15th December 2020

Appeal for the Redevelopment of part of golf course to provide new leisure resort (sui generis) incorporating waterpark, family entertainment centre, hotel, conferencing facilities and restaurants with associated access, parking and landscaping at Land to the east of M40 and south of A4095 Chesterton Bicester Oxon

PINS reference: APP/C3105/W/20/3259189

Cherwell District Council ref: 19/02550/F & 20/00030/REF

LLFA response to Curtins Letter dated 11th December 2020

Following meetings held on the 20th November 2020 and 8th December 2020, a response letter was sent to the LLFA from Michael Smith from Curtins, the drainage consultant acting on behalf of the appellant.

The main body of the letter is provided below with further comments from the LLFA provided in blue.

Proposed Great Wolf Lodge, Chesterton, Bicester – Proposed Attenuation Tank

Following our meeting on 20th November, as agreed, this letter has been written to provide further information and justification on the use of the below ground attenuation tank as part of the above scheme.

The proposed surface water strategy for the project includes a number of SuDS as detailed in the Drainage & SuDS Strategy (068535-CUR-00-XX-RP-C-00002 P02) submitted for planning. The intention of these SuDS is to provide benefits to water quantity, water quality, biodiversity and amenity. The design parameters of the water quantity aspect of the SuDS design are dictated by Oxfordshire Lead Local Flood Authority (LLFA). Notably it has been agreed that the site will discharge at a rate no greater than QBAR (calculated as 31.3l/s) and that flood water should not leave the site during a 1 in 100 year event with a 40% allowance for climate change.

Site wide modelling of the surface water network showed that in order to achieve the aforementioned LLFA requirements, 2000m3 of storage would be required, in addition to the other SuDS features shown on the General Arrangement drawing (068535-CUR-00-XX-DR-C-92000 P05). The method by which this volume is to be provided is affected by the following factors.

This is not LLFA requirements, this is national requirements and best practice.

Whilst some SuDS measures are proposed, we do not accept that biodiversity benefit arises part of the SuDS proposal, particularly when assessed against the impact of the loss of the existing ponds and wide swales/ditches.

Outfall

The proposed outfall of the surface water network is located to the south of the site as identified on the Drainage General Arrangement drawing (068535-CUR-00-XX-DR-C-92000 P05). The location of the outfall is set by the site topography which falls from north to south. The outfall is the existing ditch network that traverses the site. There are no alternative feasible outfalls located in the vicinity of the site.

The outfall is set by site topography, but the existing outfall in the calculations is shown to be 78.262m which we are now aware is assumed and the ditch level adjacent to this manhole is shown to be 79.778m.

Topography

The site topographical survey is contained in Appendix A of the Drainage & SuDS Strategy report. The survey shows that the site falls from north west to south east, with the low spot being located in the vicinity of the proposed outfall from the site. The proposed surface water network is a gravity solution which is required to discharge to a surface feature.

The existing drainage outfalls via shallow ditches/swales to a manhole on the southern boundary of the proposed site. The level in existing MH EXSW1 is not known but the ditch level adjacent to this manhole is shown to be 79.778m. The proposed level is 1.5m lower which suggests a significant change in level to manage the drainage is proposed.

The FRA and Drainage Strategy are misleading as they have not mentioned at all that this outfall level is assumed. Looking at the existing topography downstream, we cannot see evidence that demonstrates how the drainage will work at the proposed level and this needs to be confirmed.

Groundwater

A UAV Survey was conducted across the site to establish the groundwater levels. The results and discussion around this are contained in the site-specific Flood Risk Assessment (068535-CUR-00- XX-RP-C-00001). The results of this survey were calibrated with the water levels in the ponds which are groundwater fed. The survey showed high groundwater levels are present across the south and east of the site.

In the area surrounding the outfall, the groundwater levels have been estimated to be 0m – 0.5m below ground. Further anecdotal evidence from site maintenance staff indicated that this area is prone to groundwater flooding. Therefore, any surface storage system would only have a maximum effective storage depth of 0.2m when a 300mm freeboard is accounted for and no anchorage is assumed. The freeboard requirement is outlined by Policy L10 of the “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire”. Based on this assessment, to provide the 2000m3 of storage without using a tank, 10,000m2 of area would be required (this figure does not include an allowance for side slopes or edge protection). This is approximately 6% of the total site area and 7.8% of the area which is proposed for development and this space is not available in the area local to the outfall.

Furthermore, the available storage depth of 0.2m would not allow for the required head over the vortex flow control device to control flows to 31.3l/s.

