



Flood Risk Assessment & Drainage Strategy at

**Cheetham Hill
Manchester
M8 0TN**

Client: Mosscafe St Vincents

Reference: Job 33716-SUT-ZZ-00-RP-S-0001

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Flood Risk Assessment & Drainage Strategy

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Flood Risk Assessment

1 Introduction

- 1.1 As part of the planning requirements for the development at Cheetham Hill, Manchester it is necessary to prepare a site-specific flood risk assessment to ensure the flood risk is appropriately considered to protect people and the property from flooding.
- 1.2 The development boundary, Figure 1, is 1.36 hectares and situated within Flood Zone 1 as defined by the Environment Agency.
- 1.3 The National Planning Policy Framework (NPPF) Paragraph 162 seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. This assessment will demonstrate that all sources of flooding have been considered and that development of the site is appropriate.
- 1.4 The proposed site plan is provided in Appendix A for reference.
- 1.5 The development site is located in Cheetham Hill and is made up of 2 sites. The location data for the sites is:

Post Code:	M8 0TN		
Grid Reference:	SD 83990 00768		
Coordinates:	X: 383990	Y: 400768	
Latitude:	53°30'12"N	Longitude:	002°14'34"W
What3Words:	artist.indoor.voters		

Table 1 – Location details



Figure 1: Site Boundary

- 1.6 Flood risk information for planning has been obtained from the Environment Agency (EA) website and is provided in Appendix C. The EA data confirms the site falls within Flood Zone 1.

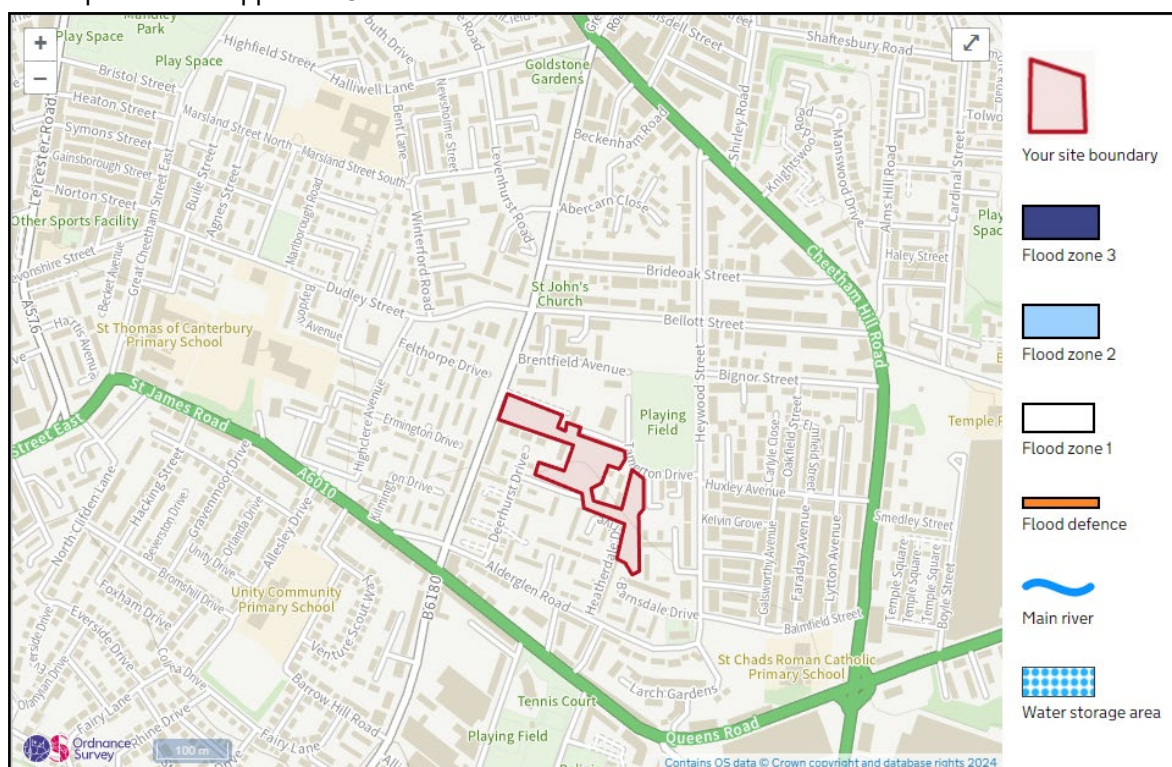


Figure 2: Environment Agency Flood Map for Planning

2 Planning Context

- 2.1. The National Planning Policy Framework expects local planning authorities to protect people and property from flooding. In fulfilling their duty local planning authorities are to ensure the following steps are followed prior to granting planning permission:

- Assess flood risk
 - o The LPA must undertake a Strategic Flood Risk Assessment to inform the local plan and identify development sites that are in areas of low flood risk.
 - o Sites greater than 1 hectare or in areas of flood risk must have a Site-Specific Flood Risk Assessment prepared.
 - o Or 0.5 hectare in critical drainage areas which this site falls within.
- Avoid flood risk
 - o The LPA should apply the sequential test to, as far as practicable, locate development sites in area at the least risk of flooding, and if required carry out the exception test.
- Manage and mitigate flood risk
 - o Where alternative sites are not available the LPA should ensure that development is flood resilient and resistant, safe for the users over the development's lifetime and will not increase overall flood risk.
 - o LPAs and developers should manage flood risk through the inclusion of sustainable drainage techniques.

- 2.2. There is no general statutory duty on the Government to protect land or property against flooding. However, the Government recognises the need for action to be taken to safeguard the wider social and economic wellbeing of the country.
- 2.3. Landowners have the primary responsibility for safeguarding their land and others property against natural hazards such as flooding. Individual property owners and users are also responsible for managing the drainage of their land in such a way as to prevent, as far as is reasonably practicable, adverse impacts on neighbouring land.
- 2.4. Those proposing development are responsible for:
- Demonstrating that it is consistent with the NPPF.
 - Providing an assessment of:
 - Whether any proposed development is likely to be affected by flooding from any source.
 - Whether it will increase flood risk elsewhere.
 - The measures to deal with these effects and risks.
 - Satisfying the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect.
 - Designs which reduce flood risk to the development and elsewhere, by incorporating sustainable drainage systems and where necessary flood resilience measures.
 - Identifying opportunities to reduce flood risk, enhance biodiversity and amenity and seek collective solutions to managing flood risk.

3 Catchment/Site Description

- 3.1 The topography of the site generally slopes from north to south. The maximum elevation is 61.84mAOD, the minimum elevation is 59.40mAOD. The topographic survey is included within the appendix for reference.
- 3.2 A review of grid reference finder confirms there is the River Irk approximately 1.17km east from the development site and the River Irwell approximately 1.6km west from the development, an extract of the Map is in figure 3.

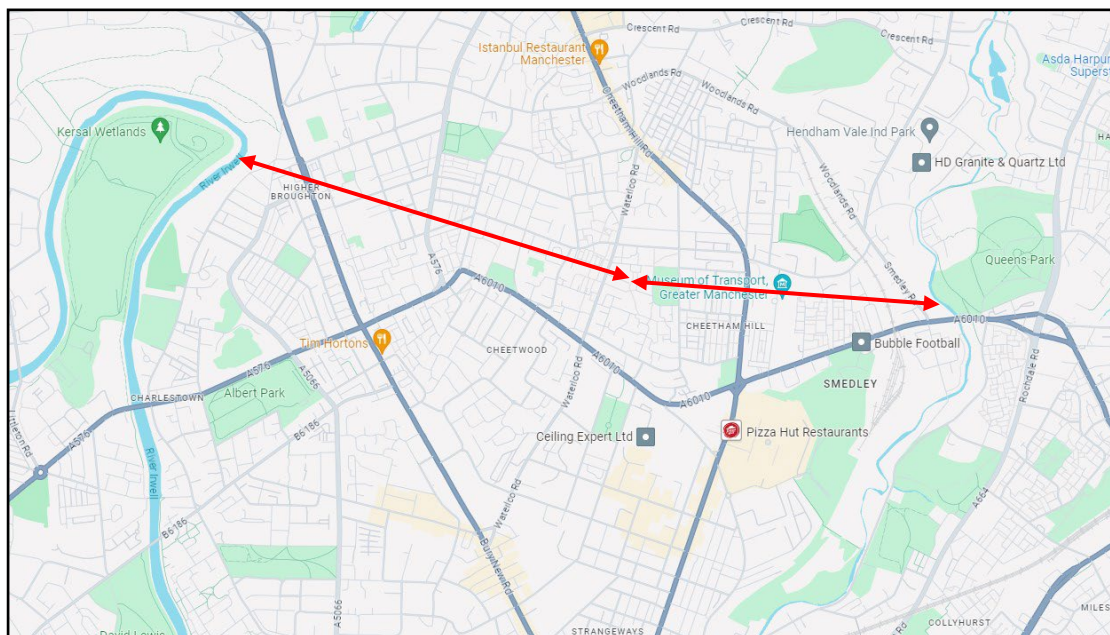


Figure 3: Existing Watercourse. (Source: Google Maps)

- 3.3 The British Geological Survey (BGS) Geology of Britain viewer defines the bedrock geology as Chester Formation - Sandstone. The superficial deposits are Till, Devensian - Diamicton
- 3.4 The National Soils Resources Institute, through the Soilscape web viewer, identify the soil type as Soilscape 17, Slowly permeable seasonally wet acid loamy and clayey soils and Soilscape 10, Freely draining slightly acid sandy soils.
- 3.5 Flood Risk Assessment
 - 3.5.1 The National Planning Policy Framework (NPPF) seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. The purpose of this site-specific flood risk assessment is to demonstrate that the site can be considered to fall within an area of low annual probability and assess the risk to the site from all sources of flooding.
 - 3.5.2 The planning flood maps from the Environment Agency confirm that the site is in Flood Zone 1 due the low risk posed by sea or river or surface water flooding.
 - 3.5.3 A review of Table 3 of the NPPF Technical guide indicates that an exception test is not required for areas classed as more vulnerable that fall within Flood Zone 1.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗
Key: ✓ Development is appropriate. ✗ Development should not be permitted.						

Figure 4: Table 3 from the NPPF Technical Guide illustrating site classification.

3.6 Sources of Flooding

3.6.1 Flooding is a natural hazard and can happen at any time in a wide variety of locations. There are several forms of flooding, which present a range of different risks. The speed of inundation and the duration of different forms of flooding vary greatly. With climate change, the frequency, patterns, and severity of flooding are forecast to change and become more damaging.

3.6.2 The limits of flood risk areas cannot be defined precisely because floods with similar probability can arise from different combinations of weather, sources, rainfall patterns, local topography, and patterns of development.

3.6.3 Every flood will have different consequences on people, property and the environment and depends on the land use.

3.7 Flooding from the River and the Sea

3.7.1 Flooding from rivers or the sea is classed as a very low/no risk for the development site as seen in Figure 5 as it is not situated near the sea or a river.

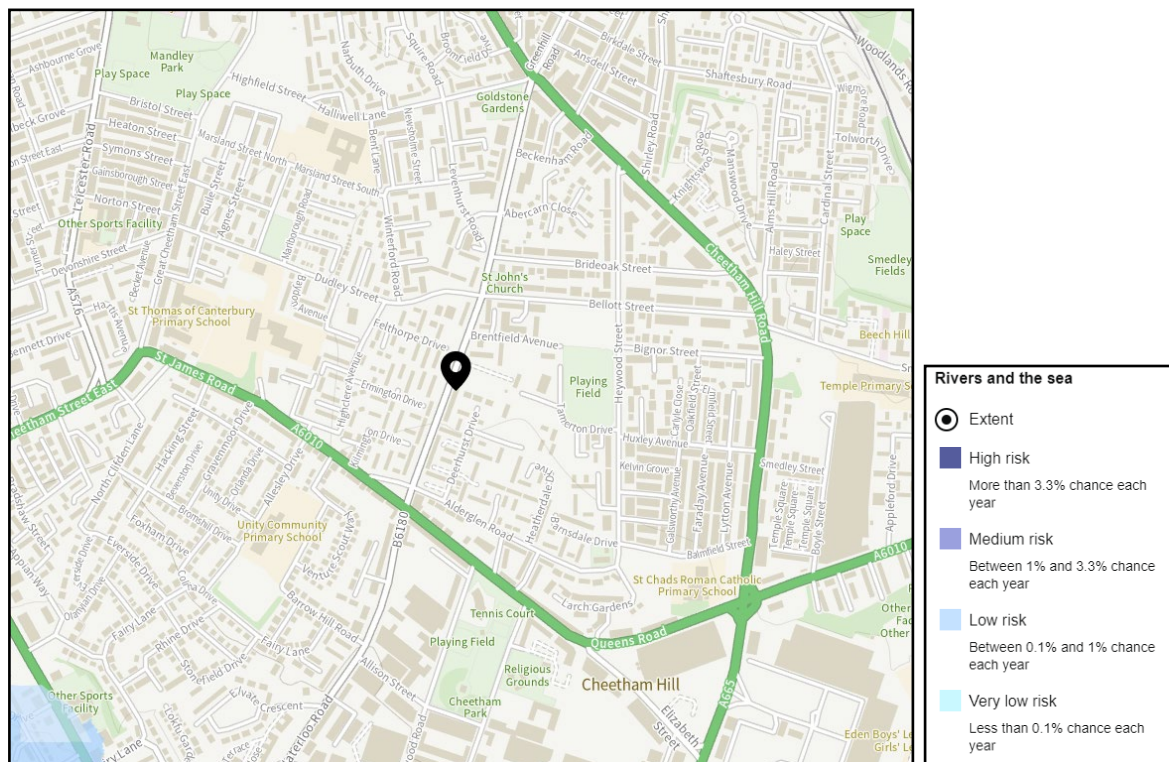


Figure 5: Environment Agency Flood Map - Extents of Flooding from Rivers or the Sea

3.8 Flooding from Surface Water

- 3.8.1 Flooding from surface water may occur in times of intense rainfall at a local site level as any drainage system may not be able to disperse the rainfall quickly enough. Surface flooding occurs when both the natural interception capacity of the ground is exceeded and the capacity of inlets to the drainage system are exceeded.
- 3.8.2 The Environment Agency provides surface water flood maps for the high (greater than 3.3% AEP), medium (1% AEP) and low (0.1% AEP) risk scenarios. All the surface water flood maps from the Environment Agency website are provided in Appendix C for reference, although the low-risk scenario is generally considered above the design return period.
- 3.8.3 The Environment Agency cautions that due to the limitations within the model (single drainage rate, national level modelling, LiDAR data etc.) the surface water flood maps do not provide a definitive risk of surface water flooding at the plot level. The following assessment reflects the current scenario and provides an indication of the potential surface water flood risk in the absence of drainage network designed to facilitate the proposed development through the management of surface water.
- 3.8.4 The extent of surface water flooding, Figure 6, indicates that there is a very low risk of surface water flooding occurring within the site boundary. The surface water flood risk is shown occurring at several isolated spots within the site area. The isolated flooding in the development area is constrained to the roadway and only occurs for the 0.1% AEP event.
- 3.8.5 The surface water flooding for the 0.1% AEP event is noted being less than 300mm on the Environment Agency Low Risk Surface Water Flood Map, Appendix C.

