



**ENVIRONMENTAL STATEMENT**  
**VOLUME 2**  
**APPENDIX 12.2 – BELOW GROUND DRAINAGE**  
**STRATEGY**



# Proposed Great Wolf Lodge Chesterton, Bicester

## Drainage & SuDS Strategy

Curtins Ref: 068535-CUR-00-XX-RP-C-00002

Revision: P01

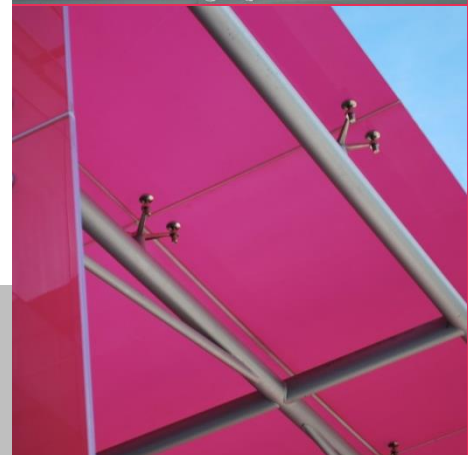
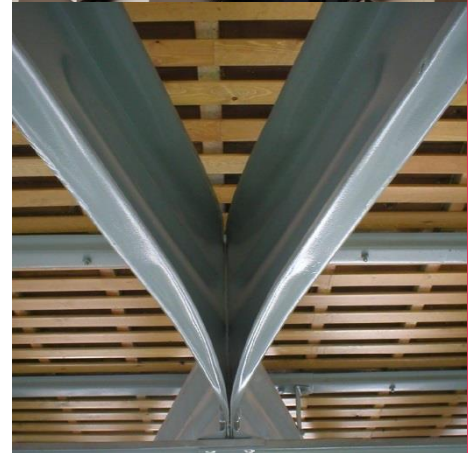
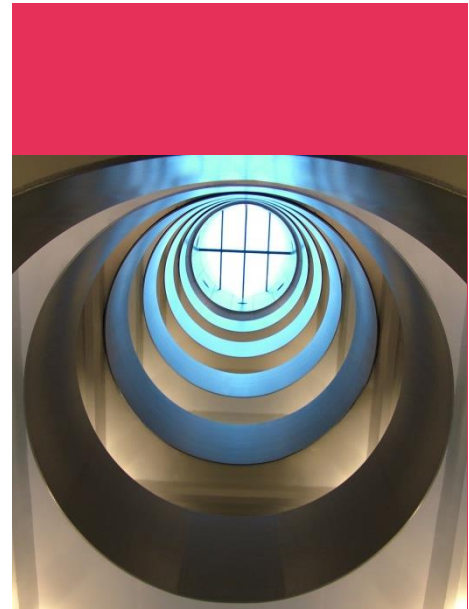
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Client Name: Great Lakes UK Limited

Site Address: Land to the east of M40 and south of A4095, Chesterton, Bicester

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## 1.0 Introduction

### 1.1 Project Overview

Curtins Consulting Ltd have been appointed by Great Lakes UK Limited to prepare a drainage strategy for a proposed development to support a planning application. This report is intended to give an overview of the proposed strategy and suitable methods of discharge, it is to be read in conjunction with the site-specific flood risk assessment (FRA) 068535-CUR-00-XX-RP-C-00001 and the wider set of planning application documents.

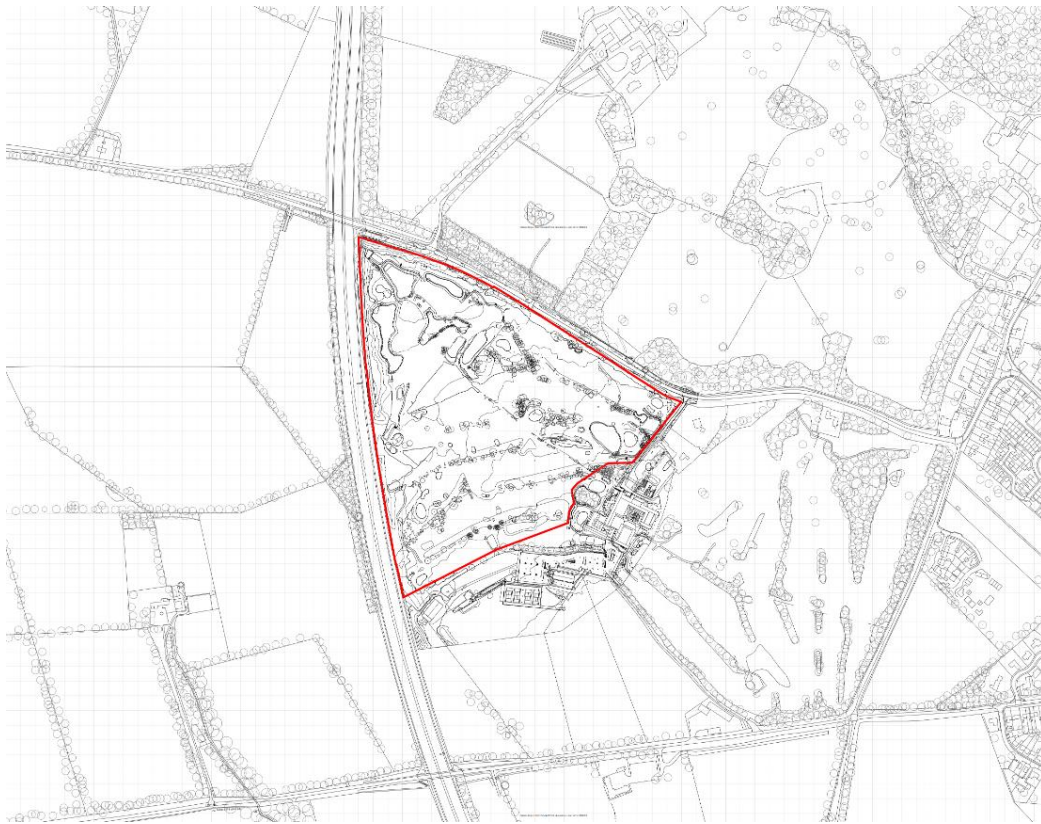
This report is based on currently available information and discussions with the relevant authorities and bodies, namely Thames Water and Oxfordshire County Council (OCC) as the Lead Local Flood Authority (LLFA).

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works, to which this report refers, are undertaken more than twelve months following the issue of this report Curtins Consulting shall reserve the right to reevaluate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

### 1.2 Site Location

The Site is located on part of the existing golf course associated with the Bicester Hotel, Golf and Spa (BHGS). The Site is located to the west of Chesterton which is an outlier village to the west of Bicester. It is bound by the M40 to the west, A4095 to the north and the remainder of BHGS to the east and south. The project proposal intends to use holes 10-18 of the existing golf course to the north west of the hotel, which will remain in situ and operational. The remaining holes are to continue being used as a 9-hole golf course. The Site location can be seen in Figure 1-1 below.



**Figure 1-1: Site Location**

The site has grid reference;

E:454923 N:221686

### **1.3 Site Description**

The Site is currently used as part of an 18-hole golf course associated with BHGS. The project proposes to use the north western 9 holes as the Site for the development, turning the existing golf course from an 18 hole to a 9-hole golf course. The Site is currently accessed from the south, via a dedicated entrance of Green Lane. There is a secondary access to the service area from the West off the A4095. The Site planning boundary has a total area of 18.6ha.

The Site is located in Flood Zone 1, as shown on the Environment Agency's online mapping.

The site wide topographical survey is shown in **Appendix A**.

### **1.4 Project Proposal**

It is proposed to construct a new part 3, part 4-storey 498 room hotel and waterpark with associated parking for approximately 900 vehicles. The Site will also offer indoor activities, conference facilities, food and beverage hall and public nature trails.



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The proposed impermeable area of the development is approximately 7.2ha. This area is made up of the proposed structures and associated hardstanding, areas contributing to the drainage network, car park and access roads.

The Site layout is shown in **Appendix B**.

