

St Michael's Place

Drainage Strategy

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0054419

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Contents

1	Executive Summary	7
2	Introduction	8
2.1	Appointment and Brief	8
2.2	Limitations	8
3	Existing Site	9
3.1	Site Location and Description	9
3.2	Topography and Existing Levels	10
3.3	Watercourses	10
3.4	Existing Drainage Regime	10
3.4.1	Existing Private Foul Water Drainage	11
3.4.2	Existing Private Surface Water Drainage	12
3.5	Local stakeholders and approving authorities	12
3.6	Flood Risk	12
4	Proposed Development	15
5	Proposed Surface Water Drainage Strategy	17
5.1	Existing Site	17
5.2	Drainage Hierarchy	18
5.3	Climate Change	19
5.4	SuDS Feasibility	19
5.5	SuDS selection	21
5.5.1	Green roofs	21
5.5.2	Permeable Paving	21
5.5.3	Bioretention System	21
5.5.4	Swale	21
5.5.5	Geocellular Storage System	21
5.6	Pollution Control	21
5.7	Surface Water Drainage Network	23

5.7.1	Design Principles	23
5.7.2	Design Infrastructure	23
5.7.3	Design Summary	23
5.8	Designing for Exceedance	25
5.9	Consultation	27
5.9.1	Lead Local Flood Authority (LLFA)	27
5.9.2	United Utilities (UU)	27
5.10	SuDS Operation and Maintenance Manual	27
5.10.1	Maintenance	27
5.10.2	Management	27
6	Proposed Foul Water Drainage Strategy	29
	Appendix A Topographic Survey	31
	Appendix B CCTV Survey	32
	Appendix C Existing Catchments Plan	33
	Appendix D Proposed General Arrangement Network Plan	34
	Appendix E Quick Storage Estimates for Outline Plots	35
	Appendix F United Utilities Correspondence	36
	Appendix G Hydraulic Model Calculations	37
	Appendix H SuDS Proforma	38
 Table of Tables		
	Table 5-1 Existing Discharge Rates	18
	Table 5-2 Full Bore Pipe Analysis	18
	Table 5-3 Peak Rainfall Allowances	19
	Table 5-4 SuDS Techniques and Feasibility	20
	Table 5-5 Pollution Hazard Indices and Proposed Mitigation Methods	22
	Table 5-6 Mitigation Indices of Proposed SuDS Components	22
	Table 5-7 Proposed Discharge Rates	24

Table 5-8 Attenuation Volumes	24
Table 5-9 Surface Water Outfall Locations	25
Table 6-1 Foul Water Outfall Locations	29
Table 6-2 Peak Foul Water Discharge Rates	29
 Table of Figures	
Figure 3-1 Site Location Plan	9
Figure 3-2 Local Existing Public Sewer Network	11
Figure 3-3 Environment Agency Flood Zone map (© Environment Agency copyright and / or database rights 2025. All rights reserved. © Crown Copyright and database right 2025.)	13
Figure 3-4 Environment Agency Surface Water flood map (© Environment Agency copyright and / or database rights 2025. All rights reserved. © Crown Copyright and database right 2025.)	14
Figure 4-1 Proposed Development, extract from Lucid's drawing Public Realm – General Arrangement Plan, drawing number SMP-LUD-MP-ZZ-DR-L-91-02-00 rev 06, dated 21/10/25.	16
Figure 5-1- Existing Surface Water Catchment Areas	17
Figure 5-2 Exceedance Flow Routes	26

Glossary

Term	Definition
AEP	Annual Exceedance Probability
BGS	British Geological Society
BH	Buro Happold
CHQ	Council Headquarters
DN	Diameter Nominal
EA	Environmental Agency
FRA	Flood Risk Assessment
GKRL	Genr8 Kajima Regeneration Limited
KC	Knowsley Council
LLFA	Lead Local Flood Authority
MH	Manhole
RWP	Rainwater Pipe
SSG	Sewer Sector Guidance
SuDS	Sustainable Drainage Systems
UU	United Utilities

1 Executive Summary

Buro Happold has been instructed by Genr8 Kajima Regeneration Limited to prepare a surface water drainage strategy in support of a hybrid planning application comprising: (Part A) Detailed application for the erection of a new Council Headquarters, hotel, public realm, change of use of Cavendish Walk to flexible Class E and/or F1 uses, site-wide enabling and associated works following demolition of existing buildings. (Part B) Outline application for a mixed-use development comprising residential (Classes C2 and C3) uses, commercial and community uses (Classes E and F1), replacement car parking provision at Lathom Road, public realm and associated works, with provision for meanwhile uses.

The drainage strategy has been undertaken in accordance with local and national standards, best practice and the requirements of KC and United Utilities.

The site encompassing Civic Way, Cavendish Walk and Lathom Road in Huyton is currently occupied by the existing Knowsley Council Headquarters, Huyton Village Library, car parks associated to these buildings, and existing hardstanding areas. The immediate surrounding area comprises mainly of the Huyton Village Shopping Centre to the east, Asda petrol station to the west, and residential areas to the north. The majority of the existing site is drained via an existing private drainage network which discharges into a public sewer to the north of the site in Archway Road.

The proposed surface water drainage strategy will begin with the use of permeable paving in appropriate hardstanding areas, allowing rainfall to infiltrate directly through the surface and into the underlying sub-base. This initial SuDS feature provides source control by reducing surface runoff, filtering pollutants, and promoting infiltration. Where infiltration is not feasible or where additional attenuation is required, excess flows will be conveyed via a traditional gravity drainage network to a geocellular storage tank located within the central soft landscaping area of the development. From there, water will be discharged offsite at an agreed allowable discharge rate. A swale will also be incorporated into the landscape design to manage exceedance flows, providing an additional conveyance route and temporary storage during extreme rainfall events. The overall drainage design incorporates a range of SuDS elements to manage water quality, conveyance, and attenuation in a sustainable and integrated manner.

The foul water drainage strategy will comprise a traditional gravity drainage network sized to convey flows from connection points within the office building and hotel building and using existing connections where feasible.

2 Introduction

2.1 Appointment and Brief

Buro Happold has been instructed by Genr8 Kajima Regeneration Limited (GKRL) to prepare a surface water drainage strategy in support of a hybrid planning application comprising: (Part A) Detailed application for the erection of a new Council Headquarters, hotel, public realm, change of use of Cavendish Walk to flexible Class E and/or F1 uses, site-wide enabling and associated works following demolition of existing buildings. (Part B) Outline application for a mixed-use development comprising residential (Classes C2 and C3) uses, commercial and community uses (Classes E and F1), replacement car parking provision at Lathom Road, public realm and associated works, with provision for meanwhile uses, herein referred to as the site. This report is to be read in conjunction with all other documents submitted as part of the application.

This report will review and document the following;

- Site constraints;
- Existing drainage regime; and
- Proposed surface and foul water drainage strategy.

The drainage strategy has been undertaken in accordance with local and national standards, best practice and the requirements of KC and United Utilities.

2.2 Limitations

This report is based on the interpretation and assessment of data provided by third parties. It should be noted that the detailed design of the drainage and associated Sustainable Drainage Systems (SuDS) features for the site has not been finalised and the assumptions and information presented herein is subject to design development and outcomes from consultation with relative authorities. Operation and maintenance of all SuDS (including proprietary systems) is outlined but will need to be considered further once the proposed development has been finalised with all specific information being presented to those responsible for the maintenance of the facility. Buro Happold cannot be held responsible for the accuracy of third-party data or the conclusions that come from this information or as a result of changes arising from the developing design. The conclusions and findings of this report may change if the proposed development is amended or updated after the date of publishing.

3 Existing Site

3.1 Site Location and Description

The site is located within the land at Civic Way, Cavendish Walk and Lathom Road within the village of Huyton to the east of Liverpool. It is approximately 3.8ha and is bordered by the Huyton Village Shopping Centre to the east, Asda petrol station to the west, residential areas to the north, and the rail line to the south.

The main site area is approximately 3.1ha and is currently occupied by the existing Knowsley Council Headquarters, Huyton Village Library, car parks associated to these buildings, and existing hardstanding areas. The vast majority of the existing site is considered to be impermeable, with only small areas of soft landscaping. The majority of the existing site is drained via an existing private drainage network which discharges into separate foul and surface water sewers to the north of the site in Archway Road.

Figure 3-1 shows the boundary of the site and its relative location.



Figure 3-1 Site Location Plan

The area east of the proposed site relates to an existing multi-storey car park on Lathom Road to the east of the main site. The proposed drainage strategy for this area is to be developed and documented separately to this report at a later date.

3.2 Topography and Existing Levels

The site has a slight slope. The highest point of the site is located in the northeastern side of the site within the existing Archway Road with an approximate level of +39.20mAOD. The site slopes down towards the northwest to a low point in Archway Road at a level of approximate +29.96m AOD. Refer to **Appendix A** for Topographical survey.

3.3 Watercourses

The nearest watercourse to the site is the River Alt, approximately 585m to the north of the site and is designated as a Statutory Main River.

3.4 Existing Drainage Regime

Record information obtained from UU (see Figure 3-2) indicates the following drainage systems are present in the vicinity of the site:

- DN300 vitrified clay into a DN375 concrete surface water sewer running east to west to the north of the site in Archway Road;
- DN225 vitrified clay into an DN825 concrete combined sewer running from east to west to the north of the site in Archway Road;
- DN225 into a DN300 vitrified clay surface water sewer running from south to the north to the west of the site in Poplar Bank;
- DN225 vitrified clay combined sewer running from south to north to the west of the site in Poplar Bank;
- DN225 vitrified clay surface water sewer running from east to west to south to the south of the site in Westmorland Road and Griffith's Road;
- DN225 vitrified clay foul water sewer running from west to east to the south of the site in Westmorland Road;
- DN150 vitrified clay surface water sewer running from south to north to east to the east of the site in Westmorland Road and Derby Road;
- DN150 vitrified clay foul water sewer running from south to north to east to the east of the site in Westmorland Road and Derby Road.
- DN300 vitrified clay surface water sewer running from south to north to the east of the car park site in Lathom Road.
- DN300 vitrified clay foul water sewer running from north to south to the east of the car park site in Lathom Road.

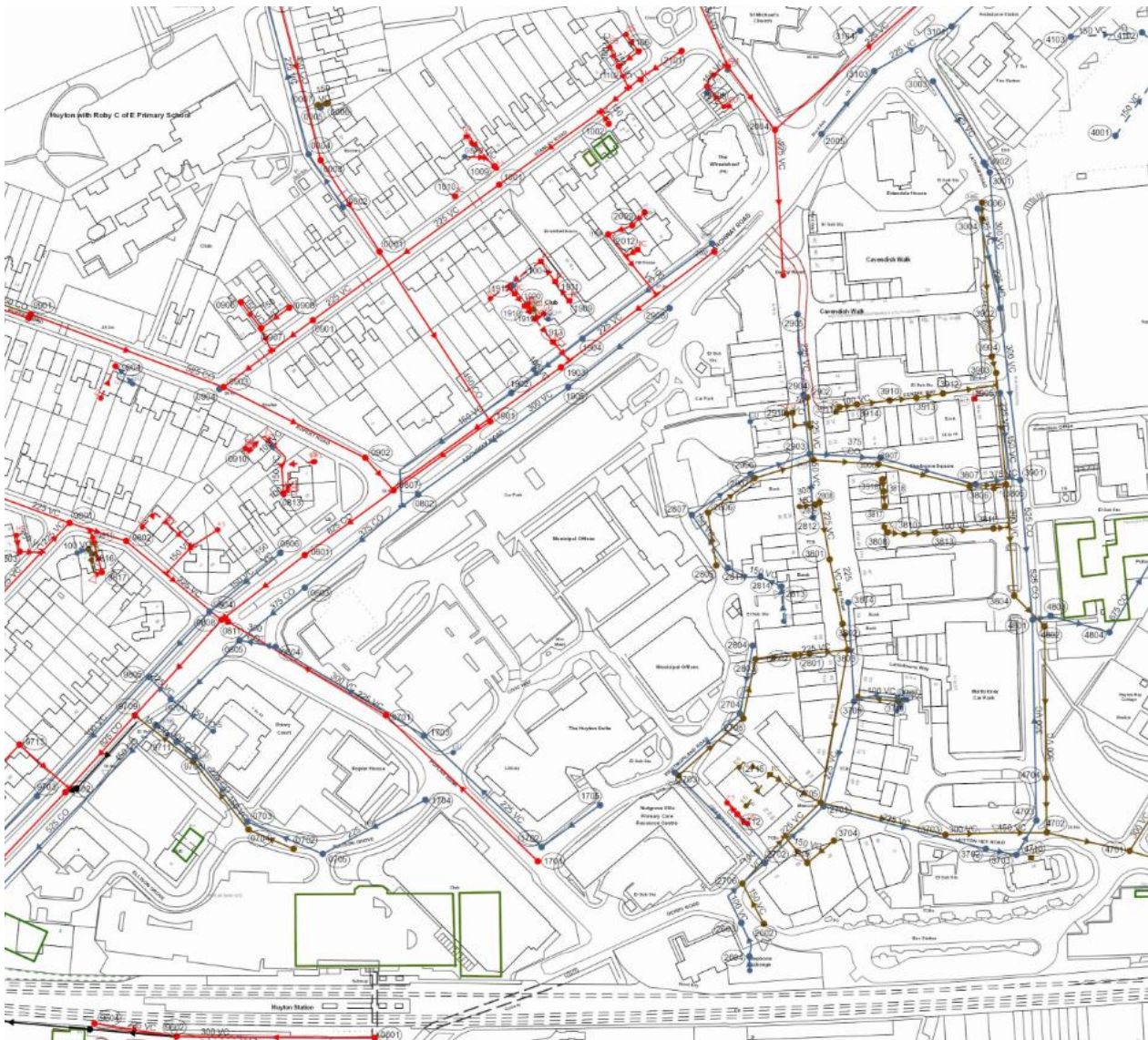


Figure 3-2 Local Existing Public Sewer Network

3.4.1 Existing Private Foul Water Drainage

Foul water flows from the existing Municipal Tower and computer centre building and associated infrastructure drain via private drains running north and east, discharging into UU sewers.

The completed CCTV surveys, refer to **Appendix B**, indicate the following private foul water sewers are present within the site boundary:

1. A DN150 foul sewer running from the existing Municipal Tower to the existing UU sewer in the north of the site in Archway Road;
2. A DN100 into a DN150 foul sewer running from the west to the east of the site into the existing UU foul sewer to the east of the site;

3.4.2 Existing Private Surface Water Drainage

Surface water flows from the existing hardstanding areas drain via private surface water drains running west, discharging into the UU surface water sewer to the north of the site in Archway Road. Surface water flows from the existing Municipal Tower and Computer Centre drain via private surface water drains running east, discharging into the UU surface water sewer to the east of the site in Westmorland Road.

The completed CCTV surveys, refer to **Appendix B**, indicate the following private surface water sewers are present within the site boundary:

- Four DN150 sewer runs convey flows from the office roof and adjacent hardstanding areas such as car parking to a UU surface water sewer to the northwest of the site in Archway Road;
- A DN225 sewer conveys flows from the Municipal Tower and adjacent hardstanding areas to a UU surface water sewer to the east of the site in Westmorland Road;
- A DN150 sewer conveys flows from the computer centre to a UU surface water sewer to the east of the site in Westmorland Road.

3.5 Local stakeholders and approving authorities

With regard to development planning and permissions, and residual flood risk and drainage related matters, there are two principal stakeholders and/or approving authorities associated with the site. They are as follows:

Knowsley Council are the local governing planning authority and Lead Local Flood Authority (LLFA), having responsibility for:

- Leading the management of risk of flooding from ordinary watercourses, canals, ponds and reservoirs in its area; and
- Surface water flood risk in relation to planning applications, under The Flood and Water Management Act.
- This scheme aligns with the requirements of Policy CS24 of the Knowsley Local Plan: Core Strategy, demonstrating compliance with local flood risk management objectives through the integration of appropriate sustainable drainage measures.

United Utilities (UU) are the statutory sewerage undertaker with powers under The Water Industry Act 1991.

Preliminary enquiries have been made to KC and UU and are reported on herein. Consultation with the Environment Agency has not been deemed necessary as the site does not lie within a Groundwater Protection Zone and discharge is not to the ground or a main river. For further details, refer to the Flood Risk Assessment (FRA) 0054419-BHE-XX-XX-RP-CW-0001 submitted alongside this Drainage Strategy.

3.6 Flood Risk

The site is located entirely within Flood Zone 1 as designated by the Environment Agency (EA) and shown in Figure 3-3. The site is considered to be at low risk of flooding from rivers and the sea.

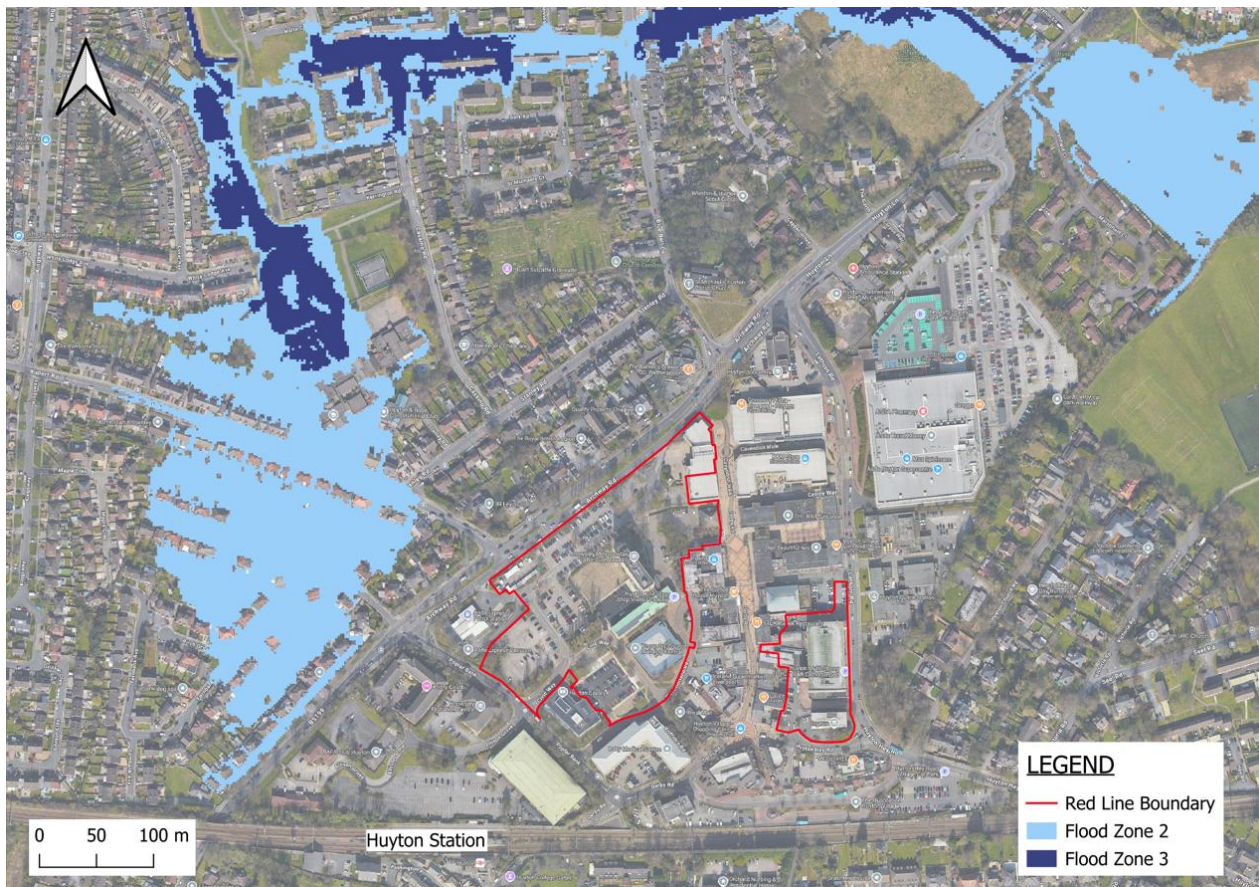


Figure 3-3 Environment Agency Flood Zone map (© Environment Agency copyright and / or database rights 2025. All rights reserved. © Crown Copyright and database right 2025.)

