Plot H, Sister
Charles Street, Manchester
Flood Risk Assessment and Drainage Strategy

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Inspiring Built Environments

Civil & Structural Engineering
DfMA & Precast Concrete
Below Ground Drainage

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Acronyms	
AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
DCG	Design and Construction Guidance
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FEEP	Flood Emergency and Evacuation Plan
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SWMP	Surface Water Management Plan
UU	United Utilities

1.0 Introduction

Roscoe have been commissioned to undertake a Flood Risk Assessment (FRA) for Plot H, Charles Street in Manchester This statement will be used to support the full planning application for the proposed development.

The National Planning Policy Framework (NPPF) states that an appropriate FRA will be required for all development proposals of 1ha or greater in Flood Zone 1 and for any development within Flood Zone 2 or 3.

The EA's Flood Map for Planning shows that the site is located in Flood Zone 2, this assessment will therefore focus on the flood risk to the site from watercourses as well as assessing the flood risk from all other sources.

1.1 Relevant Legislation Policy and Guidance

This FRA has been carried out in accordance with the NPPF and the accompanying Planning Practice Guidance (PPG) "Flood Risk and Coastal Change". This FRA also incorporates advice and guidance from the Environment Agency (EA), Manchester City Strategic Flood Risk Assessment (SFRA) 2011 and CIRIA documents.

The surface water drainage strategy is in accordance with:

- The Department for Environment, Food and Rural Affairs (DEFRA) "Non-Statutory Technical Standards for Sustainable Drainage Systems".
- The Lead Local Flood Authority in Manchester (LLFA), Manchester City Council (SFRA), guidance document on SUDS/Drainage.
- Building Regulations Part H
- Places for Everyone (PfE) Policy JP-S4 Flood Risk and the Water Environment
- Manchester Core Strategy Development Plan 2024
- Policy EN8 Adapting to Climate Change
- Policy EN14 Flood Risk
- Policy EN17 Water Quality

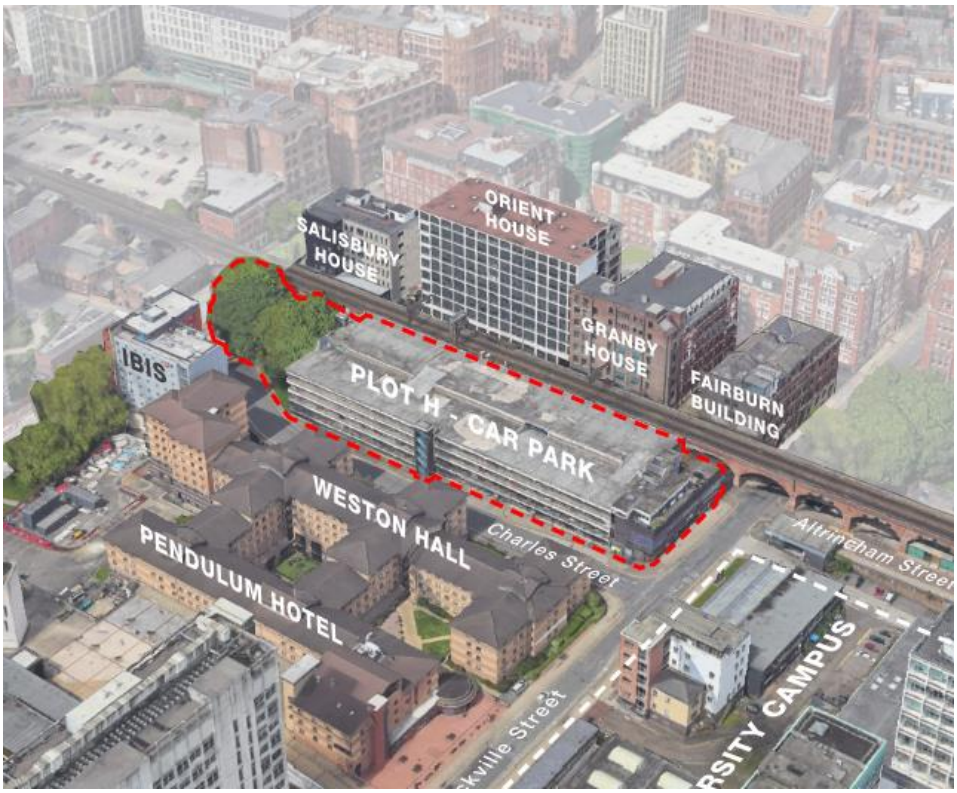


Figure 1.1: Site Location Plan (Google Maps 2025)

Policy Context and Compliance

This Flood Risk Assessment (FRA) has been prepared in accordance with national, regional, and local planning policy, including the Manchester City Council Strategic Flood Risk Assessment (SFRA), the Manchester Core Strategy Development Plan (2024), and the Greater Manchester Places for Everyone (PfE) Plan.

Places for Everyone (PfE) Policy JP-S4: Flood Risk and the Water Environment

PfE Policy JP-S4 seeks to ensure that new development is directed to areas of lowest flood risk, incorporates appropriate mitigation, and delivers sustainable water management in line with the catchment-based approach promoted by the Greater Manchester Combined Authority.
This FRA demonstrates that the proposed development accords with JP-S4 by:

- Locating development within Flood Zone 2 and incorporating mitigation measures to ensure safety and resilience to flooding;
- Managing surface water runoff through the implementation of Sustainable Drainage Systems (SuDS);
- Ensuring runoff rates and volumes do not increase flood risk elsewhere; and
- Supporting enhancement of the local water environment through appropriate water quality and discharge controls.

Manchester Core Strategy Development Plan (2024)

This FRA responds to the relevant policies within the Core Strategy as follows:

- **Policy EN8: Adapting to Climate Change**
  The development integrates climate resilience measures, including SuDS and raised finished floor levels, to adapt to potential increases in flood risk arising from climate change.
- **Policy EN14: Flood Risk**
  The site-specific FRA demonstrates that the development will be safe for its lifetime without increasing flood risk on or off site. Mitigation includes maintaining appropriate freeboard above design Finish Floor Levels (FFLs) and ensuring safe access and egress during extreme events.
- **Policy EN17: Water Quality**
  Surface water from the site will be managed through SuDS features designed to improve water quality prior to discharge. The drainage design will include treatment stages to remove pollutants and protect downstream receiving waters.

Manchester Strategic Flood Risk Assessment (SFRA)

The MCC SFRA identifies Flood Zone 2 areas as being subject to a medium probability of flooding and requires site-specific FRAs to demonstrate resilience. This FRA follows the SFRA's recommendations by:

- Assessing all potential flood sources, including fluvial, surface water, groundwater, and sewer flooding;
- Incorporating mitigation measures appropriate to the site's flood risk level; and
- Demonstrating compliance with the Sequential and Exception Tests where relevant.

In summary, the proposed development is fully compliant with the relevant flood risk and water environment policies of the PfE Plan, Manchester Core Strategy Development Plan, and MCC SFRA. The FRA confirms that flood risk will be appropriately managed and that the development contributes to wider objectives of climate resilience and sustainable water management.

2.0 Site Description and Location

The site is located in Manchester city centre. It forms the north-western corner of the former UMIST campus. The site can be identified by nearest postcode M1 7AR and can be further located by national grid reference 38444, 39757. The site is bound by Charles Street to the South, Manchester South Junction and Altrincham Railway viaduct and Granby Row to the North, Sackville Street to the East and Princess Street to the West. The site also lies within the sister strategic regeneration area aligned to Plot H.

Land to north and northwest, beyond the viaduct arches on Granby Row, comprises the following residential buildings: Uncle, Granby House, and Salisbury House. Land to the north-east comprises green public space at Vimto Park and the now vacant Sackville Building, which also form part of the sister masterplan.

To the east lies the Paper Science Building and Renold Building. Renold Building has recently undergone works to re-activate the building for commercial uses and collaboration spaces related to Sister and beyond Renold, Plot C for which planning applications have been recently submitted for a commercial development and new civic square. Further north- east lies Picadilly station, Manchester's primary rail hub.

Land to the south comprises Weston Hall which is purpose-built student accommodation building. Land to the south-west comprises the former UMIST Campus.

The southern boundary of the SRF area is the Mancunian Way, beyond which lies the predominantly residential areas of Ardwick, Brunswick and Hulme.

The site principally was used as a multistorey car park which closed in October 2024. The car park is no longer fit for purpose and therefore has reached the end of its economic life. The site is roughly 0.742 ha.

Full Planning Permission for demolition of existing multi-storey car park and associated commercial units (retail and sui generis bar uses), to facilitate future development was validated on the 27th of August 2025.



Figure 2.1: Red Line Boundary (Hodder + Partners 17/10/2025)

2.1 Existing Drainage

A United Utilities asset survey was obtained on the 3rd of April 2025. The survey identified a 900mm surface water culvert entering the site in the north-east corner on Sackville Street, travelling diagonally through the site and exiting in the south-west of the development within Charles Street. Subsequent correspondence with the LLFA has identified the existing sewer as a culverted section of Shooters Brook, which ultimately discharges into the River Medlock. There are foul runs either side of the side, located on Sackville Street and Princess Street. The asset survey has been attached in Appendix A.

A further CCTV drainage survey was conducted on the 2nd of September 2025 by Ironwork Locations. The pipe routes inside the multistorey car park were only shown indicatively as a trace was not possible, most likely due to the presence of rebar in the ground floor construction. The culvert outflows downstream to the river Medlock. The depths of the two manholes on site are 4.81m and 6.17m. The labelled plan CCTV survey is attached in Appendix B.



Figure 2.2: United Utilities Asset Survey (2025)

3.0 Development Proposal

RGRE Ltd, ID Manchester and The University of Manchester's northern campus is set to become the home of Manchester's new innovation district- Sister. The location of the district provides the opportunity to link Manchester Picadilly to the Oxford Road corridor and circle Square, connecting the university campus to the heart of the city centre. The proposed development comprises Purpose Built Student Accommodation (PBSA) with ground floor flexible commercial floorspace across three buildings of 8, 10 and 38 storeys with a two storey podium.

There are 1,041 accommodation units and 3 commercial units proposed. As part of the development, high quality amenity space is proposed, predominantly located at ground floor and within the podium of tower 3. The development on plot H will enhance pedestrian cycle routes, revive green public space and create landmark entrance to sister neighbourhood.

The proposed ground floor level is expected to range from 33.50-36.50m AOD and the basement level is expected to range from 31.35-31.85m AOD.

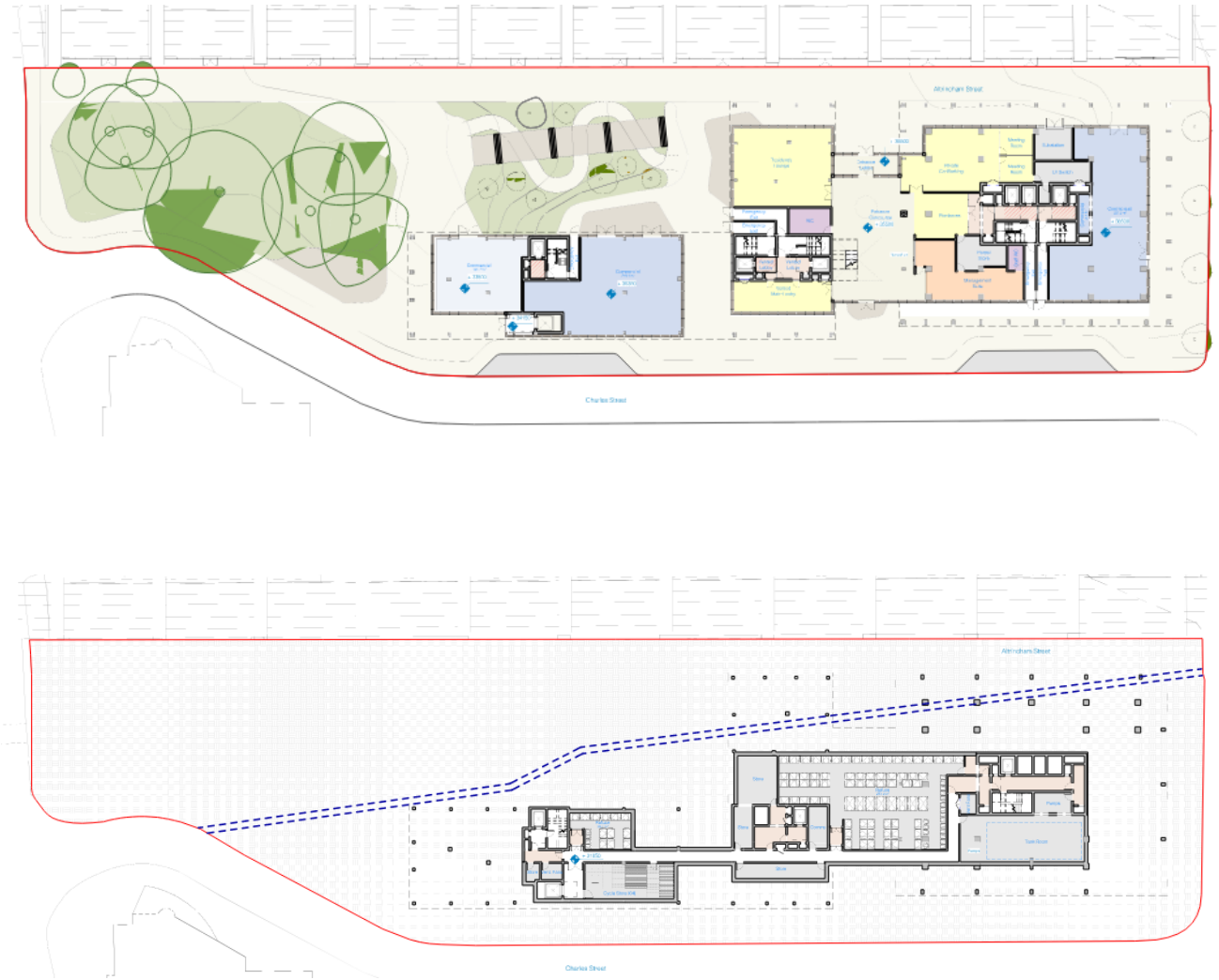


Figure 2.1: Ground/ Basement Site Layout (17/10/25)



Figure 3.2: Proposed Site Layout (Hodder +Partners 2025)

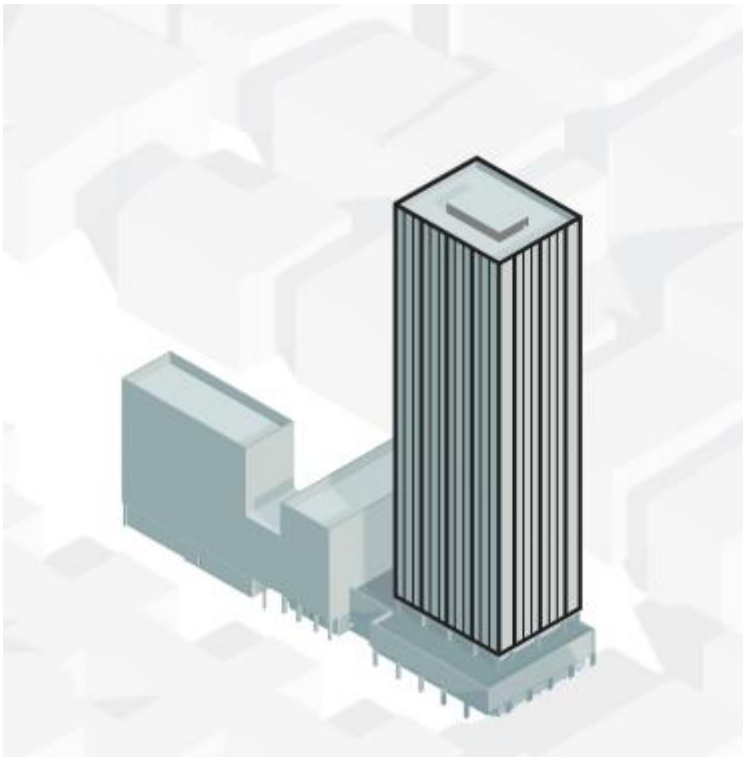


Figure 3.3: Proposed Site Layout (Hodder + Partners 2025)

4.0 Flood Risk Assessment

4.1 Flood Risk from Watercourses

The Environment Agency's Flood Map for Planning (Figure 4.1) identifies the site as being located within Flood Zone 2, indicating a medium probability of flooding associated with the River Medlock. The River Medlock lies immediately to the southwest of the site and flows westward as a minor watercourse along the southern and western boundaries. According to the EA classification, land within Flood Zone 2 has an annual probability of fluvial flooding between 0.1% and 1% (1 in 1,000 to 1 in 100-year events).

The EA's mapping does not indicate that the site benefits from formal flood defences, although it is noted that not all existing defences are represented on the publicly available datasets.

Further review of the EA's detailed flood mapping (Figure 4.2) confirms that the site is predominantly at low risk of fluvial flooding, with much of the eastern portion — where the main development activities are concentrated — located within an area of very low flood risk. Accordingly, the majority of the site lies outside the defined fluvial flood extents associated with the River Medlock.

Development activities, including site access, infrastructure, and any ancillary works, will be located outside the areas identified as being at risk of flooding. As such, the proposed development will not:
- Obstruct existing flood flows;
- Reduce functional floodplain storage; or
- Increase flood risk to third parties.

While the site's proximity to the River Medlock is acknowledged, the proposed layout and design ensure that flood risk to and from the development remains low. A precautionary approach will be maintained through ongoing monitoring of river levels during high-risk periods and the implementation of flood resilience and emergency procedures in line with Environment Agency guidance.

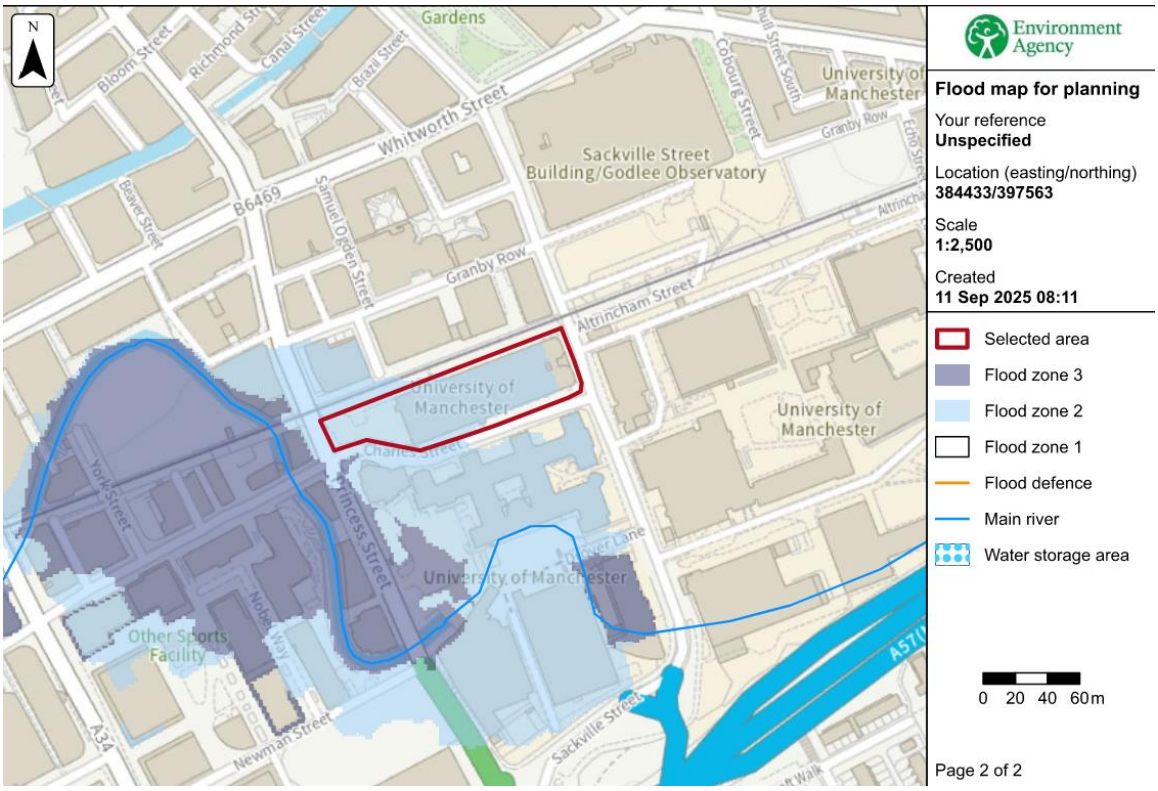


Figure 4.1: EA's Flood Map for Planning (2025)

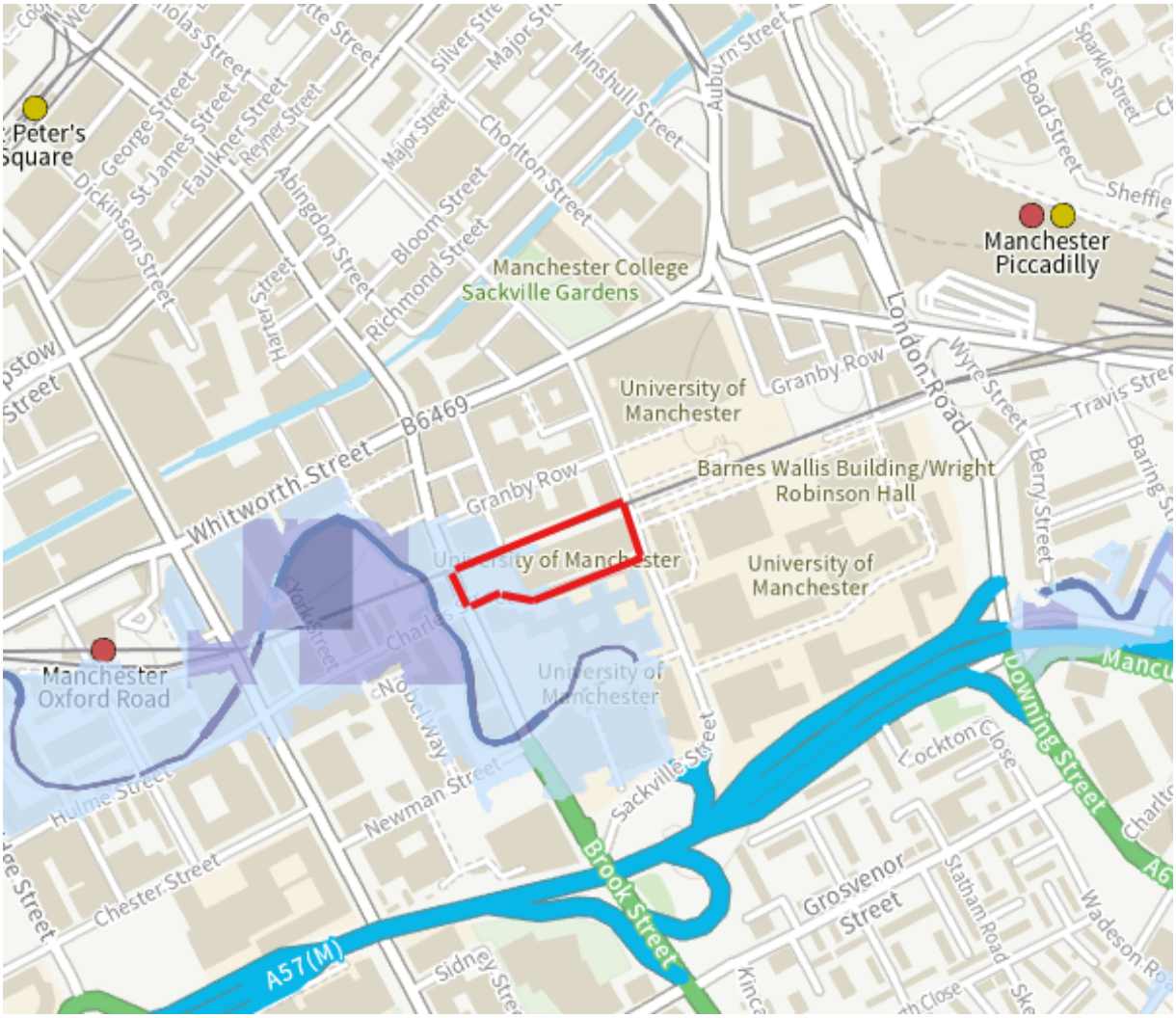


Figure 4.2: EA's Detailed Flood Mapping (2025)

4.2 Sequential and Exception Tests

Sequential Test

In accordance with the National Planning Policy Framework (NPPF);

"The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

"A sequential, risk-based approach should also be taken to individual applications in areas known to be at risk now or in the future from any form of flooding." (paragraph 173)

and associated Planning Practice Guidance (PPG);

"The sequential approach to the location of development in flood risk areas … is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. … Avoiding flood risk through the sequential test is the most effective way of addressing flood risk because it places the least reliance on measures like flood defences, flood warnings and property-level resilience features."

The PPG also states:

"The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites…"

The Sequential Test has been considered in accordance with the above statements for the proposed development. The site lies within Flood Zone 2, where residential development (classified as 'more vulnerable') is appropriate subject to the Sequential Test being satisfied.

In line with updated guidance and the local planning authority's advice, the Flood Risk Assessment demonstrates that the proposed layout, design, and mitigation measures will ensure that occupiers and users of the development remain safe from all sources of flooding, including current and future surface water flood risk, for the lifetime of the development. The assessment confirms that the proposals will not increase flood risk elsewhere. Refer to Section 4.8 for climate change allowances and Appendix D for the proposed drainage strategy.

On this basis, it is concluded that the Sequential Test is met, as the development is appropriately located and all identified flood risks have been fully addressed through the proposed design and mitigation strategy.

This development has a vulnerability classification of More Vulnerable, under the PPG and so as can be seen from Table 4.1 it is appropriate in Flood Zone 2, and the exception test will therefore not be required.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	**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.						

Table 4.1 Flood Risk Vulnerability and Flood Zone Compatibility from PPG "Flood Risk and Coastal Change" Table 3

4.3 Flood Risk from Pluvial Flooding

Pluvial flooding can occur when intense or prolonged rainfall overwhelms surface water drainage systems, resulting in overland flow and temporary ponding in low-lying areas. This is typically a concern where the local topography encourages runoff to concentrate or where drainage infrastructure is insufficient.

Based on Environment Agency surface water flood mapping, the site is located in an area classified as very low risk of surface water flooding. There are no mapped overland flow routes crossing the site, and adjacent roads are also shown to be at low risk, meaning the potential for off-site flows entering the site is minimal.

The overall risk of surface water flooding during the enabling works is considered very low. No additional flood mitigation measures are considered necessary, although river levels and weather forecasts will be monitored during works to ensure temporary structures do not impede natural drainage.

