Project Title: Great Wolf Lodge, Chesterton
Planning review

Ref No: 0354-RPT-01

Report

26 February 2020

Great Wolf Lodge

Planning review

Client
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Document Control

Issue	Date	Status	Originator	Checked	Approved
1	02/04/2020	Draft	Various	Toby Andrews	Christina Petrides

Issue	Date	Comment
Rev		First issue for client preview and comments

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1. Introduction

This report comprises a review of technical documents submitted as part of a planning application made by Great Lakes UK to develop part of the site currently occupied by Bicester Hotel Golf Club and Spa.

The planning application (application number 19/02550/F) seeks 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'.

This review is undertaken by Tyrens UK and responds to a request by Cherwell District Council (CDC) to consider the development proposals and associated water efficiency measures proposed for the development that seek to minimise reliance on mains water feed and reduce stress on a district identified as already being subject to water stress.

2. Referenced application documents

The planning application has been subject to an Environmental Impact Assessment and an Environmental Statement (ES) produced by WSP consultants.[1]

This review focusses on elements of the ES that pertain to the water demand, use, storage and efficiency. The relevant sections of the ES are:

1. Drainage & SuDS Strategy, Curtins Consulting Limited, Ref: 068535-CUR-00-XX-RP-C-00002, November 2019
2. Flood Risk Assessment, Curtins Consulting Limited, Ref: 068535-CUR-00-XX-RP-C-00001, November 2019
3. Energy & Sustainability Statement (including BREEAM Pre-Assessment) Rev 03, Hoare Lea, November 2019
4. Outline Water Resources Scoping Note, Hoare Lea, November 2019
5. Phase 1 Preliminary Site Risk Assessment, WSP, Curtins Consulting Limited, February 2018, Ref: 071596.001-CUR-00-XX-RP-GE-00001-V00, April 2019

3. The Cherwell Local Plan 2011-2031

The Local Plan (adopted 2016) sets out the Council's vision how the District will grow and change in the period up to 2031. The Local Plan sets the long-term spatial vision for the District and contains policies to help deliver that vision. Relevant policies concerning water usage include:

Policy ESD 3: Sustainable Construction: *'Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations'.* And *'All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect'.*

Policy ESD 7: Sustainable Drainage Systems: '*All development will be required to use sustainable drainage systems (SuDS) for the management of surface water run-off. Where site specific Flood Risk Assessments are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems'.*

[1] Proposed Great Wolf Lodge – Land To The East Of M40 And South Of A4095, Chesterton, Bicester, Environmental Statement, WSP, November 2019

Policy ESD8: Water Resources: *'The Council will seek to maintain water quality, ensure adequate water resources and promote sustainability in water use….Development will only be permitted where adequate water resources exist, or can be provided without detriment to existing uses'.*

4. Drainage and surface water

For this review, the Flood Risk Assessment (FRA), Drainage Strategy and Chapter 12 ("Water Resources, Flood Risk and Drainage") appendices were reviewed. However, the main text of Chapter 12 did not appear to have been uploaded onto the Cherwell District Council Planning Portal website and could not be reviewed at this time.

Within Section 2.0 of the FRA and the Drainage Strategy 'National and Local Policy Considerations' reference should be made to Oxfordshire County Council's (OCC) 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' (November, 2018).

The above OCC guidance states that: *"Pre-application discussions should be a collaborative approach with the LPA, Oxfordshire County Council as Highway Authority and where appropriate/applicable the Environment Agency and other consultees".* As the main text of Chapter 12 could not be reviewed, which would normally present a list of consultees and their comments, it is unclear whether or not such consultation took place at the pre-application stage.

Within the FRA and Drainage Strategy, the range of potential flood sources considered and the assessment of the flood risk status of the site appears reasonable. The use of a 40 % climate change (allowance) for peak rainfall intensity throughout the FRA and Drainage Strategy is deemed appropriate.

