NYMNPA

03/08/2022

Ladycross Plantation Holiday Park, Egton

Whitby, North Yorkshire

Flood Risk Assessment & Drainage Strategy

March 2022

Waterco

Assessment | Modelling | Design

Project Information	
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Report Title:	Flood Risk Assessment & Drainage Strategy
Client:	Ladycross Plantation Holiday Park
Instruction:	The instruction to undertake this Flood Risk Assessment & Drainage Strategy was received from Jonathan Lambe of Lambe Planning and Design Ltd
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Approval Record	
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	Document History	
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This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

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Introduction

Waterco has been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in relation to a proposed extension and restructuring at Ladycross Plantation Holiday Park, Egton, Whitby, YO21 1UA.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk. This report has been prepared in accordance with the guidance contained in the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG): Flood Risk and Coastal Change.

From April 2015, North Yorkshire County Council as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

Existing Conditions

The site covers an area of approximately 5.231ha and is divided into 2 land parcels. The northern land parcel (Woodland Lodges) covers an area of 3.686ha and is located at National Grid Reference (NGR): 481872, 508138. The southern land parcel (Woodland Holiday Caravans) covers an area of 1.545ha and is located at NGR: 481681, 507907. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed March 2022) shows that the northern land parcel comprises of woodland, touring caravans and an access road. The southern land parcel comprises of woodland.

The northern land parcel is bordered by woodland to the north and east, the existing holiday park to the south and agricultural land to the west. The southern land parcel is bordered by agricultural land to the north, the existing holiday park to the east, agricultural land to the south and woodland to the west.

The existing holiday park is accessed off an unnamed road to the east.

Local Topography

Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data shows that the northern land parcel generally slopes from 221m AOD in the east to approximately 217m AOD in the west. The southern land parcel generally slopes from 215m AOD in the north to 210m AOD in the south.

Topographical information is provided as Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that both land parcels are underlain by superficial Devensian Glaciofluvial deposits generally comprising sand and gravel. The superficial deposits are identified as being underlain by the Long Nab Member consisting of sandstone, siltstone, and mudstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed March 2022], the Devensian Glaciofluvial deposits are classified as a Secondary A Aquifer. The underlying Long Nab Member is also classified as a Secondary A Aquifer.

Secondary A Aquifers are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.

The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed March 2022], indicates that the site is not located within a Groundwater Source Protection Zone.

The Cranfield University 'Soilscapes' map [accessed March 2022] indicates that the northern land parcel is underlain by *'Freely draining sandy and loamy soils'*. The southern land parcel is underlain by *'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'.*

Local Drainage

Public sewer records have been obtained from Yorkshire Water in February 2022 and are included in Appendix C. The Yorkshire Water sewer records show that there are no public sewers within immediate vicinity of the site. The nearest public sewer is a 150mm public foul sewer located approximately 1.58km south-west of the site in Egton.

Anecdotal information from the Client indicates that foul flows from the site are pumped to the public sewer in Egton. Surface water from the site discharges to a series of ditches within the site. Existing drainage plans showing the indicative location of the ditches and foul sewers within the site are included in Appendix C.

Development Proposals

The proposed development is for an extension and restructure of Ladycross Plantation Holiday Park.

Proposals include 7 woodland lodges in the northern land parcel (in addition to 41 lodges that have already been consented) and 12 woodland holiday caravans in the southern land parcel (in addition to 15 pitches that have already been consented). Proposed development plans are included in Appendix D.

The Drainage Strategy element of this report will consider the proposed additional units and the consented

units.

Development in the northern land parcel (including the previously consented lodges) will included approximately 7,828m^2 of new hardstanding in the form of holiday lodges and associated access roads.

Development in the southern parcel (including the previously consented pitches) will include approximately 4,447m^2 of new hardstanding in the form of caravan pitches and associated access roads (including a resurfaced existing access road).

Measurements have been taken from a PDF copy of the proposed development plan and are approximate only.

Flood Zone Classification and Policy Context

The Environment Agency (EA) 'Flood Map for Planning', included in Appendix E, shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% annual probability of flooding.