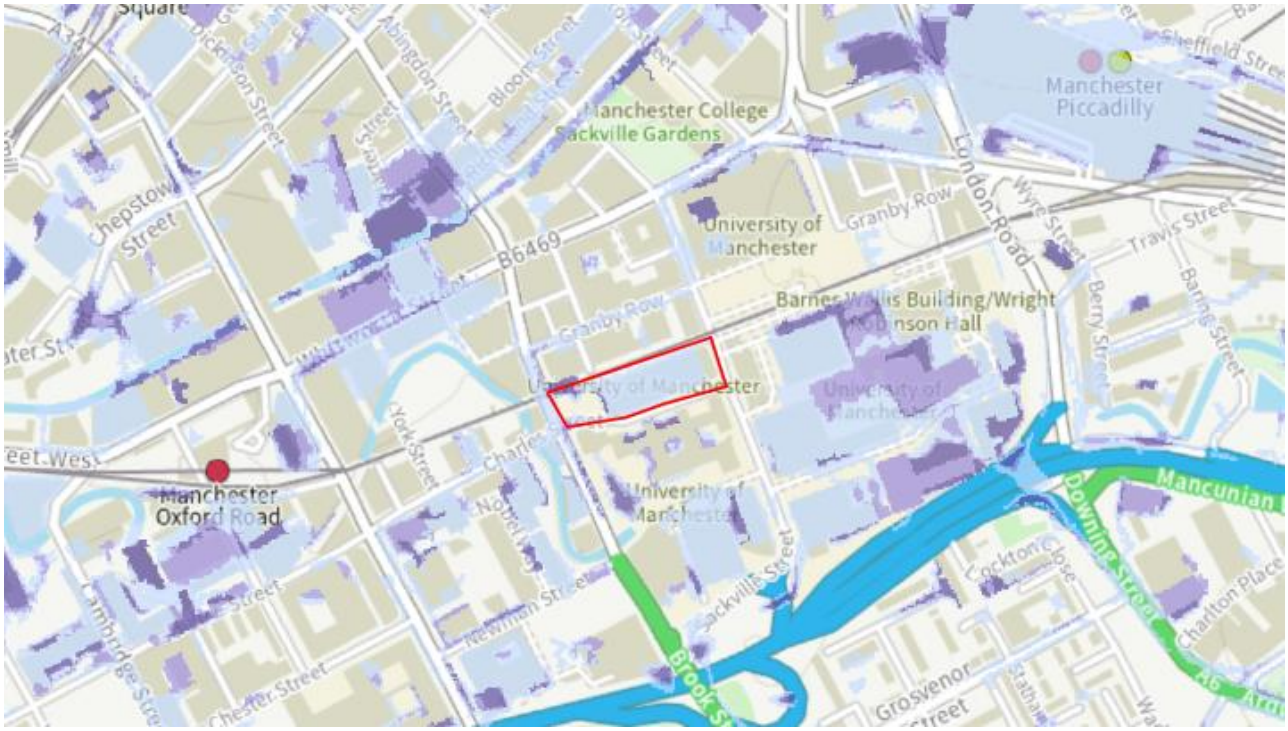


Figure 4.3: EA Historic Pluvial Flood Map (2025)

4.4 Flood Risk from Overland Flows

Overland flow flooding can occur when rainfall intensity exceeds the capacity of local drainage infrastructure, leading to surface water accumulation that follows the natural topography toward lower-lying areas. The extent and direction of such flows are primarily influenced by ground gradients and local physical features.

A review of the site's topographic data indicates levels fall gradually from approximately 36.6 m AOD in the east to 33.0 m AOD in the west, resulting in a gentle westward slope across the site. The adjacent Charles Street, located immediately to the south, sits marginally lower than the site platform, while the railway embankment and bridge to the north form a raised boundary that would restrict overland flow from external sources. Based on these local level relationships, it is considered unlikely that surface water runoff from adjoining land or infrastructure would enter the site during extreme rainfall events.

Surface water runoff generated within the site will be directed and managed in accordance with a detailed drainage strategy developed for the proposed development. The strategy will incorporate Sustainable Drainage Systems (SuDS) where feasible, ensuring that runoff is attenuated, treated, and discharged at greenfield or agreed rates to prevent an increase in flood risk downstream.

Given the site's topography, absence of overland flow pathways from surrounding areas, and the inclusion of sustainable drainage measures within the design, the overall risk of surface water (pluvial) flooding at the site is assessed to be low. Ongoing management and maintenance of the drainage infrastructure will ensure continued performance and compliance with planning policy requirements.

4.5 Flood Risk from Groundwater

Groundwater flooding can occur when the water table rises above ground level, typically following extended periods of sustained rainfall that lead to elevated groundwater conditions. This form of flooding is most likely to occur in low-lying areas underlain by permeable geological strata, such as sands, gravels, or fractured bedrock, where groundwater can move freely and respond rapidly to rainfall events.

At present, no site-specific ground investigation or borehole data is available to confirm the depth to groundwater beneath the site. However, based on a review of available geological mapping and the site's topographical context, the site is situated at an elevated level relative to surrounding streets. There are no records or indications of historical groundwater flooding in the immediate vicinity.

On this basis, the potential for groundwater emergence or flooding at the surface is assessed to be low. It is therefore considered that groundwater flooding does not present a significant constraint to the proposed development. Should future site investigations identify localised perched groundwater, this can be managed through conventional foundation and drainage design measures as part of detailed design.

4.6 Flood Risk from Reservoirs

According to the Environment Agency's flood mapping for reservoirs, the site is located within an area identified as being at risk in the extremely unlikely event of a reservoir failure.

While the probability of reservoir flooding is extremely low, due to robust inspection and maintenance procedures under the Reservoir Act 1975, the consequences could be significant. The flood extent mapping provided by the EA assumes a worst-case uncontrolled release and does not account for operational response or downstream attenuation. This map is attached as Figure 3.3. Much of the reservoir network is owned and managed by UU, who monitor and maintain reservoirs as required to ensure their structural integrity and safety.

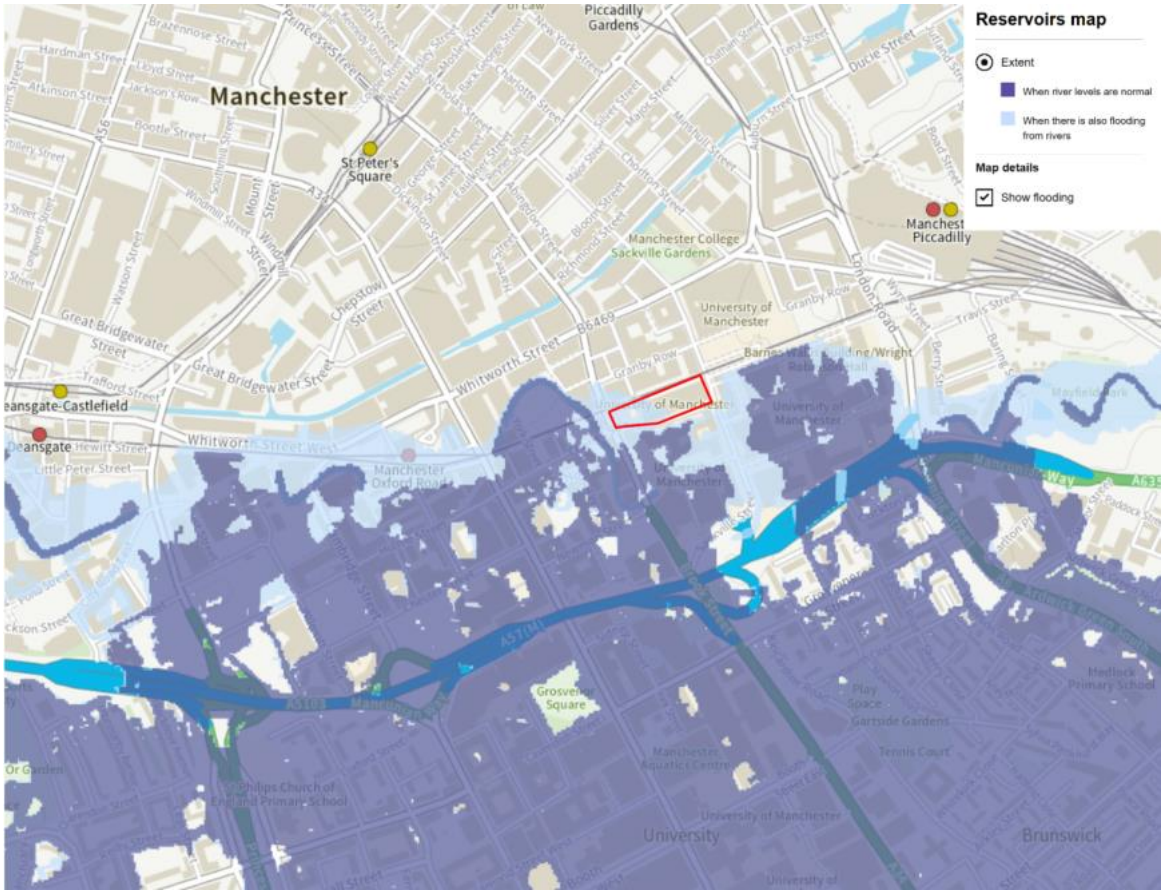


Figure 4.4: Environment Agency Risk of Reservoir Flooding Map 2025

The EA's information states that reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Reservoir Act of 1975 ensures that reservoirs are inspected regularly, and essential safety work is carried out.

4.7 Flood Risk from Sewers

Sewer flooding can occur when the capacity of the public sewer network is exceeded during intense rainfall, or if blockages or hydraulic restrictions occur.

There are no known records of sewer flooding in the vicinity of the site, and the risk of surcharge from the local sewer network is therefore considered to be very low.

Given the absence of historic incidents and the limited scope of the works, the risk of flooding from public sewer surcharge is considered negligible.

4.8 Climate Change

In line with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG), the potential effects of climate change on flood risk have been considered.

The site is located within Flood Zone 2, indicating a low to medium probability of fluvial flooding during extreme events.

Product 4 data was obtained on the 30th of October 2025 for the site and is attached in Appendix F. “No defences exist modelled fluvial extent and height” was modelled on the site with water levels reaching a maximum height of 33.88m AOD for the 0.1% AEP flood event. No data was available for the 1% AEP scenario. The evaluation of the product 4 data in relation to the proposed basement is included in Section 6.5.

In line with the Environment Agency guidance (March 2023) for the North West River Basin District, the upper end allowance for the 2070s epoch (45%) has been applied to rainfall to reflect climate change impacts over the lifetime of the development. This represents the most appropriate allowance given the site’s lifetime and vulnerability classification, ensuring a precautionary and robust approach.

Climate change mapping and EA modelled extents

A search of the Environment Agency Risk of Flooding from Rivers and Sea mapping was undertaken on 5th November 2025. The EA mapping layer for “Yearly chance of flooding between 2036 and 2069” returned “No data available” for the site (i.e. the EA does not provide a modelled flood extent for that epoch at this location). A copy of the EA mapping extract is included in Figure 4.5.

In the absence of EA Product 4 modelled climate-change flood extents, the assessment follows the NPPF/PPG and EA guidance for the North West River Basin District. The site is located within Flood Zone 2 and, given existing site topography and the distance from the nearest main river channel, it is not anticipated that future increases in river levels would materially increase flood risk to the site. In addition, a precautionary allowance for climate change has been applied to rainfall (upper end allowance of 45% for the 2070s epoch) in line with the Environment Agency (March 2023) guidance.

Should the Local Planning Authority require EA modelled flood extents incorporating the central allowance for peak river flow, these can be requested from the Environment Agency (Product 4 model outputs) or via the LLFA.

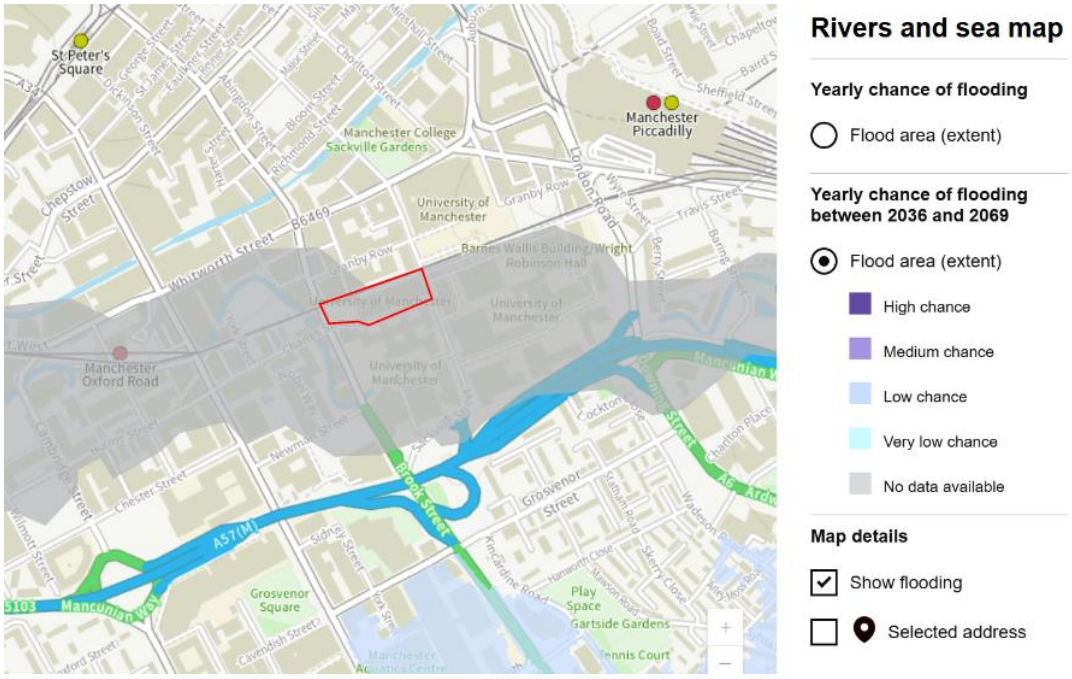


Figure 4.5: Environment Agency Risk of Rivers and Sea Map (2025)

4.9 Summary of Flood Risk

Flood Risk	Flood Zone/ Risk	Actions
Fluvial (Watercourses – River Medlock)	Flood Zone 2 – **Medium** Probability (0.1%–1% annual chance)	Development areas positioned outside fluvial flood extents. Maintain floodplain storage and flow routes. Apply EA climate change allowances (45% rainfall). Incorporate flood resilience and emergency procedures.
Pluvial (Surface Water)	**Very Low**	No specific measures required beyond monitoring weather and river levels during construction. Maintain natural drainage routes.
Overland Flow	**Low**	Implement SuDS-based drainage strategy to manage on-site runoff at greenfield/agreed rates. Maintain and manage drainage infrastructure to ensure long-term performance.
Groundwater	**Low**	Investigate groundwater during detailed design. If perched groundwater identified, manage via foundation/drainage design.
Sewers (Public Drainage Network)	**Very Low**	Ensure connection to public network is agreed with utility provider. Maintain regular inspection of private drains.
Reservoirs	**Extremely Low**	None required beyond standard emergency planning. Risk remains minimal due to statutory inspection and maintenance under the Reservoirs Act 1975.

5.0 Safe Access, Warning and Evacuation Plan

In accordance with the Planning Practice Guidance (PPG), developments located within areas at risk of flooding must demonstrate that safe access and egress can be achieved for the lifetime of the development. The proposed development is situated within Flood Zone 2, representing a low to medium probability of flooding from fluvial sources.

Safe access and egress will be maintained via the surrounding highway network, which lies outside the mapped flood extents and provides a dry route to areas at lower risk. The layout has been designed to ensure that key access points, pedestrian routes, and emergency exits remain functional during a flood event up to the design flood level.

A site-specific Flood Emergency and Evacuation Plan (FEEP) will be developed and maintained by the site operator to provide clear procedures for early warning, evacuation, and recovery. The FEEP will include the following key measures:

- Registration with the Environment Agency's Flood Warning Service to ensure timely receipt of alerts.
- Ongoing monitoring of Met Office weather forecasts and flood alerts, with proactive suspension of vulnerable operations during high-risk periods.
- Designation of safe refuge areas within the site, located on land of lowest flood risk.
- Identification and signage of safe access and egress routes connecting to the wider highway network.
- Staff training and periodic drills to ensure all personnel are familiar with emergency procedures.
- Secure storage of materials, equipment and plant to prevent damage or displacement during flooding.

Through these measures, the proposed development will ensure that safe access and egress can be maintained in the event of flooding, thereby complying with the requirements of the NPPF and PPG, and ensuring that flood risk to people and property is appropriately managed.

Flood Alert - Prepare: Flooding is possible. Be prepared	
 Is used from two hours to twelve hours in advance of flooding.	**Following Actions:** • Check your flood risk • Sign up for flood warnings • Keep up to date with the latest situation - call Floodline on 0345 988 1188 • Be ready to follow your flood plan • Have insurance documents and any medications ready • Avoid walking, cycling or driving through any flood water • Move any livestock and farming equipment away from areas likely to flood
Flood Warning - Act: Flooding is expected. Immediate action is required	
 Is used from half an hour to two hours in advance of flooding.	**Following Actions:** As with Flood Alert plus; • Protect yourself and your loved ones • Move your loved ones, pets and valuables to a safe place • Move to higher ground or the upper floor of a building • Turn off the gas, electricity and water in your home if it's safe • Put flood protection equipment in place • Do as the emergency services tell you • Help others if it's safe to do so
Severe Flood Warning - Survive: Severe flooding. Danger to life	
 issued when flooding threatens life and communities	**Following Actions:** As with Flood Warning plus; • Stay in a safe place • Be ready to evacuate your home • Do as the emergency services tell you • Call 999 if you are in immediate danger • If you are caught in a flash flood move to higher ground or the upper floor of a building if it's safe.

Table 5.1: Environment Agency Flood Warning System

6.0 Surface Water Run Off Assessment

The total site area is approximately 0.742 ha of which all has been assumed as impermeable. As described in section 1, the site currently drains to a surface water drainage network on site.

6.1 Greenfield Runoff Rates

The local guidance states that development should aim to achieve as close to the greenfield runoff rate as possible. The greenfield run off rates for storm events of several difference return periods were calculated using the IH 124 method and are summarised below. Supporting documentation is attached as Appendix C.

Q_{BAR} = 3.0 l/s
Q_{30} = 5.8 l/s
Q_{100} = 7.1 l/s

Following consultation with the Lead Local Flood Authority (LLFA), the greenfield run off rate has been proposed as the allowable discharge from the site. Greenfield runoff methods have been calculated using the IH124 method, which is the nationally recognised methodology for sites of this nature.

For robustness, the proposed discharge has been limited to Q_{BAR} (mean annual flood). This approach aligns with the advice provided at the pre-application stage and ensures that the development does not discharge at a higher rate greater than the typical long-term greenfield response, providing a precautionary and sustainable basis for design.

In line with the agreed drainage strategy, the surface water will discharge at a rate of 3.0 l/s into the culvert on site.

By following the council's direction and applying Q_{BAR} as the limiting discharge, the scheme demonstrates compliance with local requirements and provides assurance that flood risk will not be increased on or off the site. Following a meeting with the LLFA and UU on the 5th of November 2025- the flow rate of 3l/s has been agreed by both parties.

6.2 Proposed Run-off

The proposed surface water drainage strategy has been developed using detailed hydraulic modelling carried out in Infodrainage, based on the 1% annual exceedance probability rainfall event (1 in 100 year) plus a 45% climate change allowance on rainfall intensity. The system design is site-specific, incorporating measured impermeable areas, site gradients and drainage infrastructure in accordance with current best practice and national guidance.

Given that the development is for a residential development, it is classified as "more vulnerable" under the National Planning Policy Framework (NPPF) vulnerability classifications. The anticipated design life of the development is 60 years, extending to approximately 2085. In line with the Environment Agency Guidance (March 2023) for the North West River Basin District, the central allowance for the 2070s epoch (45%) has been applied to rainfall to reflect climate change impacts over the lifetime of the development. This represents the most appropriate allowance given the site's lifetime and vulnerability classification, ensuring a precautionary and robust approach.

One attenuation tank is proposed for the development; it has been sized based on the Infodrainage modelling to provide adequate storage and manage peak runoff effectively. The discharge rate for the proposed site into the existing United Utilities surface water manhole to the south of the site shall be restricted to 3l/s- this will require an attenuation volume of 285m^3. A detailed proposed drainage layout for the site is included in Appendix D and the Infodrainage results are attached in Appendix E.

As the surface water drainage system will remain in private ownership, it is not subject to adoption under Sewers for Adoption or the Design and Construction Guidance (DCG). For the purposes of hydraulic modelling, we have

adopted a volumetric runoff coefficient (Cv) value of 1.0 for all impermeable areas, in line with industry best practice.

6.3 Attenuation Tank Zone 2

The proposed surface water drainage strategy includes an attenuation tank located within Flood Zone 2 and the tank has approximately 1m of cover. The inclusion of this feature in the floodplain has been fully accounted for in the Infodrainage hydraulic modelling which demonstrates that, under extreme conditions including the 1% AEP rainfall event with a 45% climate change allowance. A comprehensive maintenance plan will ensure that inlets, outlets and overflow paths remain fully operational.

This approach aligns with CIRIA SuDS Manual (C753) and Environment Agency guidance, which allows attenuation structures in floodplains provided they are designed to manage flows safely and avoid increasing flood risk. Together, these measures demonstrate that the attenuation tanks and pond in Flood Zone 2 provide a controlled, resilient and policy compliant method of managing water for the site.

6.4 Proposed Buildover Solution

The CCTV survey had identified that the existing multistorey car park discharges surface water directly into a culverted watercourse beneath the site without any form of attenuation or treatment. This free discharge arrangement posed a significant risk to water quality, particularly due to the potential for hydrocarbons, from vehicle drips, spills, and exhaust residues, and de-icing salts, used during winter maintenance, to be conveyed directly into the watercourse. The absence of any interceptors or water quality treatment measures means there is no control over first flush contaminants or long-term pollutant loading. Furthermore, the direct connection to the culvert eliminates opportunities for natural attenuation, infiltration, or pollutant settlement that would otherwise reduce environmental impact. The proposed design will remove any discharge to the watercourse via trafficked areas whilst also introducing a significant increase in soft landscaping features that allow for natural infiltration.

There will also be a significant reduction in surface water runoff for the development, from the previous free discharge rate of 42l/s, calculated of the modified rational method, to a greenfield runoff rate of 3l/s, based on the Qbar for the development boundary. This constitutes a 93% betterment on the existing flow for the development, with large storm events attenuation in a proposed crate system for up to the 100yr + 40% climate change storm events.

Correspondence was undertaken with United Utilities regarding buildover requirements. United Utilities confirmed that, as the asset in question comprises a culverted section of Shooters Brook rather than a public sewer, they have no comments or specific requirements in relation to asset protection or buildover.

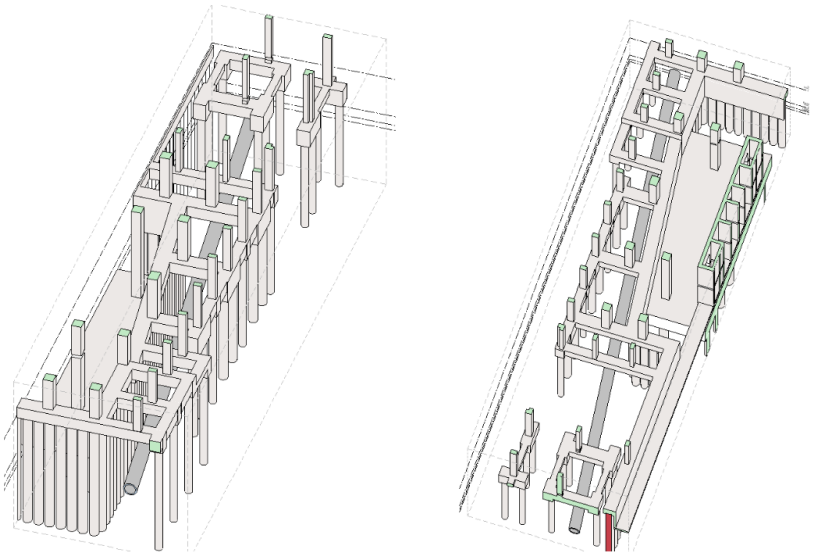


Figure 6.1: Pile Arrangement with Culvert (Roscoe 2025)

6.5 Basement/ Ground Level Fluvial Flood Risk

Product 4 data obtained from the Environment Agency on the 30st of October 2025 which identifies that the site lies within Flood Zone 2, indicating a medium probability of fluvial flooding. The modelled flood extents associated with the adjacent watercourse are located to the west of the site and do not extend across the proposed development footprint.

Flood modelling for the 1% AEP +35% climate-change allowance indicates a maximum water level of 32.88 m AOD, while the 1% AEP +70% allowance produces a maximum level of 33.44 m AOD. In both cases, the modelled flood extents remain to the west and do not overlap with the site or the proposed basement outline.

The basement outline has been overlayed on top of the fluvial extent map and is shown in Figure 6.2. The proposed basement floor level is 31.85 m AOD and will be non-habitable, used solely for plant and storage. Although the basement level lies below the modelled flood levels, the flood mapping confirms that floodwaters are not predicted to reach this area under either climate-change scenario. To manage residual risks such as groundwater ingress or extreme exceedance events, the basement will be designed and constructed in accordance with BS 8102: 2022 (Protection of Below Ground Structures Against Water Ingress). The design will incorporate tanking and structural waterproofing and a dedicated sump-and-pump system comprising duty and standby pumps with automatic operation and high-level alarm functionality. A maintenance and management plan will ensure continued reliability of the system and other flood-resilience measures.

The ground-floor finished floor level (FFL) is 33.50 m AOD, which is above both the 1% AEP +35% (32.88 m AOD) and 1% AEP +70% (33.44 m AOD) predicted flood levels. Consequently, the ground-floor accommodation will remain dry and accessible during both the design and extreme-event scenarios, providing safe refuge and continuity of building operation. The FFL provides approximately 620 mm of freeboard above the 1% AEP +35% level, satisfying Environment Agency freeboard guidance, and remains slightly above the upper-end 1% AEP +70% level. As the +70% scenario represents a sensitivity test rather than the design condition, it is considered appropriate to retain the current FFL, supported by the proposed flood-resilient construction measures, flood-warning procedures, and safe access and egress arrangements.

All essential plant and electrical equipment will be located above the 1% AEP +35% design flood level, or housed within sealed, flood-rated enclosures where retained in the basement.

Given that the site lies outside the modelled flood extents for all assessed climate-change scenarios, and that the development incorporates robust waterproofing, pumping and management measures, the residual fluvial flood risk to both the basement and ground floor is considered low and acceptable for the proposed use.

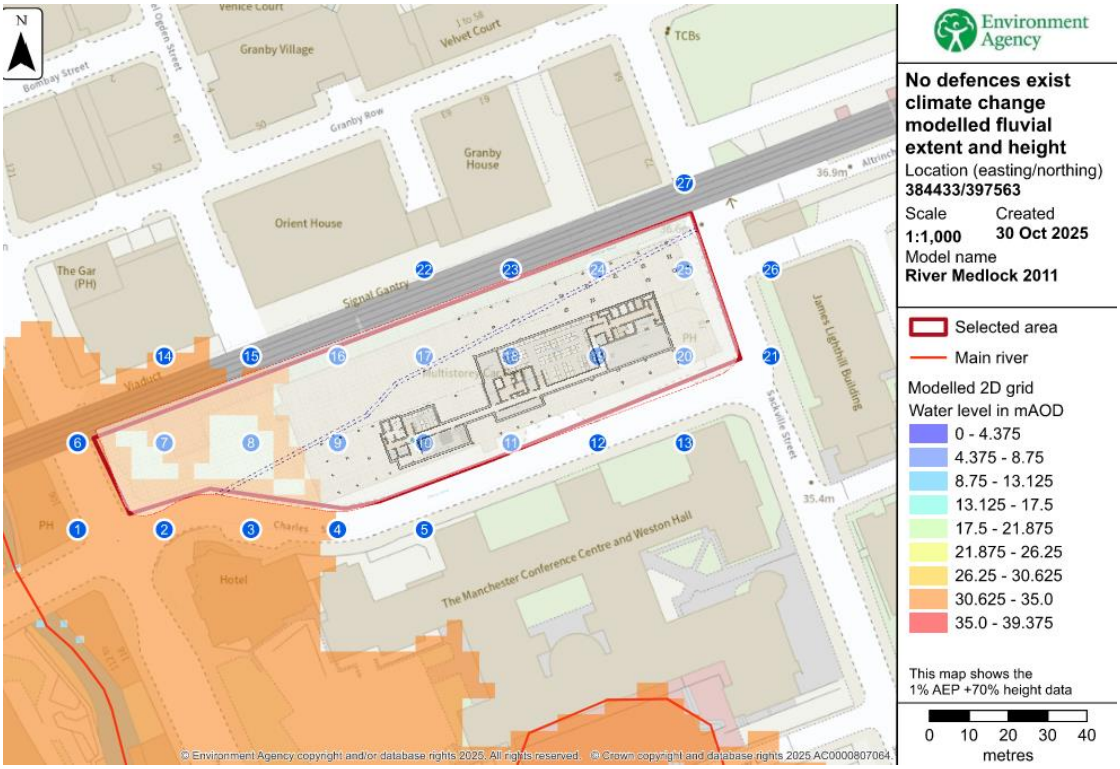


Figure 6.2: Basement Extents with Product 4 Fluvial Extent Data (2025)

7.0 SuDS Assessment

In accordance with EA guidelines and CIRIA documents, surface water runoff should be managed as close to its source as possible. The NPPF states that the following drainage hierarchy should be used to determine runoff destination.

