

Proposed Development at 764-786 Stockport Road.

Flood Risk Assessment and Drainage Strategy

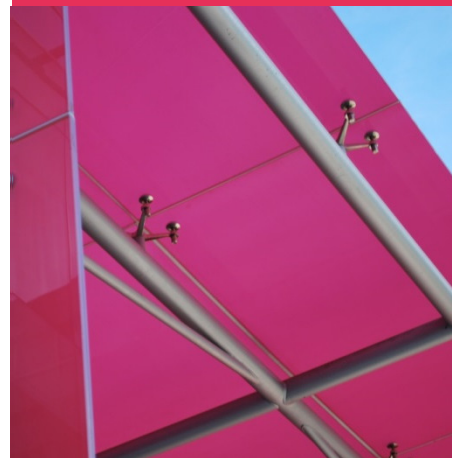
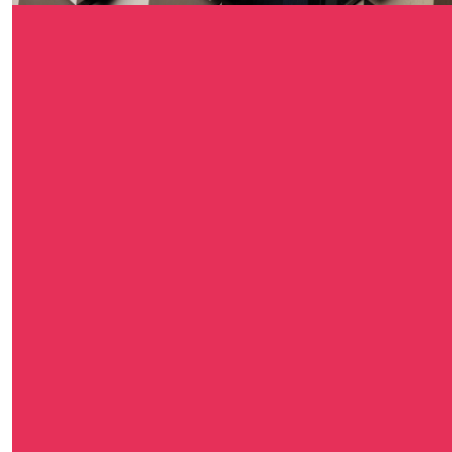
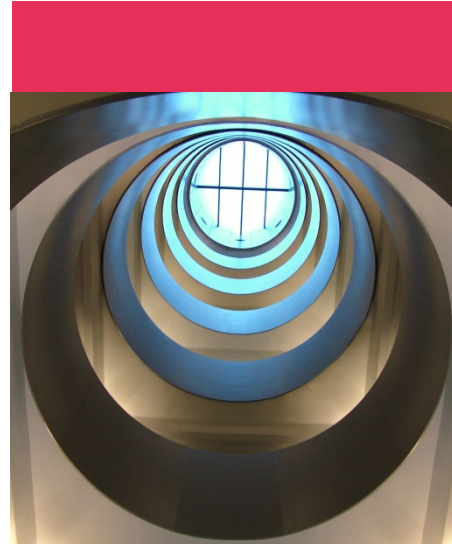
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Site Address: 764-786 Stockport Road, Manchester, M12 4GD



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1.0 Introduction

1.1 Project Background

- 1.1.1 Curtins has been appointed by Views Limited to provide a Flood Risk Assessment (FRA) and Drainage Strategy for the proposed development on Land at 764-786 Stockport Road, Levenshulme, Manchester, M12 4GD.
- 1.1.2 The report provides information on the nature of flood risk at the site and follows Government guidance regarding development and flood risk.
- 1.1.3 The report is based on currently available information and preliminary discussions.
- 1.1.4 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.
- 1.1.5 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

- 1.2.1 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).
- 1.2.2 The assessment will:
 - Investigate all potential risks of flooding to the site,
 - Consider the impact the development may have elsewhere with regards to flooding,
 - Consider design proposals to mitigate any potential risk of flooding determined to be present,
 - Consider the foul & surface water drainage proposals for the development.
- 1.2.3 Although the total site area is less than 1 hectare and located within low-risk Flood Zone 1, a review of the Manchester Council Strategic Flood Risk Assessment has confirmed that it is located within a Critical Drainage Area (CDA). Therefore, a Flood Risk Assessment is required to support a planning application.
- 1.2.4 In 2021, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a material consideration in the determination of planning applications for all developments.

- 1.2.5 A Drainage Strategy will therefore be required as part of the Planning Application for the development, as the site is considered to be 'major' development by the Town and Country Planning Order 2015.
- 1.2.6 This Flood Risk Assessment and Drainage Strategy reviews the following information:
- Environment Agency flood maps for rivers and sea flooding.
 - UK Government Flood Warning Information Service maps for surface water flooding and reservoir flooding.
 - Manchester City, Salford City and Trafford Councils Level 1 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2010.
 - Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010.
 - Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2011.
 - Preliminary Flood Risk Assessment (PFRA) for Manchester County Council dated May 2011.
 - Manchester City Council SuDS Requirements for New Developments.
 - United Utilities Public Sewer Records Extract and response to a predevelopment enquiry.
 - BGS ground investigation data.

1.3 Proposed Development

- 1.3.1 The proposed scheme is for a mixed-use building retail space, plant rooms & bin stores at ground floor and residential units above over three levels. The site area is approximately 0.12 hectares.
- 1.3.2 The proposed Site Context and Location Plan is enclosed in *Appendix A*.

2.0 Existing Site Details

2.1 History and Current Use

- 2.1.1 The site is located along the junction of Swallow Street and Stockport Road (A6), within the Levenshulme area. Levenshulme is situated approximately 4km to the south of Manchester City centre. The land within the red line boundary is currently a mix of boarded up shops and a car garage area accessed from Stockport Road. The wider area is considered to be a mixture of both residential and commercial with many retail and eatery units to the north and south. Jain Community Centre with associated car parking is located directly to the east of the proposed site with residential properties to the west. There is a railway line approximately 95m west of the site

Figure 1: Aerial Photograph (© Google 2020)



2.2 Existing Watercourses and Other Waterbodies

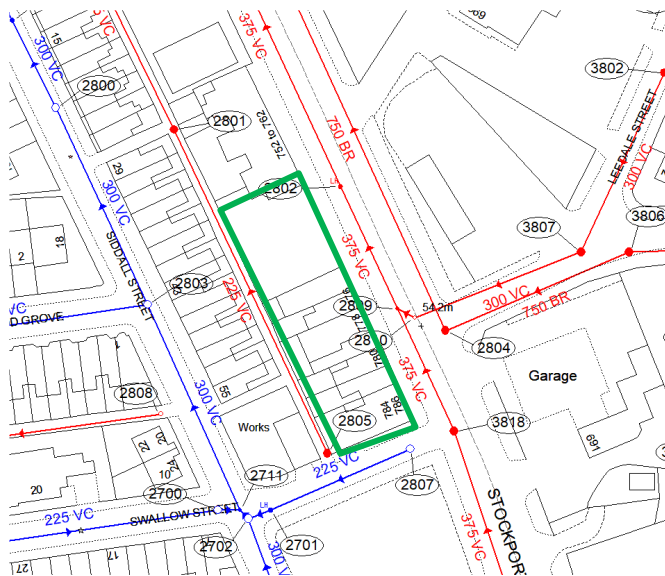
- 2.2.1 No above ground watercourses have been identified within the proposed site or immediately adjacent to the site.
- 2.2.2 Manchester Lead Local Flood Authority have confirmed that the Nico Ditch culvert (ordinary watercourse) is located approximately 100m to the South of the site. Further details of this watercourse have not been provided.
- 2.2.3 The Manchester, Salford and Trafford Strategic Flood Risk Assessment identifies that there is a lost watercourse known as Crowcroft Brook located approximately 120m north of the site within Crowcroft Park and flows in a westerly direction connecting to the Chorlton Gore Brook.

2.2.4 The Chorlton Gore Brook is located approximately 600m west of the site at its closest location.

2.3 Existing Drainage

2.3.1 A copy of the local sewer records and a request pre-development assessment has been received from United Utilities regarding the site and the proposed development. An extract from the public sewer records has been obtained for the development site and is shown in Figure 2.

Figure 2: United Utilities Public Sewer Record (extract)



2.3.2 The public sewer records indicate that there are no recorded public sewers located within the development site boundary.

2.3.3 The following public sewers are recorded within the vicinity of the site:

- There is a 225mm combined water sewer flowing north within the rear alley directly to the west of the site.
- Within Stockport Road there is a 375mm diameter combined sewer flowing north.
- To the south of the site in Swallow Street there is a 225mm diameter surface water sewer flowing west.

2.3.4 There are further public sewers identified on the public sewer records within the wider vicinity of the site, but these are not considered relevant to the scheme.

2.3.5 No CCTV Drainage Survey has been completed at the site. As the current development is fully impermeable, it is anticipated that all surface water runoff outfalls unrestricted to the adjacent combined water public sewers.

2.4 Topography

- 2.4.1 A topographical survey has been completed at the site and included in Appendix B. Existing buildings take up some 50% of the site area. What has been surveyed is showing a moderate fall in a northerly direction from circa 54.50m AOD to 53.60m AOD.

2.5 Geology

- 2.5.1 The British Geological Survey (BGS) map confirms that the superficial deposits are listed as Till comprised of clay and silt.
- 2.5.2 The bedrock geology is described as the Chester Formation (Sandstone).
- 2.5.3 Reviewing a local BGS borehole has indicated the strata to encompass a shallow depth of made ground over stiff clay with sandstone as the bedrock at depth.
- 2.5.4 The site is not located within a Groundwater Source Protection Zone.

3.0 Development and Flood Risk

3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance

- 3.1.1 In July 2021, the Department of Communities and Local Government published the National Planning Policy Framework document (NPPF) and the Planning Practice Guidance was published in March 2014 which provides guidance on how flood risk should be assessed during the planning and development process.