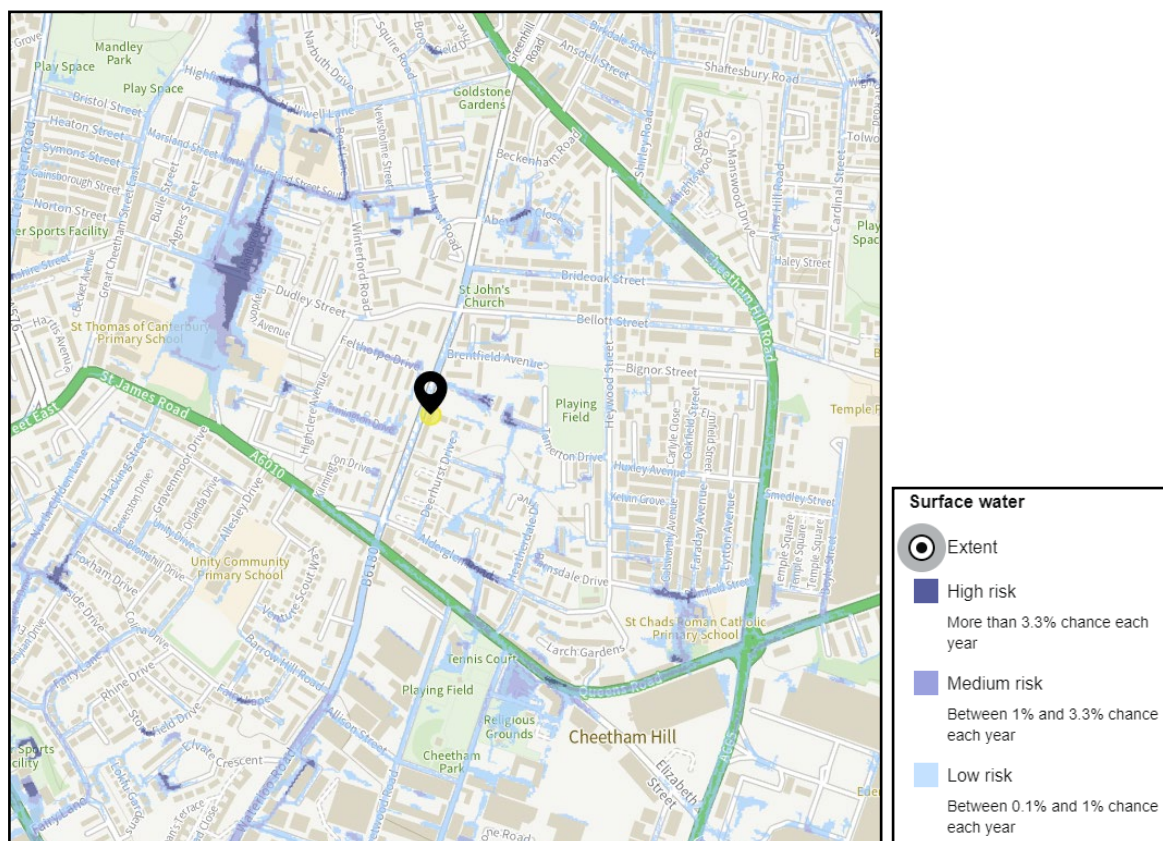


Figure 6: Environment Agency Extent of Surface Water Flooding Map

- 3.8.6 The risk of surface water flooding to the development can be mitigated by ensuring the surface water management network safely manages rainfall events to the required standard. Also, a careful consideration of finished floor levels is made during design .
- 3.8.7 Following implementation of the mitigation measures the risk of surface water flooding to the site can be considered to be low.
- 3.9 Flooding from Sewers
- 3.9.1 Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development is not likely to increase the risk posed by sewer flooding as the surface water runoff, a primary cause of sewer surcharging, from the site is to be managed in accordance with the requirements of the NPPF and LLFA.
- 3.9.2 The development area is served by a series of private combined drainage networks connecting into the combined public sewer, an extract from the public sewer record is shown in Figure 7.
- 3.9.3 Drainage for the proposed development will be designed to current best practice for the foul sewers using Approved Document H. Where new surface water drainage for the site is proposed it shall be designed to cater for the 100-year plus climate change event in accordance with current guidance and will incorporate long-term storage and SuDS as appropriate.
- 3.9.4 As the sewers are operated and maintained by United Utilities and the proposed drainage within the site will be designed to the current requirements of the LLFA the site can be considered at low risk of sewer flooding.

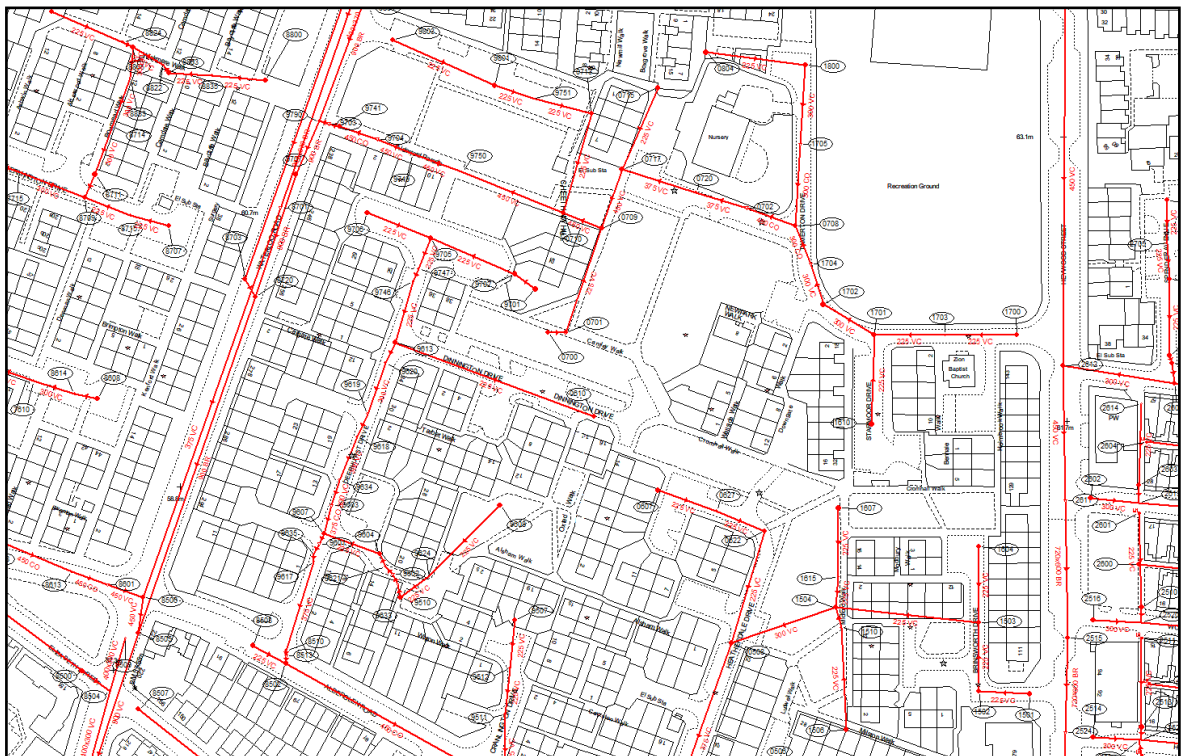


Figure 7: United Utilities Sewer Record Extract.

3.10 Flooding from Infrastructure

3.10.1 Flooding from infrastructure occurs when canals, dams or other manmade structures capacity is exceeded, or fail. The Environment Agency Flood Map for Planning confirms the site is not within a flood risk area for a reservoir and the site is not located near canals.

3.10.2 There is no risk of flooding associated with infrastructure failure.

3.11 Flooding from Groundwater

3.11.1 The Manchester City Council Flood risk management strategy document, groundwater flood risk map, Figure 8, confirms the site falls within an area denoted as being at risk of groundwater emergence, however, it states ‘The likelihood of groundwater flooding occurring in Manchester is considered to be generally low’.

3.11.2 The site has sufficient topographic relief for groundwater emergence not to cause a significant risk.

3.11.3 There are no other sources of flooding that affect the site. Overall flood risk to the proposed development can be considered low.

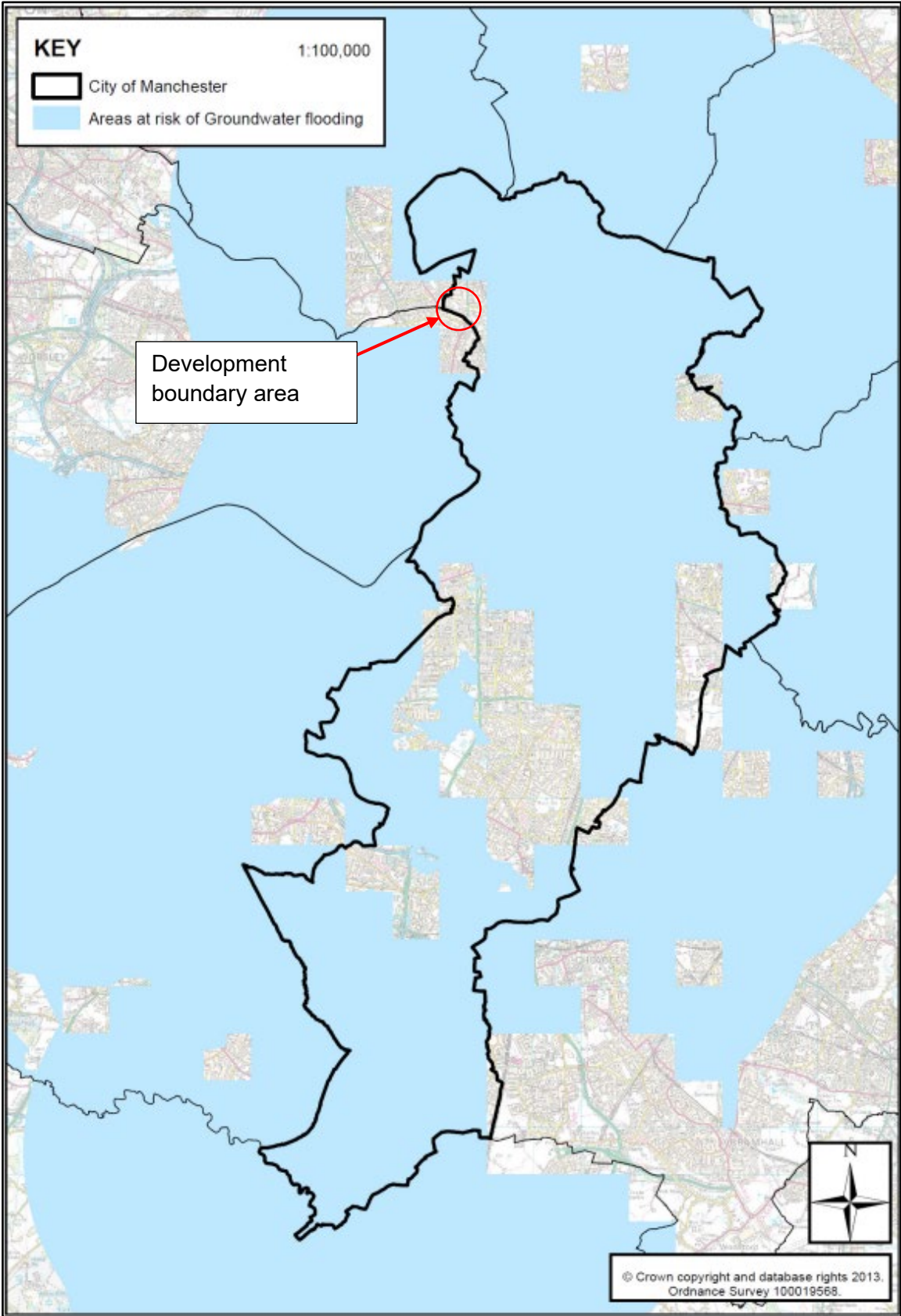


Figure 8: Groundwater Flood Risk (Local flood risk management strategy 2014)

4 Climate Change

- 4.1 Paragraph 158 of the National Planning Policy Framework (NPPF) requires that plans should take a proactive approach to mitigating and adapting to climate change.
- 4.2 Paragraph 167 of the NPPF requires all plans to adopt a risk-based approach taking into account all sources of flood risk and future impacts of climate change.
- 4.3 To appropriately mitigate the increased flood risk caused by climate change the Government has published guidance (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>) related to the appropriate climate change allowances.

3.3% Annual Exceedance Rainfall Event		
Irwell	Central Allowance	Upper End Allowance
2050s	25%	35%
2070s	30%	40%
1% Annual Exceedance Rainfall Event		
Irwell	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

Table 1: Climate Change Allowances.

- 4.4 For development with a lifetime between 2061 and 2125 the 2070s epoch data should be used.
- 4.5 To mitigate the impact of climate change on the development the upper end allowances should be considered for both the 1% and 3.3% annual exceedance probability events and the development should be design for the 1% annual exceedance probability event so that there is:
- 4.5.1 No increased flooding elsewhere.
- 4.5.2 And the development is safe from surface water flooding.
- 4.6 Where new surface water drainage is proposed an allowance for climate change shall be included to mitigate the risk.

5 Emergency Access/Escape

- 5.1 With flood risk to the site considered low and the area being within a flood zone 1 for sea and rivers, there is no requirement for an emergency access or escape routes.

6 Flood Risk Summary and Conclusion

- 6.1 From the above assessment of flood risk, it has been established that the development site is entirely within Flood Zone 1 for river and sea flooding.
- 6.2 Surface water flood risk can be mitigated through careful consideration of finished floor levels and implementation of a SuDS drainage scheme that helps to manage runoff from the development.
- 6.3 Proposed surface water and foul water drainage will connect into existing public combined sewer running east to west with the site.
- 6.4 The surface water drainage network will be designed taking climate change into consideration and to help ensure the development is safe for its lifetime.
- 6.5 The site is not at risk of any form of flooding.

Surface Water Drainage Strategy

7 Policy Context

- 7.1 The LLFA expect the surface water management strategy to comply with:
- 7.2 Paragraph 80 of the Planning Practice Guidance (PPG);
- 7.3 Paragraph 175 of the National Planning Policy Framework; and
- 7.4 Standards 2, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage (March 2015).
- 7.5 Paragraph 56 of the Planning Practice Guide requires that surface water from development be discharged in line discharge hierarchy:
 - 7.5.1 Infiltrate into the ground close to source.
 - 7.5.2 Discharge runoff to a surface water body.
 - 7.5.3 Discharge runoff to a surface water sewer, highway drain or other surface water drainage system.
 - 7.5.4 Discharge to a combined sewer.
 - 7.5.5 The implementation of the hierarchy will be discussed in greater detail in Section 12.
- 7.6 Paragraph 80 of the PPG does recognise that particular types of sustainable drainage systems may not be practicable in all locations.
- 7.7 Paragraph 173 of the National Planning Policy requires major developments to incorporate sustainable drainage systems unless there is clear evidence that their inclusion would be inappropriate. Sustainable drainage systems should:
 - 7.7.1 Take account of advice from the LLFA.
 - 7.7.2 Have appropriate proposed minimum operational standards.
 - 7.7.3 Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - 7.7.4 Where possible, provide multifunctional benefits.
- 7.8 Standards 2, 3, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage System (2015) are:
 - 7.8.1 S2 requires, for greenfield developments, the peak runoff rate from the development to any highway drain, sewer, or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.

