

FLOOD RISK AND DRAINAGE
SOLUTIONS

NPPF Flood Risk Assessment

Extension at Springwood,
Clitheroe

Report No: 2023-066

Client: Zara Moon Architects

Date: 19/12/2023

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Contract

This report describes work commissioned by Zara Moon Architects dated 21st November 2023. Chris Vose of Flood Risk and Drainage Solutions carried out the work.

Disclaimer

This document has been prepared solely as a Flood Risk Assessment for Zara Moon Architects. Flood Risk and Drainage Solutions accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

Executive Summary

Flood Risk and Drainage Solutions Ltd have been appointed by Zara Moon Architects, to provide a Flood Risk Assessment in support of a planning application for the proposed extensions at Springwood, Great Mitton, Clitheroe.

The redline boundary of the site is located within Flood Zones 1, 2 and 3; and therefore, has a low, medium and high risk associated with fluvial flooding.

An initial assessment indicates that the primary flood risk at the proposed development is from the fluvial source the River Hodder and surface water flow routes.

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

The application site currently comprises of an existing farm house property named Springwood, barn and garage, with access road direct from Whalley Road from the north west boundary.

The closest watercourse to the application site is the River Hodder, which is located adjacent to the east boundary of the site.

The topographical survey provided identifies that the site slopes from north from Whalley Road down to the River Hodder at the south east boundary, levels range from 53.000m AOD down to 41.190m AOD. Finished floor levels have also been provided for each of the existing buildings these have been identified below for reference.

- Springwood House = 44.520m AOD
- Barn = 43.950m AOD
- Garage = 43.770m AOD

Development proposals include the following elements:

- Proposed single-story extension to rear and single-story extension to side to the farm house
- Conversion of the existing barn into ancillary living accommodation and creation of rear balcony
- Extension of the existing garage to incorporate additional parking bay

Surface Water Flooding/Overland Flow

A surface water flow route passes through the site from the north west boundary making its way into the River Hodder located at the east of the site. Due to the scale and nature of surface water flooding it would be difficult to pin point the specific reason as to why this occurs. However, it is likely to be as a result of topographical depressions facilitating flow routes in the direction of the watercourse.

During the worst-case scenario i.e. the low risk event, the depth is considered to be between 300mm and 900mm with a velocity of more than 0.25m/s. However, during the most frequent scenario i.e. the high risk event the depth is below 300mm with a velocity of less than 0.25m/s.

In conclusion, providing that flood resilience/resistance measures are incorporated into the development proposals, the risk of surface water flooding can be suitably managed.

Fluvial Flooding: River Hodder

The Environment Agency have not been able to provide any modelled flood levels associated with the River Hodder, they have stated the following:

'We do not hold any further modelling for this site therefore we are unable to provide a product 4.'

Taking the above into account, flood levels have been determined by transposing the flood map for planning over topographical and LIDAR Data to estimate flood levels for Flood Zone 2 and 3.

Following a review of all the available information, it is concluded that the existing buildings have a low risk of flooding during the 1 in 100 year and 1 in 1000 year events.

However, due to the proximity of the development proposals to the outlines of Flood Zones 2 and 3, it is recommended that flood resilience/resistance measures are incorporated into the design of the extensions set at a minimum of 900mm above proposed finished floor levels.

Flood Mitigation Measures

Finished Floor Levels

Due to the development proposals comprising of extensions to existing buildings, proposed finished floor levels must remain in line with existing finished floor levels for level access and restrictions from ceiling heights.

Existing Finished Floor Levels

- Springwood House = 44.520m AOD
- Barn = 43.950m AOD
- Garage = 43.770m AOD

Springwood House is currently elevated in excess of 600mm above the 1 in 1000 year event (44.450m AOD) by 0.070m, therefore based on the available data this property is considered to be low risk associated with fluvial flooding. Therefore, it is the decision of the developer if they wish to incorporate flood resilience/resistance measures into the property or not.

The Barns finished floor level is currently below the 1 in 1000 year + 0.600m i.e.. 44.450m AOD, therefore it is proposed that extra flood resilience/"resistance measures must be incorporated into the property up to a level of 0.900m above existing finished floor levels.

The Garage is currently set 0.675m below the 1 in 1000 year event + 0.600m = 44.450m AOD. However, it is noted that the garage will be for less vulnerable development and therefore flood reliance/resistance measures are not considered necessary. Therefore, it is the decision of the developer if they wish to incorporate flood resilience/resistance measures into the property or not.

Flood Resilience/Resistance

Flood resilience/resistance measures must be set at a minimum of 0.900m above finished floor levels, these are outlined below.

Flood Resilience/Resistance Measures

- Springwood House = $44.520 + 0.900 = 45.420\text{m AOD}$ (flood resilience/resistance decision of the developer/client)
- Barn = $43.950 + 0.900 = 44.850\text{m AOD}$ (flood resilience/resistance must be incorporated into the property)
- Garage = $43.77 + 0.900 = 44.670\text{m AOD}$ (flood resilience/resistance decision of the developer/client)

Flood Resilience/Resistance measures to be Incorporated into the development

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required.
- Avoid using timber frame and cavity walls. Consider applying a water-resistant coating.
- Avoid use of gypsum plaster if possible or apply plasterboards horizontally rather than vertically
- Avoid use of stud partition walls.
- Wall sockets to be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property.

- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.
- Storage of any materials or possessions that may be susceptible to flood damage should be stored or raised at a level 0.900m above finished floor levels to limit the damage caused in the event of a flood.
- Non-Return Valves fitted to prevent backflow of sewage which can occur during flood conditions.
- Avoid fitted carpets where possible.
- Locate electrical, gas and telephone equipment and systems as high as practically feasible
- Fit flood specific external doors at ground floor level or at the very least flood barriers which can be installed prior to flooding.

Environment Agency Flood Warnings/Alerts

The application site is situated within an area not covered by the Environment Agency's Flood Warning's Direct Service.

However, due to the site being within close proximity of the River Hodder, it is advised that residents sign up to receive Environment Agency Flood Alerts.

Emergency Evacuation Route

It is recommended that persons on site are prepared to evacuate away from the property, if advised to do so by the EA Flood Alert Service, the emergency services and/or local authority, in the advance of the onset of any flooding.

Evacuation away from the property during fluvial flood events should be directed out of the north of the site, then south along Whalley Road. It is noted that dry access and egress is available at all times.

The Emergency Evacuation Route is depicted for reference within Figure 7.1.

Personal Flood Plan

It is also recommended that residents create a personal flood plan. This is a simple document that assists the occupant to prioritise actions required at the property before, during and following a flood event.

A copy of a Personal Flood Plan Template has been provided within the appendices of this report.

Contents

1.0	Introduction.....	7
1.1	Terms of Reference	7
1.2	Objectives.....	7
1.3	Data Sources.....	7
2.0	Planning Policy Context	8
2.1	Approach to the Assessment.....	8
2.2	National Planning Policy Framework (NPPF)	8
2.2.1	Site Specific Flood Risk Assessment Checklist.....	8
2.2.2	Sources of Flooding.....	11
2.2.3	Flood Zones	12
2.2.4	Vulnerability of Different Development Types.....	12
2.2.5	Climate Change.....	13
3.0	Details of the Site.....	14
3.1	Site Details.....	14
3.2	Site Description	14
3.3	Proposed Development Details	15
4.0	Historic Flooding.....	16
4.1	Internet Search.....	16
4.2	Ribble Valley Borough Council SFRA Level 1	16
4.3	Environment Agency.....	16
5.0	Initial Evaluation of Flood Risk	17
5.1	The Environment Agency Flood Map.....	17
5.2	Sources of Flooding.....	17
6.0	Quantitative Flood Risk Assessment.....	19
6.1	Pluvial / Overland Flow.....	19
6.1.1	General.....	19
6.1.2	Low Risk Event	19
6.1.3	Medium Risk Event.....	20
6.1.4	High Risk Event	20
6.1.5	Pluvial: Conclusion.....	20
6.2	Fluvial: River Hodder.....	20
6.2.1	General.....	20
6.2.2	Environment Agency Modelled Flood Levels.....	20
6.2.3	1 in 100-year Flood Event (Flood Zone 3)	20
6.2.4	1 in 1000-year Flood Event (Flood Zone 2).....	21
6.2.5	Fluvial: Conclusion.....	21

7.0	Mitigation Measures	22
7.1	Finished Development Levels	22
7.2	Flood Resilience/Resistance.....	22
7.3	Environment Agency Flood Warnings.....	23
7.4	Emergency Evacuation Route	24
7.5	Personal Flood Plan	25
8.0	Conclusions & Recommendations	26

Figures

Figure 2.1: The Environment Agency Flood Map	12
Figure 5.2: Environment Agency Surface Water Flood Map.....	18
Figure 6.1: Environment Agency Surface Water Flood Depth.....	19
Figure 6.2: Environment Agency Surface Water Flood Velocity.....	19
Figure 6.3: Flood Extent and Associated Levels.....	21
Figure 7.1: Suggested Evacuation Route.....	25

Tables

Table 1: Ribble Management Catchment Climate Change Allowances	13
Table 2: Development Location.....	14
Table 3: Possible Flooding Mechanisms	17
Table 4: Environment Agency Flood Warning Codes.....	23

Appendices

Appendix A: -	Development Proposals
Appendix B: -	Topographical Survey
Appendix C: -	Topo/LIDAR Flood Extent and Estimated Levels
Appendix D: -	Personal Flood Plan

1.0 Introduction

1.1 Terms of Reference

Flood Risk and Drainage Solutions have been appointed by Zara Moon Architects, to provide a Flood Risk Assessment in support of a planning application for the proposed extensions at Springwood, Great Mitton, Clitheroe.

