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Our Ref: 068535_CUR_CO_D_0001

18th February 2020

Dear Adam Littler

Great Wolf Lodge – LLFA Objection Response

Following your recent comments on the supporting documents of application 19/02550/F, relating to flood management and drainage, please see the below responses.

Comment:
Discharge noted to be to Gagle Brook ordinary watercourse. Riparian ownership and consent to discharge to be justified. Ditch condition and capacity to take additional flows to be demonstrated.

Response:
Discharge via ditched to Wendlebury Brook. Discharge to be in third party land to the south of the proposed site. Written permission to be demonstrated by the owner of Bicester Golf Resort and Spa. The existing back nine holes of the golf course are drained using a network of land drains, to the proposed outfall. As the proposed peak site discharge is to be at QBAR, the ditch should see no increase in peak discharge from the site.

Comment
Borehole/BRE to determine level of ground water to be provided.

Response
No intrusive surveys are able to be conducted due to the golf course remaining live until planning is granted. Unmanned Aerial Vehicle surveys of the site have demonstrated the groundwater levels. These will be confirmed post planning.

Comment
Section 4.2.2. states that there will be an "increase in peak discharge from that of a greenfield site." This should occur and robust justification as to why this is deemed the case to be provided.

Response
The comment included in Section 4.2.2 of the Flood Risk Assessment is reflective of the fact that the existing site includes artificial drainage in the form of perforated land drains and ditches. As these are artificial, they will affect the flow profile to differ from that of an undeveloped site. It is not a comment on the proposed development. The proposed development will not discharge at a rate higher than QBAR.

Comment
Section 5.2.2. identifies the use of Qbar methodology. For a site this size FEH should be used, (Qmed).

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Response

The use of QBAR for the site discharge rate was confirmed by Richard Bennett from the LLFA via email on 22nd July 2019. The email is appended to this response as evidence.

Comment
MicroDrainage calculations provided use default Cv values, these are not representative of the site. It is recommended values of 0.95 for roofs and 0.9 for paved areas are applied. The designer must justify where a Cv of less than 0.9 has been used.

Response:
The results of the MicroDrainage model along with the Drainage Strategy was issued to the LLFA on the 25th September 2019 ahead of Pre-App #6 which took place on 7th October 2019 and a subsequent follow up meeting with the LLFA on 23rd October 2019. The parameters of the design were presented at these meeting. No objection or guidance was given by the LLFA with regard to the required volumetric run-off coefficient. The used values have been proved in the SuDS Pro-Forma

Comment
Calculations should be undertaken for all relevant return periods and identify the critical duration used.

Response
Updated MicroDrainage results have been appended to this correspondence showing the critical storm by return periods.

Comment
A sub-catchment approach should be applied to surface water management, with clearly defined flow controls, on site utilising a method of dispersed site storage.

Response
Orifice plates have been used extensively across the proposed surface water network to ensure that excess flows are attenuated in SuDS features higher up the SuDS hierarchy. Attenuation has been provided across the site, controlled close to the source using vortex flow controls and orifice plates. Please expand on this comment. The large below ground attenuation tank is driven by the requirement of volume for the proposed rainwater harvesting system designed by the MEP Engineer.

Comment
Ground water depth to bottom of proposed tanking/attenuation requires justification as does the need for buried attenuation when it appears there is ample space to use on the surface SuDS and surface water management techniques.

Response
As stated in the Drainage Strategy report, the proposed development is to use an innovative system where below ground storage systems are to function as rainwater harvesting tanks. This system, proposed by the MEP Engineer, designed by a third-party designer and facilitated by the Civil Engineer, holds rainfall for reuse whilst using up to date rainfall information from the MET office to ensure that the system can accommodate

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imminent future rainfall. This offers a significant reduction in the water demand of the building. The tank is therefore deemed as necessary, this was discussed in a meeting with the LLFA on 23rd October.
The groundwater levels are anticipated to be higher than the bottom of the tank, to ensure that there is no floatation risk the tank is proposed to be anchored. This and the previous stated use as a rainwater harvesting tank are the main drivers for its design.