Infiltration Into the Ground

Infiltration drainage has been considered in accordance with the Sustainable Drainage Systems (SuDS) hierarchy; however, it is not considered a viable option for this site. A United Utilities-owned culvert is known to run beneath the site, and the asset owner does not permit the placement of infiltration or other SuDS features directly above or within the easement of their strategic infrastructure due to the potential risk of structural interference and restricted maintenance access. Furthermore, no BRE 365 infiltration testing has been undertaken on site to confirm ground permeability or infiltration rates. In the absence of site-specific infiltration data and given the presence of the culvert constraint, infiltration-based drainage solutions are deemed unsuitable for this development.

To a Surface Water Body

Surface water from the proposed development is to discharge into the existing culvert that runs beneath the site, via an existing manhole connection. The discharge will be restricted to a controlled rate of 3 l/s, ensuring compliance with greenfield runoff principles and minimising the potential for increased flood risk downstream. United Utilities, as the asset owner, has confirmed that this discharge arrangement and connection point are acceptable in principle. The culvert conveys flows directly into the River Medlock, providing a suitable outfall for the site's surface water runoff in accordance with the SuDS hierarchy and the requirements of the Lead Local Flood Authority.

To a Surface Water Sewer, Highway Drain, or Another Drainage System

The intention is to discharge the surface water from the proposed site into an existing surface water sewer as mentioned in the section above. This connection will be direct and will require a Section 106 agreement from United Utilities.

To a Combined Sewer

The proposals do not involve discharging surface water into a combined sewer, however as discharging to a combined sewer.

Proposed Discharge Rates and Attenuation Volume

Communications with United Utilities have been initiated with the intention to discharge surface water via gravity to their surface water drainage network. The proposed discharge rates and attenuation volumes have been included in Section 6.2.

Water Quality

SuDS have the potential to provide water quality benefits to runoff entering the environment. The SuDS Manual states that SuDS should be designed to treat runoff to reduce the risk of environmental pollution. Chapter 26 of The SuDS Manual sets out the 'simple index approach' to water quality risk management. This approach has been used to quantify the benefits of the proposed SuDS scheme on water quality.

Step 1 of the simple index approach is to identify the pollution hazard indices for the proposed land use. As the site is student accommodation, the CIRIA SuDS Manual (C753) categorises it under residential roofs.

Therefore, the proposed development is considered to have a 'very low' pollution hazard level and 7.1 below shows the associated pollution hazard index:

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change, all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution, sites where chemicals and fuels are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.8

Table 7.1: Pollution Hazard Indices, taken from Table 26.2 of The SuDS Manual (CIRIA, 2015)

Step 2 of the simple index approach is to select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.

The principal destination of the runoff is to surface water sewer, but small amounts of infiltration may occur from unlined components. Therefore, the surface water pollution mitigation indices should be used for the main surface water discharge, and the groundwater pollution mitigation indices used for the discharge to groundwater, as shown in Table below.

The indicative surface water pollution mitigation indices for a filter drain and pond are shown in Table 7.2 below:

Type of SuDS Component	TSS	Metals	Hydrocarbons
Filter Drain	0.4	0.4	0.4

Table 7.2: Surface Water Pollution Mitigation Indices, taken from Table 26.3 of The SuDS Manual

To determine if a filter drain is enough for the site using the Simple Index Approach (SIA) from the CIRIA SuDS Manual (C753), the pollution hazard indices will need to be compared with the combined mitigation indices of the SuDS components.

Pollutant	TSS	Metals	Hydrocarbons
Pollution Index	0.2	0.2	0.05
Filter Drain	0.4	0.4	0.4
Meets requirement?	yes	yes	yes

Table 7.3: Surface Water Pollution Mitigation Index vs mitigation assessment

Provided that the mitigation indices of the treatment techniques are greater than or equal to the hazard indices for the proposed development then there should be no reduction in the overall water quality within the receiving watercourse or groundwater body. Therefore, the incorporation of a filter drain, will provide suitable prevention from pollution.

Biodiversity and Amenity

The SuDS Manual describes that in addition to water quantity and water quality, key aspects of SUDS are amenity and biodiversity. Filter drains offer significant biodiversity and amenity benefits alongside their primary role in surface water management. A green public space is also proposed which increases the overall greenery on the site.

Filter drains and the proposed green space can enhance biodiversity, especially when designed with vegetation. They create habitats that support insects, pollinators, and small mammals, while also acting as linear green corridors that help wildlife move through urban spaces. The stones and gravel within filter drains offer microhabitats for invertebrates, further boosting ecological value. From an amenity perspective, vegetated filter drains improve the visual appeal of a site compared to traditional drainage systems.

8.0 Surface Water Maintenance Strategy

ID Manchester Ltd will own the SuDS and will maintain it in accordance with the guidance below. The successful implementation and operation of a SuDS system depends on a robust and clear maintenance strategy being implemented. The following measures should form part of the site's proposed management plan.

It is envisaged that the majority of the site drainage will be offered for adoption to United Utilities subject to further discussions. However, the majority of the SuDS will be maintained by ID Manchester Ltd and will form part of the overall maintenance regime for the site.

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
Filter Drains	**Regular Maintenance**	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly, or as required
		Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Half yearly
		Remove sediment from pre-treatment devices	Half yearly, or as required
	Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods e.g. NJUG, 2007 or BS 3998:2010	As required
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
		Clear perforated pipework of blockages	As required
Attenuation Tank	**Monitoring / Inspections**	Inspect all inlets, outlets, vents, overflows and control structures to ensure they are working as they should	Annually or after severe storms
		Inspect and identify any elements that are not operating correctly.	Monthly for three months, then half yearly or as required.
	Regular Maintenance	Remove sediments / debris from catch pits / gullies and control structures	Annually, after severe storms or as required
	Remedial Actions	Repair inlets, outlets, vents, overflows and control structures.	As required

Table 8.1: Surface Water Maintenance Strategy Table

Effective SuDS design must assess all foreseeable risks during construction and maintenance. These must be mitigated during the detailed design stages where effective design will aim to avoid, reduce and mitigate risks.

This process will also require input from the principal contractor who will ensure the construction of SuDS components are carried out in a safe and sustainable manner.

9.0 Foul Water Assessment

The foul drainage will flow via gravity to a United Utilities combined sewer asset to the north of the site. Further investigation is required to confirm if this connection is viable. The foul drainage from the basement will be pumped to higher level at a restricted rate of 6l/s.

All proposed networks will be designed to Adoptable Standards as outlined in the Design and Construction Guidance (Appendix C of the Sewerage Sector Guidance in relation to the adoption of sewerage assets) (DCG) and in accordance with Building Regulations Part H.

The foul water drainage will discharge at an unrestricted flow.

A 'Pre-development Enquiry' was submitted to United Utilities to confirm capacity exists within the receiving public sewers on the 3rd of September 2025. United Utilities have confirmed that their preferred point of connection for the foul drainage is the one that we have proposed.

10.0 Conclusions

This FRA relates solely to Charles Street, Plot H. The site can be identified by nearest postcode M1 7AR, and can be further identified by national reference 38444, 39757.

The EA mapping indicates that the site is within Flood Zone 2.

The proposed ground floor level is expected to range from 33.50-36.50m AOD and the basement level is expected to range from 31.35-31.85m AOD.

The overall risk from fluvial flooding (Watercourses- River Medlock) is medium probability.

The overall risk from pluvial flooding is very low.

The overall risk from overland flow is low.

The overall risk from groundwater flow is low.

The overall risk from sewers is very low.

The overall risk from reservoirs is extremely low.

A site-specific Flood Emergency and Evacuation Plan (FEEP) will be implemented.

The use of filter drains and an attenuation tank will be used as SuDS features on site. Roscoe proposes a QBAR greenfield run off discharge rate which is a flow rate of 3l/s which is accordance with the local SFRA and has been confirmed with United Utilities. The required attenuation tank size is 285m^3. The surface water will discharge directly into an existing United Utilities surface water manhole on site.

The foul drainage will flow via gravity to a United Utilities combined sewer asset to the north of the site.

Appendix A
United Utilities Asset Survey

Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Jonathon Taylor

Quayside House
Furnival Road,
Sheffield,
S4 7YA

FAO:

Your Ref: Former Charles St MSCP
Our Ref: UUPS-ORD-641696
Date: 03/04/2025

Dear Sirs

Location: FLAT 4 GRANBY HOUSE GRANBY ROW, MANCHESTER, M1 7AR

I acknowledge with thanks your request dated 27/03/2025 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

[redacted]

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

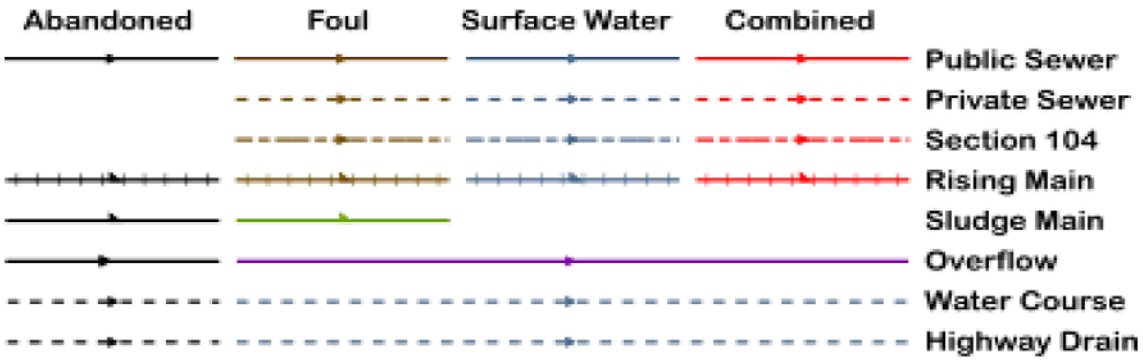
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

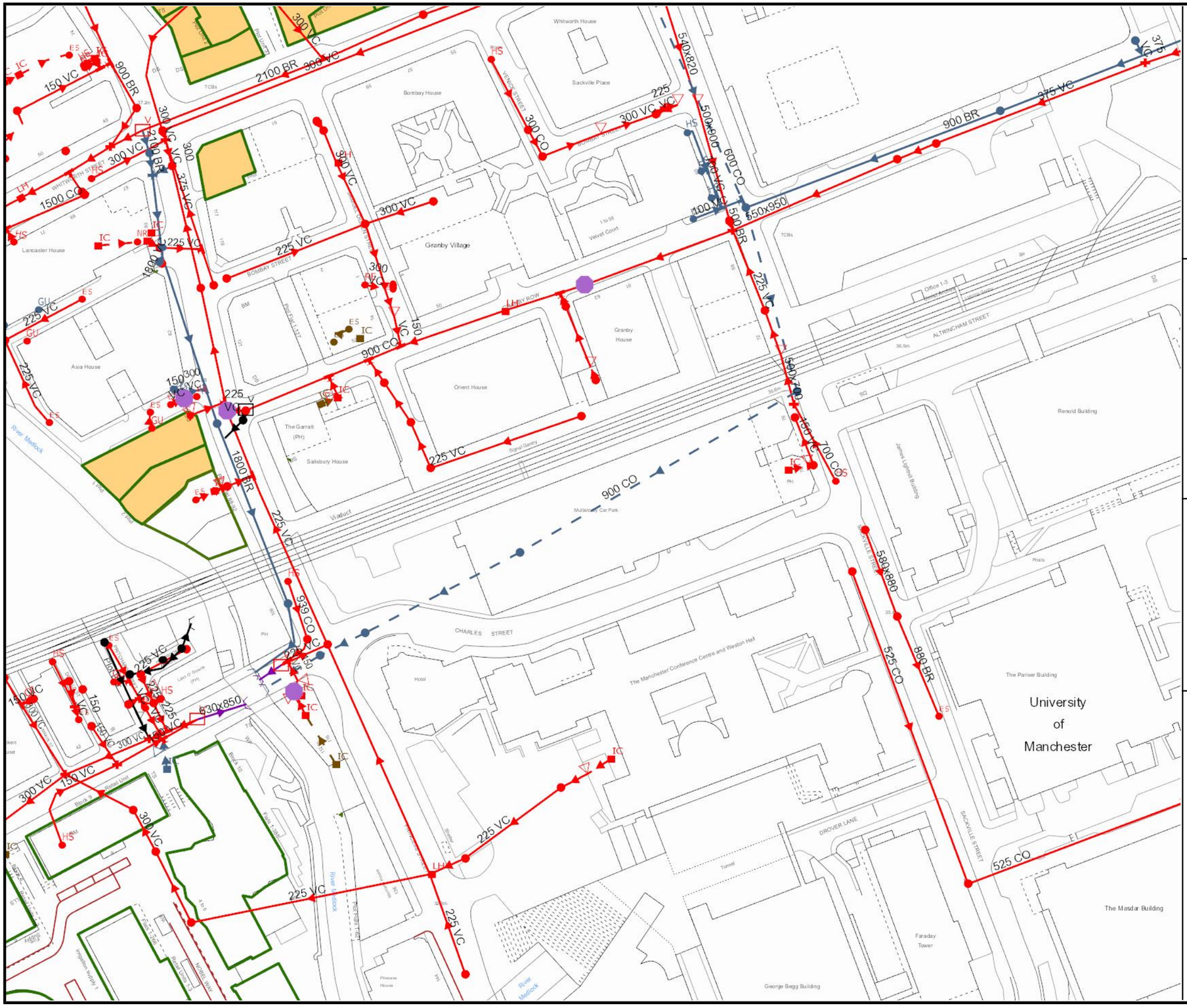
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- CK Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



United Utilities

Water for the North West

SEWER RECORDS

Address or Site Reference

FLAT 4 GRANBY HOUSE
GRANBY ROW,
MANCHESTER,
M1 7AR

Scale: 1:1250
Date: 03/04/2025

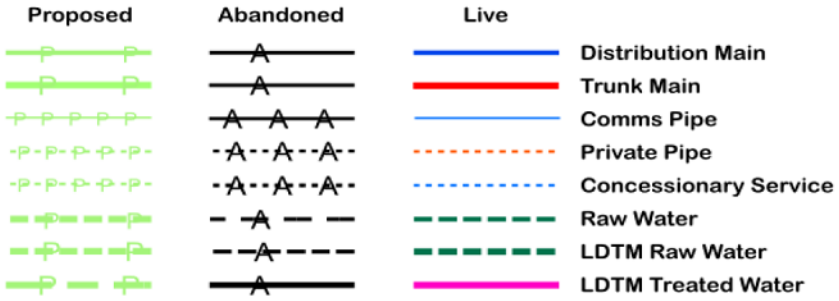
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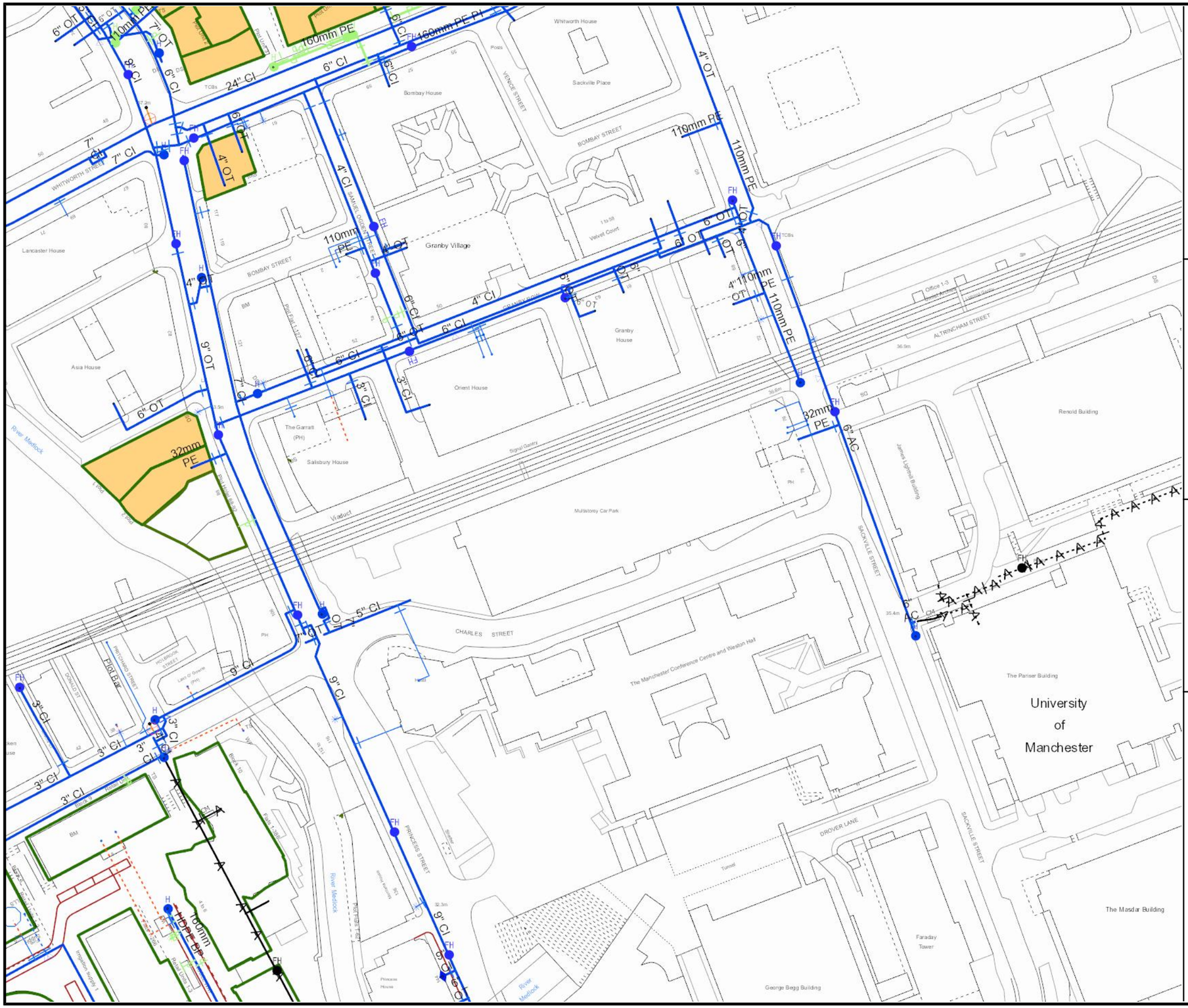
United Utilities
Water for the North West

Clean Water Symbology





Symbology for proposed assets is the same as above, but shown in green
Symbology for abandoned assets is the same as above, but shown in black



WATER MAIN RECORDS

Address or Site Reference

FLAT 4 GRANBY HOUSE
GRANBY ROW,
MANCHESTER,
M1 7AR

Scale: 1:1250
Date: 03/04/2025

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix B
Drainage CCTV Survey

Charles Street, Manchester M1 3BB

CCTV Survey Review and Remedial Requirements

Ref: 25415-ROS-00-XX-T-C-0552 (P01)

900mm Circular Surface Water run across site.

Based on - Charles Street_Manchester_Drainage CCTV Survey (02/09/2025)

Ambler Group Surveys.

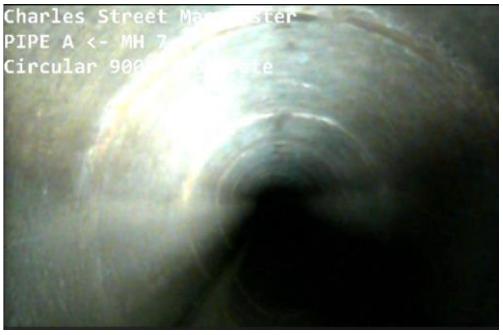
Colour coding as an indicator of severity.

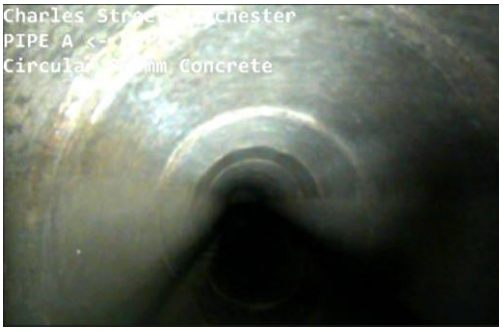
Green – Remedial work not required.

Orange – Remedial work recommended.

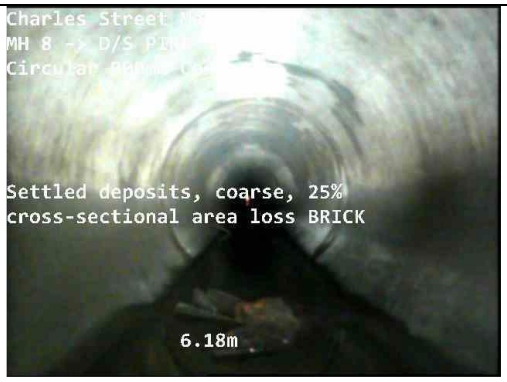
Red – Remedial work required.

Charles Street_Manchester_Drainage CCTV Survey (02/09/2025)					
Section	**Drainage Run Existing Site Run (Surface / Foul)**	**CCTV Comments**	**Photos**	**Comments**	**Severity**
1	MH5 > MH7 Start Node MH7. (length: 84.0m)	1. Settled deposits, 15% cross-sectional area loss start at 1m, change to 5% at 6m. 2. Pipe condition at 10m – Good.	1.  2.  	**High-Pressure Water Jetting:** Flushing out loose material. If the cleaning process does not resolve the issue, further remedial work may be required.	

		3. Pipe condition at 20m – Good.	3.  		
		4. Settled deposits, 15% cross-sectional area loss.	4.  		
		5. Pipe condition at 30m – Good.	5.  		
		6. Pipe condition at 40m – Good.	6.  		
		7. Pipe condition at 50m – Good.	7.  		

		8. Pipe condition at 60m – Good. 9. Pipe condition at 70m – Good. 10. Pipe condition at end of run – Good.	8.  9.  10.  		
2	MH7 > MH8 (Surface) (length: 8.82m)	1. Pipe condition at start of run - Good. 2. Pipe condition at 3m – Good.	1.  2.  	No remedial action required.	

		3. Pipe condition at 6m - Good.	3.  		
3	MH8 > MH9 (Surface) (length: 51.07m)	1. Pipe condition at start of run - Good.	1.  	**High-Pressure Water Jetting:** Flushing out loose material. If the cleaning process does not resolve the issue, further remedial work may be required.	
		2. Settled deposits at 1m.	2.  		
		3. Settled deposits, coarse, 15% cross-sectional area loss, start at 2.13m.	3.  		
		4. Settled deposits, hard or compacted, 10% cross-sectional area loss at 4.12m.	4.  5.		

		5. Settled deposits, coarse, 25% cross-sectional area loss (BRICK) at 6.18m.			
		6. Settled deposits, coarse, 10% cross-sectional area loss at 7.01m.	6. 		
		7. Pipe condition at 10m - Good.	7. 		
		8. Pipe condition at 20m - Good.	8. 		
		9. Pipe condition at 30m - Good.	9.  10.		

		10. Settled deposits, coarse, 20% cross-sectional area loss (STONE & BRICK) at 35.86m.			
		11. Pipe condition at 40m - Good.	11. 		
		12.Settled deposits, coarse, 10% cross-sectional area loss, finish at 43.40m.	12. 		
		13. Settled deposits, fine, 5% cross-sectional area loss, start at 43.41m.	13. 		
		14. Pipe condition at 45m – Good.	14. 		
			15.		

		15. Settled deposits, fine, 5% cross-sectional area loss, finish at 51.07m.			
7	MH9 > Outfall (length: 75.4m)	No defects detected. 1. Pipe condition at start of run – Good. 2. Pipe condition at 10m – Good. 3. Pipe condition at 20m – Good. 4. Pipe condition at 30m – Good.	1.  2.  3.  4.	No remedial action required.	

		5. Pipe condition at end of run – Good.	 5. 		

Appendix C
Greenfield Run Off Rates

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

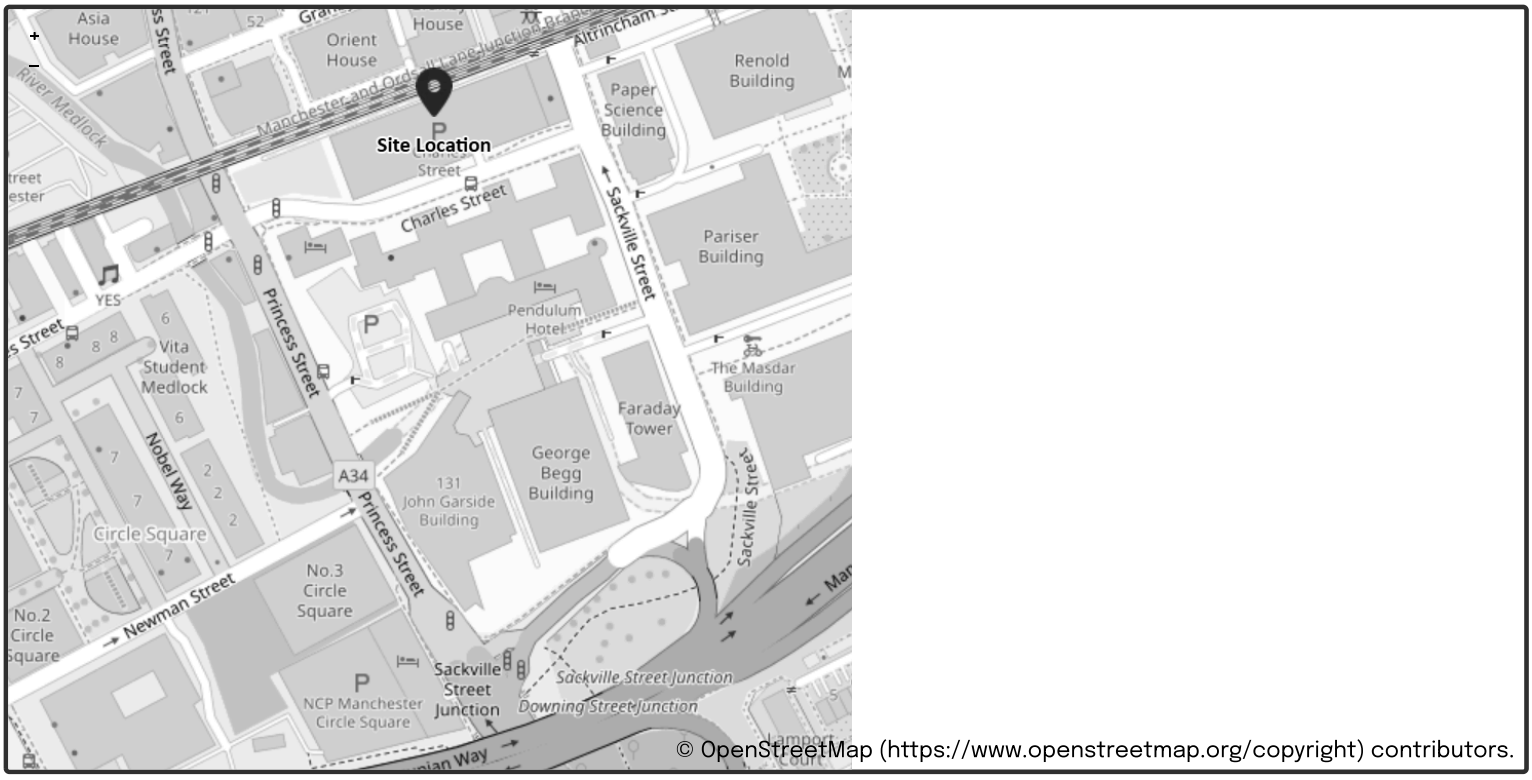
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	25/09/2025
Calculated by	Adnan yusuf
Reference	Charles st ROSCOE
Model version	2.1.2

Location

Site name	Charles Street
Site location	



Site easting (British National Grid)	384440
Site northing (British National Grid)	397564

Site details

Total site area (ha)	0.54 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	881 mm		881
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	3.41 l/s		

Growth curve factors

	My value		Map value
Hydrological region	10		10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

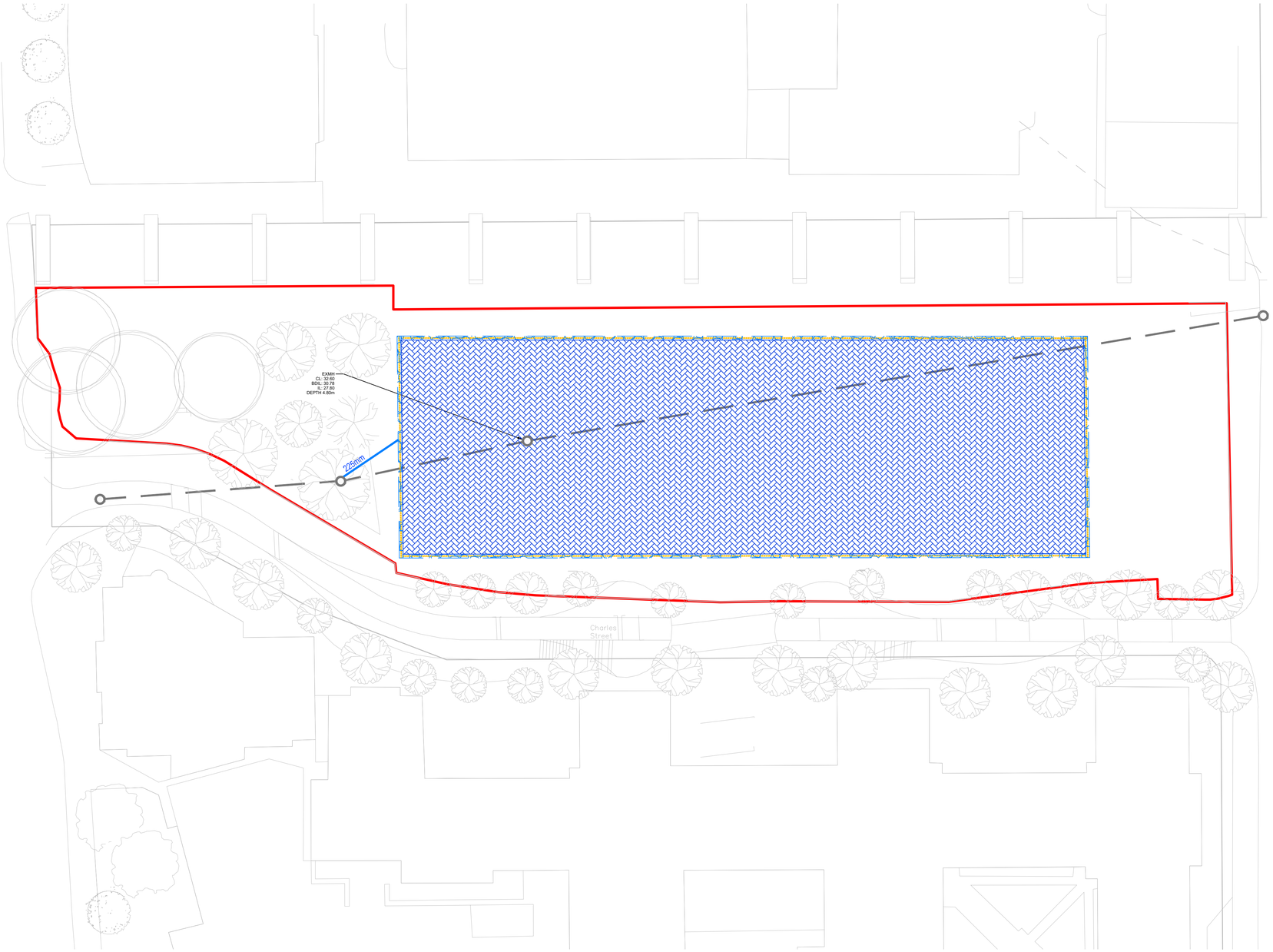
Method	IH124
Flow rate 1 year (l/s)	3.0 l/s
Flow rate 2 year (l/s)	3.2 l/s
Flow rate 10 years (l/s)	4.7 l/s
Flow rate 30 years (l/s)	5.8 l/s
Flow rate 100 years (l/s)	7.1 l/s
Flow rate 200 years (l/s)	8.1 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.1.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix D
Proposed Drainage Layout



DO NOT SCALE

General:

1. Do not scale from the drawings. All dimensions must be checked / verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant Architects, Engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. The drawing is for information purposes only. Drainage design subject to change throughout detailed design.