With reference to the main text and Appendix D of the OCC Guidance identified above, a Drainage Strategy for a full application should include:

"*Demonstration that National Non-Statutory Technical Standards for SuDS have been met by the drainage design*."

"*The preferred means of surface water disposal is through infiltration to the ground. Only where the subsurface geology is not suitable for infiltration should other runoff destinations be considered. The location of infiltration SuDS is likely to be different to other forms of SuDS. Consequently infiltration SuDS should be determined in advance of the masterplan or land use allocation. Thus permeability tests need to be carried out at the outset. Infiltration testing should be undertaken, and infiltration drainage designed and constructed, in accordance with BRE Digest 365 (2016) and CIRIA Report 156. To ensure protection of groundwater quality a minimum of 1.0 m clearance between the base of infiltration SUDS and peak seasonal groundwater levels*."

The Drainage Strategy should also include ground investigation results "*which should account for:*

- *The presence of constraints that must be considered prior to planning infiltration SuDS;*
- *The drainage potential of the ground;*
- *Potential for ground instability when water is infiltrated; and*
- *Potential for deterioration in groundwater quality as a result of infiltration."*

With reference to Section 3.6 of the FRA and 3.1.2 of the Drainage Strategy, groundwater levels have only been ascertained with an unmanned aerial vehicle survey; it should be noted that the sensing method or its accuracy/reliability is not discussed. The survey suggests that the water table is within 1 m of the surface across a large part of the site. Should these results be reliable and represent peak seasonal levels, then there are large parts of the site where infiltration could be feasible, as long as infiltration test results provide favourable results and the proposed infiltrating SuDS devices were of a shallow construction (*e.g.* shallow infiltration basins or shallow infiltrating modular storage below car parking areas).

With reference to Figure 4-3 of the FRA showing inferred groundwater levels being *"inferred from the pond levels*", it is unclear whether any or all on-site ponds are lined, which would render this method of inferring groundwater levels unreliable. Furthermore, within Section 4.1.2., it is stated that: *"Certain SuDS methods such as infiltration techniques might be unsuitable for the Site. Whilst initial indicators highlight that areas of the Site are at risk of high groundwater, further site investigations will be required to monitor the change in groundwater level seasonally".*

Similarly, within Section 3.1.2, the Drainage Strategy states: *"Whilst initial indicators show that the groundwater levels are high, there are have been no report[ed] incidents of groundwater flooding in the Oxfordshire or Cherwell SFRA. Further site investigation is required to monitor the long term, seasonal level of the groundwater".*

Subsequently, the Drainage Strategy concludes in Table 1 discharge opportunities that *"Due to high ground water levels across the Site, infiltration is not seen as a feasible outfall solution and therefore has been discounted".* In the absence of infiltration testing to BRE365 and seasonal groundwater monitoring from dedicated piezometers, as required by OCC Guidance, it is concluded that the use of infiltration has been discounted too readily.

The British Geological Society (BGS) online resources indicate the majority of the site is underlain by Cornbrash Formation (sedimentary limestone) with Forest Marble Formation, comprising interbedded sedimentary limestone and mudstone. Soilscape classifies the soils as *"freely draining lime-rich loamy soils"*, which indicates that infiltration may well be feasible for at least some of the site, perhaps using shallow devices. Infiltration testing and groundwater monitoring during winter months should be conducted to confidently assess the feasibility of this discharge option.

The OCC Guidance states that: *"SuDS should be considered in all developments at an early stage. This allows for allocation of appropriate land take to accommodate adequate SuDS features that are technically appropriate for the environment in which they are to be placed".*

It also states that:

- *"Justification for the use of underground storage should be provided, given the additional maintenance burden that this form of storage affords, and the lack of additional benefits provided compared to more natural solutions. Only systems that do not allow silt to enter will be acceptable as an infiltration drainage feature, unless a robust solution for entry, inspection and maintenance is provided";* and

