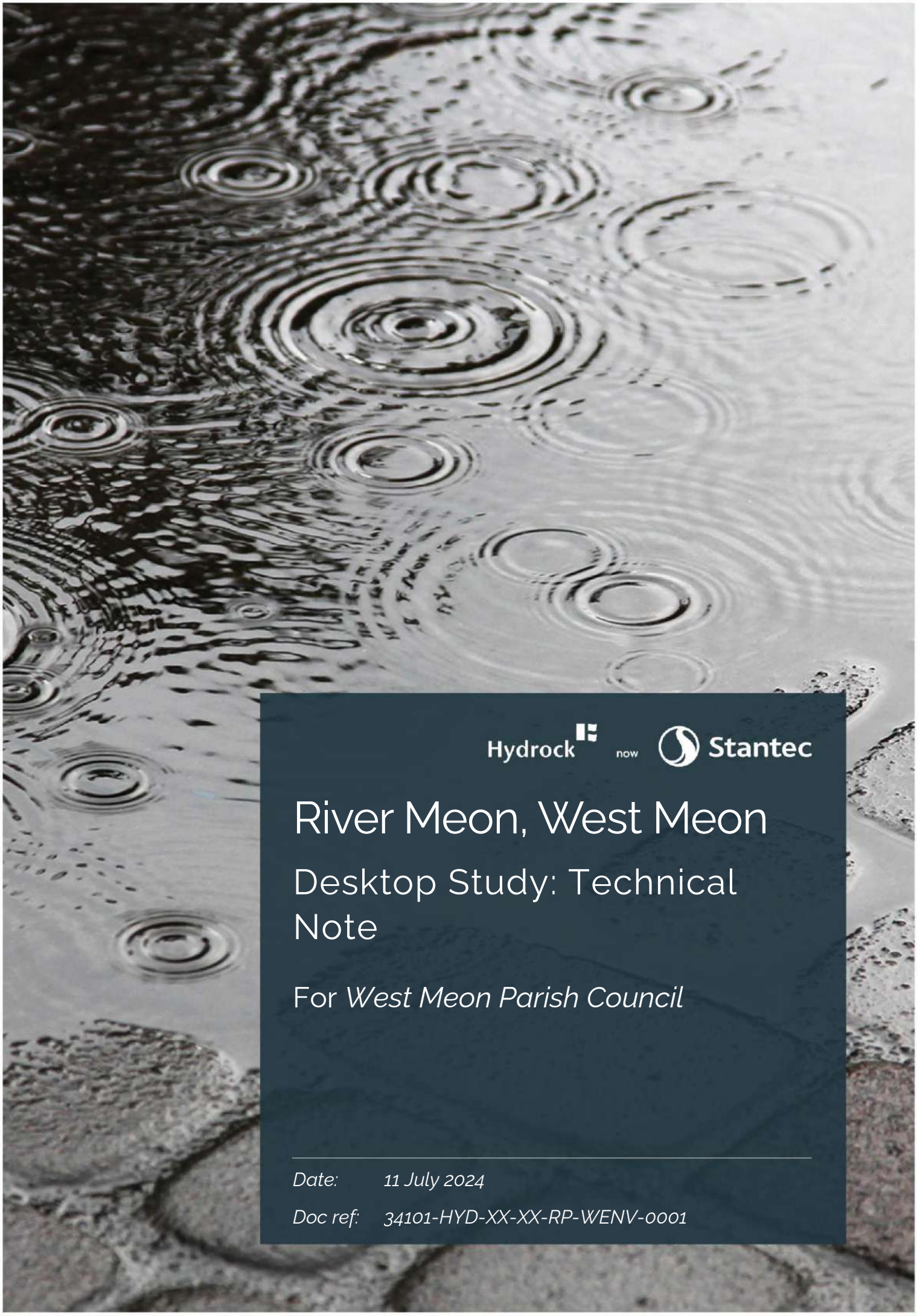

Hydrock now Stantec

River Meon, West Meon

Desktop Study: Technical Note

For *West Meon Parish Council*

Date: *11 July 2024*

Doc ref: *34101-HYD-XX-XX-RP-WENV-0001*

Document control sheet

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Hydrock Consultants Limited (Hydrock), now Stantec, has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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1. Introduction

Hydrock Consultants Limited (Hydrock), now Stantec, have been commissioned by West Meon Parish Council to undertake a flood risk investigation that identifies the various sources of flood risk and potential mitigation strategies for West Meon, Hampshire.

This flood risk investigation comprises a desktop study conducted through on-site observations and information obtained from publicly available sources, summarised in Section 1.1 of this report. Additionally, a field reconnaissance (walkover) has been undertaken to determine the nature of the site and its surroundings.

This report is also a scoping exercise that highlights the further work that is required in order to accurately define and quantify risk. This is an important step that is required to facilitate an assessment used to inform West Meon Parish Council of how to mitigate this risk in West Meon.

1.1 Available information

The following documents have been provided to Hydrock by West Meon Parish Council for use in the preparation of this report:

- Plan A: Road Flood Area Sketch **(Appendix A)**
- Plan B: Map of channel characteristics that could increase flood risk **(Appendix B)**
- West Meon Flood Map **(Appendix C)**

The following datasets were obtained from the Environment Agency (EA):

- Product 4 **(Appendix D)**; this includes detailed flood data, flood defence locations and attributes, and data on past flood events.
- Product 6; this is the hydraulic model output dataset, although the Product 6 dataset received for this study is limited in its use due to obsolete model data.

The following publicly available sources of information have been used:

- The Partnership for South Hampshire Strategic Flood Risk Assessment (SFRA) (2024) [1]
- EA 1m LiDAR dataset[2]
- National River Flow Archive (NRFA): Meon at West Meon Gauge Data[3]
- River Levels UK: River Meon at West Meon Gauge Data[4]
- DEFRA Hydrology Data Explorer: West Meon[5]

[1] Partnership for South Hampshire SFRA (2024) - Part 3: Winchester City Council
[2] EA 1m LiDAR dataset
[3] National River Flow Archive: 42030 - Meon at West Meon
[4] River Levels UK: River Meon at West Meon
[5] DEFRA Hydrology Data Explorer: West Meon

2. Site Description

West Meon is a village and civil parish located in south-eastern Hampshire, within the South Downs National Park and the City of Winchester district. It is located approximately 10.5 kilometres (km) west of Petersfield and approximately 4km north-west of East Meon, where the headwaters of the River Meon are located.

The key focus areas for flood risk in this study are situated along a stretch of the River Meon measuring approximately 2km; specifically, these are land adjacent to West Meon Road located to the east of the village centre, and land to the south of High Street and along Church Lane within the village centre.

The central portion of the focus area for this study is approximately located at National Grid Reference SU 64529 23999 and postcode GU32 1LT. The study area location plan is shown in **Figure 1**.