- Proposed Surface Water Drainage
- Existing Surface Water Culvert
- Porous Paving
- Filter Drain

REV	DATE	BY	DESCRIPTION	CHK	APP
P01	19.09.25	NP	FOR INFORAMTION	JT	JT

DRAWING STATUS: FOR INFORMATION

Roscoe
CIVIL & STRUCTURAL ENGINEERS
INSPIRING BUILT ENVIRONMENTS

CLIENT: RG GROUP

ARCHITECT: HODDER + PARTNERS

PROJECT: CHARLES STREET MANCHESTER

TITLE: PROPOSED DRAINAGE LAYOUT OPTION 1

SCALE @ A1:	CHECKED:		APPROVED:
1:200	JT		AW
PROJECT NUMBER:	DESIGNED:	DRAWN:	DATE:
25XXX	AY	AY	MAY 2025

DRAWING No: 25XXX-ROS-00-00-DR-C-09000 REV: P01

Appendix E
Infodrainage Calculations

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		



Catchment Area

Type : Catchment Area

Area (ha)	0.056

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.028

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.049

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (4)

Type : Catchment Area

Area (ha)	0.055

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (5)

Type : Catchment Area

Area (ha)	0.049

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (6)

Type : Catchment Area

Area (ha)	0.045

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (7)

Type : Catchment Area

Area (ha)	0.018

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (8)

Type : Catchment Area

Area (ha)	0.024

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (9)

Type : Catchment Area

Area (ha)	0.022

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (10)

Type : Catchment Area

Area (ha)	0.025

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	Company Address:		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
Manhole	Manhole	384468.880	397559.989	36.600	1.200	35.400	Circular	1.200
Manhole (1)	Manhole	384500.324	397572.128	36.600	1.540	35.060	Circular	1.200
Manhole (2)	Manhole	384493.202	397593.268	36.600	1.820	34.780	Circular	1.200
Manhole (3)	Manhole	384487.746	397598.951	36.600	1.920	34.680	Circular	1.200
Manhole (4)	Manhole	384435.010	397577.962	34.850	1.520	33.330	Circular	1.200
Manhole (5)	Manhole	384436.147	397560.686	34.300	1.190	33.110	Circular	1.200
Manhole (6)	Manhole	384427.357	397558.641	34.300	1.270	33.030	Circular	1.200
Manhole (7)	Manhole	384423.645	397567.354	34.850	2.270	32.580	Circular	1.200
Manhole (8)	Manhole	384402.429	397534.849	34.300	0.860	33.440	Circular	1.200
Manhole (9)	Manhole	384399.928	397543.335	34.300	0.970	33.330	Circular	1.200
Manhole (10)	Manhole	384407.051	397557.201	34.300	1.300	33.000	Circular	1.200
Manhole (11)	Manhole	384411.752	397556.074	34.800	3.800	31.000	Circular	1.200
Manhole (12)	Manhole	384412.892	397553.209	32.600	4.800	27.800	Circular	1.200

Name	Lock
Manhole	None
Manhole (1)	None
Manhole (2)	None
Manhole (3)	None
Manhole (4)	None
Manhole (5)	None
Manhole (6)	None
Manhole (7)	None
Manhole (8)	None
Manhole (9)	None
Manhole (10)	None
Manhole (11)	None
Manhole (12)	None

Inlets

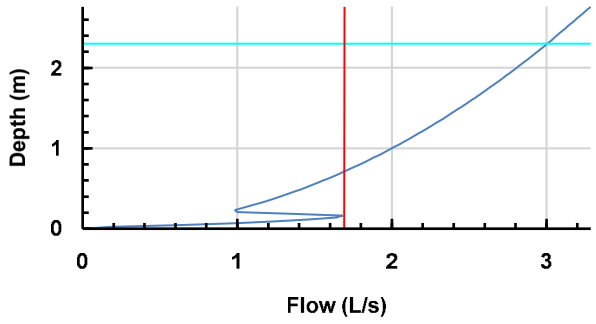
Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Manhole	Inlet	Catchment Area	(None)	No Restriction
Manhole (1)	Inlet	Pipe	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
Manhole (2)	Inlet	Pipe (1)	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
Manhole (3)	Inlet	Pipe (2)	(None)	No Restriction
	Inlet (1)	Catchment Area (3)	(None)	No Restriction
Manhole (4)	Inlet	Pipe (3)	(None)	No Restriction
	Inlet (1)	Catchment Area (4)	(None)	No Restriction
Manhole (5)	Inlet	Catchment Area (5)	(None)	No Restriction
Manhole (6)	Inlet	Pipe (5)	(None)	No Restriction
	Inlet (1)	Catchment Area (6)	(None)	No Restriction
Manhole (7)	Inlet	Pipe (4) Pipe (6)	(None)	No Restriction
	Inlet (1)	Catchment Area (10)	(None)	No Restriction
Manhole (8)	Inlet	Catchment Area (7)	(None)	No Restriction
Manhole (9)	Inlet	Pipe (7)	(None)	No Restriction
	Inlet (1)	Catchment Area (8)	(None)	No Restriction
Manhole (10)	Inlet	Pipe (8)	(None)	No Restriction
	Inlet (1)	Catchment Area (9)	(None)	No Restriction
Manhole (11)	Inlet	Pipe (12)	(None)	No Restriction
Manhole (12)	Inlet	Pipe (9)	(None)	No Restriction

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	Company Address:		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Manhole	Outlet	Pipe	Free Discharge
Manhole (1)	Outlet	Pipe (1)	Free Discharge
Manhole (2)	Outlet	Pipe (2)	Free Discharge
Manhole (3)	Outlet	Pipe (3)	Free Discharge
Manhole (4)	Outlet	Pipe (4)	Free Discharge
Manhole (5)	Outlet	Pipe (5)	Free Discharge
Manhole (6)	Outlet	Pipe (6)	Free Discharge
Manhole (7)	Outlet	Pipe (10)	Free Discharge
Manhole (8)	Outlet	Pipe (7)	Free Discharge
Manhole (9)	Outlet	Pipe (8)	Free Discharge
Manhole (10)	Outlet	Pipe (11)	Free Discharge
Manhole (11)	Outlet	Pipe (9)	Hydro-Brake®

Invert Level (m)	31.000
Design Depth (m)	2.300
Design Flow (L/s)	3.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0064-3000-2300-3000



Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		



Tank

Type : Tank

Dimensions

Exceedance Level (m)	33.300
Depth (m)	2.000
Base Level (m)	31.300
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:X)	0.00
Total Volume (m³)	295.450

Depth (m)	Area (m²)	Volume (m³)
0.000	155.50	0.000
2.000	155.50	295.450

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (10)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (11)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	Pipe (12)
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	9.000

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 100 years: +45 %: 15 mins: Summer	0.06	39.7	17.202
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Summer	0.03	20.1	8.725
Catchment Area (2)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	14.0	6.075
Catchment Area (3)	FSR: 100 years: +45 %: 15 mins: Summer	0.05	34.7	15.073
Catchment Area (4)	FSR: 100 years: +45 %: 15 mins: Summer	0.05	38.8	16.848
Catchment Area (5)	FSR: 100 years: +45 %: 15 mins: Summer	0.05	34.9	15.121
Catchment Area (6)	FSR: 100 years: +45 %: 15 mins: Summer	0.05	32.2	13.955
Catchment Area (7)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	12.9	5.613
Catchment Area (8)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	16.8	7.298
Catchment Area (9)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	15.8	6.854
Catchment Area (10)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	17.4	7.553

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: 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
Manhole	FSR: 100 years: +45 %: 15 mins: Summer	36.600	35.400	35.547	0.147	39.7	0.166	0.000	37.8	17.147	OK
Manhole (1)	FSR: 100 years: +45 %: 15 mins: Summer	36.600	35.060	35.407	0.347	57.9	0.392	0.000	40.8	25.920	Surcharged
Manhole (2)	FSR: 100 years: +45 %: 15 mins: Summer	36.600	34.780	35.232	0.452	54.8	0.511	0.000	46.9	31.996	Surcharged
Manhole (3)	FSR: 100 years: +45 %: 15 mins: Summer	36.600	34.680	35.133	0.453	81.6	0.512	0.000	74.3	47.079	Surcharged
Manhole (4)	FSR: 100 years: +45 %: 15 mins: Summer	34.850	33.330	33.920	0.590	113.2	0.667	0.000	107.3	63.887	Surcharged
Manhole (5)	FSR: 100 years: +45 %: 960 mins: Winter	34.300	33.110	33.302	0.192	2.3	0.217	0.000	2.3	53.056	OK
Manhole (6)	FSR: 100 years: +45 %: 960 mins: Winter	34.300	33.030	33.302	0.272	4.5	0.308	0.000	4.5	102.002	Surcharged
Manhole (7)	FSR: 100 years: +45 %: 960 mins: Winter	34.850	32.580	33.302	0.722	15.5	0.817	0.000	15.5	352.677	Surcharged
Manhole (8)	FSR: 100 years: +45 %: 15 mins: Summer	34.300	33.440	33.520	0.080	12.9	0.091	0.000	12.7	5.612	OK
Manhole (9)	FSR: 100 years: +45 %: 15 mins: Summer	34.300	33.330	33.436	0.106	29.5	0.120	0.000	28.8	12.906	OK
Manhole (10)	FSR: 100 years: +45 %: 960 mins: Winter	34.300	33.000	33.302	0.302	3.0	0.341	0.000	3.0	69.293	Surcharged
Manhole (11)	FSR: 100 years: +45 %: 960 mins: Winter	34.800	31.000	33.301	2.301	3.0	2.603	0.000	3.0	274.705	Surcharged
Manhole (12)	FSR: 100 years: +45 %: 960 mins: Winter	32.600	27.800	27.812	0.012	3.0	0.000	0.000	3.0	274.692	OK

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: 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. Resident Volume (m^3)	Max. Flooded Volume (m^3)	Total Lost Volume (m^3)	Max. Outflow (L/s)	Total Discharge Volume (m^3)	Percentage Available (%)	Status
Tank	FSR: 100 years: +45 %: 960 mins: Winter	33.302	33.302	2.002	2.002	18.5	295.688	0.238	0.000	3.0	276.496	-0.081	Flood

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: 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
Pipe	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (1)	Manhole (1)	36.600	35.547	0.225	17.147	1.0	0.72	37.8	OK
Pipe (1)	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole (1)	Manhole (2)	36.600	35.278	0.225	25.912	1.1	0.72	41.7	OK
Pipe (2)	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Manhole (2)	Manhole (3)	36.600	34.972	0.182	42.812	1.4	0.85	49.6	OK
Pipe (3)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (3)	Manhole (4)	36.600	35.133	0.225	47.079	2.0	0.92	74.3	Surcharged
Pipe (4)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (4)	Manhole (7)	34.850	33.920	0.225	63.887	3.1	0.93	107.3	Surcharged
Pipe (5)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (5)	Manhole (6)	34.300	33.272	0.176	15.120	1.0	0.67	32.8	OK
Pipe (6)	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole (6)	Manhole (7)	34.300	33.160	0.225	29.059	1.4	0.48	55.0	OK
Pipe (7)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (8)	Manhole (9)	34.300	33.520	0.093	5.612	0.8	0.22	12.7	OK
Pipe (8)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (9)	Manhole (10)	34.300	33.436	0.089	12.906	2.0	0.38	28.8	OK
Pipe (9)	FSR: 100 years: +45 %: 960 mins: Winter	Pipe	Manhole (11)	Manhole (12)	34.800	33.301	0.012	274.692	3.5	0.01	3.0	Surcharged
Pipe (10)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (7)	Tank	34.850	33.098	0.225	100.416	4.8	0.89	174.0	Surcharged
Pipe (11)	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	Manhole (10)	Tank	34.300	33.071	0.225	19.729	2.2	0.22	44.4	OK
Pipe (12)	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	Tank	Manhole (11)	33.300	32.087	0.225	4.436	0.5	0.1	9.0	Surcharged

Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

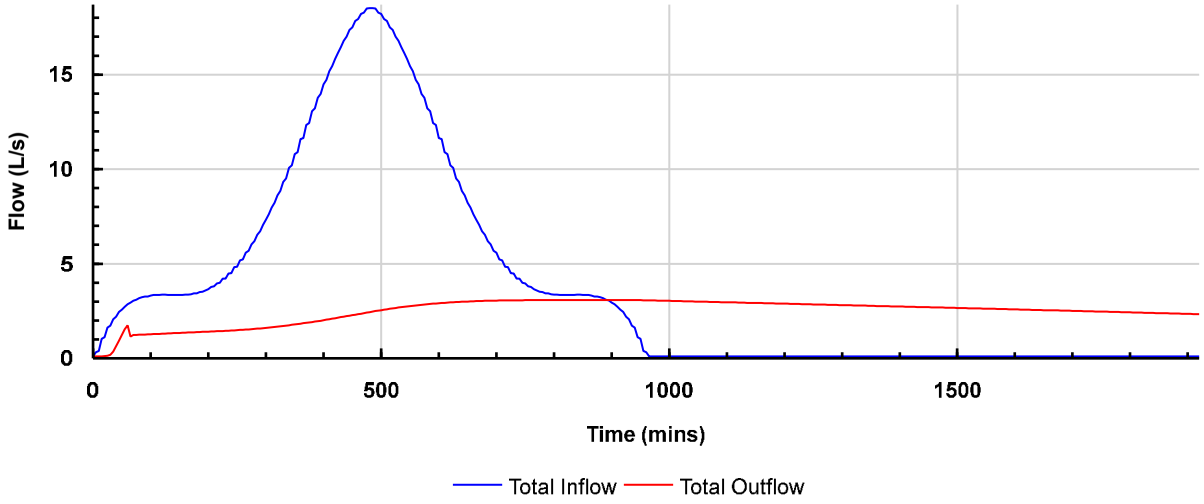
Phase
FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

Tables

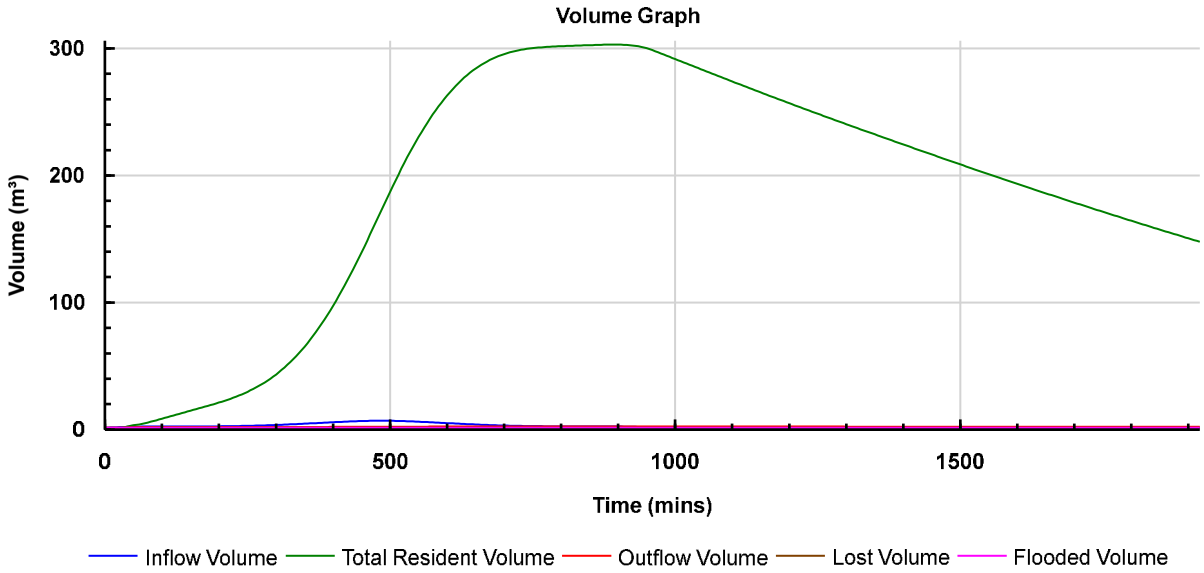
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Manhole (12)			3.0	274.692
TOTAL	18.5	421.987	3.0	274.692

Graphs

Flow Graph



Volume Graph

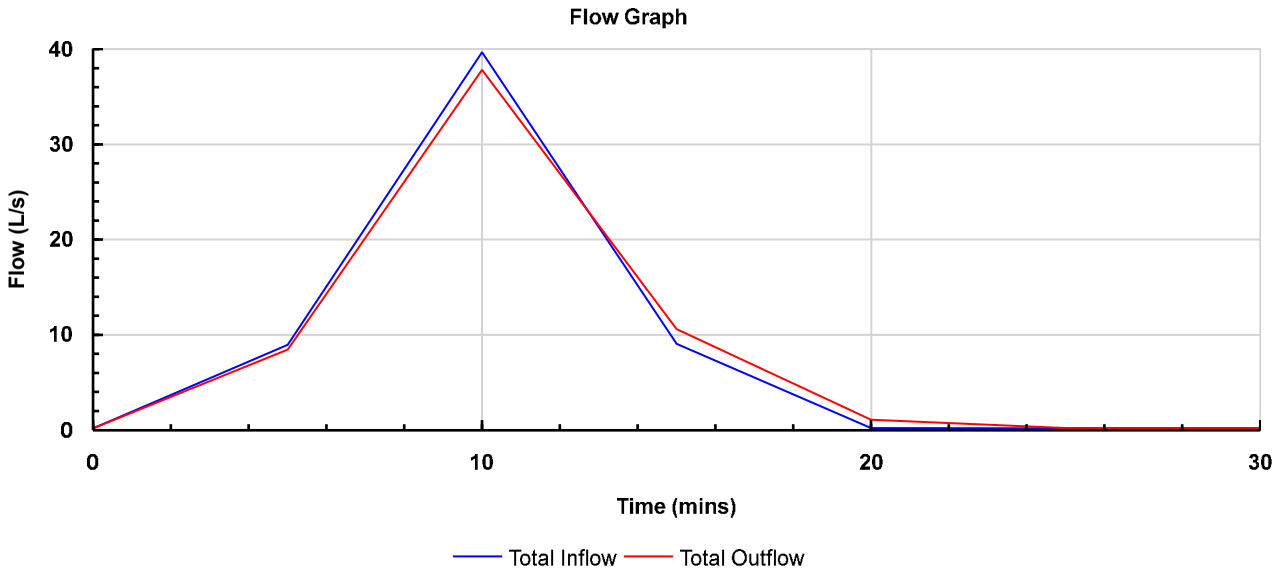


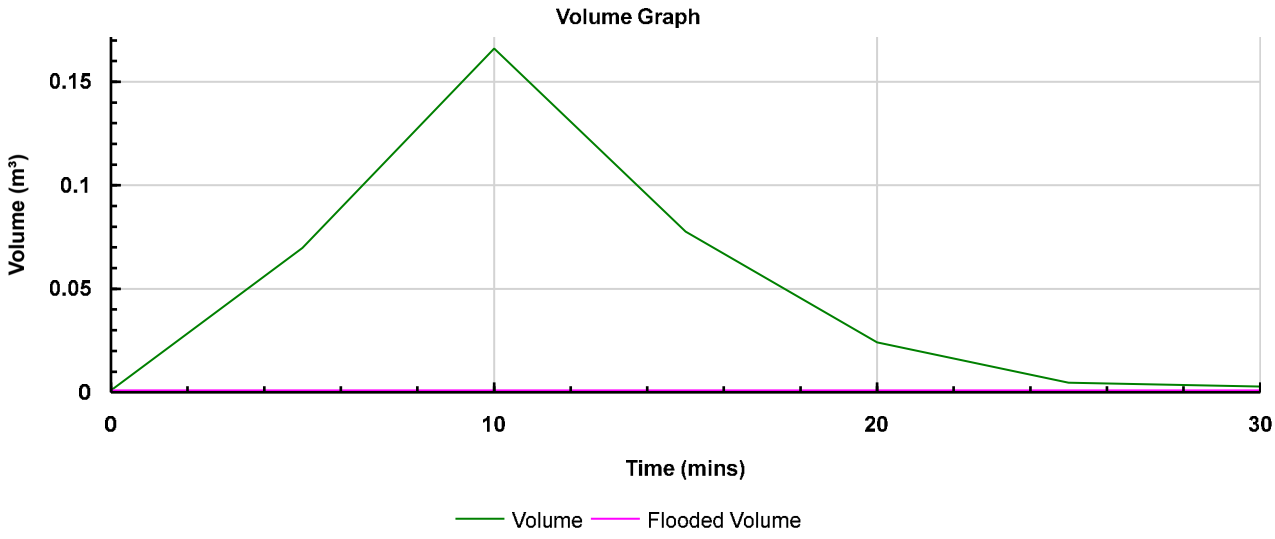
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole Type : Manhole

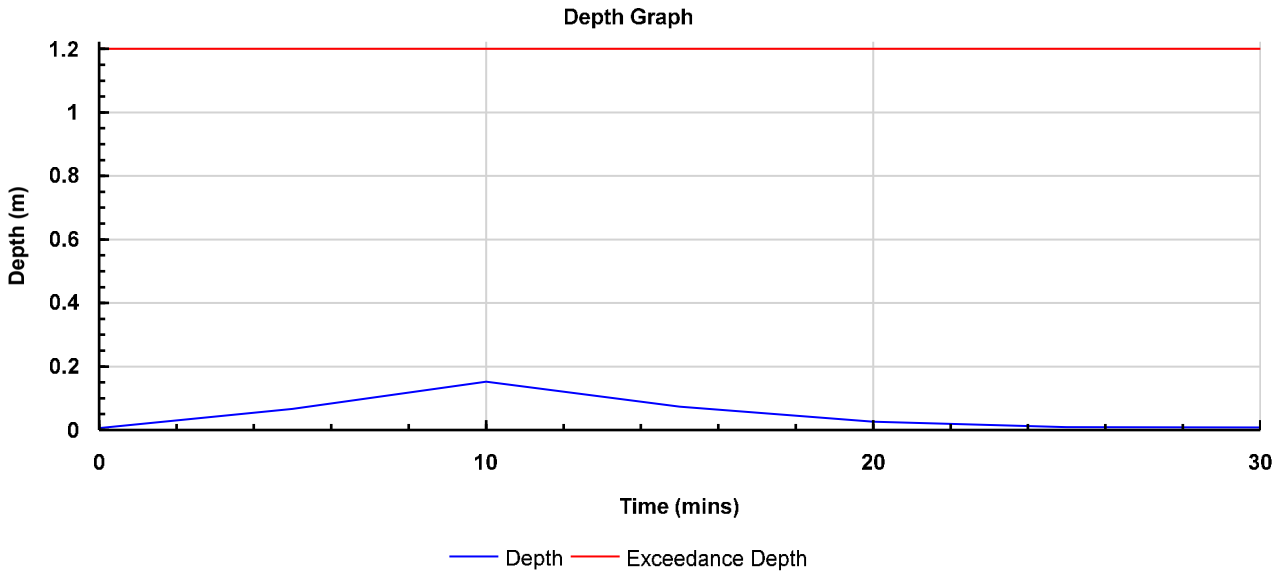
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

