

Flood Risk Assessment & Drainage Strategy for a Development at Riverpark Road, Newton Heath, Manchester, M40 2XP. Rev. 8

Contract Ref: FD186

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Quality Assurance Record

Contributors for Townsend Water Engineering Limited:

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The work described in this report was undertaken for the party or parties stated; for the purpose or purposes stated; to the time and budget constraints stated. No liability is accepted for use by other parties or for other purposes, or unreasonably beyond the terms and parameters of its commission and its delivery to normal professional standards.

1. EXECUTIVE SUMMARY

A summary of the main conclusions for the FRA is presented below:

- Development proposals are for a residential development comprising apartment blocks in the West and low rise residential dwellings across the remainder of the site at land at Riverpark Road, Newton Heath, Manchester, M40 M2XP;
- The proposed development will comprise the following:
 - **498 dwellings made up of 221 houses and 277 apartments**
 - Around 300 car parking spaces
 - Hard and soft landscaping, including children's play area
 - Over a third of new dwellings (214) will be affordable
- The development site is approximately 7.4ha. The approximate impermeable area is 3.77ha, assumed at 65% impermeable area;
- The site is within a Flood Zone 1;
- There is some high surface water flooding at the site, however, we are raising the finished floor levels by 300mm;
- All forms of flooding (Fluvial, Surface Water, Ground Water, Infrastructure and Sewer) at this site is low;
- The proposed development passes the sequential test;
- According to E3p's soakaway testing at the site, infiltration does not work;
- The calculated existing run off to be 2,524l/s, with a 50% reduction it would be 1,262l/s.
- However, the discharge will be set at 200l/s this has been agreed with the *UU*. The site will discharge to the *UU* CSO to the South of the site. This is 80% less than the existing discharge.;
- MCC have agreed to a discharge of 200l/s.
- The proposed development will have storage up to and including the 1 in 100 year event plus climate change of 45%;
- Finished floor levels will be raised by 300mm in the West of the site, to mitigate any potential surface water flows coming from *Briscoe Lane*;
- The public drainage will be offered up to *United Utilities*;
- According to the SFRA there is an underground watercourse running through the site, however MCC have agreed with the information provided by Kellen Homes that there is no underground watercourse; and
- The attenuation for the 1 in 100 year event plus climate change will be held in oversized pipes in the east and under the car parks in the east. Permeable pavement will be used in the car parks. On the apartments water butts will be used. Finally there will be rainwater gardens and an attenuation pond in the west for attenuation up to and including the 1 in 100 year event plus climate change 45%.

2. INTRODUCTION

2.1 Purpose of this Report

Townsend Water Engineering Ltd. has been appointed by *Kellen Homes and Great Places Housing Group* for a Flood Risk Assessment (FRA) of a development for the erection of a total of approximately 498 new dwellings at Riverpark Road, Newton Heath, Manchester, M40 2XP (Grid Ref: 387241, 399485). This report has been prepared in support of the planning permission for the aforementioned development. The 498 dwellings will comprise of:

- 277 apartments
- 214 affordable dwellings
- Around 300 car parking spaces
- Hard and soft landscaping, including children's play area
- Over a third of new dwellings (c.214) will be affordable

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FRA is consistent with the 'Site Specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG):

<https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>

2.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings and respective topographic plan delivered by *Kellen Homes*;
- *Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 2 SFRA Final March 2011*;
- *Manchester City Council March 2014 Local Flood Risk Management Strategy*;
- *Manchester City Council Core Strategy*;
- *Places for Everyone Policies*;
- Defra Magic Map <https://magic.defra.gov.uk/magicmap.aspx>;
- The EA online flood maps;
- <https://flood-map-for-planning.service.gov.uk/>;
- E3p's soakaway testing results; and
- <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>.

2.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

1. National policy contained within the National Planning Policy Framework (NPPF); and
2. The NPPF Planning Practice Guidance (PPG).

2.4 Structure of this Report

The Report has been prepared based on the following structure:

1. Section 3 refers to spatial planning considerations by reference to the proposed land use, flood zoning and NPPF vulnerability;
2. Section 2 presents an Executive Summary;
3. Section 4 presents the assessment of existing flood risk at the site;
4. Section 5 presents the proposed development and findings of flooding; and
5. Section 5 presents the drainage strategy.

Additional Appendices are provided that deal with the following:

Appendix A: Topographical Survey;
Appendix B: E3P Report;
Appendix C: Statutory Bodies Communications and evidence
Appendix D: Proposed layout;
Appendix E: Existing Drainage
Appendix F: Concept Drainage Calculations.
Appendix G: Simple Pollution Index

3. SPATIAL PLANNING CONSIDERATION

3.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The site is located at Riverpark Road, Newton Heath, Manchester, M40 2XP (Grid Ref: 387241, 399485). (Table 1: Site Details). The application proposals present an opportunity to create a new community on a sustainably located site in East Manchester, delivering new family housing and affordable homes.

The Site is 7.4 hectares (18.3 acres) in size and is located within the administrative boundary of Manchester City Council ("MCC"). It is bounded by Riverpark Road to the south, and the Manchester to Huddersfield railway line to the north. Ten Acres Lane forms the eastern boundary of the Site, with Briscoe Lane forming the western boundary.

The Site is currently occupied by several buildings relating to its former use as an industrial estate. It is also the site of the former Manchester Abattoir which is understood to have operated at the Site until 2000.

The Site is located to the north of Phillips Park, which includes Philips Park Cemetery (located immediately to the south of the Site) and is a Grade II registered park and garden. A number of buildings and structures within the cemetery are also Grade II listed, including the cemetery chapel and the entrance lodge; cemetery office; and gates and railings at the main entrance on Briscoe Lane. There are no listed buildings or structures within the Site and it is not within a conservation area. In terms of flood risk, the site is located in Flood Zone 1.

The River Medlock is to the south of the site, it is a main river.

Table 1: Site Details

Reference	Value
OS X (Eastings)	387241
OS Y (Northings)	399485
Nearest Post Code	M40 2XP
Nat. Grid	SJ872994

Grid Reference Details Taken from the site Grid Reference Finder

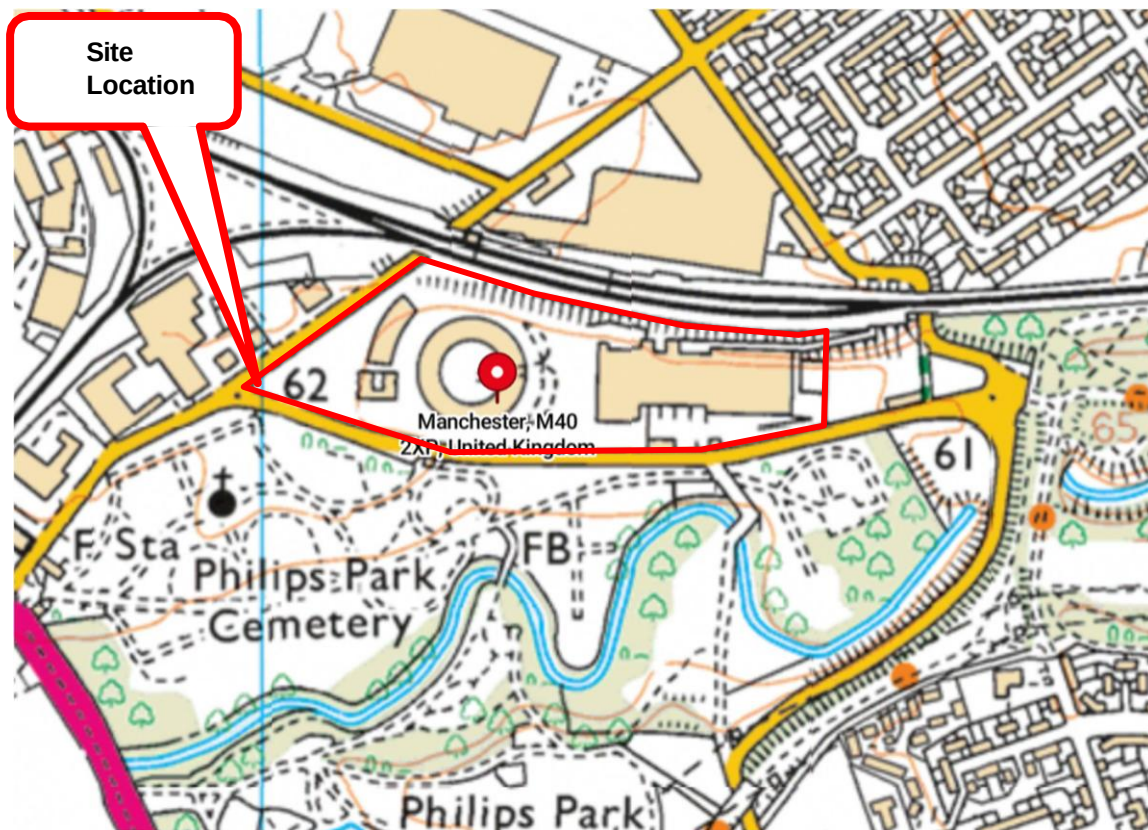


Figure 1: Site Location (Source: Bing Map)

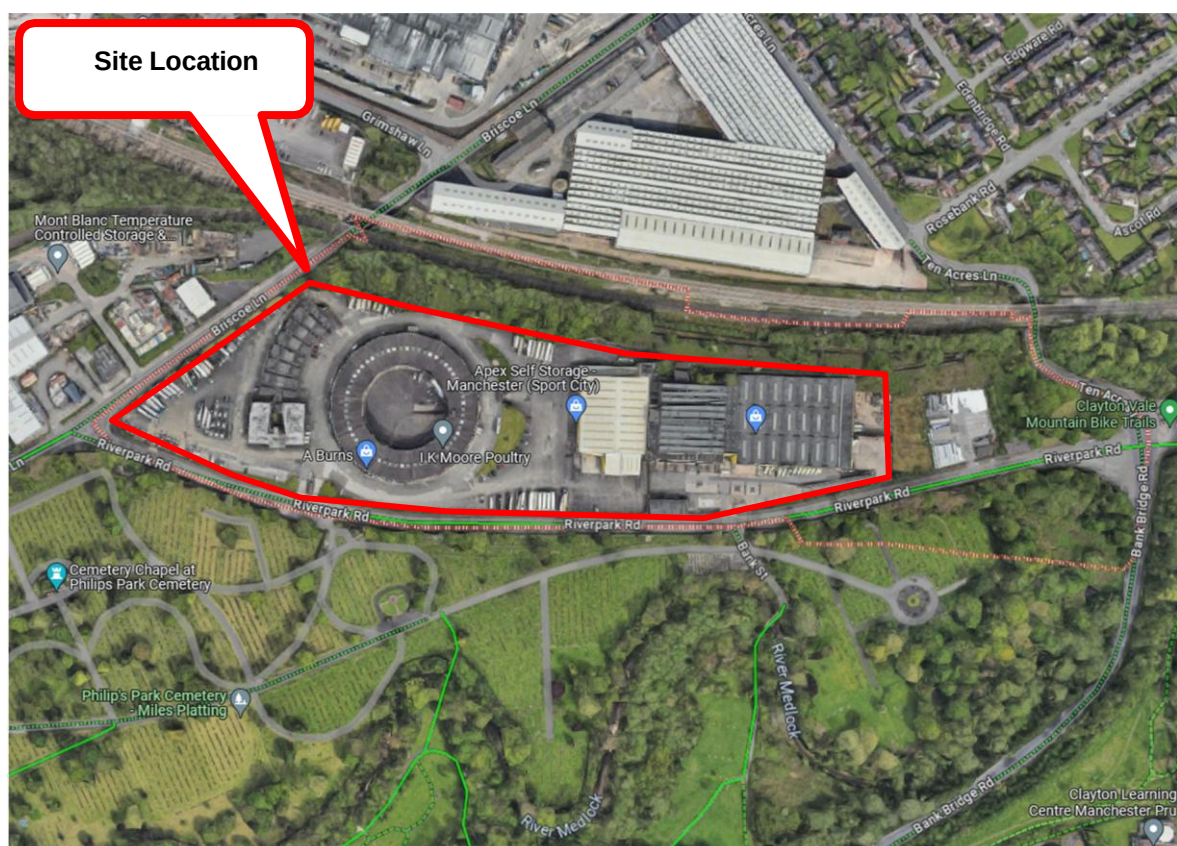


Figure 2: Aerial View of the Site (Source: Google Maps)

3.2 Topography

The existing ground elevations on site is shown in the topographic survey (Appendix A). The survey indicates that the site is highest in the North and lowest to the South. Ground levels vary between 69.3mAOD and 56.9mAOD. The ground sweeps down to the South, towards the *River Medlock* watercourse. Please see Appendix A.

3.3 Geology and Soil

A Geo-Environmental report Published by E3p was undertaken for the site. Within this report, soakaway testing was undertaken; infiltration was not successful. Therefore, soakaways are not suitable for this site. Please see Appendix B for an extract of E3p report.

3.4 Flood Zone and Surface Water Flooding

The existing site is within a Flood Zone 1, please see Figure 3. An area with a 0.1% chance of flooding (1 in 1000 year event). This suggests that the site is at low risk of fluvial flooding.

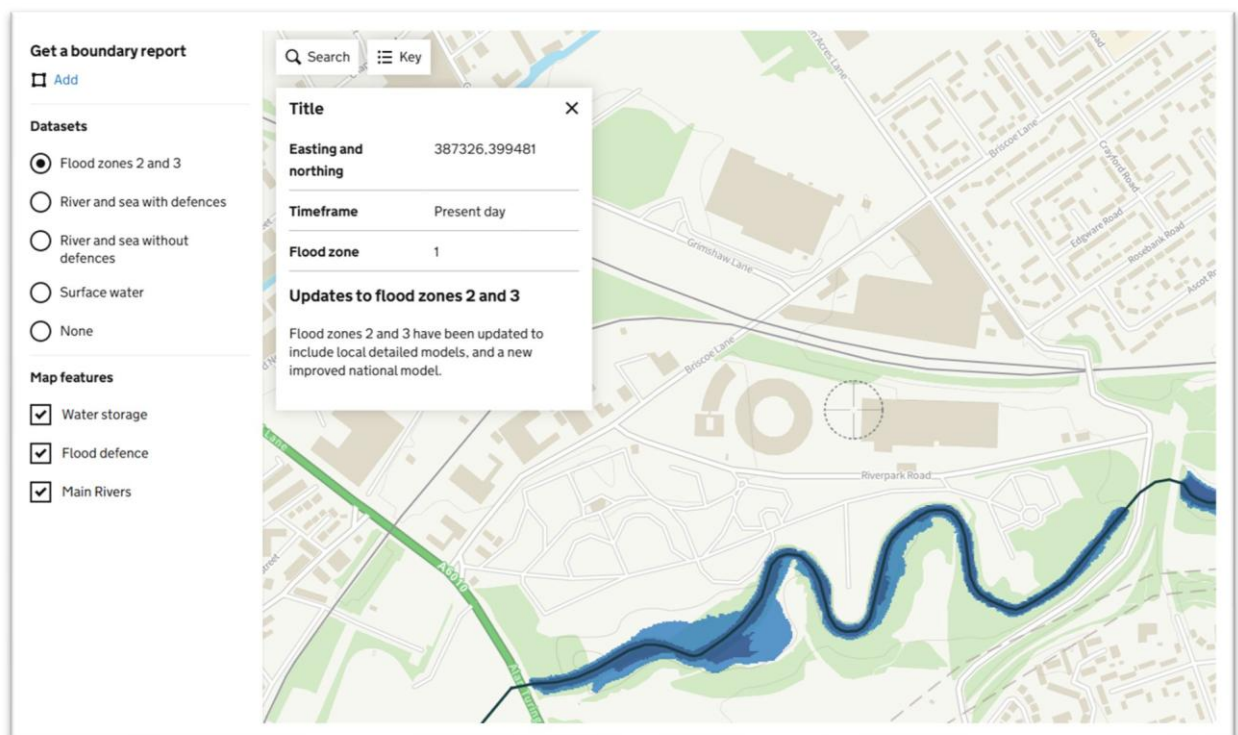


Figure 3: Flood Risk Maps

The existing site is at low to high risk of surface water flooding. Please see Figure 4.

