FLOOD RISK CONSULTANCY LIMITED

Level 2 Flood Risk Assessment

Ribblesdale Hall, Chatburn, Clitheroe, BB7 4LD

Client: Peter Hitchen Architects

Report No: 20091-01 Revision A

Date: 09/03/2021

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APPRAISING, MANAGING & REDUCING FLOOD RISK

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Contract

This report describes work commissioned by Peter Hitchen Architects for Mr Barry Turner. Lisa Aspinall of Flood Risk Consultancy Limited (FRC) carried out the work.

Prepared by……Lisa Aspinall (Flood Risk Consultant)

Checked by……Donna Metcalf (Managing Director)

Approved by……Donna Metcalf (Managing Director)

Disclaimer

This document has been prepared solely as a Flood Risk Assessment for Barry Turner. Flood Risk Consultancy Limited accepts no responsibility or liability for any use that is made of this document other than by the Clients for the purposes for which it was originally commissioned and prepared.

Executive Summary

Flood Risk Consultancy Ltd has been appointed by Peter Hitchen Architects, to provide a Flood Risk Assessment in support of a planning application for a development of nine holiday lodges located at Ribblesdale Hall, Chatburn, Clitheroe.

The red-line boundary containing the development covers an area approximating 1.59 Hectares; and the existing site comprises of a green field.

The primary source of flood risk to the development is identified to be from:

- Fluvial – the River Ribble

Tidal & Fluvial Flood Risk:

Topography typically within the district is relatively flat; and topographic data indicates that levels across the site range between 84 - 91mAOD.

The lowest ground level within the site is approximately 84.95mAOD.

LIDAR data has also been reviewed to assess the levels either side of the River Ribble which shows the north side of the bank to be significantly lower than the location of the site – North side approximately 66.53mAOD; location of site approximately 87.201mAOD.

The finished floor level for the new dwelling must be set at a minimum of 150mm above external ground level.

Overall, the assessment concurs with the flood mapping to conclude that the development area within the site has a low risk of flooding (Flood Zone 1).

Management of Surface Water Runoff:

Surface water runoff from the development must be managed in a sustainable way.

Building regulations and the NPPF requires rainwater from new sites to be managed using the following hierarchy:

- Infiltration (preferred)
- Watercourse
- Sewer

A desk-top assessment indicates that dissipation of surface water runoff to ground via infiltration methods is not likely to be feasible at the development site; and therefore, it is proposed that runoff will be discharged to watercourse i.e., the River Ribble, which is located 165m to the north west of the development site.

It is highlighted that The Ribble Valley Borough Council may require the undertaking of percolation testing in accordance with BRE Digest 365 at the detailed design stage of the project to provide evidence that soakaways are not suitable for use within this development.

A preliminary drainage strategy has been prepared for the development. It is proposed that surface water runoff will be collected via rainwater pipes, gullies and channels; and directed to a gravity drainage system comprising pipes and manholes with outflow to watercourse controlled using an orifice or similar control device.

Hydraulic modelling has been undertaken using Causeway Flow; and in order to model the worst-case situation i.e., in the event that underlying ground is saturated, all new roof and 50% paved areas have been directed to the on-site drainage system.

It is recommended that permeable paving is utilised within the development plan wherever possible, in order to provide an element of sustainable development; and help to minimise the volume of online attenuation needed within the drainage system.

Outflow to the receiving channel should be restricted to greenfield runoff rates.

Under normal flow conditions, there is no surface flooding indicated to occur from the drainage system. Modelled outflow to the receiving river is:

- 1 in 1-year: 10.3l/s
- 1 in 30-year: 21.7l/s
- 1 in 100-year + 40% climate change: 31.2l/s

Foul Drainage Provision:

Foul flow from the proposed development will be directed to a package treatment plant; with effluent discharged to the River Ribble, subject to approval from the Lead Local Flood Authority.

Management & Maintenance:

A suitable inspection and maintenance regime will be required to ensure optimum performance of the proposed foul and surface water drainage systems serving the development over its lifetime.

Approvals:

Any works within 6m of the River Ribble will be subject to LLFA approval via Land Drainage Consent.

Contents

Figures

Tables

Appendices

1.0 Introduction

1.1 Terms of Reference

Flood Risk Consultancy Ltd has been appointed by Peter Hitchen Architects on behalf of Mr Barry Turner, to provide a Flood Risk Assessment in support of a planning application for the proposed development of nine No. detached timber framed holiday cottages, on an existing greenfield site at Ribblesdale Hall, Chatburn, Clitheroe.

The red-line boundary containing the development covers an area approximating 1.59 Hectares; and is shown to be situated in Flood Zone 1 of the Flood Map for Planning.

Definitions of the Flood Zones are provided within Section 2.2.2 of this report.

It is usual for objections to be raised by Statutory Consultees for new development in excess of 1 Hectare, or located within the floodplain, or Zones 2 and 3 of the flood maps until the issue of flood risk has been properly evaluated.

1.2 Objectives

The objective of this assessment is to evaluate the following issues in regard to flood risk at the application site.

- Suitability of the proposed development in accordance with current planning policy.
- Identify the risk to both the proposed development and people from all forms of flooding.
- Recommendation of appropriate measures to mitigate against flooding both within the proposed development, and neighbouring land and property.

1.3 Data Sources

This assessment is based on desk-top study of information from the following sources:

- National Planning Policy Framework (Original Publication 2012)
- Planning Practice Guidance – Flood Risk & Coastal Change (Updated July 2017)
- Building Regulations Approved Document H (March 2015)
- Flood Mapping for Planning (https://flood-map-for-planning.service.gov.uk)
- Ribble Valley Borough Council Level 1 SFRA (May 2010)
- Ribble Catchment Flood Management Plan (EA 2009)
- Site Specific Flood Risk Summary Sheets & Flood Risk Vulnerability
- Ribble Valley Borough Council Districtwide Local Plan
- British Geological Society – Historic Borehole Logs
- Cranfield University's Soilscape Viewer
- CIRIA C753 The SUDS Manual (Updated Nov 2015)
- Causeway Flow
- HR Wallingford Calculations (https://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation)

2.0 Planning Policy Context

2.1 Approach to the Assessment

The project will be submitted for planning approval to Ribble Valley Borough Council and as the site is shown to be located in close proximity to an area exhibiting a medium to high risk from tidal and fluvial flooding, a detailed site-specific flood risk assessment is required.

A Level 2 FRA is designed to provide a qualitative and quantitative appraisal of flood risk both within the application site and any potential impact that the development will have on flood risk elsewhere; and provide recommendations for mitigation measures which may be installed at the proposed development to reduce the overall flood risk.

An initial assessment indicates that the primary flood risks at the proposed development are from:

- Fluvial – River Ribble

Consideration has also been given to the site flooding from secondary sources such as pluvial, groundwater; artificial water bodies; infrastructure failure; overland flow and ponding.

2.2 National Planning Policy Framework (NPPF Updated 2018)

The requirements for undertaking site specific flood risk assessments are generally as set out in Guidance Point 10 from the Planning Practice Guide – Flood Risk & Coastal Change (www.gov.uk).

The information provided in the flood risk assessment should be credible and fit for purpose.

Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a Strategic Flood Risk Assessment for the area, and the interactive flood risk maps available on the Environment Agency's website.

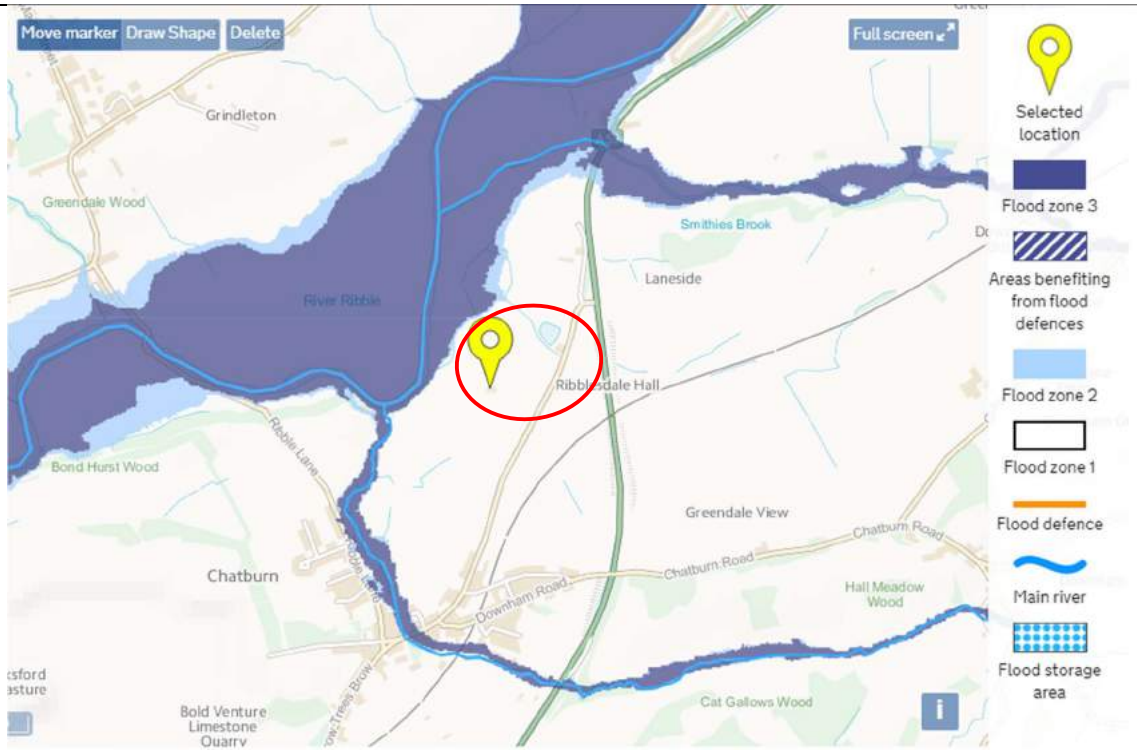
A flood risk assessment should also be appropriate to the scale, nature and location of the development.

