

320200318P

FLOOD RISK ASSESSMENT

**23 BRIDGE END
BILLINGTON
LANCASHIRE
BB7 9NU**

Prepared by Michael Frankland

15 April 2020

Contact 07770 443521

PROPOSED DEVELOPMENT AT 23 BRIDGE END BILLINGTON LANCASHIRE BB79NU

ONE DETACHED DWELLING

Executive Summary

A flood risk assessment has been requested and provided in support of a Planning Application for the Replacement of an existing building (2 Storey Garage) to provide 1 Detached Dwellings plus parking on the site at 23 Bridge End Billington Lancashire BB7 9NU. NB A similar Risk Assessment was prepared for this site Planning Application no 3/2019/0703 and approved. This new proposal is sited further above the initial application site which can be seen from the data provided.

The site is shown to be situated within Flood Zone 1 2 and 3 of the Environment Agency Flood Map (see attached plan) and therefore has a risk of fluvial flooding.

The application site (see attachment) currently consists of a 2 Storey dilapidated garage on a relatively steep site with a slope rising from approximately 40m AOD to 51.2m AOD at street level.

A Topographical report and LIDAR Data-has been used to estimate the levels on the site with build levels stated below.

The footprint on which the dwelling will be located (see attachment) is above 48.41m AOD.

The Environment Agency has produced Historic Flood Information Data and the applicant has used his local knowledge of flooding having resided at the property since 1998 to calculate the highest potential flood levels as required by the Environment Agency (1000yr).

It is confirmed by both sources that the site was partially flooded in 2015 to a height of approximately 45m AOD (Attachment).

The Environment Agency have provided Flood Plain levels associated with the River Calder reflecting the most recent modelling approximately 10m from site (see attached table)

The worst case scenario of Un defended levels has been used in the assessment to evaluate flood levels at the site (see table below).

100yr EVENT FLOOD ZONE 3

Flood levels associated with a 100 yr event is identified as 45.02 AOD.

The ground level on which the footprint of the proposed dwelling is been located has been determined using topographical Data is above 48.41m AOD.

As such during the 100yr return period the application is sufficiently elevated by 3.39m

100YR + 20% Climate Change is identified as 45.36m AOD.

Therefore the proposed development is sufficiently elevated by 3.05m.

100Yr + 35% (EA Revised Advice and Guidance)is identified as 45.61 AOD.

Therefore the proposed development is sufficiently elevated by 2.80m.

1000 YR EVENT (Flood Zone 2)

The flood Level associated with the 1000 year event is identified as 46.33 AOD
Therefore during the 1000 yr return period the application site is not expected to flood and has built resilience of 1.88m

A review of the Environment Agency Flood Data (see attached plan)shows the applicants overall site is located within Flood Zones 1 2 and 3.

However the development footprint will not be affected during the 100yr, 100yr plus 20% and 35% Climate change and 1000 year events as it is located in the lowest risk Flood Zone which is 1

In conclusion it is considered with additional and suitable mitigation measures incorporated in the development (attachment) the proposal be deemed-satisfactory.

DRAINAGE

The current site has no existing facility for surface water drainage. As such it is recommended that flows from the new build should be subject to rainwater harvesting as proposed below and the property owners will be responsible for maintenance.

There is currently a foul drainage system connecting the existing building to Mains Foul Drains the development would seek to maintain that facility with the water authority.

MITIGATION MEASURES

In order to provide an extra element of safety to the development Flood resilience /resistant measures are incorporated (see attachment).

The Site is situated in an area covered by the Environment Agency Flood Warning Direct Service. Due to the site being covered by all 3 Flood zones and within close proximity to the River Calder it is advisable to get residents to sign up to the flood warning service and equally resident should have their own flood risk plan in place as additional insurance.

FLOOD RISK ASSESSMENT EVIDENCE PROVISION

The review of the evidence submission commences with Environment Agency Flood Map (see attachment) detailing Areas and Zones affected by potential Flooding and associated Data. Detailed below

FLOOD ZONES

Flood Zone 1 Low probability (less than 1 in 1000 year).

Flood Zone 2 Medium probability.

Flood Zone 3 High Probability (1 in 100 (1.0%AEP) or greater probability river flooding in any year or 1 in 200 (0.5% AEP) or greater annual probability of sea flooding in any year.

SEQUENTIAL AND EXCEPTIONS TEST

As set out in the National Planning Policy Framework the aim of the sequential test is to steer new developments to areas of the lowest probability of flooding

The Flood Zones are the starting point for the sequential approach

The Environment Agency Flood Map shows the development site to be located within Flood Zones 1 2 and 3 . However the proposed development is completely set within Flood Zone 1. Therefore it is not considered a requirement to apply the Sequential and Exception tests.

CLIMATE CHANGE (EA DATA)

The NPPF requires the application of climate change data over the lifetime of the development. The Climate Change allowance for the North West (listed in the climate change allowance document 2016) relevant to this development are listed below "The Environment Agency has requested that a figure of 35% is now to be used .

The selection of Climate Change allowance should be chosen appropriate to the lifespan of the proposed development.

Paramater	Allowance category	2070 2115	
Peak Rainfall Intensity	Central	20%	
Peak River Flow	Central	*35%	

DETAILS OF SITE

Site Name 23 Bridge End Billington Lancashire BB7 9NU.

Replacement of existing Building on identical footprint with Detached Dwelling.
Current Use Two Storey Garage used for storage.

Planning Authority Ribble Valley Borough Council.

SITE DESCRIPTION

The site is currently a Two storey Garage (see attachment) To the West are open fields and the East similar properties to the proposed development. To the front of the site is the Main Whalley Road.

The footprint to which the new development will be located will be above 48.41m AOD.

The closest watercourse to the site is the River Calder.

Aerial view of site shown below.

HISTORIC FLOODING

The most severe flood event was on Boxing Day 2015 . The owner of the property was in residence on that day and confirm the level as 45.00m approximately. This is confirmed by the Environment Agency who have no record of the Flood entering the property on the day in question. just the garden area , The information is confirmed by the Ribble Valley Borough Council who undertook a Strategic Risk Assessment in April 2017 (see pictures attached).

In Whalley during 2015 the event approached a 1 in 1000 chance of occurring

FLOOD RISK EVALUATION

The Environment Agency Flood Map below confirms the proposed development site is in zones 1 2 and 3.

SOURCES OF FLOODING

Source	Significance
Fluvial	Flood Zone 1 2 3
Reservoir	EA Map shows that the site is only marginally affected by reservoir flooding

Source	Significance
Ground Water	SFRA States that ground water Flooding within the area is not considered significant
Surface Water Flooding	Site has low risk of Surface water Flooding

ASSESSMENT

From the initial assessment it is considered that the primary course of flood risk will be from the fluvial source the River Calder.

RIVER CALDER FLUVIAL

The River Calder is approximately 6m to the rear of the site development. and due to the proposed development being located in Flood Zone 1 2 3 further evaluation is undertaken below

GROUNDWATER.

Due to the steepness of the site and close proximity to the river groundwater flooding is highly unlikely.

SURFACE WATER FLOODING

The Environment Agency Surface Water Flooding Map Identified that the site has a very low risk associated with pluvial surface water flooding.

Definition Very low equates to a less than 0.1%chance Though surface water flooding is extremely difficult to predict As stated earlier the site is situated on a relatively steep slope,

FLOODING FROM RESERVOIRS

The Environment Agency flooding from reservoirs map identifies that the proposed site will be affected during breach or failure .

However the risks of this actually happening are deemed to be very low in addition there has been no loss of life caused by reservoir flooding In the last 100 years.

QUANTITATIVE FLOOD RISK ASSESSMENT

Fluvial River Calder

General

The River Calder is the Main River at this location and the site is located within flood zone 3 and the build footprint in Flood Zone 1. A evaluation of the potential depth associated fluvial flooding at he proposed development is requires and has been undertaken using Environment Agency Data information provided.

The Flood Data for the River Calder regarding Flood defences has been reviewed and it has determined that none of the flood defences have a design standard of protection in excess of the 10 year return period Therefore flood defences have not been taken into account during this review.

Environment Agency Modelled Flood Levels

Return Period	Defended Scenario M AOD	Un defended Scenario M AOD
100 YR	45.02	45.02
100 YR +20%	45.35	46.36
100 YR +35%	45.61	45.62
1000 YR	46.33	46.33

The Environment Agency have provided Flood Plain Levels associated with the River Calder in close proximity to the development site The levels are listed above.

The undefended levels have been used in ALL calculations.

The Environment Agency have provided flood plain levels associated with the River Calder reflecting the most recent modelling approximately 10m from site
The worst case scenario of Un defended levels has been used in the assessment to evaluate flood levels at the site

100yr EVENT FLOOD ZONE 3

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1000YR EVENT (Flood Zone 2)

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FLUVIAL CONCLUSION

Following a review of the Environment Agency Flood Data the application site is located in Zone 1 2 and 3 but Zone 1 is not affected during the 100 year, 100 year +20% +35% and 1000year climate change event.

In conclusion it is considered that the site is suitable and with some additional mitigation measures built in over and above the minimum requirements the site be deemed suitable.

