



#### North

t: 0151 933 0328

m: info@baseenergy.co.uk

44 Canal Street  
Bootle  
Liverpool  
L20 8QU

#### South

t: 020 3286 2016

m: info@baseenergy.co.uk

117 Knyvett House,  
Watermans Business  
Park, The Causeway,  
Staines-upon-Thames,  
TW18 3BA

# Flood Risk and Surface Water Assessment Rev2

## Site Address:

St James C of E Primary School  
Clitheroe

## Date:

9 July 2021

---

1. Introduction.....	4
Development Proposals.....	4
2. Planning Policy- Flood Risk, and Surface Water Management.....	5
National Planning Policy Framework.....	5
Ribble Valley Borough Council.....	7
Non-Statutory Technical Standards for SuDS.....	8
3. Sources of Flood Risk.....	9
Fluvial Flood Risk.....	9
Groundwater Flooding.....	12
Surface Water Flooding.....	13
Sewer Flooding.....	14
4. Flood Mitigation Measures.....	15
West Side of the River.....	15
East Side of the River.....	15
Flood Alerts.....	16
Flood Management Plan.....	16
5. Surface Water and SuDS.....	17
Surface Water Runoff from the Existing Site.....	17
Surface Water Runoff from the Redeveloped Site.....	17
SuDS Maintenance.....	19
6. Conclusions.....	20
Appendices.....	23

---

## Appendices

- Appendix A** - Site Location Plan
- Appendix B** - Existing Site Layout
- Appendix C** - Topographic Survey
- Appendix D** - Proposed Site Layout
- Appendix E** - Environment Agency Detailed Flood Information
- Appendix F** - British Geology Survey Borehole Record
- Appendix G** - Thames Water Public Sewer Records
- Appendix H** - ICP SuDS Greenfield Rate of Runoff

Prepared by	Checked by	Date
Carina Hassall BSc (Hons)	Liam Rushton	9 July 2021

This document has been prepared solely as a Flood Risk and Surface Water Assessment for Cassidy & Ashton Ltd. Base Energy 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.

---

## **1. Introduction**

This Flood Risk and Surface Water Assessment has been prepared to support the planning application for the proposed redevelopment of St James' C of E Primary School, Clitheroe.

A site location plan is provided in **Appendix A**.

### **Development Proposals**

The existing site layout is shown on the existing site layout plan in **Appendix B**, and on the topographic survey in **Appendix C**.

Proposals are for the redevelopment of the school including:

- Demolition of parts of the existing buildings
- A new infant block
- Redevelopment of the existing buildings
- Hard and soft (grassed) outdoor play areas
- Revised parking and modification of entrances to the school

A copy of the proposed site layout plan is provided in **Appendix D**.

---

## **2. Planning Policy- Flood Risk, and Surface Water Management**

### **National Planning Policy Framework**

The aim of the National Planning Policy Framework (NPPF) (and accompanying Planning Practice Guidance (PPG)) is to direct development away from areas at highest risk of flooding; where development is necessary, it should be made safe without increasing flood risk elsewhere.

The NPPF states that a Flood Risk Assessment (FRA) is required to support a planning application for developments that are:

- located in Flood Zone 2 and/or Flood Zone 3
- located in Flood Zone 1 and comprise 1ha or above

In some instances, for example where a site is located in Flood Zone 1 and comprises less than 1ha, an FRA may be required if the site is within an area which has critical drainage problems (i.e. a Critical Drainage Area - CDA) as notified to the Local Authority by the Environment Agency (EA).

In order to provide an indication of the flood zone classification of the site, and to ascertain whether an FRA is required, the starting point is the EA flood maps which are available on the EA website.

### **Environment Agency Flood Map**

The EA flood maps show fluvial and tidal flood outlines based on the following:

- Flood Zone 1 - land assessed as having less than 1 in 1000 annual probability of river or sea flooding
- Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding, or between a 1 in 200 and 1 in 1000 annual probability of flooding from the sea
- Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding, or a 1 in 200 or greater annual probability of flooding from the sea

The flood maps available on the EA website confirm that the site is largely located within the Flood Zone 3 outline (**Figure 1**). The EA flood maps also show that portions of the site are 'defended' and that a flood defence is located at the site.

A detailed assessment of flood risk is provided in the following section.

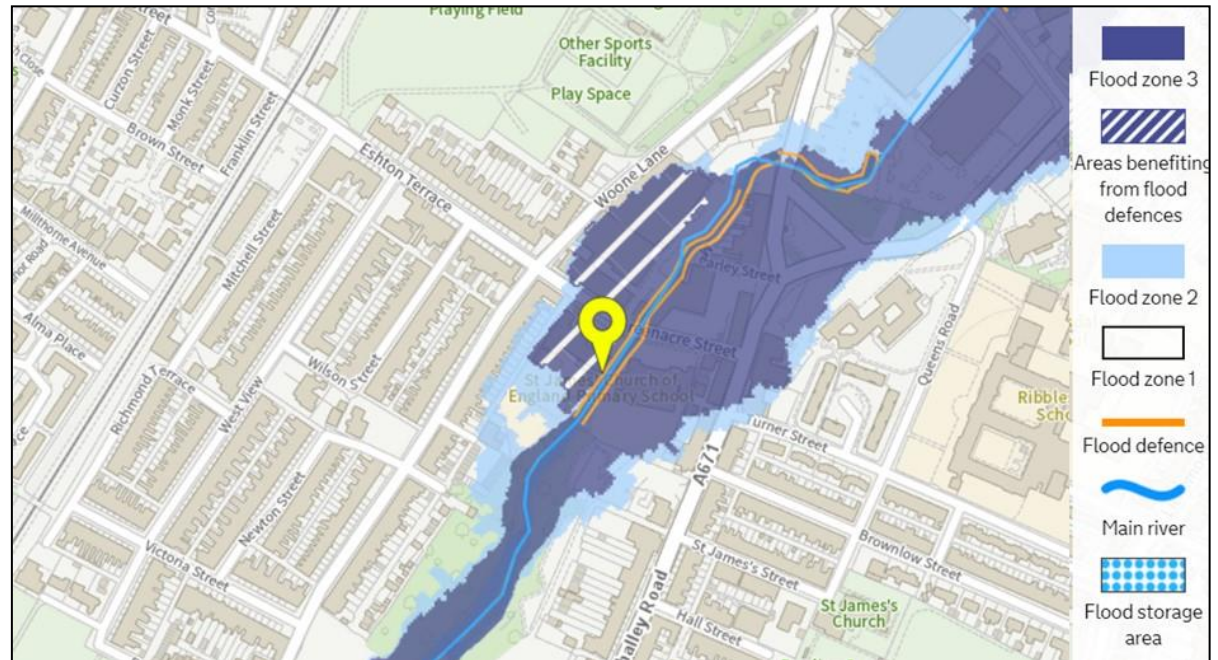
### Sequential and Exception Tests

The aim of the Sequential Test is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding).

Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required.

Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Under the NPPF, non-residential educational establishments are classified as 'more vulnerable' to the risks of flooding.



**Figure 1 - Environment Agency Flood Map**

---

It should be noted that:

- The proposals are for redevelopment of the existing school. The proposals will enhance the school facilities and provide greater benefits to pupils and staff when compared to the current situation
- The school is well established and is linked to the nearby St James' C of E Church
- The proposals will not result in an increase in hardstanding areas
- Given the scale of what is proposed, it would be unreasonable for alternative sites to be considered, particularly as the existing buildings are being retained.
- This FRA demonstrates how the proposals could be developed safely and how flood risk could be managed over the lifetime of the development.
- The measures proposed in the following sections of this report will provide betterment (in terms of flood risk management)

It is therefore considered that the proposals will meet the requirements of the Sequential and Exception Tests.

### **Ribble Valley Borough Council**

#### **Core Strategy Policy DME6: Water Management**

*10.17 Development will not be permitted where the proposal would be at an unacceptable risk of flooding or exacerbate flooding elsewhere. applications for development should include appropriate measures for the conservation, protection and management of water such that development contributes to:*

- 1. preventing pollution of surface and / or groundwater*
- 2. reducing water consumption*
- 3. reducing the risk of surface water flooding (for example the use of sustainable drainage systems (SuDS))*

---

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

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

*It is important to ensure the water environment including the use of water, pollution and flood risk can be adequately controlled through the development management process to deliver the development strategy and its strategic framework as envisaged in the core strategy.*

### **Strategic Flood Risk Assessment Level 1 (Revised 2017)**

The Level 1 SFRA has been reviewed and the information has been used to inform this report.

### **Non-Statutory Technical Standards for SuDS**

The Non-Statutory Technical Standards for SuDS, (and accompanying Local Authority SuDS Officer Organisation (LASOO) Practice Guidance) sets out the details which should be addressed within a SuDS Report, including:

- Flood Risk Outside of the Development
- Peak Flow Control and Volume Control
- Flood Risk Within the Development
- Runoff Destinations
- Structural Integrity
- Designing for Maintenance Considerations
- Construction

---

### **3. Sources of Flood Risk**

#### **Fluvial Flood Risk**

The site is shown to be located within the Flood Zone 3 outline associated with Mearley Brook. Mearley Brook flows through Clitheroe and passes through the centre of the school grounds.

In order to more accurately refine the risk of fluvial flooding, detailed flooding information including a detailed flood and node location map, and modelled flood levels for a range of events has been obtained from the EA (**Appendix E**). This is summarised below.

#### **Detailed Flood Map**

The detailed flood maps confirms that the site is largely located in Flood Zone 3. The portion of the site on the far side of Mearley Brook is located within the defended Flood Zone 3 outline, and Flood Zone 2.

#### **Modelled Flood Levels**

The EA has provided 1D and 2D modelled flood levels for a range of events including the 1 in 100 year, 1 in 100 year plus climate change, and 1 in 1000 year.

For 'more vulnerable' development in the North-West of England, higher central (35%) and upper end (70%) allowances for climate change should be considered.

The 1D defended modelled flood levels taken at the node locations just upstream of the site and adjacent to the site are as follows:

**Table 1 - 1D DEFENDED (m AOD)**

Node	100 year	100 year plus 35%	100 year plus 70%	1000 year
PEBR01_02504	71.62	71.91	72.08	72.45
PEBR01_02472	71.49	71.84	72.02	72.38
PEBR01_02470	71.28	71.60	71.84	72.26
PEBR01_02440	71.25	71.56	71.81	72.23

The 2D defended modelled flood levels at the site are as follows:

West side of the river:

- **1 in 100 year** - NA
- **1 in 100 year plus 35%** - NA
- **1 in 100 year plus 70%** - 72.58 and 72.15m AOD
- **1 in 1000 year** – 72.71 and 72.24m AOD

East site of the river:

- **1 in 100 year** – 72.27, 71.54 and 71.17m AOD
- **1 in 100 year plus 35%** - 72.75 and 71.78 m AOD
- **1 in 100 year plus 70%** - 72.94 and 71.95m AOD
- **1 in 1000 year** – 73.02, 71.89, and 71.73m AOD

---

### Existing Site Levels

As previously noted, a topographic survey of the site is provided in **Appendix C**. In general, site levels are in the region of:

#### West side of the river:

- ~71.70m AOD at the entrance to the site
- ~71.80m AOD at the existing play area
- ~72.80m AOD at the western boundary of the site
- ~72.10m AOD at the southern boundary of the site

#### East side of the river

- ~71.30m AOD at the entrance to the site
- ~71.50m AOD at the existing building
- ~71.40m AOD at the southern boundary

### Comparison of Modelled Flood Levels and Existing Site Level

#### West side of the river:

As shown above, the portion of the school located to the west side of the river remains flood free in up the 1 in 100 year plus 35% allowance for climate change.