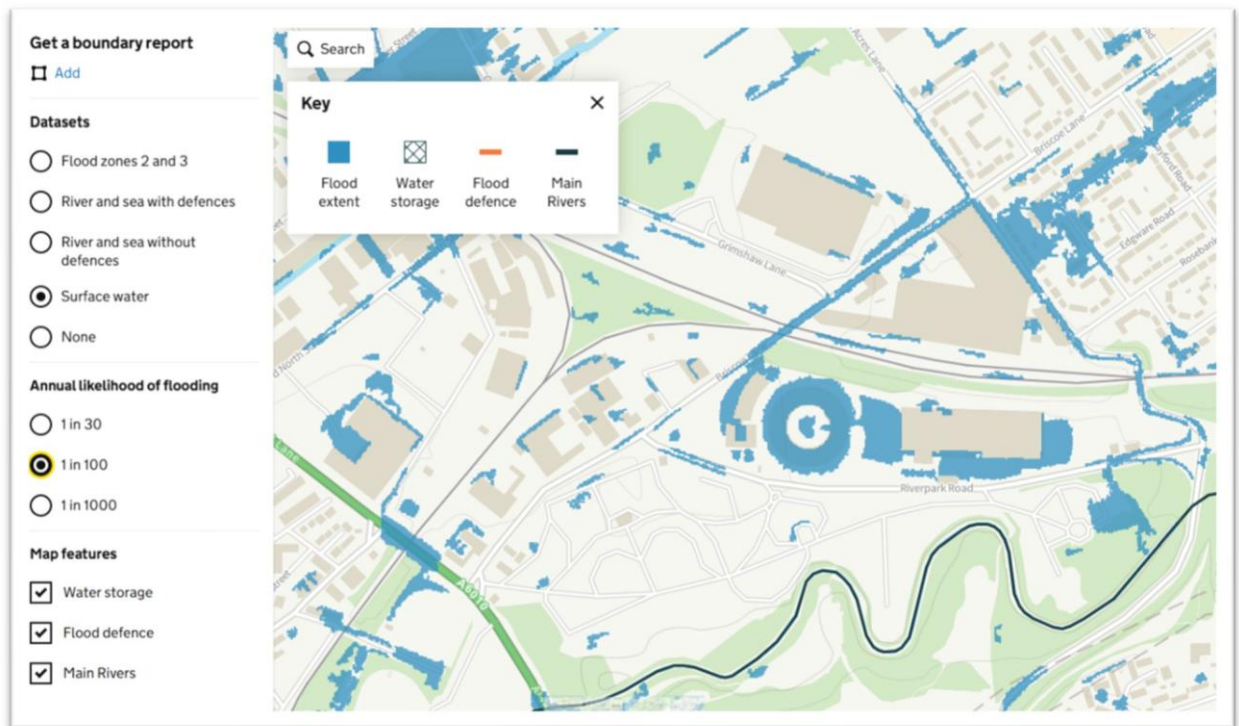


Figure 4: Flood Risk Maps: Surface Water (Source: EA Open Dataset) 1 in 100 Year AEP

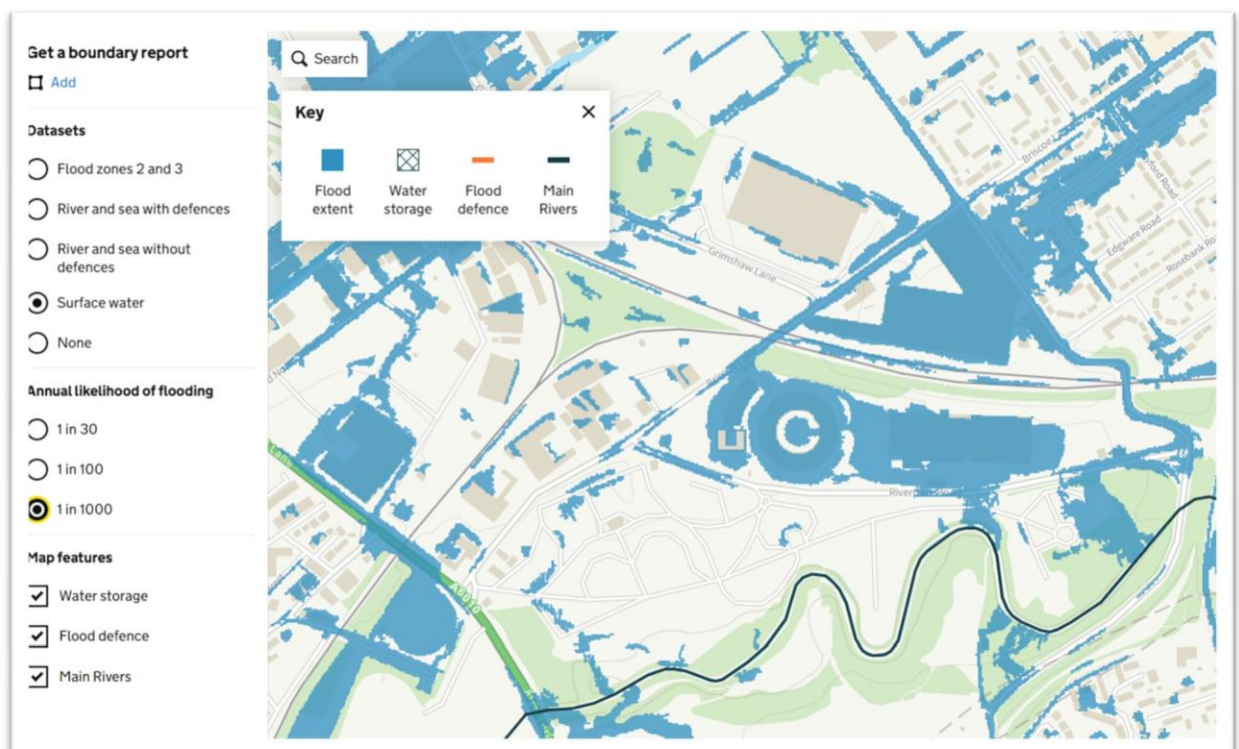


Figure 5: Flood Risk Maps: Surface Water (Source: EA Open Dataset) 1 in 1000 Year AEP

Surface water flooding will be mitigated by the inclusion of a new drainage systems, which will attenuate up to and including the 1 in 100 year event plus climate change. Furthermore, the finished floor levels on the Western boundary will be raised by approximately 300mm, to ensure

a minimum risk of potential surface water flooding from *Briscoe Lane*. Therefore, the site is believed to be at low risk of surface water flooding.

3.5 NPPF Vulnerability

The development will be classed as 'More Vulnerable' under the NPPF vulnerability classification (Table 2). The flood risk vulnerability and flood zone compatibility are displayed in Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Source: NPPF Technical Guide). As noted in Section 2.4, the site is within Flood Zone 1 according to the EA flood risk map for planning.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

More vulnerable (MV)
Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels
Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
Non-residential uses for health services, nurseries and educational establishments.
Landfill and sites used for waste management facilities for hazardous waste ⁶ .
Sites used for holiday or short let caravans and camping, subject to a specific warning and evacuation plan. ⁷

Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Source: NPPF Technical Guide)

Flood Zone	Definition	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
1	$T > 1,000$	✓	✓	✓	✓	✓
2	$100 < T_{fluv} < 1,000$ $200 < T_{tidal} < 1,000$	✓	✓	Exc. Test	✓	✓
3a	$T_{fluv} < 100$ $T_{tidal} < 200$	Exc. Test	✓	✗	Exc. Test	✓
3b (functional floodplain)	$T_{fluv} < 20$	Exc. Test	✓	✗	✗	✗

As the site is within a Flood Zone 1 and more vulnerable, the site passes the sequential test. Please see Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Source: NPPF Technical Guide). Please see an extract from Manchester City, Salford City & Trafford Council Level 2 Hybrid SFRA Level 2 SFRA Final March 2011 (Figure 6, M0003) which suggests that the site is acceptable to development in regards to flooding.

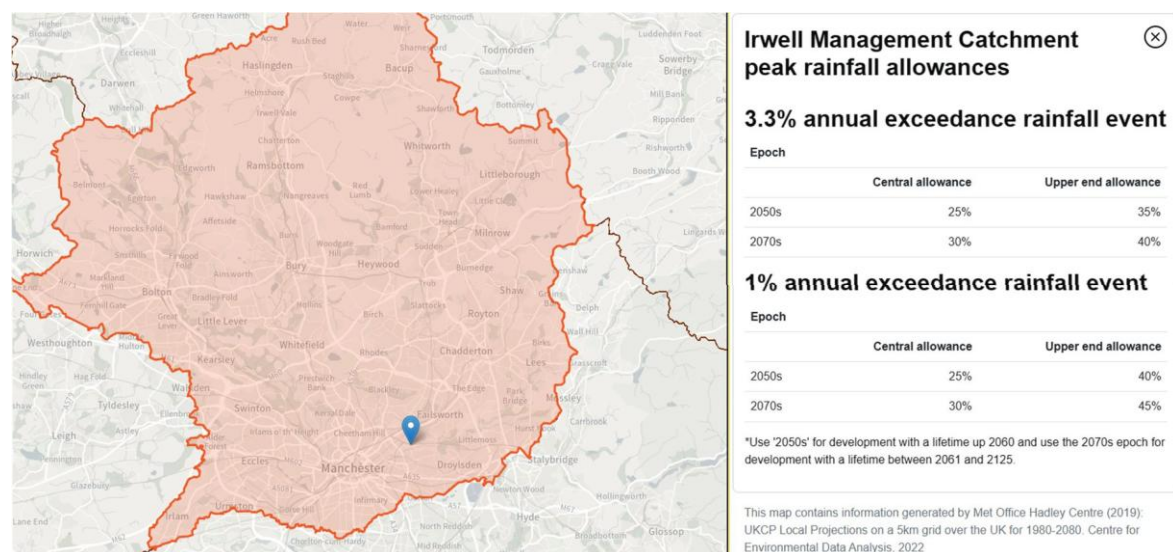
SFRA Strategic Location	Strategic development sites	Flood risk	Planning conclusion
Manchester			
Regional Centre and Inner Areas West	Victoria (M0005) Strangeways (M0004)	Primary risk from the Lower Irwell and Grey Irwell Secondary risk from surface water, groundwater and lost watercourses	Development should be acceptable on flood risk grounds. Residual risk from these sources needs to be taken into account when planning developments, including the careful consideration of urban design at Strangeways
Regional Centre and Inner Areas North	Harpurhey/Moston (M0015-M0020) Irk Valley (M0021) Booth Hall (M0022) Blackley Village (M0023) Collyhurst (M0013) Miles Platting (M0008) Newton Heath (M0009) Central Park (M0003)	Primary risk from the River Irk and Moston Brook Secondary risk from canal breach and overtopping, surface water and lost watercourses	Areas of the highest risk within sites affected by flooding from the River Irk should be sequentially avoided Development elsewhere should be acceptable on flood risk grounds. Residual risk from extreme events and other sources needs to be taken into account when planning developments
Regional Centre and Inner Areas South	Eastern Gateway (M0001) Sport City (M0002) Holt Town (M0024) Chancellors Place (M0025) Lower Medlock (M0026) Oxford Road Corridor (M0042) West Gorton (M0010) Brunswick (M0011) Coverdale Crescent/New Bank Street (M0012)	Primary risk from the River Medlock and Corn Brook Secondary risk from canal breach and overtopping, surface water, groundwater and lost watercourses	Areas of the highest risk within sites affected by flooding from the River Medlock, Bridgewater Canal interactions and Corn Brook should be sequentially avoided Development elsewhere should be acceptable on flood risk grounds. Residual risk from extreme events and other

Figure 6: Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 2 SFRA Final March 2011

3.6 Climate Change Allowances for Peak Rainfall Intensity

The Environment Agency and NPPF require a consideration of the impacts of climate change in Flood Risk Assessments (FRA). In May 2022, the Environment Agency updated the climate change allowances required in Flood Risk Assessments (Environment Agency, 2022); this advice updates previous climate change allowances to support the NPPF (DCLG, 2021). Table 4: Peak rainfall intensity allowance shows anticipated changes in small catchments, recommending a progressive increase, reaching 45% for the 'Upper End' allowance by 2070. This allowance would be recommended for this proposed development, which is classified as 'More Vulnerable' and has been taken to have a 100-year design life. The 45% climate change allowance is based on the 90th percentile, meaning that there is a 90% chance that rainfall will not increase by more than the 45% increment.

Table 4: Peak Rainfall Intensity Allowance



4. FLOOD HAZARD FOR EXISTING SITE

4.1 Source of Flood Risk

Flood sources and their possibilities are shown below.

4.1.1 Flood Risk from Fluvial Sources

The proposed development is in a flood zone 1. Therefore, the site is considered to be at low risk of fluvial flooding.

4.1.2 Surface Water

The site is at low to high risk of surface water flooding, as mentioned in section 2.4.

Surface water flooding will be mitigated by the inclusion of a new drainage system, which will attenuate up to and including the 1 in 100 year event plus 45% climate change. Furthermore, the finished floor levels on the Western boundary will be raised by approximately 300mm, to ensure a minimum risk of potential surface water flooding from *Briscoe Lane*. Therefore, the site is believed to be at low risk of surface water flooding.

4.1.3 Flood Risk from Reservoir /Canals / Other Artificial Sources

Figure 7: Extent of Flooding from Reservoirs (Source; EA Flood Warning Information Service), indicates that the site is not within potential risk of flooding in the event of a breach from reservoirs(over 25,000 m³ of water. Flooding from reservoir is considered to be extremely unlikely and the risk of flooding to the site considered to be low.

Rochdale canal is 480m west of the site. The canal is believed to be of no flood risk to the site as there is an embankment between the site and Rochdale canal. Furthermore, the site is typically higher than the canal. Therefore, there is no flood risk from canals or other artificial sources as there are no artificial sources within the vicinity of the site.

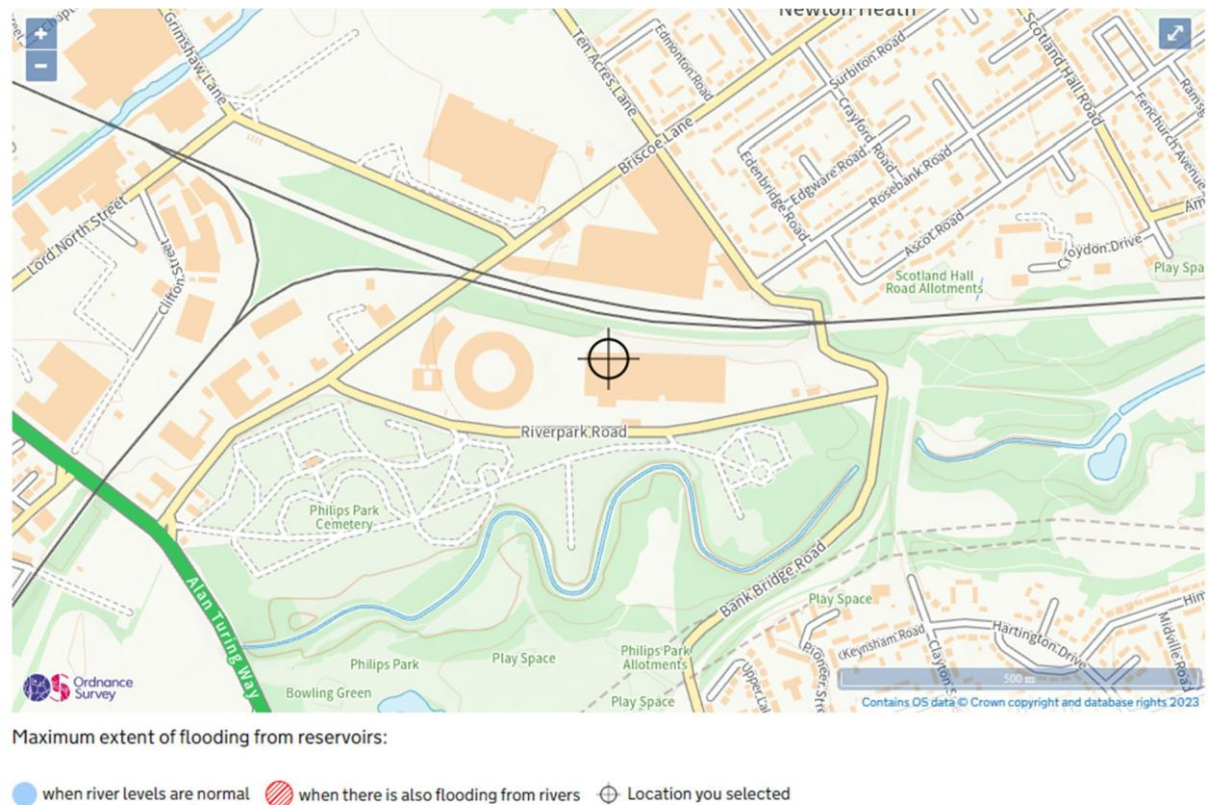


Figure 7: Extent of Flooding from Reservoirs (Source; EA Flood Warning Information Service)

4.1.4 Flood Risk from Groundwater

According to *Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 2 SFRA Final March 2011* (Figure 6), the site is not at risk from groundwater flooding. Therefore, the risk of groundwater flooding is low for this site.

SFRA Strategic Location	Strategic development sites	Flood risk	Planning conclusion
Manchester			
Regional Centre and Inner Areas West	Victoria (M0005) Strangeways (M0004)	Primary risk from the Lower Irwell and Grey Irwell Secondary risk from surface water, groundwater and lost watercourses	Development should be acceptable on flood risk grounds. Residual risk from these sources needs to be taken into account when planning developments, including the careful consideration of urban design at Strangeways
Regional Centre and Inner Areas North	Harpurhey/Moston (M0015-M0020) Irk Valley (M0021) Booth Hall (M0022) Blackley Village (M0023) Collyhurst (M0013) Miles Platting (M0008) Newton Heath (M0009) Central Park (M0003)	Primary risk from the River Irk and Moston Brook Secondary risk from canal breach and overtopping, surface water and lost watercourses	Areas of the highest risk within sites affected by flooding from the River Irk should be sequentially avoided Development elsewhere should be acceptable on flood risk grounds. Residual risk from extreme events and other sources needs to be taken into account when planning developments
Regional Centre and Inner Areas South	Eastern Gateway (M0001) Sport City (M0002) Holt Town (M0024) Chancellors Place (M0025) Lower Medlock (M0026) Oxford Road Corridor (M0042) West Gorton (M0010) Brunswick (M0011) Coverdale Crescent/New Bank Street (M0012)	Primary risk from the River Medlock and Corn Brook Secondary risk from canal breach and overtopping, surface water, groundwater and lost watercourses	Areas of the highest risk within sites affected by flooding from the River Medlock, Bridgewater Canal interactions and Corn Brook should be sequentially avoided Development elsewhere should be acceptable on flood risk grounds. Residual risk from extreme events and other

Figure 8: Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA LEVEL 2 SFRA Final March 2011

4.1.5 Flood Risk from Sewers

The proposed site has 3 combined *United Utilities (UU)* sewers entering the site in the South and South-West of the site. These sewers will need a 3m easement on either side, or a section 185 will be applied for to remove/relocate them, if required.