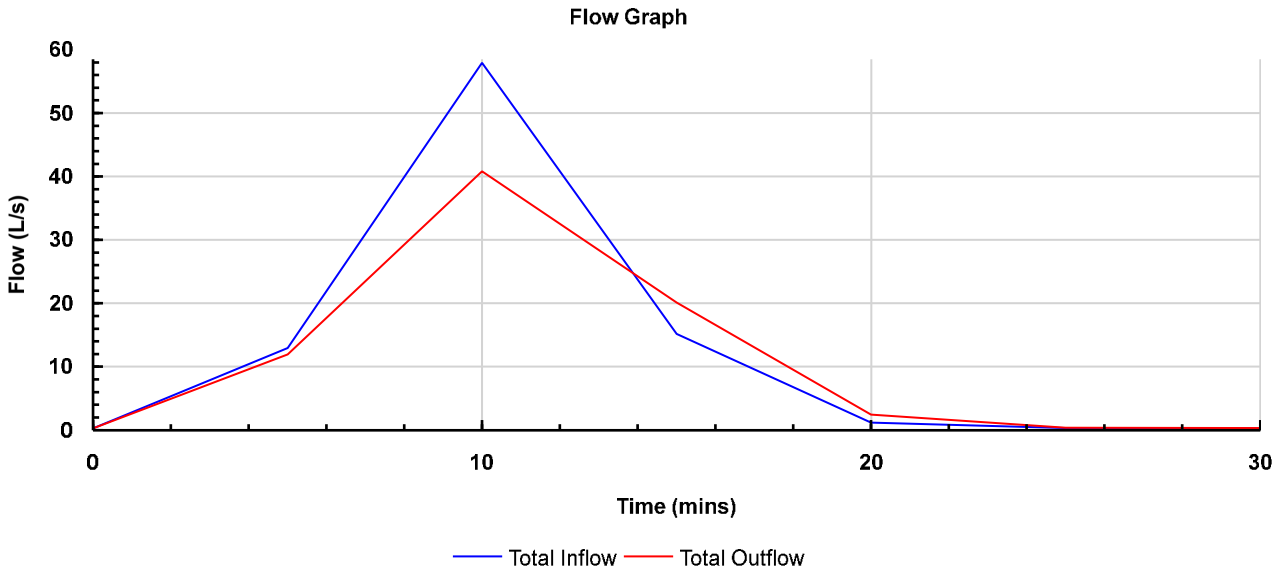


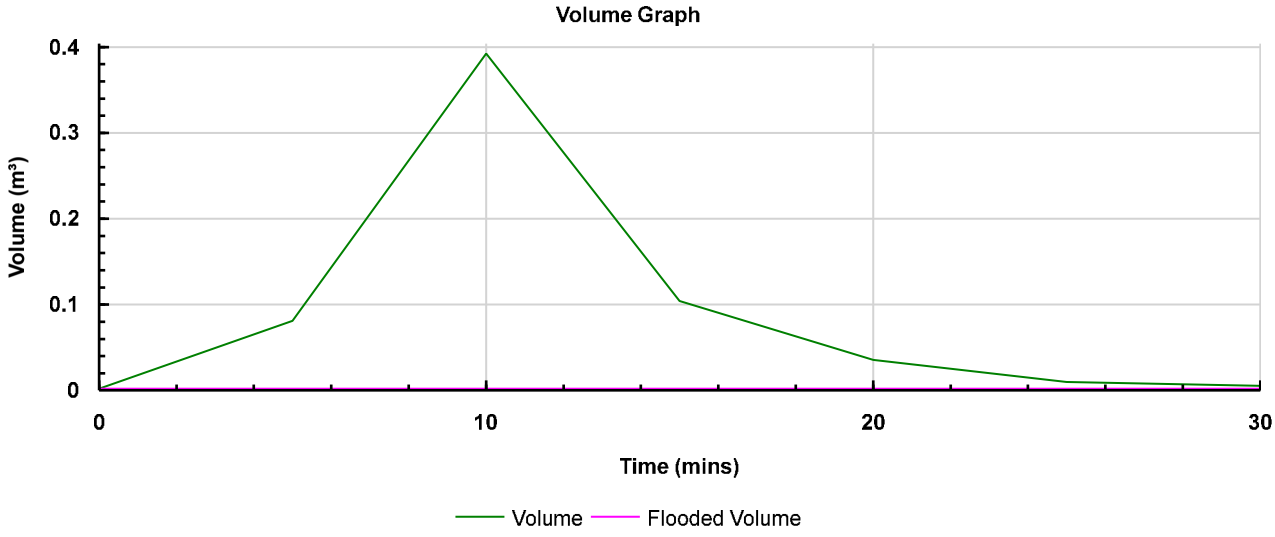
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (1) Type : Manhole

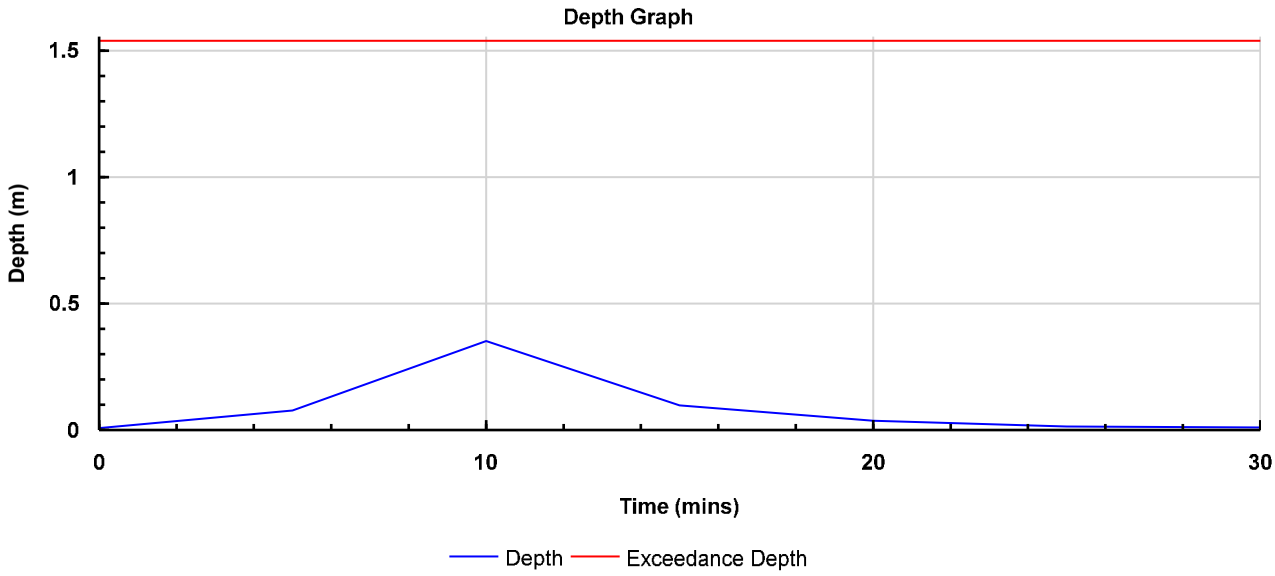
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Graphs





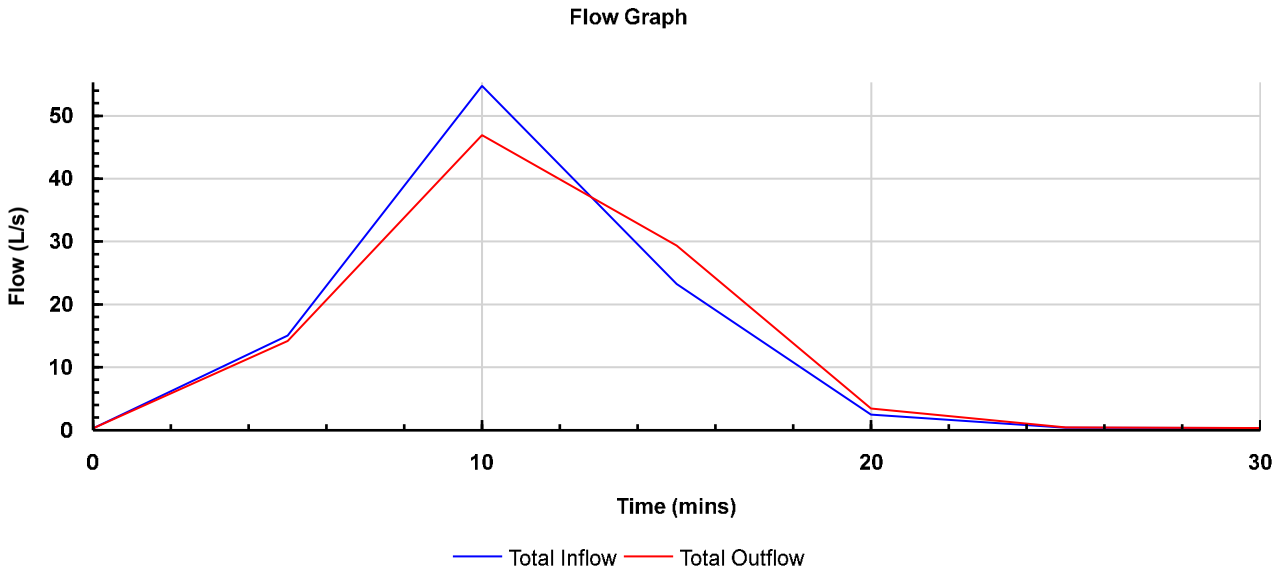
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

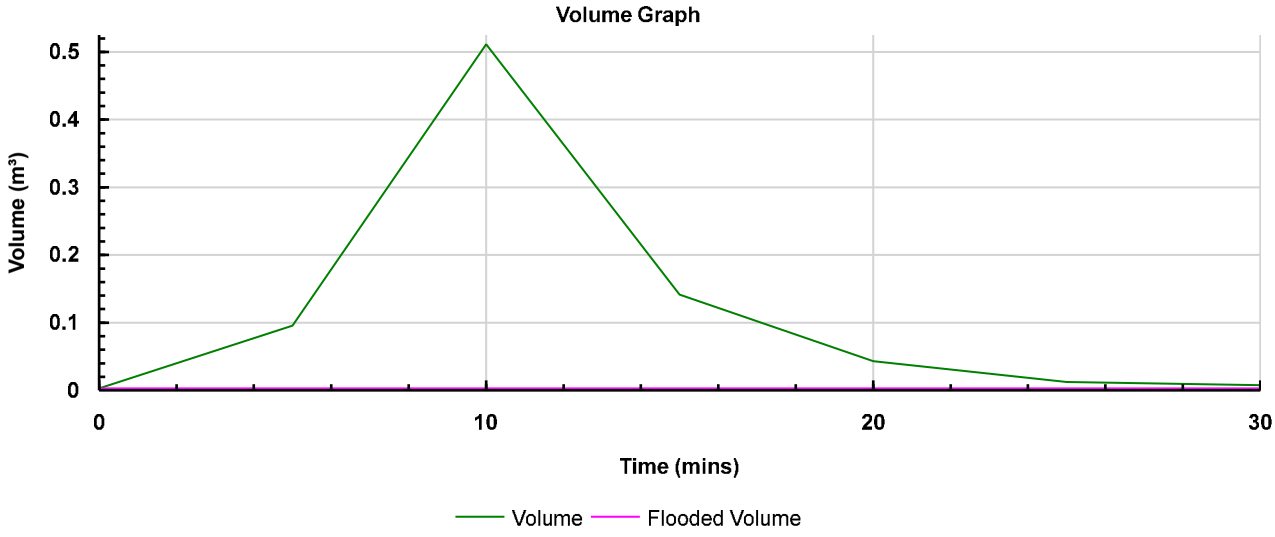


Manhole (2) Type : Manhole

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

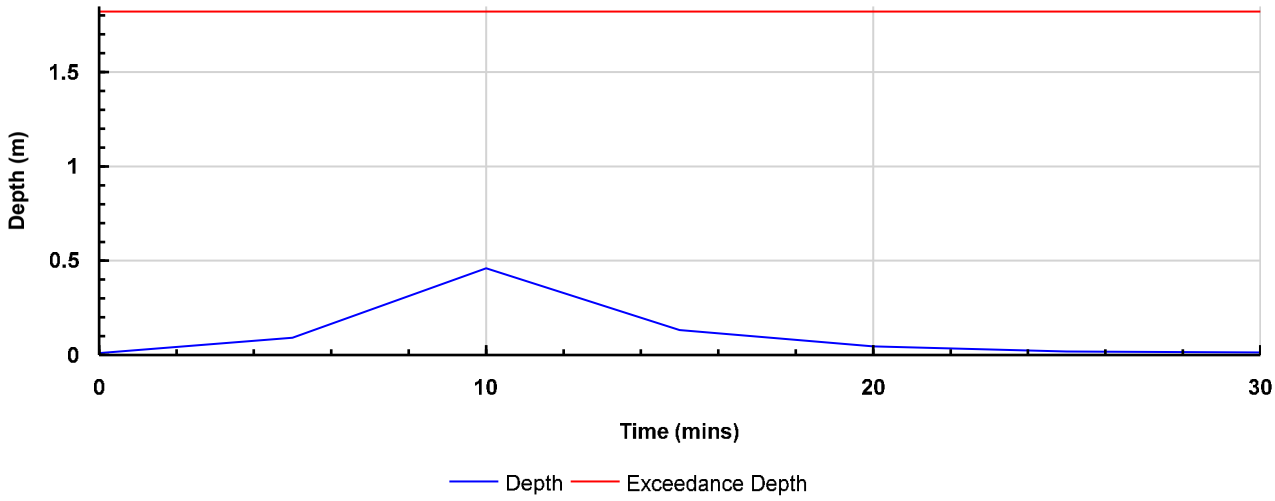
Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Depth Graph

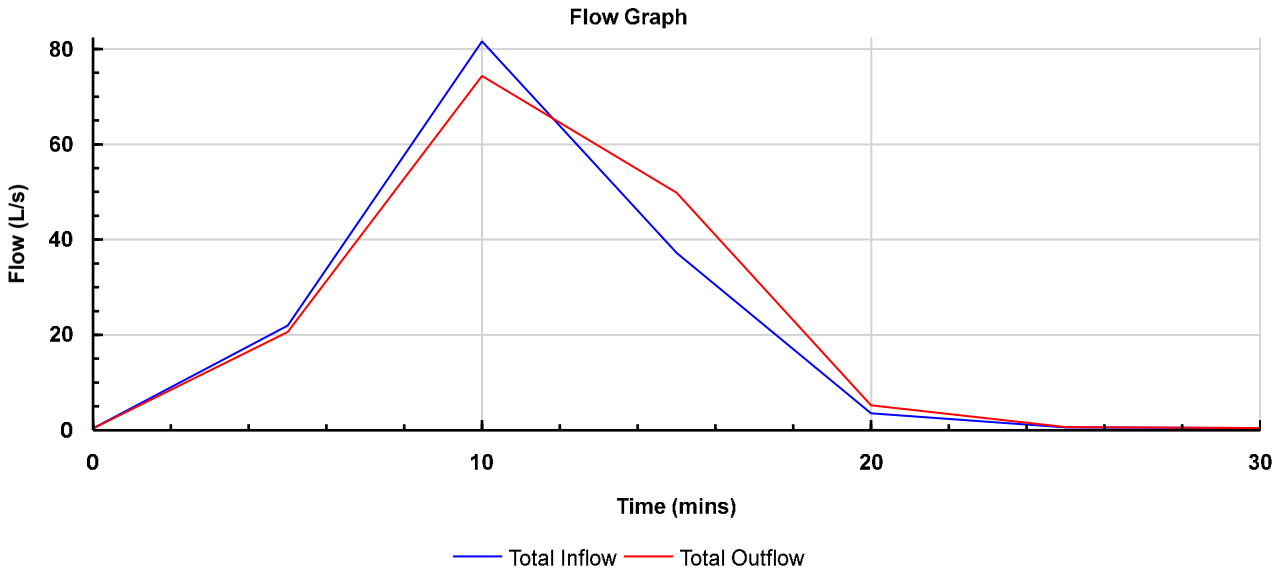


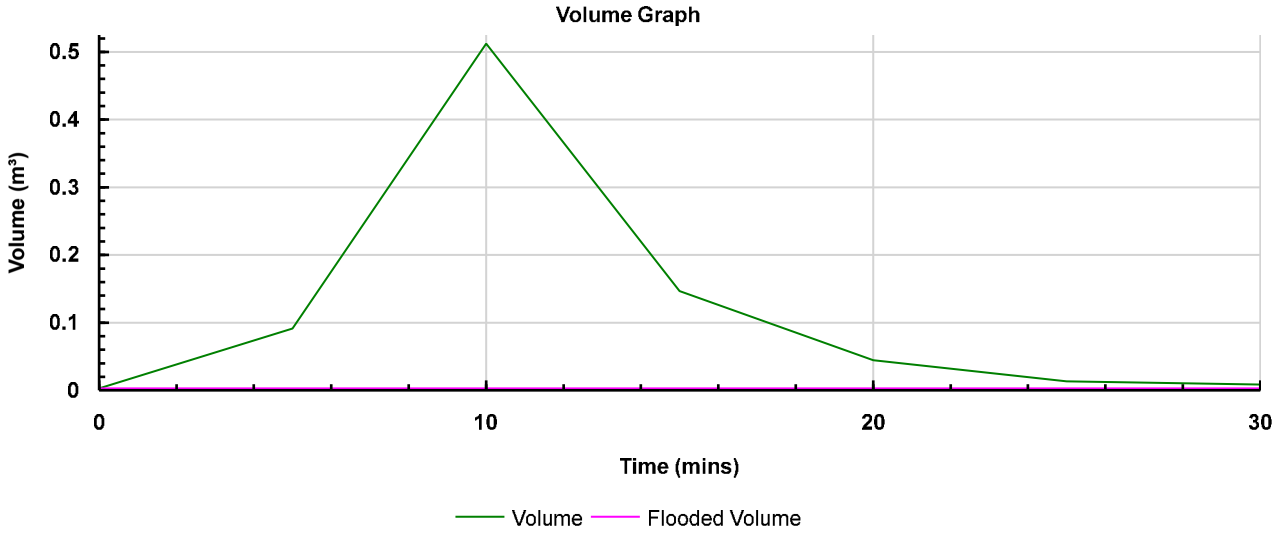
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (3)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

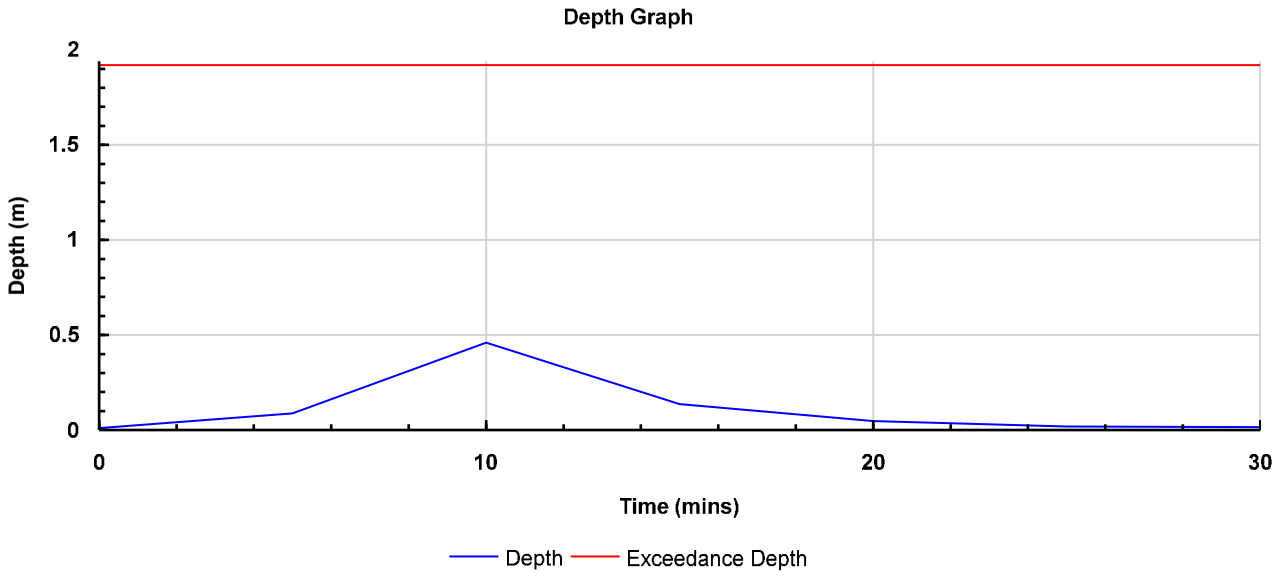
Type : Manhole

Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

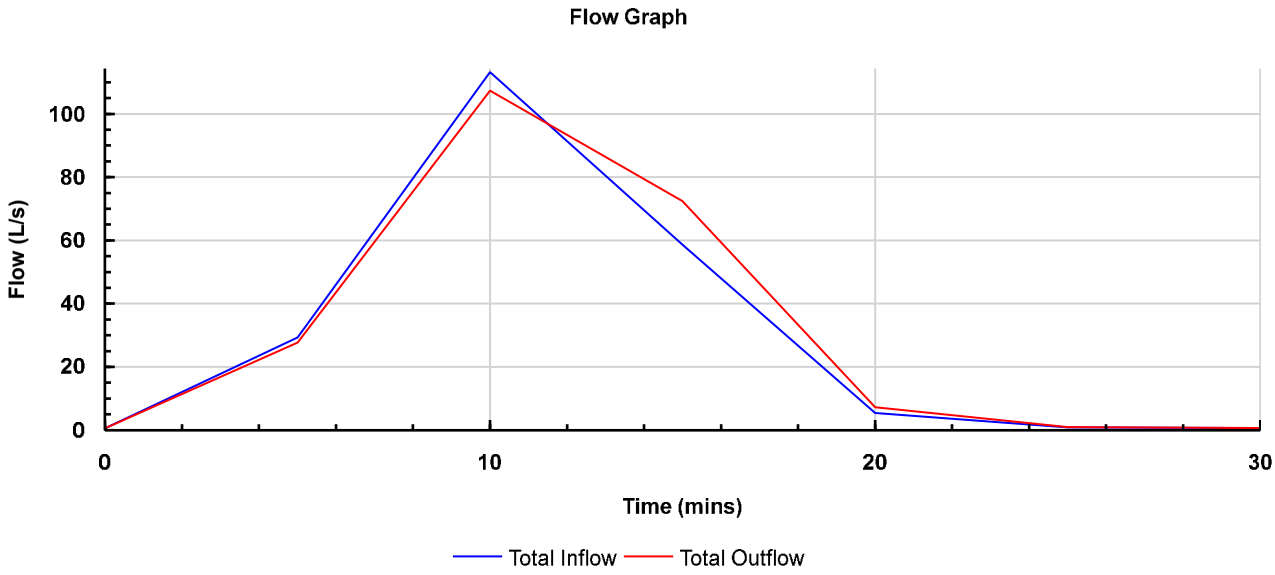


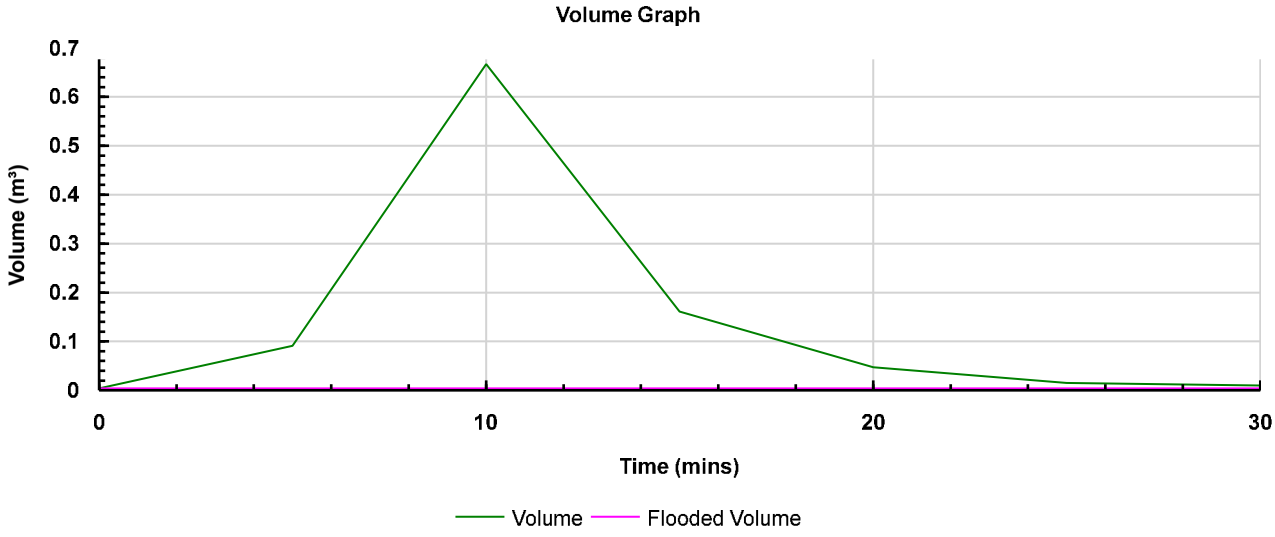
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (4)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

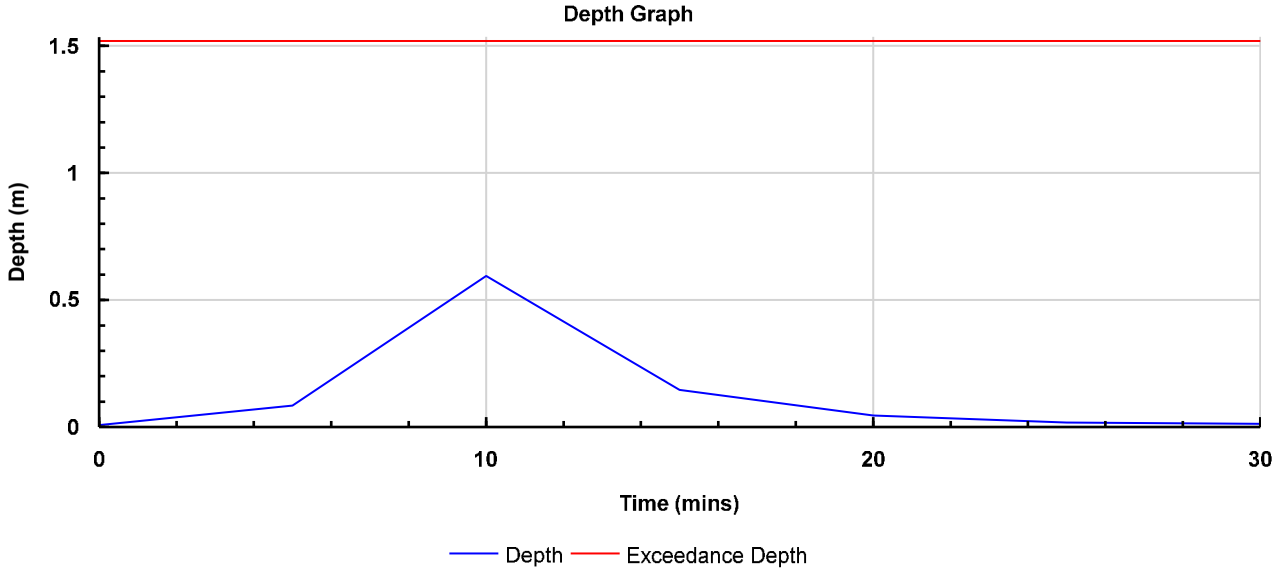
Type : Manhole

Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

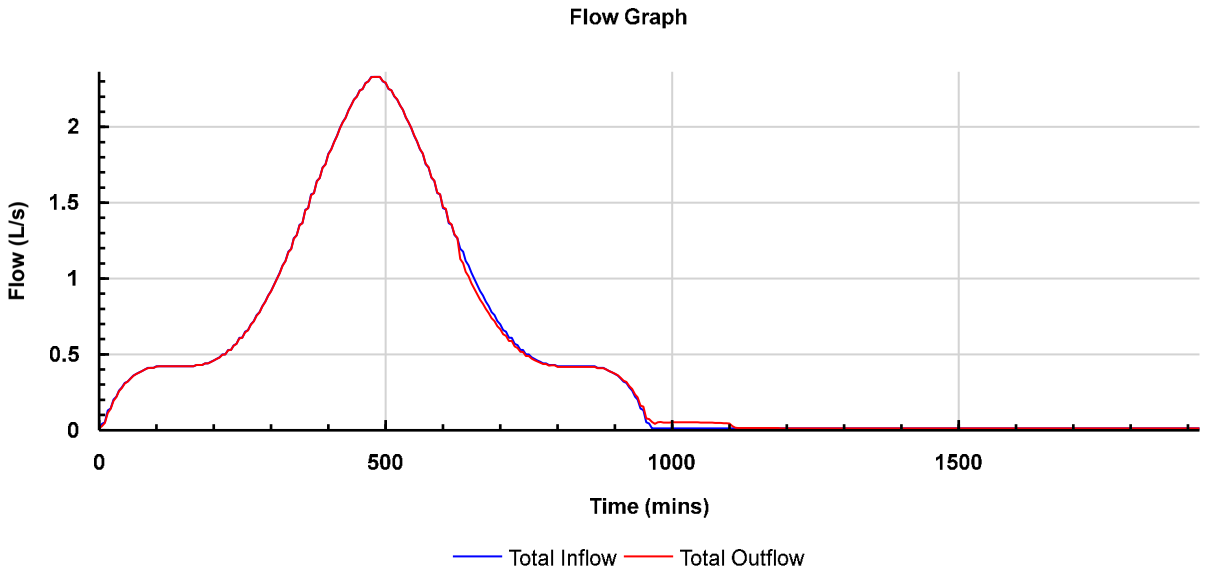


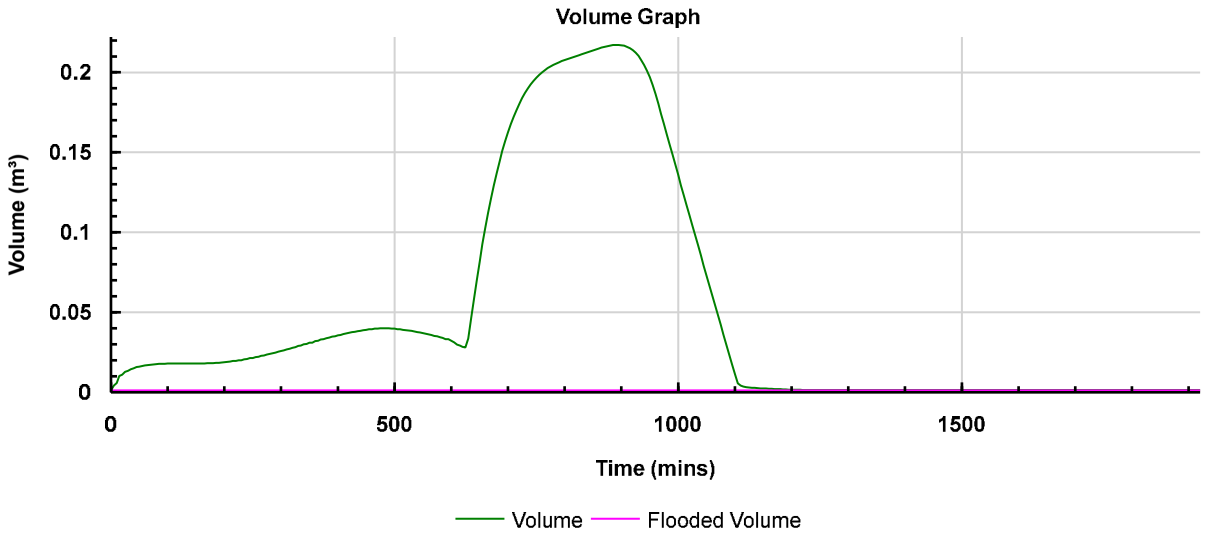
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (5)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

