

Environment Agency  
Solent & South Downs Area Office  
Colvedene Court (Wessex Business Park)  
Wessex Way  
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Winchester  
SO21 1WP

Our ref: CP/13:0262/4527  
Date: 30<sup>th</sup> April 2014  
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APP/14/00026  
HA/2013/114492/02-L01

**DISCHARGE OF CONDITION NOs 8 AND 26 OF FULL PLANNING PERMISSION**  
**APP/12/01222 AND CONDITION 28 OF OUTLINE PLANNING PERMISSION**  
**APP/12/01222**  
**MANOR FARM AND COPSEYS NURSERY, HALLETT ROAD, HAVENT**

Dear Ms Giles,

Thank you for your recent comments relating to the discharge of the outstanding planning conditions for the above development.

Please find below individual responses to each of the comments:

*The plan showing the overflow from the permeable sub-base into the balancing pond (MJA Dwg 4572-71) does not demonstrate how it will safely transfer surface water from across the site when groundwater levels are high.*

The highest groundwater levels recorded during the two year monitoring program are below the base of the proposed permeable road construction in all nine test locations, owing to the proposed raising of ground levels across the site.

The level of the permeable block paving roads and stone sub-base across the site has been designed to create an overall fall towards the eastern low point of the site.

In the event that groundwater rises above the underside of the permeable paving sub-base, exceedance flows (groundwater and rainfall runoff) will be safely conveyed within the stone sub-base across the site towards the eastern low point due to hydraulic gravity.

The approximate gradient of the paving sub-base is 1:250.

Refer to MJA Dwg 4572-71 for a typical section through the permeable block paving and balancing pond, demonstrating the link through the SuDS components in the system.

A series of cellular Permaviod cells connected to DN150 overflow pipes located within the stone sub-base at the eastern extent of the permeable block paving will collect and discharge flows into the balancing ponds (Manor Farm) and both the watercourse and balancing pond (Copseys Nursery).

A single permavoid cell with a DN150 overflow pipe has a flow capacity of 8 l/s.

There are 11no. overflows into the 4no. balancing ponds equating to a potential total discharge capability of 88 l/s (317m<sup>3</sup>/hr) from the sub-base system and into the ponds.

If groundwater should into the sub-base stone, runoff will be already be transferring horizontally through the sub-base of the paving to the low point of the site and discharging through the overflows into the balancing ponds, providing a continual capacity with the sub-base system to receive further groundwater and overflows from soakaways.

Current limitations of modelling software mean it is not possible to accurately demonstrate the laminar horizontal flow rate of runoff over a specified gradient through a granular media.

However, our investigations have concluded that the approximate  $K(i)$  value (hydraulic conductivity at a specific gradient and head) of 10-63mm coarse aggregate laid at a gradient of 1:250 is approximately 5m/minute (0.08m/sec).

This demonstrates that any groundwater entering the system at the furthest point of the site would reach the balancing ponds within approximately 20-30 minutes, ensuring continual capacity is provided within the system to adequately receive and discharge flows in the event of high groundwater.

*There are no details showing how exceedance flows will be managed safely within the site.*

A single permavoid cell with DN150 overflow pipe has a flow capacity of 8 l/s.

There are 11 no. overflows into the 4 no. balancing ponds equating to a potential total discharge capability of 88 l/s (317m<sup>3</sup> /hr) from the sub-base into the ponds.

The permeable block paving and soakaways have been designed to store the 1:100+30% storm event.

In the event that the ability of the permeable paving to infiltrate is exceeded, flows will be safely conveyed via hydraulic gradient within the stone sub-base across the site towards the eastern low point, where flows are discharged into the balancing ponds.

In the event that the capacity of soakaways are exceeded, where feasible an overflow pipe will connect with the sub base of the permeable block paving within the road.

Please see attached extract (Figure 1), highlighting that the vast majority of plots on the development drain directly to the sub base within the road.

Most of the remaining plots that do drain to a soakaway have an overflow connection to the road sub-base.