- *"At least one surface feature should be deployed within the drainage system for water quality purposes, or more features for runoff which may contain higher levels of pollutants in accordance with the CIRIA SuDS Manual C753. Only if surface features are demonstrated as not viable, then approved proprietary engineered pollution control features such as vortex separators, serviceable/ replaceable filter screens, or pollution interceptors may be used."*

However, Section 5.0 of the Drainage Strategy states that *"The method of attenuation is proposed to follow the SuDS hierarchy, with green roofs, permeable pavements, detention basins and swales being used where possible. A larger storage feature will be required to protect the Site during high intensity rainfall events, however, due to spatial constraints this is required to be a below ground storage tank".* Seeing that this is essentially a large greenfield development, it is unclear why the applicant has needed to rely on the provision of a very large (2000 m^3) underground storage tank, with no mention of petrol interceptors or other pollution-prevention devices to accommodate surface runoff from the majority of the car parking area, when there should have been ample room to provide above-ground solutions such as infiltration/detention basins and swales, which are easier to maintain and provide inherent water quality treatment features. Even without modifying the proposed car park layout, there appear to be landscaped areas along the south-eastern boundary of the site where such basins and swales could potentially be located.

Even the use of shallow modular permeable pavements with inherent water treatment elements (e.g. filtration, siltation, absorption and biodegradation) would have been preferential and, depending on the results of the groundwater monitoring/infiltration testing could perhaps have been used as infiltration devices.

The OCC Guidance states that: *"The Drainage Strategy should contain sufficient detail of typical development layouts to indicate the likely location of all the SuDS features and connecting flow paths (pipes, swales, ditches*

etc). It should clearly identify peak discharge rates and total attenuation storage volumes required within each package of the overall development".

It also states that: *"Detailed Drainage Plans: Showing the layout of the proposed drainage network, the location of storage within the proposed development and how these relate to submitted calculations, including any chamber, pipe numbers, direction of flow, invert and cover levels, gradients diameters and dimensions that are referenced in Micro Drainage (or similar) reports….Based on the existing and proposed discharge cases calculated as above, the applicant should now have detailed calculations of storage volume required on site for the 1% (1 in 100) plus climate change case".*

As stated above, 2000m^3 of attenuation storage is to be provided by a concrete tank beneath the car park in addition to storage elsewhere in granular sub-base and modular sub-surface storage and detention ponds, however no explanation is given as to how these volumes have been derived or how the separate SuDS devices will interact. Calculations should be shown in order to demonstrate how the SuDS provisions will meet the DEFRA Non-Statutory Technical Standards, March 2015, as per OCC guidance.

The OCC guidance also states that: *"Calculations [of] proposed values of impermeable area should include a 10% allowance for Urban Creep".* There is no evidence presented to demonstrate that this allowance has been included in the calculations.

The Drainage Strategy states that all sewers and the foul water pumping station will be designed as per Sewers for Adoption (7th Edition). This should refer to the more recent 8th Edition (August 2018). The principal changes in this edition are to Part C, which has been extended to give guidance on the design and construction of SuDS and the criteria to be met for SuDS components to be considered for adoption under a Section 104 Agreement.

5. Water consumption

It is expected that the proposed scheme will use a combination of the following features to minimise the water consumption for the site:

- Low-use water fittings
- Water recycling (greywater or rainwater)
- Water-saving measures

The proposals in the Outline Water Resources Scoping Note (4) identify methods of using each of these options to varying degrees.

5.1. Low-use fittings

Low-use water fittings are allowed for WCs. The WCs are shown to have an effective flush volume of 4.5 litres which is consistent with a 6/4 litre dual flush system.

Section 3 of the Outline Water Resouces Scoping Note states that taps to wash basins will be delivering 8 litres/minute but the BREEAM calculator provided as Appendix 5 of the same document is based on taps delivering 4 litres/minute. Four litres/minute would represent current good practice and could be the target value for tap output for wash basins.

Showers are expected to typically consume 12 litres/minute. This is a high value and justification should be provided for this selection. Showers providing 10 litres/minute or less could be selected to further reduce water consumption.