## 2.0 Planning and Policy Considerations

### 2.1 National Planning Policy Requirements

#### 2.1.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

In recent years, the Government and local Councils have placed increased priority on the need for developers to take full account for the risks of their development at all stages of the planning process. The National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) identifies how the issue of flooding is dealt with through the planning process and with the creation of a site-specific Flood Risk Assessment (FRA) for sites over 1ha in area or in Flood Zones 2 & 3. The Site is located in Flood Zone 1, however as the Site is larger than 1ha, a site-specific Flood Risk Assessment has also been undertaken for the Site.

#### 2.1.2 DEFRA – Sustainable Drainage Systems

The Department for Environment, Food and Rural Affairs (DEFRA) national standards for sustainable drainage systems provides technical guidance on the design, construction and maintenance of Sustainable Drainage Systems (SuDS).

### 2.2 Local Planning Policy Requirements

#### 2.2.1 The Cherwell Local Plan 2011-2031

This drainage strategy has been written in line with the current revision of the Cherwell Local Plan. The plan is aimed to support and guide developments in the area between 2011-2031.

This report has been specifically produced with the following policies in mind;

##### Policy ESD 6: Sustainable Flood Risk Management

This policy aims to reinforce the guidance set out in the NPPF and outlines Cherwell's requirements for new developments in respect to flooding. As with the requirements of the NPPF, ESD 6 outlines the requirements of the site-specific flood risk assessment. The policy states the need of the FRA to demonstrate that there will be no increase in surface water discharge or volume emanating from a site for any event up to and including the 1 in 100 year event (plus climate change), it also places the requirement for developments not to experience flooding for any events up to and including the 1 in 30 year storm event, ensuring any flood water is held safely on site.

##### Policy ESD 7: Sustainable Drainage Systems (SuDS)

This policy aims to promote the use of SuDS or all new developments in the management of surface water runoff. The policy states that;

*“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.*

*In considering SuDS solutions, the need to protect ground water quality must be taken into account, especially where infiltration techniques are proposed. Where possible, SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. SuDS will require the approval of Oxfordshire County Council as LLFA and SuDS Approval Body, and proposals must include an agreement on the future management, maintenance and replacement of the SuDS features”*

### **2.2.2 Strategic Flood Risk Assessment**

Cherwell District Council produced a SFRA in May 2017 which provides an update on a previous version with new legislative policy and summary of flood risk in Cherwell. The document provides guidelines on use of SuDS and guidance for FRAs. The document requires the consider of groundwater emergence as part of the decision-making process on the type of the SuDS techniques. The list of items to be provided with drainage strategy is set out below;

Site Drainage Strategy to include:

- SuDS proposals;
- Outfall locations and levels, including confirmation from relevant authorities that the proposed outfall location will be accepted;
- Rates of discharge including confirmation from relevant authorities that the proposed discharge rate will be accepted;
- On-site storage requirements including storage location indicated within the proposed development plan, confirmation that it is to be located outside the existing 1% AEP+CC flood extent, and evidence that sufficient space is available; and
- Maintenance, funding and operation proposals for the SuDS.

### **2.2.3 Oxfordshire Flood Risk Management Plan**

Oxfordshire County Council act as the Lead Local Flood Authority for the county. A Flood Risk Management Strategy has been produced as part of this role, with an aim to;

- Setting out a long-term programme for flood risk reduction.
- Setting out procedures for identifying relative priorities of measures for flood risk reduction.
- Establish how to find area where a holistic approach to flood risk reduction will achieve multiple benefits.
- Establish how to identify affordable measures for implementation to agreed time frames,
- Facilitate engagement and consultation with community and strategic partners.
- Encourage public awareness and self-help where appropriate.

### 3.0 Flood Risk Summary

A detailed site-specific Flood Risk Assessment (FRA) has been written for the Site (CUR-00-00-RP-C-00001). The FRA;

- Investigates all potential risks of current or future flooding to the Site
- Considers the impact the development may have elsewhere with regards to flooding
- Considers design proposals to mitigate any potential risk of flooding determined to be present

A summary of the assessments of flood risks posed to the Site is given below

#### 3.1 Fluvial Flood Risk

With reference to the EA's indicative flood maps, it can be seen that the Site lies in Flood Zone 1 on the EA's flood risk maps. This means the Site has an annual flood probability of less than 0.1%.

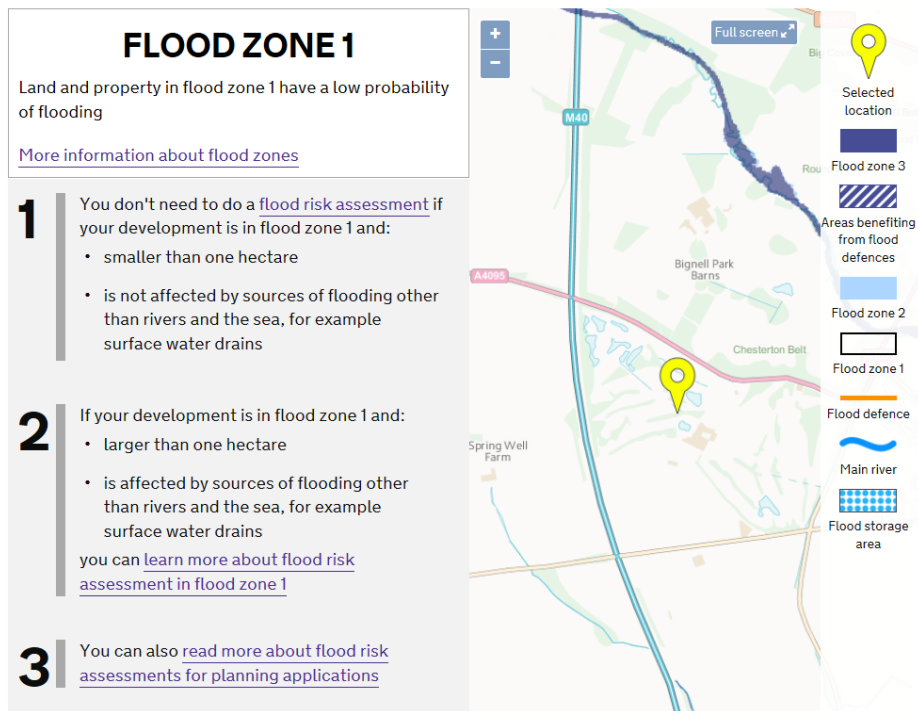
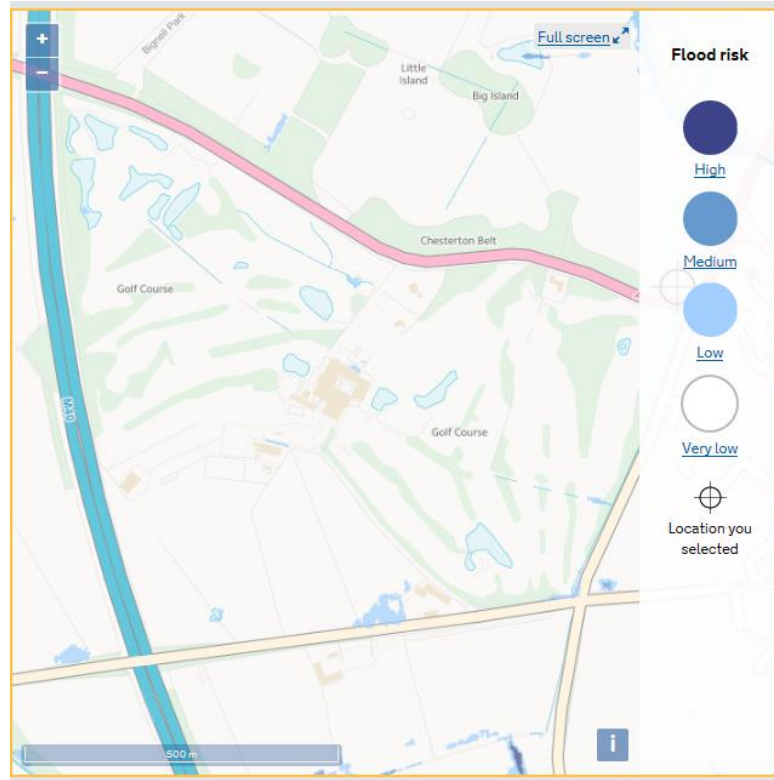


Figure 3-1: Environment Agency's Flood Zone Map

The risk of flooding from fluvial sources is therefore seen as very low.