The redline boundary of the site is located within Flood Zones 1, 2 and 3; and therefore, has a low, medium and high risk associated with fluvial flooding.

It is usual for the Environment Agency to raise an objection to development applications within the floodplain, or Zones 2 and 3 of the flood map, until the issue of flood risk has been properly evaluated. The Agency will also object to developments where the total site area is in excess of 1 Hectare until suitable consideration has been given to the management of surface water runoff.

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.
- Provide a preliminary assessment of foul and surface water management.
- Increasing the risk of flooding elsewhere e.g. surface water flows and flood routing.
- 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 (2023)
- Planning Practice Guidance at www.gov.uk
- Building Regulations Approved Document H
- Environment Agency Flood Mapping
- Lancashire Area Preliminary Assessment Report May 2011
- Ribble Valley Strategic Flood Risk Assessment Updated 2017
- Local Flood Risk Management Strategy for Lancashire 2021 - 2027
- British Geological Society – Historic Borehole Logs
- Cranfield University's Soilscape Viewer
- CIRIA C697 The SUDS Manual
- Chronology of British Hydrological Events (Dundee University)
- R&D Technical Report FD2320/TR2 (2005)

2.0 Planning Policy Context

2.1 Approach to the Assessment

An initial assessment indicates that the primary flood risk at the proposed development is from the fluvial source the River Hodder and surface water flow routes.

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

The requirements for flood risk assessments are generally as set out in the 'Technical Guidance to the National Planning Policy Framework', updated in September 2023 and in more detail from the Environment Agency's 'Standing Advice on Flood Risk' available from <https://www.gov.uk/government/publications/national-planning-policy-framework-3>.

2.2 National Planning Policy Framework (NPPF)

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 Site Specific Flood Risk Assessment Checklist

The following checklist has been extracted from Flood Risk & Coastal Change Section available from www.gov.uk, updated in July 2018.

1. Development site and location

Provide a description of the site you are proposing to develop, including, or making reference to, a location map which clearly indicates the development site.

- A. Where is the development site located? (e.g. postal address or national grid reference)
- B. What is the current use of the site? (e.g. undeveloped land, housing, shops, offices)
- C. Which Flood Zone (for river or sea flooding) is the site within? (i.e. Flood Zone 1, Flood Zone 2, Flood Zone 3).

Check the Flood Map for Planning (Rivers and Sea) and the Strategic Flood Risk Assessment for the area available from the local planning authority.

2. Development proposals

Provide a general summary of the development proposals, including, or making reference to, an existing block plan and a proposed block plan, where appropriate.

- A. What are the development proposal(s) for this site? Will this involve a change of use of the site and, if so, what will that change be?
- B. In terms of vulnerability to flooding, what is the vulnerability classification of the proposed development?
- C. What is the expected or estimated lifetime of the proposed development likely to be? (E.g. less than 20 years, 20-50 years, 50-100 years?).

3. Sequential test

For developments in flood zones 2 or 3 only.

(If the development site is wholly within flood zone 1, this section can be skipped - go to section 4).

Describe how the sequential test has been applied to the development (if required, and as set out in paragraphs 101-104 of the National Planning Policy Framework); and provide the evidence to demonstrate how the requirements of the test have been met.

See paragraph 033 of the NPPF guidance for further information. (It is recommended that the Developer or Agent contacts the LPA to confirm whether the sequential test should be applied and to ensure the appropriate level of information is provided).

- A. What other locations with a lower risk of flooding have you considered for the proposed development?
- B. If you have not considered any other locations, what are the reasons for this?
- C. Explain why you consider the development cannot reasonably be located within an area with the lowest probability of flooding (flood zone 1); and, if your chosen site is within flood zone 3, explain why you consider the development cannot reasonably be located in flood zone 2.
- D. As well as flood risk from rivers or the sea, have you taken account of the risk from any other sources of flooding in selecting the location for the development?

Exception test

Provide the evidence to support certain development proposals in flood zones 2 or 3 if, following application of the sequential test, it is appropriate to apply the exception test, as set out in paragraphs 102-104 of the National Planning Policy Framework.

It is advisable to contact the local planning authority to confirm whether the exception test needs to be applied and to ensure the appropriate level of information is provided.

- A. Would the proposed development provide wider sustainability benefits to the community? If so, could these benefits be considered to outweigh the flood risk to and from the proposed development?
- B. How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere?
- C. Will it be possible for the development to reduce flood risk overall (e.g. through the provision of improved drainage)?

4. Climate Change

How is flood risk at the site likely to be affected by climate change? (The local planning authority's Strategic Flood Risk Assessment should have taken this into account). Further advice on how to take account of the impacts of climate change in flood risk assessments is available from the Environment Agency.

5. Site specific flood risk

Describe the risk of flooding to and from the proposed development over its expected lifetime, including appropriate allowances for the impacts of climate change. It would be helpful to include any evidence, such as maps and level surveys of the site, flood datasets (e.g. flood levels, depths and/or velocities) and any other relevant data, which can be acquired through consultation with the Environment Agency, the lead local flood authority for the area, or any other relevant flood risk management authority. Alternatively, you may consider undertaking or commissioning your own assessment of flood risk, using methods such as computer flood modelling.

- A. What is/ are the main source(s) of flood risk to the site? (E.g. tidal/sea, fluvial or rivers, surface water, groundwater, other?). You should consider the flood mapping available from the Environment Agency, the Strategic Flood Risk Assessment for the area, historic flooding records and any other relevant and available information.

- B. What is the probability of the site flooding, taking account of the maps of flood risk available from the Environment Agency, the local planning authority's Strategic Flood Risk Assessment and any further flood risk information?
- C. Are you aware of any other sources of flooding that may affect the site?
- D. What is the expected depth and level for the design flood? See paragraph 055 of the NPPF guidance for information on what is meant by a "design flood". If possible, flood levels should be presented in metres above Ordnance Datum (i.e., the height above average sea level).
- E. Are properties expected to flood internally in the design flood and to what depth? Internal flood depths should be provided in metres.
- F. How will the development be made safe from flooding and the impacts of climate change, for its lifetime? Further information can be found in paragraphs 054 and 059 (including on the use of flood resilience and resistance measures) of the NPPF guidance.
- G. How will you ensure that the development and any measures to protect the site from flooding will not cause any increase in flood risk off-site and elsewhere? Have you taken into account the impacts of climate change, over the expected lifetime of the development? (e.g. providing compensatory flood storage which has been agreed with the Environment Agency).
- H. Are there any opportunities offered by the development to reduce the causes and impacts of flooding?

6. Surface water management*

Describe the existing and proposed surface water management arrangements at the site using sustainable drainage systems wherever appropriate, to ensure there is no increase in flood risk to others off-site.

- A. What are the existing surface water drainage arrangements for the site?
- B. If known, what (approximately) are the existing rates and volumes of surface water run-off generated by the site?
- C. What are the proposals for managing and discharging surface water from the site, including any measures for restricting discharge rates? For major developments (e.g. of ten or more homes or major commercial developments), and for all developments in areas at risk of flooding, sustainable drainage systems should be used, unless demonstrated to be inappropriate.
- D. How will you prevent run-off from the completed development causing an impact elsewhere?
- E. Where applicable, what are the plans for the ongoing operation and/or maintenance of the surface water drainage systems?

7. Occupants and users of the development

Provide a summary of the numbers of future occupants and users of the new development; the likely future pattern of occupancy and use; and proposed measures for protecting more vulnerable people from flooding.

- A. Will the development proposals increase the overall number of occupants and/or people using the building or land, compared with the current use? If this is the case, by approximately how many will the number(s) increase?
- B. Will the proposals change the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? If this is the case, describe the extent of the change.
- C. Where appropriate, are you able to demonstrate how the occupants and users that may be more vulnerable to the impact of flooding (e.g., residents who will sleep in the building; people with health or mobility issues; etc.,) will be located primarily in the parts of the building and site that are at lowest risk of flooding? If not, are there any overriding reasons why this approach is not being followed?

8. Residual risk

Describe any residual risks that remain after the flood risk management and mitigation measures are implemented, and to explain how these risks can be managed to keep the users of the development safe over its lifetime.

- A. What flood related risks will remain after the flood risk management and mitigation measures have been implemented?
- B. How, and by whom, will these risks be managed over the lifetime of the development? (e.g., putting in place flood warning and evacuation plans).

9. Flood risk assessment credentials

Provide details of the author and date of the flood risk assessment.

- A. Who has undertaken the flood risk assessment?
- B. When was the flood risk assessment completed?

Other considerations

* Managing surface water

The site-specific flood risk assessment will need to show how surface water runoff generated by the developed site will be managed. In some cases, it may be advisable to detail the surface water management for the proposed development in a separate drainage strategy or plan. You may like to discuss this approach with the lead local flood authority.

Surface water drainage elements of major planning applications (e.g., of ten or more homes) are reviewed by the lead local flood authority for the area. As a result, there may be specific issues or local policies, for example the Local Flood Risk Management Strategy or Surface Water Management Plan, that will need to be considered when assessing and managing surface water matters.

It is advisable to contact the appropriate lead local flood authority prior to completing the surface water drainage section of the flood risk assessment, to ensure that the relevant matters are covered in sufficient detail.

Proximity to Main Rivers

If the development of the site involves any activity within specified distances of main rivers, a flood risk activity permit may be required in addition to planning permission.

For non-tidal main rivers, a flood risk activity permit may be required if the development of the site is within 8 metres of a river, flood defence structure or culvert.