During the 1 in 100 year plus 70% allowance for climate change, potential maximum flood depths would be 880mm.

During the 1 in 1000 year modelled flood event, potential maximum flood depths would be 1.01m.

---

East side of the river:

During the 1 in 100 year event, maximum potential flood depths are up to 970mm, rising to 1.25m during the 1 in 100 year plus 35% allowance for climate change event, and 1.64m during the 1 in 100 year plus 70% allowance for climate change.

During the 1 in 1000 year modelled flood event, maximum potential flood depths would be 1.72m.

***It is important to note that the above is a general comparison of 2D modelled levels with existing site levels, taking the worst case 2D levels and the lowest site levels. The 2D levels will be used to inform the flood mitigation strategy outlined in Section 4, and will provide a more refined overview of potential flood depths at the specific areas of the site proposed for development.***

### **Groundwater Flooding**

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. It is most common in low-lying areas overlain by permeable soils and permeable geology, or in areas with a naturally high water table.

The Soils Maps provided by the National Soil Resources Institute at Cranfield University indicate that the soils at the site and surrounding areas are comprised of 'Slowly permeable seasonally wet acid loamy and clayey soils'.

Reference has been made to the British Geological Survey (BGS) geology maps indicate that the site is underlain by Clitheroe Limestone Formation And Hodder Mudstone Formation (undifferentiated) – Mudstone.

BGS also provide borehole records, and whilst none are available for the school, there are records for a site located on Sun Street to the north. A copy is provided in **Appendix F** which confirms that beneath the made ground (present to depths of approximately 2.4m bgl), the ground is comprised of soft medium brown silty sandy clay, and stiff medium to dark brown and grey silty, sandy clay with some gravel and occasional boulders'.

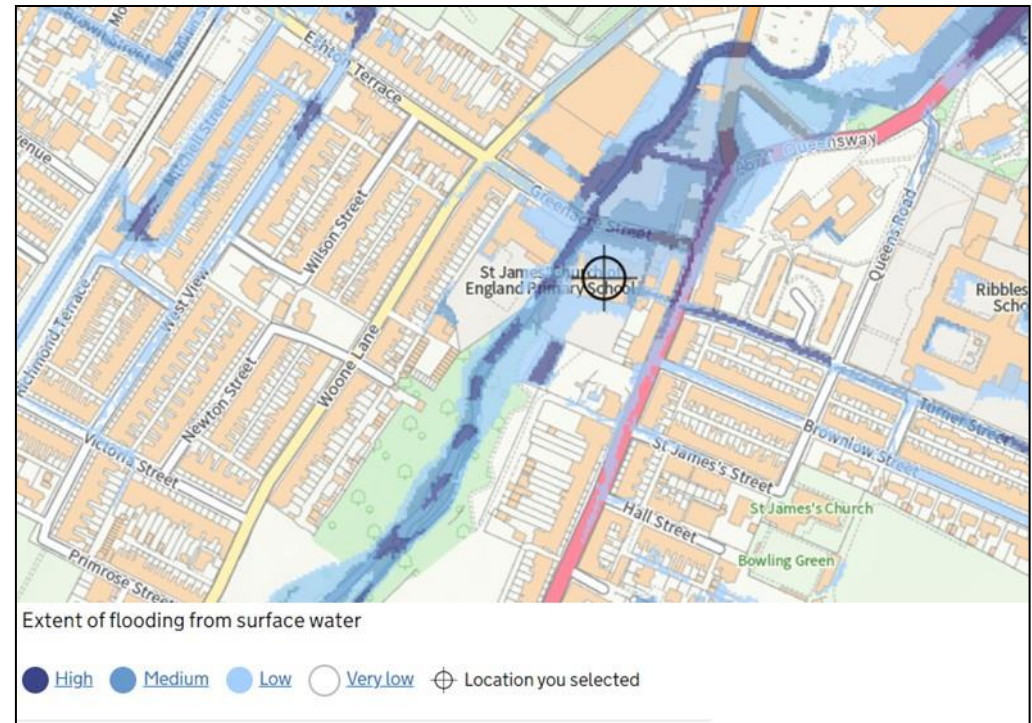
The record also states that the borehole was visibly moist from 0.50m to 2.40m, and whilst no direct water strike was recorded, there was water standing at 1.75m on removal of temporary casing at the end of the borehole.

The Ribble Valley Borough Council SFRA (Page 17) states that groundwater flooding is not considered by the EA to be a significant flood risk factor.

Based on the above, the risk of groundwater flooding is considered to be low.

### Surface Water Flooding

Surface water flooding results from rainfall generated overland flows, before the runoff reaches a watercourse/ drainage system, or where the watercourse/ drainage system is overwhelmed and unable to accept further runoff. Surface water runoff is usually associated with high intensity rainfall events but may also occur with lower intensity rainfall where the ground is saturated, developed or otherwise has low permeability resulting in overland flows and ponding within depressions in the topography.



**Figure 2 - Environment Agency Surface Water Flooding Map**

The EA provide maps on their website which illustrate the risk of surface water flooding along with potential depths and velocities; these show that the site generally ranges from very low to medium risk of surface water flooding, with the central section (Mearley Brook) at high risk.

---

**Section 5** of this report details the surface water drainage strategy for the site, which will ensure that surface water is appropriately managed over the lifetime of the development and will ensure that the proposals will not exacerbate surface water flooding at the site or surrounding areas.

### **Sewer Flooding**

Sewer flooding occurs when the capacity of underground sewerage systems is exceeded, resulting in flooding inside and outside of buildings. Normal discharge of sewers and drains through outfalls may be impeded by high water levels in receiving waters.

There are no known records of sewer flooding at the site location.

## 4. Flood Mitigation Measures

As previously detailed proposals are for the overall redevelopment of the existing school. The proposals afford the opportunity to incorporate measures to mitigate the risks of flooding at the school, which will provide betterment when compared to the existing situation.

Additionally, the proposals afford the opportunity for SuDS to be implemented to manage surface water over the lifetime of the development. The SuDS strategy is outlined in the following section.

### West Side of the River

Proposals for the portion of the school to the west side of the river include the demolition of parts of the existing building, new parking and modification of the site entrance, and hard and soft outdoor play areas.

Given that this portion of land is shown to remain flood free in up to the 1 in 100 year plus 35% allowance for climate change, no specific mitigation measures are proposed.

### East Side of the River

Proposals for the portion of the school to the east side of the river include widening of the existing entrance to the parking area, a hard play area, and a new infant block located in the south of this portion of the site.

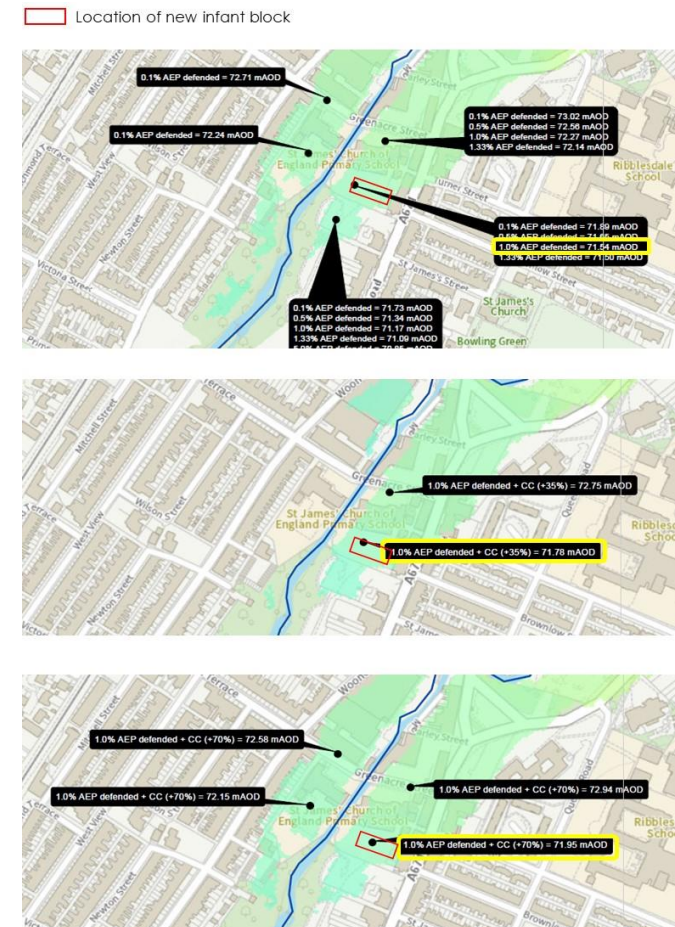


Figure 3 - Location of Infant Block and 2D Levels

---

### **Finished Floor Levels**

At the location of the proposed infant block, 2D maximum potential levels are shown to be 71.54m AOD in the 1 in 100 year event, rising to 71.78m AOD in the 1 in 100 year plus 35% allowance for climate change, and 71.95m AOD in the 1 in 100 year plus 70% allowance for climate change.

Finished floor levels of the new infant block will be set at 72.32m AOD. This will provide a 780mm freeboard above the 1 in 100 year flood level.

### **Flood Alerts**

The school is located in an area where the EA provide Flood Warnings and Alerts. If not already registered, it is recommended that the school signs up at:

<https://www.fws.environment-agency.gov.uk/app/olr/doDetails>

### **Flood Management Plan**

It is strongly recommended that a Flood Management Plan is prepared in consultation with Ribble Valley Borough Council Emergency Planners. This will ensure that the School Management has procedures in place should EA Flood Warning / Alerts be received, or if it is felt necessary that the school is evacuated. The plan should consider safe access and egress routes, how information will be disseminated, and information on how to prepare for a flood event / what to do during and after a flood event. Additionally, the plan should include a list of contact numbers.

## **5. Surface Water and SuDS**

The total site comprises approximately 8100m<sup>2</sup> / 0.81ha.

For the purposes of the SuDS strategy, the site will be split into 2 catchments: 1) west side of the river (~4200m<sup>2</sup>), 2) east side of the river (~3900m<sup>2</sup>).

### **Surface Water Runoff from the Existing Site**

A copy of the United Utilities public sewer records is provided in **Appendix G**. These show that public combined sewers are located around the site.

Given the topography of the site, it is also reasonable to assume that flows could connect into the river.

In order to gain an indication of the greenfield rates of surface water runoff from the existing site, the ICP SuDS Method within Micro Drainage has been used, as detailed in **Appendix H**. The flow rates are shown in **Table 2**.

