BRIDGE COTTAGE, STITCHCOMBE

Marlborough, Wiltshire, SN8 2EU

FLOOD RISK ASSESSMENT

Project No	21-256-60
Revision No	02
Issue date	20/01/23

Transport Planning | Flood Risk & Hydrology | Infrastructure & Drainage

Control Sheet

This report has been prepared by Calibro Consultants Ltd for the sole benefit and use of the Client. Calibro Consultants Ltd offer no liability for the information contained within the report to any third party.

Prepared by	Signature	Date
Lucy Ginn BSc MSc Graduate Flood Risk Consultant	[redacted]	20/01/2023

Reviewed by	Signature	Date
Patrick Goodey BSc MSc Principal Flood Risk Consultant	[redacted]	20/01/2023

Approved for issue by	Signature	Date
Alex Bearne BSc MSc Head of Flood Risk & Hydrology	[redacted]	20/01/2023

CONTENTS

1	EXECUTIVE SUMMARY	1
2	INTRODUCTION	3
3	EXISTING SITE AND HYDROLOGY CHARACTERISTICS	4
4	PROPOSED DEVELOPMENT	7
5	FLOOD RISK	9
6	PROPOSED DRAINAGE STRATEGY	18
7	CONCLUSIONS	26

Tables

Table 4-1	PPG Development Vulnerability Classification	8
Table 5-1	Flood Zone Classification	9
Table 5-2	Modelled 1d Node Flood Levels	11
Table 5-3	Climate Changes Allowances for the 'Kennet and tributaries' Catchment	12
Table 5-4	Level for Level Floodplain Compensation Summary	17
Table 6-1	Rainfall Intensity Allowances	20
Table 6-2	Assessment of SuDS Suitability	20
Table 6-3	Water Quality Indices (as per C753 The SuDS Manual)	23
Table 6-4	Proposed Drainage System Maintenance Plan	25

Figures

Figure 3-1	Regional Site Context	4
Figure 3-2	Local Site Context	5
Figure 5-1	Flood Map for Planning	10
Figure 5-2	Modelled Flood Extents and 1D Node Location	11
Figure 5-3	1 in 100 year +25% Modelled Flood Depths	13
Figure 5-4	RoFSW Extents	14
Figure 6-1	Impermeable Areas Plan	19

Appendices

Appendix A	Topographic Survey
Appendix B	Site Proposals
Appendix C	Indicative Alignment of Foul System
Appendix D	Environment Agency Cost Recovery Advice – May 2021
Appendix E	Level for Level Floodplain Compensation
Appendix F	Greenfield Runoff and Microdrainage Calculations
Appendix G	Proposed Drainage Strategy

1 EXECUTIVE SUMMARY

1.1.1 *Ramsbury Sarl* are applying for permission for the demolition of an existing residential dwelling and the construction of a replacement residential dwelling at Bridge Cottage, Stitchcombe, Wiltshire.

1.1.2 This document considers the flood risk to the site and presents a drainage strategy to mitigate against the potential downstream impacts of the development.

1.1.3 The Flood Map for Planning shows that the site is located in Flood Zone 2 and 3, at risk of fluvial flooding from the River Kennet (Main River) which flows alongside both the western and eastern site boundary. Flood risk from the Kennet has been assessed using the Marlborough to Newbury model provided by the Environment Agency (EA).

1.1.4 The proposals constitute 'More Vulnerable' development and are appropriate in Flood Zones 2 and 3, subject to passing the Sequential and Exception tests. This is addressed in the Planning Supporting Statement.

1.1.5 Parts of the site are affected by a 1 in 1,000 year surface water flooding event. Areas of highlighted risk are associated with the River Kennet and therefore more accurately assessed by the Marlborough to Newbury model.

1.1.6 The site is assessed as being at low risk of flooding from surface water and very low risk of flooding from groundwater and sewers. The flood risk from other artificial sources is considered to be negligible.

1.1.7 The design event (1 in 100 year +25%) flood level at the site is 118.57mAOD. EA guidance requires floor levels and mitigation measures to include a 'freeboard' of 300mm above the design flood level to account for residual uncertainty. The proposed finished floor levels are 119.14mAOD, providing additional freeboard above the EA requirements and being significantly above the predicted 1 in 1,000 year flood level. The proposals represent a significant reduction in flood risk when compared with the existing dwelling.

1.1.8 The proposed replacement dwelling will be formed with block and beam floor supported on external and intermediate walls with gaps in excess of 1m in order to minimise the loss of floodplain storage and allow the conveyance of flood flows.

1.1.9 The proposed development will result in the loss of approximately 1.12m^3 of floodplain storage between 118.2mAOD and 118.5mAOD when compared with the existing dwelling. To compensate for this loss, it is proposed to lower an area of approximately 15m^2 situated between 118.2mAOD and 118.5mAOD by 100mm to provide 1.52m^3 of additional storage and a net gain of 0.40m^3 of floodplain storage volume and no loss of floodplain on a level-for-level basis in accordance with Environment Agency guidance.

1.1.10 The proposed replacement dwelling proposals comprise approximately 240m^2 of impermeable hardstanding compared to an existing impermeable area of approximately 70m^2. It is proposed to manage surface water runoff from the development with an attenuation basin which will discharge to the River Kennet at a maximum rate of 2.7/s (considered the practicable minimum discharge rate from the development). Surface water will be routed to the proposed basin using conveyance features to be confirmed during detailed design.

1.1.11 This document demonstrates that the proposals meet the aims of the National Planning Policy, being safe from all sources of flooding and not increasing flood risk elsewhere.

2 INTRODUCTION

2.1 Background

2.1.1 Calibro has been appointed by *Ramsbury Sarl* to undertake a Flood Risk Assessment (FRA) for a proposed replacement residential dwelling at Bridge Cottage, Stitchcombe, Wiltshire.

2.1.2 The National Planning Policy Framework (NPPF) requires that the planning system takes full account of flood risk. This requires that:

- A 'site specific' Flood Risk Assessment will be undertaken for any site that has a flood risk potential;
- Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' land uses;
- Sustainable drainage systems are used for surface water management where practicable;
- Flood risk is managed through the use of flood resilient and resistant techniques;
- Residual risk is identified and safely managed;
- Safe access and egress to and from the development can be achieved.

2.1.3 NPPF states that a site-specific Flood Risk Assessment will be required for proposals:

a) that are greater than 1 hectare in area within Flood Zone 1;
b) that are in Flood Zones 2 and 3;
c) in an area within Flood Zone 1 which has critical drainage problems;
d) in an area within Flood Zone 1 identified in a Strategic Flood Risk Assessment as being at increased flood risk in the future;
e) in an area in Flood Zone 1 that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.1.4 The site is approximately 0.14ha in area and is located entirely within Flood Zones 2 and 3. An FRA is therefore required in accordance with NPPF.

2.1.5 This assessment considers the risks of all types of flooding to the site and provides mitigation measures to minimise flood risk to the site. A drainage strategy has been derived to manage surface water runoff from the development.

3 EXISTING SITE AND HYDROLOGY CHARACTERISTICS

3.1 Site Description

3.1.1 The site is located at Bridge Cottage, Stitchcombe, Marlborough, Wiltshire. The approximate co-ordinates at the centre of the site are 422746, 169554. The nearest postcode is SN8 2EU. The site is approximately 0.14ha.

3.1.2 Regionally, the site is located approximately 1.5km north of the A4 and 3.6km east of the town of Marlborough. Figure 3-1 shows the regional context of the site.

3.1.3 At a local level, the site is in a rural location, generally bordered by greenspace. An unnamed road abuts the site to the south. The River Kennet flows alongside the western boundary and a secondary channel is located on the eastern boundary. A mill pond is located approximately 25m from the southern site boundary, across the unnamed road. An existing residential dwelling is present on site. Figure 3-2 shows the local context of the site.

Figure 3-1 Regional Site Context

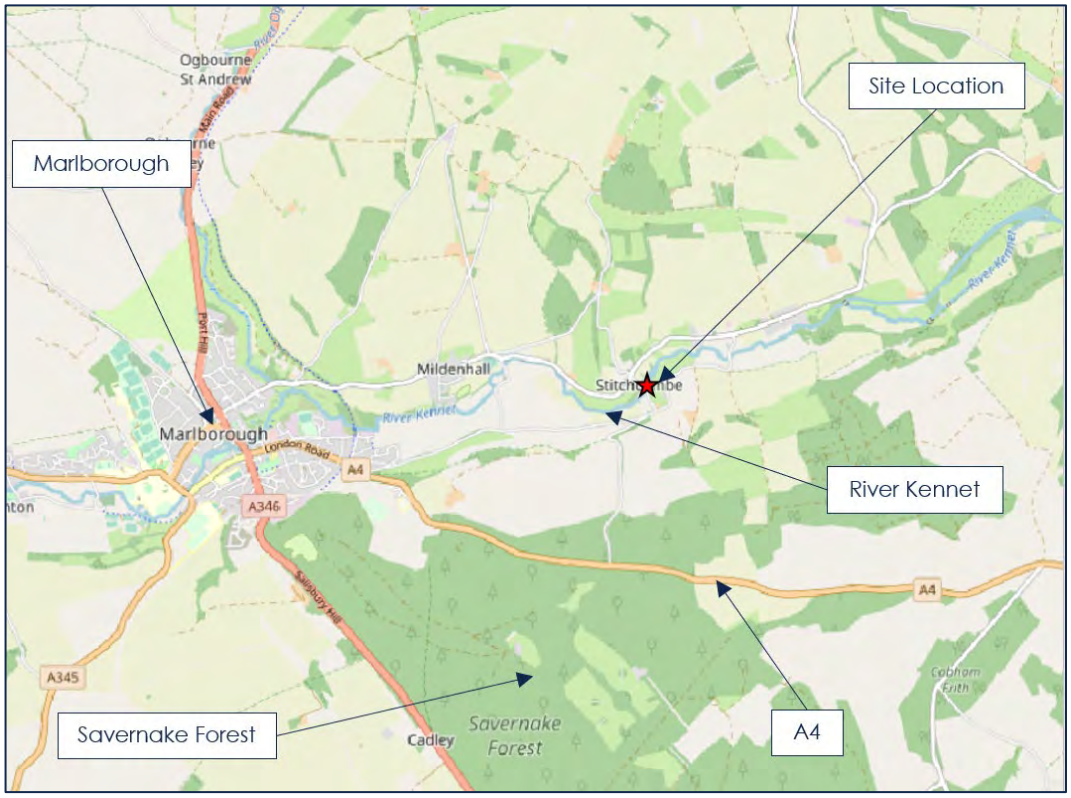


Figure 3-2 Local Site Context



3.2 Topography

3.2.1 The site is relatively flat, recorded by the topographic survey as ranging from a high point of 118.85mAOD in southwestern corner of the site, to a low point of 118.25mAOD at the River Kennet top of bank at the western site boundary.

3.2.2 The topographic survey is included in Appendix A.

3.3 Existing Drainage and Hydrology

3.3.1 The River Kennet (Main River and the largest tributary of the River Thames) flows southwest to northeast at both the eastern and western side of the site, away from the mill pond.

3.3.2 It has been presumed that surface water from the existing dwelling on site discharges directly to the River Kennet, with no other formal drainage features currently in place.

3.4 Geology and Soils

3.4.1 Geological data held by the British Geological Survey (BGS) show that entire site is underlain by *'Lewes Nodular Chalk Formation- Chalk'* bedrock.

3.4.2 BGS superficial deposits mapping indicates that the entire site is located within a band of '*Alluvium - Clay, Silt, Sand And Gravel'* associated with the River Kennet.

3.4.3 The BGS Hydrogeology aquifer classification (625k) records the geology under the entire site as '*Highly Productive Aquifer*'.

3.4.4 SoilScapes Mapping records that '*Loamy and clayey floodplain soils with naturally high groundwater*' are the only soil type on site.

4 PROPOSED DEVELOPMENT

4.1 Site Proposals

4.1.1 The proposals are for a replacement residential dwelling at Bridge Cottage, Stitchcombe. It is proposed to demolish the existing dwelling on site prior to the construction of a new building and terrace and associated access and parking.

4.1.2 The proposed dwelling will be constructed with block and beam floor supported on external and intermediate walls with gaps in excess of 1m. The proposed support walls are 0.215m wide.

4.1.3 The southwestern and northeastern extents of the proposed building will be open to voids below the floor. The voids will be fitted with 75x75mm removable grills which will allow water to flow beneath the proposed replacement dwelling whilst preventing unauthorised access to people and animals but facilitating maintenance.

4.1.4 There will be 5 sets of open, low-displacement steps to the proposed replacement dwelling.

4.1.5 The site proposal drawings are provided in Appendix B

4.2 Development Vulnerability

4.2.1 Table 2 of the Planning Practice Guidance (PPG) defines which types of development are acceptable in each Flood Zone and is reproduced in Table 4-1. The proposed residential development falls within Flood Zone 2 and 3 and is defined by the PPG as 'More Vulnerable'. The proposals are therefore appropriate, subject to the Sequential and Exception tests as discussed in the Planning Supporting Statement.

4.3 Sequential Test

4.3.1 The site is located within Flood Zone 2 and 3. Normally the sequential test is required for development in Flood Zones. However, as the proposals are for a replacement dwelling these are not considered to apply to this proposal as set out in the Planning Supporting Statement.

4.4 Exception Test

4.4.1 The development proposals are classified as 'More Vulnerable' and located within Flood Zone 2 and 3. The Exception Test is therefore required (it is not known whether there is an exception in the case of a replacement dwelling).

