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FLOOD RISK ASSESSMENT

Scheme name:

Rigoletto, Bicester Road, Middleton Stoney

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Foreword

This document has been prepared solely as a Flood Risk Assessment for the Client, Jim Kirkman (Via Coleman Hicks Partnership). No responsibility or liability will be accepted for any use that is made of this document other than by the Client for the purpose it was written. The conclusions resulting from this study and contained within this report are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

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Some of the information presented within this report is based on third-party information which is believed to be correct; no liability will be accepted for any discrepancies inaccuracies, mistakes or omissions in such information. The report assesses the flood risk in relation to the requirements of the Environment Agency and as such assesses the site for a specific flood event and not all flood events. The contents of this document must not be copied or reproduced in whole or in part without the written consent of Infrastruct CS Ltd

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1.0 Summary

A Flood Risk Assessment (FRA) has been undertaken to accompany the planning application for the proposed development at Rigoletto, Bicester Road, Middleton Stoney. This report has been prepared by Infrastruct CS Ltd on behalf of Jim Kirkman in accordance with the guidelines set out in the National Planning Policy Framework.

The following table is an overview of the flood risk assessment for the proposed development of the site, based upon currently available information and finds the following –

ITEM	RESPONSE
Site Location	Rigoletto, Bicester Road, Middleton Stoney, bound by B4030 Road to the north, Residential building to the west, and grassland to the east and to the south. The approximate grid reference is 453860E, 223432N.
Size and Current Land Usage	The current site is approximately 3.20ha in plan and is currently used as a restaurant.
Flood Zone	The development site falls within Flood Zone 2 and 3, which is classified as low probability of flooding with appropriate defences.
Fluvial Flood Risk	**High to the site, low to the dwelling** – Refer to Section 6.1
Overland Flood Risk	**Low** – Refer to Section 7.1
Groundwater Flood Risk	**Low** – Refer to Section 7.2
Sewerage Flood Risk	**Low** – Refer to Section 7.3
Artificial Flood Risk	**Low** – Refer to Section 7.4
Proposed Development	The proposals for the development is for the change of use from a restaurant to a private dwelling. The building's existing layout will remain, with existing rooms repurposed for residential use.

Based on this assessment, it is concluded that in accordance with the Flood risk vulnerability and flood zone compatibility table in Section 6.6 from the Planning Practice Guidance document, the report considers the proposed development appropriate.

2.0 Introduction

2.1 Commission

Steven Wakefield has commissioned Infrastruct CS Ltd, to prepare a Flood Risk Assessment (FRA) to support a planning application for the re-development at Rigoletto, Bicester Road, Middleton Stoney.

2.2 Guidance

This flood risk assessment has been compiled in accordance with the recommendations of the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG).

2.3 Aims and Objectives

The purpose of this flood risk assessment is to assess the potential flood risks by and to the proposed development. It will identify the flood risk zone, potential sources of flood risk, and will be used to support the proposed planning application.

3.0 Site Details

3.1 Location

The site is Rigoletto, Bicester Road, Middleton Stoney, bound by B4030 Road to the north, residential building to the west, and grassland to the east and to the south.

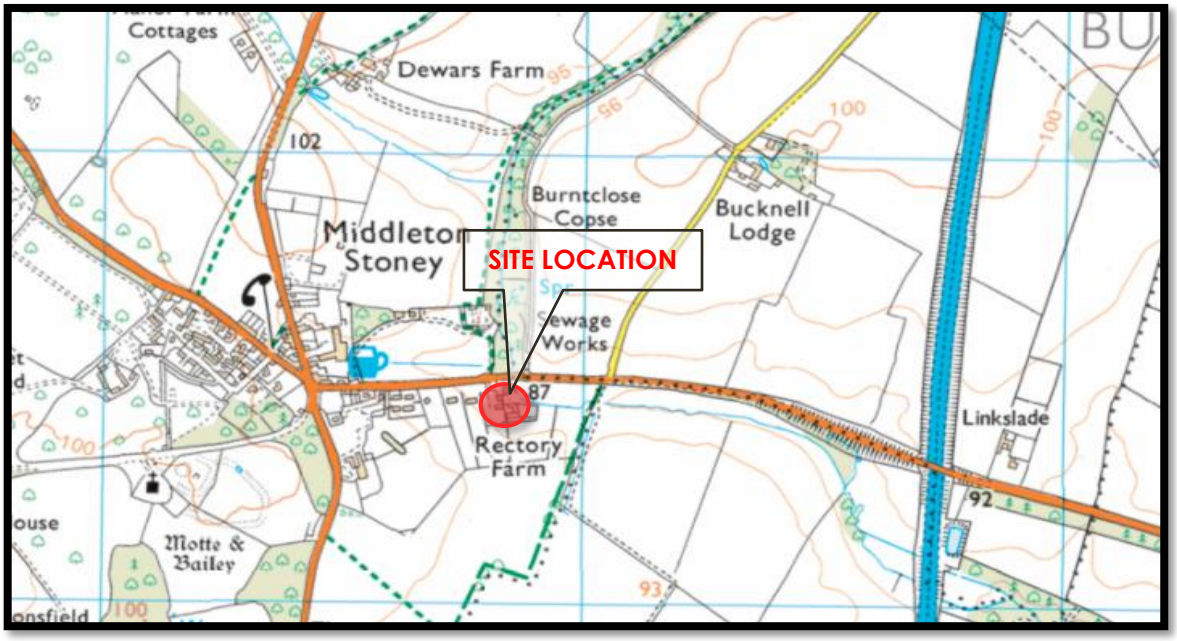


Figure 3.1.1 - Site Context

Figure 3.1.2 - Site location

3.2 Grid Reference

The Ordnance Survey National grid reference for the centre of the site is:

453860E, 223432N (Nat Grid SP 53860 23432)

3.3 Topography and Site Description

The site covers an approximate brownfield area of 3.20ha, and is located Bicester Road, Middleton Stoney. The site is irregular on plan with its long axis running in a North-South direction.

Levels vary within the site between 86.64mAOD to the north-western corner and 89.76mAOD to the south-eastern corner. The maximum fall across the site is 3.12m over 175m, giving a gradient of 1 in 56. See Refer to Appendix A for a copy of the topographic survey.

3.4 Ground Conditions

To date no intrusive ground investigation has taken place on site, however reference to the Geological Survey of Great Britain indicates the following strata:

Superficial deposits: Alluvium - Clay, silt, sand, and gravel. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Bedrock geology: White Limestone Formation - Limestone. Sedimentary bedrock formed between 168.3 and 166.1 million years ago during the Jurassic period.

Figure 3.4.1 – Geological Survey data from ArcGis Map

Intrusive site investigations carried out adjacent/near the development and shown on the British Geological Survey database (BGS ID: 336890, BGS Ref: SP52SW4, British NGR: 453800,223500) Showed the following strata:

Gas Council Borehole GCN116 — **SP52SW/4**
Alternative designations Middleton Stoney — NGR 5380 2350
Log Types available Gamma Ray; Spontaneous Potential; Resistivity, chippings; partial cores from 563 ft downwards — RG Box No 819

	Ft	m
Ground level	268	81.7
Datum Level	268	81.7
casing to	50	15.2
terminal depth	615	187.5

	top ft	top m	base ft	base m	Thick m
White Limestone Fm	0	0.0	39	11.9	11.9
Ardley Member at	*0*	*0.0*	*24*	*7.3*	*7.3*
Shipton Member at	*24*	*7.3*	*39*	*11.9*	*4.6*
Rutland Formation	39	11.9	54	16.5	4.6
Taynton Limestone	54	16.5	76	23.2	6.7
Sharp's Hill Formation	76	23.2	80	24.4	1.2
Horsehay Sand Fm	80	24.4	96	29.3	4.9
Northampton Sand Fm	96	29.3	108	32.9	3.7
Whitby Mudstone Fm	108	32.9	158	48.2	15.2
Marlstone Rock Fm	158	48.2	166	50.6	2.4
Dyrham Formation	166	50.6	192	58.5	7.9
Charmouth Mdst Fm	192	58.5	458	139.6	81.1
with 100 Marker at	*245*	*74.7*	*248*	*75.6*	*0.9*
85 Marker at	*296*	*90.2*	*305*	*93.0*	*2.7*
70 Marker at	*361*	*110.0*	*371*	*113.1*	*3.0*
Penarth Group	458	139.6	478	145.7	6.1
Mercia Mudstone Group	478	145.7	520	158.5	12.8
Bromsgrove Sandstone Fm	520	158.5	566	172.5	14.0
Halesowen Formation (?)	566	172.5	615	187.5	14.9

Interpreted mainly from Gamma Ray Log — M G Sumbler, 09 Oct 2000

Figure 3.4.2 – Borehole records from British Geological Survey (BGS ID:- 336890)

3.5 Ground Water

Boreholes carried out in the vicinity of the site, found no groundwater within the trial pits. Further in-situ testing is required to confirm the depth of groundwater.

3.6 Existing Site Drainage

The Thames Water wastewater plans show sewers within the immediate vicinity of the site. However, from the 1st October 2011, many private sewers were transferred into public ownership and may not be recorded on the public sewer map. Please refer to Appendix B for a copy of the sewer record plans.

3.7 Existing Watercourses

The nearest main river watercourse to the site is the Gagle Brook, which crosses the site through the north.