##### 3.1.1 Pluvial Flooding and Overland Flow

With reference to the EA's online mapping, data related to the risk of potential surface water inundation or flooding is also provided. This shows that the Site and the proposed outfall location (discussed later) is at very low risk of flooding.

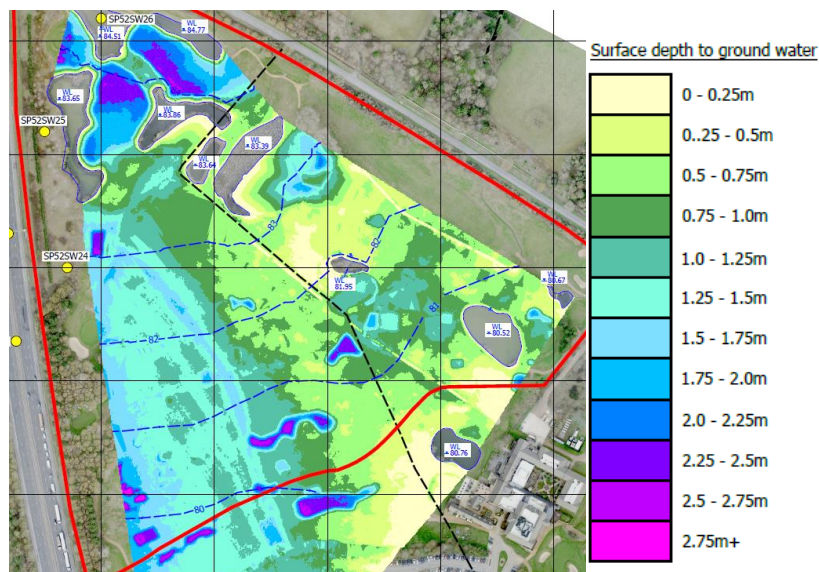


**Figure 3-2: Surface Water Flood Risk Map**

The risk of flooding to the Site from pluvial sources is therefore seen as very low.

### 3.1.2 Ground Water Flooding

An unmanned aerial vehicle survey was conducted across the Site to map the groundwater levels. An extract of this survey is shown in Figure 3-3.



**Figure 3-3: UAV Groundwater Survey**

The survey shows that groundwater levels are shallow across the south and east of the Site. This is further discussed in the Flood Risk Assessment (068535-CUR-00-DR-RP-C-00001). Whilst initial indicators show that the groundwater levels are high, there have been no reported incidents of groundwater flooding in the Oxfordshire or Cherwell SFRA. Further site investigations are required to monitor the long term, seasonal level of the groundwater.

The Site currently benefits from land drainage across the east of the Site, corresponding to the highest level shown in Figure 3-3. There has been no formal survey conducted on this, however from site visits and aerial imagery, traces of the system can be identified. Figure 3-4 below shows evidence of land drainage in the south east of the Site. The approximate routes of the perforated land drains are shown using blue arrows, with the drainage ditches highlighted in dark blue. These have been confirmed during site visits.



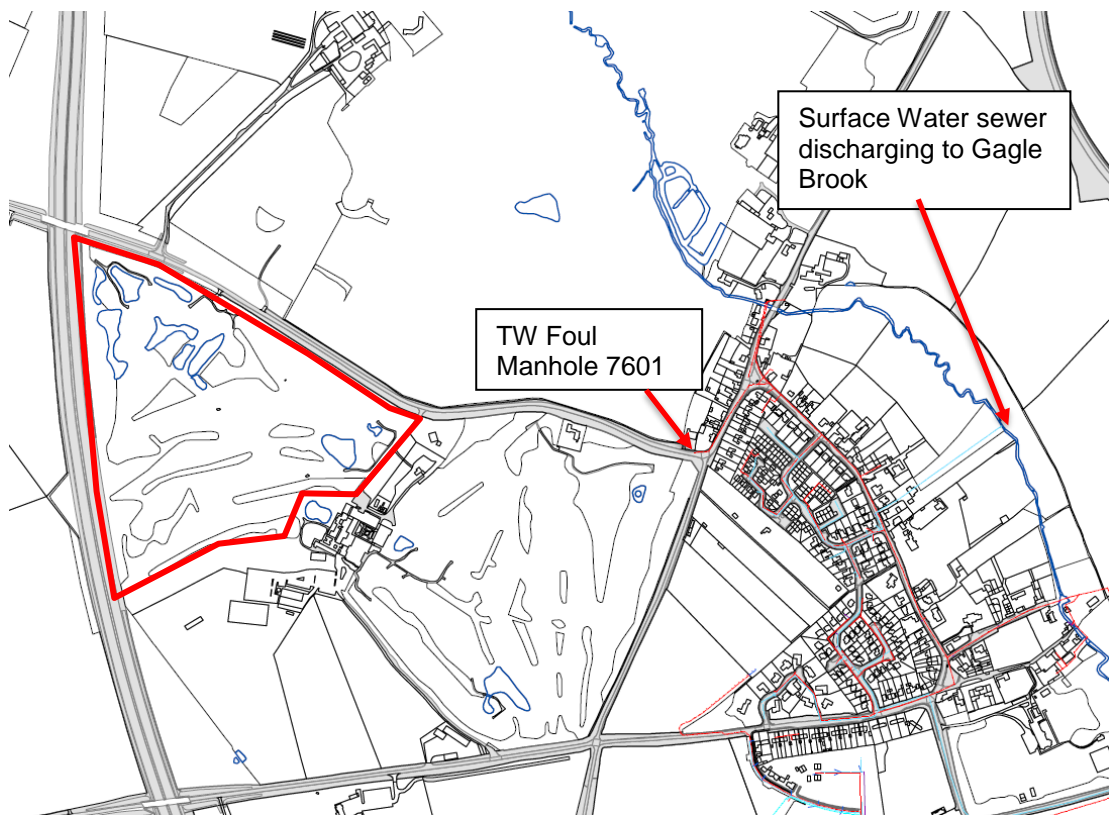
**Figure 3-4: Aerial Imagery Showing Land Drainage**

It is proposed to reinstate the land drainage across the Site during construction, albeit at a lower level. The risk of groundwater flooding will therefore be managed following construction. This will be discussed later on in this report.

## 4.0 Existing Drainage

### 4.1 Public Sewerage

There are no public foul, surface or combined water sewers located on the Site or in the immediate vicinity of the Site. The closest public sewer is a Thames Water foul sewer located 400m to the east along the A4095, manhole reference 7601. This sewer serves the residential areas around Chesterton and also is the outfall for the rising main from the BHGS Golf Course. The location of the manhole can be seen in Figure 4-1. The Thames Water sewer records are contained in **Appendix C**.