2.2.1 Sources of Flooding

- **Rivers (fluvial):** Flooding occurs when flow within river channels exceeds capacity; and the type of flood event experienced e.g. flash flooding; depends upon the characteristics of the river catchment.
- **The Sea (tidal):** Flooding at low lying coastline and tidal estuaries is caused by storm surges and high tides; with overtopping and breach failure of sea defences possible during extreme storm events.
- **Pluvial (surface flooding or overland flows):** Heavy rainfall, which is unable to soak away via infiltration or enter drainage systems can flow overland, resulting in localised flooding. Topography generally influences the direction and depth of flooding caused by this mechanism.
- **Groundwater:** Caused when ground water levels rise to the surface; and is most likely to occur in low lying areas underlain by aquifers.
- **Sewers and drains:** Generally, occurs in more urban areas; where sewers and drains are overwhelmed by heavy rainfall or blocked pipes and gullies.

- **Artificial Sources (reservoirs, canals, lakes and ponds):** Reservoir and canal flooding may occur as a result of capacity exceedance or structural failure.

Figure 2.1: Flood Map for Planning



Source: www.gov.uk

2.2.2 Flood Zones

- **Flood Zone 1:** Low probability (less than 1 in 1000 year (<0.1% AEP) annual probability of river or sea flooding in any year.
- **Flood Zone 2:** Medium probability (between 1 in 100 year (1.0% AEP) and 1 in 1000 year (0.1% AEP) annual probability of river flooding; or between 1 in 200 year (0.2% AEP) and 1 in 1000 year (0.1% AEP) annual probability of sea flooding in any year).
- **Flood Zone 3a:** High probability (1 in 100 year (1.0% AEP) or greater annual probability of river flooding in any year or 1 in 200 year (0.5% AEP) or greater annual probability of sea flooding in any year).
- **Flood Zone 3b:** This zone comprises land where water has to flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 20 (5% AEP), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

2.2.3 Vulnerability of Different Development Types

- **Essential Infrastructure:** Transport infrastructure (railways and motorways etc…); utility infrastructure (primary sub-stations, water treatment facilities; power stations; and wind turbines).
- **Water Compatible Development:** Flood control infrastructure; water and sewage infrastructure; navigation facilities; outdoor recreational facilities.

- **Highly Vulnerable:** Emergency services; basement dwellings; mobile home parks; industrial or other facilities requiring hazardous substance consent.
- **More Vulnerable:** Hospitals; **residential dwellings**; educational facilities; landfill sites caravan and camping sites.
- **Less Vulnerable:** Commercial premises; emergency services not required during a flood; agricultural land.

2.2.4 Sequential & Exceptions Test

As set out in the National Planning Policy Framework, the aim of the Sequential Test is to steer new development to areas at the lowest probability of flooding.

The Flood Zones are the starting point for the sequential approach.

The proposed development involves construction of nine No. holiday lodges on a site located within Flood Zone 1, and therefore the Sequential Test does not need to be applied.

2.2.5 Climate Change

The NPPF requires the application of climate change over the lifetime of a development.

Clitheroe is located within the North West River Basin District; and the climate change allowances for this district are therefore tabulated below:

Table 1: North-West Basin Climate Change Allowances[1]

Parameter	Allowance Category	2010 - 2039	2040 - 2059	2060 - 2069	2070 - 2115
Peak Rainfall Intensity	Upper end	+ 10%	+ 20%		**+ 40%**
	Central	+ 5%	+ 10%		+ 20%
Peak River Flow	H++	+ 25%	+ 45%		+ 95%
	Upper end	+ 20%	+ 35%		**+ 70%**
	Higher Central	+ 20%	+ 30%		**+ 35%**
	Central	+ 15%	+ 25%		+ 30%

Table 2: Sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets [1]

Area of England	2000-2035	2036-2065	2066-2095	2096-2125	Cumulative Rise 2000-2125 (m)
H ++	-	-	-	-	1.90m
North West Higher Central	4.5 (158) mm	7.6 (219) mm	10 (300) mm	11.2 (336) mm	1.01m
North West Upper End	5.7 (200) mm	9.9 (297) mm	14.2 (426) mm	16.3 (489) mm	1.41m

[1] Updated July 2020

The selection of climate change allowance should be chosen appropriate to the expected lifespan of the proposed development.

Residential development is anticipated to have a design lifespan approximating 100 years. Climate change of 70% should be applied to peak river flows to estimate the impact of increased flow within watercourses over the lifetime of the development; with the impact associated with the H++ allowance category of 95% reviewed within the assessment.

For rainfall and associated management of surface water runoff, a climate change allowance of 40% should be applied within the flood risk assessment.

The cumulative sea level rise for the higher central and upper end allowances are 0.92m and 1.3m respectively.

2.2.6 Sustainable Urban Drainage Systems (SUDS)

The key planning objectives in the NPPF are to appraise, manage and where possible, reduce flood risk.

For residential development comprising 10+ dwellings or development area in excess of 1 Hectare, details of how surface water runoff from the site will be sustainably managed must be provided within the details of the planning application.

The application site incorporates nine No. residential dwellings within a red-line development area approximating 1.59 Hectares; and as such a detailed surface water management plan is required.

It is advised that the incorporation of Sustainable Urban Drainage Systems (SUDS) into development designs are strongly encouraged by all Statutory Consultees to assist in reducing the potential impact of new and existing developments with respect to surface water discharges.

Furthermore, the NPPF and Building Regulations Approved Document Part H direct developers towards the use of SUDS wherever possible; and The Floods and Water Management Act 2010 also reinforces the requirements for SUDS to be implemented where practicable.

2.2.7 Planning Policy

The Core Strategy sets out Ribble Valley Borough Council's development plan over the next eight years up to 2028. It contains strategic policies used in determining applications, and was adopted in 2014.

Relevant policies within the Core Strategy which focus on flooding and surface water management have been extracted from the Cor Strategy for reference:

Key Statement EN3: Sustainable Development and Climate Change

All development should optimise energy efficiency by using new technologies and minimising the use of energy through appropriate design, layout, material and landscaping and address any potential issues relating to flood risk.

Policy DME6: Water Management

Development will not be permitted where the proposal would be at unacceptable risk of flooding or exacerbate flooding elsewhere.

Applications for development should include appropriate measures for the conservation and protection and management of water such that the development contributes to:

1. Preventing pollution of surface and/or groundwater
2. Reducing water consumption
3. Reducing the risk of surface water flooding (for example the use of sustainable drainage systems (SUDS))

As part of the consideration of water management issues, and in parallel with flood management objectives, the authority will seek the protection of the borough's watercourses for their biodiversity value.

All applications for planning permission should include details for surface water drainage and means of disposal based on sustainable drainage principles. The use of the public sewerage system is the least sustainable form of surface water drainage and therefore development proposals will be expected to investigate and identify more sustainable alternatives to help reduce the risk of surface water flooding and environmental impact.

3.0 Details of the Site

3.1 Site Details

Table 3: Development Location

Site Name:	Ribblesdale Hall
Purpose of Development:	Holiday Lodges
Existing Land Use:	Greenfield
OS NGR:	SD 770 447
Red-Line Boundary Area	1.59 Ha
Country:	England
County:	Lancashire
Local Planning Authority:	Ribble Valley Borough Council
Lead Local Flood Authority:	Ribble Valley Borough Council
Critical Drainage Area:	No
Internal Drainage Board:	Not Applicable
Other Authority (e.g. British Waterways/ Harbour Authority)	Not Applicable

Location Plan:

