

Technical Note

HASKONINGDHV UK LIMITED
INFRASTRUCTURE

Author : Jason Morgans
Date : 28 January 2015
Our reference : TN001-PB2348-310055-Egha
**Subject : Dunsbury Hill Farm
Planning Condition A2 – SUDS Masterplan
Surface Water Drainage Strategy Technical Note**

1.0 General

- 1.1 This technical note describes the surface water drainage strategy for the adoptable highway works associated with the Dunsbury Hill Farm development. The adoptable highway works include; Modifications to Hulbert Road including a new roundabout and site access road; The provision of a spine road through the site including a bridge over the Hermitage Stream; an new internal 4 arm roundabout and a number of priority junction access points off the spine road and a bus only link to Woolston Road.
- 1.2 Planning Condition A2 requires the production of this technical note as part of the SUDS Masterplan to demonstrate that that detailed design of the surface water drainage for the adoptable highway works follows the principles of SUDS as set out in the consented scheme.
- 1.3 For the purpose of the surface water drainage detailed design the highway is split into 4 catchment areas.

Catchment 1: Hulbert Road. The northern arm of the Hulbert Road roundabout and a small part of the northern end of the new parking area off Hulbert Road.

Catchment 2: Hulbert Road roundabout to the Hermitage Stream. The Hulbert Road roundabout and the new spine road up to the bridge over the Hermitage stream will drain eastwards and discharge to the Hermitage Stream.

Catchment 3: The high point of the new spine road east of the Hotel Roundabout to the Hermitage Stream. The adopted road area will drain westwards and discharge to the Hermitage Stream.

Catchment 4 The high point of the new spine road east of the Hotel Roundabout to Woolston Road. The adopted road area will drain eastwards and discharge to an adopted sewer located in Woolston Road.

1.4 The following documents and drawings have informed this technical note.

- a) Dunsbury Hill Farm Flood Risk Assessment – March 2012 (Atkins)
- b) Outline Design Drainage Layout drawings DHFSI-ATK-TP05-DS-DR-D-0001 to 0004 inclusive (4 no. drawings - Atkins)
- c) Highway Drainage Technical Note 5099849 Highway Drainage TN – 24th August (Atkins)

2.0 Design Parameters

2.1 The following design parameters are stated in the wording of condition A2.

- a) Attenuate flows on the site so as to not exceed the greenfield run-off rate of 3.4 l/s/ha
- b) Proposals tested against 1, 30 and 100 year return periods
- c) Proposals tested for a 100 year + 30% climate change return period.

2.2 In addition to the parameters stated in section 2.1, the following design parameters are stated in the documents and drawings listed in section 1.2.

- a) Design volume of surface water storage for a 1 in 100 year event plus 30% climate change.
- b) All drainage associated with the road and to be maintained by the local authority shall be kept separate from any other site drainage.
- c) The principles of SUDS as defined in the Ciria SUDS manual are to be used in the design of the surface water drainage.
- d) The SUDS surface water drainage strategy is to provide two level of treatment in series in order to maintain water quality in the key receptor the Hermitage Stream.
- e) Where there is an increased risk of serious spillages it is recommended that a storage area is provided that could be operated in the event of an emergency prior to discharge directly to a watercourse or an existing sewer.

3.0 Catchment 1

- 3.1 The existing Hulbert Road, at the location of the proposed new roundabout and the northern Hulbert Road arm of the A3 roundabout, drains to a system of filter drains that run along the east side of Hulbert Road and then runs through the site, following the alignment of the new spine road eventually discharging to the Hermitage Stream.
- 3.2 The existing system of filter drains also connects to the drainage for the existing embankments that support Hulbert Road and as such needs to be maintained.
- 3.3 Sections of the system of filter drains are within the footprint of the new spine road and will be diverted.
- 3.4 Part of the northern arm of the roundabout and a small section of the northern end of the parking area will drain to the existing and diverted system of filter drains. A new system of gullies, filter drains and carrier drains will be constructed which discharges to the existing filter drain to the east of Hulbert Road.
- 3.5 The total flows being received by the existing system from the highway areas will be reduced as the catchment area of the proposed realigned Hulbert Road has been proved to be less than the existing Hulbert Road catchment area.

4.0 Catchment 2

- 4.1 The new Hulbert Road roundabout circulatory carriageway, the new parking area of Hulbert Road, the realigned section of Hulbert Road forming the southern arm of the roundabout and the new spine road from Hulbert Road to the Hermitage Stream will drain to a new surface water drainage system discharging to the Hermitage Stream.
- 4.2 The new surface water drainage will be a system of gullies, filter drains, carrier drains and swales and an attenuation basin that will discharge to an existing 300mm dia. outfall pipe. The pipe discharges to the Hermitage Stream.
- 4.3 Where the roundabout and new spine road is kerbed then the road will drain to gullies connected to carrier drains. Where the new spine road is un-kerbed then the road will drain to a swale which in turn will drain to the carrier drain via gully / catch pits or filter drains constructed beneath the swales.
- 4.4 The system of carrier drain will drain to an attenuation basin. The basin will be adopted by the highway authority and will be designed to remain dry and will be a grass basin and will only fill with water during storm events. The basin will be 1.5m deep and have side slopes at a 1 in 3 gradient. An access track will be constructed at a shallower gradient to allow access by maintenance vehicles to the bottom of the basin for grass cutting.
- 4.5 The outflow from the attenuation basin to the existing 300mm diameter pipe that discharges to the Hermitage Stream will be restricted by a hydrobrake to the greenfield run-off rate of 3.4 l/s/ha. The attenuation basin has been sized in order to store the 100 year + 30% climate change return period critical storm duration and the drainage system has been modelled to demonstrate no flooding, that cannot be temporarily stored with the footprint of the adopted highway, in the 100 year + 30% climate change return period.
- 4.6 Two levels of treatment of the surface water run-off will be provided. The gullies and the swales will provide one level of treatment of the surface water run-off and the attenuation basin will provide a second level of treatment through the processes of the removal of sediments and hydrocarbons by settlement and filtration.
- 4.7 At roundabouts there is an increase in risk of serious spillages and therefore penstocks valves are provided to allow any spillage to be isolated in either the pipework and manholes or the attenuation basin to prevent it from discharging to the Hermitage Stream

