Intended for
Bruntwood

Document type
Drainage Strategy Report

Date
July 2022

DIDSBURY TECHNOLOGY PARK

SURFACE AND FOUL WATER DRAINAGE STRATEGY

RAMBOLL Bright ideas. Sustainable change.

DIDSBURY TECHNOLOGY PARK
SURFACE AND FOUL WATER DRAINAGE STRATEGY

Project no.	**1620006198**
Document Type	**Planning Report**
Version	**1**
Document no	**6198-RAM-XX-XX-RP-D-00002**
Date	**07/07/2022**
Prepared by	**Conor O'Loughlin**
Checked by	**Labieba February**
Approved by	**Simona Peet**
Description	**Drainage Strategy for Planning**

Ramboll
2nd Floor, The Exchange
St. John Street
Chester
CH1 1DA
United Kingdom

T +44 1244 311855
https://uk.ramboll.com

This report is produced by Ramboll at the request of the client for the purposes detailed herein. This report and accompanying documents are intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party and shall not be liable for any loss, damage or expense of whatsoever nature which is caused by their reliance on the information contained in this report.

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

CONTENTS

1.	**Introduction**	**2**
2.	**Scope and Objectives**	**3**
2.1	Scope	3
2.2	Objectives	3
2.3	Relevant Planning History	3
3.	**Limitations**	**4**
4.	**Legislation**	**5**
4.1	Planning Policy	5
4.2	Strategic Flood Risk Assessment	6
5.	**Consultations**	**7**
5.1	United Utilities (UU)	7
5.2	Lead Local Flood Authority Manchester City Council (LLFA)	9
6.	**Site Description**	**10**
6.1	Existing Site Description	10
6.2	Ground Conditions	10
6.3	Existing Drainage	11
6.4	Existing Surface Water Flows	13
7.	**Surface Water Drainage Proposals**	**14**
7.1	Surface Water Discharge Strategy	14
7.2	Review of Sustainable Drainage Techniques	15
7.3	Surface Water Discharge Calculations	16
7.4	Surface Water Design Criteria	17
8.	**Foul Sewage Proposals**	**18**
8.1	Foul Water Discharge Strategy	18
8.2	Proposed Peak Foul Water Flows	19
8.3	Design Codes	19
9.	**Maintenance of Drainage Systems**	**20**
9.1	Performance Objectives	20
9.2	Maintenance Requirements	20
9.3	Maintenance Schedule	20

APPENDIX CONTENTS

Appendix 1 – Consultations
Appendix 2 – Existing ground information
Appendix 3 – Existing drainage information
Appendix 4 – Proposed drainage strategy
Appendix 5 – Calculations

1. INTRODUCTION

Ramboll UK Ltd (Ramboll) is appointed on behalf of Bruntwood (Didsbury TP) Limited (The Client) to prepare a Drainage Strategy in support of a detailed planning application for Phase 1 of the development of the former Siemens Campus fronting Princess Road, West Didsbury, Manchester, M20 2EW.

The site area is 1.68ha which includes the construction of circa 10,000m^2 of office accommodation spread across a ground floor and five additional stories. The proposals also include the construction of circa 7,000m^2 car park deck to provide additional car parking spaces within RLB.

Land within the redline boundary currently comprises surface car parking, vehicle access routes and a grassed area in the northwest corner. All land within the redline boundary falls within an area identified for commercial development by Manchester City Council.

The Site sits within the wider Didsbury Technology Park masterplan. Immediately to the north is Sir William Siemens House with Nell Lane beyond. To the east is the Green Walk residential development. To the south is the Spire Hospital and Barlow Moor Road beyond. To the west is Princess Parkway, which is a major arterial road into the city centre.

Beyond the immediate environs, the Southern Cemetery is located to the west, Barlow Moor Road and residential properties are located to the south, and Nell Lane and the former Withington Hospital residential development are located to the north. The Birches and Lancastrian schools and a police station are located to the south and east.

The site is located in Didsbury, south of Manchester city centre at National Grid Reference 383266, 392157 on the A5103. The site is near an existing bus terminus on the junction of A5103 Princess road and A5145 Barlow Moor road, and new residential units located at the rear of the site.

A site location plan indicating the site boundary is indicated on Layer's drawing 159-LYR-XX-XX-DWG-L-1007 and shown below. The site, hereafter will be referred to as the "Application Site".

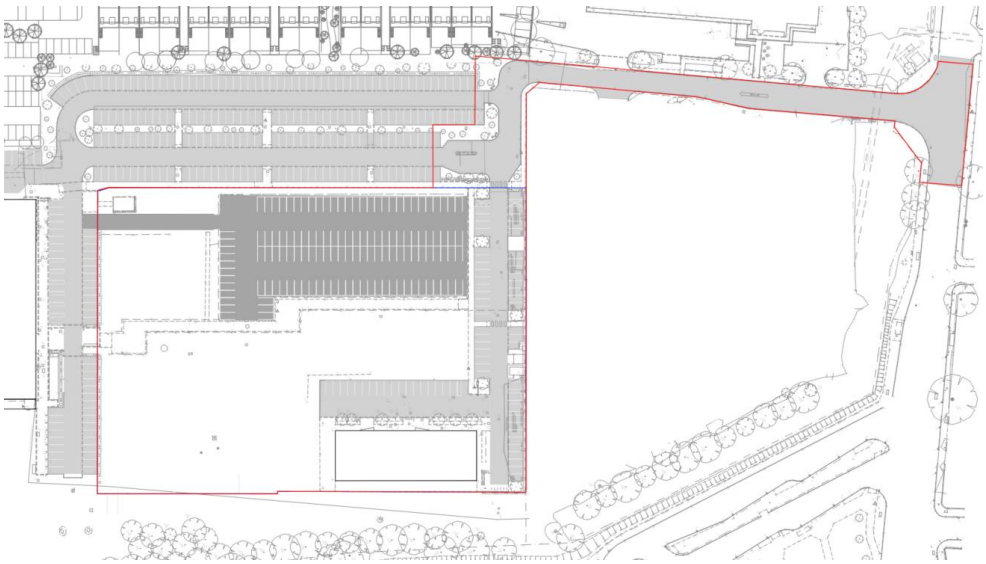


Figure 1 - Existing site plan and site boundary (taken from Layer drawing)

2. SCOPE AND OBJECTIVES

2.1 Scope

This Drainage Strategy report has been prepared to support the planning application for the development of the Application Site. This should be read in conjunction with the Flood Risk Assessment reference 1620006198-XX-XX-RP-WA-01 and all other planning documents.

2.2 Objectives

The specific objectives of this assessment are to establish the following:

- Existing drainage systems in and adjacent to the application site.
- Proposals for collection and discharge of surface water from the application site.
- Proposals for collection and discharge of foul water from the application site.

2.3 Relevant Planning History

The Site forms one part of a larger strategic development site, which is allocated by saved policy DB12.

The Development Framework was endorsed by Manchester City Council (MCC) in November 2014. The Development Framework provides the high-level development principles for future development proposals and has been considered in the development of this application and the Illustrative Masterplan for the wider site.

The site includes a range of low-rise buildings, up to 6 storeys. Planning permission was granted in February 2015 (ref: 107473/FO/2014/S1) for the redevelopment of the southern part of the wider site for the erection of a four-storey building to form a new private hospital with associated car parking and landscaping. The hospital was completed and became operational in early 2017.

Planning permission was also granted in March 2017 for Phases 1 & 2 of the Masterplan. One of the permissions related to a commercial building in the southwest corner (known as 'Ohm') with associated car parking and landscaping. The other permission was for a residential development to the east of the site (known as Green Walk). Both schemes have been delivered and are occupied.

3. LIMITATIONS

This report has been prepared for the detailed planning application of the Application Site and shall not be relied upon by any third party unless that party has been granted a contractual right to rely on this report for the purpose for which it was prepared.

The findings and opinions in the report are based upon information derived from a variety of information sources. Ramboll believe these information sources to be reliable and where possible have tried to verify the information.

This report has been prepared on the basis of the proposed end land use defined by the Client at the time of writing. If this proposed end land use is altered or changed then it will be necessary to review the findings of this report.

It should be noted that some of the aspects considered in this study are subject to change with time. Therefore, if the development is delayed or postponed for a significant period then it should be reviewed to confirm that no changes have taken place, either at the Application Site or within relevant legislation.

4. LEGISLATION

The following legislation has been reviewed and has been considered in preparation of the proposed drainage strategy.

4.1 Planning Policy

Government has strengthened planning policy on the provision of sustainable drainage systems (SuDS) for 'major' planning applications and this is covered in Section 14 of National Planning Policy Framework February 2019. As per the guidance issued by the Department of Communities and Local Government (DCLG), all 'major' planning applications being determined from 6 April 2015 and the NPPF 2021, must consider sustainable drainage systems.

Assessment of the suitability of sustainable drainage systems must be undertaken in accordance with Section 14 Meeting the challenge of climate change, flooding and coastal change.

The department for Environment, Food and Rural Affairs has produced a non-statutory technical standard for sustainable drainage systems.

In regard to peak discharge this states:

For greenfield developments the peak runoff rate from the development to any highways, sewer, or surface water body for the 1 in 1 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.

In regard to volume control this states.

S4: Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

S5: Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

S6: Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

In regard to flood risk within the application site this states;

S7: The drainage system must be designed so that, unless an area is designated to hold

and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.

S8: The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of a building (including a basement); or in any utility plant susceptible to water (e.g., pumping station or electricity substation) within the development.

S9: The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.

4.2 Strategic Flood Risk Assessment

The Level 2 Manchester City Council, Salford City and Trafford Councils Strategic Flood Risk Assessment (SFRA) dated March 2011 has been reviewed. Criteria related to flood risk will be covered within the Flood Risk Assessment.

The SFRA indicates that the Application site is within the Didsbury Critical Drainage Area. The climate change assessment shows a general increase in flood risk across the Didsbury area with the worst affected area in central Didsbury.

For critical drainage areas the SFRA states.

- Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change; and
- Development should be designed so that there is no flooding to the development in a 1 in 30-year event and so that there is no property flooding in a 1 in 100 year plus climate change event.

5. CONSULTATIONS

5.1 United Utilities (UU)

Initial communication was made regarding the application site with United Utilities in August 2020.

The response indicated (contained within email thread "Didsbury Technology Park - Phase 1 - Email 1 of 2 - UU Ref 4200033206"):

Foul drainage would be allowed to discharge to the public sewer directly or indirectly via the existing infrastructure installed at part of the previous phase of works.

If infiltration testing confirms that the scheme is unable to facilitate the appropriate level of infiltration systems, an overflow connection from the infiltration/soakaway systems to the combined sewer would be acceptable in principle.

United Utilities would request that this is secured through the planning system if this is an amendment to a previously approved drainage masterplan. UU would also request that the requirement for a robust maintenance and management plan for the soakaway/SuDS is imposed through planning.

Any overflow connection should be limited to a maximum pass forward flow that does not exceed greenfield run-off rates.

Further consultations have been made regarding the application site with United Utilities in June 2022. The response contained the following information (full text can be found within the email PDE for: Didsbury Technology Park UU Ref: 0234661:

Foul Water

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

Our preferred point of discharge would be to the 675mm diameter public combined sewer within Barlow Moor Road (UUMH3909) located to the South of your proposed development at an unrestricted rate.

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

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

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

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

This is outlined as follows, in order of priority:

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

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

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

Infiltration

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

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

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Public Sewer

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

We agree and confirm acceptance of to the previous agreement, If infiltration testing confirms the anticipated lower rate and you are unable to facilitate the appropriate level of infiltration systems, an overflow connection from the infiltration/soakaway systems to the combined sewer would be acceptable in principle. We would request that this is secured through the planning system if this is an amendment to a previously approved drainage masterplan.
UU would also request that the requirement for a robust maintenance and management plan for the soakaway/SuDS is imposed through planning.

Any overflow connection should be limited to a maximum pass forward flow that does not exceed 2.3l/s for building D1.

As a Water Company, we have no obligation to accept highway drainage into our public sewer

network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

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

Land drainage / Overland flows / track drainage

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

Refer to Appendix 1 for a copy of the consultations to date.

5.2 Lead Local Flood Authority Manchester City Council (LLFA)

Initial communication was made regarding the application site with the LLFA in the Flood Risk Management team at Manchester City Council in August 2020.

The response indicated (contained within email thread "Didsbury Technology Park - Phase 1":

The Flood Risk Management team would be looking for green Sustainable Drainage Systems (SuDS) where possible including blue/green roofs and raingardens to slow the water down and reduce the overall volume of water to be discharged. They would prefer that a connection was not made to the foul outfall pipework but that this should be discussed with United Utilities. Infiltration tests would be required at the locations and depths of any proposed soakaways.

Planning conditions imposed on the D3 building by the LLFA indicate that 40% climate change would be required in the design of the on-site drainage systems.

Refer to Appendix 1 for a copy of the consultations.

6. SITE DESCRIPTION

6.1 Existing Site Description

The site is located in Didsbury, south of Manchester city centre at National Grid Reference 383266, 392157 on the A5103. The site is near an existing bus terminus on the junction of A5103 Princess Road and A5145 Barlow Moor road, and new residential units located at the rear of the site.

The application site currently compromises grassed areas, hardstanding, access roads and a surface level car park to the southeast corner. The topography of the site can generally be described as flat.

A site location plan indicating the site boundary is indicated on Layer's drawing 159-LYR-XX-XX-DWG-L-1007. The boundary of the planning application site covers an area of 1.68Ha.

The site is bounded:

- to the north by Siemens house, a 5-storey commercial building, accessed from Nell Lane, with car parking to the northeast corner of the site.
- to the East by an access road linking Barlow Moor Road and Nell Lane
- to the South by the Spire hospital and building D3.
- to the West and central parts of the site, comprising grassed areas with mature trees to the western boundary.

Phase 1 of the works included the construction of the D3 Building, associated car parking and an access road linking the application site to Nell Lane and then Barlow Moor Road.

A site location plan indicating the site boundary is indicated on Layer's drawing 159-LYR-XX-XX-DWG-L-1007.

Assessment of flood risk has determined a low baseline risk of flooding from fluvial, pluvial (surface water) and groundwater sources. Additionally, no flooding risk from artificial sources or reservoirs was identified. For the full flood risk assessment, refer 1620006198-XX-XX-RP-WA-01 by Ramboll.

6.2 Ground Conditions

The application site is generally underlain by Glaciofluvial Sheet Deposits generally described as sands and gravel. Bedrock beneath the site comprises the Wilmslow Sandstone Formation of Triassic age.

The ground conditions found at the site during the site investigation confirmed the anticipated geology which generally comprises Made Ground overlying natural sand. The sand in turn overlies firm and stiff clay, proven to a maximum depth up to 10m.

The Made Ground generally comprises a top layer of 'surface coverings' including tarmac, gravel, grass and reinforced concrete. Beneath surface coverings made ground predominantly comprised sand or gravel locally with cobbles. Made ground depths were generally noted at 1.5m, and a maximum depth of 2.2m to the southeast corner of the site.

Brown slightly gravely sand, (at depths in the range of 2.8 to 4.8m bgl) were underlain by clays. The depth to the top of the clay did not appear to vary significantly across the site. The material was generally described as brown slightly gravelly clay. The base of the clay was not proven.

The application site is located on a principal aquifer relating to the Wilmslow Sandstone formation.

Groundwater monitoring measured standing water levels at depths ranging between 1.8 and 3.0m below ground level (bgl). It is therefore considered that groundwater may be encountered in excavations >1.8m bgl.

Refer to Appendix 2 for Ground Conditions and Infiltration Test results. Information gathered from ground investigation report undertaken by Ian Farmer Associates Limited in January 2017, document reference 41787 Siemens Development GIR.

6.3 Existing Drainage

There are no water courses on the site. The River Mersey meanders past the site in an overall easterly direction, approximately 250m to the south and is a main river at this point.

Public sewer records indicate that there are no known public sewers crossing the application site boundary. Storm water sewers do exist within the Kensal Drive on the western side of the site. However, it is not confirmed whether these are public or private. There is also a combined public sewer running along the Barlow Moor road along the southern direction of the site.

There is also a private system of surface water drains serving the existing Siemens buildings and car park, which passes through a Tubosider storage tank with HydrobrakeTM control. The outfall from the tank passes through the south-eastern corner of the proposed development site before leaving the site in a southerly direction. There is currently no known information for the existing connection, and further investigation to be undertaken in the following design stage should this be utilised. Figure 2 displays the existing private surface water drainage network.

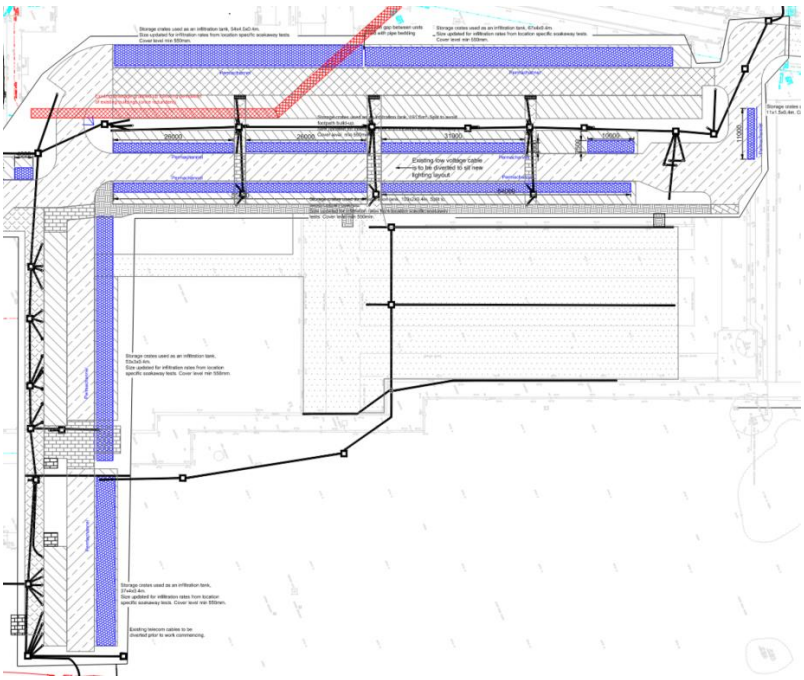


Figure 2 – Existing private surface water drainage network

As built information for Building D3 indicates that the surface water network is a positive system within the site boundary which infiltrates the entire runoff from within the D3 site and does not connect to the public/adopted sewer networks. Attenuation provided in the as built information has increased in volume from that indicated on the master planning drawings by a slight margin of 15m^3 but an increase in plan area of the attenuation tanks.