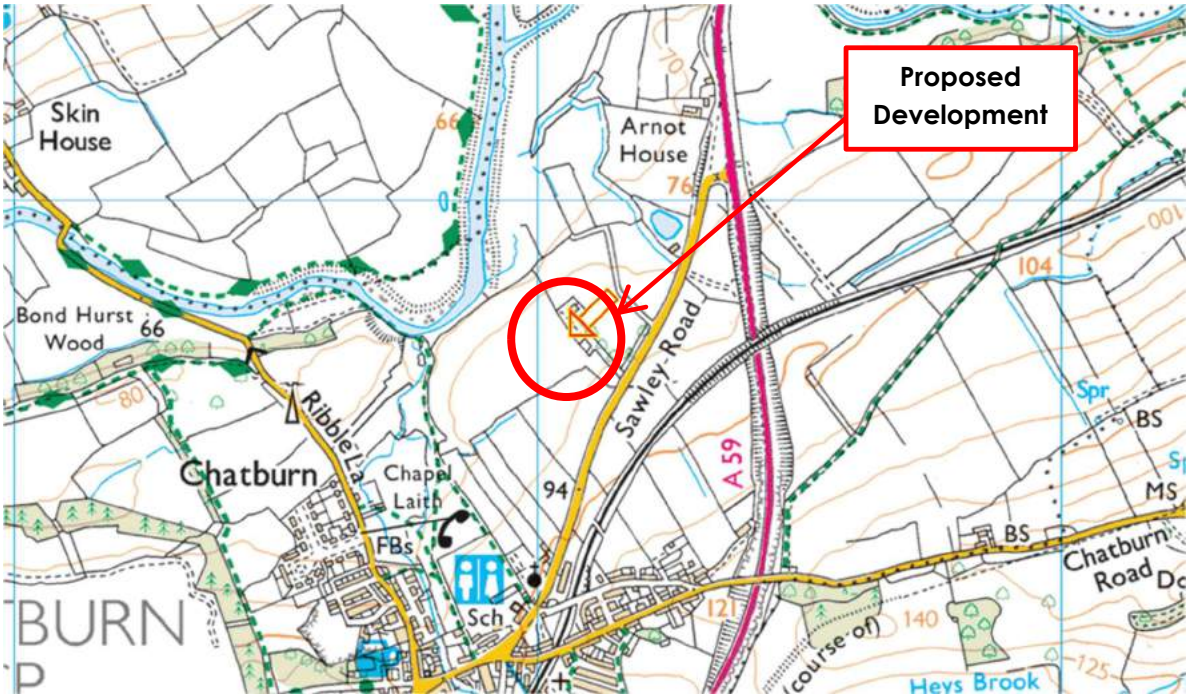


Image produced from the Ordnance Survey Get-a-map service.
Image reproduced with kind permission of Ordnance Survey and Ordnance Survey of Northern Ireland.

3.2 Site Description

The application site is located within an existing greenfield site next to Ribblesdale Hall in the Clitheroe area of the Ribble Valley, and is located a distance approximating 165m east of the River Ribble; and 35km east of the Irish Sea.

Access to the site is via Sawley Road.

Figure 3.1: Aerial Photograph of the Existing Site (Viewed North)

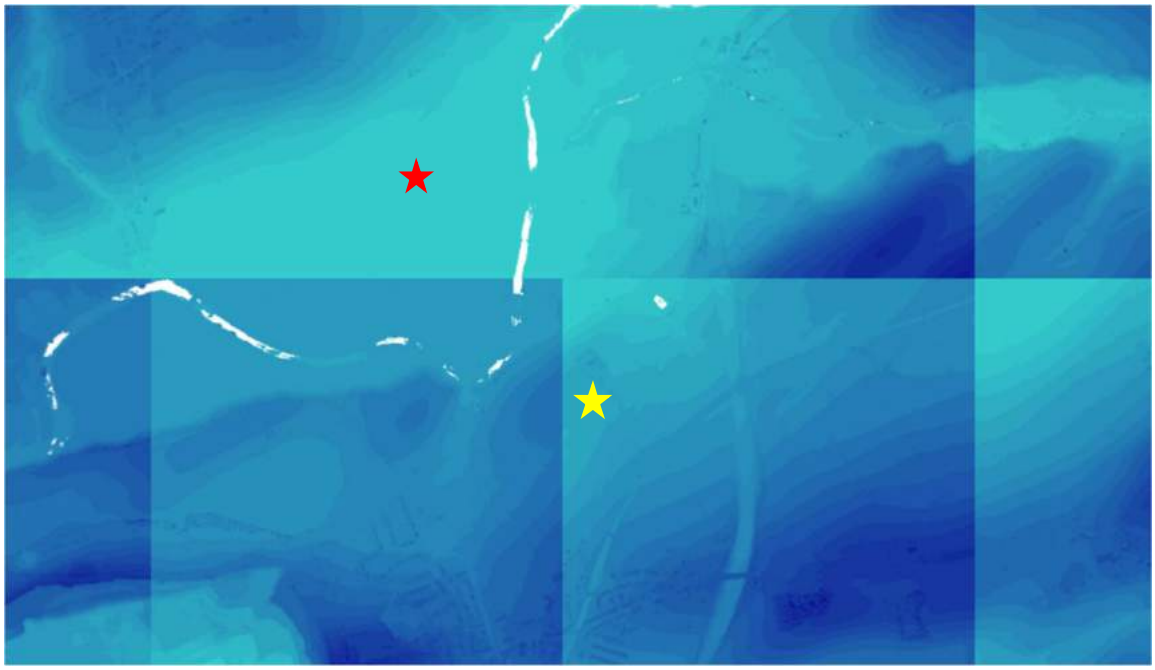
Source: Bing Maps

Topographically the area surrounding the application site shows the site to be flat. A survey of the site has been and shows the site to be between 84.00 – 90.54m AOD; and a few relevant levels have been extracted reference within the assessment:

- Entrance to site at south east of plot: 91.28mAOD
- North Corner of site: 84.95mAOD
- South west corner of site: 95.02mAOD

LIDAR data has also been reviewed to assess the levels either side of the River Ribble (see Figure 3.2 overleaf). It shows the north side of the bank to be significantly lower than the location of the site – North side approximately 66.53mAOD (red star); location of site approximately 87.201mAOD (yellow star).

Figure 3.2: LIDAR Map of site



Source: data.gov.uk

Reviewing both the LIDAR and survey information available, it is apparent that the site is flat with a very slight fall to the north west. The north bank of the River Ribble is lower meaning if it is ever in flood, this area would be significantly flooded and the site at Ribblesdale Hall would be unaffected.

3.3 Proposed Development Details

Nine one-story one and two bedroomed holiday lodges, comprising of a lounge/kitchen/dining room, bathroom and one/two bedrooms.

The primary vehicular access will be from Sawley Road and will be adjacent to the existing access road to Ribblesdale Hall.

Figure 3.3: Proposed Site Plan

Source: Peter Hitchen Architects

4.0 Historic Flooding

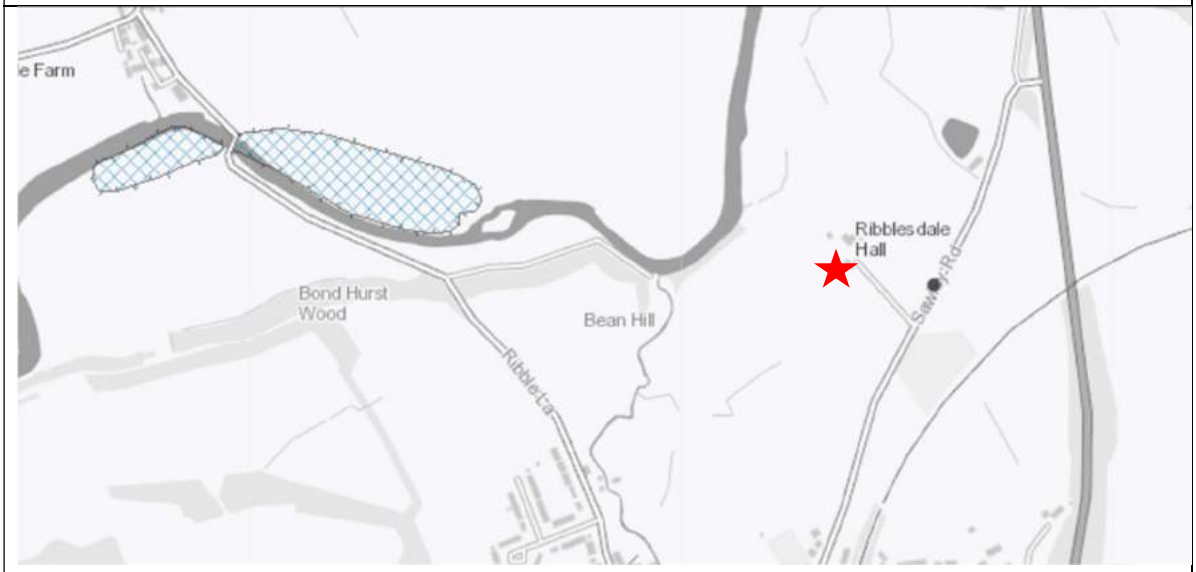
4.1 Internet Search

The Ribble Valley coast has been subject to serious flood incidents although no reports specific to Chatburn were found.

- 9th February 2020 (BBC News): Storm Ciara caused flooding which affected approximately 100 properties in Walley, Ribchester, Sawley and Low Moore.
- 16th March 2019 (The Clitheroe Advertiser and Times): Severe weather caused the River Ribble to burst its banks, causing Sawley Road in Sawley to be closed due to rising water. Four people required rescuing from their vehicles.

4.2 Open Data (www.data.gov.uk)

Figure 4.1: Recorded Flood Outlines – Ribblesdale Hall



Source: www.data.gov.uk

The mapping confirms that there are no recent, or historic, recorded flood outlines for this site. It is noted there is some historic flooding recorded nearby from the River Ribble.

4.3 Notable Storms – 2020

Storm Ciara (February 8th & 9th): Strong winds and heavy rain caused disruption across the UK. Reports indicate that flooding primarily occurred along the coastline between Blackpool and Fleetwood. There is no indication that flooding occurred at the application site, as a result of this storm event.