In accordance with Table 2 of the NPPG: Flood Risk and Coastal Change, sites used for holiday or short-let caravans and camping are considered to be 'more vulnerable'. Table 3 of the NPPG: Flood Risk and Coastal Change, states that 'more vulnerable' development is considered appropriate within Flood Zone 1. Therefore, the NPPF Exception Test does not need to be applied and the Sequential Test is passed.

Local Policy

The Scarborough Borough Local Plan 2011-2032 (adopted July 2017) contains the following policy relating to flood risk and drainage:

'Flood Risk

8.25 - The Local Planning Authority will adopt the sequential approach in accommodating development (as detailed in the NPPF and NPPG) and any proposals that will involve an exception to this approach will need to demonstrate appropriate measures have been taken in order to ensure any adverse impacts are mitigated.

8.26 - The Local Plan aims to ensure development is avoided in areas at the highest risk of flooding and manage the risk of flooding to ensure there are no adverse impacts elsewhere. The North-East Yorkshire Strategic Flood Risk Assessment (SFRA) (February 2010) and Environment Agency data are used to identify areas at being of high, medium or low-risk to flooding.

8.27 - The NPPF and NPPG seek to ensure the impacts from flood risk are avoided or limited wherever possible and in doing so seek the utilisation of both the Sequential and Exception Tests.

8.28 - The Sequential Test states development should not be permitted on land when there are reasonably available sites in areas with a lower probability of flooding as defined by the SFRA. Where this may not be possible, the Exception Test must be used in order to demonstrate wider sustainability benefits to the

community are accrued that outweigh flood risk and demonstrate that the development can be achieved without increasing flood risk elsewhere through a site-specific flood risk assessment. In this instance, proposals should be supported by a demonstration that they are in accordance with relevant policy and guidance such as the Flood and Water Management Act 2010, the SFRA, the NPPF and NPPG and any future updates.

Drainage Sensitive Areas and Sustainable Drainage Systems

8.30 - The SFRA also identifies Drainage Sensitive Areas, and proposals on such locations will be expected to provide a detailed assessment of this and implement Sustainable Drainage Systems as mitigation. The use of Sustainable Drainage Systems will also be encouraged as a way of achieving wider benefits such as sustainable development, water quality, biodiversity and local amenity.

Policy ENV 3: Environmental Risk

Proposals will be expected to mitigate against the implications of environmental risk and the effects of climate change. This will be achieved by:

… ensuring water supply and water resources are managed and water efficiency measures are incorporated to reduce resource need, in line with the Environment Agency's licensing strategies;

d. using mitigation measures such as Sustainable Drainage Systems where possible in order to facilitate development in areas of sensitive drainage and to meet the requirements of the Water Framework Directive;

e. ensuring development has adequate provision for foul and surface water disposal in advance of occupation;

f. ensuring development does not lead to pollution of controlled waters in line with the requirements of the Water Framework Directive;

g. requiring development to manage waste from the site (both during construction and operation) in a sustainable way consistent with the waste hierarchy;

h. requiring the remediation or mitigation of contaminated or unstable land to reduce unacceptable risks to the environment through development;'.

Local guidance documents including the North East Yorkshire Strategic Flood Risk Assessment (SFRA) (updated February 2010) and the North Yorkshire County Council Preliminary Flood Risk Assessment (PFRA) (August 2011) have been reviewed and inform this report.

Consultation

A consultation request was submitted to the LLFA in February 2022. A response is included in Appendix F. The LLFA have stated that:

'Should site investigation and testing deem that infiltration is not viable, discharging at greenfield rate is acceptable, however land drainage consent may be required to discharge to the drain, this is a separate matter outside of the planning process.

If the site is in a critical drainage area or source control zone, further restrictions may be required.

Discharge of foul flows is not a matter for the LLFA to comment on, we suggest you contact Yorkshire water for advice.

Also, please find below the design parameters that NYCC require for any drainage network modelling.'