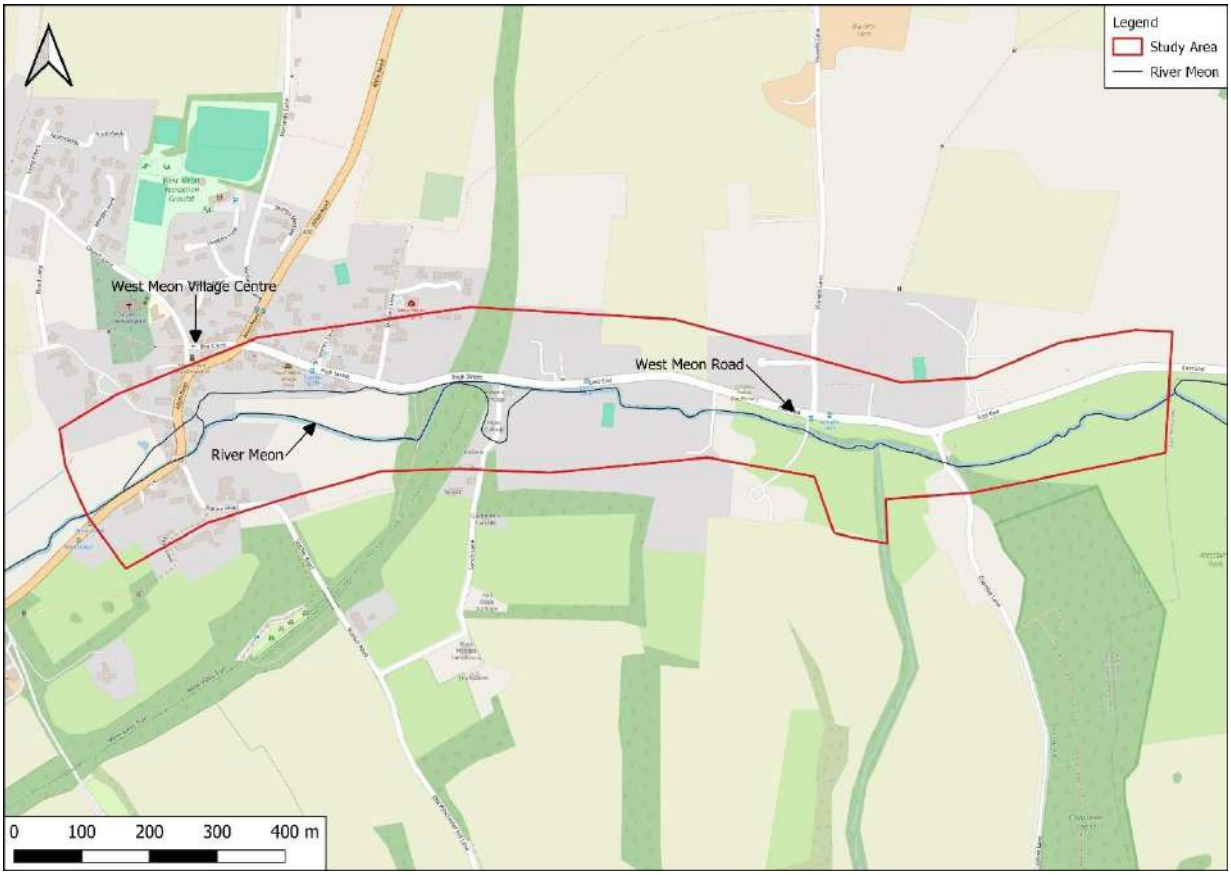


Figure 1: Site Location

The study area is located along the River Meon, which flows in a westerly direction through West Meon. EA LiDAR data show that the River Meon decreases in elevation by approximately 11m along the approximate 2km stretch within the study area, from 86.1m Above Ordnance Datum (AOD) in the east to 75.1m AOD in the west.

The study area is primarily comprised of agricultural and forested land. Residential uses are primarily concentrated adjacent to West Meon Road and within the village centre itself.

A rail viaduct previously ran through the middle of the study area in a north-south direction perpendicular to the River Meon during much of the 20th century. Although this has since been removed, the footprint of the former rail viaduct still impacts the topography of the study area and constrains flows into the main village.

2.1 Geology and Hydrogeology

British Geological Survey (BGS)[6] geology mapping (accessed June 2024) shows that the study area is underlain by Newhaven Chalk Formation. Superficial alluvium deposits overlie the bedrock geology in the shallow valley base along the River Meon.

Soilscapes[7] mapping shows that the underlying soils within the study area along the River Meon's floodplain are primarily indicated to be 'loamy and clayey floodplain soils with naturally high groundwater', which are 'naturally wet'. The underlying soils immediately adjacent to the primary floodplain are indicated to be freely-draining 'shallow lime-rich soils over chalk or limestone'.

According to the Department for Environment, Food and Rural Affairs (DEFRA) MAGIC mapping[8], the underlying bedrock geology at the site is categorised as a Principal aquifer, which is defined as a strategically important rock unit with high permeability and water storage capacity.

2.2 Hydrology

The River Meon is a 34km-long chalk stream designated by the EA as a Main River. It flows in a westerly direction through West Meon before continuing in a southerly direction towards its mouth in The Solent, approximately 25km to the south-west of West Meon.

The main channel of the River Meon runs through West Meon primarily in an individual channel until it reaches Lynch Lane, where artificial channel straightening undertaken in the 20th century created a secondary channel to avoid the original meander. A secondary channel also exists downstream of the former rail viaduct to the south of High Street within the main village. Additionally, a drainage ditch located immediately adjacent to the south side of West Meon Road forms an informal secondary channel. This ditch is activated particularly during flood events when floodwaters from the main channel collect in the field immediately to the east of Coombe Lane and flow into the drainage ditch, which itself becomes a source of flooding to the study area.

The River Meon is mostly lined by high ground on either side, with small sections of embankments downstream of West Meon and several short sections of river wall in West Meon. The Partnership for South Hampshire (PfSH) Strategic Flood Risk Assessment (SFRA) (2024)[9] states that most of the high ground along the River Meon has a design standard of protection for a 1 in 5 year flood event (20% annual probability).

Several structures are located within the channel, including a small weir, culverts, and pipes. When insufficient in size or poorly maintained, these can act as a constraint to flow within the River Meon.

2.3 Fluvial and tidal flood risk

According to the current EA Flood Map for Planning **(Appendix D; Figure 2)**, much of the study area is located within Flood Zone 3 (High Probability) and Flood Zone 2 (Medium Probability). This flood risk is associated with the River Meon, which has a catchment area of approximately 30.5km^2 at West Meon according to the Flood Estimation Handbook web service.

The study area is not at risk of tidal flooding as it is 25km from the nearest coastline and is situated entirely above 75m AOD.

The 'Flood defences' dataset provided by the EA **(Appendix D)** shows that several flood defences are located along the stretch of the River Meon within this study area. However, no areas have been recognised as benefitting from flood defences.

[6] BGS Geology Viewer
[7] LandIS - Land Information System - Soilscapes soil types viewer
[8] MAGIC (defra.gov.uk)
[9] Partnership for South Hampshire SFRA (2024) - Part 3: Winchester City Council

2.4 Surface water flood risk

According to the EA Long Term Flood Risk Map, much of the study area is located at 'Low' risk of surface water flooding (<0.1-1% annual probability), although some locations along the main river channel and drainage ditch running along the south of West Meon Road are at 'Medium' risk (1-3.3% annual probability) and 'High' risk (<3,3% annual probability).

EA mapping **(Appendix E)** also shows several overland flow routes running in a westerly direction along the River Meon main channel and the adjacent drainage ditch.

2.5 Groundwater flood risk

As identified in Section 1.5 of this report, the geology of the site indicates a chalk geology with naturally high groundwater and soils which are 'naturally wet'.

Groundwater flood risk is a key source of flooding to the study area due to the underlying chalk geology's high permeability (which indicates that most rainfall is directly absorbed into the ground) alongside the study area's naturally high groundwater levels. The 2024 PfSH SFRA states that the winter of 2000/2001 saw record high groundwater levels and exceptional spring flows within West Meon, which were exacerbated following runoff from periodic heavy rainfall episodes. The SFRA also reports groundwater flowing along the valley sides during this flood event, emerging as springs at the foot of the valley. Groundwater flooding was the primary source of flood risk during this event. Further details of this specific flood event are provided in Section 1.6 of this report.

West Meon is named by Hampshire County Council (HCC) as one of the areas with the highest groundwater flood risk, with a settlement-specific Action Plan having been developed accordingly.

Increased total winter rainfall associated with climate change could result in increased infiltration and seasonally higher groundwater levels, thus exacerbating groundwater flood risk.

2.6 Historic flooding

The study area regularly experiences seasonal flooding during autumn and winter when the River Meon exceeds its banks, flooding West Meon Road and some properties within the study area. The most severe instance of flooding in recent history occurred from 6-7 November 2000; during this event, river levels reached a record high of 0.93m (compared to a usual range of 0.05m-0.51m) and daily flow peaked at 2.214m3/s on 6th November 2000 (compared to a 0.176m3/s mean flow rate) according to National River Flow Archive (NRFA) gauge data. Subsequently, channel profile modifications, bank reinforcements, and the EA-funded installation of a weir took place in 2001. NRFA gauge data also show gauge daily flow rates of up to 2.213m^3/s in February 2014.

The 'Recorded Flood Outlines' dataset provided by the EA **(Appendix D)** shows that the study area is shown to be within the extents of the November 2000 flood event. The 2024 PfSH SFRA states that the winter of 2000/2001 was the wettest water year on record in West Meon, with a probability of annual occurrence of <1%. This flood event resulted in groundwater flooding to 16 properties (including three instances of cellar flooding, 11 instances of ground floor flooding, and three instances of contaminated sewage ground floor flooding). The SFRA also states that there is a history of flooding in West Meon, with eight homes flooding at Long Priors in 1989. A Historic Flooding Information report was received by HCC, but no further relevant information was included.

Anecdotal evidence provided by local councillors also states that seasonal flooding during autumn and winter often results in flooding to West Meon Road for up to 400m in length, although topography limits the extent of floodwaters into the main village. Additionally, external and internal property flooding has been recorded during autumn and winter flood events within properties on Lynch Lane located immediately adjacent to the River Meon according to local knowledge and imagery. This evidence is supported by the SFRA, which also states that the A32 and High Street flood regularly (possibly annually) when the River Meon exceeds its bank level.

3. Key flood risk locations and mechanisms

There are several key locations of flood risk within West Meon. These are depicted within **Figure 2** (which also shows the extents of Flood Zone 2 and Flood Zone 3), with details of their specific flood mechanisms outlined in the below sections.