Table 1: (Extract from Planning Practice Guidance) Flood Zone Classifications

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's [Flood Map for Planning \(Rivers and Sea\)](#), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Police, ambulance and fire stations which are **not** required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

3.2 Site Specific NPPF Flood Risk Categorisation

- 3.2.1 To assess the NPPF flood risk classification for the site, the first step was to inspect the UK Government web based 'Flood Map for Planning' which is used to inform planning of a site's Flood Zone(s) and the probability of flooding from rivers or sea (not taking into account the presence of flood defences or climate change). However, the web based 'Long Term Flood Risk Assessment for Locations in England' should also be used to identify the long-term flood risks from rivers and seas, surface water and reservoirs.
- 3.2.2 The Flood Map for Planning report is enclosed in *Appendix C*, and it can be seen that the site is located within Flood Zone 1.
- 3.2.3 Further site-specific review of the flood risk to the site is provided in section 4.

3.3 Site Specific Flood Zone Compatibility

- 3.3.1 The proposals for the development site are likely to fall within the following category:
- Buildings used for dwellings; and
 - Buildings used for shops and other services
- 3.3.2 Buildings used for dwellings are classed as 'More Vulnerable' development and Buildings used for shops and other services are classed as 'Less Vulnerable' development in the Flood Risk Vulnerability Classification (Table 2).
- 3.3.3 The site is located within Flood Zone 1 for which a 'More Vulnerable' development is deemed to be appropriate. Therefore, the development passes the sequential test and an exception test is not required (refer to the Flood Zone compatibility table in the NPPF technical guidance).

3.4 Sequential Test

- 3.4.1 The site is categorised as a 'More Vulnerable' and 'Less Vulnerable' development (shown in table 2) and is within Flood Zone 1 therefore the sequential test is not required to be applied (see table 3).

4.0 Hydrological Assessment

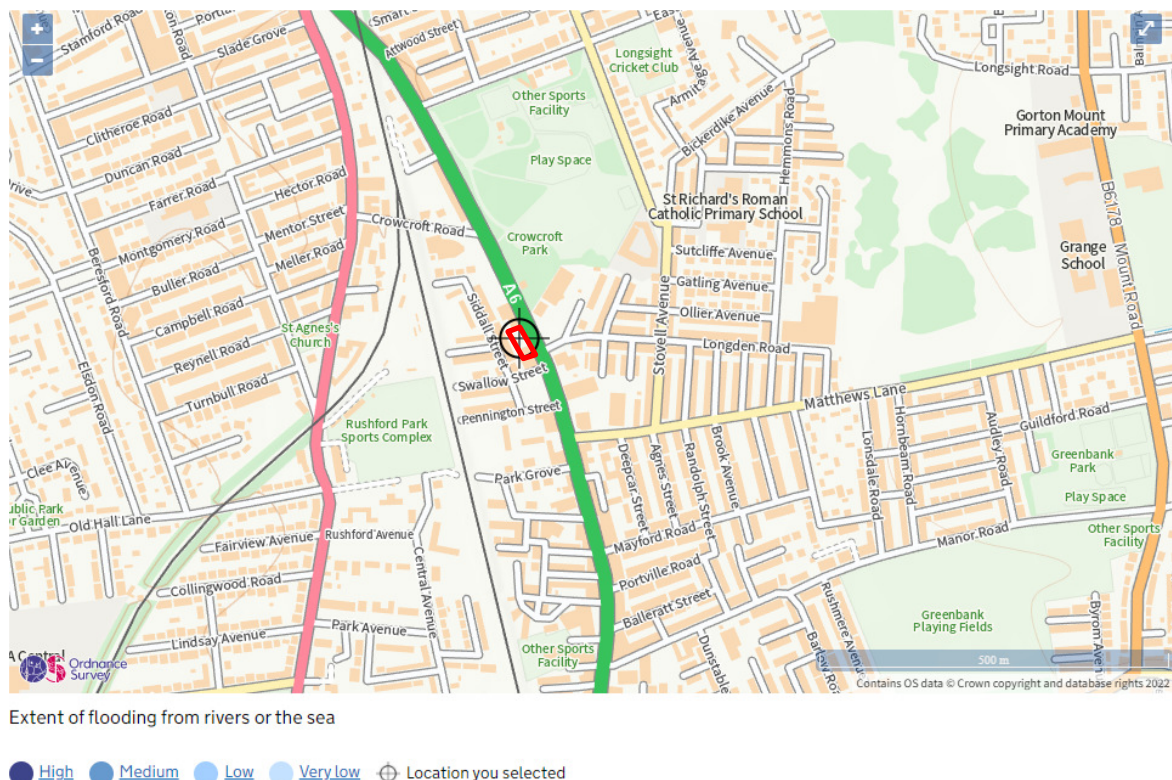
4.1 Sources of Flood Risk

- 4.1.1 This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2 Fluvial Flooding (Rivers and Streams)

- 4.2.1 Flooding to the site from rivers and sea is indicated below in Figure 3, taken from the UK Government's Long-Term Flood Risk Information.

Figure 3: Long Term Flood Risk Assessment Map – Flood Risk from Rivers or Sea (© Crown Copyright)



- 4.2.2 It can be seen that the site is located within Flood Zone 1. The site is not shown to be in an area which benefits from flood defences. The site has less than a 1 in 1000 annual probability of fluvial flooding (1% - 0.1%). Therefore, the proposed site is considered to be at low risk from fluvial flooding.

Figure 4: Long Term Flood Risk Assessment (Detailed Information) – Flood Risk from Rivers or Sea (© Crown Copyright)

Flood risk from rivers or the sea

Very low risk means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

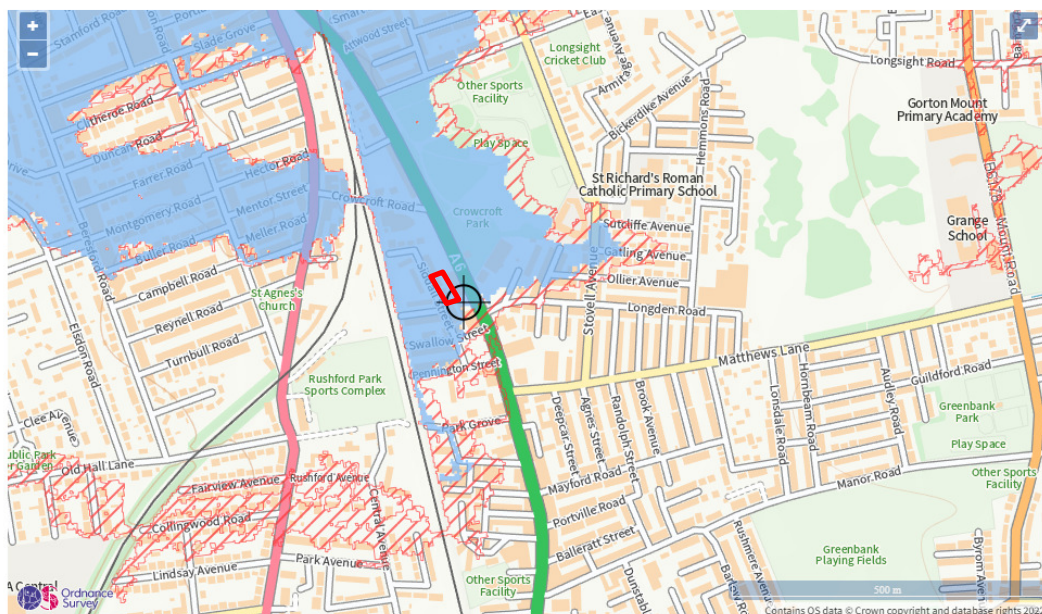
4.3 Tidal Flooding (Coastal or Estuarine)

- 4.3.1 There is currently no flood risk identified on the Environment Agency flood maps for the site and it is therefore regarded to be at low risk from tidal flooding.

4.4 Reservoir Flooding

- 4.4.1 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.
- 4.4.2 The Long-Term Flood Risk Assessment (Flood Risk from Reservoirs) map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds (see Figure 5).

Figure 5: Long Term Flood Risk Assessment Map – Flood Risk from Reservoirs (© Crown Copy Right)



Maximum extent of flooding from reservoirs:

● when river levels are normal ■ when there is also flooding from rivers ⊕ Location you selected

- 4.4.3 The site is located within the maximum extent of flooding from a reservoir. However these maps are worst case scenarios and given the unlikelihood that such an event would ever occur there is no further investigation required.

4.5 Canal Flooding

- 4.5.1 The nearest canal to the site is the Ashton Canal which is located approximately 3.5 km north of the site.
- 4.5.2 The canals are identified in the SFRA as not generally posing a direct flood risk as they are a controlled water body. Therefore, the residual risk of canal flooding is usually associated with lower probability events such as overtopping and/or the breaching of embankments.
- 4.5.3 Given the above information, it is considered that there is low risk of canal flooding to the site.