Only a small area of the main site area is at risk from surface water flooding as per EA Flood Risk from Surface Water Mapping, as shown in Figure 3-4. This area includes the hardstanding area between the council office building and the Huyton Village shopping centre building. However, the flooding extent is considered low risk with an annual chance of occurring between the 1% Annual Exceedance Probability (AEP) storm event and the 0.1% AEP storm event in any given year.

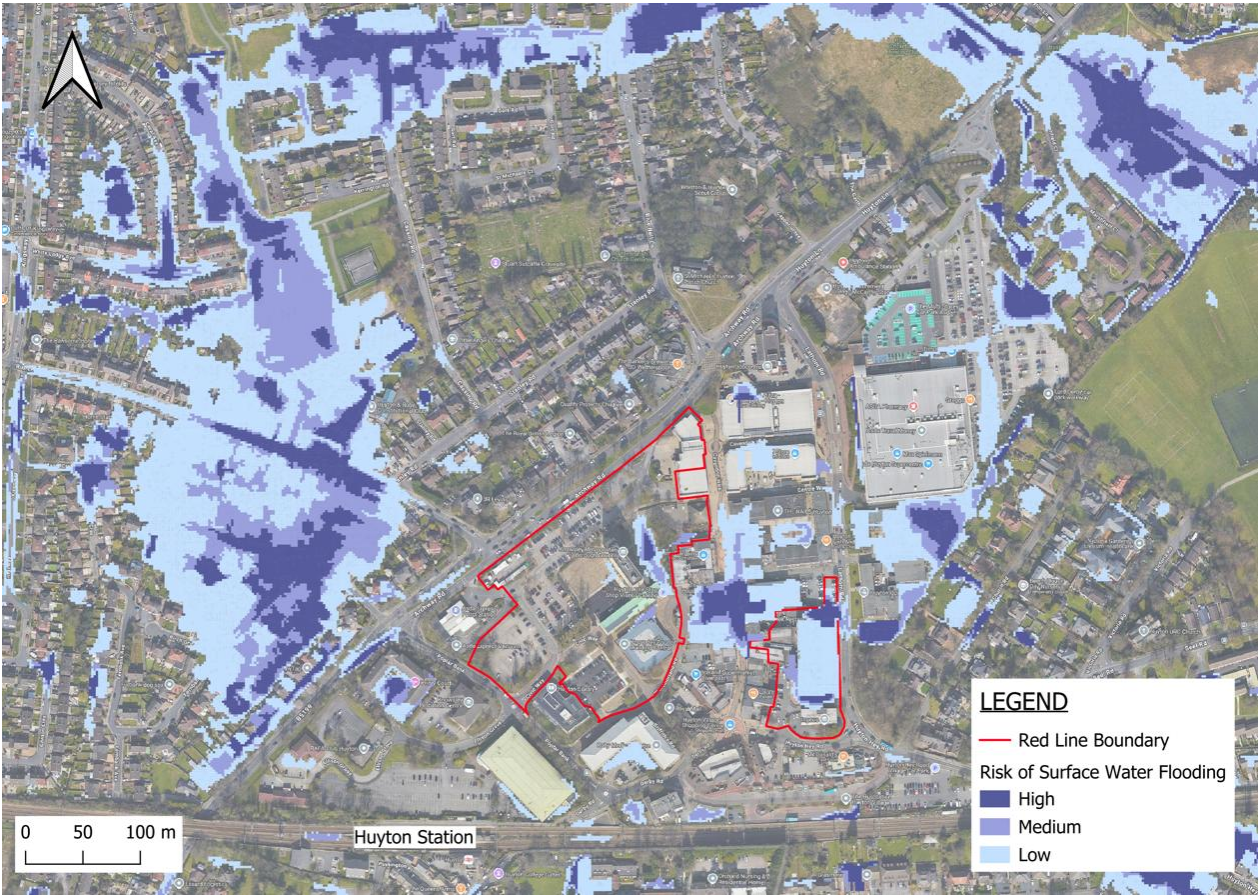


Figure 3-4 Environment Agency Surface Water flood map (© Environment Agency copyright and / or database rights 2025. All rights reserved. © Crown Copyright and database right 2025.)

For further details on flood risk management and mitigation measures, including for the Lathom Road site area, refer to BH Flood Risk Assessment (FRA) document number 0054419-BHE-XX-XX-RP-W-0001.

4 Proposed Development

The proposed development comprises: (Part A) Detailed application for the erection of a new Council Headquarters, hotel, public realm, re-development of Lathom Road multi-storey car park to form a surface level car park, change of use of Cavendish Walk to flexible Class E and/or F1 uses, site-wide enabling and associated works following demolition of existing buildings. (Part B) Outline application for a mixed-use development comprising residential (Classes C2 and C3) uses, commercial and community uses (Classes E and F1), public realm and associated works, with provision for meanwhile uses. See Figure 4-1 below for a plan of the proposed development, including the plot numbers which are referenced within this report hereafter.



Figure 4-1 Proposed Development, extract from Lucid's drawing Public Realm – General Arrangement Plan, drawing number SMP-LUD-MP-ZZ-DR-L-91-02-00 rev 06, dated 21/10/25.

5 Proposed Surface Water Drainage Strategy

The proposed surface water strategy is presented within this section. It will set out the existing site catchments and the associated brownfield runoff rates, the discharge methodology in line with the discharge hierarchy, the climate change allowances to be used within the drainage design, an explanation of the SuDS to be used onsite, where they will be located and how they will be utilised, a summary of the surface water strategy for the site, the water quality management design methods and calculations for the site and the exceedance flow strategy.

The proposed drainage strategy for Lathom Road car park is to be developed at a later date and will meet the requirements of the Knowsley Council Sustainable Drainage & Surface Water Management Technical Guidance for Developers.

5.1 Existing Site

The main site existing site area measures 3.1ha and is all positively drained hardstanding and buildings. The site's drainage is split into different catchment areas based on private below ground drainage systems and site levels. These areas are shown in Figure 5-1 below. Areas which are not coloured are assumed to be collected by gullies and public UU sewers within the highways. Refer to **Appendix C** for more detail on the existing catchment plan.

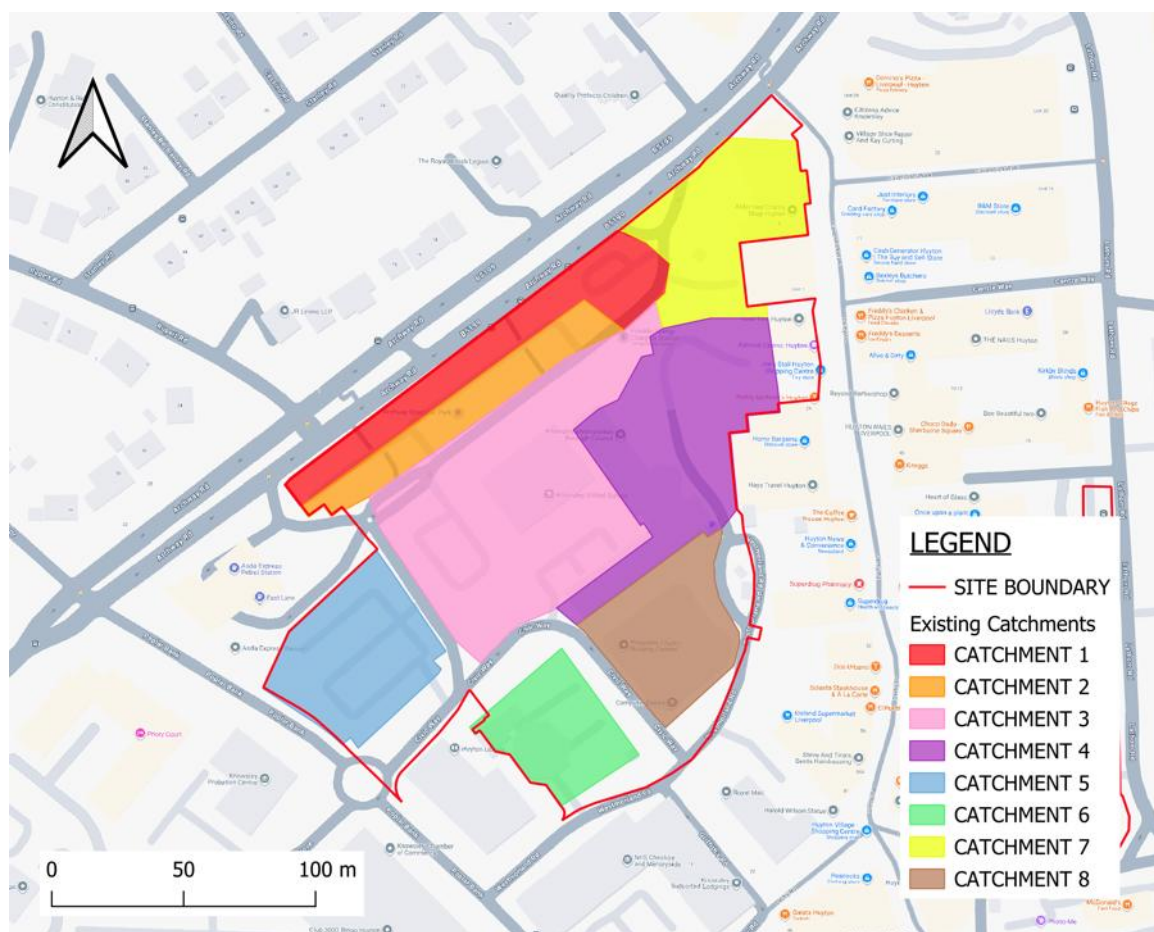


Figure 5-1- Existing Surface Water Catchment Areas

The existing site conditions were modelled using Infodrainage, with the brownfield discharge rate for each positively drained catchment determined from the simulation results of a 50% AEP, 60-minute winter storm event.

These results are detailed in **Table 5-1** below.

Table 5-1 Existing Discharge Rates

Existing Catchment	Discharge Rate (l/s)
1	17.2
2	14.4
3	41.9
4	29.5
5	17.6
6	5.00*
7	29.1
8	16.4

* An existing 5 l/s restricted outfall has been identified from review of design information from this catchment, supported by an attenuation tank during site surveys. This is understood to arise from the Venue car park development from 2021.

A full-bore capacity assessment was undertaken for the outfall pipes using pipe size and gradient information taken from site surveys, which are shown in **Appendix B**. The assessment was undertaken to ensure that the results obtained from the hydraulic analysis did not provide unrealistically high discharge rates. The results of this assessment are summarised in Table 5-2 below.

Table 5-2 Full Bore Pipe Analysis

Catchment	Full Bore Analysis (l/s)	Assessment
1	114.0	PASS
2	69.0	PASS
3	96.0	PASS
4	76.1	PASS
5	30.6	PASS
6	5.0	PASS
7	41.8	PASS
8	42.4	PASS

5.2 Drainage Hierarchy

Planning guidance requires drainage strategies for new developments to discharge surface water in line with the following hierarchy:

1. Infiltration
2. Existing Watercourse

3. Existing sewer

Infiltration is deemed unsuitable for this site due to ground conditions identified during the site investigation, which revealed the presence of Made Ground, refer to document CCG-C-23-14178.

There are no existing watercourses onsite to receive flows from the development.

It is therefore proposed to discharge into the UU public surface water sewers surrounding the site in Archway Road, Poplar Bank, and Westmorland Road.

5.3 Climate Change

The stormwater network will ensure no property flooding in the 1% AEP storm event. The site is modelled using FEH22 rainfall data.

In accordance with the Alt and Crossens Management Catchment peak rainfall allowance, for a 1% annual exceedance event, an uplift in rainfall intensity of 45% is proposed to account for the future effects of climate change across the lifespan of the development.

Table 5-3 Peak Rainfall Allowances

Epoch	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

5.4 SuDS Feasibility

Sustainable Drainage Systems (SuDS) are implemented to manage surface water runoff from storm events in a way that reduces environmental impact. These systems aim to replicate the site’s natural drainage patterns and treat pollutants at the source. The SuDS Manual (CIRIA C753) outlines a variety of approaches, including surface features like swales and ponds, subsurface options such as storage tanks and soakaways, and roof-based systems like green and blue roofs.

The proposed development aligns with local policy by incorporating sustainable drainage measures. According to CIRIA SuDS Manual, there is a preferred hierarchy for managing rainwater – starting with infiltration into the ground and progressing to water resource recharge. Where infiltration is not viable, surface water should be retained in open features and discharged gradually. If necessary, underground storage solutions such as tanks and cellular systems may be used.

An overview of the proposed SuDS techniques including their suitability for the development is provided in Table 5-4 below.

Table 5-4 SuDS Techniques and Feasibility

	SUDS Technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	Suitability for the Proposed Development	Comments
Most Sustainable ↑ ↓ Least Sustainable	Living roofs	✓	✓	✓	Yes	An area of green roof is considered for both the Plot 4 - Hotel and Plot 1 CHQ office buildings.
	Basins & ponds	✓	✓	✓	No	Not considered feasible due to the setting of the site within an urban environment alongside the aspirations for the public realm areas, which are proposed as community spaces for local people and visitors alike and as such are not able to accommodate open-water SuDS features.
	-Constructed Wetlands				No	
	-Balancing ponds				No	
	-Detention basins				No	
	-Retention ponds				No	
	Filter strips & swales	✓	✓	✓	No	
	Rain Gardens	✓	✓	✓	Yes	Raingardens are included in soft landscaped areas within the landscape design.
	Infiltration devices	✓	✓	✓	No	Infiltration techniques should be avoided following review of the ground investigation results.
	-soakaways					
	-infiltration trenches & basins					
	Permeable surfaces	✓	✓		Yes	Parking bays and areas of hardstanding are proposed to incorporate permeable surfacing to allow for attenuation storage.
	-gravelled areas				No	Subject to landscape design
	-solid paving blocks				No	Unsuited to landscape design
	-porous pavers				No	Unsuited to landscape design
	Tanked systems	✓			Yes	Underground attenuation tanks can be implemented within hardstand areas subject to coordination of services and other constraints.
	-over-sized pipes/tanks				No	Due to limited space and site constraints, oversized pipes are not considered suitable.
	-attenuation cells				Yes	Attenuation cells can potentially be accommodated under hardstand areas.

5.5 SuDS selection

The following Sustainable Drainage Systems (SuDS) are considered appropriate for the development.

5.5.1 Green roofs

Areas of green roof are proposed within the designs of both the Plot 1 - CHQ and the Plot 4 - Hotel buildings. These areas are designed to provide source control through intercepting and retaining precipitation, therefore reducing the volume of runoff and attenuating peak flows.

5.5.2 Permeable Paving

Permeable paving offers a durable surface for both pedestrian and vehicular use, while enabling rainwater to infiltrate through the surface layers into the underlying structure. This system temporarily stores water beneath the surface before gradually releasing it downstream. As part of the St Michael's Place development, permeable paving is being considered to facilitate water conveyance, provide attenuation, and support water treatment within hardstanding areas. Given the site's relatively flat topography, the subsurface storage capacity can help reduce the overall volume required for the attenuation tank.

5.5.3 Bioretention System

Bioretention systems, commonly known as rain gardens, are shallow, landscaped depressions designed to capture and treat surface water runoff. They use layers of soil, sand, and gravel, along with carefully selected vegetation, to slow down water flow and filter out pollutants. These systems are proposed within soft landscaped areas to help reduce flood risk, improve water quality, and enhance biodiversity.

5.5.4 Swale

Swales are shallow, broad and vegetated channels designed to store and/or convey runoff and remove pollutants. They may be used as conveyance structures to pass the runoff to the next stage of the treatment train and can be designed to promote infiltration where soil and groundwater conditions allow. A section of swale is proposed in the village green to provide management of exceedance flows, and also to provide biodiversity and amenity benefits.

5.5.5 Geocellular Storage System

Geocellular storage systems consist of modular plastic units with a high porosity (approximately 95%), designed to efficiently form underground structures for the temporary storage of surface water prior to controlled discharge. Given the limited external space that isn't being used as permeable paving, geocellular storage will be incorporated into the design as a method of attenuation.

5.6 Pollution Control

The suitability of the proposed SuDS for the development has been assessed using the Simple Index Approach from the CIRIA SuDS Manual (2015). Pollution hazard indices for various land uses were sourced from Table 26.2, while mitigation indices were determined using Table 26.3. To be effective, the mitigation index must meet or exceed the pollution hazard index. Where a single component is insufficient, multiple components are combined, with a reduction factor of 0.5 applied to secondary or tertiary components to reflect lower inflow concentrations.

$$\begin{array}{ccc} \text{Total SuDS mitigation index} & \geq & \text{pollution hazard index} \\ \text{(for each contaminant type)} & & \text{(for each contaminant type)} \end{array}$$

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5(\text{mitigation index}_2)$$

Where;

$$\text{mitigation index}_n = \text{mitigation index for component } n$$

Table 5-5 Pollution Hazard Indices and Proposed Mitigation Methods

Land Use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs	Low	0.3	0.2	0.05
Low traffic roads	Low	0.5	0.4	0.4
Non-residential car parking with infrequent use	Low	0.5	0.4	0.4

Table 5-6 Mitigation Indices of Proposed SuDS Components

Type of SuDS	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Bioretention System	0.8	0.8	0.8

To ensure adequate water quality treatment before offsite discharge, the SuDS design has been developed in accordance with Section 26 of the CIRIA C753 SuDS Manual.

