



MESSRS ASHWORTH

FISHES AND PEGGY HILL FARM

FLOOD RISK ASSESSMENT

SEPTEMBER 2021

DATE ISSUED: SEPTEMBER 2021
JOB NUMBER: ST19018
REPORT NUMBER: 0001
VERSION: V1.0
STATUS: FINAL

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FLOOD RISK ASSESSMENT

SEPTEMBER 2021

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1 INTRODUCTION

1.1 General

1.1.1 Wardell Armstrong LLP (WA) has been commissioned by Messrs Ashworth (the Client) to prepare a Flood Risk Assessment (FRA) for the proposed development of holiday lodges at Fishes and Peggy Hill Farm in Clitheroe.

1.1.2 This report sets out the findings of the FRA required by the Local Planning Authority to support the planning application for development on the site. The assessment has been carried out in accordance with the guidance set out in the National Planning Policy Framework (NPPF).

1.2 Methodology

1.2.1 The methodology for this FRA is comprised of a desktop study, and a review of site information and relevant local and national planning policy reports.

1.2.2 Reference has been made to relevant plans and documents, including:

- Lancashire County Council (2011) - *Preliminary Flood Risk Assessment*;
- Lancashire County Council (2017) - *Preliminary Flood Risk Assessment Addendum*;
- Ribble Valley Borough Council (2010) - *Strategic Flood Risk Assessment Level One*.

2 FLOOD RISK AND PLANNING POLICY

2.1 National Planning Policy

2.1.1 The NPPF and the accompanying Planning Practice Guidance (PPG) aim to ensure that flood risk is taken into consideration at all stages of the planning process and advocates the use of a risk-based 'Sequential Test' to preferentially locate development in areas with a low risk of flooding. Where development is necessary in high-risk areas, the NPPF aims to ensure that the development is safe without increasing flood risk through the application of the Exception Test.

2.1.2 The PPG defines the levels of flood risk within England as follows.

- Flood Zone 1 – Low Probability – Land having less than a 1 in 1,000 annual probability of river or sea flooding.
- Flood Zone 2 – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
- Flood Zone 3a – High Probability – Land having a 1 in 100 or greater annual probability of river flooding; or having a 1 in 200 or greater annual probability of sea flooding.
- Flood Zone 3b – Functional Floodplain – Land where water has to flow or be stored in times of flood.

2.1.3 The PPG states that a site-specific FRA is required for all new development proposals located in Flood Zones 2 and 3, and for any proposal of 1 hectare or greater regardless of its flood zone classification. The flood zones as described above are shown on the Environment Agency's Flood Map for Planning, available online.

2.1.4 Table 2 of the PPG classifies development types based on their vulnerability to flooding, ranging from 'Essential Infrastructure' which has to be operational in times of flood, through 'Highly Vulnerable' (e.g. emergency service stations), 'More Vulnerable' (e.g. residential dwellings and establishments), 'Less Vulnerable' (e.g. offices/retail), to 'Water Compatible' development (e.g. open space, docks, marinas and wharves).

2.1.5 Based on Table 2 of the NPPG, the proposed holiday lodges are classified as 'More Vulnerable' development.

2.1.6 Table 3 of the PPG indicates which 'vulnerability classes' are acceptable in each of the Flood Zones, and when the Exception Test should be applied. This is reproduced as Table 1 below.

Table 1: Flood Risk Vulnerability and Flood Zone 'Compatibility'					
Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	✓	✓	✓	✓	✓
2	✓	Exception Test	✓	✓	✓
3a	Exception Test	✗	Exception Test	✓	✓
3b	Exception Test	✗	✗	✗	✓

2.2 Application of the Sequential and Exception Test

2.2.1 The majority of the site is shown on the EA Flood Map for Planning to be located within Flood Zone 1, with a small western area of the access road being located in Flood Zone 2 (see Figure 1).

2.2.2 The Sequential Test, as set out in the NPPG, aims to steer developments to areas with the lowest risk of flooding (i.e. Flood Zone 1) where possible. As the site is located in Flood Zone 1 and 2 and is classified as a 'More Vulnerable' development, the Sequential Test is deemed to have been passed.