4.6 Groundwater Flooding

- 4.6.1 According to Manchester City Council SFRA, states that it does not consider groundwater flooding to be a significant issue in its administrative boundary, as there is no historic evidence to suggest that groundwater flooding is an issue worth further investigation.
- 4.6.2 The site is not shown to be within an area at risk of groundwater flooding according to the groundwater flooding map shown within the Governments online 'Magic' maps website.
- 4.6.3 At the time this report was written no intrusive ground investigation works had taken place or been published; therefore, site specific depths have not been confirmed.
- 4.6.4 Based on the current information it is overall assumed that the site is at a low risk of groundwater flooding.

4.7 Public Sewers or Highway Drainage Flooding (Infrastructure Failure)

- 4.7.1 There are no highway drains recorded within the site. It is likely that there will be localised highway drainage surrounding the site (such as gullies and connections).
- 4.7.2 There are no public sewers recorded within the site.
- 4.7.3 United Utilities and Manchester City Council have not provided any records of flooding to the site or the vicinity.
- 4.7.4 United Utilities Water and Manchester City Council maintain their drainage assets within the vicinity of the site, if any, the risk of flooding to the proposed development site from public sewers or highway drainage is considered as low.

4.8 Surface Water Flooding to the site

4.8.1 Surface water flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows, which if originating at a higher elevation than a development site can potentially pose a flood risk.

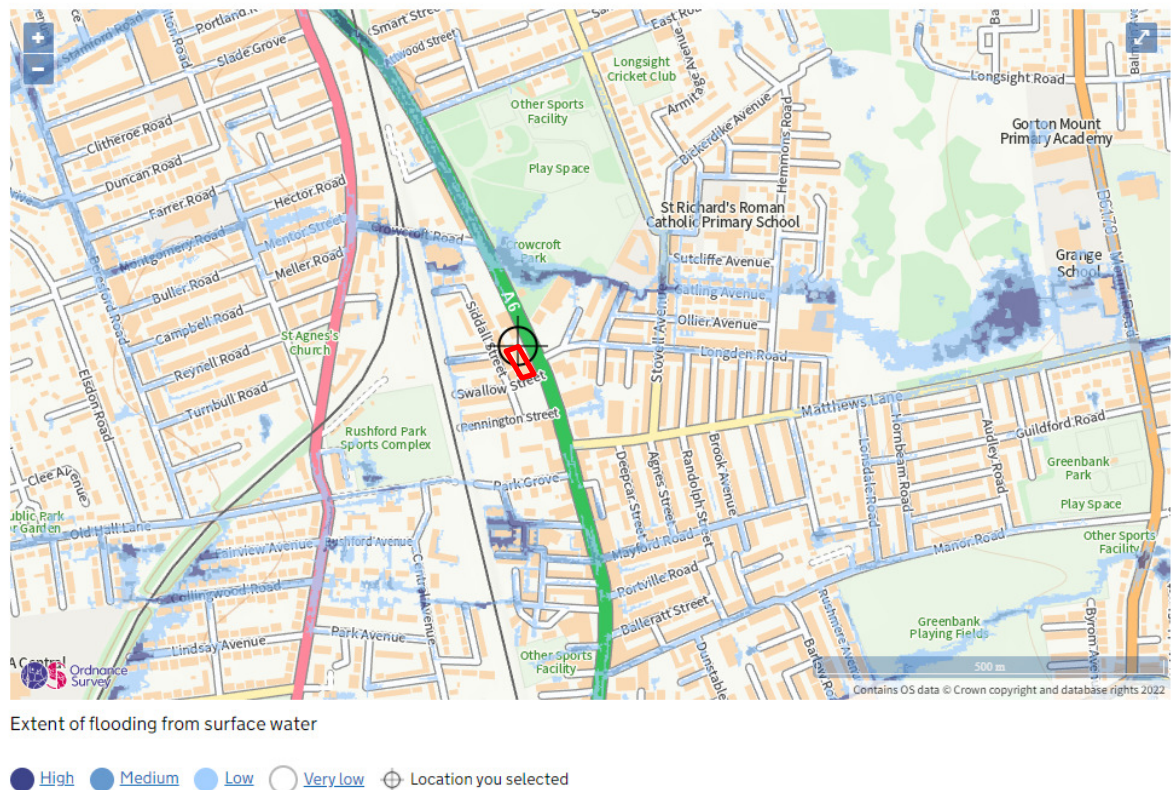
4.8.2 From the UK Government's Flood Risk from Surface Water (extent of flooding) map;

- Where a site is located in a dark blue shaded zone, this indicates that the site is at high risk of flooding, where flooding occurs as a result of rainfall with a greater than 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding, where flooding occurs as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year.
- Where a site is located in a light blue shaded zone, this indicates that the site is at low risk of flooding, where flooding occurs as a result of rainfall of between 1 in 1000 (0.1%) and 1 in 100 (1%) chance in any given year.
- Where a site is located in a clear (unshaded) area; this indicates that the site is at very low risk of flooding, where flooding occurs as a result of rainfall with less than 1 in 1000 (0.1%) chance in any given year.

4.8.3 The extent of flooding to the site from surface water is indicated in

- 4.8.4 Figure 6 and it can be seen that the whole site is identified as being at a 'very low' risk of flooding from surface water. The surrounding roads are classed as 'low risk', however these areas are at a lower level than the development site. There is no overland flood flow route passing through the site.

Figure 6: Risk of Flooding from Surface Water - Extent of Flooding



4.8.5 Considering the above information, the risk of surface water flooding to the site is generally considered very low.

4.9 Surface Water Flooding from the site

4.9.1 Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. Where new development is proposed, the proposed surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

4.9.2 The development has the potential to increase flood risk where additional run-off from proposed paved areas and building roofs are discharged freely into the downstream drainage network. It is therefore encouraged to propose permeable areas, landscaping areas and incorporate sustainable drainage features utilising infiltration or attenuation to satisfy local and national guidance.

4.9.3 An assessment of the proposed surface flows is carried out within the drainage strategy in Section 6 of this report.

4.9.4 Overall, the surface water flooding from the site to surrounding areas is considered very low.

4.10 Historical Flooding

4.10.1 No historic records of flooding for the site were received at the time of writing this report.

4.11 Summary of Flood Risk

4.11.1 From the evidence collated and subsequent negotiations the main types of flooding that may apply to the proposed development site are as follows:

- Groundwater flooding (potential)
- Surface water flooding to the site
- Surface water flooding from the site

5.0 Mitigation

5.1 Groundwater Flood Mitigation

- 5.1.1 Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.
- 5.1.2 Generally, the site has a potential for groundwater flooding for any properties set below the ground level.
- 5.1.3 The proposed development does not include any below ground basement areas and generally, floor levels are at or above existing ground levels therefore the risk of groundwater flooding to the area is considered low.
- 5.1.4 Finished floor levels for the development should be set above the highest groundwater level where possible.
- 5.1.5 External ground levels across the site should fall away from the proposed buildings and ensure that the creation of low points is avoided (other than those used intentionally for drainage features) in order that in the unlikely event of groundwater flooding, the flood water is safely routed away from the buildings on site.
- 5.1.6 Providing the above mitigation measures were imposed, the risk from groundwater flooding would therefore be considered low post development.

5.2 Surface Water Flooding to the site Mitigation

- 5.2.1 The UK Government Long Term Flood Risk Assessment surface water flood maps indicate that the site is at very low to low risk of surface water flooding. However, the site topography is likely to be partially reprofiled as part of the development proposals. Therefore, measures outlined in this section are recommended in order to ensure that the risk of surface water flooding to the post-development site shall not be increased and shall be reduced where possible.
- 5.2.2 Section 4.8 of the report confirms that the risk of surface water flooding to the site is generally considered very low, however, to ensure that the 'very low' risk can be maintained through development it is recommended that proposed external ground levels across the site should fall away from the proposed buildings in a manner which does not create low points where water might collect unintentionally. This will ensure that any surface water will not flow towards the proposed buildings. The proposed surface water drainage network shall be designed to accommodate flows generated from within the site.

- 5.2.3 It is assumed that the surface water drainage outside of the site boundary will be subject to the relevant landowner's regular drainage maintenance schedule.
- 5.2.4 Providing the above measures are implemented the flooding risk to the development site from surface water is therefore considered low post development.

5.3 Surface Water Flooding from the site Mitigation

- 5.3.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.
- 5.3.2 In October 2011, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 4 demonstrates the climate change allowances with central and upper end allowances being considered.
- 5.3.3 Based on the nature of the development, a lifespan in excess of 100 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, an allowance of 40% for climate change on peak rainfall intensity will be included in the hydraulic calculations.

Table 4: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

- 5.3.4 Section 6 reviews the surface water discharge options, and it is proposed that the surface water will outfall into the public surface water sewer within Swallow Street (subject to a Section 106 Agreement with United Utilities) via a new connection at a maximum pass flow rate of 8.5l/s.
- 5.3.5 To minimise localised flooding within the site, the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Also, all inlet features should have suitably sized sumps to catch silts and should be subject to a documented routine maintenance and cleansing regime.