While the WC proposals meet current good practice for low water usage, confirmation of the tap flow rates should be sought. The proposed flow rates for the showers are high and if a justification cannot be provided then the flow rates could be reduced.

5.2. Water recycling

A rainwater harvesting and recycling system has been proposed for use with the site WCs and this system is to be combined with the rainwater attenuation for the site. The proposal uses weather data to balance the need for stored rainwater with the need for attenuation volume to help prevent excessive rainwater discharge from the site. This approach is a relatively new method of meeting the needs of both recycled water and rainwater attenuation and such a system should be capable of reducing mains water consumption while providing adequate rainwater attenuation.

Grey water recycling has been rejected as a suitable system for the site. The system has been considered for the hotel area but due to the hotel arrangement, it is not considered feasible to install a system which will meet the site's needs. We would generally agree with the applicant that design difficulties prevent installation of grey water recycling systems.

5.3. Water-saving measures

Leak detection is allowed for; however, the wording of the requirement for it is not written for a site of this scale. BREEAM requirement WAT 03 calls for leak detection within buildings rather than across sites with many buildings. The principle of the credit should be applicable to the entire site with all buildings and plant areas meeting this requirement with any water-consuming plant having a metered connection back to a site-wide water consumption monitoring system. The system should be capable of identifying leaks and raising an alarm if necessary. As a matter of good design, we would advise that all major plant areas using or storing water are metered.

The need for filtration to the site water features is identified in the Outline Water Resources Scoping Note (4). Details are given of a conventional sand filter system and the proposed regenerative media filter. Regenerative media filters use a mechanical system to help remove deposits from filter surfaces whereas sand filters wash the sand clean during the backwash process. The proposal for a regenerative media filter appears to be an effective measure to reduce this wastewater volume by approximately 28,800,000 litres per year.

Irrigation is not expected to be necessary for the site although where it is needed, it will be provided by bowsers taking water from existing waterbodies in the wider parkland. This approach will help minimise the mains water consumption for the site.

6. Groundwater resource

Review of application documents indicates that all water demand for the development would be met from mains supply with exception of limited rainwater harvesting. No consideration appears to have been made as to the potential for onsite groundwater abstraction.

The site lies within the Oxon Ray Operational Catchment of the larger Cherwell and Ray Catchment Management Area (see Figure 6.1 and Figure 6.2)

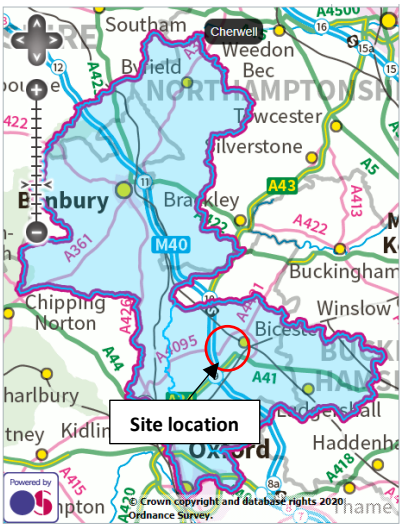

Figure 6.1 - Cherwell and Ray Catchment Management Area

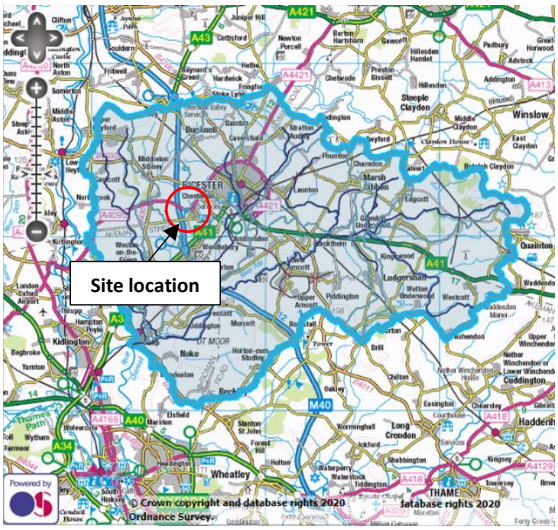

Figure 6.2 - Oxon Ray Operational Catchment

Paragraph B221 of the CDC Local Plan states that "*Cherwell District lies within an area of serious water stress and the Upper Cherwell area has been over abstracted*". From a search of online sources, we have not been able to ascertain the extent of the 'Upper Cherwell area' but based on the above, the application site is not considered to fall within this area as its location is in the southern (lower) extent of the Cherwell and Ray Catchment.

