuDS techniques is the site-specific constraints for a specific development, such as the site layout, the geology and topography of the site and the willingness of the local authority to take a SuDS element in charge.

In the case of the proposed development, infiltration testing has not yet been completed to establish whether the underlying geology is suitable for infiltration or not. However it is assumed based on data from the Geological Survey of Ireland that infiltration potential will be limited and the current design reflects that. Given that the site was previously occupied, the site investigation will also establish whether there are any contamination issues from its previous use. This may impact the type of SuDS elements that may be feasible. Open SuDS systems proposed such as filter drains and infiltration zones (trenches) have the potential to mobilise contaminates into the water cycle. These SuDS techniques may have to be reconsidered and deemed unsuitable for the proposed development if contamination is found to be present.

As part of the surface water drainage strategy, it is proposed to provide the surface water attenuation in the northwest of the development. The site levels will be such that this area will be largely flat and will somewhat replicate the existing falls of the site to mirror what groundwater currently does. The attenuation will be located within the permeable paving area under the courtyard. The site is too small to consider any above ground storage features such as basins, swales or wetlands.

Therefore it is proposed to utilise permeable paving within the courtyard that will be used for parking and tree pits used in the communal greenspace area to collect and treat surface water runoff before it enters the public storm network in North Street. Sump manholes will be provided in manhole S4 to ensure sediment is caught and collected prior to leaving the site.

A detailed breakdown of the SuDS considered is included in Appendix D and outlines the rationale for their use or exclusion based on specific site conditions.

5.0 Flood Summary

Given the extensive modelling of the CFRAM Flood studies mapping and that there is no historical flooding at the site on the OPW website it is considered than flood risk is minimal for this site.
Please refer to the Flood Map in Appendix C.

6.0 Watermain Design

The watermain for this development will be connected to the 150mm diameter ductile iron watermain located in North Street, subject to Irish Water approval. This 100mm diameter watermain connection will be taken into the development and provide water to the units via boundary box meters, with the 4No. 1st floor apartments being served by a communal manifold boundary box. From here each unit will be provided with a metered connection and distributed via 25mm diameter flexible pipes to the units.

An additional boundary box meter will be provided on a sluice valve at the entrance to allow monitoring of night time flows as per the Code of Practice requirements.

A fire hydrant will be located in the courtyard at a minimum 6m distance from all properties.

As with the foul sewer the watermain will not be provided with the full 6.225mm wayleave required by Irish Water. This will require agreement from Irish Water.

7.0 Traffic Management

7.1 Existing Traffic Management

The existing dwellings and outbuildings within the site have no private vehicular parking spaces and there is no vehicular entrance to the site. Access into the site is via the dwelling and via a pedestrian only gate within the boundary wall The existing public footpath adjacent the site is approximately 4m wide and the kerb is cast in-situ as part of the footpath.

7.2 Justification of the Courtyard & Parking Layout

This planning application proposes to construct a vehicular access point at the northwest of the site along North Street. This access will be 4.0m wide at its narrowest to allow conservation of as much of the existing stone boundary wall as possible, in line with FCC's Development Plan.

Externally from the site entrance to the public road it is proposed to construct block paving to provide a contrasting surface to help visually impaired pedestrians determine that there is the potential interaction with vehicular traffic at this location. It is proposed to construct kerb radii of 1m at the entrance between the public road & footpath to minimise the approach / entry speeds to the development. The Design Manual for Urban Roads & Streets (DMURS) recommends a radius of 1-3m for areas with few large vehicles, therefore this proposal complies with the requirements.

Internally there will be a shared surface between pedestrians & vehicles, with the use of block paving to highlight the shared nature of the environs. For local roads in a development, *DMURS* specifies that the maximum carriageway width should be a 4.8m for a shared surface. The entry is 4m wide and therefore compliant with the DMURS. A carriageway width of 6.0m has been provided within the main parking area which is recommended when providing perpendicular parking. Wheel stops and bollards are proposed to prevent vehicles entering pedestrian only areas within the site

No speed control measures are deemed necessary within the site due to the arrangement of the proposed courtyard and small length of internal roadway. A 15 km/h speed limit should be enforced given the shared nature of the courtyard and its access across the public footpath. A stop sign and road marking should be provided at the exit from the site onto the public footpath to ensure drivers minimise potential risk to pedestrians when leaving the site.

There is insufficient space within the development to provide a turning area that complies with the standards set out in *"Recommendations for Site Development Works for Housing Areas"* within the site that would not compromise the unit numbers. Drawing C-08 shows how a car can manoeuvre

within the site and complete parking and turning. As no turning area will be provided the communal bin stores have been located at the entrance to facilitate easy access for collection. The refuse vehicles will be able to temporarily stop along the public road and empty these bins, as they do along the rest of North Street. FCC have discussed the proposed layout with the local fire authority who have confirmed they will drive in / reverse out of the site to gain access in the event of an emergency. Auto-tracking of a fire engine confirming that this manoeuvre is achievable can be seen on drawing C-07.

7.3 Provision of Bicycle Parking

The Fingal County Council Development Plan 2017 - 2023 Table 12.9 was referenced when specifying the number of parking spaces required. 1No. space is required per unit, with 1 No. visitor space provided for every 5 units. Therefore 15No. bicycle parking spaces are required.

A total of 43 bicycle parking spaces have been provided and the layout is therefore deemed compliant.

7.4 Provision of Car Parking

The Fingal County Council Development Plan 2017 - 2023 Table 12.8 was referenced when specifying the number of parking spaces required. Table 12.8 specifies that 1No. parking space is required per apartment / house with 1No. Bed, 1.5No. parking spaces per apartment / house with 2No. beds, and 2No. parking spaces required for every apartment / house with 3No. beds. 1No. visitor space is required for every 5No. Units in the development. Therefore the 13 units require 20 parking spaces.

North Street is located centrally in Swords which is a Major Town Centre in the FCC Development Plan and it is classified as Zone 1. Zone 1 allows fewer parking spaces to be provided than the standards set out in Table 12.8. Therefore the proposed layout with only 6No. car parking bays, one being a disabled parking bay, is deemed to be in compliance with the Development Plan.

The site has been provided with bicycle parking numbers exceeding the requirements of the Development Plan, and it is located within 100m of a bus stops travelling north or south in a major town. Therefore the site is served by ample sustainable travel and public transport facilities to compensate for lower car parking spaces.

The parking bays within the development comply with the minimum standards set out in DMURS i.e. spaces should be a minimum of 4.8m long x 2.4m wide.

8.0 Conclusion

The proposed development will incorporate a robust surface water drainage strategy to ensure flood risk off and on site will not be affected by the proposed development.

Surface water falling on the development will be collected by gullies, downpipes, filter drains, tree pits and permeable paving and conveyed to the dedicated surface water pipe network. Flow will be conveyed to the northwest corner of the site to the permeable paving that will have sufficient storage volume within its stone layer to accommodate up to the 1 in 100 year event plus 10% for climate change.

Flow leaving the site will be controlled by a flow control device which will limit runoff to less than 50% of the current the equivalent brownfield runoff rate. Currently it is estimated that the flow rate leaving the site (combined runoff from the Brownfield area the remaining greenfield area) is 5.5 l/s. Post development, the overall runoff from the site will be reduced by 54% to 2.5 l/s and will therefore provide a significant betterment on the existing scenario. This will reduce downstream flows and help contribute to a reduction of flood risk elsewhere.

A detailed review of possible SuDS techniques has been undertaken in the overall context of the site and implemented where appropriate. Permeable paving will be implemented within the courtyard area of the development to be used for parking. Tree pits and filter drains will be used to collect runoff from footpaths in external areas. Flow conveyed to the surface water attenuation area will pass through a sump manhole prior to entering the attenuation area to remove any sediment, ensuring the quality of surface water leaving the development will be maintained.

Through this mixture of source control and water improvement elements of SuDS the surface water runoff from this site post development will be both significantly reduced but also be of improved quality. It is concluded that the proposed strategy is beneficial to the site and greater area.

The layout of the entrance, courtyard and provision of parking have been reviewed and are deemed to be in compliance with the requirements as set out in the Fingal County Council Development Plan 2017 - 2023 and also by DMURS.

Appendix A:

- C-01 Site Layout
- C-02 Drainage Layout
- C-03 Watermain Layout
- C-04 Site Levels
- C-05 Drainage Longsections
- C-06 Proposed Road Profile
- C-07 Proposed Fire Engine Swept Path Analysis
- C-08 Proposed Private Car Swept Path Analysis

GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF THE WORKS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S AND OTHER ENGINEERING DRAWINGS.

SITE LAYOUT LEGEND

- EXISTING FOOTPATH
- EXISTING ROAD (NORTH STREET)
- PROPOSED APARTMENT UNITS
- PROPOSED PERMEABLE PAVING TO ARCHITECT'S SPECIFICATION
- PROPOSED PAVING (NON PERMEABLE) TO ARCHITECT'S SPECIFICATION
- PROPOSED CONCRETE SURFACING
- PROPOSED LANDSCAPE AREA
- PROPOSED WHEEL STOPS IN PARKING BAYS
- PROPOSED 125mm HALF BATTERED CONCRETE KERB
- PROPOSED HALF BATTERED INSITU CONCRETE KERB (DROPPED)
- PROPOSED 125mm FLUSH CONCRETE KERB
- 13.300 PROPOSED FINISHED FLOOR LEVEL
- EXISTING BOUNDARY WALL TO BE RECONSTRUCTED AS A MASONRY WALL
- EXISTING BOUNDARY WALL TO BE RECONSTRUCTED AS A RETAINING WALL
- EXISTING BOUNDARY WALL TO BE RETAINED (UNDERPINNING MAY BE REQUIRED)
- PLT_01 PROPOSED PLATE LOAD TEST LOCATION

N

EXISTING BOUNDARY WALL TO BE MAINTAINED

PROPOSED CONCRETE KERB TO TIE INTO EXISTING KERB AT THIS LOCATION.