- 5.3.6 Flood water exceedance routes should be identified on the site.
- 5.3.7 For any sustainable drainage systems employed in the development, an appropriate management and maintenance plan for the sustainable drainage system for the lifetime of the development should be submitted which should include:
- Any arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Residents' Management Company
 - Arrangements concerning appropriate funding mechanisms for its on-going maintenance of all elements of the sustainable drainage system (i.e. inspections, regular maintenance)
 - Means of access for maintenance and easements where applicable
- 5.3.8 Assuming that the proposed drainage system is designed to provide adequate capacity, and that the private and adopted sewers will be maintained by their adopted authority, it can be assumed risk of flood from blockage or overloading is minimal.
- 5.3.9 The final design of the drainage networks shall be in accordance with the legislation set by Manchester City Council LLFA and United Utilities.

6.0 Drainage Strategy

6.1 Existing Drainage

- 6.1.1 A copy of the local sewer records and a request pre-development assessment has been received from United Utilities regarding the site and the proposed development.
- 6.1.2 The public sewer records indicate that there are no recorded public sewers located within the development site boundary.
- 6.1.3 The following public sewers are recorded within the vicinity of the site:
- There is a 225mm combined water sewer flowing north within the rear alley directly to the west of the site.
 - Within Stockport Road there is a 375mm diameter combined sewer flowing north.
 - To the south of the site in Swallow Street there is a 225mm diameter surface water sewer flowing west.
- 6.1.4 No CCTV Drainage Survey has been completed at the site. As the current development is fully impermeable, it is anticipated that all surface water runoff outfalls unrestricted to the adjacent combined water public sewers.
- 6.1.5 A Pre-development request was issued to United Utility Water regarding the site and the proposed development. Their feedback is that foul drainage can discharge unrestricted to any of the adjacent public combined sewers. Surface water must follow the SuDS hierarchical approach. Should infiltration or connection to a watercourse not be feasible then United Utilities will allow connection to the surface water public sewer at a pass forward flow rate not exceeding 8.5l/s. Full details can be found in Appendix D.

6.2 Proposed Foul Water Drainage

- 6.2.1 A separate foul and surface water system is proposed.
- 6.2.2 The proposed foul drainage is to be collected by gravity and outfall into the existing combined public sewer located in the rear alleyway, where possible via an existing connection.
- 6.2.3 The peak flow rate for the development has been calculated based on the 'Design and Construction Guidance for foul and surface water sewers' Sewerage Sector Guidance Appendix C.
- 6.2.4 The residential element of the development assumes 4000 l/d/d (litres per dwelling per day). The peak foul discharge is therefore estimated as 1.38l/s based on 30 dwellings.

- 6.2.5 The commercial element of the development is based on the sum of the domestic design flow and the trade effluent design flow. However, in the absence of appropriate information, 0.6 litres per second per hectare of developable land for the domestic element and 0.5 litres per second per hectare for normal industry is assumed. The peak foul discharge is therefore estimated at 0.088l/s based on 0.080ha of commercial space.
- 6.2.6 The total foul peak flow from the development is therefore estimated at 1.47 l/s.
- 6.2.7 Where sewers remain private, connection to the public sewer network will be subject to a Section 106 Agreement with United Utilities.
- 6.2.8 The proposed drainage strategy is enclosed in *Appendix E*.

6.3 Proposed Surface Water Drainage

- 6.3.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.
- 6.3.2 In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

- 6.3.3 A Phase 2 Intrusive Site Investigation has not yet been carried out at the site. However, given the site has had previous use, it is likely that the development will contain depths of made ground. The superficial deposits are listed as Devensian Till and the underlying deep strata is described as comprising Sandstone. Nearby boreholes available on the BGS online mapping suggest that the primary material identified is fill over clay and, on this basis, it is assumed that infiltration will be unlikely.
- 6.3.4 A BGS infiltration report have been ordered and reviewed as part of this assessment and included in Appendix C. In summary the report suggested that infiltration is not preferable due to high groundwater and that infiltration is dependant on the superficial deposit material. In conjunction with the evidence found that the majority of the material is clay, an effective infiltration system is unlikely to be achievable. To fully run out infiltration, a BRE 365 compliant infiltration test will be required and should be carried out as part of intrusive site investigations. It must also be noted that the building takes up the full footprint of the development and therefore the minimum offset distance between a soakaway and foundation of 5m cannot be achieved.

Watercourse

- 6.3.5 The nearest watercourse to the site is the Nico Ditch culvert (ordinary watercourse) which is located approximately 100m to the South of the site. Manchester City Council have advised that they have previous records of flooding at this ditch, downstream of the proposed development site and therefore advise not to connect surface water from the site to this watercourse.
- 6.3.6 The next nearest watercourse is the lost watercourse known as the Crowcroft Brook, which is located approximately 120m north of the site within Crowcroft Park and flows in a westerly direction connecting to the Chorlton Gore Brook. To drain to this watercourse would not be feasible due to the distance from the site and the requirement to cross third party land

Surface Water Sewer

- There is a 300mm diameter surface water sewer flowing west within Swallow Street immediately to the south of the site. From the UU records, this sewer is approximately 2.6m deep.
- Following the drainage hierarchy, the site is proposed to discharge via a new Manhole at a maximum flow of 5l/s. United Utilities have confirmed where a connection to surface water sewer is demonstrated as necessary, a maximum flow of 8.5 l/s is acceptable. Refer to the United Utilities correspondence enclosed in *Appendix D*.

Combined Water sewer

- 6.3.7 There are various combined sewers in the vicinity of the site. The site is proposed to drain to the UU surface water network and therefore no surface water will flow directly from the site into the public combined sewers located within the close vicinity from the development.
- 6.3.8 Table 5 summarises the options for surface water disposal.

Table 5: Surface Water Disposal

Surface Water Disposal	Potential	Description
Infiltration	X	It is assumed that the site will not be suitable for infiltration SuDS. Potential high groundwater means an effective infiltration system is unlikely. Further intrusive BRE 365 infiltration testing required to confirm.
Watercourse	X	The Crowcroft Brook is located approximately 120m north of the site. A new connection to the watercourse is not considered a viable option as it would have to pass through third-party land.
Surface Water Public Sewer	✓	There is a surface water sewer within the vicinity of the site. United Utilities have confirmed where a connection to surface water sewer is demonstrated as necessary, a maximum flow of 5 l/s is acceptable.
Combined Public Sewer	X	There are various combined water sewers in the vicinity of the sites. However, in line with the drainage hierarchy the site is proposed to drain to the surface water public sewers system.

- 6.3.9 It is therefore considered at this stage that connection to the surface water public sewer system via a new Manhole will be proposed.
- 6.3.10 The proposed surface water drainage is to be collected by gravity and outfall into the existing surface water public sewer in Swallow Street. It is currently proposed that a single outfall is proposed, however this will be subject to co-ordination during detailed design.
- 6.3.11 The LLFA have been consulted regarding discharge rates. They have recommended that the MCC 'SuDS Requirements for New Developments' (update 2019) is followed.
- 6.3.12 This indicates that for Brownfield sites, the post development runoff rate should not exceed 50% of the predevelopment rates.
- 6.3.13 The Brownfield flow rates have been calculated below based on the Modified Rational Method with a rainfall allowance for each event:

Figure 7: Brownfield Run-off Rate

	Area (ha)	1 year	30 year	100 year
Brownfield Runoff Rates	0.123	10.3 l/s (30mm/hr)	22.2 l/s (65mm/hr)	32.4 l/s (95mm/hr)

- 6.3.14 The brownfield run-off rate has been calculated between 10.3 and 32.4 l/s. However, in accordance with the response from UU and to limit blockage risk, the proposed discharge from the development has been set at a maximum of 8.5 l/s. This satisfies the MCC LLFA policy and is reduced for the higher order events.
- 6.3.15 It is recommended that sustainable methods of attenuation are implemented where possible. The strategy currently proposes for an attenuation tank providing up to 22m³ of storage for the 100 year plus a 40% allowance for climate change.
- 6.3.16 The proposed drainage strategy for the site has been included within *Appendix E*.
- 6.3.17 The preliminary surface water calculations have been included within *Appendix F*.
- 6.3.18 Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Access roads are considered as a low hazard in terms of contamination. Figure 8 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015)

Figure 8: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

6.3.19 Figure 9 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015)

Figure 9: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters				
Type of SuDS component	Mitigation indices¹			
	TSS	Metals	Hydrocarbons	
Filter strip	0.4	0.4	0.5	
Filter drain	0.4 ²	0.4	0.4	
Swale	0.5	0.6	0.6	
Bioretention system	0.8	0.8	0.8	
Permeable pavement	0.7	0.6	0.7	
Detention basin	0.5	0.5	0.6	
Pond ⁴	0.7 ³	0.7	0.5	
Wetland	0.8 ³	0.8	0.8	
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.			

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

- 6.3.20 The selection of treatment should ensure that the SuDS mitigation component index (Figure 9) exceeds the pollution hazard index (Figure 8).
- 6.3.21 As the development site encompasses roof area only, no formal treatment is deemed necessary.
- 6.3.22 Where sewers remain private, connection to the public sewer network will be subject to a Section 106 Agreement with United Utilities.
- 6.3.23 The final design of the drainage networks shall be in accordance with the legislation set by Manchester City Council and United Utilities.