The foul water from D3 unit however is collected and discharged into the existing United Utilities within Barlow Moor road combined network in running south of the proposed development site. There is a stub connection/capped end indicated for future connection at North side of the D3 unit with an invert level of 29.840. Figure 3 displays the existing private network for the D3 development. Refer to appendix 3 for existing drainage information.

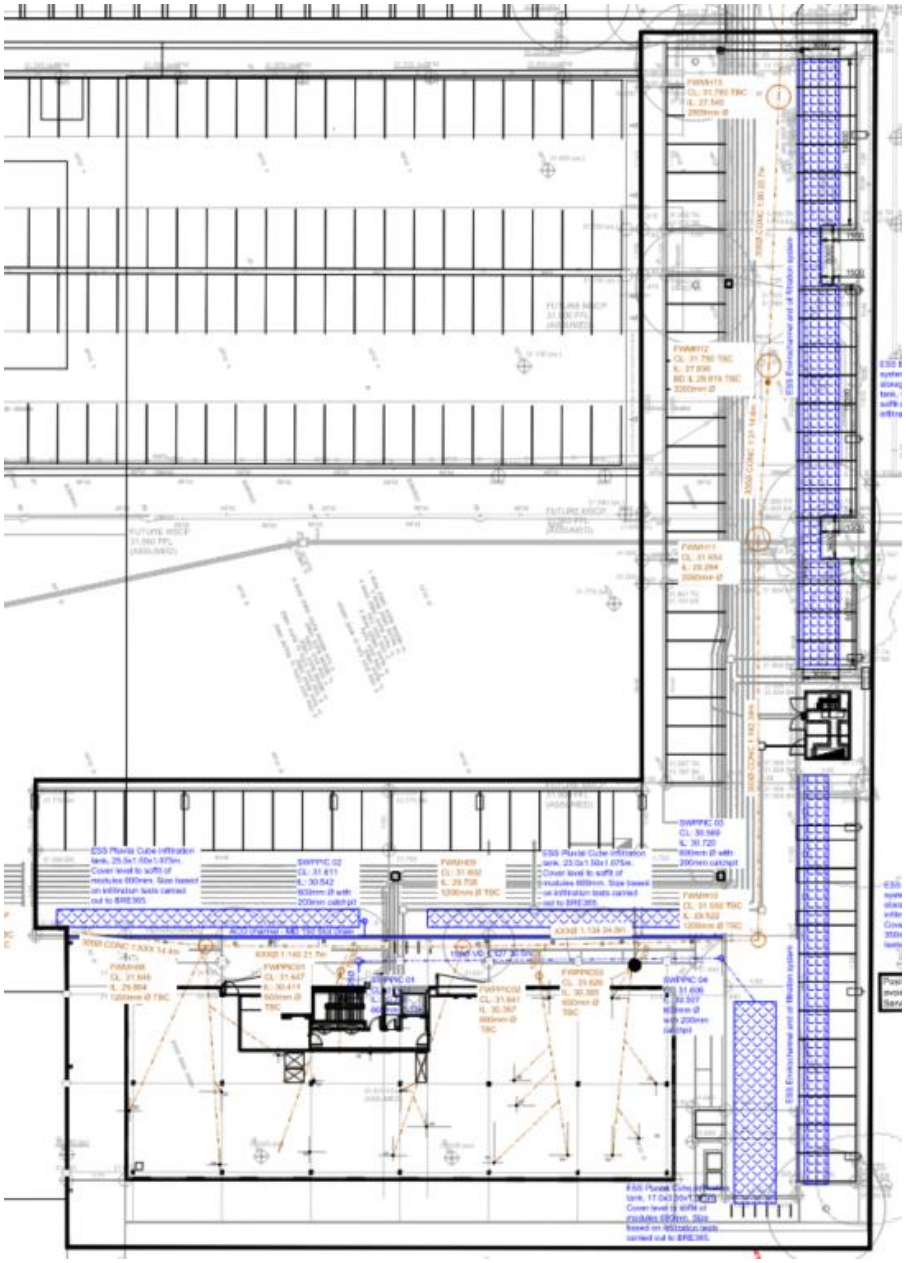


Figure 3 – Existing D3 private drainage system

The existing foul outfall is indicated as a steel lined pipework. This is believed to be due to the construction methods utilised and the presence of multiple services which cross the pipework.

Existing private drainage indicated within the application site will be removed as part of the future works, excluding the D3 private drainage system.

The existing drainage information can be found in Appendix 3.

6.4 Existing Surface Water Flows

Much of the existing application site is greenfield with no positive drainage connections and therefore only greenfield rates have been calculated for the site. To establish the existing peak storm run-off rates the greenfield runoff rates have been calculated for the area within the site redline boundary that was not developed during Phase 1, this application consists of phase 2 of the development this area totals 1.05ha.

Table 1: Existing Run-off - Greenfield - Site Area = 1.050 ha

Return Period	Peak Run-off Rate (l/s)
Q_{bar}	2.4 l/s
M1-5	2.0 l/s
M30-5	4.0 l/s
M100-5	5.0 l/s

7. SURFACE WATER DRAINAGE PROPOSALS

7.1 Surface Water Discharge Strategy

The following hierarchy has been reviewed regarding discharge of surface water from the masterplan site:

- Infiltration
- Watercourse
- Sewer

Infiltration

Existing ground conditions indicated that the sand layer is to be of good drainage characteristics and therefore infiltration tests have been undertaken at 1.0m to 1.5m below existing ground level to ensure that we are above the ground water level which is assumed to be at 1.8m below existing ground level.

Based on the ground investigation carried out in February 2016 for Building D3 (although indicates in the JBA report (114283_FO_2016-FLOOD_RISK_ASSESSMENT-483567)that this is indicative for the entire site) the sand layers are of good drainage characteristics although local variations in the grading of the sand, notably silt and clay content do exist. Ground water was recorded at the depths between 1.8m and 3.0m in these tests. Soakaway testing was carried out at only one location on the development area and infiltration rates of 3.9×10^{-5} and 4.9×10^{-5} m/s, which indicates good infiltration potential. The drainage strategy indicated all infiltration tanks above the ground water level.

The use of infiltration therefore within the scheme can only be undertaken up to 1.5m below existing ground level and therefore may not be possible for all the site.

Watercourse

The site is bounded by Nell lane to the North, Siemens complex and playing fields to the west, Siemens road to the east and a bus station to the south. There are no water courses on or adjacent to the site. The River Mersey is 250m to the south and is a main river at this point. It is therefore not possible to make a direct connection into the closest watercourse.

Sewer

There are no surface water only public sewers near the site.

A combined water sewer exists in Barlow Moor road in the southern side of the site. Private surface water drains also pass through the south-eastern corner of the proposed development although it is unsure if these have sufficient capacity to accommodate run-off from the proposed development.

If connection to the combined public sewer is required for surface water discharge, then a restricted flow from the proposed development could be discharged into the existing foul outfall which was constructed as part of the D3 building. The capacity of the existing combined sewer would be reduced for future developments, and there for discharging from the proposed developed into the existing combined sewer would only be considered where infiltration is not possible.

7.2 Review of Sustainable Drainage Techniques

Planning policy promotes sustainable management of surface water run-off from a new development or redevelopment, and the use of Sustainable Drainage Systems (SuDS) are recommended. Due to the infiltration rates obtained during the survey work & ground investigations, the restriction of any overflows to the public sewer on site, attenuation will be required to help slow down the water, surface water attenuation will be required to manage run-off and reduce volumes into any sewer network.
A further requirement in the design of the proposed development is to reduce the amount of carbon used throughout the lifetime of the scheme. Therefore, by replacing traditional drainage elements with a more sustainable drainage solution will also satisfy these criteria.

A review of potential sustainable drainage systems has been undertaken to identify the likely form of attenuation which could be included on this application site.

Table 2: Review of SuDS techniques

Component	Description	Purpose	Suitability
Filter strips	Gently sloping strips	To promote sedimentation and infiltration	Unsuitable for the site as it is generally a flat site
Filter drains	Open drains lined with a porous membrane and filled with permeable material	To facilitate infiltration	May be suitable and could be incorporated into landscape plan between buildings or around the perimeter
Swales	Shallow grassed channel	To slow surface water runoff, allowing settlement of sedimentation and infiltration of runoff	Insufficient space to utilise for the entire site but possible localised depressions could be incorporated into landscaping in the form of raingardens.
Tank Soakaways	Below ground attenuation tank with infiltration characteristics	Designed to allow storage below ground prior to infiltration	Suitable between buildings as long as 5m away from substructure
Porous Paving	A hard surface to allow water ingress to a substrate permeable layer	To allow surface water to infiltrate into substrate	This could be utilised in all hard landscaping areas 5m away from the building and requires incorporating into the landscape plan
Infiltration basin	A shallow depression within the landscaping	To store surface water and allow to infiltrate into the substrate	This does need a large space requirement close to source to keep shallow. No space available within the redline boundary
Blue/Green roofs	Storage in tanks on the roof	To retain water at source and slow it down into the below ground systems	This should be possible on this site as the building roof arrangement lends itself to this. This will need to be incorporated into the building design.

Component	Description	Purpose	Suitability
Large drainage channels/rills	Storage in channels at source	To store and slow water down before discharging into other forms of attenuation	This should be possible between buildings
Tanked Attenuation	Large tanks under the ground which allow for attenuation	To store and slow water down before discharging into other forms of attenuation which then infiltrates to ground	This should be possible but could be required below buildings and below the proposed car park if space in between is restricted and infiltration rates are low.

The proposed surface water drainage arrangement can be found in Appendix 4.

7.3 Surface Water Discharge Calculations

There are several driving factors behind the selected discharge rate for the proposed development.

- Restrictions imposed by the LLFA to suit local and site development plans
- Restrictions imposed by the EA to suit local flood risk requirements – as per LLFA requirements
- Capacity of the existing downstream system
- Proposed site layout and adjacencies dictating viable space for attenuation or SuDS features.
- Infiltration rates on the site

As such, an assessment of these flows has been undertaken and can be found in the table below.

Table 3: Proposed Discharge Rates

Return Period	Predevelopment Run-off Rate assuming greenfield	Proposed Development Maximum Discharge Rates
Q_{bar}	2.4 l/s	2.3 l/s
M1-5	2.1 l/s	2.3 l/s
M30-5	4.0 l/s	2.3 l/s
M100-5	4.9 l/s	2.3 l/s
*M100-5 + 40& CC	6.9 l/s	2.3 l/s

** The M100 + Climate Change figure does not apply to the existing system but has been included for reference.*

Following the review of sustainable drainage options within section 7.2, a proposed flow rate into the private network of 2.3 l/s is proposed in line with the guidance provided by United Utilities. This is to drain the car park, immediate surrounding external works and building D1 only.

The remaining external works are to drain via infiltration within tree pits on the site. An overflow for events higher than the return period stated will be included within the design of the tree pits.

United Utilities have provided the flow rate within their pre development enquiry advice & the LLFA are to confirm acceptance of these flows prior to commencement of works.

Surface Water calculations can be found in Appendix 5.

7.4 Surface Water Design Criteria

The following British Standards and design guides shall be used for storm water design purposes. Please note that this list is not exhaustive but covers the overall general drainage requirements.

- BS EN 752 Drain and Sewer Systems Outside Buildings
- BS EN 12056-3 Gravity Drainage Systems Inside Buildings – Part 3 Roof Drainage
- BS EN 16933-2 Drain and Sewer Systems Outside Buildings – Part 2: Design
- CIRIA C753 The SuDS Manual
- HR Wallingford Wallingford Procedure for Design and Analysis of Urban Storm Drainage
- PPG3 Environment Agency Pollution Prevention Guidelines 3 (Withdrawn but remains best practice)
- SSG 2019 Sewer Sector Guidance (formerly Sewers for Adoption)
- Building Regulations 2010 Approved Document H – Drainage and Waste Disposal 2015

In accordance with Building Regulations 2010 Approved Document H, Section H5, separate foul and surface water systems shall be designed for the proposed development.

8. FOUL SEWAGE PROPOSALS

8.1 Foul Water Discharge Strategy

In accordance with the Building Regulations Part H, foul and surface water drainage systems are to be designed as separate networks on the Application Site prior to discharge offsite into an existing combined sewer.

Separate surface and foul water drainage networks are possible where infiltration is proposed on the Application Site prior to discharge to the public sewer.

Where a surface water connection is made to the existing foul water drain construction as part of Building D3, then separate surface and foul water drain will only be possible up to this existing connection within the Plot D3 boundary

United Utilities have agreed for the foul water connection to the 625mm combined sewer via a saddle connection in Barlow Moor road on the southern side of the site and this has been constructed. Refer to appendix 1 for consultations.

There is a stub connection on the western side of the D3 unit within the private drainage installed as part of the Phase 1 works, indicated in Figure 4 below from Drainage GA D3 Unit – Overall Drainage (Dwg 12534/501) by Booth King. The foul water can be connected by gravity to this stub connection which could be conveyed to the existing combined sewer adopted by United Utilities. An additional connection will be required into the downstream system to allow for a connection from the future building D2 due to the depth of the existing manhole being only 1.7m.

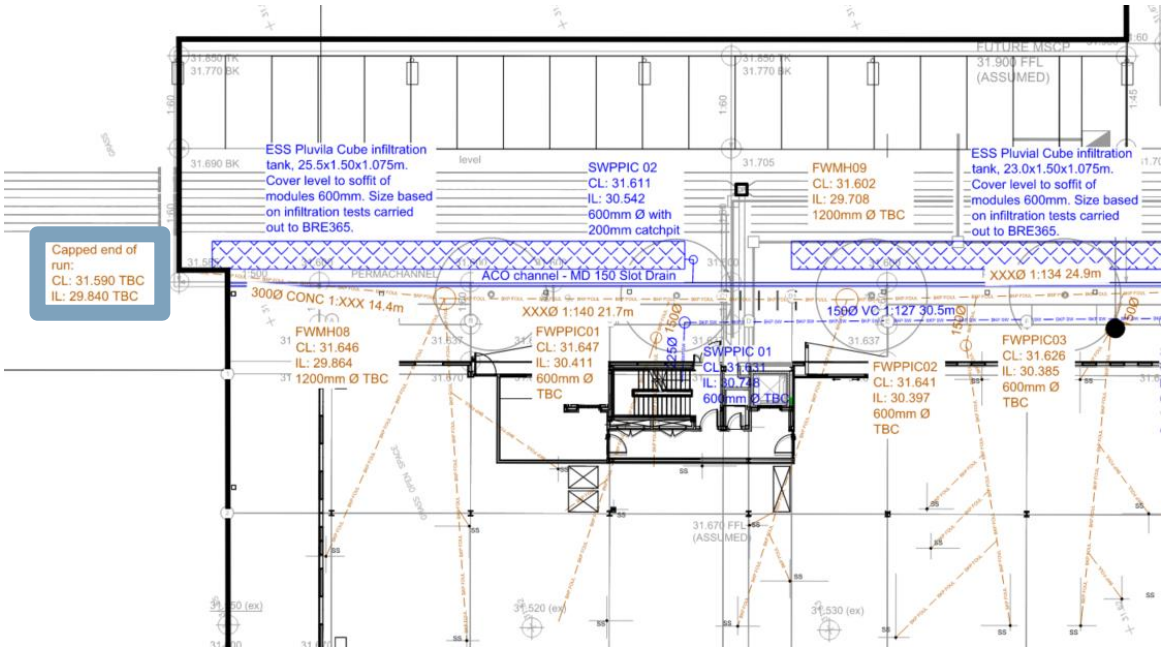


Figure 4 – Existing foul manhole connection

Information provided by Booth King (D3 Unit drainage strategy dated January 2018) indicates that the S106 application issued and approved includes foul drainage discharge from D1, D2 and MSCP. Refer to landscape architects details for information on buildings.

The foul drainage strategy is indicated on the drawing in Appendix 4.

8.2 Proposed Peak Foul Water Flows

The proposed peak foul water flow from the application site into the public sewer system via the as constructed connection has been calculated as 13.2 l/s using the area schedule provided within the Sheppard Robson stage 3 report (5949-SRA-D1-XX-RP-00003 revision P01) and utilising an assumption of 8m^2 per person for the occupancy figure calculations.

Flows have been calculated using the Population Method as described in BS EN 752:2017 and references British Water Flows and Loads 4.

Foul calculations can be found in Appendix 5.

8.3 Design Codes

The detailed foul drainage system will be designed in accordance with the following codes of practice:

- Building Regulations 2010 Drainage and Waste Disposal Approved Document H
- BS EN 752:2017 Drain and sewer systems outside buildings
- BS EN 10256-2:2000 Gravity drainage systems inside buildings

9. MAINTENANCE OF DRAINAGE SYSTEMS

9.1 Performance Objectives

The operational maintenance need of the installed drainage system is to provide:

- a system that will continue to perform in accordance with the design;
- that the operation of the system is safe, environmentally acceptable, economically efficient and provide the client with a functional and easily operated asset.

The drainage design solution is integral with the landscaping design and any changes to this will impact on the drainage within the application site.

9.2 Maintenance Requirements

Effective maintenance includes a combination of planned and reactive tasks and looks to ensure that the system is kept in a condition where it can function as required.