DROPPED CONCRETE KERB WITH A 6mm SHOW TO BE CONSTRUCTED ALONG EXISTING CARRIAGEWAY

REFER TO DRAWING C-06 FOR VISIBILITY SPLAY

EXISTING BOUNDARY WALL TO BE MAINTAINED

PROPOSED CONCRETE KERB TO TIE INTO EXISTING KERB AT THIS LOCATION

AREA BETWEEN PUBLIC ROAD AND ENTRY TO DEVELOPMENT TO BE SURFACED WITH CONTRASTING PAVERS TO HELP VISUALLY IMPAIRED PEDESTRIANS DETERMINE THAT THERE IS A POTENTIAL INTERACTION WITH VEHICULAR TRAFFIC. FLUSH CONCRETE KERBS TO BE PROVIDED BETWEEN EXISTING CONCRETE SURFACE AND PAVERS.

COMMUNAL BIN STORE FOR THE APARTMENTS. WALL CONSTRUCTED ALONG ENTRY WITH GATE TO BE PROVIDED TO ENCLOSE THIS AREA.

STOP LINE TO RRM017 OF THE TRAFFIC SIGNS MANUAL CHAPTER 7
STOP ROAD MARKING TO M114 OF THE TRAFFIC SIGNS MANUAL CHAPTER 7

125mm UPSTAND KERB & SECTION OF CONCRETE ALONG GABLE WALL.

ENTRYWAY INTO THE DEVELOPMENT AND THE CAR PARKING AREA IS TO BE A FULLY SHARED AREA FOR PEDESTRIANS AND VEHICLES

6No.CAR PARKING SPACES PROVIDED FOR DEVELOPMENT.
1No. DISABLED SPACE TO BE PROVIDED.
WHEEL STOPS TO BE PROVIDED TO PREVENT CARS OVERHANGING ONTO THE FOOTPATH.
CONTRASTING PAVERS TO BE USED TO DENOTE LINES BETWEEN THE PARKING BAYS

THIS SECTION OF EXISTING BOUNDARY WALL IS TO BE DEMOLISHED AND RECONSTRUCTED AS A REINFORCED CONCRETE / BLOCK RETAINING WALL

33No. BICYCLE PARKING BAYS WITHIN SECURE COMMUNAL AREA. 13No. LOCKERS PROVIDED

LEVEL ACCESS TO BE PROVIDED TO UNIT 2 FROM EXISTING PUBLIC FOOTPATH

LEVEL ACCESS TO BE PROVIDED TO UNIT 1 FROM EXISTING PUBLIC FOOTPATH

SECTION OF PROPOSED CONCRETE SURFACING BETWEEN EXISTING FOOTPATH & PROPOSED UNIT

10No. VISITOR BICYCLE PARKING BAYS WITHIN CENTRAL COURTYARD

PROPOSED CONCRETE STEPS TO PROVIDE ACCESS TO UNITS 10 – 13 VIA THE EXTERNAL CONCRETE TERRACE.

THIS SECTION OF EXISTING BOUNDARY WALL IS TO BE DEMOLISHED AND RECONSTRUCTED AS A REINFORCED CONCRETE / BLOCK RETAINING WALL

EXISTING WALL ALONG BOUNDARY IS TO BE RETAINED FOLLOWING THE DEMOLITION OF THE OUTBUILDINGS. EXISTING WALL MAY REQUIRE UNDERPINNING AS PART OF THESE WORKS. EXTENT OF THIS WILL NOT BE KNOWN UNTIL DEMOLITION OF THE OUTBUILDINGS IS COMPLETED

R1000 R1000 STOP 4000 450 1800 950 1500 6000 6000 1200 2400 1200 4800 2400 1200 1500 1500 1800 1800 1200

PLT_01 PLT_02

UNIT 1 F.F.L. 13.400
UNIT 2 F.F.L. 13.400
UNIT 3 F.F.L. 13.400
UNIT 4 F.F.L. 13.400
UNIT 5 F.F.L. 13.500
UNIT 6 F.F.L. 13.500
UNIT 7 F.F.L. 13.950
UNIT 8 F.F.L. 13.950
UNIT 9 F.F.L. 14.175

CREDIT U
DES KELLY INTERIORS
NORTH STREET
FINGAL COMMUNITY SCHOOL

PROPOSED SITE LAYOUT
SCALE 1:100

REV	DATE	DESCRIPTION	BY	APPR
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED SITE LAYOUT

PROJECT No.:	DRAWING No.:
P-3626	C-01
	REV. No.: A

SCALE:	SHEET:	DATE:
1:100	A1	25.07.22

DRAWN BY:	CHECKED BY:	APPROVED BY:
PM	MK	PMCM

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DRAINAGE LAYOUT LEGEND

- PROPOSED uPVC STORM SEWER & 1200mm ø MANHOLE
- PROPOSED uPVC FOUL SEWER & 1200mm ø MANHOLE
- PROPOSED 1200mm ø BACKDROP MANHOLE
- PROPOSED 1200mm ø BACKDROP MANHOLE
- PROPOSED 150mm I.D. uPVC STORM SEWER & 450mm ø DEMARCATION IC
- EXISTING STORM SEWER
- EXISTING FOUL SEWER
- PROPOSED FILTER DRAIN / PLANTED RILL
- 100mm PERFORATED LAND DRAIN
- PROPOSED DOMESTIC GULLY
- PROPOSED ACO CHANNEL & SUMP OUTLET O.E.A.
- G PROPOSED ROAD GULLY
- RWB PROPOSED 210L RAINWATER BUTTS
- TP PROPOSED TREE PIT

N

EXISTING 150mm ø FOUL SEWER SHOWN ON IRISH WATER RECORD MAPPING. IT WAS NOT CONFIRMED BY THE GPR SURVEY. THEREFORE CONNECTION SHOWN INTO 600mm ø FOUL SEWER

PROPOSED CONNECTION FROM DEVELOPMENT TO BE CONNECTED INTO EXISTING 600mm ø CONCRETE FOUL SEWER. INVERT LEVEL OF EXISTING SEWER TBC AS IT IS APPROXIMATE ONLY BASED ON THE GPR SURVEY. SUBJECT TO IRISH WATER APPROVAL.

PROPOSED CONNECTION FROM DEVELOPMENT TO BE CONNECTED INTO EXISTING 750mm ø CONCRETE STORM SEWER. INVERT LEVEL OF EXISTING SEWER TBC AS IT IS APPROXIMATE ONLY BASED ON THE GPR SURVEY. SUBJECT TO FCC APPROVAL

DOMESTIC GULLIES AT LOW POINTS IN COMMUNAL BIN STORE

VORTEX FLOW CONTROL (HYDROBRAKE OPTIMUM OR SIMILAR APPROVED) ON FINAL MANHOLE S4 TO RESTRICT FLOW TO 2.5 l/s

AS THIS IS A BROWNFIELD SITE AND EXISTING STRUCTURES ARE BEING RETAINED AND INCORPORATED INTO THE DESIGN. THE FULL 3m WAYLEAVE REQUIREMENTS OF IRISH WATER CANNOT BE PROVIDED ON BOTH SIDES OF THE FOUL SEWER ALONG THE ENTRY SUBJECT TO IRISH WATER APPROVAL

ROAD GULLIES CONSTRUCTED AT LOW POINTS IN THE PERMEABLE PAVING TO PROVIDE AN OUTLET FOR SURFACE WATER IN EXTREME RAINFALL EVENTS

STORM PIPES 1.000 & 1.001 ARE TO BE 225mm ø PERFORATED PIPES TO COLLECT STORM WATER FROM PERMEABLE PAVING. MANHOLES S1, S2 & S3 ARE TO HAVE PERFORATED RINGS TO ALLOW WATER INGRESS / EGRESS FROM THE PERMEABLE STONE LAYER

OUTLINE OF 12m³ TREE PITS WITH FILTER DRAIN CONNECTED THROUGH THEM AND DISCHARGING FREELY INTO THE PERMEABLE PAVING. APPROXIMATELY 1.6m3 OF STORAGE COULD BE UTILISED IF A FLOW CONTROL WAS PROVIDED ON END OF TREE PIT DRAIN. HOWEVER SUFFICIENT STORAGE WILL BE PROVIDED WITHIN PERMEABLE PAVING LAYER SO TREE PITS PRIMARILY WILL BE A FORM OF SOURCE CONTROL AND TREATMENT

FILTER DRAIN / RILL TO CROSS UNDER FOOTPATH AND DRAIN FREELY INTO PERMEABLE PAVING LAYER. RODDING EYES TO BE PROVIDED THROUGHOUT FILTER DRAIN TO ALLOW MAINTENANCE.

1 IN 100 YEAR RAINFALL EVENT +10% CLIMATE CHANGE REQUIRES 30m³ OF STORAGE. THIS CAN BE ACCOMMODATED WITHIN THE THE FOOTPRINT OF THE PERMEABLE PAVING WITHIN THE STONE LAYER.
THE PERMEABLE STONE LAYER WILL HAVE APPROXIMATELY 30% VOIDS RATIO WITHIN THE STONE AND THIS WILL ACCOMMODATE THE STORAGE REQUIREMENT.

PROPOSED FILTER DRAIN / PLANTED CONCRETE RILL USED TO COLLECT RUNOFF FROM THE FOOTPATH AND PROVIDE SOURCE CONTROL AND WATER QUALITY IMPROVEMENT.
UPPER TERRACE CAN BE DRAINED TO THIS FEATURE IF RILL IS USED.