7.0 Maintenance

- 7.1.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 7.1.2 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.
- 7.1.3 Where sewers and SuDS features are offered for adoption, the adopting authority will have their own maintenance strategy in place.
- 7.1.4 The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

7.1 Components

- 7.1.1 The following components have been included within the drainage design for the proposed development:
- Pipes
 - Gullies
 - Attenuation Tank
 - Flow Control Unit
- 7.1.2 The maintenance strategy should be implemented to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 7.1.3 The maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 7.1.4 Maintenance of the drainage network will be the responsibility of an on-site facilities management team.
- 7.1.5 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.

- 7.1.6 Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.
- 7.1.7 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.
- 7.1.8 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter
- 7.1.9 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

7.2 Inspection, Manhole and Catchpit Chambers

- 7.2.1 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.
- 7.2.2 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

7.3 Pipes

- 7.3.1 Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins drainage specification.
- 7.3.2 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 7.3.3 Access for maintenance is provided through access chambers and manholes.
- 7.3.4 Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

7.4 Gullies

- 7.4.1 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.
- 7.4.2 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating

- 7.4.3 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near gully gratings.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect sumps and outlet pipes and rod through poorly performing channels and outlets as initial remediation.	As required.

7.5 Attenuation Tanks

- 7.5.1 The attenuation tanks are currently specified as geocellular units, which are wrapped in a geotextile blanket.
- 7.5.2 The geocellular units and geotextile are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.
- 7.5.3 Access for maintenance should be provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.
- 7.5.4 Regular inspection and maintenance is important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	As required.

7.6 Flow Control Units

7.6.1 The flow control units are intended for flood control and flow restriction.

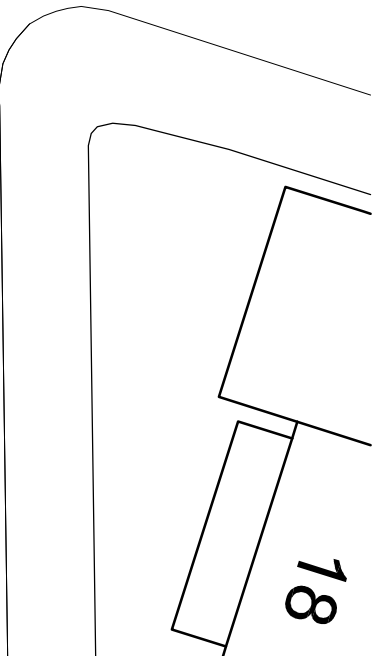
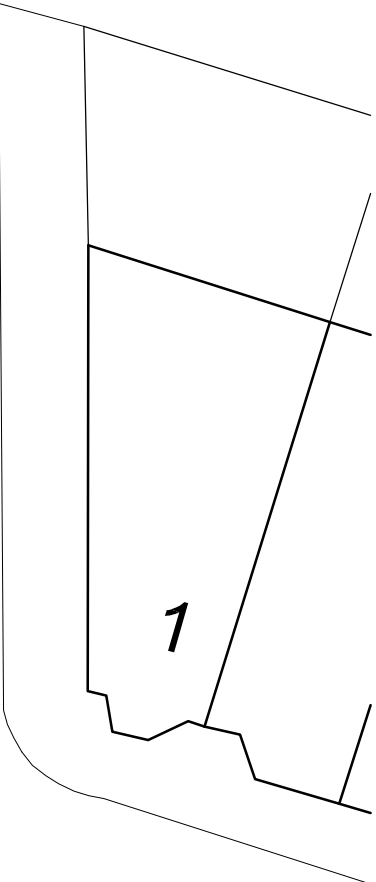
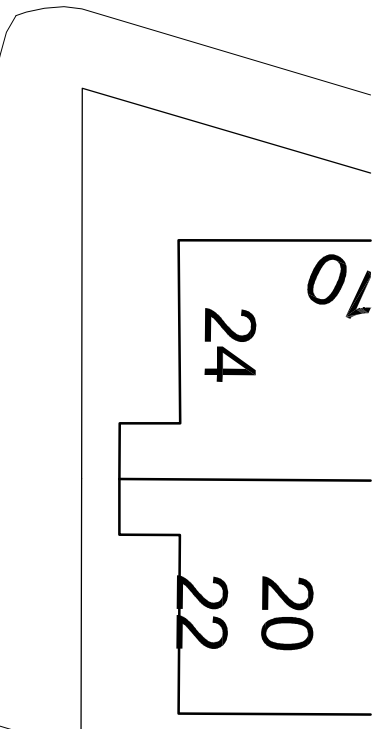
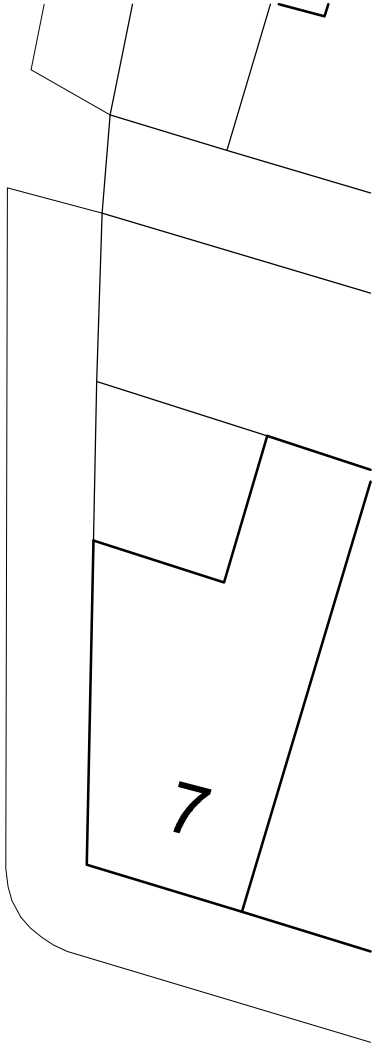
7.6.2 The flow control is specified as Hydro-brake and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