**Table 2 –ICP SuDS - Existing Rates of Runoff (greenfield) (l/s)**

Return Period	Flow Rate for 0.81 ha (l/s)
1 in 1 year	4.9
Qbar	5.7
1 in 30 year	9.6

### **Surface Water Runoff from the Redeveloped Site**

Following redevelopment, there will be no increase in hardstanding areas. The proposed infant block will be located on an existing area of hardstanding.

## SuDS Approach

Given that there is no increase in hardstanding areas at the site, there will be no increase in rates of surface water runoff. However, the proposals afford the opportunity for some simple SuDS to be included into the proposals to provide betterment when compared with the existing situation.

In this instance, some simple rain planters could safely and feasibly be incorporated into the proposals.

## Rain Gardens

In its simplest form, a rain garden is a shallow depression, with absorbent, yet free draining soil and planted with vegetation that can withstand occasional temporary flooding. Rain gardens are designed to mimic the natural water retention of undeveloped land and to reduce the volume of rainwater running off into drains from impervious areas and treat low level pollution.

### Typical Design

- Freeboard – 100mm
- Topsoil – 300mm (ratio of approximately 50% sand, 30% topsoil and 20% compost)
- Subbase – 300mm
- Planting to be shrubs / wildflowers / perennial flowering plants
- The downpipe will feed water directly onto the rain garden. Stones or gravel will be used to dissipate the energy of the water and prevent heavy flows from washing away soil.



*Before, during and after the installation of a rain garden at Kingsmead Way, Hackney, London, led by Groundwork London's Green Team and Sanctuary Housing, and planted up by local residents  
| Groundwork London*



**Figure 4 - Example of Rain Garden (taken from UK Rain Garden Guide)**

**SuDS Maintenance**

**Rain Garden**

Maintenance Schedule	Required Action	Typical Frequency
<b><i>During Establishment Period (Years 1 and 2)</i></b>	<p>Watering</p> <p>Weeding Litter picking Pruning and trimming Check / clean channels, inlets and outlets</p> <p>Mulching</p>	<p>Weekly</p> <p>3 Monthly</p> <p>Annually or as required</p>
<b><i>Following Establishment Period (Year 3 onwards)</i></b>	<p>Weeding Litter picking Pruning and trimming Check / clean channels, inlets and outlets</p> <p>Replanting</p>	<p>6 Monthly</p> <p>Annually or as required</p>

---

## **6. Conclusions**

This Flood Risk and Surface Water Assessment has been prepared to support the planning application for the proposed redevelopment of St James' C of E Primary School, Clitheroe.

Proposals are for the redevelopment of the school including:

- Demolition of parts of the existing buildings
- A new infant block
- Redevelopment of the existing buildings
- Hard and soft (grassed) outdoor play areas
- Revised parking and modification of entrances to the school

### **Sequential and Exception Tests:**

- The proposals are for redevelopment of the existing school. The proposals will enhance the school facilities and provide greater benefits to pupils and staff when compared to the current situation
- The school is well established and is linked to the nearby St James' C of E Church
- The proposals will not result in an increase in hardstanding areas
- Given the scale of what is proposed, it would be unreasonable for alternative sites to be considered, particularly as the existing buildings are being retained.
- This FRA demonstrates how the proposals could be developed safely and how flood risk could be managed over the lifetime of the development.
- The measures proposed in the following sections of this report will provide betterment (in terms of flood risk management)

### **Flood Risk**

The site is shown to be located within the Flood Zone 3 outline associated with Mearley Brook. Mearley Brook flows through Clitheroe and passes through the centre of the school grounds.

---

Based on the comparison of modelled flood levels and existing site levels:

- West side of the river:

The portion of the school located to the west side of the river remains flood free in up the 1 in 100 year plus 35% allowance for climate change.

During the 1 in 100 year plus 70% allowance for climate change, potential maximum flood depths would be 880mm.

During the 1 in 1000 year modelled flood event, potential maximum flood depths would be 1.01m.

- East side of the river:

During the 1 in 100 year event, maximum potential flood depths are up to 970mm, rising to 1.25m during the 1 in 100 year plus 35% allowance for climate change event, and 1.64m during the 1 in 100 year plus 70% allowance for climate change.

During the 1 in 1000 year modelled flood event, maximum potential flood depths would be 1.72m.

***It is important to note that the above is a general comparison of 2D modelled levels with existing site levels, taking the worst case 2D levels and the lowest site levels. The 2D levels have been used to inform the flood mitigation strategy, and will provide a more refined overview of potential flood depths at the specific areas of the site proposed for development.***

Based on the desktop study of underlying ground conditions, the risk of groundwater flooding is considered to be low.

The EA surface water flooding maps show that the site generally ranges from very low to medium risk of surface water flooding, with the central section (Mearley Brook) at high risk.

There are no known records of sewer flooding at the site location.

---

## **Flood Mitigation Measures**

### *Finished Floor Levels*

At the location of the proposed infant block, 2D maximum potential levels are shown to be 71.54m AOD in the 1 in 100 year event, rising to 71.78m AOD in the 1 in 100 year plus 35% allowance for climate change, and 71.95m AOD in the 1 in 100 year plus 70% allowance for climate change.

Finished floor levels of the new infant block will be set at 72.32m AOD. This will provide a 780mm freeboard above the 1 in 100 year flood level.

### *Flood Alerts*

The school is located in an area where the EA provide Flood Warnings and Alerts. If not already registered, it is recommended that the school signs up at:

<https://www.fws.environment-agency.gov.uk/app/olr/doDetails>

### *Flood Management Plan*

It is strongly recommended that a Flood Management Plan is prepared in consultation with Ribble Valley Borough Council Emergency Planners. This will ensure that the School Management has procedures in place should EA Flood Warning / Alerts be received, or if it is felt necessary that the school is evacuated. The plan should consider safe access and egress routes, how information will be disseminated, and information on how to prepare for a flood event / what to do during and after a flood event. Additionally, the plan should include a list of contact numbers.

## **Surface Water and SuDS**

Given that there is no increase in hardstanding areas at the site, there will be no increase in rates of surface water runoff. However, the proposals afford the opportunity for some simple SuDS to be included into the proposals to provide betterment when compared with the existing situation.

In this instance, some simple rain planters could safely and feasibly be incorporated into the proposals.

---

Appendices

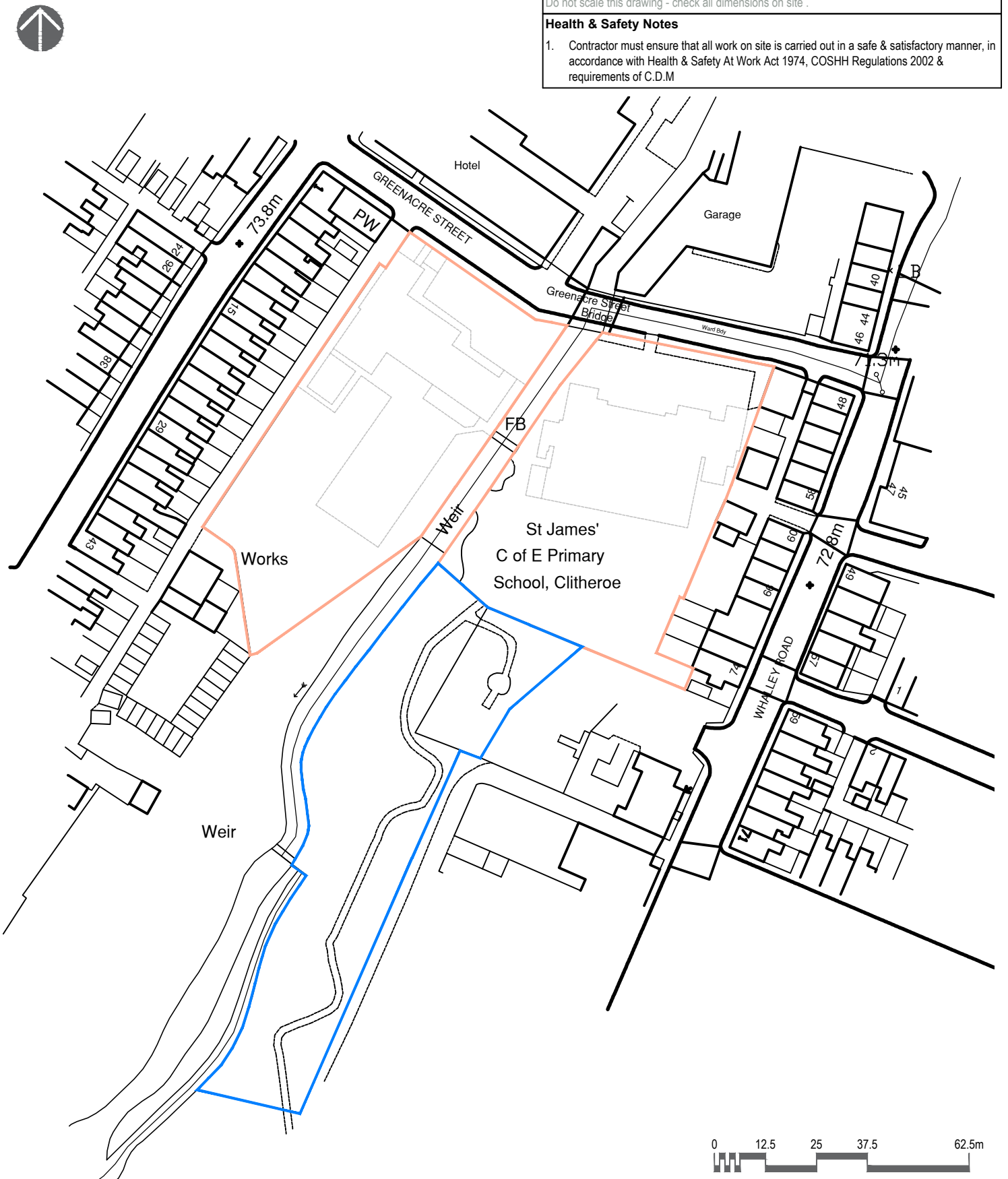
---


**Appendix A** - Site Location Plan

This drawing is subject to copyright and is not to be reproduced in part or whole without approval. Do not scale this drawing - check all dimensions on site.