- 7.8.2 S3 requires for sites that were previously developed the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.
- 7.8.3 S4 requires, where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.
- 7.8.4 S7 requires the drainage system be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.
- 7.8.5 S8 requires the drainage system to be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
- 7.8.6 S9 requires the design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall exceeding a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
- 7.9 The requirements of the local and national policy will be addressed by the proposed site layout and proposed drainage system, discussed in detail in Sections 10 and 11.

8 Existing Drainage

- 8.1 Compliance with policy begins with a review of the existing site and its drainage characteristics.
- 8.2 As discussed within the flood risk assessment, the development site is considered to have a greenfield land classification although it falls within an area with existing buildings which are served by an existing combined drainage network.
- 8.3 There are 2 watercourses near the development, these are the River Irk approximately 1.17km east of the development site and the River Irwell approximately 1.6km west of the development.
- 8.4 The site topography directs runoff to the south.
- 8.5 The standard S3 of the Non-Statutory Technical Standards for Sustainable Drainage requires that surface water runoff from development sites be as close as reasonably practicable to greenfield rates but should never exceed the previously developed rates.
- 8.6 As per The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA (Section 3.4.1) "All new connections to the watercourses shall comply with reduction of flows to greenfield runoff rates".
- 8.7 The Q_{Bar} rate for the total drained areas of the site is 1.9l/s. Calculations are provided in Appendix B.

9 Proposed Site Layout

- 9.1 The proposed site layout is influenced by retained infrastructure and residential accommodation.
- 9.2 Proposed site levels reflect the existing topography with the site falling gently towards the south.
- 9.3 The proposed FFLs are 150mm above existing ground levels.

10 Urban Creep

- 10.1 Urban creep is applied to the residential impermeable areas, the urban creep allowance is set at 10%. The allowances should be applied to the hydraulic modelling for each development area, and only to the hardstanding area, where future expansion could take place.

11 Proposed Surface Water Drainage

- 11.1 Planning policy requires that the proposed network manage surface water runoff in line with the discharge hierarchy noted in Section 7.
- 11.2 The first level of the hierarchy requires that infiltration solutions be considered for the management of surface water runoff.
 - 11.2.1 Infiltration systems can take the form of soakaways, detention ponds, permeable pavements, bio-retention areas etc.
 - 11.2.2 The Soilscales viewer identified the general area as Soilscale 17, Slowly permeable seasonally wet acid loamy and clayey soils and Soilscale 10, Freely draining slightly acid sandy soils.
 - 11.2.3 Infiltration testing to BRE365 was carried out and the results confirm that the use of soakaways is not a viable solution for the management of surface water from the development.
- 11.3 The second tier of the hierarchy requires surface water to be discharged to a surface water body.
 - 11.3.1 A review of the area surrounding the site has confirmed that there are no watercourses around the development site. A review of the public sewer record confirms that the combined sewers within the site discharge to external combined sewers.
 - 11.3.2 The existing records and CCTV survey have confirmed that there is an existing combined sewer network within the proposed development that can be discharged into.
 - 11.3.3 With the combined sewers discharging to external combined sewers the development is considered to be managed at level four of the discharge hierarchy.
- 11.4 Details of the proposed drainage strategy are presented on the proposed drainage plans in Appendix A.
- 11.5 The proposed drainage plans show that the develop sites are divided in to two catchment areas as the combined public sewer runs through the development sites.

- 11.6 United Utilities have confirmed from consultation with Planning that should an infiltration solution not be viable then the development can connect to the public sewer at a maximum pass forward rate of 7 l/s for site A and 5 l/s for site B.
- 11.7 Site A has been designed at 5 l/s to comply with LLFA requirements. Site B has been designed to 5 l/s as confirmed by United Utilities.
- 11.8 The proposed drainage networks require flow controls and attenuation, to achieve the required discharge rates and manage surface water to mitigate the flood risk stemming from the development, prior to discharging to the combined sewer and subsequently the watercourse.
- 11.9 Attenuation is provided in the form of attenuation tanks prior to controlling discharge to the existing surface water sewer via a vortex control.
- 11.10 The calculations for the proposed drainage strategy network are provided in the Appendix, for reference, these confirm the attenuation volume and discharge rates. The calculations confirm the resultant discharges can be managed to satisfy the limiting discharge rate.
- 11.11 The simulation results confirm that the proposed surface water network satisfies the required design standards for all events up to and including the 100 year plus 45% climate change event.
- 11.12 The proposed surface water drainage network can be considered to fulfil the policy requirements as far as practicable.

12 Water Quality

- 12.1 Water quality guidance is set out in Chapter 26 of the SuDS Manual (CIRIA C753). For the anticipated hazards the simple index approach is suitable.
- 12.2 Pollution hazard indices for the simple index approach are provided in Table 26.2 of the SuDS Manual. The development site primarily consists of roofs and pedestrian areas. The pollution hazard from these land use classifications can be considered very low.
- 12.3 Suspended solids from the surface runoff will be managed through the use of trapped gullies and a sump, prior to the outfall, which will allow suspended solids to settle out.

13 Proposed Foul Water Network

- 13.1 The proposed foul water network will be designed in accordance with the requirement of Approved Document H.
- 13.2 The anticipated peak foul flow from up to 70 dwellings is 16.9 l/s based on BS EN 12056.

14 Maintenance and Management

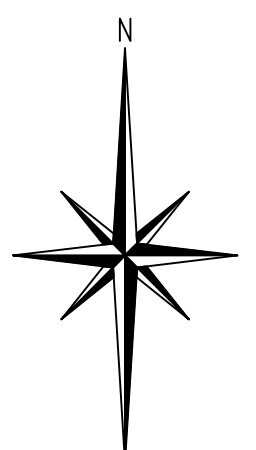
- 14.1 The proposed drainage network will be managed by residents, council, and United Utilities.
- 14.2 The piped network, attenuation and flow control will be maintained in accordance with the councils maintenance process. The adopted road will be maintained by United Utilities in accordance with their management plan.

15 Surface Water Management summary and Conclusion

- 15.1 The proposed drainage network manages surface water runoff up to the 100-year plus 45% climate event.
- 15.2 Long-term storage is provided within cellular storage systems and the runoff rates are controlled to comply with standards S2 and S3 of the Non-Statutory Technical Standards for Sustainable Drainage Systems, as far as practicable, through the inclusion of flow controls in accordance with CIRIA C753.
- 15.3 The surface water discharge rate is controlled in line with the requirements of the Statutory Undertaker and the LLFA.
- 15.4 The proposed drainage network includes SuDS as far as practicable given the layout of the site and constraints set by the existing infrastructure.
- 15.5 Through the implementation of the proposed drainage strategy the site does not increase flooding within or downstream of the catchment including an allowance for climate change.
- 15.6 The proposed drainage network is considered to satisfy the requirement of local and national planning policy.

16 Appendix

16.1 Drawings



General Notes

DO NOT SCALE OFF THIS DRAWING

THIS DRAWING IS TO BE USED IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, QUALITY HEALTH AND SAFETY (QH&S) REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

ALL FLOOR LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION.

ALL COVER LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION.

ALL DRAINAGE PENETRATING THROUGH FLOOR SLABS AND RAINWATER PIPE LOCATIONS TAKEN FROM ARCHITECT'S DRAWINGS. ARCHITECT TO CONFIRM LOCATIONS PRIOR TO CONSTRUCTION.

EXISTING SERVICES

ROAD SIGNS AND LAMP COLUMNS ON THE SITE PERIMETRY TO BE RE-SITED IF REQUIRED BY, AND TO THE APPROVAL OF, THE LOCAL AUTHORITY.

CONTRACTOR TO SATISFY THEMSELVES THAT EXISTING AND PROPOSED SERVICES DO NOT CLASH WITH PROPOSED DRAINAGE.

KNOWN EXISTING SERVICES ARE INDICATED ON THE PLAN WHERE THEY CROSS THE PROPOSED DRAINAGE. THE EXACT TYPE AND LOCATION SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO START OF WORKS TO ENSURE THAT PROPOSED DRAINAGE LEVELS DO NOT INTERFERE WITH SERVICES. ALL DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.

THE CONTRACTOR SHALL CHECK ALL EXISTING COVER / INVERT LEVELS AND PIPE SIZES ON SITE PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE CAN BE CONSTRUCTED AS INDICATED ON THE DRAWING. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

ALL REDUNDANT DRAINAGE WITHIN SITE TO BE GROUND UP, CHASED AND SEALED TO APPROVAL OF LOCAL AUTHORITY.

PROPOSED DRAINAGE

OUTSIDE EDGE OF ADOPTED SEWER SHALL NOT ENDOSE WITHIN 1M OF KERB FACE. OUTSIDE EDGE OF ADOPTED MANHOLE SHALL NOT ENDOSE WITHIN 1M OF KERB FACE.

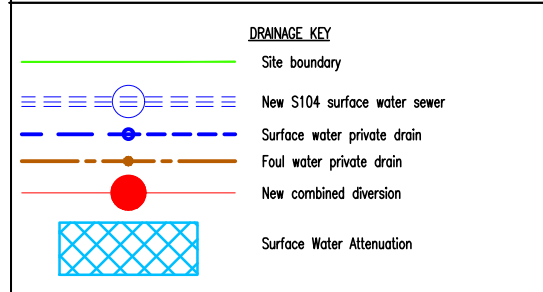
ALL DRAINAGE IN HIGHWAYS/CAR PARKING AREAS/DROVeways LESS THAN 1.2M DEEP TO BE CONCRETE CHASED.

ALL PIPES GREATER THAN 1.2M DEEP TO HAVE REDUCED ACCESS COVERS TO PREVENT MAN ENTRY.

SURFACE WATER DRAINAGE:

ALL PRIVATE SURFACE WATER DRAINAGE TO BE 100MM # AT 1:80 GRADIENT UNLESS NOTED OTHERWISE. ALL OTHER PRIVATE Foul WATER DRAINAGE TO BE 100MM # AT 1:80 GRADIENT UNLESS NOTED OTHERWISE.

ALL INTERNAL SP/SPAD POSITIONS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION OF GROUND FLOOR SLAB.



Rev	Description	Date	By	Check
P01	PRELIMINARY ISSUE	22/04/24	MB	DS



Client
MOSSCARE ST VINCENTS

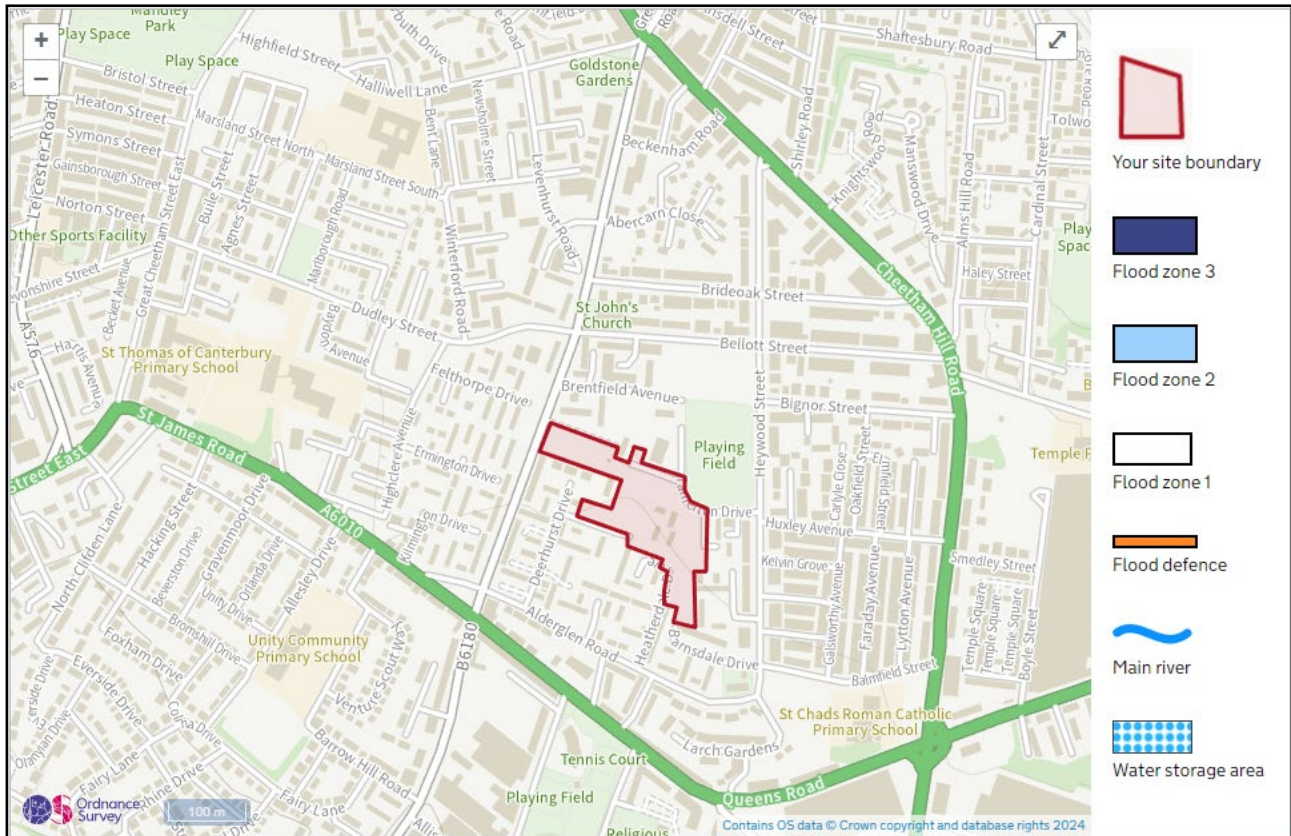
Project
CHEETHAM HILL MANCHESTER

Drawing Title
PROPOSED DRAINAGE LAYOUT SHEET 1 OF 2

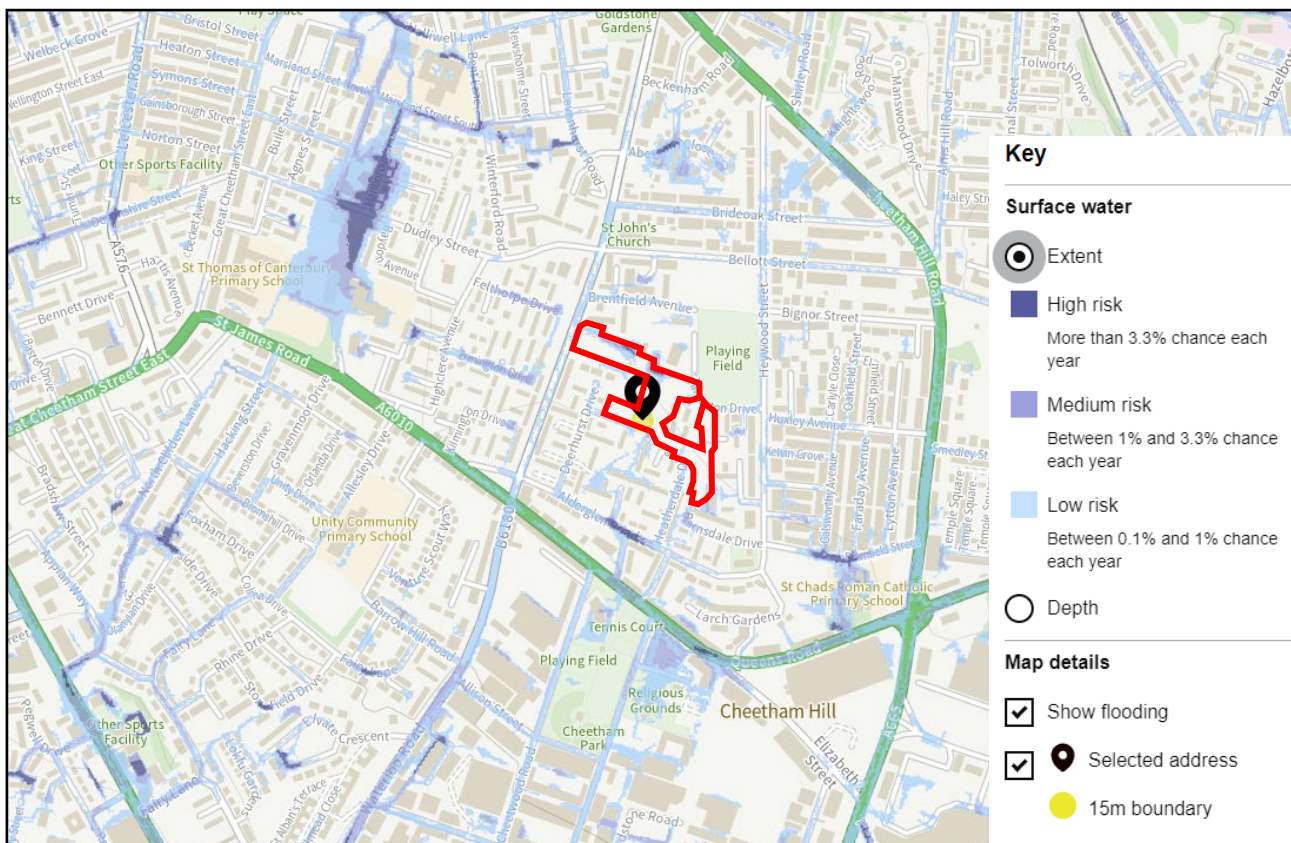
Date	Drawn By	Checked By
APR' 24	MB	DS
Scale as at	Project Number	Revision
1:250	33716	
Sheet Number		
33716-SUT-ZZ-XX-DR-C-655-0001		P01