SURFACE WATER RUN OFF

At present the site comprises a single building with an approximate area of 50ms. The new development site will be 170ms approx. There is currently no site drainage regime.

Existing Sewer

The site currently has a main foul drain facility. It is recommended that the proposed drainage network should be used for the site.

Surface Water

Having reviewed the building regulations approved document H the following method seems the most suitable for the site .

Rainwater Harvesting

Rainwater Harvesting provides a source of non potable water. It can be installed at relatively low cost. It reduces the time of concentration of surface water flows into the system and it is the most suitable solution for the site. The measurements of the proposed build are approximately $10\text{ m} \times 10\text{ m} \times 10\text{ m} = 100\text{ ms}$. This could be potentially dealt with by using an on site tank 20 ms.

Mitigation Measures

Finished development levels

Though the finished floor levels are above the flood risk parameters of 48.00 m. In order to provide an extra element of safety, it is recommended flood resilience/resistance measures as described below are to be incorporated into the building design.

SUPPORTING EVIDENCED (attachments)

ARIEL VIEW OF SITE

BB7 9NU Google Maps

10/06/2010, 17:37

Go gle Maps BB7 9NU



Image ©2010 Google, Map data ©2010 30 m

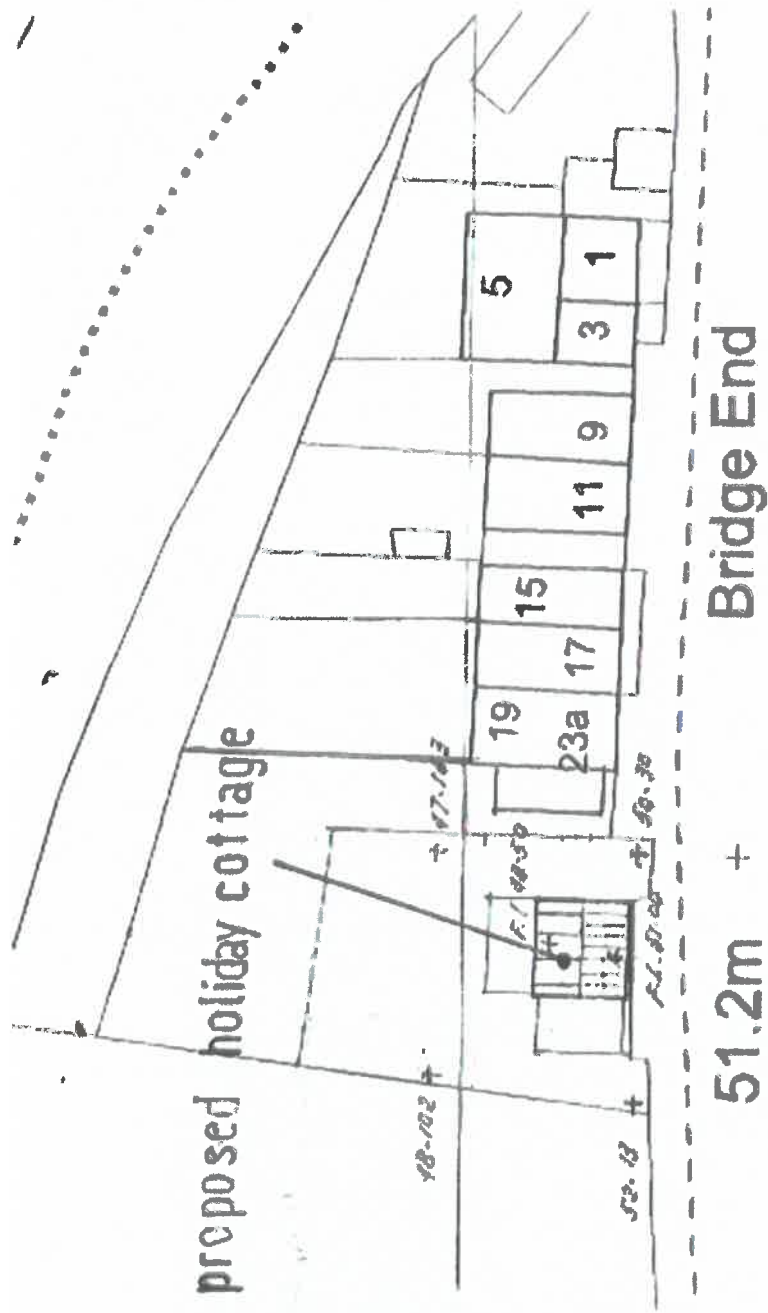
TWO STOREY GARAGE (EXISTING ON SITE)