It is anticipated that the goods drop off zone to the east of Plot 1 – CHQ and to the south of Plot 4 - Hotel will both average less than 300 traffic movements per day. Table 26.2 of the Ciria C753 SuDS notes that pollution hazard levels for low traffic roads are as follows:

TSS is 0.5; Metals is 0.4; Hydrocarbons is 0.4.

Treatment will be provided via permeable paving which provide the following mitigation indices

TSS = 0.7; Metals = 0.6; Hydrocarbons = 0.7.

The pollutant levels associated with the proposed site usage are below the thresholds identified in the guidance. Therefore, the implementation of bioretention systems and permeable paving will provide sufficient pre-treatment where applied across the development.

The roofs of Plot 4 - Hotel and Plot 1 - CHQ office are non-residential roofs and have been assessed to pose an extremely low risk of introducing metals and hydrocarbons into the drainage network, meaning minimal contamination from surface runoff. To further enhance water quality management, the design incorporates catchpits installed on manholes located upstream of the proposed geocellular storage tank. These catchpits will effectively facilitate the settlement of solids, thereby preventing debris and sediment from entering the system and maintaining the efficiency and longevity of the drainage infrastructure.

5.7 Surface Water Drainage Network

The surface water strategy below has been devised to reduce flood risk and provide a betterment to the existing surface water flows discharging from the site. Refer to drawing 0054419-BHE-XX-DR-C-3000 in **Appendix D** for more details on the general arrangement of the network.

5.7.1 Design Principles

SuDS will be incorporated into this development, following a conceptual strategy based on the principles set out in the CIRIA C753 SuDS Manual and BS 8582:2013 – Code of Practice for Surface Water Management on Development Sites.

The scheme will make use of the proposed topography and natural drainage catchments. This site will be re-profiled to channel surface water runoff away from the planned structures and towards the central soft landscaping areas, thereby reducing the risk of flooding to buildings.

In the proposed model, the impermeable area of the catchments has been assumed to encompass the entire site, with a volumetric runoff coefficient of 0.75 applied to account for the contribution from permeable surfaces. Given the limited scope for additional hardstanding to be added at a later date, it is considered suitable to make no allowance for urban creep.

The proposed piped drainage system should be designed to ensure no surcharging occurs during the 50% AEP storm event, no surface flooding during the 3.33% AEP storm event, and no property flooding during the 1% AEP storm event including allowances for climate change. The system must comply with the requirements of Building Regulations Part H.

5.7.2 Design Infrastructure

The surface water drainage strategy will consist of a conventional gravity-fed network, designed to convey runoff from hardstanding areas and buildings to a geocellular storage tank situated within the central soft landscaped area. From there, flows will be discharged offsite to a UU public surface water sewer at a pre-agreed allowable rate. Pipe gradients will be set to maintain a self-cleansing velocity of 1 m/s. The proposed outline plots will have their own storage tank and outfall location.

Permeable paving will be installed adjacent to buildings and along all pathways within the site to provide attenuation, reduce peak flood flows, and treat surface runoff. Any additional hardstanding will be graded to direct runoff towards the permeable paving before connecting flows to the geocellular storage tank.

Rainwater from the office, hotel, and all other proposed building roofs will be collected via multiple rainwater pipes (RWP). These RWPs will discharge into the proposed gravity drainage network, which will convey the flow to the geocellular storage tank. It should be noted that the locations of the RWPs have not yet been determined and will be defined during the next design stage.

The existing drainage arrangement for Civic Way will remain unchanged, even with a minor surface re-profiling, as it continues to discharge into the current highway drainage infrastructure. The proposed development will not affect the existing highway drainage outflows.

5.7.3 Design Summary

In accordance with the Knowsley Council Sustainable Drainage and Surface Water Management guidance, a 50% betterment is required for brownfield sites, this was applied to the existing flow rates. The final allowable discharge rate for each catchment was then established by comparing the calculated betterment values with United Utilities' discharge

rate acceptance criteria, ensuring compliance with both local and statutory requirements and ensuring the rate does not exceed the outfall pipe capacity. Refer to Table 5-7 for the proposed rates.

Table 5-7 Proposed Discharge Rates

Existing Catchment	Proposed Plot/Catchment	Existing Discharge Rate (l/s)	Full Bore Check	UU Accepted Discharge Rate (l/s)	Proposed Discharge Rate (l/s)	% Betterment
1, 2, 3	Plot 1 – CHQ Plot 4 – Hotel Plot 5	73.5	279.0 = PASS	56.7	36.7	50%
4	Plot 2A	29.5	76.1 = PASS	18.9	14.8	50%
5	Plot 6	17.6	30.6 = PASS	6.4	6.4	64%
6	Plot 3	5.0*	5.0 = PASS	5.0	5.0	N/A*
7	Cavendish Walk	29.1	41.8 = PASS	N/A**	N/A**	N/A
8	Plot 2B	16.4	42.4 = PASS	5.0	5.0	70%

* An existing 5 l/s restricted outfall, identified via an attenuation tank during site surveys, will continue to be utilised.

** UU has accepted the existing discharge rate for this catchment, as the proposed works involve only refurbishment and landscaping improvement. These enhancements are expected to reduce surface water flood risk, supporting the overall drainage strategy.

The attenuation volume for each plot applied for within the outline elements of this application have been calculated using the InfoDrainage Quick Storage Estimate tool, while the main scheme including CHQ and Hotel plots has been calculated using a detailed InfoDrainage model. Refer to Table 5-8 for the required attenuation volumes per plot, with calculations provided in **Appendix E**. Attenuation will be achieved through a combination of geocellular storage tanks and available permeable paving. The geocellular tanks have been sized based on a 95% void ratio and are designed to accommodate rainfall events up to an including the critical 1% AEP storm event, incorporating a 45% allowance for climate change. Permeable paving has been designed with a 30% void ratio and a 300mm storage depth, with a 130mm paving layer.

Table 5-8 Attenuation Volumes

Proposed Plot/Catchment	Catchment Area (ha)	Proposed Discharge Rate (l/s)	Approximate Total Volume (m ³)
Plot 1 – CHQ Plot 4 – Hotel	1.447	31.7	689
Plot 2A	0.197	14.8	66
Plot 2B	0.136	5.0	55
Plot 3	0.248	5.0	121
Plot 5*	0.186	5.0	83
Plot 6	0.306	6.4	147
Cavendish Walk	0.346	29.1	N/A**

* An allowance of 5 l/s has been allocated for the outline application of Plot 5, as it shares the same outfall location as the detailed application areas for Plot 1 and 4, including the associated public realm.

** No geocellular storage tank nor other storage system is required for Cavendish Walk, as the majority of this catchment, including the existing drainage network, is proposed to be retained as existing. The proposed landscaping strategy

includes for the addition of several areas of soft landscaping, which will lead to a reduction in impermeable areas and therefore a betterment on the existing scenario.

The proposed outfall locations have been confirmed with UU, due to all discharging into their assets – refer to **Appendix F** for records of correspondence. Refer to Table 5-9 below for the agreed outfall locations and to the general arrangement plan 0054419-BHE-XX-DR-C-3000 in **Appendix D** for all further information.

Table 5-9 Surface Water Outfall Locations

Proposed Plot/Catchment	Outfall Location
Plot 1 – CHQ Plot 4 – Hotel	DN300 public SW sewer under Archway Road
Plot 2A	DN225 public SW sewer under Westmorland Road
Plot 2B	DN300 public SW sewer under Archway Road
Plot 3	DN225 public SW sewer under Westmorland Road
Plot 5	DN300 public SW sewer under Archway Road
Plot 6	DN225 public SW sewer under Poplar Bank

5.8 Designing for Exceedance

The proposed site levels have been carefully designed to accommodate exceedance flow paths, ensuring that overland surface water is safely conveyed during extreme rainfall events. Ground levels are proposed to direct flows toward the central soft-landscaped zone and low-impact areas, minimizing the risk to buildings and infrastructure. See Figure 5-2 below for the exceedance routes.



Figure 5-2 Exceedance Flow Routes

5.9 Consultation

5.9.1 Lead Local Flood Authority (LLFA)

Two pre-application meetings have been held with the LLFA to ensure early engagement and alignment on the surface water drainage strategy.

The first meeting focused on establishing the key principles of the design, including agreement on the hydraulic modelling criteria to be used for assessing the proposed drainage network. This early agreement provided a solid foundation for the development of a robust and compliant drainage solution.

The second meeting built upon this by presenting the detailed strategy for the proposed SuDS, including layout, function, and integration of SuDS features within the site. Feedback from the LLFA was incorporated into the evolving design to ensure that the proposed measures meet both regulatory expectations and site-specific requirements.

5.9.2 United Utilities (UU)

UU have been consulted regarding the proposed points of discharge and the associated discharge rates. This consultation was essential to confirm the acceptability of the discharge locations and to ensure that the proposed rates align with the capacity of the receiving network. The outcomes of these discussions have been documented and are included in the records of correspondence provided in **Appendix F**, which should be referred to for further detail.

This collaborative approach with both the LLFA and UU has helped to shape a drainage strategy that is technically sound, environmentally responsible, and aligned with local policy and infrastructure constraints.

5.10 SuDS Operation and Maintenance Manual

5.10.1 Maintenance

Regular maintenance of the SuDS is crucial to ensure its continued performance. An Operation and Maintenance Manual will be developed in line with the CIRIA guidance C753, Section 32. This manual will be incorporated into the Health & Safety File and Building Manual for the development.

The manual will detail the location of all SuDS components on-site, along with a concise explanation of their design intent, functionality, purpose, and associated performance risks. It will also include a tailored maintenance schedule for each feature, aligned with the specifications of the selected attenuation system supplier. Additionally, the manual will provide a maintenance plan and record template, outlining the objectives of the proposed maintenance activities and the potential consequences of failing to meet these objectives.

5.10.2 Management

An estate management strategy will ensure the long-term performance and sustainability of the development, with a particular emphasis on maintaining high-quality standards in the public realm and the effective operation of SuDS. This approach will support the ongoing success of the completed development and enable future growth.

The strategy will be delivered through an Estate Management Company ("Manco"), which will assume overarching responsibility for the stewardship of the estate, including the management and maintenance of SuDS infrastructure. As no SuDS features are proposed within private curtilages, the long-term management strategy, and the company, can focus solely on the public realm, ensuring effective maintenance in perpetuity.

Manco will be established and appointed under a formal legal agreement, supported by a detailed Schedule of Services. GKRL will act on behalf of the Council to negotiate and agree the terms of this appointment, ensuring that SuDS responsibilities are clearly defined and embedded within the service framework.

A comprehensive maintenance strategy will be developed and implemented by Manco, ensuring that all elements of the public realm—including SuDS features such as green roofs, permeable paving, and attenuation tanks—are maintained to the highest standards. This strategy will be informed by the detailed hard and soft landscaping maintenance plan prepared by the Landscape Architect ("Lucid"). The strategy will be aligned with the delivered public realm design, ensuring that SuDS components function as intended and contribute to water quality, biodiversity, and flood resilience.

The Manco will procure and manage specialist contractors through a competitive tendering process to deliver maintenance services in line with the agreed strategy. This will include routine inspection, cleaning, and performance monitoring of SuDS features to ensure long-term effectiveness and regulatory compliance.

A service charge regime will be implemented and managed by the Manco, based on principles of good estate management. Each occupier will contribute proportionally, typically based on the size of their premises, with the overall cost burden reducing as the estate becomes more fully occupied. This approach ensures fair cost distribution while supporting the sustainable operation of the estate's infrastructure, including SuDS.

To support community engagement and placemaking, the Manco will also coordinate events and activities that promote awareness of the estate's sustainable features, including SuDS, and foster a vibrant, resilient town centre environment.

6 Proposed Foul Water Drainage Strategy

The foul water strategy is included on the general arrangement plan, 0054419-BHE-XX-DR-C-3000, and can be found in **Appendix D**.

All areas of the site will be connected to a private foul water drainage system, which will be designed in compliance with Part H of the Building Regulations.

The system will primarily consist of a conventional gravity-fed drainage network, designed to carry flows from designated connection points within both the hotel and office buildings to an existing private connection on-site, before ultimately discharging into the UU public combined sewer located in Archway Road. However, due to site levels, a separate pumped system will be required solely for the cycle store within Plot 1 - CHQ. Anticipated flows from this area are expected to be low, and any flows from higher levels will be directed to the gravity-fed network. Each outline plot will be served by its own dedicated drainage network and outfall point. For details on the outfall location for each plot, refer to Table 6-1 below.

Table 6-1 Foul Water Outfall Locations

Proposed Plot/Catchment	Outfall Location
Plot 1 – CHQ Plot 4 – Hotel	Private manhole connection into DN450 public CW sewer under Archway Road
Plot 2A	DN150 public FW sewer under Westmorland Road
Plot 2B	DN225 public FW sewer under Westmorland Road
Plot 3	DN225 public FW sewer under Westmorland Road
Plot 5	DN825 public CW sewer under Archway Road
Plot 6	DN225 public CW sewer under Poplar Bank

The peak foul discharge flow for the detailed application area of the site has been calculated using established benchmarks specific to each building type. For the hotel, a usage rate of 250 litres per person per day was applied, based on guidance from CIBSE'S Flows and Loads, and adjusted using a peaking factor of 3 to reflect peak demand conditions. For the office, the calculation followed the Sewerage Sector Guidance (SSG), using a benchmark of 0.6 litres per second per hectare of developable land, which is standard for commercial developments and does not rely on occupancy figures, and was always adjusted using a peaking factor of 3. Refer to table below for the peak discharge flow rate for Plot 4 - Hotel and Plot 1 - CHQ office.

Table 6-2 Peak Foul Water Discharge Rates

Plot	Peak Discharge Rate (l/s)
Plot 4 - Hotel	2.26
Plot 1 - CHQ Office	1.53
Total	3.79

As this calculation is based on preliminary estimates, it will be reviewed, refined, and coordinated further as the design progresses into the next stage; however, for this development, it is reasonable to assume that the individual buildings will not discharge at peak flow simultaneously. As such, the calculated total site discharge rate is likely to represent a conservative estimate.

UU have agreed to accept flows from the site at an unrestricted rate to their network – refer to **Appendix F** for correspondence.

Appendix A Topographic Survey

Appendix B CCTV Survey

GRID
NORTH

NOTES

1. BACKGROUND PLAN INFORMATION IS BASED ON TOPOGRAPHIC SURVEY DATA CREATED BY OTHERS AND SUPPLIED TO US FOR THE PURPOSES OF PRESENTING OUR SURVEY OUTPUT. WE CANNOT BE HELD RESPONSIBLE FOR THE CONTENT, COMPLETENESS AND ACCURACY OF DATA CREATED BY OTHERS.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS/DOCUMENTATION. PLEASE REFER TO TOPOGRAPHIC SURVEY DRAWING: 23F248. PLEASE REFER TO CCTV REPORT: TS-2645 Huyton Town Centre Regeneration CCTV Report_303_Issue01.
3. DO NOT SCALE FROM THIS DRAWING.
4. IF IN DOUBT ASK.

SERVICES LEGEND

BT QL-B2	UNDERGROUND BT CABLES
CMF QL-B2	UNDERGROUND COMMUNICATIONS CABLES
CATV QL-B2	UNDERGROUND CABLE TV CABLES
E QL-B2	UNDERGROUND ELECTRIC CABLES
FO QL-B2	UNDERGROUND ELECTRIC CABLES
G QL-B2	FIBEROPTIC CABLES
HW QL-B2	GAS MAIN
HT QL-B2	HOT WATER PIPE
OE	OVERHEAD BT CABLES
OE	OVERHEAD ELECTRIC CABLES
OE	OVERHEAD WATER SEWER
OE	UNIDENTIFIED OVERHEAD CABLES
UD QL-B2	UNIDENTIFIED PIPE
SEC QL-B2	SECURITY CABLEING
SL QL-B2	LIGHTING CIRCUIT (WHERE IDENTIFIED)
TS QL-B2	TRAFFIC SIGNAL CABLES
W QL-B2	WATER MAIN
FW QL-B2	FOUL SEWER
SW QL-B2	SURFACE WATER SEWER
CW QL-B2	COMBINED SEWER
HW QL-B2	RISING MAIN
E QL-B4	ASSUMED ROUTES
E QL-B4	SERVICES TAKEN FROM RECORDS

UTILITIES COMMENT BOX
DEPTH TO SERVICE (H)

INFORMATION SHOWN AS TFR HAS NOT BEEN PROVEN ON SITE AND HAS BEEN OVERLAIN ONTO THIS DRAWING BY BEST FIT METHODS USING COMMON DATA.

INFORMATION SHOWN AS AR HAS NOT BEEN PROVEN ON SITE. ASSUMED ROUTES ARE SHOWN WHERE WE SUSPECT SERVICES TO BE PRESENT BUT THEY WERE NOT LOCATED.

UTILITIES ABBREVIATIONS

10 SC	1 DUCT 5 CABLES	DTB	DEPTH TO SOFTT
AR	ASSUMED ROUTE	EDT	EXTERNAL BACKDROP
ACP	ASSUMED CONNECTION POINT	EOT	END OF TRACE
BL	BASE LEVEL	FW	FOUL WATER SEWER
CB	CONCRETE BENCHING	IBD	INTERNAL BACKDROP
CBC	CIRCULAR BRICK CHAMBER	I	INVERT LEVEL
CDP	CABLE DRAW PIT	PCC	PRECAST CONCRETE CHAMBER
CL	COVER LEVEL	RBC	RECTANGULAR BRICK CHAMBER
CPC	CIRCULAR PLASTIC CHAMBER	SL	SOFTT LEVEL
CO	CROWN LEVEL	SW	SURFACE WATER SEWER
DO	DEPTH TO CROWN	TR	TAKEN FROM RECORDS
DI	DIAMETER	UTL	UNABLE TO LIFT
DTB	DEPTH TO BASE	UTS	UNABLE TO SURVEY
DTI	DEPTH TO INVERT	UT	UNABLE TO TRACE

AVAILABILITY OF STATUTORY UNDERTAKERS RECORDS DRAWINGS

TYPE	COMMENTS	TYPE	COMMENTS
SEWER	YES	CABLE TV	YES
WATER MAIN	YES	ELECTRICITY	YES
GAS MAIN	YES	OL PIPELINES	NO
BT	YES	OTHER	NO

SERVICE LOCATION

ELECTRODETECTION AND/OR GROUND PROBING RADAR (GPR) TECHNIQUES HAVE BEEN USED TO LOCATE UNDERGROUND SERVICES SHOWN ON THIS PLAN. THESE ARE INTERPRETIVE METHODS AND IT IS THEREFORE RECOMMENDED THAT TRAIL LOCATIONS OF SERVICES ARE CORROBORATED BY OTHER METHODS. LOCATION AND DEPTH OF SERVICES ARE REASONABLELY ASSUMED TO BE CORRECT. THE COMPLETENESS OF SERVICES SHOWN ARE BASED ON THE INFORMATION PROVIDED TO US. THE COMPLETENESS OF SERVICES SHOWN ARE BASED ON THE INFORMATION PROVIDED TO US. THE COMPLETENESS OF SERVICES SHOWN ARE BASED ON THE INFORMATION PROVIDED TO US.