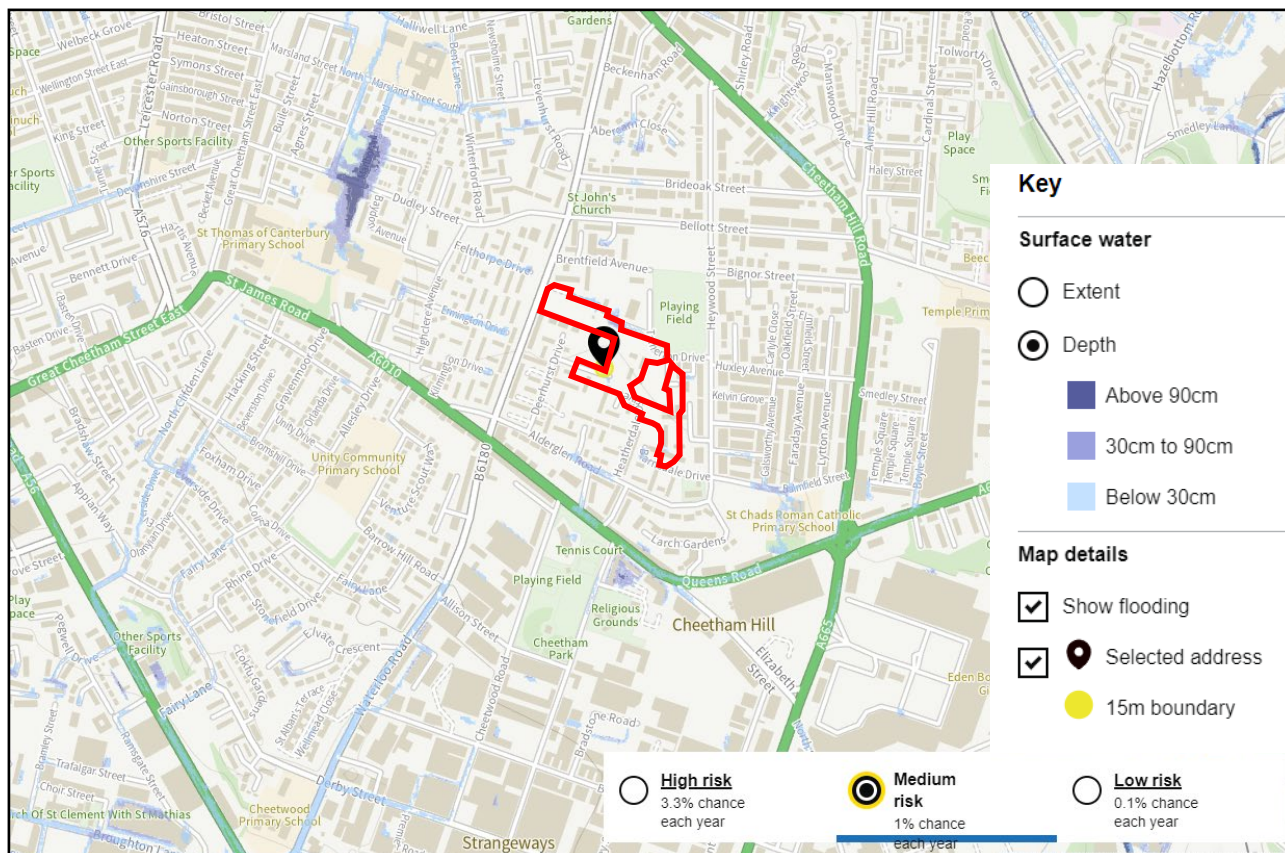
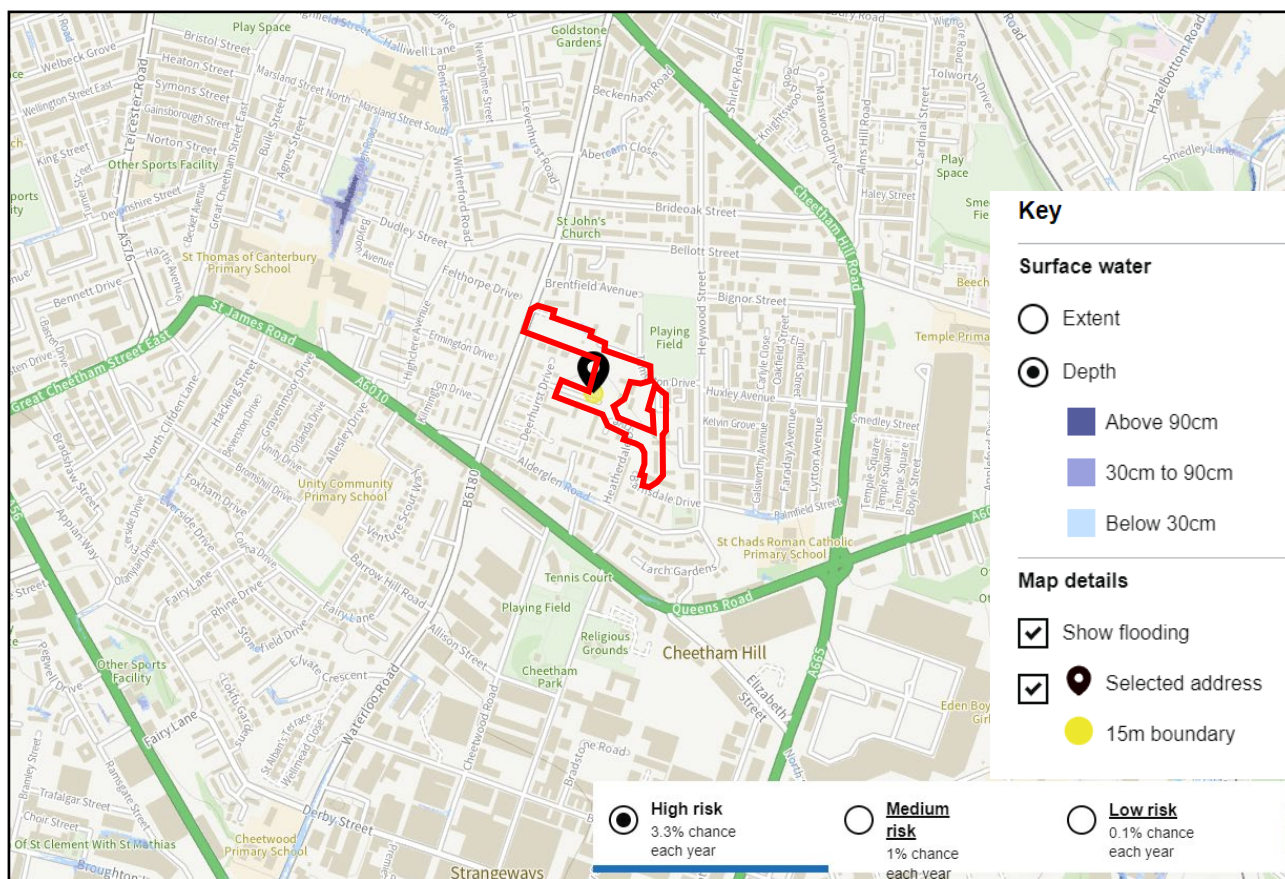
16.2 Flood Maps

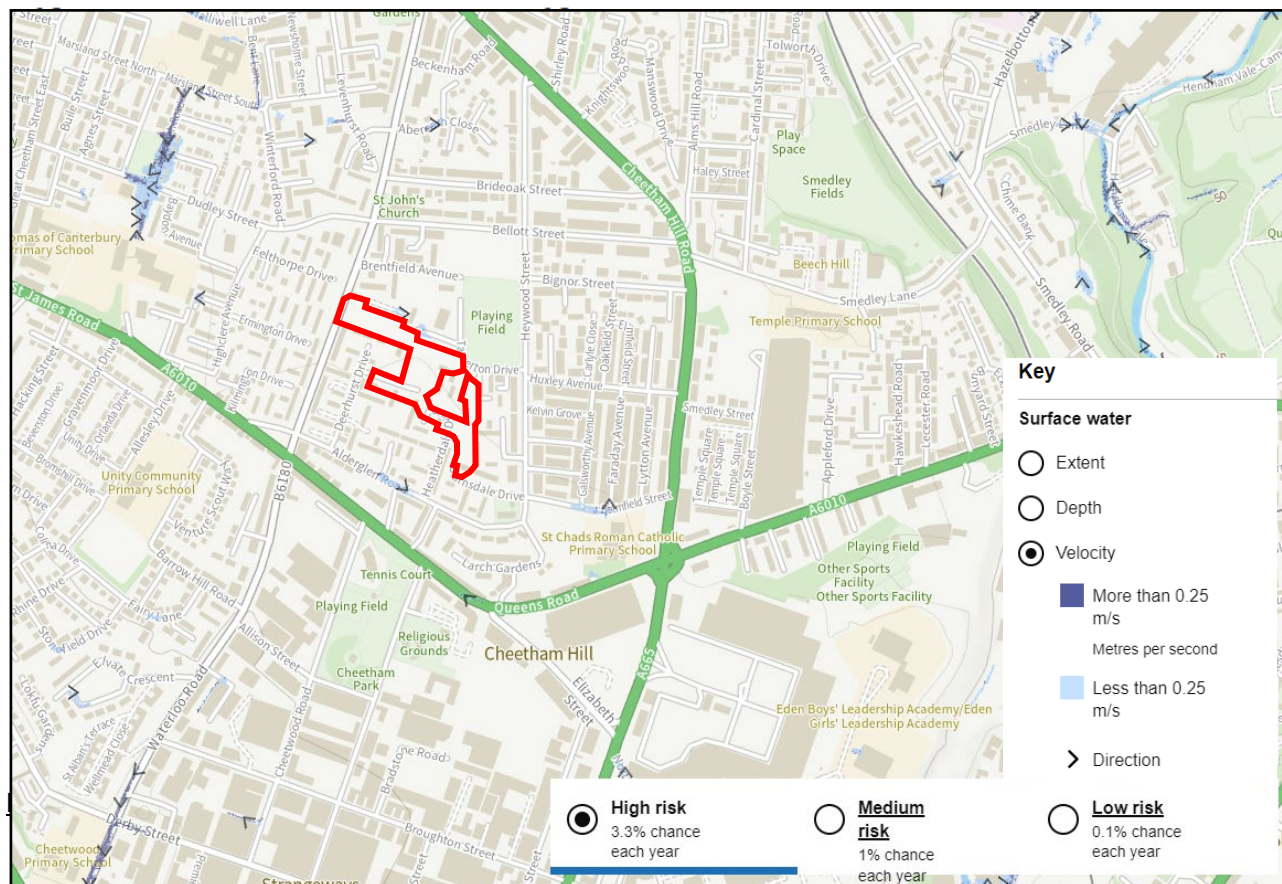
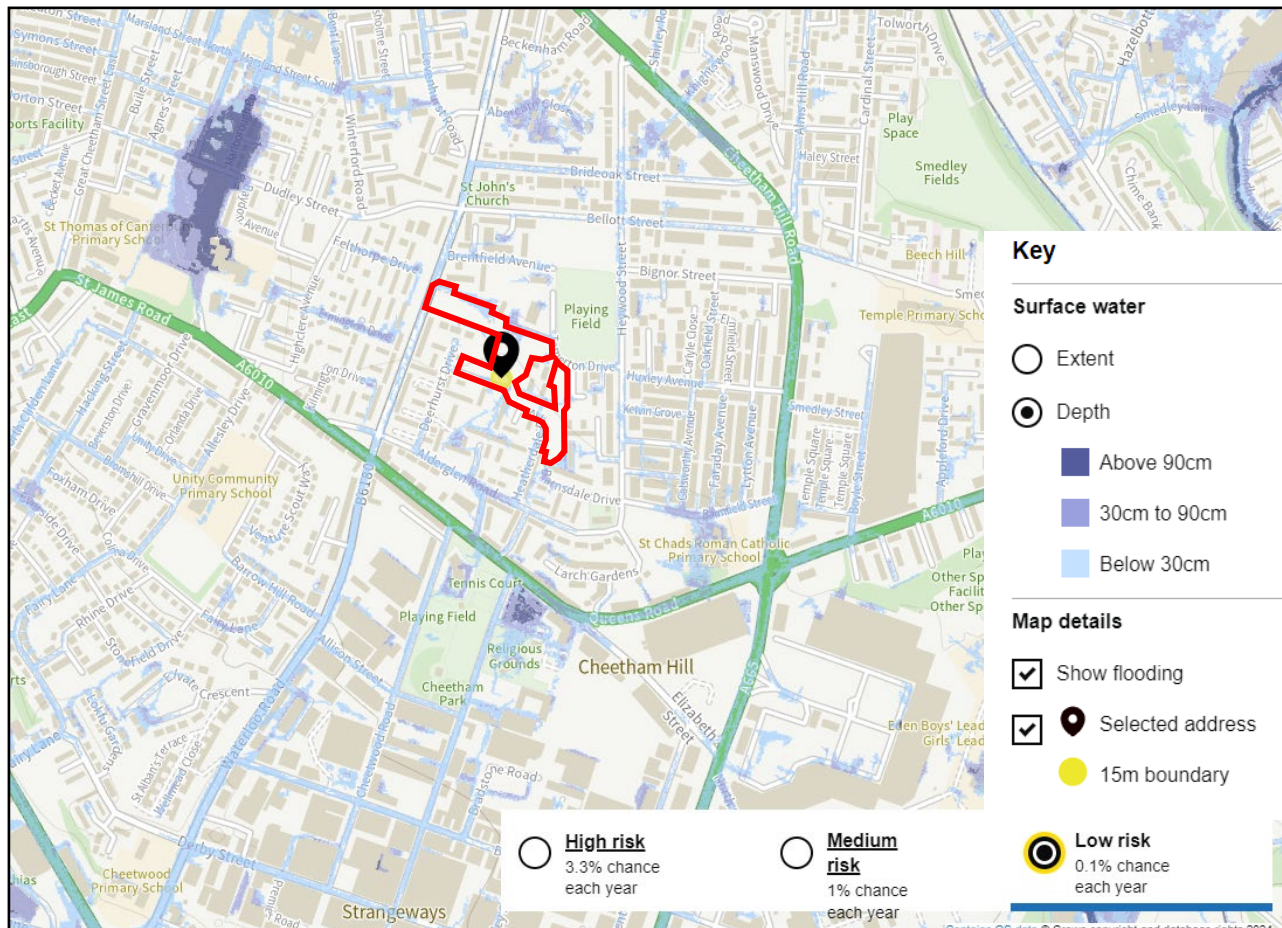
Flooding from the River and Sea