**Health & Safety Notes**

1. Contractor must ensure that all work on site is carried out in a safe & satisfactory manner, in accordance with Health & Safety At Work Act 1974, COSHH Regulations 2002 & requirements of C.D.M



-		First Issue	27.01.2021
Rev.	Description		Date
 www.cassidyashton.co.uk <b>Architecture + Building Surveying + Town Planning</b> 7 East Cliff, Preston, Lancashire, PR1 3JE 01772 258 356 10 Hunters Walk, Canal Street, Chester, CH1 4EB 01244 402 900	Client <b>St James CofE Primary School Clitheroe</b>		Drawing Title <b>Location Plan</b>
	Project <b>Development Planning</b>		Drawn by FH    Checked by AB    Date 27.01.2021
			Status <b>PRELIMINARY</b> Scale @ A4    1:1250
			Job no. <b>10512</b> Dwg.no. <b>L01</b> Rev. -

---

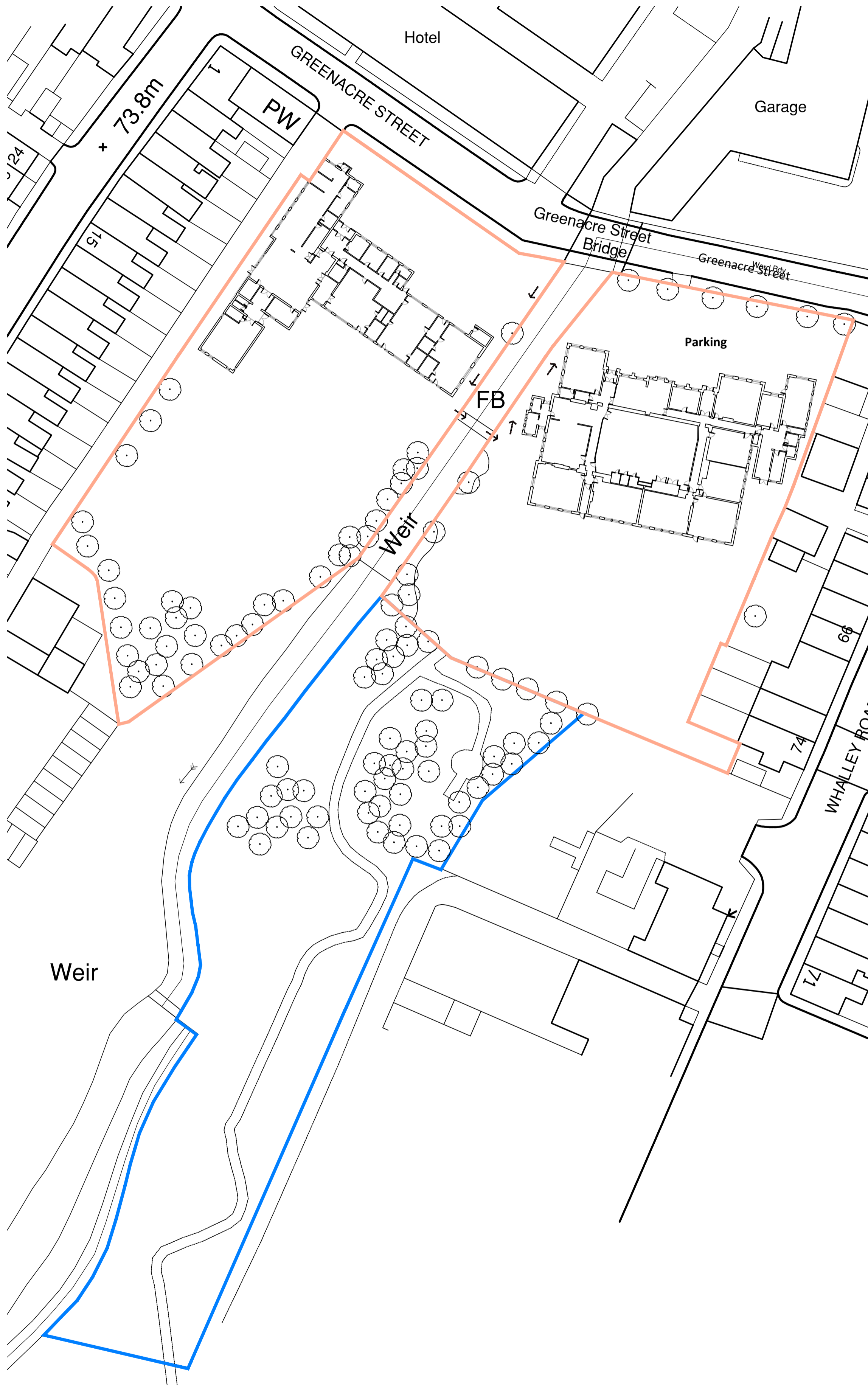
**Appendix B** - Existing Site Layout



This drawing is subject to copyright and is not to be reproduced in part or whole without approval. Do not scale this drawing - check all dimensions on site.

**Health & Safety Notes**

1. Contractor must ensure that all work on site is carried out in a safe & satisfactory manner, in accordance with Health & Safety At Work Act 1974, COSHH Regulations 2002 & requirements of C.D.M



Weir

Hotel

Garage

GREENACRE STREET

Greenacre Street Bridge

Parking

FB

Weir

WHALLEY ROAD

66

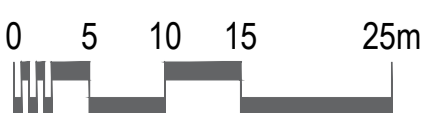
74

12

73.8m

PW

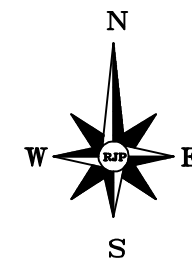
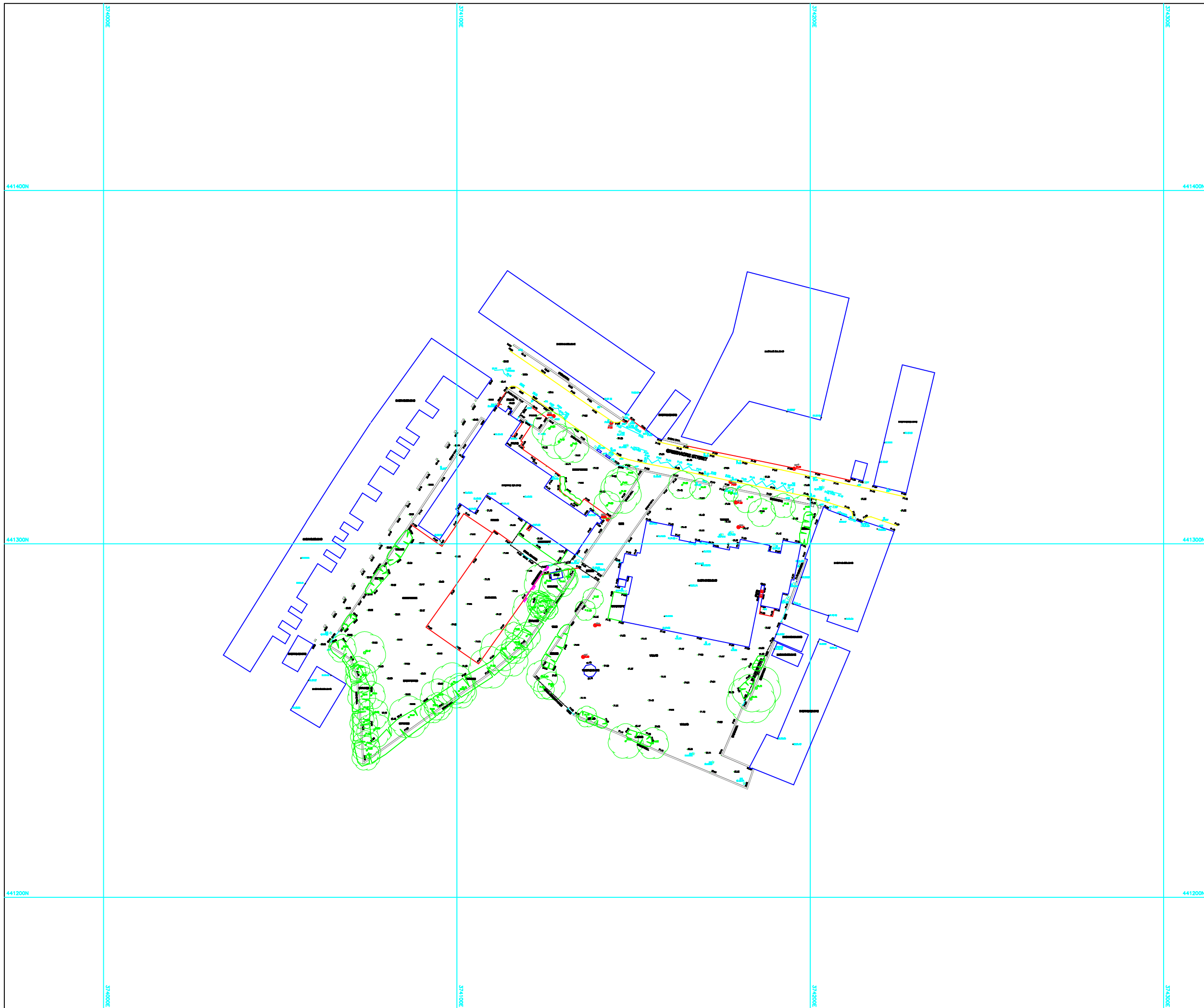
24



Rev.	First Issue	16.12.2020
Rev.	Description	Date
Client		
<b>St James CofE Primary School Clitheroe</b>		
Project		
<b>Development Planning</b>		
Drawing Title		
<b>Existing Site Plan</b>		
Drawn by	FH	Checked by AB Date 16.12.2020
Status	<b>PRELIMINARY</b>	Scale @ A2 1:500
Job no.	Dwg.no.	Rev.
<b>10512</b>	<b>E01</b>	<b>-</b>
<b>Cassidy+Ashton</b> <small>www.cassidyashton.co.uk</small>		<b>C+A</b>
<b>Architecture + Building Surveying + Town Planning</b>		
<small>7 East Cliff, Preston, Lancashire, PR1 3JE 10 Hunters Walk, Canal Street, Chester, CH1 4EB</small>		<small>01772 258 356 01244 402 900</small>

---

**Appendix C - Topographic Survey**



**COORDINATED STATIONS**

STATION	EASTING	NORTHING	LEVEL (m)
GPS1	374143.665	441334.202	71.606
GPS2	374195.447	441321.263	71.350
A	374177.438	441317.541	71.265
B	374127.371	441336.178	72.074
C	374179.706	441304.758	71.474
D	374178.911	441311.711	71.293
G	374142.715	441306.863	71.638

**ABBREVIATIONS**

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
DI	DILAPIDATED	PB	POST BOX
DW	DISUSED	PX	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RODGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FOS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	US	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

**SYMBOLS**

	SURVEY STATION		TREE
	O/H ELEC CABLE		BENCH MARK
	O/H PHONE LINE		TRIAL PIT
	CANOPY/HEDGE		BOREHOLE

- NOTES**
- A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN
  - B) O/S USED AND ORIENTATED TO TRUE NORTH
  - C) LEVELS IN METRES RELATED TO G.P.S.
  - D) DRAINAGE INFORMATION TAKEN FROM LOCAL AUTHORITY RECORDS. INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date
	PROPOSED DEVELOPMENT AT GREENACRE ROAD, CLITHEROE	
	CASSIDY + ASHTON	
	TOPOGRAPHICAL SURVEY	
CA292/T00	Surveyed	A. BAYBUTT
	Drawn	I. GREEN
	Date	JUNE 2021
	Scale	1:500 @ A1