IT SHOULD BE NOTED THAT CERTAIN TYPES OF SERVICES, SUCH AS PLASTIC OR BURIED SERVICES SHOWN ON THIS DRAWING MAY BE ASSUMED ROUTES AND WILL NORMALLY BE OF UNKNOWN CONDITION. CONTRACTORS SHOULD UNDERTAKE SUITABLE VALIDATION WORK AND TAKE PARTICULAR CARE DURING EXCAVATION WORK. SAFE DIGGING PRACTICES SHOULD BE FOLLOWED.

DEPTHS OBTAINED USING GEOPHYSICAL TECHNIQUES SUCH AS GROUND PROBING RADAR, ARE AFFECTED BY GROUND CONDITIONS THEREFORE MUST BE VIEWED AS INDICATIVE ONLY. NUMBERS OF CABLES IN RUNS ARE NOT DETERMINED UNLESS SPECIFICALLY SHOWN. CABLE RUNS BETWEEN DRAWINGS ARE ASSUMED STRAIGHT UNLESS OTHERWISE SHOWN.

DEPTHS TO TRACED METALLIC PIPEWORK REFER TO PIPE CENTRE.

PIPE RUNS ARE ASSUMED STRAIGHT BETWEEN CHAMBERS UNLESS OTHERWISE INDICATED.

ALL SERVICES ARE UNDERGROUND EXCEPT WHERE INDICATED.

PLEASE NOTE THAT TOWER SURVEYS CCTV LTD ARE NOT PERMITTED TO INVESTIGATE ANY TELECOMMUNICATIONS APPARATUS OTHER THAN EXPOSED FEATURES. THEREFORE THIS INFORMATION MAY NOT APPEAR ON SURVEY DRAWINGS.

INFORMATION SHOWN AS TFR HAS NOT BEEN PROVEN ON SITE.

PLEASE NOTE OUR CAD LAYERING CONVENTION CONTAINS FURTHER INFORMATION.

GENERAL

- NO ALLOWANCE HAS BEEN MADE FOR SUB SURFACE ENTRY INTO MANHOLES OR OTHER CHAMBERS OR VOIDS BELOW GROUND LEVEL. THEREFORE ANY DETAILS RELATING TO DEPTHS, SIZES ETC. ARE TAKEN FROM ABOVE GROUND AND AS SUCH WILL BE APPROXIMATE ONLY.
- THE CONTRACTOR IS TO CHECK AND VERIFY ALL CRITICAL DIMENSIONS AND LEVELS BEFORE WORK STARTS.
- BURIED SERVICES SHOWN ON THIS DRAWING MAY BE ASSUMED ROUTES AND WILL NORMALLY BE OF UNKNOWN CONDITION. CONTRACTORS SHOULD UNDERTAKE SUITABLE VALIDATION WORK AND TAKE PARTICULAR CARE DURING EXCAVATION WORK. SAFE DIGGING PRACTICES SHOULD BE FOLLOWED.
- SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THEN TOWER CCTV LTD SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.
- IT IS IMPORTANT TO NOTE THAT THE SAME ACCURACIES IMPLIED BY THE PLOTTING SCALE ARE EQUALLY APPLICABLE TO DIGITAL DATA SUPPLIED FOR CAD.
- EVERY EFFORT IS MADE TO IDENTIFY ALL VISIBLE ABOVE-GROUND FEATURES. HOWEVER, IT SHOULD BE BORNE IN MIND THAT THERE MAY BE ITEMS OBTAINED AT THE TIME OF SURVEY. VISIBLE FEATURES IN THE VICINITY OF THE FEATURES AS SHOWN ON THIS SURVEY, MAY NOT REPRESENT THE EXTENT OF LEGALLY CONVEYED OWNERSHIP.

DESCRIPTION	REV	DATE	DRWN	CHKD	APPR
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DRAWING STATUS

INFORMATION



40 ORCHARD DRIVE
NOTTINGHAM
NG12 3TP
TEL: 01773 435 897
info@tower-surveys.co.uk
www.tower-surveys.co.uk

CLIENT

GENR8 KAJIMA REGENERATION (HUYTON) LIMITED

PROJECT TITLE

HUYTON TOWN CENTRE REGENERATION

DRAWING DETAIL

CCTV DRAINAGE AND UTILITY SURVEY (PAS128)
AS OF 08/05/25 - SHEET 1 OF 2

DRAWN	NJ/L	DATE
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PROJECT ENGINEER	DW	MAY 2025
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CHECKED	DW/DM	SCALE
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APPROVED	DW	1:500 (WHEN PLOTTED @ A1)
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DRAWING NUMBER	REVISION
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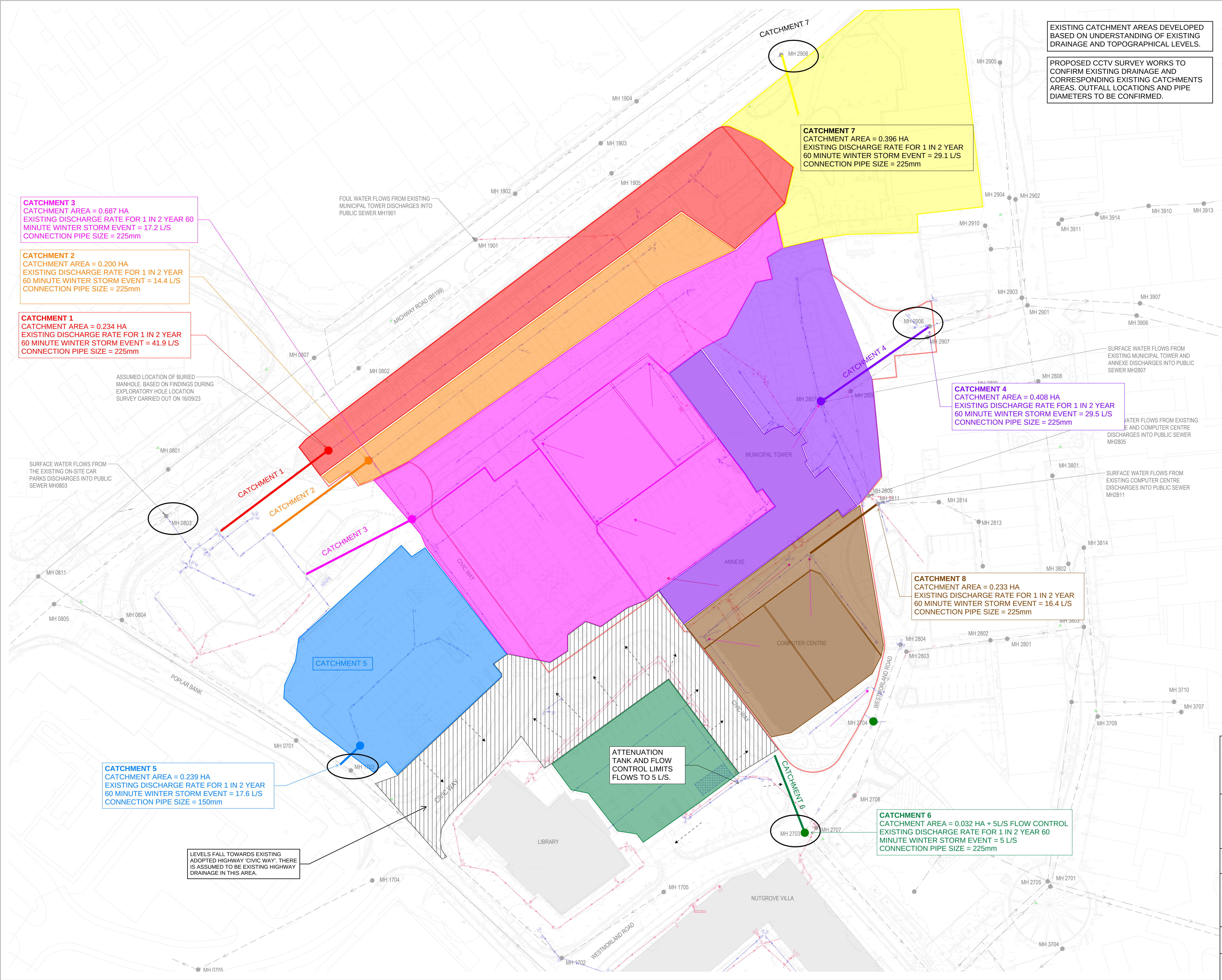
TS-2645_301	
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CAD REFERENCE
\\2025Projects\TS-2645\TS-2645_301-302_Issue01

CTB REFERENCE
\\CTB-files\TS-Utils-v02.ctb

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Appendix C Existing Catchments Plan



CATCHMENT 3
CATCHMENT AREA = 0.687 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 17.2 L/S
CONNECTION PIPE SIZE = 225mm

CATCHMENT 2
CATCHMENT AREA = 0.200 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 14.4 L/S
CONNECTION PIPE SIZE = 225mm

CATCHMENT 1
CATCHMENT AREA = 0.234 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 41.9 L/S
CONNECTION PIPE SIZE = 225mm

ASSUMED LOCATION OF BURIED MANHOLE: BASED ON FINDINGS DURING EXPLORATORY HOLE LOCATION SURVEY CARRIED OUT ON 16/09/23

SURFACE WATER FLOWS FROM THE EXISTING ON-SITE CAR PARKS DISCHARGES INTO PUBLIC SEWER MH0803

FOUL WATER FLOWS FROM EXISTING MUNICIPAL TOWER DISCHARGES INTO PUBLIC SEWER MH1901

CATCHMENT 7
CATCHMENT AREA = 0.396 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 29.1 L/S
CONNECTION PIPE SIZE = 225mm

CATCHMENT 4
CATCHMENT AREA = 0.408 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 29.5 L/S
CONNECTION PIPE SIZE = 225mm

CATCHMENT 8
CATCHMENT AREA = 0.233 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 16.4 L/S
CONNECTION PIPE SIZE = 225mm

CATCHMENT 5
CATCHMENT AREA = 0.239 HA
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 17.6 L/S
CONNECTION PIPE SIZE = 150mm

ATTENUATION TANK AND FLOW CONTROL LIMITS FLOWS TO 5 L/S.

CATCHMENT 6
CATCHMENT AREA = 0.032 HA + 5L/S FLOW CONTROL
EXISTING DISCHARGE RATE FOR 1 IN 2 YEAR 60 MINUTE WINTER STORM EVENT = 5 L/S
CONNECTION PIPE SIZE = 225mm

EXISTING CATCHMENT AREAS DEVELOPED BASED ON UNDERSTANDING OF EXISTING DRAINAGE AND TOPOGRAPHICAL LEVELS.

PROPOSED CCTV SURVEY WORKS TO CONFIRM EXISTING DRAINAGE AND CORRESPONDING EXISTING CATCHMENTS AREAS. OUTFALL LOCATIONS AND PIPE DIAMETERS TO BE CONFIRMED.

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IN ADDITION TO THE HAZARDOUSNESS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING
CONSTRUCTION
MAINTENANCE/CLEANING/OPERATION
DECOMMISSIONING/DEMOLITION
NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
2. DRAWINGS BASED ON THE FOLLOWING BACKGROUND INFORMATION:
• TOPOGRAPHICAL & GPR SURVEY AS PER SURVEY OPERATIONS DRAWING 23F247, RECEIVED 27/09/23
• UNITED UTILITIES SEWER RECORDS
• KNOWSLEY COUNCIL PROPOSED TENDER PLAN DRAWING 002, DATED 12/05/21, HIGHLIGHTING THE EXISTING DRAINAGE WITHIN THE LIBRARY CAR PARK.
3. THE COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION CANNOT BE GUARANTEED AND THEREFORE OTHER SERVICES MAY EXIST.
4. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE

KEY	ENABLING WORK
—	SITE BOUNDARY
● —	EXISTING PUBLIC COMBINED SEWER
● —	EXISTING PUBLIC FOUL WATER SEWER
● —	EXISTING PUBLIC SURFACE WATER SEWER
FW —	EXISTING PRIVATE FOUL WATER DRAIN
SW —	EXISTING PRIVATE SURFACE WATER DRAIN

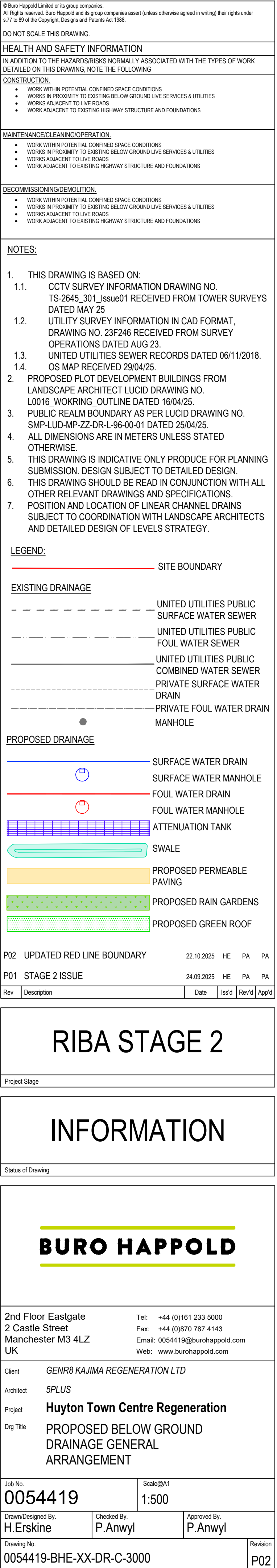
	SURFACE WATER
	CATCHMENTS ASSUMED TO DRAIN VIA PRIVATE
	DRAINAGE NETWORK TO PUBLIC DRAINAGE NETWORK

P0	PRELIMINARY ISSUE	21/11/23	LD	AD	AD
Rev	Description	Date	Iss'd	Rev'd	App'd

PLANNING
Project Stage
INFORMATION
Status of Drawing

BUROHAPPOLD ENGINEERING		
Project: SMP Huyton		
Project Number: P054419		
Sketch Title: Existing Drainage and Catchments		
Sketch Number:		
Date: OCT 2025	Initials: HE	Revision: P04

Appendix D Proposed General Arrangement Network Plan



Appendix E Quick Storage Estimates for Outline Plots

Rainfall Design Parameters

Rainfall Manager

File Edit



Rainfall Manager Items

Rainfall

Design Storms

FSR

FEH

FEH

User Defined Rainfall

Known Rainfall

Temporal Pattern

IDF

Select from the following

Label FEH

Parameters

Return Periods

Storm Durations

Parameters

Version

2022

 Point

Site Location

GB 344151 390873 SJ 44151

...

Storm Profile ☒ Summer ☒ Winter

OK

Cancel

Help

Rainfall Manager

File Edit



Rainfall Manager Items

Rainfall

Design Storms

FSR

FEH

FEH

User Defined Rainfall

Known Rainfall

Temporal Pattern

IDF

Select from the following

Label FEH

Parameters

Return Periods

Storm Durations

Return Periods

Use	Return Period (years)	Increase Rainfall (%)
☒	100	45

Add

Delete

Clear All

Deselect All

Select All

OK

Cancel

Help

Rainfall Manager

File Edit



Rainfall Manager Items

 Rainfall

 Design Storms

 FSR

 FEH

 FEH

 FEH

 User Defined Rainfall

 Known Rainfall

 Temporal Pattern

 IDF

Select from the following

Label FEH

Parameters

Return Periods

Storm Durations

Storm Durations

Use	Duration (mins)	Run Time (mins)
☒	15	30
☒	30	60
☒	60	120
☒	120	240
☐	180	360
☒	240	480
☒	360	720
☒	480	960
☐	600	1200
☐	720	1440
☒	960	1920
☒	1440	2880
☐	2160	4320
☐	2880	5760
☐	4320	8640

Add

Delete

Clear All

Deselect All

Select All

Default

OK

Cancel

Select to use for analysis

 Help

Plot 2A Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

0.197

Volumetric Runoff Coefficient

0.750

Discharge Rate (L/s)

14.8

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

Create New

From Library

All

FEH

...

Method

FEH

Number of Storms

18

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 40m³ - 66m³.

These values are estimates only and should not be used for final design purposes.

Plot 3 Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

0.248

Volumetric Runoff Coefficient

0.750

Discharge Rate (L/s)

5.0

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

Create New

From Library

All

FEH

...

Method

FEH

Number of Storms

18

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 85m³ - 121m³.

These values are estimates only and should not be used for final design purposes.

Plot 5 Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

0.186

Volumetric Runoff Coefficient

0.750

Discharge Rate (L/s)

5.0

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

Create New

From Library

All

FEH

...

Method

FEH

Number of Storms

18

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 60m³ - 83m³.

These values are estimates only and should not be used for final design purposes.

Plot 6 Catchment

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

0.306

Volumetric Runoff Coefficient

0.750

Discharge Rate (L/s)

6.44

Infiltration Rate (m/hr)

0.0

Safety Factor

2.0

Quick

Calculate

☐ Create New

☒ From Library

☒ All

☒ FEH

Method

FEH

Number of Storms

18

Max. Run Time (mins)

2880

Input

Results

2D Graph

OK

Cancel

Create New

Help

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 104m³ - 147m³.

These values are estimates only and should not be used for final design purposes.

Appendix F United Utilities Correspondence

United Utilities Grasmere House, 2nd Floor
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

06.06.25

Dear Helen,

Pre-Development Enquiry for **SMP Huyton**

UU Reference Number: **07249922**

We have assessed your application based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your strategy will need review by other authorities as part of the planning process. We advise conducting necessary site investigations to confirm viability of your proposals.

Modelled Flood Risk [Please see the image on page 3 for details](#)

I can confirm that we have modelled flood risk within the vicinity of the proposed development.

Please note that our modelling data is indicative, and only representative of the 1:100year storm event.

[Please see comment 2 of the attached guidance sheet](#)

Asset Protection

According to our public sewer records, there are public sewers located within your site boundary. This requires an easement of 6m. If you cannot achieve the required clearance, you may wish to consider diverting and or abandoning the public sewer.

[Please see comment 3 of the attached guidance sheet and Working Near Our Pipelines Guidance document](#)

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 as per the below:

1. Plot 1 and Plot 4 as part of the detailed application to discharge to the UU combined water sewer MH1901 at an unrestricted rate.
2. Plot 2A to discharge to the UU foul water sewer MH2806 and MH2805 at an unrestricted rate.
3. Plot 2B to discharge to the UU foul water sewer MH2803 at an unrestricted rate.
4. Plot 3 to discharge to the UU foul water sewer MH2707 at an unrestricted rate.
5. Plot 5 to discharge to the UU combined water sewer MH0807 at an unrestricted rate.
6. Plot 6 to discharge to the UU combined water sewer MH0701 at an unrestricted rate.
7. Northeast catchment to discharge to the UU foul water MH2902 using existing connection at an unrestricted rate.