Design Consideration	Design Parameter
Minimum Slope	1:500
Roughness Value (K) – manning "n" should only be used for open channels.	0.6mm
Minimum System Velocity	1.0 m/s
Climate change	30%
Additional Flows - Urban Creep (Where Applicable)	10%
Maximum Drained Area for Gullies	150m^2
Highway Drains Minimum Cover	1.2m
Minimum Pipe Diameter	150mm
Volumetric Runoff Coefficient Cv (Summer/Winter)	1.0 For both summer and winter rainfall profiles (In accordance with HR Wallingford recommendations and Sewers for Adoption)
Percentage Impermeable Area (PIMP)	100% for compliance with SfA
Margin for Flood Risk Warning	300mm
Area Reduction Factor	1
Time of Entry	3-8 minutes
Return Period	1, 30, 100 as a minimum

A pre-development enquiry request was submitted to Yorkshire Water in February 2022. In their response (Appendix C) Yorkshire Water have stated that:

'Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

The site is remote from the public sewer network. Foul water domestic waste can discharge to the 150 mm diameter public foul sewer recorded in Egton High Street, at a point approximately 1.5 kilometres to the south of the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

As the proposed site is currently undeveloped no surface water is known to have previously discharged to the public sewer network.

As such, the local public sewer network does not have capacity to accept any surface water from the proposed site. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority/Internal Drainage Board with a view to establishing a suitable watercourse for discharge.

It is understood that a watercourse is located adjacent to the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable).

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.'

Sources of Flooding and Probability

Fluvial

As shown on the existing surface water plan (Appendix C), the site is intersected by a number of ditches. The ditches originate on or immediately adjacent to the site and accommodate surface water drainage from the site and adjacent land in Client ownership. The ditches merge south of the site and flow south eventually draining into the River Esk approximately 2.35km south-east of the site. There are no other watercourses within the immediate vicinity of the site.

The EA 'Historic Flood Risk' map (Appendix E) shows that there are no historical records of fluvial flooding at or in the immediate vicinity of the site.

The EA 'Flood Map for Planning' (Appendix E) shows that that the site is located within Flood Zone 1 – an area outside of the extreme flood extent, considered to have less than 0.1% annual probability of flooding from rivers or the sea.

The ditches on site serve a limited catchment area (originating within the wider holiday park) and were

originally constructed as drainage features to serve the existing holiday park. As such, flows within the ditches will be minimal and the associated flood risk is very low.

The SFRA and PFRA contain no records of fluvial flooding at or near to the site. It can therefore be concluded that the risk of fluvial flooding is very low.

Tidal

The site is situated at a minimum of approximately 210m AOD and is significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The EA 'Flood Risk from Surface Water' map (Appendix E) indicates that the site (both land parcels) is at very low risk of surface water flooding, meaning there is less than 0.1% annual probability of flooding.

The SFRA and PFRA contain no records of surface water flooding affecting the site. The North Yorkshire SFRA 'Areas susceptible to surface water flooding' map (Appendix G), shows that the site is not situated within an area vulnerable to surface water flooding.

Any potential surface water flooding arising at or near to the site would be directed south-west, away from the site, following the local topography. There are no distinct flow routes in the area which would direct any potential surface water flooding towards the site.

It can therefore be concluded that the risk of surface water flooding is very low.

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The Yorkshire Water sewer plan (Appendix C) indicates that there are no public sewers within the immediate vicinity of the site. It can therefore be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

The SFRA and PFRA contain no records of groundwater flooding at or near the site. The site will entail holiday lodges/caravans raised above surrounding ground levels. As such, the risk of groundwater flooding is

considered to be low.

Artificial Sources

There are no canals within the vicinity of the site. The EA 'Flood Risk from Reservoirs' map (Appendix E) shows that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that the risk of flooding from artificial sources is very low.

Summary of Potential Flooding

It can be concluded that the risk of flooding from all sources is very low. Therefore, no site-specific mitigation measures are considered necessary.

Surface Water Management

Surface water from the existing holiday park drains to a ditch network within the park which has connectivity to the River Esk.

The proposed development will include impermeable drainage areas in the form of holiday lodges/caravan pitches, parking and access roads. The proposed development in the northern land parcel will introduce 7,828m² of hardstanding in the form of holiday lodges and the access road. The proposed development in the southern land parcel will introduce 4,447m² of hardstanding in the form of caravan pitches and the access road (including a resurfaced existing access road).

The introduction of hardstanding area will result in an increase in surface water runoff rates and volumes. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

Runoff Rates

In order to establish the proposed limited discharge rate, greenfield runoff rates have been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method. A summary of the greenfield runoff rates for a range of events is provided as Appendix H.