**RJP Surveying Consultants Ltd**  
 LAND SURVEYORS & SITE ENGINEERS  
 AYREFIELD COTTAGE  
 AYREFIELD ROAD  
 ROBY MILL  
 UPHOLLAND  
 LANCASHIRE  
 WN8 0QP

TEL: 01257 251554  
 MOBILE: 07710 308709  
 WEBSITE : [www.rjpsurveyors.co.uk](http://www.rjpsurveyors.co.uk)  
 E-MAIL: [mail@rjpsurveyors.co.uk](mailto:mail@rjpsurveyors.co.uk)

---

**Appendix D - Proposed Site Layout**

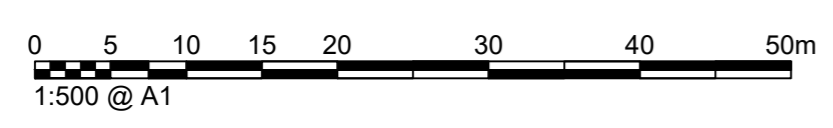


**Key**

- Site Boundary
- Ownership Boundary
- Trees to be retained
- Trees to be removed
- Proposed Trees
- Demolition
- New
- New Fence Line



Ordnance Survey (c) Crown Copyright 2020. All rights reserved. Licence number 100022432



Rev. Description		Date	
Client <b>Diocese of Blackburn</b>			
Project <b>St James C of E Primary School Clitheroe</b>			
Drawing Title <b>Proposed Site Plan</b>			
Drawn by	FH	Checked by	AB Date 02.06.2021
Status	<b>PLANNING</b>	Scale @ A1	As Indicated
Job no.	<b>10512</b>	Dwg no.	<b>P01</b>
Rev.	-		
<b>Cassidy+Ashton</b>			<b>C+A</b>
www.cassidyashton.co.uk			
Architecture + Building Surveying + Town Planning			
7 East Cliff, Preston, Lancashire, PR1 3JE			01772 258 356
10 Hunters Walk, Canal Street, Chester, CH1 4EB			01244 402 900

---

**Appendix E -** Environment Agency Detailed Flood Information

## Flood Zones Map





St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

NGR: 374125, 441280

### Key

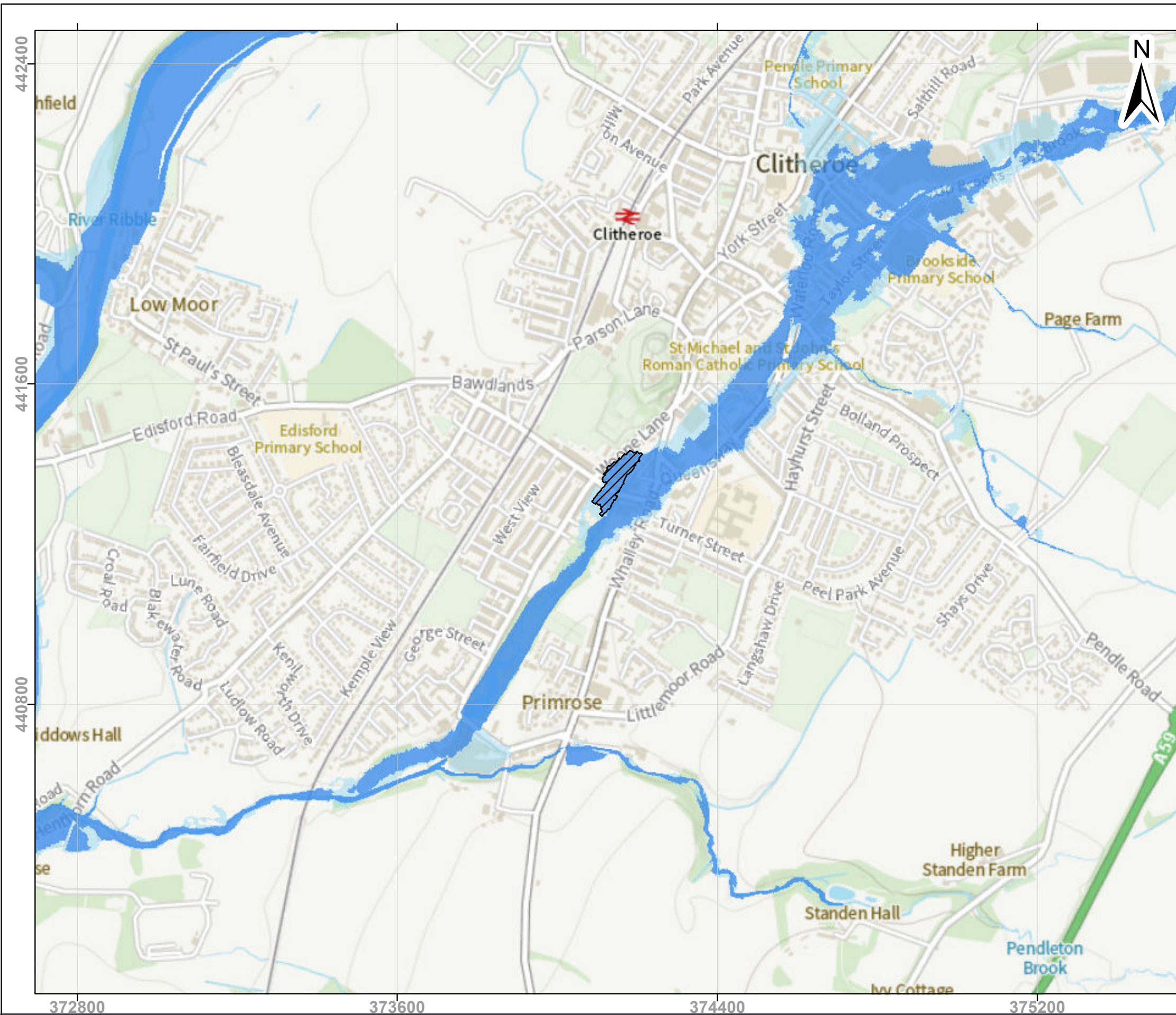
-  Main River
-  Areas Benefiting from Defences
-  Flood Zone 3
-  Flood Zone 2

**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

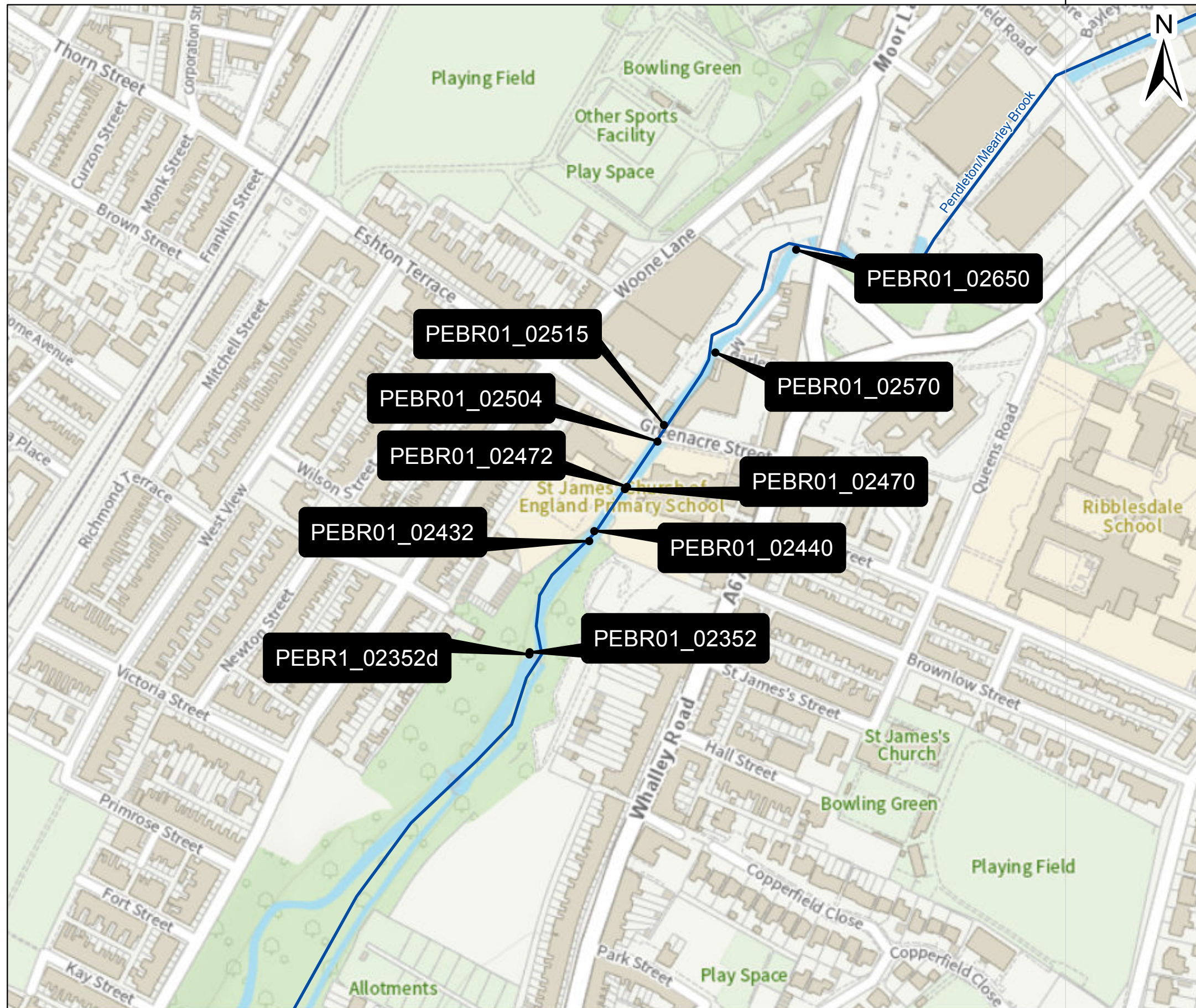
## Modelled Water Levels Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

NGR: 374125, 441280



### Key

-  Node Points
-  Main River

**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

Node Point	Flood Flow ( $\text{m}^3\text{s}^{-1}$ ) and Level (mAOD) data for a range of annual probability of flooding													
	0.1%				0.5%		1.0%				5.0%			
	Defended		Undefended		Defended		Defended		Undefended		Defended		Undefended	
Map ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
PEBR1_02352d	71.46	60.94	71.46	60.24	71.16	38.05	71.00	31.80	71.02	32.48	70.67	22.18	70.66	21.85
PEBR01_02650	73.00	26.00	72.72	17.48	72.54	25.85	72.26	25.60	72.30	17.28	71.84	21.89	71.77	16.98
PEBR01_02570	73.00	26.41	72.70	19.85	72.53	25.86	72.28	24.69	72.31	15.86	71.82	21.88	71.78	15.92
PEBR01_02515	72.95	28.35	72.69	19.83	72.48	26.32	72.22	25.13	72.25	19.70	71.71	22.19	71.66	19.43
PEBR01_02504	72.17	28.35	72.40	19.83	71.79	26.32	71.62	25.13	71.88	19.70	71.29	22.19	71.33	19.43
PEBR01_02472	72.12	28.83	72.22	38.58	71.71	26.33	71.49	25.13	71.72	27.26	71.07	22.19	71.07	21.62
PEBR01_02470	71.96	28.83	71.86	38.58	71.46	26.33	71.28	25.13	71.46	27.26	71.04	22.19	71.04	21.62
PEBR01_02440	71.93	28.99	71.89	35.86	71.43	26.29	71.25	25.11	71.25	30.28	70.91	22.19	70.90	21.84
PEBR01_02432	71.75	42.01	71.74	42.21	71.35	32.10	71.18	29.24	71.21	31.76	70.90	22.19	70.89	21.85
PEBR01_02352	71.59	60.94	71.58	60.24	71.24	38.05	71.06	31.80	71.09	32.48	70.74	22.18	70.72	21.85
Level data in mAOD (metres above ordnance datum). Flow data in $\text{m}^3$ per second														
Data taken from Mearley Brook 2018														