Water stress is defined by the Environment Agency (EA)[2] as where:

(a) The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand; or

(b) The future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand.

Mapping of the water body stress classification in England is provided in the EA's report and reproduced below as Figure 6.3.

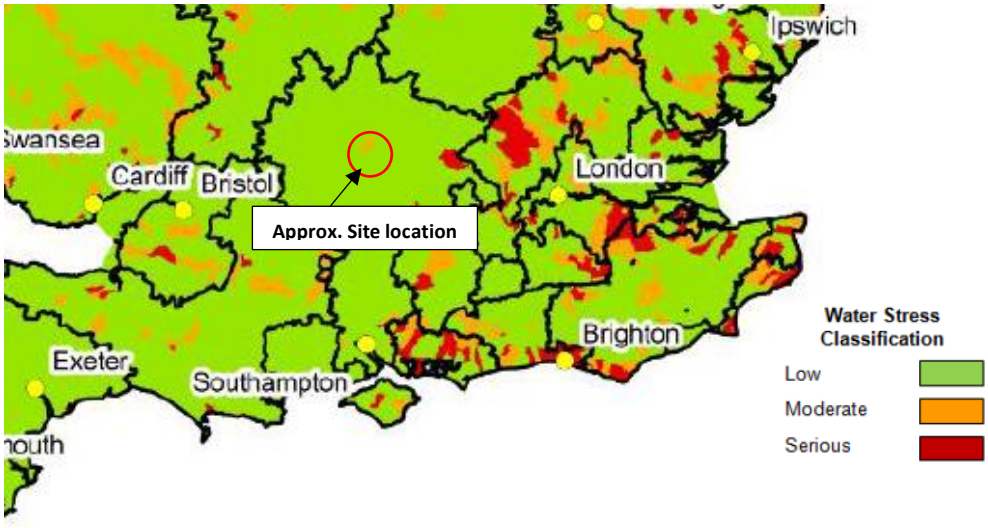

Figure 6.3 - Extract of water body stress classification **source: Environment Agency**

[2] Water stressed areas – final classification, Environment Agency, July 2013

With reference to Figure, the EA's current classification of water body stress for the approximate area of the site is low/moderate. The moderate rating is considered to apply to the 'Upper Cherwell area' as noted in CDC's Local Plan. The identification of the district as an area of Serious Water Stress appears therefore based on the EA's categorisation at a 'company-wide level' to 'support decision about metering'. It is therefore not a strict classification of the Cherwell District. Confirmation of this could be sought from the EA's Cherwell Catchment officer - Stuart Malaure (stuart.malaure@environment-agency.gov.uk).

6.1. Groundwater abstraction

The Phase 1 Preliminary Site Risk Assessment (5) states "*there are no registered water abstractions registered within 500m of the site*". Data appended to this risk assessment records the nearest registered abstraction at a distance of over 500 m from the application site. Where recorded, the licensed yearly abstraction rates go up to 2,077 cubic metres. All recorded abstractions are used for general farming and domestic use.