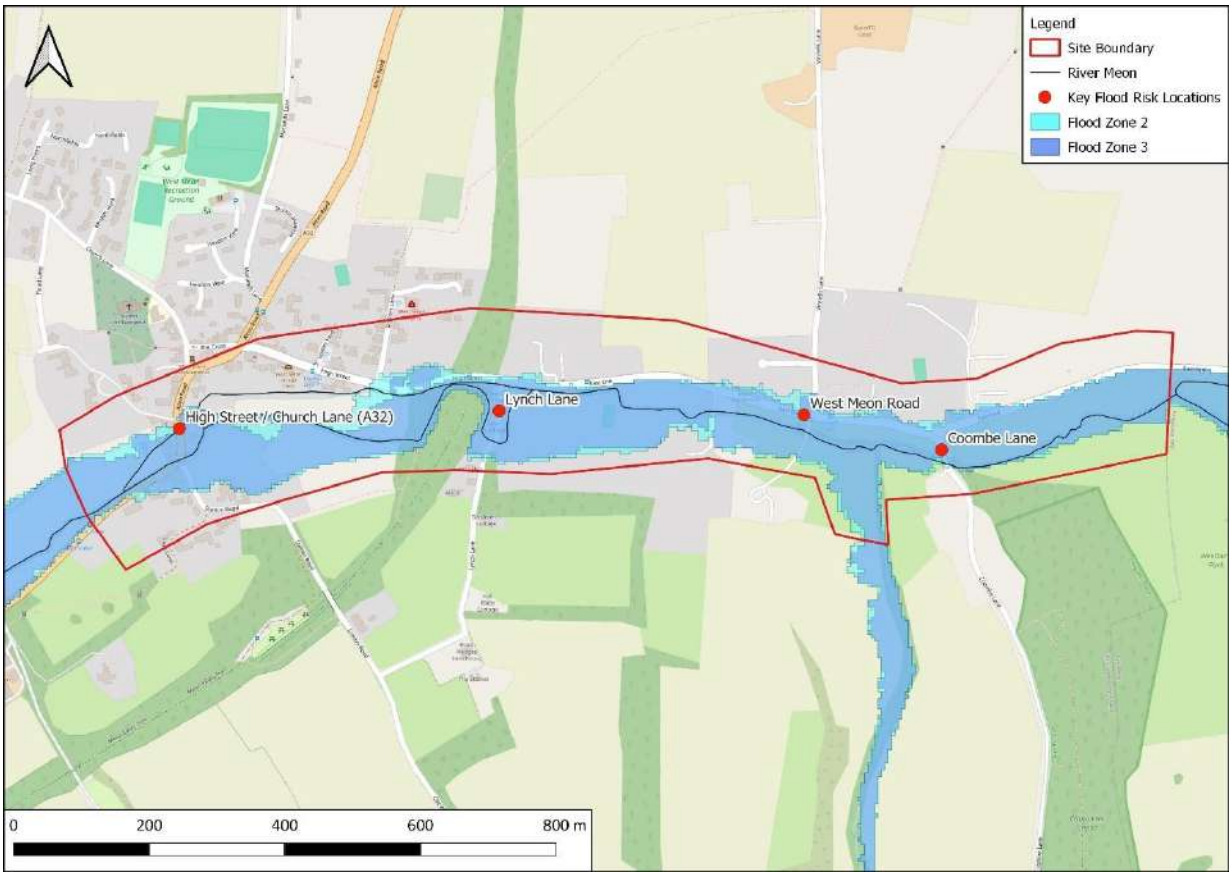


Figure 2: Key Flood Risk Locations

These locations have been identified primarily based upon local anecdotal information received during the field reconnaissance survey that Hydrock, now Stantec, undertook alongside local councillors on 4th June 2024. This survey was completed to obtain anecdotal information and visually assess the nature of the site and its surroundings, including current land uses, topography, hydrology, and the location and condition of in-channel structures.

Gauge data obtained from River Levels UK show that river levels within the River Meon at West Meon were 0.14m during the field reconnaissance survey, which is towards the lower end of the average level range. This is likely due to relatively dry antecedent conditions, which may not be representative of conditions during other times of the year when heavier rainfall is more likely. **Figure 3** shows the River Meon at the 'High Street / Church Lane (A32) location looking upstream (east) during the field reconnaissance survey in 'daily flow' (i.e. non-flood) conditions.

Figure 3: River Meon during typical daily flow conditions along Church Lane (A32) on 4th June 2024

3.1 Coombe Lane

The junction of Coombe Lane with West Meon Road is the most upstream of the four key flood risk locations within the study area, At this location, a small road bridge acts as a constraint to flow of the River Meon and the river banks adjacent to this bridge are partially eroded. During periods of high flow, the River Meon exceeds its banks and flows out onto the adjacent field. These flows then travel into the drainage ditch along the south side of West Meon Road depicted in **Appendix B**. Consequently, this results in the ditch conveying a large proportion of flow compared to the main channel and acting as a secondary channel.

3.2 West Meon Road

Flooding along West Meon Road typically begins near the junction with Coombe Lane as discussed in Section 3.1, before continuing westward for a length of up to 400m. West Meon Road usually experiences flooding on a seasonal basis during autumn and winter, resulting in limited vehicle access. Several drainage grips exist along West Meon Road to encourage floodwaters to return to the adjacent drainage ditch. Flooding along West Meon Road does not extend into the main village due to topography. As depicted in **Appendix B**, the road from West Meon Road onto Hall Farm contains a bridge that restricts flow along the River Meon due to the presence of two small pipes each with a diameter of approximately 30cm that are insufficient in size to manage flow. Flows back up along the river in this location and exacerbate flooding along West Meon Road.

3.3 Lynch Lane

The northern end of Lynch Lane near the junction with West Meon Road is a key area of concern for flood risk. In this location, the main channel bifurcates. A small EA-owned weir is located on the

upstream end of the original meander, which is not actively maintained by the EA and may present a key source of flood risk. Additionally, groundwater from a spring originating within a field adjacent to Lynch Lane cannot flow through the culvert situated along Lynch Lane during periods of particularly high groundwater levels due to its insufficient size. Floodwater thus travels along Lynch Lane, with topographical constraints at the junction with West Meon Road impeding the flow of floodwaters onto West Meon Road itself. Consequently, floodwaters back up within the northern end of Lynch Lane and flow into properties. Recent instances of external and cellar flooding have occurred within properties in Lynch Lane situated along the main channel.

3.4 High Street / Church Lane (A32)

The downstream end of the study area is located within the south-west corner of the main village and is another area of key flood risk concern. This area is situated along an area of the River Meon where it has split into two main channels, with a few properties located immediately adjacent to these channels. The channels flow through culverts under Church Lane (A32) and onto the fields to the west of the village.

4. Conclusion and Recommendations

4.1 Conclusion

The study area is located within Flood Zones 2 and 3 and within a high groundwater and surface water flood risk area. While groundwater flooding is the key source of flood risk in West Meon due to the village's underlying chalk geology, the conveyance of these groundwater flows into rivers and drainage networks results in flooding from rivers and surface water. During periods of high rainfall (particularly during autumn and winter), local groundwater levels can rise significantly and result in flooding to various locations along the River Meon within the study area. The activation of the drainage ditch along West Meon Road into an informal secondary channel is a key issue for flood risk according to anecdotal information. In-channel structures, including the weir, are likely to also contribute to flood risk within the study area.

4.2 Recommendations for further work

Following this desktop flood risk investigation, we recommend that a detailed hydraulic modelling study is necessary in order to fully quantify the extent and sources of flooding. It will be necessary to create a hydraulic model from scratch due to the low-resolution and obsolete JFLOW model data that has been provided by the EA. This modelling study would then be used as a tool to enable the recommendation of appropriate mitigation measures.

This baseline modelling study would quantify flows, velocities, and flood levels across West Meon and would identify specific areas where potential mitigation measures can be implemented.

Options to manage groundwater flood risk are more limited than options for managing fluvial and surface water flooding. However, the interaction of groundwater flows with the river system and drainage networks means that an integrated catchment approach to managing flood risk could be taken to reduce the impacts of flooding from various sources in West Meon. Potential mitigation options for West Meon that could be explored within a modelling study could include the improvements of drainage ditches and upgrades to culverts within the key flood risk areas noted in Section 3, the installation of additional pipe systems to collect groundwater, or the alteration of existing in-channel structures. It should be noted that any potential mitigation options situated on privately-owned land is subject to landowner consent before construction and implementation.