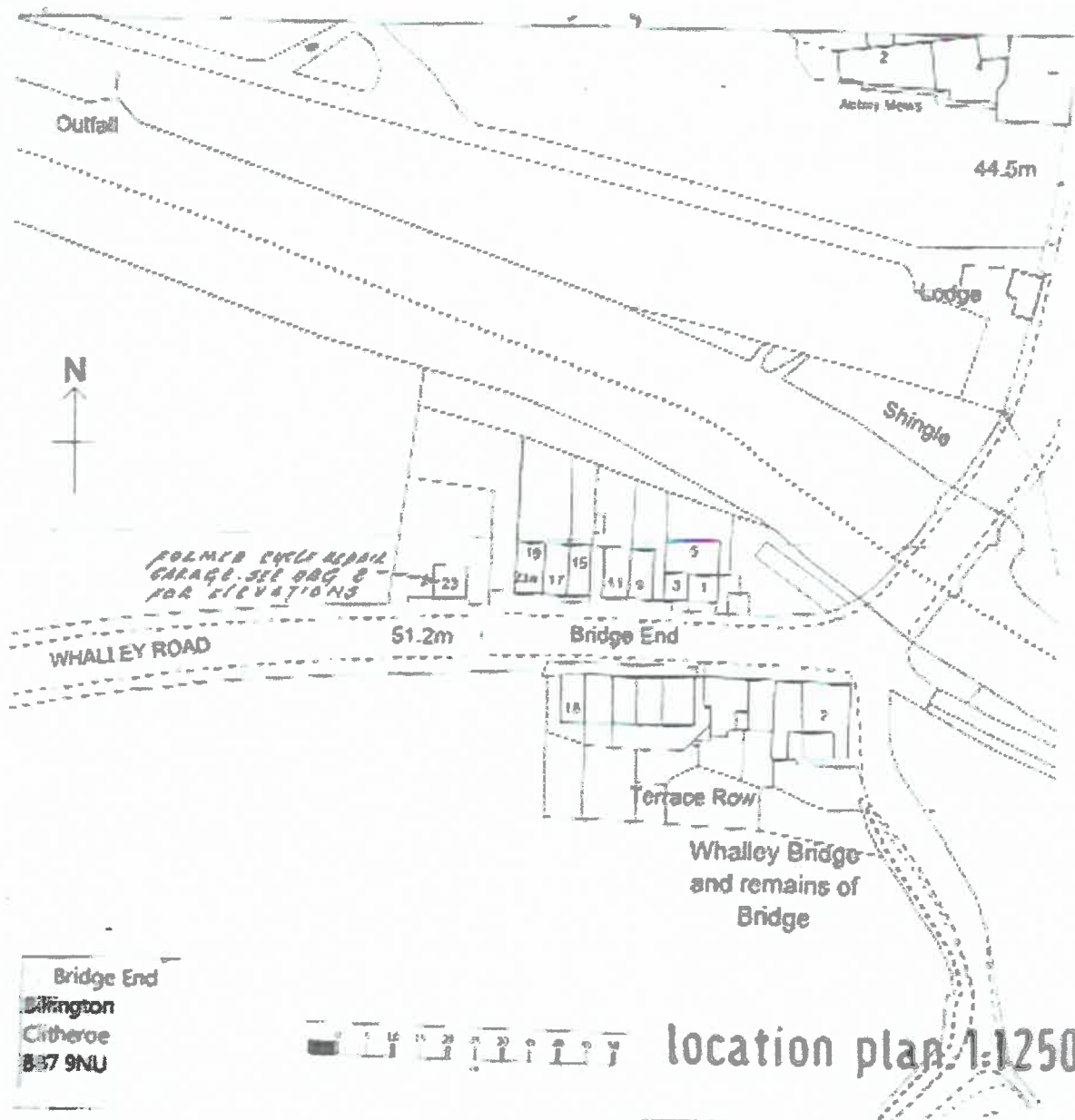
FLOODING DATA 2015





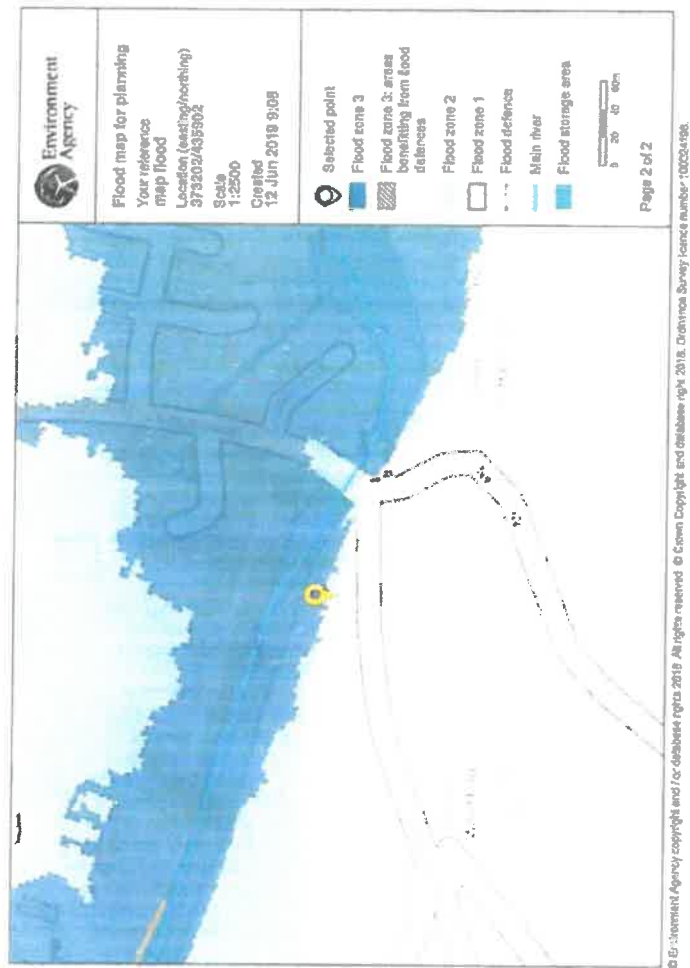
proposed site plan. scale: 1:500

PROPOSED HOLIDAY COTTAGE ADJ. 17/23 BRIDGE END WHALLEY



drg.ref.134/20 sheet 2 of 4 scale:1:100.

EA FLOOD MAP FOR PLANNING AND SITE LOCATION

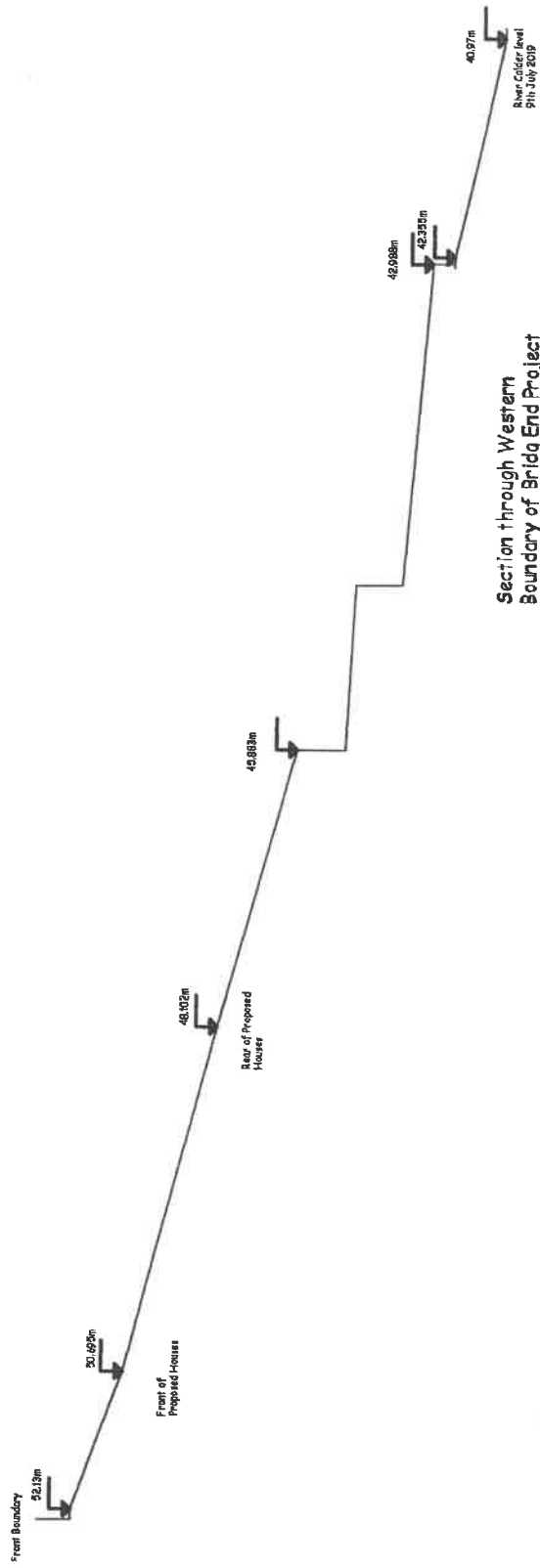


EA MAP FOR RESERVOIR FLOODING



EA MAP FOR SURFACE WATER FLOODING





Section through Western
Boundary of Bridg End Project
for M. Frankland

July 2019
Scale 1:100 1h on A2

**Fluvial Flood Level Map:
Bridge End, Billington,
BS7 9NU**

Produced: 29 April 2019
Our Ref: CL120116
NGR: SD7320135882

Key

Main River

Fluvial 0.1% annual probability of flooding Unflooded Scenario

mAOD

High: 57
Low: 40

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% or greater chance of happening each year.

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

ABDEs (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.

Unflooded Level data given in mAOD (Metres above Ordnance datum)

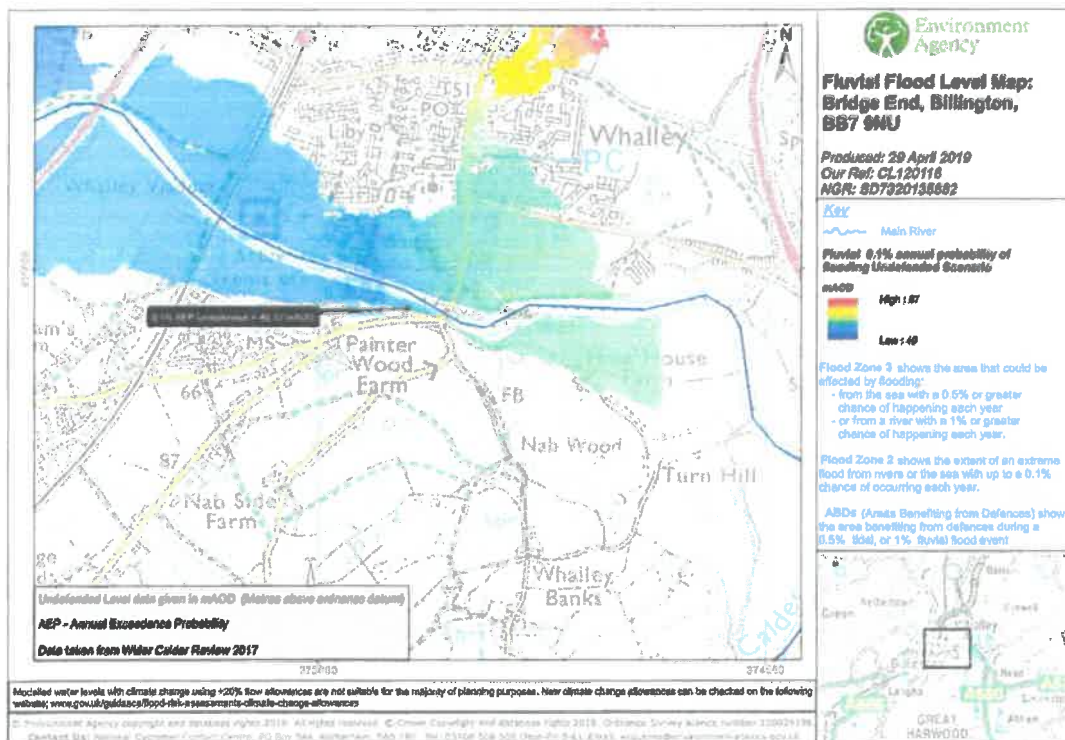
AEP - Annual Exceedance Probability

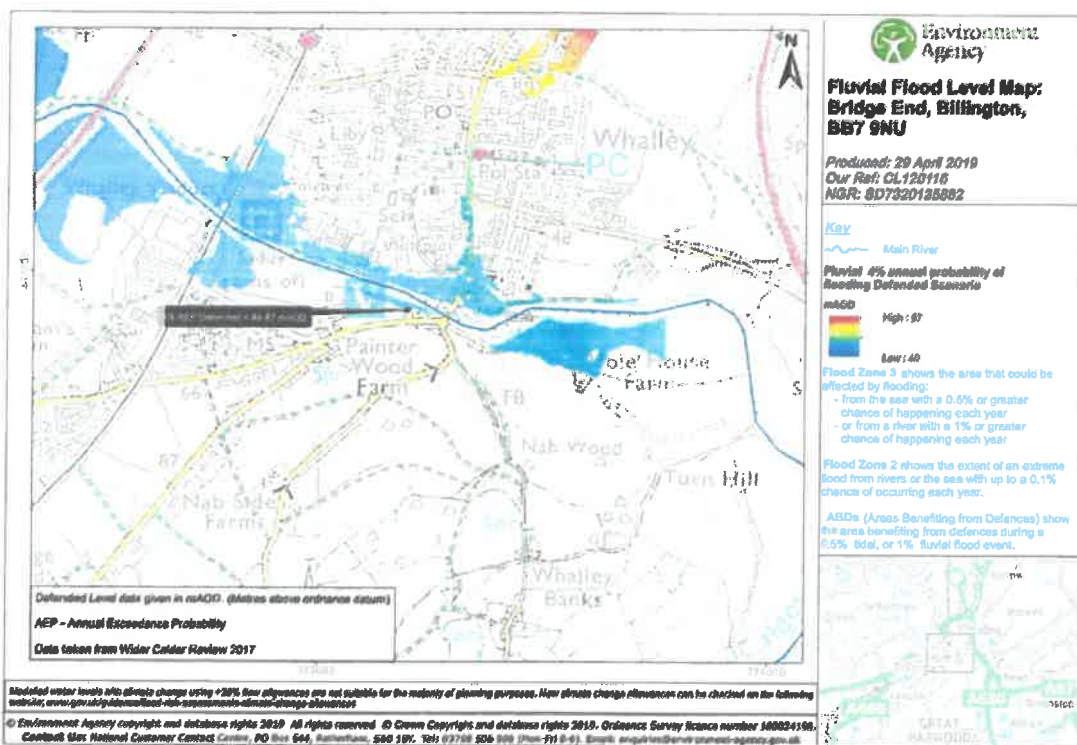
Data taken from Wider Calder Review 2017