The existing *UU* sewer will be where the foul water will drain to. It is believed that this is in working order and does not flood the site. Therefore, the existing flood risk from sewers is believed to be low.

There is a combined sewer overflow (CSO) that runs down South, through the cemetery.

Please see the sewer map below in Figure 9:

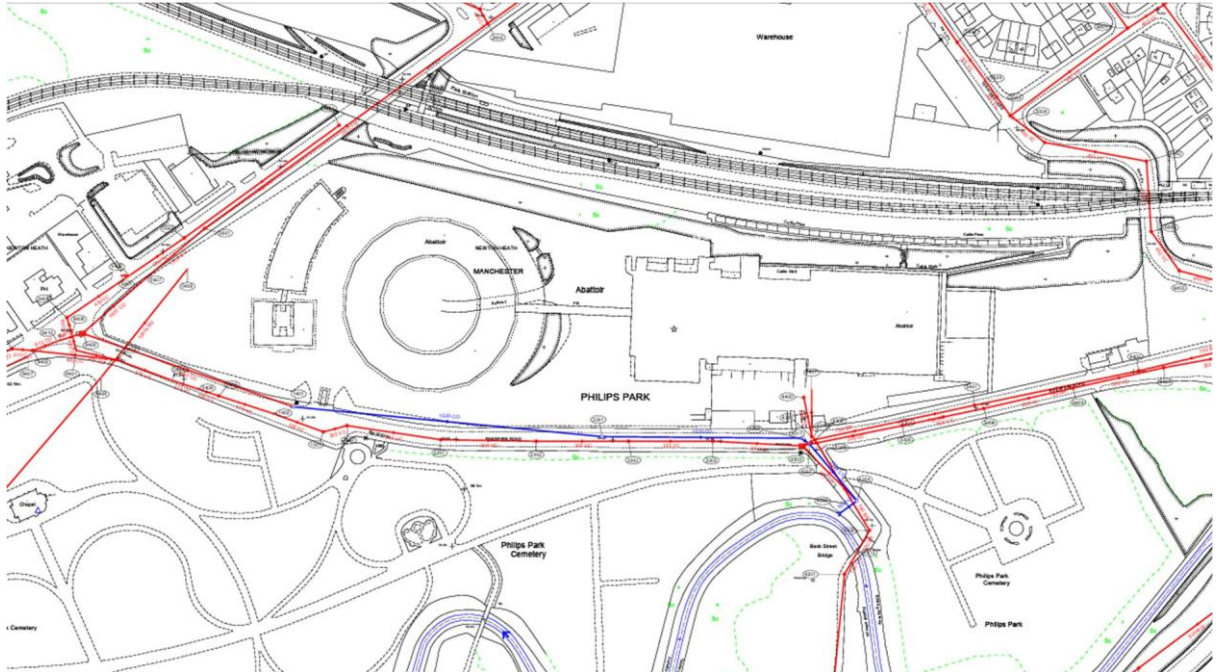


Figure 9: Existing Sewers

Kellen Homes have undertaken CCTV services of the *UU* assets to confirm where sewers are. The combined sewer starting in the western part of the site (manhole number 0406 and 0402) was found to be bricked up and is not there. At a meeting between Manchester City Council (MCC), Kellen Homes and AJP on the 22nd November; MCC confirmed that the sewer was not there because of the evidence supplied. Please see appendix C for the evidence and MCC comments confirming that the sewer is not redundant.

The surface water drainage pipe running between manhole 1401 and 3301 crosses the site according to the sewer maps.

However Kellen homes undertook CCTV survey, and it indicates that the sewer actually follows the road and bends around the site. Please see appendix C for the CCTV survey and MCC agreement with Kellen Homes findings.

According to the SFRA there is an underground watercourse please see Figure 10. The watercourse is indicated as a purple line

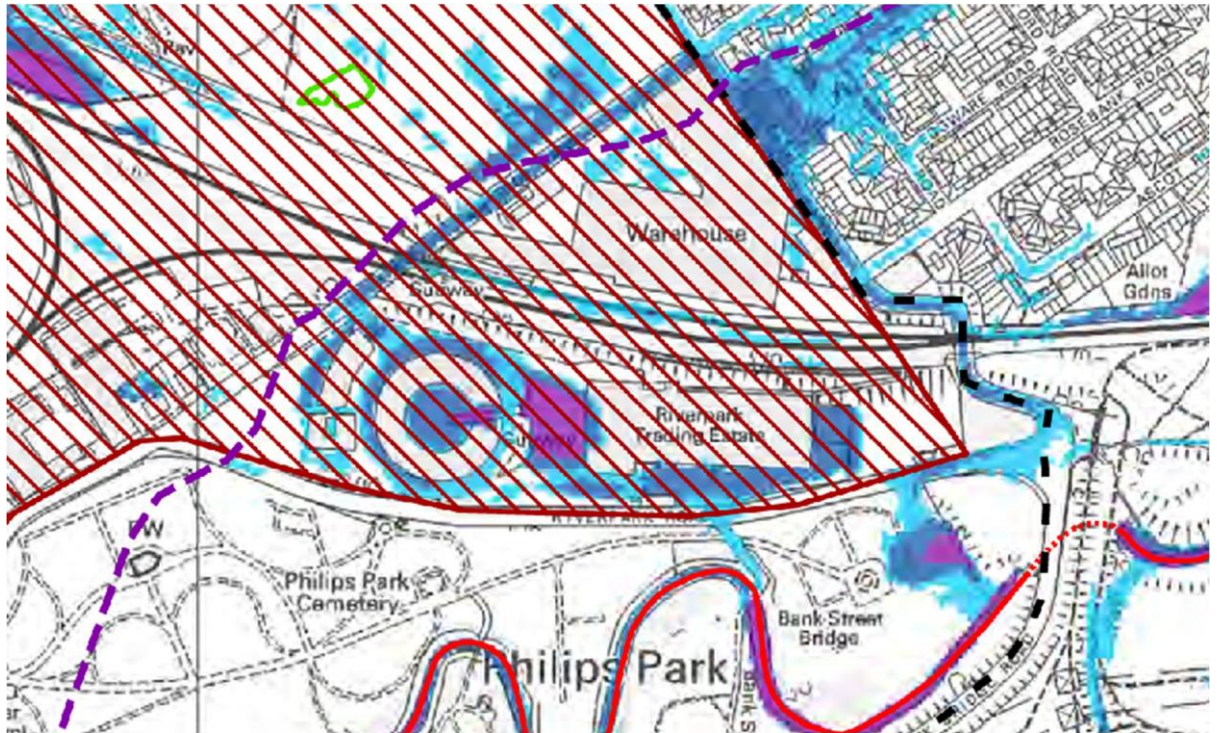


Figure 10: SFRA critical drainage map

However, Kellen Homes had a meeting with Manchester city Council on the 22nd November and provide evidence that suggested there was no underground water in the site. Please see appendix C.

1 in 100 year event plus climate change (45%) and the finished floor levels on the Western boundary being raised by approximately 300mm, to ensure a minimum risk of potential surface water flooding from *Briscoe Lane*, the surface water risk is to be minimised.

6. DRAINAGE STRATEGY

6.1.1 Surface Water

The existing site is a brownfield site, which drains via a *United Utilities* CSO to the South of the site. Please see the existing drainage in Appendix E.

6.2 Infiltration Rates

As said in section 2.3, E3p carried out infiltration testing at the site and found that infiltration does not work.

6.3 Run-off

We have contacted the LLFA regarding discharge rates, unfortunately they have currently suspended any pre-application advice. Please see the e-mail exchange in Appendix E.

We have calculated the existing run off to be 2,524l/s, with a 50% reduction it would be 1,262l/s. However, we are proposing 200l/s as a compromise.

We have contacted the LLFA regarding discharge rates, and a meeting was held on 18.11.2024 here Laura Peacock agreed to the above proposal.

This is a significant decrease in discharge from the existing situation. The decrease is approximately 80%.

Discharge rates have been agreed with *United Utilities* into their CSO. Please see Appendix C.

6.4 Surface Water Drainage Strategy

6.4.1 Hierarchy of Discharge

As detailed in section 2.3, infiltration is not feasible at this site. The *River Medlock* is 45m to the South of the site. It has been agreed with *United Utilities* and Manchester City Council that the proposed development can drain into their combined sewer overflow (CSO), which will then drain to the watercourse.

6.4.2 Sizing of SUDS Features

As discussed in section 4.1 of this report, the proposed impermeable surface area of the dwellings and associated features is anticipated to be approximately 4.81ha. It is intended that the proposed surface water system will be adopted by *United Utilities*.

The discharge will be restricted to 200l/s via a Hydrobreak (or similar flow control device), in the 1 in 100 year event plus climate change.

The storage will be held primarily in:

- oversized pipes;
- rainwater gardens;
- permeable pavement in the car parks;
- water butts; and
- attenuation pond up to and including the 1 in 100 year event plus 45% climate change.

Modelling of the surface water runoff to the design parameters was carried out using Causeway, an industry leading software which allows design and analysis of SuDS features. Original model

results are displayed in Appendix F: Info Drainage modelling results. The following conservative assumptions and design parameters have been set within the Hydraulic model:

- It is assumed that the impermeable area of the site is approximately 65%, which is 3.77ha;
- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology, and increased by 45%, the upper end allowance for climate change over the 100 years design life of the proposed residential development (Appendix F), in line with the requirements of the NPPF;
- No runoff losses have been assumed in the modelling, therefore, all the design rainfall landing on the impermeable surfaces is expected to reach the oversized pipes;
- As per the conclusions in Section 3.3, the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- A Hydro-Break (or similar flow control device) has been used to restrict the discharge to 200l/s; and
- Using the quick storage estimate the storage will be approximately between 2030m³ and 3242m³.

Please see Appendix F and Figure 12 for the design.

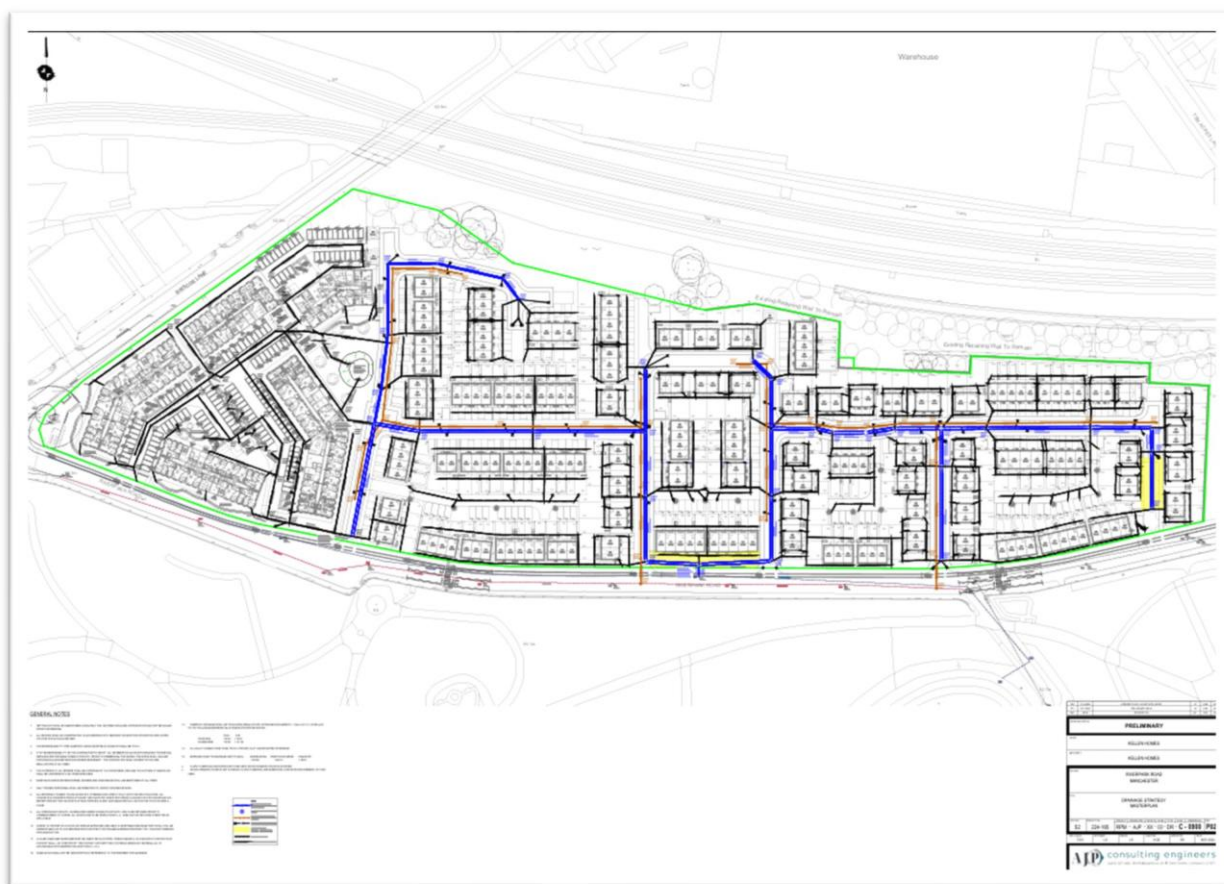


Figure 12: Drainage Design

6.4.3 Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g., after heavy rainfall, should be established by the site owners to reduce the risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed for the drainage system to be adopted by a NAV. The following maintenance will be undertaken for the oversized pipes, attenuation pond, rainwater garden and permeable pavements:

Table 5: Operation and Maintenance Requirements for Oversized Pipes

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

Table 6; Operation and Maintenance Requirements for Permeable pavements

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 glyphosate 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 7: Operation and Maintenance Requirements for Rainwater Butts

TABLE 11.6	Operation and maintenance requirements for RWH systems		
	Maintenance schedule	Required action	Typical frequency
Regular maintenance		Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
		Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance		Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial actions		Repair of overflow erosion damage or damage to tank	As required
		Pump repairs	As required

Table 8: Figure 12: Operation and Maintenance Requirements for Rainwater Gardens

TABLE 18.3	Operation and maintenance requirements for bioretention systems		
	Maintenance schedule	Required action	Typical frequency
Regular inspections		Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
		Check operation of underdrains by inspection of flows after rain	Annually
		Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
		Inspect inlets and outlets for blockage	Quarterly
Regular maintenance		Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
		Replace any plants, to maintain planting density	As required
		Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance		Infill any holes or scour in the filter medium, improve erosion protection if required	As required
		Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions		Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Table 9: Figure 12: Operation and Maintenance Requirements for Attenuation Ponds

TABLE 23.1 Operation and maintenance requirements for ponds and wetlands			
	Maintenance schedule	Required action	Typical frequency
Regular maintenance		Remove litter and debris	Monthly (or as required)
		Cut the grass – public areas	Monthly (during growing season)
		Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
		Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
		Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
		Inspect water body for signs of poor water quality	Monthly (May – October)
		Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
		Check any mechanical devices, eg penstocks	Half yearly
		Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
		Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
		Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
		Remove sediment from any forebay.	Every 1–5 years, or as required
		Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
	Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
	Remedial actions	Repair erosion or other damage	As required
		Replant, where necessary	As required
		Aerate pond when signs of eutrophication are detected	As required
		Realign rip-rap or repair other damage	As required
		Repair / rehabilitate inlets, outlets and overflows.	As required

6.4.4 Water Quality

The simple pollution index approach has been used. There is 4 types of water quality mitigation. Firstly permeable paving's which into a bioremediation area.

According the simple pollution approach, this is sufficient water quality infrastructure for the site. Please see Appendix G for the simple pollution index.

7. REFERENCES

Author	Date	Title/Description
Department for Communities and Local Government	Dec 2024	Technical Guidance to the National Planning Policy Framework
Ministry of Housing, Communities and Local Government.	Feb 2025	National Planning Policy Framework

Appendix A: Topographical Survey

[illegible][illegible]

The survey survey has been undertaken using a questionnaire (2000-2001) to:

When sampling features shown on the drawing are shown as an individual address line, the lines of network, represent the number of cables, a forty percent and it is possible that there could be a wide variety of cable building, W/L, V/L and communications transmission cables forming the cable trace line. There could be at different depths, the trace signal from the depth channel being sensed by signal shifted from the channel sensor device. Cable runs could also be present running parallel to the single line shown.

[illegible]

REV	DESCRIPTION	SURVEYED DRAWN	DATE

JLP Surveying

JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL:- peterhouston@jlp-surveys.com

PROJECT
Manchester Abattoir,
Riverpark Road,
Manchester.

