

The Flood Risk Team have raised the following queries:

- *Surface water drainage layout including discharge points, proposed attenuation and proposed overland flow routes.*

Response

There is no existing drainage system to discharge to. The philosophy of the design is to allow overland flow to existing limits. Brownfield run-off calculations are indicated below. Overland flows are shown on the attached plan.

- *Details would be required of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates, as the site is located within Conurbation Core Critical Drainage Area;*

Response

It is proposed to provide a drainage trench around the car park that will attenuation, allow infiltration, and overflow when full but only discharge the volume of brownfield run-off, see calculations.

- *Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 30 (note this was changed from 100 year, based on the temporary carpark only being in use for 18months) year storm rainfall event. Surface water flows should be restricted to ensure that no run-off from the site enters the adjacent Delaunays Road*

Response

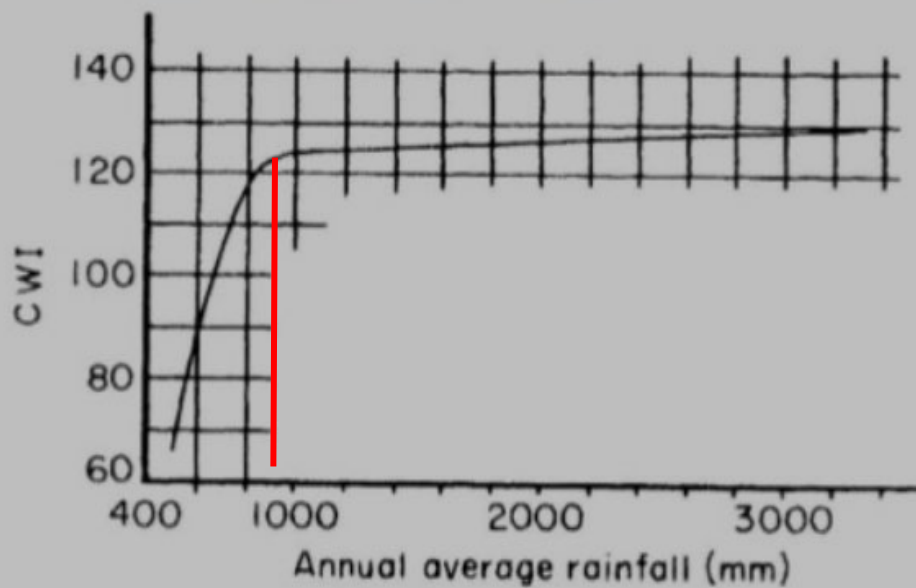
The system has been designed for 1 in 30 year event, see calculations.

- *Hydraulic calculation of the proposed drainage system;*

Response

Calculate the existing run-off volume going down the embankment towards Delaunays Road.

Appendix A5 – Catchment Wetness Index Graph



Estimate existing run-off volume for 1 in 30 year event, 360 minutes.

Pre-development discharge	
Site Makeup	Brownfield
Brownfield Method	Greenfield
Greenfield Method	FSR/FEH
Positively Drained Area (ha)	0.100
Soil Index	5
SPR	0.53
Catchment Wetness Index	120.000
Return Period (years)	30
Climate Change (%)	0
Storm Duration (mins)	360
Betterment (%)	0
	Calc
PR	0.524
Runoff Volume (m³)	22

Note – **22m³** is the existing brownfield run-off for this site. Therefore, any drainage solution we implement must not flood more than this.

If we utilise the drainage design currently provided 450mm x 450mm drainage trenches we have on the car park, then we get **38.5m³** of flooding for a 1 in 30 year event! This would suggest the drainage trenches are in-sufficient width. Infiltration has been assumed at 10.8m/hr (to be confirmed by testing). 6.291m³ is the storage provided on site through the above mentioned trenches.

Flow+ - Car park drainage ditch.pfd

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30 year Critical Upstream Depth Results for 30 year Critical Storm Duration.

Node Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
1440 minute winter	Depth/Area 1	480	99.250	0.450	1.3	6.2910	38.5208	FLOOD

If we increased the width to 750mm wide x 900mm deep then the flooding becomes less, with 19.6m³ of storage on site.

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30 year Critical Upstream Depth Results for 30 year Critical Storm Duration.

Node Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status	Link ID
1440 minute winter	Depth/Area 1	720	99.250	0.900	1.3	19.5750	24.8424	FLOOD	Infiltration

This is still a bit more than the 22m³ of existing run-off volume that occurs, but it gives an order of what the trenches would need to be. In fact, 800mm wide appears to eliminate flooding ie infiltration occurs for the event. 21.24m³ of storage provided within trenches.

Node Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID
1440 minute winter	Depth/Area 1	1440	99.205	0.855	0.6	21.2399	0.0000	OK	Infiltration

This synopsis is based upon infiltration rates of 10.8m/hr infiltration rate, which is considered a suitable rate of infiltration for the granular material existing on site.

For the existing scenario the existing overland flows go down the existing embankment, with Delauneys Road set higher than the adjacent ground level. There is also sustainable vegetation and trees to enable water to be absorbed by tree roots. It is not envisaged that flooding of Delauneys Road can occur as a result.