**Figure 4-1: Thames Water Sewer Records Extract**

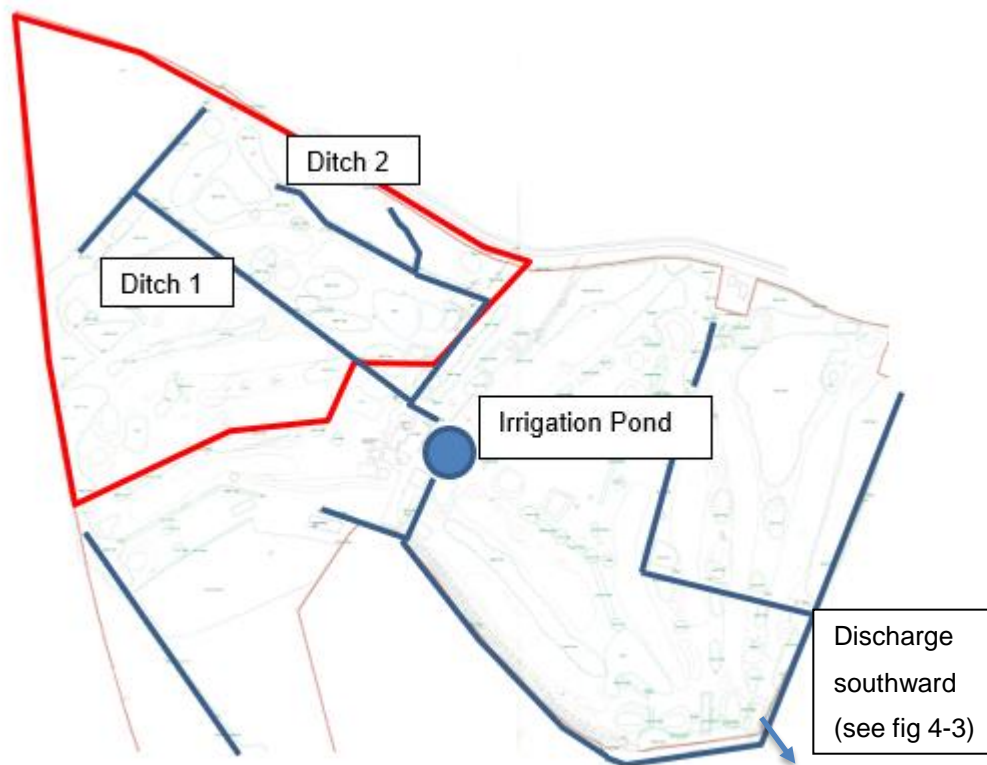
There are public surface water sewers in Chesterton, however these are further away and not utilised currently by the Site as a method of discharge. All surface water sewers ultimately discharge to Gagle Brook.

### 4.2 Private Drainage

The Site is the back nine holes of the golf course associated with BHGS, however for the benefit of understanding, this section will refer to discharge from the southern nine holes and hotel/club house as well.

Following a site visit to the existing golf course and hotel and walk over with site maintenance staff, it has been seen that the existing buildings are served by a series of below ground foul water sewers. These sewers direct flows to the east and south of the building where foul flows are discharged into pump chambers. From here the sewerage is pumped across the southern 9 holes to the foul water manhole 7601 beneath the A4095. It is understood from maintenance staff that the macerator pumps used by the existing golf hotel and spa are currently at capacity.

Surface water across the existing site is collected via a range of above and below ground systems. There is a ditch network that manages land drainage and overland flow from the golf course and green spaces to the north and south of the existing hotel. The roof drainage is managed by guttering and rain water pipes guiding the surface water to a below ground sewer system. The surrounding hardstanding and car parking areas are drained using road and yard gullies. All of the surface water collection systems are then either discharged into an existing pond to the south of the hotel or downstream into the network of ditches guiding flows southward off the existing site. Figure 4-2 shows the arrangement of this network. The Site boundary is all drained via two ditches that outfall via a 300mm diameter pipe into a pond to the south of the existing hotel. The pond has a high-level outfall discharging to the ditch network shown in Figure 4-3. It is understood that the pond is used for irrigation of the existing site in summer.



**Figure 4-2: Site Wide Existing Drainage Network**



It is assumed that all surface water is currently discharged from the existing site via a series of swales and culverts, leading flows southward to Gagle Brook. Figure 4-3 shows the approximate route, with swales shown in green and culverts in purple. This is the understanding taken from the flow direction of the ditched on the topographical survey, site walk overs and evidence given by the golf resorts maintenance staff.

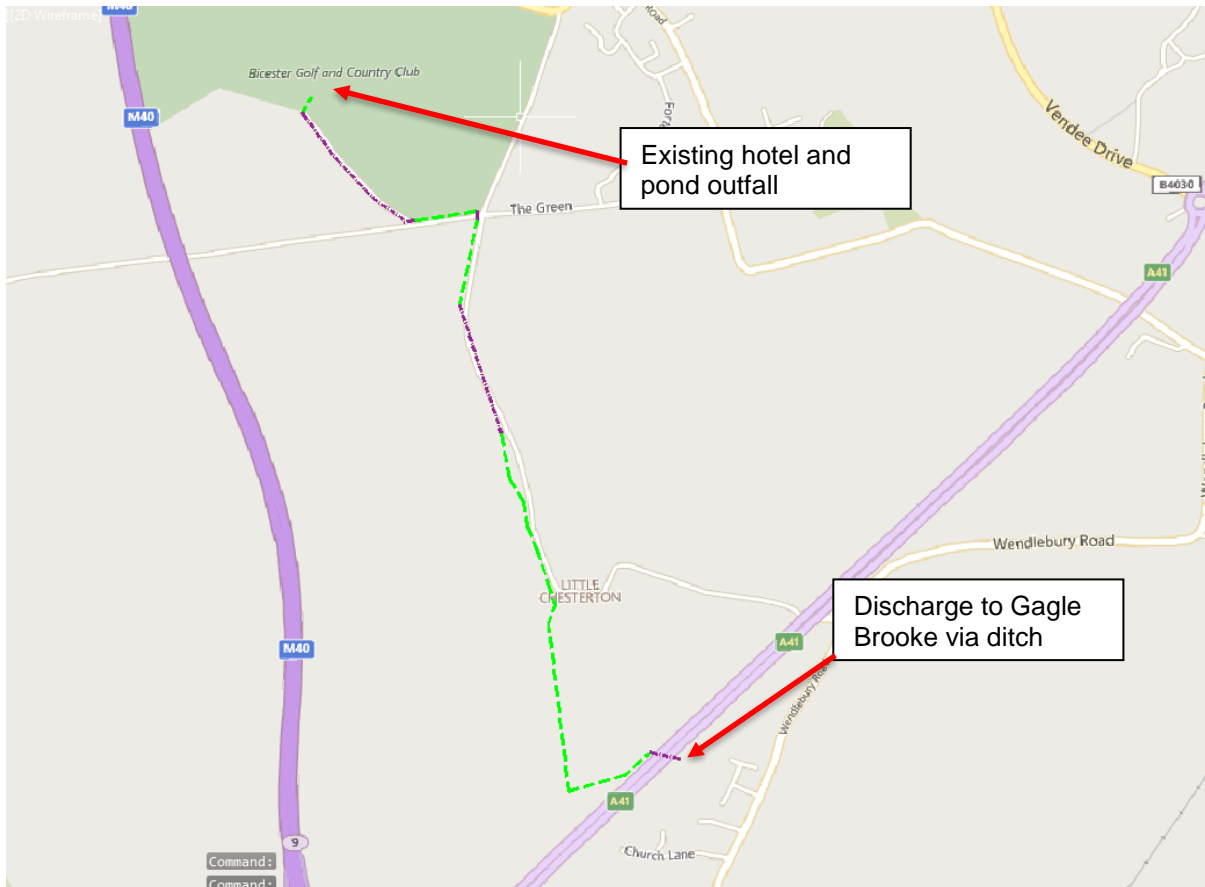


Figure 4-3: Surface Water Discharge Route

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## 5.0 Proposed Drainage Strategy

### 5.1 General

It is proposed to drain the surface water via the existing outfall network previously discussed. The discharge will be restricted to greenfield run-off rates, with excess flows being managed on the Site. 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.

A separate foul water sewer is proposed to collect and convey foul water. As there are no existing foul sewers on, or near the Site that have available capacity, it is proposed to pump foul water to the nearest Thames Water manhole. The proposed pumping station is to be designed to the requirements of Sewers for Adoption 7<sup>th</sup> Edition, located to the east of the Site and offered to Thames Water for adoption. This is subject to agreement with Thames Water.

Two existing ditches that dissect the Site from north to south are proposed to be diverted as part of the scheme. These will be incorporated into the proposed car park and connect to the existing drainage ditch, running along the southern boundary.

