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FOREST HOLIDAYS / FORESTRY ENGLAND
FOREST VISITOR CENTRE,
HAMSTERLEY FOREST,
FOUL DRAINAGE STRATEGY –13th JULY 2023

Introduction

Tweddell and Slater Ltd have been appointed to prepare a foul drainage statement that is compliant with National Planning Policy.

This report has been prepared in support of a masterplan development in Hamsterley forest, that consist of:

1) Forest Holiday development consisting of 70 lodges.
2) Redevelopment of the existing Forestry England visitor centre, which include the construction of a new cycle hub.
3) Go Ape
4) Campsite

However, this report only focusses on elements 1 to 3. A separate report is prepared for the campsite.



Figure 1 – Site Location Existing Visitor Centre

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The site location indicators are as follows:

OS X (Eastings): 409178	OS Y (Northings): 531254
Nearest Post Code: DL13 3QH	National Grid Ref: NZ 09178 31254
Latitude (WGS84): 54.676266	Longitude (WGS84): -1.8591888

This report has been developed in accordance with the Environment Agency (EA), Building Regulations Part H and CIRIA guidelines with the aim of providing the most sustainable solution for the proposed foul drainage upgrade.

In accordance with the Building Regulations Part H, the preferred option for foul water drainage is a connection into an existing public sewer. The Environment Agency also require that the option to connect into the existing foul system is fully explored prior to contacting them for a permit to discharge to ground or a watercourse. Such evidence should include the approximate cost of connecting to the existing system and details of any physical obstacles such as roads, railways, rivers etc.
Sewer records show no available foul water sewer on site, with the nearest potential foul sewer connections at Hamsterley village which is approximately 2.5km from the site. Due to the distance to the existing sewer a connection to mains is not considered a viable option at this time.

A site/ground investigation is has been completed and highlights unviable infiltration on the site. In addition, soil/bedrock mapping information obtained from DEFRA shows that the site is underlain by a loamy/clayey soil with impeded drainage. This information shows that it is unlikely that discharging to ground would be viable on the site. In addition, due to the nature of the development the use of a foul drainage field is considered not suitable. It is therefore proposed to discharge the treated foul water from the development to the existing watercourse. (Bedburn beck.)

The site is currently served by a septic tank, there is an Environment Agency exemption for the discharge of sewage effluent in place. The details are:

Exemption Ref: EPR/AE5389VN/A001

Grid Ref: NZ0910031200

Forest Holiday Development

All cabins in this development are to have hot tubs installed which are drained twice weekly on a Monday and Friday between the hours of 10am and 4pm. It is assumed that 100% will be drained on both Monday and Friday. The proposal is to discharge all the foul effluent into holding tanks on the site. The 70 hot tubs equate to 65.7m3 of effluent for each emptying (each change over day) that equates to a total of 131,428 litres a week, as shown below.

No Bedrooms	Quantity	Hot tub capacity (litres)	Total hot tub volume (litres)
1	8	782	6,256
2	31	782	24,242
3	21	1136	23,856
4	10	1136	11,360
		Change over	**65,714**
		2 x change overs a week	**131,428 litres**

The average daily rate for the hot-tub effluent is 0.217 l/s.

During the hours where hot tub drainage will occur, the foul flow is to be diverted to a bromine/chloride settlement tank for treatment of the effluent using thiosulphate dosing. Bromine neutralisation would be induced by thiosulphate dosing which would be in liquid form. Dosing control would be pre-determined volume of thiosulphate dosed over a six-hour period with intermittent air mixing (10mins on, 20mins off for 6 hours followed by 6 hrs on, then 1 hour on and 4 hours off for 24 hours. The treated hot tub effluent from the bromine reaction tank would discharge to the main foul drainage system for treatment through the treatment plant in the normal manner.

