Flood Risk Assessment

Malt Kiln Brow Chipping PR3 2QP

Proposed Residential Development

For

Hodson Homes

July 2022

CONTENTS

Introduction

The Flood Risk Assessment (FRA) has been commissioned by Hodson Homes to assess the flood risks associated with a proposed new residential development on a plot of land to the west of Malt Kiln House, off Malt Kiln Brow, Chipping PR3 2QP.

The National Planning Policy Framework (NPPF) Technical Guidance requires all planning applications on land over 1 hectare in area to be subject to an FRA.

In addition to FRA's under certain criteria, the NPPF Technical Guidance (March 2012) requires development sites to be subject to a risk based Sequential Test in order to identify the availability of any other appropriate sites located on land with a lower flood risk. This is not applicable to the planning proposal in this instance as the residential development site is confined entirely within flood zone 1of the site, whilst part of the far north eastern portion of the site bounding Chipping Brook which is designated flood zone 3 will remain undisturbed.

The aims of this report are:

- To identify and assess potential sources of flooding.
- Assess flooding risks both to and from the proposed development.
- Assess the potential surface water run–off from the site and develop a strategy relating to how this is managed in order to minimise the risk of flooding to, adjacent land and properties within the local flood risk catchment area.

2.0 **Existing Site Description and New Development Proposals**

2.1 Existing Site Description

The existing site (See Appendix 1 – Site Location Plan, Dwg Ref MKB/L01) comprises of an irregular piece of undeveloped scrubland located in Chipping within the Borough of Ribble Valley, Lancashire.

The site is bounded at its north eastern edge by Chipping Brook (which is designated by the Environment Agency as Main River.) The boundary then continues south easterly running to the rear of residential properties to Malt Kiln Brow. The southern site boundary follows along the highway verge of Church Raike and then heads northwards following a field boundary with the Old Hive.

The National Grid Reference for the centre of the site is: E361938

N443525.

The area of the site is 0.71hectares.

The site comprises mainly of grass and scrub around much of the site boundaries. The site boundaries comprise generally of various species of mature and semi mature trees and shrubs.

The site is currently vacant and overgrown; its former use post 1940 was mainly for agricultural land use.

(See Appendix 2 - Topographical Survey Dwg Ref MKB/TS01)

Ground levels across the site generally fall approximately 8m from the northern corner of the site which is at a height of 129.5m AOD, falling to the lowest part of the site in the south eastern corner. The main natural drainage outlet for the entire site is Chipping Brook which runs to the north eastern edge of the site, and a small ditch along the southern boundary running adjacent the highway of Church Raike drains the southern portion of the site.

The existing ground levels are generally:

- At the northern corner of the site 129.5m AOD
- At the centre of the site 128.5m AOD
- At the south eastern corner of the site 121.0m AOD
- At the south western corner of the site 127.5m AOD

Enquires with statutory service providers have shown the presence of a combined sewer which is designated by United Utilities as a 150mm diameter public combined sewer, and is located within the proposed site following the north eastern boundary down to the rear of Malt Kiln House.

There are no other services evident within the site boundary and no evidence of the land being previously artificially drained.

2.2 New Development Proposals

(See Appendix 3- Proposed Site Layout Plan MKB/PO1 and House Types Dwgs Ref HTA/PO1, HTA/PO2)

The proposal for the site is for a residential development comprising of 4 detached residential Eco houses and two detached double garage units served by a new estate road with a dedicated vehicular access directly off Church Raike. There are private garden areas to the front and rear of the properties with proposed hedge planting delineating the northern residential boundary.

The residential development will cover 0.14 hectares with an additional public open space area of 0.57 hectares.

(See Appendix 4 - Environment Agency Flood Zone Map)

The residential area of the site will be developed entirely upon the existing plateau area of the site which is entirely within Flood Zone 1.

The lower area of the site in the north eastern extremity, which bounds Chipping Brook is designated Flood Zone 3 and will remain undisturbed providing an 8 metre buffer for any future maintenance and an emergency access that may be required in the future by the Environment Agency.

3.0 **Sources of Potential Flooding**

(See Appendix 4 - EA Flood Zone Map, and Appendix 5 - DEFRA Flood Risk and Vulnerability Tables 1- 3)

The Technical Guidance to the NPPF in table 1 defines the Flood Risk Zones as:

Flood Zone 1 - Low Probability

Land assessed as having a less than 1 in 1000 (<0.1%) probability of river and sea flooding in one year.