Northern Land Parcel (Woodland Lodges)

The existing 1 in 1 year greenfield runoff rate for the 3.686ha northern land parcel is 10.5 l/s. A discharge rate of 10.5 l/s will therefore be applied.

Southern Land Parcel (Woodland Holiday Caravans)

The existing 1 in 1 year event greenfield for the 1.545ha southern land parcel is 4.9 l/s. A discharge rate of 4.9 l/s will therefore be applied.

The majority of the southern land parcel (1.44ha / 93.2%) will be developed with caravan pitches and new

access roads. Approximately 0.105 ha (6.8%) of the southern land parcel comprises an existing access road which will be resurfaced. Due to topography, a separate drainage system is proposed for the resurfaced access road.

The proposed discharge rate of 4.9 l/s will be split with 2 l/s applied for the resurfaced access road and the remaining 2.9 l/s applied to the remainder of the development (caravan pitches and new access road).

Discharge Method

Paragraph 080 of the NPPG: Flood Risk and Coastal Change sets out the following hierarchy of drainage options: into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain or another drainage system; to a combined sewer.

Infiltration

The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above, the site is underlain by superficial Devensian Glaciofluvial deposits comprising sand and gravel. As such, infiltration techniques may be suitable for the discharge of surface water runoff.

Infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of infiltration techniques. Where infiltration techniques are feasible, permeable surfaces will be used throughout and runoff from lodge roofs drained to soakaways.

Watercourse

Where infiltration techniques are not suitable (subject to BRE 365 infiltration testing) a connection to watercourse is the next consideration.

The site is served by a network of ditches which merge south of the site and have wider connectivity to the river network. Discharge by gravity to the drainage ditches within the site, or beyond the site and within Client ownership appears feasible. A plan showing the route of the ditch to the nearest watercourse as identified on Ordnance Survey mapping is provided in Appendix I.

Attenuation Storage & Sustainable Drainage Systems

In order to achieve a limited discharge rate (applicable for discharge to the ditch network), attenuation storage will be required. Attenuation storage estimates have been provided using MicroDrainage software and are included in Appendix J.

Attenuation storage for both land parcels will be provided in the form of the sub-grade material of porous surfaced access roads. Check dams will be placed at frequent intervals within the access roads to distribute the attenuation storage throughout the site. Check dam placement and quantity should be confirmed at the detailed design stage.

Northern Land Parcel (Woodland Lodges)

An estimated storage volume of 394m^3 will be required to accommodate the 1 in 100 year plus 30% Climate change (CC) event. The storage estimate is based on a discharge rate of 10.5 l/s, storage within a tank or

pond structure, an impermeable drainage area of 7,828m², a design head of 1m and hydro-brake flow control.

Based on a proposed access road area of 3,030m^2 and a void ratio of 30% (applicable to stone aggregate), a sub-grade depth of 450mm will be required to provide the 394m^3 of storage sufficient to accommodate the 1 in 100 year plus 30% CC event.

Southern Land Parcel (Woodland Holiday Caravans)

Resurfaced Access Road

An estimated storage volume of 45m^3 will be required to accommodate the 1 in 100 year plus 30% CC event. The storage estimate is based on a discharge rate of 2 l/s, storage within tank or pond structure, an impermeable drainage area of 0.105ha, a design head of 1m and hydro-brake control.

Based on a road area of 1,050m^2 and a void ratio of 30% (applicable to stone aggregate) a sub-grade depth of 150mm will be required to provide the 45m^3 of storage sufficient to accommodate the 1 in 100 year plus 30% CC event.

Caravan Pitches and New Access Roads

An estimated storage volume of 227m^3 will be required to accommodate the 1 in 100 year plus 30% CC event. The storage estimate is based on a discharge rate of 2.9 l/s, storage within a tank or pond structure, an impermeable drainage area of 0.35ha, a design head of 1m and hydro-brake control.

Based on an access road area of 1,750m^2 and a void ratio of 30% (applicable to stone aggregate), a sub-grade depth of 450mm will be required to provide the 227m^3 of storage sufficient to accommodate the 1 in 100 year plus 30% CC event.