DRAWING TITLE

UTILITY SURVEY

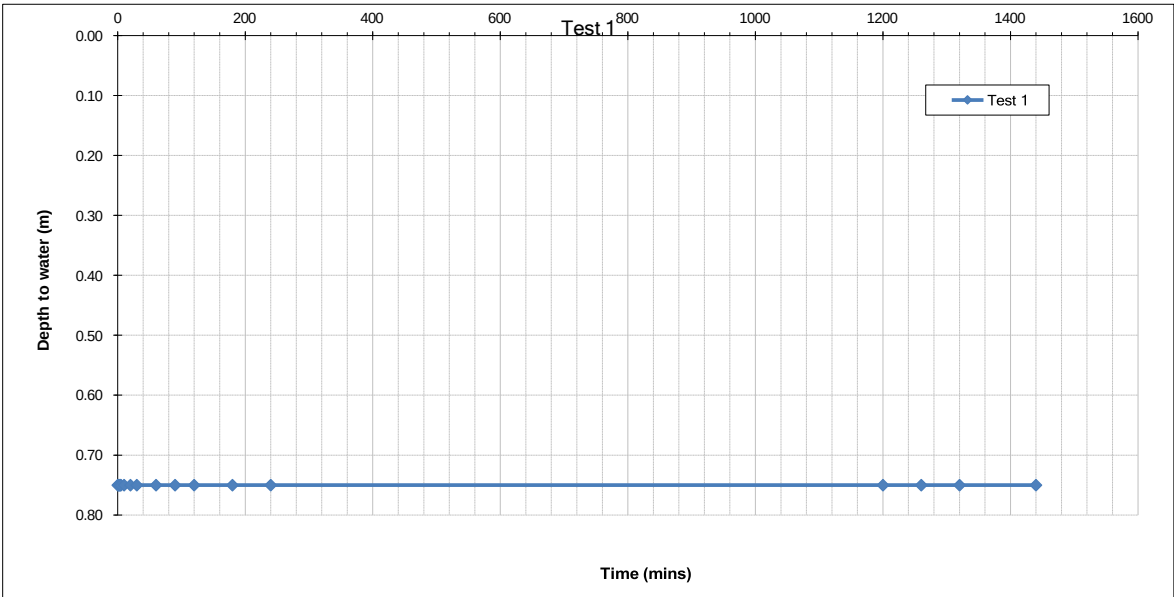
SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1:500	A1	3	05.08.2022	

DRAWING NUMBER
S22-767-1-3

Appendix B:E3P Report

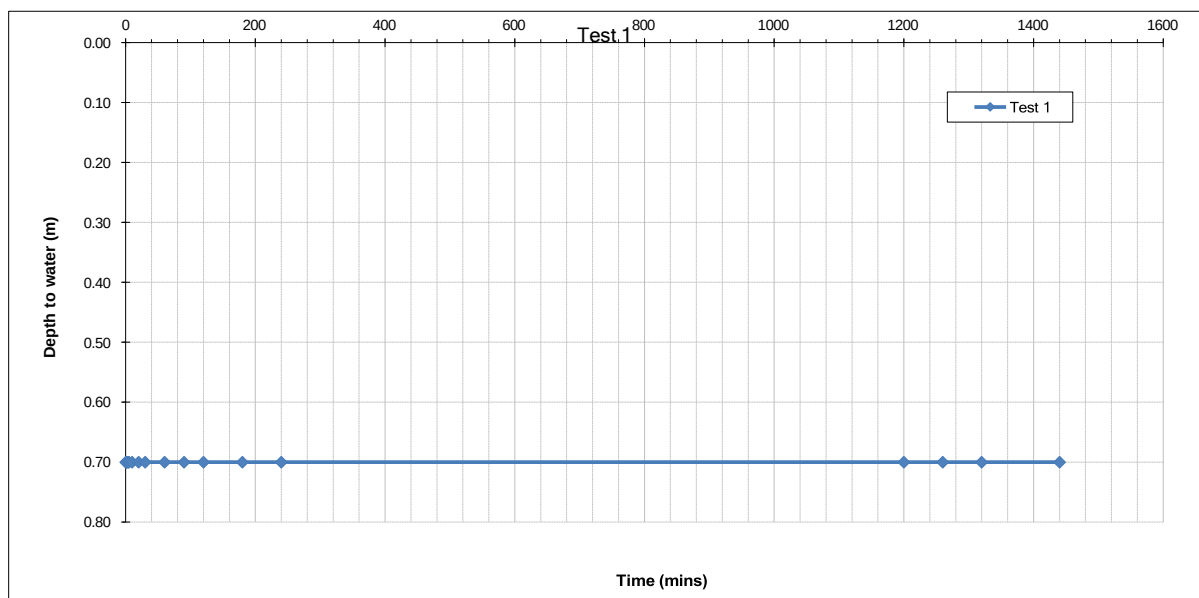
		Site: Riverpark Job Number: 17-246 Date of Test: 17/01/2024 to 19/01/2024		Trial Pit Number: SA201 (TP208) Length: 2.00 m Width: 0.60 m Depth: 1.80 m Groundwater Level: Not encountered m	
Test 1 did not reach 75% or 25 % effective storage depth.	TEST 1		TEST 2		TEST 3
	Time(min)	Depth to Water (m)			
	0	0.75			
	1	0.75			
	2	0.75			
	3	0.75			
	4	0.75			
	5	0.75			
	10	0.75			
	20	0.75			
	30	0.75			
	60	0.75			
	90	0.75			
	120	0.75			
	180	0.75			
	240	0.75			
1200	0.75				
1260	0.75				
1320	0.75				
1440	0.75				
Effective Storage Depth	m	1.05			
75% Effective Storage Depth	m	0.79			
(i.e. depth below GL)	m	1.01			
25% Effective Storage Depth	m	0.26			
(i.e. depth below GL)	m	1.54			
Effective Storage Depth 75%-25%	m	0.53			
Time to fall to 75% effective depth	mins	0.00			
Time to fall to 25% effective depth	mins	0.00			
V (75%-25%)	m3	0.63			
a (50%)	m2	3.93			
t (75%-25%)	mins	N/A			
SOIL INFILTRATION RATE	m/s	N/A			

DESIGN SOIL INFILTRATION RATE, f	N/A - Failed to reach 25% effective depth within 24 hours and therefore tests were terminated.
----------------------------------	--



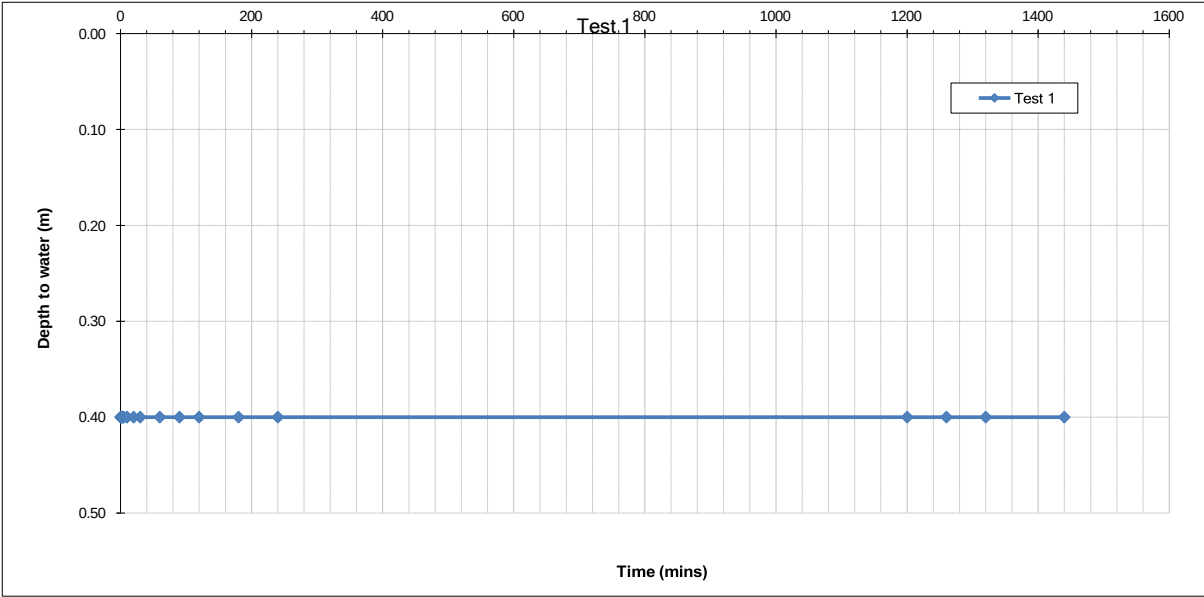
		Site: Riverpark Job Number: 17-246 Date of Test: 17/01/2024 to 19/01/2024		Trial Pit Number: SA202 (TP210) Length: 1.90 m Width: 0.60 m Depth: 1.70 m Groundwater Level: Not encountered m	
Test 1 did not reach 75% or 25 % effective storage depth.	TEST 1		TEST 2		TEST 3
	Time(min)	Depth to Water (m)			
	0	0.70			
	1	0.70			
	2	0.70			
	3	0.70			
	4	0.70			
	5	0.70			
	10	0.70			
	20	0.70			
	30	0.70			
	60	0.70			
	90	0.70			
	120	0.70			
	180	0.70			
	240	0.70			
	1200	0.70			
	1260	0.70			
1320	0.70				
1440	0.70				
Effective Storage Depth	m	1.00			
75% Effective Storage Depth	m	0.75			
(i.e. depth below GL)	m	0.95			
25% Effective Storage Depth	m	0.25			
(i.e. depth below GL)	m	1.45			
Effective Storage Depth 75%-25%	m	0.50			
Time to fall to 75% effective depth	mins	0.00			
Time to fall to 25% effective depth	mins	0.00			
V (75%-25%)	m3	0.57			
a (50%)	m2	3.64			
t (75%-25%)	mins	N/A			
SOIL INFILTRATION RATE	m/s	N/A			

DESIGN SOIL INFILTRATION RATE, f	N/A - Failed to reach 25% effective depth within 24 hours and therefore tests were terminated.
----------------------------------	--



		Site: Riverpark Job Number: 17-246 Date of Test: 17/01/2024 to 19/01/2024		Trial Pit Number: SA203 (TP201) Length: 2.00 m Width: 0.70 m Depth: 1.50 m Groundwater Level: Not encountered m			
Test 1 did not reach 75% or 25 % effective storage depth.		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)				
		0	0.40				
		1	0.40				
		2	0.40				
		3	0.40				
		4	0.40				
		5	0.40				
		10	0.40				
		20	0.40				
		30	0.40				
		60	0.40				
		90	0.40				
		120	0.40				
		180	0.40				
		240	0.40				
		1200	0.40				
		1260	0.40				
		1320	0.40				
		1440	0.40				
Effective Storage Depth		m	1.10				
75% Effective Storage Depth		m	0.83				
(i.e. depth below GL)		m	0.68				
25% Effective Storage Depth		m	0.28				
(i.e. depth below GL)		m	1.23				
Effective Storage Depth 75%-25%		m	0.55				
Time to fall to 75% effective depth		mins	0.00				
Time to fall to 25% effective depth		mins	0.00				
V (75%-25%)		m3	0.77				
a (50%)		m2	4.37				
t (75%-25%)		mins	N/A				
SOIL INFILTRATION RATE		m/s	N/A				

DESIGN SOIL INFILTRATION RATE, f	N/A - Failed to reach 25% effective depth within 24 hours and therefore tests were terminated.
---	---





Appendix C: Statutory Bodies Communication and Evidence

Case Ref:	RIV/M40/A/PRE
Site Name:	Riverpark Trading Estate (M40 2XP)
LLFA Advice Suitability Stage:	☐ RIBA 0 – 2 (Strategic appraisals, feasibility, and concept design). ☒ RIBA 3 – 7 (to prepare a Planning application and to discharge Planning Conditions for pre-commencement through to handover & occupation).

LLFA Comments 11/02/2025

Site checked in Asset Register	Yes – culvert investigation plus LLFA asset register is accepted to disprove culvert onsite. Please include investigation in submission. An informative will be attached to any prospective planning application covering residual risk of an uncharted culvert – if a culvert is located onsite during intrusive SI or construction, MCC LLFA should be contacted immediately.
Data Screen Recommended	No (based on above)
FRA Required	Yes (trigger): 1 (Site >1 Ha) - light version acceptable, applicant advised already completed.

Standard Condition Clauses (Pre-commencement and Pre-occupation)	Notes made during meeting to appraise proposals against the Clauses
Progression through the drainage hierarchy must be evidence based and supported by site investigation including assessments of ground conditions and infiltration testing in accordance with BRE365. Proposals of attenuation should achieve half drain time within 24 hours.	Accepted not feasible on basis applicant advises SI done to close out infiltration – please include in submission.
Where surface water is connected to the main river, any works within or adjacent to the river that would affect it would require consent from Environment Agency. An email of acceptance of proposed flows and/or new connection will suffice.	Accepted not feasible.

Manchester City Council LLFA

Where surface water is connected to the ordinary watercourse, agreement in principle from Manchester City Council as Lead Local Flood Authority is required. Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates. An email of acceptance of proposed flows and/or new connection will suffice.	Accepted as not feasible based on the fact applicant has done investigation and not found culvert.
Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.	Accepted on basis of email: From: seweradoptions@uuplc.co.uk Sent: 10 April 2024 15:32
Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable.	Applicant is considering maximising these (bioretention/water harvesting currently under consideration).
Details of surface water attenuation to align with the Manchester, Trafford and Salford Strategic Flood Risk Assessment. For brownfield sites a minimum of 50% betterment is required for reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates.	Accepted on basis of UU agreement above.
Development must be limited to greenfield runoff on Greenfield sites up to a 1 in 100-year event, including climate change allowance.	N/A
A finalised drainage layout showing all components, outfalls, levels and connectivity.	Applicant will aim to issue drafts for pre-app review. Discussed need for drainage layout to align with calculation package.
An existing and proposed impermeable areas drawing to accompany all discharge rate calculations.	
Hydraulic calculations of the proposed drainage system, including all design parameters. Calculations must Include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change.	Please include all manhole, storage & flow control printouts. Climate change not required on the 30 year calcs for MCC.

Manchester City Council LLFA

Where a XXX diversion is proposed, agreement in principle from XXX is required. An email of acceptance will suffice.	Applicant may receive this clause as a Condition, subject to stage of agreement with UU on onsite assets.
Where a XXX build-over is proposed, agreement in principle from XXX is required. An email of acceptance will suffice.	N/A
A blockage risk assessment must be undertaken as part of the drainage strategy to support proposed flows less than 5 l/s.	N/A
An assessment of surface water pollution risk in-line with CIRIA C753 and, where required, evidence of pollution control measures (preferably through SuDS) to treat surface water prior to discharge.	Applicant will do a simple index approach to account for ultimate discharge to main river (via UU asset).
A plan indicating surface water overland flow routes for extreme events to ensure flows are diverted away from existing and proposed buildings (including basements).	If there is any flooded volume in 100+CC (if it exists in the model) please show how it is managed on layout.
Construction details of flow control and SuDS elements.	Applicant will decide whether they are ready to submit now or reserve for a CDN discharge.
A plan indicating easements. SuDS features (including attenuation tanks) should be appropriately positioned, including a 2.5m easement from the existing highway and a 5m easement from any dwellings, guaranteeing accessibility for future maintenance and contingency for asset failure. This practice is in accordance with SuDS Manual (C753).	Easements less than this will need accompanying statement of support from structural engineer, evidencing compatibility with foundations.
Finished floor levels and proposed ground levels plan.	N/A (Flood Zone 1)
Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.	N/A

Important Information

- **Our review and advice are proportional to the development stage of the proposal. Details of LLFA Advice Suitability Stage are in the top table of page 1.**

- **Where LLFA Advice Suitability Stage is RIBA 3 – 7, formal Planning submissions must contain information at approvable standard for all above clauses to avoid or discharge a Condition.**
- **Some matters cannot be Conditioned because they affect proposal viability. The LLFA may recommend an Objection if applications do not contain viability information to support the Planning Application. This includes but is not limited to inconsideration of drainage assets near development, inconsideration of flood risk assessment, inconsideration of securing at least one viable option to drain the site.**
- **This review has been made based on information presented in:**
 - MS Teams meeting 18/11/2024.
 - **Submission emails of culvert investigation:**
 - From: Andy Brown <andybrown@kellenhomes.com>
Sent: 18 November 2024 17:43
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Cc: Danny Sinclair <dannysinclair@ajpltd.co.uk>; John Speers <johnspeers@ajpltd.co.uk>; Lee Stanley <leestanley@ajpltd.co.uk>; Stuart Ellis <stuartellis@kellenhomes.com>
Subject: Riverpark Road - Manchester Abattoir Existing Drainage
 - From: Stuart Ellis
Sent: 26 November 2024 09:35
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>; Andy Brown <andybrown@kellenhomes.com>
Subject: RE: Riverpark Road - Manchester Abattoir Existing Drainage

Charles Townsend

From: seweradoptions@uuplc.co.uk
Sent: 10 April 2024 15:32
To: andybrown@kellenhomes.com
Cc: Charles Townsend; Alice Osborne
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

External (seweradoptions@uuplc.co.uk)

[Report This Email](#) [FAQ](#) [GoDaddy Advanced Email Security](#), Powered by INKY

Hi Andy & Charles,

Thank you for your patience in this matter, as per telephone conversations please see below:

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

I am happy to confirm United Utilities will accept a connection to our CSO Spill pipe with a pass forward flow rate of 200 l/s, I must stress this does not set a precedence for any other connections.