4.4.2 There are two parts to the Exception Test:

a) That the development will provide wider sustainability benefits to the community that outweigh flood risk; and,
b) That the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

4.4.3 Part one of this test is covered elsewhere in the planning application. Part two is demonstrated in this document being raised comfortably above the predicted flood levels and resulting in an increase in floodplain storage (refer to Section 5).

4.4.4 The replacement dwelling will be safe from the effects of climate change and more sustainable than the existing dwelling and it is presume that it would meet the requirements of the Exception Test. This point is considered elsewhere in the planning application.

Table 4-1 PPG Development Vulnerability Classification

Flood Zone	Flood Risk Vulnerability				
	Essential Infrastructure	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**	**Water Compatible**
1	✓	✓	✓	✓	✓
2	✓	Exception Test Required	✓	✓	✓
3a	Exception Test Required	×	**Exception Test Required**	✓	✓
3b	Exception Test Required	×	×	×	✓

5 FLOOD RISK

5.1 National Planning Policy Framework (NPPF)

5.1.1 In accordance with the National Planning Policy Framework, this Flood Risk Assessment considers the following sources of flooding:

a) Tidal Flooding – from sea;
b) Fluvial Flooding – from rivers and streams;
c) Surface Water Flooding – from intense rainfall events;
d) Groundwater flooding – from elevated groundwater levels or springs;
e) Flooding from sewers – from existing sewer systems; and
f) Artificial sources – from reservoirs, canals etc.

5.2 Historical Flooding

5.2.1 The Environment Agency do not hold any records of historical flooding at the site. There are also no reports of historic flooding within the vicinity of the site included in the Wiltshire Council Kennet Strategic Flood Risk Assessment (SFRA).

5.3 Flood Zones

5.3.1 The Flood Zones are based on the assessed probability of the site flooding from rivers and the sea, ignoring the presence of flood defences. The Flood Zone classifications from PPG are presented in Table 5-1 below.

Table 5-1 Flood Zone Classification

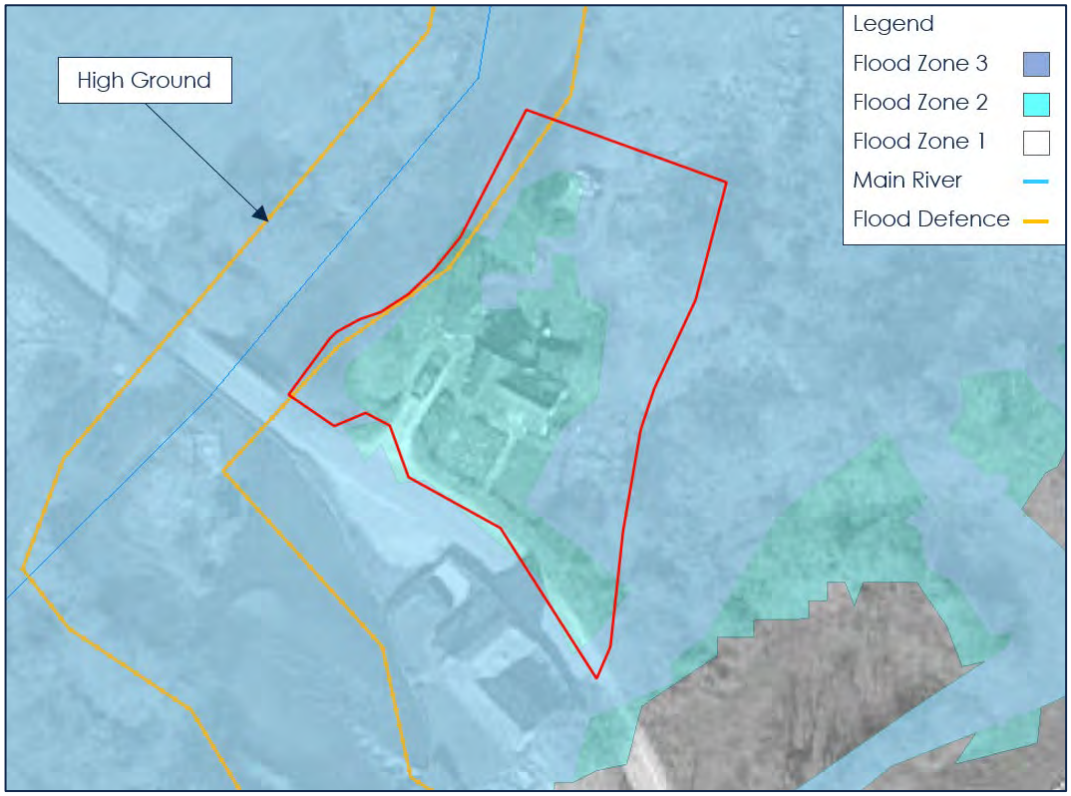
Flood Zone	Risk	Fluvial Flooding Annual Probability	Tidal Flooding Annual Probability
1	Low	< 1 in 1,000 year	
2	Medium	1 in 1,000 – 1 in 100 year	1 in 1,000 – 1 in 200 year
3	High	1 in 100 year	1 in 200 year
3b	Functional Floodplain	Land where water has to flow or be stored in times of flood. This is defined in the relevant SFRA.	

5.3.2 The Flood Map for Planning defines the site as Flood Zone 2 and 3 (Figure 5-1). These areas are predicated to be at risk of fluvial flooding during the 1 in 1,000 year and 1 in 100 year event, respectively.

5.3.3 The Flood Map for Planning also highlights flood defences defined as 'High Ground' alongside the River Kennet at the site's eastern boundary. Although partially evident in the LiDAR coverage of the site, there are no significant defences protecting the site.

5.3.4 Flood model data has been retrieved from the Environment Agency and is discussed in Section 5.4.

Figure 5-1 Flood Map for Planning



5.4 Fluvial Flood Risk

5.4.1 Flood model outputs from the 2007 Marlborough to Newbury model were obtained from the Environment Agency. The model is a 1D only hydraulic model, created using ISIS software, extending from Marlborough to Newbury Gauging Station.

5.4.2 The data provided by the EA included flood outlines, flood depth grids and maximum flood levels for river channel locations, or nodes, along the channel in the vicinity of the site.

5.4.3 The modelled flood outlines shown in Figure 5-2 have been adopted to define Flood Zones 2 and 3 in the Flood Map for Planning to define. The far western and eastern extents of the site, closest to the River Kennet, are at risk during the 1 in 20 year event (Figure 5-2). The Wiltshire Council Kennet SFRA defines areas impacted by the 1 in 20 year event as Flood Zone 3b, the functional floodplain. No development is proposed in Flood Zone 3b.

5.4.4 Figure 5-2 shows the nearest model nodes to the site. Levels from node rk13.152d are generally higher and have been used for the purpose of this FRA. The modelled flood levels for the two nodes shown in Figure 5-2 are provided in Table 5-2.

Figure 5-2 Modelled Flood Extents and 1D Node Location

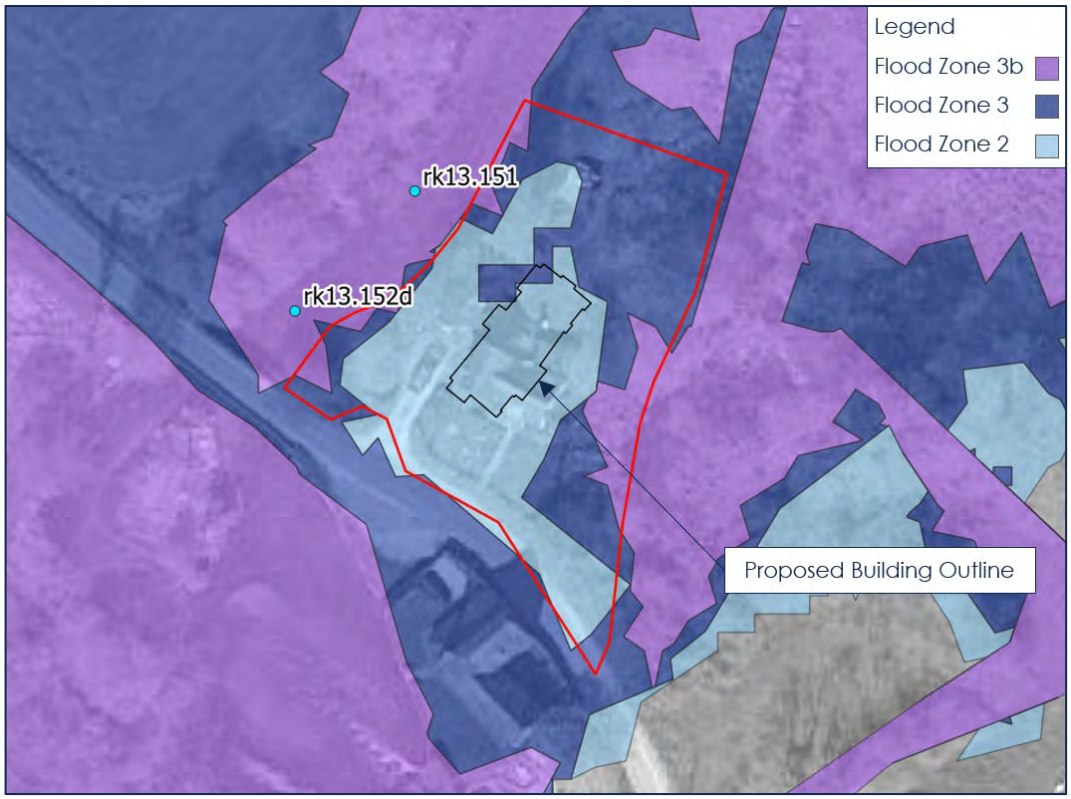


Table 5-2 Modelled 1d Node Flood Levels

	Modelled Flood Level (mAOD)						
Node	**1 in 20 year**	**1 in 100 year**	**1 in 1,000 year**	**1 in 100 year +15%**	**1 in 100 year +25%**	**1 in 100 year +35%**	**1 in 100 year +70%**
rk13.152d	118.30	118.50	118.66	118.55	118.57	118.60	118.65
rk13.151	118.28	118.49	118.70	118.54	118.57	118.60	118.69

5.5 Climate Change

5.5.1 In July 2021 the Environment Agency 'Flood Risk Assessments: Climate Change Guidance' was updated to reflect the latest predicted changes in peak river flow. These allowances are provided for over 100 management catchments for a range of time periods and probabilistic scenarios.

5.5.2 The application site lies within the 'Kennet and tributaries' Management Catchment. The peak river flow climate change allowances for the 'Kennet and tributaries' Management Catchment presented by the PPG are reproduced in Table 5-3.

Table 5-3 Climate Changes Allowances for the 'Kennet and tributaries' Catchment

Peak River Flows Scenario	2020s	2050s	2080s
Upper End	32%	39%	76%
Higher Central	16%	16%	35%
Central	10%	8%	**21%**

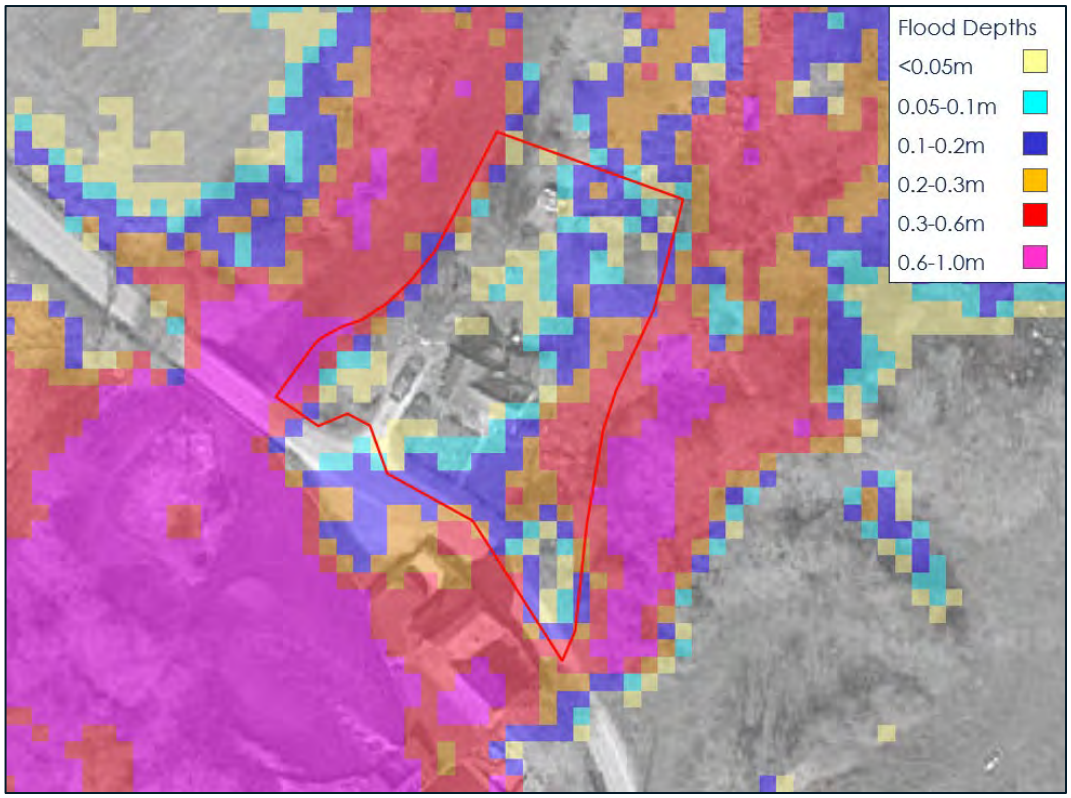
5.5.1 The PPG states that for '*More Vulnerable*' infrastructure in Flood Zone 2 and 3a, the central peak river flow climate change allowance should be used. The proposals for a replacement residential dwelling have a design life of 100 years and as such, should consider the 2080s epoch. The design event for the proposed replacement dwelling is therefore the 1 in 100 year +21% event (Table 5-3).