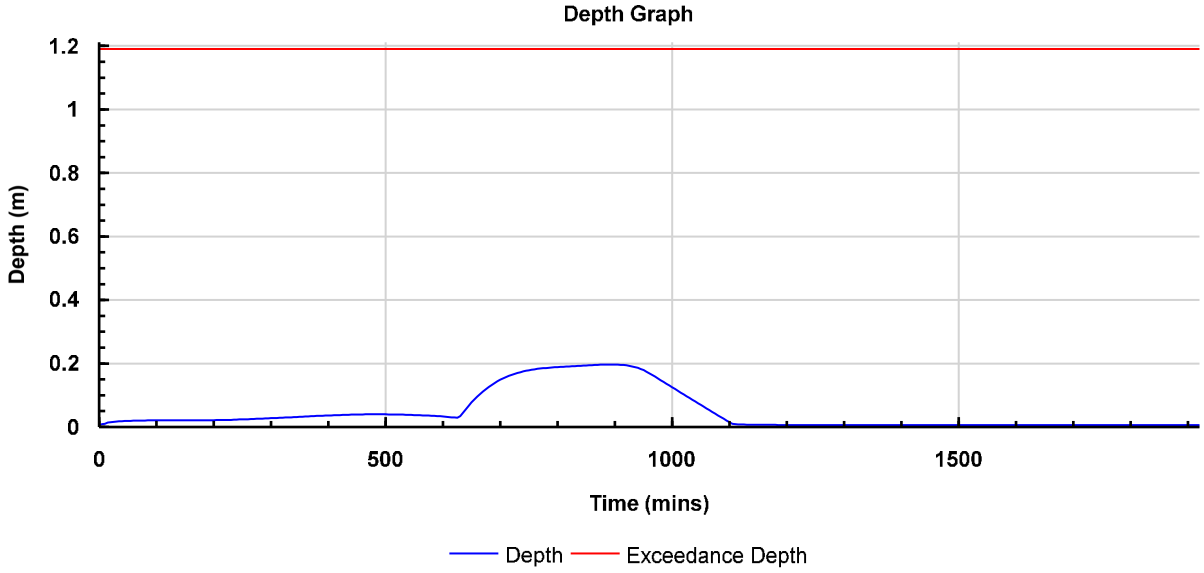
Type : Manhole

Graphs





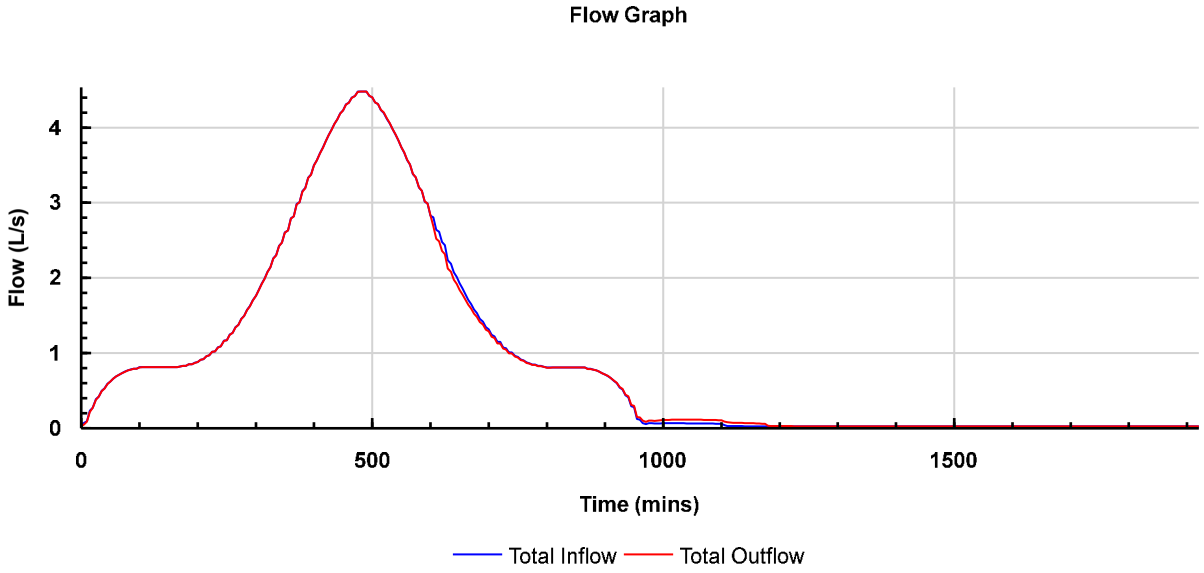
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

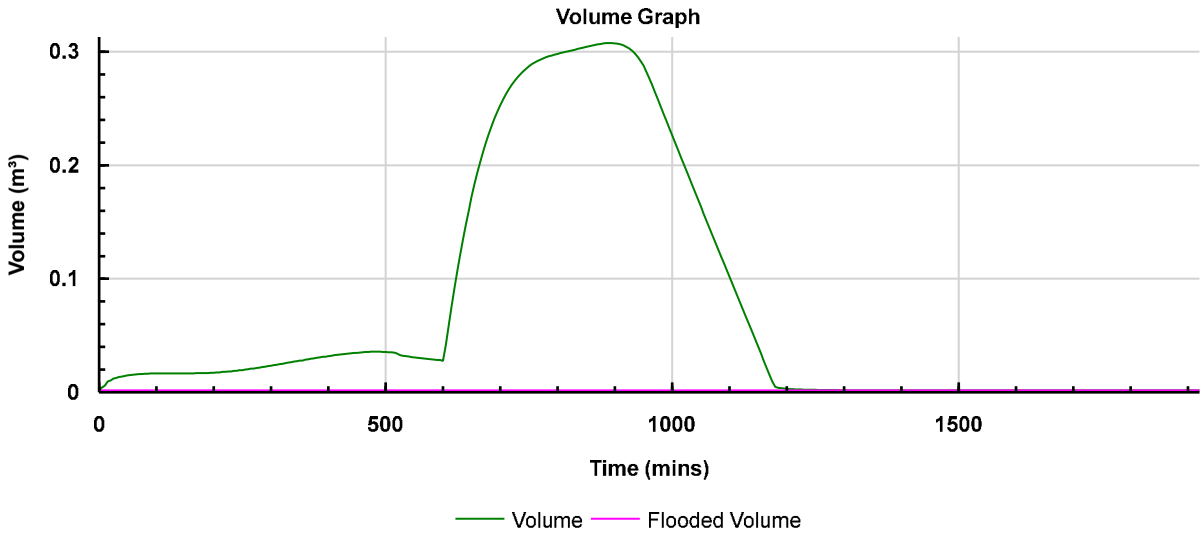


Manhole (6)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

Type : Manhole

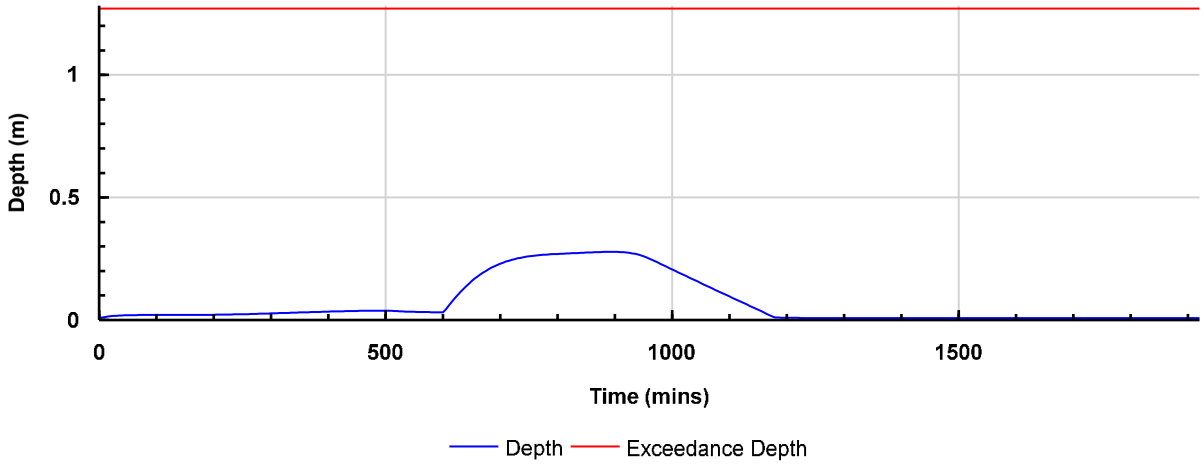
Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Depth Graph

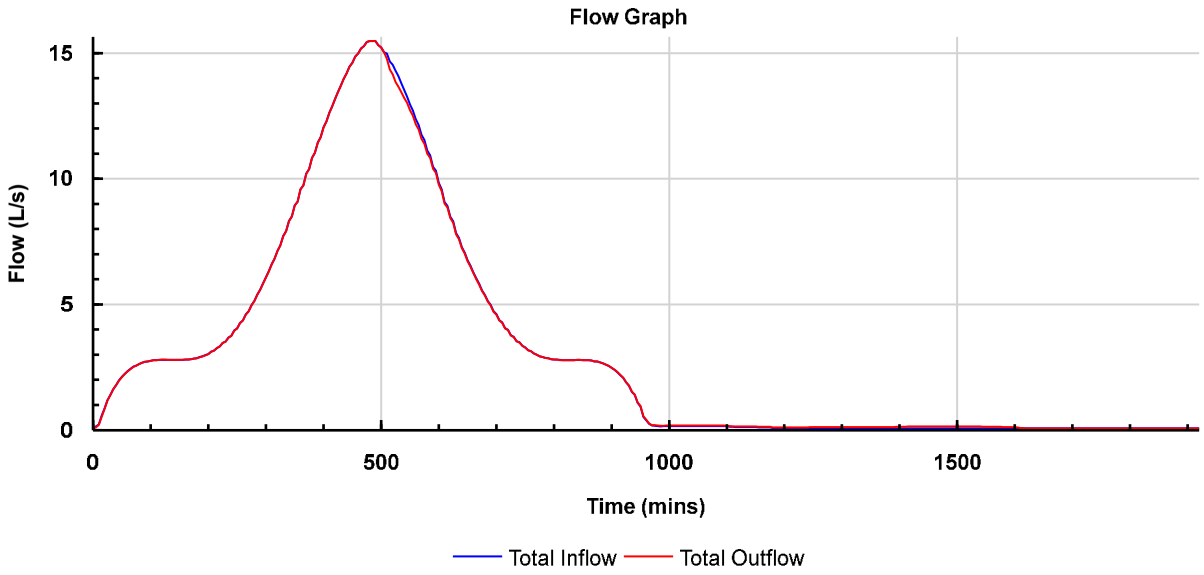


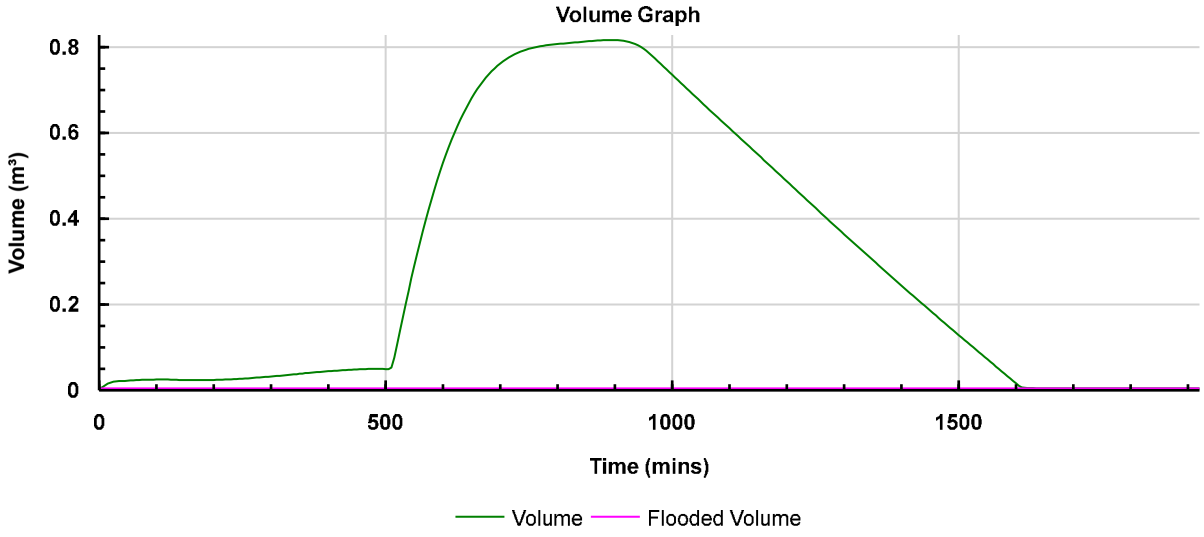
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (7)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

Type : Manhole

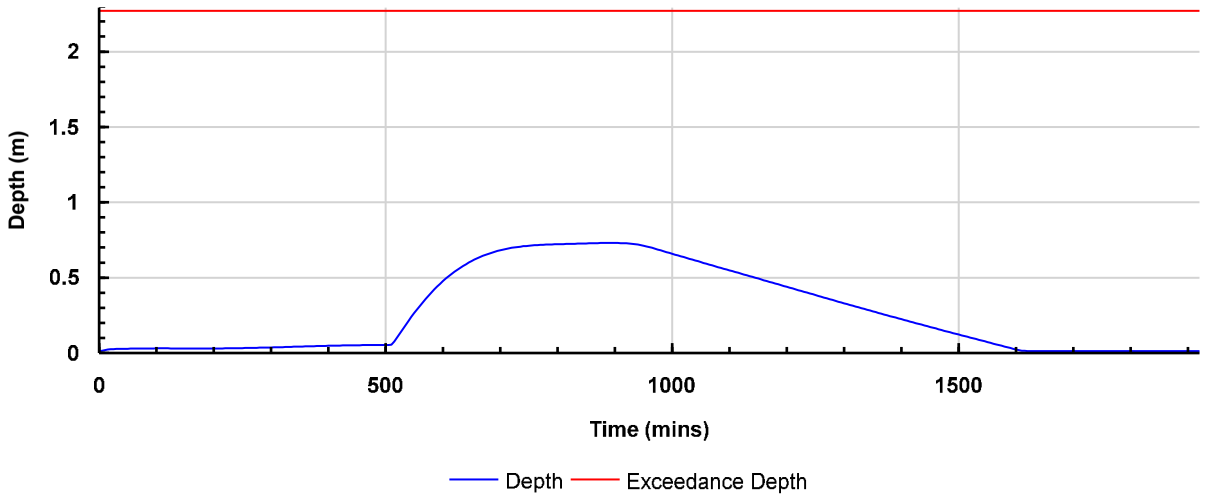
Graphs





Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Depth Graph



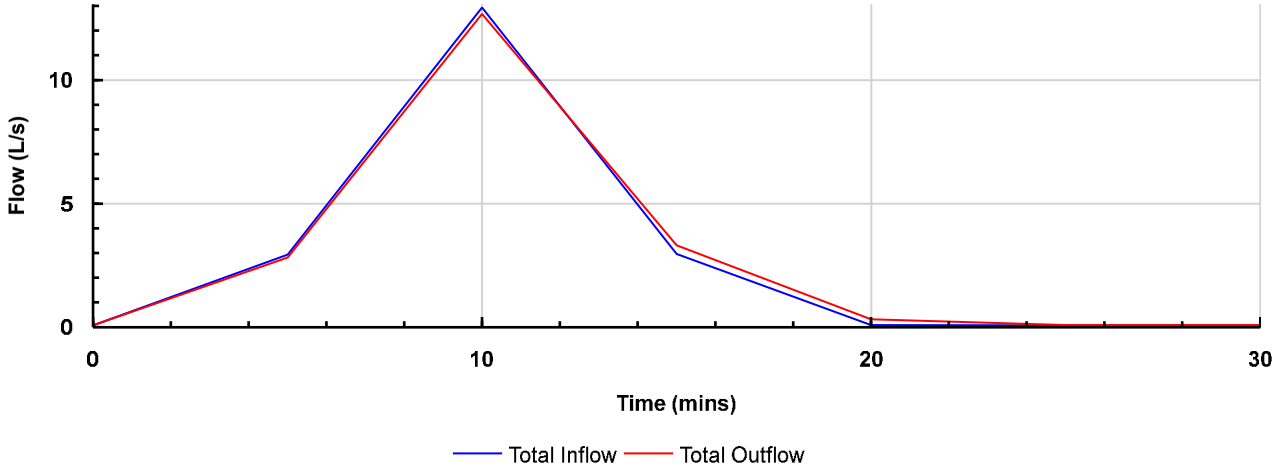
Project:	Date: 25/09/2025		
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Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (8)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

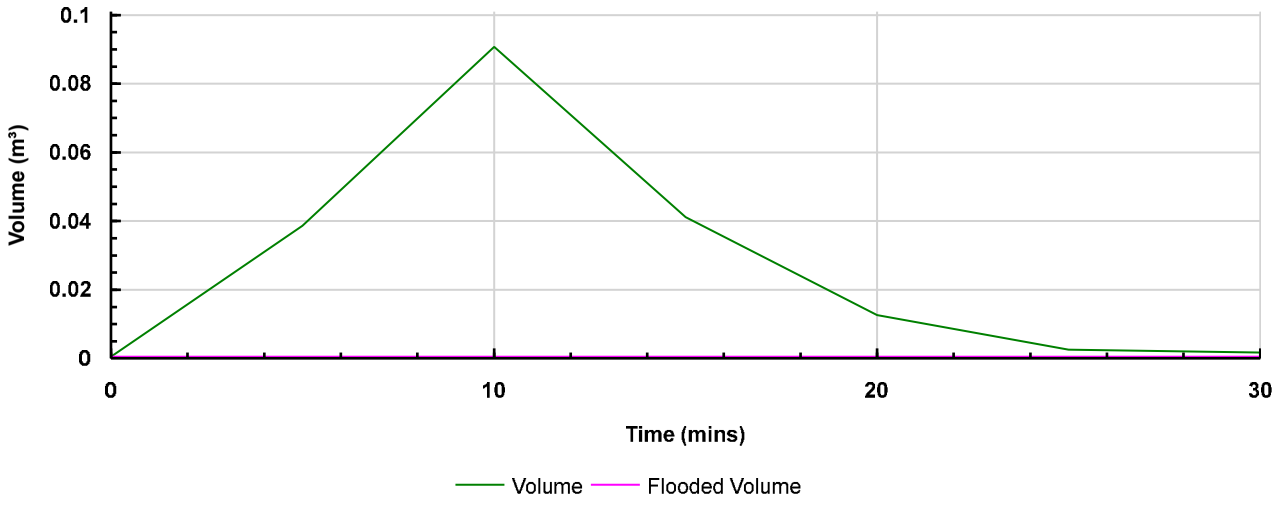
Type : Manhole

Graphs

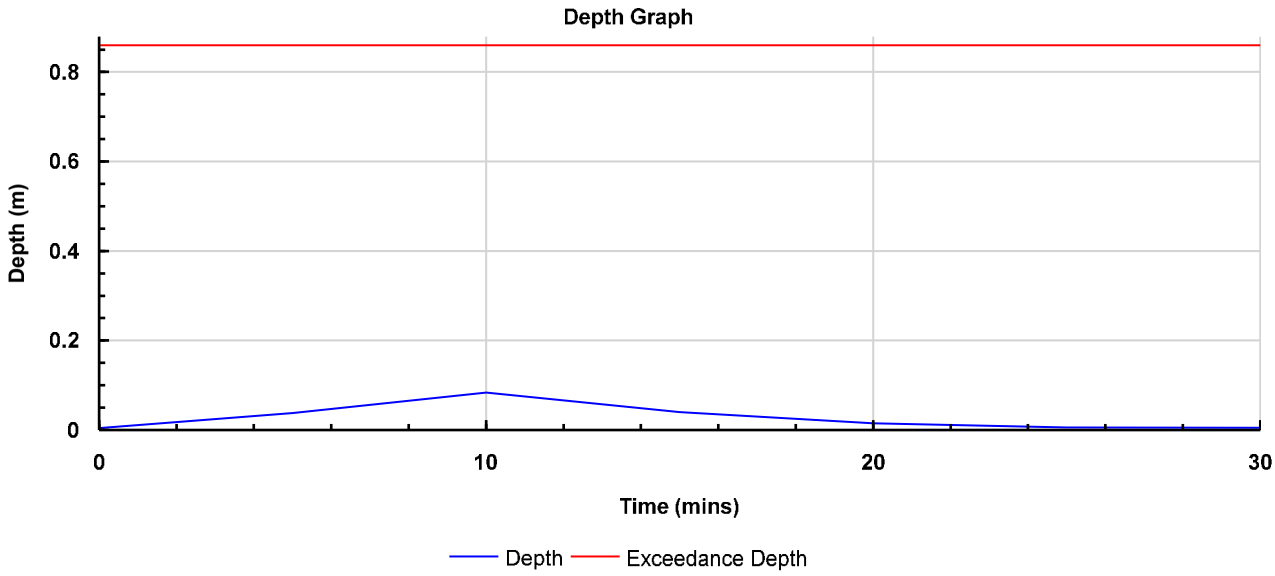
Flow Graph



Volume Graph



Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

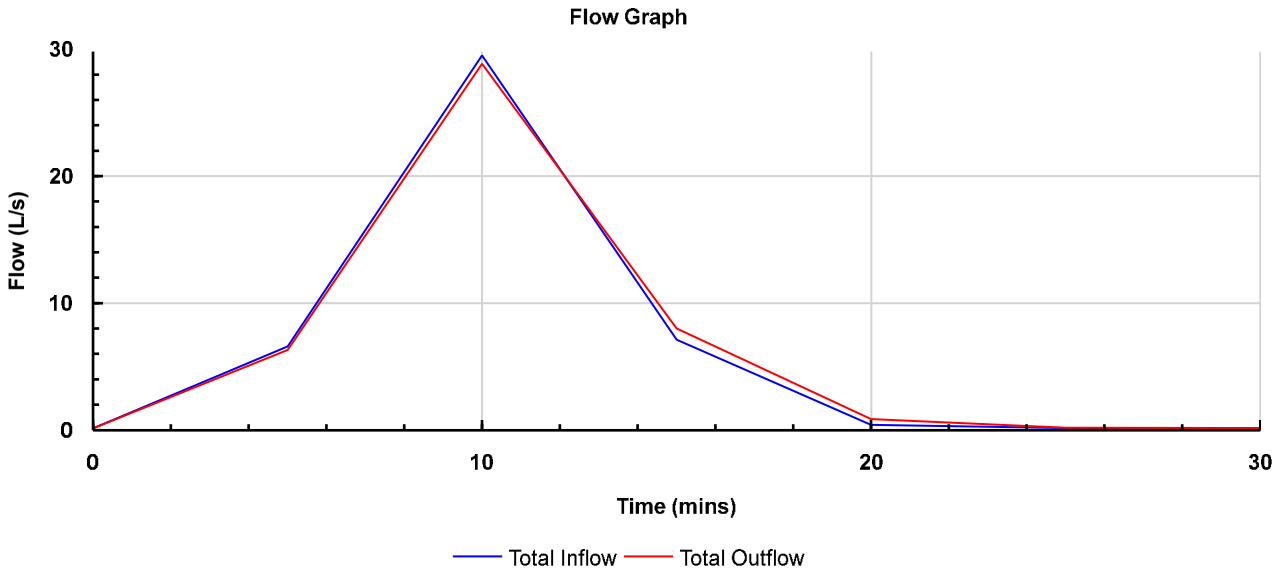


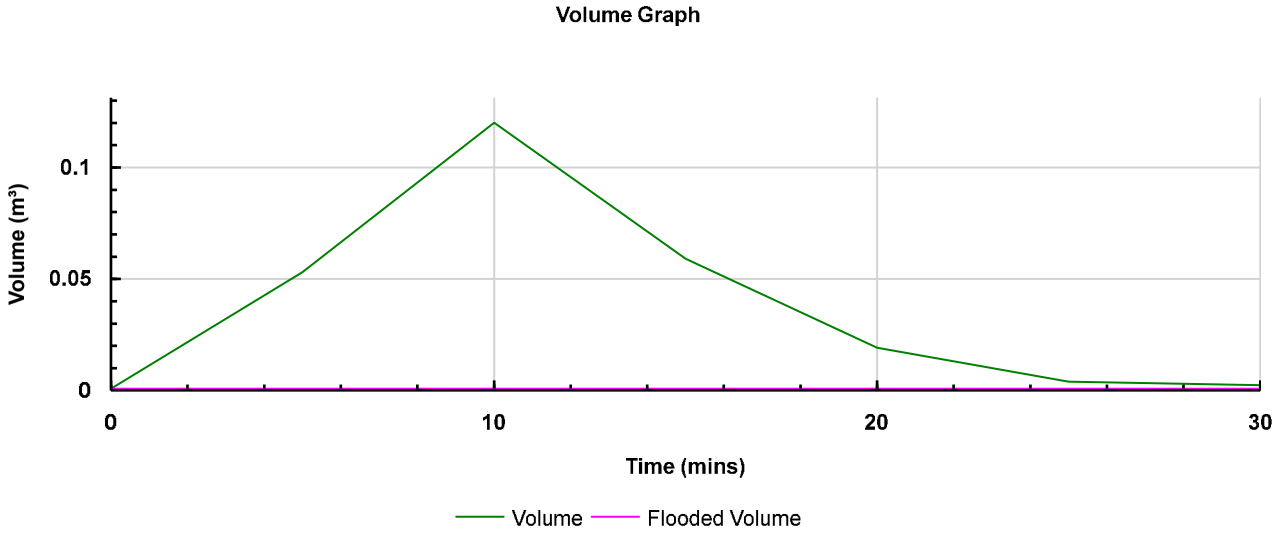
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