The area of the site is and has been subject to a number of local groundwater abstractions. Information from the British Geological Survey online Geoindex records the following abstraction wells (locations shown in Figure 6.4):

Map no.	Reference	Location	Year	Depth (m)	Rest water level (ft)	Pumping rate (gph)	Pumping water level (ft)
1	SP52/31	Chesterton (north-east corner of golf course)	1949	39.6	10	2800	62
2	SP52/57A	Chesterton Vicarage	1950	3.7			
3	SP52/57B	Chesterton Vicarage	1950	4.6			
4	SP52/28	Chesterton Pumping Station		39.6			
5	SP52/56	Chesterton Public Pump	1950	39.6	226	2100	215?
6	SP52/55	Chesterton Lodge	1889	12.2	24		
7	SP52/23	Chestertonfields Farm	1938	36.6	30	360	43
8	SP52/80	Simms Farm	1998	38.1	11	850	16.1
9	SP52/71	Bicester Trailer Park	1986	30.5			
10	SP52/62	Promised Land Farm	1983	15.2	2.75 (above well top)		
11	SP52/34	Promised Land Farm		3.7			
12	SP52/24B	White Lands Farm	1953	42.1	25	1000	80

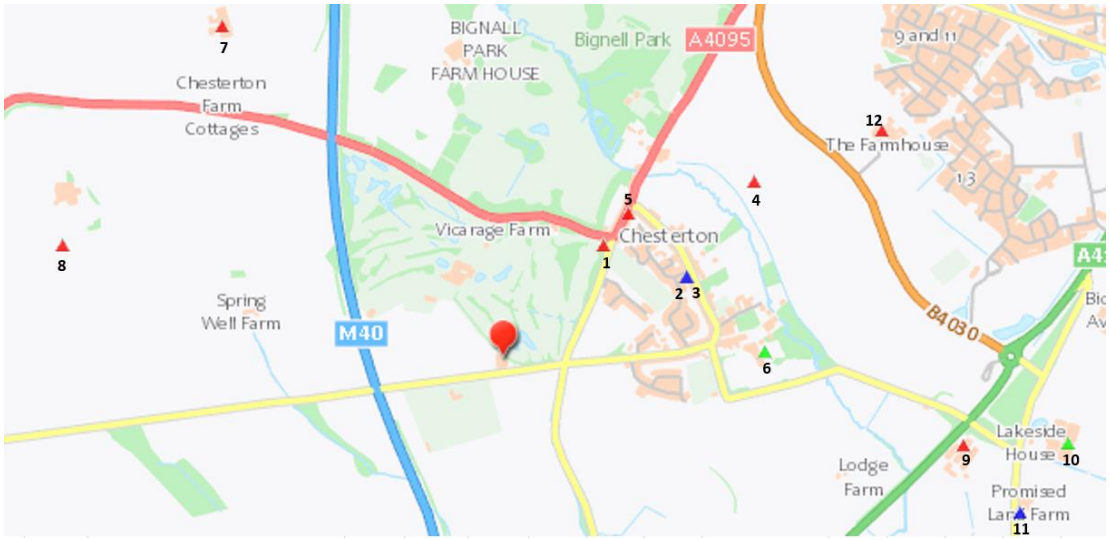

Figure 6.4 – Location of BGS recorded abstraction wells

Based on the above we would consider that groundwater abstraction on the site may be a viable means of reducing reliance of mains water supply to the development. Current EA abstraction licensing exempts abstractions of less than 20 cubic metre per day although greater volumes may be extracted subject to permitting.

The site geology and permeability of groundwater-bearing strata will dictate the viability of abstraction. We would advise that CDC seek assurance from the applicant that such opportunity has been explored and adequately assessed.

7. BREEAM

This project is being assessed under the BREEAM 2018 New construction scheme (as stated in the BREEAM pre-assessment comprising part of the Energy & Sustainability Statement (3)).

The BREEAM UK New Construction 2018 scheme is used to assess the environmental life cycle impacts of new non-domestic buildings at the design and construction stages.

Policy ESD 3 of Cherwell's Local Plan requires the development to achieve a 'Very Good' BREEAM rating. The BREEAM pre–assessment has been written to demonstrate the route to achieving the required rating and predicts that a score of 60.9% would be achieved which is a 5.9% margin over the required score to achieve Very Good. This margin means the development would comfortably achieve the 'Very Good' rating.