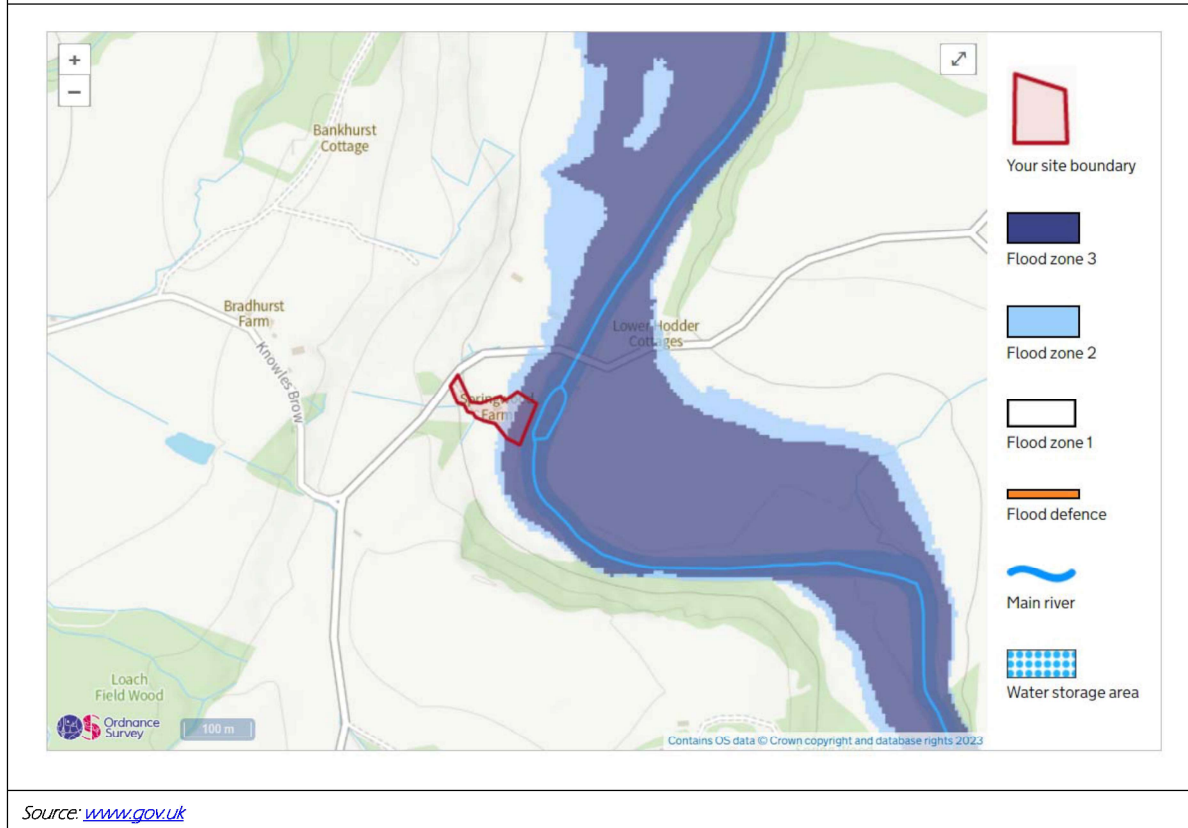
For tidal main rivers, a flood risk activity permit may be required if the development of the site is within 16 metres of a river, flood defence structure or culvert.

Details on obtaining a Flood Risk Activity Permit are available from the Environment Agency.

2.2.2 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: The Environment Agency Flood Map



2.2.3 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.

2.2.4 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.
- **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.

2.2.5 Climate Change

The NPPF requires the application of climate change over the lifetime of a development. As of 27th May 2022, the Technical Guidance for NPPF has updated the climate change allowances based on river basin catchments. The climate change allowance for the Ribble Management Catchment is tabulated below:

Table 1: Ribble Management Catchment Climate Change Allowances¹

Parameter	Allowance Category	2020's	2050's	2080's
Peak Rainfall Intensity	Upper	+ 36%	+ 46%	+77%
	Higher	+23%	+ 29%	+ 44%
	Central	+ 16%	+ 19%	+ 27%

Due to the proposed development being considered more vulnerable and located partially within Flood Zone 3 the central allowance of 27% should be applied to peak river flow to account for climate change as a minimum.

¹ Extracted from Tables 1-4 of the Technical Guidance for flood risk assessments: Climate change allowances Document (May 2022)

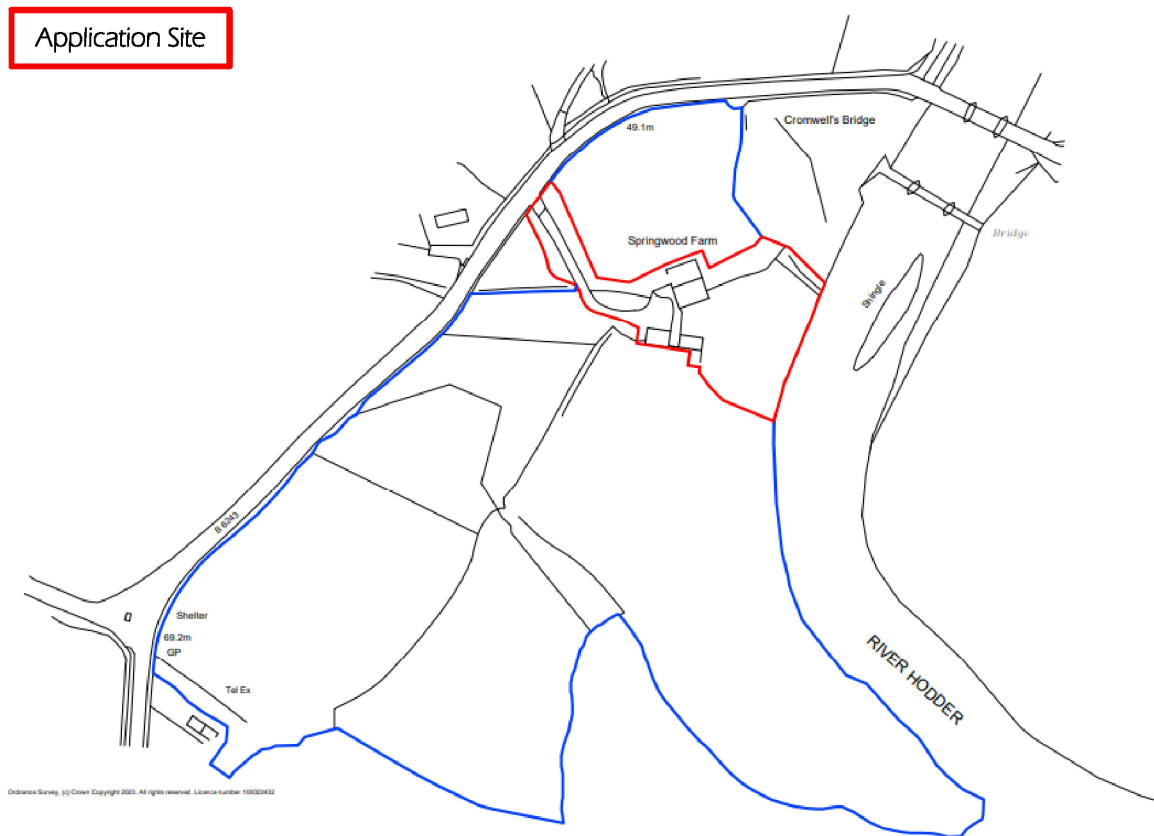
3.0 Details of the Site

3.1 Site Details

Table 2: Development Location

Site Name:	Springwood
Purpose of Development:	Residential
Existing Land Use:	Residential
OS NGR:	SD7031139101
Country:	England
County:	Lancashire
Local Planning Authority:	Ribble Valley Borough Council
Lead Local Flood Authority	Lancashire County Council
Internal Drainage Board:	Not Applicable
Other Authority (e.g. British Waterways/ Harbour Authority)	Not Applicable

Location Plan:



Source: Google

3.2 Site Description

The application site currently comprises of an existing farm house property named Springwood, barn and garage, with access road direct from Whalley Road from the north west boundary.

The closest watercourse to the application site is the River Hodder which is located adjacent to the east boundary of the site.

The topographical survey provided identifies that the site slopes from north from Whalley Road down to the River Hodder at the south east boundary, levels range from 53.000m AOD down to 41.190m AOD. Finished floor levels have also been provided for each of the existing buildings these have been identified below for reference.

- Springwood House = 44.520m AOD
- Barn = 43.950m AOD
- Garage = 43.770m AOD

3.3 Proposed Development Details

Development proposals include the following elements:

- Proposed single-story extension to rear and single-story extension to side to the farm house
- Conversion of the existing barn into ancillary living accommodation and creation of rear balcony
- Extension of the existing garage to incorporate additional parking bay

4.0 Historic Flooding

4.1 Internet Search

An internet search for historic flooding within the vicinity of the development came back with no results.

4.2 Ribble Valley Borough Council SFRA Level 1

Ribble Valley Borough Councils Strategic Flood Risk Assessment was undertaken by themselves and completed in April 2017. Section 4.4 Historic Floods identifies that the River Hodder has suffered flooding on 2 occasions in 1881 and 1936, however the scale and magnitude of the flood events are unknown.

- 1771 Ribble No information available
- 1775 Ribble No information available
- 1866 Ribble, Calder, Whalley, Clitheroe, Ribchester,
- 1881 Ribble, Calder, Hodder Slaidburn,
- 1923 Ribble, Calder Clitheroe
- 1936 Ribble, Hodder, Calder Slaidburn, Whalley, Clitheroe, Bolton-by- Bowland
- 1995 Ribble, Calder, Darwen Ribchester
- 2000 Ribble, Calder, Darwen Ribchester,
- 2002 Calder, Darwen Whalley
- 2012 Calder, Whalley
- 2015 Ribble, Calder Whalley, Ribchester and outlying villages

4.3 Environment Agency

The Environment Agency have stated that they do not have any Historic Flood Records for the application site

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 proposed development site is partially located within Zones 2 and 3.