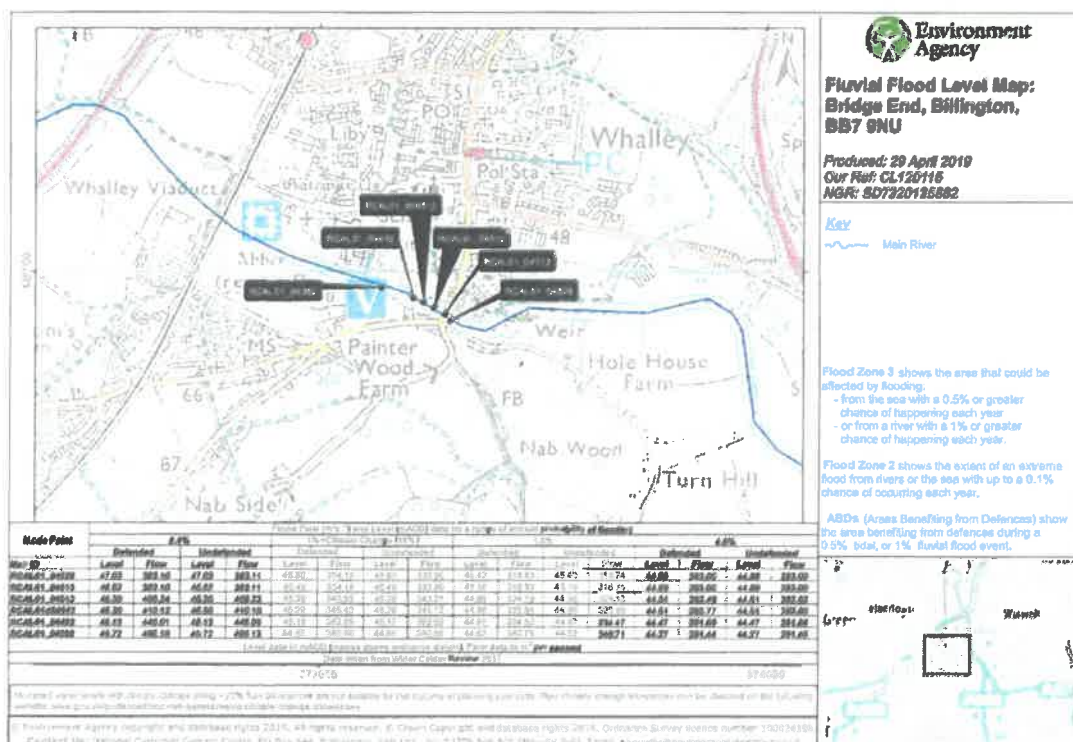
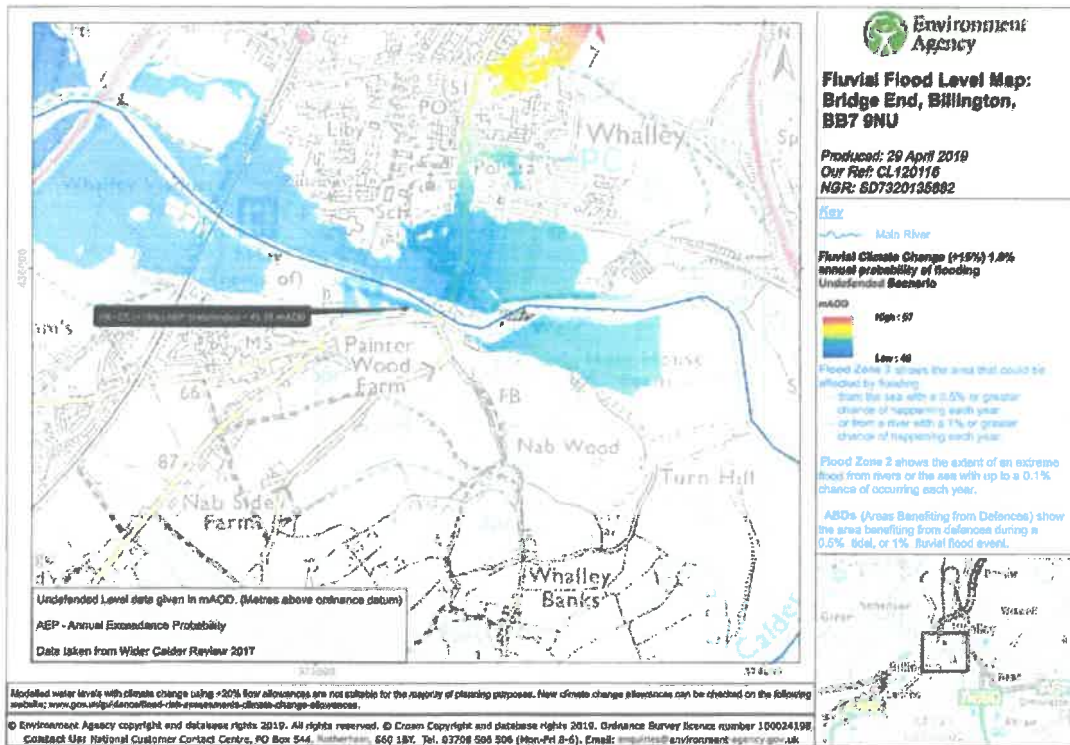
373000 374000