5.0 Catchment 3

- 5.1 The new spine road; from the high point of the spine road north east of the Hermitage stream, including the hotel roundabout, to the Hermitage Stream; will drain to a new surface water drainage system discharging to the Hermitage Stream.
- 5.2 The new surface water drainage will be a system of swales, gullies, carrier drains and an attenuation pond that will discharge to the Hermitage Stream.
- 5.3 Where the road is kerbed then the road will drain to gullies connected to carrier drains. Where the new spine road is un-kerbed then the road will drain to swales which in turn will drain to the carrier drains via gully / catch pits or filter drains constructed beneath the swales.
- 5.4 The system of carrier drain will drain to an attenuation pond. The pond will not be adopted by the highway authority and will be designed to be wet and have a depth of permanent water below the level of the inlet and outlet pipes. The pond is designed to fill with water during storm events. The pond will be 2.0m deep and have a permanent water level of 0.5m deep and will have side slopes at a 1 in 3 gradient. An access track will be constructed at a

shallower gradient to allow access by maintenance vehicles. Ownership and maintenance of the pond will be with Portsmouth City Council.

- 5.5 The outlet from the pond will be through a small section of carrier drain connected to the Hermitage Stream. Discharge to the Hermitage Stream will be restricted by a hydrobrake to the greenfield run-off rate of 3.4 l/s/ha. The pond has been sized in order to store the 100 year + 30% climate change event and the drainage system has been modelled to demonstrate no flooding in the 100 year + 30% climate change return period.
- 5.6 Two levels of treatment of the surface water run-off will be provided. The gullies and the swales will provide one level of treatment of the surface water run-off and the attenuation pond will provide a second level of treatment through the processes of the removal of sediments and hydrocarbons by settlement and filtration.
- 5.7 At roundabouts there is an increase in risk of serious spillages and therefore penstocks valves are provided to allow any spillage to be isolated in either the pipework and manholes, swales or the pond to prevent it from discharging to the Hermitage Stream.

6.0 Catchment 4

- 6.1 The new spine road; from the high point of the spine road north east of the Hermitage stream to the Woolston Road; will drain to a new surface water drainage system discharging to an existing sewer in Woolston Road.
- 6.2 The new surface water drainage will be a system of gullies, carrier drains and swales, with filter drains and storage crates constructed beneath the swales.
- 6.3 Where the road is kerbed then the road will drain to gullies connected to carrier drains; where the new spine road is un-kerbed then the road will drain to swales which in turn will drain to storage crates and carrier drains via filter drain constructed beneath the swales; carrier drains will connect this system to the Southern Water adopted sewer located in the roundabout on Woolston Road.
- 6.4 Prior to discharging to the sewer the drainage system passes through a hydrobrake chamber that restricts discharge to the greenfield run-off rate of 3.4 l/s/ha plus an allowance for existing impermeable areas that currently drains to this sewer but which will be diverted through the new system. The pond has been sized in order to store the 100 year + 30% climate change return period critical storm duration and the drainage system has been modelled to demonstrate no flooding, that cannot be temporarily stored with the footprint of the adopted highway, in the 100 year + 30% climate change return period.
- 6.5 Two levels of treatment of the surface water run-off will be provided. The gullies and the swales will provide one level of treatment of the surface water run-off, and the filter drains below the swales will provide a second level of treatment, through the processes of the removal of sediments and hydrocarbons by settlement and filtration.

7.0 Summary and Conclusion

- 7.1 The proposed surface water drainage that is split into four catchment areas meets the requirements of the planning permission and the requirements of a drainage system adopted by the highway authority in that;
 - a) The drainage has been designed using the principles of SuDS;
 - b) All drainage associated with the road is separate from other site drainage, with the exception of the wet attenuation pond which will be maintained by Portsmouth City Council by agreement of Hampshire County Council;

- c) Proposed flows to the Hermitage Stream and the Woolston Road sewer are restricted to greenfield run off rates of 3.4 l/s/ha;
- d) volumes of surface water storage are designed for 1 in 100 year event plus 30% climate change return period;
- e) two levels of treatment is provided in order to maintain water quality in the key receptor the Hermitage Stream, and;
- f) the surface water drainage is designed to enable the drainage to be isolated to prevent the risk of contamination of the watercourses in the area in the event of a spillage.