Upon completion of this modelling, the proposed mitigation options could be tested via post-development modelling. It should be noted that a separate fee proposal could be provided after reviewing the outcome of baseline modelling. The next steps would involve the following:

- Provide a scope and specification for watercourse survey using the information collected during the desktop study and site walkover.
- Calculate peak flows for the catchment using FEH methods and any suitable gauge information.
- Review survey data and build a baseline 1D/2D model of the River Meon over the study area, capturing the ley flood risk mechanism areas.
- Verify the model against gauge information where appropriate.
- Run the model for key return period events.
- Map peak flood depths and extents.
- Conduct sensitivity testing to ensure the model is robust.

Appendix A Plan A

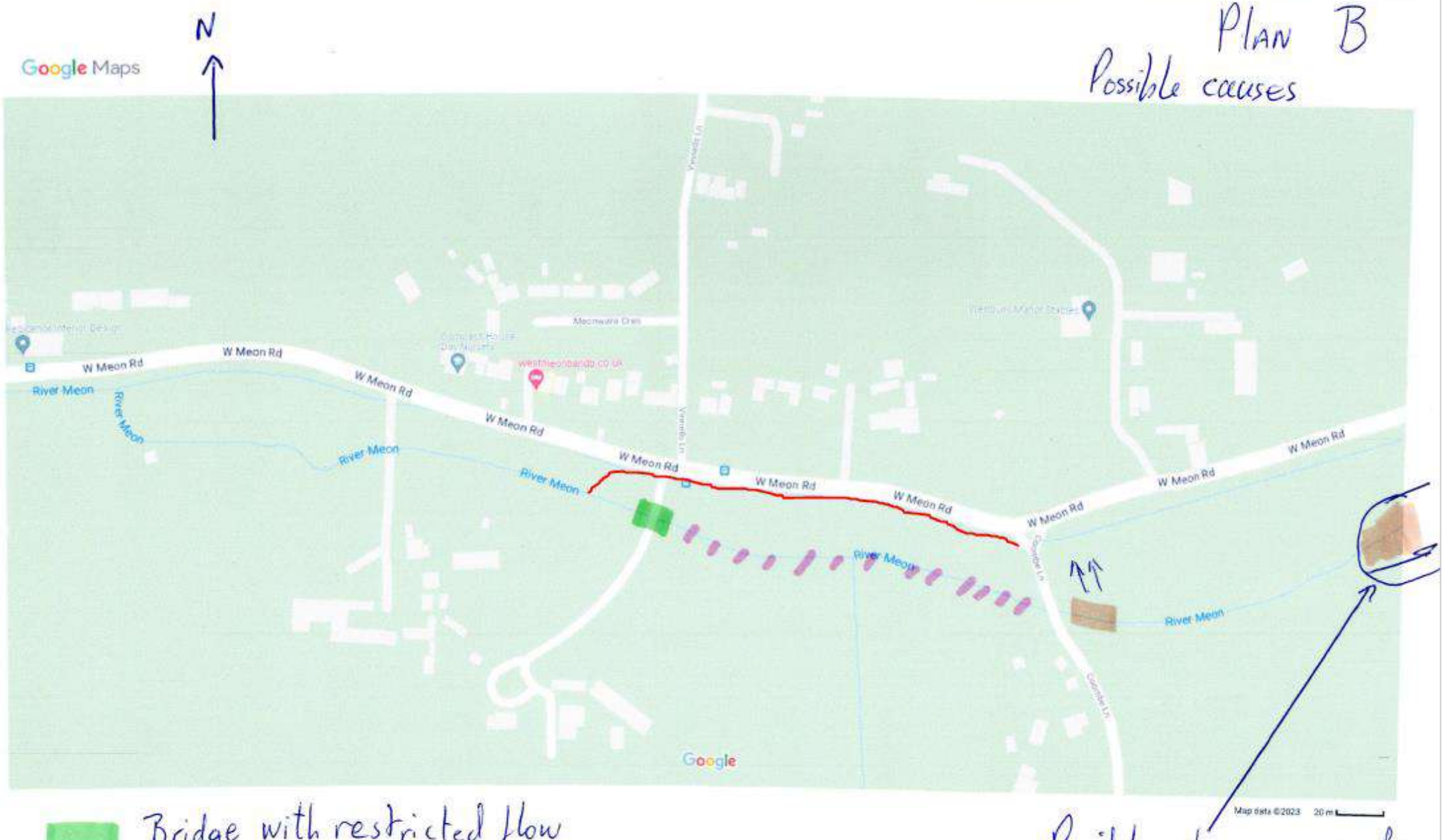
PLAN A
Road Flood Area

Google Maps

Map data ©2023 50 m

Measure distance
Total area: 7,876.17 m² (84,778.38 ft²)
Total distance: 753.77 m (2,472.99 ft)

Appendix B Plan B


Google Maps
N
Plan B
Possible causes
W Meon Rd
River Meon
Google
Map data ©2023 20 m
Bridge with restricted flow
Bank eroded
River overgrown
Drainage Ditch
Possible changes made to water course.

Appendix C West Meon Flood Map

West Meon Flood Map

EA flooding data, based on 50m cells. Each cell is allocated 1 of 4 flood risk categories, taking into account flood defences & their

Hambledon

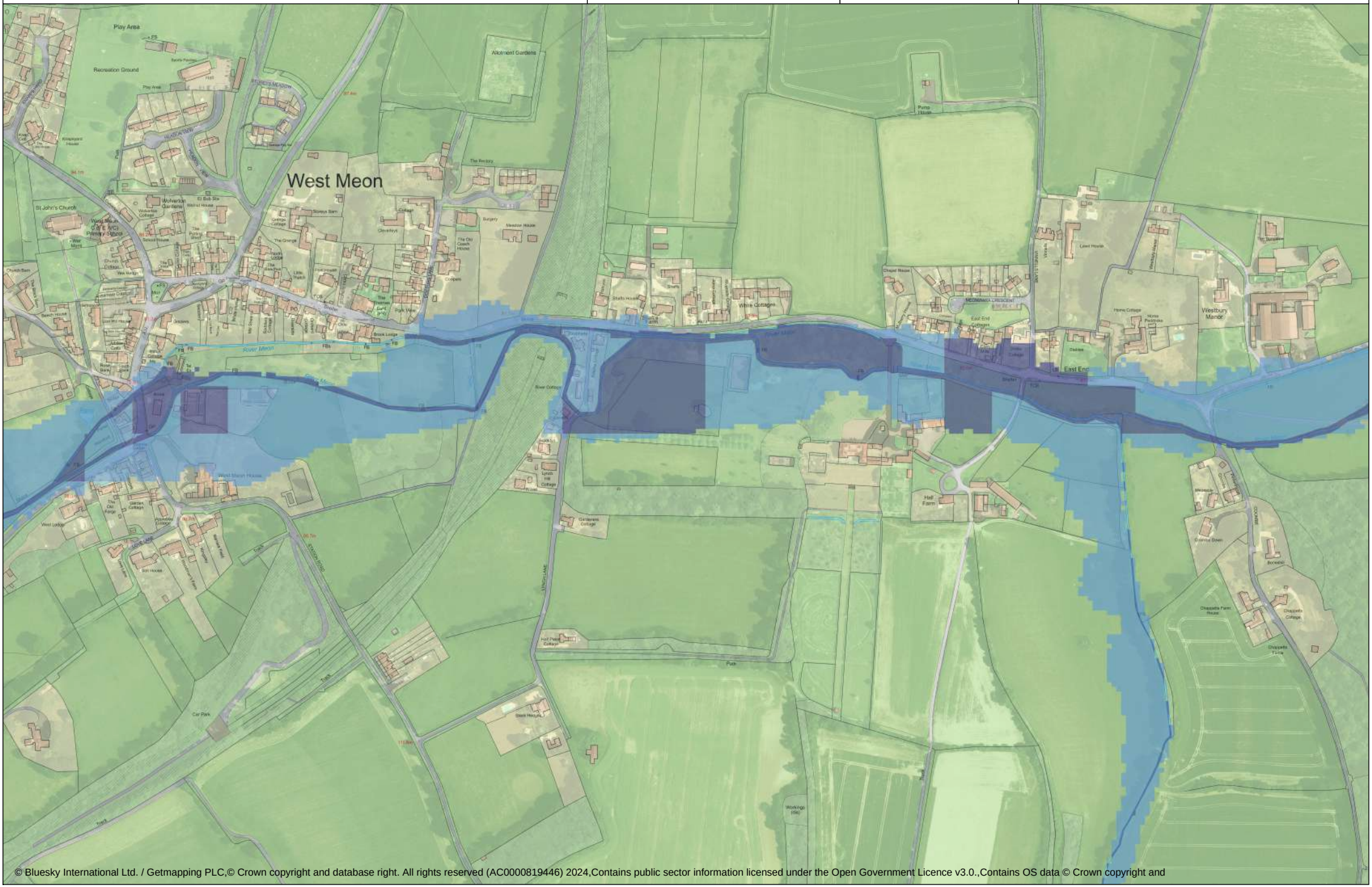
Author: L. Administrator

Date: 22/02/2024

0 20 40 60 80m

Scale: 1:5000

PARISH ONLINE



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West Meon Flood Map

EA data: blue/thatched area shows historic flooding areas; red overlay represents areas with current flood alert.