2.2.3 The Exception Test, detailed in paragraph 159 of the NPPF, should only be used after the Sequential Test has been applied, and when 'More Vulnerable' development and 'Essential Infrastructure' cannot be located within Flood Zone 1 or 2, or a 'Highly Vulnerable' development cannot be located within Flood Zone 1.

2.2.4 The proposed development is located within areas of Flood Zone 1 and Flood Zone 2; it is, therefore, unnecessary to apply the Exception Test.

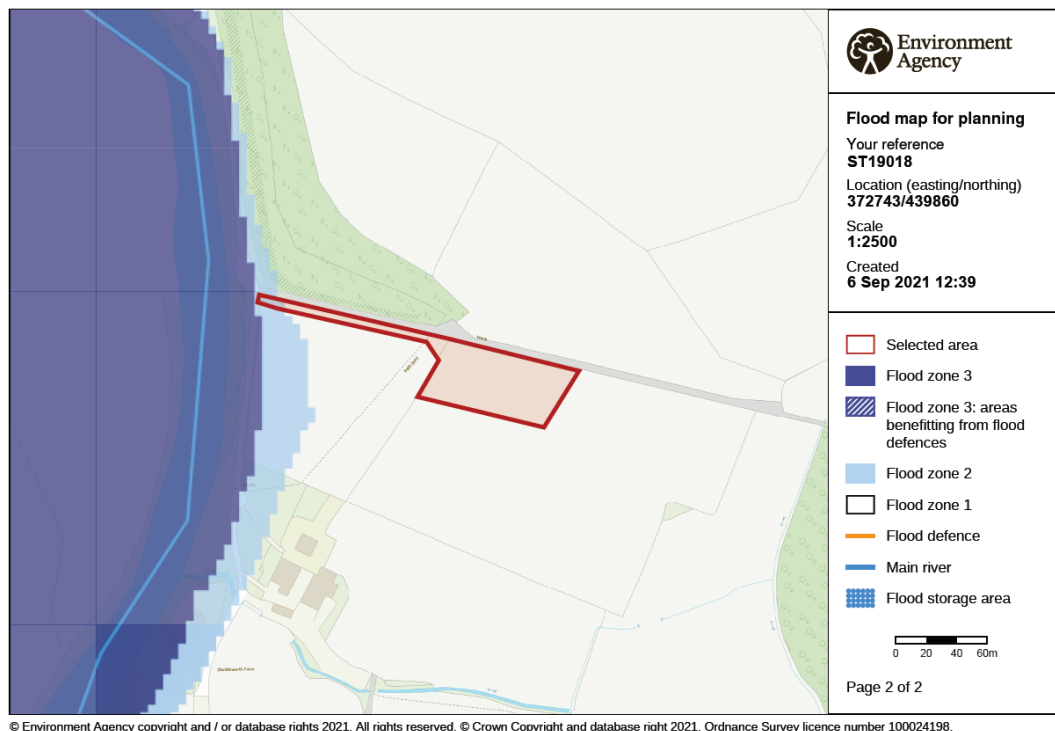


Figure 1. Environment Agency Flood Map for Planning

3 SITE SETTING

3.1 Site Description and Location

3.1.1 A summary of the site and its characteristics is provided in Table 2.

Table 2: Site Location Summary	
Site Name	Fishes and Peggy Hill Farm
Site Address	Fishes and Peggy Hill Farm, Henthorn Road, Clitheroe, BB7 3BY
Development Area (ha)	Approximately 0.33ha
National Grid Reference	SD 72773 39862
Existing Land Use	Agricultural land
Proposed Land Use	Holiday Lodgings
Local Planning Authority	Ribble Valley Borough Council
Sewerage Undertaker	United Utilities

3.1.2 The proposed development area is located on the eastern side of Henthorn Road. The National Grid Reference of the site is SD 72773 39862, and the nearest postcode is BB7 3BY. A Site Location Plan is included in Appendix 1.

3.1.3 The proposed development area occupies approximately 0.33ha and is located along the northern boundary of the existing farm. Access to the development site is from Henthorn Road to the west.

3.1.4 The site has a hillside location, with ground levels across the site falling generally westwards from a maximum elevation of approximately 50mAOD in the east to a minimum elevation of approximately 46mAOD in the west.