The tasks may include:

- Localised repair or replacement of damaged pipework or other structures
- Removal of natural occurring sediments, abnormal obstructions etc. to restore hydraulic capacity
- Maintenance of mechanical plant
- Rodent and insect control

9.3 Maintenance Schedule

A strategy for the maintenance of the drainage elements will be developed incorporating normal regular maintenance requirements, any potential long term maintenance work and any monitoring required.

Any parties involved with the disposal of any waste materials from the underground drainage system should hold appropriate management licenses to undertake any such activities. Disposal of any site materials is required to be made in accordance with current legislation and guidance.

This initial maintenance schedule has been prepared using guidance provided in 'CIRIA C625 – Model agreements for sustainable water management systems', CIRIA 626 – Rainwater and Greywater systems, the SuDS Manual and manufacturers recommendation for specialist drainage elements.

The following table notes the likely maintenance requirements for this project and is to be developed further at the next stage of the design.

The tables below, taken from the CIRIA SuDS Manual, provides guidance on the type of operational and maintenance requirements that may be appropriate for the drainage features proposed in this Drainage Strategy report.

Table 4. Maintenance Requirements of Drainage Components (Pervious Pavements) [CIRIA SuDS manual, chapter 20]

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 5. Maintenance Requirements of Drainage Components (Attenuation Storage Tanks) [CIRIA SuDS manual, chapter 21]

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

In addition to the items listed above, the table below provides further guidance on type of operational and maintenance requirements that may be appropriate for the drainage features not included in the tables provided above.

Table 6: Drainage Maintenance Strategy

Drainage Feature	Regular Maintenance	Occasional/Remedial Maintenance	Monitoring
Drainage channels/Gullies	Inspections will include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent surfacing. Check for accumulation of debris and silt and cleaned as necessary Gratings, frames and all associated locking parts to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage.	Channel cleaning will be by flushing with water or high pressure jetting (no boiling water or cleaning agent will be used). All silt buckets and sumps will be cleaned out replaced back into the units ensuring they are correctly fitted. All channel surfaces and joints will be checked and repaired as necessary. Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 4 months or after large storm.
Catchpit Manholes/Inspection Chambers	Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures Check for accumulation of debris and silt and cleaned as necessary. Covers and frames to be checked for damage. Exposed concrete and adjacent surfacing to be checked for cracking and general damage. Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures	Clean as necessary. All manhole and inspection chamber covers and frames to be replaced as necessary. Repair exposed concrete and surfacing as necessary Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 6 months or after large storm.
Proprietary treatment system	Remove litter and debris and inspect for sediment, oil and grease accumulation; six monthly Change the filter media; as recommended by manufacturer Remove sediment, oil, grease and floatables; as necessary – indicated by system inspections or immediately following significant spill	Replace malfunctioning parts or structures; as required	Inspect for evidence of poor operation; six monthly Inspect filter media and establish appropriate replacement frequencies; six monthly Inspect sediment accumulation rates and establish appropriate removal frequencies; monthly during the first half year of operation, then every six months

APPENDIX 1
CONSULTATIONS

Conor O Loughlin

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 28 June 2022 11:34
To: Conor O Loughlin
Subject: PDE for: Didsbury Technology Park UU Ref : 02346616

Good morning Conor ,

Pre Development Enquiry for: Didsbury Technology Park UU Reference Number : 02346616

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

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

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

Foul Water

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

Our preferred point of discharge would be to the 675mm diameter public combined sewer within Barlow Moor Road (UUMH3909) located to the South of your proposed development at an unrestricted rate.

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

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

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

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

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

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

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

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

Infiltration

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

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

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

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

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

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

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

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Public Sewer

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

We agree and confirm acceptance of to the perivious agreement, If infiltration testing confirms the anticipated lower rate and you are unable to facilitate the appropriate level of infiltration systems, an overflow connection from the infiltration/soakaway systems to the combined sewer would be acceptable in principle. We would request that this is secured through the planning system, if this is an amendment to a previously approved drainage masterplan. UU would also request that the requirement for a robust maintenance and management plan for the soakaway/SuDS is imposed through planning.

Any overflow connection should be limited to a maximum pass forward flow that does not exceed 2.3l/s for building D1.

We noted in drawing no RAM-XX-XX-DR-D-00, Rev:P02, Dated:04/06/2022 that part of surface water drain freely to

the network after the hydro brake manhole SW20. The developer need to redesign the drainage network to achieve a total 2.3 l/s discharged from building D1 **(The flow control device should be installed on manhole SW24 to gain full control).**

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

Levels

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

Land drainage / Overland flows / track drainage

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

Existing Wastewater Assets Crossing the Site

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

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: **DeveloperServicesWater@uuplc.co.uk**. Further information for this service can be found on our website via the link below:

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

Connection Application

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

https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/

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

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

Kind regards,

Mohammed Aljafarawi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

The information contained in this e-mail is intended only for the individual to whom it is addressed. It may contain legally privileged or confidential information or otherwise be exempt from disclosure. If you have received this Message in error or there are any problems, please notify the sender immediately and delete the message from your computer. You must not use, disclose, copy or alter this message for any unauthorised purpose. Neither United Utilities Group PLC nor any of its subsidiaries will be liable for any direct, special, indirect or consequential damages as a result of any virus being passed on, or arising from the alteration of the contents of this message by a third party.

United Utilities Group PLC, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP
Registered in England and Wales. Registered No 6559020

www.unitedutilities.com
www.unitedutilities.com/subsidiaries

Lisa Sawyer

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 02 September 2020 16:54
To: Lisa Sawyer
Cc: Wastewater Developer Services
Subject: RE: Didsbury Technology Park - Phase 1 - Email 1 of 2 - UU Ref 4200033206

Good Afternoon Lisa

If infiltration testing confirms the anticipated lower rate and you are unable to facilitate the appropriate level of infiltration systems, an overflow connection from the infiltration/soakaway systems to the combined sewer would be acceptable in principle. We would request that this is secured through the planning system, if this is an amendment to a previously approved drainage masterplan. UU would also request that the requirement for a robust maintenance and management plan for the soakaway/SuDS is imposed through planning.

Any overflow connection should be limited to a maximum pass forward flow that does not exceed greenfield run-off rates.

Kind regards

United Utilities
Water for the North West

Matthew Dodd
Developer Engineer
Developer Services & Metering
Customer Services
T: 07468 758244
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

We now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at developerserviceswater@uuplc.co.uk

---

From: Lisa Sawyer [mailto:Lisa.Sawyer@ramboll.co.uk]
Sent: 20 August 2020 12:32
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Didsbury Technology Park - Phase 1 - Email 1 of 2

Email 1 of 2

Please find attached the predevelopment enquiry for a new project Didsbury Technology Park in Didsbury Manchester.

There was a masterplan drainage strategy produced in 2016 which indicated that the Phase 1 scheme, which is the detailed planning application we have been appointed to look at, discharges surface water via infiltration and foul into the combined public sewer in Barlow Moor Road via an existing connection which was constructed as part of an

earlier phase to construct building D3. Drawing 12534-500-P7 attached on email 2 is the approved masterplan scheme.

During the construction of building D3 infiltration tests were undertaken and the rates were much lower than this design was based on therefore the final design of the soakaways for the D3 building is indicated on drawing 12534-501-FI1 also attached on email 2 (the outfall has been highlighted on here also).

Based on the rates and the knowledge that the ground water levels are approximately 1.5m below existing ground level obtained during the construction of D3 it is unlikely that soakaways alone will be possible for the remainder of the masterplan.

The planning application which we have been appointed for is Phase 1 only and whilst this does appear to have external space for SuDs when the final masterplan is realised this space is reduced by the construction of the two other new buildings. See sketch also attached.

We are planning to undertaken infiltration tests for our scheme to verify these results but would like your thoughts on the discharge of restricted surface water overflow from the soakaway/attenuation systems into the existing 300mm diameter outfall pipework which was constructed as part of the D3 works (initially for foul only) into the combined public sewer in Barlow Moor Road. This is the closest public sewer which does not require us to cross third party land.

We propose to connect foul drainage into an existing stub connection into the head of the run constructed as part of Building D3 which will discharge via the existing infrastructure which connects into the public sewer in Barlow Moor Road.

Look forward to hearing from you. Thanks in advance.

Lisa Sawyer

Director, Head of Department
D +44 7896227086
lisa.sawyer@ramboll.co.uk

_____

Connect with us

Ramboll
2nd Floor, The Exchange
St. John Street
Chester
CH1 1DA
https://uk.ramboll.com

Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

COVID-19 STATEMENT
We are fully focused on supporting you and living up to our commitments.
Read our latest statement on business continuity in uncertain times www.uk.ramboll.com/covid-19
RAMBØLL Bright ideas. Sustainable change.

EMGateway3.uuplc.co.uk made the following annotations

The information contained in this e-mail is intended only

for the individual to whom it is addressed. It may contain legally privileged or confidential information or otherwise be exempt from disclosure. If you have received this Message in error or there are any problems, please notify the sender immediately and delete the message from your computer. You must not use, disclose, copy or alter this message for any unauthorised purpose. Neither United Utilities Group PLC nor any of its subsidiaries will be liable for any direct, special, indirect or consequential damages as a result of any virus being passed on, or arising from the alteration of the contents of this message by a third party.

United Utilities Group PLC, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP
Registered in England and Wales. Registered No 6559020

www.unitedutilities.com
www.unitedutilities.com/subsidiaries

Lisa Sawyer

From: Lisa Sawyer
Sent: 14 December 2020 09:20
To: 'floodriskmanagement@manchester.gov.uk'
Subject: RE: Didsbury Technology Park - Phase 1
Attachments: UU Consultations.pdf; RAM-XX-XX-DR-D-00100.pdf

Morning Zorica

I just wanted to give you an update on the drainage design which will be put forward in the new year for planning at Didsbury Technology Park.

Infiltration tests have been undertaken on the site and whilst they are low we do intend on utilising infiltration techniques for the external works design. We have incorporated raingardens around the building for collection of pavement areas, subbase attenuation under parking areas with some permeable paving to the parking bays and tree pit attenuation which will all be allowed to infiltrate into the ground. We have kept these structures as shallow as possible as ground water is believed to be only 1.7m below ground level. A high level overflow has been included for at this stage from the tree pit attenuation system until final tree pit details are confirmed with the landscape architect.

There will be a blue roof to the proposed building and allowance has also been for connection from a blue roof for a future building on the site with restricted outlet but this will discharge into the public sewer system as agreed with United Utilities no greater that greenfield runoff rates.

Kind regards
Lisa Sawyer
Director, Head of Department

D +44 7896227086
lisa.sawyer@ramboll.co.uk

Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

RAMBOLL 75 YEARS

Through 75 years we have looked beyond today for future proof solutions. Shaping sustainable societies where people and nature flourish. We call it Bright ideas. Sustainable change.

From: z.todorovic@manchester.gov.uk <z.todorovic@manchester.gov.uk> **On Behalf Of** floodriskmanagement@manchester.gov.uk
Sent: 28 August 2020 16:44
To: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>
Cc: floodriskmanagement@manchester.gov.uk
Subject: Re: Didsbury Technology Park - Phase 1

Hi Lisa

Hope you are safe and well.

We have communicated with the developer the need for more green SuDS for these sites and we will be looking for these options including blue/green roof and raingardens as they would not only slow the flow but also reduce the overall volume of water to be discharged.
I do not think that there should be a surface water connection to the foul outfall drain. This should also be discussed with United Utilities but I do not believe that they would accept that option.
The best way forward is to undertake percolation tests in locations and at the depths of the proposed soakaways and develop a plan from there.

Happy to discuss this further if required.

Kind regards

Zorica

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

From: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>
To: "floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk>,
Date: 20/08/2020 14:03
Subject: Didsbury Technology Park - Phase 1

Hi Zorica/Ester

I hope you are both well and are managing ok with the Covid situation?

We are looking at a new project at Didsbury Technology Park just off Princess Road close to the Siemens building.

There was a masterplan drainage strategy produced in 2016 which we believe was agreed for outline planning (although I am struggling to get confirmation of this or find this on the planning website) which indicated that the Phase 1 scheme, which is the detailed planning application we have been appointed to look at, discharges surface water via infiltration and foul into the combined public sewer in Barlow Moor Road via an existing connection which was constructed as part of an earlier phase to construct building D3. Drawing 12534-500-P7 attached is the approved masterplan scheme.

During the construction of building D3 infiltration tests were undertaken and the rates were much lower than this design was based on therefore the final design of the soakaways for the D3 building were larger volumes spread over a larger plan area, this is indicated on drawing 12534-501-FI1 also attached (the outfall mentioned earlier has been highlighted on here also).

Based on the rates and the knowledge that the ground water levels are approximately 1.7m below existing ground level obtained during the construction of D3 it is unlikely that soakaways alone will be possible for the remainder of the masterplan.

The planning application which we have been appointed for is Phase 1 only and whilst this does appear to have external space for SuDs when the final masterplan is realised this space is reduced by the construction of the two other new buildings. See sketch also attached.

We are planning to undertaken infiltration tests for our scheme to verify these results but would like your thoughts on the discharge of restricted surface water overflow from the soakaway/attenuation systems into the existing 300mm diameter outfall pipework which was constructed as part of the D3 works (initially for foul only) into the combined public sewer in Barlow Moor Road. This is the closest public sewer which does not require us to cross third party land.

We are discussing the use of a blue roof with our design team and client also to try to remove the need for some below ground tanks and discuss with the landscape architect the use of large channels/rills around the buildings to help store before discharge but this hasn't been agreed yet.

Your initial thoughts would be appreciated.

Kind regards
Lisa Sawyer
Director, Head of Department
D +44 7896227086
lisa.sawyer@ramboll.co.uk

Connect with us
Ramboll
2nd Floor, The Exchange
St. John Street
Chester
CH1 1DA
https://uk.ramboll.com
Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

****

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you have received this email in error please notify the system manager. The full text of the Council's email disclaimer is available at www.manchester.gov.uk/emaildisclaimer.

Your personal data is very important to us. Please refer to our privacy notice at www.manchester.gov.uk/privacy for further information.

This footnote also confirms that this email message has been swept for the presence of computer viruses.

****

APPENDIX 2
EXISTING GROUND INFORMATION

[SIEMENS PARKING DECK OVER FOR 100 SPACES]

D1

D2

D4

D3

[40]

[40]

[21]

[51]

16

SOAKAWAY TEST LOCATION 1

SOAKAWAY TEST LOCATION 2

SOAKAWAY TEST LOCATION 3

SOAKAWAY TEST LOCATION 4

SOAKAWAY TEST LOCATION 5

- 5 no. soakaway test (X) in accordance with BRE Digest 365
  1.0m x 1.0x 1.0 m bgl

Test locations identified in red are to confirm attenuation/infiltration requirements for building D1.
Test location in blue is to confirm that any strategy assumed for the D1 scheme will by future proofed for the D2 and D4 schemes.

The soakaway tests should only be undertaken if the ground conditions within the pit allows and free from contamination

Project:	1620006198 Didsbury Technology Park		
Drawing:	Proposed Soakaway Test Locations	Drawn:	LS
Drawing No:	RAM-XX-XX-SK-D-004		
Revision:	02		
Status:	Revised Stage 2	Date:	07/09/2020

IAN FARMER ASSOCIATES

Plant used: 1.5 Tonne Excavator	Project: Siemens Development, Didsbury		Location ID: **SA01**
Dates: 13/10/2020	Client: Bruntwood		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: NM / Vertical scale: 1:25 / Contract ID: 2230330

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.30) 0.30	MADE GROUND: Dark brown, gravelly, slightly silty, fine and medium SAND with abundant rootlets. Gravel is angular to subangular, fine to coarse including mixed lithologies, brick, tile and geotextile.				
				(0.70) 1.00	Reddish brown, gravelly, slightly silty, fine and medium SAND. Gravel is subangular to subrounded, fine to coarse including mixed lithologies.		1 2 3 4 5		
					End of Trial Pit at 1.00m				

Termination: Target depth.

Stability: Trial pit remained stable during excavation.

Remarks: Location cleared of buried services. Groundwater not encountered.

Dimensions (Length m x Width m): 1.20 x 1.00

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	JT
Status:	DRAFT

IFA TP v01.01

IAN FARMER ASSOCIATES

Plant used: 1.5 Tonne Excavator	Project: Siemens Development, Didsbury		Location ID: **SA02**
Dates: 14/01/2020	Client: Bruntwood		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: NM / Vertical scale: 1:25 / Contract ID: 2230330

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.30) 0.30	MADE GROUND: Grass over dark brown, slightly gravelly, silty, fine and medium SAND with abundant rootlets. Gravel is angular to subangular, fine to coarse including mixed lithologies, tile and brick.				
				(0.60) 0.90	Orangish brown, slightly silty, fine to coarse SAND.				
				1.00	Brownish grey, slightly gravelly, silty, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including mixed lithologies.		1		
					End of Trial Pit at 1.00m		2		
							3		
							4		
							5		

Termination: Target depth.

Stability: Trial pit remained stable during excavation.

Remarks: Location cleared of buried services.

Dimensions (Length m x Width m): 1.00 x 1.00

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	JT
Status:	DRAFT

IFA TP v01.01

IAN FARMER ASSOCIATES

Plant used: 1.5 Tonne Excavator	Project: Siemens Development, Didsbury		Location ID: **SA03**
Dates: 13/10/2020	Client: Bruntwood		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: NM / Vertical scale: 1:25 / Contract ID: 2230330

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.20	MADE GROUND: Grass over dark brown, very gravelly, slightly silty, fine SAND with abundant rootlets. Gravel is angular to subangular, fine to coarse including mixed lithologies, brick and concrete.				
				(0.50)	Dark brown, slightly silty, fine SAND.				
				0.70					
				(0.30)	Reddish brown, silty, fine to coarse SAND.				
				1.00	End of Trial Pit at 1.00m		1		
							2		
							3		
							4		
							5		

Termination: Target depth.

Stability: Trial pit remained stable during excavation.

Remarks: Location cleared of buried services. Groundwater not encountered.