Storm Dennis (15th February): Yellow weather warning was issued across the UK on 15th; 16th; and 17th February for rain and wind. It is noted that South Wales and South-East England were primarily impacted by this storm event. Again, there is no indication that flooding occurred at the application site.

Storm Jorje (29th February): Heavy rainfall and strong winds resulted across the UK from this storm event. The areas which were affected by this storm included Wales, the South-West and Yorkshire. There are no reports that Storm Jorje, caused flooding within the Clitheroe area.

5.0 Initial Evaluation of Flood Risk

5.1 The Environment Agency Flood Map

The Environment Agency Flood Map illustrated within Figure 2.1, confirms that the proposed development site is located in Flood Zone 1.

The definition for each of the flood zones is provided for reference within Section 2.2.2 of this report.

5.2 Review of Potential Flood Mechanisms

5.2.1 General Review

Table 4: Possible Flooding Mechanisms

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	Site is located approximately 35km from the Irish Sea and the River Ribble at this location is not affected by tidal influences.
Fluvial	**Yes**	River Ribble
Canal	No	Not Applicable
Reservoir	No	Mapping indicates that the site does not lie within the impact zone associated with reservoir flooding
Groundwater	No	Groundwater flooding is considered to generally present a low flood risk within the Poulton-le-Fylde area
Pluvial - Overland flow	No	Topography within the area is relatively flat; and therefore, the risk of overland flows from land at higher elevations is considered to be low.
Pluvial – Surface Water Flood Routes & Ponding	No	Mapping indicates a low risk from this flood source.
Pluvial – Surface Water Runoff	**Yes**	Increased drained area will need to be sustainably managed on-site
Blockage	No	Not applicable
Infrastructure failure	No	Not applicable

From the initial assessment it has determined that the primary flooding mechanisms at the site are from fluvial sources.

6.0 Quantitative Flood Risk Assessment

6.1 National Planning Policy Framework

The flood risk assessment must be undertaken in accordance with the checklist provided within the NPPF Planning Practice Guidance.

6.2 Fluvial: River Ribble

6.2.1 General

The River Ribble runs in a westerly direction approximately 165m north west of the site.

6.2.2 Environment Agency

The Environment Agency has confirmed that they do not hold detailed flood risk modelling for the site and therefore are unable to provide modelled data required for a Product 4. They also do not hold any records of historic flooding at this site.

6.2.3 Ground Levels

As discussed in 3.2 LIDAR and Topographical data show the River Ribble and the north banks to be at a considerably lower level to the site, meaning any instances of the river bursting its banks in this area should not affect the proposed Holiday Lodges.

6.2.4 Conclusion

Overall, there is a low risk of direct flooding at the application site

6.3 Surface Water Management

The development covers an area of 1.59 Hectares; and will comprise of nine one-story holiday lodges.

6.3.1 Existing Drainage Regime

The existing site is a greenfield site and therefore is not considered to be positively drained.

It is estimated run off from the field drains to ground, where it can be infiltrated or flow overland following natural topography towards the north west corner of the site; where the River Ribble is located.

6.3.2 Existing Runoff Rates

Using the UK SUDS Tool (https://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation)

Table 5: Existing Surface Water Runoff

Return Period	Greenfield Discharge Rate (l/s) Red-line boundary area 1.59Ha
1 in 1 year	13.25
1 in 30 year	25.89
1 in 100 year	31.67

6.3.3 Surface Water Drainage Hierarchy

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer
- Discharge to public combined sewer

Infiltration

A site investigation report for the proposed development site is not currently available.

In order to assess the potential for infiltration methods to dispose of surface water from the development, a desk top investigation of the general ground conditions within the local vicinity of the site has been undertaken.

- Superficial Deposits – Till, Devensian - Diamicton
- Clitheroe Limestone Formation and Hodder Mudstone Formation (undifferentiated) - Mudstone.

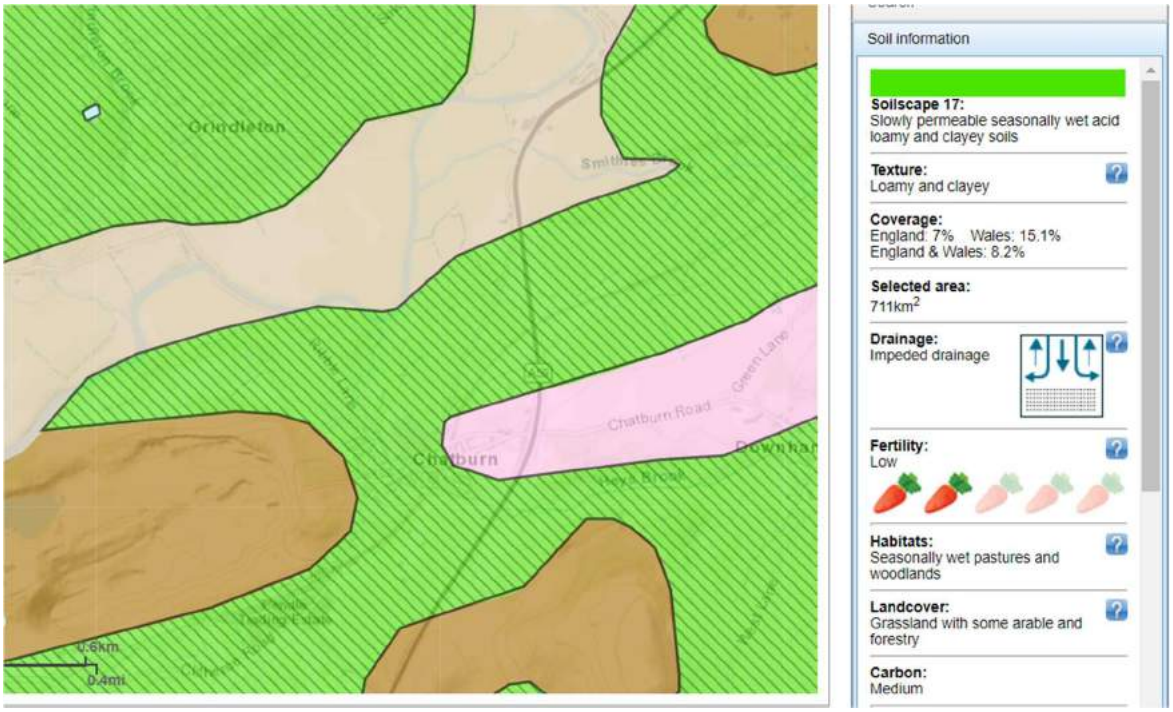
A review of historical borehole logs from the website www.bgs.ac.uk/data/boreholescans has shown that there are several borehole logs to the east of the site. The details of the closest boreholes are listed below:

- BGS Reference: SD74SE82 – A59 Whalley/Clitheroe By-Pass 158
- E:377420; N:444780
- Depth: 4.57m
- Sandstone to a depth of 62ft

No further boreholes are available in the vicinity of the proposed development.

Information from the National Soil Resource Institute: www.landis.org.uk/soilscapes details the development area as being situated on slowly permeable seasonally wet acid loamy and clayey soils.

Figure 6.1: Soilscape Maps



The desktop study indicates that due to the impeded drainage, traditional soakaways are unlikely to be feasible.

It is however recommended that percolation testing in accordance with BRE Digest 365 is undertaken at the site to provide evidence to Ribble Valley Borough Council of the suitability for using soakaways to manage surface water runoff at the site.

Watercourse

The nearest watercourse to the proposed development is the River Ribble, which is located approximately 165m north west of the development.

It is recommended that surface water runoff is directed towards the river.

6.3.4 Design Discharge Rates

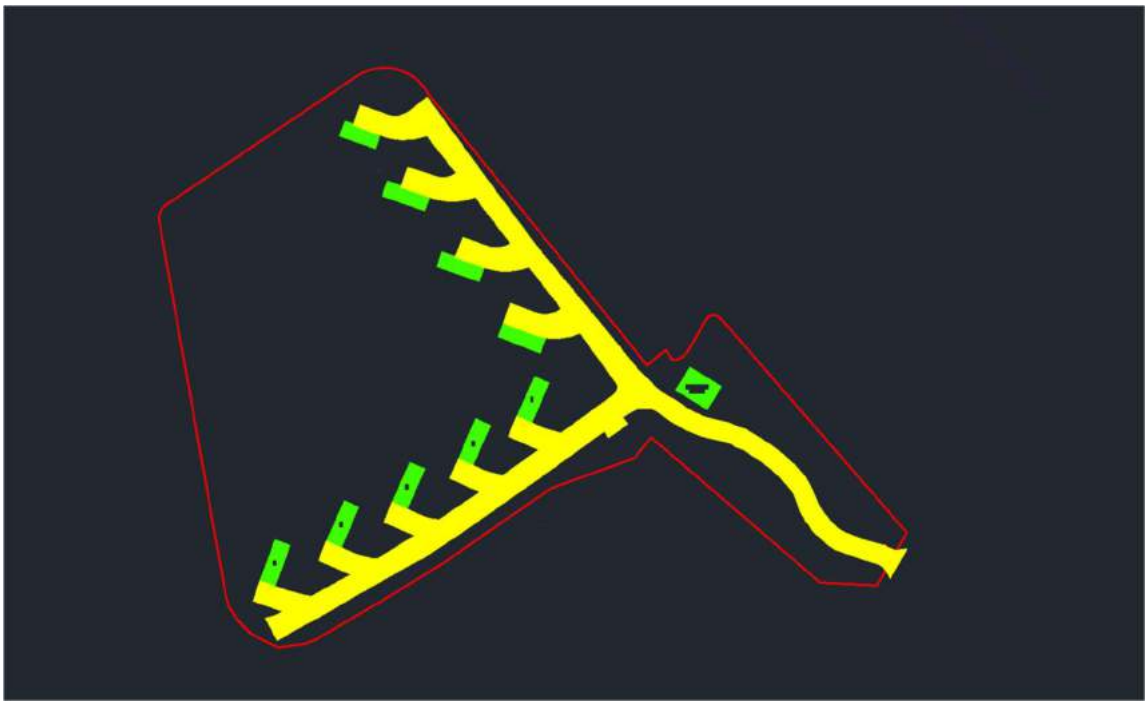
Discharge from the proposed development to watercourse must be restricted to ensure that existing greenfield runoff rates are not exceeded; to ensure that the flood risk both on-site and for others, is not increased as a result of the development.