Please ensure the asset characteristics are understood to allow the best method of connection and also ensure the LLFA are engaged with your proposed outfall proposals so that they can add comment

Should you wish to discuss any matters please contact me.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

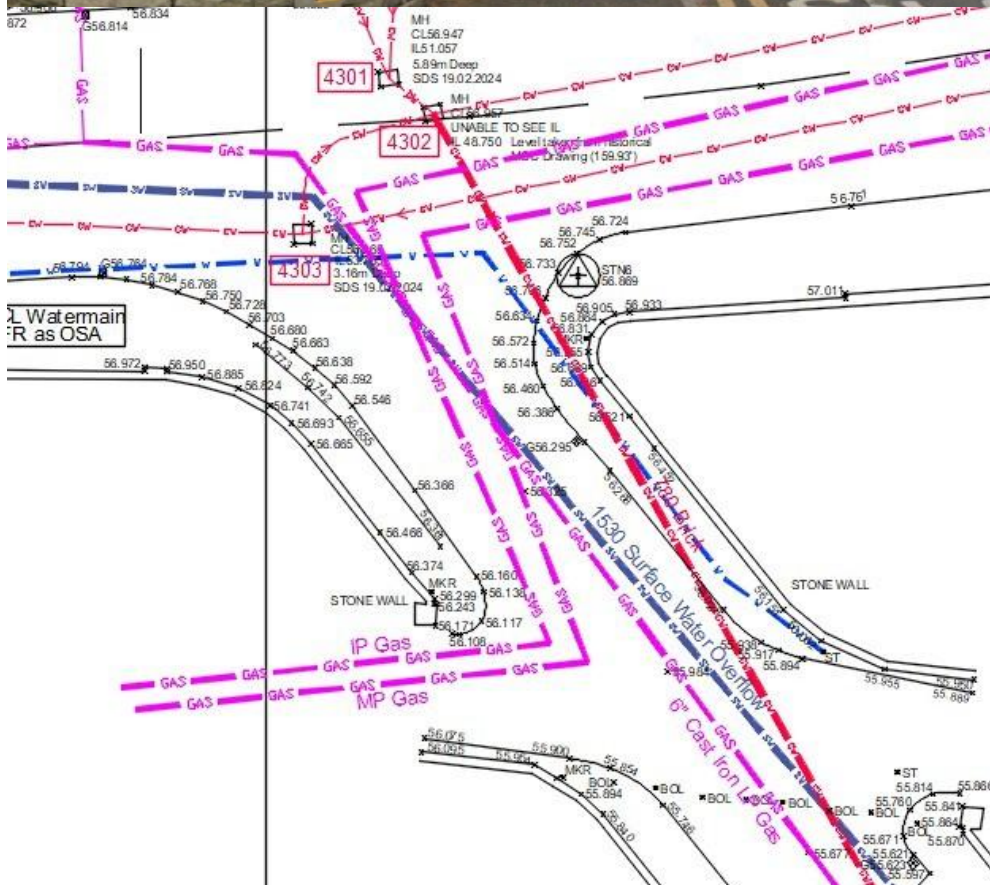
From: Andy Brown [andybrown@kellenhomes.com]
Sent: 04/04/2024 15:39
To: charles@townsendwaterengineering.co.uk; seweradoptions@uuplc.co.uk
Cc: alice.osborne@townsendwaterengineering.co.uk; samantha.mottram@uuplc.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Ant

Thanks for calling back earlier today and apologising for things outside your control, and thanks for letting me know you've escalated the issue within UU.

As requested I can confirm its not particle to construct an separate outfall from Riverpark Road to The River Medlock via the access road for the following reasons.

1. Disruption to one of the entrances to the Philips Park Cemetery and the public relation nightmare this could potentially have.
2. The access road to the river is private, and the route would go through a Grade II listed cemetery <https://historicengland.org.uk/listing/the-list/list-entry/1001634>
3. The access road is also riddled with existing services - Low, Medium and Intermediate Pressure Gas mains, water mains, the existing 780Ø brick combined sewer would cross the route also the 1530Ø concrete overflow will also clash.
4. Regarding the hierarchy the Charles has already mentioned that soakaways are not feasible due to ground conditions.
5. TPO'd trees line both side of the track and would require pruning to avoid damage, also their roots would also be damaged during the construction. Future damage from roots is inevitable to the new pipe.



I trust this explains the situation and reason to connect to the overflow or the combined sewer in Riverpark Road for our Surface Water drainage.

Cheers Andrew

From: Charles Townsend <charles@townsendwaterengineering.co.uk>
Sent: Thursday, April 4, 2024 3:34 PM
To: seweradoptions@uuplc.co.uk; Andy Brown <andybrown@kellenhomes.com>
Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>; samantha.mottram@uuplc.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

CAUTION: This email originated from outside your organisation. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Anthony,

Please see your email of the 25th January. You have already discounted the infiltration because of our email from before Christmas. Please see your confirmation on the 31st January that infiltration doesn't work. You have then said you not allowed to put a pipe following the CSO because it is a cemetery because of water quality problems. As regards the distance to the watercourse please see the email of the 25th March where I state the watercourse is 450m away of you follow the road.

Please can you guys come to a decision on what we can do as we have waiting since before Christmas to sort this out.

If you have any queires please do not hesitate to contact me.

Kind regards

Charles

Charles Townsend BSc (Hons) CIWEM CSci

Townsend Water Engineering

charles@townsendwaterengineering.co.uk

Tel: 07786912617

Landline (better reception) 01244 294890

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Thursday, April 4, 2024 2:56 PM
To: andybrown@kellenhomes.com
Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>; Charles Townsend <charles@townsendwaterengineering.co.uk>; samantha.mottram@uuplc.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Good Afternoon Andy,

Thank you for your email, please see our response below:

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

As per our telephone conversation I can confirm I have escalated this matter with my manager to push for a response regarding the outstanding matters.

As you're aware our Asset Manager is currently reviewing the possibility of a connection to our CSO pipe or an increased flow rate to the combined sewer that is greater than the previously confirmed rate of 40 l/s – please accept my apologies in the time taken to respond to this matter, a connection to the CSO is not a standard process as this requires several elements of engagement with the wider business.

Our Asset Manager has however challenged why a connection to the watercourse is not achievable by following the location of our CSO pipe down the road of the cemetery? And also asked for any correspondence regarding the drainage hierarchy with the LLFA?

If you could provide a response to the above this will help our Asset Manager with their response and once received and reviewed I am hoping to be in a position to provide an answer to connection points, flow rates and tanker access matters.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

From: Andy Brown [andybrown@kellenhomes.com]
Sent: 04/04/2024 08:08

To: samantha.mottram@uuplc.co.uk; seweradoptions@uuplc.co.uk
Cc: alice.osborne@townsendwaterengineering.co.uk; charles@townsendwaterengineering.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi 'SewerAdoptions'

I've just tried to call Anthony to get an update on discharge rates / connection points / existing pump station access proposal etc, but I understand he is unavailable.

We are looking to purchase the site tomorrow. I appreciate Anthony is waiting on information from the Asset Manager but I'm getting desperate for answers.

Cheers Andrew



Andy Brown | Head of Engineering | Kellen Homes Limited

1st Floor, 103 Dalton Avenue, Birchwood Park, Warrington WA3 6YF

T: 01925 363108 M: 07809 677510

E: andybrown@kellenhomes.com W: kellenhomes.com

This e-mail is confidential and may be privileged. It may be read, copied and used only by the intended recipient. If you believe that you have received this e-mail in error, please contact the sender immediately on 01925 363108. Please note that all references to "this e-mail" in this disclaimer include this e-mail and any associated attachments. WARNING: It is the responsibility of the recipient to ensure that the onward transmission, opening or use of this message and any attachments will not adversely affect its systems or data. Please carry out such virus and other checks as you consider appropriate. No responsibility is accepted by Kellen Homes Limited or any associated companies/subsidiaries in this regard.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Wednesday, March 27, 2024 5:08 PM
To: charles@townsendwaterengineering.co.uk
Cc: alice.osborne@townsendwaterengineering.co.uk; Andy Brown <andybrown@kellenhomes.com>
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

CAUTION: This email originated from outside your organisation. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Charles,

I have been in liaison with our Asset Manager but still have no confirmation – once in position of their response I will give you a call.

Regards

Anthony



Anthony Laithwaite

Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

From: Charles Townsend [charles@townsendwaterengineering.co.uk]

Sent: 27/03/2024 12:59

To: seweradoptions@uuplc.co.uk

Cc: alice.osborne@townsendwaterengineering.co.uk; andybrown@kellenhomes.com

Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

Any news on this, I would quite like to wrap it up before Easter.

Kind regards

Charles

Charles Townsend BSc (Hons) CIWEM CSci

Townsend Water Engineering

charles@townsendwaterengineering.co.uk

Tel: 07786912617

Landline (better reception) 01244 294890

From: Charles Townsend <charles@townsendwaterengineering.co.uk>
Sent: Tuesday, March 26, 2024 9:15 AM
To: seweradoptions@uuplc.co.uk
Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>
Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Ok I'll give you a call at 3.30.

Thanks Anthony

Sent from [Outlook for iOS](#)

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Tuesday, March 26, 2024 9:10:52 AM
To: Charles Townsend <charles@townsendwaterengineering.co.uk>
Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Charles,

Thank you for your additional information, I would recommend giving me a call between 3 -4 pm this afternoon.

I have passed on your information to the Asset Manager.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 25/03/2024 16:39
To: charles@townsendwaterengineering.co.uk
Cc: alice.osborne@townsendwaterengineering.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hello Charles

Thank you for the further information, I have referred back over to the engineer Anthony Laithwaite.

The response is due by the 8th April.

If you do need to contact us please ring 0345 026 8989 - Option 4

Regards
Samantha

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

From: Charles Townsend [charles@townsendwaterengineering.co.uk]
Sent: 25/03/2024 16:01
To: seweradoptions@uuplc.co.uk
Cc: alice.osborne@townsendwaterengineering.co.uk
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

I have just check the distance going down the road from our site to the river Medlock (I have gone round the cemetery) it is approximately 450m. The road itself is major road. It beyond size and scale of this development to implement putting a surface water pipe in.

If you have any queires please do not hesitate to contact me.

Kind regards

Charles

Charles Townsend BSc (Hons) CIWEM CSci

Townsend Water Engineering

charles@townsendwaterengineering.co.uk

Tel: 07786912617

Landline (better reception) 01244 294890

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Monday, March 25, 2024 3:52 PM
To: Charles Townsend <charles@townsendwaterengineering.co.uk>
Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>
Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Charles,

Following our telephone conversation I have chassed this with the Asset Manager and stressed the importance.

As agreed, we will speak again tomorrow @ 11am.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

From: Charles Townsend [charles@townsendwaterengineering.co.uk]

Sent: 25/03/2024 10:56

To: seweradoptions@uuplc.co.uk

Cc: alice.osborne@townsendwaterengineering.co.uk

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

Hope you are well, Just wondering if you have had any comment from your

Charles Townsend BSc (Hons) CIWEM CSci

Townsend Water Engineering

charles@townsendwaterengineering.co.uk

Tel: 07786912617

Landline (better reception) 01244 294890

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: 18 March 2024 15:03

To: Charles Townsend <charles@townsendwaterengineering.co.uk>

Cc: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>

Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Charles,

Thank you for your patience, I have received a response from our Asset Manager – please see below:

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

Surface Water Connection / Flow Rate:

Can you provide evidence as to why you cannot achieve a connection to the watercourse? I believe this is due to being land locked with a cemetery however, has all means to avoid the combined sewer been explored?

As you're aware United Utilities are considering a connection to our CSO spill pipe, I must make clear that this is a unique scenario and does not set any precedence for other sites, should we be able to accept a connection to this asset I could consider a flow rate based higher than 5 l/s per hectare, however should a connection to the combined sewer be the only alternative then the rates permitted including highway drainage would be 5l/s per hectare, I can appreciate the significant reduction in flow rates from the existing site, however the calculations used within your email do not represent a true summary of the run off.

Please do call me should you wish to discuss

Regards

Anthony



Anthony Laithwaite

Ww Engineer

Developer Services & Metering

Customer Services

M: 07880 298897

unitedutilities.com

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

From: Charles Townsend [charles@townsendwaterengineering.co.uk]

Sent: 12/03/2024 13:55

To: alice.osborne@townsendwaterengineering.co.uk; seweradoptions@uuplc.co.uk

Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

Thank you for your comments. Firstly, has there been any movement regarding draining into the watercourse? This may sort all our problems out.

In regards to the discharge into the combined sewer 40l/s is a very low discharge. The site is entirely hardstanding and is over 8.3ha. This implies the discharge of the site is under 5l/s/ha.

The pipe coming out of the site is a 600mm pipe please see the utility survey included. The drop between MH4400 and MH4306 is approximately 5m and the length is 89m. Giving a gradient approximately 1 in 5. Therefore using Colebrook white calculation the pipe has a maximum discharge of 2524l/s (at a 1 in 10 gradient as the Tables for the hydraulic design of pipes, sewers and channels).

With Manchester policy you take 50% so therefore the discharge would be approximately 1262l/s.

We would discharge less than that and are hoping for a discharge of 250l/s. This is still a decrease of over 95% from the site. As you have seen previously there will be suds on site which will decrease the amount of flow entering the system and the impermeable area will decrease from the existing situation.

Please can you review your discharge rates and hopefully let us have a larger discharge.

If you have any queries please do not hesitate to contact me.

Kind regards

Charles

Charles Townsend BSc (Hons) CIWEM CSci

Townsend Water Engineering

charles@townsendwaterengineering.co.uk

Tel: 07786912617

Landline (better reception) 01244 294890

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: Thursday, February 29, 2024 9:45 AM

To: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>

Cc: Charles Townsend <charles@townsendwaterengineering.co.uk>

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Alice,

As promised please see below:

Surface Water Connection / Flow Rate:

United Utilities confirm that a connection to the combined sewer as shown on drawing number 103 Rev A is permitted in principal with a maximum pass forward flow of 40l/s, however we are currently looking at another option that would get surface water straight to watercourse which would align to achieving sustainability from your site. We are looking to try and get this signed off internally and should be able to come back to you within 3 weeks to confirm.

Regards

Anthony



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

From: Alice Osborne [alice.osborne@townsendwaterengineering.co.uk]

Sent: 28/02/2024 09:40

To: seweradoptions@uuplc.co.uk

Cc: charles@townsendwaterengineering.co.uk

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

just following up to see if there's any new of a connection for Riverpark Road yet?

Many thanks,

Alice Osborne,

Assistant Flood Risk Consultant,

Townsend Water Engineering,

alice.osborne@townsendwaterengineering.co.uk,

Office Phone Number: 07786912617.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 12 February 2024 14:42
To: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>
Cc: Charles Townsend <charles@townsendwaterengineering.co.uk>
Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Alice,

Thank you for the existing drainage plans, please see below:

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

I can confirm I am currently in discussions with our Asset Manager and will respond soon with a preferred connection point and flow rate.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]

Sent: 12/02/2024 11:27

To: alice.osborne@townsendwaterengineering.co.uk

Cc: charles@townsendwaterengineering.co.uk

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Good Morning,

Thank you for your email this has been logged to the engineer Anthony, their number is 07880298897. They have a service level agreement to respond on or before 23/02/2024.

Kind Regards,



Katie Houghton

Customer Advisor Advanced
Developer Services & Metering
Customer Services

Tel: 0345 072 6067 (option 4)
unitedutilities.com

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

From: Alice Osborne [alice.osborne@townsendwaterengineering.co.uk]

Sent: 09/02/2024 16:34

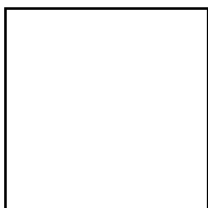
To: seweradoptions@uuplc.co.uk

Cc: charles@townsendwaterengineering.co.uk

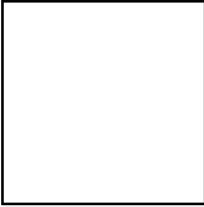
Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Hi Anthony,

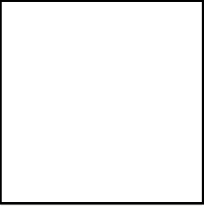
please see the existing drainage information attached below:



[RRIVERPARK ROAD - UTILITY SURVEY S22-767-1-3.pdf](#)



[RRIVERPARK ROAD - UTILITY SURVEY S22-767-1-1.pdf](#)



[RRIVERPARK ROAD - UTILITY SURVEY S22-767-1-2.pdf](#)

Please let me know if you require anything else, and have a lovely weekend.

Alice Osborne,

Assistant Flood Risk Consultant,

Townsend Water Engineering,

alice.osborne@townsendwaterengineering.co.uk,

Office Phone Number: 07786912617.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Sent: 31 January 2024 16:05

To: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>

Cc: Charles Townsend <charles@townsendwaterengineering.co.uk>

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

External (seweradoptions@uuplc.co.uk)

Report This Email FAQ GoDaddy Advanced Email Security, Powered by INKY

Hi Alice,

Thank you for your response, please see below.

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

I can see you are looking for a flow rate to connect to the combined public sewer as I note infiltration tests have failed and the obstruction of a cemetery.

Before analysing the development and providing you with a rate I will require an existing drainage arrangement clearly showing the pipe sizes and connection point to the public sewer, I note the plan provided however, this does not appear to be an as-built drawing or contain pipe diameters.

I look forward to hearing from you.

Regards

Anthony

 Water for the North West	Anthony Laithwaite Ww Engineer Developer Services & Metering Customer Services M: 07880 298897 unitedutilities.com
--	--

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

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]

Sent: 31/01/2024 11:31

To: alice.osborne@townsendwaterengineering.co.uk

Cc: charles@townsendwaterengineering.co.uk

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Good Morning,

Thank you for your email this has been logged to the engineer Anthony, their number is 07880298897. They have a service level agreement to respond on or before 14/02/2024.

Kind Regards,

 Water for the North West	Katie Houghton Customer Advisor Advanced Developer Services & Metering Customer Services Tel: 0345 072 6067 (option 4) unitedutilities.com
---	--

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

From: Alice Osborne [alice.osborne@townsendwaterengineering.co.uk]

Sent: 31/01/2024 10:55

To: seweradoptions@uuplc.co.uk

Cc: charles@townsendwaterengineering.co.uk

Subject: Re: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Dear Anthony,

thank you for your response, dated 5th January 2024.