[Please see the images on page 3 for clarification](#)

Surface Water

Follow the National Planning Policy Guidance drainage hierarchy and Provide evidence for discounting higher options before considering public sewer discharge. Consult the Lead Local Flood Authority regarding surface water concerns.

[Please see comment 4 within the guidance sheet](#)

Public Sewer

United Utilities will permit connections as per the below:

1. Proposed catchment encompassing Plot 1, Plot 4, Plot 5, and proposed landscaping, to discharge to the UU surface water sewer in Archway Road at a combined rate of 56.70l/s between MH0802 and MH0803.
2. Plot 2A to discharge to UU surface water MH2811 at a rate of 5.0l/s
3. Plot 2B to discharge to UU surface water MH2806 at a rate of 18.90l/s
4. Plot 3 to discharge to UU surface water MH2703 at a rate of 5.0l/s
5. Plot 6 to discharge to UU surface water MH1703 at a rate of 6.44l/s
6. Northeast catchment current connection to MH 2908 be retained with reduction in impermeable area.

[Please see images on page 3 for clarification](#)

Water for the North West

Helen Erskine

From: Helen Erskine
Sent: 16 April 2025 11:17
To: Helen Erskine
Subject: FW: 07249922 - SMP Huyton - UU PDE
Attachments: Proposed strategy - April 25.pdf; Existing Drainage - Catchments Sketch P02.pdf

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 15 April 2025 15:18
To: Niamh Cullen <niamh.cullen@burohappold.com>; Phil Anwyl <phil.anwyl@burohappold.com>
Subject: 07249922 - SMP Huyton - UU PDE

****External Email. This email originated from outside Buro Happold.****

Hi Phil & Niamh

I have reviewed the information sent over, please see below:

Catchment 1

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 2

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 3

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 4

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Connection point MH 2906
MH 2807 falls within the boundary of this site and is subject to flooding 80m³ in the 100 year event

Catchment 5

Assumed 150mm connection at 1/400 gradient max capacity would be 8.589/s at 75% capacity this is 6.44l/s
Connection to MH1703

Catchment 6

Connection to MH2703 Restrict at 5L/S

Are you saying there is a connection at 5l/s to MH2074? We would want to reduce connections at this point, it currently shows flooding 104m³ in the 100 year event

Catchment 7

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Connection at MH 2908

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
T: 01925 429 096
unitedutilities.com

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From: Phil Anwyl <Phil.Anwyl@BuroHappold.com>
Sent: 11 April 2025 17:41
To: Pilkington, Nicola <Nicola.Pilkington@uuplc.co.uk>
Cc: Niamh Cullen <Niamh.Cullen@BuroHappold.com>
Subject: RE: SMP Huyton - UU PDE

Hi Nicola

Thanks for your time today. Please find attached the drawings shared in our discussion showing existing catchments and flow rates, and proposed drainage connections. I'm afraid we don't have any asset records that show manhole references on file.

If you have any comments or questions, please let me know.

Thanks

Phil

Phil Anwyl
Associate Director
Buro Happold | Cities - Infrastructure
T: +44 (0)1612335000

M: +44 (0)7845512202

E: phil.anwyl@burohappold.com
www.burohappold.com | [LinkedIn](#) | [Twitter](#) | [Instagram](#)

[Image is no longer available]

-----Original Appointment-----

From: Niamh Cullen <Niamh.Cullen@BuroHappold.com>

Sent: 09 April 2025 08:34

To: Niamh Cullen; nicola.pilkington@uuplc.co.uk; Phil Anwyl

Subject: SMP Huyton - UU PDE

When: 11 April 2025 15:00-16:00 (UTC+00:00) Dublin, Edinburgh, Lisbon, London.

Where: Microsoft Teams Meeting

Meeting to discuss SMP Huyton proposals with UU

Microsoft Teams [Need help?](#)

[Join the meeting now](#)

Meeting ID: 324 249 241 564

Passcode: qN6qz2yW

Join on a video conferencing device

Tenant key: teams@vc.burohappold.com

Video ID: 129 193 200 7

[More info](#)

For organisers: [Meeting options](#)

[Org help](#)

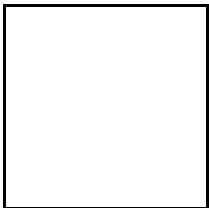
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Helen Erskine

From: seweradoptions@uuplc.co.uk
Sent: 25 April 2025 08:08
To: Phil Anwyl
Cc: Helen Erskine; Niamh Cullen; nicola.pilkington@uuplc.co.uk
Subject: RE: 07249922 - SMP Huyton - UU PDE

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Hi Phil

Next week I have the below availability:

Monday 11am
Tuesday – All day
Wed 10am
Thurs – All day

If you want to send a teams invite to my email address copied in for whatever suits you

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
T: 01925 429 096
unitedutilities.com

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----- Original Message -----

From: Phil Anwyl [phil.anwyl@burohappold.com]
Sent: 22/04/2025 16:36
To: seweradoptions@uuplc.co.uk
Cc: helen.erskine@burohappold.com; nicola.pilkington@uuplc.co.uk; niamh.cullen@burohappold.com
Subject: RE: 07249922 - SMP Huyton - UU PDE

Hi Nicola

Thank you for your email following our call on the 11th. If possible we'd really appreciate a follow up call to run through the connections/discharge rates, and provide clarifications on the questions in your email. We can also provide more detail on our proposed design strategy, for example we'd certainly be proposing connections at steeper gradients than those noted in your email. Please could you advise of your availability for a call?

Thanks

Phil

Phil Anwyl
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T: +44 (0)1612335000

M: +44 (0)7845512202

E: phil.anwyl@burohappold.com
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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: 15 April 2025 15:18

To: Niamh Cullen <niamh.cullen@burohappold.com>; Phil Anwyl <phil.anwyl@burohappold.com>

Subject: 07249922 - SMP Huyton - UU PDE

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Hi Phil & Niamh

I have reviewed the information sent over, please see below:

Catchment 1

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 2

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 3

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Final connection point is MH 0803 however this is via an indirect connection so you would need to obtain permission from the owners of the sewers and check condition

Catchment 4

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Connection point MH 2906
MH 2807 falls within the boundary of this site and is subject to flooding 80m³ in the 100 year event

Catchment 5

Assumed 150mm connection at 1/400 gradient max capacity would be 8.589/s at 75% capacity this is 6.44l/s
Connection to MH1703

Catchment 6

Connection to MH2703 Restrict at 5L/S

Are you saying there is a connection at 5l/s to MH2074? We would want to reduce connections at this point, it currently shows flooding 104m³ in the 100 year event

Catchment 7

Assumed 225mm connection at 1/400 gradient max capacity would be 25.212l/s at 75% capacity this is 18.90l/s
Connection at MH 2908

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
T: 01925 429 096
unitedutilities.com

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From: Phil Anwyl <Phil.Anwyl@BuroHappold.com>

Sent: 11 April 2025 17:41

To: Pilkington, Nicola <Nicola.Pilkington@uuplc.co.uk>

Cc: Niamh Cullen <Niamh.Cullen@BuroHappold.com>

Subject: RE: SMP Huyton - UU PDE

Hi Nicola

Thanks for your time today. Please find attached the drawings shared in our discussion showing existing catchments and flow rates, and proposed drainage connections. I'm afraid we don't have any asset records that show manhole references on file.

If you have any comments or questions, please let me know.

Thanks

Phil

Phil Anwyl
Associate Director
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T: +44 (0)1612335000

M: +44 (0)7845512202

E: phil.anwyl@burohappold.com
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[Image is no longer available]

-----Original Appointment-----

From: Niamh Cullen <Niamh.Cullen@BuroHappold.com>

Sent: 09 April 2025 08:34

To: Niamh Cullen; nicola.pilkington@uuplc.co.uk; Phil Anwyl

Subject: SMP Huyton - UU PDE

When: 11 April 2025 15:00-16:00 (UTC+00:00) Dublin, Edinburgh, Lisbon, London.

Where: Microsoft Teams Meeting

Meeting to discuss SMP Huyton proposals with UU

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Meeting ID: 324 249 241 564

Passcode: qN6qz2yW

Join on a video conferencing device

Tenant key: teams@vc.burohappold.com

Video ID: 129 193 200 7

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For organisers: [Meeting options](#)

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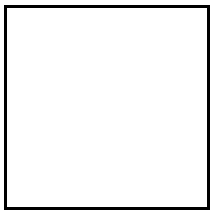
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Helen Erskine

From: Helen Erskine
Sent: 28 May 2025 15:17
To: seweradoptions@uuplc.co.uk
Cc: Niamh Cullen; Phil Anwyl
Subject: RE: 07249922 - SMP Huyton - UU PDE

Hi Nicola,

To clarify what we mean by unrestricted, we are proposing to retain the existing network with a reduced impermeable catchment area. This will effectively provide a betterment on the current scenario.

Please could you provide a formal PDE response which we could append to our drainage strategy for planning?

Many thanks,

Helen Erskine

Graduate Infrastructure Engineer
Buro Happold | Cities - Infrastructure
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BURO HAPPOLD

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 28 May 2025 12:48
To: Helen Erskine <helen.erskine@burohappold.com>
Cc: Niamh Cullen <niamh.cullen@burohappold.com>; Phil Anwyl <phil.anwyl@burohappold.com>
Subject: RE: 07249922 - SMP Huyton - UU PDE

****External Email. This email originated from outside Buro Happold.****

Hi Helen

This is all fine, my only issue is with point 6, We wouldn't agree to an unrestricted rate however as discussed this is an internal refurbishment so we can agree to continue with the current discharge rate and existing connections.

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
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----- Original Message -----

From: Helen Erskine [helen.erskine@burohappold.com]

Sent: 23/05/2025 16:47

To: seweradoptions@uuplc.co.uk

Cc: phil.anwyl@burohappold.com; niamh.cullen@burohappold.com

Subject: RE: 07249922 - SMP Huyton - UU PDE

Good afternoon,

Following on from our previous meeting, I wanted to confirm proposed connection points and rates which we agreed over the phone on 28/04.

Please see link below for survey information we have received from Tower Surveys.

 [TS-2645_301_Provisional.dwg](#)

Our proposals for surface water are as follows:

1. Proposed catchment encompassing Plot 1, Plot 4, Plot 5, and proposed landscaping, to discharge to the UU surface water sewer in Archway Road at a combined rate of 56.70l/s between MH0802 and MH0803.
 1. *Outfall pipe from existing Catchment 1 sized at 225mmØ and surveyed at 1:21 gradient.*
 2. *Outfall pipe from existing Catchment 2 sized at 225mmØ and surveyed at 1:56 gradient.*
 3. *Outfall pipe from existing Catchment 3 sized at 225mmØ and surveyed at 1:29 gradient.*
2. Plot 2A to discharge to UU surface water MH2811 at a rate of 5.0l/s
3. Plot 2B to discharge to UU surface water MH2806 at a rate of 18.90l/s
 1. *Outfall from existing Catchment 4 sized at 225mmØ and surveyed at 1:141 gradient.*
4. Plot 3 to discharge to UU surface water MH2703 at a rate of 5.0l/s
 1. *Outfall from existing Catchment 6 sized at 150mmØ and surveyed at 1:34 gradient.*

5. Plot 6 to discharge to UU surface water MH1703 at a rate of 6.44l/s
 1. *Outfall pipe from existing Catchment 5 sized at 150mmØ and surveyed at 1:34 gradient.*
6. Northeast catchment to discharge at an unrestricted rate to UU surface water MH2908 (refurbishment building and minor resurfacing in external areas, to reuse existing drainage connections).
 1. *Outfall pipe from existing Catchment 7 sized at 225mmØ and surveyed at 1:154 gradient.*

Our proposals for foul water are as follows:

1. Plot 1 and Plot 4 as part of the detailed application to discharge to the UU combined water sewer MH1901 at an unrestricted rate.
2. Plot 2A to discharge to the UU foul water sewer MH2806 and MH2805 at an unrestricted rate.
3. Plot 2B to discharge to the UU foul water sewer MH2803 at an unrestricted rate.
4. Plot 3 to discharge to the UU foul water sewer MH2707 at an unrestricted rate.
5. Plot 5 to discharge to the UU combined water sewer MH0807 at an unrestricted rate.
6. Plot 6 to discharge to the UU combined water sewer MH0701 at an unrestricted rate.
7. Northeast catchment to discharge to the UU foul water MH2902 using existing connection at an unrestricted rate.

Furthermore, see attached for a draft of the proposed surface water network and foul water network.

Many thanks,

Helen Erskine

Graduate Infrastructure Engineer
Buro Happold | Cities - Infrastructure
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From: Phil Anwyl <phil.anwyl@burohappold.com>
Sent: 15 May 2025 12:59
To: seweradoptions@uuplc.co.uk
Cc: Helen Erskine <Helen.Erskine@BuroHappold.com>; Niamh Cullen <Niamh.Cullen@BuroHappold.com>
Subject: RE: 07249922 - SMP Huyton - UU PDE

Hi Nicola

Thanks for the update. As an update, we are expecting to receive CCTV survey data at the end of next week, after which we can update you on both these and the surface water proposals (regarding both the connections and the discharge rate).

Thanks

Phil

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 06 May 2025 13:26
To: Phil Anwyl <phil.anwyl@burohappold.com>
Cc: Helen Erskine <helen.erskine@burohappold.com>; Niamh Cullen <niamh.cullen@burohappold.com>
Subject: RE: 07249922 - SMP Huyton - UU PDE

****External Email. This email originated from outside Buro Happold.****

Hi Phil

Further to our meeting last week, please see below confirmation on connection points for foul at an unrestricted rate:

SJ44902708 & SJ44902707 on westmorland road

SJ44900701 on Poplar Bank

SJ44900801, SJ44900807, SJ44901901 on Archway road

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
T: 01925 429 096
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Appendix G Hydraulic Model Calculations

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

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Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SWMH11	Manhole	344159.587	390872.128	36.056	2.456	33.600	Circular	1.200
SWMH12	Manhole	344134.459	390904.296	33.856	1.300	32.556	Circular	1.200
SWMH13	Manhole	344085.697	390867.682	33.000	2.200	30.800	Circular	1.200
SWMH01	Manhole	344251.668	390903.163	36.530	0.750	35.780	Circular	1.200
SWMH03	Manhole	344226.984	390901.650	36.516	1.281	35.235	Circular	1.200
SWMH04	Manhole	344206.786	390897.460	36.285	1.692	34.593	Circular	1.200
SWMH07	Manhole	344187.121	390826.074	36.862	1.862	35.000	Circular	1.200
SWMH08	Manhole	344190.928	390854.128	36.551	1.851	34.700	Circular	1.200
SWMH09	Manhole	344177.855	390845.607	36.149	1.200	34.949	Circular	1.200
SWMH10	Manhole	344189.136	390894.982	36.429	1.200	35.229	Circular	1.200
SWOutfall	Simple Junction	344070.547	390871.502					
SWMH05	Manhole	344201.482	390906.321	36.443	1.200	35.243	Circular	1.200
SWMH02	Manhole	344218.554	390937.868	36.666	1.200	35.466	Circular	1.200
SWMH06	Manhole	344217.895	390832.269	36.995	1.200	35.795	Circular	1.200
SWMHP2B	Manhole	344191.625	390835.681	37.034	1.500	35.534	Circular	1.200
SWMHP52	Manhole	344088.604	390863.426	33.165	2.235	30.930	Circular	1.200
SWMHP51	Manhole	344100.873	390863.101	33.553	1.200	32.353	Circular	1.200

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Name	Part Family	Lock
SWMH11	SSG - TypeB - 1.5 -3m Depth	None
SWMH12	SSG - TypeB - 1.5 -3m Depth	None
SWMH13	SSG - TypeB - 1.5 -3m Depth	None
SWMH01	SSG - TypeB - 1.5 -3m Depth	Levels
SWMH03	SSG - TypeB - 1.5 -3m Depth	None
SWMH04	SSG - TypeB - 1.5 -3m Depth	None
SWMH07	SSG - TypeB - 1.5 -3m Depth	None
SWMH08	SSG - TypeB - 1.5 -3m Depth	Levels
SWMH09	SSG - TypeB - 1.5 -3m Depth	Levels
SWMH10	SSG - TypeB - 1.5 -3m Depth	Levels
SWOutfall		
SWMH05	SSG - TypeB - 1.5 -3m Depth	Levels
SWMH02	SSG - TypeB - 1.5 -3m Depth	Levels
SWMH06	SSG - TypeB - 1.5 -3m Depth	Levels
SWMHP2B	SSG - TypeB - 1.5 -3m Depth	None
SWMHP52	SSG - TypeB - 1.5 -3m Depth	None
SWMHP51		None

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Inlets

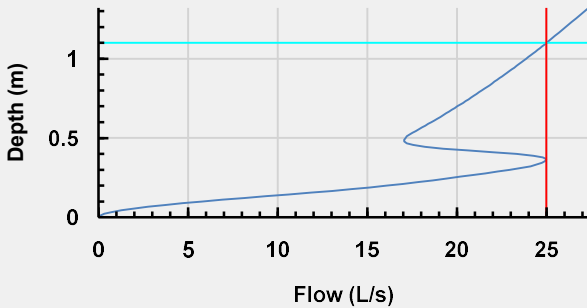
Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SWMH11	Inlet	PP15P	(None)	No Restriction
	Inlet (1)	S1	(None)	No Restriction
	Inlet (2)	PP8P	(None)	No Restriction
	Inlet (Pipe 11)	11	(None)	No Restriction
	Inlet (PP12P)	PP12P	(None)	No Restriction
SWMH12	Inlet	Green Roof CHQ	(None)	No Restriction
	Inlet (C15)	C15	(None)	No Restriction
	Inlet (Pipe 12)	12	(None)	No Restriction
	Inlet (PP13P)	PP13P	(None)	No Restriction
	Inlet (PP14P)	PP14P	(None)	No Restriction
SWMH13	Inlet	13	(None)	No Restriction
	Inlet (1)	P53	(None)	No Restriction
SWMH01	Inlet	PP2P	(None)	No Restriction
	Inlet (1)	PP1P	(None)	No Restriction
SWMH03	Inlet	1	(None)	No Restriction
	Inlet (1)	2	(None)	No Restriction
	Inlet (2)	PP4P	(None)	No Restriction
SWMH04	Inlet	3	(None)	No Restriction
	Inlet (1)	PP7P	(None)	No Restriction
	Inlet (3)	5	(None)	No Restriction
	Inlet (4)	PP5P	(None)	No Restriction
SWMH07	Inlet (1)	PP10P	(None)	No Restriction
SWMH08	Inlet	2B	(None)	No Restriction
	Inlet (Pipe 6)	6	(None)	No Restriction
	Inlet (Pipe 7)	7	(None)	No Restriction
	Inlet (Pipe 8)	8	(None)	No Restriction
	Inlet (PP11P)	PP11P	(None)	No Restriction
SWMH09	Inlet	Green Roof Hotel	(None)	No Restriction
	Inlet (1)	Hotel	(None)	No Restriction
SWMH10	Inlet	CHQ	(None)	No Restriction
SWOutfall	Inlet	14	(None)	No Restriction
SWMH05	Inlet	PP6P	(None)	No Restriction
SWMH02	Inlet (3)	PP3P	(None)	No Restriction
SWMH06	Inlet	PP9P	(None)	No Restriction
SWMHP2B	Inlet	Plot 2B	(None)	No Restriction
SWMHP52	Inlet	P52	(None)	No Restriction
SWMHP51	Inlet	Plot 5	(None)	No Restriction