6.3.5 Proposed Drained Areas

Roof and other paved areas have been extracted from the latest development plan.

- Roof (green hatch) – 500m² or 0.05Ha @ 100% impermeability
- New access road and parking area (yellow hatch) – 2426m² or 0.2431Ha @ 50% impermeability (permeable paving is proposed) – 0.2431 x 0.5 = 0.122 Ha
- Remaining grassed area – 14180m² or 1.418Ha
- Total new impermeable area – 0.365Ha

Figure 6.2: Proposed Drained Areas

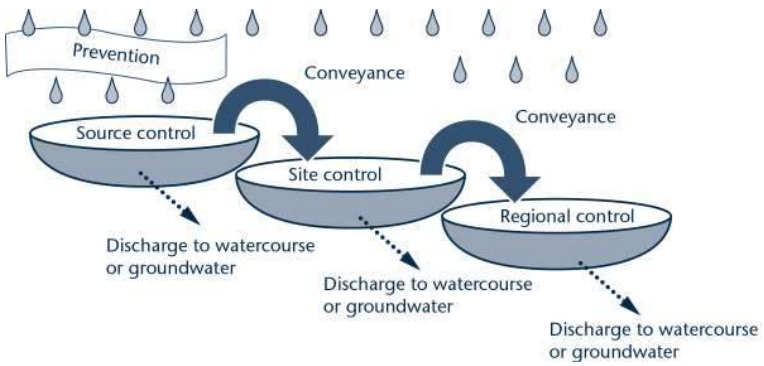


6.3.6 Sustainable Urban Drainage Systems (SUDS)

In accordance with the Flood Water and Management Act 2010; there is a requirement to incorporate sustainable drainage systems i.e. SUDS into new development.

SUDS act to reduce the impact of surface water runoff from the development by limiting runoff volumes and rates from leaving the site.

Figure 6.3: Typical SUDS Train



Source: www.netregs.org.uk

A detailed and site-specific appraisal of SUDS for inclusion within the development plan has been undertaken; and tabulated overleaf.

Table 6: SUDS Appraisal

<table>
<tr><th>SUDS Group</th><th>Type</th><th>Comment</th></tr>
<tr><td rowspan="2">Source Control</td><td>Rainwater Harvesting</td><td>Rainwater harvesting is the collection of rainwater runoff for further use. Runoff can be collected from roofs and other impermeable areas, subsequently stored, treated and then used as a supply of water for domestic, commercial, industrial and institutional properties; for non-potable use.

Can have the benefit of reducing water supply costs; and should be considered for application at the development</td></tr>
<tr><td colspan="2">   </td></tr>
<tr><td>Source Control</td><td>Green Roof</td><td>Green roofs are areas of living vegetation, installed on the top of buildings; and have a number of benefits including, ecological value, visual impact, improved thermal performance and reduction in surface water run-off.

Extensive green roofs cover the entire roof area with hardy, slow growing, drought resistant plants. They can be formed on flat or sloping roofs.

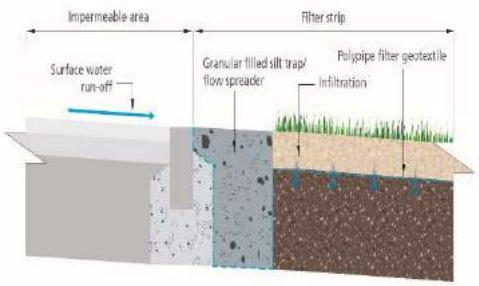
Intensive green roofs, or roof gardens are planted with a greater range of plants including grasses, shrubs and trees. Roof gardens require greater maintenance than extensive green roofs and are usually limited to larger flat roofs.

Green roofs often lend themselves to industrial/ leisure developments, or buildings with large roofs or relatively flat roof spaces.

Given the type of development; which incorporates a holiday let property, with traditional pitched roof design; and due to the increased maintenance burden on the potential occupant, it is unlikely that the final development plans will incorporate a green roof design.</td></tr>
</table>

		A photograph which illustrates green roof on a pitched or sloping roof is provided for reference below.
		
Source Control	**Permeable Pavements**	The basic principle of permeable paving is to allow surface water to percolate through the surface layers into storage structures below. The storage can be formed using soft ground, granular sub surfaces or holding tanks. Porous pavements allow water to infiltrate across the whole surface material e.g. reinforced grass, gravel (loose or resin-bound), porous asphalt, concrete or block paving. Permeable pavements can be used on most sites but should be avoided where there is high risk of silt loads or heavy vehicle movements on the surface. They are usually built as an alternative to impermeable surfaces so do not require extra space for construction. Permeable pavements act as source control, and can be used as part of the treatment train for either full or partial infiltration; or conveyance into other SuDS components such as detention ponds or wetlands. Driveways and the access track are included within the development design. In order to reduce the surface water management burden, it is recommended that permeable surfacing is utilised on these areas of the site, to promote natural infiltration (if possible), or at least minimise the rate and volume of runoff leaving the site. This has been confirmed to be proposed by the client.
		

Source Control	**Soakaway**	There are numerous different types of SuDS components that facilitate infiltration, including soakaways. Soakaways are excavations that are filled with a void forming material that allows the temporary storage of water before it soaks into the ground. They can range from excavated areas filled with rubble or crushed stone to soakaways formed using perforated precast manhole rings surrounded by granular backfill or using geocellular units wrapped in a geotextile. The performance of a soakaway is dependent on the infiltration capacity of the surrounding ground. It is typically considered that infiltration rates of 1 x 10-6 m/s or less are unsuitable for soakaways, unless designed for partial infiltration. Groundwater must be considered when designing soakaways or using other infiltration techniques, and should have a minimum 1 metre clearance from the bottom of a soakaway to the groundwater level, to minimise the risk of groundwater surcharge. A desk-top assessment indicates that typically the underlying ground at the location of the development is not likely to be suitable for soakaways; and therefore, these SUDS elements should be discounted from the drainage strategy for the site.
Source Control	**Trees**	Trees are one of the simplest SuDS measures to install. Trees can help reduce surface water runoff in a number of ways; • Transpiration • Interception • Increased infiltration • Phytoremediation Trees are only intended to manage surface water runoff from the localised area, similar to the area drained by one road gully; and are not suitable for draining large areas. Trees can be installed with other infiltration SuDS components or as standalone features. Tree pits and planters can be designed to collect and attenuate runoff by installing additional storage within the underlying structure. This can assist in filtering out pollutants in the water.

		An example is presented below; and indicates that this type of SUDS feature is typically used for car park areas; or footpath areas.
		
Source Control	**Filter Strips**	Filter strips are uniformly graded and gently sloping strips of grass, dense vegetation or filter material e.g. gravel, designed to slow down the flow of surface water runoff to increase sedimentation, filtration and infiltration. Filter strips should be designed with a minimum longitudinal slope of 1in100 to avoid ponding and a maximum of 1in 20 to prevent flow channelling. Maximum flow velocities across the strips of 1.5m/s are recommended to prevent erosion. Filter strips can be used in a variety of situations and should be effectively incorporated into landscaping and public open spaces so its function is not compromised. Filter strips can be used around the perimeter of new developments to prevent overland flows from or to the development area.
		
Site Control	**Swales**	Swales are shallow, flat bottomed, potentially vegetated channels designed to convey, treat and attenuate surface water runoff. They are similar to filter strips but are generally wider and flatter to allow some attenuation; and to encourage evapotranspiration as well as infiltration into the ground. When incorporated into site design swales can be used to enhance the natural landscape and provide visual and biodiversity benefits.

		Dry swales are vegetated conveyance channels with a filter bed overlaying an underdrain system. The underdrain provides an additional level of treatment and prevents waterlogging. Wet swales are designed to be wet and marshy in the base of the swales. They can be used in very flat areas and soils are poorly drained or to provide biodiversity and amenity areas. Specific wetland planting will be required in the base of a wet swale. They can typically be constructed alongside a highway, resulting in cost savings instead of installing conventional drainage systems. Swales should generally be designed with a base between 0.5 and 2.0m wide, longitudinal slopes between 1in 20 and 1in 200 and maximum side slopes of 1in 4. The typical depth of a swale is between 400 and 600mm. It is considered that swales are not suitable for use within the drainage strategy for the site, due to limiting site spatial constraints.
		