Please find attached the historic site records showing the abattoirs existing drainage strategy, the proposed drainage strategy and the soakaway tests results:

☐ [Manchester Abattoir Existing Drainage.pdf](#)

☐ [17-246 Riverpark Soakaway Logs.pdf](#)

☐ [17-246 BRE354 Soakaway Results.pdf](#)

☐ [Riverpark - Development Strategy - 103 - Drainage Strategy.pdf](#)

As expected, the soakaway tests were unsuccessful, so we have ruled out infiltration at the site.

The historical site records indicate that the site drains to the United Utilities sewer in River Park Road. The pipe is a 750mm pipe; please see the historical site records.

We have not made efforts to cross the 3rd party land between the site and the River Medlock to the south, as this land is a cemetery, which is not ideal land to propose drainage works through.

Thank you for pointing out the existing sewers and their easements; this is noted.

I hope this is everything you need to provide us with a flow rate, but if not, please don't hesitate to contact me.

Kind Regards,

Alice Osborne,

Assistant Flood Risk Consultant,

Townsend Water Engineering,

alice.osborne@townsendwaterengineering.co.uk,

Office Phone Number: 07786912617.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 05 January 2024 10:41
To: Alice Osborne <alice.osborne@townsendwaterengineering.co.uk>
Cc: Charles Townsend <charles@townsendwaterengineering.co.uk>
Subject: RE: PDE CA28, Riverpark Road, Manchester, M40 2XP - 05124913

Good Morning Alice,

Thank you for your WW PDE, please see our initial response below:

UU REF 05124913 – WW PDE – Riverpark Road, Manchester

I can see from your email that you're looking for a surface water connection and flow rate acceptance in principal, please note the asset you're proposing to connect to is not a surface water sewer and is a Combined Sewer overflow, there are no connections permitted to such asset.

I also note you have eliminated SuDS and a discharge to the Brook, can you please supply me with evidence of your efforts to cross 3rd party land to allow a discharge to the brook along with infiltration testing logs

Should a connection to United Utilities public sewer be required we would need to see a full existing drainage arrangement showing all the areas of impermeable area that communicate with the private drainage on site, the plan must also include all of the pipe sizes and ultimately where the existing outfalls are to the public sewer, only

then can I provide you with a flow rate.

I must also point out that there are some critical sewers located within close proximity / within your site boundary and easements must be met for all of these assets.

Do call me should you wish to discuss.

Regards

Anthony



Anthony Laithwaite

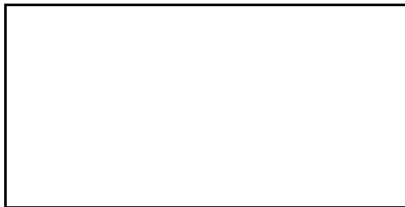
Ww Engineer

Developer Services & Metering

Customer Services

M: 07880 298897

unitedutilities.com

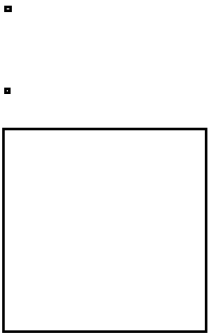
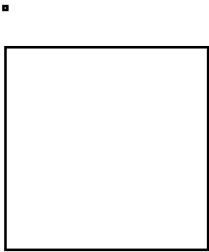


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Warrington, WA5 3LP
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Appendix D: Proposed Layout

Appendix E: Existing Drainage Layout

SCHEDULE OF MANHOLES.

[illegible]

— Cover levels marked. Figures approximately only.
— Invert levels shown. Thus indicate drop shaft(s).
— Drainage to Larnage etc. shown. Thus to consist of double layer of pipes' half 7 feet in diameter. Connecting upper portions of pipes to shafts outside works. (See sketching)
— Land drains and surface plot drains shown. Thus.

Detailed interior view of the entrance to the "Old" section of the building.
 A large, ornate wooden door is visible, featuring intricate carvings and a central panel. The door is set within a stone frame. To the right of the door, a small, arched window is visible. The wall to the left of the door is made of stone and features a small, rectangular opening. The floor is made of stone tiles.



PLAN NO.	COVER LEVEL	INVERT LEVEL	TYPE & SIZE	MAN. NO.	COVER LEVEL	INVERT LEVEL	TYPE & SIZE
L1	187.64	187.64	150mm (110mm) J 414 x 51	L34	187.66	187.66	150mm (110mm) J 414 x 51
L2	187.64	187.64	150mm (110mm) K 414 x 51	L35	187.56	187.56	150mm (110mm) J 414 x 51
L3	187.54	187.54	150mm (110mm) J 414 x 51	L36	187.56	187.56	150mm (110mm) J 414 x 51
L4	187.50	187.50	150mm (110mm) J 414 x 51	L37	187.58	187.58	150mm (110mm) J 414 x 51
L5	187.58	187.58	150mm (110mm) J 414 x 51	L38	187.58	187.58	150mm (110mm) J 414 x 51
L6	187.44	187.44	150mm (110mm) J 414 x 51	L39	187.58	187.58	150mm (110mm) J 414 x 51
L7	187.15	187.15	150mm (110mm) J 414 x 51	L40	187.58	187.58	150mm (110mm) J 414 x 51
L8	187.18	187.18	150mm (110mm) J 414 x 51	L41	187.42	187.42	150mm (110mm) J 414 x 51
L9	187.16	187.16	150mm (110mm) J 414 x 51	L42	187.58	187.58	150mm (110mm) J 414 x 51
L10	187.14	187.14	150mm (110mm) J 414 x 51	L43	187.58	187.58	150mm (110mm) J 414 x 51
L11	187.14	187.14	150mm (110mm) K 414 x 51				
L12	187.50	187.50	150mm (110mm) K 414 x 51				
L13	187.50	187.50	150mm (110mm) K 414 x 51				
L14	187.72	187.72	150mm (110mm) J 414 x 51				
L15	187.58	187.58	150mm (110mm) J 414 x 51				
L16	187.58	187.58	150mm (110mm) J 414 x 51				
L17	187.18	187.18	150mm (110mm) J 414 x 51				
L18	187.58	187.58	150mm (110mm) J 414 x 51				
L19	187.58	187.58	150mm (110mm) J 414 x 51				
L20	187.11	187.11	150mm (110mm) J 414 x 51				
L21	187.58	187.58	150mm (110mm) K 414 x 51				
L22	187.58	187.58	150mm (110mm) K 414 x 51				
L23	187.58	187.58	150mm (110mm) K 414 x 51				
L24	187.58	187.58	150mm (110mm) K 414 x 51				
L25	187.58	187.58	150mm (110mm) J 414 x 51				
L26	187.48	187.48	150mm (110mm) J 414 x 51				
L27	187.18	187.18	150mm (110mm) J 414 x 51				
L28	187.58	187.58	150mm (110mm) J 414 x 51				
L29	187.58	187.58	150mm (110mm) J 414 x 51				
L30	187.58	187.58	150mm (110mm) J 414 x 51				
L31	187.58	187.58	150mm (110mm) J 414 x 51				
L32	187.48	187.48	150mm (110mm) J 414 x 51				
L33	187.48	187.48	150mm (110mm) J 414 x 51				

MAIL NO.	CONVEY LEVEL	INVEST. DATE	TYPE OF
K. B. A.	196-35	170-06	RET. LAND.
K. B. A.	198-42	179-03	H

CITY OF MANCHESTER
MARKETS COMMITTEE
NEW CITY ABATTOIR

Drawn by <i>Jed</i>	KEY DRAINAGE PLAN	Drawing M150/258
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Date	6/6/1	Scale	1/8" = 1' / 500'
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Appendix F; Concept Drainage Calculations

The Alan Johnston Partnership		Page 1
1 Dale Street Liverpool L2 2ET	224-165 Riverpark 1 in 100 + CC	
Date 03/04/2025 16:08 File REV B NETWORK.MDX	Designed by JP Checked by KOB	
Micro Drainage	Network 2020.1.3	

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)	5	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.355	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	12.754	0.035	364.4	0.131	5.00	0.0	0.600		o	600	Pipe/Conduit	
1.001	32.954	0.085	387.7	0.050	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.002	24.153	0.060	402.6	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.003	35.039	0.090	389.3	0.033	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.004	26.906	0.070	384.4	0.047	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.005	16.735	0.045	371.9	0.084	0.00	0.0	0.600		o	600	Pipe/Conduit	
2.000	45.313	0.455	99.6	0.036	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	34.021	0.340	100.1	0.027	0.00	0.0		0.045	o	225	Pipe/Conduit	
2.002	23.009	0.230	100.0	0.000	0.00	0.0		0.045	o	225	Pipe/Conduit	
2.003	11.382	0.115	99.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.004	21.800	0.220	99.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.005	27.302	0.275	99.3	0.059	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.17	55.210	0.131	0.0	0.0	0.0	1.27	359.0	23.7
1.001	50.00	5.61	55.175	0.181	0.0	0.0	0.0	1.23	348.0	32.7
1.002	50.00	5.95	55.090	0.181	0.0	0.0	0.0	1.21	341.4	32.7
1.003	50.00	6.42	55.030	0.214	0.0	0.0	0.0	1.23	347.2	38.6
1.004	50.00	6.79	54.940	0.261	0.0	0.0	0.0	1.24	349.5	47.1
1.005	50.00	7.01	54.870	0.345	0.0	0.0	0.0	1.26	355.4	62.3
2.000	50.00	5.75	60.500	0.036	0.0	0.0	0.0	1.01	17.8	6.5
2.001	50.00	7.49	59.970	0.063	0.0	0.0	0.0	0.33	13.0	11.4
2.002	50.00	8.66	59.630	0.063	0.0	0.0	0.0	0.33	13.0	11.4
2.003	50.00	8.81	59.400	0.063	0.0	0.0	0.0	1.31	52.3	11.4
2.004	50.00	9.09	59.285	0.063	0.0	0.0	0.0	1.31	52.2	11.4
2.005	50.00	9.43	59.065	0.122	0.0	0.0	0.0	1.31	52.2	22.0

1 Dale Street
Liverpool
L2 2ET

224-165 Riverpark
1 in 100 + CC



Date 03/04/2025 16:08
File REV B NETWORK.MDX

Designed by JP
Checked by KOB

Micro Drainage Network 2020.1.3

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
2.006	26.966	0.270	99.9	0.043	0.00	0.0	0.600		o	225	Pipe/Conduit	
3.000	14.841	0.150	98.9	0.032	5.00	0.0		0.045	o	225	Pipe/Conduit	
3.001	12.486	0.375	33.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.007	19.136	0.195	98.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.008	16.045	0.160	100.3	0.041	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.009	8.234	0.085	96.9	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.000	42.627	0.430	99.1	0.000	5.00	0.0		0.045	o	150	Pipe/Conduit	
4.001	4.449	0.045	98.9	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
2.010	7.560	0.080	94.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.000	34.120	0.450	75.8	0.024	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.011	21.568	0.220	98.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
6.000	50.645	0.510	99.3	0.050	5.00	0.0		0.045	o	225	Pipe/Conduit	
6.001	6.750	0.220	30.7	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.012	9.932	0.440	22.6	0.080	0.00	0.0	0.600		o	300	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)
2.006	50.00	9.78	58.790	0.165	0.0	0.0	0.0	1.31	52.0	29.8
3.000	50.00	5.75	60.500	0.032	0.0	0.0	0.0	0.33	13.0	5.8
3.001	50.00	5.85	60.350	0.032	0.0	0.0	0.0	2.28	90.5	5.8
2.007	50.00	9.98	58.445	0.197	0.0	0.0	0.0	1.59	112.2	35.6
2.008	50.00	10.15	58.250	0.238	0.0	0.0	0.0	1.57	111.0	43.0
2.009	50.00	10.23	58.090	0.238	0.0	0.0	0.0	1.60	112.9	43.0
4.000	50.00	7.84	60.000	0.000	0.0	0.0	0.0	0.25	4.4	0.0
4.001	50.00	7.91	59.570	0.000	0.0	0.0	0.0	1.01	17.9	0.0
2.010	50.00	10.31	58.005	0.238	0.0	0.0	0.0	1.62	114.4	43.0
5.000	50.00	5.49	60.000	0.024	0.0	0.0	0.0	1.16	20.4	4.3
2.011	50.00	10.54	57.925	0.262	0.0	0.0	0.0	1.59	112.3	47.3
6.000	50.00	7.58	60.000	0.050	0.0	0.0	0.0	0.33	13.0	9.0
6.001	50.00	7.63	59.490	0.050	0.0	0.0	0.0	2.37	94.3	9.0
2.012	50.00	10.59	57.705	0.392	0.0	0.0	0.0	3.32	234.9	70.8

1 Dale Street
Liverpool
L2 2ET

224-165 Riverpark
1 in 100 + CC



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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
7.000	36.665	0.735	49.9	0.071	5.00	0.0	0.600		o	300	Pipe/Conduit	
7.001	40.094	2.000	20.0	0.065	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.13	23.796	0.210	113.3	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
8.000	48.900	1.500	32.6	0.038	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.14	8.835	0.500	17.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.15	56.001	0.140	400.0	0.074	0.00	0.0	0.600		o	1200	Pipe/Conduit	
9.000	46.294	0.465	99.6	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
9.01	26.901	0.270	99.6	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
9.02	6.387	0.120	53.2	0.005	0.00	0.0	0.600		o	150	Pipe/Conduit	
9.03	38.152	0.315	121.1	0.120	0.00	0.0	0.600		o	225	Pipe/Conduit	
10.000	21.045	0.210	100.2	0.040	5.00	0.0	0.600		o	225	Pipe/Conduit	
10.01	27.292	0.275	99.2	0.047	0.00	0.0	0.600		o	225	Pipe/Conduit	
10.02	10.948	0.110	99.5	0.004	0.00	0.0	0.600		o	225	Pipe/Conduit	
10.03	15.492	0.095	163.1	0.021	0.00	0.0	0.600		o	300	Pipe/Conduit	
10.04	28.129	0.165	170.5	0.018	0.00	0.0	0.600		o	300	Pipe/Conduit	
10.05	11.735	0.070	167.6	0.004	0.00	0.0	0.600		o	300	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)
7.000	50.00	5.27	60.000	0.071	0.0	0.0	0.0	2.23	157.7	12.8
7.001	50.00	5.46	59.265	0.136	0.0	0.0	0.0	3.53	249.3	24.6
2.013	50.00	10.86	57.265	0.528	0.0	0.0	0.0	1.48	104.3	95.3
8.000	50.00	5.46	60.000	0.038	0.0	0.0	0.0	1.77	31.3	6.9
2.014	50.00	10.89	57.055	0.566	0.0	0.0	0.0	3.76	265.6	102.2
2.015	50.00	11.40	54.365	0.640	0.0	0.0	0.0	1.86	2108.6	115.6
9.000	50.00	5.77	60.000	0.000	0.0	0.0	0.0	1.01	17.8	0.0
9.001	50.00	6.21	59.535	0.000	0.0	0.0	0.0	1.01	17.8	0.0
9.002	50.00	6.29	59.265	0.005	0.0	0.0	0.0	1.38	24.4	0.9
9.003	50.00	6.82	59.070	0.125	0.0	0.0	0.0	1.19	47.2	22.6
10.000	50.00	5.27	60.000	0.040	0.0	0.0	0.0	1.31	51.9	7.2
10.001	50.00	5.62	59.790	0.087	0.0	0.0	0.0	1.31	52.2	15.7
10.002	50.00	5.75	59.515	0.091	0.0	0.0	0.0	1.31	52.1	16.4
10.003	50.00	5.96	59.330	0.112	0.0	0.0	0.0	1.23	86.8	20.2
10.004	50.00	6.35	59.235	0.130	0.0	0.0	0.0	1.20	84.9	23.5
10.005	50.00	6.52	59.070	0.134	0.0	0.0	0.0	1.21	85.6	24.2

1 Dale Street
Liverpool
L2 2ET

224-165 Riverpark
1 in 100 + CC



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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
10.006	8.717	0.320	27.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
9.004	47.017	0.200	235.1	0.040	0.00	0.0	0.600		o	300	Pipe/Conduit	
11.000	11.588	0.120	96.6	0.000	5.00	0.0	0.600		o	150	Pipe/Conduit	
11.01	2.444	0.025	97.8	0.000	0.00	0.0	0.600		o	150	Pipe/Conduit	
11.02	27.509	0.275	100.0	0.041	0.00	0.0	0.600	0.045	o	225	Pipe/Conduit	
11.03	6.893	0.070	98.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
11.04	9.082	0.095	95.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
11.05	8.071	0.085	95.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
11.06	16.445	0.200	82.3	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
9.05	5.965	0.035	170.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
9.06	12.821	0.855	15.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.06	22.331	0.060	372.2	0.000	0.00	0.0	0.600		o	1200	Pipe/Conduit	
1.07	55.444	0.140	396.0	0.110	0.00	0.0	0.600		o	1200	Pipe/Conduit	
1.08	54.978	0.440	125.0	0.343	0.00	0.0	0.600		o	1200	Pipe/Conduit	
12.000	31.061	0.400	77.7	0.209	5.00	0.0	0.600		o	300	Pipe/Conduit	
1.09	31.893	0.080	398.7	0.017	0.00	0.0	0.600		o	1200	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)
10.006	50.00	6.56	59.000	0.134	0.0	0.0	0.0	3.02	213.8	24.2
9.004	50.00	7.59	58.680	0.299	0.0	0.0	0.0	1.02	72.2	54.0
11.000	50.00	5.19	59.500	0.000	0.0	0.0	0.0	1.02	18.1	0.0
11.001	50.00	5.23	59.380	0.000	0.0	0.0	0.0	1.02	18.0	0.0
11.002	50.00	6.63	59.280	0.041	0.0	0.0	0.0	0.33	13.0	7.4
11.003	50.00	6.72	59.005	0.041	0.0	0.0	0.0	1.32	52.4	7.4
11.004	50.00	6.83	58.935	0.041	0.0	0.0	0.0	1.34	53.2	7.4
11.005	50.00	6.94	58.840	0.041	0.0	0.0	0.0	1.34	53.4	7.4
11.006	50.00	7.13	58.755	0.041	0.0	0.0	0.0	1.44	57.4	7.4
9.005	50.00	7.67	58.480	0.340	0.0	0.0	0.0	1.20	84.9	61.4
9.006	50.00	7.73	58.445	0.340	0.0	0.0	0.0	4.08	288.4	61.4
1.006	50.00	11.59	54.225	1.325	0.0	0.0	0.0	1.93	2186.5	239.2
1.007	50.00	12.08	54.165	1.435	0.0	0.0	0.0	1.87	2119.2	259.1
1.008	49.82	12.35	54.025	1.778	0.0	0.0	0.0	3.35	3784.1	319.8
12.000	50.00	5.29	56.500	0.209	0.0	0.0	0.0	1.79	126.2	37.7
1.009	49.20	12.64	53.585	2.004	0.0	0.0	0.0	1.87	2112.1	356.0