5.5.2 As the climate change allowances displayed in Table 5-3 were only updated in July 2021, the Environment Agency model results do not include an event to match the newly updated allowances. In the case of Bridge Cottage and the Marlborough to Newbury model, the closest results to the design event (1 in 100 year +21%) provided by the Environment Agency are from the 1 in 100 year + 25% event. This event is more precautionary than the updated guidance and has been used to develop the site proposals.

5.5.3 During the 1 in 100 year +25% event, the modelled flood level at rk13.152d is 118.57mAOD, increasing by 80mm up to 118.65mAOD during the 1 in 100 year +70% event (Table 5-2), indicating that the model is not particularly sensitive to flows.

5.5.4 The predicted flood depths across the site for 1 in 100 year +25% event are generally less than 0.6m but vary between <0.05m to >0.6m, as shown in Figure 5-3.

Figure 5-3 1 in 100 year +25% Modelled Flood Depths



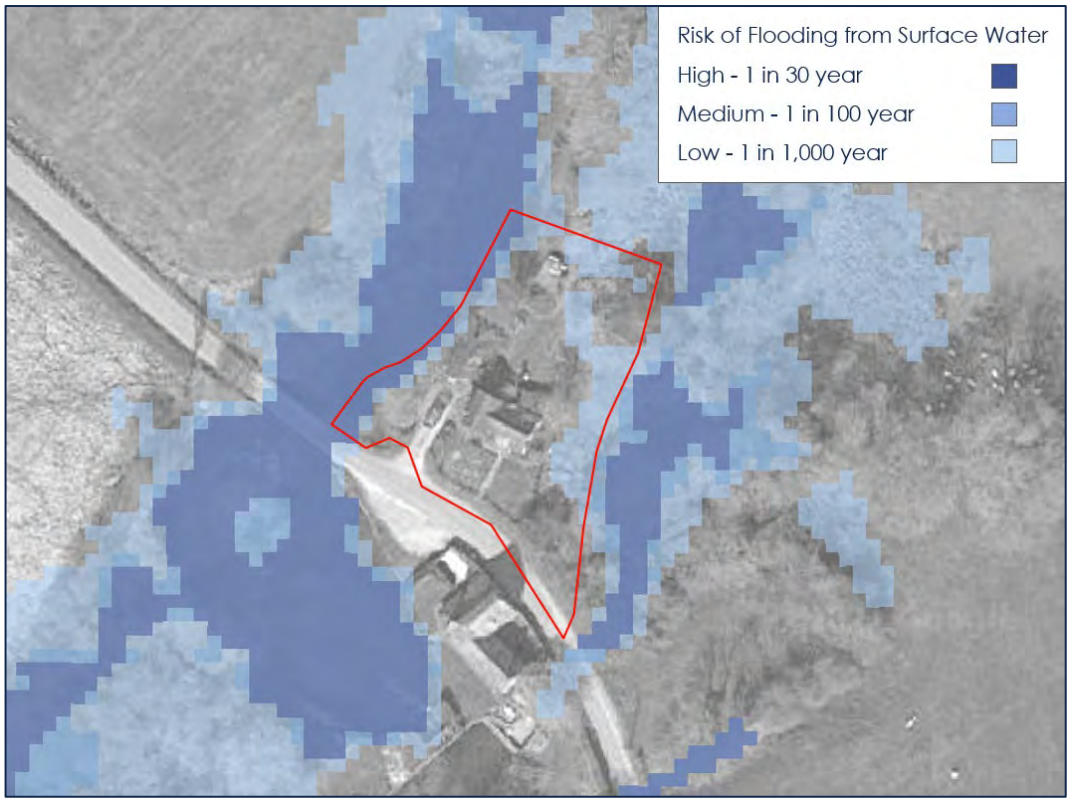
5.6 Surface Water Flooding

5.6.1 The Risk of Flooding from Surface Water (RoFSW) dataset indicates areas where surface water is likely to flow and accumulate. The mapping is derived by simulation of rainfall events over a digital terrain model (DTM).

5.6.2 The RoFSW dataset shows that parts of the site are at risk of surface water flooding. This risk ranges from High at the eastern and western edges of the site to Very Low across much of the site (Figure 5-4). These areas of risk are associated with the River Kennet. This risk is more accurately defined by the flood modelling discussed in Section 5.4.

5.6.3 A review of site topography concludes that the surrounding land would not drain into the site and as a result, the risk of flooding from surface water at the site is considered to be **Low.**

Figure 5-4 RoFSW Extents



5.7 Groundwater Flooding

5.7.1 The hydrogeology aquifer classification shows that the site is entirely underlain by 'Highly Productive Aquifer'. The BGS bedrock map shows that the site is underlain by permeable 'Less Nodular Chalk Formation – Chalk'.

5.7.2 SoilScapes shows that the only soil type on site is 'Loamy and clayey floodplain soils with naturally high groundwater'. Clay soils typically have relatively low permeability, which could limit the vertical migration of groundwater.

5.7.3 Given the site's proximity to watercourses, groundwater levels are unlikely to rise above the level in the watercourses.

5.7.4 The risk of flooding from groundwater is therefore assessed as being **Very Low.**

5.8 Flooding from Sewers

5.8.1 Foul water drainage from the existing dwelling and Stitchcombe Mill is managed with a private system comprising a large septic tank with a pumped outlet directing grey water into an adjacent pasture field where it drains into a drainage field to the southeast, on the opposite site of the River Kennet to the proposed dwelling.

5.8.2 The existing septic tank is located to the southeast of the proposed dwelling, located opposite Stitchcombe Mill and north of the unnamed road. The ground level above the septic tank is approximately 118.68mAOD, as defined by the topographic survey and approximately 320mm below the lowest proposed Finished Floor Level of 119.00mAOD (see Section 5.11).

5.8.3 In the unlikely event that the existing septic tank was to fail or become blocked, the proposed dwelling is not considered to be at risk of flooding given its elevated position. To date, the system has not had any functioning issues and has no history of flooding. The indicative alignment of this system is included in Appendix C.

5.8.4 As the septic tank serves both Stitchcombe Mill and Bridge Cottage, there are presumed to be no other foul sewers located within the vicinity of the site.

5.8.5 This risk of sewer flooding to the site is considered to be **Very Low**.

5.9 Flooding from Artificial Sources

5.9.1 Mapping data from the Environment Agency shows that the site is not at risk from a catastrophic reservoir breach. The mill pond and associated infrastructure is represented in the Marlborough to Newbury Model and is therefore considered in Section 5.4. There are no other artificial sources, such as canals, identified which may pose a risk to the site.

5.9.2 The development is therefore considered to be at **Negligible** risk of flooding from reservoirs, canals and other artificial sources of flooding.

5.10 Safe Access and Egress

5.10.1 Site access is from the unnamed road at the southern site boundary (See Figure 3-2). The road at the site's southern boundary is shown by the Flood Map for Planning to fall within Flood Zone 3, becoming Flood Zone 1 approximately 35m south of the access into the site.

5.10.2 During a flood event access and egress may be impaired by flooding on the local road network. It is recommended that a Flood Emergency Management Plan is put in place with a stay-put policy during extreme flood events. The replacement dwelling will be safe from flooding and will provide safe refuge. This represents a significant improvement over the existing situation.

5.11 Flood Risk Mitigation Measures

5.11.1 As discussed in Section 5.3, the site is in Flood Zone 2 and 3. It will therefore be necessary to ensure that the proposed replacement dwelling is safe from flooding from the River Kennet.

Finished Floor Levels

5.11.2 In accordance with cost recovery advice from the Environment Agency (EA) received in May 2021 (see Appendix D), Finished Floor Levels (FFLs) should be set a minimum of 300mm above the design event flood level of 118.57mAOD at node rk13.152d.

5.11.3 The proposed FFL of the replacement dwelling will be 119.14mAOD and the FFL of the terrace will be 119.00mAOD, providing additional freeboard above the EA guidance.

5.11.4 Both the dwelling and the terrace will be situated comfortably above the 1 in 100 year +70% and 1 in 1,000 year modelled flood levels which are recorded as 118.65mAOD and 118.66mAOD, respectively, at node rk13.152d. As a result, the proposals will be resilient to extreme flooding and a number of potential climate change scenarios.

5.11.5 FFLs of the existing building are approximately 118.72mAOD assuming a 100mm upstand from ground levels outside the front door. Therefore, the proposals will deliver a significant reduction in flood risk to both people and property.

Level for Level Floodplain Compensation

5.11.6 The EA advised that "*any increase in built footprint or land raising is compensated for on a level for level basis up to the 1 in 100 plus 35% level*" (see Appendix E).

5.11.7 As discussed in Section 5.5, peak river flow climate change guidance was updated in July 2021. Therefore, using a precautionary approach, the floodplain compensation calculations for the site utilise the 1 in 100 year +25% event flood level of 118.57mAOD.

5.11.8 The existing dwelling to be demolished has a footprint of approximately 70m^2.

5.11.9 The proposed replacement dwelling and terrace, approximately 163m^2 in area, have been designed to minimise the extent and volume of construction within the floodplain. The supporting walls comprise 0.215m wide concrete blocks. Of the 163m^2 proposed building and terrace outline, approximately 18m^2 will consist of these supporting walls.

5.11.10 As summarised in Table 5-4, the proposed supporting walls will result in the loss of approximately 1.12m^3 of floodplain storage between 118.2mAOD and 118.5mAOD and a gain of floodplain storage of approximately 0.72m^3 between 118.5mAOD and 118.57mAOD.

5.11.11 To compensate for the loss of floodplain storage between 118.2mAOD and 118.5mAOD, it is proposed to lower an area of approximately 15m^2 situated away from the building footprint and between 118.2mAOD and 118.5mAOD by 100mm.

5.11.12 This area of proposed lowering has been modelled using Autodesk Civil 3D software. The ground level changes meet the requirement for level-for-level

storage and will provide a total of approximately 1.52m³ of additional floodplain storage between 118.2mAOD and 118.5mAOD (Table 5-4)and a net gain of 0.40m³.

5.11.13 The net gain of 0.40m³ of floodplain storage between 118.2mAOD and 118.5mAOD provided by the proposed 100mm lowering and the storage gain of 0.72m³ between 118.5mAOD and 118.57mAOD provided by the reduced proposed building occupation here will result in a total net gain of 1.12m³ of floodplain storage below the 1 in 100 year +25% flood level.

5.11.14 Appendix E highlights the level for level floodplain compensation proposed at the site.

Table 5-4 Level for Level Floodplain Compensation Summary

		Floodplain Storage Volume (m³)			
Lower Band (mAOD)	**Upper Band (mAOD)**	**Occupied by Existing Dwelling**	**Occupied by Proposed Dwelling**	**Provided by Proposed 100mm Lowering**	**Proposed Net Gain**
118.20	118.30	0.00	0.09	0.25	0.17
118.30	118.40	0.00	0.42	0.46	0.05
118.40	118.50	0.01	0.64	0.80	0.18
118.50	118.57	1.51	0.79	0.00	0.72

Access for Maintenance

5.11.15 Further mitigation in accordance with EA advice includes ensuring that "*the new built development does not encroach with 8 metres of the main river watercourse*". This 8m easement is shown in the site proposal plans included in Appendix B.

6 PROPOSED DRAINAGE STRATEGY

6.1 Foul Water Management

6.1.1 Foul drainage from the existing dwelling and Stitchcombe Mill (located south of unnamed road alongside Bridge Cottage) are currently managed together by a large, shared septic tank with a pumped outlet directing grey water into an adjacent pasture field where it drains into a drainage field. Appendix C shows the indicative alignment of this foul drainage system.

6.1.2 The septic tank has its own electricity supply and meter, is emptied of solids twice a year and to date, has not had any functioning issues. It is proposed to utilise the existing septic tank and associated foul water drainage system for the proposed replacement dwelling.

6.1.3 In accordance with the 'General Binding Rules for Small Sewage Discharge[1] use of the existing system is acceptable provided the volume of discharge does not exceed $2m^3$ a day. Using the gov.uk 'Daily discharge calculator for residential dwellings;' this equates to a maximum of ten bedrooms across two dwellings.

6.1.4 Both Stitchcombe Mill and the proposed replacement dwelling have four bedrooms, totalling eight bedrooms across two dwellings discharging to the existing system. This is compliant with guidance.

6.2 Surface Water Management

6.2.1 Across the site, a total of $240m^2$ of impermeable hardstanding is proposed (see Figure 6-1). The existing dwelling measures approximately $70m^2$. This increase in impermeable surfacing has, without mitigation, the potential to increase runoff generated from the site. Therefore, it will be necessary to mitigate the potential impact by implementing a sustainable drainage strategy which follows the Sustainable Drainage Systems (SuDS) hierarchy.