A Concept Drainage Sketch is included in Appendix K. The proposed surface water drainage system will ensure no increase in runoff over the lifetime of the development.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 30% CC event. Storm events in excess of the 1 in 100 year plus 30% CC event should be permitted to produce temporary shallow depth flooding within the access roads and landscaped areas. Finished floor levels will be set above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs (applicable to holiday lodges) have a 'very low' pollution hazard level, with low traffic roads classified as having a 'low' pollution hazard level. Table 1 shows the pollution hazard indices for each land use.

Table 1 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

* Indices values range from 0-1.

Runoff from roofs and roads will be directed to the sub-grade of permeable surfaced access roads. Table 2 demonstrates that permeable surfaces will provide sufficient treatment.

Table 2 – SuDS Mitigation Indices

	Mitigation Indices		
Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Surfacing	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

Maintenance

Maintenance of the drainage system including permeable surfacing will be the responsibility of the site owner. A maintenance schedules for permeable surfacing is included in Appendix L.

Foul Drainage

Correspondence from Yorkshire Water (Appendix C) states:

'The site is remote from the public sewer network. Foul water domestic waste can discharge to the 150 mm diameter public foul sewer recorded in Egton High Street, at a point approximately 1.5 kilometres to the south of the site.'

It is proposed to discharge foul flows to the public foul sewer in Egton utilising the existing pumped arrangements. The performance of the existing pump and storage capacity of the pump wet well should be reviewed to ensure the additional units can be accommodated. Additional wet well storage (to prevent flooding in times of pump or power failure) and a higher performance pump (to increase the pump flow rate) may be necessary.

Conclusions

The proposed development is for the extension and restructure of Ladycross Plantation Holiday Park.

The site is located within Flood Zone 1 on the Environment Agency (EA) 'Flood Map for Planning' – an area considered to have the lowest probability of fluvial and tidal flooding. The site is shown to be located outside the extreme 0.1% annual probability extent.

The risk of flooding from all sources has been assessed and the flood risk to the site is considered to be very low. Therefore, no flood risk mitigation measures are considered necessary.

The proposed development will include impermeable drainage area in the form of holiday lodges/caravans, parking and access roads. The increase in impermeable area will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, sustainable drainage systems will be used to accommodate storm events up to and including the 1 in 100 year plus 30% climate change event.

Northern Lane Parcel (Woodland Lodges)

Where infiltration techniques are not suitable (subject to BRE 365 infiltration testing), surface water runoff will discharge to a ditch which crosses the site at the 1 in 1 year greenfield runoff rate of 10.5 l/s. A gravity connection can be achieved. Attenuation will be provided within the sub-grade of a permeable surfaced access road.

Based on an impermeable drainage area of 7,828m², a permeable surfaced access road area of 3,030m² and a discharge rate of 10.5 l/s, a sub-grade depth of 450mm will be required to accommodate the 1 in 100 year plus 30% CC event. Check dams will be placed at frequent intervals within the sub-grade to distribute the attenuation storage within the site.

Parcel of land to the south (Woodland Holiday Caravans)

Where infiltration techniques are not suitable (subject to BRE 365 infiltration testing), surface water runoff will discharge to a ditch at the 1 in 1 year greenfield runoff rate of 4.9 l/s. Attenuation will be provided within the sub-grade of permeable surfaced access roads.

The majority of the southern land parcel (1.44ha / 93.2%) will be developed with caravan pitches and new access roads. Approximately 0.105 ha (6.8%) of the southern land parcel comprises an existing access road which will be resurfaced. Due to topography, a separate drainage system is proposed for the resurfaced access road.

The proposed discharge rate of 4.9 l/s will be split pro-rata with 2 l/s applied for the resurfaced access road and the remaining 2.9 l/s applied to the remainder of the development (caravan pitches and new access road).

Resurfaced Access Road

Based on an impermeable drainage area of 0.105 ha, a permeable surfaced access road of 1,050m^2 and a discharge rate of 2 l/s, a sub-grade depth of 150mm will be required to accommodate the 1 in 100 year plus 30% CC event.

Caravan Pitches and New Access Road

Based on an impermeable drainage area of 0.350ha, a permeable surfaced access road area of 1,750m^2 and a discharge rate of 2.9 l/s, a sub-grade depth of 450mm will be required to accommodate the 1 in 100 year plus 30% CC event.