RAIN WATER BUTTS PROVIDED FOR ALL GROUND FLOOR UNITS TO HARVEST RAINWATER FOR REUSE IN THE GARDENS AND FOR POTTED PLANTS

750mm ø STORM SEWER
600mm ø FOUL SEWER
150mm ø FOUL SEWER (TBC RECORDS ONLY)

F1 F2 F3 F4
S1 S2 S3 S4 S5 S6 S7 S8
1.000 1.001 1.002 1.003 2.001
4000 3250 3750

UNIT 1 F.F.L. 13.400
UNIT 2 F.F.L. 13.400
UNIT 3 F.F.L. 13.400
UNIT 4 F.F.L. 13.400
UNIT 5 F.F.L. 13.500
UNIT 6 F.F.L. 13.500
UNIT 7 F.F.L. 13.950
UNIT 8 F.F.L. 13.950
UNIT 9 F.F.L. 14.175

RWB G TP

DES KELLY INTERIORS
NORTH STREET
FINGAL COMMUNITY SCHOOL

PROPOSED DRAINAGE LAYOUT
SCALE 1:100

REV	DATE	DESCRIPTION	BY	APPR
B	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK
A	09.08.22	DWG STATUS UPDATED TO PLANNING	PM	PM&M

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED DRAINAGE LAYOUT

PROJECT No.:	DRAWING No.:
P-3626	C-02
	REV. No.: B

SCALE:	SHEET:	DATE:
1:100	A1	25.07.22
DRAWN BY: PM	CHECKED BY: MK	APPROVED BY: PMCM

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150mm ø D.I. WATERMAIN IN PUBLIC ROAD. LOCATED AS PER RECORD MAPPING AND CONFIRMED BY GPR SURVEY

710mm ø CONCRETE WATERMAIN IN PUBLIC ROAD. LOCATED AS PER RECORD MAPPING AND CONFIRMED BY GPR SURVEY

CONNECTION FOR DEVELOPMENT TO BE MADE TO 150mm ø WATERMAIN TO AVOID ANY WORKS TO THE 710mm ø TRUNK MAIN. 3WAY SLUICE VALVE ARRANGEMENT REQUIRED AT THIS JUNCTION.
2No. SLUICE VALVES LOCATED IN PUBLIC ROAD WITH THE 3RD LOCATED IN PUBLIC FOOTPATH. MARKER POSTS AND INDICATOR PLATES FOR THE 3No. SLUICE VALVE ALL LOCATED ADJACENT ENTRY.

3RD NO. SLUICE VALVE REQUIRED FOR THE CONNECTION JUNCTION. A DOMESTIC TAPPING TO BE PROVIDED AT THE SIDE OF THIS VALVE, LINKED BY A 25mm ø INTERNAL DIAMETER POLYETHYLENE PIPE TO A DOMESTIC SIZED METER LOCATED IN A BOUNDARY BOX. THIS IS PROVIDED TO MONITOR NIGHT TIME FLOWS AS PER SECTION 3.15.1 OF THE IRISH WATER COP.

3No. SLUICE VALVES NORMALLY REQUIRED AT JUNCTION IN WATERMAIN. GIVEN THE CLOSED NATURE OF THE DEVELOPMENT AND PROVISION OF SLUICE VALVE AT ENTRANCE THEY ARE NOT DEEMED NECESSARY. SUBJECT TO IRISH WATER APPROVAL

ONLINE AIR VALVE AT HIGH POINT IN NETWORK. LOCATION TO BE AGREED WITH IRISH WATER.
INDICATOR PLATE FIXED TO WALL TO IDENTIFY AIR VALVE LOCATION

AS THIS IS A BROWNFIELD SITE AND EXISTING STRUCTURES ARE BEING RETAINED AND INCORPORATED INTO THE DESIGN. THE FULL 3m WAYLEAVE REQUIREMENTS OF IRISH WATER CANNOT BE PROVIDED BOTH SIDES OF THE WATERMAIN ALONG THE ENTRY SUBJECT TO IRISH WATER APPROVAL

PROPOSED EXTERNAL MANIFOLD BOUNDARY BOX COMPLIANT WITH IRISH WATER SPECIFICATION, OR APPROVED BY IW.
4No. DWELLINGS TO HAVE A SEPARATE SUPPLY PIPE, METER AND STOP VALVE WITHIN THIS COMMUNAL BOUNDARY BOX FOR THE 1ST FLOOR UNITS. ALL PIPES TO BE IDENTIFIED AND LABELLED APPROPRIATELY WITH THE PROPERTY SUPPLIED AND ANY UNUSED OUTLETS ARE TO BE BLANKED OFF. TO M&E DETAIL

4No. 25mm ø SERVICE CONNECTIONS FOR THE 1ST FLOOR APARTMENTS (10-13) TO BE CONNECTED TO THIS SERVICE RISER CHAMBER. TO M&E DETAIL

FIRE HYDRANT LOCATED CENTRALLY WITHIN THE DEVELOPMENT TO ENSURE THAT ALL PROPERTIES ARE WITHIN 46m OF A HYDRANT.
LOCATED 6m MINIMUM AWAY FROM ALL PROPERTIES.
INDICATOR PLATE FIXED TO MARKER POST TO IDENTIFY FIRE HYDRANT LOCATION

25mm ø SERVICE CONNECTIONS TO BE PROVIDED TO ALL GROUND FLOOR UNITS. SERVICE PIPES TO BE LAID AS CONTINUOUS, UN-JOINTED PIPE. SERVICE DUCT SHOULD BE BLUE THERMOPLASTIC PIPE LAID WITH SLOW BENDS TO FACILITATE INSTALLATION AND/OR REMOVAL OF SERVICE PIPE

150mm ø D.I. WATERMAIN IN PUBLIC ROAD. LOCATED AS PER RECORD MAPPING. THIS SECTION OF WATERMAIN WAS NOT CONFIRMED BY GPR SURVEY

150mm ø DUCTILE IRON WATERMAIN (RECORD ONLY)

710mm ø CONCRETE TRUCK WATERMAIN (GPR CONFIRMED)

UNIT 1 F.F.L. 13.400
UNIT 2 F.F.L. 13.400
UNIT 3 F.F.L. 13.400
UNIT 4 F.F.L. 13.400
UNIT 5 F.F.L. 13.500
UNIT 6 F.F.L. 13.500
UNIT 7 F.F.L. 13.950
UNIT 8 F.F.L. 13.950
UNIT 9 F.F.L. 14.175

3650
3575
7150
7400
3950
2000
RAB600

NORTH STREET

FINGAL COMMUNITY SCHOOL

N

GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF THE WORKS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S AND OTHER ENGINEERING DRAWINGS.

WATERMAIN LAYOUT LEGEND

- EXISTING WATERMAIN (CONFIRMED BY GPR SURVEY)
- EXISTING WATERMAIN (RECORDS ONLY)
- PROPOSED WATERMAIN 100mm (PE80)
- PROPOSED STOPCOCK AND WATER METER BOUNDARY BOX
- 25mm ø SERVICE CONNECTION FROM BOUNDARY BOX
- PROPOSED FIRE HYDRANT
- PROPOSED MARKER POST & INDICATOR PLATE
- TB PROPOSED CONCRETE THRUST BLOCK
- AV PROPOSED AIR VALVE
- PROPOSED SLUICE VALVE
- PROPOSED MANIFOLD BOUNDARY BOX TO I.W. SPECIFICATION (UNITS 10-13)

PROPOSED WATERMAIN LAYOUT

SCALE 1:100

REV	DATE	DESCRIPTION	BY	APPR
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED WATERMAIN LAYOUT

PROJECT No.:	DRAWING No.:
P-3626	C-03
	REV. No.: A

SCALE:	SHEET:	DATE:
1:100	A1	25.07.22
DRAWN BY: PM	CHECKED BY: MK	APPROVED BY: PMCM

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GENERAL NOTES:

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SITE LEVELS LEGEND

- 10.00 PROPOSED ROAD LEVEL
- 10.00 PROPOSED FOOTPATH LEVEL
- 10.00 PROPOSED LANDSCAPE LEVEL
- × 10.00 EXISTING SITE LEVELS
- PROPOSED SURFACE GRADIENT
- EXISTING BOUNDARY WALL TO BE RECONSTRUCTED AS A MASONRY WALL
- EXISTING BOUNDARY WALL TO BE RECONSTRUCTED AS A RETAINING WALL
- EXISTING BOUNDARY WALL TO BE RETAINED (UNDERPINNING MAY BE REQUIRED)
- LOW LEVEL BLOCK RETAINING WALL TO BE MAXIMUM OF 500mm HIGH

NOTES:

1. REAR GARDEN LEVELS WITHIN CURTILAGE OF UNITS 4 – 8 GRADED AT MAX 1:25 (5%)
2. ACCESS FROM PUBLIC FOOTWAY TO GROUND FLOOR OF DWELLING TO COMPLY WITH BUILDING REGULATIONS PART M 1:20 (5%); AS A MAXIMUM
3. PUBLIC FOOTWAY CROSSFALL 1:40 (2.5%)
4. PUBLIC FOOTWAY MAX LONGITUDINAL 1:20 (5%)

SURFACE TO BE RAMPED AT 1:15 FROM PUBLIC ROAD BACK TO EXISTING LEVELS WITHIN EXISTING FOOTPATH TO ENTRANCE TO SITE.