Dimensions (Length m x Width m): 1.20 x 1.00

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	JT
Status:	DRAFT

IFA TP v01.01

IAN FARMER ASSOCIATES

Plant used: 1.5 Tonne Excavator	Project: Siemens Development, Didsbury		Location ID: **SA04**
Dates: 14/10/2020	Client: Bruntwood		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: NM / Vertical scale: 1:25 / Contract ID: 2230330

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.20	Grass over dark brown, slightly gravelly, silty SAND with abundant rootlets. Gravel is angular to subangular, fine to coarse including mixed lithologies..				
				(0.75)	Orangish brown, slightly silty, fine to coarse SAND.				
				0.95 1.00	Brownish grey, slightly gravelly, silty, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including mixed lithologies.		1		
					End of Trial Pit at 1.00m		2		
							3		
							4		
							5		

Termination: Target depth.

Stability: Trial pit remained stable during excavation.

Remarks: Location cleared of buried services. Groundwater not encountered.

Dimensions (Length m x Width m): 1.00 x 1.00

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	JT	IFA TP v01.01
Status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: 1.5 Tonne Excavator	Project: Siemens Development, Didsbury		Location ID: **SA05**
Dates: 14/10/2020	Client: Bruntwood		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: NM / Vertical scale: 1:25 / Contract ID: 2230330

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.30) 0.30	MADE GROUND: Grass over dark brown, slightly silty SAND with abundant rootlets.				
				(0.30) 0.60	MADE GROUND: Dark brown and grey, slightly gravelly, silty SAND with cobbles of concrete and brick. Gravel is angular to subangular, fine to coarse including mixed lithologies.				
				(0.60) 1.20	Reddish brown, slightly silty, fine to coarse SAND.		1 2 3 4 5		
					End of Trial Pit at 1.20m				

Termination: Target depth.

Stability: Trial pit remained stable during excavation.

Remarks: Location cleared of buried services. Groundwater not encountered.

Dimensions (Length m x Width m): 1.00 x 1.00

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	JT	IFA TP v01.01
Status:	DRAFT	

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA01**	**Test Ref.:**	**1**
Date:	**13/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

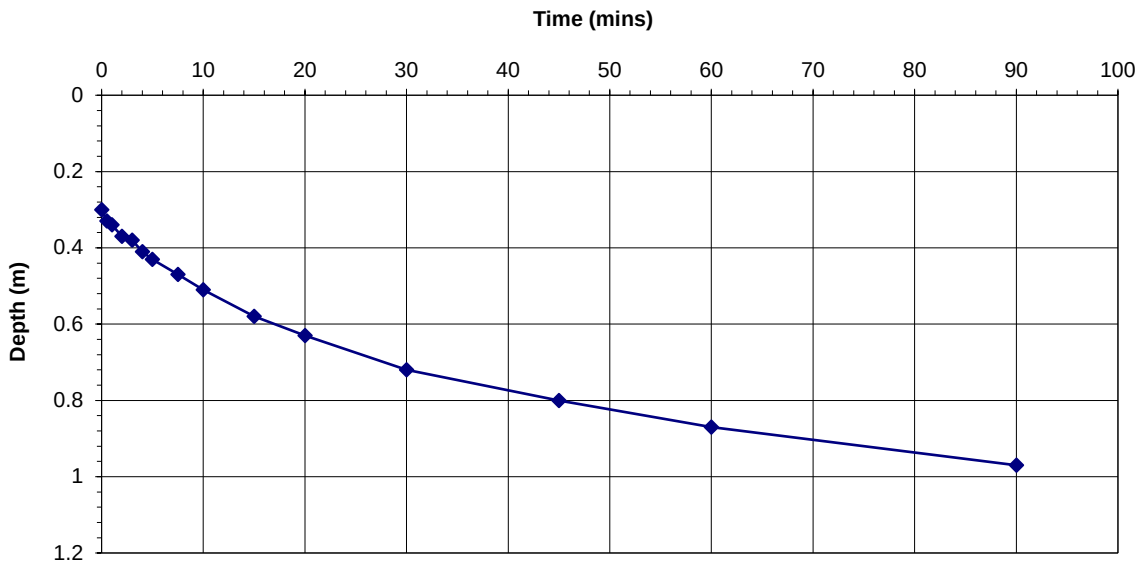
Time (min)	Depth (m)
0	0.3
0.5	0.33
1	0.34
2	0.37
3	0.38
4	0.41
5	0.43
7.5	0.47
10	0.51
15	0.58
20	0.63
30	0.72
45	0.80
60	0.87
90	0.97

Pit dimensions	Length (m) =	1.20
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.30
Depth to water at end of test (m) =	0.97
Depth to water at 75% level (m) =	0.48
Depth to water at 50% level (m) =	0.65
Depth to water at 25% level (m) =	0.83
Base area of pit (m^2) =	1.20
Effective area of loss a_{s50} (m^2) =	2.74
V_{P75} - V_{P25} (m^3) =	0.42

From the graph:	
t_{p75} (min) =	8
t_{p25} (min) =	51

Soil infiltration rate, f, (m/s) =	**5.94E-05**	**normal test**	
Tested by:	**NM**	**Date:**	**13/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA01**	**Test Ref.:**	**2**
Date:	**13/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

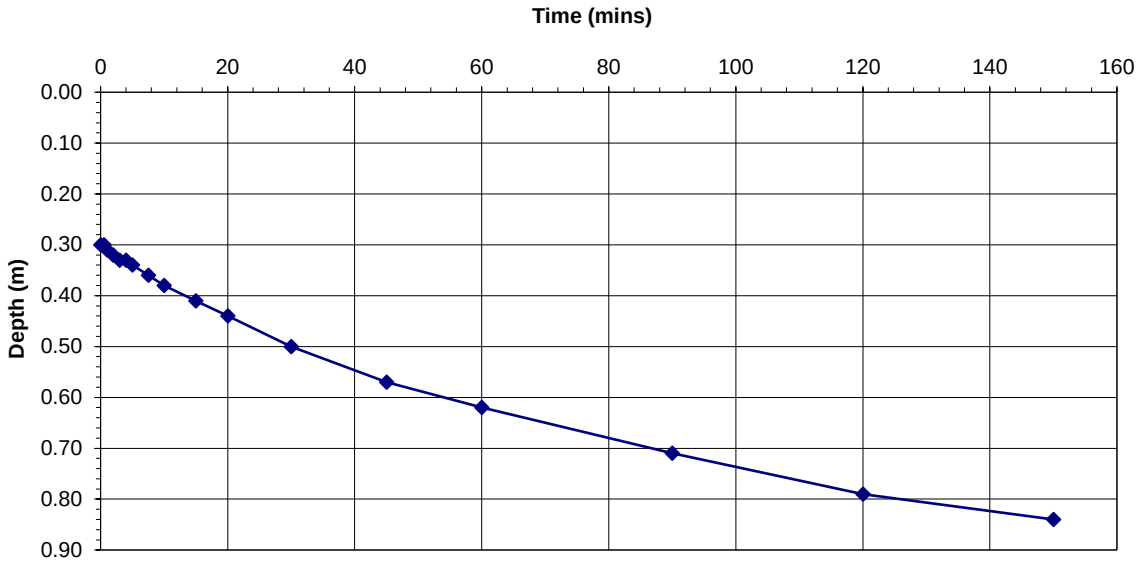
Time (min)	Depth (m)
0	0.30
0.5	0.30
1	0.31
2	0.32
3	0.33
4	0.33
5	0.34
7.5	0.36
10	0.38
15	0.41
20	0.44
30	0.50
45	0.57
60	0.62
90	0.71
120	0.79
150	0.84

Pit dimensions	Length (m) =	1.20
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.30
Depth to water at end of test (m) =	0.84
Depth to water at 75% level (m) =	0.48
Depth to water at 50% level (m) =	0.65
Depth to water at 25% level (m) =	0.83
Base area of pit (m^2) =	1.20
Effective area of loss a_{s50} (m^2) =	2.74
V_{P75} - V_{P25} (m^3) =	0.42

From the graph:	
t_{p75} (min) =	27
t_{p25} (min) =	144

Soil infiltration rate, f, (m/s) =		**2.18E-05**	**normal test**
Tested by:	**NM**	**Date:**	**13/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA02**	**Test Ref.:**	**1**
Date:	**14/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

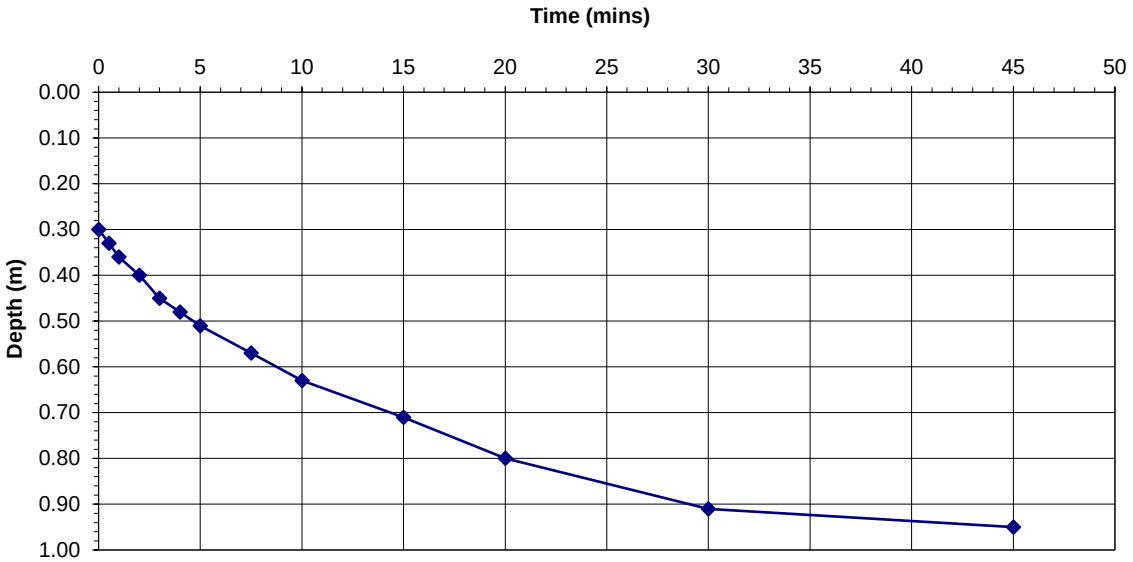
Time (min)	Depth (m)
0	0.30
0.5	0.33
1	0.36
2	0.40
3	0.45
4	0.48
5	0.51
7.5	0.57
10	0.63
15	0.71
20	0.80
30	0.91
45	0.95

Pit dimensions	Length (m) =	1.00
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.30
Depth to water at end of test (m) =	0.95
Depth to water at 75% level (m) =	0.48
Depth to water at 50% level (m) =	0.65
Depth to water at 25% level (m) =	0.83
Base area of pit (m^2) =	1.00
Effective area of loss a_{s50} (m^2) =	2.40
V_{P75} - V_{P25} (m^3) =	0.35

From the graph:	
t_{p75} (min) =	4
t_{p25} (min) =	23

Soil infiltration rate, f, (m/s) =	**1.28E-04**	**normal test**	
Tested by:	**NM**	**Date:**	**14/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA02**	**Test Ref.:**	**2**
Date:	**14/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

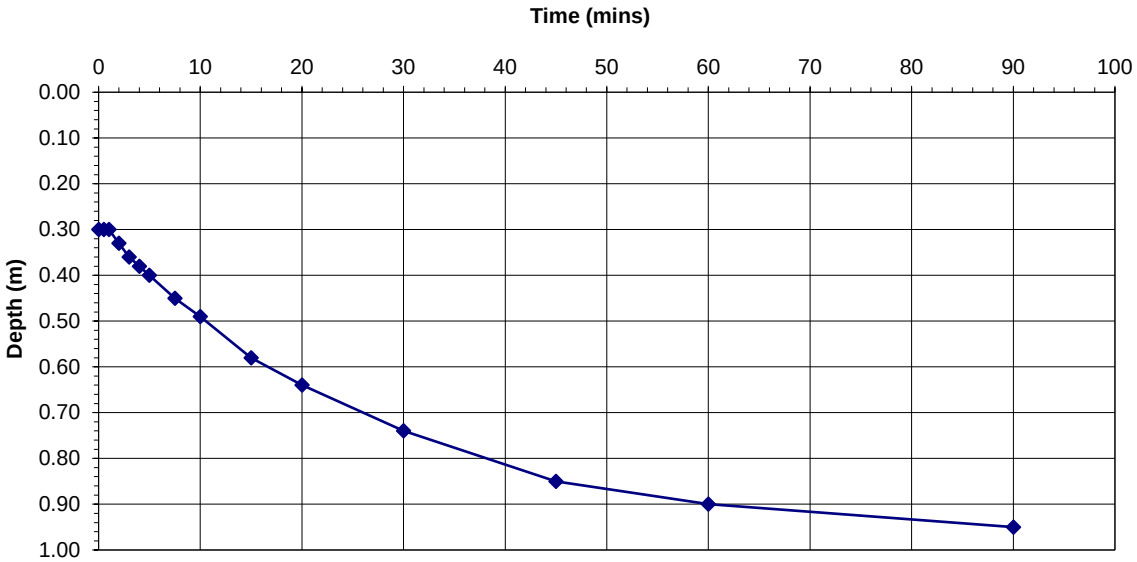
Time (min)	Depth (m)
0	0.30
0.5	0.30
1	0.30
2	0.33
3	0.36
4	0.38
5	0.40
7.5	0.45
10	0.49
15	0.58
20	0.64
30	0.74
45	0.85
60	0.90
90	0.95

Pit dimensions	Length (m) =	1.00
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.30
Depth to water at end of test (m) =	0.95
Depth to water at 75% level (m) =	0.48
Depth to water at 50% level (m) =	0.65
Depth to water at 25% level (m) =	0.83
Base area of pit (m^2) =	1.00
Effective area of loss a_{s50} (m^2) =	2.40
V_{P75} - V_{P25} (m^3) =	0.35

From the graph:	
t_{p75} (min) =	9
t_{p25} (min) =	42

Soil infiltration rate, f, (m/s) =		**7.37E-05**	**normal test**
Tested by:	**NM**	**Date:**	**14/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

Pit walls became unstable at end of test, unable to carry out accurate thrid test.

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA03**	**Test Ref.:**	**1**
Date:	**13/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

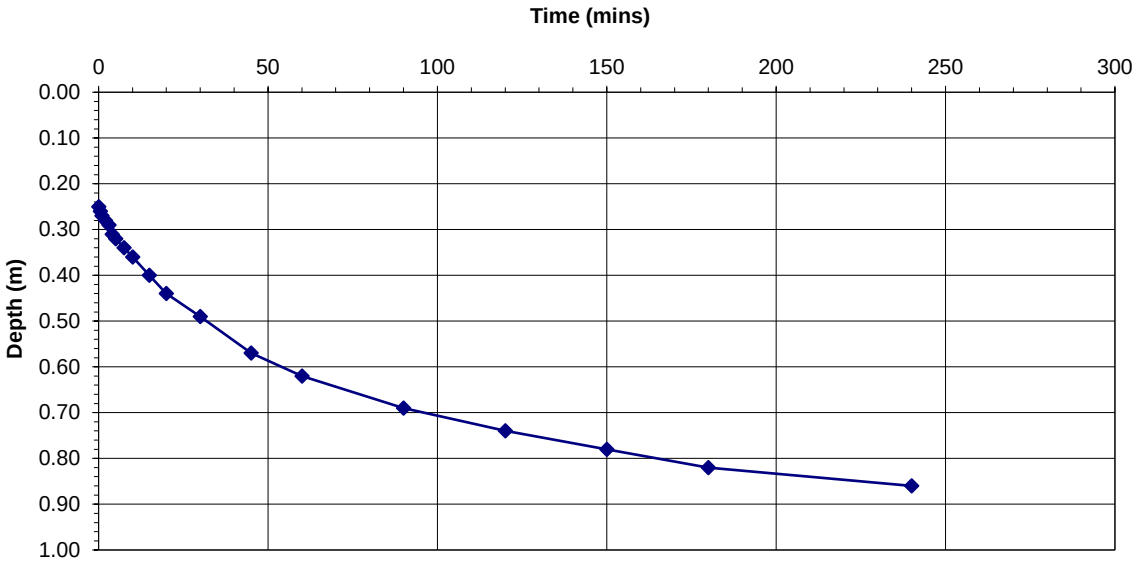
Time (min)	Depth (m)
0	0.25
0.5	0.26
1	0.27
2	0.28
3	0.29
4	0.31
5	0.32
7.5	0.34
10	0.36
15	0.40
20	0.44
30	0.49
45	0.57
60	0.62
90	0.69
120	0.74
150	0.78
180	0.82
240	0.86

Pit dimensions	Length (m) =	1.20
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.25
Depth to water at end of test (m) =	0.86
Depth to water at 75% level (m) =	0.44
Depth to water at 50% level (m) =	0.63
Depth to water at 25% level (m) =	0.81
Base area of pit (m^2) =	1.20
Effective area of loss a_{s50} (m^2) =	2.85
V_{P75} - V_{P25} (m^3) =	0.45

From the graph:	
t_{p75} (min) =	20
t_{p25} (min) =	173

Soil infiltration rate, f, (m/s) =	**1.72E-05**	**normal test**	
Tested by:	**NM**	**Date:**	**13/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

Second test not undertaken due to slow drainage and time restricitons.