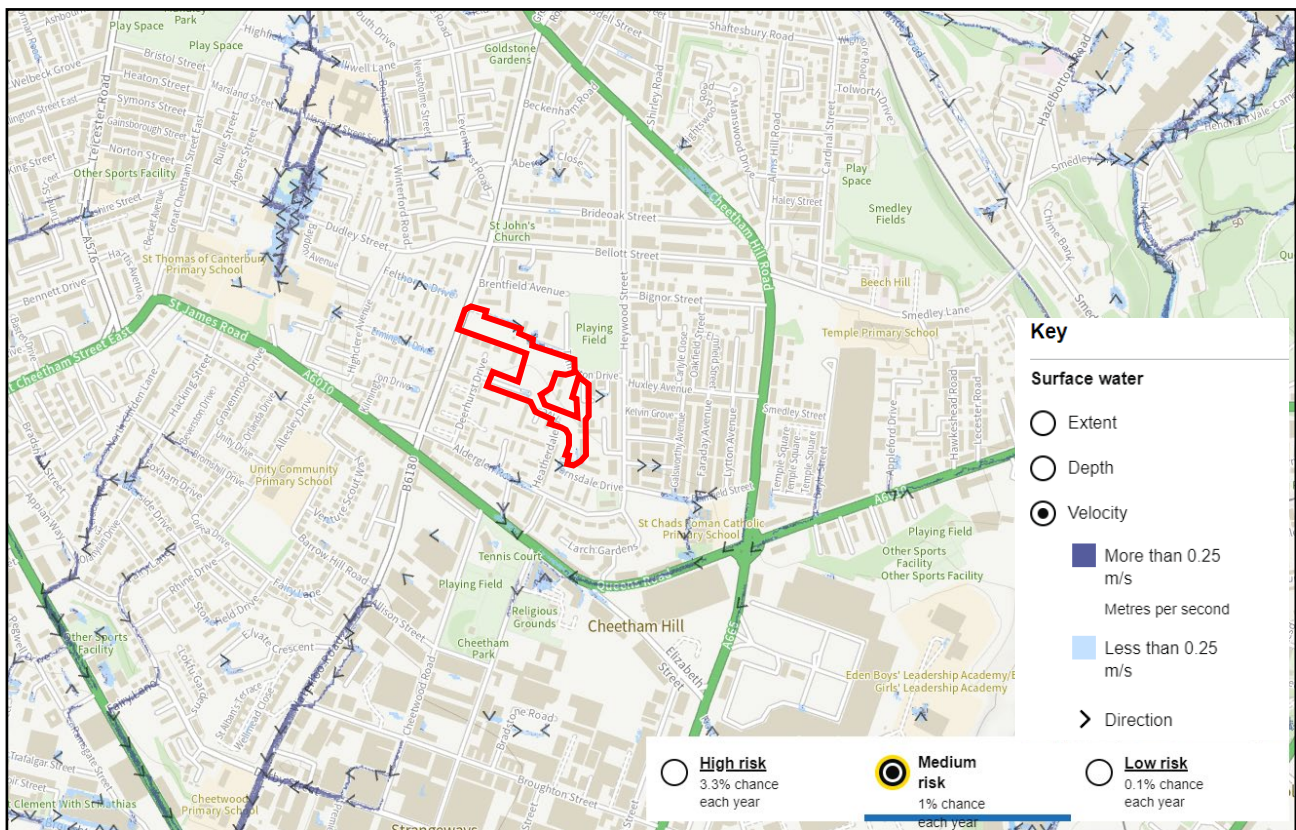
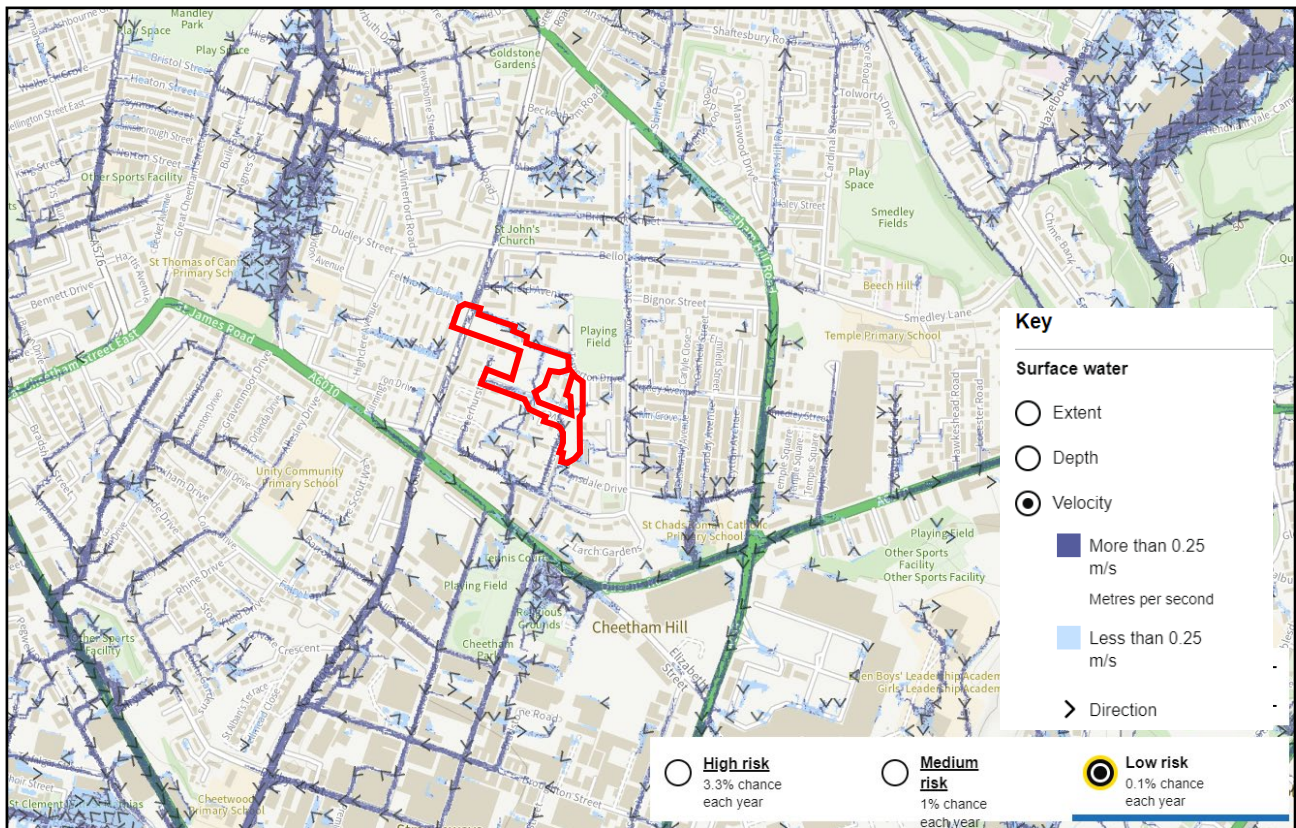


Flood Risk from Surface Water

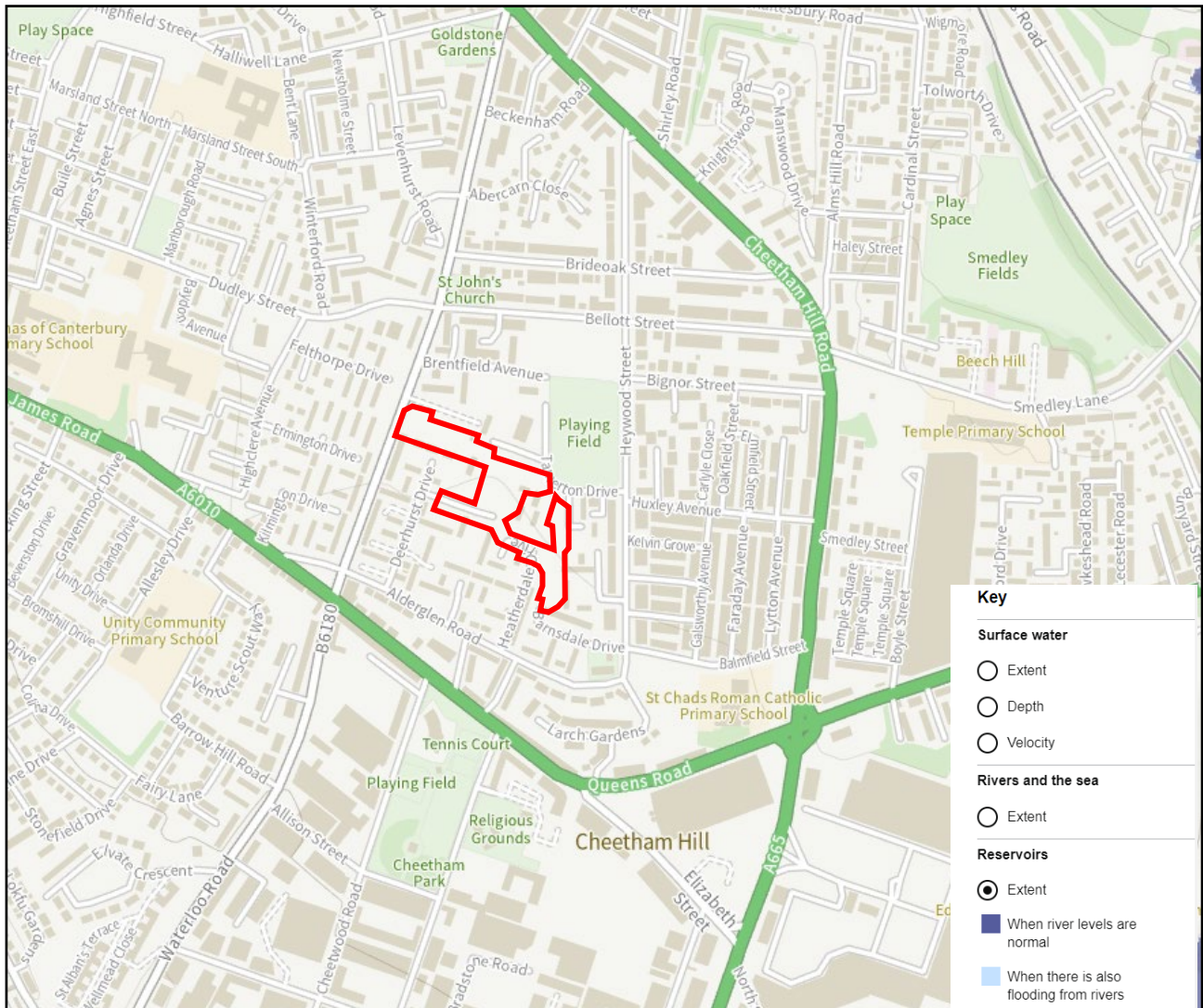








Flooding from Reservoirs



16.3 Calculations

Project:	Date: 04/04/2024		
	Designed by: bowdenm	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		





Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
EX UU1504	FSR: 100 years: +45 %: 15 mins: Summer	59.19 0	56.69 0	56.690	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0508	FSR: 100 years: +45 %: 120 mins: Summer	58.51 0	56.08 0	56.121	0.041	5.4	0.000	0.000	5.4	61.973	OK
EX UU0622	FSR: 100 years: +45 %: 15 mins: Summer	59.33 0	56.81 0	56.810	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0607A	FSR: 100 years: +45 %: 15 mins: Summer	59.22 0	57.30 0	57.300	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU9613	FSR: 100 years: +45 %: 30 mins: Summer	59.65 0	56.31 0	56.378	0.068	5.0	0.000	0.000	5.0	15.140	OK
EX 0610	FSR: 100 years: +45 %: 15 mins: Summer	59.23 0	57.47 0	57.470	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH10	FSR: 100 years: +45 %: 15 mins: Summer	59.23 0	57.82 0	57.820	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH11	FSR: 100 years: +45 %: 15 mins: Summer	59.40 0	58.11 0	58.110	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH12	FSR: 100 years: +45 %: 15 mins: Summer	59.60 0	58.42 0	58.420	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH13	FSR: 100 years: +45 %: 15 mins: Summer	59.58 0	58.52 0	58.520	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH14	FSR: 100 years: +45 %: 15 mins: Summer	59.52 0	58.64 0	58.640	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH19	FSR: 100 years: +45 %: 15 mins: Summer	59.48 0	58.76 0	58.760	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0701	FSR: 100 years: +45 %: 15 mins: Summer	60.53 0	58.25 0	58.250	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH08	FSR: 100 years: +45 %: 15 mins: Summer	60.37 0	58.64 8	58.648	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH25	FSR: 100 years: +45 %: 15 mins: Summer	60.65 0	58.92 0	58.920	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH24	FSR: 100 years: +45 %: 15 mins: Summer	60.55 0	59.01 0	59.010	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH23	FSR: 100 years: +45 %: 15 mins: Summer	60.63 0	59.11 7	59.117	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH43	FSR: 100 years: +45 %: 15 mins: Summer	60.74 0	59.19 0	59.190	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0700	FSR: 100 years: +45 %: 15 mins: Summer	60.48 0	58.44 0	58.440	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH15	FSR: 100 years: +45 %: 15 mins: Summer	59.60 0	58.60 0	58.600	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project:	Date: 04/04/2024			
	Designed by: bowdenm	Checked by:	Approved By:	
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:			