The approach adopted is consistent with Policy L9 in the “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire”

Not agreed. Its good to see that you are now quoting our guidance which the FRA and Drainage strategy failed to acknowledge even though we have consistently raised this in our comments throughout the planning process. The outfall is assumed so there is no reliable evidence to support the claim that L9 is met and high water levels at the outfall will not affect the performance of the proposed system, especially when surface water is being proposed to be managed at over 1.5m lower than it is currently with no appreciation of water levels downstream.

We also do not agree with the point of effective storage depth and freeboard as this can easily be designed out to provide the attenuation base above groundwater level but the flow control at a lower level. The site is proposed to be raised at least 0.5m anyway where the tank is proposed.

As you have stated groundwater is between 0-0.5m below ground level in places, especially where the tank is proposed. That is why the existing features are shallow to manage surface water above the groundwater which is in line with best practice. However, the proposed solution is proposing to manage surface water significantly lower with the proposed tank invert level 2.5m below the proposed ground level.

As you have stated this area is at high risk of groundwater flooding. The proposed scheme to manage groundwater is to reinstate the land drains on the proposed site at a lower level however, there is no evidence to demonstrate this will have a positive effect as this is controlled by the levels downstream which are not being altered.

There are three ponds to be removed and part of a further pond on the northern boundary is also shown to be removed. The largest pond is 2600m² in area with approximately 400mm of free depth recorded from the water level and lowest bank level on the topographical survey. The depth is unknown, but the water level currently takes up approximately 2000m² in area which will fluctuate with groundwater levels. There is a significant volume of water in this pond that will be lost post development. There is also a significant area of groundwater storage which will be lost by the introduction of the tank. This loss of groundwater storage has not been compensated for.

Tank Design
The tank arranged has been designed with a number of parameters and features in mind as summarised below.

Discharge Rate and Flood Risk
The LLFA have previously noted that the area downstream of the existing ditch network is at risk of flooding. The site is currently drained via a land drainage network that consists of a series of perforated pipes and ditches. The site has been assessed as a greenfield site for the purposes of this development, but this is overly robust because the reality is that the existing site discharge will be greater than estimated. However, for the purpose of discussion, the greenfield run-off rates from the site (flow off an undeveloped site) are given below.

Return Period	**Greenfield Run-off Rate (l/s)**
1 in 1 year	26.6
QBAR (~1 in 2.3 year)	31.3
1 in 30 year	70.8
1 in 100 year	99.7

As agreed with the LLFA, the proposed surface water network with the development in place will be limited to QBAR. This will mean that the development will offer a significant reduction in flow from the site of 68.4l/s (not including an allowance for climate change or the existing drainage system on the site) as compared with the existing situation during the 1 in 100 year event. The development with the proposed tank arrangement therefore offers a significant reduction in the existing flood risk posed to areas downstream and therefore a significant improvement generally.

In the meeting attended by the LLFA on 30th November, it was suggested by the LLFA that the volume of storage might be reduced if the discharge rate were to be increased to allow for a surface feature. We do not consider that this is advisable or necessary. It would reduce the flood risk benefits of the development to residents downstream of the site for no good reason. The development provides an opportunity to provide attenuation provision on the site which enables the site to reduce the flood risk for those downstream.

Local standards would technically permit surface flooding to occur on site in the event of rainfall events greater than the 1 in 30 year event, but we have avoided such a result. The site topography falls towards the existing hotel and golf course site to the south and therefore any controlled flooding would pose a flood risk, greater than existing, to the southern site. It has therefore proposed to store all excess rainfall for events up to and including the 1 in 100 year event (+40% climate change) within the proposed SuDS and below ground tank. This delivers benefits to both the neighboring site and downstream residents.

This approach is consistent with Policy L6 in the “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire”

The design points raised above are requirements which are also required from national best practice and these are not issues we are disputing.

We do not agree that the existing site drainage currently discharges greater than greenfield rates and we have repeatedly confirmed that we don’t agree with this in our planning responses and during meetings. The existing drainage measures are mimicking natural measures that we promote, and they currently don’t have any impermeable areas draining to them. They are managing both surface water and the groundwater level.

The proposed strategy may be designed based on QBar and sized accordingly to manage surface water, but it is based on an assumed outfall and attenuation at a significantly lower level than existing. We are not convinced it is managing groundwater appropriately.