Hambledon

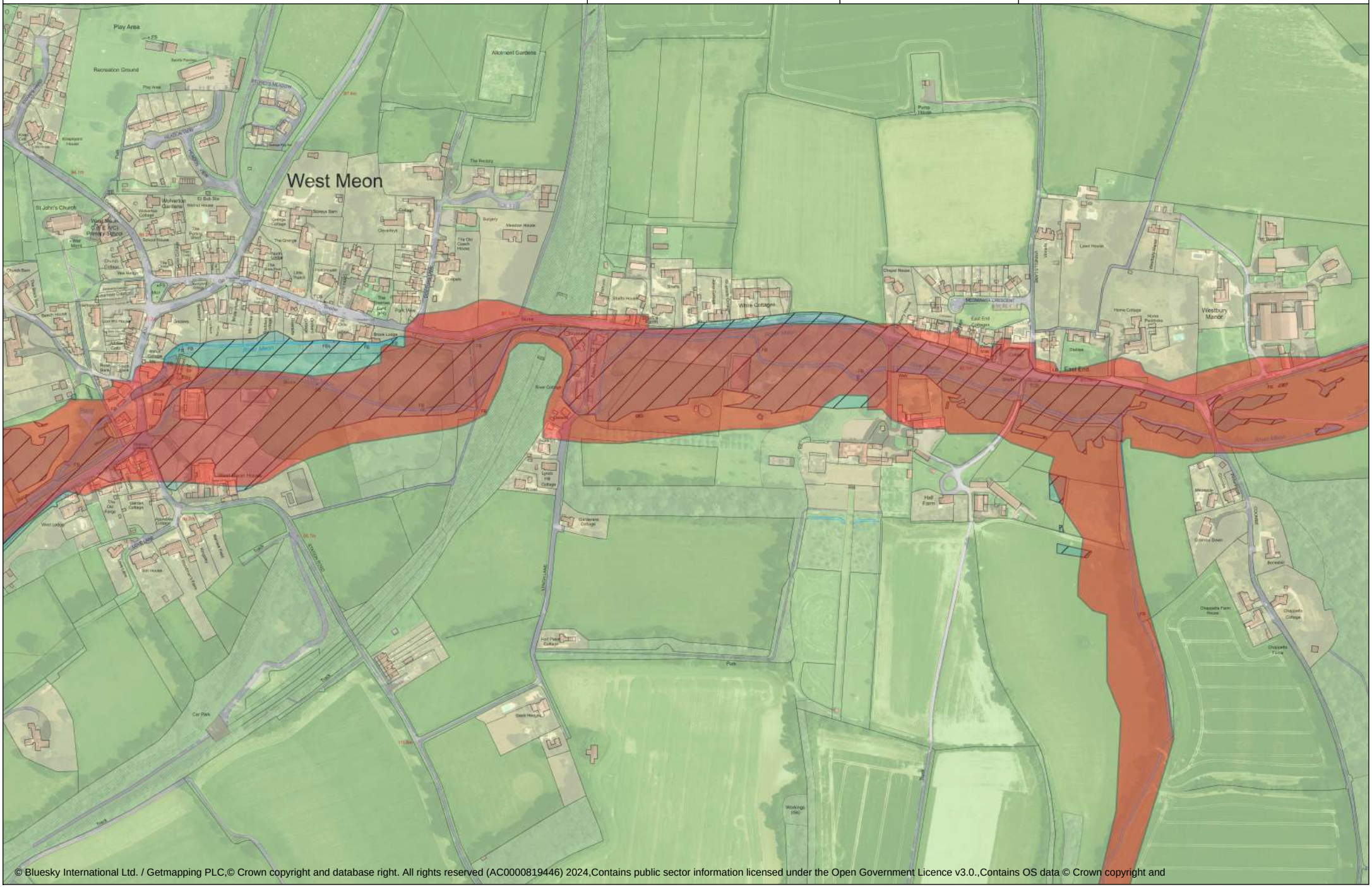
Author: L. Administrator

Date: 22/02/2024

0 20 40 60 80m

Scale: 1:5000

PARISH ONLINE



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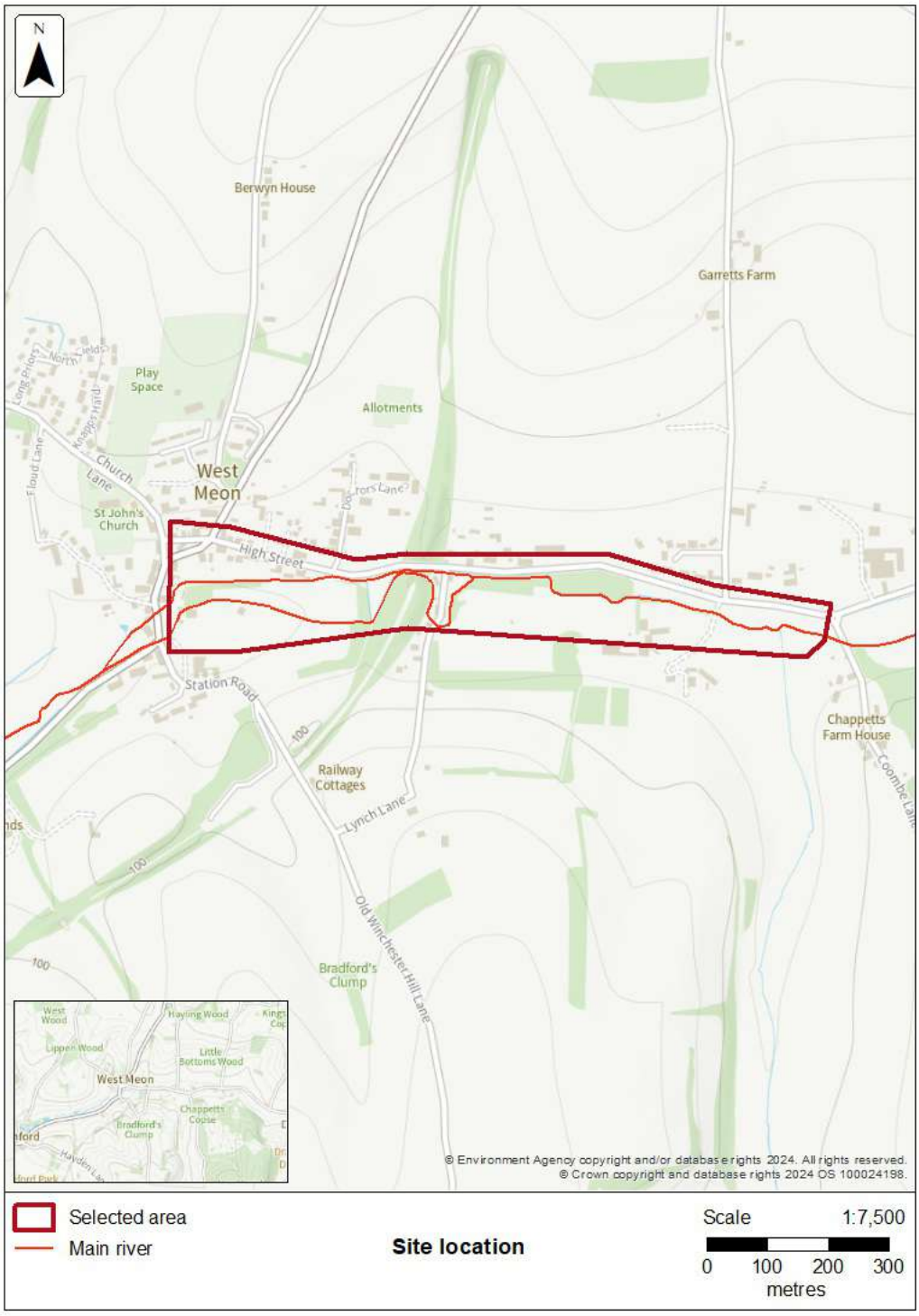
Appendix D EA Product 4 Data

Flood risk assessment data

Location of site: 464555 / 123965 (shown as easting and northing coordinates)
Document created on: 29 February 2024
This information was previously known as a product 4.
Customer reference number: SSD/348988

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

> **We recommend that you work with a flood risk consultant to get your flood risk assessment.**

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- modelled data
- climate change modelled data

The modelled levels have not been provided these can be obtained by directly interrogating the model output files (Product 6) provided as part of this data request.

There is not any modelled climate change data for this location. This is because detailed modelling hasn't been carried out in this area. You will need to consider the latest flood risk assessment climate change allowances and factor in the new allowances to demonstrate the development will be safe from flooding.