EX MH01	FSR: 100 years: +45 %: 15 mins: Summer	59.20 0	57.55 0	57.550	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0607	FSR: 100 years: +45 %: 15 mins: Summer	59.23 0	57.47 0	57.470	0.000	0.0	0.000	0.000	0.0	0.000	OK
PR DIV 02	FSR: 100 years: +45 %: 15 mins: Summer	59.37 0	56.44 6	56.446	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH07	FSR: 100 years: +45 %: 30 mins: Summer	61.50 0	59.79 9	59.817	0.019	0.6	0.021	0.000	0.6	0.509	OK
MH08	FSR: 100 years: +45 %: 30 mins: Summer	61.52 0	59.68 8	59.711	0.023	1.3	0.026	0.000	1.3	1.086	OK
MH10	FSR: 100 years: +45 %: 15 mins: Summer	60.80 0	59.02 4	59.096	0.072	19.0	0.082	0.000	18.3	9.084	OK
MH09	FSR: 100 years: +45 %: 15 mins: Summer	61.20 0	59.49 9	59.569	0.070	12.5	0.080	0.000	12.0	5.905	OK
PSW61	FSR: 100 years: +45 %: 15 mins: Summer	61.55 0	60.65 0	60.686	0.036	2.3	0.010	0.000	2.2	0.997	OK
PSW62	FSR: 100 years: +45 %: 15 mins: Summer	61.50 0	60.46 3	60.543	0.080	9.8	0.023	0.000	9.7	4.290	OK
PSW63	FSR: 100 years: +45 %: 15 mins: Summer	61.48 0	60.34 5	60.383	0.038	9.7	0.011	0.000	9.6	4.289	OK
PSW64	FSR: 100 years: +45 %: 30 mins: Summer	61.18 0	59.98 0	59.997	0.017	0.6	0.005	0.000	0.6	0.538	OK
PSW65	FSR: 100 years: +45 %: 15 mins: Summer	60.85 0	59.84 5	59.875	0.030	1.7	0.008	0.000	1.6	0.871	OK
PSW66	FSR: 100 years: +45 %: 15 mins: Summer	60.90 0	59.73 1	59.763	0.032	6.0	0.009	0.000	5.9	2.761	OK
MH11	FSR: 100 years: +45 %: 120 mins: Summer	60.20 0	58.51 2	58.625	0.113	12.7	0.128	0.000	12.7	26.784	OK
PSW67	FSR: 100 years: +45 %: 15 mins: Winter	60.30 0	59.10 0	59.118	0.018	0.6	0.005	0.000	0.6	0.286	OK
PSWS68	FSR: 100 years: +45 %: 15 mins: Summer	59.90 0	58.95 0	58.974	0.024	1.2	0.007	0.000	1.1	0.623	OK
PSW69	FSR: 100 years: +45 %: 15 mins: Summer	60.10 0	58.80 4	58.842	0.038	6.8	0.011	0.000	6.7	3.090	OK
MH12	FSR: 100 years: +45 %: 120 mins: Summer	60.13 0	58.36 7	58.625	0.258	12.7	0.292	0.000	12.7	26.874	OK
PR DIV 03	FSR: 100 years: +45 %: 120 mins: Summer	58.63 2	56.19 0	56.233	0.043	5.4	0.049	0.000	5.4	61.973	OK
PR DIV 01	FSR: 100 years: +45 %: 15 mins: Summer	59.28 2	56.56 5	56.565	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH13	FSR: 100 years: +45 %: 120 mins: Summer	59.90 0	58.13 7	58.625	0.488	28.7	0.552	0.000	28.6	60.780	Surcharged
MH15	FSR: 100 years: +45 %: 120 mins: Summer	59.30 0	57.65 1	58.624	0.974	34.6	1.101	0.000	31.5	73.067	Surcharged
MH16	FSR: 100 years: +45 %: 120 mins: Summer	59.30 0	57.61 3	58.624	1.011	38.1	1.144	0.000	38.0	86.872	Surcharged

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Report Details:	Company Address:			
Type: Junctions Summary Storm Phase: Phase				

PSW70	FSR: 100 years: +45 %: 15 mins: Summer	59.93 0	58.75 8	58.790	0.032	1.6	0.009	0.000	1.7	1.042	OK
PSW71	FSR: 100 years: +45 %: 15 mins: Summer	60.20 0	58.66 7	58.699	0.032	1.7	0.009	0.000	1.7	1.028	OK
PSW72	FSR: 100 years: +45 %: 120 mins: Summer	60.14 0	58.54 2	58.628	0.086	3.8	0.024	0.000	3.8	8.109	OK
PSW73	FSR: 100 years: +45 %: 120 mins: Summer	60.05 0	58.46 5	58.628	0.163	5.9	0.046	0.000	5.9	12.594	Surcharged
PSW74	FSR: 100 years: +45 %: 120 mins: Summer	60.00 0	58.39 7	58.628	0.230	7.7	0.065	0.000	7.7	16.323	Surcharged
PSW75	FSR: 100 years: +45 %: 120 mins: Summer	59.96 0	58.30 5	58.627	0.322	16.0	0.091	0.000	16.0	33.927	Surcharged
PSW76	FSR: 100 years: +45 %: 15 mins: Summer	59.60 0	58.60 0	58.968	0.368	14.0	0.104	0.000	10.4	6.070	Surcharged
MH14	FSR: 100 years: +45 %: 120 mins: Summer	59.58 7	57.88 4	58.624	0.741	33.6	0.838	0.000	33.7	71.431	Surcharged
PSW77	FSR: 100 years: +45 %: 120 mins: Summer	59.20 0	58.20 0	58.625	0.425	2.3	0.120	0.000	2.3	4.827	Surcharged
PSW78	FSR: 100 years: +45 %: 120 mins: Summer	59.71 0	58.04 6	58.625	0.579	3.6	0.164	0.000	3.6	7.798	Surcharged
PSW79	FSR: 100 years: +45 %: 120 mins: Summer	59.80 0	57.93 1	58.625	0.694	5.0	0.196	0.000	5.0	10.777	Surcharged
MH17	FSR: 100 years: +45 %: 120 mins: Summer	59.10 0	56.95 6	58.619	1.663	5.9	1.881	0.000	5.4	62.124	Surcharged
MH01	FSR: 100 years: +45 %: 15 mins: Summer	60.82 0	57.40 0	57.618	0.218	164.0	0.755	0.000	154.2	92.855	OK
MH02	FSR: 100 years: +45 %: 15 mins: Summer	60.73 0	56.96 8	57.219	0.251	191.0	0.871	0.000	181.2	113.924	OK
MH03	FSR: 100 years: +45 %: 60 mins: Summer	60.15 0	56.94 3	57.195	0.252	146.4	0.872	0.000	154.3	199.851	OK
PSW08	FSR: 100 years: +45 %: 15 mins: Summer	61.39 0	59.96 3	59.968	0.004	0.0	0.001	0.000	0.0	0.022	OK
PSW09	FSR: 100 years: +45 %: 15 mins: Winter	61.34 0	59.86 1	59.930	0.068	8.3	0.019	0.000	8.2	3.856	OK
PSW10	FSR: 100 years: +45 %: 30 mins: Summer	61.35 0	59.76 9	59.884	0.115	9.6	0.033	0.000	8.9	8.254	OK
PSW11	FSR: 100 years: +45 %: 30 mins: Summer	61.38 0	59.67 6	59.875	0.199	13.2	0.056	0.000	13.0	11.979	OK
PSW12	FSR: 100 years: +45 %: 30 mins: Summer	61.35 0	59.58 2	59.865	0.282	17.4	0.080	0.000	16.0	15.787	Surcharged
PSW13	FSR: 100 years: +45 %: 30 mins: Summer	61.32 0	59.37 4	59.714	0.340	71.3	0.384	0.000	71.0	68.805	Surcharged
PSW01	FSR: 100 years: +45 %: 15 mins: Summer	61.86 0	60.59 9	60.741	0.142	10.6	0.040	0.000	8.6	4.594	Surcharged
PSW02	FSR: 100 years: +45 %: 30 mins: Summer	61.63 0	60.27 8	60.484	0.206	11.8	0.058	0.000	10.9	10.855	Surcharged

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PSW03	FSR: 100 years: +45 %: 30 mins: Summer	61.53 0	60.13 0	60.418	0.289	19.9	0.082	0.000	19.0	18.832	Surcharged
PSW04	FSR: 100 years: +45 %: 30 mins: Summer	61.42 0	59.89 5	60.224	0.328	27.8	0.093	0.000	27.0	26.693	Surcharged
PSW05	FSR: 100 years: +45 %: 15 mins: Summer	61.42 0	59.80 3	60.173	0.370	35.8	0.105	0.000	35.3	25.089	Surcharged
PSW06	FSR: 100 years: +45 %: 15 mins: Summer	61.38 0	59.70 4	60.095	0.391	55.7	0.111	0.000	52.4	35.909	Surcharged
PSW15	FSR: 100 years: +45 %: 30 mins: Summer	61.22 0	59.24 6	59.536	0.290	70.7	0.328	0.000	70.4	68.741	OK
PSW16	FSR: 100 years: +45 %: 30 mins: Summer	61.15 0	59.21 9	59.479	0.260	70.4	0.294	0.000	70.1	68.714	OK
PSW17	FSR: 100 years: +45 %: 30 mins: Summer	61.12 0	59.17 1	59.388	0.217	70.1	0.246	0.000	70.1	68.680	OK
PSW19	FSR: 100 years: +45 %: 30 mins: Summer	60.56 0	59.05 8	59.313	0.254	94.4	0.288	0.000	95.6	89.568	OK
PSW23	FSR: 100 years: +45 %: 15 mins: Winter	60.66 0	59.01 6	59.105	0.088	97.0	0.100	0.000	100.7	65.051	OK
PSW07	FSR: 100 years: +45 %: 30 mins: Summer	61.33 0	59.48 6	59.846	0.360	71.7	0.407	0.000	71.3	68.830	Surcharged
PSW14	FSR: 100 years: +45 %: 30 mins: Summer	61.09 0	59.30 4	59.621	0.317	71.0	0.358	0.000	70.7	68.772	Surcharged
PSW43	FSR: 100 years: +45 %: 15 mins: Summer	60.90 0	60.30 0	60.343	0.043	2.7	0.012	0.000	2.6	1.574	OK
PSW44	FSR: 100 years: +45 %: 15 mins: Summer	61.06 0	60.16 6	60.251	0.085	10.9	0.024	0.000	10.7	5.179	OK
PSW45	FSR: 100 years: +45 %: 15 mins: Summer	61.08 0	60.01 1	60.103	0.092	10.7	0.026	0.000	10.2	5.170	OK
PSW46	FSR: 100 years: +45 %: 15 mins: Summer	60.90 0	60.30 0	60.300	0.000	0.0	0.000	0.000	0.0	0.000	OK
PSW47	FSR: 100 years: +45 %: 15 mins: Summer	61.09 0	59.94 0	60.072	0.132	20.2	0.037	0.000	19.5	9.920	OK
PSW48	FSR: 100 years: +45 %: 30 mins: Summer	60.85 0	60.25 0	60.277	0.027	1.8	0.008	0.000	1.8	1.585	OK
PSW49	FSR: 100 years: +45 %: 15 mins: Summer	60.90 0	59.78 5	59.847	0.062	21.4	0.017	0.000	21.2	10.885	OK
PSW50	FSR: 100 years: +45 %: 15 mins: Summer	60.70 0	60.10 0	60.129	0.029	1.9	0.008	0.000	1.9	0.986	OK
PSW51	FSR: 100 years: +45 %: 15 mins: Summer	60.58 0	58.48 1	59.580	1.099	33.4	0.311	0.000	18.4	25.266	Surcharged
PSW53	FSR: 100 years: +45 %: 15 mins: Summer	60.50 0	58.68 7	59.585	0.898	10.7	0.254	0.000	8.0	6.227	Surcharged
PSW52	FSR: 100 years: +45 %: 15 mins: Summer	59.97 0	58.87 0	59.593	0.723	8.6	0.205	0.000	6.7	4.943	Surcharged
PSW54	FSR: 100 years: +45 %: 15 mins: Summer	60.00 0	59.00 0	59.594	0.594	9.1	0.168	0.000	8.6	6.232	Surcharged

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PSW55	FSR: 100 years: +45 %: 15 mins: Summer	60.71 0	58.26 8	59.438	1.170	24.1	0.331	0.000	25.1	30.231	Surcharged
PSW57	FSR: 100 years: +45 %: 30 mins: Summer	60.56 0	58.05 3	59.223	1.170	30.4	0.331	0.000	31.1	50.798	Surcharged
PSW59	FSR: 100 years: +45 %: 30 mins: Summer	60.54 0	57.85 4	58.783	0.930	40.8	0.263	0.000	40.2	60.623	Surcharged
PSW56	FSR: 100 years: +45 %: 15 mins: Summer	60.00 0	59.00 0	59.459	0.459	7.5	0.130	0.000	7.9	5.279	Surcharged
PSW58	FSR: 100 years: +45 %: 30 mins: Summer	60.10 0	59.00 0	59.261	0.261	4.4	0.074	0.000	3.7	3.814	Surcharged
PSW60	FSR: 100 years: +45 %: 30 mins: Summer	60.05 0	57.68 5	57.766	0.080	40.2	0.023	0.000	40.2	60.608	OK
PSW18	FSR: 100 years: +45 %: 15 mins: Summer	60.82 0	59.51 8	59.518	0.000	0.0	0.000	0.000	0.0	0.000	OK
PSW20	FSR: 100 years: +45 %: 15 mins: Summer	60.84 0	59.79 0	59.853	0.063	6.9	0.018	0.000	6.8	3.113	OK
PSW21	FSR: 100 years: +45 %: 15 mins: Summer	61.04 0	59.65 4	59.840	0.185	24.3	0.052	0.000	23.3	10.723	Surcharged
PSW22	FSR: 100 years: +45 %: 15 mins: Summer	60.84 0	59.59 2	59.684	0.092	26.1	0.026	0.000	26.0	11.919	OK
PSW41	FSR: 100 years: +45 %: 15 mins: Summer	60.60 0	59.40 9	59.458	0.049	36.0	0.014	0.000	35.8	21.087	OK
PSW42	FSR: 100 years: +45 %: 15 mins: Summer	60.71 0	59.65 5	59.655	0.000	0.0	0.000	0.000	0.0	0.000	OK
PSW39	FSR: 100 years: +45 %: 15 mins: Summer	60.75 0	59.54 3	59.663	0.120	28.3	0.034	0.000	27.9	17.576	OK
PSW40	FSR: 100 years: +45 %: 15 mins: Summer	60.90 0	59.79 0	59.790	0.000	0.0	0.000	0.000	0.0	0.000	OK
PSW37	FSR: 100 years: +45 %: 15 mins: Summer	60.85 0	59.73 6	59.936	0.200	26.6	0.057	0.000	25.3	16.353	Surcharged
PSW35	FSR: 100 years: +45 %: 15 mins: Summer	61.11 0	59.87 1	60.076	0.205	20.5	0.058	0.000	21.1	12.936	Surcharged
PSW36	FSR: 100 years: +45 %: 15 mins: Summer	61.11 0	60.04 6	60.072	0.026	1.1	0.007	0.000	1.1	0.089	OK
PSW38	FSR: 100 years: +45 %: 15 mins: Summer	61.11 0	59.91 1	59.918	0.007	0.8	0.002	0.000	0.1	0.045	OK
PSW33	FSR: 100 years: +45 %: 15 mins: Summer	61.25 0	60.05 0	60.256	0.206	19.8	0.058	0.000	18.8	11.742	Surcharged
PSW28	FSR: 100 years: +45 %: 15 mins: Summer	61.22 0	60.20 4	60.409	0.205	19.9	0.058	0.000	18.4	10.900	Surcharged
PSW32	FSR: 100 years: +45 %: 15 mins: Summer	61.20 0	60.38 8	60.415	0.027	1.4	0.008	0.000	1.3	0.740	OK
PSW34	FSR: 100 years: +45 %: 15 mins: Summer	60.88 0	60.22 8	60.248	0.020	0.6	0.006	0.000	0.6	0.273	OK
PSW30	FSR: 100 years: +45 %: 15 mins: Summer	61.55 0	60.36 7	60.487	0.120	7.3	0.034	0.000	5.2	3.358	Surcharged