A distribution chamber/valve will therefore be incorporated into the design so that the flow can be diverted as required. The proposed settlement tank is to allow the hot tub water to cool and for the disinfectant to dissipate to an appropriate level prior to be passing thought the sewage treatment plant, to treat the foul sewage before being disposed under control to the existing watercourse Bedburn Beck. A primary tank

(18,000 litre capacity) will be used on non-change over days to hold the foul water below the treatment plant. The proposal is to use a Kee 50HR-R NuDisc treatment plant. The foul effluent from the site will be within the quality parameters summarised below:

- BOD < 5mg/l
- Suspended Solids < 10mg/l
- Ammonical nitrogen < 1mg/l
- Phosphorus < 4mg/l

It is anticipated that the treated foul discharge from the development will discharge into Bedburn Beck to the southeast of the site. The settlement and primary tanks will be positioned to the west of the proposed forestry retreat centre / car park.

From the site treatment plant, the foul discharge will head east within the verge of the asphalt access track to the site. It will then head south within the verge of the existing access to the Forestry England visitor centre before discharging into the beck It is proposed to connect into the treated foul drainage from the Forestry England visitor centre prior to discharging into the watercourse. The foul water system will remain private with responsibility for the maintenance and management by Forest Holidays Ltd. The proposed foul water drainage system will be designed to building regulations to ensure the structural integrity under anticipated loading conditions over the design life this includes the cover to pipes that have been designed in accordance with the manufacturer's requirements and specification.

A management system would be in place to ensure that diversion into the hot tub treatment tanks occurred at the correct time and to ensure reversion to the normal operational regime thereafter.

On non-drain down days, the normal foul flow from the site would be discharged into the site holding tank, which control the discharge to the treatment plant This would have a daily rate of 36.450m3 which is 0.422litres per second for a day. As shown below this is based on a site population of 243 and a daily foul discharge of 150l/s per person.

No Bedrooms	Quantity	Population	Daily Volume
1	8	16	2,400
2	31	93	13,950
3	21	84	12,600
4	10	50	7,500
	70	**243**	**36,450**

It is anticipated that during the drain down periods i.e. 10.00 to 16.00 on the drain down days, (Monday and Friday) that the holiday makers are more likely to be away from the cabins so it would be considered that the normal foul flow during these times would be light.

With the cabin and the hot tubs, the average daily foul discharge from the site is estimated as 0.637 litres second. Both the hot tub and cabin effluent will be held on site via the proposed settlement and primary holding tanks. The proposal is to discharge from the site with a peak rate of 0.75 – 1.00 litres/second.

Drawing 7437-101 within the appendix shows the proposed drainage system and outfall.

Forestry England Visitor Centre

The existing Forestry England visitor centre is currently served by a septic tank, the proposal is to replace the septic tank with a treatment plant. This will serve the redeveloped visitor centre, the new cycle hub and a Go-Ape site.

A settlement and balancing tank are proposed upstream of the treatment plant to control the flow into the treatment plant, this will assist with dealing with seasonal variation from the visitor centre.

Based on car park data for the existing site, figure 2 shows the estimated number of visitors to the Hamsterley visitor centre throughout the year. It shows the months from April to September (high season) being the busiest time of the year. Figure 3 shows the

predicted visitors' numbers to the site and shows the high season being the busiest time of the year.

Figure 2 and 3 highlight the seasonal variation throughout the year, with the low season (October, November, December, January, February and March) having lower visitor numbers when compared to the high season. Based on the future visitor numbers for the site, during the weekend, the high season has an average of 1486 visitors whilst the low season has 880 visitors. This is an increase of approximately 69% from the low to high season. The week day average for the low and high seasons, shows an average of 350 visitors for the low season and 622 for the high season, this equates to a 77.7% increase from the low to high season. The overall % increase for the entire year is therefore approximately 73% increase from low to high season.