7.6.3 Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

Appendix A

Site Location and Context Plan



Accommodation

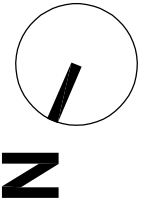
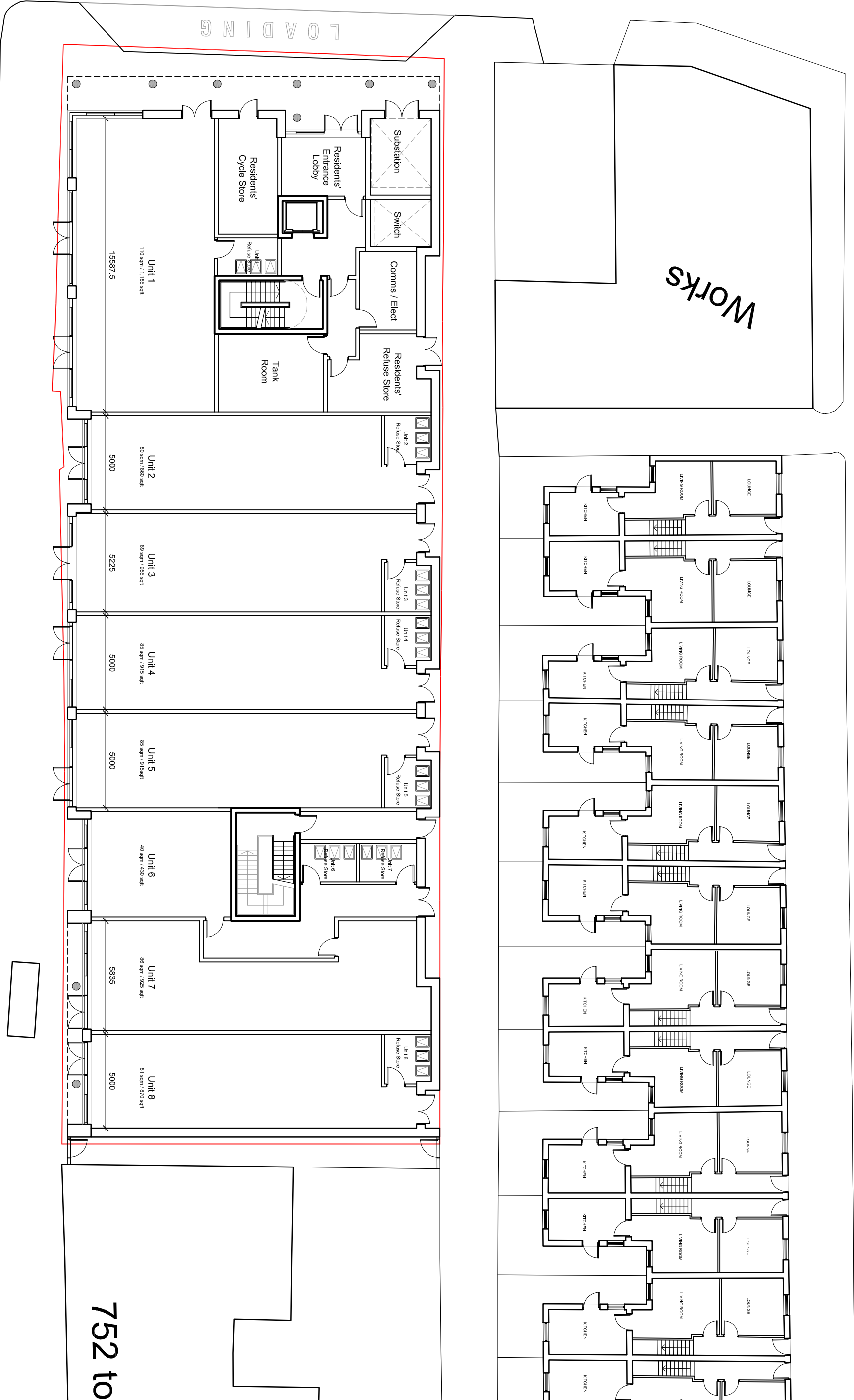
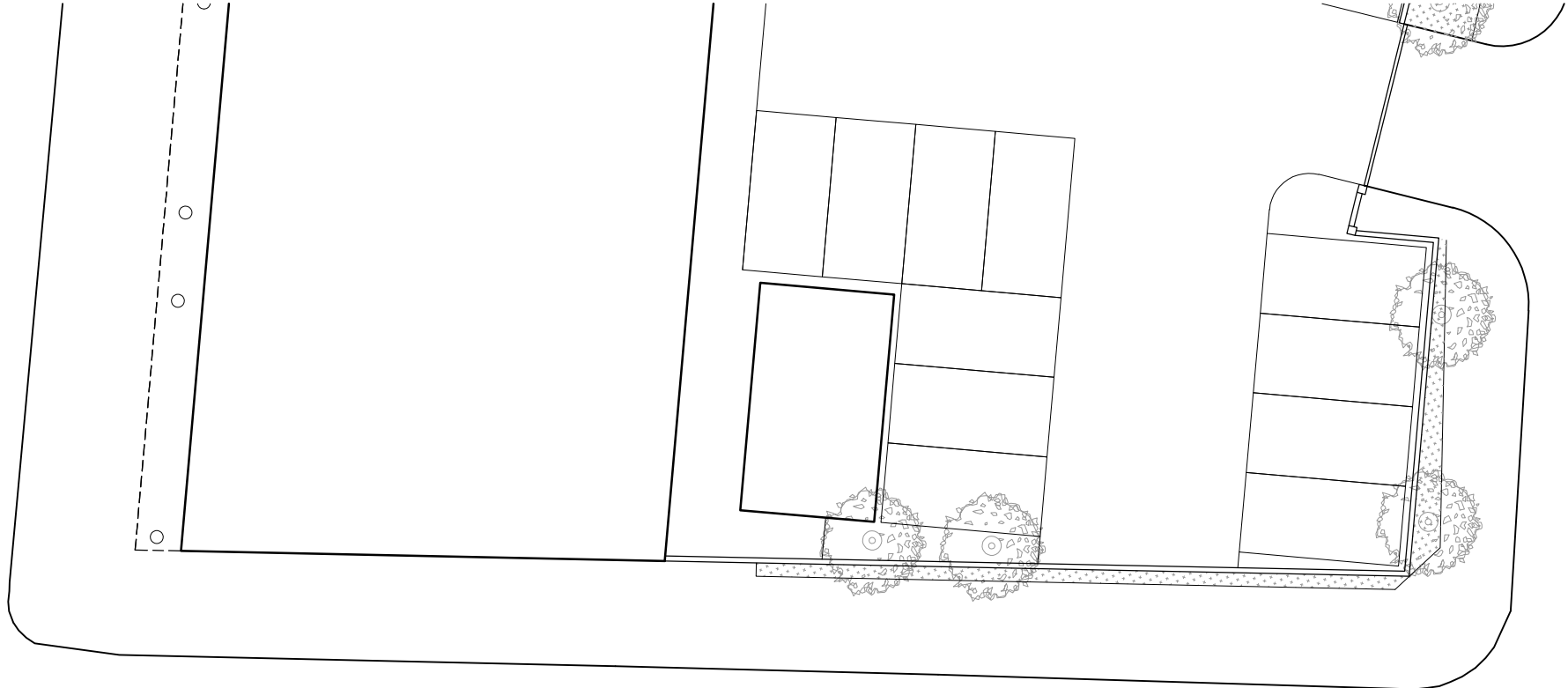
	1 Bed	2 Bed
G	-	-
1F	2	8
2F	2	8
3F	5	4
	09	24

Total: 33 Apartments

Areas

	GIA (sqm)	NIA (sqm)
G	967	656*
1F	790	640
2F	781	631
3F	652	513
	3,190	2,440

*Retail Units: 656sqm / 7,061sqft



DO NOT SCALE OFF THIS DRAWING

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Architects

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Client
VIEWS LTD

Project
764 STOCKPORT ROAD

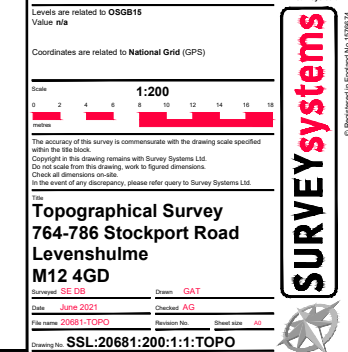
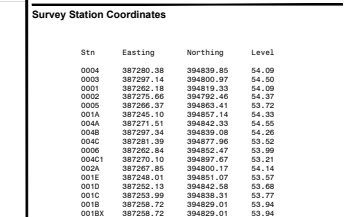
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8135 L(00)46

Proposed to
PROPOSED GROUND FLOOR PLAN - OPTION

Scale
1:200 @ A2
Date drawn
22.06.21
Drawn by
KM
Reviewed by
CJG
Checked by
CJG
Purpose of Issue
Planning
Building Reg
Other
Comments
Approval
Consentation

Appendix B

Topographical Survey



Appendix C

Environment Agency Flood Map for Planning

Flood map for planning

Your reference
079844

Location (easting/northing)
387265/394822

Created
28 Feb 2022 21:35

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

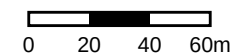
Notes

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/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Appendix D

United Utilities Sewer Records & Correspondence

Curtins Consulting Ltd

**51-55
Tithebarn Street,
Liverpool,
L2 2SB**

FAO:

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

**Your Ref: B079844 - PO No. ICMA571 Stockport Road
Our Ref: UUPS-ORD-363239
Date: 02/02/2022**

Dear Sirs

Location: 822 STOCKPORT ROAD, MANCHESTER, M19 3AW

I acknowledge with thanks your request dated 01/02/2022 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,



Karen McCormack
Property Searches Manager

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.

Dan Eddon

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 01 February 2022 12:11
To: Dan Eddon
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for :4200046581 UU reference Number : 764-786 Stockport Road Manchester M19 3AR

Pre Development Enquiry for: 4200046581 UU reference Number : 764-786 Stockport Road Manchester M19 3AR

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 225mm diameter public combined sewer within the rear alley way of the site on Stockport Rd located to the west of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public surface water sewer within Swallow Street located south of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 8.5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-connections/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Graham Perry



Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

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Appendix E

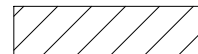
Drainage Strategy



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING.