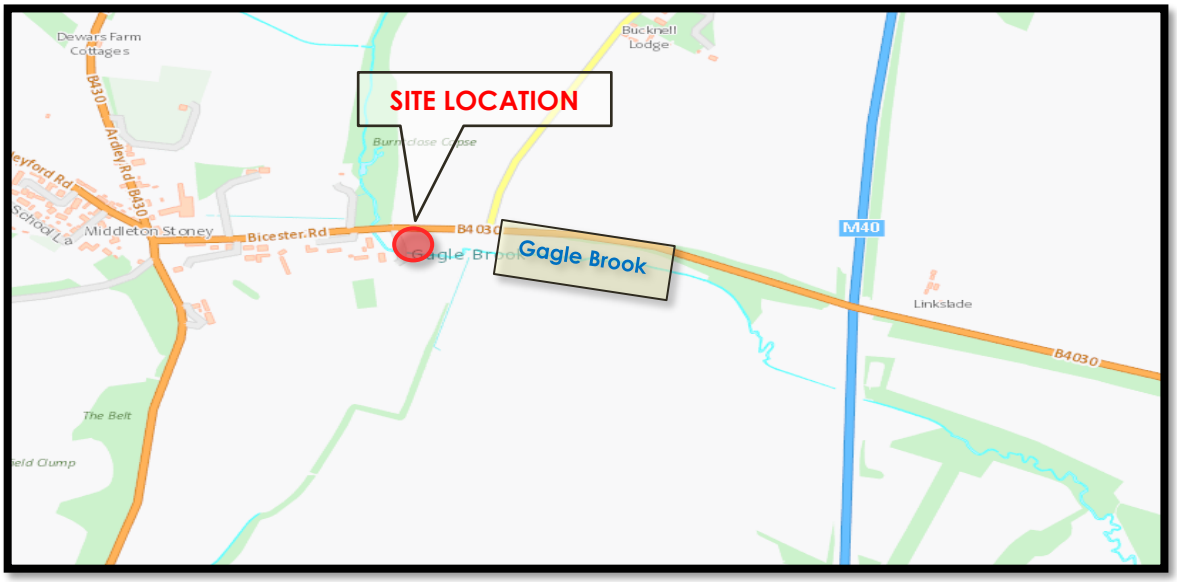


Figure 3.7.1 – Local Rivers

3.8 Environment Agency Groundwater and Aquifer Protection

Reference to the Environment Agency Groundwater Protection Zone Map shows the area is sited outside all groundwater protection zone. The Environment Agency have defined Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes, and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk.

Figure 3.8.1 – Groundwater Protection Zones

KEY:

- **Zone I** – Inner Protection Zone
- **Zone I** – Subsurface Activity
- **Zone II** – Outer Protection Zone
- **Zone II** – Subsurface Activity
- **Zone III** – Total Catchment
- **Zone III** – Subsurface Activity
- **Zone of Special Interest**

The Environment Agency use the zones to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby.

A study of the aquifer maps on the Environment Agency website revealed the site to be located within both Principal and Secondary A bedrock aquifer.

Principal Aquifers These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

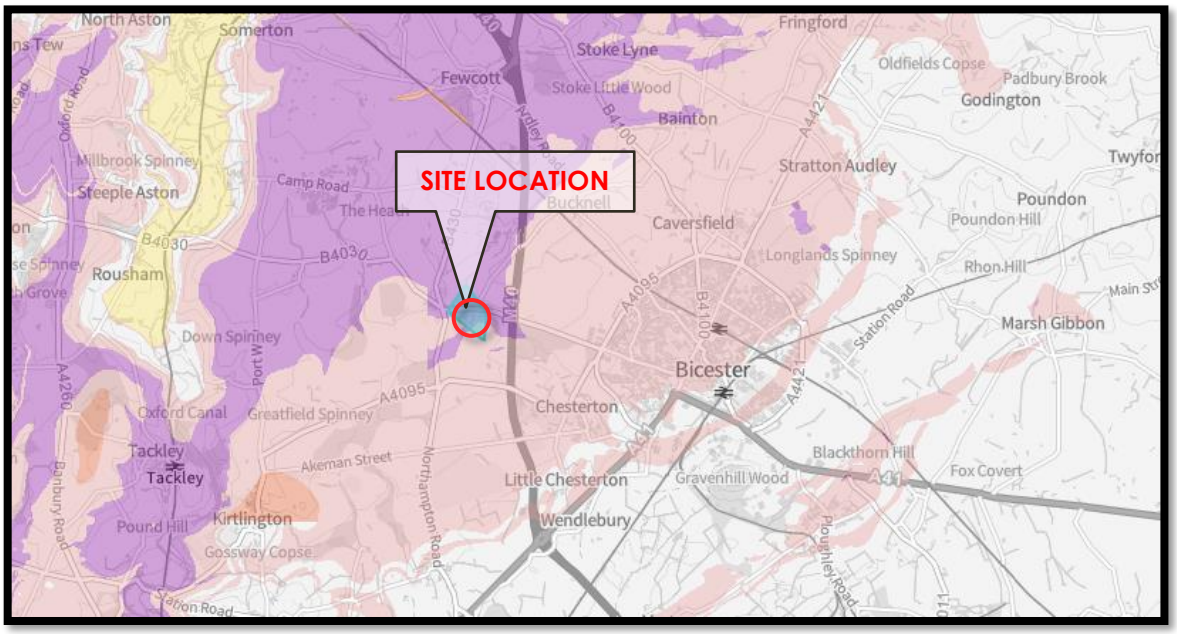


Figure 3.8.3 – Aquifer Designation Map – Bedrock

KEY:

- **Principal**
- **Secondary A**
- **Secondary B**
- **Secondary (undifferentiated)**
- **Unknown (Lakes & Landslip)**
- **Unproductive**

4.0 Proposed Development

The current architectural proposals involve the change of use from an existing restaurant to a private dwelling. The proposed development plans can be found in Appendix C.

5.0 Local Planning Policy and Guidance

5.1 The Cherwell Local Plan

Policy ESD1: Mitigating and Adapting to Climate Change

Measures will be taken to mitigate the impact of development within the district with regards to climate change. At a strategic level, this will include:

1. Distributing growth to the most sustainable locations as defined in this Local Plan
2. Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars
3. Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)
4. Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).

The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

1. Taking into account the known physical and environmental constraints when identifying locations for development
2. Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling.
3. Minimising the risk of flooding and making use of sustainable drainage methods, and
4. Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

Policy ESD 6: Sustainable Flood Risk Management

The Council will manage and reduce flood risk in the District through using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Development proposals will be assessed according to the sequential approach and where necessary the exceptions test as set out in the NPPF and NPPG. Development will only be permitted in areas of flood risk when there are no reasonably available sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding.

In addition to safeguarding floodplains from development, opportunities will be sought to restore natural river flows and floodplains, increasing their amenity and biodiversity value. Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

Existing flood defences will be protected from damaging development and where development is considered appropriate in areas protected by such defences it must allow for the maintenance and management of the defences and be designed to be resilient to flooding.

Site specific flood risk assessments will be required to accompany development proposals in the following situations:

1. All development proposals located in flood zones 2 or 3
2. Development proposals of 1 hectare or more located in flood zone 1
3. Development sites located in an area known to have experienced flooding problems
4. Development sites located within 9m of any watercourses.

Flood risk assessments should assess all sources of flood risk and demonstrate that:

1. There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event)
2. Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on site.

Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.

6.0 Flood Risk Policy

6.1 Environment Agency Flood Map

The flood map for the development site shown below suggests that the site falls within Flood Zones 1, 2 and 3. However, the floor level of the building is some 900mm higher than the peak 1 in 1000 year flood level and ground level on the brook-side of the site.

Flood Zone 2, which is defined as land assessed as having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river flooding; or land having between a 1 in 200 (0.5%) and 1 in 1,000 (0.1%) annual probability of sea flooding

Zone 3 which is defined as land assessed as having a 1 in 100 (1%) or greater annual probability of river flooding; or Land having a 1 in 200 (0.5%) or greater annual probability of sea flooding.

Figure 6.1 - Environment Agency © 2017 - Flood Zone map

KEY:

- **Flood Zone 3**
- Areas Benefiting from flood defences
- **Flood Zone 2**
- **Food Zone 1**
- Flood defence
- Main river.
- Flood storage area

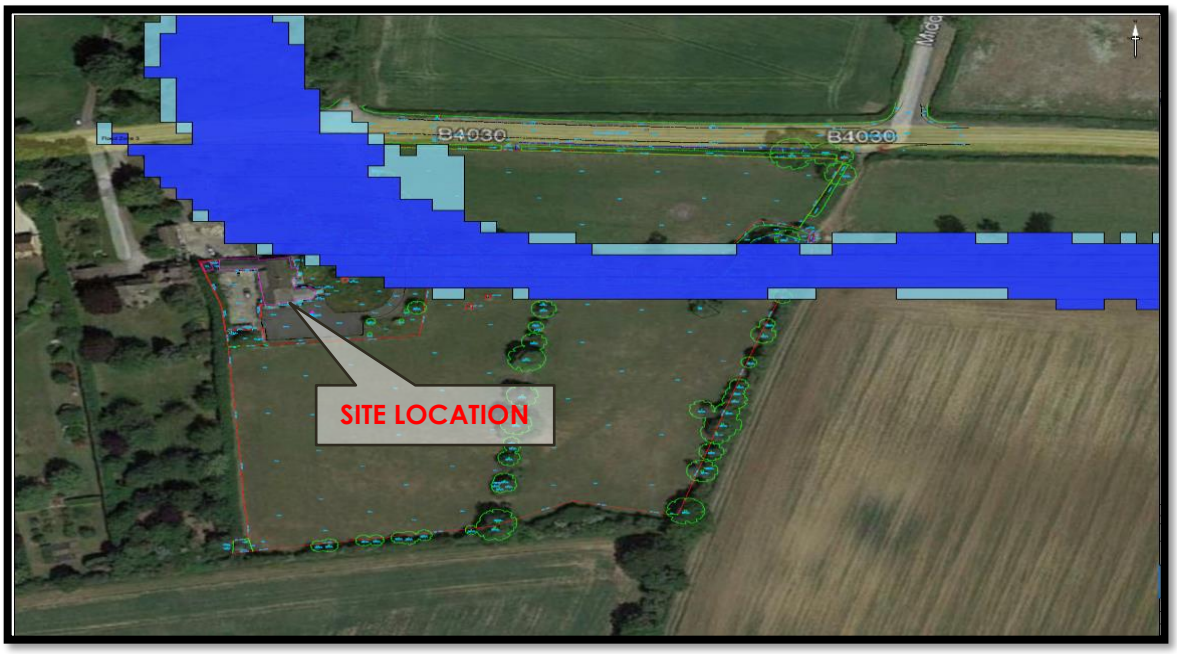


Figure 6.1.2 - ArcGis - Flood Zone map

It is, therefore, the consideration of this FRA that the site has a high risk of flooding from fluvial sources. However, the building itself sits in floodzone 1, having a low risk of flooding.