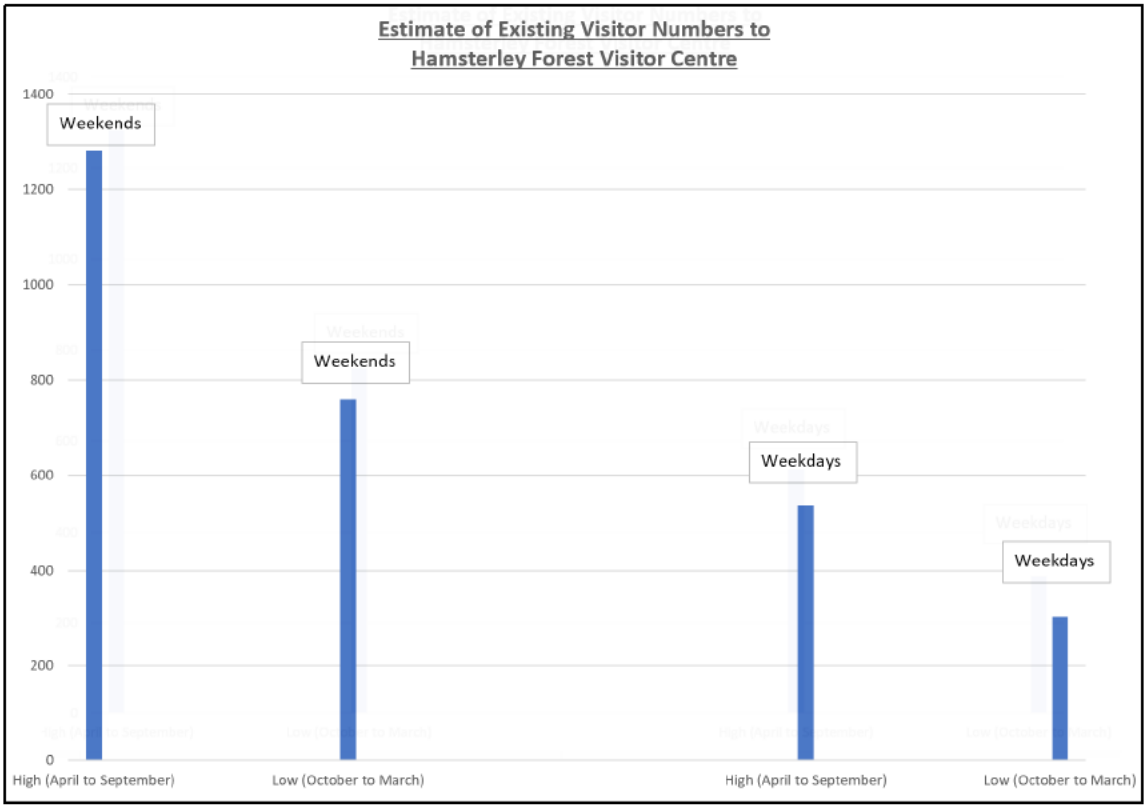


Figure 2 – Estimate of existing visitors to the visitor centre.

