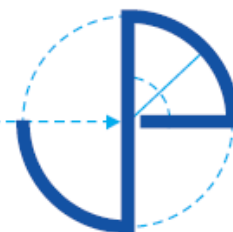


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22 September 2017
IE17/069/HP

187 High Street,
Cheveley,
Suffolk,
CB8 9DG

For the attention of: Richard Fullerton

Dear Sir,

**Land to the rear of The Paddocks, Cheveley
Analysis of Flood Risk Assessment (FRA) and Drainage Strategy (DS)**

Further to your e-mail instruction dated 14th September 2017, in relation to the above, we have now completed our analysis of the FRA and DS to establish the nature and extent of the flood risk on the site, the potential impact of the development and the viability of the proposed mitigation techniques and drainage strategy.

Introduction

We understand that according to planning reference 17/01518/FUM a development comprising 10 new dwellings is proposed on land to the rear of The Paddocks, Cheveley. As the site is greater than a hectare (approximately 1.19 hectares) in size, a flood risk assessment and drainage strategy are required to accompany the planning application. A previous planning application for the site submitted earlier in 2017 (17/00703/FUM) was refused on the basis of a failure to provide an adequate solution to surface water drainage.

We have reviewed this Flood Risk Assessment & Drainage Strategy in the context of current policy and legislation which includes BRE 365, NPPF, CIRIA SuDS Manual and the Cambridgeshire County Council Surface Water Guidance. We have considered the proposals in the same frame of reference as the Lead Local Flood Authority to determine whether the surface water mitigation strategy put forward by Rossi Long Consulting in their FRA & DS dated August 2017 are 'sustainable' and compliant.

Local Geology

Both the BGS online geological records and the onsite intrusive investigation agree that the site is underlain by a shallow layer of topsoil, over Made Ground, overlying Clay of the Lowestoft Formation. This suggests that infiltration based SuDS are unlikely to be viable and another solution must be adopted. This was subsequently confirmed by onsite infiltration testing and undertaken by Delta-Simons.



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We have summarised our main queries/concerns regarding the proposals in the following points;

Infiltration testing

The infiltration testing completed by Delta-Simmons on behalf on Rossi Long was not fully compliant with the BRE365 methodology, which is the industry recognised process for determining site specific infiltration rates. Instead a falling head test was completed in a borehole of dimensions 1.07m deep by 0.12m wide. This would be appropriate if deep bore soakaways were proposed but as shallow infiltration methods (permeable paving/swales) are proposed a shallow infiltration test pit would have been more appropriate. Additionally, the test was only undertaken once and ran for 60 mins. The BRE365 methodology requires a test to be run to completion (not less than 75% empty) three times in quick succession to assess the impact of prolonged wet weather on soil permeability. In order for infiltration based methods to be proved viable, a half drain time of 24 hours is required.

SuDS component: Permeable paving

Permeable paving has been specified for all areas of private hardstanding/driveway except the shared access road. As there is a significant drop in levels over the site (3m over a 150m distance) it is likely that in order to allow surface water sufficient time to infiltrate thereby preventing overland flow the permeable paving may have to be terraced or incorporate baffles/check dams. The drainage layout drawing does not make reference to any such feature and no cross-section or design details have been included. The properties to the east of the access road have no apparent point of discharge for excess surface water which cannot infiltrate to the ground. This creates a potential surface water flood risk for these properties, which also has the potential to impact the highway.

Source Protection Zone

According to the Environment Agency mapping the site is located within a Groundwater Source Protection Zone (Zone 2) and vulnerability zone 'Major Aquifer Intermediate'. The site is within 500m of a point of abstraction and therefore groundwater has a higher degree of sensitivity to potential contamination.

Although infiltration based SuDS are not prohibited within this zone, consultation with the Environment Agency (EA) is advised to ensure that surface water treatment guidelines are adhered to. The FRA report does not refer to any consultation with the EA on this matter. This is of particular importance given that surface water runoff from carparking areas is designed to infiltrate to ground through the use of permeable paving and has the potential to contain low level hydrocarbon pollution within it and therefore a risk of contamination to groundwater.

SuDS component: Swales/Ditches

Some areas of impermeable hardstanding such as the estate road are proposed to drain into a series of swales and ditches. No explanation is given as to why these two elements are differentiated within the design. Swales are a valid SuDS component and must conform to specific dimensions, while ditches are not specifically referred to within the CIRIA guidance other than in the context of existing hydraulic features, or as a conveyance system. The swales/ditches are connected in series via the use of interconnected pipework. This results in total of 10 headwalls and corresponding pipework sections each of which is liable to become blocked during a storm event if maintenance is not rigorous and loose debris were to accumulate in the ditch. The party responsible for the maintenance of these swales/ditches is not defined within the FRA.

