

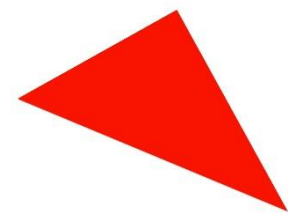


Carley Daines and Partners Limited

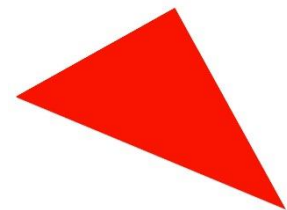
Consulting Civil and Structural Engineers

CHAIN ROAD, BLACKLEY, MANCHESTER 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	<u>Not suitable:</u> 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.	<u>Not suitable:</u> - 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.	<u>Not suitable:</u> Ground intrusive investigations outlines in the Phase 2 site investigation 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.	<u>Not suitable:</u> Ground intrusive investigations 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.	<u>Not suitable:</u> 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 discharge in piped system on infiltration.	<u>Not suitable:</u> - 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.	<u>Suitable:</u> - 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. WHERE REQUIRED.
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, where appropriate (e.g. United Utilities).	<u>Suitable</u> - 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	Through intrusive site investigations, detailed in the Phase 2 Site Investigations, the underlying ground has been found to be Unsuitable for infiltration.
Connection to Watercourse	No	No watercourse or culvert in close proximity to the site.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity to the site.
Connection to a Combined Sewer	Yes	As the above options are not viable due to poor ground conditions/ absence of suitable apparatus, a connection into the combined sewer will be resorted to as a last option with the flow restricted to 5l/s as per United Utilities request.

Due to the ground being unsuitable for infiltration, and the lack of watercourses and surface water sewers in the vicinity of the site, the developer shall discharge surface water into the public combined sewer system at the flow rate agreed by United Utilities, 5l/s, restricted via a HydroBrake.

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 suitably sized pipes and manholes in the private and adopted surface water drainage to accommodate storms up to and including 1:30 years, the use of a HydroBrake flow control to restrict overall discharge and the use of off line attenuation storage for storm water exceeding 1:30 years, up to 1:100 plus an allowance for climate change of 40% - where required.