The definition for each of the flood zones highlighted above is provided for reference within Section 2.2.3 of this report.

5.2 Sources of Flooding

Table 3: Possible Flooding Mechanisms

Source/Pathway	Significant?	Comment/Reason
Fluvial	Yes	Flood Zones 2 and 3 (River Hodder)
Canal	No	Not Applicable
Tidal/Coastal	No	Not Applicable
Reservoir	No	EA Map shows that the site may be affected by reservoir flooding. However there has been no loss of life resulting from reservoir flooding in the last 100 years and therefore the risk is considered to be low.
Pluvial (urban drainage)	No	Existing drainage to be reused where possible
Groundwater	No	SFRA states that groundwater flooding within the area is not considered to be a significant risk
Surface Water Flooding	Yes	Site is located within an area that has a low to high risk of flooding
Overland Flow	Yes	Possible overland flow from the north west boundary
Blockage	No	Not Applicable
Infrastructure failure	No	Not Applicable
Rainfall Ponding	No	No areas of ponding identified within the boundary of the site.

From the initial assessment it is concluded that the primary source of flood risk will be from the fluvial source the River Hodder and surface water flooding /overland flow.

Fluvial: River Hodder

The River Hodder is located adjacent to the east boundary of the application site where it flows a southerly direction.

The River Hodder is considered to be a Main River and therefore the Environment Agency has certain roles and responsibilities regarding maintenance and management of the watercourse.

The majority of the proposed development site is located within Flood Zone 1, however the east of the site is located within Flood Zones 2 and 3, as such further evaluation of fluvial flooding has been undertaken within Section 6.1 of this report.

Surface Water Flooding / Overland Flow

The Environment Agency's Surface Water Flood Map identifies that the application site has a low to high risk associated with pluvial (surface water) flooding.

Figure 5.1: Environment Agency Surface Water Flood Map



- **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.
- **Medium risk** means that this area has a chance of flooding of between 1% and 3.3% each year. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.
- **High risk** means that this area has a chance of flooding of greater than 3.3% each year. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Due to the risk associated with surface water flooding being considered high risk at worst, flooding from this mechanism requires further evaluation.

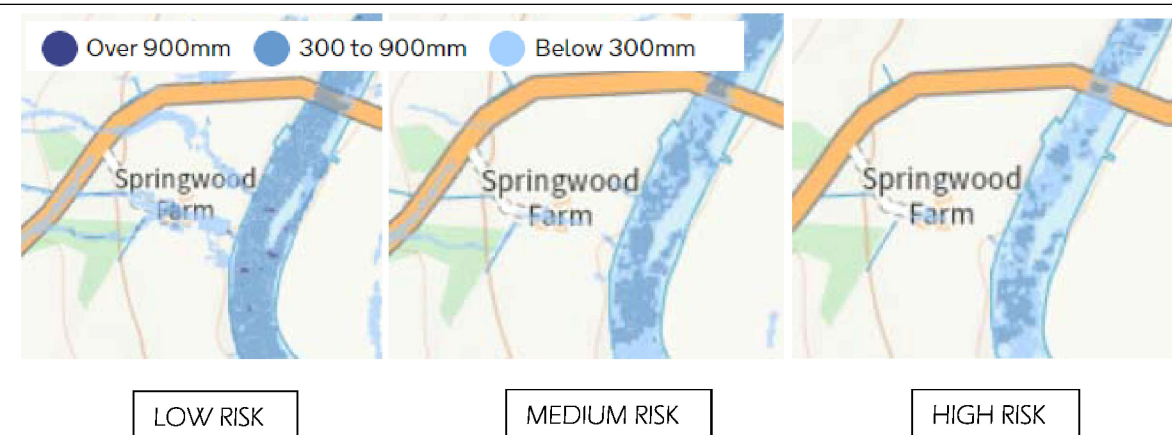
6.0 Quantitative Flood Risk Assessment

6.1 Pluvial / Overland Flow

6.1.1 General

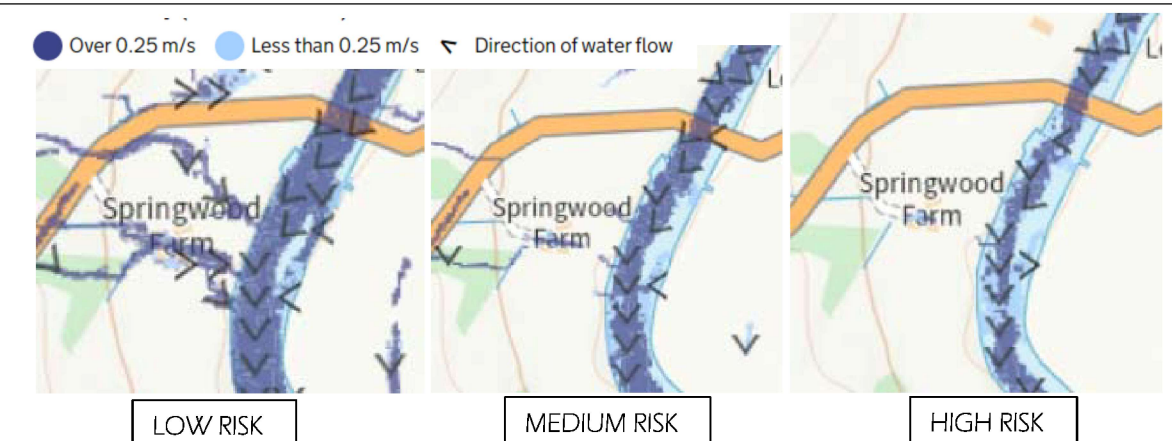
The Environment Agency's Surface Water Flood Map identifies that the site has a high to low risk associated with pluvial flooding. Evaluation has been undertaken to determine flood depths and velocities within the curtilage of the redline boundary of the proposed development, this is shown below for a range of events.

Figure 6.1: Environment Agency Surface Water Flood Depth



Source: www.gov.uk

Figure 6.2: Environment Agency Surface Water Flood Velocity



Source: www.gov.uk

6.1.2 Low Risk Event

During the low risk event (1:1000 year) the depths and velocities at the site are identified below:

- Depth = Between 300mm – 900mm
- Velocity = Over 0.25m/s

6.1.3 Medium Risk Event

During the medium risk event (1:100 year) the magnitude of flooding has reduced compared to the low risk event, the depths and velocities are identified below:

- Depth = Below 300mm
- Velocity = Over 0.25m/s

6.1.4 High Risk Event

During the high-risk event (1:30 year) the magnitude of flooding has reduced compared to the medium risk event, the depths and velocities are identified below:

- Depth = Less than 300mm
- Velocity = Less than 0.25m/s

6.1.5 Pluvial: Conclusion

A surface water flow route passes through the site from the north west boundary making its way into the River Hodder located at the east of the site. Due to the scale and nature of surface water flooding it would be difficult to pin point the specific reason as to why this occurs. However, it is likely to be as a result of topographical depressions facilitating flow routes in the direction of the watercourse.

During the worst-case scenario i.e. the low risk event the depth is considered to be between 300mm and 900mm with a velocity of more than 0.25m/s.

In conclusion, providing that flood resilience/resistance measures are incorporated into the development proposals, the risk of surface water flooding can be suitably managed.

6.2 Fluvial: River Hodder

6.2.1 General

The River Hodder is located adjacent to the east boundary of the application site where it flows a southerly direction.

The River Hodder is considered to be a Main River and therefore the Environment Agency has certain roles and responsibilities regarding maintenance and management of the watercourse.

Due to the application site being partially located within Flood Zones 2 and 3 an evaluation to determine the depth associated with fluvial flooding at the proposed development site has been undertaken.

6.2.2 Environment Agency Modelled Flood Levels

The Environment Agency have not been able to provide any modelled flood levels associated with the River Hodder, they have stated the following:

'We do not hold any further modelling for this site therefore we are unable to provide a product 4.'

Taking the above into account flood levels have been determined by transposing the flood map for planning over the topographical survey and LIDAR Data to estimate flood levels for Flood Zone 2 and 3 (see figure 6.1).

6.2.3 1 in 100-year Flood Event (Flood Zone 3)

The flood level associated with the 100-year event is estimated using LIDAR and the topographical survey as 43.260m AOD.