6.2 Historic Flood Events

According to the Historic Flood Map GIS layer provided by the Environment Agency and available at the DEFRA website, there are no records of the site flooding.

Fig 6.2 – Historic Flood Outlines

6.3 Flood Modelling Results for the Development Site

No modelled (product 4) flood data was available from the Environment Agency. This document provides specific flood level nodes for the development site which could then be related to the detailed topographic survey. In lieu of this data, so a flood impact assessment of the site could be made. A comparison of the flood map for planning and the topographic survey was made, to estimate the 1 in 1000 year and 1 in 100-year flood levels.

The estimated flood levels for the closest most appropriate model grid cells to the dwelling are provided below. These are modelled and compared to the EA flood map for planning in appendix D:

Floodplain Reference	1 in 100yr	1 in 1000yr
ICS_102	85.80m	86.00

To determine the impacts of flooding across the site, and to establish accurate flood boundaries, the flood levels were superimposed onto a 3D model of the topographic survey for the development site. This then provided a true plan of the flood envelopes associated with the 1 in 100yr and 1 in 1000yr plus climate change events. Refer to Appendix C for full map.

6.4 The National Planning Policy Framework

The National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG) gives direction for development with respect to flooding. These documents promote a sequential approach to encourage development away from areas that may be or are susceptible to flooding. In doing so it categorizes flood zones in the context of their probability of flooding, as shown in the table within Section 6.3 below.

6.5 Flood Zone Definition

The National Planning Policy Framework Definition of Flood Zones

Flood zone	Fluvial	Tidal	Probability of flooding
1	< 1 in 1000 year	<1 in 1000 year	Low probability
2	Between < 1 in 1000 year and 1 in 100 year	Between <1 in 1000 year and 1 in 200 year	Medium Probability
3a	> 1 in 100 year	> 1 in 200 year	High probability
3b	Either > 1 in 30 (3.3%) or as agreed between the EA and the LPA	Either > 1 in 30 or as agreed between the EA and the LPA	Functional flood plain

6.6 Flood Zones – Table 1 PPG

(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 2 - Medium Probability
Definition
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.
Appropriate uses
Essential infrastructure and the water-compatible, less vulnerable, and more vulnerable uses of land and essential infrastructure in (Table 2 NPPF) are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses in Table 2 are only appropriate in this zone if the Exception Test is passed.
FRA requirements
All development proposals in this zone should be accompanied by an FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

Zone 3a - High Probability
Definition
This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Appropriate uses
The water-compatible and less vulnerable uses of land in (Table.2 NPPF) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in time of flood.
FRA requirements
All development proposals in this zone should be accompanied by an FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to: reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and relocate existing development to land with a lower probability of flooding.

6.7 Flood Risk Vulnerability Classification - Extract from Table 2 PPG

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.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

6.8 Flood Risk Vulnerability & Flood Zone Compatibility Table

Vulnerability classification flood zone	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
1	✓	✓	✓	✓	✓
2	✓	Exception test required	✓	✓	✓
3a †	Exception test required (†)	X	Exception test required	✓	✓
3b *	Exception test required (*)	X	X	X	✓ (*)

✓ Development is appropriate x development is not appropriate.

Notes to table 2:

- This table does not show the application of the Sequential Test which should be applied first to guide development to the lowest flood risk areas; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea.
- The Sequential and Exception Tests do not need to be applied to those developments set out in National Planning Policy Framework footnote 56. The Sequential and Exception Tests should be applied to 'major' and 'non major' development.
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used unless the development is considered in its component parts.

"†" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

The above table, taken from PPG (Table 3), confirms that residential properties within flood zones 3 with necessary defence is an appropriate development. The dwelling itself, lies within floodzone 1.

6.9 Exception Test

The Exception Test is an additional test to be applied by decision-makers following application of the Sequential Test. The Exception Test is a series of three criteria as shown below, all of which must be satisfied for development in a flood risk area to be considered acceptable. For the Exception Test to be passed it must be demonstrated that:

a) development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk, and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

How can it be demonstrated that wider sustainability benefits to the community outweigh flood risk?

Wider benefit will be provided via the re-use of suitable brownfield land to provide much needed housing. With an overall reduction in flood risk to the wider community through the provision of refurbished drainage system.

How can it be demonstrated that development will reduce flood risk overall?

It is proposed that existing surface water system from the roof drainage is to be maintained as part of the refurbishment works, thereby reducing the risk of blockage and the overall flood risk locally.

6.10 Other Flooding Mechanisms

In addition to the potential for assessing flooding from fluvial and tidal sources NPPF also requires that consideration is given to other mechanisms for flooding:

- Flooding from land – intense rainfall, often in short duration, that is unable to soak into the ground or enter drainage systems, can run rapidly off land and result in local flooding.
- Flooding from groundwater – occurs when water levels in the ground rise above the surface elevations.
- Flooding from sewers – In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater sewers known as combined sewers. Flooding can result causing surcharging when the sewer is overwhelmed by heavy rainfall.
- Flooding from reservoirs, canals, and other artificial sources – Non-natural or artificial sources of flooding can result from sources such as reservoirs, canals lakes etc, where water is held above natural ground levels.

7.0 Other Sources of Flood Risk to The Development

7.1 Flooding from Overland Flows

The risk of flooding due to overland flood flows is considered low by the Environment Agency. The surface water flood data for the site, shown below, indicates that there is high flood risk to the North of the site, along Gagle Brook river, but very low risk within the site itself.

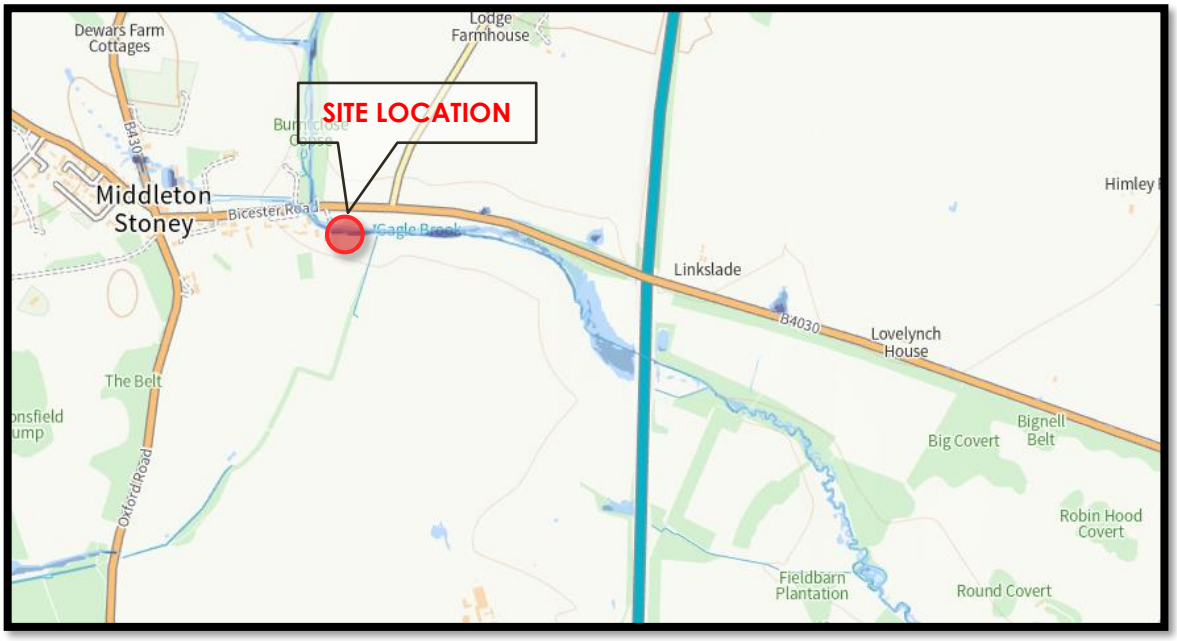


Fig 7.1 – Environment Agency © 2017 - Flood Risk from Surface Water map

KEY:

High (Greater than 3.3% chance of flooding)

Medium (Between 1% and 3.3% chance of flooding)

Low (Between 0.1% and 1% chance of flooding)

Very Low (Less than 0.1% chance of flooding)

It is, therefore, the consideration of this FRA that the site has a low risk of flooding from overland flows.

7.2 Flooding from Rising Groundwater

Groundwater flooding is dependent on local variations in topography, geology, and soils. The causes of groundwater flooding are generally understood; however, it is difficult to predict the actual location, timing and extent of groundwater flooding without comprehensive datasets.

There is a lack of reliable measured datasets to undertake flood frequency analysis and even with datasets, this analysis is complicated due to the non-independence of groundwater level data. Surface water flooding incidents are sometimes mistaken for groundwater flooding incidents, such as where runoff via infiltration seeps from an embankment, rather than locally high groundwater levels.

Section 3.5 of this report confirms that boreholes carried out in the vicinity of the site and after long and wet winter, found no groundwater. Further testing is recommended to establish the groundwater levels along the whole site so the infiltration capacity if the SuDS features is not affected.

It is, therefore, the consideration of this FRA that the site has a low risk of flooding from rising groundwater levels.

7.3 Flooding from the Local Sewerage Network

Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding from sewers can also occur as a result of blockage, poor maintenance, or structural failure.