Flood Zone 2 – Low to Medium Probability

Land assessed as having between 1in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding, or between a 1in 200 (0.5%) and a 1 in 1000 (0.1%) annual probability of flooding from the sea in any one year.

Flood Zone 3a – High Risk

Land assessed as having a 1 in 200 (0.5%) or greater chance of flooding from the sea in any one year.

Flood Zone 3b – Functional Floodplain

Land where water has to flow or must be stored at times of flood.

In addition to the Environment Agency categorising flood risk, the Lancashire Surface Water Management Plan (SWMP), contains localised flood risk data identifying the flood zone areas 1, 2 and 3.

For the area proposed for new residential development this area designated flood zone 1 and is classified within Table 2: Flood Risk Vulnerability Classification as a ‘more vulnerable’ type of development.

Referring to Table 3 Flood Risk Vulnerability and Flood Zone ‘compatibility’ this type of development is appropriate within Flood Zone 1.

From the Environment Agency Online Flood Maps the site proposed for the housing development is contained entirely within Flood Zone 1 and therefore has a low probability of less than 1 in 1000 (<0.1%) probability of river and sea flooding in one year.

Flood Zone 3 is outside the development site and confined within the undeveloped land along the watercourse of Chipping Brook.

The sources of potential flooding to the development site are identified as follows:

3.1 Flooding from local watercourses (fluvial flooding)

The nearest open watercourse is Chipping Brook flowing generally from the north west to the south east, this is an Environment Agency designated 'Main River' running.

Survey data provided by the Environment Agency indicates that fluvial flood levels are generally contained well within the steep bounds of the brook channel and therefore would not pose a threat to any future proposed residential development which will be set back approximately 10m from the EA buffer zone, with floor levels some 9.4m above the mean water level of Chipping Brook. (See Appendix 7- cross section plots Dwg Ref MKB/PO2)

Chipping Brook forms the primary overland surface drainage function to the northern site boundary as the land generally falls steeply from the central plateau area. There is a small open ditch running alongside Church Raike which collects surface water flows from the southern area of the site, there are no other noticeable water bodies or watercourses within the site.

3.2 Potential Flooding from Adjacent Developments

Private drainage systems associated with neighbouring properties such as the adjacent Malt Kiln House and properties along Malt Kiln Brow are well established and assumed to have been designed to the relevant standards at the time of construction and are appropriately maintained.

The surrounding topography to the site generally falls away from the development site and is drained overland into Chipping Brook. There is no evidence or records of standing groundwater within or around the proposed area for development.

3.3 **Potential Flooding from Public Sewer System and Highway Drains**

Public sewer records obtained from United Utilities show an existing 150 mm diameter combined sewer within the development site running along the north eastern boundary. It is proposed that the foul drainage from the development will be connected to the existing foul sewer system at the north eastern area of the site in accordance with the requirements of United Utilities.

The highway drainage outside the southern site boundary serves solely the highway of Raikes Lane and is drained independently from the proposed site.

It is considered that potential flooding from the sewer system or the highway drainage network presents a low risk to flooding of the proposed development.

3.4 **Potential Flooding from Groundwater**

Groundwater levels vary from season to season generally as a result from intense rainfall events. There is no known issue with groundwater within the development site but this should be monitored during the early construction phase of the works.

4.0 **Sequential Test**

The NPPF Technical Guidance requires that planning applications *'in areas to be known to be at risk from flooding*' should apply the Sequential Test. The NPPF paragraph 101 states that; '*the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated*

or permitted if there are reasonably available sites appropriate for the proposed development in areas with lower probability of flooding.'

It is also stated that applications for '*minor*' development or '*changes of use'* should not be subject of the Sequential Test.
In this instance it has been established that the site includes a small area along the course of Chipping Brook which is known to be at risk from flooding. This area of the site will remain undisturbed and separated from the higher Zone 1 development land.
The planning application takes into account the flood risk variations across the site, and proposes that development is confined solely to the low risk area defined as flood zone 1 of the site.

5.0 **The Exception Test**

This test provides a method of managing flood risk while still allowing necessary development to occur.

However the Exception Test is only appropriate for use when there are large areas of development proposed in Flood Zones 2 and 3, "*where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons, taking into account the need to avoid social or economic blight*".

As the proposed development is confined entirely to an area designated as flood zone 1, the Exception Test does not apply in this case.