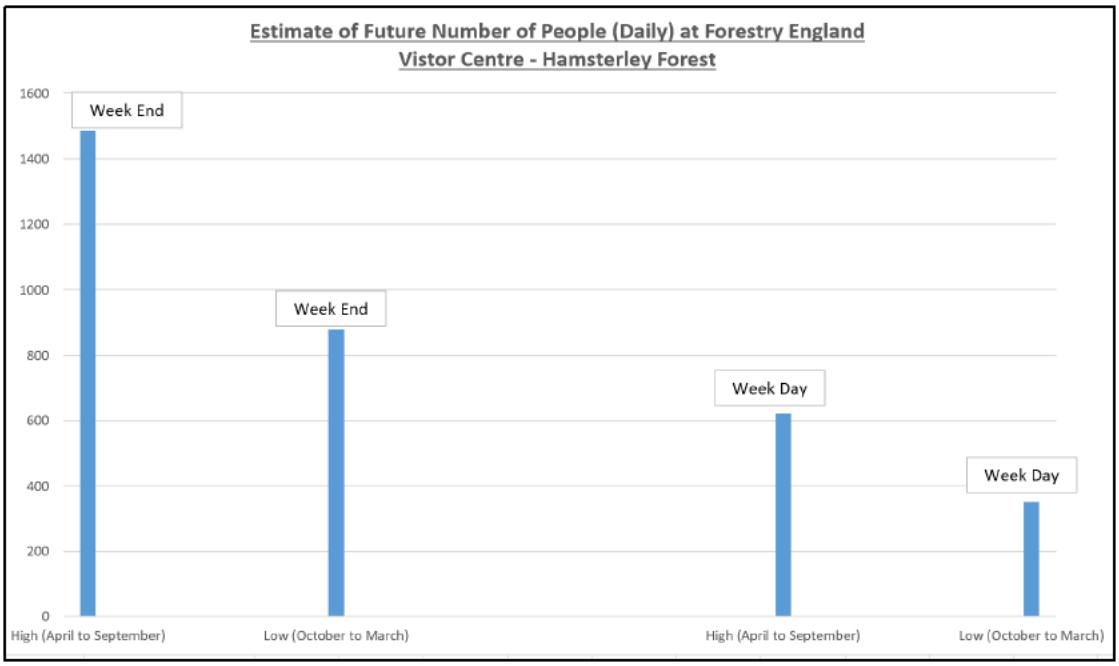


Figure 3 – Estimate of future visitors to the visitor centre

A klargester bio-disc commercial sewage treatment plant is proposed and is based on a occupancy of 4500 people a day and a discharge amount of 10 litres per person a day. The unit will have a foul inflow rate of 1.041 litre/second.

The foul effluent from the site will be within the quality parameters summarised below:

- BOD < 5mg/l
- Suspended Solids < 10mg/l
- Ammonical nitrogen < 1mg/l
- Phosphorus < 4mg/l

With the existing septic tank for the visitor centre being replaced with a more modern package treatment plant, the water quality from the development will provide betterment on the existing.