Yorkshire Water have confirmed that foul flows can discharge to the 150mm public foul sewer in Egton High Street. It is proposed to discharge foul flows to the public foul sewer in Egton utilising the existing pumped arrangements. The performance of the existing pump and storage capacity of the pump wet well should be reviewed to ensure the additional units can be accommodated.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix M.

Recommendations

1. Submit this Flood Risk Assessment and Drainage Strategy to the Planning Authority in support of the Planning Application.

2. Undertake BRE 365 infiltration testing to determine the suitability of infiltration techniques.

3. Verify the attenuation volumes included in this report when undertaking detailed drainage design.

Appendix A Location and Aerial Plan

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies

0 100 200 300 400 m

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CLIENT:
Ladycross Plantation Holiday Park

Waterco
www.waterco.co.uk

SCHEME:
Ladycross Plantation Holiday Park, Egton

PLOT TITLE:
Location Plan

PLOT STATUS:	DATE:
FINAL	28-02-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	AW	NJ	1:2500

PLOT NAME:	REVISION:
14491_Location_Plan	-

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

CLIENT:
Ladycross Plantation Holiday Park

waterco
www.waterco.co.uk

SCHEME:
Ladycross Plantation Holiday Park, Egton

PLOT TITLE:
Aerial Plan

PLOT STATUS:	DATE:
FINAL	28-02-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	AW	NJ	1:2500

PLOT NAME:	REVISION:
14491_Aerial_Plan	-

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Appendix B LiDAR Plan

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary

Site Levels (m AOD)

Ground Elevations (m AOD)

- <= 204.0
- 204.0 - 208.0
- 208.0 - 212.0
- 212.0 - 216.0
- > 216.0

CLIENT:
Ladycross Plantation Holiday Park

waterco
www.waterco.co.uk

SCHEME:
Ladycross Plantation Holiday Park, Egton

PLOT TITLE:
LiDAR Plan

PLOT STATUS:	DATE:
FINAL	02-03-2022

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IH	AW	NJ	1:2500

PLOT NAME:	REVISION:
14491_LiDAR_Plan	-

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Appendix C Existing Drainage Information