The existing finished floor levels associated with each building is shown below:

- Springwood House = 44.520m AOD
- Barn = 43.950m AOD
- Garage = 43.770m AOD

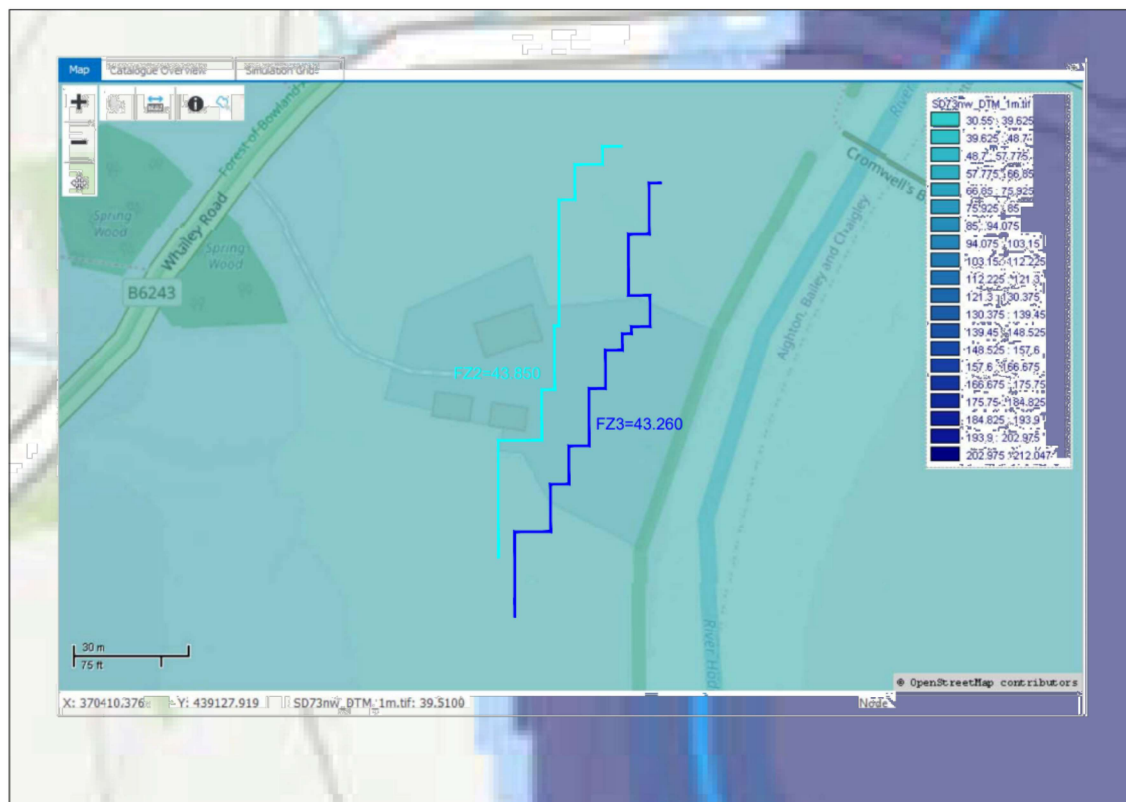
As such based on the available data during the 100 year return period the footprints of the existing buildings should not be affected and therefore has a low risk of flooding.

6.2.4 1 in 1000-year Flood Event (Flood Zone 2)

The flood level associated with the 1000-year event is estimated using LIDAR and the topographical survey as 43.850m AOD.

Based on the available data, during the 1000 year return period the footprint of the garage is expected to flood to a depth of 0.100m, however the farm house and the garage should not be affected and therefore have a low risk of flooding.

Figure 6.3: Flood Extent and Associated Levels



Source: FRDS

6.2.5 Fluvial: Conclusion

Following a review of all the available information, it is concluded that the existing buildings have a low risk of flooding during the 1 in 100 year and 1 in 1000 year events.

However, due to the proximity of the development proposals to the outlines of Flood Zones 2 and 3, it is recommended that flood resilience/resistance measures are incorporated into the design of the extensions set at a minimum of 900mm above proposed finished floor levels.

7.0 Mitigation Measures

7.1 Finished Development Levels

Due to the development proposals comprising of extensions to existing buildings, proposed finished floor levels must remain in line with existing finished floor levels for level access and restrictions from ceiling heights.

Existing Finished Floor Levels

- Springwood House = 44.520m AOD
- Barn = 43.950m AOD
- Garage = 43.770m AOD

Springwood House is currently elevated in excess of 600mm above the 1 in 1000 year event (44.450m AOD) by 0.070m, therefore based on the available data this property is considered to be low risk associated with fluvial flooding. Therefore, it is the decision of the developer if they wish to incorporate flood resilience/resistance measures into the property.

The Barns finished floor level is currently below the 1 in 1000 year + 0.600m i.e.. 44.450m AOD, therefore it is proposed that extra flood resilience/resistance measures are incorporated into the property up to a level of 0.900m above existing finished floor levels.

The Garage is currently set 0.675m below the 1 in 1000 year event + 0.600m = 44.450m AOD. However, it is noted that the garage will be for less vulnerable development and therefore flood resilience/resistance measures are not considered necessary. Therefore, it is the decision of the developer if they wish to incorporate flood resilience/resistance measures into the property.

7.2 Flood Resilience/Resistance

Flood resilience/resistance measures must be set at a minimum of 0.900m above finished floor levels, these are outlined in bold below.

Flood Resilience/Resistance Measures

- Springwood House = 44.520 + 0.900 = 45.420m AOD (flood resilience/resistance decision of the developer/client)
- Barn = 43.950 + 0.900 = 44.850m AOD (flood resilience/resistance must be incorporated into the property)
- Garage = 43.77 + 0.900 = 44.670m AOD (flood resilience/resistance decision of the developer/client)

Flood proofing is a technique by which buildings are designed to withstand the effects of flooding. There are two main categories of flood proofing, which are dry proofing and wet proofing.

Dry proofing methods are designed to keep water out of the building, and wet proofing methods are designed to improve the ability of the property to withstand effects of flooding once the water has entered the building.

In addition, fixtures and fittings should be built to withstand immersion in water or designed to be easily replaced.

Identified below are flood proofing measures which can be incorporated within the design for the proposed redevelopment works. Such measures are put forward in accordance with 'Development and Flood Risk Guidance for the Construction Industry' CIRIA C624.

It would be preferable to avoid external doors as this would remove a potential point of flood inflows. However, since free access and egress into the building will be required, flood resistant doors and/or the use of flood resistant stop logs or flood boards should be considered.

Full details of manufacturers or suppliers of flood protection equipment may be obtained from the Flood Protection Association (website: www.thefpa.org.uk).

Flood Resilience/Resistance measures to be Incorporated into the development

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required.
- Avoid using timber frame and cavity walls. Consider applying a water-resistant coating.
- Avoid use of gypsum plaster if possible or apply plasterboards horizontally rather than vertically
- Avoid use of stud partition walls.
- Wall sockets to be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property.
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.
- Storage of any materials or possessions that may be susceptible to flood damage should be stored or raised at a level 0.900m above finished floor levels to limit the damage caused in the event of a flood.
- Non-Return Valves fitted to prevent backflow of sewage which can occur during flood conditions.
- Avoid fitted carpets where possible.
- Locate electrical, gas and telephone equipment and systems as high as practically feasible
- Fit flood specific external doors at ground floor level or at the very least flood barriers which can be installed prior to flooding.

7.3 Environment Agency Flood Warnings

The application site is situated within an area not covered by the Environment Agency's Flood Warning's Direct Service.

However, due to the site being within close proximity of the River Hodder, it is advised that residents sign up to receive Environment Agency Flood Alerts.

The Flood Warning's Direct Service is a free service which enables the Environment Agency to send a direct message when flooding is expected and may affect the development. Flood warnings are designed to provide businesses the time to prepare for flooding. Flood warnings can be sent by telephone, mobile, email SMS text message or fax.

The Environment Agency also provides the Floodline 0845 988 1188 service, where occupants can listen to recorded flood warning information for the area or speak to an operator for advice 24 hours a day.

Should a flood event reach the level where development is at risk of inundation, then the Environment Agency will issue a Severe Flood Warning.

Using the latest available technology, the Environment Agency is able to monitor rainfall, river levels and sea conditions 24 hours a day and use this information to forecast the possibility of flooding.

If flooding is forecast, they are able to issue warnings using a set of three different warning types.

Table 4: Environment Agency Flood Warning Codes

Flood Warning Code	What it means	When it's used	What to do
	Flooding is possible. Be prepared.	2 hours – 2 days in advance of flooding.	• Be prepared to act on you flood plan • Prepare a flood kit • Monitor local water levels and the flood forecast of the EA website

 FLOOD WARNING	Flooding is expected. Immediate action is required.	½ hour – 1 day in advance of flooding.	• Move people to a safe place • Turn off gas, electricity and water supplies if safe to do so • Put flood protection equipment in place
 SEVERE FLOOD WARNING	Severe flooding. Danger to life.	When flooding poses a significant threat to life.	• Stay in a safe place with means of escape • Be ready to evacuate • Co-operate with the emergency services • Call 999 if you are in immediate danger
Warnings no longer in force	No further flooding is currently expected in your area	When river or sea conditions begin to return to normal	• Be careful as flood water may still be around for several days • If you have been flooded, ring your insurance company as soon as possible

How are Flood Warnings issued?

- **Direct to you** – receive warnings by phone, text, email or fax. Sign up for the Environment Agency's FREE Floodline Warnings Direct service via this website link: <https://www.fws.environment-agency.gov.uk/app/olr/register> or by calling Floodline on 0845 988 1188.
- **On the flood warnings website** – view up-to-date information about flood warnings in force, monitor the river or sea levels in your area and check out the latest flood risk forecast for your county.
- **By calling Floodline on 0845 988 1188** – you can listen to recorded information on the latest warnings and predictions or speak to an operator for more general information 24 hours a day. Environment Agency operators can also provide a quick dial number which gives you faster access to information for your area.
- **Through the media** – you may see or hear Environment Agency warnings on television and in radio broadcasts. You can also view the latest warnings on Digital Ceefax page 405.
- **Flood Wardens** – in some areas Flood Wardens are there to alert and support their local community when a flood warning is issued. Call Floodline on 0845 988 1188 to find out if this service is available in your area.
- **Sirens/loudhailers** – in some areas the Environment Agency uses loudhailer or siren systems to warn people that a flood warning has been issued. Call Floodline on 0845 988 1188 to find out if this type of service operates in your area.
- **Flood warning feeds** – Flood warning (RSS) feeds shows national and regional flood warnings in force and are updated every 15 minutes. The feeds contain a brief summary and link to the full information on the Environment Agency website.

7.4 Emergency Evacuation Route

It is recommended that persons on site are prepared to evacuate away from the property, if advised to do so by the EA Flood Alert Service, the emergency services and/or local authority, in the advance of the onset of any flooding.

Evacuation away from the property during fluvial flood events should be directed out of the north of the site, then south along Whalley Road. It is noted that dry access and egress is available at all times.