There are no sewers on the site side of the brook. Should the local infrastructure fail, this the brook would intercept flows before they reached the site.

It is, therefore, the consideration of this FRA that the site has a low risk of flooding by surcharging of the local sewer network.

7.4 Flooding from Reservoirs, Canals & Other Artificial Sources

Reservoirs in the UK have an extremely good safety record. The EA is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. These reservoirs therefore present a minimal risk.

Flooding may result from the failure of engineering installations including flood defence, land drainage pumps, sluice gates and floodgates. Hard defences may fail through the slow deterioration of structural components such as the rusting of sheet piling, erosion of concrete reinforcement and toe protection or the failure of ground anchors. This deterioration can be difficult to detect, so that failure, when it occurs, is often sudden and unexpected. Failure is more likely when the structure is under maximum stress, such as extreme fluvial events.

There are no known reservoirs, canals, or other artificial sources in the vicinity of the site.

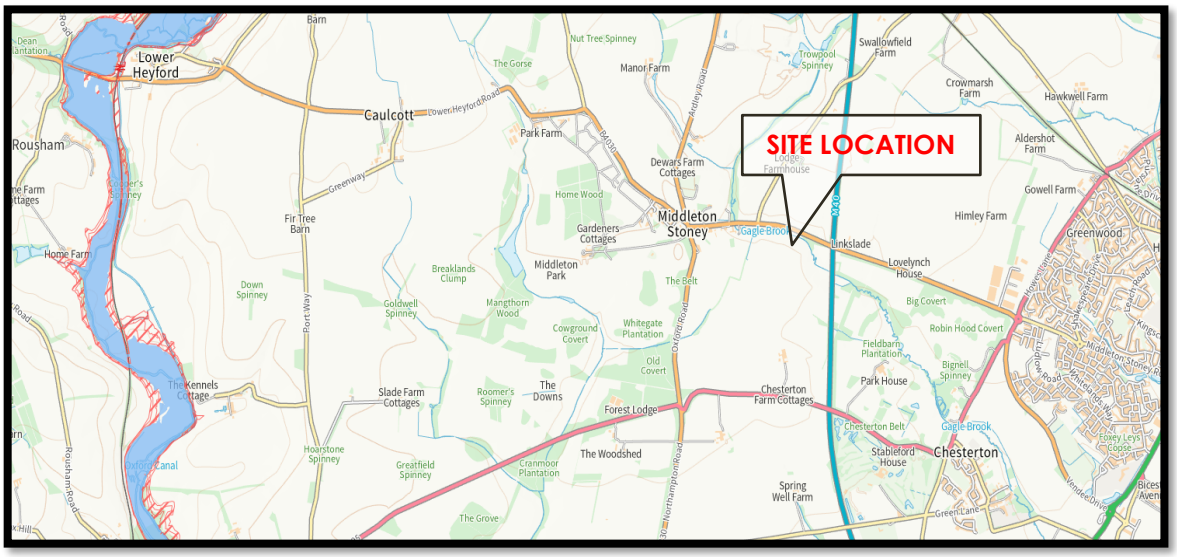


Fig 7.4 – Environment Agency © 2017 - Flood Risk from Reservoirs map

It is, therefore, the consideration of this FRA that the site has a low risk of flooding by reservoirs, canals, or other artificial sources.

8.0 Flood Warning and Dry Route of Escape

8.1 Awareness

The Agency operates a flood watch scheme called Floodline (0345 988 1188). In many places, the Agency can warn interested parties by either telephone, mobile, email, SMS text message or fax of a potential flood up to six hours in advance.

8.2 Equipment

The preparation of a flood kit is essential for instances when evacuation is required. This kit will also be useful for general emergency situations and should be stored for general emergency situations and be easily accessible if flooding occurs. These items should include:

- A torch
- Blankets or a sleeping bag, warm clothing, and waterproofs
- A first-aid kit, including a supply of any essential medication.
- A list of useful telephone numbers
- A supply of bottled water
- A stock of non-perishable food items
- A portable radio and supply of batteries
- Children's essentials (milk, baby food, sterilised bottles and spoons, nappies, wipes, nappy bags, clothing, comforter, teddy).
- Food and accommodation (cages) for pets if resident
- Wellington boots or similar waterproof boots
- Check your insurance cover – ensure it covers flood damage.
- Know how to turn off the gas, electricity, and water mains supplies.
- Think about what items you would want to move to safety during a flood.

8.3 Flood Watch

On receipt of the Flood Watch warning from the Environment Agency, or from other sources, e.g., TV, Radio, local contacts.

- Flooding is possible, and the situation could worsen.
- Flood watch means – "Flooding of low-lying land is expected. Be aware,
- Be prepared, Watch out.

When a flood watch warning is issued, residents should:

- Be aware of water levels and whether the river is rising or falling.
- Reconsider travel plans
- Listen and watch for weather and flood warnings on local radio and television stations.
- Contact Floodline on **0345 988 1188**
- Check that the flood kit has been prepared.
- Copy vital hard copy and electronic records and store them in a safe place. This includes financial and insurance records.
- Keep a store of plastic bags (grocery bags are fine) to place around the legs of furniture when you receive a flood warning.
- At this stage, residents should ensure that their neighbours are aware of the Flood Watch alert in case they are not subscribed or did not receive the alert.

8.4 Severe Flood Warning

A flood evacuation should be implemented as a matter of urgency when a Severe Flood Warning is issued. Severe Flood Warning means severe flooding is now expected. There is extreme danger to life and property and people are advised to act immediately, i.e., evacuate.

The Agency aim to provide at least 2 hours warning between the Flood Warning alert being issued and the commencement of flooding. The Agency recommends that residents should evacuate when a Flood Warning or Severe Flood Warning status is issued.

If flood levels continue to rise, residents are advised to evacuate before safe access is lost. At this level driving through flood water may become hazardous and residents must evacuate beforehand.

Residents should monitor the flood progression and evacuate, on foot, as soon as possible. Should the flood levels be higher than 100mm, residents should utilise the safe haven (dwelling) until such time that the flood waters subside.

8.5 All Clear

All clear means that flood watches or warning are no longer in force in this area.

- Keep listening to weather reports.
- Only return to evacuated buildings if you are told it is safe.
- Beware sharp objects and pollution in flood water.

Residents should contact the local authority to check that it is safe to return to their property. Residents should be aware that if floodwaters have entered the property it will need to be cleaned, disinfected, and repaired and fully dried out prior to reoccupation. Check that the building is safe before entering, and if there are any doubt's professional opinion should be sought.

If there is any doubt that appliances may be water damaged, they must be checked before switching the power or gas back on. Contact your insurance company as soon as possible to get their approval before arranging any clean-up or repairs.

8.6 Dry Access, Egress, and Escape

8.6.1 Dry Access, Egress, and Escape Route

Access and escape routes need to be designed to be functional for changing circumstances over the lifetime of the development. Specifically:

Access routes should allow occupants to safely access and exit their dwellings in design flood conditions. Vehicular access to allow the emergency services to safely reach the development during design flood conditions will also normally be required in addition to the requirements of the building regulations.

Wherever possible, safe access routes should be provided that are located above design flood levels and which avoid flow paths. Where this is not possible, limited depths of flooding may be acceptable, provided that the proposed access is designed with appropriate signage etc. to make it safe. The acceptable flood depth for safe access will vary depending on flood velocities and the risk of debris within the flood water. Even low levels of flooding can pose a risk to people in situ (because of, for example, the presence of unseen hazards and contaminants in floodwater, or the risk that people remaining may require medical attention).

Where a failure of flood risk management infrastructure would result in flooding with a speed-of-onset that would not allow sufficient time for safe access and escape, an internally accessible place of safety, capable of accommodating the likely number of occupants or users of the proposed development should also be provided. Local planning authorities should consider whether the development can be considered safe given the predicted duration of flooding and the vulnerability of occupants/users. In doing so, local planning authorities should account for the likely impacts of flooding on essential services such as electricity, gas, telecommunications, water supply and sewerage. Any place of safety needs to be designed to facilitate rescue in case emergency care is needed or if it is unlikely to be safe for occupants/users to wait until flood waters have receded sufficiently for safe access/escape to be possible.

Proposals that are likely to increase the number of people living or working in areas of flood risk require particularly careful consideration, as they could increase the scale of any evacuation required. To mitigate this impact, it is especially important to look at ways in which the development could help to reduce the overall consequences of flooding in the locality, either through its design (recognising that some forms of development may be more resistant or resilient to floods than others) or through off-site works that benefit the area more generally. Where the impact cannot be wholly mitigated, developers need to cover the full cost of any additional emergency services provision needed, consistent with the 'agent of change' policy contained in the National Planning Policy Framework (at paragraph 187).