Site Control	**Attenuation Tanks**	Attenuation storage tanks are used to create below ground void space for the temporary storage of surface water runoff before infiltration, controlled release or use. Attenuation can be achieved using the following methods: • Geo-cellular storage system • Oversized pipes • Precast or in situ box culvert sections Attenuation tanks can be used for any site requiring subsurface storage; however, typically such methods for attenuation are not preferred by the LLFA.

		It is recommended tanks are constructed above the groundwater table to minimise lateral loading on the tank. Effective treatment of runoff is required to control sediment build up. To limit the risk of sedimentation, the drained area should be minimised. Attenuation tanks require regular maintenance and inspection so therefore should not be constructed in private land. Adoption arrangements should be considered when proposing attenuation tanks as part of an overall SuDS scheme. It should be noted that underground storage should be used as a last resort, with preference to 'above ground' SuDS systems. Attenuation is not required for this site.
		
Regional Control	**Detention Basins**	Detention basins are landscaped depressions that are normally dry, only filling temporarily during storm events and emptying at a controlled rate after. Ponds can be online components, where the surface runoff is discharged into the basin, with a restricted outlet, which allows the basin to fill. Basins can also be offline with surface water runoff being diverted once the flows reach a specified threshold. Unless used for sports pitches or specific landscaping, detention basins do no need to be a geometric shape. The maximum depth of water stored during events should not exceed 2m for safety reasons; and the recommended length-width ratio for online basins is between 3:1 and 5:1. An impermeable liner is required in areas where there is a risk of polluting the underlying aquifers, or in areas where there are high ground water levels.

		The base of the basin should have a gentle slope, approximately 1 in 100, towards the outlet, and the side slopes should not exceed 1 in 3. Any embankments forming part of the basin should be designed and constructed to meet the requirements of the Reservoir Act 1975, even if the basin does not come under the Act. It is considered that there are significant space constraints to be able to facilitate any open storage features, such as detention or retention features.
		
Regional Control	**Ponds & Wetlands**	Ponds operate in a similar way to detention basins; except they have a permanent pool of water retained. This is achieved be having an outfall arrangement that varies the discharge rate base on the water level in the pond. Ponds and wetlands can support emergent and submerged aquatic vegetation along the shoreline and in the shallows, which enhances treatment processes and has amenity and biodiversity benefits. Ponds and wetlands are suitable for most sites. The geometric limits of a pond, i.e. bed slope, side slopes are the same as detention ponds. A balance between deep and shallow zones in the pond should be maintained. The maximum depth of permanent waterbody should not exceed 2m. Keeping the water level shallow allows biodegradation but there is a risk of drying out in warm weather so deeper areas should be included. The maximum depth of storage above the permanent water level should be limited to 0.5m for small and medium sized ponds and deeper for larger ponds if the risks can be managed appropriately.

		Safety benches and maintenance access routes should be provided at an appropriate level above the permanent water level. L Like detention basins any pond embankments should be designed in accordance with the Reservoir Act 1975.
		

6.4 Foul Flows

It is proposed that foul flows from the development site will be directed to a package treatment plant. And therefore, the EA's Binding Rules will apply; unless the foul can be directed to an existing system. (https://www.gov.uk/guidance/general-binding-rules-small-sewage-discharge-to-a-surface-water)

Discharge to the River Ribble is subject to approval from the Lead local Flood Authority via an application for Land Drainage Consent.

Sizing of package treatment plants should be undertaken using the guidance available from the British Water Publication entitled Flows and Loads 4.

For groups of small 1and 2-bedroom houses or flats:

- 1 bedroom – allow 3P
- 2 bedroom – allow 4P

Therefore:

- 2-bedroomed lodges = 4P
- 9 x 2-bedrooms = 9 x 4P = 36P

If the calculated total P for a group of houses exceeds 12P then some reductions can be made to allow for the balancing effects on daily flow of a group of houses (round UP not down).

Where the total is 26 – 50P multiply the total by 0.8 to give an adjusted P value:

- 36P x 0.8 = 28.8P = 29P

A system such as a Hydro Clear POP30 Package Treatment Plant or similar; provides a unit with suitable invert levels, to facilitate the foul drainage system; without the need for pumping.

6.5 Preliminary Drainage Strategy

In order to demonstrate that the site can be drained, preliminary drainage strategy has been prepared for the development.

Roof water will be collected using rainwater pipes, and discharged to a gravity drainage system with an outflow to the River Ribble controlled to greenfield runoff rates using an orifice or similar control device.

Hydraulic calculations indicate that no surface water flooding is anticipated for this rainfall event.

The orifice has been sized to be 100mm

In order to present a worst-case scenario, it has been taken that all of the roof, and 50% of paved areas (primarily the driveways and access road nearby each lodge) will be drained off-site; It is highly recommended that permeable surfacing is utilised within the development plan wherever appropriate, to limit the generation of surface water runoff from the site.

Hydraulic modelling has been undertaken using Causeway Flow. The modelling results indicate the following:

- 1 in 1-year storm event: **10.3l/s**
  - No surcharging or flooding in general within the proposed drainage network. Maximum outflow is 10.3l/s and presents a betterment on the existing site

- 1 in 30-year storm event: **21.7l/s**
  - Some surcharging is shown to occur, but no surface flooding. Maximum outflow is 21.7l/s and presents a betterment on the existing site.

- 1 in 100-year storm event; **31.2l/s**
  - Significant surcharging throughout the proposed drainage network. A slight amount of flooding is shown to be present at the manhole containing the orifice, however this is down the hill from the site and will flow to the river. Maximum outflow is 31.2l/s and presents a betterment on the existing site.

6.6 Exceedance

It is noted that during flood conditions within the catchment, flooding within the proposed site is not anticipated and therefore exceedance testing has not been carried out.

6.7 Residual Flood Risk

Following development, it is anticipated that runoff rates and volumes will be decreased. And as a result, surface water runoff rates and volumes generated by the development, are unlikely to increase flood risk at the site and beyond.

6.8 Maintenance

The development will remain under private ownership and therefore management and maintenance of the drainage system will become the responsibility of the property owner.

7.0 Mitigation Measures

7.1 Finished Floor Levels

The finished floor level of the proposed dwellings should be set at:

- 150mm above existing ground level; or
- 600mm above the 1 in 200-year plus climate change event; whichever is the highest

As there are no modelled data levels for the River Ribble in this area, and the property is in a Flood Zone 1 area, the finished floor levels for each of the holiday lodges should be 150mm minimum above the existing ground level.

7.2 Access and Egress

Given the proximity of the development to an open channel watercourse; and the increased risk associated with climate change, it is recommended that property owners prepare a personal flood plan; in case tidal flooding, exceeds expectations.

- https://www.gov.uk/government/publications/personal-flood-plan

7.3 Flood Warning

The red-line boundary is not located within an area which is able to receive flood warnings from the Environment Agency via the Flood Warnings Direct Service. Flood Alert messages for the area are available and can be signed up to vis the link below:

- https://www.fws.environment-agency.gov.uk/app/olr/register

In addition, there are a number of resources available, which can be accessed to check on flood risk within the area comprising the development site, which include but is not limited to:

- Met Office weather
  - https://www.metoffice.gov.uk/
- River and sea levels
  - https://riverlevels.uk/
- Flood warnings on Facebook
  - https://www.facebook.com/FloodAlerts/
- Live Flood Warning map
  - https://flood-warning-information.service.gov.uk/warnings
- Shoothill Flood Gauging Station Map
  - https://www.gaugemap.co.uk

7.4 Approvals

It is advised that any works within 6m of the River Ribble will be subject to LLFA approval via Land Drainage Consent.

This includes, construction of the proposed surface water outfall.

8.0 Conclusions & Recommendations

The development is shown to be located within Flood Zone 1.

Development proposals incorporate the construction of nine one-storey holiday lodges located on Ribblesdale Hall, Chatburn, Clitheroe, BB7 4LD.

The red-line boundary containing the development covers an area approximating 1.59 Hectares; and the existing site comprises of a green field.

Tidal & Fluvial Flood Risk:

Topography typically within the district is relatively flat; and topographic data indicates that levels across the site range between 84 - 91mAOD.

The lowest ground level within the site is approximately 84.95mAOD.

LIDAR data has also been reviewed to assess the levels either side of the River Ribble which shows the north side of the bank to be significantly lower than the location of the site – North side approximately 66.53mAOD; location of site approximately 87.201mAOD.

The finished floor level for the new dwelling must be set at a minimum of 150mm above external ground level.

Overall, the assessment concurs with the flood mapping to conclude that the development area within the site has a low risk of flooding (Flood Zone 1).

Management of Surface Water Runoff:

Surface water runoff from the development must be managed in a sustainable way.

Building regulations and the NPPF requires rainwater from new sites to be managed using the following hierarchy:

- Infiltration (preferred)
- Watercourse
- Sewer

A desk-top assessment indicates that dissipation of surface water runoff to ground via infiltration methods is not likely to be feasible at the development site; and therefore, it is proposed that runoff will be discharged to watercourse i.e., the River Ribble, which is located 165m to the north west of the development site.