Egton Low Moor
Egton Flats
Barton Howl
Barton Rigg
Stone Dale Slack
Bull Rigg
Middle Carr Slack
Middle Carr Slack
Tumuli
Lady Cross
Tumuli
Ladycross Plantation Caravan Site
Black House
Works (dis)
Davison Farm
Flats Plantation
Cold Keld Beck
Linden Grove Recreation Ground
Egton Plantation
Meml
East End Farm
Barn Cottages
Watergate Farm
Smoothmans
Lamplands
Cote Bank Farm
Coopers Farm
Mandalay
Sluice
Ford
Waterfall
Murk Beck Slack
Cote Bank W
A171
A171
A171
Drain
Drain
Drain
Drain
Path
Path
Path
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Date Requested : 24/01/2022, 10:51:53
Date Generated : 24/01/2022, 10:51:55
Scale - 1:2500
The position and depth of any YW apparatus shown on this map are approximate only.
UPN: Undefined
Originator: S P Midgley, Waste Water Technical, 75 4486
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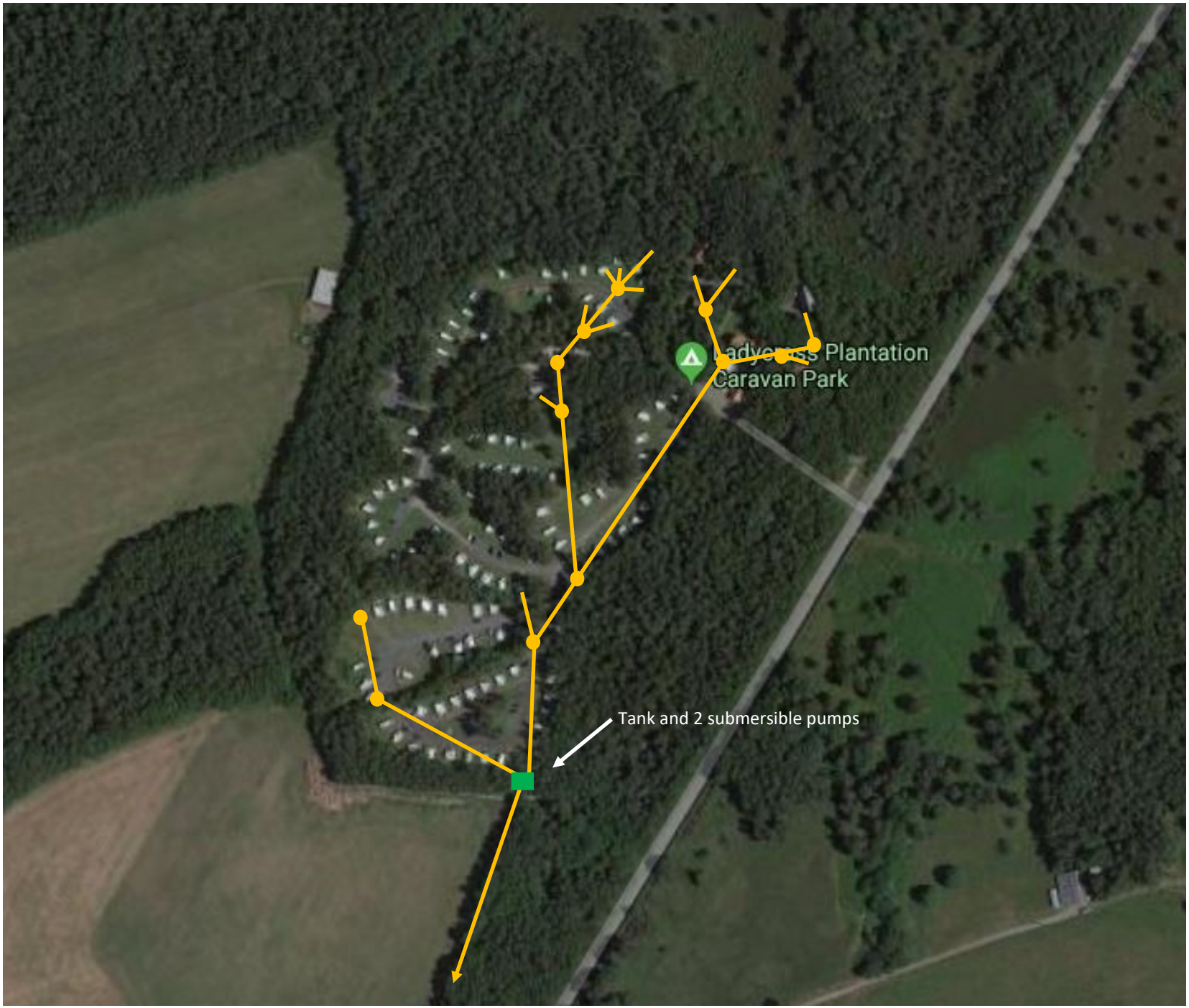
Foul water—the main runs