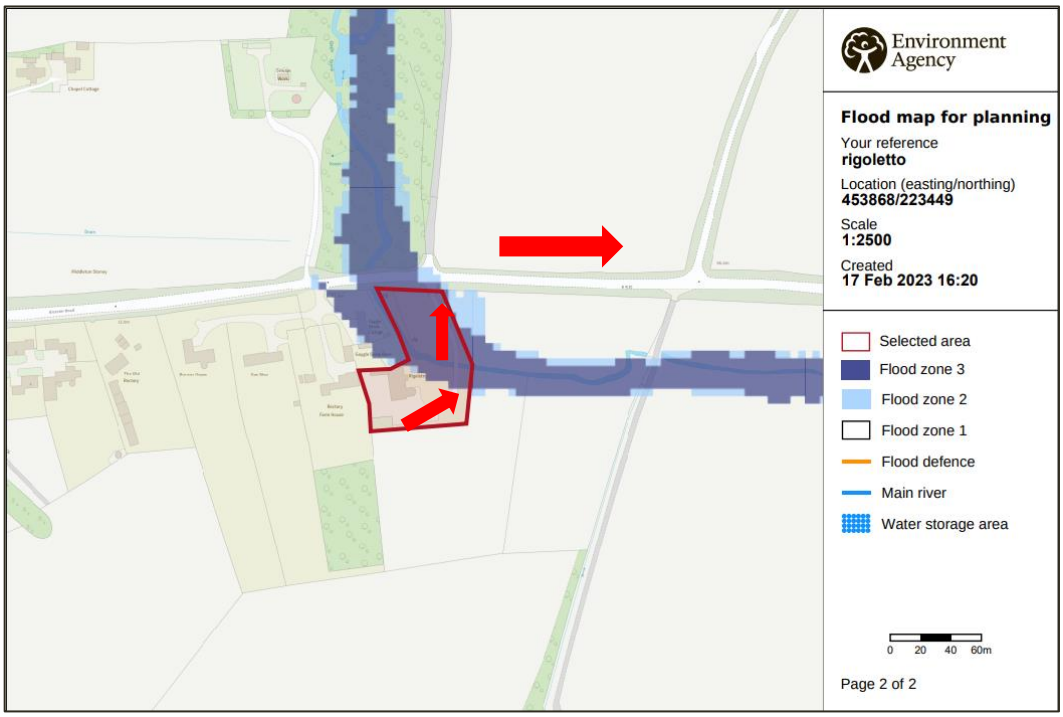
The only official access to the site is via a private Road to the front of the site, which currently lies within Flood Zones 1, 2 and 3. However, there is a bridge, which will allow access/egress above floodzones 2 and 3.

Based on the Environment Agency flood maps, the shortest route to an area in Flood Zone 1 is to utilise the existing access road.

According to the Hazard map produced by the Environment Agency for this area, the site is shown in areas of Danger for most, most likely due to the high-water velocity expected from the lake Gagle Brook when flooding. This is at its highest at the location of the bridge. But this model is for the ground level at the bottom of the brook, not at the surface of the bridge, which will provide the route of access/egress.

Based upon the estimated 0.1% (1 in 1000 year) flood level of 86.00, the deepest flood water should reach along the access during a 1 in 1000 year flood event would be between 110mm and 140mm, at a point around 20m to the north of the bridge. Based on the data in Table 4 (overleaf) this could result in a danger to some (children, the elderly and infirm). Should vulnerable people be within the dwelling at the time of a flood, it is recommended the dwelling is used as a safe haven, until they can be rescued.

Whilst it is not recommended for residents to enter any flood waters, especially none deeper than 100mm. The emergency services utilising the appropriate vehicles should be able access the site should an emergency occur, prior to the flood subsiding.



8.6.1 Suggested route to Flood Zone 1

To ensure that the risk posed by floodwaters is assessed consistently, Defra (in collaboration with the Environment Agency) produced a Flood Hazard equation. Variations of this equation are within two of their guidance documents entitled FD2321 Flood Risks to People and FD2320 Flood Risk Assessment Guidance for New Development TR1 and TR2. These two guidance documents were supplemented by an additional Note14 which reconciles the information provided in FD2321 and FD2320.

The Flood Hazard equation provides criteria for determining the degree of danger that is posed to life, assessed as a product of flood depth and flow velocity with an additional 'debris factor' factored (i.e., depth x (velocity + 0.5) + debris factor). The guidance states that if this product is below 0.75, then caution should be exercised due to "shallow flowing water or deep standing water". In contrast, if the product exceeds 2.0 then the hazard posed to life is extreme with "deep fast flowing water", representing a danger to all.

Table 4 – Hazard to People Classification using Hazard Rating *(HR= d x (v + 0.5) + DF)* for (Source Table 13.1 of FD2320/TR2 - Extended version)

HR	Depth of flooding - d (m)												
	DF = 0.5				DF = 1								
Velocity v (m/s)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.0	0.03 + 0.5 = 0.53	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.13 + 0.5 = 0.63	0.15 + 1.0 = 1.15	0.20 + 1.0 = 1.20	0.25 + 1.0 = 1.25	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25
0.1	0.03 + 0.5 = 0.53	0.06 + 0.5 = 0.56	0.12 + 0.5 = 0.62	0.15 + 0.5 = 0.65	0.18 + 1.0 = 1.18	0.24 + 1.0 = 1.24	0.30 + 1.0 = 1.30	0.36 + 1.0 = 1.36	0.48 + 1.0 = 1.48	0.60 + 1.0 = 1.60	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50
0.3	0.04 + 0.5 = 0.54	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.19 + 0.5 = 0.69	0.23 + 1.0 = 1.23	0.30 + 1.0 = 1.30	0.38 + 1.0 = 1.38	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	1.13 + 1.0 = 2.13	1.50 + 1.0 = 2.50	1.88 + 1.0 = 2.88
0.5	0.05 + 0.5 = 0.55	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.25 + 0.5 = 0.75	0.30 + 1.0 = 1.30	0.40 + 1.0 = 1.40	0.50 + 1.0 = 1.50	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	2.50 + 1.0 = 3.50
1.0	0.08 + 0.5 = 0.58	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.38 + 0.5 = 0.88	0.45 + 1.0 = 1.45	0.60 + 1.0 = 1.60	0.75 + 1.0 = 1.75	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	2.25 + 1.0 = 3.25	3.00 + 1.0 = 4.00	3.75 + 1.0 = 4.75
1.5	0.10 + 0.5 = 0.60	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.50 + 0.5 = 1.00	0.60 + 1.0 = 1.60	0.80 + 1.0 = 1.80	1.00 + 1.0 = 2.00	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	2.00 + 1.0 = 3.00	3.00 + 1.0 = 4.00	4.00 + 1.0 = 5.00	5.00 + 1.0 = 6.00
2.0	0.13 + 0.5 = 0.63	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	0.63 + 0.5 = 1.13	0.75 + 1.0 = 1.75	1.00 + 1.0 = 2.00	1.25 + 1.0 = 2.25	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.75	6.00	7.25
2.5	0.15 + 0.5 = 0.65	0.30 + 0.5 = 0.80	0.60 + 0.5 = 1.10	0.75 + 0.5 = 1.25	0.90 + 1.0 = 1.90	1.20 + 1.0 = 2.20	1.50 + 1.0 = 2.50	1.80 + 1.0 = 2.80	3.40	4.00	5.50	7.00	8.50
3.0	0.18 + 0.5 = 0.68	0.35 + 0.5 = 0.85	0.70 + 0.5 = 1.20	0.88 + 0.5 = 1.38	1.05 + 1.0 = 2.05	1.40 + 1.0 = 2.40	1.75 + 1.0 = 2.75	3.10	3.80	4.50	6.25	8.00	9.75
3.5	0.20 + 0.5 = 0.70	0.40 + 0.5 = 0.90	0.80 + 0.5 = 1.30	1.00 + 0.5 = 1.50	1.20 + 1.0 = 2.20	1.60 + 1.0 = 2.60	3.00	3.40	4.20	5.00	7.00	9.00	11.00
4.0	0.23 + 0.5 = 0.73	0.45 + 0.5 = 0.95	0.90 + 0.5 = 1.40	1.13 + 0.5 = 1.63	1.35 + 1.0 = 2.35	1.80 + 1.0 = 2.80	3.25	3.70	4.60	5.50	7.75	10.00	12.25
4.5	0.25 + 0.5 = 0.75	0.50 + 0.5 = 1.00	1.00 + 0.5 = 1.50	1.25 + 0.5 = 1.75	1.50 + 1.0 = 2.50	2.00 + 1.0 = 3.00	3.50	4.00	5.00	6.00	8.50	11.00	13.50
5.0	0.28 + 0.5 = 0.78	0.60 + 0.5 = 1.10	1.10 + 0.5 = 1.60	1.38 + 0.5 = 1.88	1.65 + 1.0 = 2.65	3.20	3.75	4.30	5.40	6.50	9.25	12.00	14.75

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.0		Danger for most – includes the general public
More than 2.0		Danger for all – includes the emergency services

Table 4 – Hazard to people classification

Table 4 'Hazard to People' classifies a 150mm depth of flooding with 2m/s velocity to have a hazard rating of 1.0.

The speed of onset of flooding it is hard to estimate because there are some limitations to the available information provided by the EA, based on LIDAR data. It is not possible to anticipate the speed of flooding of this particular site without extensive and specific modelling, both in terms of topography, watercourses, rainfall events, etc. Therefore, the data available is not enough to give a definitive answer. However, the Environment Agency has lead time for the flood alerts and warnings, as follows:

- The EA aims to issue Flood Alerts in "waking hours" and would rarely issue them before 6am or after 9pm. The EA aims to provide between 2 and 12 hours lead time between a Flood Alert being issued and possible flooding occurring.

- Flood Warnings can be issued at any time to provide as much lead time as possible. The EA/NRW aim to provide a minimum of 1-2 hours lead time for Flood Warnings on rivers and 6 hours for tidal or coastal locations.

- Severe Flood Warnings are generally issued in consultation with multiagency partners i.e. through Silver (Tactical) or Gold (Strategic) command centres attended by Local Authorities, the EA and Blue Light Services.

In many cases Flood Warnings will have already been issued and on site observations can then help determine if the conditions are likely to reach, or have reached a level where the Severe Flood Warning is needed. Where an area responds very rapidly to rainfall, and it is known that flooding can very quickly lead to severe conditions, a Severe Flood Warning can be issued from an EA forecast, before flooding has begun.

8.6.2 Evacuation route (Fast inundation without flood warning)

- **If there is no flood warning from the Environment Agency** and insufficient time to leave the site, residents should seek safe refuge within the dwelling (the finished flood level is approximately 940mm higher than the peak/1 in 1000 year flood level).
- Resources and equipment should be provided for occupants to stay in the safe refuge for at least 8 hours. **Do not plan for or assume that the emergency services will rescue you from this location**. The focus of any emergency response will be to those who are immediately vulnerable.
- The occupants should remain at the higher level until/unless advised by the emergency services.
- Avoid driving or walking through flood water: just 30cm (1 foot) of fast flowing water could move your car and even shallow moving water can knock you off your feet.
- Cooperate with the emergency services if they tell you to evacuate during a flood.
- Be prepared to act quickly and get yourself to safety.
- Check if other people are somewhere safe if it is safe for you to do so.
- Avoid walking or driving through flood water.
- Wash body and clothing thoroughly when it is safe to do so if you come into contact with flood water.