It is highlighted that Ribble Valley Borough Council may require the undertaking of percolation testing in accordance with BRE Digest 365 at the detailed design stage of the project to provide evidence that soakaways are not suitable for use within this development.

A preliminary drainage strategy has been prepared for the development. It is proposed that surface water runoff will be collected via rainwater pipes, gullies and channels; and directed to a gravity drainage system comprising pipes and manholes with outflow to watercourse controlled using an orifice or similar control device.

Hydraulic modelling has been undertaken using Causeway Flow; and in order to model the worst-case situation i.e., in the event that underlying ground is saturated, all new roof and 50% paved areas have been directed to the on-site drainage system.

It is recommended that permeable paving is utilised within the development plan wherever possible, in order to provide an element of sustainable development; and help to minimise the volume of online attenuation needed within the drainage system.

Outflow to the receiving channel should be restricted to greenfield runoff rates.

Under normal flow conditions, there is no surface flooding indicated to occur from the drainage system. Modelled outflow to the receiving river is:

- 1 in 1-year: 10.3l/s
- 1 in 30-year: 21.7l/s
- 1 in 100-year + 40% climate change: 31.2l/s

Foul Drainage Provision:

Foul flow from the proposed development will be directed to a package treatment plant; with effluent discharged to the River Ribble, subject to approval from the Lead Local Flood Authority.

Management & Maintenance:

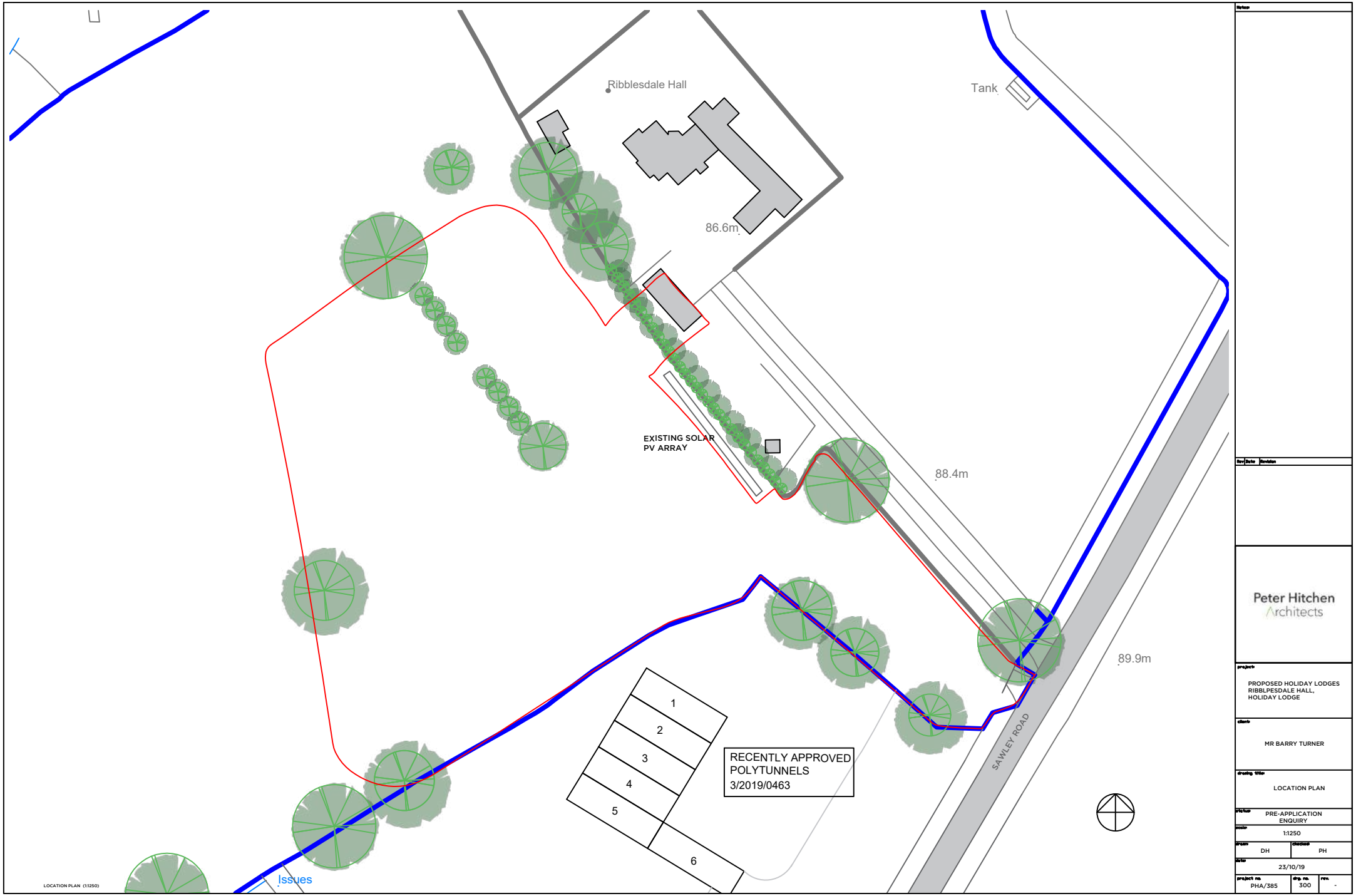
A suitable inspection and maintenance regime will be required to ensure optimum performance of the proposed foul and surface water drainage systems serving the development over its lifetime.

Approvals:

Any works within 6m of the River Ribble will be subject to LLFA approval via Land Drainage Consent.

APPENDICES

Appendix A: - Existing Site Plan



Peter Hitchen
Architects

project
PROPOSED HOLIDAY LODGES
RIBBLPESDALE HALL,
HOLIDAY LODGE

client
MR BARRY TURNER

drawing title
LOCATION PLAN

status
PRE-APPLICATION
ENQUIRY

scale
1:1250

drawn
DH

checked
PH

date
23/10/19

project no.
PHA/385

dwg no.
300

rev.
-

Appendix B: - Proposed Site Plans

1 PROPOSED SITE PLAN
1 : 500

N

Peter Hitchen
Architects

Marathon House
The Sidings Business Park
Whalley, BB7 9SE

01254 823 885

www.peterhitchenarchitects.co.uk

NOTES:

1 DERWENT LODGE - REFER TO SHEET A200 FOR DRAWINGS

3 PEMBROKE LODGES - REFER TO SHEET A201 FOR DRAWINGS

3 LANGDALE LODGES - REFER TO SHEET A202 FOR DRAWINGS

2 INDULGENCE LODGES - REFER TO SHEET A203 FOR DRAWINGS

SITE ENTRANCE - REFER TO SHEET A204 FOR FURTHER DETAIL

REFER TO ECOLOGY REPORT AND TREE SURVEY FOR FURTHER DETAIL ON ROOT PROTECTION AREA

No.	Description	Date

CLIENT:

BARRY TURNER

PROJECT:

PROPOSED HOLIDAY LODGES AND ACCOCIATED WORKS

SHEET:

PROPOSED SITE PLAN

Project number	385
Date	11/02/21
Drawn by	DC
Checked by	PH

A100

Scale	1 : 500
Sheet size	A1

Appendix C: - Greenfield Runoff Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Lisa Aspinall
Site name:	Ribblesdale Hall
Site location:	Chatburn

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.89812° N
Longitude:	2.35062° W
Reference:	71783297
Date:	Mar 03 2021 09:29

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1.59

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	1257	1257
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