3.2 Existing Watercourses and Waterbodies

3.2.1 The River Ribble, a Main River, is located approximately 20m to the west of Henthorne Road. This watercourse flows south-westwards for approximately 50km and out to the Irish Sea. The Pendleton Brook, an ordinary watercourse, is a tributary of the River Ribble and is located approximately 0.3km northwest of the site. There are no other ordinary watercourses in the vicinity of the site.

3.3 Existing Drainage

3.3.1 There is no known formal drainage within the site area. The agricultural land on site drains naturally by infiltration, transpiration, and evapotranspiration. Any surface

water unable to disperse via these methods will flow generally westwards towards the River Ribble, following the local topography.

- 3.3.2 Due to the rural setting of the site, it is assumed that there are no public or private sewers within the development area.

3.4 Ground Conditions

- 3.4.1 The online British Geological Survey (BGS) 'Geology of Britain viewer'¹ shows that the site is underlain by sandstone and mudstone of the Permian and Triassic Periods. The online DEFRA 'Magic' map² shows that this is classified as a Secondary A aquifer, defined by the EA as '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
- 3.4.2 BGS mapping shows that the site is underlain by superficial till and other clay-based deposits of the Quaternary Period. These are classified as 'Secondary Undifferentiated' aquifers, defined by the EA as 'aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type'.
- 3.4.3 'Magic' mapping also shows that the site is not located within a Groundwater Source Protection Zone.
- 3.4.4 The online 'Soilscapes' viewer³ shows that the site is underlain by 'slowly permeable, seasonally wet, acid, loamy and clayey soils'.

¹ BRITISH GEOLOGICAL SURVEY 'Geology of Britain Viewer' Available at: <https://mapapps.bgs.ac.uk/geologyofbritain/home.html>

² DEFRA 'Magic' Available at: <https://magic.defra.gov.uk/magicmap.aspx>

³ CRANFIELD SOIL AND AGRIFOOD INSTITUTE Soilscapes Available at: <https://www.landis.org.uk/soilscapes/>

4 DEVELOPMENT PROPOSALS

4.1 Description of the Proposed Development

- 4.1.1 The proposed development area is approximately 0.33ha in size, situated at the north-western boundary of a pre-existing 254ha site currently used for agriculture and farming.
- 4.1.2 The development proposals comprise the construction of holiday lodges. Six cabins with a combined area of 420m² will be introduced across the site as shown on the Site Layout Plan in Appendix 2. Additionally, the development will feature approximately 128.75m of 3.5m wide tarmacked roadway, car parking adjacent to each of the six lodges, and approximately 273.75m of hedgerows separating the cabins from the rest of the farm and each other. Site access for vehicles will be provided from Henthorne Road via the proposed tarmacked roadway. The existing footpath crossing through the site will be retained.

5 FLOOD RISK

5.1 Flood Risk to the Development

- 5.1.1 The main sources of flooding identified within the NPPF are rivers, tidal waters and the sea, surface water, groundwater, sewers and drains, and artificial sources such as canals and reservoirs.
- 5.1.2 The presence of a potential flooding source does not necessarily translate into a high risk of flooding. Table 3 below summarises the potential flood sources and the related flood risk posed to the site.

Table 3: Sources of Flood Risk			
Flood Source	Presence at Site	Potential Risk at Site	Description
Rivers (<i>fluvial flooding</i>)	Y	Low to Medium	Majority of the site is located in Flood Zone 1 with a small area within Flood Zone 2
Tidal	N/A	N/A	-
Groundwater	Y	Low	Site underlain by low-permeability superficial deposits.
Surface Water Flooding (<i>pluvial flooding</i>)	Y	Low	Majority of the site at a Very Low risk, with small areas of Low risk
Sewer	N	Very Low	Assumed that there are no public or private sewers crossing the site area
Artificial	N	Very Low	No canals, reservoirs, or impounded water bodies in the vicinity of the site

Historical Flooding Incidents

- 5.1.3 Historic Flood Events' maps in the Lancashire County Council Preliminary Flood Risk Assessment Report⁴ (PFRA) do not show any significant historical flood events in the vicinity of the site.
- 5.1.4 The PFRA Addendum lists no 'Flood Investigation Reports' for flooding events occurring since the original PFRA in 2011.