8.6.3 Re-Occupation of site

Residents should contact the local authority to check that it is safe to return to the building. They should be aware that if floodwaters have entered the building it will need to be cleaned, disinfected and repaired and fully dried out prior to reoccupation. If you notice a change in the colour, taste or smell of your tap water, stop using it and phone your water company. Do not eat food that's touched flood water. If your electricity is off, do not eat fresh food from a fridge after 4 hours or from a freezer after 24 hours.

Check that the building is safe before entering, and if there are any doubts professional opinion should be sought. If there is any doubt that appliances may be water damaged, they must be checked before switching the power or gas back on.

Contact your insurance company as soon as possible to get their approval before arranging any clean-up or repairs. Do not return to the site until authorities and site operator have confirmed it is safe to do so.

9.0 Flood Resistant & Resilient Measures

9.1 Flood Resistant measures

Flood resistance measures, or dry proofing, stops water entering a building up to a safe structural limit. Resistance measures can be passive, such as flood doors which are normally closed; or active, such as air brick covers or removable flood barriers. Flood resistant construction can prevent entry of water or minimise the amount that may enter a building where there is short duration flooding with water depth up to approximately 0.6 metres, depending on the building's characteristics. Where measures to exclude water in this way are proposed above this level, advice should be sought from a suitably qualified building surveyor, architect, or structural engineer.

This form of construction needs to be used with caution and accompanied by resilience measures that will speed-up flood recovery, as effective flood resistance can be difficult to achieve. Hydrostatic pressures exerted by floodwater can cause long-term structural damage, undermine the foundations of a building or cause leakage through the walls, floor or sub-floor, unless the building is specifically designed to withstand such stresses. In addition, temporary and demountable defences are not appropriate for new-build developments.

As part of the works associated with the refurbishment of the existing building, it is the recommendation of this report that consideration should be given to flood resistant measures. These are mechanisms which can be implemented by the occupier to provide additional defences against flood water ingress. Systems such as flood barriers to external door openings can prove an effective measure but must be used in conjunction with suitable ground floor construction techniques to prevent water entering the dwelling from the under-floor void. More information can be gained from the CIRIA document 'Improving the flood performance of new buildings'.

9.2 Flood Resilient measures

It is the recommendation of the report that flood resilient measures are used within the design to minimise the impact an extreme flood event would have on the property.

Property Flood Resilience is an approach to building design which aims to reduce flood damage and speed recovery and reoccupation following a flood. It uses a combination of flood resistance and recovery measures (referred to here as resilience measures), and is described in the industry-developed CIRIA Property Flood Resilience Code of Practice, which provides advice for both new-build and retrofit. It includes specific guidance for local authority planners.

Flood resilience measures (also called recoverability measures, or wet-proofing), accept that water will enter the building, but through careful design and changes to the construction will minimise damage and allow faster cleaning, drying, repairing and re-occupancy of the building after a flood. Measures are preferably passive, such as the use of resilient building materials, or active such as moving sensitive equipment or belongings to upper floors when flooding is expected. Flood resistance and resilience measures cannot be used to justify development in inappropriate locations.

This would mainly involve the siting of sockets and fuse boxes away from floor level where possible.

In order to mitigate the residual risk the following flood resilient construction techniques should be considered and included where reasonably practical:

- All walls at risk of coming into contact with flood water could be lime plastered or screeded with waterproof screed.
- When installing plasterboard, it should be installed lengthways to minimize the amount of plasterboard that would need to be replaced in the event of flooding.
- Plastic skirting could be used as these will not soak up water during a flood event.
- Electrical units, including boilers and heaters, should be raised on plinths.
- Kitchen units should be installed on legs to raise them or be constructed with plastic carcasses and removable doors, again to ensure no wooden features get wet.
- Ground floors should be laid with tiles, using a waterproof adhesive.
- Waste pipes and mains pipes should be fitted with non-return valves to prevent the ingress of floodwaters.
- Internal doors can be installed with lift-off hinges to allow easy removal if flood waters are expected.

Sealed PVC external framed doors should be used and, where the use of wooden doors is a preferred option, all effort should be made to ensure a good fit and seal to their frames.

Hollow-core timber internal doors should not be used where the predicted frequency of flooding is high. Where sufficient flood warning is given, butt hinges, that allow internal doors to be easily removed and stored in dry areas prior to a flood, should be used. Where the frequency of predicted flooding is low or where there is no warning (e.g. overland or sewer flooding) it may be necessary to replace the doors after the flood.

Windows and patio doors are vulnerable to flood water and similar measures to those used for doors should be taken. Special care should be taken to ensure adequate sealing of any PVC window/door sills to the fabric of the house. Of particular concern would be excessive water pressure on the glazing of patio doors. Double glazing conforming to the relevant standards would in principle adequately resist the pressures generated by flood waters; debris carrying flows may cause damage.

Special designs of air vent are available in the market to prevent water ingress in circumstances where the predicted flood depth is low (i.e. < 0.3m); e.g. periscopic air vent. Careful consideration should be given to effectively sealing any associated joints.

These measures would ensure if there were to be a flood event and the building was flooded the remediation measures and replacement costs would be minimal compared to standard construction techniques.

Resistance and resilience measures are unlikely to be suitable as the only mitigation measure to manage flood risk, but they may be suitable in some circumstances, such as:

- water-compatible and less vulnerable uses where temporary disruption is acceptable and the development remains safe;
- where the use of an existing building is to be changed and it can be demonstrated that the avoidance measures set out in paragraph 004 are not practicable and the development remains safe;
- as a measure to manage residual flood risk from flood risk management infrastructure when avoidance measures have been exhausted.

10.0 Recommendations and Conclusion

Flood risk to the site has been assessed, and where risks have been deemed above low, mitigation measures have been proposed to reduce the risk to the site.

Therefore, in line with the recommendations of the National Planning Policy Framework, the development site lies within land classified as flood zone 2 and 3a with flood defences, the dwelling itself lies within flood zone 1, which is considered at a low risk of flooding and the access is only subject to low level flooding (less than 150mm) during a 0.1% storm event.

The development is considered as more vulnerable and the data supports this reports findings that the dwelling itself is not at risk of any sources of flooding and the route of access, egress and escape is likely to be dry or subject to a low level of flooding for all storms up to and including the 1 in 1000 year event.

11.0 References & Bibliography

- The National Planning Policy Framework July 2021
- Planning Practice Guidance.
- Environment Agency - Rainfall-Runoff Management for Developments
- Environment Agency indicative flood maps https://flood-map-for-planning.service.gov.uk/
- Environment Agency indicative groundwater source protection zone maps http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx
- Environment Agency indicative Aquifer designation maps http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx
- Design and Construction Guidance 2022
- Cherwell District Council Strategic Flood Risk Assessment.
- Flood Estimation Handbook
- Environment Agency - Adapting to Climate Change: Advice for the Flood and Coastal Erosion Management Authorities March 2016

Appendix A - Topographic Survey

NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architects/Engineer's drawings, specifications and CDM documentation
3. This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
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REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
P1	RSI	RJW	Initial issue	14/02/23

DRAWING TITLE: Levels

SHEET NO.: 1/1

PROJECT: Rigoletto, Bicester Road, Middleton Stoney, OX25 4TD

CLIENT: Jim Kirkman

Infrastruct CS Ltd

SCALE @ A1: 1:500 (0m, 12.5m, 25.0m)