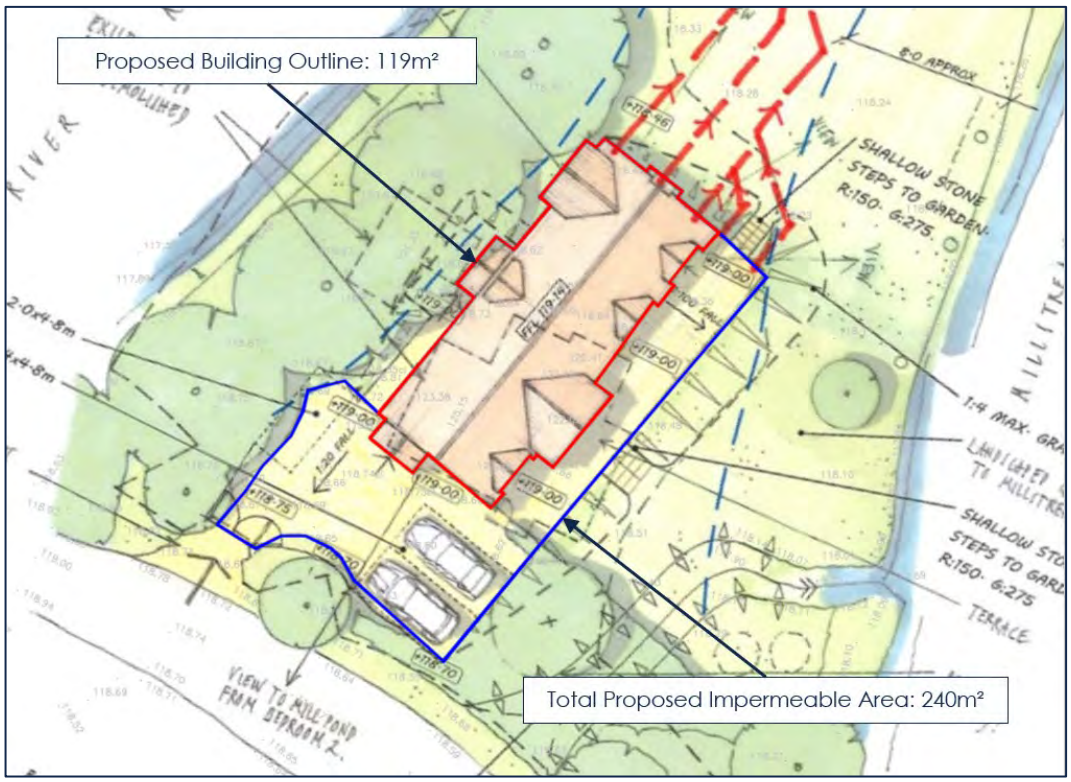
6.2.2 The SuDS hierarchy requires that surface water runoff should be managed as high up the following list as practically possible:

- Into the ground (infiltration), or then;
- To a surface water body, or then;
- To a surface water sewer, highway drain or another drainage system, or then;
- To a combined sewer.

[1] https://www.gov.uk/guidance/general-binding-rules-small-sewage-discharge-to-the-ground#existing-and-new

6.2.3 In order to determine the most suitable method of surface water management, the options have been assessed below, with the highest option in the SuDS hierarchy used.

Figure 6-1 Impermeable Areas Plan



Infiltration

6.2.4 BGS data shows that the site is entirely underlain by permeable chalk geology. However, given the proximity of the site to the River Kennet, the clayey soils and the likelihood of naturally high ground water extending across the site, infiltration is not considered to be viable for the site.

Surface Water Body

6.2.5 The next option in the SuDS hierarchy is to discharge surface water runoff into a nearby surface water body at greenfield runoff rates.

6.2.6 It is therefore proposed to discharge surface water from the proposed development to the Mill Stream of the River Kennet system.

6.3 Climate Change

6.3.1 The proposed drainage strategy has been designed to accommodate surface water flows without flooding up to, and including, the 1 in 100 year storm event plus climate change. The residential development's lifetime is expected to be 100 years

and consequently national guidance requires a 40% increase in rainfall intensity as shown in Table 6-1.

Table 6-1 Rainfall Intensity Allowances

Allowance Category	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	40%	40%
Central	20%	25%

6.4 SuDS Selection Process

6.4.1 There are various methods of SuDS and their relative merits have been considered in the context of the site proposals. Table 6-2 summarises the assessment of the suitability of different SuDS techniques for the site. Guidance from 'The SuDS manual' C753 has been used to form the basis of this assessment.

6.4.2 It is concluded that a swale and attenuation basin are the most appropriate approach to managing surface water runoff at the site.

Table 6-2 Assessment of SuDS Suitability

SuDS Technique	Potentially suitable?	Justification
Rainwater Harvesting	No	Unsuitable as a primary storage method due to the proposed building type but water saving measures such as water butts should still be proposed.
Green Roofs	No	Unsuitable for proposed building type.
Infiltration Systems (Soakaways, etc.)	No	Potentially high ground water levels conclude that the site is unsuitable for infiltration.
Filter drains	Yes	Whist not infiltration devices, these could be considered to provide conveyance.
Swales	Yes	Viable method of conveyance and/or storage.
Bioretention Systems	Yes	The proposed swale and basin arrangement could be planted with suitable species.

SuDS Technique	Potentially suitable?	Justification
Tree pits	No	Not required as sufficient storage can be provided via basin and swale.
Underground storage	Yes	Should be avoided and only proposed if multi-benefit SuDS are deemed unsuitable.
Detention basins & ponds	Yes	Primary SuDS features for attenuation, as well as providing water quality, amenity, and ecology benefits.
Wetlands	No	Disproportionate to the size and scale of the development.
Permeable Paving	No	Not required as sufficient storage can be provided via basin and swale. Could be used in car parking areas.

6.5 Runoff Rates

6.5.1 Typically, runoff rates from a proposed development to a nearby surface water body would match greenfield runoff rates for the site.

6.5.2 Existing greenfield runoff rates have been calculated using ReFH2 (Appendix F). This method uses the FEH point descriptors and specially derived plot-scale equations to determine greenfield runoff rates. It is considered to be the most up-to-date and accurate method available for calculating greenfield runoff rates.

6.5.3 ReFH2 does not calculate a QBAR runoff rate, which has a nominal return period of 1 in 2.3 years. The QBAR rate has been derived by dividing the 1 in 2 year rate by the growth factor of 0.88 contained in Table 24.2 of the CIRIA SuDS Manual.

6.5.4 Given the small area of the proposed development, it would not be possible to restrict to the greenfield QBAR rate which has been calculated as 0.02l/s.

6.5.5 It is therefore proposed that runoff from the development be released at a maximum rate of 2.7/s for all storm events up to and including the 1 in 100 year storm return period, plus 40% climate change. This is considered to be the lowest feasible discharge rate, as described in Section 6.7 below.

6.5.6 The ReFH2 outputs for the 1 in 2 year event are included in Appendix F.

6.6 Proposed Land Use

6.6.1 The proposed development will comprise a replacement dwelling, terrace and parking area totalling approximately 240m^2 of hardstanding (see Figure 6-1). The proposed drainage strategy has been designed to manage surface water from the entire 240m^2 area. Given the existing site is likely to discharge unattenuated, such arrangement represents a significant betterment when compared to the existing situation.

6.6.2 Site proposal drawings are included in Appendix B.

6.7 Proposed Surface Water Drainage

Storage

6.7.1 Given the constraints on site, notably its shallow gradient and the water level of the Mill Stream, it is proposed to construct a shallow attenuation basin to the north of the proposed replacement dwelling. Surface water from across the site will be routed to the storage features via conveyance pipes and a filter drain located around the replacement dwelling and terrace.

6.7.2 To ensure it can be drained by gravity, the attenuation basin has been designed with a maximum storage depth of 300mm. It has been designed with 1 in 3 side slopes.

6.7.3 There is insufficient depth and therefore head of water available for a flow control device such as a hydrobrake to operate. Therefore, the discharge from the basin will be controlled by a filter drain with perforated pipe, which would act as the flow restriction. The pipe would be protected from debris by the filter drain gravel surround. However, to minimise the risk of blockages, the proposed pipe would have a diameter of 50mm, which is the narrowest aperture recommended by relevant guidance.

6.7.4 Based on the above design factors, industry standard Microdrainage software calculates that approximately 9.4m^3 of storage is required to manage surface water from the proposed hardstanding (see Figure 6-1) during the 1 in 100 year +40% event. Microdrainage Source Control calculations for the site are included in Appendix F.

6.7.5 The proposed basin will be small, with a surface area of approximately 45m^2. In addition, the ground levels around the basin fall to the River Kennet and Mill Stream, away from the proposed replacement dwelling. Therefore, in an exceedance event, water would flow to the river. Consequently, it is not proposed to provide any freeboard above the design water level of the basin. This is in line with guidance included in The SuDS Manual (CIRIA C753 - paragraph 23.4.5) which states:

> *"A freeboard of 300 mm for the design event is usually sufficient for larger ponds" but that "for smaller ponds, there may be no need for freeboard, provided the risk to people and property is evaluated".*

6.7.6 The proposed drainage strategy drawing is included in Appendix G. All proposals are subject to detailed design.

Water Quality

6.7.7 The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices. To provide adequate treatment, the SuDS mitigation indices for the development must be equal to, or exceed, the pollution hazard indices.

6.7.8 Surface water runoff from residential roofs is considered to present a very low hazard to water quality and runoff from driveways presents a low hazard. Consequently, the attenuation basin provides adequate water quality treatment for these areas with silt traps and catch pits. Table 6-3 confirms that the attenuation basin provides adequate water quality treatment for the site.

Table 6-3 Water Quality Indices (as per C753 The SuDS Manual)

		Pollution Hazard Level	Total suspended solids	Metals	Hydro-carbons
Land Use	Residential roofs	Very low	0.2	0.2	0.05
	Individual Property Driveways; Low traffic roads.	Low	0.5	0.4	0.4
SuDS Component	Detention basin		0.5	0.6	0.6
Mitigation Indices ≥ Pollution Hazard Indices			**Yes**	**Yes**	**Yes**

Amenity and Biodiversity

6.7.9 It is recommended that the swale and basin are seeded with a mix of local provenance herbaceous species. The exact species should give due consideration to the existing ecology, priority habitats and ease of care or maintenance requirements.

6.8 Maintenance Regime

6.8.1 Maintenance of SuDS features are essential to ensure that the surface water drainage system operates effectively and that flooding of the site and surrounding areas is prevented. Responsibility for the SuDS features would likely lie with the site owner/operator.

6.8.2 An indicative maintenance schedule is included as Table 6-4. A full maintenance regime should be produced as part of the detailed design to ensure that the drainage system remains operational.

Table 6-4 Proposed Drainage System Maintenance Plan

Drainage Component	Required Action	Typical Frequency
Attenuation Basin and Swale	Remove litter and debris	Monthly
	Cut grass for spillways and access routes	Monthly (during growing season), or as required
	Cut grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework for physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants where used	Annually
	Replant, where necessary	As required
	Remove sediment from main basin	Every five years, or as required
	Repair erosion and any other structural damage to inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required
Pipework, manholes, flow control chambers, catch pits and silt traps	Stabilise adjacent areas	As required
	Remove weeds	As required
	Clear any poor performing structures.	As required
	Inspect all structures for poor operation	Every three months, 48 hours after large storms in first six months
	Monitor inspection chambers. Inspect silt accumulation rates and determine silt clearance frequencies	Annually

7 CONCLUSIONS

7.1.1 It is proposed to demolish the existing residential dwelling at Bridge Cottage, Stitchcombe and construct a replacement residential dwelling.

7.1.2 The site falls within Flood Zone 2 and 3, at risk of flooding from the River Kennet. The proposals constitute 'More Vulnerable' development and are appropriate in Flood Zone 2 and 3. Both the Exception Test and Sequential Test are normally required. These tests are not considered applicable in this instance for a replacement dwelling as explained in the Planning Supporting Statement and the significant decrease in flood risk satisfies the Exception Test.

7.1.3 The site is not considered to be at significant risk of flooding from surface water, groundwater, sewers or other artificial sources.

7.1.4 In accordance with pre-application advice provided by the Environment Agency (EA) finished floor levels should be set to a minimum of 118.87mAOD, 300mm above the 1 in 100 year +25% flood level. Proposed finished floor levels are 119.14mAOD significantly above this level and will be safe from extreme flood events in the future.

7.1.5 The proposed replacement dwelling has been designed with ground floor beam and block support using external and intermediate walls with gaps in excess of 1m in order to keep loss of floodplain storage to a minimum. The proposed replacement dwelling will result in the loss of approximately 1.12m^3 of floodplain storage between 118.2mAOD and 118.5mAOD. To compensate for this loss, it is proposed to lower an area of approximately 15m^2 situated between 118.2mAOD and 118.5mAOD by 100mm, providing a net gain of 0.40m^3 of floodplain storage and satisfying the requirement for level-for-level storage.

7.1.6 The proposed replacement dwelling will result in a total of approximately 240m^2 of impermeable hardstanding. It is proposed to manage surface water runoff from the development with a swale and attenuation basin which will discharge to the Mill Stream at a maximum rate of 2.7l/s, which is as close to existing greenfield rates as reasonably practicable. Surface water will be routed to the proposed basin with conveyance features to be confirmed during detailed design.

7.1.7 The proposed drainage system should effectively mitigate against potential pollutants in site runoff and suitably planted will improve local biodiversity.