6.0 **Surface Water Run-off Assessment**

6.1 **Introduction**

The Technical Guidance to the National Planning Policy Framework encourages the application of Sustainable drainage Systems (SuDs) to be included in all Flood Zones. SuDs are

designed primarily to control surface water run - off close to where it falls and deal with the drainage in a natural way as possible.

Drainage from the building roofs and hard standings around the buildings are required to comply with the Building Regulations 2010 and 2002 Approved Document – Part H Drainage and Waste Disposal.

The SuDs hierarchy and Building Regulations requirement for surface water disposal from a development is as set out below in descending order of preference.

- Discharge to ground via adequate soak away/ground infiltration system
- Discharge to watercourse
- Discharge to sewer/drain

The drainage design should always ensure that at times of peak flow during intense rainfall events that the surface water run-off from the development does not exceed those prior to the development.

In this case the maximum run-off rate from the built development must not exceed that of green field run-off rates prior to development.

6.2 **Existing site drainage and pre-development run-off rates**

The site area is 0.71ha of which 0.14ha is proposed for development.

The existing site comprises entirely of grass, scrub with boundary swathes of hedges and small trees. The greenfield pre-development run-off rates based on the HR Wallingford estimation methodology (See Appendix 6) are:

1 in 1 year –8.82 litres/sec

1 in 30 years –17.23 l/s

1 in 100 years –21.08 l/s

1in 200 years – 24.02 l/s

The mean annual maximum flow rate (Qbar) is 10.14 l/s.

The proposed site drainage to support the development should be designed so as not to exceed the above Greenfield run off rates and provide attenuation to restrict discharge into Chipping Brook to a maximum flow rate of 5 litres/sec.

6.3 **Proposed Drainage**

The surface water drainage system serving the housing development area is proposed to be designed as a fully piped system falling to an underground surface water storage tank situated at the western end of the access road. Any overflow from the attenuation tank will be, designed to restrict flows to the maximum greenfield 1 in 100 year flow rate of 5 litres/sec, before discharging the surface water via a suitable outfall (designed in accordance with the EA's requirements) into Chipping Brook along the far south-eastern boundary.

In order to provide future flood resilience for the proposed development, the finished floor level of the properties will be constructed at a minimum of 127.3m AOD allowing for effects from anticipated climate change, which is 9.4 metres above the general water levels of Chipping Brook.

The proposed highway routes serving the site will have trapped gullies to remove oils and silts from the surface water before the water enters the underground attenuation storage tank.

6.4 **Maintenance**

Chipping Brook is designated as Main River and will therefore require an 8m easement from each of its banks for future maintenance. This area of land is within Flood 3, and is precluded from any development.

The surface water system serving the residential development and associated infrastructure will be maintained under a private contract agreement.

The proposed highway will be privately maintained, and will include responsibilities for the ongoing maintenance of the road gullies and associated drainage infrastructure serving the highway.

7.0 **Summary**

The proposed housing development is located entirely within the Environment Agency's designated Flood Zone 1, with a low probability of river flooding (<0.1%) in a year.

The Main River Chipping Brook and the adjacent land forming the rivers flood plain designated as Flood Zone 3, will remain undisturbed outside the development site boundary.

The proposed drainage system will be designed to limit maximum discharge flows into Chipping Brook to within greenfield run off rates from the existing site.

Any drainage outfall to Chipping Brook will require Land Drainage Consent from the Environment Agency.