The introduction of the tank and managing water underground is also introducing a significant increase in maintenance requirements and operational standards compared to the existing system which is not in line with planning policy and best practice and in the event of blockage or failure, there is a significant increase to flood risk elsewhere compared to the existing above ground features which will be easier to maintain and to identify any blockages.

Anchorage

As previously mentioned, the area to the south of the site is subject to high groundwater. This therefore renders many storage options unfeasible. The inclusion of a tank allows the use of tensions piles to be constructed beneath it. This will protect the system from floatation, whilst maximizing the storage offered by it. This method of anchorage is not a feasible option for ponds or similar SuDS features.

Again, this approach is consistent with Policy L9 in the “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire”

The use of a deep underground tank would normally be rendered unfeasible due to the same reasons. Anchorage is only required because of the current proposal. You would not have to anchor a pond but use other significantly lower cost measures to protect it from groundwater if required which will be easy to replace in the event of failure. It is common to have a clay lined pond proposed in a sustainable drainage scheme.

The tank invert level is proposed to be at 79.00m so will always be surcharged in groundwater which will have a significant effect on the structure of the concrete tank. It is best practice to manage surface water on the surface and for any features to be lined if necessary, to ensure their capacity is not affected by groundwater.

Policy L9 states, *“It should be demonstrated that high water levels at the outfall for the design storm event would not affect the performance of the system.”* I am struggling to see how this relates to Anchorage however, this policy has yet to be demonstrated as the outfall level is assumed and doesn’t take into account the water levels downstream.

Wider SuDS Network

A SuDS system is assessed on the four pillars of sustainable drainage (water quantity, water quality, biodiversity and amenity). The below ground storage tank offers benefits to water quantity and the proposed surface water network generally has been designed with a holistic view in light of these four pillars.
The site wide collection system included filter drains, swales, ponds, permeable pavements and green roofs. These SuDS when combined with the proposed tank cover all four of the SuDS pillars.

Water quality will be strictly managed by these SuDS as collection from any areas at risk of pollution will only be carried out by SuDS. These measures have also been reviewed against the hazard indices contained in CIRIA C753 – The SuDS Manual, to ensure that they offer the required level of mitigation to manage pollutants on site.

Attenuation provision from these additional SuDS features has also been maximized, so as to reduce the volumetric requirements of the tank. Through design progression prior to planning, the tank volume has been reduced from 5244m³ to 2000m³. However, as the site discharge is limited to QBAR and it is required to manage surface water flows for events up to the 1 in 100 year +40% event (something that the site in its existing state cannot manage) the remaining storage volume in the tank enables the scheme to reduce flood risk both on site and downstream. The provision of such a tank is more desirable than increasing (or not decreasing) flood risk elsewhere.

As summarised in Table 2 of the Drainage & SuDS Strategy (068535-CUR-00-XX-RP-C-00002 P02), the tanks volume accounts for 38% of the total storage volume provided by the site.

We acknowledge the other measures provide some benefits, but the SuDS proposals do not deliver benefits in terms of biodiversity having regard to the loss of existing features and as referred to on our response on page 1 above. We have been consistent in our responses, from pre-app and throughout the planning process, stating that these measures must be retained especially the ditches.

However, the more fundamental concern is regarding the suitability of the tank at the location and the proposed depth.

Rainwater Harvesting
In addition to this significant benefit in terms of flooding, the tank also offers important other sustainability benefits. The system to be employed allows the storage volume in the tank to be used for rainwater harvesting when its full storage volume is not required for flood prevention. Details of this system have been discussed with the LLFA prior to the application and submitted via email on 25th November 2020. The information submitted via email has been appended to this letter for ease of reference.

The proposed system offered by SDS (and in regular and successful use elsewhere in the country) monitors water levels in the tank alongside receiving rainfall forecast data. This information is then used to calculate incoming rainfall volume and ensure adequate volume is provided in the tank for its storage. The system is also designed with a number of fail safes, so that in the event of any power outage or connection issues, the valves controlling the tank remain open and the rainwater harvesting function is suspended until it is safe to reinstate it.

Rainwater harvesting is rightly encouraged by Section 4.8.1.2 of the "Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire". It is recognised as top of the drainage disposal hierarchy by the current London Plan.

Furthermore, the use and design of rainwater harvesting systems is supported by CIRIA C753 – The SuDS Manual. The SuDS Manual highlights its benefits to include;

- They can meet some of the buildings water demand, delivering sustainability and climate resilience benefits
- They can help reduce the volume runoff from a site
- They can help reduce the volume of attenuation storage required on the site.