Due to the intended use of the site, it is known that there will be a high demand for water and this is recognised through the applicant's planning application documents. These documents reflect that the design has been pushed to achieve water savings through design efficiencies and reuse where considered feasible and reasonable to the scheme.

This section of this report provides commentary on the applicant's BREEAM pre-assessment and states where potential improvements may be made to development proposals relating to BREEAM Water credits. There are four water-specific BREEAM credits looking at consumption (Wat 01), monitoring (Wat 02), leak detection (Wat 03) and efficiency (Wat 04).

Our review of the BREEAM pre-assessment shows that there is reference to both the hotel and the water park. It is, however, unclear if both developments are being assessed by BREEAM. From the documentation only a single pre-assessment has been provided which implies that potentially both buildings are being done under the same assessment. This is an area for CDC to seek clarification.

7.1.1. Wat 01: Water consumption

The aim of these credits is to reduce the consumption of potable water for sanitary use in new buildings through the use of water-efficient components and water recycling systems. Five credits are available.

Under this credit it appears that three credits have been targeted in the Outline Water Resources Scoping Note (4), however in the Energy and Sustainability Statement (3) one credit has been targeted under this issue. Further review suggests that a rain water system will be implemented although it does not appear to be accounted for in the calculations. The Scoping Note states that this system should offset 90% of the WC flushes, however the figures would need to be incorporated into the BREEAM water calculator to establish what advancement this may have on the number of credits achieved under this section.

The Water Scoping document (4) states that implementing a grey water system at the proposed hotel will incur technical challenges. The challenges are stated as relating to vertical risers and lack of a basement structure to accommodate the collection tank. The document further states that while this lack of basement could be overcome there is an additional challenge in the lengths of run and associated gradient of the horizontal floats required to connect all of the dedicated vertical shower drains together; the horizontal floats could not be accommodated within the physical constraints of the building without significantly impacting on building massing. This may make implementation impractical and may not add to the significant benefits over the

proposed rain water system. However, before this can be established the contributions from the rain water system must first be confirmed.

7.1.2. Wat 02: Water monitoring

The credit is targeted through the provision of mains water metering and sub-metering to water-consuming plant. Due to the large scale of this development, some areas housing water-consuming plant may fall outside of the BREEAM assessment scope. As per the comment in Section 5.3 above, we would advise that all major plant areas using or storing water are metered.

7.1.3. Wat 03: Water leak detection

The aim of these credits (one each for leak detection and flow control devices) is to reduce the consumption of potable water in new buildings through minimising wastage due to water leaks and installing water-efficient devices.

The credit for a BREEAM-compliant system has been targeted, however its implementation seems to be restricted to checking the underground pipe work between the utilities meter and the incoming mains water meter. Given the amount of water which may be used on the development it stands to reason that the system should be extended to cover underground pipe work for the water park. This is an area for CDC to seek clarification.

The Wat 03 credit also considered flow control devices. The implementation of PIR sanitary supply shut-off valves has not been targeted. Given the that the sanitary fittings on the development are likely to be used by members of the public, insisting on such measures would be prudent to ensure that water is not wasted in the case of one of the fittings failing in an open position. If these are not to be installed then adequate reasoning should be provided.

7.1.4. Wat 04: Water efficiency

The Sustainability Document (3) makes reference to a highly efficient regenerative media filter technology, which will reduce the water required for back washing processes as part of the water park. Further detail on this is provided in Section 5.3 above.

In addition to BREEAM's water-specific credits, there are other credits where water is considered. These are considered as follows:

7.1.5. Pol 03: Flood and surface water management

The aim of this credit is to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, thereby minimising the risk and impact of localised flooding on-site and off-site, watercourse pollution and other environmental damage.

The current pre–assessment shows that only two credits are targeted (covering flood resilience), with a further two credits noted as potential (covering surface run-off). Given that rain water attenuation and harvesting systems are proposed, it would seem that all four credits could be targeted. It may even be possible for the design to achieve a further fifth credit (covering minimising watercourse pollution). The applicant should provide commentary as to why this is not targeted.