## 5.2 Surface Water

### 5.2.1 Proposed Site Discharge

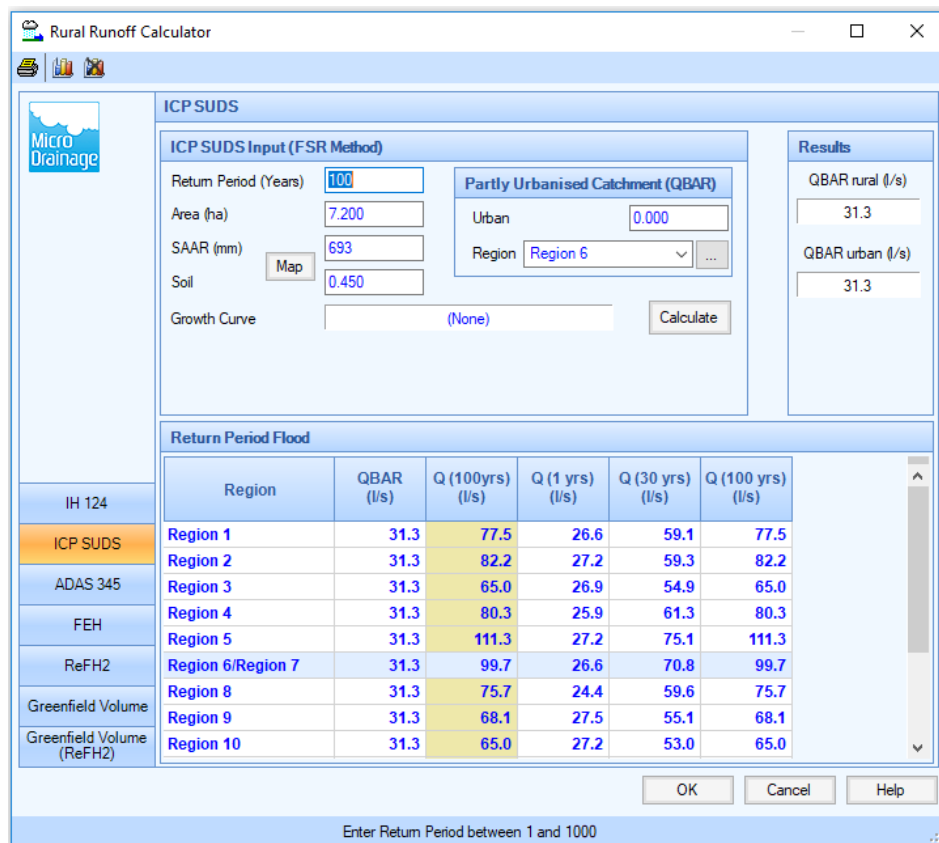
In line with the Drainage Hierarchy, surface water runoff from a site should endeavour to be controlled as close to the source as possible. Discharge from site should be via one of the methods detailed in Table 1, in descending priority;

**Table 1: Discharge Opportunities**

Sustainable Drainage Hierarchy	Site Specific Application
Store rainwater for later use	It is proposed to use a bespoke system that will allow for the below ground storage tank to be used for rainwater harvesting. The system will store water in the tank until the MET office forecasts rain, at which point it will begin discharge to provide storage capacity for excess run-off. The details of this system are to be provided separately by the MEP Engineer.
Use infiltration techniques, such as porous surfaces in non-clay areas	Due to high ground water levels across the Site, infiltration is not seen as a feasible outfall solution and therefore has been discounted. It is stated in Building Regulations that infiltration devices should not be used within 1m of the seasonal high groundwater level.
Attenuate rainwater in ponds or open water features for gradual release	Two above ground detention basins have been included on the Site, these are located either side of the main entrance to the hotel and can be seen on 068535-CUR-00-XX-DR-C-92000 – Below Ground Drainage General Arrangement in <b>Appendix E</b> .
Attenuate rainwater by storing in tanks or sealed water features for gradual release	It is proposed to store as much excess flows above ground in basins, where this is not possible, permeable pavements and swales are to be utilised. The remaining surface water run-off is to be attenuated in a below ground storage structure.
Discharge rainwater direct to a water course	It is proposed to mimic the existing outfall arrangement of the Site, where surface water is collected and discharged to the existing network of ditches and culverts, leading to Gagle Brook
Discharge rainwater to a surface water sewer/drain	There are no surface water sewers in the vicinity
Discharge rainwater to a combined sewer	There are no surface water sewers in the vicinity

The permitted discharge rate from the Site is proposed to be QBar. The Site has a total area of approximately 17ha, however it is estimated that only 7.2ha of this will be impermeable. Using the rural runoff calculator on MicroDrainage, the QBar rate has been estimated and can be seen in Figure 5-1.

Therefore, all surface water discharge from the Site is proposed to be limited to 31.3l/s for all storm events up to and including 1 in 100 year +40%. The flow restriction is proposed to be achieved using a vortex flow control device, located in the last manhole before meeting the existing below ground network. Further flow controls are proposed across the Site; however, these are aimed at managing surface water flows upstream and utilising attenuation volume held in the permeable pavements.



**Figure 5-1: QBar Calculation**

Following discussions with the LLFA, it has been agreed that the existing outfall and proposed discharge rate are adequate for this Site. As no surface water sewer is to be used for the Site outfall, discussions with Thames Water are not required. Similarly, as the Site does not discharge to a main river, the EA are not required to be consulted either.

The network has been modelled using MicroDrainage and the results can be seen in **Appendix D**.

### 5.2.2 Attenuation

As the Site discharge is proposed to be restricted to greenfield runoff rates, attenuation volume is required to hold excess flows. It is proposed to offer this volume through various SuDS features. The proposed below surface water network utilises detention basins, permeable pavements, swales and below ground attenuation tanks. The proposed General Arrangement is contained in **Appendix E**. The aim of the proposed strategy has been to push as much of the required storage volume up the drainage hierarchy as possible.

Permeable pavements are the most widely used SuDS feature across the Site. This is due to them being able to offer benefits to water quality and time of entry, as well as offering up the real estate for multi-use. The car park has been broken up into a number of systems each controlled using an orifice plate to ensure the storage volume is maximised over more frequent return periods. Table 2 shows the area and depth of each of the systems used in the MicroDrainage model. These will be subject to change following the development of the Site wide external levels strategy, however offer an insight into the storage volume required.

Further to the below, other storage volumes are required across the Site. These volumes are outlined in

Table 3 and shown in **Appendix E**.

**Table 2: Permeable Pavement Dimensions**

Permeable Paving Ref. (see 068535-CUR-00-00-DR-C-00001)	Area (m <sup>2</sup> )	Sub-base Depth (mm)	Approximate Volume (m <sup>3</sup> )
A	936	300	297
B	4775	300	430
C	2900	300	261
D	1480	300	133
E	520	300	47
F	630	300	57
G	3025	300	862
H	1700	300	153
I	685	300	62
J	690	300	62
K	945	300	85

**Table 3: Storage Volumes**

Storage Feature	Volume (m <sup>3</sup> )
Pond (volume per pond)	342 – per pond
Tank (SW2)	100

### 5.2.3 Sustainable Drainage Systems

Developments should utilise sustainable drainage systems (SuDS) unless there are practical reasons for not doing so. As mentioned previously, the design should aim to reduce run-off rates and ensure that run-off is managed as close to its source as possible as per the drainage hierarchy (see Table 1).

The SuDS Hierarchy sets out the preferred method of discharging and managing water from a development site and aims to highlight why each item has been utilised or discounted.

Table 4 analyses the SuDS hierarchy and the appropriate techniques with specific focus on this project.

Where traditional collection systems are required, gully pots and channels are to be installed with gully pot ladders to allow for the escape of any Great Crested Newts. The gully and channels will also be constructed with a safe passageway between the kerb and gully pot/channel where required. In any case, gully pots and channels have only been included where absolutely necessary.

**Table 4: SuDS Opportunities**

SuDS Technique	Site Specific Analysis
Rainwater Harvesting	As discussed previously, the large below ground attenuation tank is to be installed with a specialist system, allowing for dual use as a rainwater harvesting tank. This is further detailed in the MEP report produced by Hoare Lea.
Living or Roofs/Areas	Green roofs are proposed on top of the food area of the proposed building. The permitted area for this is shown in <b>Appendix F</b> . The remainder of the area is to be used for plant or is not structurally suitable.
Basins and Ponds	Where possible surface water storage basins are encouraged. Two basins have been included either side of the main entrance. All other potential areas are either at risk of high groundwater, not hydraulically feasible or not within the ownership boundary.
Filter Strips and Swales	Swales are proposed along the service roads to the water park. These are only proposed to be conveyance swales and will be lined to prevent groundwater entering the surface water system.  Two further swales are proposed through the car park, flowing from north to south. These swales have been designed as diversions for the existing drainage ditches crossing the site. This has been agreed with the LLFA.
Infiltration Devices	As previously mentioned, infiltration is not possible due to high ground water
Permeable Surfaces	The proposed car park is to be used as permeable pavement where possible. As there is likely to be a grade across the car park, the system will comprise of a number of small

	permeable pavement systems with orifice plates to retain flows during high intensity rainfall events. The proposed sub-base depths are approximately 300mm for all systems.
Tanked Systems	Tanks systems are to be used across the Site to protect property from flooding during high intensity rainfall events. These are to be used where no other form of storage is appropriate.