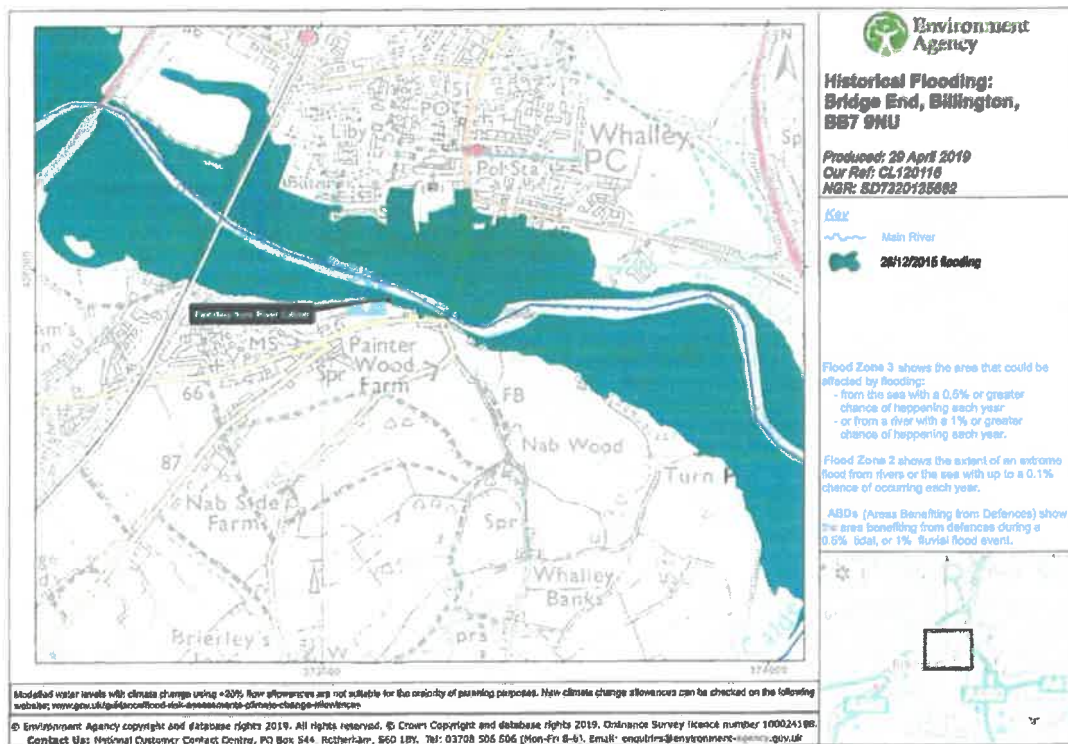
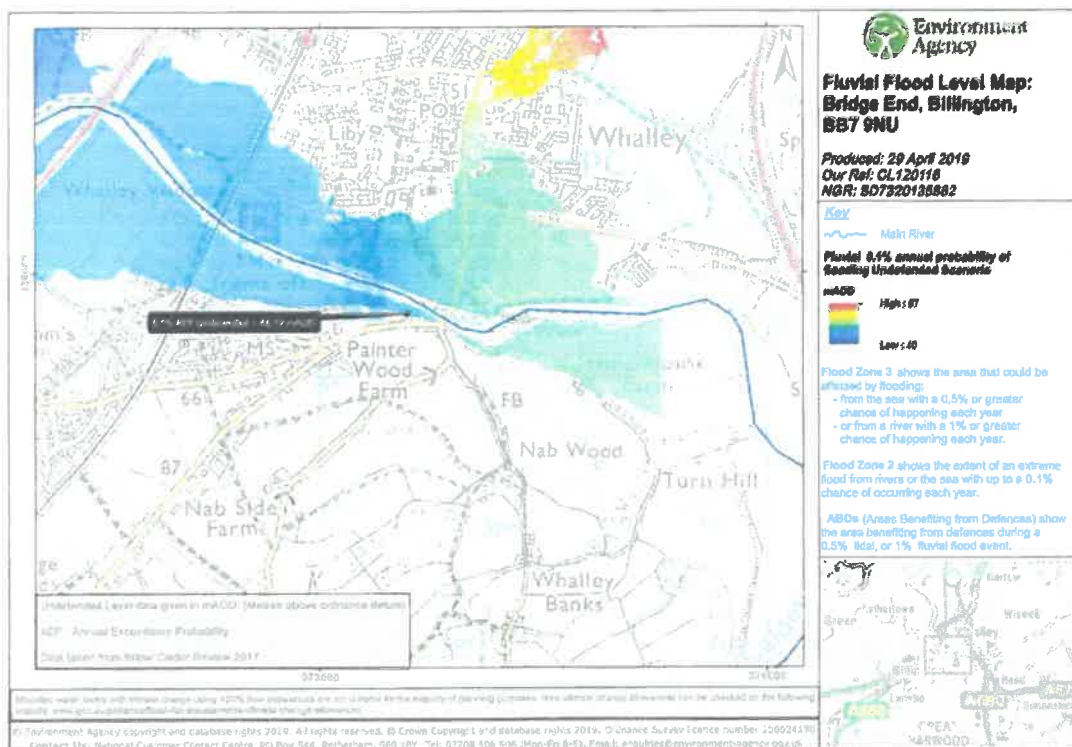
Modified water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. Near climate change allowances can be checked on the following website: www.gov.uk/guidance/flood-risk-assessment-climate-change-allowances.

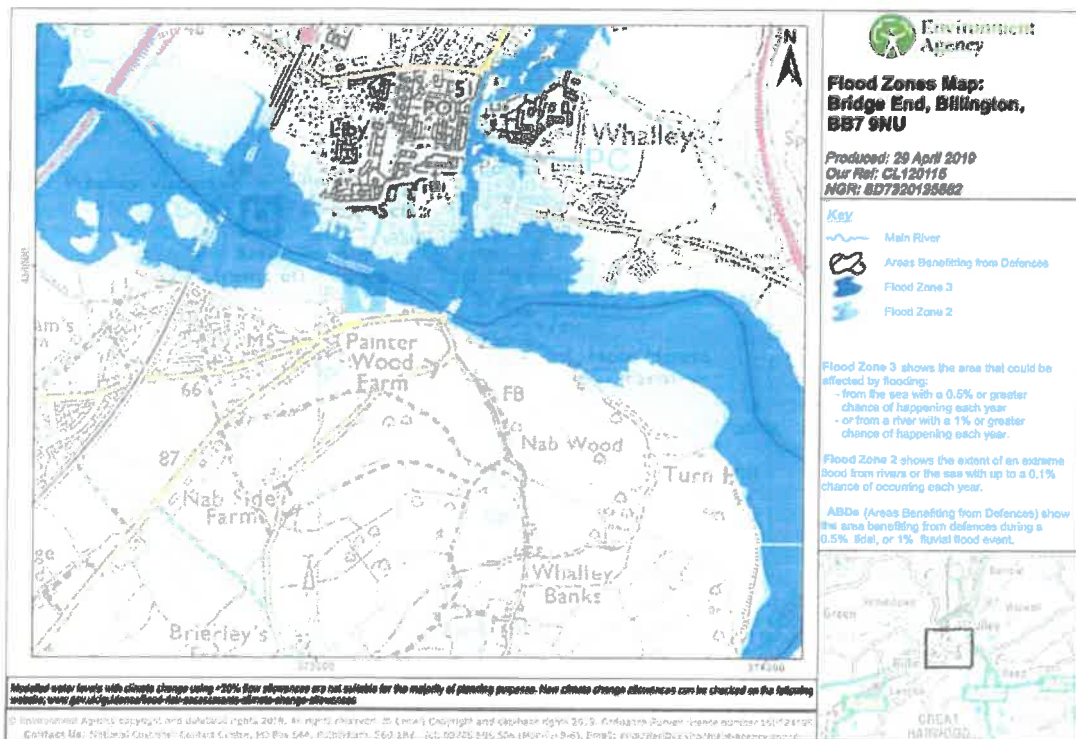
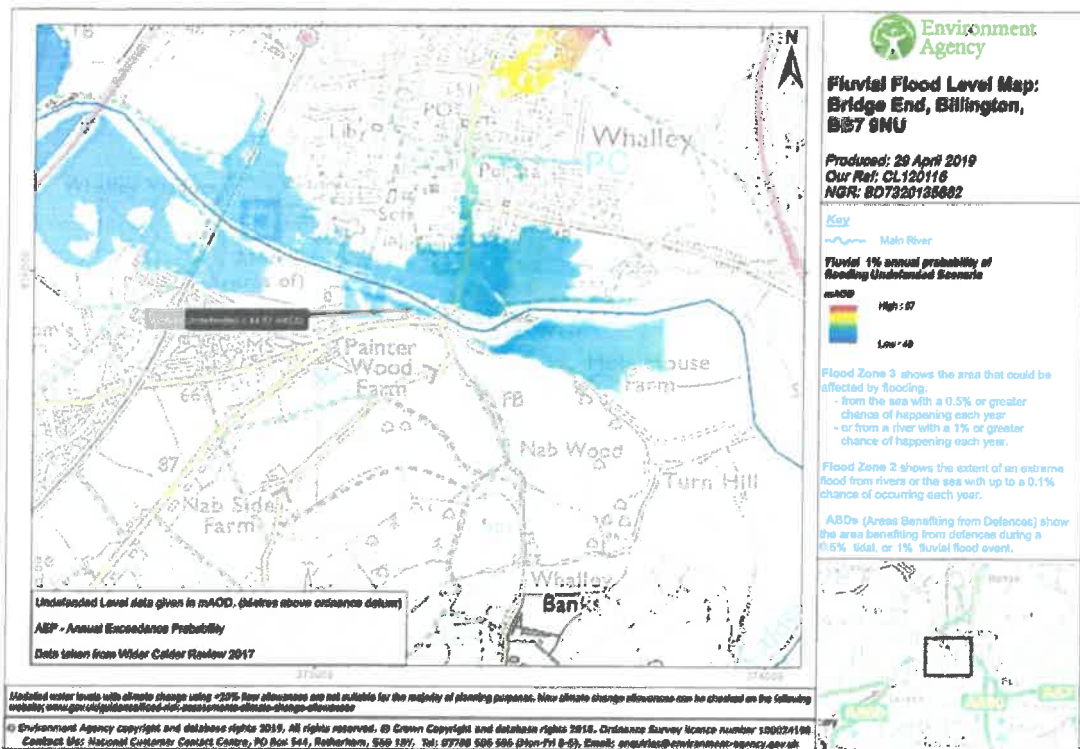
© Environment Agency copyright and database rights 2019. All rights reserved. © Crown Copyright and database rights 2019. Ordnance Survey Licence number 300029158. Contact: Map National Customer Contact Centres, PO Box 546, Ruseborough, 549 8BW, Tel. 03700 556 585 (Mon-Fri 8-5). Email: enquiries@environment-agency.gov.uk