Manhole (9) Type : Manhole

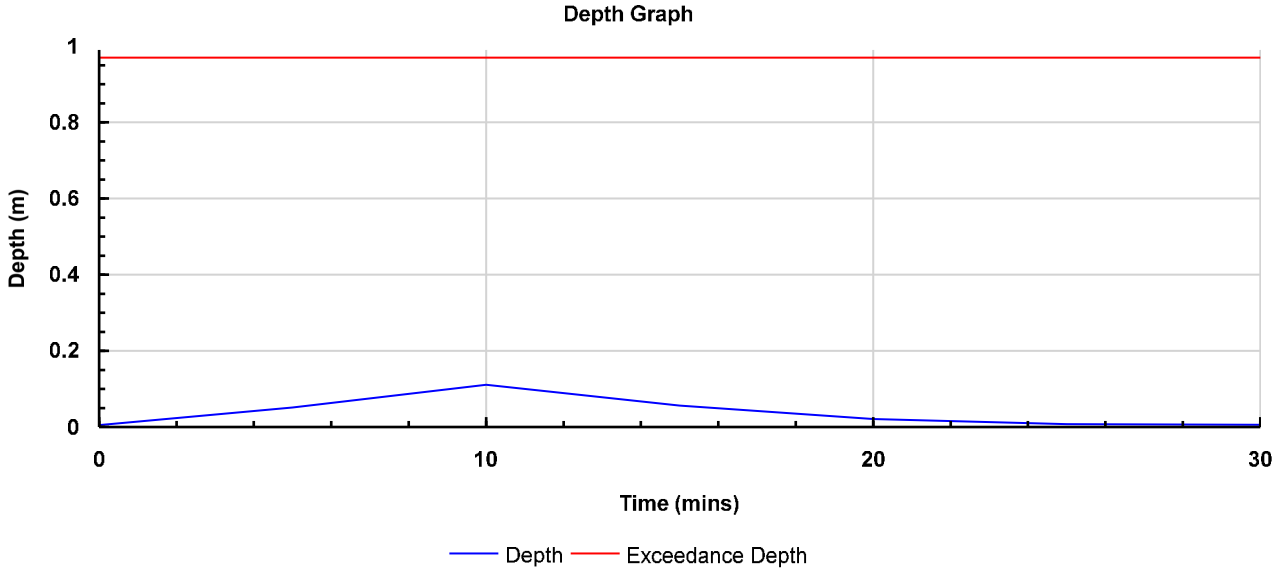
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Graphs





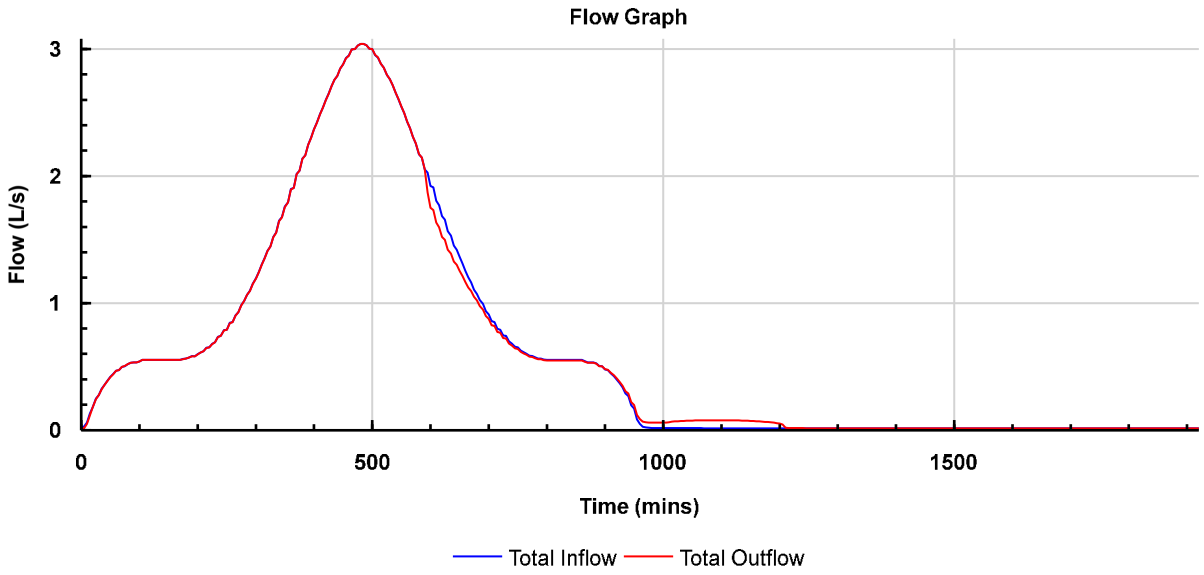
Project:	Date: 25/09/2025		
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Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

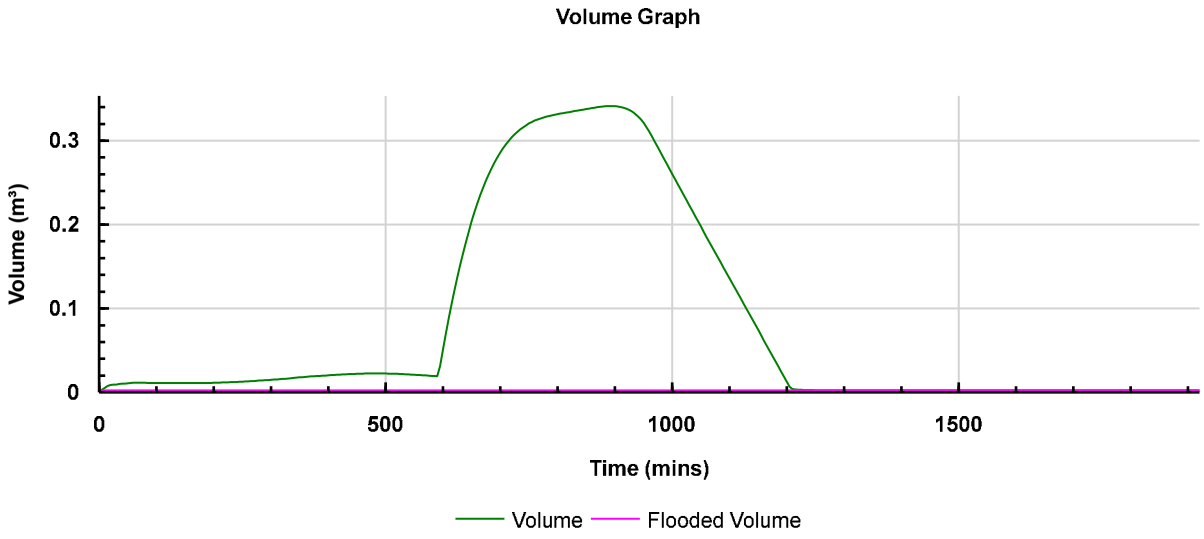


Manhole (10)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

Type : Manhole

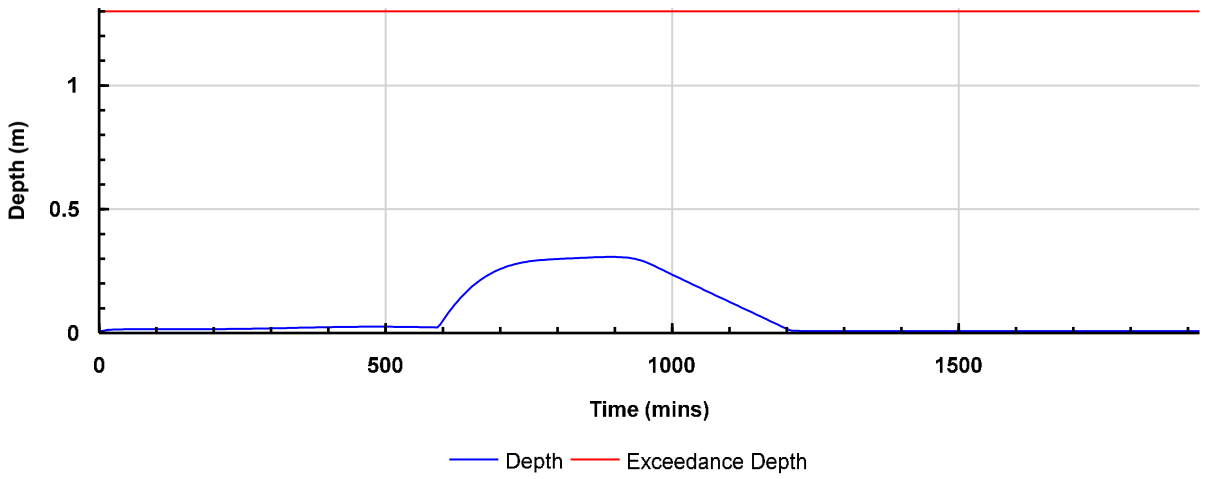
Graphs





Project:	Date: 25/09/2025		
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Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

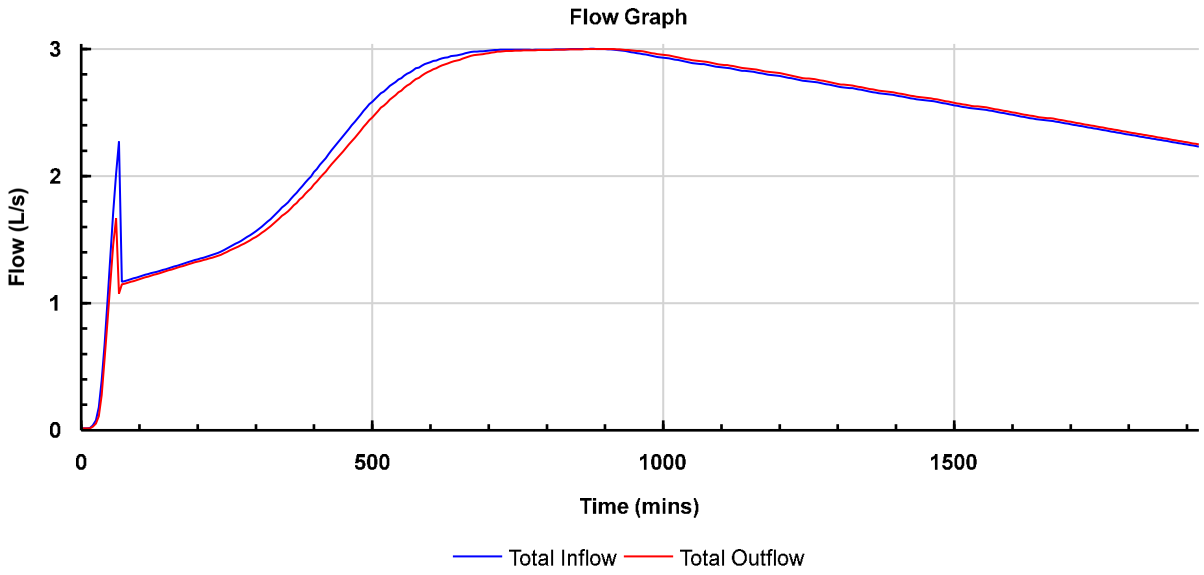
Depth Graph

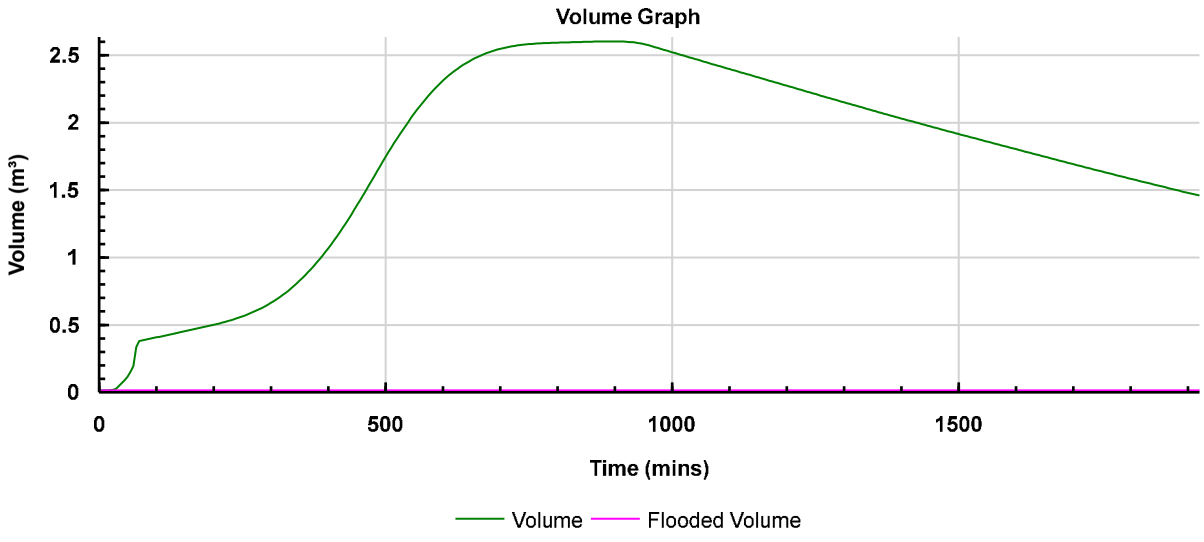


Manhole (11)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

Type : Manhole

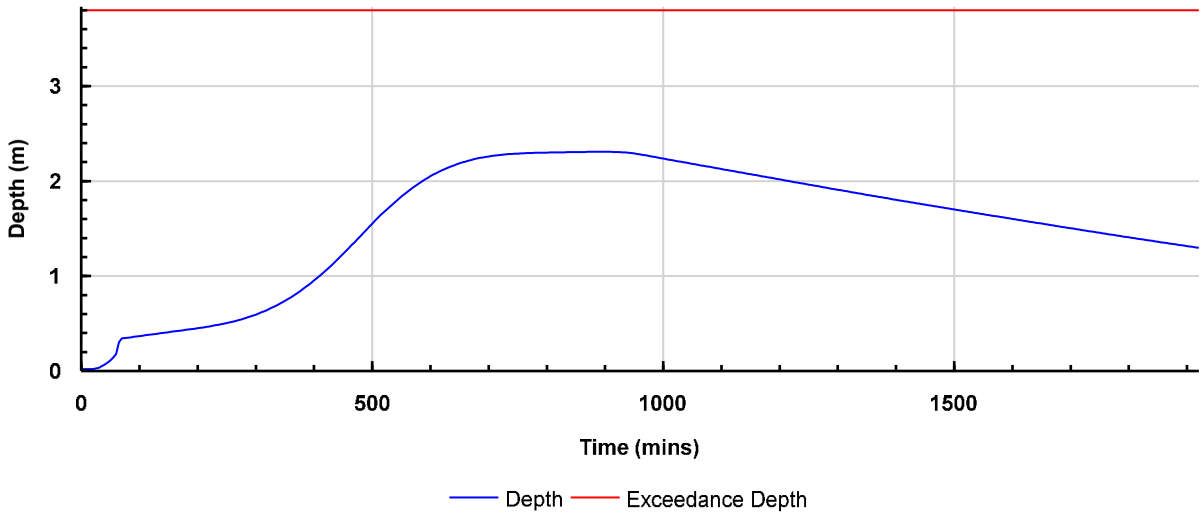
Graphs





Project:	Date: 25/09/2025		
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Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		

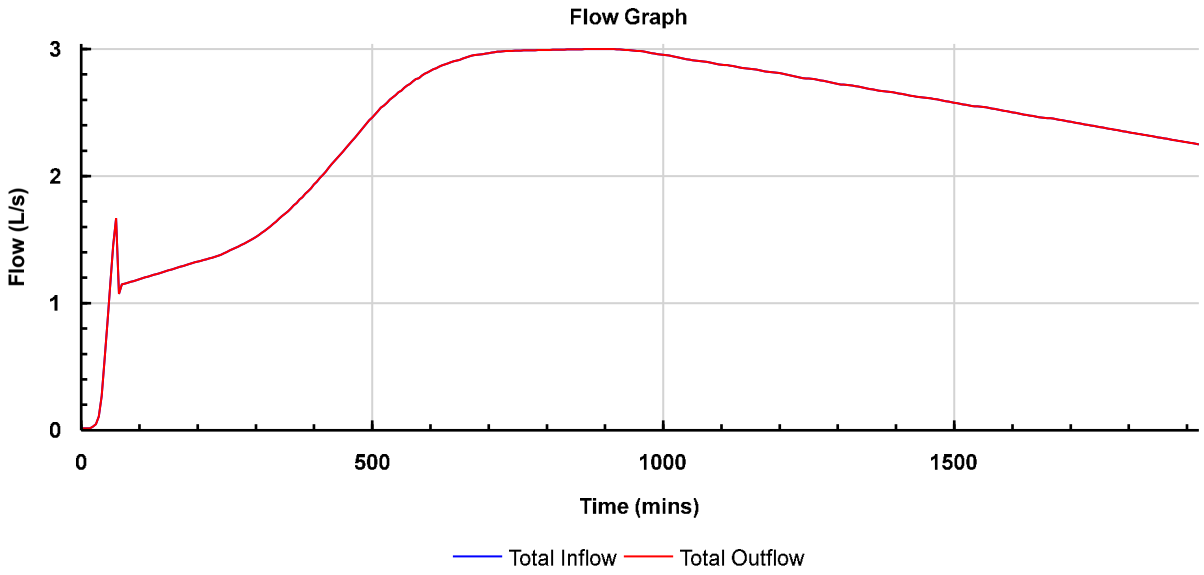
Depth Graph

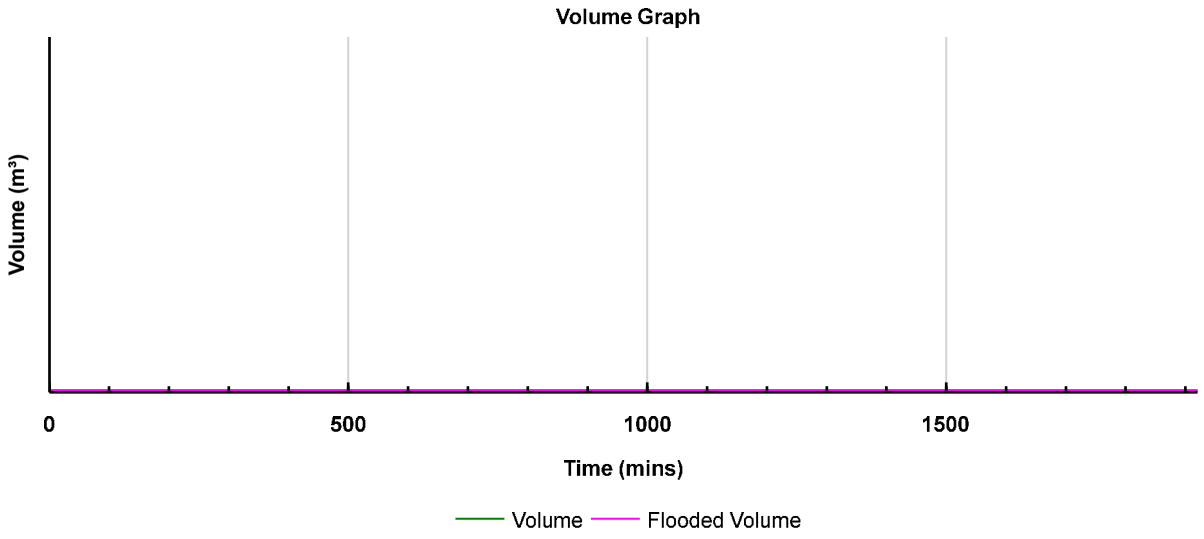


Manhole (12)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

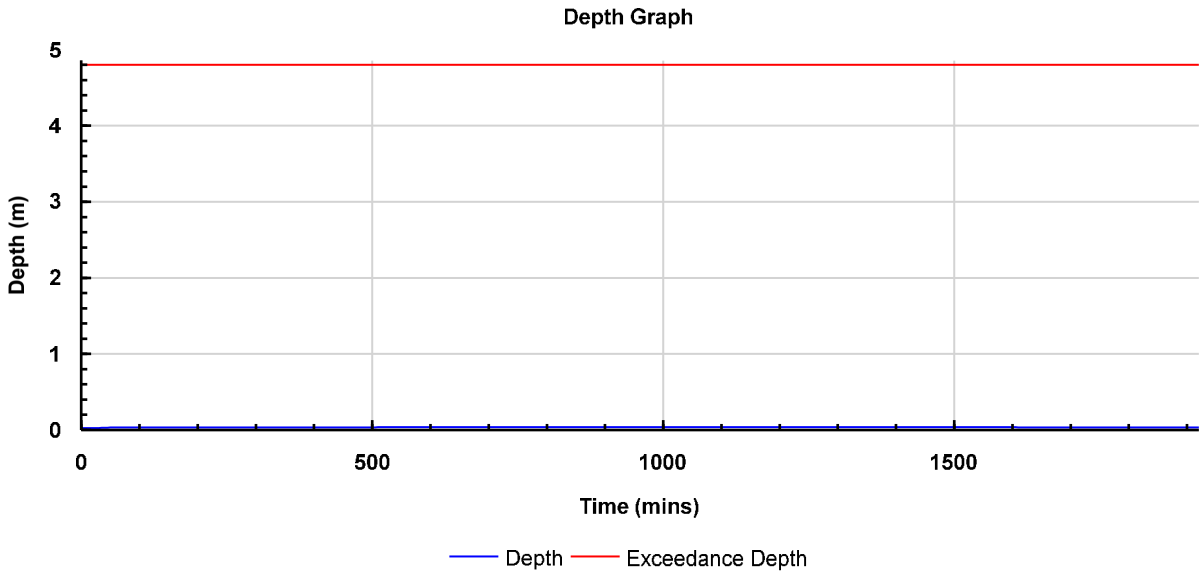
Type : Manhole

Graphs





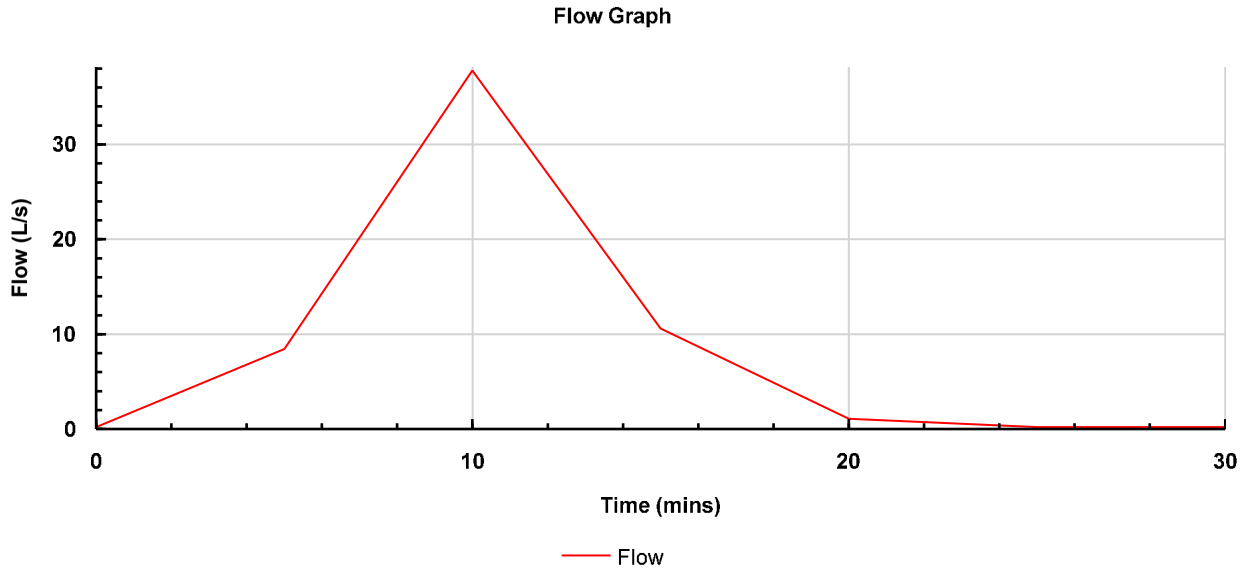
Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Company Address:		