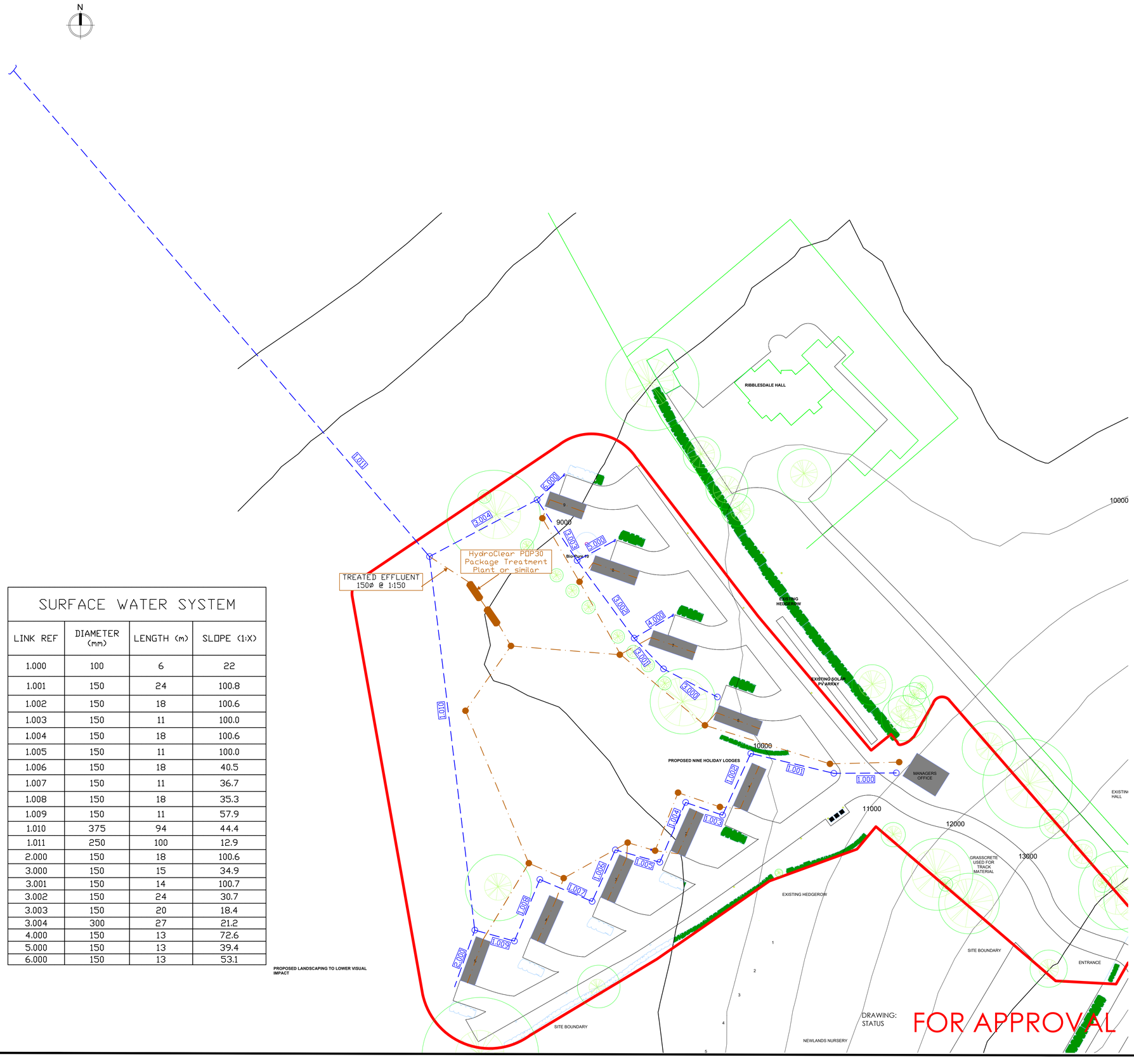
(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	15.23	15.23
1 in 1 year (l/s):	13.25	13.25
1 in 30 years (l/s):	25.89	25.89
1 in 100 year (l/s):	31.67	31.67
1 in 200 years (l/s):	36.09	36.09

Appendix D: - Preliminary Drainage Strategy



SURFACE WATER SYSTEM

LINK REF	DIAMETER (mm)	LENGTH (m)	SLOPE (1:X)
1.000	100	6	22
1.001	150	24	100.8
1.002	150	18	100.6
1.003	150	11	100.0
1.004	150	18	100.6
1.005	150	11	100.0
1.006	150	18	40.5
1.007	150	11	36.7
1.008	150	18	35.3
1.009	150	11	57.9
1.010	375	94	44.4
1.011	250	100	12.9
2.000	150	18	100.6
3.000	150	15	34.9
3.001	150	14	100.7
3.002	150	24	30.7
3.003	150	20	18.4
3.004	300	27	21.2
4.000	150	13	72.6
5.000	150	13	39.4
6.000	150	13	53.1

NOTES:

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS, RISKS NORMALLY ASSOCIATED WITH THE TYPE OF CONSTRUCTION WORK OR RELATED STRUCTURAL WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RISKS AND INFORMATION HAVE BEEN NOTED.

RISKS LISTED HERE ARE SIGNIFICANT, AND ASSOCIATED WITH THE CONSTRUCTION WORK OR RELATED STRUCTURAL WORK.

HAZARDOUS SUBSTANCE - SKIN CONTACT WITH HOT BITUMEN AND CEMENTITIOUS MATERIAL.

DUST - AIRBORNE DUST PARTICLES FROM GRANULAR SUB BASE AND CUTTING OF CONCRETE.

PUBLIC - STRUCK BY MOVING PLANT.

FOR INFORMATION RELATING TO END USE, MAINTENANCE, AND DEMOLITION WORKS, REFER TO THE CDM HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORK WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, AND WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

THE TABLE BELOW IDENTIFIES IN MORE DETAIL THE POTENTIAL RISKS ASSOCIATED WITH DIFFERENT TASKS.

	RECOMMENDATION
1. EXCAVATION ADJACENT TO BOUNDARIES	CARE TO BE TAKEN WITH DEEP EXCAVATIONS IN ORDER TO PREVENT SIDEWALL COLLAPSE / SLIPPAGE. CONTRACTOR TO PROVIDE METHOD STATEMENTS WHERE NECESSARY. EXCAVATIONS TO BE SAFELY CORDONED OFF AND ENSURE SAFE PEDESTRIAN AND VEHICLE ACCESS IS MAINTAINED TO ADJACENT BUILDINGS. ENSURE EXCAVATIONS/PLANT AND MACHINERY ARE MADE SECURE OUTSIDE WORKING HOURS TO PREVENT INJURY TO THE PUBLIC.
2. CONSTRUCTING NEW M.H'S AND ALTERATIONS TO EXISTING MANHOLES	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR SAFE CONSTRUCTION WHEN WORKING IN CONFINED SPACES. ALL PERSONNEL AFFECTED TO BE TRAINED AND BRIEFED ON THE RELEVANT METHOD STATEMENT.
3. PLACING AND HANDLING CUT AND BENT REINFORCEMENT	CONTRACTOR TO ENSURE WEIGHTS OF MATERIALS ARE INLINE WITH CURRENT REGULATIONS. NO PROJECTING BARS DETAILED. LENGTH OF BARS LIMITED TO MANAGEABLE SECTIONS.
4. EXCAVATION NEAR TO EXISTING SERVICES.	NEW CAVITY WALL LEAVES TO BE CONSTRUCTED SIMULTANEOUSLY THROUGHOUT CONSTRUCTION TO REDUCE RISK OF COLLAPSE AND PREVENTS EXPOSURE OF PROTRUDING WALL TIES. WALLS TO BE CONSTRUCTED IN SUITABLE LIFTS TO MAINTAIN FRESH MORTAR STABILITY. ISSUE AVAILABLE SERVICE RECORDS TO THE CONTRACTOR.
5. WORKING NEAR TO LIVE TRAFFIC.	CONTRACTOR TO PROVIDE METHOD STATEMENT FOR TRAFFIC MANAGEMENT/TEMPORARY WORKS. CONTRACTOR TO PROVIDE APPROPRIATE PROTECTION BARRIERS IF REQUIRED. WORKERS TO WEAR HIGH VISIBILITY CLOTHING TO AVOID BEING STRUCK BY PASSING VEHICLES OR PLANT.
6. GENERAL PUBLIC; EXISTING RESIDENTS; OR CHILDREN ON SITE.	ENSURE THAT THE SITE IS PROPERLY SECURE TO PREVENT INJURY FROM SLIPS, TRIPS, FALLS, FALLING FROM HEIGHT, UNCOVERED MANHOLES/TRENCHES. PROVIDE ADVANCE WARNING TO RESIDENTS REGARDING THE START OF CONSTRUCTION. IDENTIFY DIVERSIONS TO PUBLIC RIGHTS OF WAY, ESTABLISHED AND CLEARLY SIGNED IF REQUIRED.
7. NOISE, DUST AND VIBRATION RESULTING FROM CONSTRUCTION WORKS	METHOD STATEMENT TO BE PROVIDED. SITE STAFF TO BE PROVIDED WITH APPROPRIATE PPE. WORK MAY HAVE TO BE UNDERTAKEN AT SPECIFIC TIMES IN SENSETIVE AREAS TO MINIMISE DISRUPTION TO ADJACENT PROPERTIES.
8.0 WORKING NEAR WATER	CONTRACTOR TO PROVIDE DETAILED METHOD STATEMENT IN ACCORDANCE WITH THE APPROVED LAND DRAINAGE CONSENT, TO ENSURE SAFE WORKING ARRANGEMENTS AROUND AREAS OF OPEN OR FLOWING WATER; AND TO ENSURE THAT SUITABLE SITE OPERATION PROCEDURES ARE IN PLACE TO ELIMINATE THE RISK OF POLLUTION TRANSFER TO THE WATER ENVIRONMENT FROM PLANT & SITE MATERIALS.

KEY:

- SITE BOUNDARY
- PROPOSED SURFACE WATER MANHOLE OR INSPECTION CHAMBER
- PROPOSED SURFACE WATER DRAIN/SEWER
- PROPOSED SURFACE WATER RODDING EYE
- PROPOSED OUTFALL
- PROPOSED FOUL MANHOLE OR INSPECTION CHAMBER
- PROPOSED FOUL DRAIN/SEWER (ALL TO BE 150MM Ø AND LAID @ 1:150)
- PROPOSED FOUL PACKAGE TREATMENT PLANT

REVISION	COMMENT	DATE	BY
/	First Issue	04/03/21	LA

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WEBSITE: WWW.FLOODRISKCONSULT.COM

CLIENT:	Peter Hitchen Architects
PROJECT:	Ribblesdale Hall, Chatburn, Clitheroe, BB7 4LD
DRAWING TITLE:	Preliminary Drainage Strategy Plan
DRAWING REFERENCE:	20091-01
DATE:	04/03/2021
DRAWN BY:	LA
SCALE:	1:500
SIZE:	A1
REVISION:	A