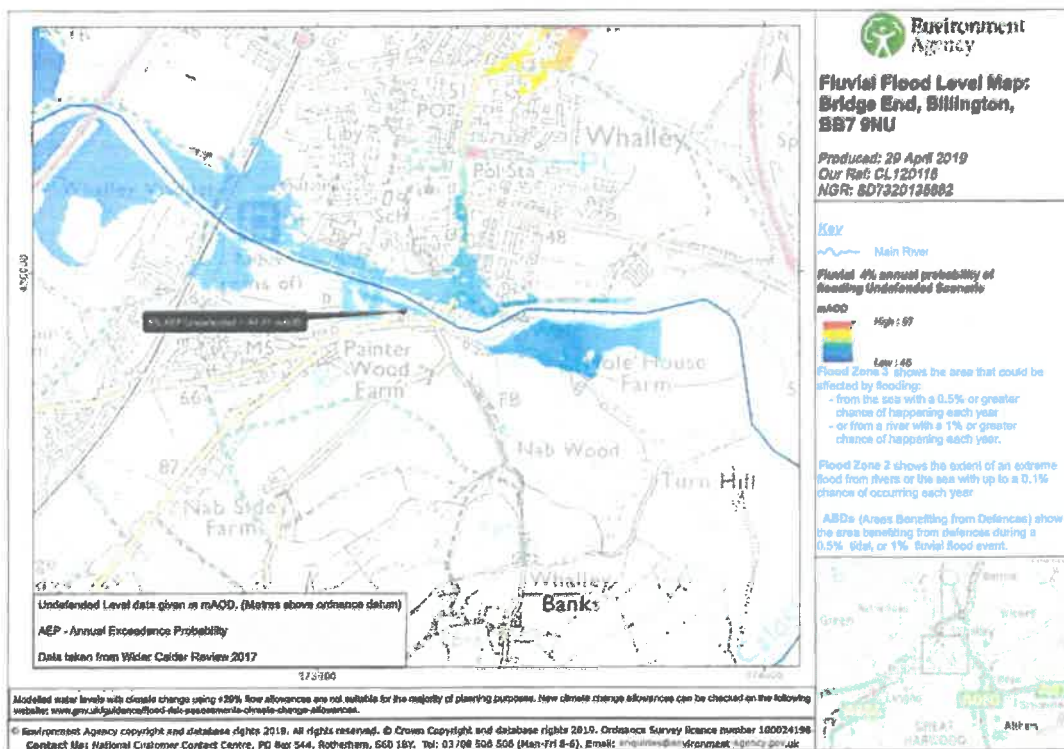


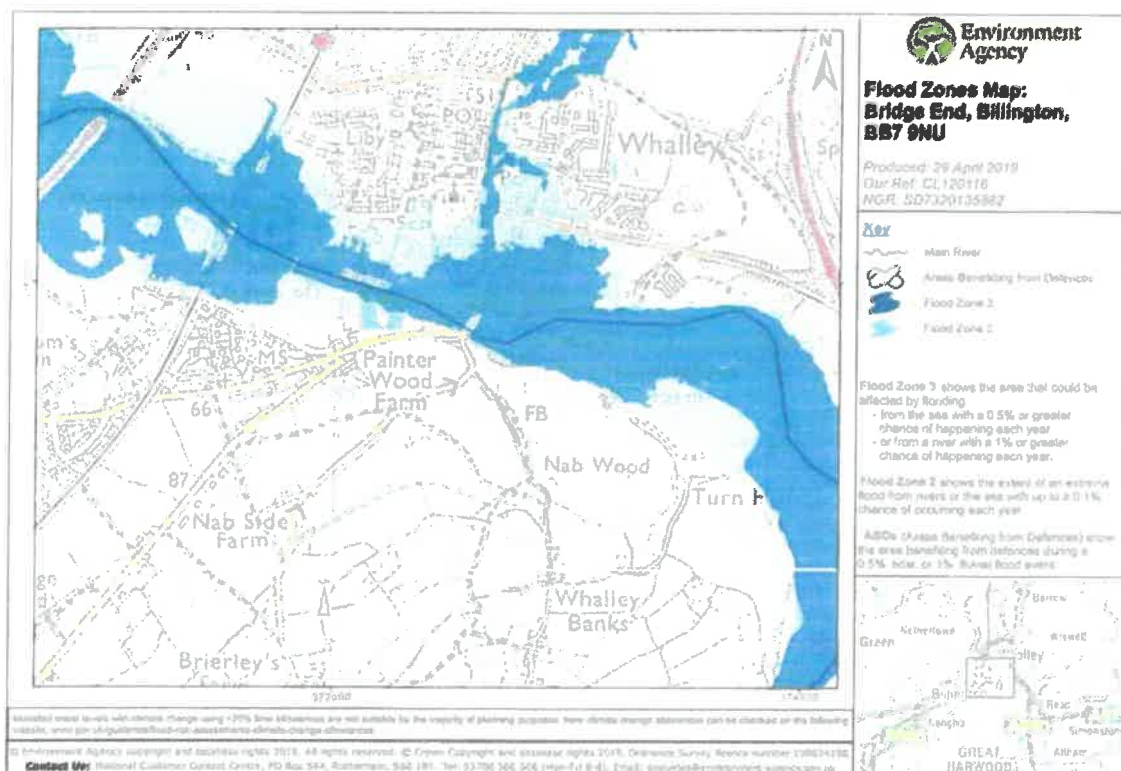












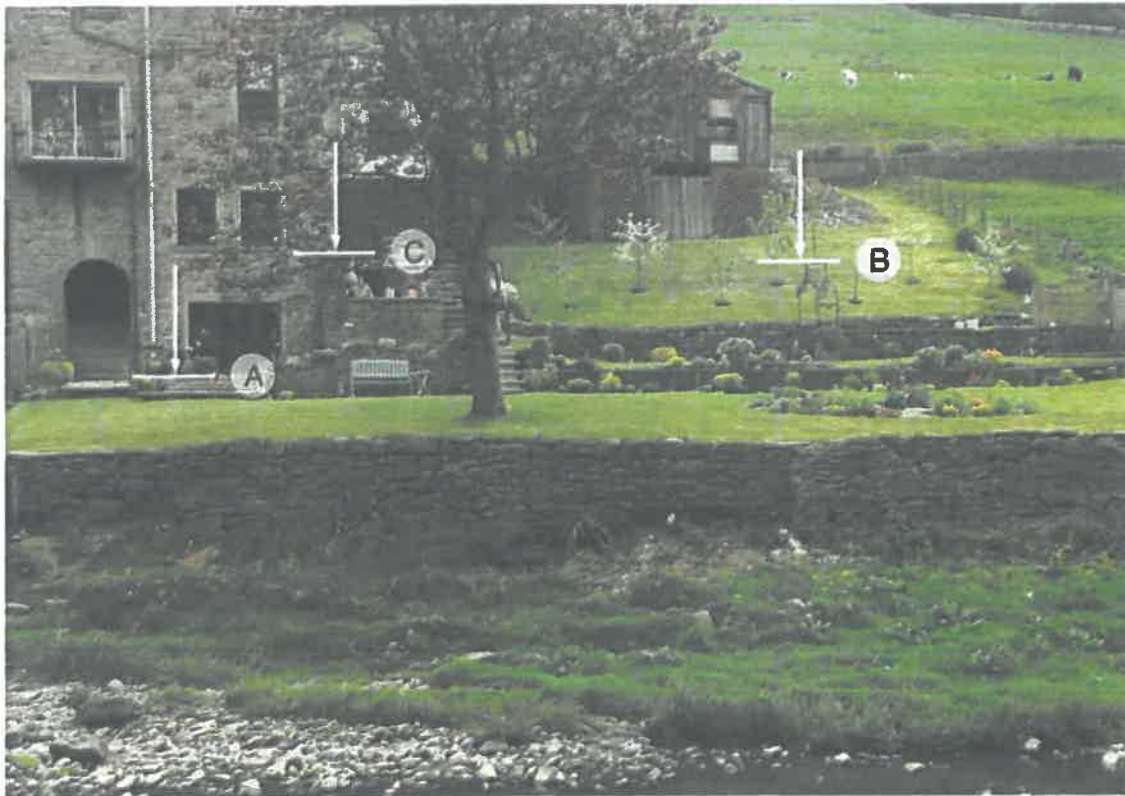


Fig A Flood level 2015 (Dec) 44.67m

Fig B Bank at Tree base 48.41m

Fig C Top of wall 48.25m

TBM Taken as 51.2m



TBM Temporary Bench Mark taken as 51.2m at Street level.