1 Dale Street
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224-165 Riverpark
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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.10	31.893	0.080	398.7	0.146	0.00	0.0	0.600		o	1200	Pipe/Conduit	
1.11	26.179	0.070	374.0	0.091	0.00	0.0	0.600		o	1200	Pipe/Conduit	
13.000	12.804	0.035	365.8	0.019	5.00	0.0	0.600		o	1200	Pipe/Conduit	
13.01	24.656	0.065	379.3	0.086	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.000	27.914	0.070	398.8	0.072	5.00	0.0	0.600		o	1200	Pipe/Conduit	
14.01	11.974	0.030	399.1	0.078	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.02	30.022	0.075	400.3	0.065	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.03	50.968	0.130	392.1	0.125	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.04	21.875	0.055	397.7	0.137	0.00	0.0	0.600		o	1200	Pipe/Conduit	
15.000	46.037	0.115	400.3	0.128	5.00	0.0	0.600		o	1200	Pipe/Conduit	
15.01	18.455	0.050	369.1	0.122	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.05	22.686	0.060	378.1	0.067	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.06	14.285	0.040	357.1	0.058	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.07	16.274	0.045	361.6	0.000	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.08	7.973	0.020	398.7	0.070	0.00	0.0	0.600		o	1200	Pipe/Conduit	
14.09	22.182	0.060	369.7	0.054	0.00	0.0	0.600		o	1200	Pipe/Conduit	
13.002	33.152	0.085	390.0	0.078	0.00	0.0	0.600		o	1200	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.010	48.59	12.92	53.505	2.150	0.0	0.0	0.0	1.87	2112.1	377.3
1.011	48.12	13.15	53.425	2.241	0.0	0.0	0.0	1.93	2181.2	389.4
13.000	50.00	5.11	53.710	0.019	0.0	0.0	0.0	1.95	2205.5	3.4
13.001	50.00	5.32	53.675	0.105	0.0	0.0	0.0	1.91	2165.7	19.0
14.000	50.00	5.25	54.195	0.072	0.0	0.0	0.0	1.87	2111.9	13.0
14.001	50.00	5.36	54.125	0.150	0.0	0.0	0.0	1.87	2110.9	27.1
14.002	50.00	5.62	54.095	0.215	0.0	0.0	0.0	1.86	2107.8	38.8
14.003	50.00	6.08	54.020	0.340	0.0	0.0	0.0	1.88	2130.0	61.4
14.004	50.00	6.27	53.890	0.477	0.0	0.0	0.0	1.87	2114.6	86.1
15.000	50.00	5.41	54.000	0.128	0.0	0.0	0.0	1.86	2107.7	23.1
15.001	50.00	5.57	53.885	0.250	0.0	0.0	0.0	1.94	2195.7	45.1
14.005	50.00	6.47	53.835	0.794	0.0	0.0	0.0	1.92	2169.2	143.4
14.006	50.00	6.59	53.775	0.852	0.0	0.0	0.0	1.97	2232.4	153.8
14.007	50.00	6.73	53.735	0.852	0.0	0.0	0.0	1.96	2218.3	153.8
14.008	50.00	6.80	53.690	0.922	0.0	0.0	0.0	1.87	2112.2	166.5
14.009	50.00	6.99	53.670	0.976	0.0	0.0	0.0	1.94	2193.9	176.2
13.002	50.00	7.28	53.610	1.159	0.0	0.0	0.0	1.89	2135.6	209.3

The Alan Johnston Partnership		Page 6
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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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
13.03	31.663	0.080	395.8	0.088	0.00	0.0	0.600		o	1200	Pipe/Conduit	
13.04	35.300	0.090	392.2	0.074	0.00	0.0	0.600		o	1200	Pipe/Conduit	
1.012	5.239	0.015	349.3	0.056	0.00	0.0	0.600		o	600	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)
13.003	50.00	7.56	53.525	1.247	0.0	0.0	0.0	1.87	2119.9	225.1
13.004	50.00	7.87	53.445	1.321	0.0	0.0	0.0	1.88	2129.5	238.5
1.012	50.00	5.07	53.355	0.000	200.0	0.0	0.0	1.30	366.8	200.0

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Liverpool
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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
01	59.800	4.590	Open Manhole	1800	1.000	55.210	600				
02	59.900	4.725	Open Manhole	1800	1.001	55.175	600	1.000	55.175	600	
03	60.200	5.110	Open Manhole	1800	1.002	55.090	600	1.001	55.090	600	
04	60.500	5.470	Open Manhole	1800	1.003	55.030	600	1.002	55.030	600	
05	60.100	5.160	Open Manhole	1800	1.004	54.940	600	1.003	54.940	600	
06	59.900	5.030	Open Manhole	1800	1.005	54.870	600	1.004	54.870	600	
50	61.600	1.100	Open Manhole	600	2.000	60.500	150				
HW	61.600	1.630	Junction		2.001	59.970	225	2.000	60.045	150	
SWALE	61.600	1.970	Junction		2.002	59.630	225	2.001	59.630	225	
HW	61.600	2.200	Junction		2.003	59.400	225	2.002	59.400	225	
51	61.500	2.215	Open Manhole	1200	2.004	59.285	225	2.003	59.285	225	
52	61.700	2.635	Open Manhole	1200	2.005	59.065	225	2.004	59.065	225	
54	61.500	2.710	Open Manhole	1200	2.006	58.790	225	2.005	58.790	225	
SWALE	61.350	0.850	Junction		3.000	60.500	225				
HW	61.350	1.000	Junction		3.001	60.350	225	3.000	60.350	225	
55	61.200	2.755	Open Manhole	1200	2.007	58.445	300	2.006	58.520	225	
								3.001	59.975	225	1455
56	61.100	2.850	Open Manhole	1200	2.008	58.250	300	2.007	58.250	300	
57	61.100	3.010	Open Manhole	1200	2.009	58.090	300	2.008	58.090	300	
SWALE	61.150	1.150	Junction		4.000	60.000	150				
HW	61.250	1.680	Junction		4.001	59.570	150	4.000	59.570	150	
58	61.200	3.195	Open Manhole	1200	2.010	58.005	300	2.009	58.005	300	
								4.001	59.525	150	1370
59	61.350	1.350	Open Manhole	600	5.000	60.000	150				
60	61.300	3.375	Open Manhole	1200	2.011	57.925	300	2.010	57.925	300	
								5.000	59.550	150	1475
HW	61.350	1.350	Junction		6.000	60.000	225				
HW	61.350	1.860	Junction		6.001	59.490	225	6.000	59.490	225	
61	61.300	3.595	Open Manhole	1200	2.012	57.705	300	2.011	57.705	300	
								6.001	59.270	225	1490
62	61.150	1.150	Open Manhole	600	7.000	60.000	300				
63	61.150	1.885	Open Manhole	600	7.001	59.265	300	7.000	59.265	300	
64	61.300	4.035	Open Manhole	1500	2.013	57.265	300	2.012	57.265	300	
								7.001	57.265	300	
65A	61.300	1.300	Open Manhole	600	8.000	60.000	150				
65	60.750	3.695	Open Manhole	1500	2.014	57.055	300	2.013	57.055	300	
								8.000	58.500	150	1295
07	60.600	6.235	Open Manhole	3000	2.015	54.365	1200	2.014	56.555	300	1290

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
66	61.700	1.700	Open Manhole	600	9.000	60.000	150				
67	61.700	2.165	Open Manhole	1200	9.001	59.535	150	9.000	59.535	150	
68	61.600	2.335	Open Manhole	1200	9.002	59.265	150	9.001	59.265	150	
69	61.300	2.230	Open Manhole	1200	9.003	59.070	225	9.002	59.145	150	
70	61.700	1.700	Open Manhole	600	10.000	60.000	225				
71	61.800	2.010	Open Manhole	1200	10.001	59.790	225	10.000	59.790	225	
72	61.000	1.485	Open Manhole	600	10.002	59.515	225	10.001	59.515	225	
73	60.850	1.520	Open Manhole	600	10.003	59.330	300	10.002	59.405	225	
74	61.800	2.565	Open Manhole	1200	10.004	59.235	300	10.003	59.235	300	
75	61.650	2.580	Open Manhole	1200	10.005	59.070	300	10.004	59.070	300	
76	61.650	2.650	Open Manhole	1200	10.006	59.000	300	10.005	59.000	300	
77	61.500	2.820	Open Manhole	1200	9.004	58.680	300	9.003	58.755	225	
								10.006	58.680	300	
78	60.850	1.350	Open Manhole	600	11.000	59.500	150				
79	60.850	1.470	Open Manhole	1200	11.001	59.380	150	11.000	59.380	150	
HW	60.850	1.570	Junction		11.002	59.280	225	11.001	59.355	150	
HW	61.150	2.145	Junction		11.003	59.005	225	11.002	59.005	225	
80	61.000	2.065	Open Manhole	1200	11.004	58.935	225	11.003	58.935	225	
HW BASIN	60.075	1.235	Junction		11.005	58.840	225	11.004	58.840	225	
HW	60.075	1.320	Junction		11.006	58.755	225	11.005	58.755	225	
81	61.150	2.670	Open Manhole	1200	9.005	58.480	300	9.004	58.480	300	
								11.006	58.555	225	
82	61.150	2.705	Open Manhole	1200	9.006	58.445	300	9.005	58.445	300	
08	60.100	5.875	Open Manhole	2100	1.006	54.225	1200	1.005	54.825	600	
								2.015	54.225	1200	
								9.006	57.590	300	2465
09	59.700	5.535	Open Manhole	2100	1.007	54.165	1200	1.006	54.165	1200	
10	58.700	4.675	Open Manhole	2100	1.008	54.025	1200	1.007	54.025	1200	
11	59.300	2.800	Open Manhole	3000	12.000	56.500	300				
12	58.000	4.415	Open Manhole	2100	1.009	53.585	1200	1.008	53.585	1200	
								12.000	56.100	300	1615
13	58.300	4.795	Open Manhole	2100	1.010	53.505	1200	1.009	53.505	1200	
14	58.600	5.175	Open Manhole	3000	1.011	53.425	1200	1.010	53.425	1200	
15	58.850	5.140	Open Manhole	3000	13.000	53.710	1200				
16	58.700	5.025	Open Manhole	3000	13.001	53.675	1200	13.000	53.675	1200	
17	57.500	3.305	Open Manhole	3000	14.000	54.195	1200				
18	57.000	2.875	Open Manhole	3000	14.001	54.125	1200	14.000	54.125	1200	
19	57.300	3.205	Open Manhole	3000	14.002	54.095	1200	14.001	54.095	1200	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
20	57.600	3.580	Open Manhole	3000	14.003	54.020	1200	14.002	54.020	1200	
21	57.200	3.310	Open Manhole	3000	14.004	53.890	1200	14.003	53.890	1200	
22	57.000	3.000	Open Manhole	3000	15.000	54.000	1200				
23	57.100	3.215	Open Manhole	3000	15.001	53.885	1200	15.000	53.885	1200	
24	57.000	3.165	Open Manhole	3000	14.005	53.835	1200	14.004	53.835	1200	
								15.001	53.835	1200	
25	57.300	3.525	Open Manhole	3000	14.006	53.775	1200	14.005	53.775	1200	
26	57.600	3.865	Open Manhole	3000	14.007	53.735	1200	14.006	53.735	1200	
27	57.900	4.210	Open Manhole	3000	14.008	53.690	1200	14.007	53.690	1200	
28	58.000	4.330	Open Manhole	3000	14.009	53.670	1200	14.008	53.670	1200	
29	58.500	4.890	Open Manhole	3000	13.002	53.610	1200	13.001	53.610	1200	
								14.009	53.610	1200	
30	58.200	4.675	Open Manhole	3000	13.003	53.525	1200	13.002	53.525	1200	
31	57.800	4.355	Open Manhole	3000	13.004	53.445	1200	13.003	53.445	1200	
32	58.500	5.145	Open Manhole	3000	1.012	53.355	600	1.011	53.355	1200	
								13.004	53.355	1200	
	58.300	4.960	Open Manhole	0		OUTFALL		1.012	53.340	600	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
01	387232.424	399523.332	387232.424	399523.332	Required	
02	387224.811	399533.564	387224.811	399533.564	Required	
03	387192.665	399540.818	387192.665	399540.818	Required	
04	387168.512	399540.818	387168.512	399540.818	Required	
05	387168.512	399505.779	387168.512	399505.779	Required	
06	387165.230	399479.073	387165.230	399479.073	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
50	387060.183	399508.676	387060.183	399508.676	Required	
HW	387023.321	399482.325			No Entry	
SWALE	387011.245	399450.520			No Entry	
HW	387033.151	399443.484			No Entry	
51	387044.354	399441.468	387044.354	399441.468	Required	
52	387052.713	399461.602	387052.713	399461.602	Required	
54	387075.592	399476.500	387075.592	399476.500	Required	
SWALE	387064.987	399459.806			No Entry	
HW	387079.239	399455.668			No Entry	
55	387091.700	399454.874	387091.700	399454.874	Required	
56	387107.318	399465.931	387107.318	399465.931	Required	
57	387116.872	399453.041	387116.872	399453.041	Required	
SWALE	387085.463	399480.969			No Entry	
HW	387112.152	399447.731			No Entry	
58	387115.590	399444.907	387115.590	399444.907	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
59	387081.912	399449.092	387081.912	399449.092	Required	
60	387114.008	399437.514	387114.008	399437.514	Required	
HW	387055.113	399434.776			No Entry	
HW	387103.117	399418.633			No Entry	
61	387109.495	399416.423	387109.495	399416.423	Required	
62	387105.805	399483.194	387105.805	399483.194	Required	
63	387127.490	399453.629	387127.490	399453.629	Required	
64	387119.218	399414.398	387119.218	399414.398	Required	
65A	387151.531	399457.388	387151.531	399457.388	Required	
65	387142.469	399409.335	387142.469	399409.335	Required	
07	387151.154	399407.713	387151.154	399407.713	Required	
66	387102.892	399536.893	387102.892	399536.893	Required	
67	387065.364	399509.787	387065.364	399509.787	Required	
68	387081.019	399487.909	387081.019	399487.909	Required	
69	387086.899	399485.414	387086.899	399485.414	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
70	387111.754	399537.193	387111.754	399537.193	Required	
71	387128.884	399549.418	387128.884	399549.418	Required	
72	387156.167	399550.095	387156.167	399550.095	Required	
73	387156.572	399539.155	387156.572	399539.155	Required	
74	387141.082	399538.908	387141.082	399538.908	Required	
75	387118.462	399522.187	387118.462	399522.187	Required	
76	387125.121	399512.525	387125.121	399512.525	Required	
77	387118.212	399507.210	387118.212	399507.210	Required	
78	387162.668	399528.004	387162.668	399528.004	Required	
79	387162.850	399516.417	387162.850	399516.417	Required	
HW	387161.695	399514.264			No Entry	
HW	387137.544	399501.093			No Entry	
80	387140.941	399495.095	387140.941	399495.095	Required	
HW BASIN	387149.382	399491.743			No Entry	
HW	387152.316	399484.223			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
81	387145.788	399469.129	387145.788	399469.129	Required	
82	387149.287	399464.298	387149.287	399464.298	Required	
08	387162.002	399462.653	387162.002	399462.653	Required	
09	387184.018	399458.919	387184.018	399458.919	Required	
10	387239.462	399458.919	387239.462	399458.919	Required	
11	387294.441	399489.980	387294.441	399489.980	Required	
12	387294.441	399458.919	387294.441	399458.919	Required	
13	387294.441	399427.026	387294.441	399427.026	Required	
14	387294.441	399395.132	387294.441	399395.132	Required	
15	387346.732	399493.909	387346.732	399493.909	Required	
16	387355.862	399484.931	387355.862	399484.931	Required	
17	387541.762	399420.842	387541.762	399420.842	Required	
18	387541.762	399448.756	387541.762	399448.756	Required	
19	387541.741	399460.730	387541.741	399460.730	Required	
20	387511.719	399460.799	387511.719	399460.799	Required	