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA04**	**Test Ref.:**	**1**
Date:	**14/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

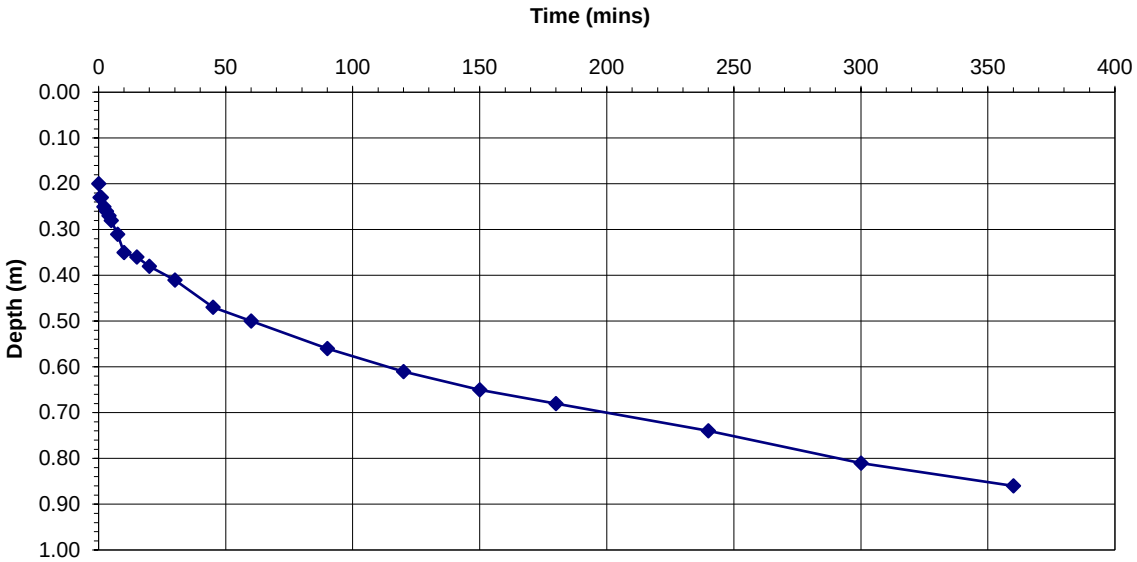
Time (min)	Depth (m)
0	0.20
0.5	0.23
1	0.23
2	0.25
3	0.26
4	0.27
5	0.28
7.5	0.31
10	0.35
15	0.36
20	0.38
30	0.41
45	0.47
60	0.50
90	0.56
120	0.61
150	0.65
180	0.68
240	0.74
300	0.81
360	0.86

Pit dimensions	Length (m) =	1.00
	Width (m) =	1.00
	Depth (m) =	1.00

Depth to water at start of test (m) =	0.20
Depth to water at end of test (m) =	0.86
Depth to water at 75% level (m) =	0.40
Depth to water at 50% level (m) =	0.60
Depth to water at 25% level (m) =	0.80
Base area of pit (m^2) =	1.00
Effective area of loss a_{s50} (m^2) =	2.60
V_{P75} - V_{P25} (m^3) =	0.40

From the graph:	
t_{p75} (min) =	27
t_{p25} (min) =	291

Soil infiltration rate, f, (m/s) =	**9.71E-06**	**normal test**	
Tested by:	**NM**	**Date:**	**14/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA05**	**Test Ref.:**	**1**
Date:	**14/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

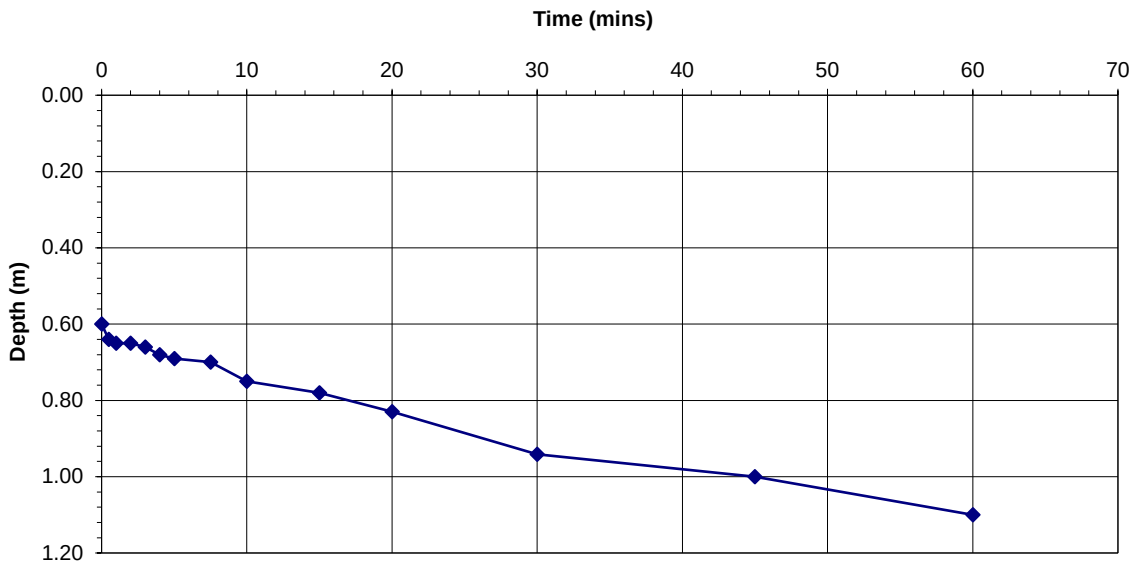
Time (min)	Depth (m)
0	0.60
0.5	0.64
1	0.65
2	0.65
3	0.66
4	0.68
5	0.69
7.5	0.70
10	0.75
15	0.78
20	0.83
30	0.94
45	1.00
60	1.10

Pit dimensions	Length (m) =	1.00
	Width (m) =	1.00
	Depth (m) =	1.20

Depth to water at start of test (m) =	0.60
Depth to water at end of test (m) =	1.10
Depth to water at 75% level (m) =	0.75
Depth to water at 50% level (m) =	0.90
Depth to water at 25% level (m) =	1.05
Base area of pit (m^2) =	1.00
Effective area of loss a_{s50} (m^2) =	2.20
V_{P75} - V_{P25} (m^3) =	0.30

From the graph:	
t_{p75} (min) =	10
t_{p25} (min) =	53

Soil infiltration rate, f, (m/s) =		**5.29E-05**	**normal test**
Tested by:	**NM**	**Date:**	**14/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	**Bruntwood**		
Project:	**Siemens Development Didsbury**		
Job No:	**2230338**		
Location:	**SA05**	**Test Ref.:**	**2**
Date:	**14/10/2020**	**Weather:**	**Clear**

INPUT DATA AND CALCULATION

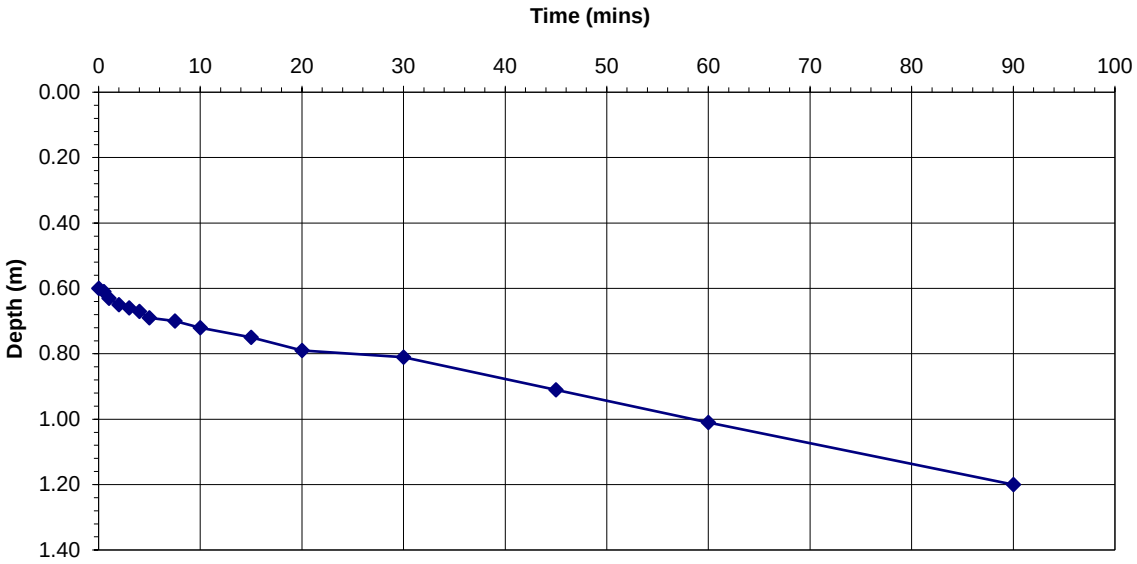
Time (min)	Depth (m)
0	0.60
0.5	0.61
1	0.63
2	0.65
3	0.66
4	0.67
5	0.69
7.5	0.70
10	0.72
15	0.75
20	0.79
30	0.81
45	0.91
60	1.01
90	1.20

Pit dimensions	Length (m) =	1.00
	Width (m) =	1.00
	Depth (m) =	1.20

Depth to water at start of test (m) =	0.60
Depth to water at end of test (m) =	1.20
Depth to water at 75% level (m) =	0.75
Depth to water at 50% level (m) =	0.90
Depth to water at 25% level (m) =	1.05
Base area of pit (m^2) =	1.00
Effective area of loss a_{s50} (m^2) =	2.20
V_{P75} - V_{P25} (m^3) =	0.30

From the graph:	
t_{p75} (min) =	15
t_{p25} (min) =	66

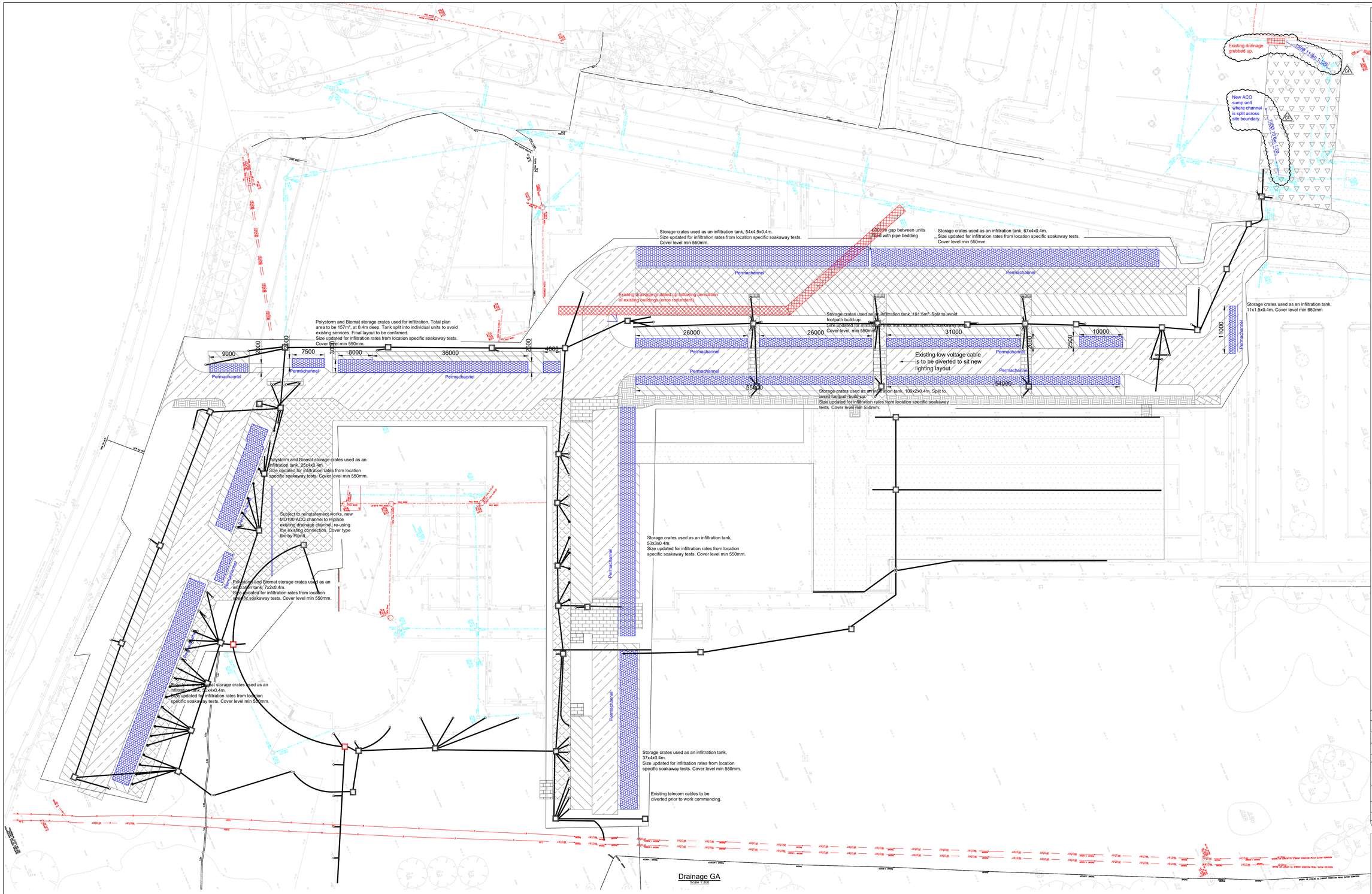
Soil infiltration rate, f, (m/s) =	**4.46E-05**	**normal test**	
Tested by:	**NM**	**Date:**	**14/10/2020**
Checked by:	**JT**	**Date:**	**20/10/2020**



Notes

1. Calculated in accordance with BRE Digest 365

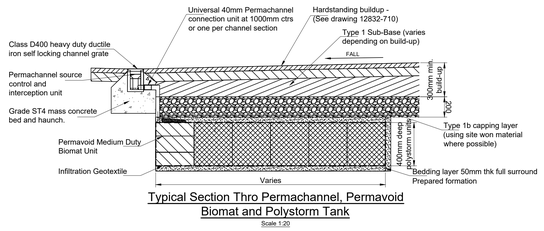
APPENDIX 3
EXISTING DRAINAGE INFORMATION



Drainage GA

Scale 1:200

Note:
Two large diameter water mains pass around the site, a 5m easement must be maintained.



Typical Section Thro Permachannel, Permavoid Biomat and Polystorm Tank

Scale 1:20

NOTES

1. Do not scale from this drawing.
2. This drawing is copyright and is sent to you in confidence. It must not be copied, used or disclosed, in whole or in part, to third parties without written permission. It remains the property of Booth King Partnership Ltd. and must be returned on request.
3. This drawing is to be read in conjunction with all relevant contractual documents.
4. Infiltration crates to be Polystorm and Permafilter Biomat adjacent to linear drainage.
5. Linear drainage to be Permachannel.
6. Final tank layout to be confirmed following appointment of specialist supplier.
7. Refer to drawing 12832-710 for hardstanding build-up details.
8. As Built layouts based on contractor supplied drawings. Booth King Partnership have not independently verified this information.

New Surface Water
Existing Surface Water Sewer
Existing Foul Water Sewer
Existing Water Main with Easement

Note:
The topographical survey and existing drainage information shown on this drawing was provided by Total Surveys. BKPL have not independently verified this information and we can therefore not guarantee its accuracy. BKPL will not accept any liability for any errors or omissions in that data, or for any subsequent errors which may rise if reliance is placed on that data.

As Built

REV	DATE	REVISION DETAILS	INITIALS
AB1	06.03.18	As Built Issue	DC
C4	12.02.18	Phase 1&2 updated to suit As Built info. Phase 3 updated to suit site ownership.	DC
C3	15.11.17	Tank and Permachannel relocated to suit updated levels and amended layout	DC
C2	19.09.17	Updated to suit latest layout. Tank dimensions added	RMS
C1	14.09.17	Tanks realigned. Issued for Construction	DC
T4	27.07.17	Updated to suit contractor proposals; alternative tank proposed. Typical Section, notes and plan sizes amended	DC
T3	25.05.17	Infiltration tank size increased to suit soakaway test results. Typical detail and notes added.	RMS
T2	23.03.17	Storage crate number and positions revised	DC
T1	06.03.17	FIRST ISSUE - FOR TENDER	DC

booth king PARTNERSHIP LIMITED
consulting civil & structural engineers
Tollgate House, 9C Bridge Street, Ramsbottom. BL0 9AB
Tel: 01706 822022, Fax: 01706 826140
Email: office@booth-king.co.uk

PROJECT:
Siemens Site Development
Enabling Works

TITLE:
Drainage GA
Pre-Commercial Development

SCALE @ A0:	DRAWN:	DATE:
1:300	DC	Jan '17

JOB No:	DRAWING No:	REVISION:
12832	500	AB1

APPENDIX 4
PROPOSED DRAINAGE STRATEGY

COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
6. FOR GENERAL DRAINAGE NOTES AND INFORMATION USED TO PRODUCE DRAWINGS REFER TO DRAWING RAM-XX-XX-DR-D-00001
7. FOR EXISTING DRAINAGE REFER TO DRAWING SERIES RAM-XX-XX-DR-D-00010
8. FOR GROUND FLOOR BELOW GROUND DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-D-00150
9. FOR DRAINAGE SCHEDULES REFER TO DRAWING RAM-XX-XX-DR-D-00200
10. FOR TYPICAL DETAILS REFER TO DRAWING SERIES RAM-XX-XX-DR-D-00400

KEY:

- PROPOSED SURFACE WATER DRAINAGE AND MANHOLE
- PROPOSED FOUL WATER DRAINAGE AND MANHOLE
- PROPOSED COMBINED WATER DRAINAGE AND MANHOLE
- EXISTING SURFACE WATER DRAINAGE AND MANHOLE
- EXISTING FOUL WATER DRAINAGE AND MANHOLE
- PROPOSED TREE PIT INFILTRATION SYSTEM
- PROPOSED GEOCELLULAR ATTENUATION SYSTEM
- PROPOSED RAIN GARDEN SYSTEM
- PROPOSED PERMEABLE PAVING SYSTEM (TYPE A)
- PROPOSED PERMEABLE PAVING SYSTEM (TYPE C)
- PROPOSED FLOW CONTROL CHAMBER
- PROPOSED CATCHPIT MANHOLE CHAMBER
- RED LINE BOUNDARY
- BLUE LINE BOUNDARY
- DC-# PROPOSED DRAINAGE CHANNEL
- SU PROPOSED SUMP OUTLET
- NRV PROPOSED NON-RETURN VALVE
- WATER MAIN EASEMENT

Rev	Description	Date	By	Chk	App
P03	STAGE 3 UPDATE	07/07 2022	CO	LF	SP
P02	STAGE 3 UPDATE	07/06 2022	CO	LF	SP
P01	STAGE 3 ISSUE	04/12 2020	CO	LS	LS

STAGE 3 - S2

DIDSBURY TECHNOLOGY PARK BUILDING D1

RAMBOLL
tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

EXTERNAL PROPOSED DRAINAGE

Project No:	Scale (@A1):	Drawn:	Date:
1620006198	1:250	SRKR	NOV 20

Drawing No: RAM-XX-XX-DR-D-00100 Rev: P03

CAR PARK DRAINAGE COLLECTED THROUGH PERMEABLE SURFACING INTO 600mm SUB-BASE ATTENUATION. REFER TO DRAWINGS RAM-XX-XX-DR-C-00750 FOR DETAILS. NO POSITIVE CONNECTION FROM SUB-BASE. INFILTRATION ONLY THROUGH 30% VOID RATIO. INFILTRATION RATE = 0.06192 m/hr.