Fluvial Flooding

- 5.1.5 The EA 'Flood Map for Planning' (see Figure 1) shows that the proposed site is located primarily within Flood Zone 1 ('Low' Risk) with an annual probability of flooding of less

⁴ LANCASHIRE COUNTY COUNCIL PRELIMINARY FLOOD RISK ASSESSMENT REPORT (2011)

than 1 in 1000 years (ie <0.01%). However, a small proportion of the proposed access track at the junction with Henthorn Road in the west of the site, is located within Flood Zone 2 ('Medium' Risk) with an annual probability of fluvial flooding between 1 in 1000 years and 1 in 100 years. The source of this flooding is understood to be the River Ribble.

- 5.1.6 The proposed holiday lodges are located within Flood Zone 1 and, therefore, the risk of flooding to the proposed development and its users is considered to be **LOW**. The area of Flood Zone 2 at the western end of the site is considered to be at a **MEDIUM** risk, however, this will have little to no impact on the proposed lodges or the operation of the site.

Surface Water Flooding (Pluvial Flooding)

- 5.1.7 EA Surface Water Flood Risk mapping (see Figure 2) indicates that the site is generally located within an area of 'Very Low Risk'. A small section of the western access road lies in a 'Low Risk' area, however, in the context of the whole site (i.e. 0.33ha), this region is considered to have negligible impacts on the proposed development.



Figure 2. Environment Agency Surface Water Flood Risk Mapping

5.1.8 EA Surface Water Velocity mapping (see Figure 3) also indicates that surface water runoff flows to the west, following existing topography away from the wider site area with no risk to the proposed holiday lodges.



Figure 3. Environment Agency Surface Water Flood Velocity Mapping

5.1.9 Based on the available information, the risk of surface water flooding is considered to be **VERY LOW**.

Groundwater Flooding

5.1.10 Flooding can occur when prolonged rainfall causes the groundwater table to rise above ground level. Groundwater flooding can occur at the same time as flooding from other sources such as overland flow.

5.1.11 Groundwater flooding vulnerability mapping in the Lancashire PFRA shows that based on its hydrogeological conditions, the site and its vicinity is not susceptible to ground water flooding.

5.1.12 The western extent of the site is approximately 20m from the River Ribble, at similar elevation to the watercourse. There is the potential for relatively high groundwater levels within the underlying sandstone bedrock which are in continuity with water levels in the river. As the site is underlain by superficial deposits clay and till deposits

with a relatively low permeability, however, it is considered that there will be limited pathways for any groundwater emergence at the surface.

5.1.13 Furthermore, there will be no underground construction in this area of the site and elevated groundwater levels will have no impact on the development.

5.1.14 The eastern area of the site, where the majority of the proposed development will be situated, is approximately 4m higher than areas in the west of the site and it is considered that groundwater levels will be at a sufficient depth below ground level to mean the risk of groundwater flooding is minimal.

5.1.15 Based on available information, the risk of groundwater flooding is considered to be **LOW**.

Sewer Flooding

5.1.16 Due to the rural setting of the site, it is considered that there are no private sewers crossing the site area. The risk of flooding from sewers is considered, therefore, to be **VERY LOW**.

Artificial Sources

5.1.17 Artificial sources of flooding include reservoirs, canals and any other impounded water body which is elevated above the level of the site. flooding can occur when the impounding structures such as dams and embankments fail, when culverts become blocked, or during times of extreme rainfall events where the waterbodies overflow.

5.1.18 The EA Extent of Flooding from Reservoirs mapping (see Figure 4) shows that the site is not in an area at risk of reservoir flooding.

5.1.19 There are no canals or impounded waterbodies in the vicinity of the site and, based on the available information, the risk to the site of flooding from artificial sources is considered to be **VERY LOW**.



Figure 4. Environment Agency Extent of Flooding from Reservoirs Map

5.2 Flood Risk from the Proposed Development

- 5.2.1 New development can pose a risk of flooding to neighbouring properties and areas downstream of the site, often as a result of an increase in impermeable area which has the effect of increasing the rate and volume of surface water runoff. In addition, climate change can be expected to cause an increase in rainfall intensity and surface water runoff over the lifetime of the development.
- 5.2.2 Flood risk can also be increased as a result of new development if the development reduces the floodplain storage area or alters flood flow paths, ultimately displacing flood water and resulting in an increased risk to the surrounding area.