Comment
Flow control from site should ensure greenfield discharge for relevant return periods, i.e. 1:10, 1:30, 1:100 and 1:100 + 40% climate change. It is doubtful the current proposed attenuation approach will maximise the attenuation and simply allow free discharge up to the 1:100 + 40%.

Response
Updated results appended to this response showing attenuation levels and discharge rates for all return periods. To give a summary, the volume of water in the tank after each return period, and therefore the volume available for use by the water harvesting system is summarised below

1 year = 430m^3 (20% climate change allowance)
2 year = 600m^3 (20% climate change allowance)
10 year = 1050m^3 (20% climate change allowance)
30 year = 1528m^3 (20% climate change allowance)
100 year = 1870m^3 (20% climate change allowance)
100 year = 2000m^3 (40% climate change allowance)

Comment
Section 5.1 notes proposal to divert two ditch lines. This should not be undertaken. It is also unclear what is meant by the two ditch lines being incorporated into the car park. It is noted that the proposed diversion had been previously agreed, evidence of this needs to be provided.

Response
The requirement for these ditches and their location were discussed at length and agreed in a meeting with Richard Bennett (LLFA) and Clare Whitehead (CDC) on 23rd October 2019. In response to comments raised by the LLFA regarding the abandonment of two ditches on site, a technical note was issued stating the use and historic use and raising the case for their abandonment (included as an appendix to the Drainage Strategy). It was subsequently agreed after extensive discussions that the LLFA would accept their abandonment if one, ideally two, surface ditches running form north to south could be accommodated in the car park. The was subject to a last minute change from the design team to ensure the LLFA's requests were incorporated.

Comment
In conjunction the diversion of the two ditch lines is noted to have a potential impact on existing pond levels. Pond levels should remain unaffected to protect and promote bio-diversity.

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Response
Levels in the existing ponds to remain in the north are to be protected. The existing ditch network across the site is the driver for the groundwater levels. The proposed, diverted ditches, are to be designed to maintain these levels. Following the planning stage, groundwater monitoring will be conducted across the site to better understand how the groundwater levels react to rainfall and how they are recharged. This will allow a geotechnical engineer to input into the design to ensure the surface water strategy maintains the pond levels.

Comment
With the amount of green space on site it is felt the use of on the surface SuDS features has not been maximised. Additional techniques should be explored, e.g. bio-retention, rain gardens etc.

Response
Where SuDS have been specified, they specifically relate to the attenuation or conveyance of surface water. The collection system is to be proposed when a full external levels strategy is designed at a later design stage. It is the view of the designer that the use of SuDS are preferential to traditional collection system and where possible, tree pits, bio-retention systems, swales and filter drains will be used over linear channels and gullies.

Comment
Surface water storage locations, extents and critical levels including freeboard require further explanation.

Response
A summary note of the maximum water level in the surface water attenuation features will be provided. The location of the below ground tank is driven by the outfall location and it's size by MEP requirements for rainwater harvesting and storage volume to remove flood risk due to site topography. Further attenuation features and volume are driven by availability of space and topography of site. As the site slopes from north to south, the majority of storage is required in the south, where space is at a premium.

Comment
Although we acknowledge it will be hard to determine all the detail of source control attenuation and conveyance features at concept stage, by Outline Design Stage we will expect the Surface Water Management Strategy to set parameters for each parcel/phase to ensure these are included when these parcels/phases come forward. Space must be made for shallow conveyance features throughout the site and by also retaining existing drainage features and flood flow routes, this will ensure that the existing drainage regime is maintained, and flood risk can be managed appropriately. By the end of the Outline Design Stage evaluation and initial design/investigations Flows and Volumes should be known. Therefore, we ask that the following Pro-Forma is completed and returned as soon as possible:

Response
Pro-Forma to be issued as soon as possible

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Yours faithfully

Michael Smith
Principal Civil Engineer
For and on behalf of
Curtins Consulting Ltd