KEY: LEGEND

-  EXTENT OF IMPERMEABLE AREA (1230m²)
-  SITE BOUNDARY

P01	ISSUED FOR INFORMATION	28/02/22	PG	DE
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Rev:	Description:	Date:	By:	Chkd:
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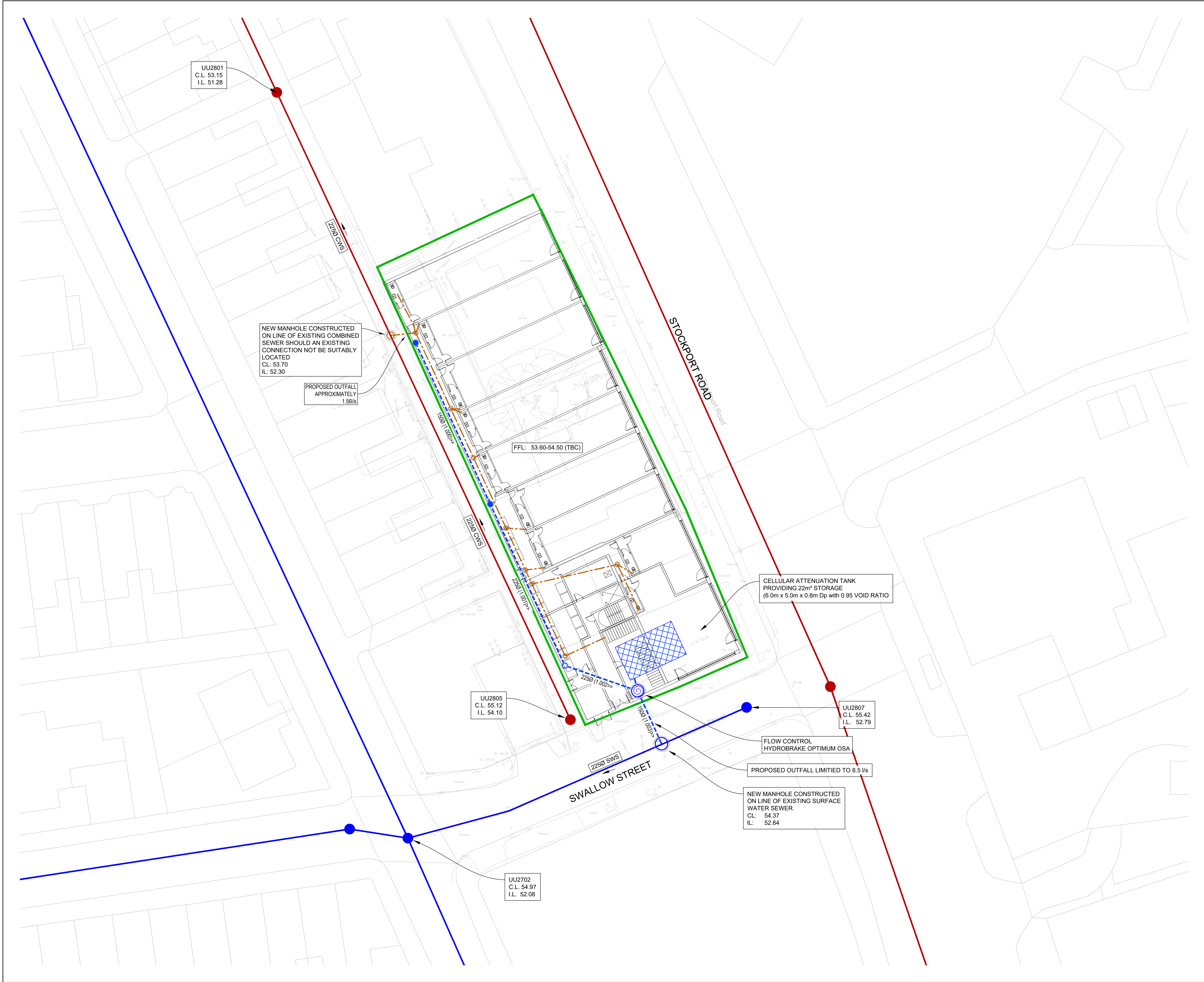
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Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kentish • Leeds • Liverpool • London • Manchester • Nottingham

INFORMATION

Project: 764-786 STOCKPORT ROAD, LEVENSHULME

Orig Title: EXISTING IMPERMEABLE AREAS

Size:	Date:	Drawn By:	Designed By:	Checked By:			
A1 / A3	28/02/22	PG	PG	DE			
Scale:	1:200						
Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
079844 - CUR - 00 - XX - DR - C - 92000 - P01							



GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN.
- ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.
- DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
- ALL DIMENSIONS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
- WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.
- ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
- ALL RAINWATER AND FOUL POP UPS LOCATIONS AND SIZES INDICATIVE ONLY AND TO BE CONFIRMED BY THE ARCHITECT AND M&E ENGINEER.
- COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT.
- ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
- OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

KEY:	LEGEND
	SITE BOUNDARY
	EXISTING PUBLIC COMBINED SEWER (APPROXIMATE)
	EXISTING PUBLIC SW SEWER (APPROXIMATE)
	PROPOSED FOUL DRAINAGE
	PROPOSED SURFACE WATER DRAINAGE
	PROPOSED FLOW CONTROL CHAMBER
	PROPOSED CELLULAR ATTENUATION (INDICATIVE)
	PROPOSED LINEAR DRAINAGE CHANNEL/ OUTLET UNIT - GATIC CASTSLOT OR SIMILAR APPROVED.

P01	ISSUED FOR INFORMATION	28/02/22	PG	DE
Rev:	Description:	Date:	By:	Chkd:

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Status:	INFORMATION
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Project:	764-786 STOCKPORT ROAD, LEVENSHULME
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Orig Title:	DRAINAGE STRATEGY PLAN
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Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	28/02/22	PG	PG	DE
Scale:	1:200			
Project No:	Originator:	Volume:	Level:	Type:
079844 - CUR - 00 - XX - DR - C -				

Category / Number:	Rev:
92001 - P01	

Appendix F

Preliminary Surface Water Hydraulic Calculations

		Page 1
	764 Stockport Road Proposed SW Network	
Date 28/02/2022 File Stockport Road SW Netwo...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.362	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.106	4-8	0.015

Total Area Contributing (ha) = 0.121

Total Pipe Volume (m³) = 1.749

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	21.000	0.210	100.0	0.042	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	21.000	0.210	100.0	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	8.000	0.080	100.0	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	3.000	0.030	100.0	0.000	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	6.000	0.100	60.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.35	53.400	0.042	0.0	0.0	0.0	1.00	17.8	5.7
1.001	50.00	4.62	53.115	0.089	0.0	0.0	0.0	1.31	52.0	12.1
1.002	50.00	4.72	52.905	0.121	0.0	0.0	0.0	1.31	52.0	16.4
2.000	50.00	4.04	53.100	0.000	0.0	0.0	0.0	1.31	52.0	0.0
1.003	50.00	4.79	52.825	0.121	0.0	0.0	0.0	1.30	23.0	16.4

		Page 2																																																																																																																																																																							
		764 Stockport Road Proposed SW Network																																																																																																																																																																							
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Innovyze		Network 2017.1.2																																																																																																																																																																							
PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>o</td><td>150</td><td>SW01</td><td>54.200</td><td>53.400</td><td>0.650</td><td>Open Manhole</td><td>600</td></tr><tr><td>1.001</td><td>o</td><td>225</td><td>sw02</td><td>54.200</td><td>53.115</td><td>0.860</td><td>Open Manhole</td><td>600</td></tr><tr><td>1.002</td><td>o</td><td>225</td><td>SW03</td><td>54.200</td><td>52.905</td><td>1.070</td><td>Open Manhole</td><td>600</td></tr><tr><td>2.000</td><td>o</td><td>225</td><td>tank</td><td>54.600</td><td>53.100</td><td>1.275</td><td>Open Manhole</td><td>300</td></tr><tr><td>1.003</td><td>o</td><td>150</td><td>SW04</td><td>54.600</td><td>52.825</td><td>1.625</td><td>Open Manhole</td><td>1500</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>21.000</td><td>100.0</td><td>sw02</td><td>54.200</td><td>53.190</td><td>0.860</td><td>Open Manhole</td><td>600</td></tr><tr><td>1.001</td><td>21.000</td><td>100.0</td><td>SW03</td><td>54.200</td><td>52.905</td><td>1.070</td><td>Open Manhole</td><td>600</td></tr><tr><td>1.002</td><td>8.000</td><td>100.0</td><td>SW04</td><td>54.600</td><td>52.825</td><td>1.550</td><td>Open Manhole</td><td>1500</td></tr><tr><td>2.000</td><td>3.000</td><td>100.0</td><td>SW04</td><td>54.600</td><td>53.070</td><td>1.305</td><td>Open Manhole</td><td>1500</td></tr><tr><td>1.003</td><td>6.000</td><td>60.0</td><td>SW SEWER</td><td>54.370</td><td>52.725</td><td>1.495</td><td>Open Manhole</td><td>0</td></tr></tbody></table> Free Flowing Outfall Details for Storm <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D,L (mm)</th><th>W (mm)</th></tr></thead><tbody><tr><td>1.003</td><td>SW SEWER</td><td>54.370</td><td>52.725</td><td>52.640</td><td>0</td><td>0</td></tr></tbody></table> Simulation Criteria for Storm <table><tbody><tr><td>Volumetric Runoff Coeff</td><td>0.750</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Areal Reduction Factor</td><td>1.000</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>Inlet Coefficient</td><td>0.800</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Run Time (mins)</td><td>60</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td>Output Interval (mins)</td><td>1</td></tr><tr><td>Number of Input Hydrographs</td><td>0</td><td>Number of Storage Structures</td><td>1</td></tr><tr><td>Number of Online Controls</td><td>1</td><td>Number of Time/Area Diagrams</td><td>0</td></tr><tr><td>Number of Offline Controls</td><td>0</td><td>Number of Real Time Controls</td><td>0</td></tr></tbody></table> Synthetic Rainfall Details <table><tbody><tr><td>Rainfall Model</td><td>FSR</td><td>Region</td><td>England and Wales</td></tr><tr><td>Return Period (years)</td><td>2</td><td>M5-60 (mm)</td><td>18.000</td></tr></tbody></table>				PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	o	150	SW01	54.200	53.400	0.650	Open Manhole	600	1.001	o	225	sw02	54.200	53.115	0.860	Open Manhole	600	1.002	o	225	SW03	54.200	52.905	1.070	Open Manhole	600	2.000	o	225	tank	54.600	53.100	1.275	Open Manhole	300	1.003	o	150	SW04	54.600	52.825	1.625	Open Manhole	1500	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	21.000	100.0	sw02	54.200	53.190	0.860	Open Manhole	600	1.001	21.000	100.0	SW03	54.200	52.905	1.070	Open Manhole	600	1.002	8.000	100.0	SW04	54.600	52.825	1.550	Open Manhole	1500	2.000	3.000	100.0	SW04	54.600	53.070	1.305	Open Manhole	1500	1.003	6.000	60.0	SW SEWER	54.370	52.725	1.495	Open Manhole	0	Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)	1.003	SW SEWER	54.370	52.725	52.640	0	0	Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000	Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000	Hot Start (mins)	0	Inlet Coefficient	0.800	Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000	Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60	Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1	Number of Input Hydrographs	0	Number of Storage Structures	1	Number of Online Controls	1	Number of Time/Area Diagrams	0	Number of Offline Controls	0	Number of Real Time Controls	0	Rainfall Model	FSR	Region	England and Wales	Return Period (years)	2	M5-60 (mm)	18.000
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2.000	3.000	100.0	SW04	54.600	53.070	1.305	Open Manhole	1500																																																																																																																																																																	
1.003	6.000	60.0	SW SEWER	54.370	52.725	1.495	Open Manhole	0																																																																																																																																																																	
Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)																																																																																																																																																																			
1.003	SW SEWER	54.370	52.725	52.640	0	0																																																																																																																																																																			
Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000																																																																																																																																																																						
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000																																																																																																																																																																						
Hot Start (mins)	0	Inlet Coefficient	0.800																																																																																																																																																																						
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000																																																																																																																																																																						
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60																																																																																																																																																																						
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1																																																																																																																																																																						
Number of Input Hydrographs	0	Number of Storage Structures	1																																																																																																																																																																						
Number of Online Controls	1	Number of Time/Area Diagrams	0																																																																																																																																																																						
Number of Offline Controls	0	Number of Real Time Controls	0																																																																																																																																																																						
Rainfall Model	FSR	Region	England and Wales																																																																																																																																																																						
Return Period (years)	2	M5-60 (mm)	18.000																																																																																																																																																																						
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<u>Synthetic Rainfall Details</u> Ratio R 0.362 Cv (Winter) 0.840 Profile Type Summer Storm Duration (mins) 30 Cv (Summer) 0.750		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW04, DS/PN: 1.003, Volume (m³): 3.5

