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From: Paul Cann <Paul.Cann@arun.gov.uk>

Sent: 28 April 2020 11:16

To: Paul Bond

Subject: RE: Planning Ref. BE/137/19/RES - The Cottage, Shripney - SuDs Options

Hi Paul

Sorry, we are just overwhelmed at the moment but hopefully my reply below will suffice.

I am not surprised about the poorer infiltration rates, which is one of the reasons why we wanted them undertaken, although I wasn't expecting them to be that much worse. ***Can you confirm at what depth the testing was done and that it was above peak recorded groundwater levels on the site.***

The rates of 10-7 are considered to be the design rate, so yes infiltration will not be the total solution and a hybrid scheme will need to be considered. The system needs to be designed based upon these rates ie. worst case scenario. This would take the form of utilising infiltration where possible and a restricted discharge to watercourses/s at QBAR rates. Greenfield run off (at QBAR) calculations to be provided. Please note that the existing catchments to the western and eastern watercourses need to be respected when considering the discharge points/rates. As there are two catchments, these must remain unlinked. It should also be noted that the original proposal to construct a pipeline through the tree area in the SE corner of the site would not be acceptable and therefore alternative routing needs to be considered and must be accessible for future maintenance.

Due to the number of trees within/adjacent to the site, it is critical that early discussions are had with our tree officer, as these can significantly impact any drainage design and my points below are all subject to the tree officers agreement.

I would suggest that the scheme includes permeable paving on all private driveways, all parking areas and the access road to create as much storage as possible. Any slopes need to be accounted for in order to maximise this storage ie. baffles may be required. The employment of crates needs to be less 'fragmented' from what was originally proposed ie. it just seems to be cramming in crates wherever possible due to unavailable space. Additional crates can be utilised in the in the original 'proposed pond area', however, this will form part of the attenuation system ie. hydrobrake downstream of the tank rather than upstream as suggested. Any storage structures above peak recorded groundwater levels can have permeable liners to make use of infiltration.

No structures or pipework are to be located in root protection areas (based upon the existing trees reaching maturity). Any infrastructure in the vicinity of these areas is likely to require additional protection against tree root intrusion.

It is very likely that offsite improvements will be required to ditches/culverts in the vicinity, especially the system alongside Shripney Road which has had inherent issues. I would suggest that the systems are surveyed to identify culvert locations/diameters/culvert and ditch levels/condition, etc, so further discussions can be had. I enclose a copy of records which may help but are far from complete. It would be useful to meet on site at some point to review your findings in this respect, but at the moment we are unable to visit site due to the virus situation.

We look forward to receiving a revised scheme, etc for consideration. If we cannot reach agreement, then the development layout will need to change in order to be more accommodating.

Regards

Paul Cann
Principal Engineer (Drainage)

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From: Paul Bond [REDACTED]
Sent: 16 April 2020 12:35
To: Paul Cann <Paul.Cann@arun.gov.uk>
[REDACTED]

Subject: RE: Planning Ref. BE/137/19/RES - The Cottage, Shripney - SuDs Options

Hi Paul,

I hope all is fine with you and you are weathering these strange times well.

I have left a couple of messages recently with regard to surface water discharge options for the above scheme, which I was hoping to talk through with you.

Following repeat infiltration testing at the above site on the 25/02/20, conducted after a winter of exceptionally heavy rainfall, the results were unsurprisingly poorer than those conducted in November 2019 (which also followed antecedent very wet weather throughout September, October and November).

Initial results in November returned infiltration rates across the site ranging from 10^{-6} to 10^{-5} m/s. As demonstrated in then Table below, the February infiltration rates were typically between 1 to 2 orders of magnitude less at 10^{-7} m/s.

February 2020 Results		November 2019 Results	
<i>Test Location</i>	<i>Infiltration Rate (m/s)</i>	<i>Comparable Test Location(s)</i>	<i>Infiltration Rate (m/s)</i>
SA01	2.8×10^{-7}	BH14/BH13	$1.7 \times 10^{-6}/2.9 \times 10^{-6}$
SA02	1.6×10^{-7}	BH12	1.1×10^{-5}
SA04	1.5×10^{-7}	BH11	2.0×10^{-5}
SA05	1.7×10^{-7}	BH1/BH15	$4.4 \times 10^{-5}/6.0 \times 10^{-6}$
SA06	1.5×10^{-7}	BH10	7.1×10^{-6}
SA03	1.3×10^{-7}	BH9	8.3×10^{-6}

Consequently, as the November 2019 results followed antecedent very wet weather throughout September, October and November (with rainfall of 121 %, 160 % and 164 % respectively compared to the long-term average) and indicated that infiltration was feasible at that time, the February results suggest that the proposed system can usually rely on infiltration, except during extremely wet conditions. During such conditions, there will be additional reliance on attenuation and discharge to the local drainage ditch network at greenfield rates.