The plots that drain solely to a soakaway without an overflow connection (where this is unachievable e.g. mid terrace plots or no direct route for connection into road) are very few in number.

All soakaways along the critical western boundary have an overflow into the land drain, providing flood protection to the existing properties that border the site.

If soakaways which do not have a link to the paving or cannot utilise an overflow link due to lack of capacity within paving sub-base become exceeded, then minimal surcharging will occur within the upstream catchpit chamber.

Due to the designed fall of ground levels from the rear of properties to the back of gardens, any exceedance flows will drain away from properties until it can soakaway through the natural ground or capacity returns within the soakaway.

The entry threshold levels of all plots are set a minimum of 150mm above surrounding ground level to prevent the flooding of properties.

During an exceedance event (greater than 1:100 +30%) it is possible that overland runoff from the permeable paving may occur.

The level of the permeable block paving has been designed to create a general overall fall towards the eastern low point of the site following the exiting natural topography of the site. Any runoff will be safely contained within the road by raised pavement levels and dropped kerbs, where flows will be conveyed to the eastern low point of the site where it will flow into the ponds mimicking the existing 'natural' flood flow route for the site towards the Nore Farm Stream.

This strategy for managing potential exceedance flows will ensure that the level of flood risk to the existing properties situated at the western boarder of the site is not increase as a result of developing this site.

*There are no calculations supporting the proposed method of preventing the lining of the attenuation ponds from floating when groundwater levels are high.*

The highest groundwater level recorded during the two year monitoring program in the borehole nearest to the proposed ponds is 0.45mBGL.

The ground level in the region of the ponds is 13.20mAOD, so it can be assumed the highest ground water level would be at 12.75mAOD.

The base of all ponds are set at 12.80mAOD, therefore above the highest recorded ground water level.

A simple calculation confirms:

Uplift force of groundwater =  $10\text{kN/m}^2 \times \text{potential depth around base of pond (0.6m)}$

= total uplift force of  $6\text{ kN/m}^2$ .

Mass of granular fill and topsoil =  $18\text{kN/m}^2 \times \text{depth (300mm stone \& 200m topsoil =0.5m)}$

=  $9\text{ kN/m}^2$ .

Therefore the total force acting on the liner is sufficient to prevent uplift if groundwater should rise above the base of the pond.

$\frac{9\text{kN/m}^2}{6\text{kN/m}^2}$

= Factor of Safety of 1.5

*The design of the private soakaways does not use the precautionary principle, may increase risk to the existing properties to the west, and as shown will make some properties responsible for the drainage of others.*

The majority of properties discharge into the road sub-base or to an individual soakaway within its rear garden, so is not reliant upon others for their regular drainage.

Where linked soakaways have been proposed, a management company will share maintenance responsibility with all effected homeowners by writing to residents annually to offer inspection of the soakaway and associated pipework/chambers and to carry out maintenance where necessary.

The best rate obtained during the infiltration testing carried out as part of the FRA was  $1.25 \times 10^{-5} \text{m/s}$ .

The rate used to design the soakaways at this development is  $5.6 \times 10^{-6} \text{m/s}$  with a FOS of 2, equating to an actual precautionary rate of  $2.8 \times 10^{-6} \text{m/s}$  (0.01 m/hr) used in the calculations.

*The drainage plans show overflows from the private soakaways entering the land drain running across the western and northern edge of the development. The land drain was intended to allow the existing properties to the west to drain through the site, given that the development is to be raised.*

This land drain system comprises of a DN225 pipe laid to a minimum of 1:250, having a discharge capability of 33 l/s (119m<sup>3</sup>/hr).

This will adequately convey both runoff from the adjacent properties and overflows from the linked soakaways.

*The development includes the diversion of a section of ditch that runs through the northern section of the site.*

An application for works affecting this ordinary watercourse has recently been submitted to Hampshire County Council, awaiting their consent.

I trust you find the additional information acceptable to overcome the objections.

Yours sincerely,



CHRIS PENDLE  
FOR MJA CONSULTING