LOW LEVEL RETAINING WALL WITH PLANTED AREA BEHIND IT

ROAD GULLIES CONSTRUCTED AT LOW POINTS IN THE PERMEABLE PAVING TO PROVIDE AN OUTLET FOR SURFACE WATER IN THE EVENT OF FAILURE OF THE PERMEABLE SURFACING

DROPPED CONCRETE KERB WITH A 6mm SHOW TO BE CONSTRUCTED ALONG EXISTING CARRIAGEWAY

PERMEABLE PAVING HAS LONGITUDINAL GRADIENT OF 1:200 AND A CROSSFALL OF 1:40. THIS IS TO PROMOTE AS MUCH INFILTRATION INTO THE PERMEABLE PAVING AS POSSIBLE

LOW LEVEL RETAINING WALL WITH PLANTED AREA BEHIND IT

THIS SECTION OF EXISTING BOUNDARY WALL IS TO BE DEMOLISHED AND RECONSTRUCTED AS A REINFORCED CONCRETE / BLOCK RETAINING WALL

LEVEL ACCESS TO BE PROVIDED TO UNIT 2 FROM EXISTING PUBLIC FOOTPATH. EXISTING FOOTPATH TO BE RE-GRADED LOCALLY IF REQUIRED

LEVEL ACCESS TO BE PROVIDED TO UNIT 1 FROM EXISTING PUBLIC FOOTPATH. EXISTING FOOTPATH TO BE RE-GRADED LOCALLY IF REQUIRED

LOW LEVEL RETAINING WALL WITH PLANTED AREA BEHIND IT

PROPOSED CONCRETE STEPS TO PROVIDE ACCESS TO UNITS 10 – 13 VIA THE EXTERNAL CONCRETE TERRACE. DASHED LINE INDICATES THE TERRACE

THIS SECTION OF EXISTING BOUNDARY WALL IS TO BE DEMOLISHED AND RECONSTRUCTED AS A MASONRY WALL

EXISTING WALL ALONG BOUNDARY IS TO BE RETAINED FOLLOWING THE DEMOLITION OF THE OUTBUILDINGS. EXISTING WALL MAY REQUIRE UNDERPINNING AS PART OF THESE WORKS. EXTENT OF THIS WILL NOT BE KNOWN UNTIL DEMOLITION OF THE OUTBUILDINGS IS COMPLETED

UNIT 1 F.F.L. 13.400
UNIT 2 F.F.L. 13.400
UNIT 3 F.F.L. 13.400
UNIT 4 F.F.L. 13.400
UNIT 5 F.F.L. 13.500
UNIT 6 F.F.L. 13.500
UNIT 7 F.F.L. 13.950
UNIT 8 F.F.L. 13.950
UNIT 9 F.F.L. 14.175

DES KELLY INTERIORS
NORTH STREET
FINGAL COMMUNITY SCHOOL

PROPOSED SITE LEVELS
SCALE 1:100

REV	DATE	DESCRIPTION	BY	APPR
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED SITE LEVELS

PROJECT No.:	DRAWING No.:
P-3626	C-04
	REV. No.: A

SCALE:	SHEET:	DATE:
1:100	A1	25.07.22
DRAWN BY: PM	CHECKED BY: MK	APPROVED BY: PMCM

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GENERAL NOTES:

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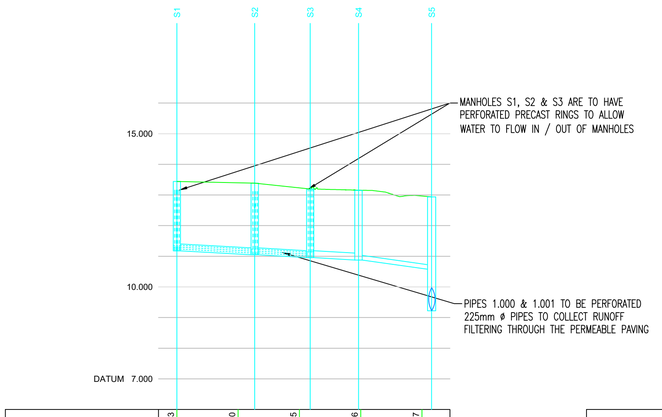
LONGSECTION LEGEND

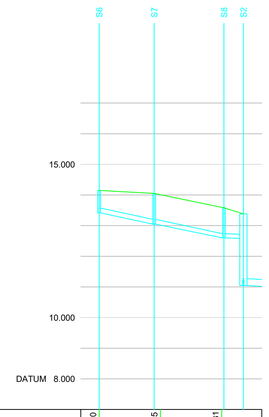
- PROPOSED STORM SEWER
- PROPOSED FOUL SEWER
- EXISTING STORM SEWER
- EXISTING FOUL SEWER
- PROPOSED GROUND LEVEL



GROUND LEVEL	13.173	13.220	13.235	13.156	12.967	
STORMWATER COVER LEVEL	13.440	13.385	13.197	13.151	12.932	
STORMWATER INVERT	11.175	11.048 / 11.048	10.957 / 10.957	10.878 / 10.878	10.580	9.255
STORMWATER DETAILS		Pipe 1.000 Dia 225 uPVC 1 in 100	Pipe 1.001 Dia 225 uPVC 1 in 100	Pipe 1.002 Dia 225 uPVC 1 in 100	Pipe 1.003 Dia 150 uPVC 1 in 40	
STORMWATER LENGTHS		12.702	9.053	7.883	11.932	

STORM PIPES 1.000 – 1.003

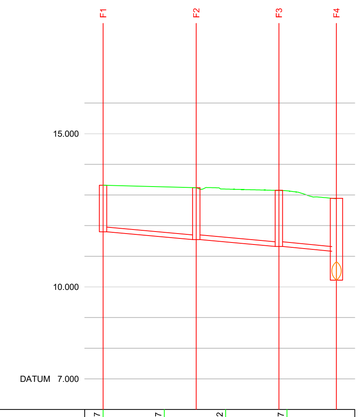
Hz SCALE 1:500
Vt SCALE 1:100



GROUND LEVEL	14.150	13.375	13.231		
STORMWATER COVER LEVEL	14.150	14.050	13.580	13.118	
STORMWATER INVERT	13.415	13.050 / 13.050	12.600 / 12.600	12.565	11.046
STORMWATER DETAILS		Pipe 2.000 Dia 150 uPVC 1 in 25	Pipe 2.001 Dia 150 uPVC 1 in 25	Pipe 2.002 Dia 150 uPVC 1 in 100	
STORMWATER LENGTHS		9.115	11.205	3.430	

STORM PIPES 2.000 – 2.002

Hz SCALE 1:500
Vt SCALE 1:100



GROUND LEVEL	13.277	13.227	13.192	13.137	
FOULWATER COVER LEVEL	13.320	13.295	13.155	12.823	
FOULWATER INVERT	11.800	11.547 / 11.547	11.322 / 11.322	11.165	10.220
FOULWATER DETAILS		Pipe 1.000 Dia 150 uPVC 1 in 60	Pipe 1.001 Dia 150 uPVC 1 in 60	Pipe 1.002 Dia 150 uPVC 1 in 60	
FOULWATER LENGTHS		15.204	13.483	9.394	

FOUL PIPES 1.000 – 1.002

Hz SCALE 1:500
Vt SCALE 1:100

STORM Network 1

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover	Chamber Dia. (mm)
1.000	225	100	uPVC	12.702	S1	11.175	13.440	S2	11.048	13.385	1200
1.001	225	100	uPVC	9.053	S2	11.048	13.385	S3	10.957	13.197	1200
1.002	225	100	uPVC	7.883	S3	10.957	13.197	S4	10.878	13.151	1200
1.003	150	40	uPVC	11.932	S4	10.878	13.151	S5	10.580	12.932	1200
2.000	150	25	uPVC	9.115	S6	13.415	14.150	S7	13.050	14.050	450
2.001	150	25	uPVC	11.205	S7	13.050	14.050	S8	12.600	13.580	450
2.002	150	100	uPVC	3.430	S8	12.600	13.580	S2	12.565	13.385	450

FOUL Network 1

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover	Chamber Dia. (mm)
1.000	150	60	uPVC	15.204	F1	11.800	13.320	F2	11.547	13.295	1200
1.001	150	60	uPVC	13.483	F2	11.547	13.295	F3	11.322	13.155	1200
1.002	150	60	uPVC	9.394	F3	11.322	13.155	F4	11.165	12.823	1200

REV	DATE	DESCRIPTION	BY	APPR
B	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK
A	09.08.22	DWG STATUS UPDATED TO PLANNING	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED DRAINAGE LONGSECTIONS

PROJECT No.: P-3626
DRAWING No.: C-05
REV. No.: B
SCALE: 1:100
SHEET: A1
DATE: 25.07.22
DRAWN BY: PM
CHECKED BY: MK
APPROVED BY: PMCM