SuDS component: Rainwater harvesting system

The roof runoff from each dwelling/garage is dealt with via individual rainwater harvesting systems. When calculating post development surface water runoff, it must be assumed that the harvesting system is full in order to account for the worst-case scenario. It has not been made clear in the drainage strategy whether this has been allowed for. Rainwater harvesting is also incorporated into the affordable housing (Plots 9 and 10), these are to be under 'shared ownership' but maintenance responsibilities are not defined.

Shared access road

As the access road is proposed for adoption by the Local Highways Authority it is drained by a series of swales/ditches along its length and by two road gullies at the eastern end which drain straight into the attenuation lagoon. It would appear that there are insufficient treatment stages in respect of the highway runoff at this point, as the south-eastern line of 'ditches'.

Attenuation lagoon

There is a great deal of inconsistency throughout the report and associated drawings regarding the drainage feature along the eastern boundary. This feature is referred to as the 'new ditch', 'attenuation lagoon' and 'detention basin'. Its design does not correlate with any of these descriptions or a recognised SuDS component. If it is classified as a swale then it must have a maximum side slope of 1 in 3, whereas if it is a detention basin it must have a length : width ratio of between 1:3 and 1:5, a 140m long detention basin would therefore require a minimum width of 28m. The same concepts apply to the drainage feature along the northern boundary. Therefore, neither of these structures would appear to comply with a SuDS compatible design.

Disagreement within the submitted information regarding the attenuation lagoon's point of discharge

Since the infiltration test proved a very slow rate of infiltration (6.64×10^{-7} m/s) it was proposed that whilst permeable paving, swales and rainwater harvesting systems would deal with some of the

surface water runoff at its source, the majority of the runoff would be directed to two 'attenuation lagoons'. The FRA states that the 'lagoons' will discharge to a nearby watercourse. However, it is clear from the drainage strategy drawing, provided in Appendix F, that the 'lagoons' discharge to a private surface water sewer associated with The Paddocks development, which in turn discharges to a pond located to the north of the site. It is not clear whether there was any historic connection to this feature or whether it is within the developer's ownership/control.

No existing point of discharge to reuse

Based on the topographical survey it would appear that the site currently discharges to a dry/seasonal ditch along the north-eastern boundary, however the report does not provide any evidence that this ditch is subsequently connected to the waterbody into which the development's surface water will discharge into. The proposed drainage strategy creates a new ditch parallel to the existing and therefore may not be able to claim an existing point of discharge to the waterbody to the north of the site. A new permission may need to be sought from the waterbody's owner. Waterbodies are usually owned by an Internal Drainage Board (IDB), the Environment Agency (EA) or a private landowner. Should it be either of the former two an application will be required and a fee payable.

Retention of 1 in 1 year rainfall event onsite

Both the CIRIA SuDS Manual and the Cambridgeshire County Council Surface Water Guidance require the 1 in 1 year rainfall event to be retained onsite as greenfield rates of runoff must be replicated on a greenfield site after development. Although there is the potential for this to be achieved through the use of swales and permeable paving it is not stated within the drainage statement that this will be achieved.

Impact of failure

While the FRA shows the impact of a drainage failure onsite, it does not appear to have assessed the risk of the receiving waterbody overtopping during an extreme rainfall event. The receiving waterbody is located within 15m of established residential properties, which increases the consequences of an overtopping event.

Foul

There is notable absence of information within the drainage strategy regarding the proposals for the disposal of foul water. It is our considered opinion that the development is likely to make use of an extension to the system that currently serves The Paddocks. The recorded invert level of the Anglian Water foul sewer in the High Street is at approximately the same height as ground level for the dwellings towards the lower end of the site. As a result, a pumped system may be required with an appropriate volume of temporary storage. This creates the potential for possible conflicts between

the surface water and foul drainage systems, additionally a pumping station and a rising main may be required onsite. The location of these features should be identified.

Use of outdated guidelines

Within the surface water drainage section of the flood risk assessment, Building Regulations 2000 are referred to – these have since been updated in 2002, 2010 and 2015 – and therefore the 2000 version is no longer applicable.

Summary

Based on the occasional inconsistencies, absence of supporting evidence and a departure from SuDS design parameters it is our considered opinion that the flood risk assessment does not provide sufficient evidence that a viable drainage strategy has been developed.

We therefore consider it likely that the Lead Local Flood Authority will raise a holding objection until the strategy is amended or missing evidence provided.

We trust that the above information is self-explanatory and meets your current requirements, however if you have any queries please do not hesitate to contact the undersigned.

Yours faithfully



H Purkis BSc Hons

On behalf of JPC Environmental Services
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