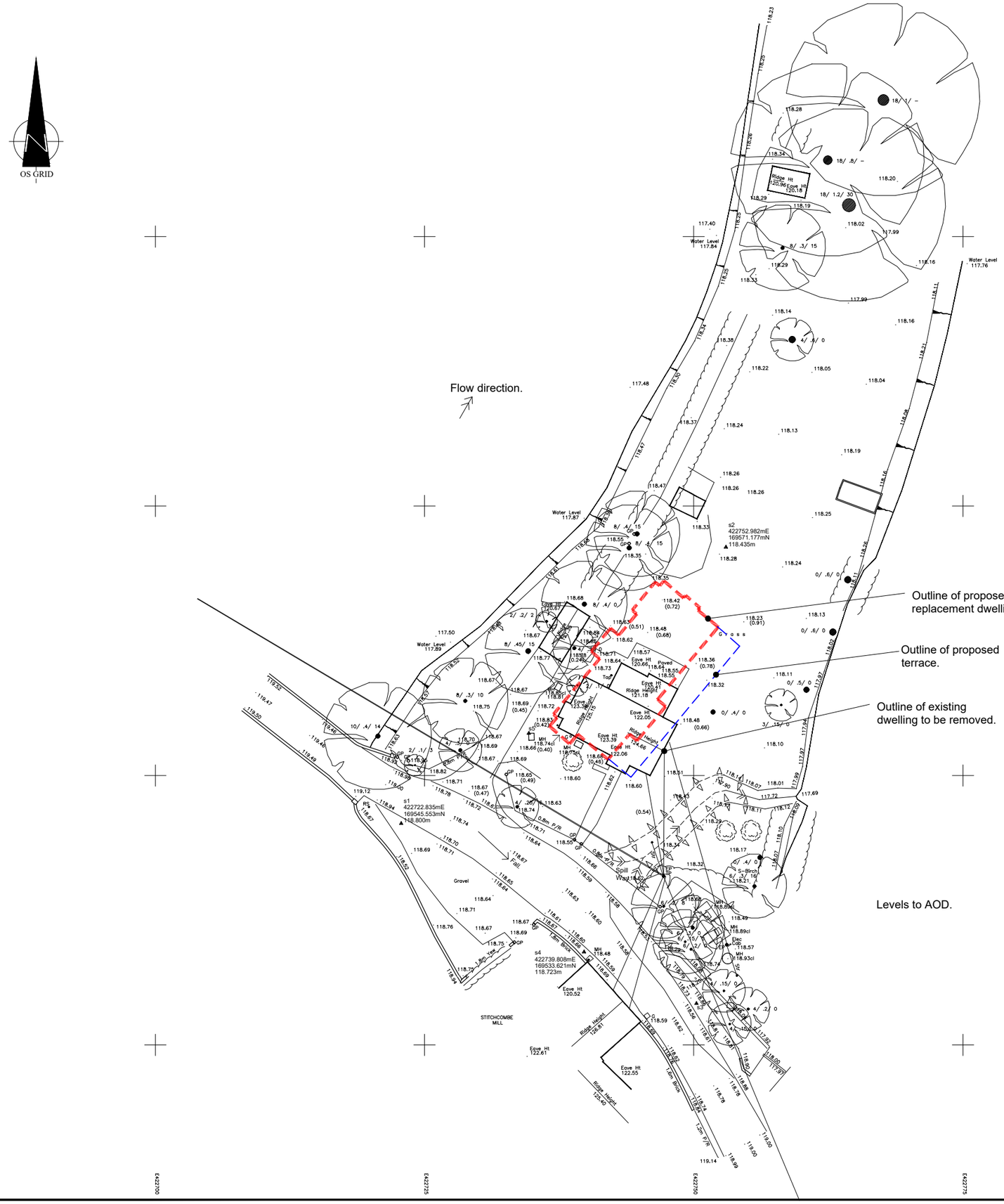
7.1.8 The proposals represent a significant reduction in flood risk when compared with the existing dwelling, will increase flood storage and reduce surface water runoff rates.

7.1.9 In conclusion, the proposed development from all forms of flooding and not increase flood risk elsewhere and therefore meets the requirements of NPPF with regards to flood risk and drainage.

APPENDICES

APPENDIX A

Topographic Survey



Rev B Updated by RRPL. 16.12.21
Rev A Updated by RRPL. 26.10.21

E422825

D&H Surveys Ltd
The Manor Stables, Great Somerford, Chippenham
Wiltshire, SN15 5EH.
Email: admin@dhsurveys.co.uk
Website: www.dhsurveys.co.uk
Tel (01249) 720545
Fax (01249) 721124

Topographic Surveys
Elevation Surveys
Floor Plan Surveys
Volumetric Surveys
As Built Drainage Surveys
Co-ordination Of Site Layouts
Rectified Photo Elevations
C.A.D Plotting Bureau

Project Name:
Bridge Cottage
Stitchcombe

Drawing Title:
Topographic Survey

Client:
Ramsbury estates Ltd

Agent:
RAW Planning Ltd

Date:	Scale:
Dec 2020	A1 @ 1:200

Drawn	Surveyor	Dwg No	Revision
KJH	GH	SU 01	Rev A

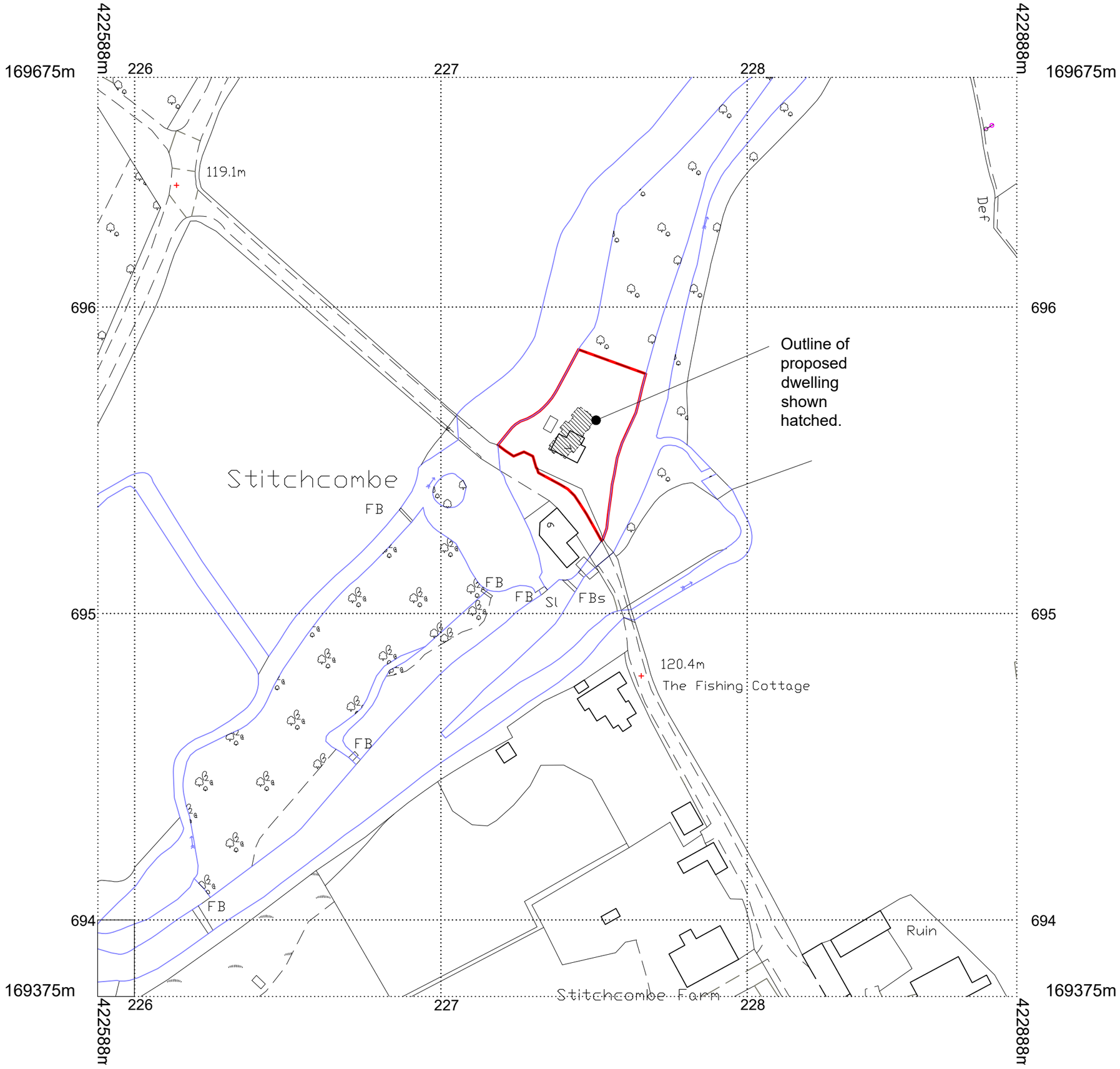
Site Datum	OSBM Ref
Ordnance Survey	OS15
Grid Orientation	**Sheet ID**
Ordnance Survey	RAMSBURY-Stitchcombe-Bridge

Disclaimer
D & H Surveys will Guarantee that this Survey Data & Station Coords are Correct to the Indicated Scale ONLY

Copyright of this Drawing Remains With D & H Surveys.

APPENDIX B

Site Proposals



NOTES:
This drawing is copyright of the Architects and must not be used without their permission.
All dimensions to be checked on site.
Discrepancies and omissions to be reported immediately to the Architect.

Relph Ross Partnership.
O.S. Licence Number 100000004.

N

0 10 20 30 40 50 60 70m

KEY 1
0.14 Hectares

Location Plan

1:625 @A1 - 1:1250 @ A3

Rev	Revision	Date
A	Outline of proposed dwelling added.	30.03.21

relphross partnership architects
The Relph Ross Partnership Ltd.
35a Brown Street, Salisbury,
Wiltshire, SP1 2AS
Email: enquiries@relphross.co.uk
Tel: 01722 410141 Fax: 01722 339846

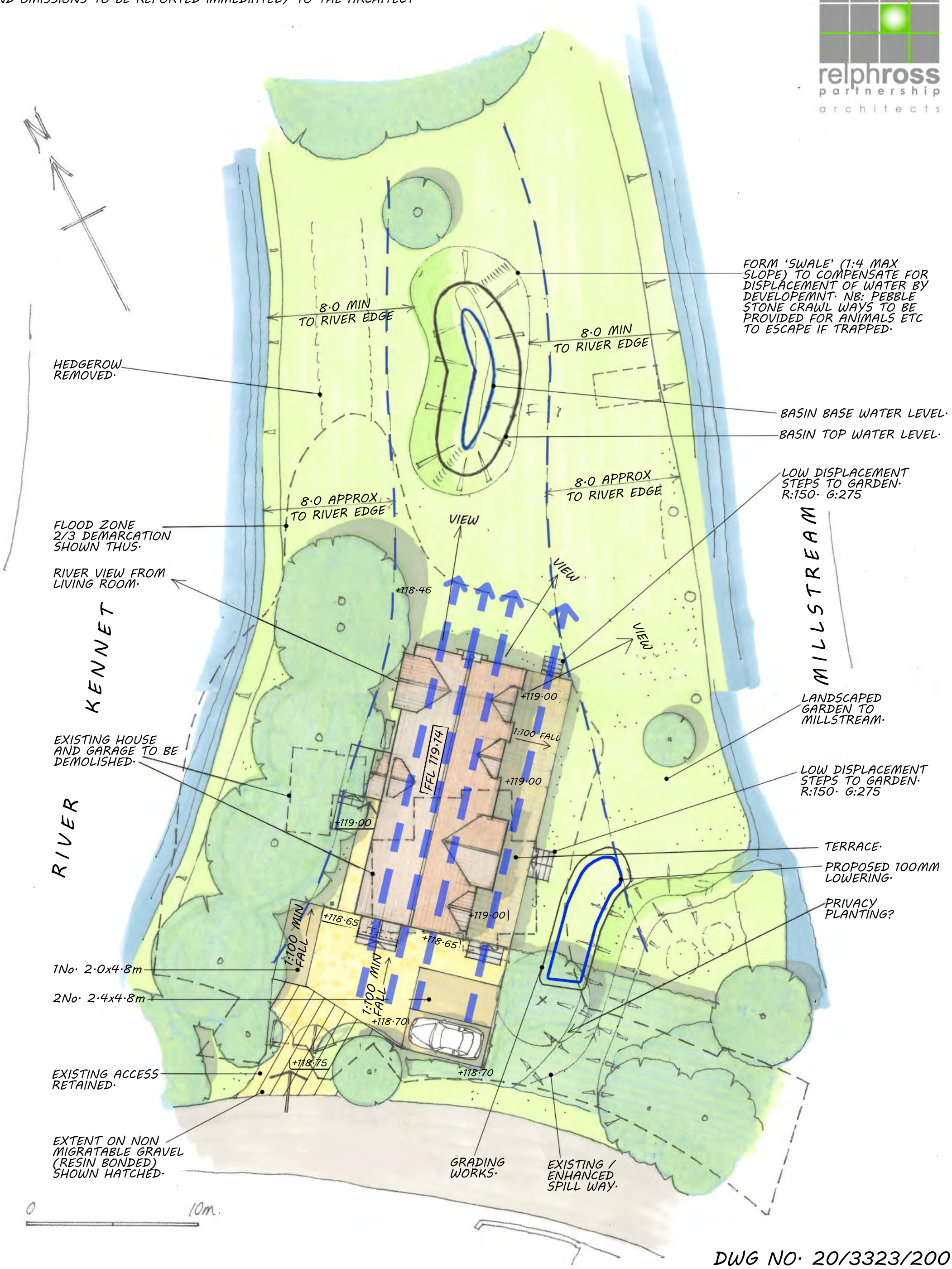
Title: Location Plan
Proposed Replacement Cottage
Project: Bridge Cottage, Stitchcombe
Marlborough SN8 2EU
Client:
Drawing Scale: 1:625 @A1 - 1:1250 @ A3
Drawing Date: December 2020
Drawn By: BM Checked By:

Drawing Number: 20/3323/LOC1 A

NOTES:

THIS DRAWING IS COPYRIGHT OF THE ARCHITECTS AND MUST NOT BE USED WITHOUT THEIR PERMISSION.
ALL DIMENSIONS TO BE CHECKED ON SITE. DISCREPANCIES AND OMISSIONS TO BE REPORTED IMMEDIATELY TO THE ARCHITECT.

relphross partnership architects

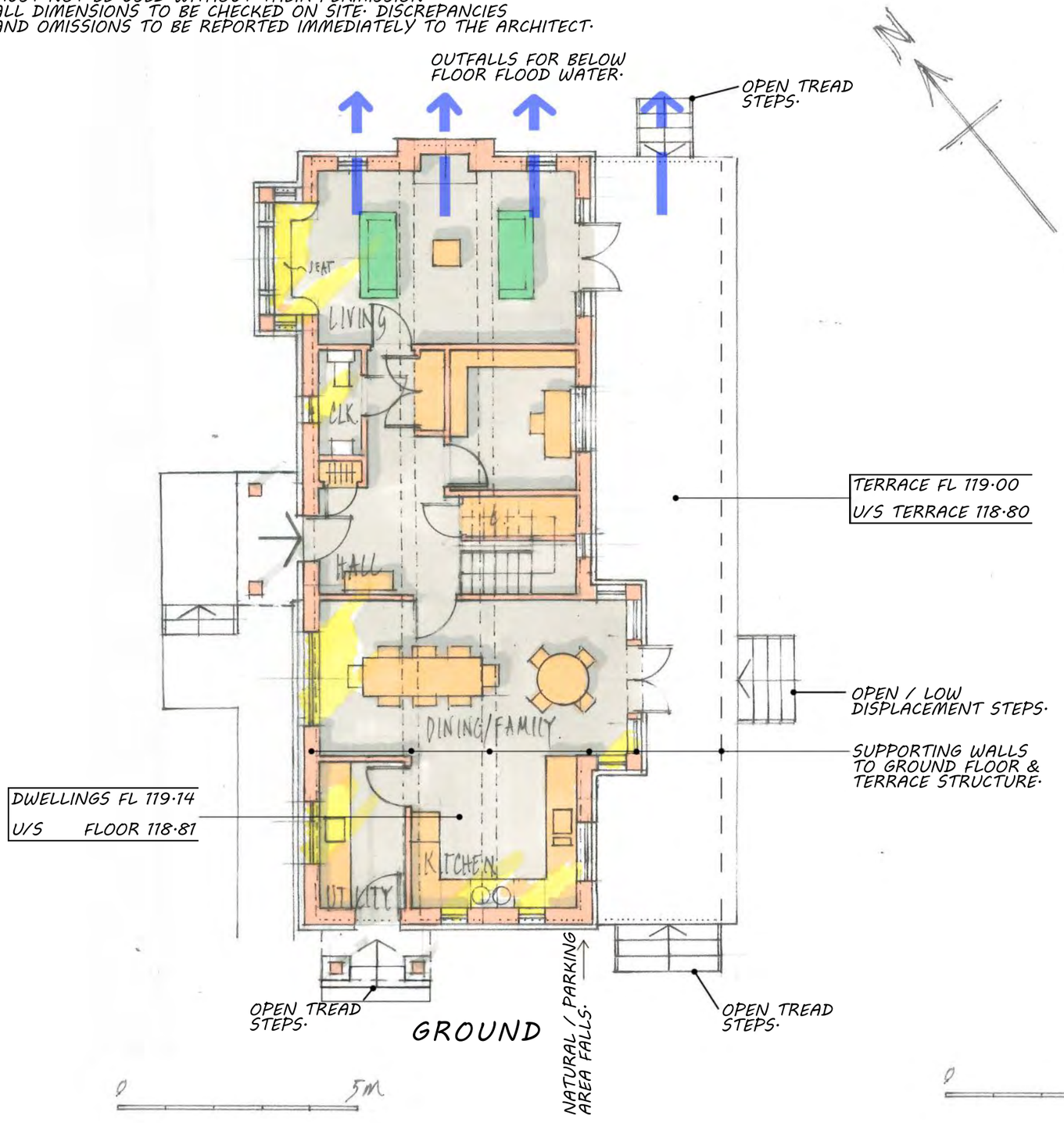


DWG NO. 20/3323/200

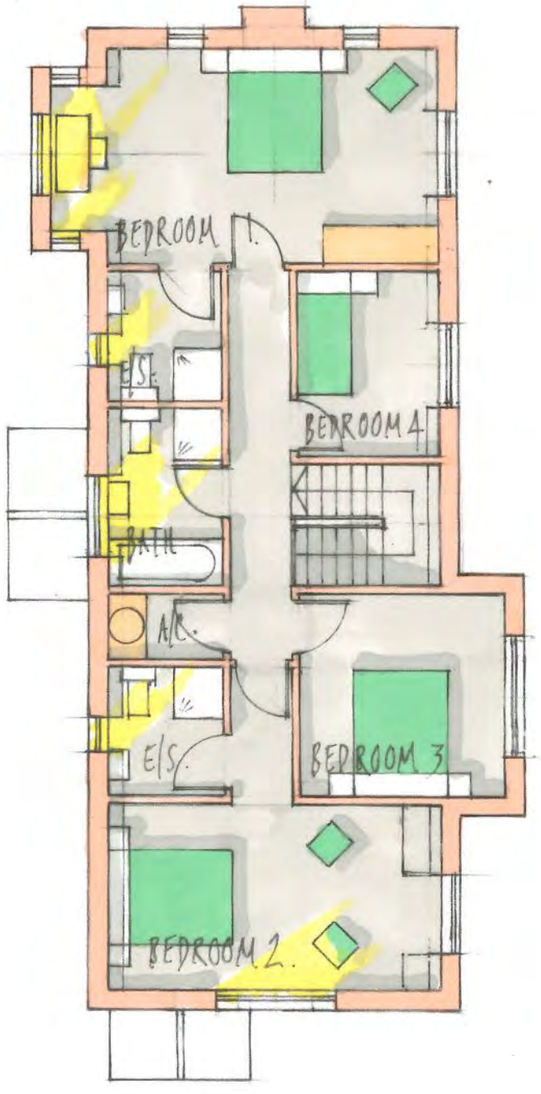
PROPOSED REPLACEMENT DWELLING AT 'BRIDGE COTTAGE', STICHCOMBE, SITE PLAN, SCALE 1:20 @ A3, © R.R.P.L. DECEMBER 2021

NOTES:

THIS DRAWING IS COPYRIGHT OF THE ARCHITECTS AND MUST NOT BE USED WITHOUT THEIR PERMISSION.
ALL DIMENSIONS TO BE CHECKED ON SITE. DISCREPANCIES AND OMISSIONS TO BE REPORTED IMMEDIATELY TO THE ARCHITECT.



GROUND



FIRST

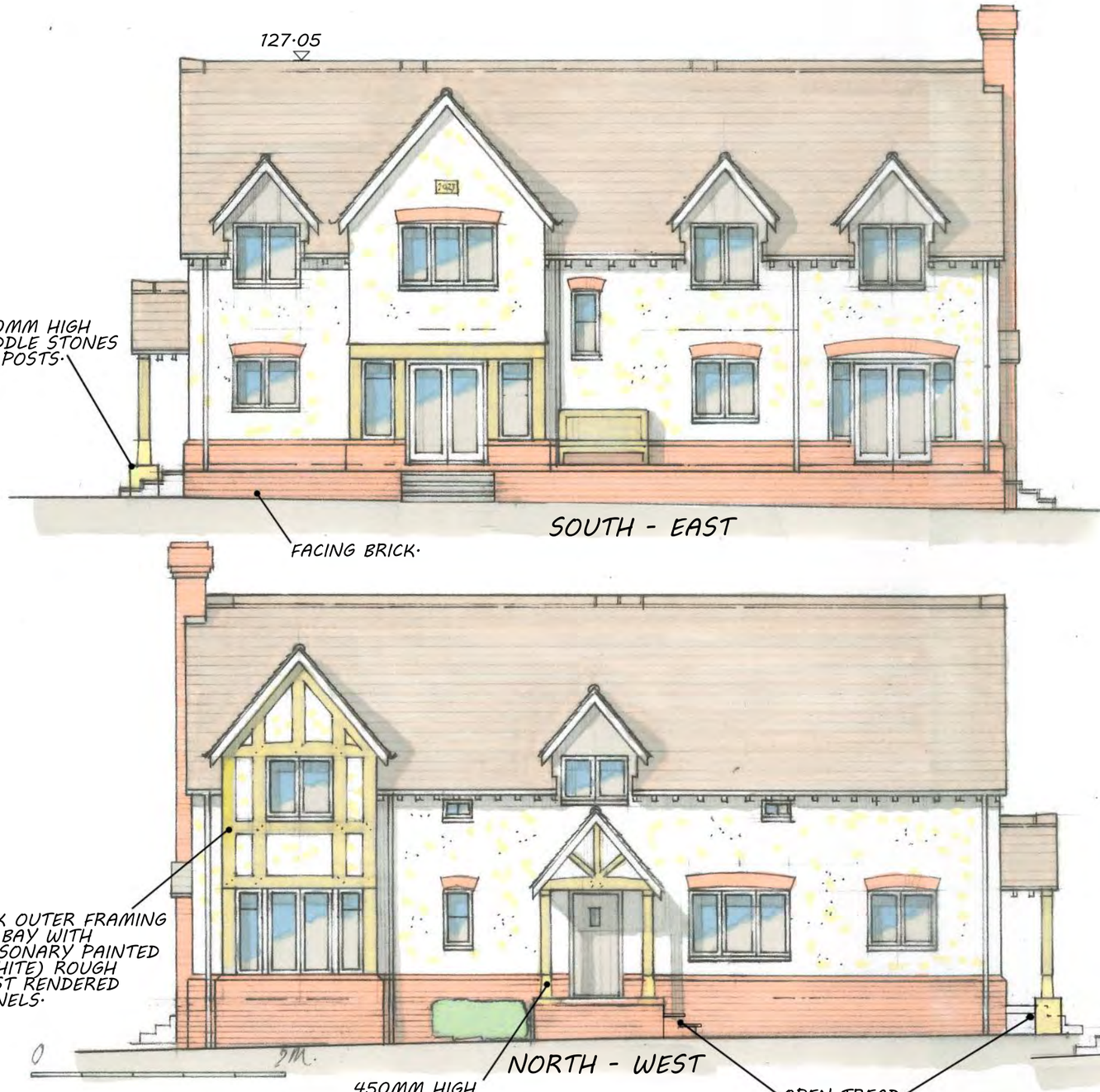
PROPOSED REPLACEMENT DWELLING AT 'BRIDGE COTTAGE', STICHCOMBE, FLOOR PLAN, SCALE 1:100 @ A3, © R.R.P.L. DECEMBER 2021

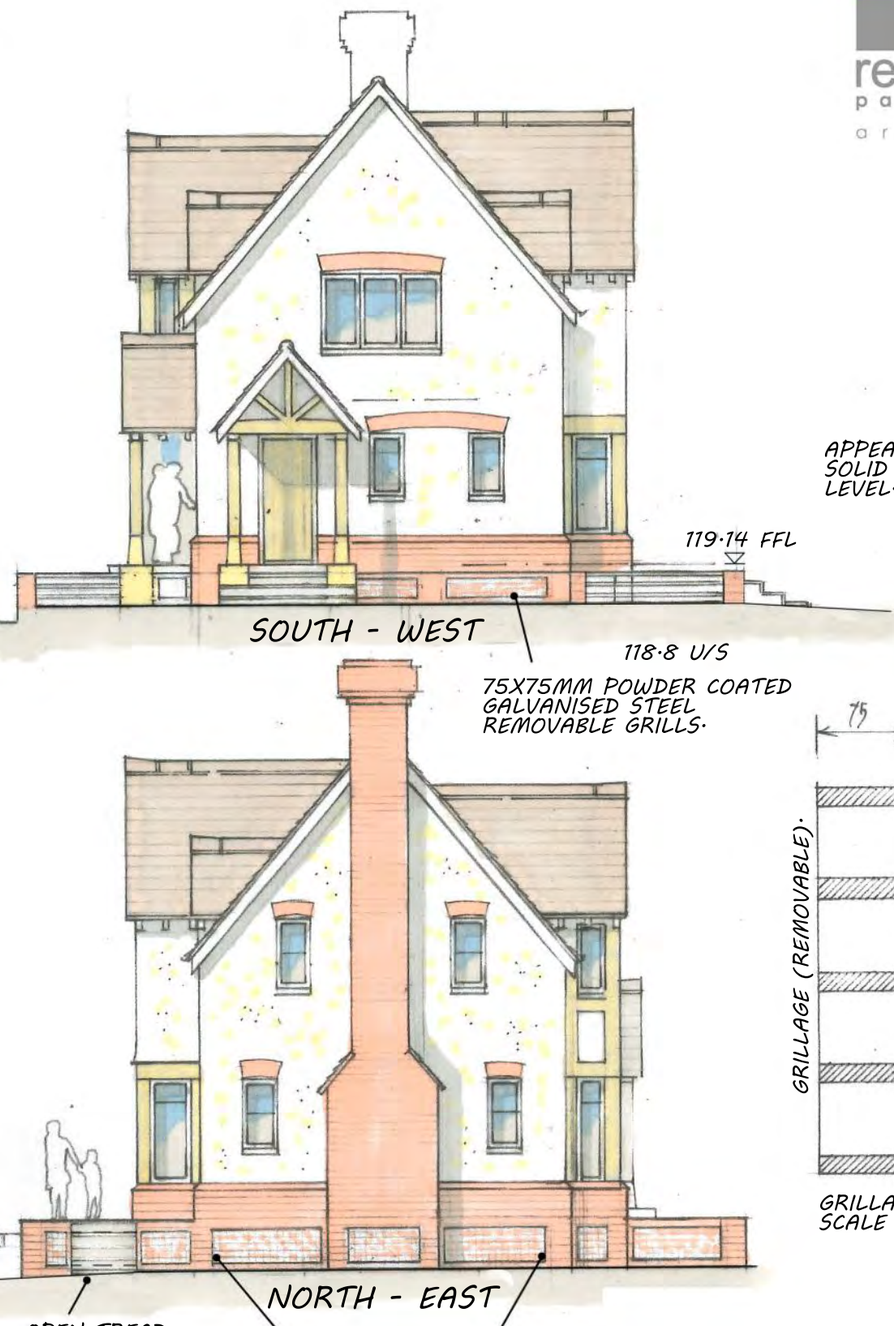
DWG NO. 20/3323/201

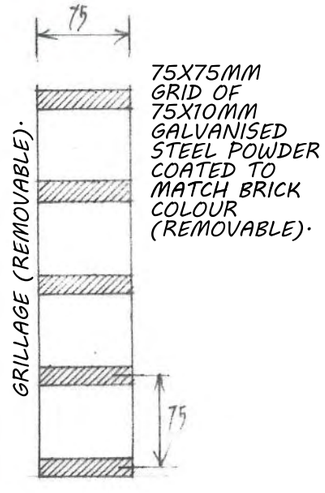
NOTES:

THIS DRAWING IS COPYRIGHT OF THE ARCHITECTS AND MUST NOT BE USED WITHOUT THEIR PERMISSION.
ALL DIMENSIONS TO BE CHECKED ON SITE. DISCREPANCIES AND OMISSIONS TO BE REPORTED IMMEDIATELY TO THE ARCHITECT.

relphross partnership architects







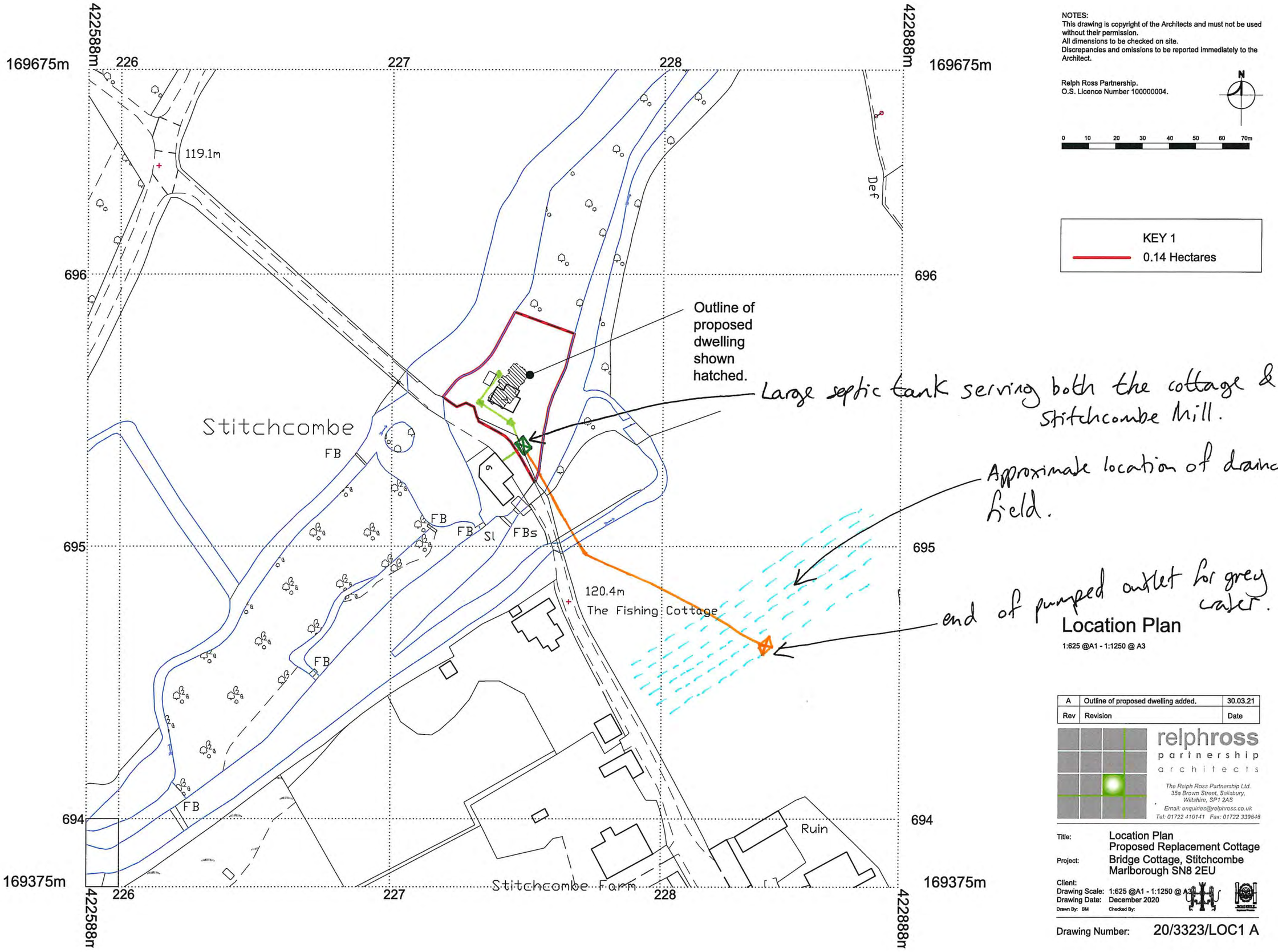
GRILLAGE DETAIL SCALE 1:5

PROPOSED REPLACEMENT DWELLING AT 'BRIDGE COTTAGE', STICHCOMBE, ELEVATIONS, SCALE 1:100 @ A3, © R.R.P.L. DECEMBER 2021

DWG NO. 20/3323/202

APPENDIX C

Indicative Alignment of Foul System



NOTES:
This drawing is copyright of the Architects and must not be used without their permission.
All dimensions to be checked on site.
Discrepancies and omissions to be reported immediately to the Architect.

Relph Ross Partnership.
O.S. Licence Number 100000004.

N

0 10 20 30 40 50 60 70m

KEY 1
0.14 Hectares

Location Plan

1:625 @A1 - 1:1250 @ A3

Rev	Revision	Date
A	Outline of proposed dwelling added.	30.03.21

relphross partnership architects
The Relph Ross Partnership Ltd.
35a Brown Street, Salisbury,
Wiltshire, SP1 2AS
Email: enquiries@relphross.co.uk
Tel: 01722 410141 Fax: 01722 339846

Title: Location Plan
Proposed Replacement Cottage
Project: Bridge Cottage, Stitchcombe
Marlborough SN8 2EU
Client:
Drawing Scale: 1:625 @A1 - 1:1250 @ A3
Drawing Date: December 2020
Drawn By: BM Checked By:

Drawing Number: 20/3323/LOC1 A

APPENDIX D

Environment Agency Cost Recovery Advice – May 2021

creating a better place

Environment Agency

Mr Alex Bearne
Calibro
81 Whiteladies Road
Bristol
BS8 2NT

Our ref: ENVPAC/1/THM/00546
WA/2021/129041/01-L01

Date: 10 May 2021

Dear Mr Bearne

Replacement Dwelling

Bridge House, Stitchcombe, Wiltshire

Thank you for consulting us. We have reviewed the following documents:

- Email from Alex Bearne (Calibro Consultants), dated 21 April 2021
- Drawing – Proposed Site Plan

You have correctly identified in your email that the existing dwelling appears to be located in Flood Zone 2. However, the wider red line boundary includes Flood Zone 3.

Therefore, we would expect a detailed Flood Risk Assessment (FRA) to be submitted which clearly demonstrated that this development will not increase flood risk. For us to find the proposed development acceptable it will need to be demonstrated that:

1. Finished Floor Levels (FFLs) are set above the 1 in 100 plus 35% flood level
2. That any increase in built footprint or land raising is compensated for on a level for level basis up to the 1 in 100 plus 35% level
3. That the new built development does not encroach with 8 metres of the main river watercourse

We are pleased that your email commits to FFLs being set 300mm above the 1 in 100 plus 35% flood level.

You have stated that you will mitigate for any increase in built footprint by putting voids under the new dwelling. We have no objection to this approach for replacement dwellings. Voiding the new building will not only provide greater flood resilience for the new property but it also presents an opportunity to actually increase flood storage in comparison to the existing situation. We are pleased there is a commitment to set the soffit level of the voids at or above the 1 in 100 plus 35% flood level. Voids openings must be 1 metre wide and set every 5 metres.

Cont/d..

The FRA will need to confirm that the new development does not encroach within the 8 metres buzzer zone to the main river watercourse. The 8 metres should be measured from top of bank.

If the above is all confirmed as part of an FRA then it's unlikely we will have any objection to a planning proposal for the above.

Please note that it's likely that the climate change levels are being updated this summer. The initial information we have seen indicates that the climate change level for the 'Upper Central' scenario (i.e. design level) for the Kennet River catchment is staying at 35%.

The Sequential Test and access/egress is now the responsibility of the Local Planning Authority (LPA). Surface water and groundwater flood risk is the responsibility of the Lead local Flood Authority (LLFA).

Yours sincerely,

Mr Jack Moeran
Planning Specialist

Direct dial 02030259655
Direct e-mail planning-wallingford@environment-agency.gov.uk

Disclaimer
Please note that the views expressed in this report by the Environment Agency, is a response to a pre-application enquiry only and **does not represent our final view in relation to any future statutory consultations made in relation to this site**. We reserve the right to change our position in relation to any such application. You should seek your own expert advice in relation to technical matters relevant to any conditions before submission.

End

APPENDIX E

Level for Level Floodplain Compensation

north

3.29m² proposed between 118.3mAOD and 118.4mAOD

2.20m² proposed between 118.4mAOD and 118.5mAOD

4.08m² proposed between 118.5mAOD and 118.6mAOD

0.86m² proposed between 118.2mAOD and 118.3mAOD

Volume Loss for Proposed Supporting Walls

100mm Band (mAOD)	Area in Band (m^2)	Cumulative Area in Band (m^2)	Proposed Walls - Volume in Band (m^3)
118.2 - 118.3	0.86	0.86	0.09
118.3 - 118.4	3.29	4.15	0.42
118.4 - 118.5	2.20	6.35	0.64
118.5 - 118.57	4.08	10.43	0.79

118.2mAOD

118.3mAOD

118.4mAOD

118.5mAOD

118.6mAOD

19.72m² of existing building between 118.5mAOD and 118.6mAOD

2.52m² lowered between 118.2mAOD and 118.3mAOD providing 0.25m³ of storage

4.62m² lowered between 118.3mAOD and 118.4mAOD providing 0.46m³ of storage

8.04m² lowered between 118.4mAOD and 118.5mAOD providing 0.80m³ of storage

1:100 MIN FALL

0 2m 4m 10m

Metres 1:100

LEGEND

EXISTING BUILDING OUTLINE

PROPOSED BUILDING OUTLINE

100mm INTERVAL CONTOURS

PROPOSED WALLS 100mm BANDS

118.2-118.3mAOD

118.3-118.4mAOD

118.4-118.5mAOD

118.5-118.6mAOD

PROPOSED LOWERING 100mm BANDS

118.2-118.3mAOD

118.3-118.4mAOD

118.4-118.5mAOD

REV:	DESCRIPTION:	BY:	DATE:
-	FIRST ISSUE	LG	27/01/22

STATUS: FOR INFORMATION

CLIENT: RAMSBURY SARL

SITE: BRIDGE COTTAGE STITCHCOMBE

TITLE: LEVEL FOR LEVEL FLOODPLAIN COMPENSATION

calibro

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:100	27/01/2022	LG	AB
PROJECT NO:	DRAWING NO:		REVISION:
21-256	60-101		-

Rev - | Copyright © 2021 Calibro Consultants Ltd

81 Whiteladies Road | Bristol | BS8 2NT T 0117 244 1970
E hello@calibro-consultants.com www.calibro-consultants.com

APPENDIX F

Greenfield Runoff and Microdrainage Calculations

UK Design Flood Estimation

Generated on Thursday, January 20, 2022 2:44:01 PM by Alex
Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: D07C-FBD6

Site name: FEH_Point_Descriptors_422742_169555

Easting: 422742

Northing: 169555

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH 2013 model (mm):	20.84	Total runoff (ML):	0.00
Total Rainfall (mm):	13.98	Total flow (ML):	0.00
Peak Rainfall (mm):	2.73	Peak flow (m³/s):	0.00