Manhole Schedules for Storm						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
21	387460.752	399460.440	387460.752	399460.440	Required	
22	387438.878	399395.784	387438.878	399395.784	Required	
23	387438.878	399441.821	387438.878	399441.821	Required	
24	387438.878	399460.275	387438.878	399460.275	Required	
25	387416.193	399460.275	387416.193	399460.275	Required	
26	387402.048	399458.275	387402.048	399458.275	Required	
27	387385.774	399458.275	387385.774	399458.275	Required	
28	387378.043	399460.224	387378.043	399460.224	Required	
29	387355.862	399460.275	387355.862	399460.275	Required	
30	387355.862	399427.124	387355.862	399427.124	Required	
31	387355.862	399395.461	387355.862	399395.461	Required	
32	387320.593	399393.954	387320.593	399393.954	Required	
	387320.468	399388.716			No Entry	

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Simulation Criteria for Storm

Volumetric Runoff Coeff 1.000 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 3 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type Summer
Return Period (years)	5	Cv (Summer) 1.000
Region England and Wales		Cv (Winter) 0.840
M5-60 (mm)	18.000	Storm Duration (mins) 30
Ratio R	0.355	

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Storage Structures for Storm

Swale Manhole: HW, DS/PN: 2.001

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	30.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	59.545	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5	Include Swale Volume	Yes

Swale Manhole: SWALE, DS/PN: 2.002

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	15.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	59.705	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5	Include Swale Volume	Yes

Swale Manhole: SWALE, DS/PN: 3.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	15.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	60.500	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5	Include Swale Volume	Yes

Swale Manhole: SWALE, DS/PN: 4.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	15.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	60.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5	Include Swale Volume	Yes

Swale Manhole: HW, DS/PN: 6.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr) 0.00000 Infiltration Coefficient Side (m/hr) 0.00000

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Swale Manhole: HW, DS/PN: 6.000

Safety Factor

2.0

Side Slope (1:X)

3.0

Porosity

1.00

Slope (1:X)

100.0

Invert Level (m)

60.000

Cap Volume Depth (m)

0.000

Base Width (m)

0.5

Cap Infiltration Depth (m)

0.000

Length (m)

15.0

Include Swale Volume

Yes

Swale Manhole: HW, DS/PN: 11.002

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)

0.00000

Length (m)

15.0

Infiltration Coefficient Side (m/hr)

0.00000

Side Slope (1:X)

3.0

Safety Factor

2.0

Slope (1:X)

100.0

Porosity

1.00

Cap Volume Depth (m)

0.000

Invert Level (m)

59.355

Cap Infiltration Depth (m)

0.000

Base Width (m)

0.5

Include Swale Volume

Yes

Tank or Pond Manhole: HW BASIN, DS/PN: 11.005

Invert Level (m) 58.915

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	110.0	1.100	266.9	1.101	0.0

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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 Coefficient 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 3 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.500 Cv (Summer) 1.000
Region England and Wales Ratio R 0.317 Cv (Winter) 1.000

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

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 2, 30, 100
Climate Change (%) 0, 0, 0, 45

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	01	120 Winter		100	+45%	100/60 Summer				56.430	0.620	0.000
1.01	02	120 Winter		100	+45%	100/60 Summer				56.429	0.654	0.000
1.02	03	120 Winter		100	+45%	100/60 Summer				56.427	0.737	0.000
1.03	04	120 Winter		100	+45%	100/60 Summer				56.425	0.795	0.000
1.04	05	120 Winter		100	+45%	100/60 Summer				56.423	0.883	0.000
1.05	06	120 Winter		100	+45%	100/60 Summer				56.421	0.951	0.000
2.000	50	15 Summer		100	+45%	100/15 Summer				61.051	0.401	0.000
2.01	HW	120 Summer		100	+45%	100/60 Summer				60.295	0.100	0.000
2.02	SWALE	120 Summer		100	+45%	100/15 Summer				60.347	0.492	0.000
2.03	HW	240 Summer		100	+45%					59.625	0.000	0.000
2.04	51	30 Summer		100	+45%	30/15 Summer				61.008	1.498	0.000
2.05	52	30 Summer		100	+45%	30/15 Summer				61.131	1.841	0.000
2.06	54	30 Summer		100	+45%	30/15 Summer				61.139	2.124	0.000
3.000	SWALE	60 Summer		100	+45%	100/15 Summer				60.920	0.195	0.000
3.01	HW	120 Summer		100	+45%					60.575	0.000	0.000
2.07	55	30 Summer		100	+45%	30/15 Summer				61.094	2.349	0.000
2.08	56	30 Summer		100	+45%	30/15 Summer	100/30 Summer			61.100	2.550	0.349
2.09	57	30 Summer		100	+45%	30/15 Summer	100/30 Summer			61.100	2.710	0.057
4.000	SWALE	60 Summer		100	+45%	100/15 Summer				60.348	0.198	0.000
4.01	HW	30 Summer		30	+0%					59.720	0.000	0.000
2.010	58	30 Summer		100	+45%	2/30 Summer				61.102	2.797	0.000
5.000	59	30 Summer		100	+45%	100/15 Summer				61.285	1.135	0.000

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Pipe		Status	Level Exceeded
				Time (mins)	Flow (l/s)		
1.00	01	0.14			31.2	SURCHARGED	
1.01	02	0.15			43.0	SURCHARGED	
1.02	03	0.16			42.9	SURCHARGED	
1.03	04	0.17			50.5	SURCHARGED	
1.04	05	0.22			61.4	SURCHARGED	
1.05	06	0.33			80.7	SURCHARGED	
2.00	50	1.37			23.7	SURCHARGED	
2.01	HW	0.86		52	11.2	SURCHARGED*	
2.02	SWALE	1.37		36	17.7	SURCHARGED*	
2.03	HW	0.40			19.0	SURCHARGED*	
2.04	51	0.43			20.5	SURCHARGED	
2.05	52	0.48			23.4	SURCHARGED	
2.06	54	0.65			31.5	SURCHARGED	
3.00	SWALE	1.26		13	16.4	SURCHARGED*	
3.01	HW	0.19			16.0	SURCHARGED*	
2.07	55	0.33			31.6	FLOOD RISK	
2.08	56	0.37			34.9	FLOOD	1
2.09	57	0.43			31.8	FLOOD	1
4.00	SWALE	1.07		18	4.7	SURCHARGED*	
4.01	HW	0.17			2.2	SURCHARGED*	
2.010	58	0.38			27.0	FLOOD RISK	
5.000	59	0.66			12.9	FLOOD RISK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

										Water Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
2.011	60	30 Summer	100	+45%	2/15 Summer				61.100	2.875
6.000	HW 60	Summer	100	+45%	100/15 Summer				60.699	0.474
6.001	HW 60	Summer	30	+0%					59.715	0.000
2.012	61	30 Summer	100	+45%	2/15 Summer				61.078	3.073
7.000	62	30 Summer	100	+45%	100/15 Summer	100/15 Summer			61.152	0.852
7.001	63	30 Summer	100	+45%	30/15 Summer	100/30 Summer			61.142	1.577
2.13	64	30 Summer	100	+45%	1/15 Summer				60.981	3.416
8.000	65A	30 Summer	100	+45%	100/15 Summer	100/15 Summer			61.300	1.150
2.14	65	30 Summer	100	+45%	1/15 Summer	100/15 Summer			60.762	3.407
2.15	07	120 Winter	100	+45%	100/60 Summer				56.421	0.856
9.000	66	30 Summer	100	+45%	100/15 Summer				60.720	0.570
9.01	67	30 Summer	100	+45%	100/15 Summer				60.721	1.036
9.02	68	30 Summer	100	+45%	30/15 Summer				60.750	1.335
9.03	69	30 Summer	100	+45%	30/15 Summer				60.784	1.489
10.000	70	30 Summer	100	+45%	100/15 Summer				61.184	0.959
10.01	71	30 Summer	100	+45%	100/15 Summer				61.131	1.116
10.02	72	30 Summer	100	+45%	30/15 Summer				60.952	1.212
10.03	73	30 Summer	100	+45%	30/15 Summer	100/30 Summer			60.850	1.220
10.04	74	30 Summer	100	+45%	30/15 Summer				60.759	1.224
10.05	75	30 Summer	100	+45%	30/15 Summer				60.657	1.287
10.06	76	30 Summer	100	+45%	30/15 Summer				60.569	1.269
9.004	77	30 Summer	100	+45%	30/15 Summer				60.378	1.398
11.000	78	15 Summer	100	+45%					59.620	-0.030
11.01	79	15 Summer	100	+45%	100/15 Summer				59.620	0.090
11.02	HW 15	Summer	100	+45%	100/15 Summer				59.621	0.116
11.03	HW 120	Summer	100	+45%					59.230	0.000
11.04	80	60 Summer	100	+45%	100/15 Summer				59.309	0.149
11.05	HW BASIN 60	Summer	100	+45%	100/15 Summer				59.305	0.240
11.06	HW 60	Summer	30	+0%					58.980	0.000
9.05	81	15 Summer	100	+45%	2/15 Summer				59.742	0.962
9.06	82	15 Summer	100	+45%	30/15 Summer				59.668	0.923
1.06	08	120 Winter	100	+45%	100/60 Summer				56.418	0.993
1.07	09	120 Winter	100	+45%	100/60 Summer				56.415	1.050
1.08	10	120 Winter	100	+45%	100/30 Winter				56.409	1.184
12.000	11	15 Summer	100	+45%	100/15 Summer				56.968	0.168
1.09	12	120 Winter	100	+45%	100/15 Summer				56.403	1.618
1.10	13	120 Winter	100	+45%	100/15 Summer				56.397	1.692
1.11	14	120 Winter	100	+45%	100/15 Summer				56.391	1.766
13.000	15	120 Winter	100	+45%	100/30 Summer				56.391	1.481
13.01	16	120 Winter	100	+45%	100/30 Summer				56.391	1.516
14.000	17	120 Winter	100	+45%	100/60 Summer				56.398	1.003
14.01	18	120 Winter	100	+45%	100/60 Summer				56.398	1.073
14.02	19	120 Winter	100	+45%	100/60 Summer				56.398	1.103
14.03	20	120 Winter	100	+45%	100/60 Summer				56.398	1.178
14.04	21	120 Winter	100	+45%	100/30 Summer				56.398	1.308
15.000	22	120 Winter	100	+45%	100/60 Summer				56.398	1.198
15.01	23	120 Winter	100	+45%	100/30 Summer				56.398	1.313
14.05	24	120 Winter	100	+45%	100/30 Summer				56.398	1.363
14.06	25	120 Winter	100	+45%	100/30 Summer				56.396	1.421

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Cap.					
2.011	60	0.000	0.29			28.3	FLOOD RISK	
6.000	HW	0.000	1.18		22	15.4	SURCHARGED*	
6.001	HW	0.000	0.17			11.1	SURCHARGED*	
2.012	61	0.000	0.28			46.8	FLOOD RISK	
7.000	62	1.658	0.27			39.6	FLOOD	5
7.001	63	0.003	0.27			63.3	FLOOD	
2.13	64	0.000	1.00			92.5	SURCHARGED	
8.000	65A	0.231	0.62			18.8	FLOOD	2
2.14	65	12.355	0.34			60.5	FLOOD	7
2.15	07	0.000	0.04			70.8	SURCHARGED	
9.000	66	0.000	0.05			0.9	SURCHARGED	
9.01	67	0.000	0.43			7.2	SURCHARGED	
9.02	68	0.000	0.50			10.3	SURCHARGED	
9.03	69	0.000	1.26			56.3	SURCHARGED	
10.000	70	0.000	0.47			22.3	SURCHARGED	
10.01	71	0.000	0.92			44.5	SURCHARGED	
10.02	72	0.000	1.00			44.0	FLOOD RISK	
10.03	73	0.029	0.73			53.6	FLOOD	1
10.04	74	0.000	0.76			58.1	SURCHARGED	
10.05	75	0.000	0.88			58.6	SURCHARGED	
10.06	76	0.000	0.41			58.2	SURCHARGED	
9.004	77	0.000	1.79			121.4	SURCHARGED	
11.000	78	0.000	0.01			0.1	OK	
11.01	79	0.000	0.14			1.6	SURCHARGED	
11.02	HW	0.000	1.20		5	15.6	SURCHARGED*	
11.03	HW	0.000	0.35			13.0	SURCHARGED*	
11.04	80	0.000	0.31			13.4	SURCHARGED	
11.05	HW BASIN	0.000	0.93			38.4	SURCHARGED*	
11.06	HW	0.000	0.41			23.8	SURCHARGED*	
9.05	81	0.000	0.97			57.3	SURCHARGED	
9.06	82	0.000	0.21			49.5	SURCHARGED	
1.06	08	0.000	0.14			190.7	SURCHARGED	
1.07	09	0.000	0.11			189.9	SURCHARGED	
1.08	10	0.000	0.09			247.6	SURCHARGED	
12.000	11	0.000	1.20			137.8	SURCHARGED	
1.09	12	0.000	0.19			277.6	SURCHARGED	
1.10	13	0.000	0.19			279.0	SURCHARGED	
1.11	14	0.000	0.18			258.3	SURCHARGED	
13.000	15	0.000	0.01			10.1	SURCHARGED	
13.01	16	0.000	0.02			32.9	SURCHARGED	
14.000	17	0.000	0.01			12.7	SURCHARGED	
14.01	18	0.000	0.02			22.1	SURCHARGED	
14.02	19	0.000	0.02			30.9	SURCHARGED	
14.03	20	0.000	0.03			48.1	SURCHARGED	
14.04	21	0.000	0.07			90.0	SURCHARGED	
15.000	22	0.000	0.02			25.5	SURCHARGED	
15.01	23	0.000	0.04			57.1	SURCHARGED	
14.005	24	0.000	0.14			190.4	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded		Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)			
14.006	25	0.000	0.18			196.9	SURCHARGED	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m³)
14.07	26	120 Winter	100	+45%	100/30 Summer				56.395	1.460	0.000
14.08	27	120 Winter	100	+45%	100/30 Summer				56.394	1.504	0.000
14.09	28	120 Winter	100	+45%	100/30 Summer				56.393	1.523	0.000
13.02	29	120 Winter	100	+45%	100/30 Summer				56.391	1.581	0.000
13.03	30	120 Winter	100	+45%	100/15 Summer				56.389	1.664	0.000
13.04	31	120 Winter	100	+45%	100/15 Summer				56.387	1.742	0.000
1.012	32	120 Winter	100	+45%	1/60 Summer				56.385	2.430	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Overflow		Time (mins)	Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)				
14.07	26	0.17			199.5	SURCHARGED	
14.08	27	0.26			199.8	SURCHARGED	
14.09	28	0.15			204.5	SURCHARGED	
13.02	29	0.16			236.9	SURCHARGED	
13.03	30	0.14			209.4	SURCHARGED	
13.04	31	0.12			184.4	SURCHARGED	
1.012	32	0.93			199.7	SURCHARGED	

Appendix G; Index Pollution Approach

SIMPLE INDEX APPROACH: TOOL



HMW shall not be liable for any direct or indirect damage claim, loss, cost, expense or liability howsoever arising out of the use or impossibility to use the tool, even when HMW has been informed of the possibility of the same. The user hereby indemnifies HMW from and against any damage claim, loss, expense or liability resulting from any action taken against HMW that is related in any way to the use of the tool or any reliance made in respect of the output of such use by any person whatsoever. HMW does not guarantee that the tool's functions meet the requirements of any person, nor that the tool is free from errors.

- The steps set out in the tool should be applied for each inflow or 'runoff' area (ie each impermeable surface area separately discharging to a SuDS component).
- The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.
- The process that is automated in this tool is described in the SuDS Manual, Chapter 26 (Section 26.7)
- Relevant design examples are included in the SuDS Manual Appendix C.
- Each of the steps below are part of the process set out in the flowchart on Sheet 3.
- Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.
- Interception should be delivered for all upstream impermeable areas as part of the strategy for water quantity and quality control for the site. This is required in order to deliver both of the water quality criteria set out in Chapter 4 of the SuDS Manual

DROP DOWN LIST	RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP
USER ENTRY	USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the runoff area, either:

use the land use type with the highest Pollution Hazard Index

apply the approach for each of the land use types to determine whether the proposed SuDS designs are sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down list.

Runoff Area Land Use Description	Pollution Hazard	Total Suspended Solids	Metals	Hydrocarbons	
Select land use type from the drop down list (or 'Other' if none applicable) If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:	Low traffic roads (e.g. residential roads and general access roads, < 20 traffic movements/day)	Low	0.5	0.4	0.4
Landuse Pollution Hazard Index		Low	0.5	0.4	0.4

DESIGN CONDITIONS	
1	2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generally described by the suggested components, then 'Proprietary treatment system' or 'User defined index' should be selected and a description of the component and agreed user defined indices should be entered in the row below the drop down list.

SuDS Component Description	Pollution Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list:	0.7	0.6	0.7
Permeable pavement (where the pavement is not designed as an infiltration component)			
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list:	0.8	0.8	0.8
Retention system (where the system is not designed as an infiltration component)			
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list:	0	0	0
None			
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined index' and enter component descriptions and agreed user defined indices in this row:			

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.95'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? [Click Here](#)
No ? [Click Here](#)

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generally described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list.

		Total Suspended Solids	Metals	Hydrocarbons
Select type of groundwater protection from the drop down list:				
		</		

DESIGN CONDITIONS			
1	2	3	4

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

Combined Pollution Mitigation Indices for the Runoff Area	Combined Pollution Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons
	>0.95	>0.95	>0.95

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at '>0.95'. In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (in row and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

Sufficiency of Pollution Mitigation Indices		
Total Suspended Solids	Metals	Hydrocarbons
Sufficient	Sufficient	Sufficient

Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process 3. The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered and consultation with relevant conservation bodies such as Natural England.

Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but interception requires separate evaluation.