Project:	Date: 04/04/2024			
	Designed by: bowdenm	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Junctions Summary Storm Phase: Phase				

PSW31	FSR: 100 years: +45 %: 15 mins: Summer	61.10 0	60.45 0	60.496	0.046	2.8	0.013	0.000	2.7	1.332	OK
PSW29	FSR: 100 years: +45 %: 15 mins: Summer	61.58 0	60.50 3	60.508	0.005	0.0	0.001	0.000	0.0	0.033	OK
PSW27	FSR: 100 years: +45 %: 15 mins: Summer	61.20 0	60.49 6	60.523	0.027	1.2	0.008	0.000	1.1	0.505	OK
PSW26	FSR: 100 years: +45 %: 15 mins: Summer	61.40 0	60.41 0	60.502	0.092	6.8	0.026	0.000	5.1	3.240	OK
PSW25	FSR: 100 years: +45 %: 15 mins: Summer	61.22 0	60.54 4	60.619	0.075	5.9	0.021	0.000	5.7	2.742	OK
PSW24	FSR: 100 years: +45 %: 15 mins: Summer	61.18 0	60.58 0	60.626	0.046	1.4	0.013	0.000	1.2	0.750	OK
Manhole (26)	FSR: 100 years: +45 %: 15 mins: Summer	60.46 0	59.38 0	59.380	0.000	0.0	0.000	0.000	0.0	0.000	OK
PR DIV 08	FSR: 100 years: +45 %: 15 mins: Summer	60.50 0	58.52 6	58.526	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH04	FSR: 100 years: +45 %: 60 mins: Summer	59.31 4	56.59 0	57.193	0.603	154.3	2.089	0.000	118.2	199.112	OK
MH06	FSR: 100 years: +45 %: 60 mins: Summer	59.67 0	56.36 0	57.193	0.833	14.1	2.886	0.000	5.0	31.680	Surcharged
MH05	FSR: 100 years: +45 %: 60 mins: Summer	59.60 2	56.40 4	57.193	0.789	156.8	2.733	0.000	67.4	269.026	Surcharged
EX MH9803	FSR: 100 years: +45 %: 15 mins: Summer	61.47 0	59.63 0	59.630	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH9801	FSR: 100 years: +45 %: 15 mins: Summer	61.33 0	58.91 0	58.910	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX MH0713	FSR: 100 years: +45 %: 15 mins: Summer	61.39 0	58.40 0	58.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0710	FSR: 100 years: +45 %: 15 mins: Summer	61.09 0	57.59 0	57.590	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0741	FSR: 100 years: +45 %: 15 mins: Summer	61.23 0	56.66 0	56.660	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX Assumed 01	FSR: 100 years: +45 %: 15 mins: Summer	61.10 0	55.07 5	55.075	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU9707	FSR: 100 years: +45 %: 15 mins: Summer	60.77 0	55.05 0	55.050	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0709	FSR: 100 years: +45 %: 15 mins: Summer	61.20 0	57.76 0	57.760	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0717	FSR: 100 years: +45 %: 15 mins: Summer	60.94 0	58.14 0	58.140	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0715	FSR: 100 years: +45 %: 15 mins: Summer	61.43 0	59.66 0	59.660	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU0708	FSR: 100 years: +45 %: 15 mins: Summer	61.14 0	58.41 5	58.415	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU1702	FSR: 100 years: +45 %: 15 mins: Summer	61.31 0	58.88 0	58.880	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project:	Date: 04/04/2024			
	Designed by: bowdenm	Checked by:	Approved By:	
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:			

EX UU1701	FSR: 100 years: +45 %: 15 mins: Summer	61.62 0	59.07 0	59.070	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU1610	FSR: 100 years: +45 %: 15 mins: Summer	60.78 0	59.32 0	59.320	0.000	0.0	0.000	0.000	0.0	0.000	OK
EX UU1607	FSR: 100 years: +45 %: 15 mins: Summer	60.29 0	57.65 0	57.650	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project:	Date: 04/04/2024			
	Designed by: bowdenm	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Summary Storm Phase: Phase				



Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 100 years: +45 %: 30 mins: Summer	61.325	61.211	0.060	0.071	3.0	1.184	0.000	0.000	2.5	2.504	79.206	OK
Porous Paving (1)	FSR: 100 years: +45 %: 30 mins: Summer	61.222	61.132	0.052	0.062	2.4	0.855	0.000	0.000	2.0	2.010	81.223	OK
Porous Paving (2)	FSR: 100 years: +45 %: 30 mins: Summer	61.102	61.012	0.052	0.062	2.4	0.855	0.000	0.000	2.0	2.010	81.224	OK
Porous Paving (3)	FSR: 100 years: +45 %: 30 mins: Summer	61.052	60.962	0.052	0.062	2.4	0.856	0.000	0.000	2.0	2.010	81.209	OK
Porous Paving (4)	FSR: 100 years: +45 %: 30 mins: Summer	60.979	60.913	0.044	0.053	1.8	0.544	0.000	0.000	1.7	1.517	84.062	OK
Porous Paving (6)	FSR: 100 years: +45 %: 15 mins: Summer	61.019	60.969	0.029	0.029	0.9	0.110	0.000	0.000	0.7	0.381	90.511	OK
Porous Paving (9)	FSR: 100 years: +45 %: 30 mins: Summer	60.655	60.614	0.035	0.044	1.2	0.297	0.000	0.000	1.2	1.022	86.935	OK
Porous Paving (10)	FSR: 100 years: +45 %: 30 mins: Summer	60.555	60.514	0.035	0.044	1.2	0.298	0.000	0.000	1.2	1.021	86.904	OK
Porous Paving (11)	FSR: 100 years: +45 %: 15 mins: Summer	60.282	60.231	0.029	0.031	0.9	0.119	0.000	0.000	0.7	0.394	90.184	OK
Porous Paving (14)	FSR: 100 years: +45 %: 15 mins: Summer	60.283	60.220	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
Porous Paving (15)	FSR: 100 years: +45 %: 15 mins: Summer	60.853	60.801	0.030	0.031	0.9	0.120	0.000	0.000	0.7	0.401	90.171	OK
Porous Paving (16)	FSR: 100 years: +45 %: 15 mins: Summer	60.872	60.819	0.029	0.029	0.9	0.115	0.000	0.000	0.7	0.383	90.469	OK
Porous Paving (17)	FSR: 100 years: +45 %: 15 mins: Summer	60.819	60.771	0.029	0.031	0.9	0.112	0.000	0.000	0.6	0.380	90.335	OK
Porous Paving (18)	FSR: 100 years: +45 %: 60 mins: Summer	59.179	59.179	0.087	0.149	1.0	0.811	0.000	0.000	1.7	1.217	61.343	OK

Project:		Date: 04/04/2024		
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Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address:		



Porous Paving (19)	FSR: 100 years: +45 %: 60 mins: Summer	59.157	59.157	0.087	0.137	0.5	0.421	0.000	0.000	0.9	0.663	63.513	OK
Porous Paving (20)	FSR: 100 years: +45 %: 60 mins: Summer	59.229	59.229	0.089	0.139	0.5	0.428	0.000	0.000	0.8	0.663	62.867	OK
Porous Paving (21)	FSR: 100 years: +45 %: 60 mins: Summer	59.294	59.294	0.092	0.154	1.9	1.603	0.000	0.000	3.1	2.292	59.418	OK
Porous Paving (22)	FSR: 100 years: +45 %: 30 mins: Summer	59.296	59.296	0.076	0.126	0.6	0.380	0.000	0.000	0.7	0.510	67.044	OK
Porous Paving (23)	FSR: 100 years: +45 %: 30 mins: Summer	59.305	59.305	0.065	0.115	0.6	0.339	0.000	0.000	1.0	0.510	70.596	OK
Porous Paving (24)	FSR: 100 years: +45 %: 30 mins: Summer	59.317	59.317	0.065	0.127	1.1	0.659	0.000	0.000	1.7	0.940	68.612	OK
Porous Paving (25)	FSR: 100 years: +45 %: 30 mins: Summer	59.343	59.343	0.053	0.103	0.6	0.292	0.000	0.000	0.9	0.511	74.668	OK
Porous Paving (26)	FSR: 100 years: +45 %: 30 mins: Summer	59.358	59.358	0.048	0.098	0.6	0.274	0.000	0.000	0.7	0.511	76.270	OK
Porous Paving (27)	FSR: 100 years: +45 %: 15 mins: Summer	59.389	59.340	0.029	0.030	0.9	0.111	0.000	0.000	0.6	0.377	90.397	OK
Porous Paving (28)	FSR: 100 years: +45 %: 15 mins: Summer	59.429	59.380	0.029	0.030	0.9	0.110	0.000	0.000	0.7	0.378	90.474	OK
Porous Paving (29)	FSR: 100 years: +45 %: 30 mins: Summer	59.475	59.434	0.035	0.044	1.2	0.297	0.000	0.000	1.2	1.022	86.974	OK
Porous Paving (30)	FSR: 100 years: +45 %: 30 mins: Summer	60.175	60.133	0.035	0.043	1.2	0.294	0.000	0.000	1.2	1.022	87.103	OK
Porous Paving (31)	FSR: 100 years: +45 %: 15 mins: Summer	61.239	61.189	0.029	0.029	0.9	0.109	0.000	0.000	0.7	0.378	90.578	OK
Porous Paving (32)	FSR: 100 years: +45 %: 15 mins: Summer	61.169	61.101	0.031	0.031	1.0	0.131	0.000	0.000	0.7	0.424	90.035	OK
Porous Paving (33)	FSR: 100 years: +45 %: 15 mins: Summer	60.750	60.701	0.030	0.031	0.9	0.113	0.000	0.000	0.7	0.399	90.183	OK
Porous Paving (34)	FSR: 100 years: +45 %: 15 mins: Summer	59.549	59.500	0.029	0.030	0.9	0.109	0.000	0.000	0.7	0.378	90.510	OK
Porous Paving (35)	FSR: 100 years: +45 %: 30 mins: Summer	59.524	59.486	0.044	0.056	1.8	0.560	0.000	0.000	1.6	1.515	83.546	OK

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	bowdenm		
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Porous Paving (36)	FSR: 100 years: +45 %: 30 mins: Summer	60.905	60.863	0.035	0.043	1.2	0.315	0.000	0.000	1.1	1.014	87.171	OK
Cellular Storage (1)	FSR: 100 years: +45 %: 60 mins: Summer	57.100	57.100	0.530	0.530	107.7	71.921	0.000	0.000	41.7	226.152	56.356	OK
Cellular Storage	FSR: 100 years: +45 %: 120 mins: Summer	58.624	58.624	1.624	1.624	38.0	42.328	0.000	0.000	5.9	63.015	1.571	OK

Project:	Date: 04/04/2024		
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Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		





Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
EX7.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0607 A	EX UU0622	59.220	57.300	0.000	0.000	0.0	0	0.0	OK
EX7.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0622	EX UU0508	59.330	56.810	0.020	0.000	0.0	0	0.0	OK
EX5.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH19	EX MH14	59.480	58.760	0.000	0.000	0.0	0	0.0	OK
EX5.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH14	EX MH13	59.520	58.640	0.000	0.000	0.0	0	0.0	OK
EX5.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH13	EX MH12	59.580	58.520	0.000	0.000	0.0	0	0.0	OK
EX5.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH12	EX MH11	59.600	58.420	0.000	0.000	0.0	0	0.0	OK
EX4.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH11	EX MH10	59.400	58.110	0.000	0.000	0.0	0	0.0	OK
EX4.007	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH10	EX 0610	59.230	57.820	0.000	0.000	0.0	0	0.0	OK
EX4.008	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX 0610	EX UU9613	59.230	57.470	0.034	0.000	0.0	0	0.0	OK
EX4.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH25	EX MH08	60.650	58.920	0.000	0.000	0.0	0	0.0	OK
EX4.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH24	EX MH25	60.550	59.010	0.000	0.000	0.0	0	0.0	OK
EX4.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH43	EX MH23	60.740	59.190	0.000	0.000	0.0	0	0.0	OK
EX4.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH23	EX MH24	60.630	59.117	0.000	0.000	0.0	0	0.0	OK
EX3.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0700	EX UU0701	60.480	58.440	0.000	0.000	0.0	0	0.0	OK

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EX6.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH15	EX MH13	59.600	58.600	0.000	0.000	0.0	0	0.0	OK
EX8.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH01	EX UU0607 A	59.200	57.550	0.000	0.000	0.0	0	0.0	OK
EX7.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0607	EX UU0607 A	59.230	57.470	0.000	0.000	0.0	0	0.0	OK
3.001	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	MH07	MH08	61.500	59.817	0.021	0.509	0.4	0.03	0.6	OK
3.002	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	MH08	MH09	61.520	59.711	0.041	1.086	0.4	0.05	1.3	OK
3.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH09	MH10	61.200	59.569	0.071	5.905	1.5	0.42	12.0	OK
3.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (31)	MH07	61.640	61.189	0.013	0.376	1.1	0.01	0.6	OK
Pipe (6)	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (32)	MH08	61.568	61.098	0.015	0.582	0.9	0.01	0.7	OK
PSW38.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW61	PSW62	61.550	60.686	0.058	0.997	0.5	0.28	2.2	OK
PSW38.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW62	PSW63	61.500	60.543	0.059	4.290	1.5	0.49	9.7	OK
PSW38.00 2	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW63	MH09	61.480	60.383	0.054	4.289	1.7	0.14	9.6	OK
PSW39.00 1	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW64	PSW65	61.180	59.997	0.022	0.538	0.5	0.06	0.6	OK
PSW39.00 2	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW65	PSW66	60.850	59.875	0.031	0.871	0.6	0.08	1.6	OK
PSW39.00 3	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW66	MH10	60.900	59.763	0.052	2.761	1.1	0.1	5.9	OK
3.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH10	MH11	60.800	59.096	0.085	9.084	1.3	0.22	18.3	OK
PSW39.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (33)	PSW64	61.150	60.700	0.013	0.396	1.1	0.02	0.6	OK
PSW40.00 0	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW67	PSWS68	60.300	59.118	0.020	0.286	0.5	0.07	0.6	OK