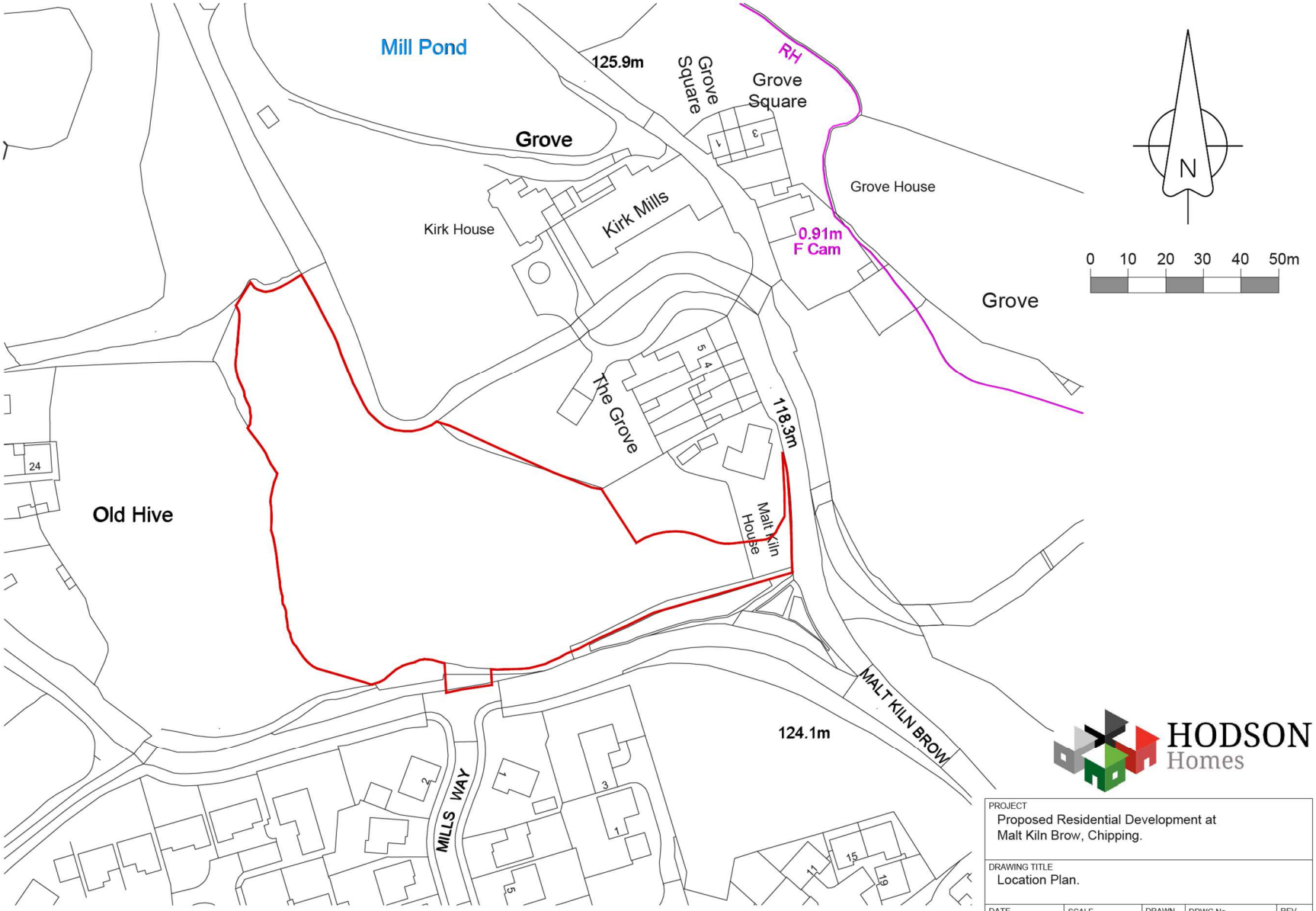
Statutory easements will be undertaken to allow the EA unrestricted access, to carry out any routine maintenance works along the course of Chipping Brook.

The Flood Risk Assessment has shown that within the guidelines set-out by the NPPF along with the latest DEFRA and Environment Agency guidance that the proposed residential development on the land off Malt Kiln Brow, Chipping can be delivered with a design that will not increase flood risk to the surrounding areas and the site will not be at risk of flooding from external sources.

APPENDICIES

APPENDIX 1	Site Location Plan- MKB/LO1
APPENDIX 2	Proposed Site Plan and House Types – MKB/PO1,HTA/PO1,HTA/PO2
APPENDIX 3	Topographical Survey - MKB/TSO1
APPENDIX 4	Environment Agency Flood Zone Map
APPENDIX 5	DEFRA Flood Risk and Vulnerability Tables 1- 3
APPENDIX 6	HR Wallingford Green Field Run Off Estimation
APPENDIX 7	Site Cross Sections - MKB/PO2

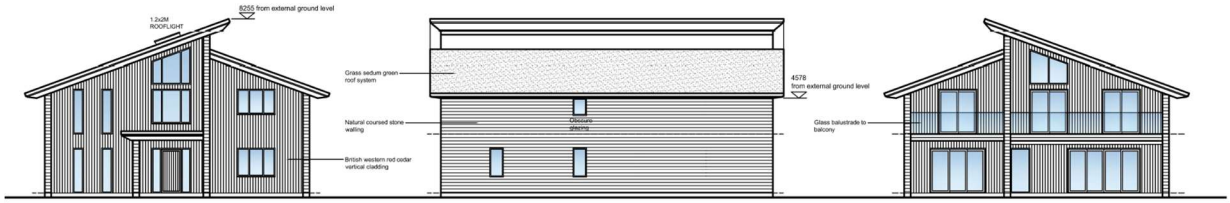
APPENDIX 3	Topographical Survey



HODSON Homes

PROJECT: Proposed Residential Development at Malt Kiln Brow, Chipping.				
DRAWING TITLE: Location Plan.				
DATE: June 2022	SCALE: 1:1250 @ A4	DRAWN: SDH	DRWG No.: MKB/L01	REV:

APPENDIX 2	Proposed Site Plan and House Types



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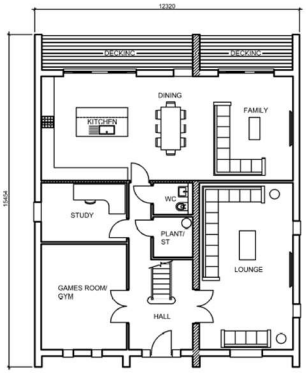
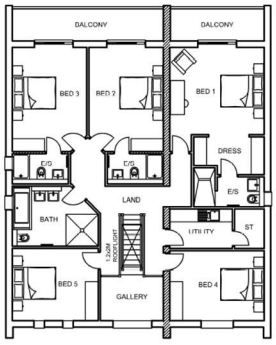
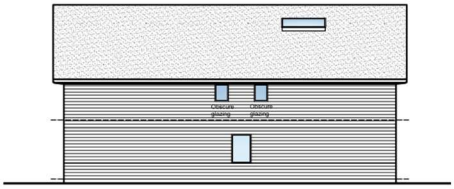


GROUND FLOOR PLAN



FIRST FLOOR PLAN



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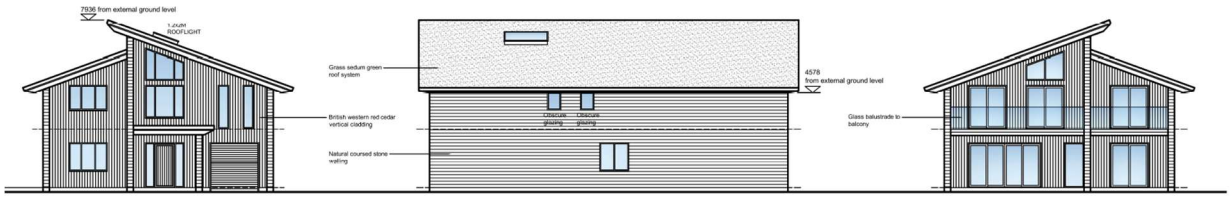
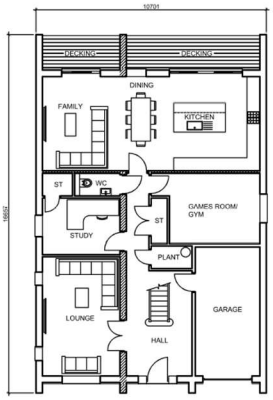


FRONT ELEVATION SIDE ELEVATION REAR ELEVATION



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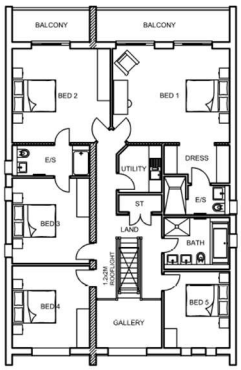