Outlets

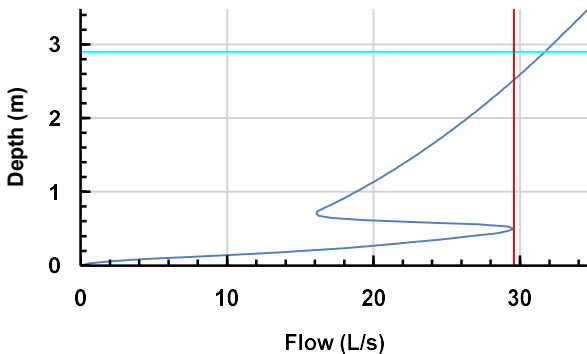
Junction	Outlet Name	Outgoing Connection	Outlet Type
	Outlet	12	Hydro-Brake®

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Junction	Outlet Name	Outgoing Connection	Outlet Type
	Invert Level (m)	33.600	
	Design Depth (m)	1.100	
	Design Flow (L/s)	25.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0206-2500-1100-2500	
			

SWMH11

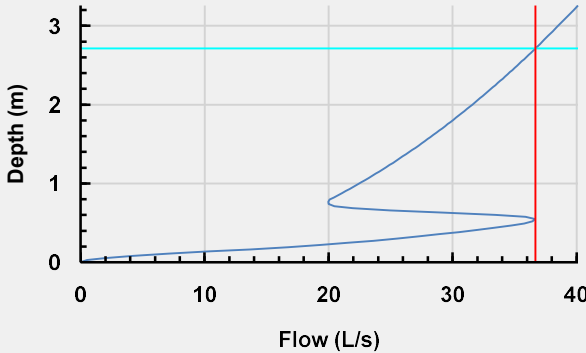
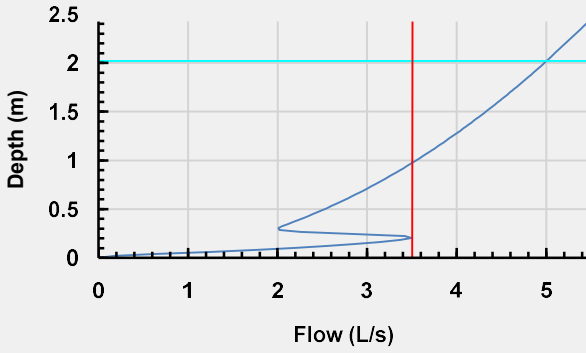
Outlet	13	Hydro-Brake®	
	Invert Level (m)	32.556	
	Design Depth (m)	2.900	
	Design Flow (L/s)	31.7	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0199-3170-2900-3170	
			

SWMH12

Outlet	14	Hydro-Brake®
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPOLD

Junction	Outlet Name		Outgoing Connection	Outlet Type
	Invert Level (m)		30.800	
	Design Depth (m)		2.713	
	Design Flow (L/s)		36.7	
	Objective		Minimise Upstream Storage Requirements	
	Application		Surface Water Only	
	Sump Available		☐	
	Unit Reference		CHE-0218-3670-2713-3670	
				
SWMH01	Outlet	1	Free Discharge	
SWMH03	Outlet	3	Free Discharge	
SWMH04	Outlet	4	Free Discharge	
SWMH07	Outlet	7	Free Discharge	
SWMH08	Outlet	9	Free Discharge	
SWMH09	Outlet	8	Free Discharge	
SWMH10	Outlet	10	Free Discharge	
SWMH05	Outlet	5	Free Discharge	
SWMH02	Outlet	2	Free Discharge	
SWMH06	Outlet	6	Free Discharge	
SWMHP2B	Outlet	2B	Free Discharge	
SWMHP52	Outlet		P53	Hydro-Brake®
	Invert Level (m)		30.930	
	Design Depth (m)		2.020	
	Design Flow (L/s)		5.0	
	Objective		Minimise Upstream Storage Requirements	
	Application		Surface Water Only	
	Sump Available		☐	
	Unit Reference		CHE-0086-5000-2020-5000	
				
SWMHP51	Outlet	P51	Free Discharge	

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP1

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.501
Depth (m)	0.430
Base Level (m)	36.071
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	60.376
Long. Slope (1:X)	200.00
Width (m)	11.394
Total Volume (m³)	62.469

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C1
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP1P
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP2

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.740
Depth (m)	0.430
Base Level (m)	36.310
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	50.559
Long. Slope (1:X)	200.00
Width (m)	5.809
Total Volume (m³)	26.975

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C2
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP2P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP3

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.198
Depth (m)	0.430
Base Level (m)	35.768
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	45.785
Long. Slope (1:X)	200.00
Width (m)	12.588
Total Volume (m³)	52.394

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

C3

Inlet Type	Point Inflow
Incoming Item(s)	C3
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP3P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP4

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.437
Depth (m)	0.430
Base Level (m)	36.007
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	39.624
Long. Slope (1:X)	200.00
Width (m)	6.410
Total Volume (m³)	23.334

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

C4

Inlet Type	Point Inflow
Incoming Item(s)	C4
Bypass Destination	(None)
Capacity Type	No Restriction

Generator

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

Outlets

Outlet

Outgoing Connection	PP4P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP5

Type : Porous Paving

Dimensions	
Exceedance Level (m)	36.241
Depth (m)	0.430
Base Level (m)	35.811
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	31.421
Long. Slope (1:X)	200.00
Width (m)	4.000
Total Volume (m³)	11.701
Under Drain	
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6
Inlets	
Inlet (1)	
Inlet Type	Point Inflow
Incoming Item(s)	C5
Bypass Destination	(None)
Capacity Type	No Restriction
Outlets	
Outlet	
Outgoing Connection	PP5P
Outlet Type	Free Discharge
Advanced	
Conductivity (m/hr)	300.0

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP6

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.449
Depth (m)	0.430
Base Level (m)	36.019
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	14.171
Long. Slope (1:X)	200.00
Width (m)	1.027
Total Volume (m³)	1.485

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C6
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP6P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP7

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.167
Depth (m)	0.430
Base Level (m)	35.737
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	21.427
Long. Slope (1:X)	200.00
Width (m)	15.721
Total Volume (m³)	30.582

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C7
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP7P
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP8

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.197
Depth (m)	0.430
Base Level (m)	35.767
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	35.346
Long. Slope (1:X)	200.00
Width (m)	3.402
Total Volume (m³)	11.255

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C8
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP8P
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP9

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.356
Depth (m)	0.430
Base Level (m)	35.926
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	47.749
Long. Slope (1:X)	200.00
Width (m)	6.992
Total Volume (m³)	30.581

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C9
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP9P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP10

Type : Porous Paving

Dimensions

Exceedance Level (m)	35.530
Depth (m)	0.430
Base Level (m)	35.100
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	62.157
Long. Slope (1:X)	200.00
Width (m)	11.349
Total Volume (m³)	64.046

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C10
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	C16
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP10P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP11

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.124
Depth (m)	0.430
Base Level (m)	35.694
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	47.376
Long. Slope (1:X)	200.00
Width (m)	5.755
Total Volume (m³)	25.068

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C11
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP11P
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP12

Type : Porous Paving

Dimensions

Exceedance Level (m)	36.007
Depth (m)	0.430
Base Level (m)	35.577
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	40.812
Long. Slope (1:X)	200.00
Width (m)	5.681
Total Volume (m³)	21.353

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C12
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP12P
Outlet Type	Flap Valve
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	35.577

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP13

Type : Porous Paving

Dimensions	
Exceedance Level (m)	33.842
Depth (m)	0.430
Base Level (m)	33.412
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	38.577
Long. Slope (1:X)	20.00
Width (m)	3.118
Total Volume (m³)	10.881
Under Drain	
Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6
Inlets	
Inlet	
Inlet Type	Point Inflow
Incoming Item(s)	C13
Bypass Destination	(None)
Capacity Type	No Restriction
Outlets	
Outlet	
Outgoing Connection	PP13P
Outlet Type	Flap Valve
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	33.412
Advanced	
Conductivity (m/hr)	300.0

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP14

Type : Porous Paving

Dimensions

Exceedance Level (m)	33.482
Depth (m)	0.430
Base Level (m)	33.052
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	67.281
Long. Slope (1:X)	30.00
Width (m)	2.066
Total Volume (m³)	12.510

Inlets

Outlets

Outlet

Outgoing Connection	PP14P
Outlet Type	Flap Valve
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	33.052

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



PP15

Type : Porous Paving

Dimensions

Exceedance Level (m)	34.730
Depth (m)	0.430
Base Level (m)	34.300
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	0.1
Porosity (%)	30
Length (m)	42.652
Long. Slope (1:X)	200.00
Width (m)	2.970
Total Volume (m³)	11.902

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	C17
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	PP15P
Outlet Type	Flap Valve
Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	34.300

Advanced

Conductivity (m/hr)	300.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



Swale

Type : Swale

Swale

Exceedance Level (m)	36.310
Depth (m)	0.333
Base Level (m)	35.977
Top Width (m)	2.498
Side Slope (1:X)	3.00
Base Width (m)	0.500
Freeboard (mm)	0
Length (m)	22.895
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.1
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6
Total Volume (m³)	14.287

Trench

Trench Depth (m)	0.750
Trench Porosity (%)	30

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.6

Outlets

Outlet

Outgoing Connection	S1
Outlet Type	Under Drain

Advanced

Swale

Porosity (%)	100
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Trench

Trench Conductivity (m/hr)	50.0
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St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

 Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	36.330
Depth (m)	1.390
Base Level (m)	33.777
Number of Crates Long	16
Number of Crates Wide	18
Number of Crates High	1
Porosity (%)	97
Crate Length (m)	1.2
Crate Width (m)	0.6
Crate Height (m)	1.39
Total Volume (m³)	280.746

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	4
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	9
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

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

Outlets

Outlet

Outgoing Connection	11
Outlet Type	Free Discharge

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Stormwater Controls Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

 **Plot 5 Storage**

Type : Cellular Storage

Dimensions

Exceedance Level (m)	33.125
Depth (m)	1.390
Base Level (m)	31.560
Number of Crates Long	6
Number of Crates Wide	9
Number of Crates High	1
Porosity (%)	97
Crate Length (m)	1.2
Crate Width (m)	0.6
Crate Height (m)	1.39
Total Volume (m³)	52.597

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	P51
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P52
Outlet Type	Free Discharge

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Connections Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
12	40.819	Pipe	39.117		0.6	300	36.056	33.600
13	60.978	Pipe	34.716		0.6	375	33.856	32.556
1	24.731	Pipe	45.377		0.6	100	36.530	35.780
3	20.627	Pipe	32.130		0.6	150	36.516	35.235
7	28.311	Pipe	94.370		0.6	150	36.862	35.000
8	15.605	Pipe	62.589		0.6	225	36.149	34.949
14	15.625	Pipe	86.805		0.6	375	33.000	30.800
5	10.327	Pipe	15.895		0.6	150	36.443	35.243
2	37.185	Pipe	161.134		0.6	150	36.666	35.466
PP3P	6.366	Pipe	21.049		0.6	150	36.615	35.768
PP4P	23.220	Pipe	30.082		0.6	150	36.752	36.007
PP5P	14.210	Pipe	11.665		0.6	150	36.459	35.811
PP6P	7.369	Pipe	9.494		0.6	150	36.479	36.019
6	34.714	Pipe	31.697		0.6	150	36.995	35.795
PP9P	7.642	Pipe	58.487		0.6	150	36.987	35.926
PP12P	10.642	Pipe	5.382		0.6	225	36.163	35.577
PP13P	8.459	Pipe	9.884		0.6	150	34.374	33.412
PP11P	7.413	Pipe	7.457		0.6	150	36.787	35.694
PP2P	26.774	Pipe	50.500		0.6	150	36.856	36.310
4	26.430	Pipe	32.389		0.6	225	36.285	34.593
9	25.611	Pipe	27.748		0.6	225	36.551	34.700
PP10P	10.206	Pipe	102.003		0.6	150	36.605	35.100
PP7P	7.446	Pipe	6.512		0.6	150	36.386	35.737
11	28.774	Pipe	162.563		0.6	300	36.785	33.777
10	15.583	Pipe	10.729		0.6	225	36.429	35.229
PP1P	19.509	Pipe	66.955		0.6	150	36.796	36.071
PP14P	3.428	Pipe	6.923		0.6	150	33.764	33.052
PP15P	12.700	Pipe	18.154		0.6	100	35.744	34.300
S1	11.522	Pipe	7.082		0.6	150	36.163	35.227
PP8P	31.828	Pipe	14.691		0.6	150	36.435	35.767
2B	18.460	Pipe	22.125		0.6	225	37.034	35.534
P52	5.853	Pipe	9.291		0.6	225	33.191	31.560
P53	5.154	Pipe	39.645		0.6	225	33.165	30.930
P51	7.908	Pipe	9.972		0.6	150	33.553	32.353

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Connections Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)
12	33.856	32.556	PE Pipe Drainage (Generic)	None	27.34
13	33.000	30.800	PE Pipe Drainage (Generic)	None	21.39
1	36.516	35.235	PE Pipe Drainage (Generic)	None	
3	36.285	34.593	PE Pipe Drainage (Generic)	None	
7	36.551	34.700	PE Pipe Drainage (Generic)	None	
8	36.551	34.700		None	
14	32.120	30.620		Levels	33.09
5	36.285	34.593		None	
2	36.516	35.235		None	
PP3P	36.666	35.466		Levels	
PP4P	36.516	35.235		None	
PP5P	36.285	34.593		None	
PP6P	36.443	35.243		None	
6	36.551	34.700		None	
PP9P	36.995	35.795		None	
PP12P	36.056	33.600		None	22.28
PP13P	33.856	32.556		None	22.28
PP11P	36.551	34.700		None	
PP2P	36.530	35.780		None	
4	36.785	33.777		None	
9	36.785	33.777		None	
PP10P	36.862	35.000		None	
PP7P	36.285	34.593		None	0.00
11	36.056	33.600		None	
10	36.785	33.777		None	
PP1P	36.530	35.780		None	0.00
PP14P	33.856	32.556		None	22.28
PP15P	36.056	33.600		None	22.28
S1	36.056	33.600		None	0.00
PP8P	36.056	33.600		None	0.00
2B	36.551	34.700		None	
P52	33.165	30.930		None	
P53	33.000	30.800		None	5.25
P51	33.191	31.560		None	

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Inflow Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (m²)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (m²)
C1	PP1		Time of Concentration	687.905	100	0	100	687.905
C2	PP2		Time of Concentration	293.687	100	0	100	293.687
C3	PP3		Time of Concentration	576.357	100	0	100	576.357
C4	PP4		Time of Concentration	249.623	100	0	100	249.623
C5	PP5		Time of Concentration	125.692	100	0	100	125.692
C6	PP6		Time of Concentration	14.553	100	0	100	14.553
C7	PP7		Time of Concentration	336.859	100	0	100	336.859
C8	PP8		Time of Concentration	120.237	100	0	100	120.237
C9	PP9		Time of Concentration	333.872	100	0	100	333.872
C10	PP10		Time of Concentration	705.421	100	0	100	705.421
C11	PP11		Time of Concentration	272.635	100	0	100	272.635
C12	PP12		Time of Concentration	231.810	100	0	100	231.810
C13	PP13		Time of Concentration	120.284	100	0	100	120.284
C14	PP14		Time of Concentration	139.669	100	0	100	139.669
C15	SWMH12		Time of Concentration	14.879	100	0	100	14.879
C16	PP10		Time of Concentration	121.249	100	0	100	121.249
C17	PP15		Time of Concentration	126.674	100	0	100	126.674
CHQ	SWMH10		Time of Concentration	1933.300	100	0	100	1933.300
Generator	PP4		Time of Concentration	54.558	100	0	100	54.558
Green Roof CHQ	SWMH12		Green Roof	52.000		0		52.000
Green Roof Hotel	SWMH09		Green Roof	114.000		0		114.000
Hotel	SWMH09		Time of Concentration	912.826	100	0	100	912.826
Plot 2B	SWMHP2B		Time of Concentration	1362.241	100	0	100	1362.241
Plot 5	SWMHP51		Time of Concentration	1219.537	100	0	100	1219.537
TOTAL		0.0		10119.866				10119.866

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Outfall Details Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
SWOutfall	Free Discharge		

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Title: Rainfall Analysis Criteria	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FEH	Type: FEH
Site Location	GB 344151 390873 SJ 44151 90873
Rainfall Version	2022
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	0.000
100.0	45.000

Storm Durations

Duration (hrs)	Run Time (hrs)
0.25	0.50
0.50	1.00
1.00	2.00
2.00	4.00
4.00	8.00
6.00	12.00
8.00	16.00
16.00	32.00
24.00	48.00