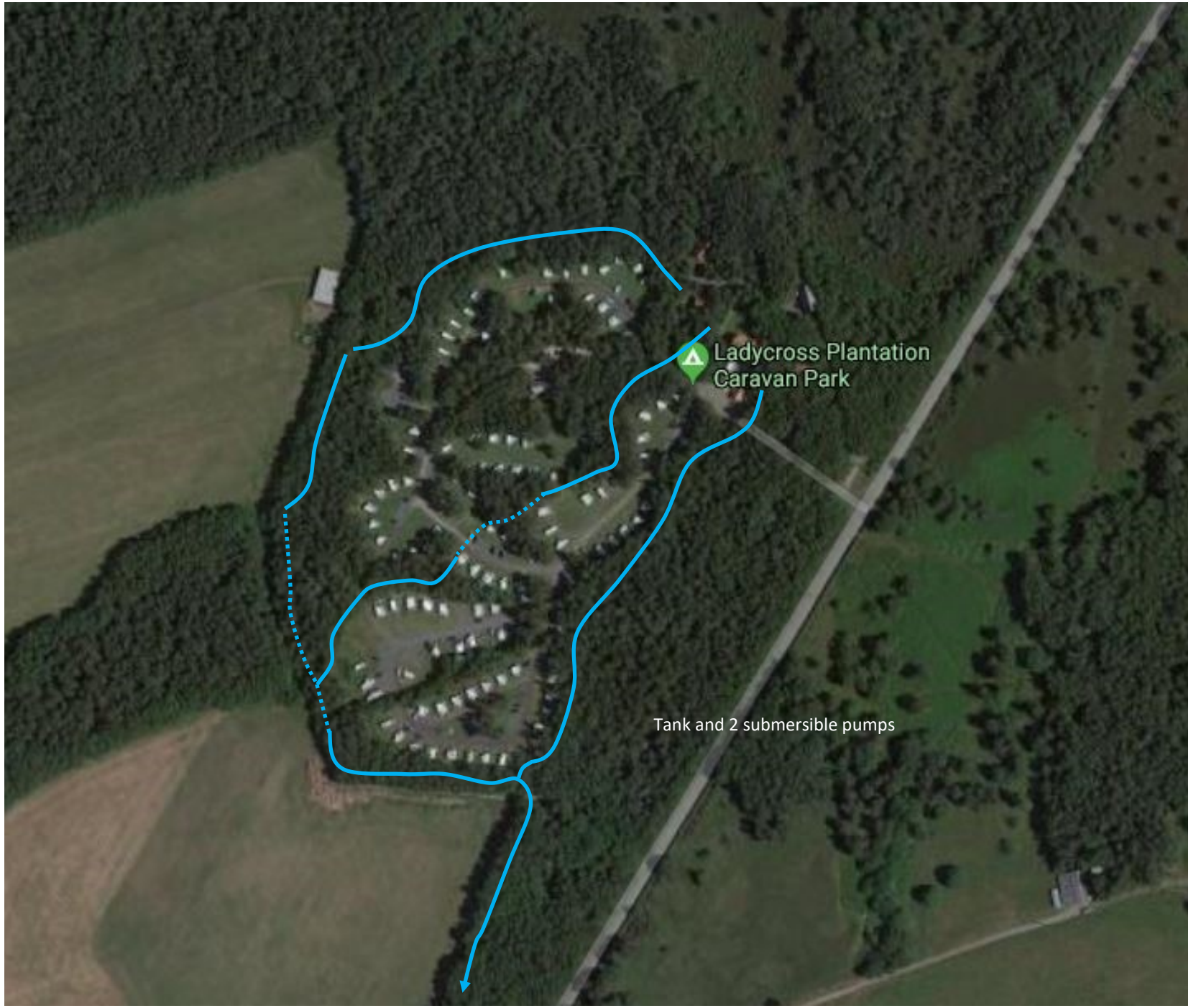


To mains connection at Egton

Surface water

Ditch

Underground



Follows ditch towards Egton

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482
Fax:

Email:
technical.sewerage@yorkshirewater.co.uk

For telephone enquiries ring:
George Mullaney on 0345 120 8482

22nd February 2022

Megan Williams
Waterco Ltd
Eden Court
Lon Parcwr Industrial Estate
Ruthin
LL15 1NJ

Your Ref:
Our Ref: Y002088

Dear Ms Williams,

Ladycross Plantation Holiday Park, Egton, Whitby, YO21 1UA - Pre Planning Sewerage Enquiry U551755

Thank you for your recent enquiry and remittance. Our official VAT receipt has been sent to you under separate cover. Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records.

The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

The site is remote from the public sewer network. Foul water domestic waste can discharge to the 150 mm diameter public foul sewer recorded in Egton High Street, at a point approximately 1.5 kilometres to the south of the site.

Surface Water

YorkshireWater

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

As the proposed site is currently undeveloped no surface water is known to have previously discharged to the public sewer network

As such, the local public sewer network does not have capacity to accept any surface water from the proposed site. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority/Internal Drainage Board with a view to establishing a suitable watercourse for discharge.

It is understood that a watercourse is located adjacent to the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable).

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply on line or obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0345 120 84 82.

Under the provisions of section 111 of the Water Industry Act 1991 it is unlawful to pass into any public sewer (or into any drain or private sewer communicating with the public sewer network) any items likely to cause damage to the public sewer network interfere with the free flow of its contents or affect the treatment and disposal of its contents. Amongst other things this includes fat, oil, nappies, bandages, syringes, medicines, sanitary towels and incontinence pants. Contravention of the provisions of section 111 is a criminal offence.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for Code for Adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

YorkshireWater

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

George Mullaney
Development Services Technician

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CUSTOMER SERVICE EXCELLENCE CSE

Appendix D Proposed Development Plans