### 5.3 Foul Water

#### 5.3.1 Outfall Location

The Site will be designed with a new separate below ground drainage foul sewer. The foul sewer will serve the hotel, waterpark and associated amenities. As previously discussed, there are no existing foul water sewers on the Site, with the closest being 400m away in Chesterton. The existing hotel and golf club discharge foul water to two on-site private pump stations, from here the effluent is pumped via rising main to the nearest Thames Water manhole (Ref. 7601). This is also the proposed outfall manhole for the Site. It is understood that this private system operates at above full capacity and often has operational issues as a result of this. It is therefore assumed that this is not a viable outfall for the Site and a new connection to TW manhole 7601 will be required.

#### 5.3.2 Pumping Station

In order to provide a foul water drainage outfall to the Site, it is proposed to install an private pumping station as part of the drainage strategy. The details of this pumping station are yet to be confirmed, however it is anticipated to be located on the Site's eastern boundary, with access to the pumping station provided through the proposed car park. The pump station will be required to be designed in accordance with Sewers for Adoption 7<sup>th</sup> Edition. The pumping station will be installed with back up pumps and power supplies. If a 24-hour storage is also required, this will be agreed with Building Control.

#### 5.3.3 Discharge Rates and Flows

The peak discharge rate for foul water has been estimated for the Site. As the project is currently at Stage 2, the estimation is based on required number of appliance and the proposed room layouts. The discharge rate from the waterpark has been provided by its designers.

An allowance has also been made for the backwash flows from the pools during maintenance. This will need to be confirmed at a later date and is not anticipated to be carried out at the peak flow time.

The total estimated site discharge, not including the pool backwash, has been calculated using BS EN 752:2018 using a frequency factor of 0.7. The peak discharge rate is estimated to be 50l/s. The calculations are shown in **Appendix G**.

The proposed foul network has been modelled using MicroDrainage to establish the required site outfall and pump requirements. As the internal SVP locations and flow rates have not been confirmed, the

model is solely used for estimating invert levels when the network is designed to Building Regulations and not BS EN 752.

## 5.4 Land Drainage

As previously discussed, the existing Site has a high groundwater table. In order to prevent the greens from waterlogging, a land drainage network has been installed. The small diameter perforated pipes are laid at a shallow depth and discharge to the existing drainage ditches on the Site. These ditches connect to the outfall described in Section 5.2. Images of these ditches, taken on a site walkover, are shown in Figure 5-2. Further information on the existing ditch network can be seen in the technical note in **Appendix H**.



**Figure 5-2: Site Drainage Ditches**

It is required to remove this land drainage as part of the proposal. This will include removing the existing drainage ditches. In order to ensure that the ground water is managed post-construction, a new land drainage network is proposed for the Site. An indicative layout has been illustrated in **Appendix I**. Further to this, a diversion of the two existing land drains have been proposed, as agreed with the LLFA in a pre-application meeting. The route of the diversion is shown on the Drainage General Arrangement drawings in **Appendix E**.



---

## 6.0 General Maintenance

All drainage within the Site will be maintained as a private network, not including the adoptable pumping station. A suitable maintenance strategy will be included within handover documentation by the contractor once final details and suppliers have been chosen for the individual drainage elements. This strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

An Operations and Maintenance Manual has been included in **Appendix J**.

## 7.0 Conclusions and Recommendations

This report is intended to provide further details on the design of the drainage systems for the proposed Great Wolf Lodge and to act as additional information in support of the planning application. The conclusions to be drawn from this report are as follows:

- The Site is located in Flood Zone 1 and therefore is at the lowest risk of fluvial flooding
- There is a low risk of surface water flooding across the Site
- The Site is subject to high ground water levels. There is an existing land drainage system on site that is proposed to be reinstated and upgraded as part of the works. As a result, it is anticipated that the flood risk will be suitably managed.
- Due to the above point, it is not anticipated that infiltration is a viable option for surface water discharge. This is demonstrated through a UAV survey of the Site.
- The proposed surface water outfall is via the existing network of drainage ditches, culverts and ponds on the Site..
- The surface water is proposed to discharge at the greenfield run-off rate. This has been calculated to be 31.3l/s
- Excess surface water flows are proposed to be attenuated using permeable pavements, detention basins, swales and a below ground attenuation tank.
- It is proposed to use green roofs, permeable pavements and swales as part of the on-site collection system
- Rainwater harvesting it to be proposed for the Site. The proposed attenuation tank it to be integrated with a specialist system that will allow for its use as a harvesting tank during no and low intensity rainfall events.
- There are two existing drainage ditches that flow from north to south across the Site and are used as part of the land drainage system. These are required to be diverted as part of the works.
- A separate foul water system is to be constructed as part of the project. As there is no viable outfall in the immediate vicinity, this will outfall to an adoptable pumping stations and be pumped via rising main to the nearest Thames Water manhole. The peak discharge rate is estimated to be 50l/s.

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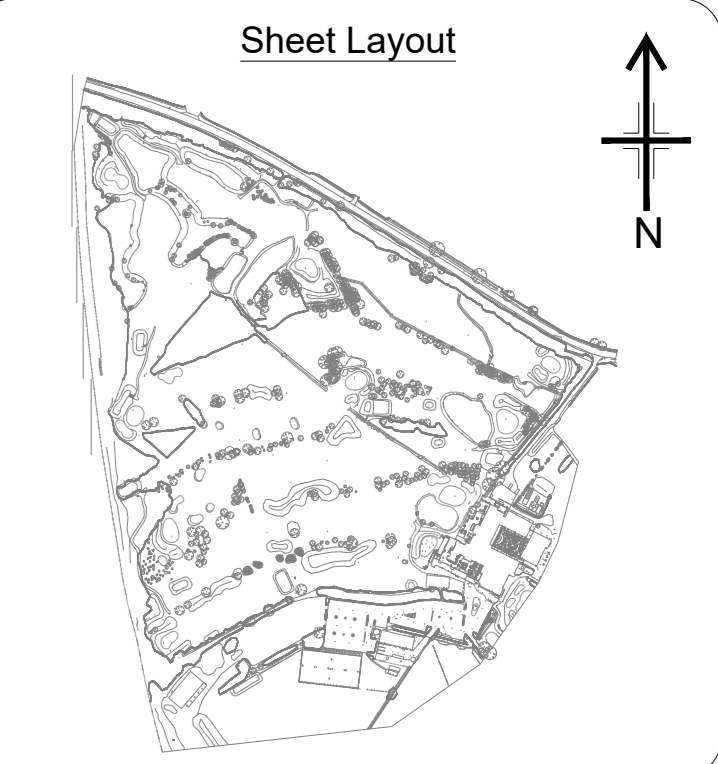
## Appendices

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## Appendix A – Topographical Survey