DESIGN: RJW

DRAFTED: NJ

APPROVED: RJW

PROJECT NUMBER: 5338

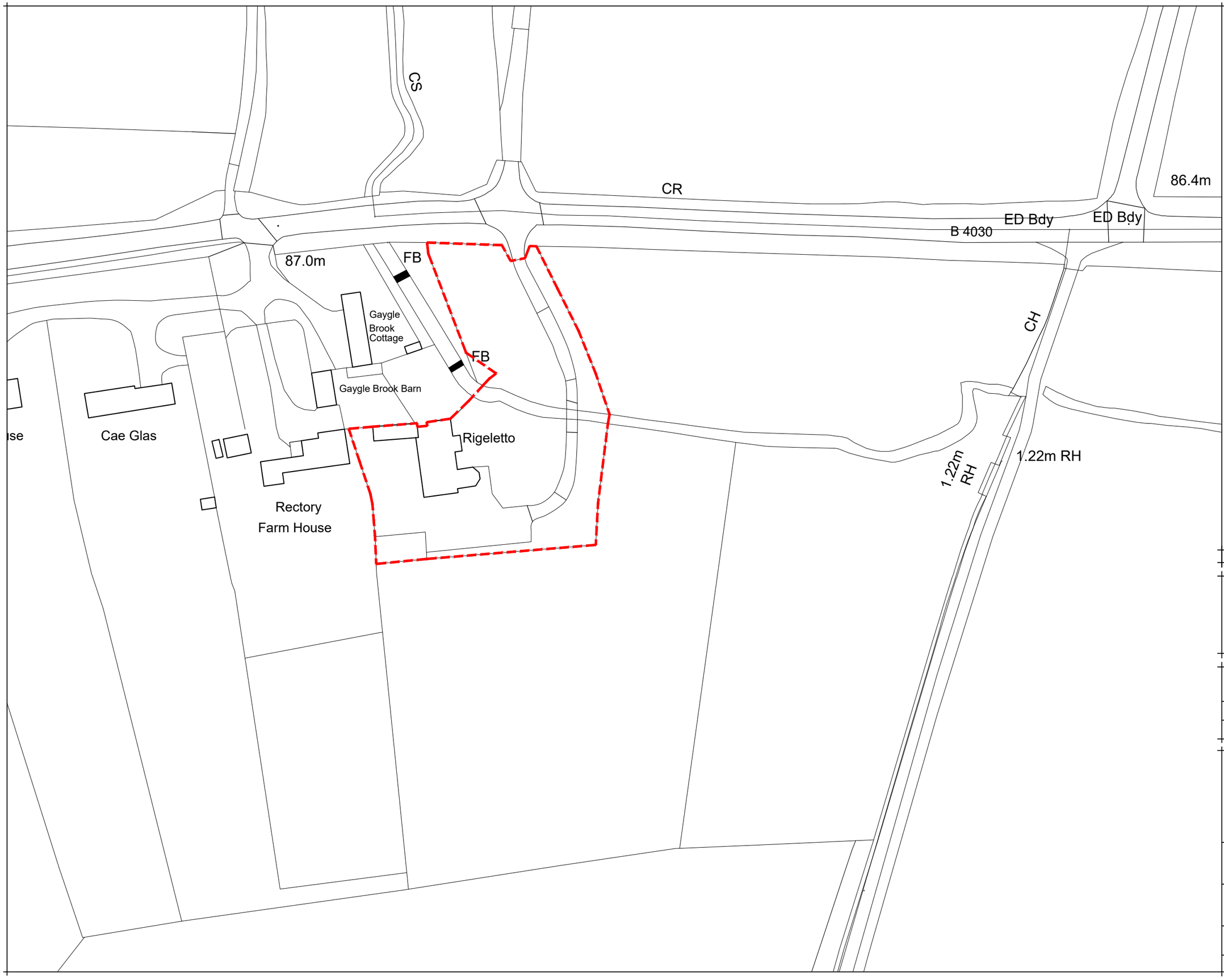
DATE: February 23

DRAWING NUMBER: 5338-STON-ICS-XX-M3-C-0100

STATUS: S2

REVISION: P1

Appendix B - Development Proposals



Rev.	Date.	Description.

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design@col-hicks.co.uk

PROJECT

Stoney Brook House
Bicester Rd
Middleton Stoney

DRAWING TITLE

Proposed Site Plan

Scale	Date	Drawn
1:1000 @ A3	FEB 23	TL

ISO 9001 REGISTERED FIRM

Job No. 2305

Drawing No. 001

Existing GF

0 2 5 10

N

Rev. | Date. | Description.

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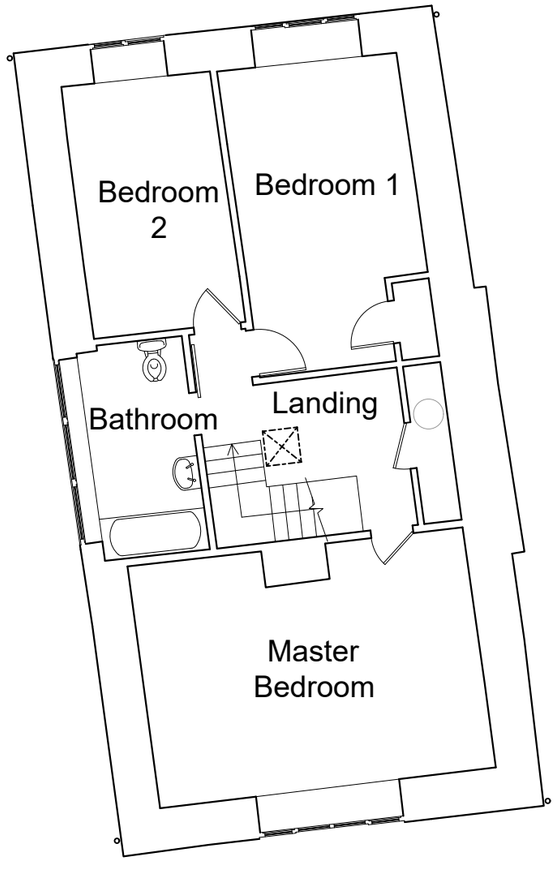
PROJECT
STONEY BROOK HOUSE
Bicester Rd
Middleton Stoney

DRAWING TITLE
Propsed use of existing ground floor

Scale	Date	Drawn
1:100 @ A3	FEB 23	TL

ISO 9001 REGISTERED FIRM

Job No. 2305
Drawing No. 002



Existing FF

0 2 5 10

N

Rev.	Date.	Description.

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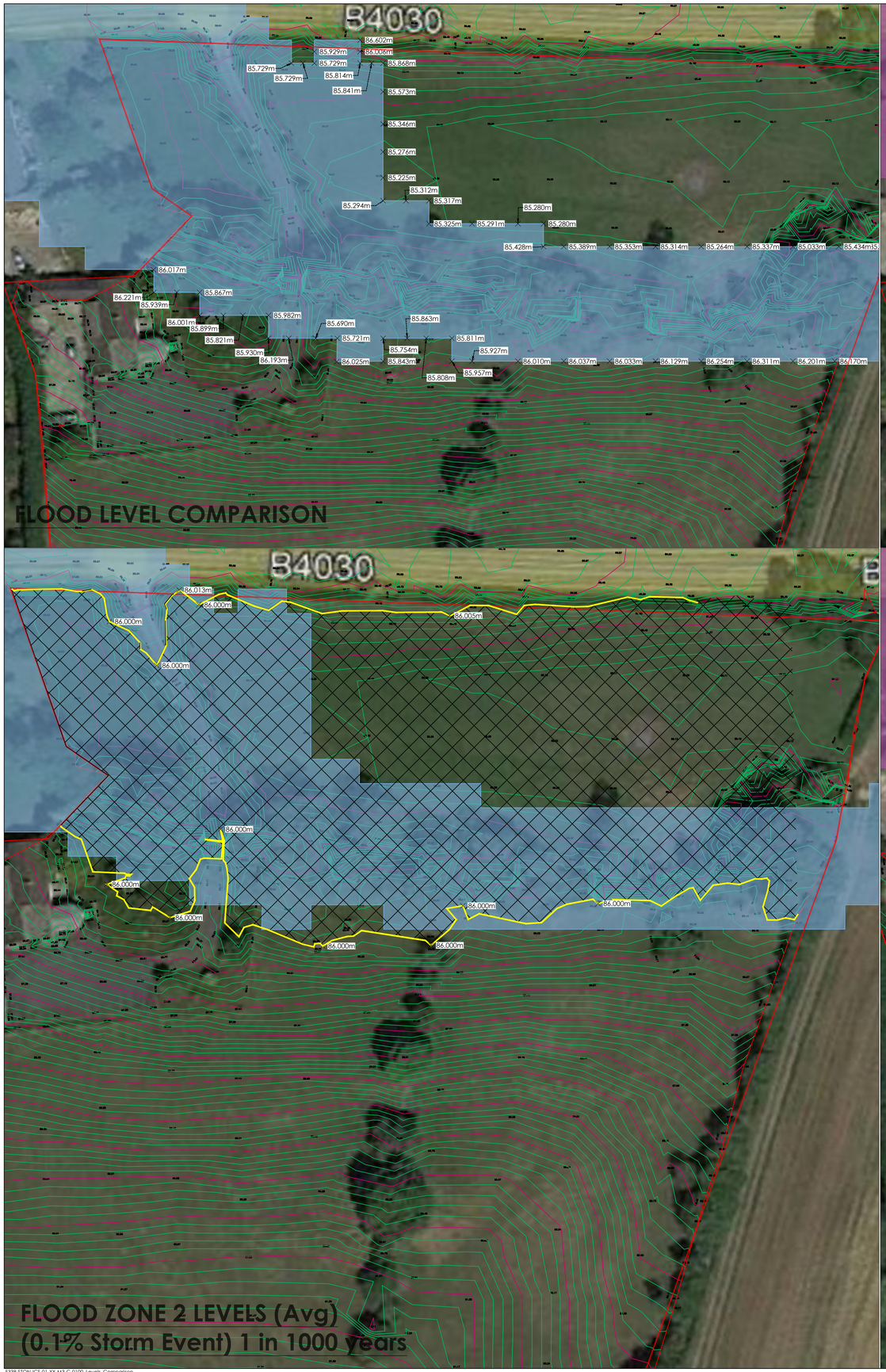
PROJECT
STONEY BROOK HOUSE
Bicester Rd
Middleton Stoney