Node Point	Flood Flow (m <sup>3</sup> s <sup>-1</sup> ) and Level (mAOD) data for a range of annual probability of flooding							
	0.1% + Climate Change (+30%)		1.0% + Climate Change (+70%)		1.0% + Climate Change (+35%)		1.0% + Climate Change (+30%)	
	Defended		Defended		Defended		Defended	
Map ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow
PEBR1_02352d	71.67	76.81	71.38	55.12	71.27	44.52	71.24	41.98
PEBR01_02650	73.24	25.94	72.92	25.97	72.73	25.92	72.67	25.90
PEBR01_02570	73.24	26.32	72.91	26.43	72.70	26.37	72.65	26.21
PEBR01_02515	73.20	28.49	72.87	28.22	72.66	27.32	72.60	26.85
PEBR01_02504	72.45	28.49	72.08	28.22	71.91	27.32	71.87	26.85
PEBR01_02472	72.38	33.45	72.02	28.37	71.84	27.37	71.80	26.88
PEBR01_02470	72.26	33.45	71.84	28.37	71.60	27.37	71.56	26.88
PEBR01_02440	72.23	33.46	71.81	28.47	71.56	27.41	71.52	26.87
PEBR01_02432	72.02	45.66	71.65	40.05	71.47	34.96	71.44	33.94
PEBR01_02352	71.81	76.81	71.49	55.12	71.35	44.52	71.32	41.98
Level data in mAOD (metres above ordnance datum). Flow data in m <sup>3</sup> per second								
Data taken from Mearley Brook 2018								

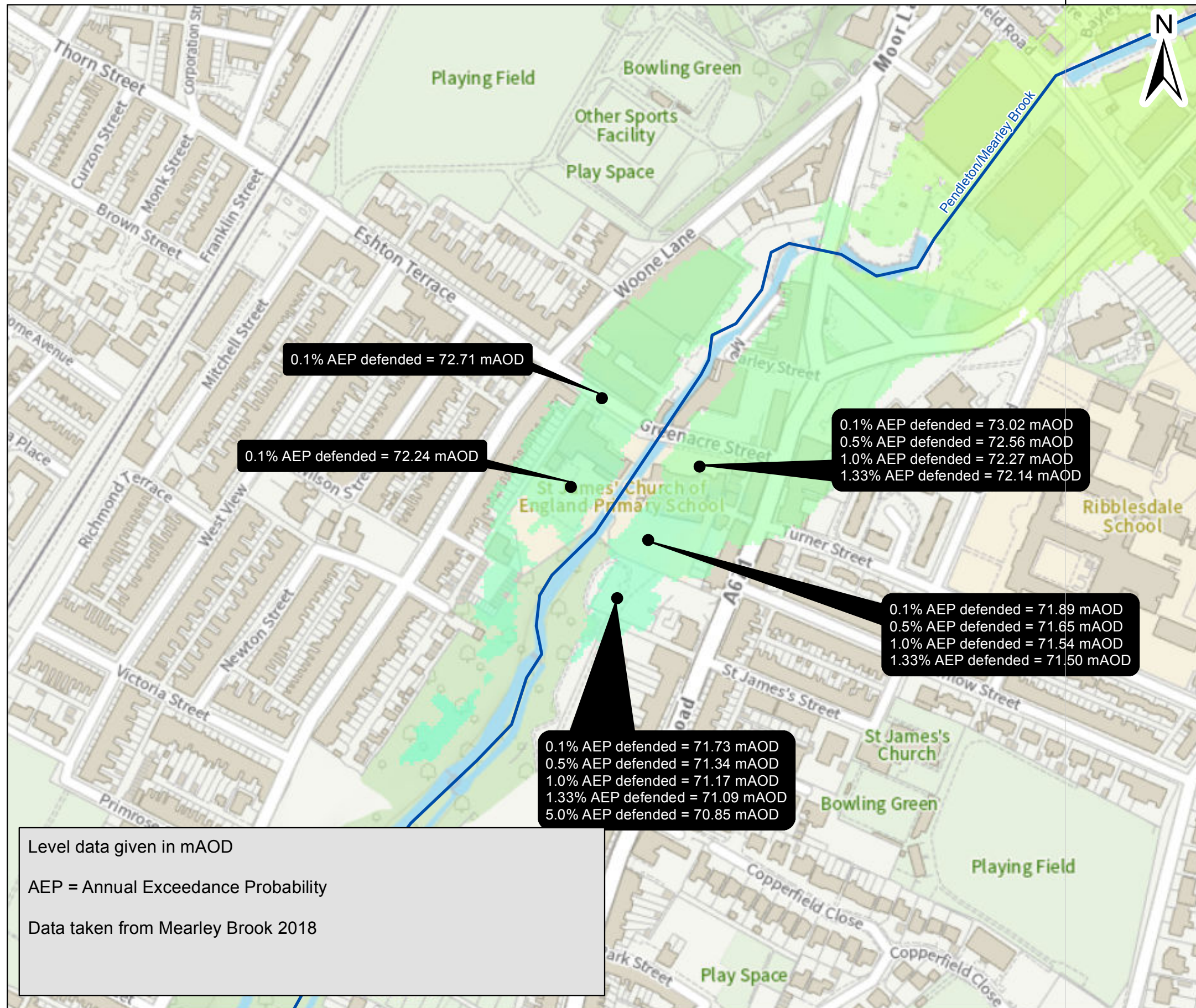
## Modelled 2D Data Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

NGR: 374125, 441280

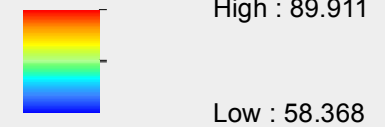


### Key

 Main River

### 0.1% AEP defended

Value



**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.

Level data given in mAOD  
AEP = Annual Exceedance Probability  
Data taken from Mearley Brook 2018



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

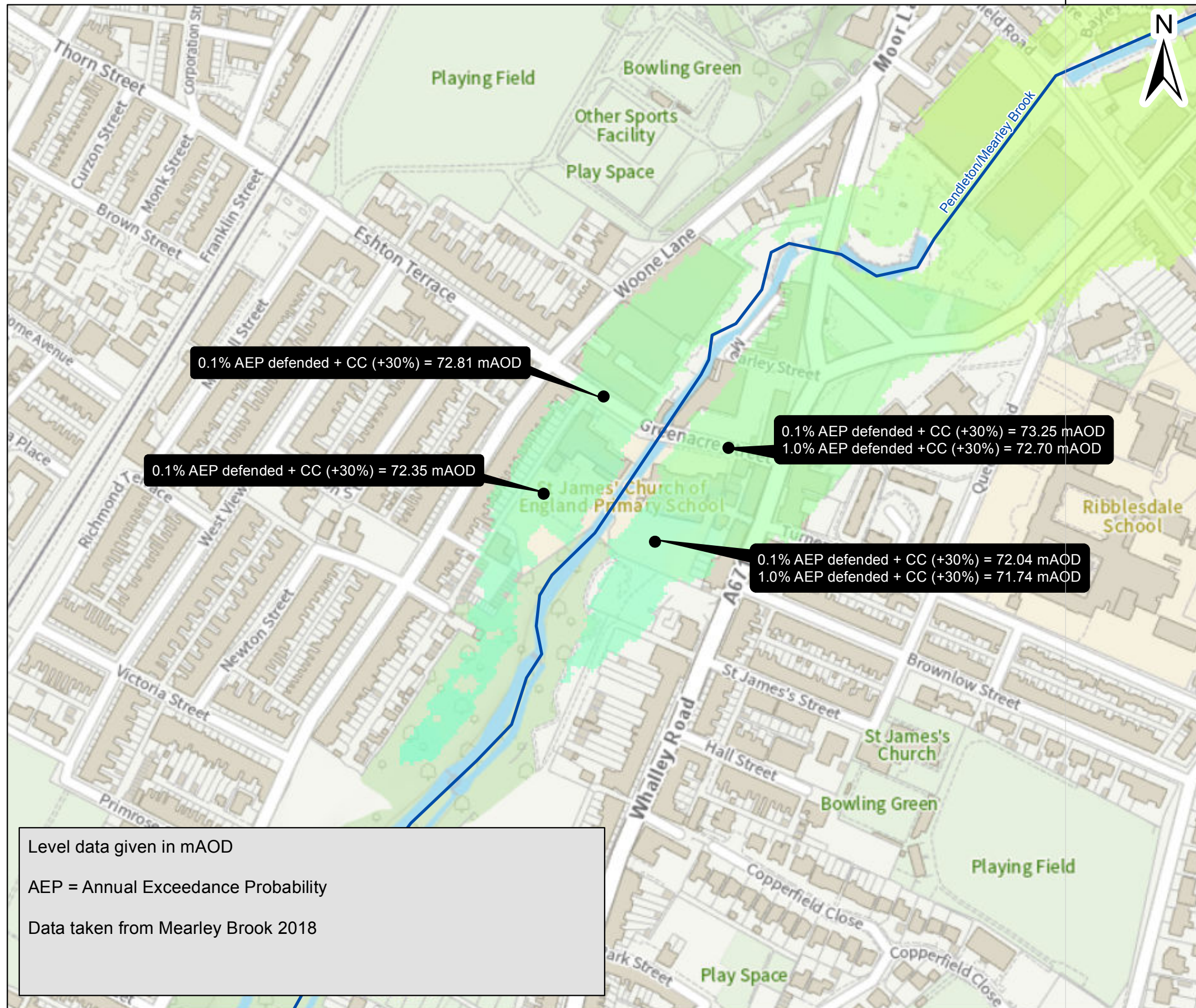
## Modelled 2D Data Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