Fig A Flood level 2015 (Dec) 44.67m

Fig B Bank at Tree base 48.41m

Fig C Top of wall 48.25m

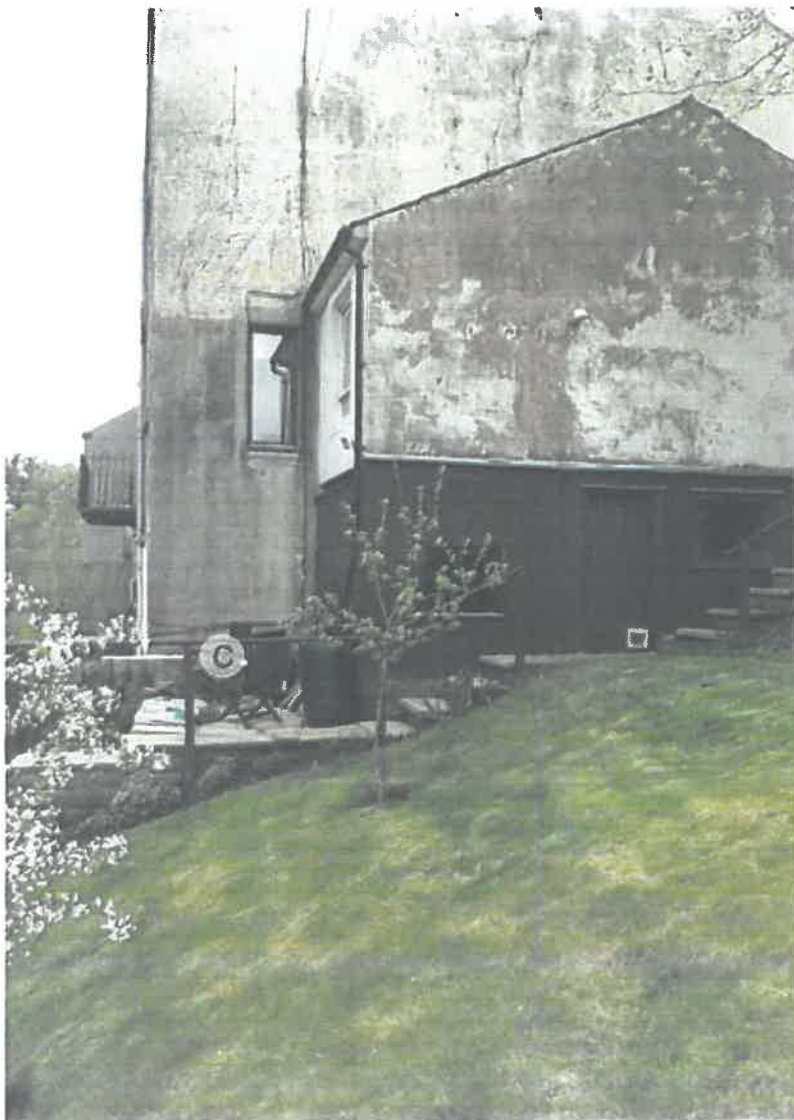


Fig C Top of wall.



Fig B Tree base 48.41m

TBM 51.2m



Fig B 48.41m

TBM 51.2

GUIDANCE NOTES FROM ENVIRONMENT AGENCY

Site-specific flood risk assessment:

Checklist

1 - Development site and location

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

A. Where is the development site located? (eg postal address or national grid reference)

b. What is the current use of the site? (eg undeveloped land, housing, shops, offices)

c. Which Flood Zone (for river or sea flooding) is the site within? (ie Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the Flood Map for Planning (Rivers and Sea). It is also a good idea to check the Strategic Flood Risk Assessment for the area available from the local planning authority.

2 - Development proposals

You can use this section to provide a general summary of the development proposals. It would be helpful to include, or make 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? See Table 2 of this guidance for an explanation of the vulnerability classifications.

c. What is the expected or estimated lifetime of the proposed development likely to be? (eg less than 20 years, 20-50 years, 50-100 years?). See paragraph 026 of this guidance for further advice on how to assess the lifetime of developments for flood risk and coastal change purposes. (It may also be advisable to seek advice from the local planning authority).

3 - Sequential test

For developments in flood zones 2 or 3 only. (If the development site is wholly within flood zone 1, you can skip this section and go to section 4).

You can use this section to describe how you have applied the sequential test (if needed as set out in paragraph 158 of the National Planning Policy Framework) to the proposed development, and the evidence to demonstrate how the requirements of the test have been met. See paragraph 033 of this guidance for further information. (You are advised to contact the local planning authority 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. See Table 1 for definitions of the flood zones.

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?

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.

4 - Climate Change

5 - Site specific flood risk

You can use this section to 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 (eg 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 un-

dertaking 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? (eg 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 this guidance for information on what is meant by a "design flood". If possible, flood levels should be presented in metres above Ordnance Datum (ie, 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 this 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? (eg 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? See paragraph 050 of this guidance for further advice.

6. Surface water management *

You can use this section to 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 (eg of 10 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 – see paragraphs 079–086 of this guidance for further advice. 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

You can use this section to 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 (eg 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. Exception test

You can use this section to 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 159 of the National Planning Policy Framework. See para-

graph 035 of this guidance for further information on the exception test. 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? See paragraph 037 of this guidance for further information.

b. How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere? See paragraph 038 of this guidance for further information.

c. Will it be possible for the development to reduce flood risk overall (eg through the provision of improved drainage)? See paragraph 050 for further advice.

9. Residual risk

You can use this section to 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. See paragraph 042 of this guidance for more information.

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? (eg putting in place flood warning and evacuation plans).

10. Flood risk assessment credentials

You can use this section to 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 (see paragraph 006 of this guidance). Surface water drainage elements of major planning applications (eg of 10 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.

Paragraph: 068 Reference ID: 7-068-20140306 Revision date: 16 11 2016 See previous version

What is the general planning approach to development and coastal change?

The aim of the policy on coastal change, as set out in paragraphs 166 of the National Planning Policy Framework, is to reduce risk from coastal change by avoiding inappropriate development in vulnerable areas or adding to the impacts of physical changes to the coast. The general approach can be summarised as follows:

Local planning authorities apply Integrated Coastal Zone Management to integrate terrestrial and marine planning regimes;

Local planning authorities identify Coastal Change Management Areas (further information in paragraph 071 and paragraph 072) likely to be affected by physical changes to the coast;

Local planning authorities are expected to be clear what development will be appropriate in Coastal Change Management Areas and make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.

Paragraph: 069 Reference ID: 7-069-20140306 Revision date: 06 03 2014

FLOOD RESILIENCE /RESISTANCE MEASURES TO BE INCORPORATED INTO 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

Provide fitting for floor boards or other temporary barriers across opening in walls.

avoid use of gypsum plasterboards use more flood resistant linings eg hydraulic lime ceramic tiles

avoid stud partition walls

wall sockets to be raised

ground floor to be concrete to minimise damage to reduce turnaround time after damage Use

solid insulation materials

wood fittings on the ground floor to be robust and or protected by suitable coatings in order to minimise damage during a flood

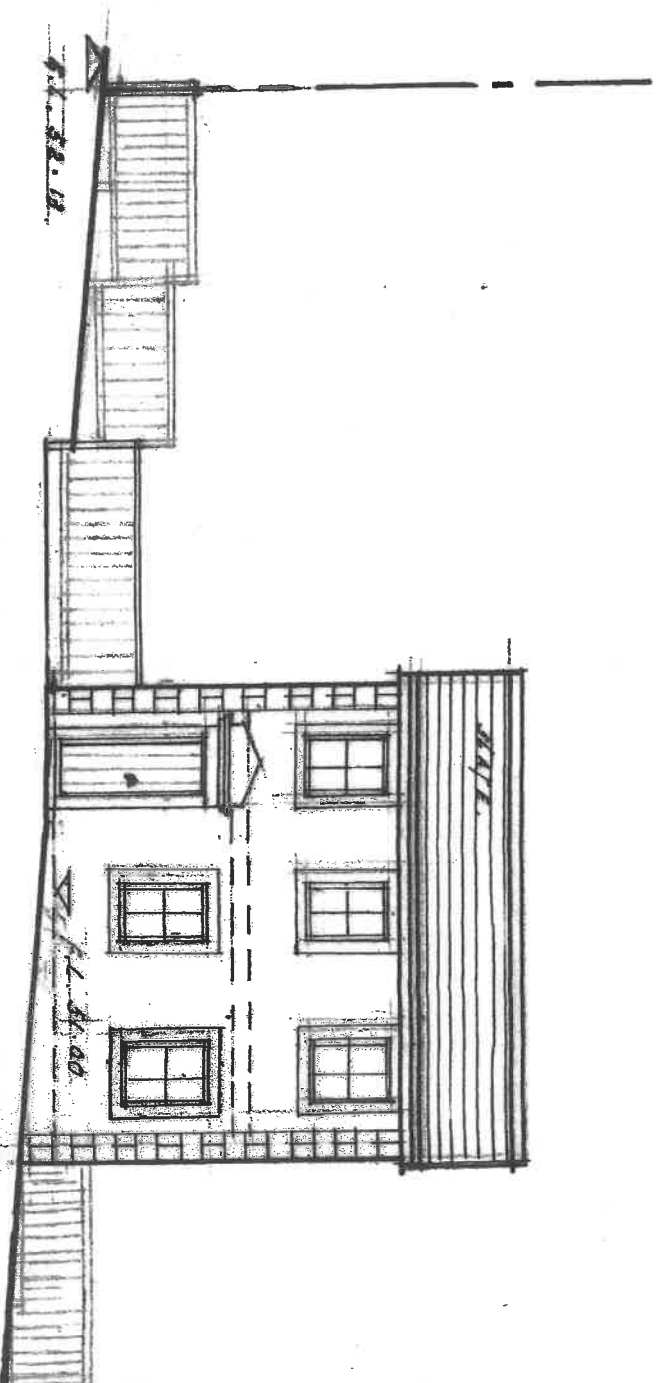
air-bricks to be raised as high as practicable

Damp proof membrane to be installed above the main floor slab and tied into the walls where appropriate