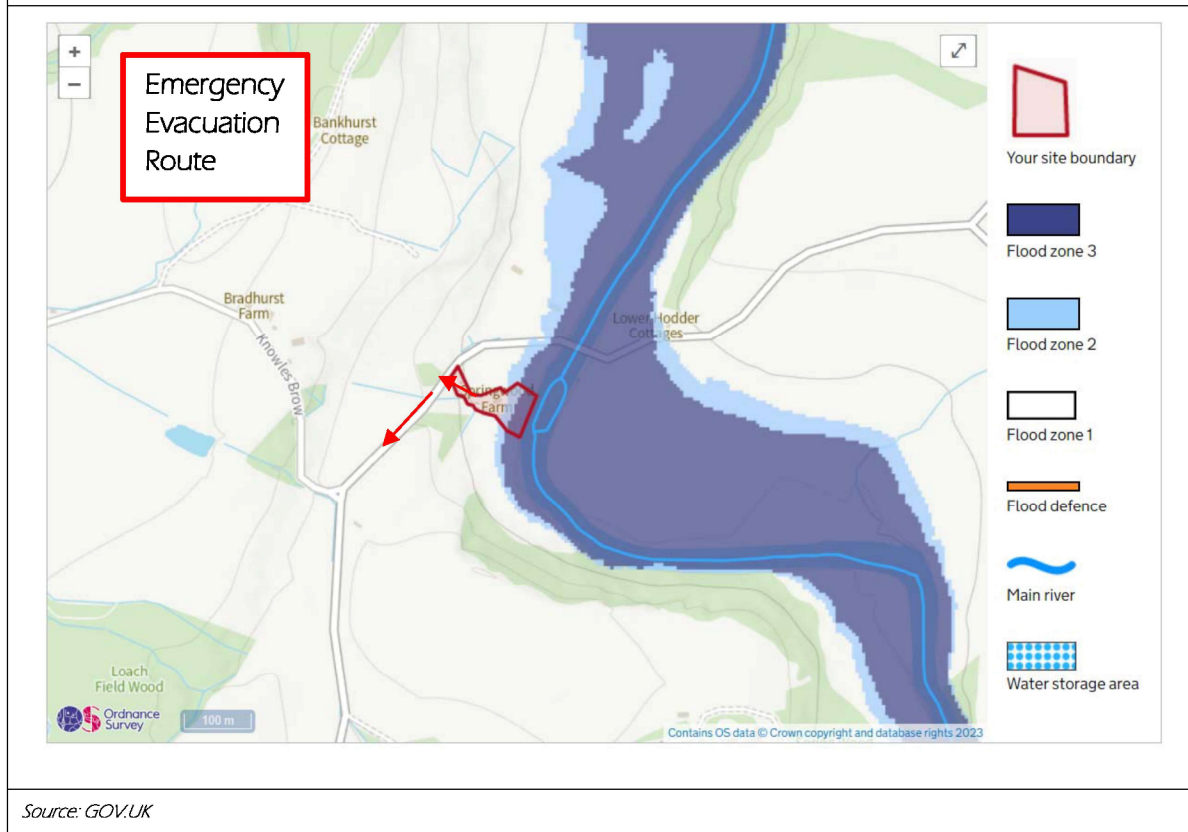
The Emergency Evacuation Route is depicted for reference within Figure 7.1.

7.5 Personal Flood Plan

It is also recommended that residents create a personal flood plan. This is a simple document that assists the occupant to prioritise actions required at the property before, during and following a flood event.

A copy of a Personal Flood Plan Template has been provided within the appendices of this report.

Figure 7.1: Suggested Evacuation Route



8.0 Conclusions & Recommendations

Surface Water Flooding/Overland Flow

A surface water flow route passes through the site from the north west boundary making its way into the River Hodder located at the east of the site. Due to the scale and nature of surface water flooding it would be difficult to pin point the specific reason as to why this occurs. However, it is likely to be as a result of topographical depressions facilitating flow routes in the direction of the watercourse.

During the worst-case scenario i.e. the low risk event, the depth is considered to be between 300mm and 900mm with a velocity of more than 0.25m/s. However, during the most frequent scenario i.e. the high risk event the depth is below 300mm with a velocity of less than 0.25m/s.

In conclusion, providing that flood resilience/resistance measures are incorporated into the development proposals, the risk of surface water flooding can be suitably managed.

Fluvial Flooding: River Hodder

The Environment Agency have not been able to provide any modelled flood levels associated with the River Hodder, they have stated the following:

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Taking the above into account, flood levels have been determined by transposing the flood map for planning over topographical and LIDAR Data to estimate flood levels for Flood Zone 2 and 3.

Following a review of all the available information, it is concluded that the existing buildings have a low risk of flooding during the 1 in 100 year and 1 in 1000 year events.

However, due to the proximity of the development proposals to the outlines of Flood Zones 2 and 3, it is recommended that flood resilience/resistance measures are incorporated into the design of the extensions set at a minimum of 900mm above proposed finished floor levels.

Flood Mitigation Measures

Finished Floor Levels

Due to the development proposals comprising of extensions to existing buildings, proposed finished floor levels must remain in line with existing finished floor levels for level access and restrictions from ceiling heights.

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Flood Resilience/Resistance measures to be Incorporated into the development

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required.
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- Storage of any materials or possessions that may be susceptible to flood damage should be stored or raised at a level 0.900m above finished floor levels to limit the damage caused in the event of a flood.
- Non-Return Valves fitted to prevent backflow of sewage which can occur during flood conditions.
- Avoid fitted carpets where possible.
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- Fit flood specific external doors at ground floor level or at the very least flood barriers which can be installed prior to flooding.

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The application site is situated within an area not covered by the Environment Agency's Flood Warning's Direct Service.

However, due to the site being within close proximity of the River Hodder, it is advised that residents sign up to receive Environment Agency Flood Alerts.

Emergency Evacuation Route

It is recommended that persons on site are prepared to evacuate away from the property, if advised to do so by the EA Flood Alert Service, the emergency services and/or local authority, in the advance of the onset of any flooding.

Evacuation away from the property during fluvial flood events should be directed out of the north of the site, then south along Whalley Road. It is noted that dry access and egress is available at all times.

The Emergency Evacuation Route is depicted for reference within Figure 7.1.

Personal Flood Plan

It is also recommended that residents create a personal flood plan. This is a simple document that assists the occupant to prioritise actions required at the property before, during and following a flood event.

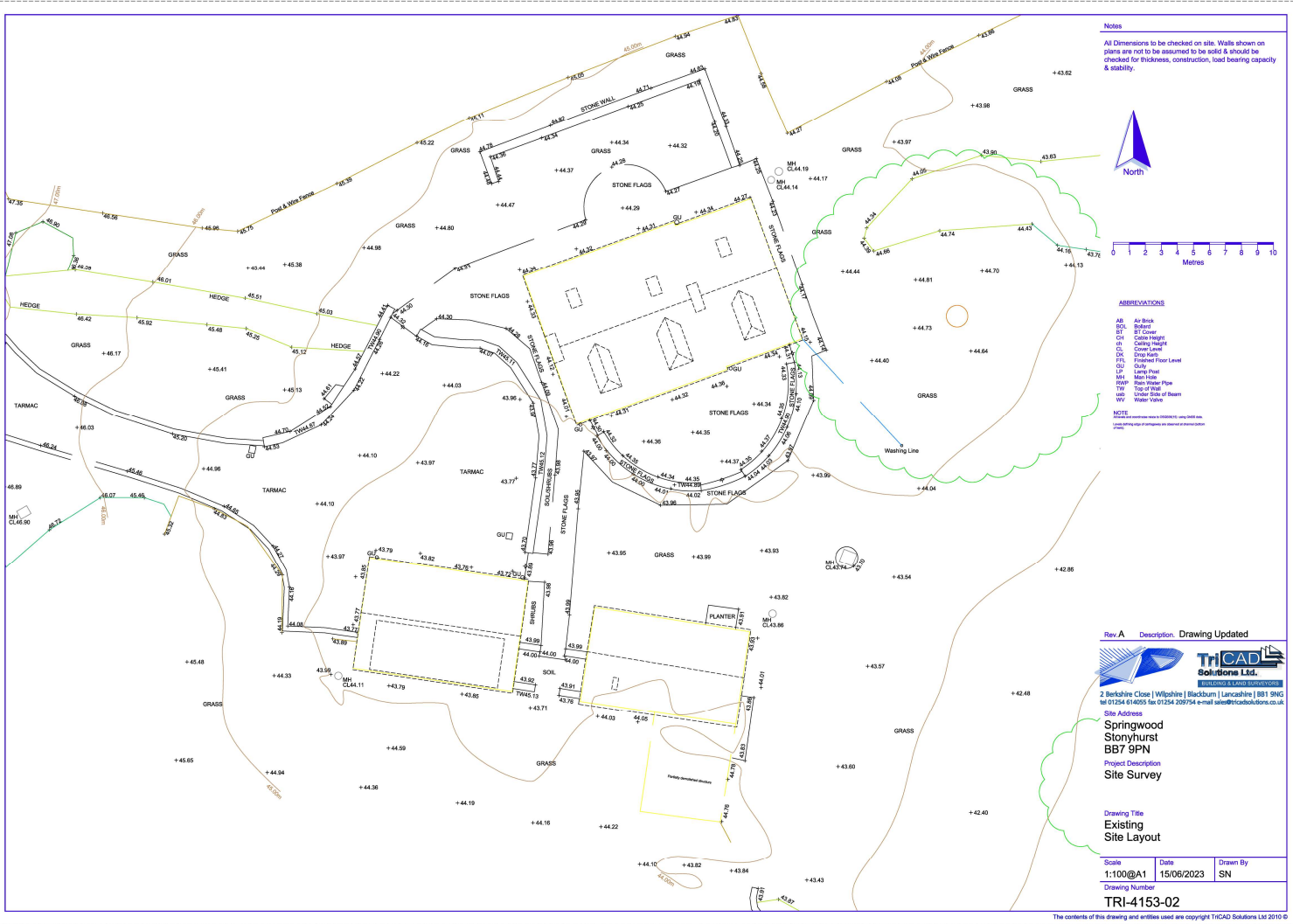
A copy of a Personal Flood Plan Template has been provided within the appendices of this report.