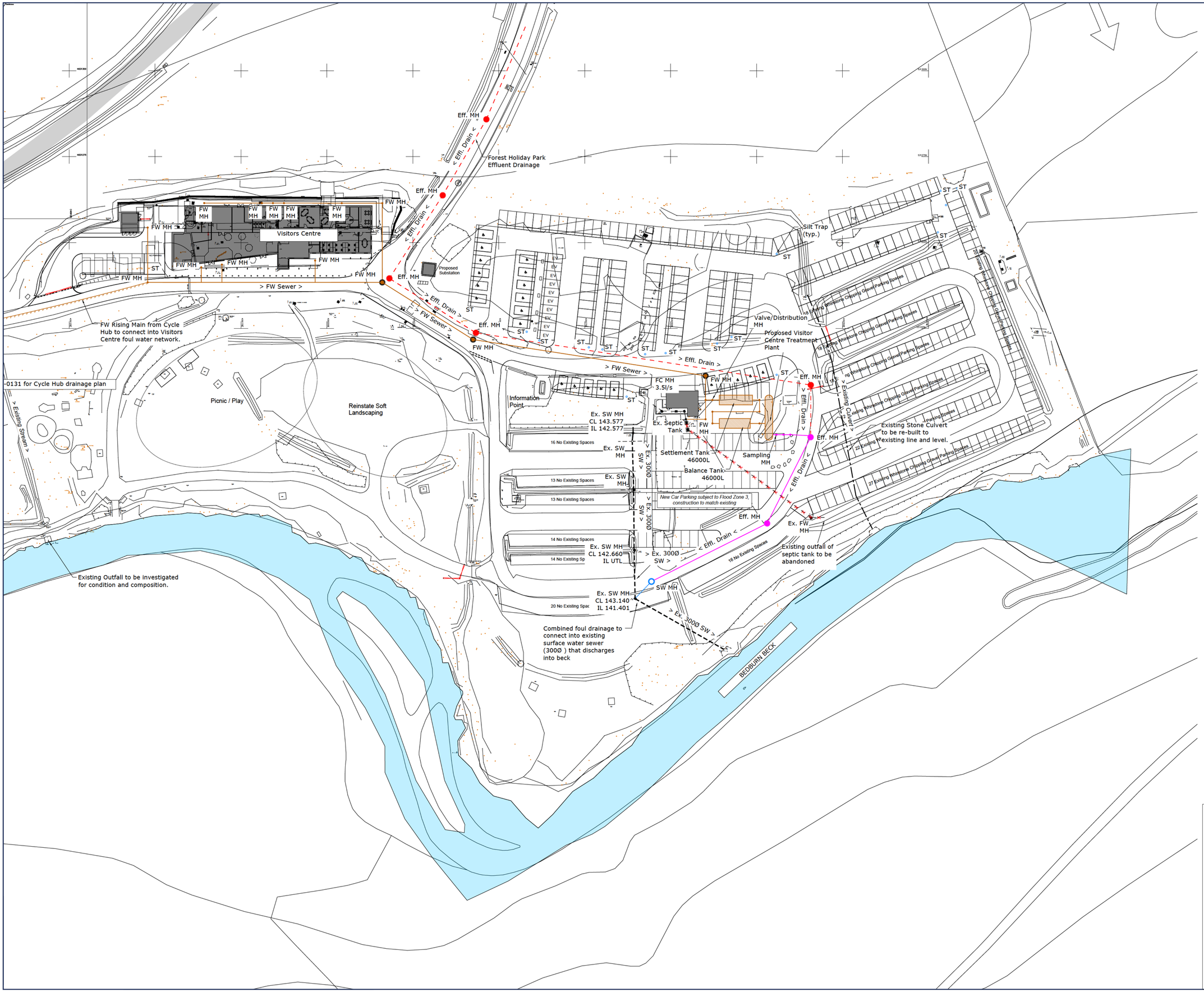
From the treatment plant, the foul discharge will combine with the treated foul water from the Forest Holiday development prior to discharging into the existing surface water sewer from the site that discharges into Bedburn Beck. Drawing 7437-101 within the appendix shows the proposed drainage system and outfall. As the existing outfall is

to be used, there will be no requirement to excavate the bank to install a new headwall. Only minor works to improve the length of the bank from the outfall to the river will be required.

The foul water system will remain private with responsibility for the maintenance and management by Forestry England. The proposed foul water drainage system will be designed to building regulations to ensure the structural integrity under anticipated loading conditions over the design life this includes the cover to pipes that have been designed in accordance with the manufacturer's requirements and specification.

A management system would be in place to ensure the maintenance of the proposed foul drainage system.

Appendix



KEY

- Proposed FW Sewer
- Proposed Effluent Drain
- Proposed Holiday Park Effluent Drain by others
- Existing SW Drain
- Existing FW Sewer
- Sewer to be abandoned

VISITOR CENTRE FOUL DRAINAGE

Foul inflow rate = 1.041 l/s
Based on 4500 people a day @ 10 litres per person.

FOREST HOLIDAYS FOUL DRAINAGE

Average daily effluent from hot tubs = 0.217 l/s
Average daily effluent from cabins = 0.422 l/s
Site total = 0.637 l/s
Proposal is to discharge at peak rate of 0.75-1.0 l/s

Preliminary

Suitability --

Project
Hamsterley Forest
Forest Holidays, County Durham

Client
Forest Holidays

Drawing
Forest Retreat Foul Drainage Strategy
Sheet 2 - To Existing Outfall

Project no	Drawing no	Date	Drawn by	Rev	Scale	Sheet
7437	101	JAN 22	RB	C	1:500	A1

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