Carley Daines and Partners Limited
Consulting Civil and Structural Engineers

13127 - BRIGHAM STREET - OPENSHAW
SuDS SUITABILITY ASSESSMENT

METHOD	COMMENT	SUITABILITY FOR DEVELOPMENT
Green Roofs	• Can be used on suitable low rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity	***Not suitable:*** • Architectural proposals for the development involve a pitched roof arrangement, which are not suitable for green roofs.
Rainwater Harvesting	• Rainwater harvesting reduces the total run-off volume from the developed site, and reduces treated water consumption.	***Not suitable:*** • Additional costs of installation would have severe effect on viability of the development. • Running and maintenance costs would not be acceptable to our client and future occupiers. • The ability to restrict peak flow rates and short term peak columns is non-existent where a critical storm event occurs. • Lack of available space on site to store storm water, not feasible.
Infiltration Options	• Reduces total run-off volume from the development.	***Not suitable:*** Ground intrusive investigations *are likely* to indicate that the underlying ground is not suitable for infiltration.
Permeable Surfacing (Infiltration)	• Reduces total run-off volume from the development. • Can be used to enhance water quality.	***Not suitable:*** Ground intrusive investigations *are likely to* indicate that the underlying ground is not suitable for infiltration.
Swales, Basins & Ponds	• Provide areas for above ground surface run-off storage. • Swales also allow filtering of particulate matter, improving water quality.	***Not suitable:*** • Space constraints on site do not permit large above ground areas for flood storage. • No scope to reduce development area due to site viability.
Bio-Retention	• Collect and retain run-off to help improve water quality, prior to	***Not suitable:***

	discharge in piped system on infiltration.	• Space constraints on site do not permit large above ground areas for flood storage. • No scope to reduce development area due to site viability.
Geocellular Storage	• Suitable for sites within insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc. • Can be very effective infiltration devices subject to ground conditions.	***Suitable:*** • Subject to detailed design and drainage layout geocellular storage can be utilized below private car parking areas. • United Utilities and Sewers For Adoption would require storms up to and including 1:30 year to remain in adoptable system, with geocellular storage provided for storms from 1:30 up to 1:100 +40%cc.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally be suitable for adoption by the water company (e.g. United Utilities).	***Suitable*** • Oversized pipes and manholes can be readily accommodated on-site and provide a viable and cost efficient drainage solution by attenuation. • Off line storage will be utilized for storms above 1:30 year, where layout and design permits.

Based on the SuDS assessment above, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

METHOD	SUITABILITY	SUITABILITY FOR DEVELOPMENT
Infiltration to ground	No	Ground intrusive site investigations suggest that the underlying ground is to be unsuitable for infiltration. On the basis of these findings, we shall explore further options of the SuDS hierarchy in anticipation.
Connection to Watercourse	No	There is NO watercourse or culvert within close proximity to the site, therefore we shall explore further options of the SuDS hierarchy.
Connection to Surface Water Sewer	No	There is a 1250mm diameter public dedicated surface water sewer to the north of the site. However, the SW sewer is outside of the site boundary, and in third party land. The third party landowners have been contacted about making this connection but have declined to communicate or allow any access to their land. Therefore, based on this sewer being inaccessible, we shall explore further options of the SuDS hierarchy.
Connection to a Combined Sewer	Yes	There is a network of combined sewers crossing and around the site. The pre development advice from United Utilities suggests that should the above orders of the SuDS hierarchy be explored and discounted, then they would consider a surface water connection to this sewer at a controlled flow rate which does not exceed 5l/s. Due to the ground conditions being unsuitable for infiltration, and there being no presence of a watercourse or public surface water sewer to site, a discharge into the combined public sewer crossing the site has been opted for as a last resort, ensuring the maximum flow rate from UU of 5l/s is adhered to via the use of attenuation and a HydroBrake.

As the site investigation results suggest that the ground conditions are not suitable for infiltration, and the lack of any water courses or culverts or a public surface water sewer on or near to site, the final order of the SuDS hierarchy has been explored – the connection to a public combined water sewer.

There is a a network of existing combined water sewers crossing the site, however as part of the development United Utilities, the consultant engineers and the contractors have agreed to a Section 185 drainage diversion which has been approved. The S185 diversion will provide a new 300mm diameter combined water public sewer crossing the site, which United Utilities have indicated that they will allow a connection into, providing evidence is provided that the orders of the hierarchy are not possible. Therefore, the drainage proposals shall be developed on this basis with surface water from the site proposed to discharge into the existing combined water sewer system, at the flow rate agreed by United Utilities, and set at a generally considered minimum of 5l/s – this maximum pass forward flow rate will be split into two separate flow rates for the functionality of the development: 3l/s for the highway drainage (to be adopted by MCC as a highway drain under the Section 38 agreement); and 2l/s for the plot drainage (to remain private). There will be two separate HydroBrakes for this, restricting flows to the respective rates, whilst the total flow off site will be no greater than the flow rate offered by United Utilities: 5l/s.

SuDS elements which are appropriate to the site have been explored above and shall be used where suitable and practical. In this instance the use of oversized pipes and manholes in the highway adopted surface water drainage will be used to accommodate storms up to and including 1:100 years +45% climate change with the use of a HydroBrake flow control to restrict overall discharge; and the use of off line geocellular crates under private areas for the storage of storm water to the plot drainage to accommodate all storms up to and including the 1 in 100 year event plus 45% climate change, with a HydroBrake used to control the flow.

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