In addition to the above, it should be noted that the AC Greenspace Officer has decided that the shallow landscaped pond at the front of the development (from which discharge into the highway ditch would have been facilitated) cannot be counted as useable amenity space and, consequently will need to be removed from the scheme (see attached figure for reference). If you remember, this pond was primarily a landscape feature and its capacity had not been required or included in the SuDS Strategy. Nevertheless, it was intended to discharge any overflow from approximately 2/3 of the site area into this feature, which originally was going to be discharged into the adjacent highway ditch at the greenfield rate. During our last conversation you had suggested that, in order to reduce the impact of the site discharge on the highway ditch, the western bank of the pond could be lowered to form a spillway, with discharge into the ditch being facilitated through diffuse overland flow from the pond during extreme events.

Now that the February infiltration test results indicate that discharge to the ditch could occur during particularly wet periods when infiltration rates will be compromised and that the pond will not form part of the proposals, it would be good to confirm with you an acceptable alternative, which could include the following:

1. Replacement of the pond feature with additional underground storage in this area, with an infiltrating bottom – to maximise infiltration opportunities (as a precautionary measure);
2. Removal of the proposed outfall into the ditch and replace this with hydrobrakes upstream of this additional storage (set at the greenfield rate);
3. Discharge into the ditch would only occur during very wet or extreme storm conditions, when it is anticipated that all of the on-site storage will fill up and water would be allowed to escape from the top of this additional storage feature, either through inspection covers or through a reinforced grass top (e.g. grassed AdPave system or similar – see attached brochure), which would then occasionally overflow into the ditch along its length at ground level and could still be used as amenity space.

If you could give me a call on my mobile to talk this through, I would be grateful.

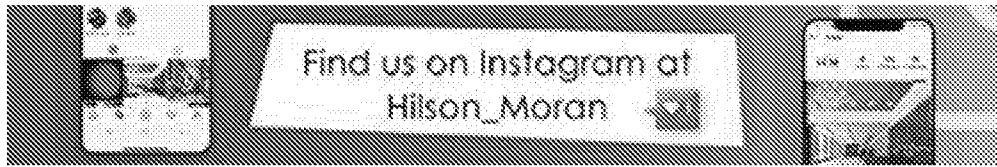
Kind regards

Paul



Paul Bond

PhD MRc BSc CEnv CSci MEnvSc MCIEEM
Associate



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From: Simon Davis <Simon.Davis@arun.gov.uk>
Sent: 18 February 2020 17:30
To: Ben Daines [REDACTED]
Subject: FW: Planning Consultation on: BE/137/19/RES

Hi Ben,

Please see drainage comments as just received. Whilst, there are separate conditions to discharge, we will need to consider the points raised that relate to layout.

I have also just chased the Landscape and Tree Officers for their consultation comments.

Kind Regards

Simon

From: Sarah Burrow
Sent: 18 February 2020 16:50
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Subject: RE: Planning Consultation on: BE/137/19/RES

Engineers Comments Regarding Surface Water Drainage

The applicant has provided some groundwater monitoring and infiltration testing data, alongside a drainage layout as apart of this application. The following points are noted:

- 1: Groundwater monitoring is expected over a full winter period for a development of this size. Luckily the applicant has captured data for when groundwater peaked in February 2019. We will accept this result in a future DOC application.
- 2: Infiltration testing was completed in November. These tests need to be completed in peak winter conditions when the ground is at it's most saturated. Before making a DOC application the applicant will need to repeat these tests in winter conditions. **We will consider further testing to be completed up to the end of February 2020. The applicant is encouraged to contact this department to agree the level of testing required.**
- 3: Despite early indications of favourable infiltration rates the applicant is proposing to attenuate part of the surface water on site and discharge any overflows to the two boundary ditches. This is not appropriate. It is expected that all water is infiltrated on site with no overflow to the ditches in accordance with the hierarchy for sustainable drainage. This will be dictated by the results of further testing as per point 2.

4: An infiltration basin appears to be located within the public open space, please consult Parks and Greenspace regarding this matter.

There is a concern that the applicant may be proposing to attenuate surface water on parts of the site due to the limited space remaining around dwellings and protected trees. Surface water drainage must be considered at the earliest opportunity and form part of the layout development process. Without adequate winter infiltration testing there is no way of determining the area take up required for a fully infiltrating surface water drainage solution. Blanket solutions will likely be required with a 5m easement from buildings to soakaways and diffuser units in permeable paving. Leaving drainage design until after a layout has been agreed will likely unduly prejudice drainage design and not allow for the hierarchy for sustainable drainage to be followed.

Furthermore, inadequately considering drainage at this stage could potentially result in a lack of sufficient capacity being provided for surface water drainage and therefore the development could lead to an increased risk of flooding elsewhere.

Therefore, we object to the application at this time.

To overcome the objection the applicant should complete winter infiltration testing and complete calculations to assess the size of structures required. A rough plan should be formed showing where these structures can be provided within the proposed layout. Detailed design of the system can be left until discharge of conditions where the applicant should provide the level of information stated within our checklist
<https://www.arun.gov.uk/drainagechecklist>.

Kind Regards

Sarah Burrow
Engineering Assistant

and

Paul Cann
Principle Drainage Engineer

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