Ground floor waterproofing to be extended 0.6m above existing ground levels

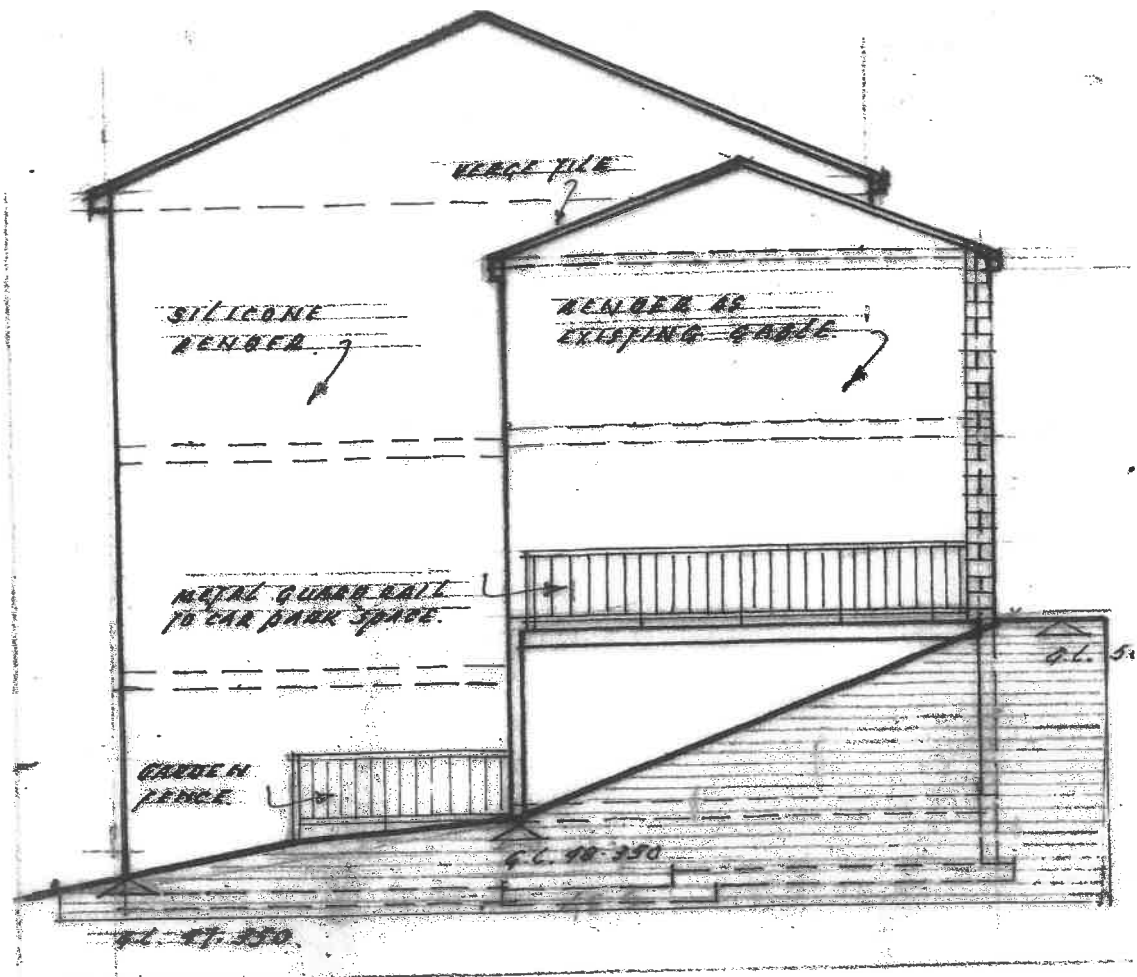
locate gas electrical and IT equipment at an appropriate height

use mountable /demountable flood barriers for large openings such as doors and windows alternatively use flood resistant doors which do not need installing prior to the onset of a flood



proposed front elevation facing road.

PROPOSED HOLIDAY COTTAGE, ADJ. 17/23 BRIDGE END WHALLEY

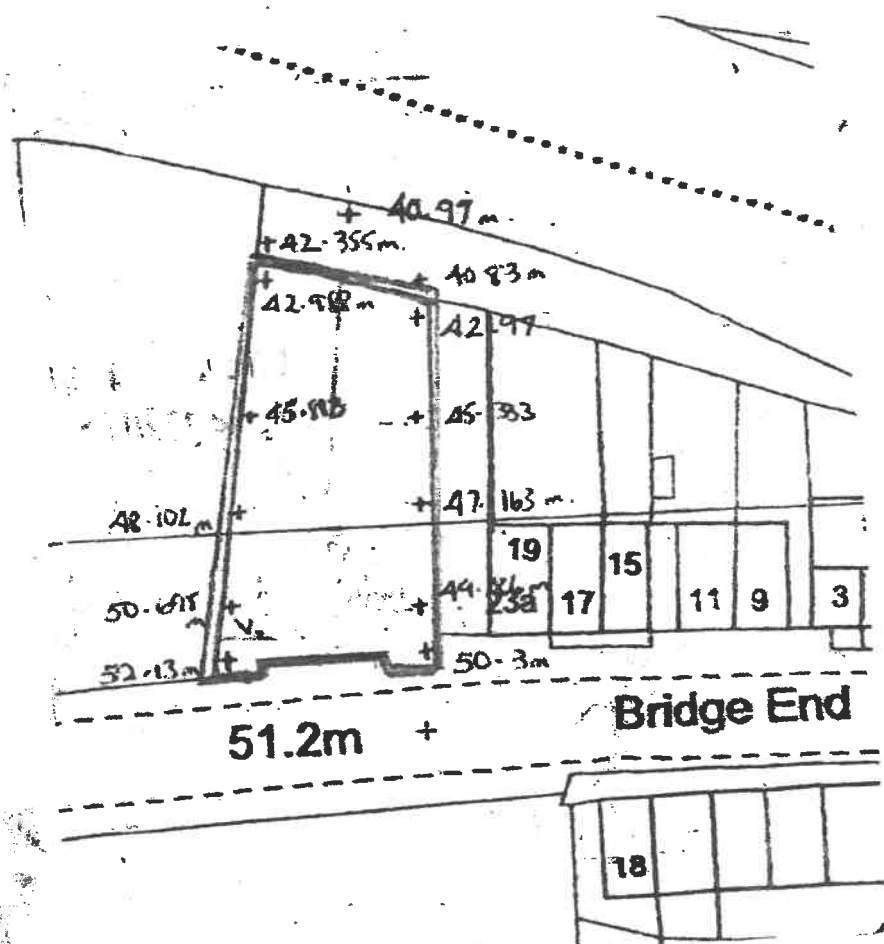


proposed gable elevation facing we st.



holiday cottage facing the river

END WHALLEY



site plan. showing existing levels.

drg. ref. 134/20. sheet 4 of 4. apl. 20 20. 1:100.

Figure 6.2: EA Flood Defence Table of Information

Location	Defence Name	Defence Type	Defence Age	Defence Status	Defence Length (m)	Defence Height (m AOD)	Defence Width (m)	Defence Area (ha)	Defence Volume (m³)	Defence Cost (£)	Defence Benefit (£)	Defence Net Benefit (£)
Location 1	Defence Name 1	Defence Type 1	Defence Age 1	Defence Status 1	Defence Length (m) 1	Defence Height (m AOD) 1	Defence Width (m) 1	Defence Area (ha) 1	Defence Volume (m³) 1	Defence Cost (£) 1	Defence Benefit (£) 1	Defence Net Benefit (£) 1
Location 2	Defence Name 2	Defence Type 2	Defence Age 2	Defence Status 2	Defence Length (m) 2	Defence Height (m AOD) 2	Defence Width (m) 2	Defence Area (ha) 2	Defence Volume (m³) 2	Defence Cost (£) 2	Defence Benefit (£) 2	Defence Net Benefit (£) 2
Location 3	Defence Name 3	Defence Type 3	Defence Age 3	Defence Status 3	Defence Length (m) 3	Defence Height (m AOD) 3	Defence Width (m) 3	Defence Area (ha) 3	Defence Volume (m³) 3	Defence Cost (£) 3	Defence Benefit (£) 3	Defence Net Benefit (£) 3
Location 4	Defence Name 4	Defence Type 4	Defence Age 4	Defence Status 4	Defence Length (m) 4	Defence Height (m AOD) 4	Defence Width (m) 4	Defence Area (ha) 4	Defence Volume (m³) 4	Defence Cost (£) 4	Defence Benefit (£) 4	Defence Net Benefit (£) 4
Location 5	Defence Name 5	Defence Type 5	Defence Age 5	Defence Status 5	Defence Length (m) 5	Defence Height (m AOD) 5	Defence Width (m) 5	Defence Area (ha) 5	Defence Volume (m³) 5	Defence Cost (£) 5	Defence Benefit (£) 5	Defence Net Benefit (£) 5

Source: EA Flood Defence Table of Information

Table 5: Flood Plain Levels

Return Period	Defended Scenario (m AOD)	Undefended Scenario (m AOD)
100 Year	45.02	45.02
100 Year + 20% Climate Change	45.35	45.35
100 Year + 30% Climate Change	45.52	45.52
1000 Year	46.33	46.33

*New application of climate change has been estimated using interpolation

Table 1: North West Climate Change Allowances

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

EA DATA USED IN SUBMISSION

THE END