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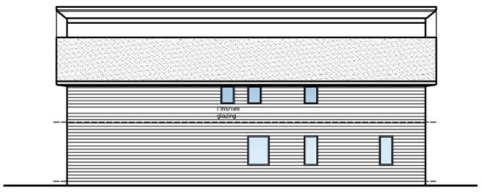
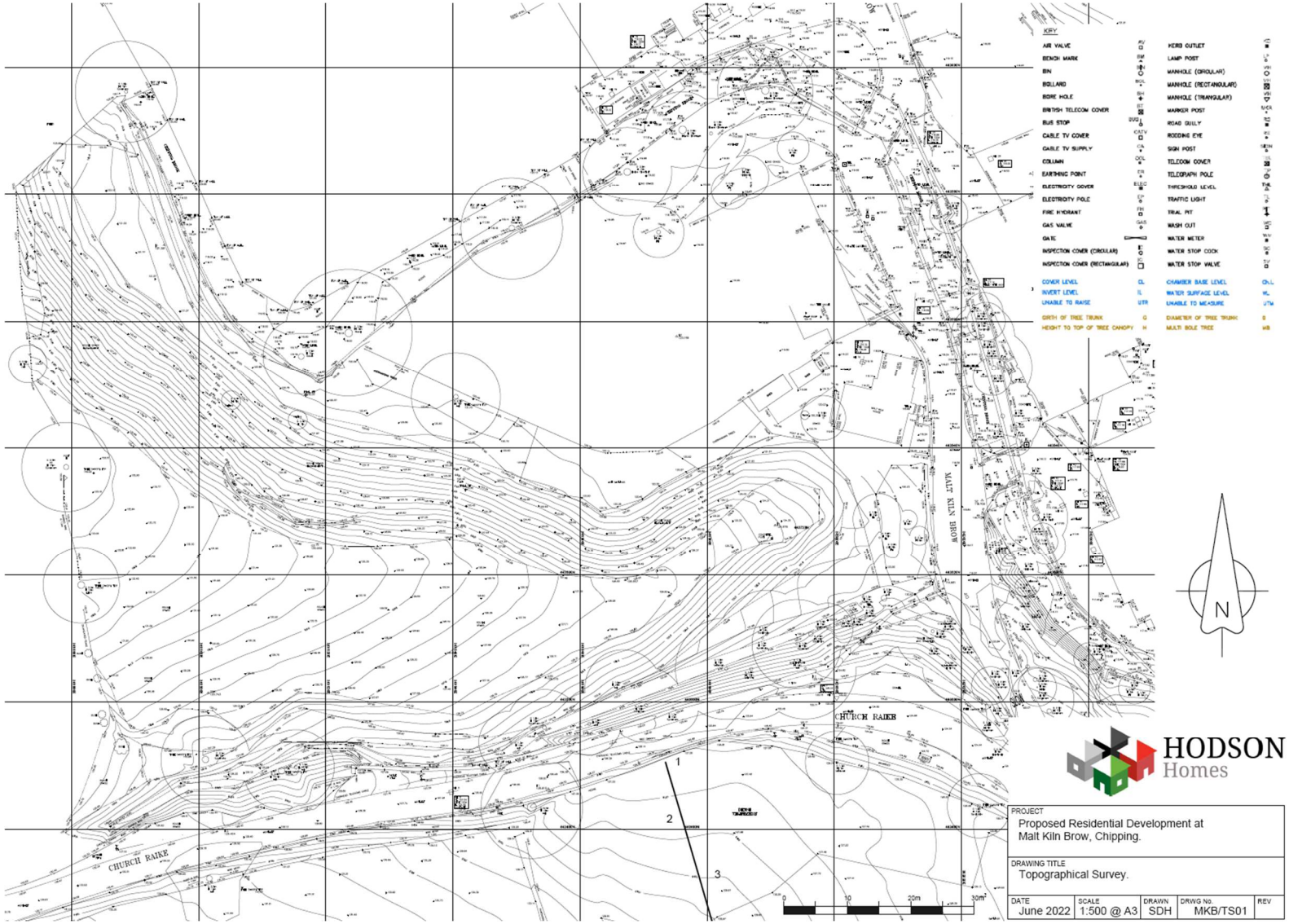


SIDE ELEVATION

APPENDIX 3	Topographical Survey



APPENDIX 4	Environment Agency Flood Zone Map

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
Flood Map Planning App 4	**361943/443537**	**13 Jul 2022 11:56**

Your selected location is in flood zone 3, an area with a high probability of flooding.