Pipe
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Type : Pipe

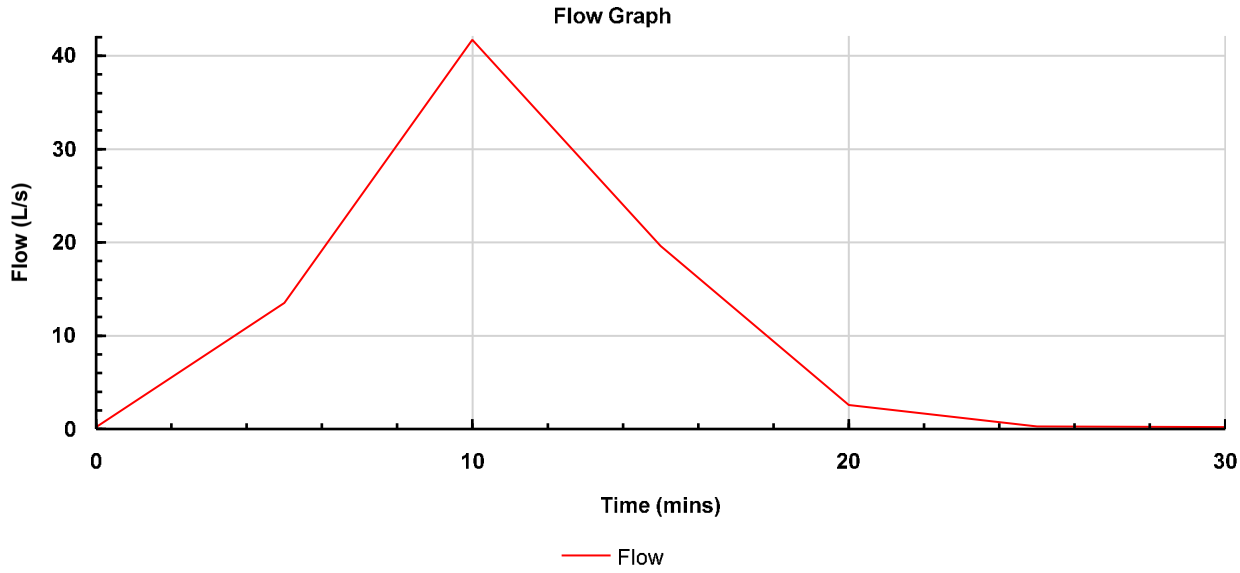
Graphs



Pipe (1) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Winter

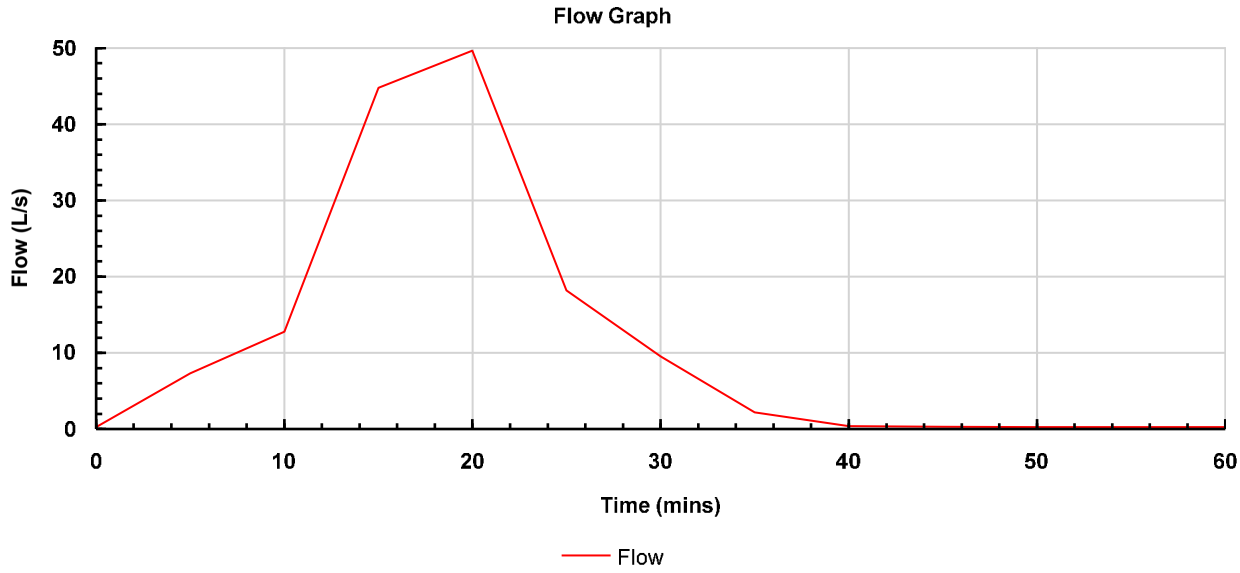
Graphs



Pipe (2) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 30 mins: Summer

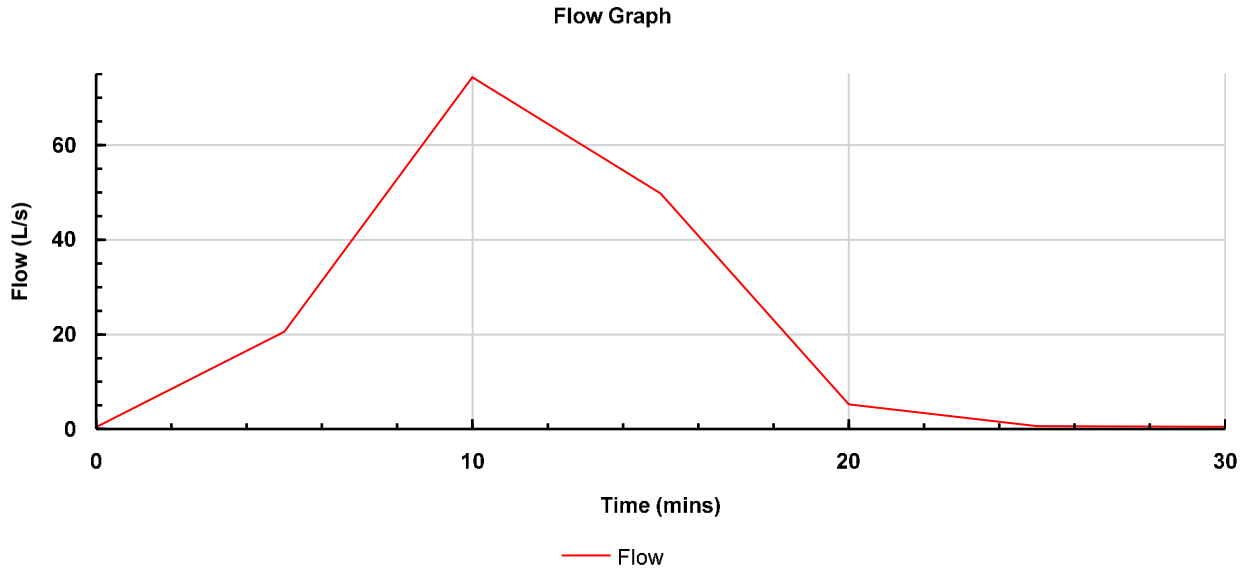
Graphs



Pipe (3) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

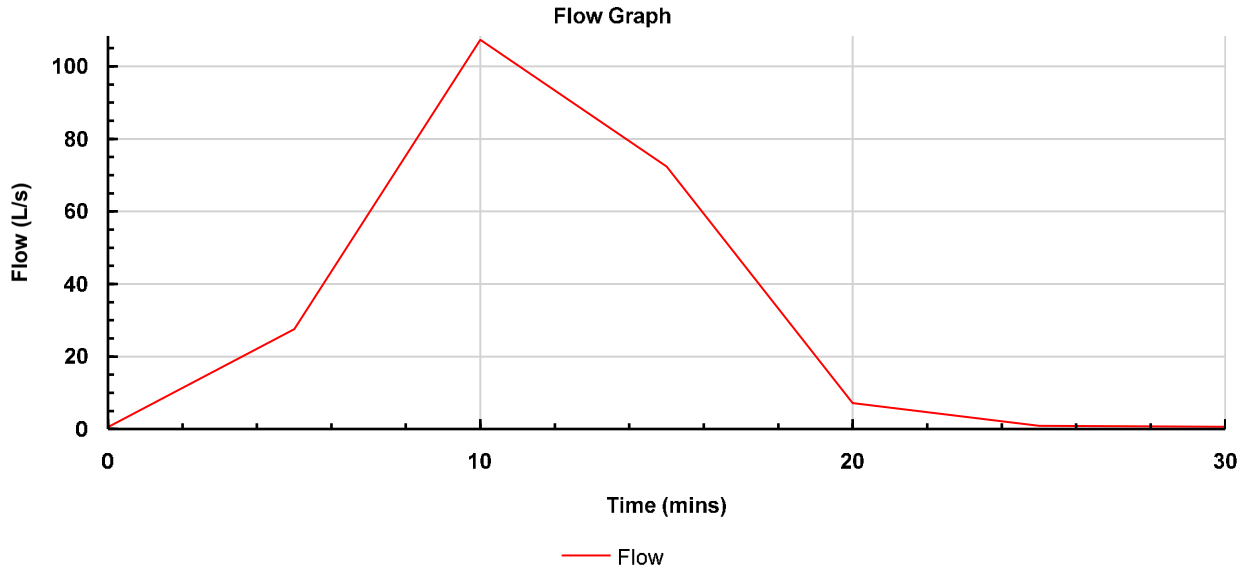
Graphs



Pipe (4) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

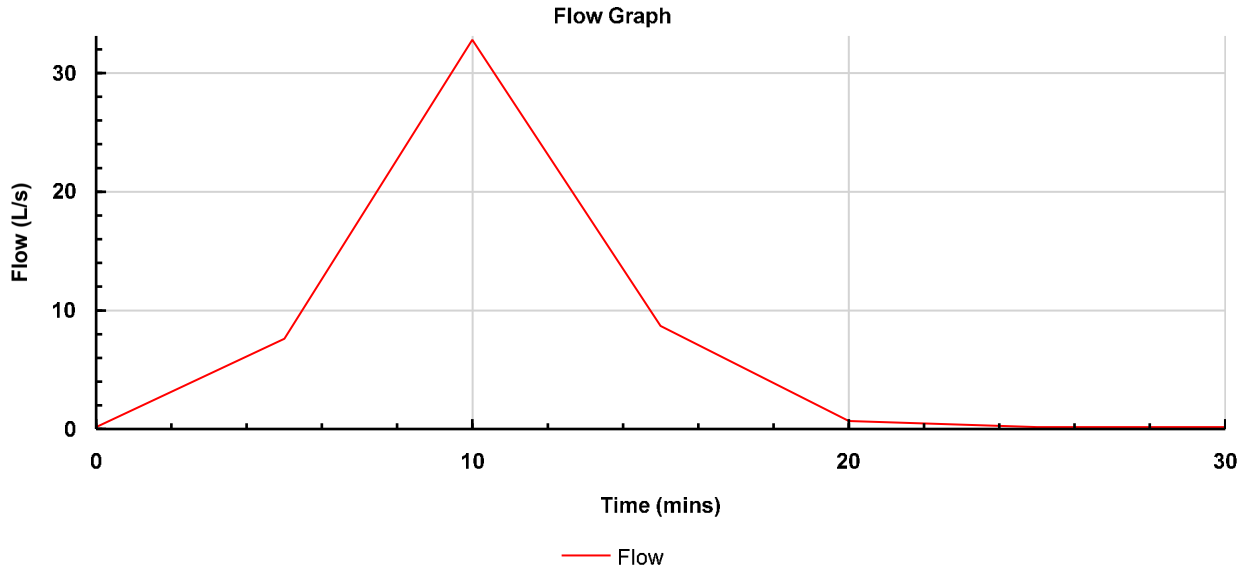
Graphs



Pipe (5) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

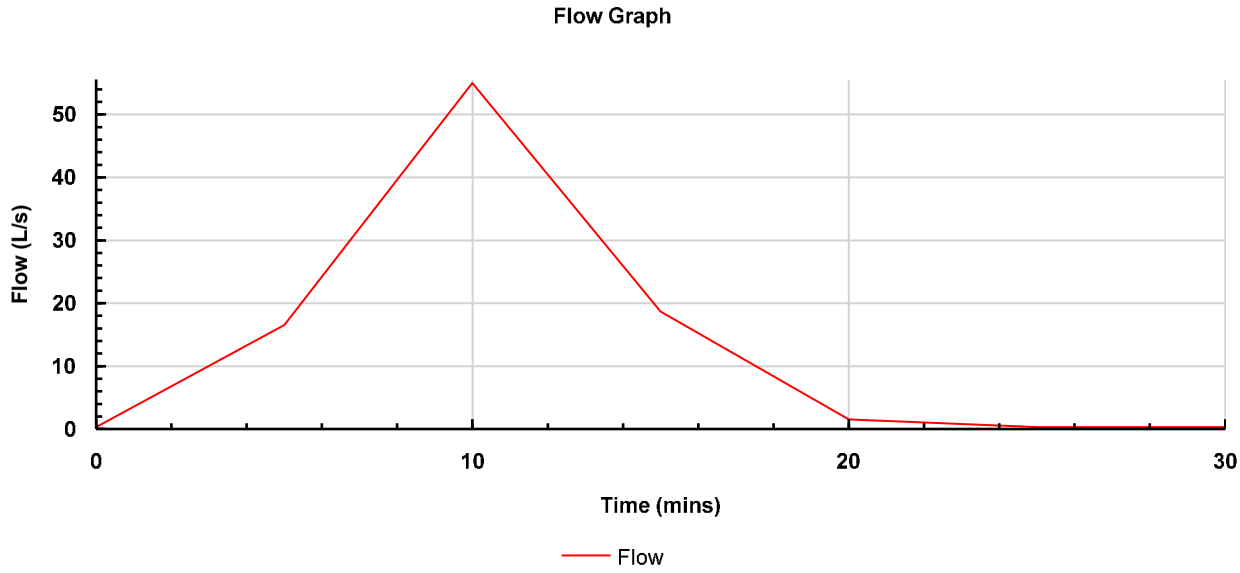
Graphs



Pipe (6) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Winter

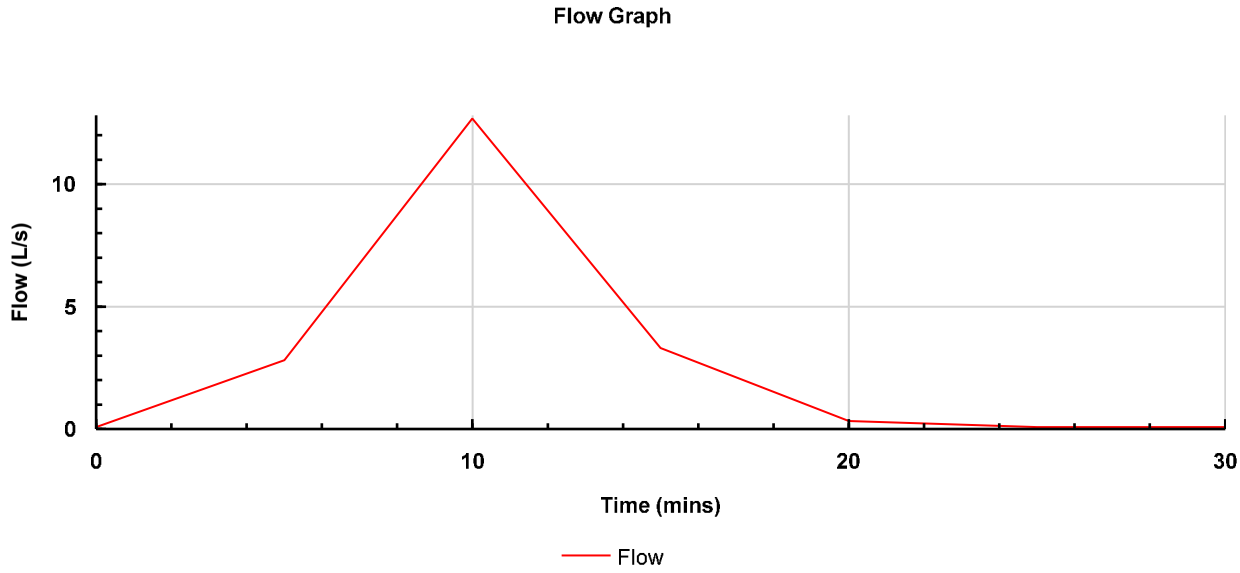
Graphs



Pipe (7) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

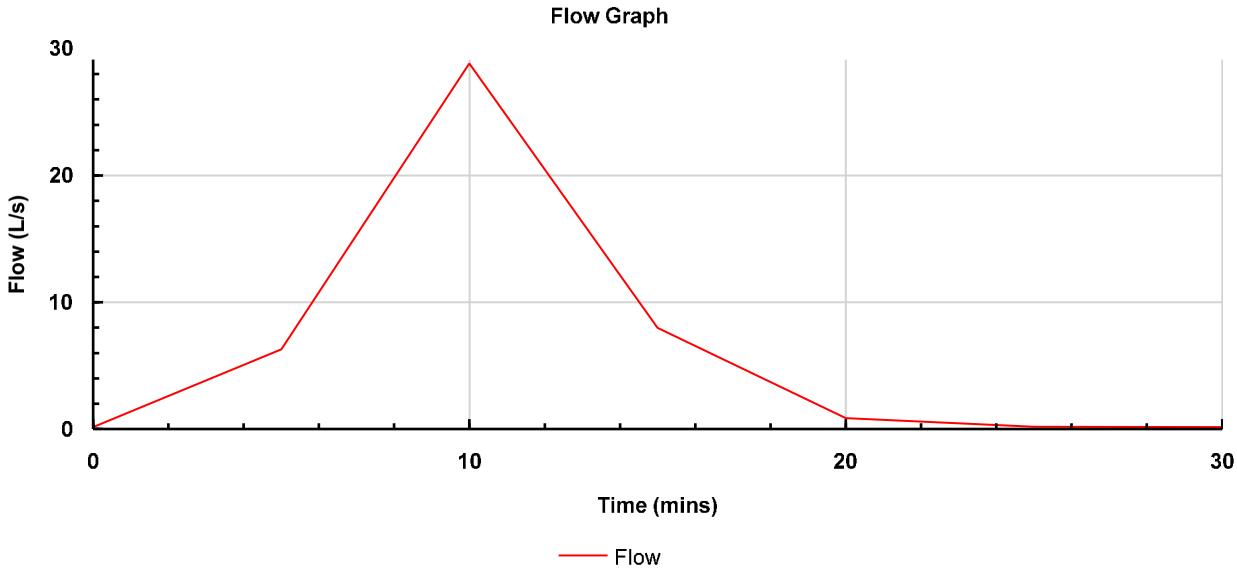
Graphs



Pipe (8) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

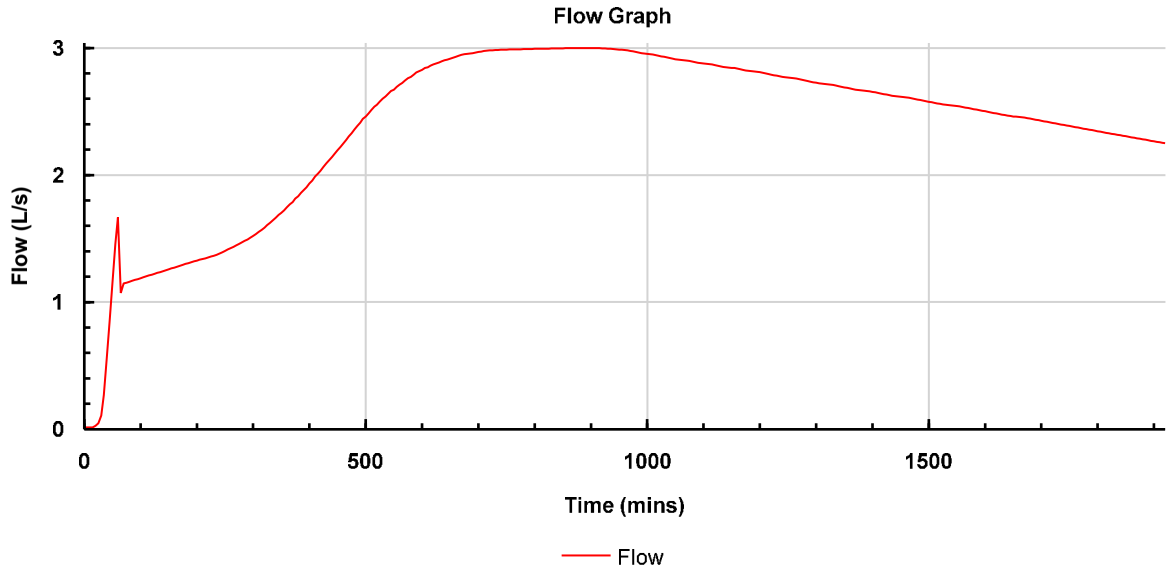
Graphs



Pipe (9) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 960 mins: Winter

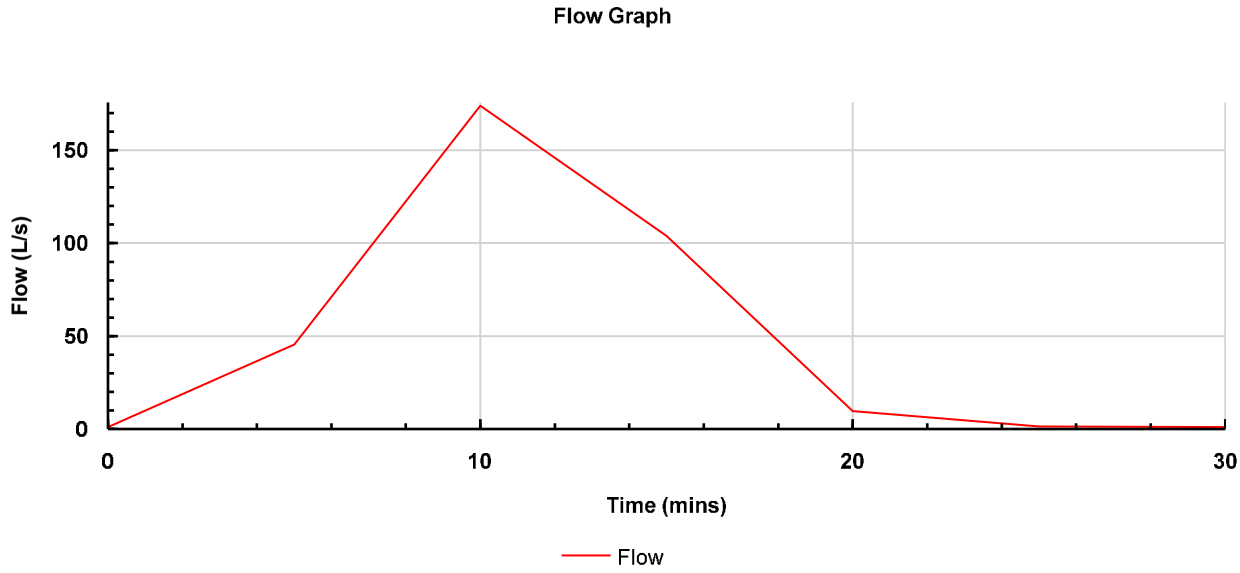
Graphs



Pipe (10) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

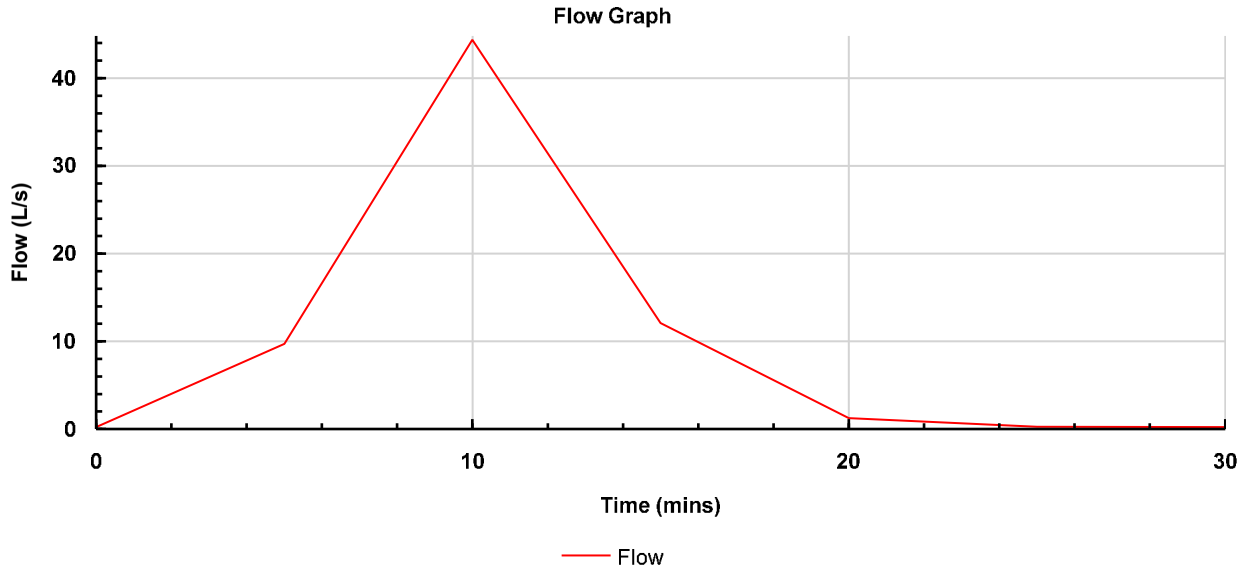
Graphs



Pipe (11) Type : Pipe

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Graphs

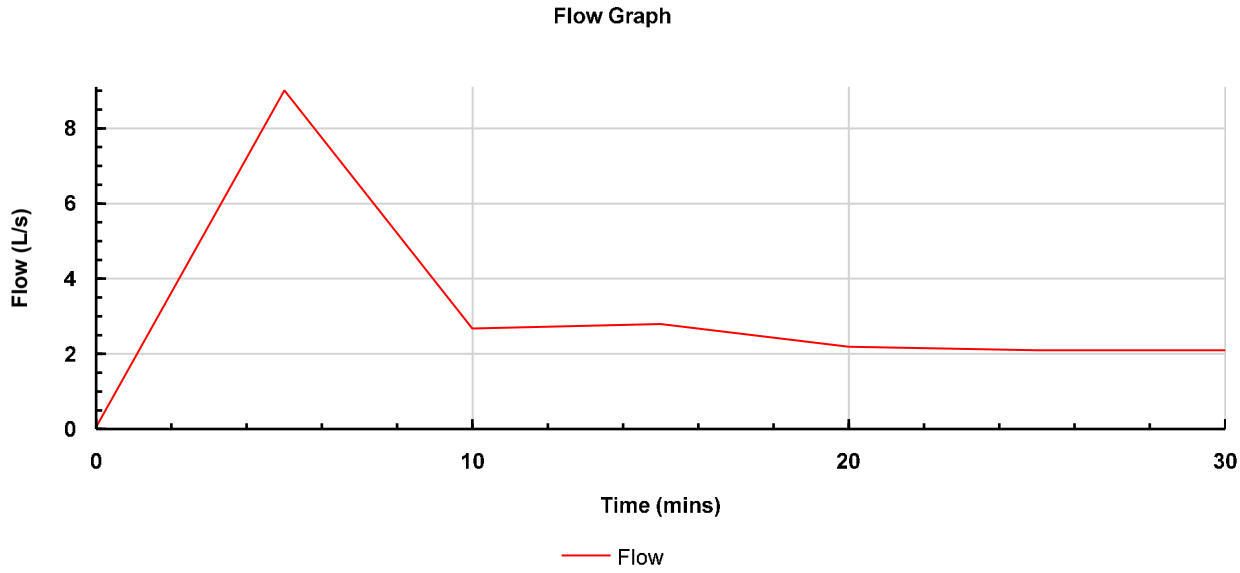


Project:	Date: 25/09/2025		
	Designed by: nperera	Checked by:	Approved By:
Report Details: Type: Connection Results Storm Phase: Phase	Company Address:		

Pipe (12)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Winter

Type : Pipe

Graphs



Appendix F
Product 4 Data

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	**384433/397563**	**11 September 2025 08:11**

Your selected location is in flood zone 2, an area with a medium probability of flooding.

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see https://www.gov.uk/guidance/flood-risk-assessment-standing-advice)

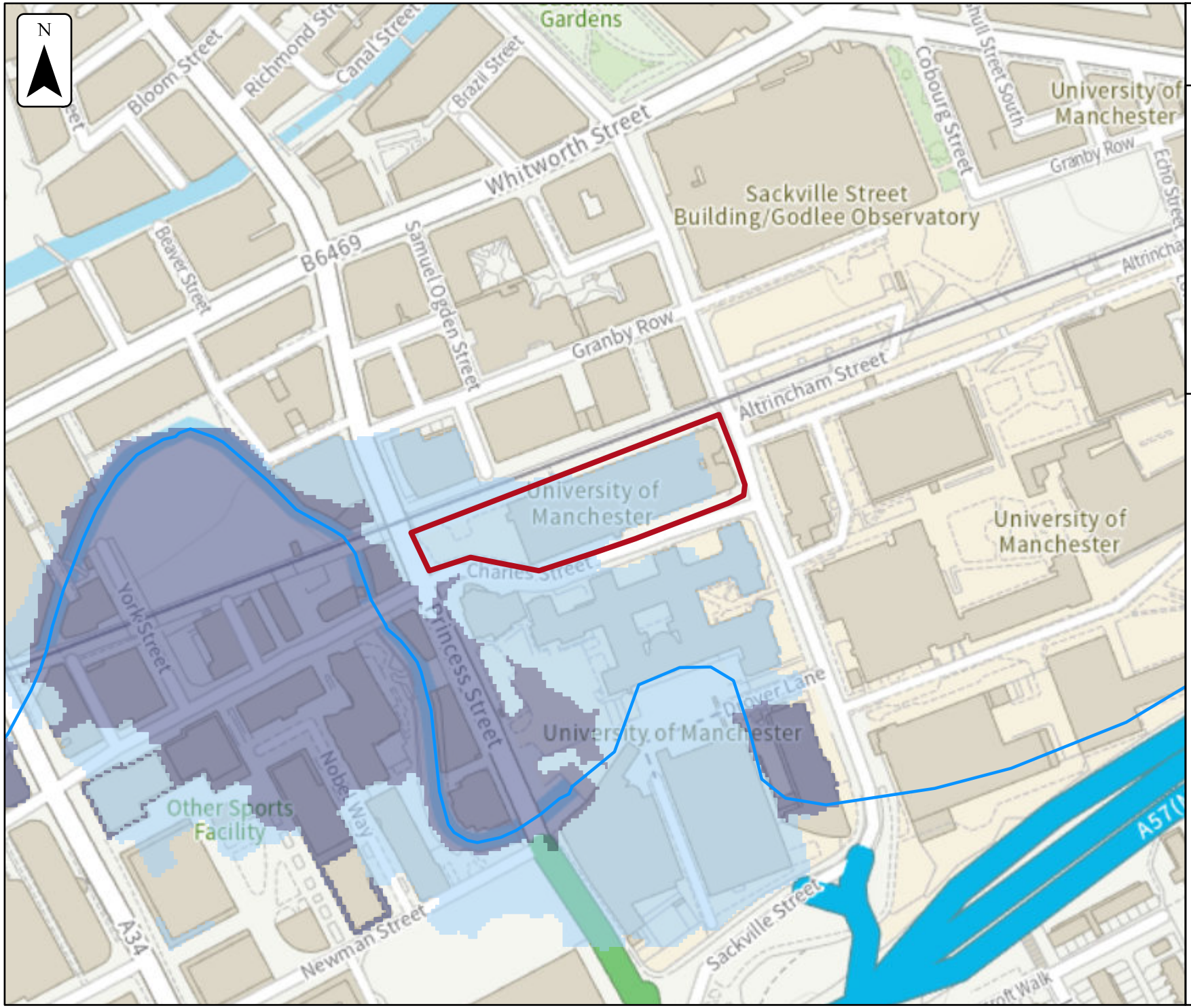
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3

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Environment Agency

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
384433/397563

Scale
1:2,500

Created
11 Sep 2025 08:11

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60 m

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