Fluvial Flooding

- 5.2.3 The proposed development is located mainly in an area of Flood Zone 1, with a small area of Flood Zone 2 to the west, and remote from any areas of Flood Zone 3a or 3b. As a result of this, it is considered that the development will cause no reduction in flood plain storage.
- 5.2.4 Structures introduced to the site such as access tracks are proposed to be built at, or below existing ground levels, meaning there will be no impact to flood flow routes within the vicinity of the site.

Surface Water Runoff

- 5.2.5 The existing agricultural land is considered to be wholly permeable, with slowly draining soils and an underlying Secondary A Aquifer. Any surface water not dispersed naturally by infiltration, evaporation, or uptake by vegetation will flow generally westwards, following local topography.
- 5.2.6 It is proposed that the site will feature lodgings, tarmacked access roads and parking, all of which will contribute to a total impermeable area of approximately 2,660m². This decrease in the permeability of the ground means that surface water runoff from the site is likely to increase, and measures to remedy this must be employed. Such measures will include the introduction of linear swales, soakaways and filter drains to accommodate for the increase in surface water runoff.

Climate Change

- 5.2.7 It is necessary to consider climate change for the lifetime of the development when assessing potential flood risk, as climate change can be expected to increase rainfall intensity over the duration of the developments lifetime, thereby creating an increase in surface water runoff rates. New climate change guidance was published by the Environment Agency in February 2016⁵, providing predictions of anticipated increases to peak rainfall intensity. In assessing the surface water runoff from the proposed development, the climate change predictions for peak rainfall intensity for the lifetime of the development must be taken into account.
- 5.2.8 The proposed development will have a lifespan of approximately 50 years and based upon guidance for a 'More Vulnerable' development located in Flood Zone 1 and 2, the 'central' allowance for climate change of 20% is deemed appropriate.
- 5.2.9 Due to this, it is considered that the risk of surface water runoff could further increase as a result of climate change, and that mitigation measures are required.

5.3 Flood Risk Mitigation Measures

Surface Water Management

- 5.3.1 The risk of flooding to areas downstream of the site may increase as a result of the development due to an increase in impermeable area and an increase in rainfall intensity (i.e. climate change) resulting in higher rates and volumes of surface water runoff. To mitigate this elevated risk, it is proposed that a surface water drainage

⁵ GOV.UK (February 2016). *Guidance – Flood Risk Assessments: Climate Change Allowances*. Available from: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

system is installed to capture and store runoff from within the site, with a controlled discharge to either the ground or a nearby watercourse. Attenuation will be provided to accommodate the increased runoff anticipated as a result of climate change. The post-development surface water runoff will, therefore, mimic the existing Greenfield regime. The proposed drainage strategy is discussed further below.

- 5.3.2 With a suitable surface water drainage system installed at the site it is considered that the risk of flooding posed by the proposed development is LOW.

5.4 Residual Risk

- 5.4.1 There is always a possibility of a storm event that exceeds the design standards of the proposed flood risk management measures for new developments. Potential risks include the exceedance of the surface water attenuation facilities during extreme storm events.
- 5.4.2 It is considered that, if the above mitigation and control measures are implemented and maintained, then the probability of flooding is extremely low and, therefore, the residual risk is negligible. Furthermore, if the capacity of the surface water attenuation features are exceeded, the exceedance flows can be anticipated to flow westwards towards the River Ribble, following the existing topography with no risk to the wider site area.