8. Conclusions and recommendations

8.1. Drainage and surface water

With regard to Flood Risk Assessment and the Drainage Strategy, the range of potential flood sources considered and the assessment of the flood risk status of the site appears reasonable. The use of a 40% climate change (allowance) for peak rainfall intensity throughout the FRA and Drainage Strategy is deemed appropriate.

However, the Drainage Strategy appears lacking or ambiguous in a number of areas including:

- Reference should be made to the OCC "*Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire*".
- In designing the Drainage Strategy for the scheme, it is unclear whether pre-application discussions have taken place with the LPA and OCC (*i.e*. the LLFA). This should be confirmed.
- Infiltration testing to BRE365 and seasonal groundwater monitoring from dedicated piezometers should be conducted to demonstrate that infiltrating SuDS are not suitable for this scheme.
- As this is essentially a large greenfield development, it is unclear why the applicant has had to rely on the provision of a very large (2000 m^3) underground storage tank; furthermore, no mention has been made of petrol interceptors or other pollution prevention devices to accommodate surface runoff from the majority of the car parking area. There should have been ample room to provide above-ground solutions such as infiltration/detention basins and swales, which are easier to maintain and provide inherent water quality treatment features. Even without modifying the proposed car park layout, there appears to be landscaped areas along the south-eastern boundary of the site where such basins and swales could potentially be located.
- Even the use of shallow modular permeable pavements with inherent water treatment elements (*e.g*. filtration, siltation, absorption and biodegradation) would have been preferential and, depending on the results of the groundwater monitoring/infiltration testing, could perhaps have been used as infiltration devices.
- Consequently, the use of such devices should be explored and the reasons for not using them fully justified.
- Calculations should be shown in order to demonstrate how the SuDS provisions will meet the DEFRA Non-Statutory Technical Standards, as per OCC guidance.
- OCC guidance states that "*Calculations proposed values of impermeable area should include a 10% allowance for Urban Creep*". Evidence should be presented to demonstrate that this allowance has been included in the calculations.
- The Drainage Strategy should refer to Sewers for Adoption 8th Edition (August 2018) and the requirements therein, particularly with reference to the design and construction of SuDS.

8.2. Water consumption

The proposals for water consumption and the associated water-saving measures are generally good. Several measures such as the use of regenerative media filters, rainwater harvesting, and low-flush volume WCs will all help to reduce the water demand of the site. The use of trees and plants which do not require irrigation is also a significant water-saving measure. There are some areas where further improvements in water efficiency may be gained:

- The flow rates through wash basin taps should be clarified, and the flow rate for showers may be reduced.

- The requirements of the BREEAM WAT 03 criteria have been applied to the proposed development but they should be clarified. The criteria call for metering to be applied in a building for applications using 10% or more of the total water consumption for that building. The CDC could consider making the metering requirements more extensive so that WAT 03 applies to all buildings as well as plant or equipment areas. Doing this would ensure that a centralised monitoring system can accurately review water consumption and identify leaks if they occur.

8.3. Groundwater resource

The application documents reviewed do not assess or consider viability for local groundwater abstraction to off-set mains water supply to the development.

- The designation of the district as an area subject to serious water stress is technically correct although misleading, as the EA's designation is assigned to water company regions as a whole.

- The site is not considered to lie within the Upper Cherwell area and therefore not within an area identified as having been over-abstracted.

- Local geology and BGS records indicate that the area's geology may be suitable to support groundwater abstraction. It is advised that CDC seek assurance from the applicant that such opportunity has been explored and adequately assessed.

8.4. BREEAM

- Review some of the sanitary fittings which are installed, namely the flow rates on the taps and showers. WC flush capacities could be reduced but may cause a risk of blockages in public facilities.

- The applicant should confirm the design and suitability of the leak detection strategy and advise if a more extensive system would result in losses through leakage or overuse.

- The applicant should review and justify the omission of sanitary supply shut-off valves.