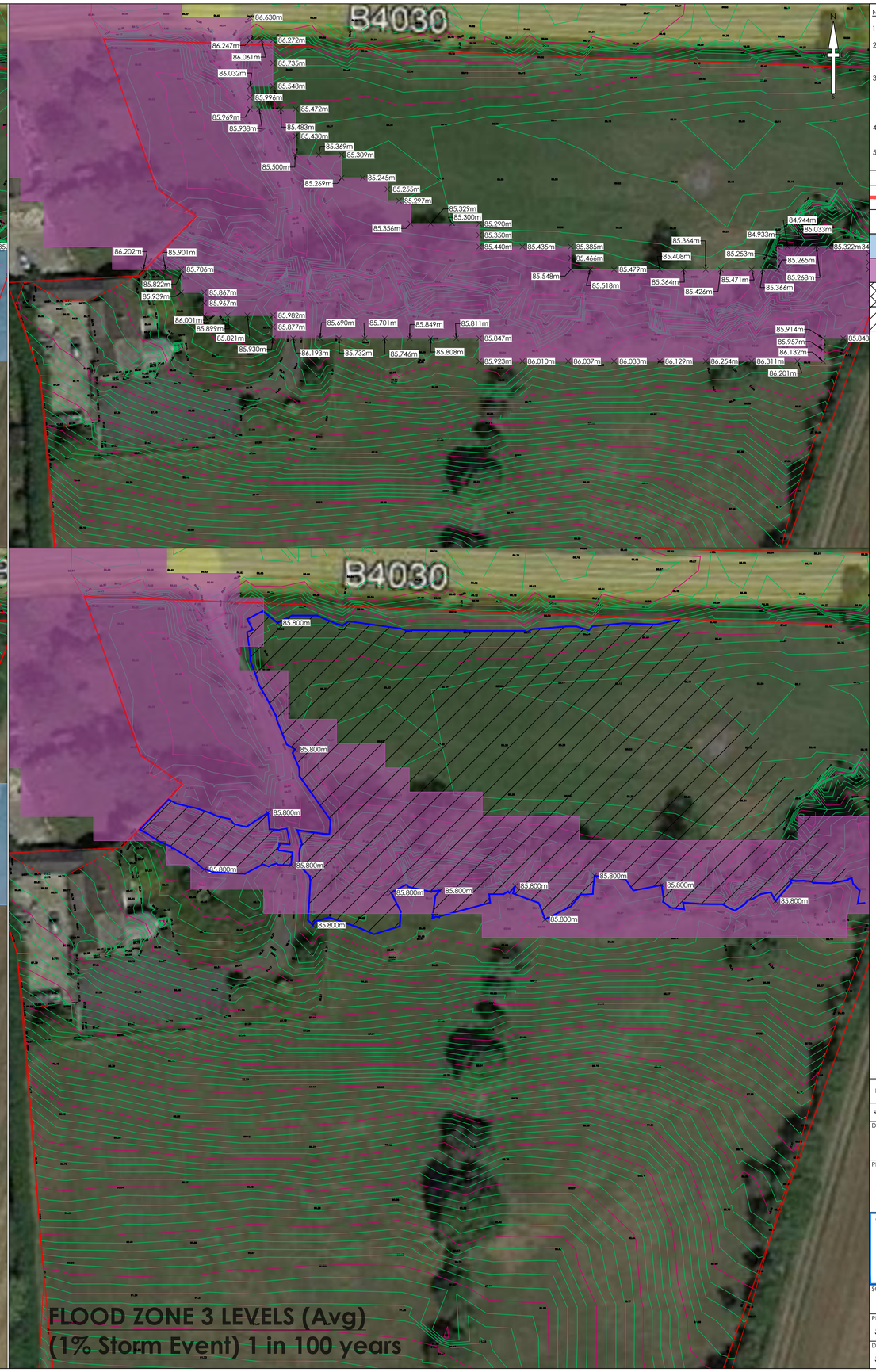
DRAWING TITLE
Proposed use of Existing First floor

Scale	Date	Drawn
1:100 @ A3	FEB 23	TL

Job No. 2305
Drawing No. SK-01

Appendix C - 3D Comparison of EA Flood Maps and Topographic Data





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Surface Finishes Legend	
	Site Boundary
+ 100.00	Levels
	Flood Zone 2 Data from Environment Agency
	Flood Zone 3 Data from Environment Agency
	EA Flood Zone 2, Flood Level of 86.00m
	EA Flood Zone 3, Flood Level of 85.60m

REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
P1	RSI	RJW	Initial issue	14/02/23

DRAWING TITLE: Average Flood Levels - EA Data

SHEET NO.: 1/1

PROJECT: Rigoletto, Bicester Road, Middleton Stoney, OX25 4TD

CLIENT: Jim Kirkman

Infrastruct CS Ltd

SCALE @ A1: 1:500 (0m, 12.5m, 25.0m)

DESIGN: RJW

DRAFTED: NJ

PROJECT NUMBER: 5338

DATE: February 23

APPROVED: RJW

DRAWING NUMBER: 5338-STON-ICS-XX-M3-C-0102

STATUS: S2

REVISION: P1

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Appendix D - EA Flood mapping Overlain on Topographic Survey

NOTES

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Default

Flood_Zone_3
Flood_Zone_2
Map Base

REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
P1	RSI	RJW	Initial issue	14/02/23

DRAWING TITLE: Flood Zones - EA Data

SHEET NO.: 1/1

PROJECT: Rigoletto, Bicester Road, Middleton Stoney, OX25 4TD

CLIENT: Jim Kirkman

Infrastruct CS Ltd

SCALE @ A1: 1:500 (0m, 12.5m, 25.0m)

DESIGN: RJW
DRAFTED: NJ
APPROVED: RJW

PROJECT NUMBER: 5338

DATE: February 23

DRAWING NUMBER: 5338-STON-ICS-XX-M3-C-0200

STATUS: S2

REVISION: P1

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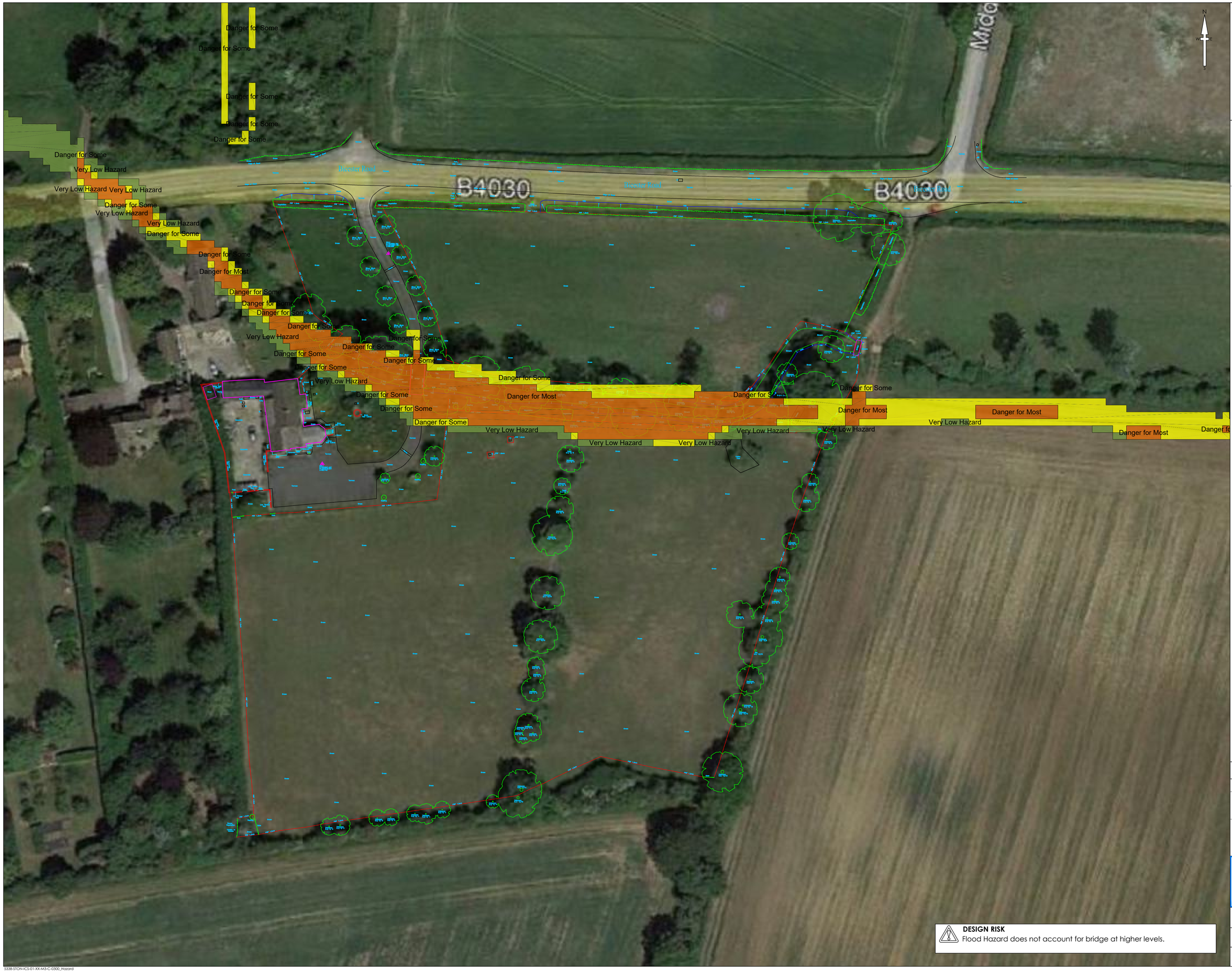
Appendix E - EA Flood Hazard Map (Excludes Bridge)



NOTES

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Flood Hazard Rating

TUFLOW ZUK1 categories[1]		Current Guidance[2]	
Flood Hazard Rating	Hazard to people	Flood Hazard Rating	Hazard to people
0	No Hazard	0	No Hazard
< 0.75	Low Hazard	<0.75	Very Low Hazard
0.75 - 1.25	Moderate Hazard	0.75 - 1.25	Danger for some
1.25 - 2.5	Significant Hazard	1.25-2.0	Danger for most
> 2.5	Extreme Hazard	> 2.0	Danger for all

Default

RoFSW_SP52_Hazard_1in1000

- > 0.50
- 0.50 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- < 2.00

Map Base

DESIGN RISK
Flood Hazard does not account for bridge at higher levels.

REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
P1	RSI	RJW	Initial issue	14/02/23

DRAWING TITLE: Flood Hazard - EA Data

SHEET NO.: 1/1

PROJECT: Rigoletto, Bicester Road, Middleton Stoney, OX25 4TD

CLIENT: Jim Kirkman

Infrastruct CS Ltd

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DESIGN: RJW

DRAFTED: NJ

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STATUS: S2

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Appendix F - EA Flood Depths for 1 in 1000year event (Excludes bridge)

B4030

Bicester Road

B4030

Bicester Road

Middleton Stoney Road

N

W E

S

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Legend

RoFSW_SP52_Depth_1in1000

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

Map Base

REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
P1	RSI	RJW	Initial issue	14/02/23

DRAWING TITLE: Flood Depth - EA Data

SHEET NO.: 1/1

PROJECT: Rigoletto, Bicester Road, Middleton Stoney, OX25 4TD

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DESIGN: RJW

DRAFTED: NJ

APPROVED: RJW

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STATUS: S2

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