6 DRAINAGE STRATEGY

6.1 Surface Water Drainage Strategy

- 6.1.1 Surface water runoff from the development will be controlled on site to ensure that there is no increase in the risk of flooding to areas downstream of the site and to the development itself.
- 6.1.2 The Building Regulations (2010) Part H stipulates a hierarchy for the disposal of surface water which should be followed as part of any surface water drainage design. This hierarchy is as follows:
- i. An adequate soakaway or some other adequate infiltration system; or, where that is not practicable,
 - ii. A watercourse; or, where that is not practicable,
 - iii. A sewer
- 6.1.3 A preliminary infiltration rate of $3 \times 10^{-7} \text{m/s}$ has been estimated for the topsoil using the CIRIA SuDS Manual C753. The SuDS Manual considers this rate to be unsuitable for 'soakaway' drainage. However, in the absence of access to a suitable watercourse or public sewer, it is proposed to discharge surface water runoff naturally via a combination of infiltration to the ground, evaporation and uptake by vegetation. The proposed surface water management plan is shown on Drawing No. ST19018-001 '*Indicative Surface Water Management Plan*'.
- 6.1.4 It is proposed that temporary storage is provided on site for any surface water runoff unable to disperse naturally during an extreme rainfall event. A total of five 13m infiltration trenches will be constructed adjacent to the holiday lodges and car parking. The infiltration trenches will contain perforated pipes and will be filled to ground level with single-sized gravel and will be aligned laterally with the land's natural topography for maximum effectiveness. These will collect and store runoff from the adjacent holiday lodges and car parking areas.
- 6.1.5 In addition to this, a 123m vegetated swale will run parallel to the tarmacked access track to intercept run off from the road. Due to the site's local topography, with ground levels falling approximately four metres from the western most cabin to the site boundary, it is necessary to introduce three 15m long turn-outs originating from the vegetated swale, which will run in a southwards direction into the adjacent field. The incorporation of turn-outs in the drainage design will counteract the effect of the steep fall in ground levels, increasing the effectiveness of the swale in allowing any

surface runoff time to disperse into the ground, rather than collecting at the lowest levels of the swale nearest the riverbank. This is deemed an appropriate method of drainage and will not affect neighbouring properties despite dispelling water from the development site, as the proposed turn-outs will be located within the Client's larger existing property.

- 6.1.6 If these drainage features are implemented and properly maintained, it is considered that sufficient measures have been taken in mitigating any risks from an increase in surface water runoff resulting from the proposed development.

Water Quality

- 6.1.7 The proposed surface water drainage features will also provide treatment to surface water runoff, with the vegetation in the swale slowing the rate of flow, promoting the settlement of sediment, and also filtering the flows as they pass downstream, further removing sediment and suspended solids. The percolation of runoff through the aggregate within the infiltration trenches will also treat surface water runoff, removing silt and suspended solids. Organic pollutants such as petrol and diesel will also undergo biodegradation within the aggregate layer.