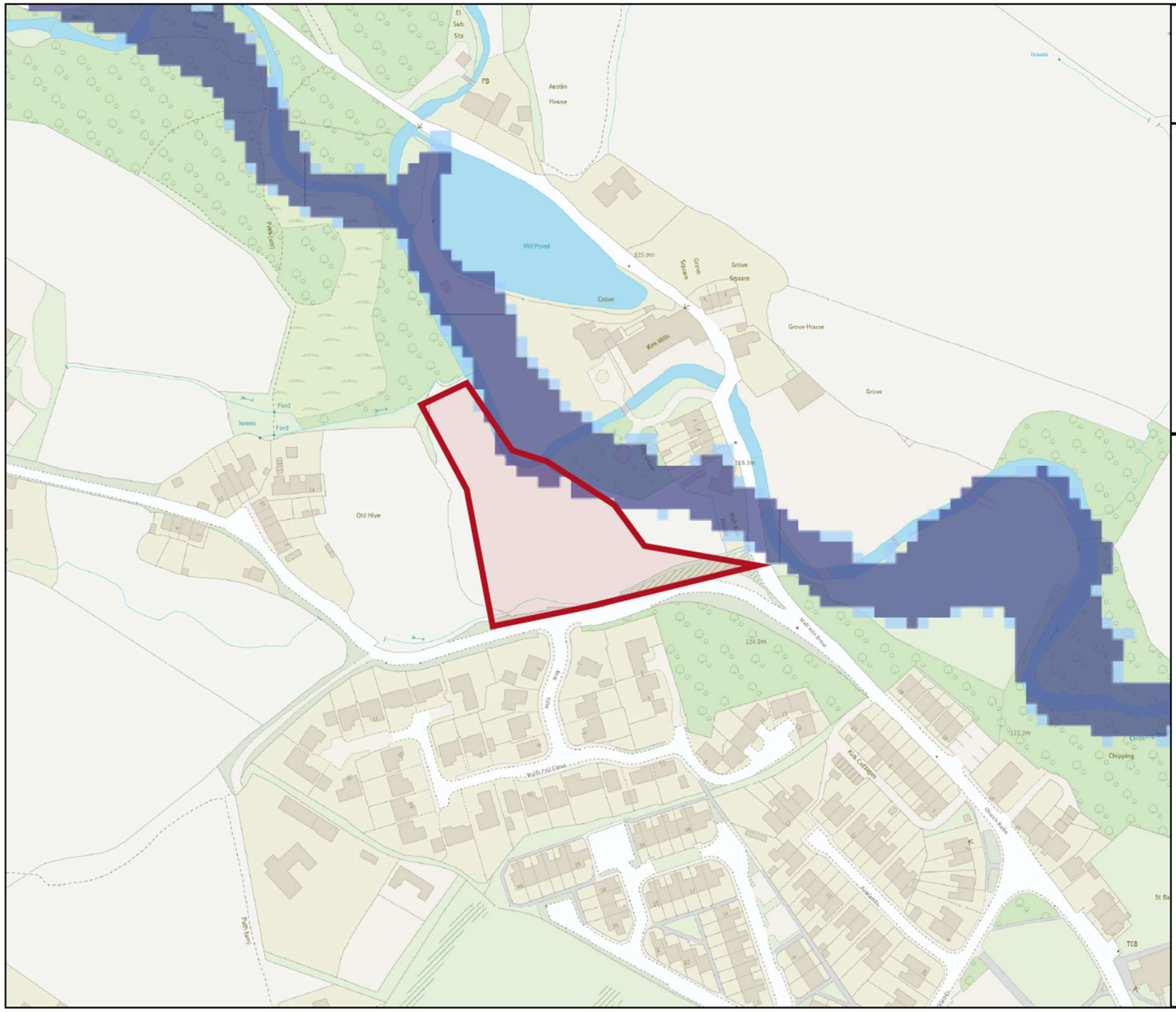
This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Flood Map Planning App 4

Location (easting/northing)
361943/443537

Scale
1:2500

Created
13 Jul 2022 11:56

- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

APPENDIX 5	DEFRA Flood Risk and Vulnerability Tables 1- 3

Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.(Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Paragraph: 065 Reference ID: 7-065-20140306

Revision date: 06 03 2014

Table 2: Flood risk vulnerability classification

Essential infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly vulnerable

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as ‘Essential Infrastructure’).

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	Y	Y	Y	Y	Y
	Zone 2	Y	Y	Exception Test required	Y	Y
	Zone 3a	Exception Test required	Y	N	Exception Test required	Y
	Zone 3b functional floodplain	Exception Test required	Y	N	N	N

Key: Y - Development is appropriate. N - Development should not be permitted.

APPENDIX 6	HR Wallingford Green Field Run Off Estimation

APPENDIX 6

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Ian Welsby
Site name:	Malt Kiln Brow
Site location:	Chipping

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.88653° N
Longitude:	2.5814° W
Reference:	3336733561
Date:	Jul 12 2022 10:59

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.71

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	5	5
HOST class:	N/A	N/A
SPR/SPRHOST:	0.53	0.53

Hydrological characteristics	Default	Edited
SAAR (mm):	1415	1415
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