Unit Reference	MD-SHE-0134-8500-1100-8500
Design Head (m)	1.100
Design Flow (l/s)	8.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	134
Invert Level (m)	52.825
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	8.5
Flush-Flo™	0.329	8.5
Kick-Flo®	0.717	7.0
Mean Flow over Head Range	-	7.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.8	1.200	8.8	3.000	13.6	7.000	20.5
0.200	8.1	1.400	9.5	3.500	14.7	7.500	21.1
0.300	8.5	1.600	10.1	4.000	15.6	8.000	21.8
0.400	8.4	1.800	10.7	4.500	16.6	8.500	22.5
0.500	8.2	2.000	11.3	5.000	17.4	9.000	23.1
0.600	7.9	2.200	11.8	5.500	18.2	9.500	23.7
0.800	7.3	2.400	12.3	6.000	19.0		
1.000	8.1	2.600	12.7	6.500	19.7		

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Innovyze	Network 2017.1.2																																																																																					
Storage Structures for Storm Cellular Storage Manhole: tank, DS/PN: 2.000 Invert Level (m) 53.100 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>30.0</td><td>30.0</td><td>5.200</td><td>0.0</td><td>47.5</td></tr><tr><td>0.400</td><td>30.0</td><td>38.8</td><td>5.600</td><td>0.0</td><td>47.5</td></tr><tr><td>0.800</td><td>30.0</td><td>47.5</td><td>6.000</td><td>0.0</td><td>47.5</td></tr><tr><td>0.801</td><td>0.0</td><td>47.5</td><td>6.400</td><td>0.0</td><td>47.5</td></tr><tr><td>1.600</td><td>0.0</td><td>47.5</td><td>6.800</td><td>0.0</td><td>47.5</td></tr><tr><td>2.000</td><td>0.0</td><td>47.5</td><td>7.200</td><td>0.0</td><td>47.5</td></tr><tr><td>2.400</td><td>0.0</td><td>47.5</td><td>7.600</td><td>0.0</td><td>47.5</td></tr><tr><td>2.800</td><td>0.0</td><td>47.5</td><td>8.000</td><td>0.0</td><td>47.5</td></tr><tr><td>3.200</td><td>0.0</td><td>47.5</td><td>8.400</td><td>0.0</td><td>47.5</td></tr><tr><td>3.600</td><td>0.0</td><td>47.5</td><td>8.800</td><td>0.0</td><td>47.5</td></tr><tr><td>4.000</td><td>0.0</td><td>47.5</td><td>9.200</td><td>0.0</td><td>47.5</td></tr><tr><td>4.400</td><td>0.0</td><td>47.5</td><td>9.600</td><td>0.0</td><td>47.5</td></tr><tr><td>4.800</td><td>0.0</td><td>47.5</td><td>10.000</td><td>0.0</td><td>47.5</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	30.0	30.0	5.200	0.0	47.5	0.400	30.0	38.8	5.600	0.0	47.5	0.800	30.0	47.5	6.000	0.0	47.5	0.801	0.0	47.5	6.400	0.0	47.5	1.600	0.0	47.5	6.800	0.0	47.5	2.000	0.0	47.5	7.200	0.0	47.5	2.400	0.0	47.5	7.600	0.0	47.5	2.800	0.0	47.5	8.000	0.0	47.5	3.200	0.0	47.5	8.400	0.0	47.5	3.600	0.0	47.5	8.800	0.0	47.5	4.000	0.0	47.5	9.200	0.0	47.5	4.400	0.0	47.5	9.600	0.0	47.5	4.800	0.0	47.5	10.000	0.0	47.5
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																	
0.000	30.0	30.0	5.200	0.0	47.5																																																																																	
0.400	30.0	38.8	5.600	0.0	47.5																																																																																	
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0.801	0.0	47.5	6.400	0.0	47.5																																																																																	
1.600	0.0	47.5	6.800	0.0	47.5																																																																																	
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4.800	0.0	47.5	10.000	0.0	47.5																																																																																	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000							
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000							
Hot Start Level (mm) 0		Inlet Coeffiecient 0.800							
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000							
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0		Number of Storage Structures 1							
Number of Online Controls 1		Number of Time/Area Diagrams 0							
Number of Offline Controls 0		Number of Real Time Controls 0							
Synthetic Rainfall Details									
Rainfall Model		FSR		Ratio R 0.362					
Region England and Wales		Cv (Summer) 0.750							
M5-60 (mm)		18.000 Cv (Winter) 0.840							
Margin for Flood Risk Warning (mm)		300.0							
Analysis Timestep 2.5 Second Increment (Extended)									
DTS Status		OFF							
DVD Status		ON							
Inertia Status		ON							
Profile(s)		Summer and Winter							
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440							
Return Period(s) (years)		1, 30, 100							
Climate Change (%)		0, 0, 40							
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	SW01	15 Winter	30	+0%	30/15 Summer	100/15 Summer			53.677
1.001	sw02	15 Summer	30	+0%	30/15 Summer				53.553
1.002	SW03	15 Summer	30	+0%	1/15 Winter				53.472
2.000	tank	30 Winter	30	+0%	30/15 Winter				53.363
1.003	SW04	15 Summer	30	+0%	1/15 Summer				53.365
Surcharged Flooded						Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
1.000	SW01	0.127	0.000	0.75		12.6	SURCHARGED	2	
1.001	sw02	0.213	0.000	0.53		25.2	SURCHARGED		
1.002	SW03	0.342	0.000	0.86		34.1	SURCHARGED		
2.000	tank	0.038	0.000	0.23		6.8	SURCHARGED		
1.003	SW04	0.390	0.000	0.44		8.4	SURCHARGED		
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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
Simulation Criteria									
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000							
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000							
Hot Start Level (mm) 0		Inlet Coeffiecient 0.800							
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000							
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0		Number of Storage Structures 1							
Number of Online Controls 1		Number of Time/Area Diagrams 0							
Number of Offline Controls 0		Number of Real Time Controls 0							
Synthetic Rainfall Details									
Rainfall Model FSR		Ratio R 0.362							
Region England and Wales Cv (Summer) 0.750									
M5-60 (mm) 18.000		Cv (Winter) 0.840							
Margin for Flood Risk Warning (mm) 300.0									
Analysis Timestep 2.5 Second Increment (Extended)									
DTS Status OFF									
DVD Status ON									
Inertia Status ON									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440									
Return Period(s) (years) 1, 30, 100									
Climate Change (%) 0, 0, 40									
Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	SW01	15 Winter	100	+40%	30/15 Summer	100/15 Summer			54.200
1.001	sw02	15 Winter	100	+40%	30/15 Summer				53.922
1.002	SW03	30 Winter	100	+40%	1/15 Winter				53.867
2.000	tank	60 Winter	100	+40%	30/15 Winter				53.848
1.003	SW04	60 Winter	100	+40%	1/15 Summer				53.849
Surcharged Flooded						Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
1.000	SW01	0.650	0.101	1.20		20.1	FLOOD	2	
1.001	sw02	0.582	0.000	0.93		43.9	FLOOD RISK		
1.002	SW03	0.737	0.000	1.20		47.8	SURCHARGED		
2.000	tank	0.523	0.000	0.23		6.9	SURCHARGED		
1.003	SW04	0.874	0.000	0.44		8.4	SURCHARGED		
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