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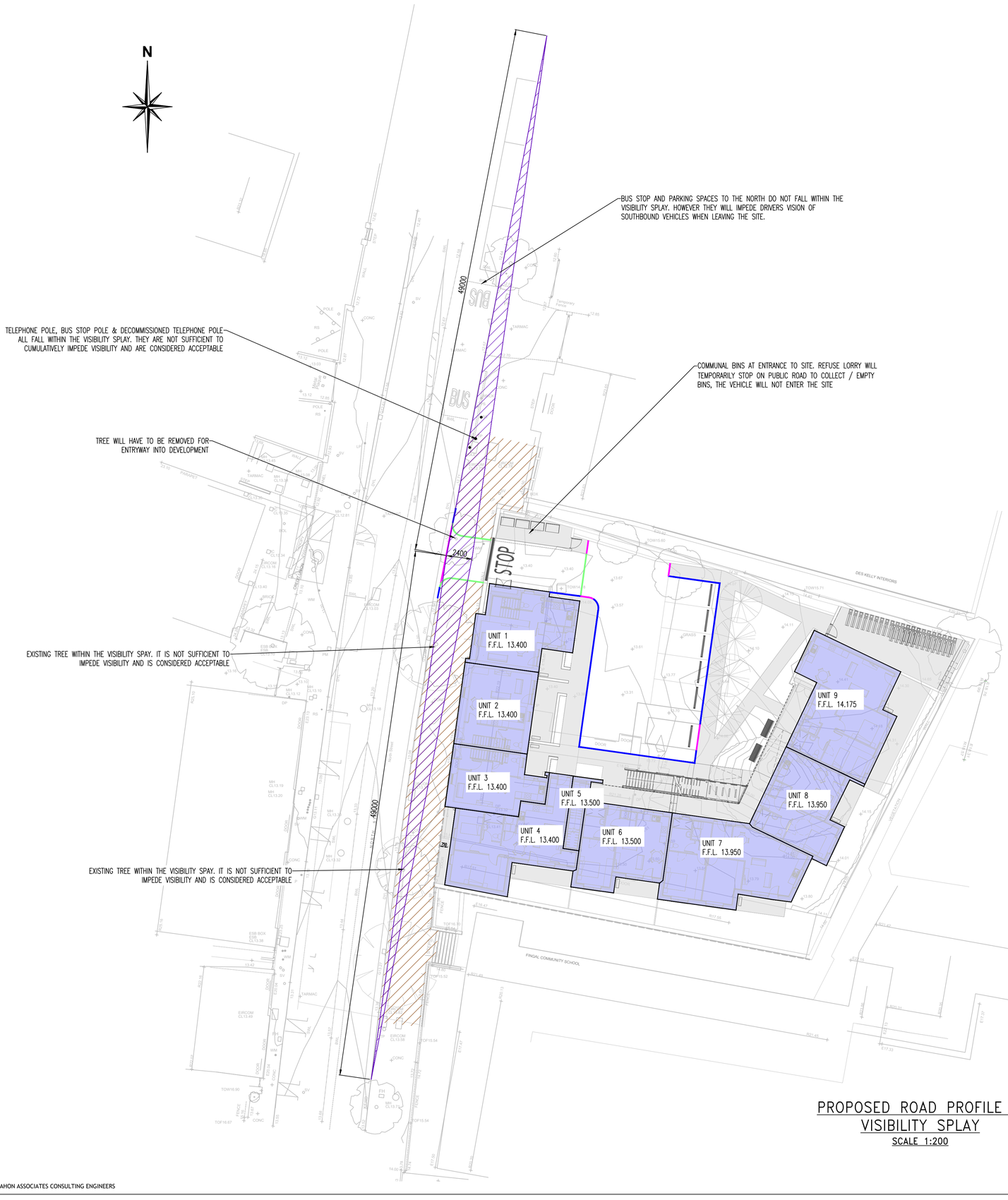
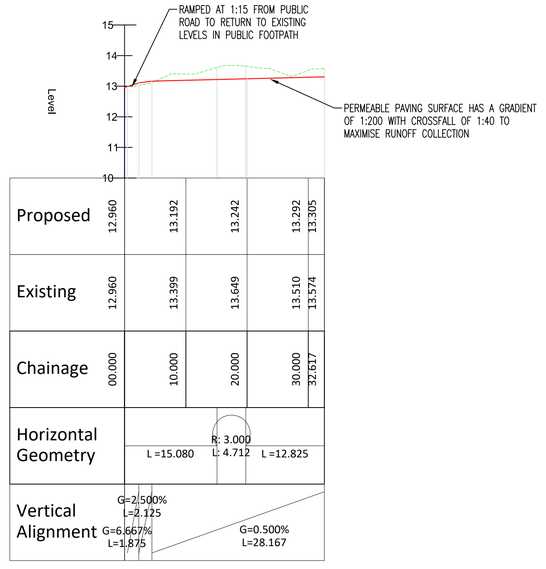


PROPOSED ROAD PROFILE & VISIBILITY SPLAY

SCALE 1:200



Proposed	12.960	13.192	13.242	13.292	13.305
Existing	12.960	13.399	13.649	13.510	13.574
Chainage	00.000	10.000	20.000	30.000	32.617
Horizontal Geometry		L =15.080	R: 3.000 L: 4.712	L =12.825	
Vertical Alignment	G=6.667% L=1.875	G=2.500% L=2.125		G=0.500% L=28.167	

COURTYARD VERTICAL PROFILE

Hz SCALE 1:500

Vt SCALE 1:100

GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF THE WORKS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S AND OTHER ENGINEERING DRAWINGS.

LEGEND

- EXISTING FOOTPATH
- EXISTING ROAD (NORTH STREET)
- PROPOSED APARTMENT UNITS
- 49m VISIBILITY SPLAY FOR 50km/h SPEED ZONE WITH A BUS ROUTE. AS PER DMURS
- PROPOSED 125mm HALF BATTERED CONCRETE KERB
- PROPOSED HALF BATTERED INSITU CONCRETE KERB (DROPPED)
- PROPOSED 125mm FLUSH CONCRETE KERB
- 13.400 PROPOSED FINISHED FLOOR LEVEL

REV	DATE	DESCRIPTION	BY	APPR
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PROPOSED ROAD PROFILE & VISIBILITY SPLAY

PROJECT No.: P-3626	DRAWING No.: C-06
	REV. No.: A
SCALE: 1:100	SHEET: A1
DATE: 25.07.22	
DRAWN BY: PM	CHECKED BY: MK
APPROVED BY: PMCM	

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N

FIRE ENGINE HAS SUFFICIENT ROOM TO DRIVE IN AND REVERSE OUT OF COURTYARD.

FCC ARCHITECT'S DEPARTMENT HAVE CONFIRMED THAT THEY HAVE RECEIVED CONFIRMATION FROM THE LOCAL FIRE AUTHORITY THAT FIRE ENGINES WILL DRIVE IN AND REVERSE OUT OF COURTYARD WITHOUT TURNING IN THE EVENT OF AN EMERGENCY

LOCATION OF FIRE HYDRANT WITHIN DEVELOPMENT

UNIT 1
F.F.L. 13.400

UNIT 2
F.F.L. 13.400

UNIT 3
F.F.L. 13.400

UNIT 4
F.F.L. 13.400

UNIT 5
F.F.L. 13.500

UNIT 6
F.F.L. 13.500

UNIT 7
F.F.L. 13.950

UNIT 8
F.F.L. 13.950

UNIT 9
F.F.L. 14.175

STOP

13.192—CH00

13.192—CH10

13.242—CH20

13.292—CH30

13.305—CH33

R46000

1.

6.

FH

DES KELLY INTERIOR

NORTH STREET

North Street

FIRE ENGINE SWEPT PATH ANALYSIS

SCALE 1:100

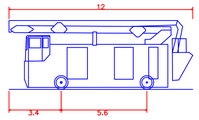
GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF THE WORKS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S AND OTHER ENGINEERING DRAWINGS.

LEGEND

- PROPOSED APARTMENT UNITS
- PROPOSED 125mm HALF BATTERED CONCRETE KERB
- PROPOSED HALF BATTERED INSITU CONCRETE KERB (DROPPED)
- PROPOSED 125mm FLUSH CONCRETE KERB
- 13.300 PROPOSED FINISHED FLOOR LEVEL

AERIAL FIRE APPLIANCE



Aerial Platform/ Turntable Ladder/ Special Appliance	
Overall Length	12.000m
Overall Width	2.550m
Overall Body Height	4.500m
Min Body Ground Clearance	0.130m
Track Width	2.550m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	13.750m

REV.	DATE	DESCRIPTION	BY	APPR.
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: FIRE ENGINE SWEPT PATH ANALYSIS

PROJECT No.:		DRAWING No.:
P-3626		C-07
		REV. No.: A
SCALE: 1:100	SHEET: A1	DATE: 25.07.22
DRAWN BY: PM	CHECKED BY: MK	APPROVED BY: PMCM

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COMMUNAL BINS AT ENTRANCE TO SITE. REFUSE LORRY WILL TEMPORARILY STOP ON PUBLIC ROAD TO COLLECT / EMPTY BINS, THE VEHICLE WILL NOT ENTER THE SITE

PRIVATE CAR CAN DRIVE IN AND REVERSE OUT OF PARKING BAY IN 3 POINT MANOEUVRE

Passenger vehicle 5.2 m

UNIT 1
F.F.L. 13.400

UNIT 2
F.F.L. 13.400

UNIT 3
F.F.L. 13.400

UNIT 4
F.F.L. 13.400

UNIT 5
F.F.L. 13.500

UNIT 6
F.F.L. 13.500

UNIT 7
F.F.L. 13.950

UNIT 8
F.F.L. 13.950

UNIT 9
F.F.L. 14.175

1.

6.

DES KELLY INTERIORS

CREDIT UNION

FINGAL COMMUNITY SCHOOL

NORTH STREET

North Street

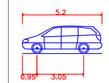
GENERAL NOTES:

1. ALL DIMENSIONS AND LEVELS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF THE WORKS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S AND OTHER ENGINEERING DRAWINGS.

LEGEND

- PROPOSED APARTMENT UNITS
- PROPOSED 125mm HALF BATTERED CONCRETE KERB
- PROPOSED HALF BATTERED INSITU CONCRETE KERB (DROPPED)
- PROPOSED 125mm FLUSH CONCRETE KERB
- 13.300 PROPOSED FINISHED FLOOR LEVEL

PEOPLE CARRIER



Passenger vehicle (5.2 m)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	6.300m

REV	DATE	DESCRIPTION	BY	APPR
A	01.09.22	UPDATED WITH LATEST LAYOUT	PM	MK

DRAWING STATUS: PART_8_PLANNING

CLIENT: FINGAL COUNTY COUNCIL

JOB DESCRIPTION: 13No. DWELLING HD AT 30-32 NORTH STREET, SWORDS, Co. DUBLIN

DRAWING TITLE: PRIVATE CAR SWEPT PATH ANALYSIS

PROJECT No.:	DRAWING No.:
P-3626	C-08
	REV. No.: A

SCALE:	SHEET:	DATE:
1:100	A1	25.07.22
DRAWN BY: PM	CHECKED BY: MK	APPROVED BY: PMCM

McMahon Associates
Consulting Civil & Structural Engineers, Project Managers
Environmental Engineers, PSDP & Traffic Engineers
The Mill Building, Newtown Link Road, Greenhills, Drogheda, Co. Louth
t: 041 2137 050 e: info@mcmahonengineers.com

Appendix B:

- QBar Calculation
- Met Eireann Data
- 1 in 1 year event plus 10% Climate Change
- 1 in 30 year event plus 10% Climate Change
- 1 in 100 year event plus 10% Climate Change
- Foul Network Details

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	50.000	Urban	0.000
SAAR (mm)	741	Region Number	Ireland Greater Dublin

Results l/s

QBAR Rural	97.4
QBAR Urban	97.4
Q100 years	254.2
Q1 year	82.8
Q2 years	89.6
Q5 years	133.4
Q10 years	162.7
Q20 years	190.7
Q25 years	199.7
Q30 years	206.9
Q50 years	226.9
Q100 years	254.2
Q200 years	281.5
Q250 years	n/a
Q1000 years	n/a

WARNING: Irish growth curves are not defined above 200 years.