Moreover, the form of rainwater harvesting proposed for the scheme is directly outlined in Table 11.1 of CIRIA C753, where it is covered under "RWH for water conservation (supply) and surface water management, active systems".

We promote the use of rainwater harvesting but the design of the rainwater harvesting needs to be carefully considered.

As stated in our guidance, "*rainwater harvesting volumes are not considered to contribute to the overall attenuation volume for a SuDS system as it cannot be guaranteed that the storage will be empty prior to rainfall. Rainwater harvesting would however be accepted as a means of removing the first 5mm of rainfall in terms of water quality protection."*

The SuDS system must be designed to ensure the required capacity is available in the system when the tank required for rainwater harvesting is full. At the moment it is has not been demonstrated how the proposed SDS rainwater harvesting system will be implemented appropriately in the design.

LLFA Comments
The LLFA has previously suggested that the proposed drainage system does not adhere to the existing drainage regime of the site, but these comments related to the removal of a pond and existing ditches across the site. In response to these comments two ponds have

been included in the site wide drainage strategy and both ditches have been reinstated and realigned across the site.

For the sake of completeness, we note that in Section 4.6 of “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire” that the LLFA will not comment on the landscape implications of a proposal and that early engagement with the LPA should be carried out at the masterplanning stage. This was carried out and no comments were raised with regards to the existing ponds or proposed ponds by the LPA.

The LLFA has also asked about the effect the proposed strategy will have on the water levels in the northern ponds, especially in regard to existing habitats. This has been discussed and we have confirmed that a condition would be accepted whereby the water levels in the northern ponds would be monitored and maintained. Again, for the sake of completeness we note in Section 4.7 of “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire” it is stated that the LLFA will not comment on the nature conservation aspects of the application.

Prior to submission of the planning application, a pre-application meeting was attended by Curtins, DP9 and Richard Bennett from Oxfordshire LLFA, where the tank and its functionality was presented. At that meeting the LLFA stated that a geo-cellular form of tank would not be acceptable to them and that they required a concrete tank. The design was progressed based on this discussion as it was understood from this meeting that a tank would be acceptable to the LLFA. The view that a geo-cellular tank would not be permitted is not the view expressed in Section 4.8.1.4 of “Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire”.

We trust that this letter clearly outlines the reasons behind the inclusion of a below ground storage tank as part of the proposed development and that the LLFA are now able to remove their objection to the planning application. If there are any remaining concerns, please could you let us know what they are so that we can consider them and discuss them with you as a matter of priority.

We have never approved the proposed replacement/realignment of the ditches. The proposed ditches are not being reinstated appropriately. The existing ditches are on average 3-4m wide and 0.3-1m deep. The proposal has squeezed 1m wide ditches in the proposed layout which are culverted in many places. This is not an acceptable replacement. We have repetitively stated in our responses and during meetings that the existing drainage features must be retained. All ditches, no matter when installed are classed as ordinary watercourses.

A number of design issues were discussed at the pre app meetings along with the tank. We raised concerns with the tanks for a number of reasons including suitability under the parking area, especially if it was of geo-cellular construction. We did not require a concrete tank, the design was unilaterally amended by Curtins to include a concrete tank.

It was suggested at the pre app meetings that a tank was required due to the topography. We stated that we will expect the existing features to be retained and further above ground features to be integrated wherever possible and if a tank was felt to be still required, then it must be fully justified to why it is required over other SuDS measures.

At the pre app stage, we were not provided with the FRA and drainage strategy documents until after these meetings so were not fully aware of the issues such as high groundwater at the site.

Apart from design principles such as the QBar rate, we have never agreed to the scheme as proposed.

As stated in our comments on several occasions, surface water management must be considered from the beginning of the development planning process and throughout – influencing site layout and design. The proposed drainage solution should not be limited by the proposed site layout and design.

The LLFA advice has been consistent throughout but the fundamental points have continued to be ignored and no effort has been made to change the layout to accommodate an adequate drainage strategy to manage flood risk appropriately. The LLFA feels the current proposals completely alter the existing drainage regime and do not manage all flood risk elements appropriately.

The LLFA are happy to continue to work with the applicant to try and address the issues however, as stated above, we do feel there needs to be a change to the layout, specifically in the area of high groundwater where the car park is proposed, to ensure an adequate sustainable drainage scheme can be implemented.

Richard Bennett

Flood Risk Engineer
Oxfordshire County Council
County Hall
New Road
Oxford
OX1 1ND