### Topographic Abbreviations

AV	Air Vent	IL	Invert Level
BB	Bottle Beacon	JB	Junction Box
BD	Back Drop	KO	Kerb Outlet
BK	Block	LS	Liste Box
BL	Base/Bed Level	LP	Lamp Post
BS	Bus Stop	MH	Man Hole
BP	Block Pillar	MK	Service Marker
BPF	Block Pave	MT	Mercury Telephone Cover
BR	Blue Rack	OSM	Ordnance Survey Benchmark
BS	Blue Sign	P	Post
BT	BT Inspection Cover	PB	Post Box
C	Combined (Sewer)	PCC	Pavement Control Point
CAM	Camera	PLT	Planar
CAY	Cable & Wireless	PM	Parking Meter
CAB	Cable Junction Box	PFL	Parapet Level
CATV	Cable Inspection Cover	PJ	Pump
CB	Control Box	PL	Roof Level
CC	Control Cabinet	RL	Road Level
CCO	Cable Outlet	RS	Road Sign
CCTV	Close Circuit Television	RSW	Rising Wall
CCO	Cable Core	RWC	Rain Water Channel
CR	Cast Iron	RWP	Rain Water Pipe
CS	Cable Inspection Point	SD	30mm (Sewer)
CL	Cover Level	SIA	Soil Auger
CO	Column	SB	Siding Board
CP	Chain Pit	SSC	Water Stop Cook
D	Depth	SD	Service Duct
DK	Drop Kiosk	SE	Sign Post
DCP	Damp Proof Course	SL	Slab Level
ES	Electricity Control Box	SP	Sign Post
EJB	Electricity Junction Box	ST	Sty Cable
EL	Eave Level	SV	Stop Valve
ELIC	Electricity Inspection Cover	SVP	Soil Vent Pipe
EM	Electric Meter	SW	Stop Wall
EP	Electricity Pylon/Pole	TB	Telephone Call Box
ER	Earth Rod	TSM	Telephone Bench Mark
F	Foul (Sewer)	TC	Traffic Control Inspection Cover
FB	Fuel Box	TH	Threat Level
FC	Fuel Cover	THL	Threshold Level
FH	Fire Hydrant	TI	Telephone Inspection Cover
FL	Floor Level	TJB	Telephone Junction Box
FL	Floor Light	TL	Tree
FO	Fibre Optic	TMC	Tarmac
FF	Footpath	TOW	Tree
FRL	Fuel/Road Level	TP	Telephone Pole
G	Gully	TRD	Tree Root
GAS	Gas Inspection Cover	UTL	Unlikely to Lift
GB	Gas Junction Box	VP	Vent Pipe
GM	Gas Meter	WL	Water Level
GP	Gas Post	WM	Water Meter
GV	Gas Vent	WO	Wash Out
H	Head Level	WP	Water Pipe
IC	Inspection Cover	WTR	Water Inspection Cover

### Topographic Legend

Gate	Vegetative Border
Rising	Pin Kerd
Bottom Of Batter	Overhead Power Line
Top Of Batter	Building Canopy
Building/Wall	Grass Edge
Drip/Vegetative Line	Control W/L Level
Sideline	Edge of Handstanding
Slope of batter	Down Hole
Kerb	Tree
Pipes	Bush
Fences/Lines	Survey Station
	Photograph Origin

### Utility Abbreviations

AK	ADVERSE SURVEY	HW	HIGH VOLTAGE
D1C	DEPTH TO CURB	HW	WATER MAIN RECORDS
D1B	DEPTH TO BOTTOM	IS	INTERNAL SERVICE
D1S	DEPTH TO SLT	USA	UNABLE TO OBTAIN RECORDS
D1W	DEPTH TO WATER	UL	UNABLE TO LOCATE
END	END OF TRACE	UT	UNABLE TO TRACE
NO ACCESS	NO ACCESS REQUIRED		
NO VISIBILITY	NO VISIBILITY		

### Utility Legend

FUEL LINE - PETROL	CHAMBER EXTENTS
FUEL LINE - DIESEL, KERO OR PARAFFIN	REPORT POINTS
ELECTRICITY CABLE	
HIGH VOLTAGE ELECTRICITY CABLE	
WATER SUPPLY PIPE	
TELECOM CABLE	
CABLE TELEVISION	
HEATING PIPES	
CATHODIC PROTECTION	
HEATING PIPES	
SURFACE WATER DRAIN	
FUOIL WATER DRAIN	
COMBINED DRAIN	
UNIDENTIFIED (LOCATED USING GPR) - SEE NOTES	
UNIDENTIFIED (LOCATED BY INDUCTION) - SEE NOTES	
UNIDENTIFIED (LOCATED BY RADIO) - SEE NOTES	
UNIDENTIFIED (LOCATED BY GPR) - SEE NOTES	
TANK GAUGE LINE OR COMMS CABLE	
OFF-SET PIPE	
VENT PIPE	
REMEDICATION PIPES	
WAPOR RECOVERY	
SURVEY EXTENTS BOUNDARY LINE	
END OF FRACEDRIVE	

**Notes**  
THE ACCURACY OF BOTH THE RADAR DETECTION EQUIPMENT AND THE GROUND PENETRATING RADAR, CAN ONLY BE ASSUMED TO BE +/-15% OF THE LOCATED DEPTH FOR BOTH X AND Z REPORT INFORMATION. WHILST 1ST HORIZON PROVIDE SUITABLY TRAINED STAFF ON ALL PROJECTS AND OUR INVESTMENT IN THE LATEST DETECTION EQUIPMENT, LOCATED DATA MUST NOT BE ASSUMED EXHAUSTIVE AND DOCUMENT REGARD MUST ALWAYS BE ADHERED TO IN ALL AREAS DURING ANY EXCAVATION WORKS.  
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DO NOT SCALE FROM THIS DRAWING.  
ALL LEVELS ARE RELATED OSN15 GRID PROJECTION.

Rev	Details	Name	Date

Client: **Curtins**  
17-19 Whitworth St West  
Manchester  
M1 5WG

Project: **Great Wolf Lodge,**  
Cheterton, Bicester,  
OX26 1TH

Title: **Great Wolf Lodge**  
Topographic Survey  
Overall Layout

Surveyed:	RD, RL, DF	CAD:	ABR, RD
Chk'd:	ABR	Appr'd:	JG
Date:	02.08.19	Scale:	1:100@A0

**1ST HORIZON**  
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www.1sthor.co.uk	info@1sthor.co.uk

No. CS-GW5389-01

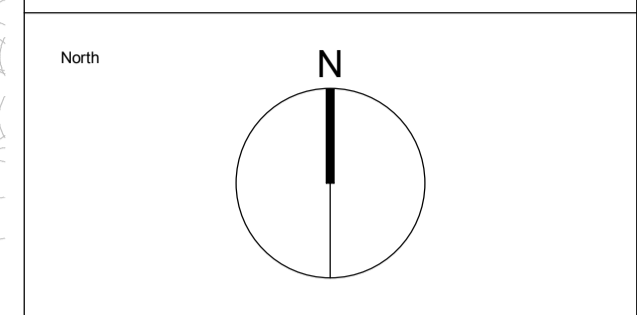
Rev:	-
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## Appendix B – Proposed Site Layout



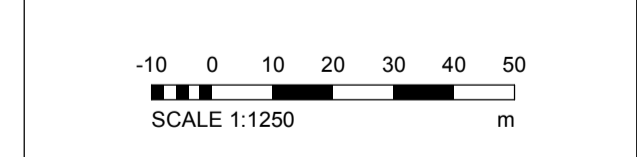
Keyplan



Notes:  
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 3. EPR Architects accepts no liability for use of this drawing by parties other than the party for whom it was prepared or for purposes other than those for which it was prepared.  
 4. This drawing is issued in dwg/print format as an uncontrolled version to enable the recipient to prepare their own documents/drawings/models for which they are solely responsible. This drawing is based on project information current at the time of issue. EPR Architects Limited accepts no liability for any alterations or additions to or discrepancies arising out of any change to such project information that occurs to the information after it is issued by EPR Architects Limited.  
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No.	Revision	Date	Initial	Chk'd
3	P03 - Planning Issue	08.11.19	LOG	AJ
2	P02 - Preliminary Planning Issue	26.10.19	LOG	AJ
1	P01 - Preliminary Planning Issue	25.10.19	LOG	CT

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 3. Landscape shown for illustrative purposes only, refer to Landscape Architect's for Landscape proposals for further details.  
 4. Tree locations & existing trees beyond site perimeter - indicative - for illustrative purposes only.



**EPR Architects**  
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 www.epr.co.uk

Proposed Great Wolf Lodge  
 Chesterton, Bicester, Oxfordshire

Proposed Site Plan

Scale	Status	Revision
1:1250	Planning	3

Project Code: 10875 - EPR - 00 - ZZ - DR - A - TP - 0102

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## Appendix C – Thames Water Sewer Records



# Asset location search



## Property Searches

Curtins  
LONDON  
EC1V 0BD

**Search address supplied** OX26 1TE

**Your reference** GWL 068535

**Our reference** ALS/ALS Standard/2019\_3986151

**Search date** 15 April 2019

### Keeping you up-to-date

#### Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)  
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.