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 318361, Northing: 247073,

	Interval		Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.0,	4.8,	5.3,	5.7,	7.0,	8.5,	9.5,	10.9,	12.1,	13.0,	14.5,	15.6,	16.5,	N/A ,
10 mins	3.5,	4.8,	5.6,	6.7,	7.4,	8.0,	9.8,	11.9,	13.2,	15.1,	16.8,	18.1,	20.2,	21.7,	23.0,	N/A ,
15 mins	4.1,	5.7,	6.6,	7.8,	8.7,	9.4,	11.5,	14.0,	15.6,	17.8,	19.8,	21.4,	23.7,	25.5,	27.1,	N/A ,
30 mins	5.4,	7.4,	8.5,	10.1,	11.1,	12.0,	14.6,	17.6,	19.5,	22.2,	24.6,	26.4,	29.2,	31.4,	33.1,	N/A ,
1 hours	7.2,	9.7,	11.0,	13.0,	14.3,	15.3,	18.5,	22.1,	24.4,	27.6,	30.5,	32.6,	35.9,	38.5,	40.6,	N/A ,
2 hours	9.5,	12.6,	14.3,	16.7,	18.3,	19.6,	23.5,	27.8,	30.6,	34.4,	37.8,	40.3,	44.2,	47.2,	49.7,	N/A ,
3 hours	11.1,	14.8,	16.6,	19.4,	21.2,	22.6,	27.0,	31.8,	34.9,	39.1,	42.9,	45.7,	50.0,	53.3,	55.9,	N/A ,
4 hours	12.5,	16.5,	18.5,	21.5,	23.5,	25.0,	29.8,	35.0,	38.3,	42.9,	46.9,	49.9,	54.5,	58.0,	60.8,	N/A ,
6 hours	14.7,	19.3,	21.6,	25.0,	27.2,	28.9,	34.2,	40.0,	43.7,	48.7,	53.1,	56.5,	61.5,	65.4,	68.5,	N/A ,
9 hours	17.3,	22.5,	25.1,	28.9,	31.4,	33.3,	39.3,	45.7,	49.8,	55.4,	60.3,	63.9,	69.5,	73.7,	77.1,	N/A ,
12 hours	19.4,	25.1,	28.0,	32.1,	34.8,	36.9,	43.3,	50.3,	54.7,	60.7,	65.9,	69.8,	75.7,	80.2,	83.9,	N/A ,
18 hours	22.9,	29.3,	32.6,	37.3,	40.3,	42.6,	49.8,	57.5,	62.4,	69.0,	74.7,	79.0,	85.5,	90.4,	94.4,	N/A ,
24 hours	25.7,	32.8,	36.3,	41.4,	44.7,	47.2,	54.9,	63.2,	68.5,	75.6,	81.7,	86.3,	93.2,	98.5,	102.7,	117.1,
2 days	31.8,	39.9,	43.9,	49.6,	53.2,	56.0,	64.5,	73.6,	79.2,	86.8,	93.3,	98.2,	105.5,	111.0,	115.4,	130.4,
3 days	36.8,	45.7,	50.0,	56.2,	60.1,	63.1,	72.3,	81.9,	87.9,	96.0,	102.8,	108.0,	115.6,	121.4,	126.0,	141.6,
4 days	41.1,	50.7,	55.3,	61.9,	66.1,	69.3,	79.0,	89.2,	95.5,	103.9,	111.1,	116.5,	124.5,	130.4,	135.2,	151.4,
6 days	48.7,	59.4,	64.6,	71.9,	76.5,	80.0,	90.6,	101.7,	108.6,	117.7,	125.4,	131.2,	139.7,	146.1,	151.2,	168.4,
8 days	55.4,	67.1,	72.7,	80.6,	85.6,	89.4,	100.8,	112.6,	120.0,	129.7,	137.9,	144.0,	153.0,	159.7,	165.1,	183.1,
10 days	61.5,	74.0,	80.1,	88.5,	93.9,	97.8,	110.0,	122.5,	130.2,	140.5,	149.1,	155.5,	165.0,	172.0,	177.7,	196.4,
12 days	67.2,	80.5,	86.9,	95.9,	101.5,	105.7,	118.5,	131.7,	139.8,	150.5,	159.5,	166.2,	176.0,	183.3,	189.2,	208.7,
16 days	77.7,	92.5,	99.6,	109.4,	115.5,	120.1,	134.1,	148.3,	157.1,	168.7,	178.3,	185.5,	196.1,	203.9,	210.2,	230.9,
20 days	87.4,	103.5,	111.1,	121.7,	128.4,	133.3,	148.3,	163.5,	172.9,	185.2,	195.5,	203.1,	214.2,	222.5,	229.2,	251.1,
25 days	98.7,	116.3,	124.6,	136.0,	143.2,	148.6,	164.7,	181.0,	191.0,	204.2,	215.1,	223.2,	235.1,	243.9,	250.9,	274.1,

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

M5-60 = 15.3
Ratio R = 15.3 / 56 = 0.273
SAAR = 741

Storm 1 in 1 year +10% CC

McMahon Associates		Page 1
Consulting Engineers 50 Dobbin Street Armagh BT61 7QQ	P3626 13No. Unit HD 30-32 North Street, Swords	
Date 24/08/2022 File P3626_DRAINAGE DESIGN.MDX	Designed by SM Checked by MK	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	15.300	Add Flow / Climate Change (%)	0
Ratio R	0.273	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.081	4-8	0.033

Total Area Contributing (ha) = 0.114

Total Pipe Volume (m³) = 1.805

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.703	0.127	100.0	0.104	5.00	0.0	0.150	o	225	Pipe/Conduit	
2.000	12.852	0.129	100.0	0.010	5.00	0.0	0.150	o	150	Pipe/Conduit	
2.001	10.687	0.107	100.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	
1.001	9.052	0.091	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	
1.002	7.883	0.079	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.14	11.175	0.104	0.0	0.0	0.0	1.53	60.7	14.1
2.000	50.00	5.18	12.504	0.010	0.0	0.0	0.0	1.18	20.8	1.4
2.001	50.00	5.33	12.375	0.010	0.0	0.0	0.0	1.18	20.8	1.4
1.001	50.00	5.43	11.048	0.114	0.0	0.0	0.0	1.53	60.7	15.4
1.002	50.00	5.52	10.957	0.114	0.0	0.0	0.0	1.53	60.7	15.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	11.932	0.298	40.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	5.62	10.878	0.114	0.0	0.0	0.0	1.89	33.4	15.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	13.173	1.998	Open Manhole	1200	1.000	11.175	225				
6	13.375	0.871	Open Manhole	450	2.000	12.504	150				
7	13.375	1.000	Open Manhole	450	2.001	12.375	150	2.000	12.375	150	
2	13.118	2.070	Open Manhole	1200	1.001	11.048	225	1.000	11.048	225	
								2.001	12.268	150	1145
3	13.197	2.240	Open Manhole	1200	1.002	10.957	225	1.001	10.957	225	
4	13.151	2.273	Open Manhole	1200	1.003	10.878	150	1.002	10.878	225	
S5	12.932	2.352	Open Manhole	1500		OUTFALL		1.003	10.580	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	718309.190	747096.792	718309.190	747096.792	Required	
6	718332.775	747102.530	718332.775	747102.530	Required	
7	718321.171	747108.055	718321.171	747108.055	Required	
2	718310.572	747109.419	718310.572	747109.419	Required	
3	718301.573	747110.404	718301.573	747110.404	Required	
4	718293.764	747111.479	718293.764	747111.479	Required	
S5	718281.984	747113.376			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	S5	12.932	10.580	9.255	1500	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 2.8

Unit Reference	MD-SHE-0076-2500-0950-2500
Design Head (m)	0.950
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	76
Invert Level (m)	10.878
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.950	2.5
Flush-Flo™	0.285	2.5
Kick-Flo®	0.594	2.0
Mean Flow over Head Range	-	2.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.8	3.000	4.2	7.000	6.3
0.200	2.4	1.400	3.0	3.500	4.6	7.500	6.5
0.300	2.5	1.600	3.2	4.000	4.9	8.000	6.7
0.400	2.4	1.800	3.4	4.500	5.1	8.500	6.9
0.500	2.3	2.000	3.5	5.000	5.4	9.000	7.1
0.600	2.0	2.200	3.7	5.500	5.6	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Storage Structures for Storm

Cellular Storage Manhole: 3, DS/PN: 1.002

Invert Level (m) 10.419 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.1	30.1	1.001	0.0	52.7
1.000	30.1	52.7			

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.273
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	15.300	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1
Climate Change (%)	10

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+10%					11.250
2.000	6	15 Winter	1	+10%					12.528
2.001	7	15 Winter	1	+10%					12.400
1.001	2	15 Winter	1	+10%					11.134
1.002	3	600 Winter	1	+10%					10.985
1.003	4	600 Winter	1	+10%					10.948

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.150	0.000	0.24			11.8	OK	
2.000	6	-0.126	0.000	0.06			1.1	OK	
2.001	7	-0.125	0.000	0.06			1.1	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.001	2	-0.139	0.000	0.30			12.9	OK	
1.002	3	-0.197	0.000	0.04			1.5	OK	
1.003	4	-0.080	0.000	0.05			1.5	OK	

Storm 1 in 30 year +10% CC

McMahon Associates		Page 1
Consulting Engineers 50 Dobbin Street Armagh BT61 7QQ	P3626 13No. Unit HD 30-32 North Street, Swords	
Date 24/08/2022 File P3626_DRAINAGE DESIGN.MDX	Designed by SM Checked by MK	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	15.300	Add Flow / Climate Change (%)	0
Ratio R	0.273	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.081	4-8	0.033