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

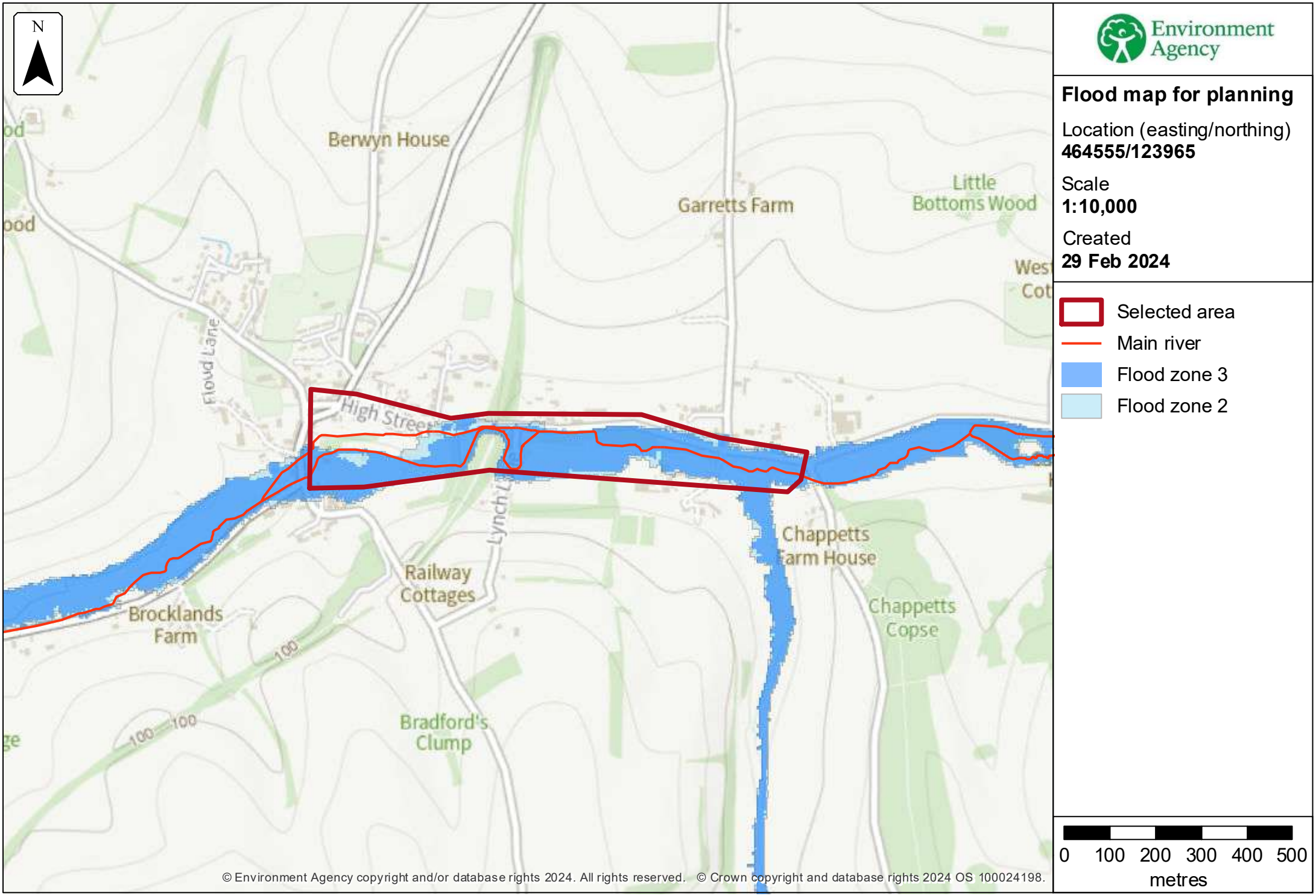
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.


N
Berwyn House
Garretts Farm
Little Bottoms Wood
Flood Lane
High Street
Lynch Lane
Railway Cottages
Chappetts Farm House
Chappetts Copse
Brocklands Farm
Bradford's Clump
100
100
100
Environment Agency
Flood map for planning
Location (easting/northing)
464555/123965
Scale
1:10,000
Created
29 Feb 2024
Selected area
Main river
Flood zone 3
Flood zone 2
0 100 200 300 400 500
metres
© Environment Agency copyright and/or database rights 2024. All rights reserved. © Crown copyright and database rights 2024 OS 100024198.

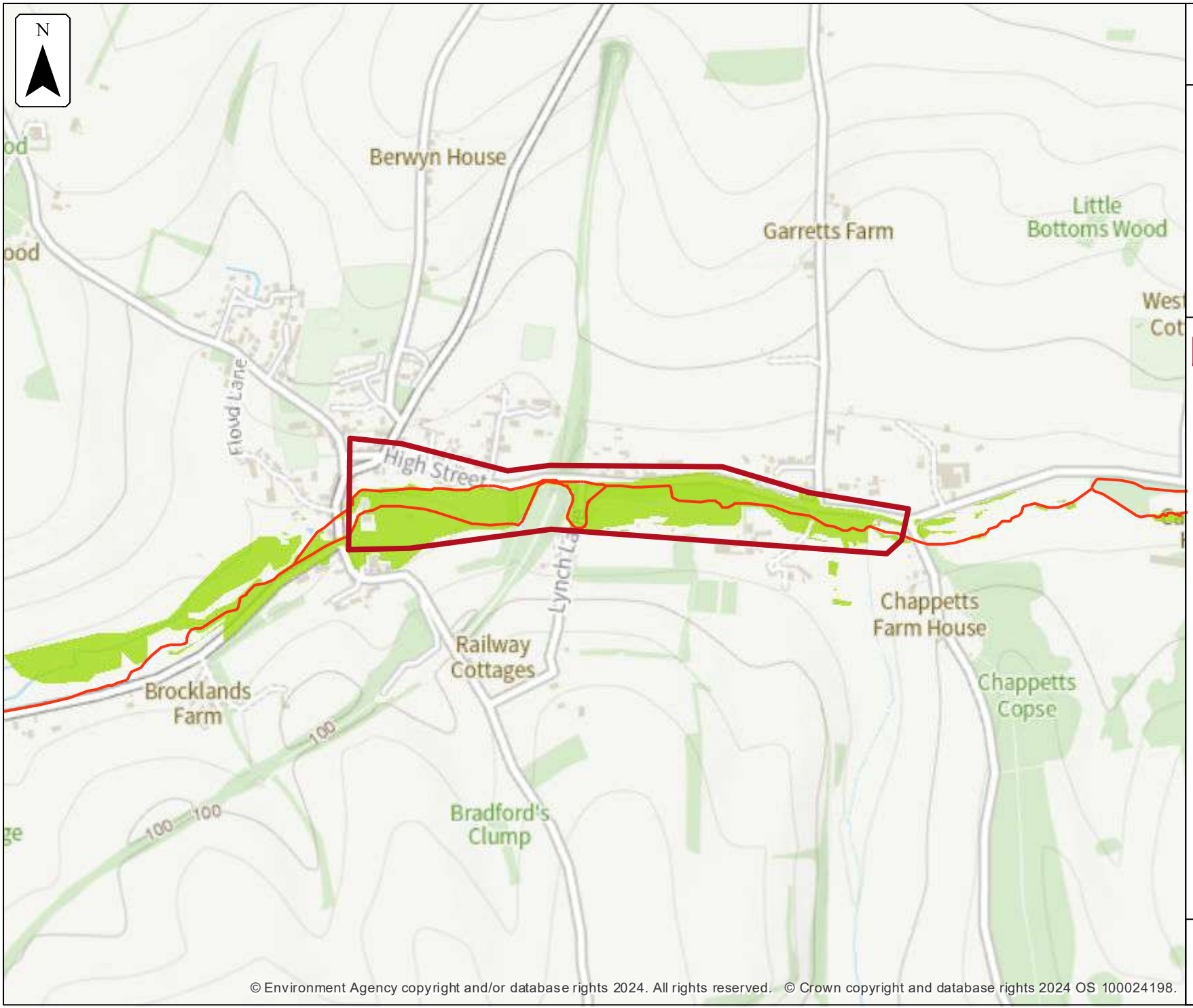
Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources - we can only supply flood risk data relating to flooding from rivers or the sea

You can also contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Download recorded flood outlines in GIS format



Environment Agency

Historic flood map

Location (easting/northing)
464555/123965

Scale
1:10,000

Created
29 Feb 2024

Selected area

Main river

Date of flood event

November, 2000

0 100 200 300 400 500
metres

Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
6 November 2000	7 November 2000	unknown	unknown	Yes