NGR: 374125, 441280



### Key

 Main River

### 0.1% AEP defended + 30% Climate Change

Value



High : 89.991

Low : 58.391

**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

## Modelled 2D Data Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

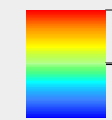
NGR: 374125, 441280

### Key

 Main River

### 1.0% AEP defended + 35% Climate Change

Value



High : 89.8

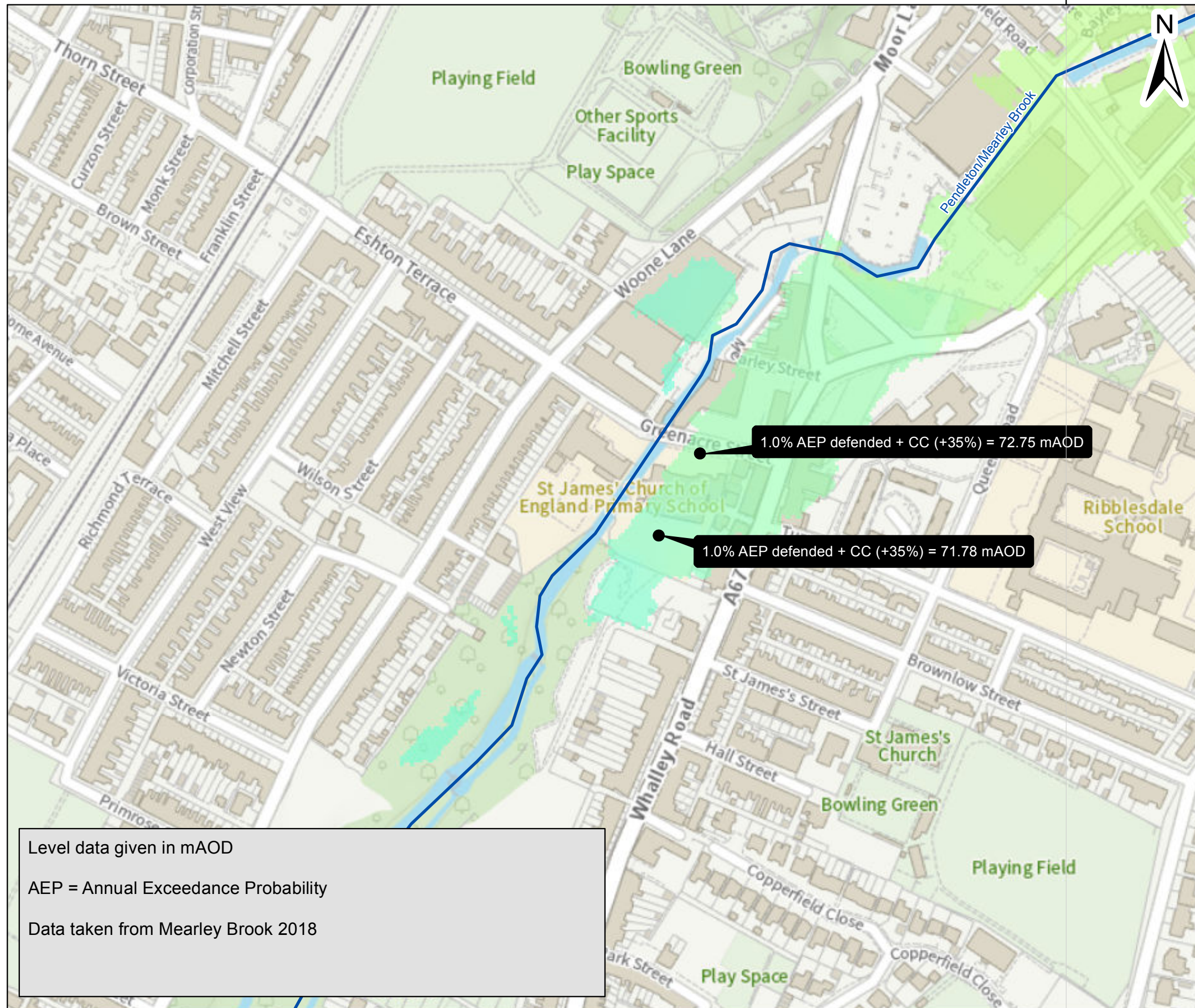
Low : 58.799

**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Mearley Brook 2018



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

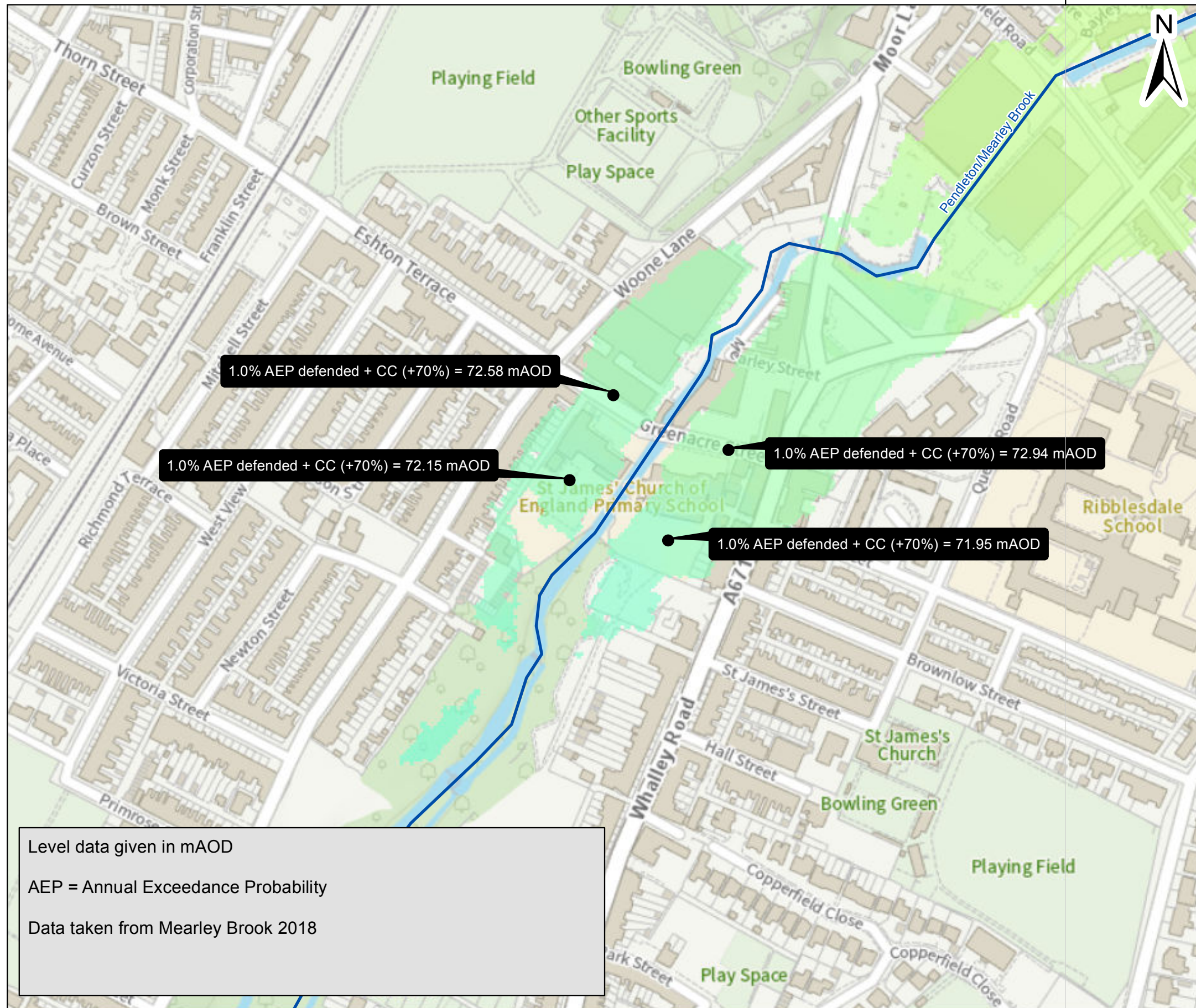
## Modelled 2D Data Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

NGR: 374125, 441280



1.0% AEP defended + CC (+70%) = 72.58 mAOD

1.0% AEP defended + CC (+70%) = 72.15 mAOD

1.0% AEP defended + CC (+70%) = 72.94 mAOD

1.0% AEP defended + CC (+70%) = 71.95 mAOD

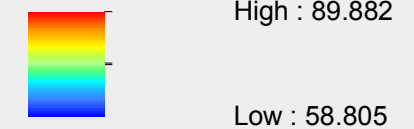
Level data given in mAOD  
 AEP = Annual Exceedance Probability  
 Data taken from Mearley Brook 2018