7 CONCLUSIONS

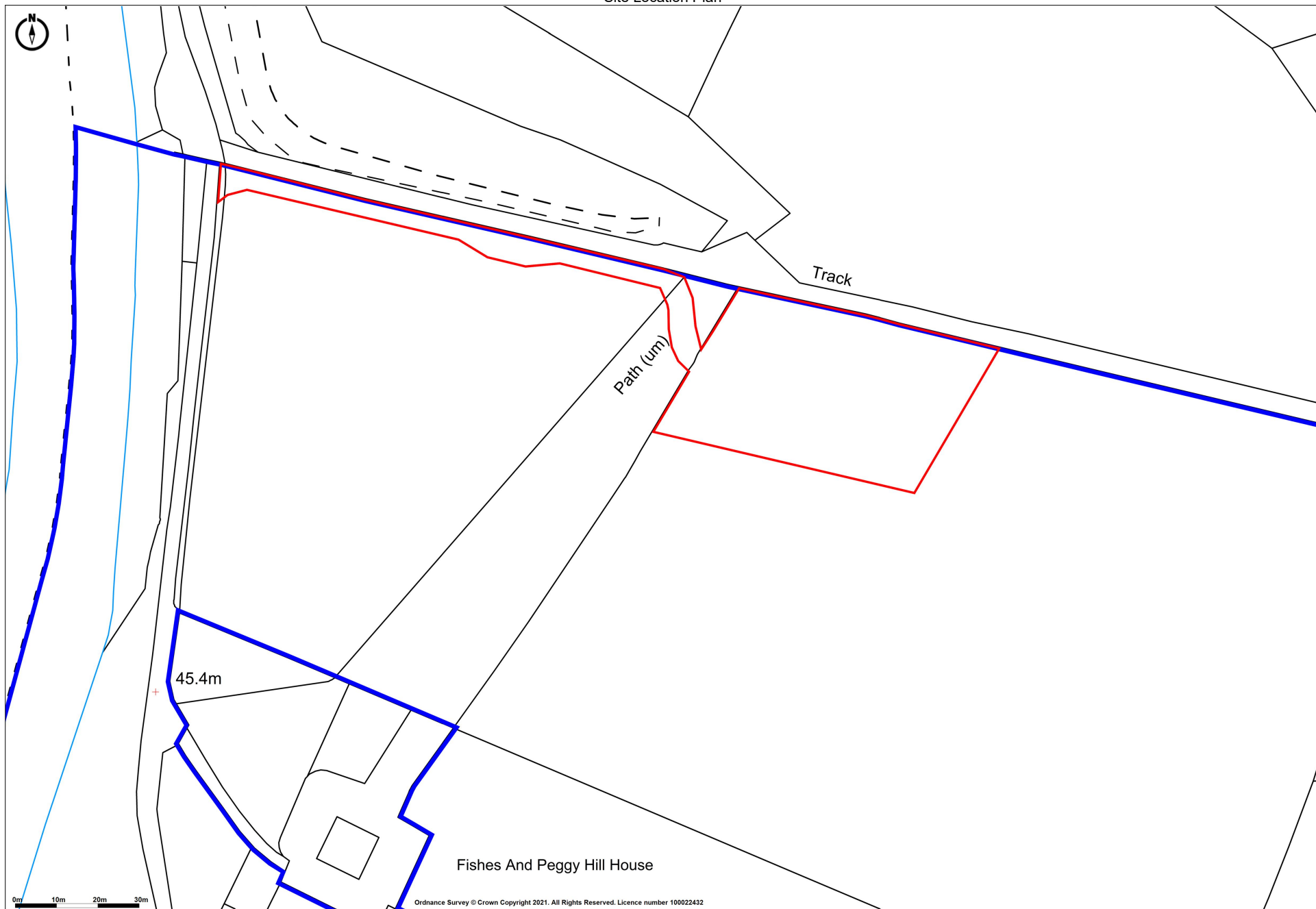
- 7.1.1 This report gives details of the Flood Risk Assessment, which has been carried out in accordance with the National Planning Policy Framework.
- 7.1.2 The proposed development will comprise of a series of holiday lodges, associated car parking and an access road, and dividing hedgerows on previously undeveloped agricultural land.
- 7.1.3 The proposed development is primarily located within fluvial Flood Zone 1 ('Low' risk) with a small area at the western extent of the site access road located in Flood Zone 2 ('Medium' risk).
- 7.1.4 The risk of flooding to the development from sewers and artificial flooding is considered to be Very Low. This risk of flooding from surface water and groundwater is considered to be Low.
- 7.1.5 There will be an increase in impermeable ground as a result of the proposed development, however, it is considered that the establishment and continued management of swales and infiltration trenches throughout the site will prevent an increase in flood risk. The drainage features will also provide treatment to the surface water runoff ensuring that there is no impact on surface water quality as a result of the proposed development.
- 7.1.6 As the risk of flooding to the site is considered to be Low or Very Low, and the risk of flooding to the surrounding areas will not increase as a result of the proposed development, it is considered that the site is suitable for development from a flood risk and drainage perspective.