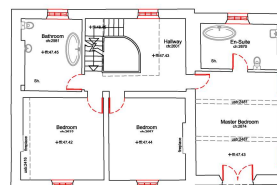
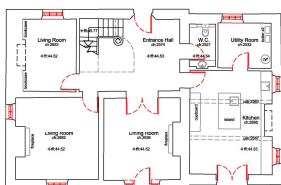
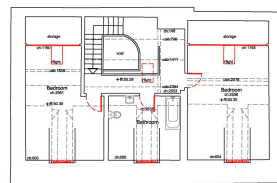
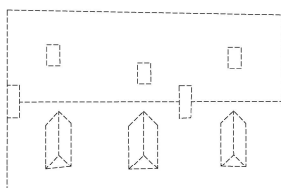
APPENDICES

Appendix A: - Development Proposals



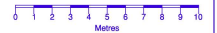
Appendix B: - Topographical Survey





Notes

All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.



ABBREVIATIONS

AB	Air Brick
BOL	Bollard
BT	BT Cover
CH	Cable Height
ch	Ceiling Height
CL	Cover Level
DK	Drop Keel
FFL	Finished Floor Level
GU	Gully
LP	Lamp Post
MH	Man Hole
RWP	Rain Water Pipe
TW	Top of Wall
usb	Under Side of Beam
WV	Water Valve

NOTE
 Elevations and coordinates relate to D650063YE using GRS84 data.
 Levels defining edge of terragenosity are shown at shaded bottom of each.

Rev. A Description. Drawing Updated



2 Berkshire Close | Wilpshire | Blackburn | Lancashire | BB1 9NG
tel 01254 614055 fax 01254 209754 e-mail sales@tricadsolutions.co.uk

Site Address

Springw

Springwood
Stonyhurst

Stonyhurs
BB7 8BN

BB7 9PN

Project Description

Site Survey

Drawing Title
Existing
Floor Plans

Scale	Days
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Scale	Date
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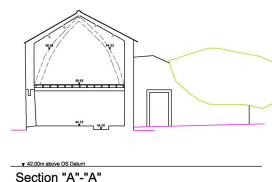
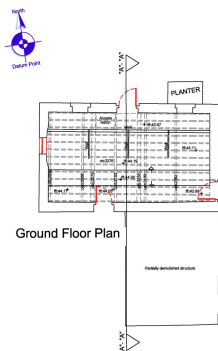
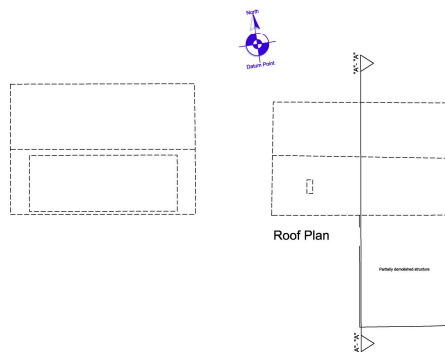
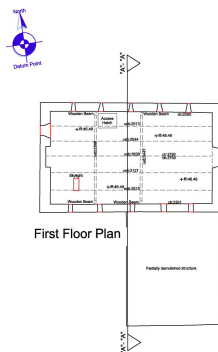
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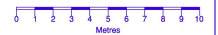
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of this drawing and entities use

THE GROWING AND CHANGING COUNTRIES



Notes
All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.



ABBREVIATIONS

AB Air Brick
BOL Bolting
BT BT Cover
CH Ceiling Height
CH Ceiling Height
CL Corner Level
DRL Drop Kerb
FSL Finished Floor Level
GL Gully
LP Lorry Post
M&T Manhole
RWP Rain Water Pipe
TW Top of Wall
UL Under Slope of Beam
VV Vertical

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Rev A Description Drawing Updated



2 Berkshire Close | Wilpshire | Blackburn | Lancashire | BB1 9NG
Tel 01254 614825 Fax 01254 209754 e-mail sales@thcad.co.uk

Site Address
Springwood
Stonyhurst
BB7 9PN

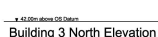
Project Description
Site Survey

Drawing Title
Existing
Floor Plans
& Section

Scale 1:100@A1 Date 15/06/2023 Drawn By SN IW

Drawing Number
TRI-4153-04

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All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.



AB	Air Brick
BOL	Bolt
BT	BT Cover
CH	Cable Height
ch	Ceiling Height
CL	Cover Level
DK	Drop Keel
FFL	Finished Floor Level
GU	Gully
LP	Lamp Post
MH	Man Hole
RWP	Rain Water Pipe
TW	Top of Wall
usb	Under Side of Beam
WV	Water Valve

NOTE
Altitudes and coordinates relate to CG2000 (YE) using GRS data.
Lowest different value of latitudes was observed at station 1001.

Rev. A Description Drawing Updated



2 Berkshire Close | Wilshire | Blackburn | Lancashire | BB1 9NG
tel 01254 614055 fax 01254 209754 e-mail sales@tricadsolutions.co.uk

Site Address
Springwood
Stonyhurst
BB7 9PN

BB7 9FN

Project Description

Site Survey

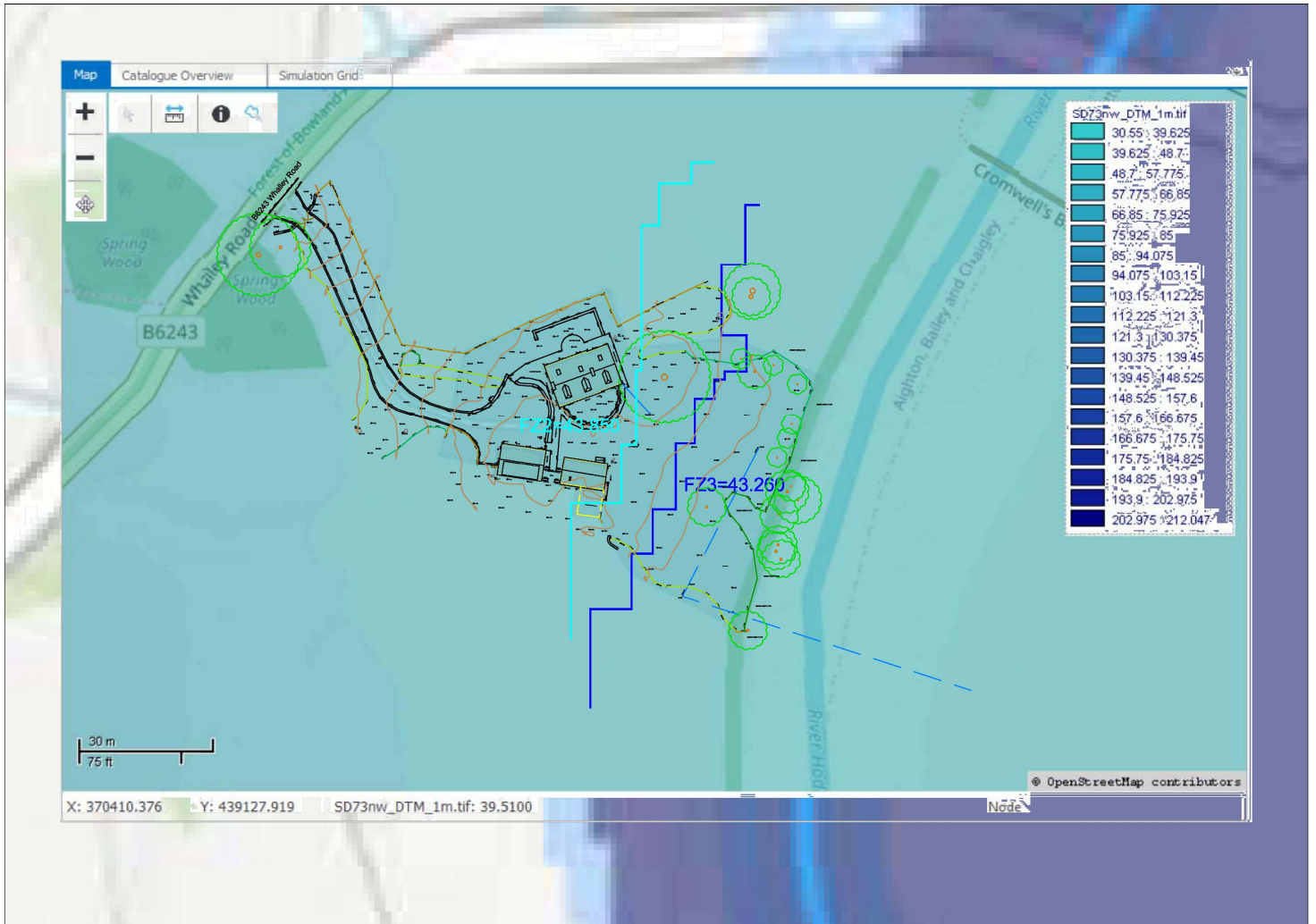
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Elevations