Total Area Contributing (ha) = 0.114

Total Pipe Volume (m³) = 1.805

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.703	0.127	100.0	0.104	5.00	0.0	0.150	o	225	Pipe/Conduit	
2.000	12.852	0.129	100.0	0.010	5.00	0.0	0.150	o	150	Pipe/Conduit	
2.001	10.687	0.107	100.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	
1.001	9.052	0.091	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	
1.002	7.883	0.079	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.14	11.175	0.104	0.0	0.0	0.0	1.53	60.7	14.1
2.000	50.00	5.18	12.504	0.010	0.0	0.0	0.0	1.18	20.8	1.4
2.001	50.00	5.33	12.375	0.010	0.0	0.0	0.0	1.18	20.8	1.4
1.001	50.00	5.43	11.048	0.114	0.0	0.0	0.0	1.53	60.7	15.4
1.002	50.00	5.52	10.957	0.114	0.0	0.0	0.0	1.53	60.7	15.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	11.932	0.298	40.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	5.62	10.878	0.114	0.0	0.0	0.0	1.89	33.4	15.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	13.173	1.998	Open Manhole	1200	1.000	11.175	225				
6	13.375	0.871	Open Manhole	450	2.000	12.504	150				
7	13.375	1.000	Open Manhole	450	2.001	12.375	150	2.000	12.375	150	
2	13.118	2.070	Open Manhole	1200	1.001	11.048	225	1.000	11.048	225	
								2.001	12.268	150	1145
3	13.197	2.240	Open Manhole	1200	1.002	10.957	225	1.001	10.957	225	
4	13.151	2.273	Open Manhole	1200	1.003	10.878	150	1.002	10.878	225	
S5	12.932	2.352	Open Manhole	1500		OUTFALL		1.003	10.580	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	718309.190	747096.792	718309.190	747096.792	Required	
6	718332.775	747102.530	718332.775	747102.530	Required	
7	718321.171	747108.055	718321.171	747108.055	Required	
2	718310.572	747109.419	718310.572	747109.419	Required	
3	718301.573	747110.404	718301.573	747110.404	Required	
4	718293.764	747111.479	718293.764	747111.479	Required	
S5	718281.984	747113.376			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	S5	12.932	10.580	9.255	1500	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 2.8

Unit Reference	MD-SHE-0076-2500-0950-2500
Design Head (m)	0.950
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	76
Invert Level (m)	10.878
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.950	2.5
Flush-Flo™	0.285	2.5
Kick-Flo®	0.594	2.0
Mean Flow over Head Range	-	2.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.8	3.000	4.2	7.000	6.3
0.200	2.4	1.400	3.0	3.500	4.6	7.500	6.5
0.300	2.5	1.600	3.2	4.000	4.9	8.000	6.7
0.400	2.4	1.800	3.4	4.500	5.1	8.500	6.9
0.500	2.3	2.000	3.5	5.000	5.4	9.000	7.1
0.600	2.0	2.200	3.7	5.500	5.6	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Storage Structures for Storm

Cellular Storage Manhole: 3, DS/PN: 1.002

Invert Level (m) 10.419 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.1	30.1	1.001	0.0	52.7
1.000	30.1	52.7			

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.273
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	15.300	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	30
Climate Change (%)	10

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+10%					11.292
2.000	6	15 Winter	30	+10%					12.541
2.001	7	15 Winter	30	+10%					12.413
1.001	2	360 Winter	30	+10%					11.259
1.002	3	360 Winter	30	+10%	30/120 Winter				11.256
1.003	4	240 Winter	30	+10%	30/60 Summer				11.254

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.108	0.000	0.53			26.3	OK	
2.000	6	-0.113	0.000	0.14			2.5	OK	
2.001	7	-0.112	0.000	0.14			2.5	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.001	2	-0.014	0.000	0.12			5.2	OK	
1.002	3	0.074	0.000	0.07			2.6	SURCHARGED	
1.003	4	0.226	0.000	0.08			2.4	SURCHARGED	

Storm 1 in 100 year +10% CC

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Consulting Engineers 50 Dobbin Street Armagh BT61 7QQ	P3626 13No. Unit HD 30-32 North Street, Swords	
Date 24/08/2022 File P3626_DRAINAGE DESIGN.MDX	Designed by SM Checked by MK	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	15.300	Add Flow / Climate Change (%)	0
Ratio R	0.273	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.081	4-8	0.033

Total Area Contributing (ha) = 0.114

Total Pipe Volume (m³) = 1.805

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.703	0.127	100.0	0.104	5.00	0.0	0.150	o	225	Pipe/Conduit	
2.000	12.852	0.129	100.0	0.010	5.00	0.0	0.150	o	150	Pipe/Conduit	
2.001	10.687	0.107	100.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	
1.001	9.052	0.091	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	
1.002	7.883	0.079	100.0	0.000	0.00	0.0	0.150	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.14	11.175	0.104	0.0	0.0	0.0	1.53	60.7	14.1
2.000	50.00	5.18	12.504	0.010	0.0	0.0	0.0	1.18	20.8	1.4
2.001	50.00	5.33	12.375	0.010	0.0	0.0	0.0	1.18	20.8	1.4
1.001	50.00	5.43	11.048	0.114	0.0	0.0	0.0	1.53	60.7	15.4
1.002	50.00	5.52	10.957	0.114	0.0	0.0	0.0	1.53	60.7	15.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	11.932	0.298	40.0	0.000	0.00	0.0	0.150	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	5.62	10.878	0.114	0.0	0.0	0.0	1.89	33.4	15.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	13.173	1.998	Open Manhole	1200	1.000	11.175	225				
6	13.375	0.871	Open Manhole	450	2.000	12.504	150				
7	13.375	1.000	Open Manhole	450	2.001	12.375	150	2.000	12.375	150	
2	13.118	2.070	Open Manhole	1200	1.001	11.048	225	1.000	11.048	225	
								2.001	12.268	150	1145
3	13.197	2.240	Open Manhole	1200	1.002	10.957	225	1.001	10.957	225	
4	13.151	2.273	Open Manhole	1200	1.003	10.878	150	1.002	10.878	225	
S5	12.932	2.352	Open Manhole	1500		OUTFALL		1.003	10.580	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	718309.190	747096.792	718309.190	747096.792	Required	
6	718332.775	747102.530	718332.775	747102.530	Required	
7	718321.171	747108.055	718321.171	747108.055	Required	
2	718310.572	747109.419	718310.572	747109.419	Required	
3	718301.573	747110.404	718301.573	747110.404	Required	
4	718293.764	747111.479	718293.764	747111.479	Required	
S5	718281.984	747113.376			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	S5	12.932	10.580	9.255	1500	0

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.003, Volume (m³): 2.8

Unit Reference	MD-SHE-0076-2500-0950-2500
Design Head (m)	0.950
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	76
Invert Level (m)	10.878
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.950	2.5
Flush-Flo™	0.285	2.5
Kick-Flo®	0.594	2.0
Mean Flow over Head Range	-	2.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.8	3.000	4.2	7.000	6.3
0.200	2.4	1.400	3.0	3.500	4.6	7.500	6.5
0.300	2.5	1.600	3.2	4.000	4.9	8.000	6.7
0.400	2.4	1.800	3.4	4.500	5.1	8.500	6.9
0.500	2.3	2.000	3.5	5.000	5.4	9.000	7.1
0.600	2.0	2.200	3.7	5.500	5.6	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.9		
1.000	2.6	2.600	4.0	6.500	6.1		

Storage Structures for Storm

Cellular Storage Manhole: 3, DS/PN: 1.002

Invert Level (m) 10.419 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	30.1	30.1	1.001	0.0	52.7
1.000	30.1	52.7			

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.273
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	15.300	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	10

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	360 Winter	100	+10%	100/120 Winter				11.833
2.000	6	15 Winter	100	+10%					12.547
2.001	7	15 Winter	100	+10%					12.418
1.001	2	360 Winter	100	+10%	100/60 Winter				11.829
1.002	3	360 Winter	100	+10%	100/60 Summer				11.826
1.003	4	360 Winter	100	+10%	100/30 Summer				11.824

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.433	0.000	0.12			6.1	SURCHARGED	
2.000	6	-0.107	0.000	0.18			3.3	OK	
2.001	7	-0.107	0.000	0.18			3.2	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.001	2	0.556	0.000	0.15			6.3	SURCHARGED	
1.002	3	0.644	0.000	0.07			2.7	SURCHARGED	
1.003	4	0.796	0.000	0.09			2.5	SURCHARGED	

McMahon Associates		Page 1
Consulting Engineers 50 Dobbin Street Armagh BT61 7QQ	P3626 13No. Unit HD 30-32 North Street, Swords	
Date 24/08/2022 File P3626_DRAINAGE DESIGN.MDX	Designed by SM Checked by MK	
XP Solutions	Network 2020.1.3	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	450.00	Maximum Backdrop Height (m)	0.000
Persons per House	1.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	15.204	0.253	60.0	0.000	13	0.0	1.500	o	150	Pipe/Conduit	
1.001	13.483	0.225	60.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
1.002	9.394	0.157	59.8	0.000	0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	11.800	0.000	0.0	13	0.0	15	0.44	1.13	20.0	0.4
1.001	11.547	0.000	0.0	13	0.0	15	0.44	1.13	20.0	0.4
1.002	11.322	0.000	0.0	13	0.0	15	0.44	1.13	20.0	0.4

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	13.277	1.477	Open Manhole	1200	1.000	11.800	150				
2	13.176	1.629	Open Manhole	1200	1.001	11.547	150	1.000	11.547	150	
3	13.155	1.833	Open Manhole	1200	1.002	11.322	150	1.001	11.322	150	
F4	12.823	1.658	Open Manhole	1500		OUTFALL		1.002	11.165	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	718304.134	747096.592	718304.134	747096.592	Required	
2	718306.238	747111.650	718306.238	747111.650	Required	
3	718292.891	747113.559	718292.891	747113.559	Required	
F4	718283.644	747115.214			No Entry	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	1	13.277	11.800	1.327	Open Manhole	1200
1.001	o	150	2	13.176	11.547	1.479	Open Manhole	1200
1.002	o	150	3	13.155	11.322	1.683	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	15.204	60.0	2	13.176	11.547	1.479	Open Manhole	1200
1.001	13.483	60.0	3	13.155	11.322	1.683	Open Manhole	1200
1.002	9.394	59.8	F4	12.823	11.165	1.508	Open Manhole	1500