APPENDICES

APPENDIX 1

Site Location Plan

Site Location Plan



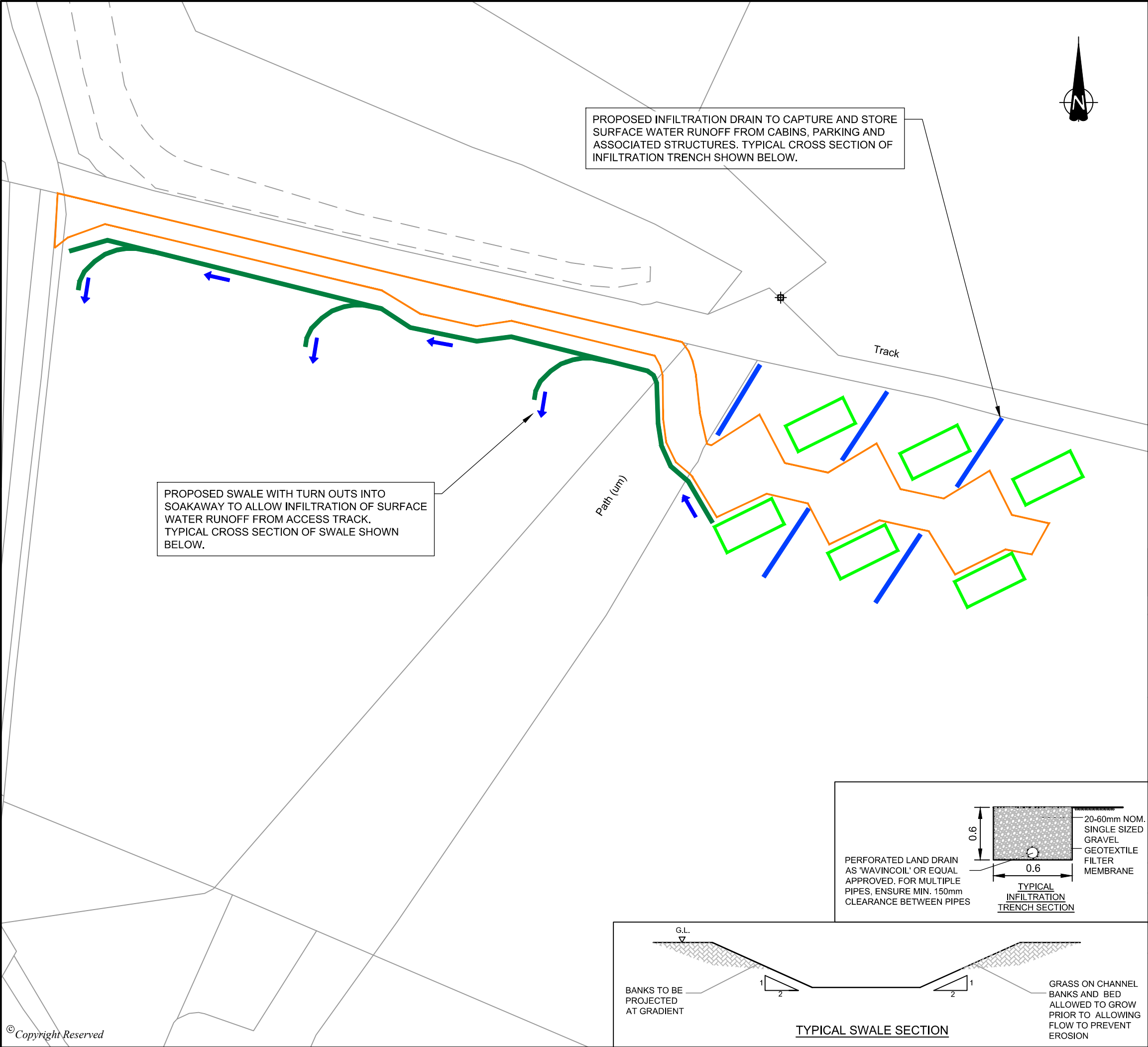
APPENDIX 2

Site Layout Plan

Site Layout Plan



DRAWINGS



DO NOT SCALE FROM THIS DRAWING

NOTES:

1) TO BE READ IN CONJUNCTION WITH FLOOD RISK ASSESSMENT (REF: ST19018/0001)

2) LAYOUT IS INDICATIVE ONLY AND SUBJECT TO DETAILED DESIGN

PROPOSED INFILTRATION TRENCH

PROPOSED VEGETATED SWALE

PROPOSED SWALE TURN-OUT

A	FIRST ISSUE	28-09-21	DR	BG	AD
REVISION	DETAILS	DATE	DRN	CHKD	APPD

CLIENT

MESSRS ASHWORTH

PROJECT

FISHES AND PEGGY HILL

DRAWING TITLE

INDICATIVE SURFACE WATER MANAGEMENT LAYOUT

DRG No.

ST19018-001

REV

A

DRG SIZE

A3

SCALE

NOT TO SCALE

DATE

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