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Junctions Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SWMH11	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.05 6	33.60 0	33.896	0.296	18.7	0.335	0.000	18.7	112.334	OK
SWMH12	FEH: 2 years: +0 %: 2.00 hrs: Winter	33.85 6	32.55 6	32.867	0.311	19.1	0.352	0.000	19.1	114.696	OK
SWMH13	FEH: 2 years: +0 %: 2.00 hrs: Winter	33.00 0	30.80 0	31.134	0.334	21.8	0.377	0.000	21.7	131.877	OK
SWMH01	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.53 0	35.78 0	35.817	0.037	2.7	0.042	0.000	2.7	12.228	OK
SWMH03	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.51 6	35.23 5	35.279	0.044	5.5	0.050	0.000	5.5	23.667	OK
SWMH04	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.28 5	34.59 3	34.634	0.041	7.0	0.046	0.000	7.1	30.103	OK
SWMH07	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.86 2	35.00 0	35.040	0.040	2.8	0.046	0.000	2.8	10.273	OK
SWMH08	FEH: 2 years: +0 %: 0.25 hrs: Winter	36.55 1	34.70 0	34.799	0.099	34.7	0.112	0.000	33.2	16.788	OK
SWMH09	FEH: 2 years: +0 %: 0.25 hrs: Winter	36.14 9	34.94 9	35.021	0.072	14.1	0.082	0.000	13.8	6.657	OK
SWMH10	FEH: 2 years: +0 %: 0.25 hrs: Winter	36.42 9	35.22 9	35.299	0.069	29.9	0.078	0.000	29.8	13.893	OK
SWOutfall	FEH: 2 years: +0 %: 2.00 hrs: Winter		30.62 0	30.700	0.080	21.7			21.7	131.852	OK
SWMH05	FEH: 2 years: +0 %: 0.50 hrs: Winter	36.44 3	35.24 3	35.249	0.007	0.1	0.008	0.000	0.1	0.131	OK
SWMH02	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.66 6	35.46 6	35.505	0.040	2.1	0.045	0.000	2.1	7.283	OK
SWMH06	FEH: 2 years: +0 %: 1.00 hrs: Winter	36.99 5	35.79 5	35.818	0.023	1.6	0.026	0.000	1.6	3.024	OK
SWMHP2B	FEH: 2 years: +0 %: 0.25 hrs: Winter	37.03 4	35.53 4	35.600	0.066	21.1	0.075	0.000	20.8	9.779	OK
SWMHP52	FEH: 2 years: +0 %: 0.50 hrs: Winter	33.16 5	30.93 0	31.721	0.791	3.5	0.895	0.000	3.0	8.576	Surcharged
SWMHP51	FEH: 2 years: +0 %: 0.25 hrs: Winter	33.55 3	32.35 3	32.416	0.063	18.9	0.072	0.000	18.8	8.760	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPPOLD



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SWMH11	FEH: 30 years: +0 %: 2.00 hrs: Winter	36.056	33.600	34.266	0.666	25.1	0.753	0.000	24.9	214.000	Surcharged
SWMH12	FEH: 30 years: +0 %: 0.50 hrs: Winter	33.856	32.556	33.041	0.484	27.6	0.548	0.000	27.4	57.194	Surcharged
SWMH13	FEH: 30 years: +0 %: 0.50 hrs: Winter	33.000	30.800	31.268	0.468	30.1	0.529	0.000	29.6	63.096	Surcharged
SWMH01	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.530	35.780	35.844	0.064	6.6	0.073	0.000	6.6	18.294	OK
SWMH03	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.516	35.235	35.309	0.074	13.9	0.083	0.000	14.0	35.891	OK
SWMH04	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.285	34.593	34.659	0.066	18.2	0.075	0.000	18.1	45.801	OK
SWMH07	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.862	35.000	35.067	0.067	7.2	0.076	0.000	7.1	15.570	OK
SWMH08	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.551	34.700	34.848	0.148	69.1	0.168	0.000	66.6	37.144	OK
SWMH09	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.149	34.949	35.060	0.111	28.1	0.125	0.000	27.6	13.763	OK
SWMH10	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.429	35.229	35.328	0.099	59.6	0.112	0.000	59.3	27.633	OK
SWOutfall	FEH: 30 years: +0 %: 0.50 hrs: Winter		30.620	30.714	0.094	29.6			29.6	62.947	OK
SWMH05	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.443	35.243	35.253	0.010	0.3	0.011	0.000	0.3	0.197	OK
SWMH02	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.666	35.466	35.533	0.067	5.7	0.076	0.000	5.7	11.149	OK
SWMH06	FEH: 30 years: +0 %: 0.50 hrs: Winter	36.995	35.795	35.832	0.036	4.1	0.041	0.000	4.1	4.612	OK
SWMHP2B	FEH: 30 years: +0 %: 0.25 hrs: Winter	37.034	35.534	35.630	0.096	42.0	0.108	0.000	41.5	19.464	OK
SWMHP52	FEH: 30 years: +0 %: 1.00 hrs: Winter	33.165	30.930	32.017	1.087	5.9	1.230	0.000	3.3	20.338	Surcharged
SWMHP51	FEH: 30 years: +0 %: 0.25 hrs: Winter	33.553	32.353	32.449	0.096	37.6	0.108	0.000	37.3	17.399	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Junctions Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		





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

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SWMH11	FEH: 100 years: +45 %: 2.00 hrs: Winter	36.056	33.600	34.934	1.334	26.7	1.509	0.000	26.7	290.733	Surcharged
SWMH12	FEH: 100 years: +45 %: 2.00 hrs: Winter	33.856	32.556	33.037	0.481	27.3	0.544	0.000	27.3	296.723	Surcharged
SWMH13	FEH: 100 years: +45 %: 2.00 hrs: Winter	33.000	30.800	31.298	0.498	31.2	0.564	0.000	31.1	338.923	Surcharged
SWMH01	FEH: 100 years: +45 %: 1.00 hrs: Winter	36.530	35.780	36.171	0.391	12.1	0.442	0.000	11.0	36.674	Surcharged
SWMH03	FEH: 100 years: +45 %: 1.00 hrs: Winter	36.516	35.235	35.351	0.116	27.1	0.132	0.000	27.2	70.794	OK
SWMH04	FEH: 100 years: +45 %: 2.00 hrs: Winter	36.285	34.593	34.967	0.374	30.2	0.423	0.000	29.2	108.712	Surcharged
SWMH07	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.862	35.000	35.097	0.097	12.3	0.110	0.000	12.4	18.474	OK
SWMH08	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.551	34.700	35.196	0.496	120.6	0.560	0.000	104.6	72.985	Surcharged
SWMH09	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.149	34.949	35.348	0.399	52.2	0.451	0.000	45.6	25.272	Surcharged
SWMH10	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.429	35.229	35.372	0.143	107.0	0.162	0.000	106.4	49.625	OK
SWOutfall	FEH: 100 years: +45 %: 2.00 hrs: Winter		30.620	30.716	0.096	31.1			31.1	338.763	OK
SWMH05	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.443	35.243	35.256	0.013	0.7	0.015	0.000	0.7	0.365	OK
SWMH02	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.666	35.466	35.573	0.108	11.5	0.122	0.000	11.6	14.815	OK
SWMH06	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.995	35.795	35.849	0.054	8.6	0.061	0.000	8.7	9.592	OK
SWMHP2B	FEH: 100 years: +45 %: 0.25 hrs: Winter	37.034	35.534	35.672	0.138	75.4	0.156	0.000	74.9	34.994	OK
SWMHP52	FEH: 100 years: +45 %: 1.00 hrs: Winter	33.165	30.930	32.554	1.624	5.4	1.837	0.000	4.0	24.434	Surcharged
SWMHP51	FEH: 100 years: +45 %: 0.25 hrs: Winter	33.553	32.353	33.003	0.650	67.5	0.736	0.000	59.9	31.314	Surcharged

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				



**FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max.
Avg. Depth**

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FEH: 2 years: +0 %: 2.00 hrs: Winter	33.910	33.910	0.133	0.133	23.0	26.850	0.000	0.000	17.3	106.110	90.436	OK
PP1	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.424	36.122	0.051	0.050	3.4	8.436	0.000	0.000	1.9	8.298	86.496	OK
PP2	FEH: 2 years: +0 %: 1.00 hrs: Winter	36.604	36.335	0.041	0.025	2.2	2.810	0.000	0.000	1.5	2.746	89.583	OK
PP3	FEH: 2 years: +0 %: 2.00 hrs: Winter	36.044	35.792	0.047	0.024	2.9	6.445	0.000	0.000	2.1	7.311	87.699	OK
PP4	FEH: 2 years: +0 %: 1.00 hrs: Winter	36.247	36.031	0.042	0.024	2.2	2.582	0.000	0.000	1.8	3.020	88.935	OK
PP5	FEH: 2 years: +0 %: 0.50 hrs: Winter	36.000	35.825	0.032	0.014	1.3	0.942	0.000	0.000	0.9	0.945	91.948	OK
PP6	FEH: 2 years: +0 %: 0.25 hrs: Winter	36.103	36.024	0.014	0.006	0.2	0.047	0.000	0.000	0.1	0.097	96.851	OK
PP7	FEH: 2 years: +0 %: 2.00 hrs: Winter	35.879	35.771	0.035	0.034	1.7	3.254	0.000	0.000	1.2	4.538	89.360	OK
PP8	FEH: 2 years: +0 %: 0.50 hrs: Winter	35.975	35.793	0.031	0.026	1.2	0.929	0.000	0.000	0.8	0.890	91.746	OK
PP9	FEH: 2 years: +0 %: 1.00 hrs: Winter	36.208	35.953	0.044	0.027	2.5	3.253	0.000	0.000	1.6	3.047	89.363	OK
PP10	FEH: 2 years: +0 %: 2.00 hrs: Winter	35.467	35.142	0.056	0.042	4.1	9.732	0.000	0.000	2.8	10.307	84.805	OK
PP11	FEH: 2 years: +0 %: 1.00 hrs: Winter	35.971	35.710	0.040	0.016	2.0	2.480	0.000	0.000	1.5	2.630	90.108	OK
PP12	FEH: 2 years: +0 %: 1.00 hrs: Winter	35.818	35.609	0.037	0.032	1.7	2.113	0.000	0.000	1.1	2.259	90.103	OK
PP13	FEH: 2 years: +0 %: 0.25 hrs: Winter	35.362	33.442	0.021	0.030	1.9	0.685	0.000	0.000	1.0	0.668	93.700	OK
Swale	FEH: 2 years: +0 %: 0.25 hrs: Summer	35.341	35.227	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP14	FEH: 2 years: +0 %: 0.25 hrs: Summer	35.294	33.052	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP15	FEH: 2 years: +0 %: 0.50 hrs: Winter	34.545	34.328	0.032	0.028	1.3	0.993	0.000	0.000	0.8	0.923	91.657	OK
Plot 5 Storage	FEH: 2 years: +0 %: 0.50 hrs: Winter	31.722	31.722	0.162	0.162	12.2	6.094	0.000	0.000	3.5	9.525	88.415	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max.
Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FEH: 30 years: +0 %: 2.00 hrs: Winter	34.275	34.275	0.498	0.498	52.0	100.096	0.000	0.000	24.6	202.340	64.346	OK
PP1	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.466	36.160	0.093	0.089	10.2	14.089	0.000	0.000	4.8	12.258	77.446	OK
PP2	FEH: 30 years: +0 %: 0.50 hrs: Winter	36.633	36.351	0.070	0.041	5.9	4.705	0.000	0.000	4.1	4.269	82.559	OK
PP3	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.081	35.807	0.084	0.039	8.6	10.874	0.000	0.000	5.7	11.210	79.247	OK
PP4	FEH: 30 years: +0 %: 0.50 hrs: Winter	36.277	36.046	0.072	0.039	6.1	4.349	0.000	0.000	4.6	4.758	81.363	OK
PP5	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.020	35.833	0.051	0.022	3.9	1.468	0.000	0.000	2.4	1.352	87.456	OK
PP6	FEH: 30 years: +0 %: 0.25 hrs: Winter	36.109	36.027	0.019	0.008	0.4	0.067	0.000	0.000	0.3	0.199	95.493	OK
PP7	FEH: 30 years: +0 %: 1.00 hrs: Winter	35.906	35.801	0.062	0.064	5.0	5.571	0.000	0.000	3.3	6.931	81.783	OK
PP8	FEH: 30 years: +0 %: 0.25 hrs: Winter	35.994	35.809	0.051	0.043	3.7	1.477	0.000	0.000	1.7	1.231	86.874	OK
PP9	FEH: 30 years: +0 %: 1.00 hrs: Winter	36.229	35.971	0.064	0.045	5.0	5.491	0.000	0.000	4.0	6.892	82.046	OK
PP10	FEH: 30 years: +0 %: 1.00 hrs: Winter	35.516	35.171	0.105	0.071	12.3	16.201	0.000	0.000	7.2	15.643	74.704	OK
PP11	FEH: 30 years: +0 %: 0.50 hrs: Winter	35.999	35.719	0.068	0.024	5.5	4.151	0.000	0.000	3.8	4.094	83.439	OK
PP12	FEH: 30 years: +0 %: 0.50 hrs: Winter	35.843	35.639	0.062	0.062	4.7	3.582	0.000	0.000	3.0	3.477	83.227	OK
PP13	FEH: 30 years: +0 %: 0.50 hrs: Winter	35.366	33.462	0.024	0.050	2.4	1.064	0.000	0.000	2.1	2.144	90.222	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by:	Checked by:	Approved By:	
	HE	PA	PA	
Report Details:	Buro Happold:			
Type: Stormwater Controls Summary Storm Phase: SW Proposed Drainage	2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

Swale	FEH: 30 years: +0 %: 0.25 hrs: Summer	35.341	35.227	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP14	FEH: 30 years: +0 %: 0.25 hrs: Summer	35.294	33.052	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP15	FEH: 30 years: +0 %: 0.25 hrs: Winter	34.565	34.347	0.052	0.047	3.9	1.578	0.000	0.000	1.8	1.258	86.746	OK
Plot 5 Storage	FEH: 30 years: +0 %: 1.00 hrs: Winter	32.018	32.018	0.458	0.458	18.1	17.258	0.000	0.000	5.9	21.442	67.188	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By:
Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FEH: 100 years: +45 %: 2.00 hrs: Winter	34.952	34.952	1.175	1.175	107.7	236.305	0.000	0.000	25.5	270.702	15.830	OK
PP1	FEH: 100 years: +45 %: 1.00 hrs: Winter	36.527	36.243	0.153	0.172	18.6	23.706	0.000	0.000	9.0	25.031	62.051	OK
PP2	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.666	36.370	0.103	0.060	10.7	7.139	0.000	0.000	8.5	8.673	73.536	OK
PP3	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.154	35.826	0.157	0.058	21.1	16.989	0.000	0.000	11.5	14.964	67.575	OK
PP4	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.318	36.058	0.113	0.052	16.8	6.633	0.000	0.000	7.9	5.901	71.576	OK
PP5	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.031	35.840	0.063	0.028	4.6	2.068	0.000	0.000	4.1	4.001	82.325	OK
PP6	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.115	36.030	0.025	0.012	0.8	0.090	0.000	0.000	0.7	0.367	93.959	OK
PP7	FEH: 100 years: +45 %: 0.50 hrs: Winter	35.948	35.841	0.104	0.105	12.3	9.064	0.000	0.000	7.0	9.401	70.362	OK
PP8	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.005	35.839	0.061	0.073	4.4	2.212	0.000	0.000	3.9	3.813	80.346	OK
PP9	FEH: 100 years: +45 %: 0.50 hrs: Winter	36.275	35.994	0.110	0.068	12.2	8.721	0.000	0.000	8.6	9.647	71.480	OK
PP10	FEH: 100 years: +45 %: 1.00 hrs: Winter	35.610	35.204	0.199	0.104	22.4	27.346	0.000	0.000	13.0	31.119	57.302	OK
PP11	FEH: 100 years: +45 %: 0.25 hrs: Winter	36.035	35.728	0.104	0.034	15.1	6.156	0.000	0.000	7.2	4.971	75.443	OK
PP12	FEH: 100 years: +45 %: 0.50 hrs: Winter	35.870	35.676	0.088	0.099	8.5	5.552	0.000	0.000	6.1	6.962	74.000	OK
PP13	FEH: 100 years: +45 %: 0.50 hrs: Winter	35.374	33.492	0.033	0.079	4.4	1.526	0.000	0.000	4.2	3.977	85.976	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				

Swale	FEH: 100 years: +45 %: 0.25 hrs: Summer	35.341	35.227	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP14	FEH: 100 years: +45 %: 0.25 hrs: Summer	35.294	33.052	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
PP15	FEH: 100 years: +45 %: 6.00 hrs: Winter	34.540	34.518	0.027	0.219	0.9	4.314	0.000	0.000	1.9	7.753	63.756	OK
Plot 5 Storage	FEH: 100 years: +45 %: 1.00 hrs: Winter	32.555	32.555	0.995	0.995	32.9	37.518	0.000	0.000	5.4	26.111	28.670	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		

BURO HAPOLD



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
12	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH1 1	SWMH1 2	36.056	33.896	0.187	112.298	0.4	0.1	18.7	OK
13	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH1 2	SWMH1 3	33.856	32.867	0.195	114.618	0.3	0.06	19.1	OK
1	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH0 1	SWMH0 3	36.530	35.817	0.040	12.228	0.9	0.3	2.7	OK
3	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH0 3	SWMH0 4	36.516	35.279	0.042	23.667	1.4	0.18	5.5	OK
7	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH0 7	SWMH0 8	36.862	35.040	0.041	10.273	0.7	0.15	2.8	OK
8	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH0 9	SWMH0 8	36.149	35.021	0.085	6.657	1.0	0.21	13.8	OK
14	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH1 3	SWOutfall	33.000	31.134	0.082	131.852	1.2	0.1	21.7	OK
5	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH0 5	SWMH0 4	36.443	35.249	0.014	0.095	0.6	0	0.2	OK
2	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH0 2	SWMH0 3	36.666	35.505	0.042	7.283	0.5	0.15	2.1	OK
PP3P	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	PP3	SWMH0 2	36.615	35.805	0.032	7.311	0.8	0.05	2.1	OK
PP4P	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	PP4	SWMH0 3	36.752	36.041	0.029	3.020	0.9	0.05	1.8	OK
PP5P	FEH: 2 years: +0 %: 0.50 hrs: Winter	Pipe	PP5	SWMH0 4	36.459	35.836	0.021	0.945	1.1	0.02	0.9	OK
PP6P	FEH: 2 years: +0 %: 0.50 hrs: Winter	Pipe	PP6	SWMH0 5	36.479	36.029	0.006	0.132	0.6	0	0.1	OK
6	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH0 6	SWMH0 8	36.995	35.818	0.031	3.024	0.6	0.05	1.6	OK
PP9P	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	PP9	SWMH0 6	36.987	35.958	0.025	3.047	0.8	0.07	1.6	OK
PP12P	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	PP12	SWMH1 1	36.163	35.607	0.147	2.252	0.0	0.01	1.1	OK
PP13P	FEH: 2 years: +0 %: 0.50 hrs: Winter	Pipe	PP13	SWMH1 2	34.374	33.431	0.150	1.021	0.1	0.02	1.0	OK
PP11P	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	PP11	SWMH0 8	36.787	35.724	0.031	2.630	0.7	0.02	1.5	OK
PP2P	FEH: 2 years: +0 %: 1.00 hrs: Winter	Pipe	PP2	SWMH0 1	36.856	36.342	0.026	2.746	0.7	0.06	1.5	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by:	Checked by:	Approved By:	
	HE	PA	PA	
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