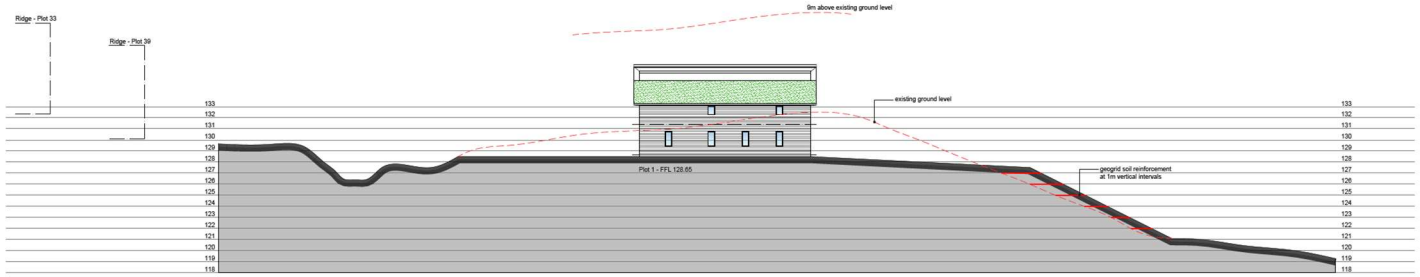
(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

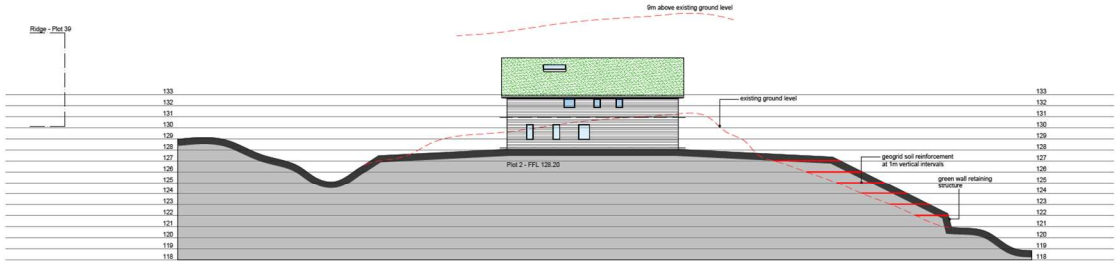
Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	10.14	10.14
1 in 1 year (l/s):	8.82	8.82
1 in 30 years (l/s):	17.23	17.23
1 in 100 year (l/s):	21.08	21.08
1 in 200 years (l/s):	24.02	24.02

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX 7	Site Cross Sections Plots



SECTION A-A



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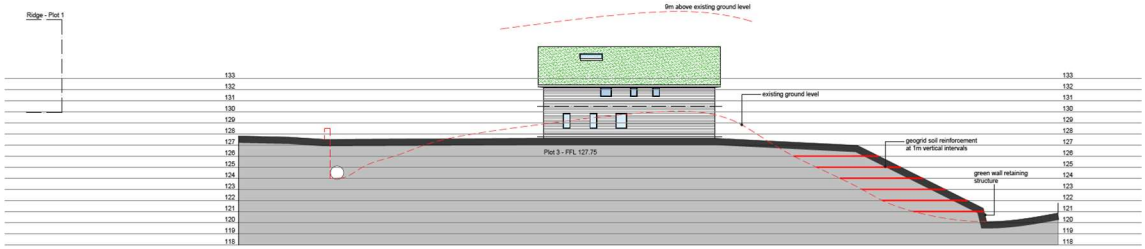

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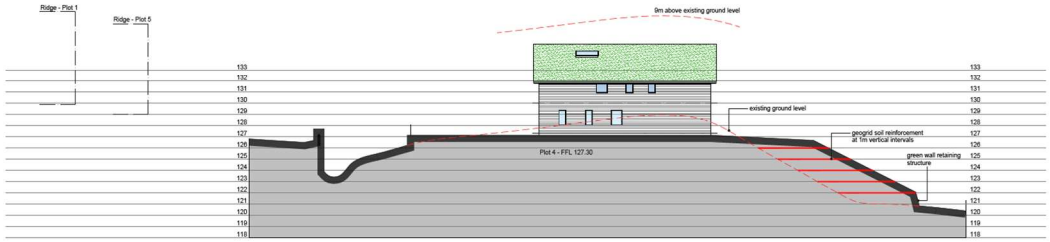

SECTION D-D

Rev.A Geogrid soil reinforcement added. SDH 16/07/2022

HODSON Homes

PROJECT: Proposed Residential Development at Malt Kiln Brow, Chipping.				
DRAWING TITLE: Proposed Site Section.				
DATE: June 2022	SCALE: 1:200 @ A1	DRAWN: SDH	DRWG No.: MKB/P02	REV: A