

Drainage design criteria

Hierarchy:- As per planning and local guidance the normal hierarchy is as below.

- 1) Infiltration
- 2) Attenuation and controlled discharge to a water course
- 3) Attenuation and controlled discharge to other

The design is based on (2) since (1) is not possible, see further below.

Infiltration

Infiltration was considered but ruled out because of a lack of sufficient area.

This is discussed in further detail below.

Cropped areas. This site is almost entirely used for crop production, at present the majority area being for outside beds, and the remainder greenhouses. The outside beds are all positively drained to ensure that the plants do not get waterlogged and to minimise disease issues. It is not possible to use the greenhouses themselves for obvious reasons.

Non-cropped areas. The areas that are not employed for production are the hedge-line to the front of the site (south), and the block of land across the stream (east), which is all woodland and therefore not accessible for such schemes, and the small wetland area to the north east which is a wildlife habitat.

The hedge-line is not suitable due to the risk of disturbance / damage to the root system of the hedge, and primarily because this land is approximately 0.5 – 0.8m higher than the adjacent road and there would also therefore be a possible risk of increasing road flooding.

Size of infiltration system. The best likely soil infiltration rate will be 0.02m/h, possibly less, and at this rate an infiltration area required would be in excess of 4,000m², which is clearly impossible on this site. The soil is classified by the BGS as 'loamy soil, naturally high groundwater'(see mapapps2.bgs.ac.uk/ukso/home), and the water level within the watercourse is approximately 1 – 1.5m below the site depending upon season, with the water table following this. As such any infiltration system needs to be very shallow which further increases the area requirement. Actual percolation rates have not been measured because the above demonstrates that even with an optimistic percolation rate such a solution is not practical.

Conclusion:- infiltration is not a suitable option to dispose of the very large quantities being generated and the limited available area.

Exceedance routes

The drainage system is designed to cope with the 1:100 event plus 40% CCA. Guidance dictates that exceedance routes must be considered. The most likely result of any excess flow is that there will be overspill at multiple locations, and therefore as an agricultural site it is accepted that exceedance

flow will be through the outside plant beds, with possible damage being accepted. Knowledge of the site over many years indicates that there is no ingress of flow from outside the site.

Top water level modelling

The discharges are from the attenuation tanks, and under extreme conditions will have a nominal head equivalent to the static head of the water in the tank, thus in excess of 3m above normal outfall levels, and as such able to cope with any conceivable top water rise.

Maintenance

<i>Task frequency</i>	<i>Task</i>
Continuous	Observe system for any evidence of system failure.
Winter monthly	Check sump drain down pump operation.
	Check system integrity
Annually	Measure outflows from orifice plates and check these match the specified volumes.
	Clean gutters and sumps.
	Inspect attenuation tanks.
	Inspect outfalls.

Checklist

Proposed Method of Surface Water Disposal

Infiltration

On-site, via soak-away structures

No

If on-site infiltration is not to be used, has justification for this been provided?

Yes

Attenuation (on-site) with a restricted discharge to a watercourse on, or adjacent to, the site

Yes

Attenuation (on-site) with a restricted discharge to a surface water sewer on, or adjacent to, the site

No

Attenuation (on-site) with a restricted discharge to a foul water sewer on, or adjacent to, the site

No

Drainage Design: Supporting Calculations

Calculations required

Calculations provided?

Infiltration Structures

n/a

Half-drain time for 10 year event (plus climate change allowance)

Half-drain time for 100 year event (plus climate change allowance)

Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site.

Lowest base level of infiltration structure

Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.

Attenuation and Subsequent Restricted Discharge

Pre-development run-off rate calculations

Yes

(based on greenfield site – see calculations)

6.27 l/s (1 in 1 year)

23.54 l/s (1 in 100 years)

Proposed discharge	6.27 l/s (1 in 1 year) 23.54 l/s (1 in 100 years)
Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site.	Yes
Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.	No – roof water only
If your proposed scheme incorporates any impermeable lined attenuation features we require calculations to demonstrate that appropriate resistance to floatation (due to groundwater levels) is catered for in the design	No – all above ground
If you propose discharging into or altering an ordinary watercourse; have you sought Ordinary Watercourse/Land Drainage Consent?	No
If discharging to a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system?	Yes
<i>Plans/Drawings/Diagrams</i>	
Plan detailing the location of groundwater monitoring and infiltration testing	No – see above
Detailed drainage layout plan	Yes
Construction detail	Yes
Exceedance flow route plans	No – see above
Impermeable area plan	Yes
If ground levels are being raised $\geq 300\text{mm}$ above existing levels and is unavoidable, have fully detailed plans been provided, together with drainage proposals, to address any potential drainage related issues.	n/a