### Key

 Main River

### 1.0% AEP defended + 70% Climate Change

Value



**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

## Modelled 2D Data Map

St James CoE School, Clitheroe

Produced: 26 May 2021

Our Ref: CL218544

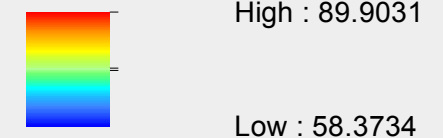
NGR: 374125, 441280

### Key

 Main River

### 0.1% AEP undefended

Value

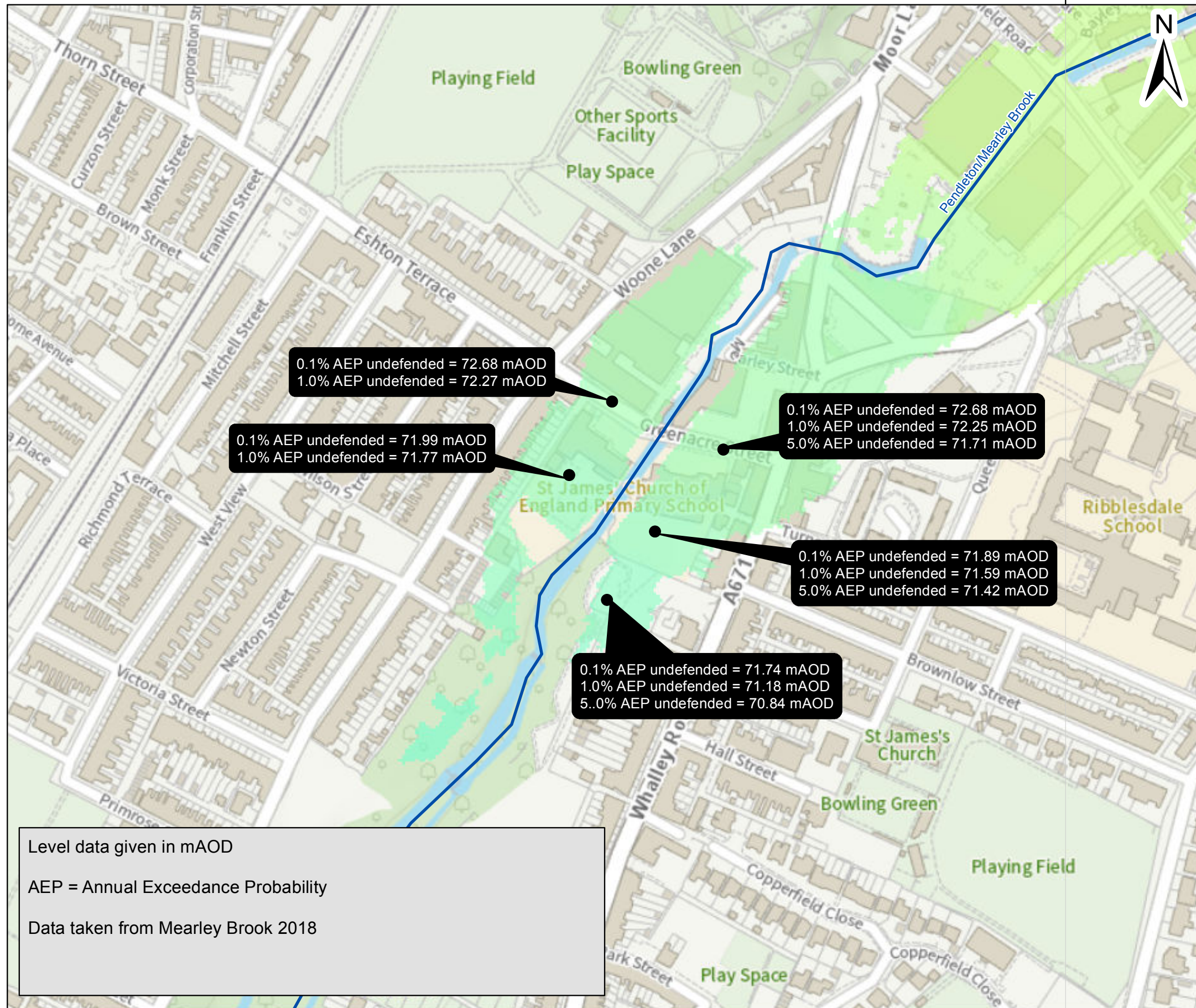


**Flood Zone 3** shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; [www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances](http://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

© Environment Agency copyright and database rights 2021. All rights reserved. © Crown Copyright and database rights 2021. Ordnance Survey licence number 100024198.

**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

---

**Appendix F -** British Geology Survey Borehole Record

CLIENT SANDERSON WATTS ASSOC.		JOB NO C8840	LOCATION SUN STREET, CLITHEROE.		BOREHOLE NO <b>BH2</b>	
DATE JANUARY 1997		SCALE 1 to 50	BORING METHOD CABLE PERCUSSIVE			Sheet: 1
Drilling & Casing Progress	SAMPLE/TEST		SPT N - value or COHESION	DESCRIPTION	O D LEVEL	DEPTH
	Type & No.	Depth(M)				
28TH	B 1	0.30 - 0.80		MADE GROUND - Concrete.		0.0
				MADE GROUND - Stone slab.		0.15
				MADE GROUND - Compact stone subbase.		0.30
	S 2	1.00 - 1.45	2	MADE GROUND - Soft medium to dark brown very silty clay.		0.50
	B 3	1.60 - 2.00				
	S 4	2.00 - 2.45	3			
				Soft medium brown silty very sandy CLAY.		2.40
	S 5	2.90 - 3.35	19			
	D 6	3.30		Stiff medium to dark brown and grey silty sandy CLAY with some to much fine to coarse gravel, with occasional cobbles and boulders.		3.10
28TH	S 7	4.40 - 4.70	95			
	B 8	5.00 - 5.50				
28TH	D 9 C 10	6.10 6.20 - 6.25	100	Light grey very fine grained strong slightly shelly carboniferous LIMESTONE, with occasional micaceous content.		5.80
						6.20

**DUNELM DRILLING COMPANY**  
**TEL0191-526-2534 FAX0191-517-0065**

**BOREHOLE LOGSHEET**

**Water Observations, Remarks, Etc**

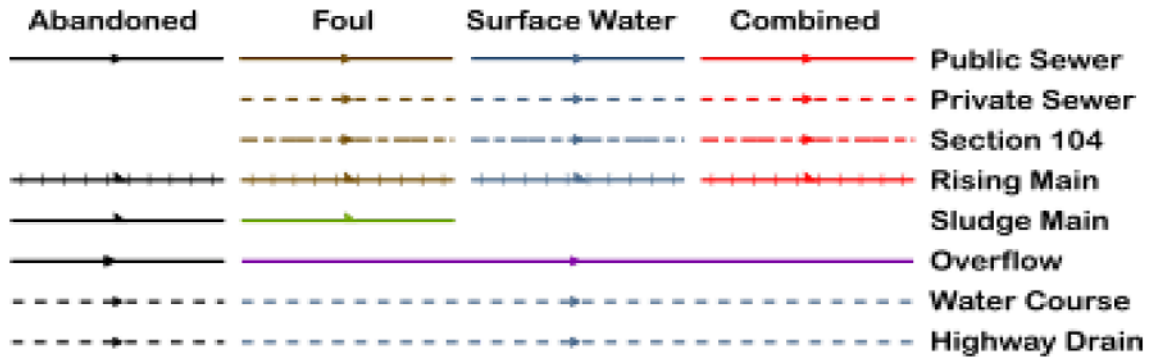
Borehole visually moist from 0.50m to 2.40m.  
 No direct water strike recorded, although water standing at 1.75m on removal of temporary casing at end of borehole.

Chiselling concrete and stone slab - 0.75 hr.  
 Chiselling to prove rock from 5.80m to 6.20m - 1.5 hrs.

---

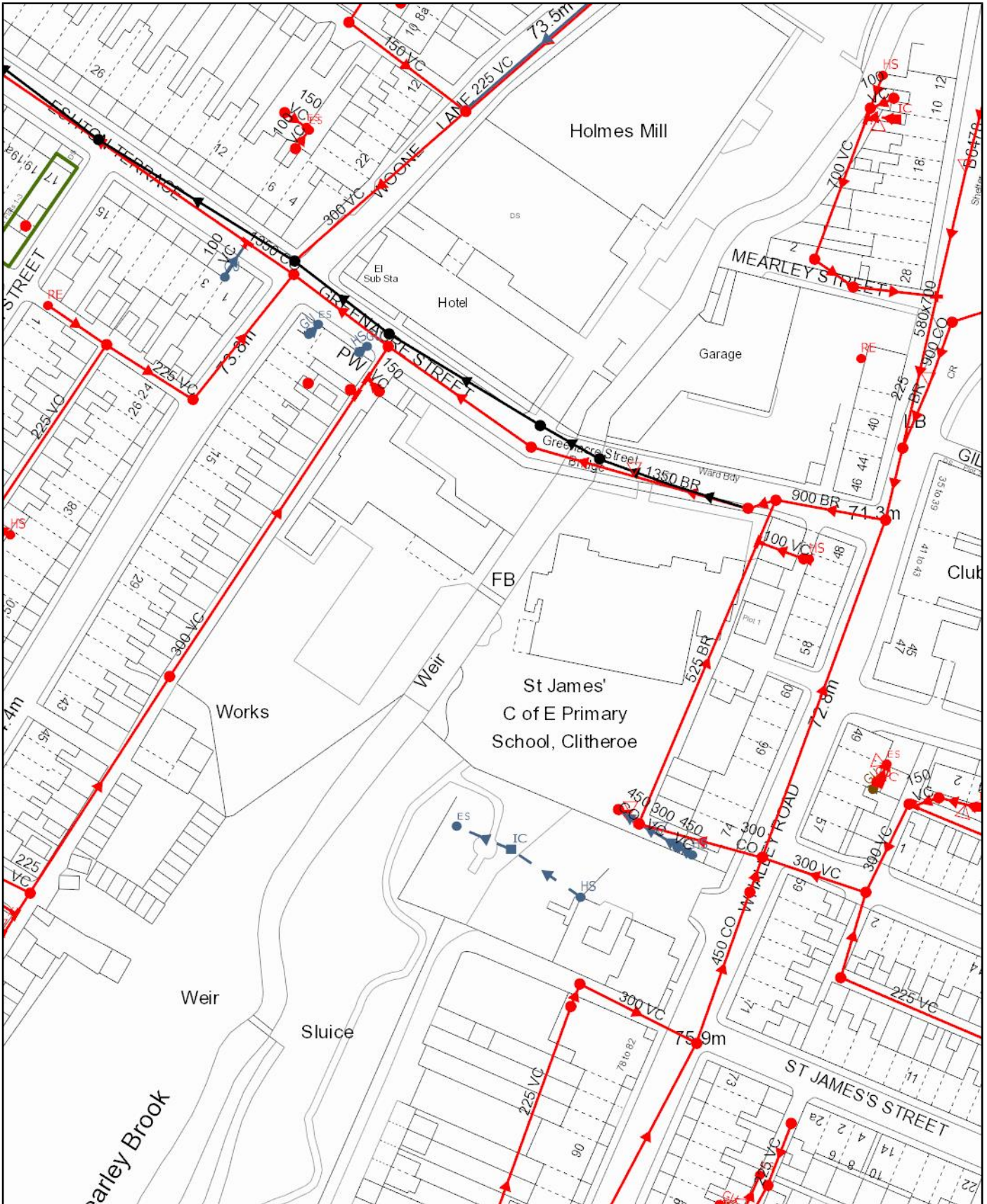
**Appendix G** - Thames Water Public Sewer Records

## Wastewater Symbology



All point assets follow the standard colour convention: **red** – combined      **brown** - foul  
**blue** – surface water      **purple** - overflow

- |                  |                          |
|------------------|--------------------------|
| Manhole          | Side Entry Manhole       |
| Head of System   | Outfall                  |
| Extent of Survey | Screen Chamber           |
| Rodding Eye      | Inspection Chamber       |
| Inlet            | Bifurcation Chamber      |
| Discharge Point  | Lamp Hole                |
| Vortex           | T Junction / Saddle      |
| Penstock         | Catchpit                 |
| Washout Chamber  | Valve Chamber            |
| Valve            | Vent Column              |
| Air Valve        | Vortex Chamber           |
| Non Return Valve | Penstock Chamber         |
| Soakaway         | Network Storage Tank     |
| Gully            | Sewer Overflow           |
| Cascade          | Ww Treatment Works       |
| Flow Meter       | Ww Pumping Station       |
| Hatch Box        | Septic Tank              |
| Oil Interceptor  | Control Kiosk            |
| Summit           |                          |
| Drop Shaft       | Change of Characteristic |
| Orifice Plate    |                          |



Scale: 1:1250  
 Date: 10/06/2021

## SEWER RECORDS



Water for the North West


**Address or Site Reference:** ST. JAMES C OF E PRIMARY SCHOOL  
 GREENACRE STREET, CLITHEROE, BB7 1ED  
**Printed by:** Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

---

**Appendix H - ICP SuDS Greenfield Rate of Runoff**

Base Energy Services Limited		Page 1
44 Canal Street Bootle Liverpool L20 8QU	St James C of E Greenfield Total Site	
Date 25/06/2021 File	Designed by CC Checked by PK	
Micro Drainage	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.800	Urban	0.000
SAAR (mm)	1055	Region Number	Region 10

**Results    l/s**

QBAR Rural	5.7
QBAR Urban	5.7

Q100 years 11.8

Q1 year	4.9
Q30 years	9.6
Q100 years	11.8