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Report Details:	Company Address:			
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PSW40.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSWS68	PSW69	59.900	58.974	0.031	0.623	0.5	0.05	1.1	OK
PSW40.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW69	MH11	60.100	58.842	0.068	3.090	0.9	0.14	6.7	OK
PSW41.000	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (34)	PSWS68	59.950	59.496	0.016	0.510	0.7	0.02	0.6	OK
EX9.001	FSR: 100 years: +45 %: 120 mins: Summer	Pipe	PR DIV 03	EX UU0508	58.632	56.233	0.042	61.973	0.9	0.04	5.4	OK
DIV1.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PR DIV 02	PR DIV 03	59.370	56.446	0.021	0.000	0.0	0	0.0	OK
DIV1.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU1504	PR DIV 01	59.190	56.690	0.000	0.000	0.0	0	0.0	OK
DIV1.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PR DIV 01	PR DIV 02	59.282	56.565	0.000	0.000	0.0	0	0.0	OK
3.005	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH11	MH12	60.200	58.610	0.106	12.449	1.3	0.28	24.8	OK
3.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH12	MH13	60.130	58.482	0.117	12.402	0.9	0.29	22.8	OK
3.009	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH15	MH16	59.300	57.938	0.300	33.089	1.7	0.7	56.6	OK
PSW42.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW70	PSW71	59.930	58.790	0.032	1.042	0.6	0.09	1.7	OK
PSW42.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW71	PSW72	60.200	58.699	0.039	1.028	0.5	0.1	1.7	OK
PSW42.003	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW72	PSW73	60.140	58.605	0.099	3.804	0.6	0.35	6.3	OK
PSW42.004	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW73	PSW74	60.050	58.599	0.150	6.142	0.7	0.51	9.1	OK
PSW42.005	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW74	PSW75	60.000	58.577	0.150	8.095	0.7	0.68	12.1	Surcharged
PSW43.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW76	PSW75	59.600	58.968	0.100	6.070	1.3	1.17	10.4	Surcharged
PSW42.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW75	MH13	59.960	58.534	0.150	15.751	1.4	1.09	25.5	Surcharged

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Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:			

PSW42.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (35)	PSW70	59.910	59.474	0.026	1.053	0.8	0.04	1.6	OK
3.007	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH13	MH14	59.900	58.255	0.128	28.126	1.6	0.26	46.1	OK
3.008	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH14	MH15	59.587	58.021	0.172	32.978	1.4	0.32	55.6	OK
PSW44.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW77	PSW78	59.200	58.265	0.069	2.248	0.9	0.68	5.0	OK
PSW44.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW78	PSW79	59.710	58.119	0.089	3.578	0.7	0.45	7.9	OK
PSW44.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW79	MH14	59.800	58.035	0.121	4.889	0.7	0.41	10.6	OK
3.012	FSR: 100 years: +45 %: 120 mins: Summer	Pipe	MH17	PR DIV 03	59.100	58.619	0.035	62.094	1.7	0.07	5.4	Surcharged
1.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH01	MH02	60.820	57.618	0.235	92.855	1.5	0.25	154.2	OK
1.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH02	MH03	60.730	57.219	0.214	113.924	1.6	0.18	181.2	OK
PSW7.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW08	PSW09	61.390	59.968	0.033	0.000	0.0	0	0.0	OK
PSW7.001	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW09	PSW10	61.340	59.930	0.087	3.854	0.6	0.2	8.2	OK
PSW7.002	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW10	PSW11	61.350	59.874	0.147	6.889	0.5	0.23	9.5	OK
PSW7.003	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW11	PSW12	61.380	59.864	0.225	10.003	0.6	0.35	14.4	OK
PSW7.004	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW12	PSW07	61.350	59.853	0.225	13.188	0.6	0.47	19.3	Surcharged
PSW1.000	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW01	PSW02	61.860	60.727	0.100	4.748	1.1	1.01	8.8	Surcharged
PSW1.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW02	PSW03	61.630	60.424	0.150	7.928	0.7	0.66	11.8	OK
PSW1.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW03	PSW04	61.530	60.378	0.150	13.738	1.2	0.93	20.8	Surcharged

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PSW1.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW04	PSW05	61.420	60.214	0.225	19.461	0.7	0.68	28.0	Surcharged
PSW1.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW05	PSW06	61.420	60.173	0.225	25.089	0.9	0.86	35.3	Surcharged
PSW1.005	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW06	PSW07	61.380	60.095	0.225	35.909	1.3	0.98	52.4	Surcharged
PSW1.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW07	PSW13	61.330	59.844	0.225	50.583	1.9	0.73	73.7	Surcharged
PSW1.007	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW13	PSW14	61.320	59.702	0.300	50.515	1.0	1.01	71.8	Surcharged
PSW1.008	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW14	PSW15	61.090	59.621	0.300	68.772	1.0	0.99	70.7	Surcharged
PSW1.009	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW15	PSW16	61.220	59.536	0.275	68.741	1.0	0.99	70.4	OK
PSW1.010	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW16	PSW17	61.150	59.476	0.236	50.272	1.2	0.98	70.2	OK
PSW1.011	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW17	PSW19	61.120	59.385	0.231	50.192	1.2	0.61	71.1	OK
PSW1.012	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW19	PSW23	60.560	59.313	0.169	89.568	2.3	1.34	95.6	OK
PSW1.013	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW23	MH01	60.660	59.104	0.153	68.275	3.0	0.17	107.1	OK
PSW22.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW43	PSW44	60.900	60.343	0.064	1.574	0.6	0.39	2.6	OK
PSW23.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW46	PSW45	60.900	60.300	0.046	0.000	0.0	0	0.0	OK
PSW22.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW44	PSW45	61.060	60.251	0.088	5.179	1.0	0.54	10.7	OK
PSW24.001	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW48	PSW47	60.850	60.277	0.067	1.585	0.3	0.17	1.8	OK
PSW22.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW45	PSW47	61.080	60.103	0.112	5.170	0.7	0.51	10.2	OK
PSW22.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW47	PSW49	61.090	60.072	0.097	9.920	1.6	0.98	19.5	OK

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PSW25.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW50	PSW49	60.700	60.129	0.045	0.986	0.5	0.18	1.9	OK
PSW22.00 5	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW49	PSW51	60.900	59.847	0.150	10.885	1.2	0.36	21.2	OK
PSW35.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW58	PSW57	60.100	59.245	0.100	2.801	0.6	0.27	4.9	Surch arged
PSW31.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW56	PSW55	60.000	59.459	0.100	3.012	1.0	0.5	7.9	Surch arged
PSW28.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW54	PSW51	60.000	59.594	0.100	2.876	1.1	0.64	8.6	Surch arged
PSW8.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW18	PSW17	60.820	59.518	0.100	0.000	0.0	0	0.0	OK
PSW9.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW20	PSW21	60.840	59.853	0.124	3.113	0.4	0.38	6.8	OK
PSW9.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW21	PSW22	61.040	59.840	0.139	10.723	1.4	1.31	23.3	Surch arged
PSW9.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW22	PSW19	60.840	59.684	0.150	11.919	1.5	0.68	26.0	OK
PSW10.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW24	PSW25	61.180	60.626	0.061	0.750	0.3	0.29	1.2	OK
PSW10.00 2	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW25	PSW26	61.220	60.619	0.084	2.742	0.8	0.84	5.7	OK
PSW11.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW27	PSW26	61.200	60.523	0.060	0.505	0.2	0.17	1.1	OK
PSW12.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW29	PSW30	61.580	60.508	0.060	0.000	0.0	0.01	0.0	OK
PSW10.00 3	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW26	PSW28	61.400	60.472	0.096	2.823	0.7	0.69	5.4	OK
PSW13.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW31	PSW30	61.100	60.496	0.083	1.332	0.4	0.44	2.7	OK
PSW12.00 1	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW30	PSW28	61.550	60.428	0.096	2.790	0.7	0.68	5.6	OK
PSW14.00 1	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW32	PSW28	61.200	60.415	0.100	0.740	0.2	0.16	1.3	OK

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PSW10.00 4	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW28	PSW33	61.220	60.409	0.150	10.900	1.0	0.92	18.4	Surcharged
PSW15.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW34	PSW33	60.880	60.248	0.100	0.253	0.1	0.08	0.6	OK
PSW10.00 5	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	PSW33	PSW35	61.250	60.190	0.145	10.277	1.1	0.96	19.0	OK
PSW16.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW36	PSW35	61.110	60.072	0.100	0.000	0.1	0.14	1.1	OK
PSW10.00 6	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW35	PSW37	61.110	60.076	0.150	12.846	1.2	1.06	21.1	Surcharged
PSW18.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW38	PSW37	61.110	59.918	0.100	0.000	0.0	0.01	0.1	OK
PSW10.00 7	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW37	PSW39	60.850	59.936	0.150	16.306	1.5	1	25.3	Surcharged
PSW19.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW40	PSW39	60.900	59.790	0.060	0.000	0.0	0	0.0	OK
PSW10.00 8	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW39	PSW41	60.750	59.663	0.084	17.576	2.1	0.48	27.9	OK
PSW20.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW42	PSW41	60.710	59.655	0.024	0.000	0.0	0	0.0	OK
PSW10.00 9	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW41	MH02	60.600	59.458	0.150	21.087	1.3	0.11	35.8	OK
PSW2.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving	PSW02	61.695	61.199	0.076	1.707	1.1	0.06	2.8	OK
PSW3.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (1)	PSW03	61.600	61.123	0.100	1.373	0.7	0.05	2.1	OK
PSW4.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (2)	PSW04	61.480	61.003	0.100	1.376	0.5	0.05	2.1	OK
PSW5.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (3)	PSW05	61.430	60.953	0.100	1.373	0.4	0.05	2.1	OK
PSW6.000	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (4)	PSW06	61.365	60.908	0.100	1.515	0.2	0.06	1.7	OK
PSW10.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (17)	PSW24	61.220	60.767	0.025	0.513	0.4	0.04	0.6	OK

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PSW13.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (16)	PSW31	61.272	60.817	0.025	0.521	0.4	0.02	0.6	OK
PSW14.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (15)	PSW32	61.253	60.798	0.018	0.544	0.7	0.03	0.6	OK
PSW22.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (9)	PSW43	61.050	60.610	0.028	1.018	0.7	0.05	1.2	OK
PSW17.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (36)	PSW35	61.300	60.859	0.095	1.011	0.3	0.02	1.1	OK
PSW25.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (11)	PSW50	60.683	60.228	0.020	0.531	0.5	0.04	0.6	OK
PSW24.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (10)	PSW48	60.950	60.510	0.021	1.018	0.9	0.05	1.2	OK
PSW27.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (18)	PSW52	59.522	59.125	0.100	0.681	0.5	0.17	3.3	OK
PSW26.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (19)	PSW52	59.500	59.110	0.100	0.448	0.4	0.25	2.8	OK
PSW28.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (20)	PSW54	59.570	59.179	0.100	0.431	0.6	0.53	4.3	OK
PSW29.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (21)	PSW54	59.632	59.262	0.100	1.730	1.0	0.2	4.1	Surchar
PSW30.00 0	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Porous Paving (22)	PSW54	59.650	59.225	0.100	0.400	0.3	0.24	2.4	OK
PSW31.00 0	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (23)	PSW56	59.670	59.280	0.100	0.607	0.5	0.12	1.3	OK
PSW32.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (24)	PSW56	59.682	59.272	0.100	0.700	0.8	0.08	2.1	OK
PSW33.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (25)	PSW56	59.720	59.307	0.100	0.453	0.3	0.14	2.3	OK
PSW34.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (26)	PSW56	59.740	59.323	0.100	0.451	0.3	0.17	2.3	OK
PSW35.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (27)	PSW58	59.790	59.340	0.100	0.370	0.4	0.05	0.7	OK
PSW36.00 0	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (28)	PSW58	59.830	59.379	0.100	0.373	0.4	0.03	0.6	OK

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PSW37.000	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (29)	PSW58	59.870	59.430	0.100	1.018	0.7	0.05	1.2	OK
22.000	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Porous Paving (30)	PSW59	60.570	60.129	0.100	1.020	0.1	0.03	1.2	OK
EX3.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (26)	EX UU0700	60.460	59.380	0.000	0.000	0.0	0	0.0	OK
EX4.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH08	PR DIV 08	60.370	58.648	0.000	0.000	0.0	0	0.0	OK
EX4.005	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PR DIV 08	EX MH11	60.500	58.526	0.000	0.000	0.0	0	0.0	OK
PSW21.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (14)	PSW41	60.713	60.220	0.024	0.000	0.0	0	0.0	OK
1.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH03	MH04	60.150	57.120	0.317	114.008	1.5	0.07	176.9	OK
1.005	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	MH06	EX UU9613	59.670	57.153	0.072	15.140	0.8	0.82	5.0	Surcharged
1.003	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	MH04	MH05	59.314	57.153	0.656	147.284	0.4	0.06	131.7	OK
1.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH05	MH06	59.602	57.074	0.692	14.021	0.4	0.01	22.1	Surcharged
PSW26.002	FSR: 100 years: +45 %: 60 mins: Summer	Pipe	PSW53	PSW51	60.500	59.523	0.150	3.450	0.5	0.42	8.3	Surcharged
PSW26.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW52	PSW53	59.970	59.593	0.100	1.917	0.9	0.84	6.7	Surcharged
PSW22.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW51	PSW55	60.580	59.580	0.150	20.905	1.0	0.92	18.4	Surcharged
PSW22.007	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW55	PSW57	60.710	59.438	0.150	29.157	1.4	1.26	25.1	Surcharged
PSW22.008	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	PSW57	PSW59	60.560	59.174	0.150	37.148	1.8	1.58	31.4	Surcharged
PSW22.009	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW59	PSW60	60.540	58.783	0.150	60.623	2.3	2.02	40.2	Surcharged
PSW9.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Porous Paving (6)	PSW20	61.420	60.969	0.035	0.377	0.4	0.01	0.6	OK

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2.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH05	Cellular Storage (1)	59.602	57.074	0.225	0.000	1.7	2.21	65.9	Surcharged
2.001	FSR: 100 years: +45 %: 240 mins: Winter	Pipe	Cellular Storage (1)	MH05	59.600	56.884	0.225	0.000	0.1	0.02	1.1	Surcharged
PSW22.010	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	PSW60	MH05	60.050	57.766	0.150	60.608	2.4	0.56	40.2	OK
3.010	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH16	Cellular Storage	59.300	57.938	0.300	38.910	2.5	0.22	73.2	Surcharged
3.011	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Cellular Storage	MH17	59.300	57.938	0.150	7.357	0.5	0.4	7.2	Surcharged
EX1.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH9803	EX MH9801	61.470	59.630	0.000	0.000	0.0	0	0.0	OK
EX1.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH9801	EX MH0713	61.330	58.910	0.000	0.000	0.0	0	0.0	OK
EX1.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX MH0713	EX UU0710	61.390	58.400	0.000	0.000	0.0	0	0.0	OK
EX1.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0710	EX UU0741	61.090	57.590	0.000	0.000	0.0	0	0.0	OK
EX1.005	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0741	EX Assumed 01	61.230	56.660	0.000	0.000	0.0	0	0.0	OK
EX1.006	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX Assumed 01	EX UU9707	61.100	55.075	0.000	0.000	0.0	0	0.0	OK
EX2.005	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0709	EX UU0710	61.200	57.760	0.000	0.000	0.0	0	0.0	OK
EX2.004	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0717	EX UU0709	60.940	58.140	0.000	0.000	0.0	0	0.0	OK
Pipe (10)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0715	EX UU0717	61.430	59.660	0.000	0.000	0.0	0	0.0	OK
EX2.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU1610	EX UU1701	60.780	59.320	0.000	0.000	0.0	0	0.0	OK
EX2.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU1701	EX UU1702	61.620	59.070	0.000	0.000	0.0	0	0.0	OK
EX2.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU1702	EX UU0708	61.310	58.880	0.000	0.000	0.0	0	0.0	OK

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EX2.003	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0708	EX UU0717	61.140	58.415	0.000	0.000	0.0	0	0.0	OK
EX3.002	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU0701	EX UU0709	60.530	58.250	0.000	0.000	0.0	0	0.0	OK
EX9.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	EX UU1607	EX UU1504	60.290	57.650	0.000	0.000	0.0	0	0.0	OK