

response that foul water flows from the development can be accommodated within the public combined sewer within the vicinity of the site and can be connected at convenient locations. Refer to the United Utilities correspondence enclosed in *Appendix E*.

- 6.2.5 The proposed drainage strategy is enclosed in *Appendix F*.

6.3 Proposed Surface Water Drainage

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

Infiltration

- 6.3.3 The Site Investigation (ref: 074971-CUR-00-XX-RP-GE-002) indicates that made ground is present on site, with Glacial Till, Superficial deposits over Clay, therefore soakaway will not be feasible.

Watercourse

- 6.3.4 There are no watercourses within, or in the vicinity of the site. A connection to a watercourse would not be feasible due to the distance from the site and the requirement to cross third party land.

Surface Water Sewer

There is no surface water sewer located in the vicinity of the site.

Combined Water sewer

- 6.3.5 There is existing 300mm diameter combined water sewer within Princedom Street, where surface water will be discharged via existing connection either new connection from the site will be created.

6.3.6 Table 5 summarises the options for surface water disposal.

Table 5: Surface Water Disposal

Surface Water Disposal	Potential	Description
Infiltration	X	It is assumed that the site will not be suitable for infiltration SuDS.
Watercourse	X	A new connection to the watercourse is not considered a viable option as it too great a distance and would have to pass through third-party land.
Surface Water Public Sewer	X	There is no surface water sewer within the vicinity of the site.
Combined Public Sewer	✓	Discharge to combined water sewer within Princedom Street

- 6.3.7 The proposed surface water drainage is to be collected by a gravity drainage network, and outfall into the existing combined water public sewer within Princedom Street.
- 6.3.8 There is the potential to reuse the existing connection from the site and offer it for adoption under S102 Agreement- subject to survey and United Utilities approval.
- 6.3.9 The LLFA and UU have been consulted regarding discharge rates (see Appendix E). They have recommended that the site drains at brownfield with 50% reduction from existing discharge rates.
- 6.3.10 Existing discharge rates have been calculated based on the existing network model included in *Appendix F* and are summarised below.
- 6.3.11 The existing impermeable area within the site has been estimated at approximately 9,910m². This is served by two drainage systems within the site.
- 6.3.12 Area E1 (approx. 9,020m²) is served by a combined drain, which exits the site via a 300mm diameter drain, connecting into the combined public sewer in Princedom Street.
- 6.3.13 Area E2 (approx. 890m²) is served by a surface water drain, which exits the site via a 300mm diameter in the southwest corner of the site. The exact details of the outgoing pipe could not be confirmed, as it shown as blocked on the Utility survey.
- 6.3.14 Models of the existing on-site drainage networks have been produced using Microdrainage software, based on the survey information received These models have been analysed to provided estimates of the existing flow rates for the 1, 30 and 100-Year Period storm events:



- 6.3.15 Further to 6.3.10, the proposed allowable flow rates for the proposed development should be limited to 50% of the pre-development flow rates.
- 6.3.16 The existing and proposed allowable flow rates are summarised in Table 6

Table 6: Existing and proposed rates:

Area	1-Year Return Period	30-Year Return Period	100-Year Return Period
E1	69.6	139.6	157.1
E2	9.7	25.1	32.5
Total Existing	79.3	164.7	189.6
Proposed Allowable Flow Rates (50% of Existing Flows)	39.7	82.4	94.8 (Including an allowance of 40% for Climate Change)

- 6.3.17 The impermeable area plan and existing drainage calculation results are included within *Appendix F*.
- 6.3.18 The proposed drainage system will require attenuation storage for the 30-Year and 100-Year return period storm events.
- 6.3.19 A surface water has been modelled using Microdrainage software, to estimate the required storage volumes. These volumes are estimates and will be subject to change through the detailed design process. The required attenuation volumes are as follows:
- 30-Year; 94m3
 - 100-Year: 216m3 (Additional 122m3). This includes an allowance of 40% for climate change.
- 6.3.20 As the site significantly falls between east and west side, to reduce surface water pipes depth, 2 flow control chambers have been proposed (first in SW6- middle site, second in SW8 near site entrance).
- 6.3.21 It is intended that the proposed surface water drainage located in the road will be offered for adoption.
- 6.3.22 The access road will be offered for adoption to Manchester City Council Highways; therefore, it is proposed to locate the attenuation tank for 1 in 100+climate change will be located within the private access road near the south boundary.
- 6.3.23 The proposed drainage strategy for the site has been included within *Appendix G*.



- 6.3.24 Where sewers are offered for adoption by United Utilities, they will be subject to a Section 104 Agreement with United Utilities. Approval to connect are likely to be agreed under the Section 104 Agreement.
- 6.3.25 Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Access roads are considered as a low hazard in terms of contamination. Figure 9 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Figure 9: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

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

6.3.26 Figure 10 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015).

Figure 10: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

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

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

- 6.3.27 The selection of treatment should ensure that the SuDS mitigation component index (Figure 10) exceeds the pollution hazard index (Figure 9).
- 6.3.28 Within the carriageway which is to be put forward for adoption, it is not possible to proposed sustainable features within road, therefore trapped gullies will be provided.
- 6.3.29 Permeable paving is proposed within the car park and non-adoptable carriageway. This is proposed as a water quality treatment and to slow the water flow, and not as an attenuation feature. This is subject to detailed design, as there are HV cables present within the car park
- 6.3.30 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Manchester City Council and United Utilities.

7.0 Maintenance

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

7.2 Components

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