4	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	SWMH0 4	Cellular Storage	36.285	34.634	0.087	30.103	0.5	0.08	7.1	OK
9	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH0 8	Cellular Storage	36.551	34.799	0.081	16.788	2.6	0.34	33.2	OK
PP10P	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	PP10	SWMH0 7	36.605	35.146	0.041	10.307	0.7	0.16	2.8	OK
PP7P	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	PP7	SWMH0 4	36.386	35.769	0.027	4.534	0.6	0.02	1.2	OK
11	FEH: 2 years: +0 %: 0.50 hrs: Summer	Pipe	Cellular Storage	SWMH1 1	36.785	33.884	0.186	33.451	0.5	0.21	18.2	OK
10	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH1 0	Cellular Storage	36.429	35.299	0.071	13.893	3.3	0.19	29.8	OK
PP1P	FEH: 2 years: +0 %: 2.00 hrs: Winter	Pipe	PP1	SWMH0 1	36.796	36.112	0.034	8.286	0.7	0.09	1.9	OK
PP14P	FEH: 2 years: +0 %: 0.25 hrs: Summer	Pipe	PP14	SWMH1 2	33.764	33.052	0.131	0.000	0.0	0	0.0	OK
PP15P	FEH: 2 years: +0 %: 0.50 hrs: Winter	Pipe	PP15	SWMH1 1	35.744	34.326	0.100	0.910	0.1	0.06	0.8	OK
S1	FEH: 2 years: +0 %: 0.25 hrs: Summer	Pipe	Swale	SWMH1 1	36.163	35.227	0.126	0.000	0.0	0	0.0	OK
PP8P	FEH: 2 years: +0 %: 0.50 hrs: Winter	Pipe	PP8	SWMH1 1	36.435	35.792	0.145	0.886	0.0	0.02	0.8	OK
2B	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMHP 2B	SWMH0 8	37.034	35.600	0.082	9.779	1.6	0.19	20.8	OK
P52	FEH: 2 years: +0 %: 0.50 hrs: Summer	Pipe	Plot 5 Storage	SWMHP 52	33.191	31.697	0.225	9.337	0.7	0.04	6.6	OK
P53	FEH: 2 years: +0 %: 4.00 hrs: Summer	Pipe	SWMHP 52	SWMH1 3	33.165	31.636	0.225	19.838	0.4	0.04	3.4	Surch arged
P51	FEH: 2 years: +0 %: 0.25 hrs: Winter	Pipe	SWMHP 51	Plot 5 Storage	33.553	32.416	0.085	8.760	2.6	0.33	18.8	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025		
	Designed by: HE	Checked by: PA	Approved By: PA
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ		





FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
12	FEH: 30 years: +0 %: 4.00 hrs: Summer	Pipe	SWMH1 1	SWMH1 2	36.056	34.169	0.259	234.199	0.5	0.14	25.0	Surcharged
13	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	SWMH1 2	SWMH1 3	33.856	33.041	0.267	56.817	0.4	0.08	27.4	Surcharged
1	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH0 1	SWMH0 3	36.530	35.844	0.068	18.294	1.2	0.73	6.6	OK
3	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH0 3	SWMH0 4	36.516	35.309	0.070	35.891	1.7	0.44	14.0	OK
7	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH0 7	SWMH0 8	36.862	35.067	0.066	15.570	1.0	0.39	7.1	OK
8	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH0 9	SWMH0 8	36.149	35.060	0.130	13.763	1.2	0.42	27.6	OK
14	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	SWMH1 3	SWOutfall	33.000	31.268	0.097	62.947	1.3	0.14	29.6	Surcharged
5	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH0 5	SWMH0 4	36.443	35.253	0.026	0.197	0.9	0.01	0.3	OK
2	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH0 2	SWMH0 3	36.666	35.533	0.070	11.149	0.7	0.41	5.7	OK
PP3P	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	PP3	SWMH0 2	36.615	35.831	0.053	11.210	1.0	0.15	5.7	OK
PP4P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP4	SWMH0 3	36.752	36.064	0.048	4.758	1.3	0.14	4.6	OK
PP5P	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	PP5	SWMH0 4	36.459	35.850	0.030	1.352	1.5	0.05	2.4	OK
PP6P	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	PP6	SWMH0 5	36.479	36.034	0.009	0.199	0.8	0.01	0.3	OK
6	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	SWMH0 6	SWMH0 8	36.995	35.832	0.055	4.612	0.9	0.13	4.1	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	HE	PA	PA	
Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ				

PP9P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP9	SWMH06	36.987	35.980	0.041	4.662	1.1	0.18	4.1	OK
PP12P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP12	SWMH11	36.163	35.629	0.225	3.458	0.1	0.01	3.0	OK
PP13P	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	PP13	SWMH12	34.374	33.441	0.150	1.476	0.1	0.05	2.6	OK
PP11P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP11	SWMH08	36.787	35.745	0.055	4.094	0.9	0.06	3.8	OK
PP2P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP2	SWMH01	36.856	36.364	0.044	4.269	0.9	0.16	4.1	OK
4	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	SWMH04	Cellular Storage	36.285	34.659	0.225	45.801	0.5	0.2	18.1	OK
9	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH08	Cellular Storage	36.551	34.848	0.148	37.144	2.8	0.67	66.6	OK
PP10P	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	PP10	SWMH07	36.605	35.177	0.069	15.643	0.9	0.41	7.2	OK
PP7P	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	PP7	SWMH04	36.386	35.792	0.044	6.924	0.8	0.05	3.3	OK
11	FEH: 30 years: +0 %: 4.00 hrs: Summer	Pipe	Cellular Storage	SWMH11	36.785	34.114	0.300	220.969	0.5	0.41	35.4	Surcharged
10	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	SWMH10	Cellular Storage	36.429	35.328	0.134	27.633	3.6	0.37	59.3	OK
PP1P	FEH: 30 years: +0 %: 1.00 hrs: Winter	Pipe	PP1	SWMH01	36.796	36.140	0.056	12.233	0.8	0.22	4.8	OK
PP14P	FEH: 30 years: +0 %: 0.25 hrs: Summer	Pipe	PP14	SWMH12	33.764	33.052	0.150	0.000	0.0	0	0.0	OK
PP15P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP15	SWMH11	35.744	34.341	0.100	2.066	0.3	0.14	2.1	OK
S1	FEH: 30 years: +0 %: 0.25 hrs: Summer	Pipe	Swale	SWMH11	36.163	35.227	0.150	0.000	0.0	0	0.0	OK
PP8P	FEH: 30 years: +0 %: 0.50 hrs: Winter	Pipe	PP8	SWMH11	36.435	35.806	0.150	1.986	0.1	0.04	2.1	OK
2B	FEH: 30 years: +0 %: 0.25 hrs: Winter	Pipe	SWMHP2B	SWMH08	37.034	35.630	0.122	19.464	1.9	0.37	41.5	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			



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

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
12	FEH: 100 years: +45 %: 2.00 hrs: Winter	Pipe	SWMH1 1	SWMH1 2	36.056	34.934	0.278	289.774	0.4	0.15	26.7	Surcharged
13	FEH: 100 years: +45 %: 2.00 hrs: Winter	Pipe	SWMH1 2	SWMH1 3	33.856	33.037	0.283	296.296	0.4	0.08	27.3	Surcharged
1	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	SWMH0 1	SWMH0 3	36.530	36.171	0.100	36.674	1.4	1.22	11.0	Surcharged
3	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	SWMH0 3	SWMH0 4	36.516	35.351	0.150	70.794	2.0	0.86	27.2	OK
7	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	SWMH0 7	SWMH0 8	36.862	35.094	0.146	31.021	1.0	0.71	13.0	OK
8	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMH0 9	SWMH0 8	36.149	35.348	0.225	25.272	1.1	0.69	45.6	Surcharged
14	FEH: 100 years: +45 %: 2.00 hrs: Winter	Pipe	SWMH1 3	SWOutfall II	33.000	31.298	0.099	338.763	1.3	0.14	31.1	Surcharged
5	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMH0 5	SWMH0 4	36.443	35.256	0.043	0.365	1.0	0.01	0.7	OK
2	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	SWMH0 2	SWMH0 3	36.666	35.573	0.110	14.815	0.8	0.83	11.6	OK
PP3P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP3	SWMH0 2	36.615	35.867	0.083	14.964	1.2	0.3	11.5	OK
PP4P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP4	SWMH0 3	36.752	36.091	0.079	9.344	1.4	0.29	9.5	OK
PP5P	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	PP5	SWMH0 4	36.459	35.864	0.051	2.754	1.3	0.1	5.0	OK
PP6P	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	PP6	SWMH0 5	36.479	36.039	0.012	0.367	1.0	0.01	0.7	OK
6	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	SWMH0 6	SWMH0 8	36.995	35.849	0.087	9.592	1.0	0.27	8.7	OK

St Michael's Place: Proposed Surface Water Drainage				Date: 13/08/0025								
				Designed by:	Checked by:	Approved By:						
				HE	PA	PA						
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage				Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ								

PP9P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP9	SWMH0 6	36.987	36.013	0.061	9.647	1.3	0.37	8.6	OK
PP12P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP12	SWMH1 1	36.163	35.657	0.225	6.943	0.2	0.03	6.0	OK
PP13P	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	PP13	SWMH1 2	34.374	33.452	0.150	2.830	0.3	0.08	4.7	OK
PP11P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP11	SWMH0 8	36.787	35.767	0.096	8.204	0.9	0.13	8.4	OK
PP2P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP2	SWMH0 1	36.856	36.391	0.150	8.673	1.1	0.34	8.5	OK
4	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	SWMH0 4	Cellular Storage	36.285	34.928	0.225	89.142	0.9	0.39	36.2	Surcharged
9	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMH0 8	Cellular Storage	36.551	35.196	0.225	72.231	3.0	1.05	104.6	Surcharged
PP10P	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	PP10	SWMH0 7	36.605	35.229	0.099	31.119	1.0	0.74	13.0	OK
PP7P	FEH: 100 years: +45 %: 0.50 hrs: Winter	Pipe	PP7	SWMH0 4	36.386	35.826	0.067	9.387	1.0	0.1	7.0	OK
11	FEH: 100 years: +45 %: 0.25 hrs: Summer	Pipe	Cellular Storage	SWMH1 1	36.785	34.311	0.300	20.281	0.6	0.3	26.2	Surcharged
10	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMH1 0	Cellular Storage	36.429	35.372	0.225	49.625	3.7	0.67	106.4	OK
PP1P	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	PP1	SWMH0 1	36.796	36.186	0.150	25.004	0.8	0.42	9.1	OK
PP14P	FEH: 100 years: +45 %: 0.25 hrs: Summer	Pipe	PP14	SWMH1 2	33.764	33.052	0.150	0.000	0.0	0	0.0	OK
PP15P	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	PP15	SWMH1 1	35.744	34.363	0.100	2.089	0.5	0.28	4.0	OK
S1	FEH: 100 years: +45 %: 0.25 hrs: Summer	Pipe	Swale	SWMH1 1	36.163	35.227	0.150	0.000	0.0	0	0.0	OK
PP8P	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	PP8	SWMH1 1	36.435	35.828	0.150	2.552	0.2	0.09	4.3	OK
2B	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMHP 2B	SWMH0 8	37.034	35.672	0.225	34.994	1.9	0.67	74.9	OK

St Michael's Place: Proposed Surface Water Drainage	Date: 13/08/0025			 BURO HAPPOLD
	Designed by: HE	Checked by: PA	Approved By: PA	
Report Details: Type: Connections Summary Storm Phase: SW Proposed Drainage	Buro Happold: 2nd Floor Eastgate, 2 Castle Street, Manchester, M3 4LZ			

P52	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	Plot 5 Storage	SWMHP 52	33.191	32.256	0.225	7.171	0.3	0.08	13.2	Surcharged
P53	FEH: 100 years: +45 %: 1.00 hrs: Winter	Pipe	SWMHP 52	SWMH1 3	33.165	32.554	0.225	24.071	0.5	0.05	4.0	Surcharged
P51	FEH: 100 years: +45 %: 0.25 hrs: Winter	Pipe	SWMHP 51	Plot 5 Storage	33.553	33.003	0.150	31.314	3.4	1.06	59.9	Surcharged

Appendix H SuDS Proforma

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

This pro-forma is a requirement of the Planning Validation Checklist. You **must complete all white boxes in full** and submit this pro-forma along with your supporting evidence to the Local Planning Authority for any application which seeks planning permission for major development (as defined in section 2 of [Statutory Instrument 2015 No. 595](#)).

This pro-forma supports developers and regulators in **summarising and confirming** how surface water from a development will be managed sustainably under current and future conditions. It should be completed in conjunction with the Council's 'Completing your Pro Forma' document and your sustainable drainage system should be designed in accordance with [CIRIA The SuDS Manual C753](#).

The pro-forma follows Policy CS24 of [Knowsley MBC's Local Plan](#), [National Planning Policy Framework](#), [House of Commons Written Statement \(HWSW 161\) on SuDS](#), [Planning Practice Guidance](#) and [Defra's Non-Statutory Technical Standards for Sustainable Drainage Systems](#). It is supported by the [Defra/EA Guidance on Rainfall Runoff Management](#) and can be completed using freely available tools such as [Tools for Sustainable Drainage Systems](#) or approved Industry Standard surface water management design software. The Council's [Sustainable Drainage & Surface Water Management Technical Guidance document](#) also provides further information.

Section 1: Development Details					
Development Name		St Michael's Place			
Development Address (including postcode)		Civic Way, L36 9BB	Planning Application Reference (if available)		
Development Grid Reference	Northings	390850	Expected lifetime of development (years)		50
	Eastings	344158	Have you submitted a Flood Risk Assessment?		Yes ☒ No ☐
Total Development Site Area (Ha)		3.1	Type of Planning Application (✓)	Outline	☐
Site area served by proposed drainage system (excluding open space) (Ha)*		1.7		Full	☐
Is your surface water drainage system designed to a (tick all that apply):				Hybrid	☒
Greenfield Standard		☒		Reserved Matters	☐
Previously Developed Standard		☐			

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 2: Impermeable Area and Existing Drainage For outline or reserved matters applications, go to Section 3

	Existing (E)	Proposed (P)	Difference (P – E)	Evidence Checklist	
Impermeable Area (Ha)	1.12	0.71	0.41	☐	Plans showing development layout of site with existing and proposed impermeable areas.
State Drainage Method	Piped	SuDS and piped	N/A	☐	Plans showing current and proposed locations of sustainable drainage system.
Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?			Yes ☒ No ☐	☒	Plans showing existing layout to include: • Watercourses, open or culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes • Soakaways, filter drains

Section 3: Surface Water Discharge Hierarchy – Planning Practice Guidance

Surface Water Discharge Method	Proposed?	If YES - Evidence Checklist		If NO - Evidence Checklist	
1. Infiltration to ground	Yes ☐ No ☒	☐	Completed Infiltration Checklist from CIRIA The SuDS Manual C753 Appendix B <i>An editable version of this form is available on SusDrain website.</i>	☒	Geotechnical Survey, including Soil Permeability Testing stating Percolation Coefficient, in accordance with BRE 365 AND Statement providing justification in your Sustainable Drainage Strategy
2. Discharge to watercourse or surface water body (Main River or Ordinary)	Yes ☐ No ☒	☐	Watercourse and/or Water Body Survey Report	☒	Plan showing nearby watercourses and water bodies AND Statement providing justification in your Sustainable Drainage Strategy
3. Discharge to surface water sewer	Yes ☒ No ☐	☒	Water and Sewerage Company written agreement for the Right to Connect.	☐	Plan showing nearby sewers AND Statement providing justification in your Sustainable Drainage Strategy
4. Discharge to combined sewer	Yes ☐ No ☒				

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 4: Calculate Peak Discharge Rates – Technical Standards S2 and S3 (unless S1 applies)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) <i>Brownfield sites must reduce discharge rates by 50%</i>	Evidence Checklist	
Qbar				☒	MicroDrainage (or equivalent) calculations
1:1 Year Event	73.5 (1:2)	11.2 (1:2)	36.7 (1:2)		
1:30 Year Event	150.1	20.5	36.7		
1:100 Year Event	173.2	25.0	36.7		

Section 5: Calculate Discharge Volume – Technical Standards S4 and S6 (unless S1 applies)

Rainfall Event	Existing Volume (m ³)	Greenfield Volume (m ³)	Proposed Volume (m ³)	Evidence Checklist	
1:100 Year 6 Hour Event	452.2	N/A	418.1	☒	MicroDrainage (or equivalent) calculations

Section 6: Infiltration

Site Information	✓	Evidence Checklist	
Do your sustainable drainage proposals include any infiltration?	Yes ☐ No ☒ <i>If NO, please move on to Section 7</i>	☐	Proposed sustainable drainage plans
You should submit an alternative 'Plan B' sustainable drainage design utilising an alternative discharge method if site specific ground conditions are unknown at this stage. This will become the default design in the event infiltration proposals are not feasible upon site specific ground investigation. Have you submitted an alternative 'Plan B' sustainable drainage design?	Yes ☐ No ☐	☐	'Plan B' conceptual sustainable drainage plans and statement of approach

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 7: Storage – Technical Standards S7, S8 and S9

Storage Details	Details	Evidence Checklist	
State climate change allowance used (%)	45	☒	State / use in MicroDrainage
State storage volume provided (m ³) (excluding non-void spaces) <i>Must include an allowance for climate change and urban creep.</i>	Tank = 280 Permeable paving = 397	☒	Drainage plans showing location of attenuation and all flow control devices and any supporting calculations
Summarise how storage will be provided for 1:30 year event on site. <i>Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas and no flooding occurs offsite in a 1 in 100 year (+ climate change allowance) event.</i>	Surface water will be managed using permeable paving and a storage tank. The paving allows infiltration, while the tank stores excess runoff, preventing flooding during moderate storms.	☒	Plans showing size and location of storage and supporting calculations
Summarise how storage will be provided for 1:100 year (+ climate change) 6 hour event on site. <i>Where storage above the 1:30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by MicroDrainage (or equivalent) calculations.</i>	In addition to the above, exceedance flows will be directed away from properties to soft landscaping including a proposed swale, which provides storage for extreme events.	☒	Plans showing size and location of storage and supporting calculations

Section 8: Operation and Maintenance – Technical Standard S12 and HCWS161

Consideration	Select <u>ALL</u> that apply (✓)		Evidence Checklist	
State how <u>ALL</u> components of the sustainable drainage system will be maintained for the design life of the development.	Sustainable drainage features are at property level	☒	☐	Statement provided within your Sustainable Drainage Strategy
	Sustainable drainage system to be adopted by Water and Sewerage Company through a Section 104 agreement (Water Industry Act 1991)	☐		
	Applicant to secure maintenance of sustainable drainage features by entering into a Section 106 agreement (Town and Country Planning Act 1990)	☐		

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Declaration and Submission

This pro-forma has been completed using evidence from information which has been submitted with my planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details

Form <u>completed</u> by	Helen Erskine	Email Address	helen.erskine@burohappold.com
		Daytime Telephone	01612335000
Form <u>signed off</u> by	Phil Anwyl	Accreditation(s) and/or Qualification(s) of Signatory	CEng MICE
Date (dd/mm/yyyy)	20/06/2025	Company	Buro Happold Engineers Ltd

Client Details

Name	Alan Hall	Company	Genr8 Kajima Regeneration Limited
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