Flood defences and attributes

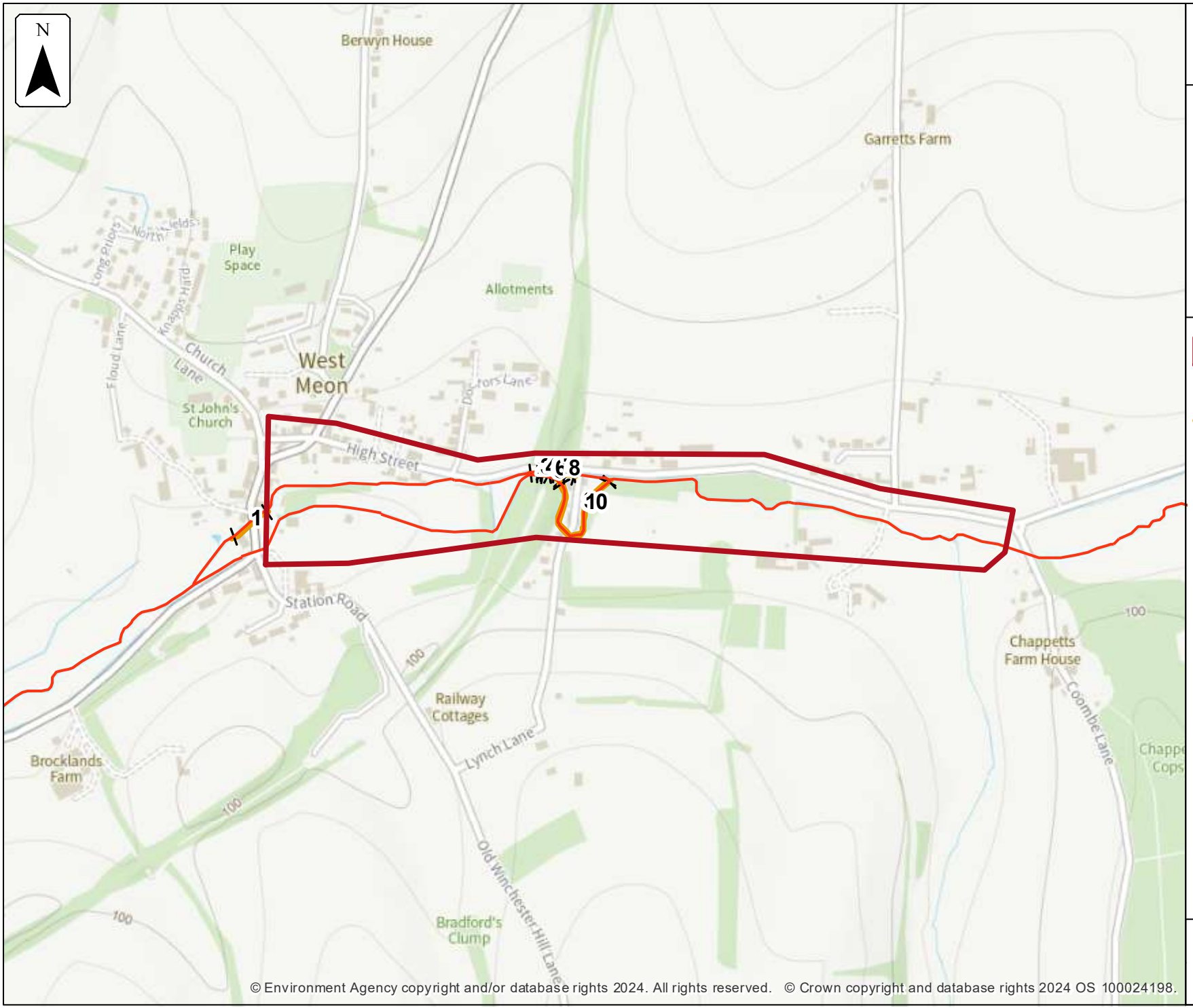
The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk



Environment Agency

Flood defences

Location (easting/northing)
464555/123965

Scale
1:7,500

Created
29 Feb 2024

- Selected area
- Main river
- Flood defence

0 100 200 300
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	22862	Wall	25		77.49	76.93	
2	500325	Engineered High Ground		Poor			
3	500324	Engineered High Ground		Fair			
4	500323	Engineered High Ground		Fair			
5	500343	Engineered High Ground		Fair			
6	500345	Engineered High Ground		Fair			
7	500348	Engineered High Ground					
8	500349	Engineered High Ground					
9	500346	Engineered High Ground					
10	500347	Engineered High Ground					

Any blank cells show where a particular value has not been recorded for an asset.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

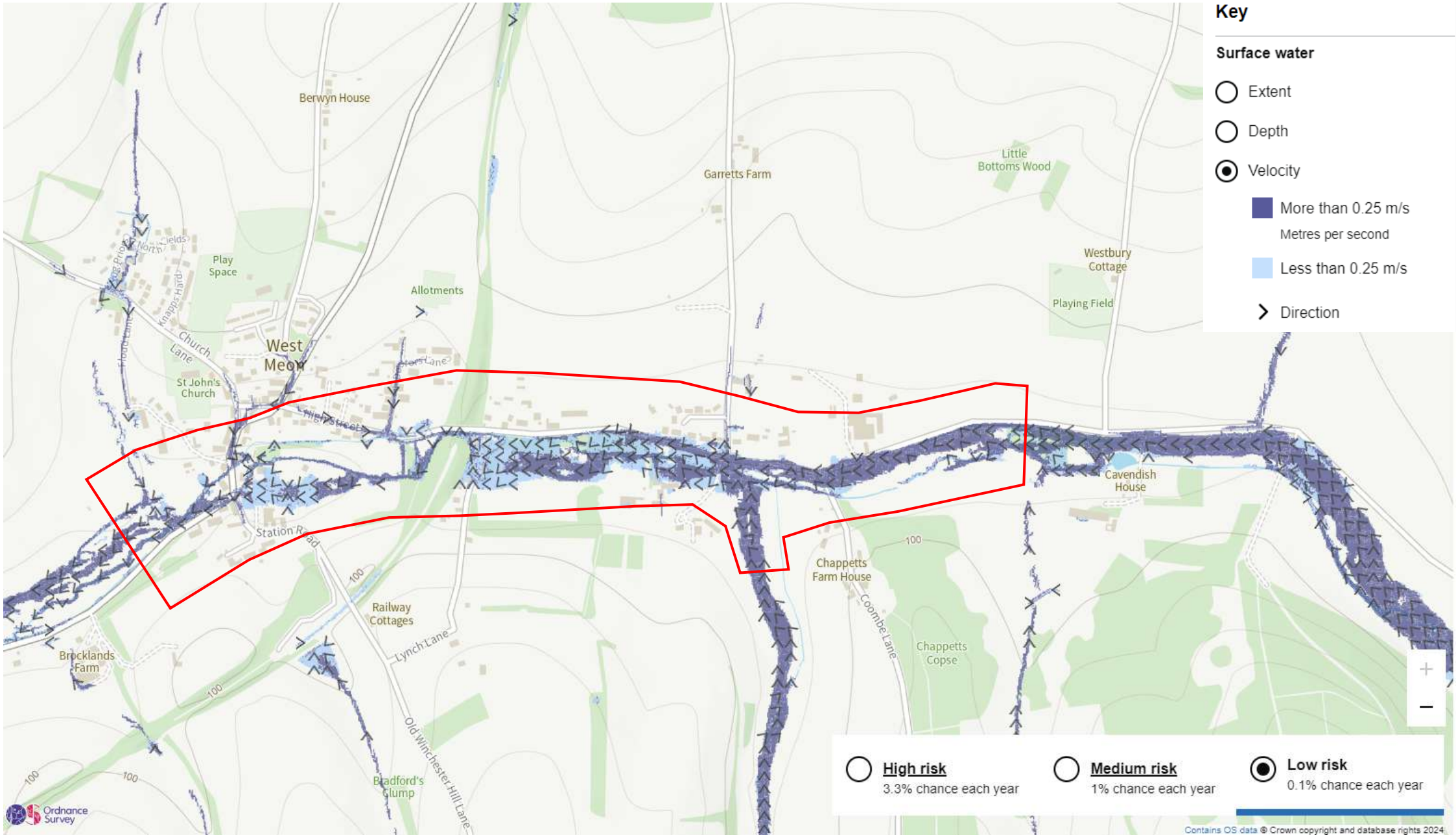
Find out more about flood risk activity permits

Help and advice

Contact the Solent and South Downs Environment Agency team at ssdenquiries@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Appendix E EA Surface Water Overland Flow Map