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002	F4	12.823	11.165	10.220	1500	0

Appendix C:

- OPW Flood Map

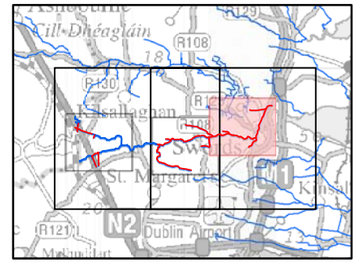
N

4Ba466U
08009
4Wa480
4Wa1296
4Wa3870
4Wa2496
4Wab561

Node Label	10% AEP Event		1% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
4Ba466U	2.99		3.76		4.71	
4Wa3870	30.52	21.00	30.89	39.43	31.16	64.23
4Wa2496	20.54	21.06	20.89	39.31	21.16	64.37
4Wa1296	11.67		12.12		12.58	
4Wa480	5.03		5.53		5.90	
08009	4.81	21.28	5.10	39.08	5.62	54.21
4Wab561	28.99	0.60	29.12	1.08	29.24	1.79

0.2 0.1 0 0.2
Kilometers

Location Plan :



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- Modelled River Centreline
- Node Point
- 21Ma237 Node label with level data (refer to table)
- 21Ma237 Node level with flow & level data (refer to table)

High confidence
Medium confidence
Low confidence
refer to table

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

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Fingal County Council
Meath County Council
OPW

Project :

Map :
WARD MODEL FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT		
Source :	FLUVIAL FLOODING		
Map area :	HIGH PRIORITY WATERCOURSE		
Scenario :	CURRENT		
Figure By :	Mara Ruiz	Date :	8 August 2010
Checked By :	Sergio Herbón	Date :	8 August 2010
Approved By :	Clare Dewar	Date :	8 August 2010

Figure No. : WAR/HPW/EXT/CURS/003
Revision 0

Drawing Scale : 1:10,000
Plot Scale : 1:1 @ A3

Appendix D:

- SuDS Selection Analysis using Appendices A, B & C from FCC's "*Green / Blue Infrastructure for Development – Guidance Note Final Rev 0 December 2020"*

Existing Scenario: **Surface Water Statement**	**(250 words max)** *separate sheet may be included*
Description of existing subject site outlining the drainage characteristics - topography, ground conditions, suitability for infiltration, natural directions and paths for water movement, existing surface water flood risk.	The existing site is a brownfield site that is currently derelict. It is situated on North Street within Swords Town Centre. The site has a mix of two storey residential buildings and single storey outbuildings. The remainder of the site is undeveloped with little hardstanding surfaces. At present there is a combined sewer onsite which collects surface water from the roofs and wastewater from the buildings and discharges to the 600mm concrete foul sewer in North Street. The topography of the site slopes from east to west with approximately 1m level difference and a gradient of 1:40 from east to west. This is the direction ground water is most likely to follow and one that will be replicated in the surface water design. Detailed site investigation works have been procured but not yet been completed and infiltration testing is to be carried out as part of these works. It is envisaged that infiltration potential will be low. Based on the OPW CFRAM Flood studies maps there is no fluvial, coastal or pluvial flood risk at the site

Proposed Scenario: **Surface Water Management Design Statement**	**(250 words max)** *separate sheet may be included*
This shall be a clear concise summary of the surface water design proposal. Applicants shall provide a brief explanation of how they have responded to the principles of Sustainable Drainage Systems (SuDS) Design contained in this policy. This could include implications of SuDS on design of other aspects of the development and price comparisons. We encourage that proposals are mindful of future implications from the beginning and present outline designs based on realistic options including maintenance activities and how they are resourced. Applicants shall be required to clearly demonstrate how the design makes a significant and positive contribution to the amenity value of the open space provision and shall state how the usability of these areas by the public has been addressed. Reference shall also be made on how the design considered the access and use of maintenance machinery in terms of slopes and any hard structures (e.g. head walls) located within the open space areas.	The surface water proposal is to reduce the current brownfield rate runoff from approximately 5.5 l/s to 2.5l/s which is a betterment of approximately 54% on the existing scenario. It is proposed to provide attenuation storage within the permeable paving's stone layers. Up to 25m3 of storage is proposed to be stored in the 1 in 100 year rainfall event + 10% Climate Change It is proposed to collect rainwater from the roofs into rainwater butts so that water can be used for amenity purposes in the units with gardens. This will provide source control and reduce the runoff from the site therefore reducing downstream flows. Filter drains and tree pits are proposed in the development to act as a form of source control by collecting the runoff and slowing it down. They will improve the water quality by filtering water through the various granular layers. Flow controls to maximise the attenuation benefits of these items will not be provided as there will be sufficient storage within the permeable paving stone layer. The proposed design means that surface water captured by the majority of the site will be provided with some form of SuDS design feature. These features will provide source control and water quality improvements. The runoff from site is being reduced by over 50% and will receive water quality treatment by being filtered through SuDS features. Therefore the proposed design adheres to the philosophy of SuDS and is compliant with the FFC Development Plan.

SUDS/Green Infrastructure measures selected for 30-32 North Street, Swords 04.08.22

Suds Measures	Measures to be used on this site	Rationale for selecting/not selecting measure
Source Control		
Swales	No	Requires 3-5m of greenspace. Insufficient space on the site
Tree Pits	Yes	4No. tree pits will be provided that take approximately 12m3 of space each. There is sufficient storage capacity within the permeable paving layer, however the tree pits will provide a measure of source control and treatment of surface water.
Rainwater Butts	Yes	Reduces surface water runoff from the roof and reduces and demand on potable water supply. Only provided to ground floor units with garden areas.
Rainwater harvesting	No	Rainwater butts provided to collect roof runoff. Maintenance of 13No. connections from a RWH tank to each of the 13Units is not desirable.
Soakaways	No	Must be 5m from a property. Insufficient space on the site
Infiltration trenches	TBC	Infiltration testing to be completed in Site Investigation to determine if this is feasible. Given information on GSI website, infiltration potential is likely to be very limited.
Permeable pavement		
- Grasscrete	No	Block paving to be used
- Block paving	Yes	Given the limited space permeable paving is the most practical method of source control and potentially infiltrating / attenuating surface water in this development. Block paving to be provided in the courtyard.
- Porous Asphalt	No	Block paving to be used
Green Roofs	No	Pitch of roof is not suitable
Filter strips	No	No space which would be beneficial to use them
Bioretention systems	No	FCC Architects Department have advised they do not wish to take up the only communal greenspace with a bioretention area.
Blue Roofs	No	Pitch of roof is not suitable
Filter Drain	Yes	Will be provided around communal area and pass-through tree pits. Will provide measure of source control and improve water quality
Site Control		
Detention Basins	No	Insufficient space
Retentions basins	No	Insufficient space
Regional Control		
Ponds	No	Insufficient space
Wetlands	No	Insufficient space

Other		
Petrol/Oil interceptor	No	Use of permeable surfacing, filter drain & tree pits to allow omission of petrol interceptors
Attenuation tank – only as a last resort where other measures are not feasible	No	Permeable paving stone is the preferred option of attenuation storage
Oversized pipes– only as a last resort where other measures are not feasible	No	Inefficient use of space & not an FCC preferred method

Note:

1. Fingal has a preference for above ground Green Infrastructure rather than tanks or oversized pipes . Above ground flows through swales, basins etc are encouraged.
2. Demonstrate SUDS system will have sufficient Pollutant removal efficiency in accordance with Ciria Suds Manual C753
3. Basins sides should be no steeper than 1:4 and no deeper than 1.2m in the 1%AEP
4. Culverting shall be avoided where possible
5. De-culverting is encouraged.

Flood risk to be assessed

Flood risk	Applicable to subject site	Measures to reduce risk	Residual risk
Fluvial	OPW Mapping used to determine no risk in 1 in 1000year event + CC	N/A	Low
Pluvial	OPW Mapping used to determine no historical flooding at the site	FFLs set above surrounding ground levels & attenuation for 1in100year flood event to be provided	Low
Coastal	OPW Mapping used to determine no risk in 1 in 1000year event + CC	N/A	Low
Groundwater	OPW Mapping used to determine no risk	N/A	Low
Dam/Embankment/Canal bank breach	OPW Mapping used to determine no risk	N/A	Low
Network drainage	FCC to confirm if any issues with flooding from storm network in vicinity	The flow control device will prevent surcharging of our system from main public storm network. The Internal network will have adequate storage for 1in100year event + 10% CC	Low
Snow melt	N/A	N/A	Low
Watermain burst	N/A	N/A	Low

Note:

Models should consider the risk when outlets are surcharged

Overall Development Site Area (m2)				1400								
% Permeable Areas (open space, green roofs, permeable surfacing etc)				448								
% Hardstanding Areas (roof areas, road surfaces, concrete paved areas etc)				952								
Park Type as per Table 12.5 of the Development Plan)	**Park size (m^2)**	**Area of Drainage green infrastructure in park (m^2)**	**Percentage of drainage infrastructure per park (%)**	**Swale (m^2)**	**Filter strip (m^2)**	**Bioretention area (m^2)**	**Retention basin (m^2)**	**Detention basin (m^2)**	**Pond (m^2)**	**Wetland ((m^2)**	**No. of head walls located on open**
Pocket Park (500m2- 0.2ha)	82	16 (Tree Pits)	20%								
Small Park (0.2ha to 2ha)	N/A	N/A									
Local Park (2-20ha)	N/A	N/A									
Urban Park Neighbourhood (20ha to 50ha)	N/A	N/A									
Regional Park (over 50 ha)	N/A	N/A									
Other permeable surfaces Grass margins/ Environmental open space ***Not part of open space provision**	218	218 (permeable paving)	100%								