PARKING BAYS TO BE PERMEABLE SYSTEMS AS PER DETAILS SHOWN ON RAM-XX-XX-DR-C-00750. TO BE INSTALLED WITH PERFORATED 100mm DIAMETER DRAIN LAID FLAT AT BASE OF BUILD UP.

TREE PIT UTILISED FOR ATTENUATION OF SURFACE WATER WITH INFILTRATION INTO THE SUB-GRADE.

HIGH LEVEL OVERFLOW FROM TREE PITS

FOUL AND SURFACE WATER DRAINAGE TO BE INSTALLED FOR FUTURE CONNECTION OF D2 BUILDING. SURFACE WATER RESTRICTED TO 1.5 l/s FROM FUTURE BLUE ROOF DESIGN. NO FLOW TO PASS THROUGH SW21 FROM PERMEABLE SURFACING.

IL = 29.815

IL = 29.540

REFER TO DRAWING RAM-XX-XX-DR-D-00150 FOR DETAILS OF D1 BUILDING DRAINAGE

REFER TO D1 BUILDING DRAINAGE DRAWING FOR INTERNAL DRAINAGE

INVERT LEVEL OF EXISTING MANHOLE TO BE CONFIRMED PRIOR TO COMMENCEMENT OF WORKS

EXMH - FWMH13
CL 31.780
IL 27.545

FLOW CONTROL DEVICE TO LIMIT TOTAL SITE OUTFLOW TO 2.3 l/s

ALL PIPEWORK AT PAD FOUNDATION CROSSINGS TO BE ENCASED IN CONCRETE TO PROTECT AGAINST LOADING FROM STRUCTURE

ATTENUATION TANKS WILL SIT WITHIN GROUNDWATER LEVEL (1.8m BGL). AT THIS STAGE ASSUME CONCRETE SLAB REQUIRED TO PREVENT FLOATATION. REQUIREMENT TO BE CONFIRMED AT THE NEXT STAGE.

INVERT LEVEL OF EXISTING MANHOLE TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS

EXMH - FWMH08
CL 31.646
IL 29.864

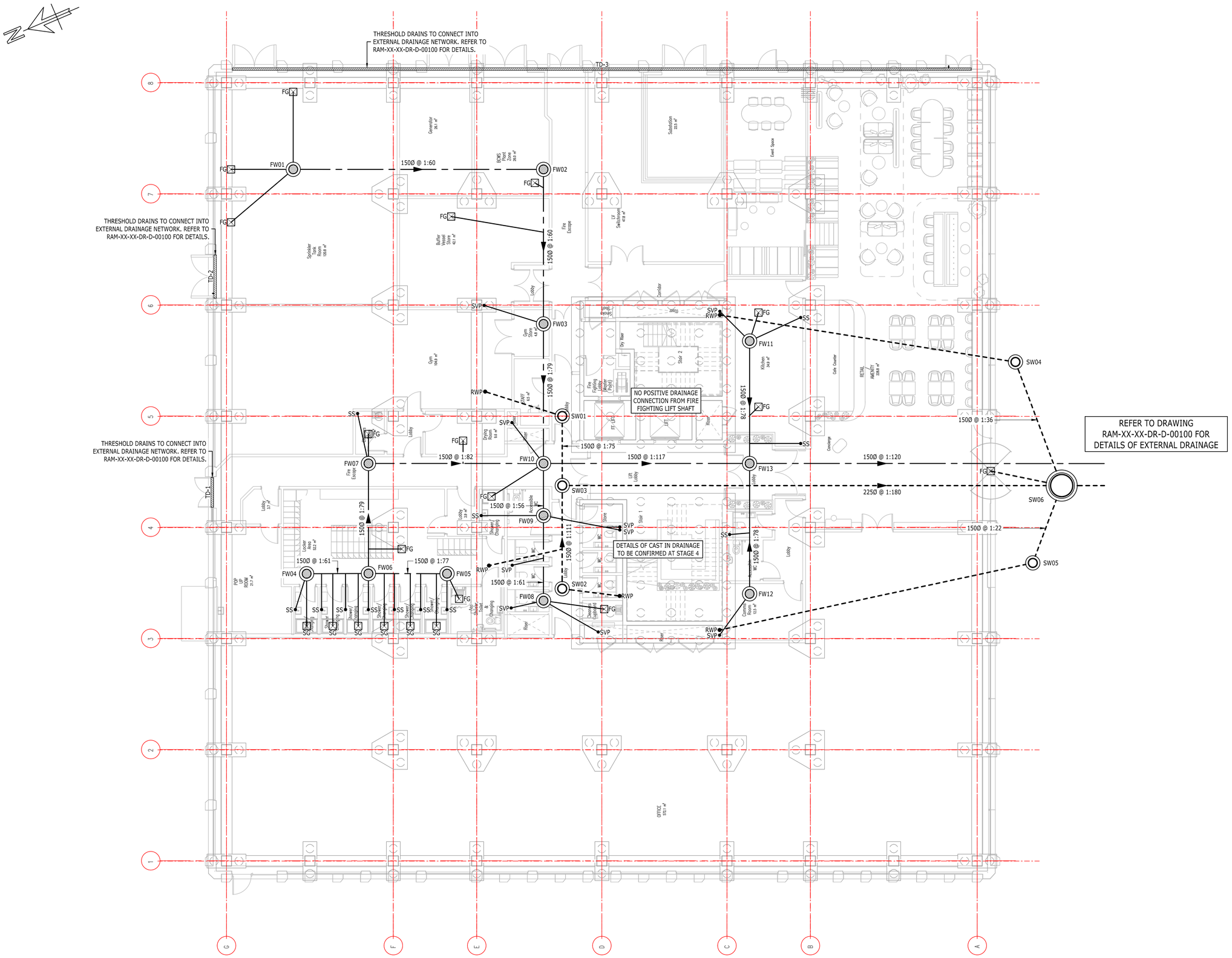
EXISTING D3 BUILDING

CONNECTION FROM RAINGARDEN INTO THE SOFFIT OF THE TREE PIT SYSTEM

PERFORATED 100mm DIAMETER DRAIN LAID FLAT WITHIN A TRENCH BENEATH THE RAIN GARDEN.

NOTE, TWO 900mm DIA WATER MAINS PRESENT IN THIS LOCATION, EACH WITH A 10m EASEMENT (INDICATED BY HATCHING). CONTRACTOR TO SATISFY UU REQUIREMENTS WHEN DIGGING, PILING & WORKING WITHIN 10m OF THESE PIPES AS SPECIFIED WITHIN DOCUMENT REFERENCED "STANDARD CONDITIONS FOR WORKS ADJACENT TO PIPELINES". REFER TO LAYER DRAWINGS FOR LOCATIONS OF GAS MAINS & EASEMENTS.

07/07/2022 14:52:33



COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION
6. FOR GENERAL DRAINAGE NOTES AND INFORMATION USED TO PRODUCE DRAWINGS REFER TO DRAWING RAM-XX-XX-DR-D-00001
7. FOR EXISTING DRAINAGE REFER TO DRAWING SERIES RAM-XX-XX-DR-00010
8. FOR EXTERNAL PROPOSED DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-00100
9. FOR DRAINAGE SCHEDULES REFER TO DRAWING RAM-XX-XX-DR-D-00200
10. FOR TYPICAL DETAILS REFER TO DRAWING SERIES RAM-XX-XX-DR-D-00400

KEY:

- PROPOSED SURFACE WATER DRAINAGE AND MANHOLE
- PROPOSED FOUL WATER DRAINAGE AND MANHOLE
- RWP● PROPOSED RAINWATER PIPE
- FG PROPOSED FLOOR GULLY
- SVP/SS● PROPOSED FOUL STACK
- VP● PROPOSED VENT PIPE
- TD-# PROPOSED THRESHOLD DRAIN

NOTE: IT IS ASSUMED THAT FURTHER COORDINATION BETWEEN MEP & STRUCTURES IS TO BE UNDERTAKEN AT THE NEXT STAGE. LOCATIONS OF POP UPS MAY CHANGE AS A RESULT OF THE COORDINATION. BELOW GROUND DRAINAGE LAYOUT SUBJECT TO CHANGE PENDING COORDINATION.

Rev	Description	Date	By	Chk	App
P02	STAGE 3 UPDATE	07/06 2022	CO	LF	SP
P01	STAGE 3 ISSUE	04/12 2020	CO	LS	LS

STAGE 3 - S2

DIDSBURY TECHNOLOGY PARK BUILDING D1

RAMBOLL
tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

INTERNAL PROPOSED DRAINAGE

Project No:	Scale (@A1):	Drawn:	Date:
1620006198	1:100	SRKR	NOV 20

Drawing No: RAM-XX-XX-DR-D-00150 Rev: P02

07/06/2022 13:48:47

SURFACE WATER MANHOLE SCHEDULE

Manhole No.	Cover Level (m)	Invert Level (m)	Depth to Invert (m)	Main Channel (mm)	Branches	Manhole Type	Chamber Size (mm)	Cover Size (mm)	Cover Loading	Comment	Co-ordinates (mm) EastingNorthing
SW01	31.550	30.200	1.350	150Ø	150Ø @ IL 30.275 In 150Ø @ IL 30.200 Out	PPIC	450Ø	450x450	AAA	Recessed, Single Sealed and Lockable	383324088,392236449
SW02	31.550	30.200	1.350	150Ø	150Ø @ IL 30.200 In 150Ø @ IL 30.200 Out	PPIC	450Ø	450x450	AAA	Recessed, Single Sealed and Lockable	383315519,392240113
SW03	31.550	30.150	1.400	225Ø	150Ø @ IL 30.150 In 150Ø @ IL 30.150 In 225Ø @ IL 30.150 Out	PPIC	450Ø	450x450	AAA	Recessed, Single Sealed and Lockable	383320640,392237923
SW04	31.550	30.200	1.350	150Ø	150Ø @ IL 30.275 In 150Ø @ IL 30.200 Out	PPIC	450Ø	450x450	B125	Recessed, Single Sealed and Lockable	383317158,392212816
SW05	31.550	30.200	1.350	150Ø	150Ø @ IL 30.275 In 150Ø @ IL 30.200 Out	PPIC	450Ø	450x450	B125	Recessed, Single Sealed and Lockable	383306820,392216222
SW06	31.500	30.000	1.500	300Ø	225Ø @ IL 30.000 In 150Ø @ IL 30.000 In 150Ø @ IL 30.000 In 150Ø @ IL 30.075 In 300Ø @ IL 30.000 Out	PCC	1200Ø	750x675	B125	Recessed, Single Sealed and Lockable	383310043,392213148
SW07	31.500	29.935	1.565	300Ø	300Ø @ IL 29.935 In 300Ø @ IL 29.935 Out	PCC	1200Ø	750x675	D400	-	383303747,392198420
SW08	31.500	29.820	1.680	300Ø	300Ø @ IL 29.820 In 150Ø @ IL 29.895 In 150Ø @ IL 29.895 In 300Ø @ IL 29.820 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383329605,392187362
SW09	31.500	29.770	1.730	300Ø	300Ø @ IL 29.770 In 300Ø @ IL 29.770 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383334571,392185236
SW10	31.700	29.265	2.435	300Ø	300Ø @ IL 29.715 In 150Ø @ IL 29.865 In 150Ø @ IL 29.865 In 300Ø @ IL 29.715 Out	PCC	1200Ø	600x600	D400	Catchpit	383329324,392172965
SW11	31.600	30.250	1.350	150Ø	150Ø @ IL 30.325 In 150Ø @ IL 30.250 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383349867,392157604
SW12	31.550	30.140	1.410	150Ø	150Ø @ IL 30.140 In 150Ø @ IL 30.215 In 150Ø @ IL 30.140 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383353323,392165685
SW13	31.700	29.415	2.285	150Ø	150Ø @ IL 29.865 In 150Ø @ IL 29.940 In 150Ø @ IL 29.865 Out	PCC	1200Ø	600x600	D400	Catchpit	383349577,392167287
SW14	31.530	30.180	1.350	150Ø	150Ø @ IL 30.255 In 150Ø @ IL 30.180 Out	PCC	1200Ø	750x675	D400	-	383305823,392181878
SW15	31.530	30.180	1.350	150Ø	150Ø @ IL 30.255 In 150Ø @ IL 30.180 Out	PCC	1200Ø	750x675	D400	-	383296386,392159811
SW16	31.530	30.025	1.505	150Ø	150Ø @ IL 30.025 In 150Ø @ IL 30.025 In 150Ø @ IL 30.025 Out	PCC	1200Ø	750x675	D400	-	383301004,392170622
SW17	31.700	29.365	2.335	150Ø	150Ø @ IL 29.815 In 150Ø @ IL 29.815 Out	PCC	1200Ø	600x600	D400	Catchpit	383313468,392165288
SW18	31.700	29.315	2.385	150Ø	150Ø @ IL 29.840 In 150Ø @ IL 29.840 In 150Ø @ IL 29.840 In 150Ø @ IL 29.765 Out	PCC	1200Ø	600x600	D400	Catchpit	383305330,392148671
SW19	31.700	29.115	2.585	150Ø	150Ø @ IL 29.115 In 150Ø @ IL 29.115 Out	PCC	1200Ø	600x600	D400	-	383329681,392138911
SW20	31.700	28.965	2.735	150Ø	150Ø @ IL 28.965 In 150Ø @ IL 28.965 Out	PCC	1200Ø	600x600	D400	-	383340052,392134476
SW21	31.550	29.815	1.735	150Ø	150Ø @ IL 29.815 In 150Ø @ IL 29.815 Out	PCC	1200Ø	600x600	D400	Recessed, Single Sealed and Lockable	383355671,392192477
SW22	31.450	29.695	1.755	150Ø	150Ø @ IL 29.695 In 150Ø @ IL 29.695 Out	PCC	1200Ø	600x600	D400	-	383351959,392183795
SW23	31.500	29.530	1.970	150Ø	150Ø @ IL 29.530 In 150Ø @ IL 29.530 Out	PCC	1200Ø	600x600	D400	-	383364038,392178629
SW24	31.700	28.455	3.245	150Ø	150Ø @ IL 28.905 In 150Ø @ IL 28.905 In 150Ø @ IL 28.905 Out	PCC	1200Ø	600x600	D400	Flow control chamber	383344358,392132631
SW25	31.500	30.450	1.050	150Ø	150Ø @ IL 30.450 In 150Ø @ IL 30.450 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383355200,392188108
SW26	31.550	30.600	0.950	150Ø	150Ø @ IL 30.675 In 150Ø @ IL 30.675 In 150Ø @ IL 30.600 Out	PPIC	450Ø	450x450	D400	Recessed, Single Sealed and Lockable	383336110,392208634
SW27	31.500	30.450	1.050	150Ø	150Ø @ IL 30.450 In 150Ø @ IL 30.450 In 150Ø @ IL 30.450 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383331615,392198001
SW28	31.500	30.450	1.050	150Ø	150Ø @ IL 30.450 In 150Ø @ IL 30.450 In 150Ø @ IL 30.450 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383306284,392209943
SW29	31.550	30.150	1.400	150Ø	150Ø @ IL 30.150 In 150Ø @ IL 30.150 Out	PCC	1200Ø	750x675	D400	Recessed, Single Sealed and Lockable	383296781,392202732

- BRANCH CONNECTIONS OF DN150 OR LESS TO DISCHARGE INTO MAIN CHANNEL AT HALF PIPE LEVEL.
- BRANCH CONNECTIONS GREATER THAN DN150 TO BE SET LEVEL WITH SOFFIT OF MAIN DRAIN