Scale	Date	Drawn By
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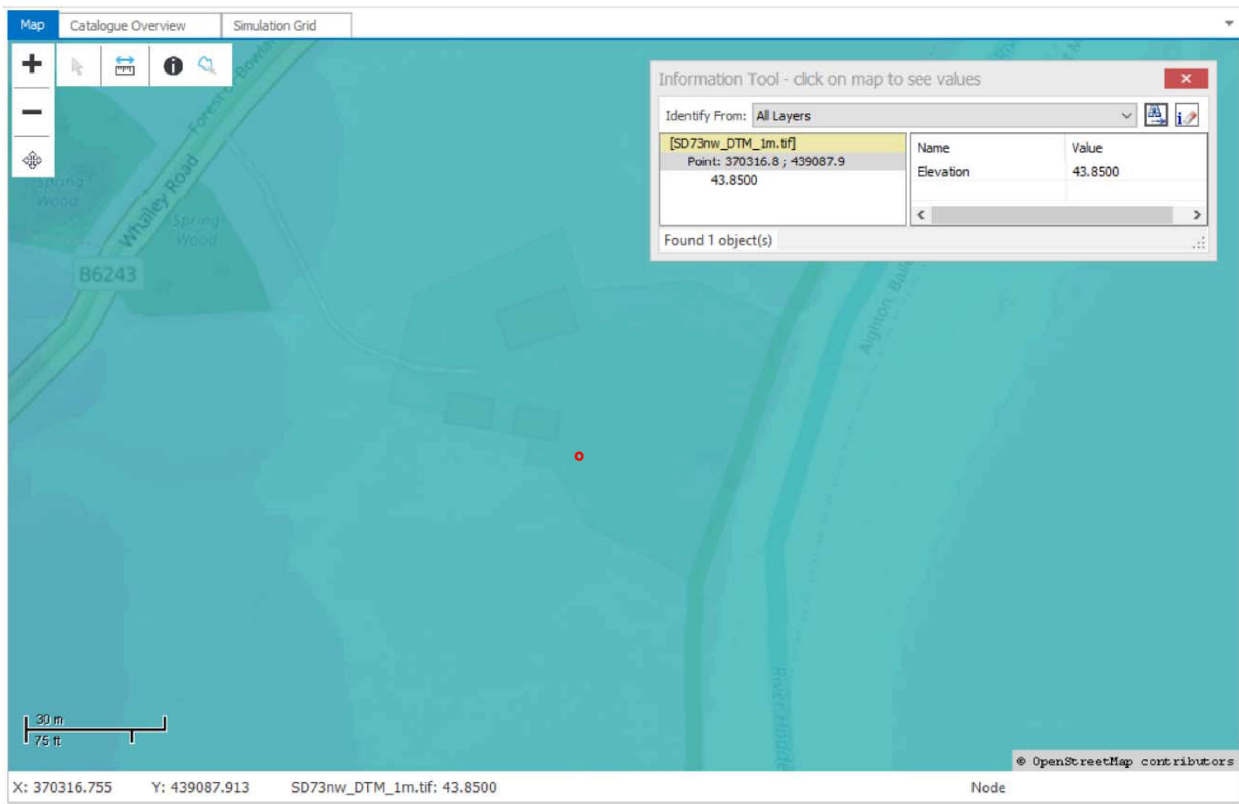
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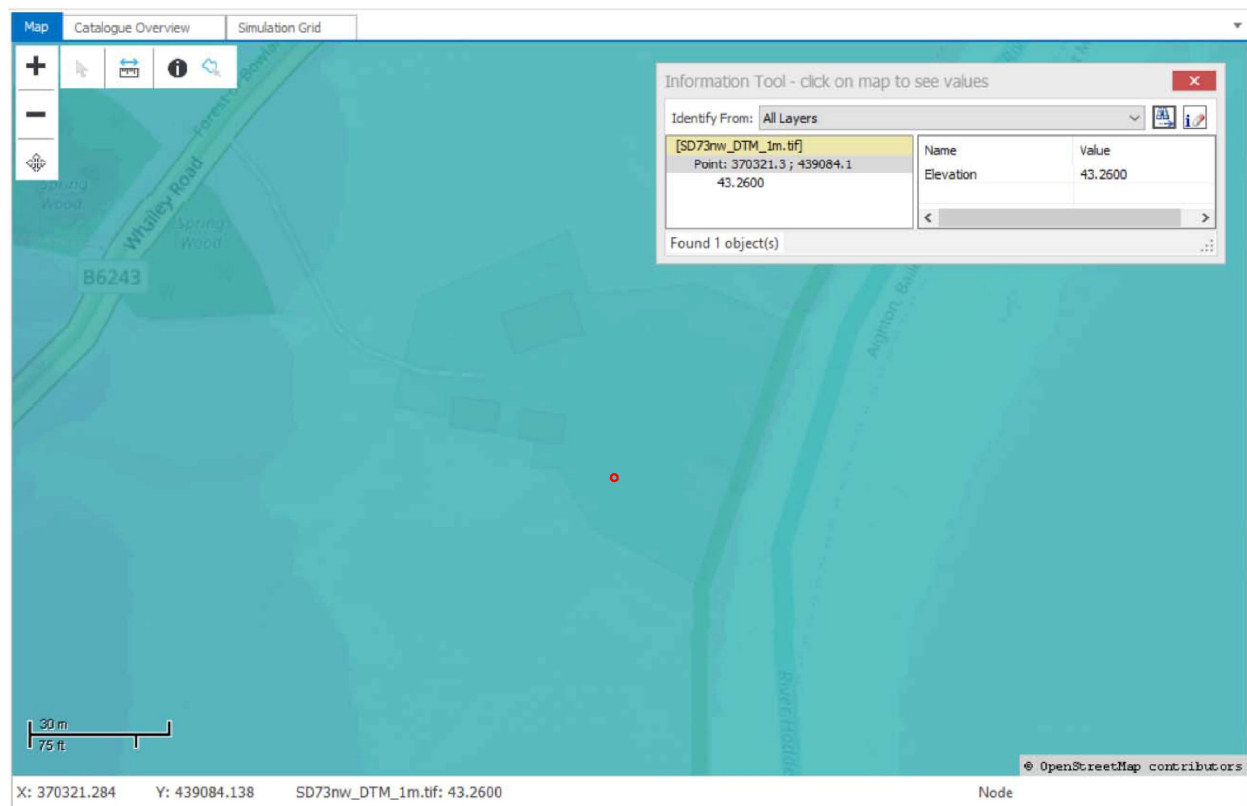
Appendix C: - Topo/LIDAR Flood Extent and Estimated Levels



Flood Zone 2 Flood Level = 43.850



Flood Zone 3 Flood Level = 43.260



Appendix D: - Personal Flood Plan

Personal flood plan

Checklists to help you prepare for flooding

Before a flood

Actions	Done	Notes
Check what to do before or during a flood		
Sign up for flood warnings		
Check you understand what the warnings mean: • Flood alert • Flood warning • Severe flood warning		
Note your local radio station for travel and weather updates		
Note the phone number for Floodline (0345 988 118)		
Note your local websites and social media for updates		
Check if your insurance covers you for flooding		

Think about how you could stop water entering your home		
Check you know how to turn off your electricity and water		

Move important documents and possessions to a high-up place so that they're safe from flood water. Protect them in a waterproof container. Keep them in a place that is easy to get to in an emergency.

Documents	Done	Notes
Passport		
Driving licence		
Medical cards		
Insurance documents		
Computers or laptops		
Mobile phones and charges		
Important photos and papers		
Items of sentimental value		

Getting help

Keep a note of who can help you and anyone you can help.

This might be relatives, friends or neighbours. Make a note of what help you might need from them, or what you can do to help them.

Contact details you might need

Insurance	Done	Notes
Home		
Contents		
Vehicle		

Utilities	Done	Notes
Electricity		
Gas		
Water		
Telephone		
Broadband		
Mobile phone		
Media providers		

Finance	Done	Notes
Bank accounts		

Pets	Done	Notes
Kennels		
Carers		
Vets		

Council	Done	Notes
District or unitary		
Town or parish		

Medical	Done	Notes
Doctors		
Hospitals		

Preparing a flood kit

Items you might want to include	Done	Notes
Important documents and contact information		
Warm, waterproof and dry clothing and footwear		

A torch		
Drinking water		
Medicine		
Toys for children		
Baby care items		
Mobile phone or device charger or spare batteries		

Pets and animals

Think about what to do with pets if a flood happens.

Actions	Done	Notes
Where they might go		
Food		
Carriers		
Medicines		

If you are asked to evacuate, many centres will allow you to bring your pet. Put cats or small animals in a carrier or small box.

Immediately before a flood

Actions you can take if you know you are about to be flooded

Actions	Done	Notes
Turn off electricity, water and gas supplies		
Lift curtains over rails above flood water levels		
Use any measures you have to stop water entering your property, such as door guards or air brick covers		
Move important items to safety		
Lift rugs and smaller furniture upstairs or on to tables or worktops if possible		
Get your flood kit together and prepare to move from your home		
Move your pets and vehicles away from flood areas if possible		
Make sure your mobile phone or devices are charged		

When a flood happens

Actions you should take

Actions	Done	Notes
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Follow warnings, information and advice issued by authorities		
Do not walk or drive through flood water, as it may conceal hidden dangers		
Do not put yourself or others at risk		
Take your flood kit with you if you are directed to an evacuation centre		
Let your family or friends know you are safe		
Check they are safe too		

After a flood

Actions you can take

Actions	Done	Notes
Do not return to your home until you are told it is safe to do so		
When returning home, remember that flood water may contain sewage and conceal hidden dangers		
Wear appropriate waterproof or protective clothing when cleaning up		

Contact your insurance company to start the claims process		
If you rent your property, contact your landlord and contents insurance company		
Throw away items damaged by flood water after your property and items have been checked by a loss adjuster		
Throw away items in an appropriate manner		

You may need gas or electricity engineers to check your supply before turning it back on.

Further information

You can find more information from:

- Your local council
- Your local advice centre
- The British Red Cross
- The National Flood Forum

Use this space to make any further notes you think might help you.