Key
Surface water
Extent
Depth
Velocity
More than 0.25 m/s
Metres per second
Less than 0.25 m/s
Direction
Berwyn House
Garretts Farm
Little Bottoms Wood
Westbury Cottage
Playing Field
Play Space
Allotments
West Meon
Church Lane
St John's Church
High Street
Lords Lane
Station Road
Railway Cottages
Lynch Lane
Old Winchester Hill Lane
Bradford's Clump
Brocklands Farm
Chappetts Farm House
Coombe Lane
Chappetts Copse
Cavendish House
100
High risk
3.3% chance each year
Medium risk
1% chance each year
Low risk
0.1% chance each year
Ordnance Survey
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West Meon Flood Map

EA flooding data, based on 50m cells. Each cell is allocated 1 of 4 flood risk categories, taking into account flood defences & their

Hambledon

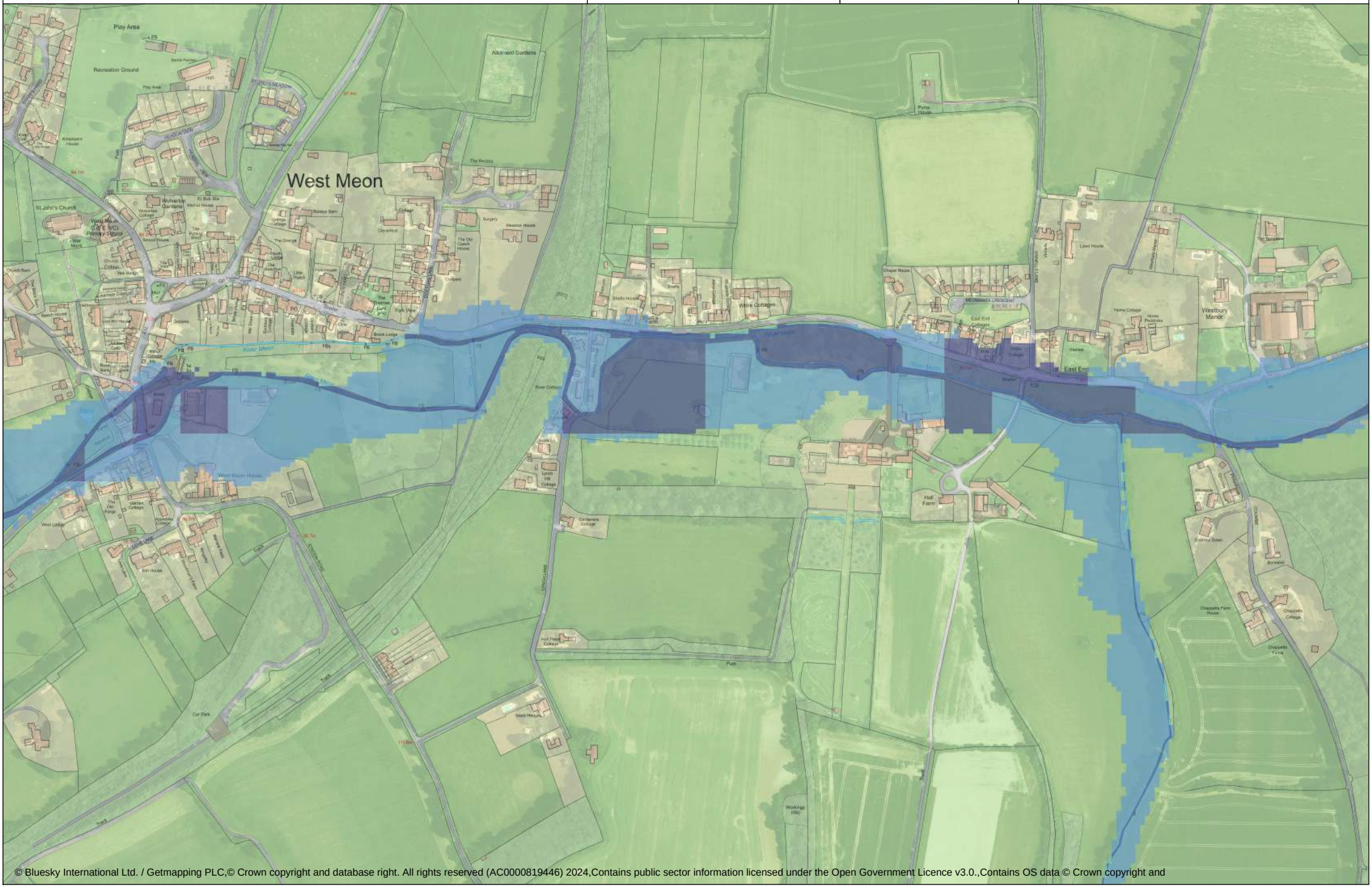
Author: L. Administrator

Date: 22/02/2024

0 20 40 60 80m

Scale: 1:5000

PARISH ONLINE



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West Meon Flood Map

EA data: blue/thatched area shows historic flooding areas; red overlay represents areas with current flood alert.

Hambledon

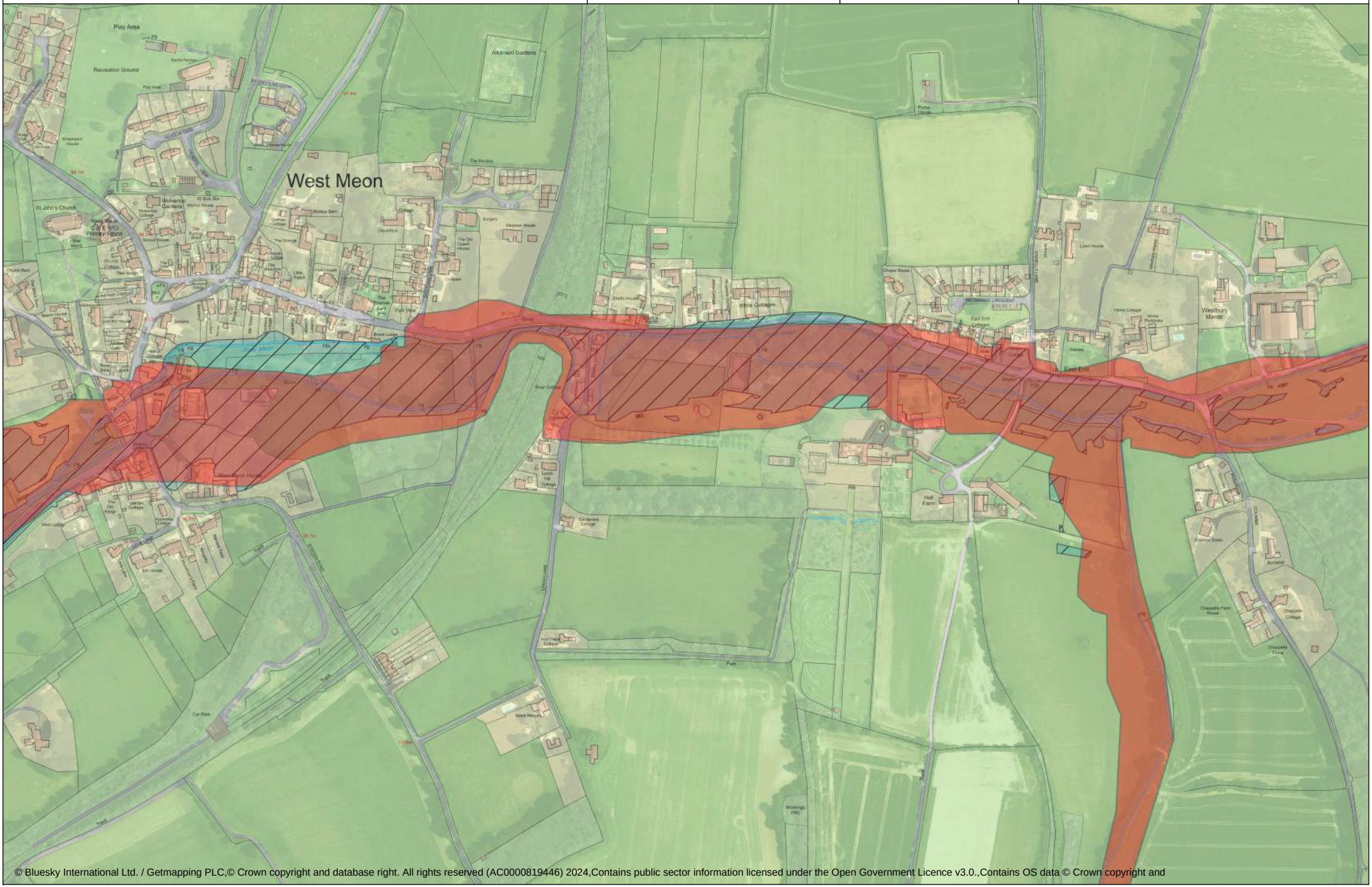
Author: L. Administrator

Date: 22/02/2024

0 20 40 60 80m

Scale: 1:5000

PARISH ONLINE



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