FOUL WATER MANHOLE SCHEDULE

Manhole No.	Cover Level (m)	Invert Level (m)	Depth to Invert (m)	Main Channel (mm)	Branches	Manhole Type	Chamber Size (mm)	Cover Size (mm)	Cover Loading	Comment	Co-ordinates (mm) EastingNorthing
FW01	31.550	30.850	0.700	150Ø	150Ø @ IL 30.925 In 150Ø @ IL 30.925 In 150Ø @ IL 30.925 In 150Ø @ IL 30.850 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383342035,392244559
FW02	31.550	30.625	0.925	150Ø	150Ø @ IL 30.625 In 150Ø @ IL 30.625 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383336725,392232142
FW03	31.550	30.485	1.065	150Ø	150Ø @ IL 30.485 In 150Ø @ IL 30.560 In 150Ø @ IL 30.485 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383329058,392235421
FW04	31.550	30.635	0.915	150Ø	150Ø @ IL 30.710 In 150Ø @ IL 30.710 In 150Ø @ IL 30.635 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383321685,392252474
FW05	31.550	30.635	0.915	150Ø	150Ø @ IL 30.710 In 150Ø @ IL 30.710 In 150Ø @ IL 30.635 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383318709,392245508
FW06	31.550	30.580	0.970	150Ø	150Ø @ IL 30.580 In 150Ø @ IL 30.580 In 150Ø @ IL 30.655 In 150Ø @ IL 30.580 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383320385,392249403
FW07	31.550	30.465	1.085	150Ø	150Ø @ IL 30.505 In 150Ø @ IL 30.465 In 150Ø @ IL 30.465 In 150Ø @ IL 30.505 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383325845,392247067
FW08	31.550	30.515	1.035	150Ø	150Ø @ IL 30.590 In 150Ø @ IL 30.590 In 150Ø @ IL 30.590 In 150Ø @ IL 30.515 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383315323,392241294
FW09	31.550	30.440	1.110	150Ø	150Ø @ IL 30.440 In 150Ø @ IL 30.515 In 150Ø @ IL 30.515 In 150Ø @ IL 30.440 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383319547,392239488
FW10	31.550	30.390	1.160	150Ø	150Ø @ IL 30.390 In 150Ø @ IL 30.390 In 150Ø @ IL 30.390 In 150Ø @ IL 30.465 In 150Ø @ IL 30.465 In 150Ø @ IL 30.390 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383322131,392238383
FW11	31.550	30.380	1.170	150Ø	150Ø @ IL 30.455 In 150Ø @ IL 30.455 In 150Ø @ IL 30.455 In 150Ø @ IL 30.380 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383323835,392225562
FW12	31.550	30.385	1.165	150Ø	150Ø @ IL 30.460 In 150Ø @ IL 30.385 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383311291,392230925
FW13	31.550	30.295	1.255	150Ø	150Ø @ IL 30.295 In 150Ø @ IL 30.295 In 150Ø @ IL 30.295 In 150Ø @ IL 30.295 Out	PPIC	450Ø	450x450	AAA	Recessed, Double Sealed and Lockable	383317759,392228159
FW14	31.450	30.060	1.390	150Ø	150Ø @ IL 30.060 In 150Ø @ IL 30.060 Out	PCC	1200Ø	750x675	D400	-	383306655,392202192
FW15	31.550	29.540	2.010	150Ø	150Ø @ IL 29.540 In 150Ø @ IL 29.540 Out	PCC	1200Ø	600x600	B125	Recessed, Double Sealed and Lockable	383354875,392194708
FW16	31.550	29.435	2.115	150Ø	150Ø @ IL 29.435 In 150Ø @ IL 29.435 Out	PCC	1200Ø	600x600	D400	-	383349873,392183011
FW17	31.500	29.295	2.205	150Ø	150Ø @ IL 29.295 In 150Ø @ IL 29.295 Out	PCC	1200Ø	600x600	D400	-	383365044,392176523
FW18	31.800	28.780	3.020	150Ø	150Ø @ IL 28.780 In 150Ø @ IL 28.780 Out	PCC	1200Ø	600x600	D400	-	383340862,392119977

COMBINED WATER MANHOLE SCHEDULE

Manhole No.	Cover Level (m)	Invert Level (m)	Depth to Invert (m)	Main Channel (mm)	Branches	Manhole Type	Chamber Size (mm)	Cover Size (mm)	Cover Loading	Comment	Co-ordinates (mm) EastingNorthing
CW01	31.500	30.010	1.490	150Ø	150Ø @ IL 30.085 In 150Ø @ IL 30.085 In 150Ø @ IL 30.010 In 150Ø @ IL 30.010 Out	PCC	1200Ø	750x675	D400	-	383302207,392200409
CW02	31.800	28.730	3.070	150Ø	150Ø @ IL 28.730 In 150Ø @ IL 28.730 In 150Ø @ IL 28.730 Out	PCC	1200Ø	600x600	D400	-	383338535,392119044

COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
6. FOR GENERAL DRAINAGE NOTES AND INFORMATION USED TO PRODUCE DRAWINGS REFER TO DRAWING RAM-XX-XX-DR-D-00001
7. FOR EXISTING DRAINAGE REFER TO DRAWING SERIES RAM-XX-XX-DR-00010
8. FOR PROPOSED EXTERNAL DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-00100
9. FOR GROUND FLOOR BELOW GROUND DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-00150
10. FOR TYPICAL DETAILS REFER TO DRAWING SERIES RAM-XX-XX-DR-D-00400

Rev	Description	Date	By Chk	App
P03	STAGE 3 UPDATE	07/07 2022	CO LF	SP
P02	STAGE 3 UPDATE	07/06 2022	CO LF	SP
P01	STAGE 3 ISSUE	04/12 2020	CO LS	LS

STAGE 3 - S2

DIDSBURY
TECHNOLOGY PARK
BUILDING D1

RAMBOLL

tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

DRAINAGE SCHEDULES
SHEET 1

Project No:	Scale (@A1):	Drawn:	Date:
1620006198	N/A	CO	NOV 20

Drawing No: RAM-XX-XX-DR-D-00200

Rev: P03

ATTENUATION TANK SCHEDULE

REF.	MANUFACTURER & TYPE	MIN. STORAGE VOLUME (m^3)	PLAN AREA (m^2)	HEIGHT (m)	INVERT LEVEL (m)	PIPE IN INVERT (m)	PIPE OUT INVERT (m)
ATTEN-1	POLYPIPE POLYSTORM (95% VOID RATIO)	114	150	0.8	29.165	150Ø @ 29.815 300Ø @ 29.665	150Ø @ 29.265 150Ø @ 29.265
ATTEN-2	POLYPIPE POLYSTORM (95% VOID RATIO)	190	250	0.8	29.115	150Ø @ 29.765 150Ø @ 29.215 150Ø @ 29.215	150Ø @ 29.215 150Ø @ 29.215 150Ø @ 29.215
ATTEN-2	POLYPIPE POLYSTORM (95% VOID RATIO)	152	200	0.8	29.065	150Ø @ 29.715 150Ø @ 29.165 150Ø @ 29.165 150Ø @ 29.165	150Ø @ 29.165

1. TANK TO BE WRAPPED AND TAPED IN IMPERMEABLE GEOMEMBRANE AND GEOTEXTILE PROTECTION FLEECE. WELDED JOINTS REQUIRED DUE TO GROUND WATER LEVELS AND DEPTHS OF TANKS.
2. 100mm VENT PIPE FROM SOFFIT LEVEL OF TANK INTO DOWNSTREAM MANHOLE TO BE PROVIDED.
3. BEDDING AND SURROUND TO BE 150mm OF 6H SHARP SAND ON UNDISTURBED GROUND WITH 5% CBR AND FULL PERIMETER TO PROTECT GEOTEXTILE AND GEOMEMBRANE.
4. FLOATATION CHECKS REQUIRED FOR ALL ATTENUATION SYSTEMS. CONCRETE SLAB MAY BE REQUIRED TO PREVENT FLOATATION, TO BE CONFIRMED AT THE NEXT STAGE. ALLOW FOR CONCRETE SLAB AT THIS STAGE.

OIL SEPARATOR SCHEDULE

REF.	MANUFACTURER & TYPE	DESIGNATION	COVER LEVEL	OIL CAPACITY	OVERALL LENGTH (mm)	OVERALL DIAMETER (mm)	INLET INVERT/ DIA (m/ mm)	OUTLET INVERT/ DIA (m/ mm)	COVER SIZE (mm)	COVER LOADING
OS-1	SPEL STORMCEPTOR CLASS 1 212 C1/SC	NSB 12	27.240	180 LITRES	3570	1225 Ø	29.065 / 150	29.015 / 150	750 dia	D400

1. OIL SEPARATOR TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. TO BE INSTALLED ON 500mm FND2 CONCRETE BASE WITH 500mm CONCRETE SURROUND (ADDITIONAL FLOATATION CHECKS REQUIRED).
2. OIL ALARM LINKED TO BMS REQUIRED. DN100 VENT PIPE TO ABOVE GROUND TO BE INSTALLED AND TERMINATED IN A LOCATION AGREED BY THE ARCHITECT

CHANNEL DRAIN SCHEDULE

REF.	MANUFACTURER & TYPE	DESIGNATION	COVER LOADING AND MINIMUM TYPE	OUTLET DIA (mm)	LENGTH (m)	STORM EVENT	RAINFALL INTENSITY (mm/hr)
SD-1	ACO QMAX	350	D400 Q-SLOT STEEL GRATING	150	42	1 in 100 (+ 40%)	173.21
SD-2	ACO MULTIDRAIN	M150D 20.0	D400 BRICKSLOT SINGLE SLOT OFFSET GALVANISED STEEL	150	51.5	1 in 5 (+ 20%)	84.60
DC-1	ACO ROADDRAIN	PD100 F 20.1	F900 ROADDRAIN PD100 F 20.1 CHANNEL	150	24.5	1 in 5 (+ 20%)	84.60
DC-2	ACO ROADDRAIN	PD100 F 30.1	F900 ROADDRAIN PD100 F 30.1 CHANNEL	150	24	1 in 5 (+ 20%)	84.60
DC-3	ACO ROADDRAIN	PD100 F 30.1	F900 ROADDRAIN PD100 F 30.1 CHANNEL	150	24	1 in 5 (+ 20%)	84.60
DC-4	ACO ROADDRAIN	PD100 F 20.1	F900 ROADDRAIN PD100 F 20.1 CHANNEL	150	8	1 in 5 (+ 20%)	84.60
DC-5	ACO ROADDRAIN	PD100 F 20.1	F900 ROADDRAIN PD100 F 20.1 CHANNEL	150	38.5	1 in 5 (+ 20%)	84.60

ALL CHANNELS HAVE BEEN DESIGNED FOR THE STATED RAINFALL INTENSITY WITH A RISK CATEGORY 3.
ALL GRATINGS TO BE FIXED AND LOCKABLE WITH RODDABLE ACCESS COVERS AT EACH END. END PLATES TO BE PROVIDED.
ALL OUTLETS TO BE DN150 WITH SUMPS AND RODDABLE TRAPS U.N.O. REFER TO GENERAL ARRANGEMENT DRAWING FOR LOCATIONS OF SUMP OUTLETS.

TREE PIT SCHEDULE

REF.	MANUFACTURER & TYPE	MINIMUM STORAGE VOLUME (m^3)	LENGTH (m)	WIDTH (m)	HEIGHT (m)	MINIMUM SYSTEM DEPTH (m)	INFILTRATION RATE (m/hr)
TP-1	GREENBLUE URBAN ROOTSPACE 800	30	20	6	1.0	1.38	0.06192
TP-2	GREENBLUE URBAN ROOTSPACE 800	25.5	17	6	1.0	1.38	0.06192
TP-3	GREENBLUE URBAN ROOTSPACE 800	25.5	17	6	1.0	1.38	0.26532
TP-4	GREENBLUE URBAN ROOTSPACE 800	28.5	19	6	1.0	1.38	0.26532
TP-5	GREENBLUE URBAN ROOTSPACE 800	12.5	19.5	2.5	1.0	1.38	0.07848

NOTE: GREENBLUE TREE PIT SYSTEMS TO BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS. REFER TO DETAIL DRAWINGS FOR TYPICAL SECTION AND LANDSCAPE ARCHITECTS DETAILS FOR FURTHER SPECIFICATION DETAILS.

RAINGARDEN SCHEDULE

REF.	MINIMUM STORAGE VOLUME (m^3)	LENGTH (m)	WIDTH (m)	OVERALL DEPTH (m)	PIPE DIA. (mm)	INVERT LEVEL (m)
RG-A	14.5	48	1.60	0.7	100	30.800
RG-B	18.5	44	1.85	0.7	100	30.800

RAINGARDENS HAVE BEEN SIZED FOR ALL STORM EVENTS UP TO 1 IN 100 YEAR + 40% CC WITH NO INFILTRATION, FLOW TO BE DIRECTED TOWARDS TREE PIT ATTENUATION. POROUS MATERIAL IN RAIGARDEN TO HAVE A MINIMUM POROSITY RATIO OF 30%.

THRESHOLD DRAIN SCHEDULE

REF.	MANUFACTURER & TYPE	DESIGNATION	COVER LOADING AND MINIMUM TYPE	OUTLET DIA (mm)	LENGTH (m)
TD-1	ACO MULTIDRAIN SHALLOW	M100D 075	B125 BRICKSLOT SINGLE SLOT GRATING	150	1.60
TD-2	ACO MULTIDRAIN SHALLOW	M100D 075	B125 BRICKSLOT SINGLE SLOT GRATING	150	2.40
TD-3	ACO MULTIDRAIN SHALLOW	M100D 075	B125 BRICKSLOT SINGLE SLOT GRATING	150	40.00

ALL OUTLETS TO BE DN150 FROM BASE OF CHANNEL U.N.O.

NON RETURN VALVE SCHEDULE

MANHOLE REF.	DRAINAGE SYSTEM	MANUFACTURER	TYPE
SW24	SURFACE WATER	ALTHON WASTOP	WASTOP SS150mm GRADE 304
SW28	SURFACE WATER	ALTHON WASTOP	WASTOP SS150mm GRADE 304
SW29	SURFACE WATER	ALTHON WASTOP	WASTOP SS150mm GRADE 304
CW01	COMBINED	ALTHON WASTOP	WASTOP SS150mm GRADE 304
CW02	COMBINED	ALTHON WASTOP	WASTOP SS150mm GRADE 304

ALL NON RETURN VALVES TO BE INSTALLED AS PER MANUFACTURER'S REQUIREMENTS
ALL NON RETURN VALVES TO BE FITTED ON DOWNSTREAM PIPE U.N.O (I.E. MANHOLE OUTLET)

COPYRIGHT RAMBOLL UK LIMITED. ALL RIGHTS RESERVED. THIS DOCUMENT IS ISSUED FOR THE PARTY WHO COMMISSIONED IT AND FOR THE SPECIFIC PURPOSES CONNECTED WITH THE PROJECT ONLY. IT SHOULD NOT BE RELIED UPON BY ANY OTHER PARTY OR USED FOR ANY OTHER PURPOSE. RAMBOLL ACCEPTS NO RESPONSIBILITY OR LIABILITY WHICH MAY ARISE FROM RELIANCE OR USE OF THIS DOCUMENT OR THE DATA CONTAINED HEREIN BY ANY OTHER PARTY OR FOR ANY OTHER PURPOSE.

Notes

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
6. FOR GENERAL DRAINAGE NOTES AND INFORMATION USED TO PRODUCE DRAWINGS REFER TO DRAWING RAM-XX-XX-DR-D-00001
7. FOR EXISTING DRAINAGE REFER TO DRAWING SERIES RAM-XX-XX-DR-00010
8. FOR PROPOSED EXTERNAL DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-00100
9. FOR GROUND FLOOR BELOW GROUND DRAINAGE REFER TO DRAWING RAM-XX-XX-DR-00150
10. FOR TYPICAL DETAILS REFER TO DRAWING SERIES RAM-XX-XX-DR-D-00400

Rev	Description	Date	By	Chk	App
P01	STAGE 3 UPDATE	07/06 2022	CO	LF	SP

STAGE 3 - S2

DIDSBURY
TECHNOLOGY PARK
BUILDING D1

RAMBOLL

tel 01244 311855 chester@ramboll.co.uk
www.ramboll.co.uk

DRAINAGE SCHEDULES SHEET 2

Project No:	Scale (@A1):	Drawn:	Date:
1620006198	N/A	CO	NOV 20

Drawing No: RAM-XX-XX-DR-D-00201
Rev: P01

APPENDIX 5
CALCULATIONS

Print | Close Report

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Conor O'Loughlin
Site name:	EV0
Site location:	Didsbury

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

Site Details

Latitude:	53.42494° N
Longitude:	2.25206° W
Reference:	3064375019
Date:	May 18 2022 10:43

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.05

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics	Default	Edited
SAAR (mm):	840	840
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	2.37	2.37
1 in 1 year (l/s):	2.06	2.06
1 in 30 years (l/s):	4.03	4.03
1 in 100 year (l/s):	4.93	4.93
1 in 200 years (l/s):	5.61	5.61

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.370	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.840	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	18.883	0.065	290.5	0.158	4.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	28.123	0.115	244.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	5.402	0.050	108.0	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	13.346	0.050	266.9	0.017	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	5.964	0.055	108.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	4.074	0.275	14.8	0.075	4.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	15.253	0.050	305.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	15.449	0.050	309.0	0.060	0.00	0.0	0.600	oo	150	Double Pipe	
S3.000	13.557	0.575	23.6	0.039	4.00	0.0	0.600	o	100	Pipe/Conduit	
S3.001	17.700	0.050	354.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	15.855	0.050	317.1	0.059	0.00	0.0	0.600	ooo	150	Triple Pipe	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	64.25	4.34	30.000	0.158	0.0	0.0	0.0	0.92	64.8	30.8
S1.001	61.70	4.81	29.935	0.158	0.0	0.0	0.0	1.00	70.8	30.8
S1.002	61.40	4.87	29.820	0.167	0.0	0.0	0.0	1.51	106.9	31.1
S1.003	60.23	5.10	29.770	0.184	0.0	0.0	0.0	0.96	67.7	33.7
S1.004	59.91	5.17	29.720	0.184	0.0	0.0	0.0	1.51	106.7	33.7
S2.000	66.12	4.03	30.140	0.075	0.0	0.0	0.0	2.63	46.5	15.0
S2.001	63.52	4.47	29.865	0.075	0.0	0.0	0.0	0.57	10.1«	15.0
S1.005	57.80	5.62	29.265	0.319	0.0	0.0	0.0	0.57	20.0«	56.0
S3.000	65.42	4.14	30.025	0.039	0.0	0.0	0.0	1.60	12.5	7.7
S3.001	62.29	4.70	29.450	0.039	0.0	0.0	0.0	0.53	9.3	7.7
S1.006	55.79	6.10	29.215	0.417	0.0	0.0	0.0	0.56	29.6«	70.6