Thames Water Utilities Ltd  
Property Searches, PO Box 3189, Slough SL1 4WW  
DX 151280 Slough 13



[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148



**Search address supplied:** OX26 1TE

Dear Sir / Madam

**An Asset Location Search is recommended when undertaking a site development.** It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

## Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd  
Property Searches  
PO Box 3189  
Slough  
SL1 4WW

Email: [searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)

Web: [www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)

## Waste Water Services

**Please provide a copy extract from the public sewer map.**

The following quartiles have been printed as they fall within Thames' sewerage area:

SP5521NE  
SP5521SE

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

The following quartiles have not been printed as they contain no assets:

SP5521NW  
SP5421NE

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

## Clean Water Services

**Please provide a copy extract from the public water main map.**

The following quartiles have been printed as they fall within Thames' water area:



SP5521NE  
SP5521SE

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

The following quartiles have not been printed as they contain no assets:

SP5521NW  
SP5421NE

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

## Payment for this Search

A charge will be added to your suppliers account.

## Further contacts:

### Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)  
Thames Water  
Clearwater Court  
Vastern Road  
Reading  
RG1 8DB

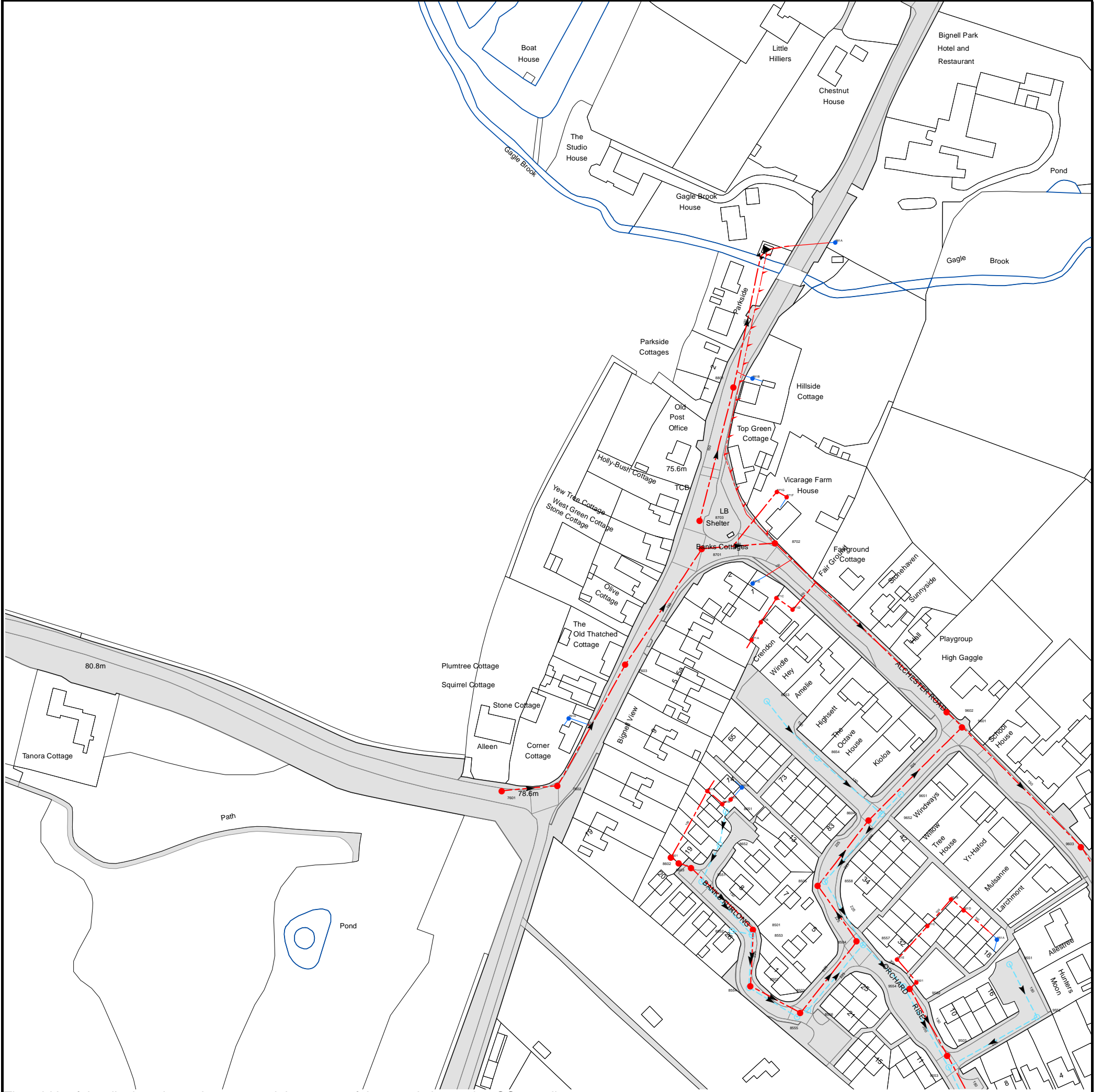
Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)

### Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)  
Thames Water  
Clearwater Court  
Vastern Road  
Reading  
RG1 8DB

Tel: 0800 009 3921  
Email: [developer.services@thameswater.co.uk](mailto:developer.services@thameswater.co.uk)



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 455750,221750  
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9652	77.34	75.7
8651	77.99	76.64
861M	n/a	n/a
861L	n/a	n/a
9651	77.25	75.8
861N	n/a	n/a
7601	78.74	77.54
861K	n/a	n/a
7602	78.11	75.86
8654	77.49	76.06
9601	76.41	74.46
9602	76.44	74.56
8653	77.58	76.29
7603	77.63	75.56
871A	n/a	n/a
871B	n/a	n/a
871D	n/a	n/a
871C	n/a	n/a
871E	n/a	n/a
8701	76.71	75.26
8702	76.46	74.91
8703	76.56	75.09
871F	n/a	n/a
871G	n/a	n/a
8801	76.69	75.32
881B	n/a	n/a
881A	n/a	n/a
9552	76.3	75.23
9551	76.43	75.44
951A	n/a	n/a
9603	75.96	74.14
9553	76.54	75.13
9503	76.52	74.79
8555	77.65	75.69
8503	77.64	75.79
8556	77.63	75.64
9502	76.9	74.96
8554	77.86	75.92
8502	77.88	75.95
9554	76.93	75.26
9501	77.08	75.18
951E	n/a	n/a
8557	77.27	75.35
8504	77.24	75.44
8553	77.75	76.1
8552	77.97	76.35
8501	77.74	76.14
951C	n/a	n/a
951D	n/a	n/a
951B	n/a	n/a
8505	77.53	75.18
8558	77.49	75.57
8551	77.96	76.14
8603	77.93	76.49
8602	78.04	76.61
8601	78.06	76.65
8652	77.94	76.45
8604	77.29	74.92

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



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The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.  
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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9302	74.68	72.96
941E	n/a	n/a
9404	76.12	74.35
9453	76.1	74.54
9201	74.52	72.94
9251	74.49	73.18
9351	74.54	73.2
9352	74.52	73.09
9303	74.43	72.76
9304	74.5	73.05
941A	n/a	n/a
931A	n/a	n/a
9353	74.41	72.93
9305	74.69	73.52
9301	74.78	73.47
9202	74.28	72.7
941G	n/a	n/a
941F	n/a	n/a
9451	75.35	74.2
0451	75.15	73.59
9452	75.85	73.67
9403	75.85	74.08
9405	76.27	74.55
9402	76.05	74.78
9454	76.33	75
9401	76.13	75.33
9101	n/a	n/a
9102	n/a	n/a
8201	n/a	n/a
8202	75.24	73.81
9254	74.78	73
8203	75.07	73.7
9255	74.78	73.11
8205	75.09	74.1
9204	74.35	72.47
8204	74.78	73.2
8206	74.79	73.63
9252	74.27	72.77
9203	74.28	72.54
811C	n/a	n/a
811B	n/a	n/a
811A	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.