©1982-2020 Innovyze

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.007	19.067	0.200	95.3	0.062	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.008	4.685	0.060	78.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	50.031	0.625	80.0	0.000	4.00	0.0	0.600	o	150	Pipe/Conduit	
S1.009	14.782	0.125	118.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.010	9.591	0.070	137.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.007	54.56	6.40	29.165	0.479	0.0	0.0	0.0	1.03	18.2«	79.3
S1.008	54.29	6.47	28.965	0.479	0.0	0.0	0.0	1.14	20.1«	79.3
S4.000	62.07	4.74	29.530	0.000	0.0	0.0	0.0	1.12	19.9	0.0
S1.009	53.29	6.74	28.905	0.479	0.0	0.0	0.0	0.92	16.3«	79.3
S1.010	52.62	6.93	28.730	0.479	0.0	0.0	0.0	0.86	15.1«	79.3

©1982-2020 Innovyze

Manhole Schedules for Storm

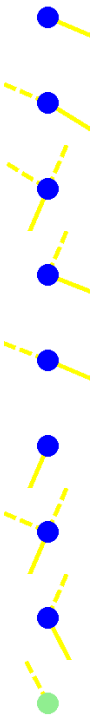
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S6	31.500	1.500	Open Manhole	1200	S1.000	30.000	300				
S7	31.500	1.565	Open Manhole	1200	S1.001	29.935	300	S1.000	29.935	300	
S8	31.500	1.680	Open Manhole	1200	S1.002	29.820	300	S1.001	29.820	300	
S9	31.500	1.730	Open Manhole	1200	S1.003	29.770	300	S1.002	29.770	300	
S10	31.700	1.980	Open Manhole	1200	S1.004	29.720	300	S1.003	29.720	300	
S12	31.550	1.410	Open Manhole	1200	S2.000	30.140	150				
S13	31.700	1.835	Open Manhole	1200	S2.001	29.865	150	S2.000	29.865	150	
S-A1	31.700	2.435	Open Manhole	1200	S1.005	29.265	150	S1.004	29.665	300	550
								S2.001	29.815	150	550
S16	31.530	1.505	Open Manhole	1200	S3.000	30.025	100				
S17	31.700	2.250	Open Manhole	1200	S3.001	29.450	150	S3.000	29.450	100	
S-A2	31.700	2.485	Open Manhole	1350	S1.006	29.215	150	S1.005	29.215	150	
								S3.001	29.400	150	185
S-A3	31.700	2.535	Open Manhole	1350	S1.007	29.165	150	S1.006	29.165	150	
S20	31.700	2.735	Open Manhole	1200	S1.008	28.965	150	S1.007	28.965	150	
S23	31.500	1.970	Open Manhole	1200	S4.000	29.530	150				
S24	31.750	2.845	Open Manhole	1200	S1.009	28.905	150	S1.008	28.905	150	
								S4.000	28.905	150	
S-C2	31.800	3.070	Open Manhole	1200	S1.010	28.730	150	S1.009	28.780	150	50
S-EXMH	31.700	3.040	Open Manhole	0		OUTFALL		S1.010	28.660	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S6	383310.043	392216.222	383310.043	392216.222	Required	
S7	383303.747	392198.420	383303.747	392198.420	Required	
S8	383329.605	392187.362	383329.605	392187.362	Required	
S9	383334.571	392185.236	383334.571	392185.236	Required	
S10	383329.324	392172.965	383329.324	392172.965	Required	
S12	383353.323	392165.685	383353.323	392165.685	Required	
S13	383349.577	392167.287	383349.577	392167.287	Required	
S-A1	383334.603	392170.190	383334.603	392170.190	Required	

©1982-2020 Innovyze

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S16	383301.004	392170.622	383301.004	392170.622	Required	
S17	383313.468	392165.288	383313.468	392165.288	Required	
S-A2	383328.526	392155.986	383328.526	392155.986	Required	
S-A3	383322.290	392141.408	383322.290	392141.408	Required	
S20	383340.052	392134.476	383340.052	392134.476	Required	
S23	383364.038	392178.629	383364.038	392178.629	Required	
S24	383344.358	392132.631	383344.358	392132.631	Required	
S-C2	383338.535	392119.044	383338.535	392119.044	Required	
S-EXMH	383342.884	392110.496			No Entry	



©1982-2020 Innovyze

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S6	31.500	30.000	1.200	Open Manhole	1200
S1.001	o	300	S7	31.500	29.935	1.265	Open Manhole	1200
S1.002	o	300	S8	31.500	29.820	1.380	Open Manhole	1200
S1.003	o	300	S9	31.500	29.770	1.430	Open Manhole	1200
S1.004	o	300	S10	31.700	29.720	1.680	Open Manhole	1200
S2.000	o	150	S12	31.550	30.140	1.260	Open Manhole	1200
S2.001	o	150	S13	31.700	29.865	1.685	Open Manhole	1200
S1.005	oo	150	S-A1	31.700	29.265	2.285	Open Manhole	1200
S3.000	o	100	S16	31.530	30.025	1.405	Open Manhole	1200
S3.001	o	150	S17	31.700	29.450	2.100	Open Manhole	1200
S1.006	ooo	150	S-A2	31.700	29.215	2.335	Open Manhole	1350
S1.007	o	150	S-A3	31.700	29.165	2.385	Open Manhole	1350
S1.008	o	150	S20	31.700	28.965	2.585	Open Manhole	1200
S4.000	o	150	S23	31.500	29.530	1.820	Open Manhole	1200
S1.009	o	150	S24	31.750	28.905	2.695	Open Manhole	1200
S1.010	o	150	S-C2	31.800	28.730	2.920	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	18.883	290.5	S7	31.500	29.935	1.265	Open Manhole	1200
S1.001	28.123	244.5	S8	31.500	29.820	1.380	Open Manhole	1200
S1.002	5.402	108.0	S9	31.500	29.770	1.430	Open Manhole	1200
S1.003	13.346	266.9	S10	31.700	29.720	1.680	Open Manhole	1200
S1.004	5.964	108.4	S-A1	31.700	29.665	1.735	Open Manhole	1200
S2.000	4.074	14.8	S13	31.700	29.865	1.685	Open Manhole	1200
S2.001	15.253	305.1	S-A1	31.700	29.815	1.735	Open Manhole	1200
S1.005	15.449	309.0	S-A2	31.700	29.215	2.335	Open Manhole	1350
S3.000	13.557	23.6	S17	31.700	29.450	2.150	Open Manhole	1200
S3.001	17.700	354.0	S-A2	31.700	29.400	2.150	Open Manhole	1350
S1.006	15.855	317.1	S-A3	31.700	29.165	2.385	Open Manhole	1350
S1.007	19.067	95.3	S20	31.700	28.965	2.585	Open Manhole	1200
S1.008	4.685	78.1	S24	31.750	28.905	2.695	Open Manhole	1200
S4.000	50.031	80.0	S24	31.750	28.905	2.695	Open Manhole	1200
S1.009	14.782	118.3	S-C2	31.800	28.780	2.870	Open Manhole	1200
S1.010	9.591	137.0	S-EXMH	31.700	28.660	2.890	Open Manhole	0

©1982-2020 Innovyze

Setting Out Information - True Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S6	1200		383310.043	392216.222	383310.043	392216.222	
S1.001	S7	1200		383303.747	392198.420	383303.747	392198.420	
S1.002	S8	1200		383329.605	392187.362	383329.605	392187.362	
S1.003	S9	1200		383334.571	392185.236	383334.571	392185.236	
S1.004	S10	1200		383329.324	392172.965	383329.324	392172.965	
S2.000	S12	1200		383353.323	392165.685	383353.323	392165.685	
S2.001	S13	1200		383349.577	392167.287	383349.577	392167.287	
S1.005	S-A1	1200		383334.603	392170.190	383334.603	392170.190	
S3.000	S16	1200		383301.004	392170.622	383301.004	392170.622	
S3.001	S17	1200		383313.468	392165.288	383313.468	392165.288	
S1.006	S-A2	1350		383328.526	392155.986	383328.526	392155.986	
S1.007	S-A3	1350		383322.290	392141.408	383322.290	392141.408	
S1.008	S20	1200		383340.052	392134.476	383340.052	392134.476	
S4.000	S23	1200		383364.038	392178.629	383364.038	392178.629	
S1.009	S24	1200		383344.358	392132.631	383344.358	392132.631	
S1.010	S-C2	1200		383338.535	392119.044	383338.535	392119.044	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.010	S-EXMH	0		383342.884	392110.496	

©1982-2020 Innovyze

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Hardstanding	85	0.186	0.158	0.158
1.001	-	-	100	0.000	0.000	0.000
1.002	Classification	Hardstanding	85	0.011	0.009	0.009
1.003	Classification	Hardstanding	85	0.020	0.017	0.017
1.004	-	-	100	0.000	0.000	0.000
2.000	Classification	Hardstanding	85	0.038	0.032	0.032
	Classification	Hardstanding	85	0.050	0.043	0.075
2.001	-	-	100	0.000	0.000	0.000
1.005	Classification	Hardstanding	85	0.071	0.060	0.060
3.000	Classification	Hardstanding	85	0.046	0.039	0.039
3.001	-	-	100	0.000	0.000	0.000
1.006	Classification	Hardstanding	85	0.069	0.059	0.059
1.007	Classification	Hardstanding	85	0.070	0.059	0.059
	Classification	Hardstanding	85	0.003	0.003	0.062
1.008	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.564	0.479	0.479

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.840
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.363		

©1982-2020 Innovyze

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S24, DS/PN: S1.009, Volume (m³): 4.1

Unit Reference	MD-SHE-0072-2300-1000-2300
Design Head (m)	1.000
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	28.905
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3	Kick-Flo®	0.625	1.9
Flush-Flo™	0.307	2.3	Mean Flow over Head Range	-	2.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.7
0.200	2.2	1.000	2.3	2.200	3.3	4.500	4.6	7.500	5.9
0.300	2.3	1.200	2.5	2.400	3.4	5.000	4.8	8.000	6.0
0.400	2.3	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.2
0.500	2.2	1.600	2.9	3.000	3.8	6.000	5.3	9.000	6.4
0.600	2.0	1.800	3.0	3.500	4.1	6.500	5.5	9.500	6.6

©1982-2020 Innovyze

Storage Structures for Storm

Cellular Storage Manhole: S-A1, DS/PN: S1.005

Invert Level (m) 29.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	126.0	0.0	0.800	126.0	0.0	0.801	0.0	0.0

Cellular Storage Manhole: S-A2, DS/PN: S1.006

Invert Level (m) 29.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	224.0	0.0	0.800	224.0	0.0	0.801	0.0	0.0

Cellular Storage Manhole: S-A3, DS/PN: S1.007

Invert Level (m) 29.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	184.0	0.0	0.800	184.0	0.0	0.801	0.0	0.0

©1982-2020 Innovyze

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.370	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S6	15 Winter	2	+0%	100/15 Summer				30.145	-0.155
S1.001	S7	15 Winter	2	+0%	100/15 Summer				30.069	-0.166
S1.002	S8	15 Winter	2	+0%	100/15 Summer				29.959	-0.161
S1.003	S9	15 Winter	2	+0%	100/15 Summer				29.925	-0.145
S1.004	S10	15 Winter	2	+0%	100/15 Summer				29.866	-0.154
S2.000	S12	15 Winter	2	+0%	30/15 Summer				30.204	-0.086
S2.001	S13	15 Winter	2	+0%	2/15 Summer				30.049	0.034
S1.005	S-A1	30 Winter	2	+0%	30/15 Summer				29.394	-0.021
S3.000	S16	15 Summer	2	+0%	30/15 Summer				30.078	-0.047
S3.001	S17	15 Winter	2	+0%	30/15 Summer				29.548	-0.052
S1.006	S-A2	480 Winter	2	+0%	30/60 Summer				29.331	-0.034
S1.007	S-A3	480 Winter	2	+0%	2/180 Winter				29.329	0.014
S1.008	S20	480 Winter	2	+0%	2/15 Summer				29.318	0.203
S4.000	S23	15 Summer	2	+0%	100/180 Winter				29.530	-0.150
S1.009	S24	480 Winter	2	+0%	2/15 Summer				29.314	0.259
S1.010	S-C2	4320 Summer	2	+0%					28.771	-0.109

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	0.000	0.47			26.5	OK	
S1.001	S7	0.000	0.41			26.0	OK	
S1.002	S8	0.000	0.44			26.7	OK	
S1.003	S9	0.000	0.52			28.9	OK	
S1.004	S10	0.000	0.48			29.2	OK	
S2.000	S12	0.000	0.38			12.6	OK	
S2.001	S13	0.000	1.34			12.5	SURCHARGED	
S1.005	S-A1	0.000	1.01		20	18.7	OK	

©1982-2020 Innovyze

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S16	0.000	0.55			6.6	OK	
S3.001	S17	0.000	0.75			6.5	OK	
S1.006	S-A2	0.000	0.22		324	6.1	OK	
S1.007	S-A3	0.000	0.22		391	3.8	SURCHARGED	
S1.008	S20	0.000	0.20			3.1	SURCHARGED	
S4.000	S23	0.000	0.00			0.0	OK	
S1.009	S24	0.000	0.15			2.3	SURCHARGED	
S1.010	S-C2	0.000	0.17			2.3	OK	

©1982-2020 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.370	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S6	15 Winter	30	+0%	100/15 Summer				30.222	-0.078
S1.001	S7	15 Winter	30	+0%	100/15 Summer				30.136	-0.099
S1.002	S8	15 Winter	30	+0%	100/15 Summer				30.036	-0.084
S1.003	S9	15 Winter	30	+0%	100/15 Summer				30.011	-0.059
S1.004	S10	15 Winter	30	+0%	100/15 Summer				29.943	-0.077
S2.000	S12	15 Winter	30	+0%	30/15 Summer				30.364	0.074
S2.001	S13	15 Winter	30	+0%	2/15 Summer				30.234	0.219
S1.005	S-A1	30 Winter	30	+0%	30/15 Summer				29.520	0.105
S3.000	S16	15 Winter	30	+0%	30/15 Summer				30.179	0.054
S3.001	S17	15 Winter	30	+0%	30/15 Summer				29.629	0.029
S1.006	S-A2	480 Winter	30	+0%	30/60 Summer				29.486	0.121
S1.007	S-A3	480 Winter	30	+0%	2/180 Winter				29.483	0.168
S1.008	S20	480 Winter	30	+0%	2/15 Summer				29.474	0.359
S4.000	S23	15 Summer	30	+0%	100/180 Winter				29.530	-0.150
S1.009	S24	480 Winter	30	+0%	2/15 Summer				29.470	0.415
S1.010	S-C2	8640 Summer	30	+0%					28.771	-0.109

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	0.000	0.89			50.0	OK	
S1.001	S7	0.000	0.77			49.1	OK	
S1.002	S8	0.000	0.82			50.5	OK	
S1.003	S9	0.000	0.98			54.6	OK	
S1.004	S10	0.000	0.90			55.2	OK	

©1982-2020 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	S12	0.000	0.67			21.9	SURCHARGED	
S2.001	S13	0.000	2.35			21.9	SURCHARGED	
S1.005	S-A1	0.000	1.80		18	33.4	SURCHARGED	
S3.000	S16	0.000	0.97			11.5	SURCHARGED	
S3.001	S17	0.000	1.31			11.5	SURCHARGED	
S1.006	S-A2	0.000	0.24			6.5	SURCHARGED	
S1.007	S-A3	0.000	0.22			3.8	SURCHARGED	
S1.008	S20	0.000	0.20			3.1	SURCHARGED	
S4.000	S23	0.000	0.00			0.0	OK	
S1.009	S24	0.000	0.15			2.3	SURCHARGED	
S1.010	S-C2	0.000	0.17			2.3	OK	

©1982-2020 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.370	Cv (Winter) 0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S6	15 Winter	100	+40%	100/15 Summer				30.663	0.363
S1.001	S7	15 Winter	100	+40%	100/15 Summer				30.523	0.288
S1.002	S8	15 Winter	100	+40%	100/15 Summer				30.342	0.222
S1.003	S9	15 Winter	100	+40%	100/15 Summer				30.229	0.159
S1.004	S10	15 Summer	100	+40%	100/15 Summer				30.094	0.074
S2.000	S12	15 Winter	100	+40%	30/15 Summer				31.027	0.737
S2.001	S13	15 Winter	100	+40%	2/15 Summer				30.697	0.682
S1.005	S-A1	720 Winter	100	+40%	30/15 Summer				29.799	0.384
S3.000	S16	15 Winter	100	+40%	30/15 Summer				30.963	0.838
S3.001	S17	720 Winter	100	+40%	30/15 Summer				29.796	0.196
S1.006	S-A2	720 Winter	100	+40%	30/60 Summer				29.796	0.431
S1.007	S-A3	720 Winter	100	+40%	2/180 Winter				29.793	0.478
S1.008	S20	720 Winter	100	+40%	2/15 Summer				29.783	0.668
S4.000	S23	720 Winter	100	+40%	100/180 Winter				29.778	0.098
S1.009	S24	720 Winter	100	+40%	2/15 Summer				29.778	0.723
S1.010	S-C2	10080 Winter	100	+40%					28.771	-0.109

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S6	0.000	1.43			80.5	SURCHARGED	
S1.001	S7	0.000	1.24			79.6	SURCHARGED	
S1.002	S8	0.000	1.36			83.4	SURCHARGED	
S1.003	S9	0.000	1.64			91.1	SURCHARGED	
S1.004	S10	0.000	1.45			89.2	SURCHARGED	

©1982-2020 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.000	S12	0.000	1.11			36.3	SURCHARGED	
S2.001	S13	0.000	3.83			35.7	SURCHARGED	
S1.005	S-A1	0.000	0.56			10.3	SURCHARGED	
S3.000	S16	0.000	1.44			17.1	SURCHARGED	
S3.001	S17	0.000	0.21			1.8	SURCHARGED	
S1.006	S-A2	0.000	0.23			6.3	SURCHARGED	
S1.007	S-A3	0.000	0.19			3.3	SURCHARGED	
S1.008	S20	0.000	0.18			2.8	SURCHARGED	
S4.000	S23	0.000	0.00			0.0	SURCHARGED	
S1.009	S24	0.000	0.15			2.3	SURCHARGED	
S1.010	S-C2	0.000	0.17			2.3	OK	

©1982-2020 Innovyze