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:15:00	No
Timestep (hh:mm:ss)	00:15:00	No
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	1	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	57.8	No
Cmax (mm)	998.03	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1.95 [1]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	55.95 [31.32]	Yes
BR	3.31	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.2488	0.0000	0.0144	0.0000	6.34E-07	6.34E-07
00:15:00	0.3853	0.0000	0.0225	0.0000	6.31E-07	6.52E-07
00:30:00	0.5946	0.0000	0.0350	0.0000	6.29E-07	7.23E-07
00:45:00	0.9134	0.0000	0.0544	0.0000	6.29E-07	8.78E-07
01:00:00	1.3929	0.0000	0.0846	0.0000	6.32E-07	1.16E-06
01:15:00	2.0934	0.0000	0.1308	0.0000	6.4E-07	1.66E-06
01:30:00	2.7264	0.0000	0.1770	0.0000	6.58E-07	2.46E-06
01:45:00	2.0934	0.0000	0.1409	0.0000	6.91E-07	3.73E-06
02:00:00	1.3929	0.0000	0.0962	0.0000	7.45E-07	5.46E-06
02:15:00	0.9134	0.0000	0.0641	0.0000	8.26E-07	7.52E-06
02:30:00	0.5946	0.0000	0.0422	0.0000	9.36E-07	9.74E-06
02:45:00	0.3853	0.0000	0.0275	0.0000	1.08E-06	1.2E-05
03:00:00	0.2488	0.0000	0.0179	0.0000	1.25E-06	1.42E-05
03:15:00	0.0000	0.0000	0.0000	0.0000	1.45E-06	1.61E-05
03:30:00	0.0000	0.0000	0.0000	0.0000	1.66E-06	1.75E-05
03:45:00	0.0000	0.0000	0.0000	0.0000	1.89E-06	1.82E-05
04:00:00	0.0000	0.0000	0.0000	0.0000	2.13E-06	1.83E-05
04:15:00	0.0000	0.0000	0.0000	0.0000	2.35E-06	1.78E-05
04:30:00	0.0000	0.0000	0.0000	0.0000	2.56E-06	1.7E-05
04:45:00	0.0000	0.0000	0.0000	0.0000	2.75E-06	1.6E-05
05:00:00	0.0000	0.0000	0.0000	0.0000	2.92E-06	1.49E-05
05:15:00	0.0000	0.0000	0.0000	0.0000	3.08E-06	1.37E-05
05:30:00	0.0000	0.0000	0.0000	0.0000	3.21E-06	1.27E-05
05:45:00	0.0000	0.0000	0.0000	0.0000	3.33E-06	1.17E-05
06:00:00	0.0000	0.0000	0.0000	0.0000	3.43E-06	1.09E-05
06:15:00	0.0000	0.0000	0.0000	0.0000	3.52E-06	1.02E-05
06:30:00	0.0000	0.0000	0.0000	0.0000	3.6E-06	9.5E-06
06:45:00	0.0000	0.0000	0.0000	0.0000	3.66E-06	8.85E-06
07:00:00	0.0000	0.0000	0.0000	0.0000	3.72E-06	8.21E-06
07:15:00	0.0000	0.0000	0.0000	0.0000	3.76E-06	7.58E-06
07:30:00	0.0000	0.0000	0.0000	0.0000	3.8E-06	6.96E-06
07:45:00	0.0000	0.0000	0.0000	0.0000	3.82E-06	6.35E-06
08:00:00	0.0000	0.0000	0.0000	0.0000	3.84E-06	5.77E-06
08:15:00	0.0000	0.0000	0.0000	0.0000	3.85E-06	5.23E-06
08:30:00	0.0000	0.0000	0.0000	0.0000	3.85E-06	4.76E-06

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
08:45:00	0.0000	0.0000	0.0000	0.0000	3.84E-06	4.4E-06
09:00:00	0.0000	0.0000	0.0000	0.0000	3.83E-06	4.15E-06
09:15:00	0.0000	0.0000	0.0000	0.0000	3.82E-06	3.98E-06
09:30:00	0.0000	0.0000	0.0000	0.0000	3.8E-06	3.88E-06
09:45:00	0.0000	0.0000	0.0000	0.0000	3.78E-06	3.81E-06
10:00:00	0.0000	0.0000	0.0000	0.0000	3.77E-06	3.77E-06
10:15:00	0.0000	0.0000	0.0000	0.0000	3.75E-06	3.75E-06
10:30:00	0.0000	0.0000	0.0000	0.0000	3.73E-06	3.73E-06
10:45:00	0.0000	0.0000	0.0000	0.0000	3.72E-06	3.72E-06
11:00:00	0.0000	0.0000	0.0000	0.0000	3.7E-06	3.7E-06
11:15:00	0.0000	0.0000	0.0000	0.0000	3.68E-06	3.68E-06
11:30:00	0.0000	0.0000	0.0000	0.0000	3.67E-06	3.67E-06
11:45:00	0.0000	0.0000	0.0000	0.0000	3.65E-06	3.65E-06
12:00:00	0.0000	0.0000	0.0000	0.0000	3.64E-06	3.64E-06
12:15:00	0.0000	0.0000	0.0000	0.0000	3.62E-06	3.62E-06
12:30:00	0.0000	0.0000	0.0000	0.0000	3.6E-06	3.6E-06
12:45:00	0.0000	0.0000	0.0000	0.0000	3.59E-06	3.59E-06
13:00:00	0.0000	0.0000	0.0000	0.0000	3.57E-06	3.57E-06
13:15:00	0.0000	0.0000	0.0000	0.0000	3.56E-06	3.56E-06
13:30:00	0.0000	0.0000	0.0000	0.0000	3.54E-06	3.54E-06
13:45:00	0.0000	0.0000	0.0000	0.0000	3.52E-06	3.52E-06
14:00:00	0.0000	0.0000	0.0000	0.0000	3.51E-06	3.51E-06
14:15:00	0.0000	0.0000	0.0000	0.0000	3.49E-06	3.49E-06
14:30:00	0.0000	0.0000	0.0000	0.0000	3.48E-06	3.48E-06
14:45:00	0.0000	0.0000	0.0000	0.0000	3.46E-06	3.46E-06
15:00:00	0.0000	0.0000	0.0000	0.0000	3.45E-06	3.45E-06
15:15:00	0.0000	0.0000	0.0000	0.0000	3.43E-06	3.43E-06
15:30:00	0.0000	0.0000	0.0000	0.0000	3.41E-06	3.41E-06
15:45:00	0.0000	0.0000	0.0000	0.0000	3.4E-06	3.4E-06
16:00:00	0.0000	0.0000	0.0000	0.0000	3.38E-06	3.38E-06
16:15:00	0.0000	0.0000	0.0000	0.0000	3.37E-06	3.37E-06
16:30:00	0.0000	0.0000	0.0000	0.0000	3.35E-06	3.35E-06
16:45:00	0.0000	0.0000	0.0000	0.0000	3.34E-06	3.34E-06
17:00:00	0.0000	0.0000	0.0000	0.0000	3.32E-06	3.32E-06
17:15:00	0.0000	0.0000	0.0000	0.0000	3.31E-06	3.31E-06
17:30:00	0.0000	0.0000	0.0000	0.0000	3.29E-06	3.29E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:45:00	0.0000	0.0000	0.0000	0.0000	3.28E-06	3.28E-06
18:00:00	0.0000	0.0000	0.0000	0.0000	3.27E-06	3.27E-06
18:15:00	0.0000	0.0000	0.0000	0.0000	3.25E-06	3.25E-06
18:30:00	0.0000	0.0000	0.0000	0.0000	3.24E-06	3.24E-06
18:45:00	0.0000	0.0000	0.0000	0.0000	3.22E-06	3.22E-06
19:00:00	0.0000	0.0000	0.0000	0.0000	3.21E-06	3.21E-06
19:15:00	0.0000	0.0000	0.0000	0.0000	3.19E-06	3.19E-06
19:30:00	0.0000	0.0000	0.0000	0.0000	3.18E-06	3.18E-06
19:45:00	0.0000	0.0000	0.0000	0.0000	3.17E-06	3.17E-06
20:00:00	0.0000	0.0000	0.0000	0.0000	3.15E-06	3.15E-06
20:15:00	0.0000	0.0000	0.0000	0.0000	3.14E-06	3.14E-06
20:30:00	0.0000	0.0000	0.0000	0.0000	3.12E-06	3.12E-06
20:45:00	0.0000	0.0000	0.0000	0.0000	3.11E-06	3.11E-06
21:00:00	0.0000	0.0000	0.0000	0.0000	3.1E-06	3.1E-06
21:15:00	0.0000	0.0000	0.0000	0.0000	3.08E-06	3.08E-06
21:30:00	0.0000	0.0000	0.0000	0.0000	3.07E-06	3.07E-06
21:45:00	0.0000	0.0000	0.0000	0.0000	3.05E-06	3.05E-06
22:00:00	0.0000	0.0000	0.0000	0.0000	3.04E-06	3.04E-06
22:15:00	0.0000	0.0000	0.0000	0.0000	3.03E-06	3.03E-06
22:30:00	0.0000	0.0000	0.0000	0.0000	3.01E-06	3.01E-06
22:45:00	0.0000	0.0000	0.0000	0.0000	3E-06	3E-06
23:00:00	0.0000	0.0000	0.0000	0.0000	2.99E-06	2.99E-06
23:15:00	0.0000	0.0000	0.0000	0.0000	2.97E-06	2.97E-06
23:30:00	0.0000	0.0000	0.0000	0.0000	2.96E-06	2.96E-06
23:45:00	0.0000	0.0000	0.0000	0.0000	2.95E-06	2.95E-06
24:00:00	0.0000	0.0000	0.0000	0.0000	2.93E-06	2.93E-06
24:15:00	0.0000	0.0000	0.0000	0.0000	2.92E-06	2.92E-06
24:30:00	0.0000	0.0000	0.0000	0.0000	2.91E-06	2.91E-06
24:45:00	0.0000	0.0000	0.0000	0.0000	2.89E-06	2.89E-06
25:00:00	0.0000	0.0000	0.0000	0.0000	2.88E-06	2.88E-06
25:15:00	0.0000	0.0000	0.0000	0.0000	2.87E-06	2.87E-06
25:30:00	0.0000	0.0000	0.0000	0.0000	2.86E-06	2.86E-06
25:45:00	0.0000	0.0000	0.0000	0.0000	2.84E-06	2.84E-06
26:00:00	0.0000	0.0000	0.0000	0.0000	2.83E-06	2.83E-06
26:15:00	0.0000	0.0000	0.0000	0.0000	2.82E-06	2.82E-06
26:30:00	0.0000	0.0000	0.0000	0.0000	2.81E-06	2.81E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
26:45:00	0.0000	0.0000	0.0000	0.0000	2.79E-06	2.79E-06
27:00:00	0.0000	0.0000	0.0000	0.0000	2.78E-06	2.78E-06
27:15:00	0.0000	0.0000	0.0000	0.0000	2.77E-06	2.77E-06
27:30:00	0.0000	0.0000	0.0000	0.0000	2.76E-06	2.76E-06
27:45:00	0.0000	0.0000	0.0000	0.0000	2.74E-06	2.74E-06
28:00:00	0.0000	0.0000	0.0000	0.0000	2.73E-06	2.73E-06
28:15:00	0.0000	0.0000	0.0000	0.0000	2.72E-06	2.72E-06
28:30:00	0.0000	0.0000	0.0000	0.0000	2.71E-06	2.71E-06
28:45:00	0.0000	0.0000	0.0000	0.0000	2.69E-06	2.69E-06
29:00:00	0.0000	0.0000	0.0000	0.0000	2.68E-06	2.68E-06
29:15:00	0.0000	0.0000	0.0000	0.0000	2.67E-06	2.67E-06
29:30:00	0.0000	0.0000	0.0000	0.0000	2.66E-06	2.66E-06
29:45:00	0.0000	0.0000	0.0000	0.0000	2.65E-06	2.65E-06
30:00:00	0.0000	0.0000	0.0000	0.0000	2.64E-06	2.64E-06
30:15:00	0.0000	0.0000	0.0000	0.0000	2.62E-06	2.62E-06
30:30:00	0.0000	0.0000	0.0000	0.0000	2.61E-06	2.61E-06
30:45:00	0.0000	0.0000	0.0000	0.0000	2.6E-06	2.6E-06
31:00:00	0.0000	0.0000	0.0000	0.0000	2.59E-06	2.59E-06
31:15:00	0.0000	0.0000	0.0000	0.0000	2.58E-06	2.58E-06
31:30:00	0.0000	0.0000	0.0000	0.0000	2.57E-06	2.57E-06
31:45:00	0.0000	0.0000	0.0000	0.0000	2.55E-06	2.55E-06
32:00:00	0.0000	0.0000	0.0000	0.0000	2.54E-06	2.54E-06
32:15:00	0.0000	0.0000	0.0000	0.0000	2.53E-06	2.53E-06
32:30:00	0.0000	0.0000	0.0000	0.0000	2.52E-06	2.52E-06
32:45:00	0.0000	0.0000	0.0000	0.0000	2.51E-06	2.51E-06
33:00:00	0.0000	0.0000	0.0000	0.0000	2.5E-06	2.5E-06
33:15:00	0.0000	0.0000	0.0000	0.0000	2.49E-06	2.49E-06
33:30:00	0.0000	0.0000	0.0000	0.0000	2.48E-06	2.48E-06
33:45:00	0.0000	0.0000	0.0000	0.0000	2.46E-06	2.46E-06
34:00:00	0.0000	0.0000	0.0000	0.0000	2.45E-06	2.45E-06
34:15:00	0.0000	0.0000	0.0000	0.0000	2.44E-06	2.44E-06
34:30:00	0.0000	0.0000	0.0000	0.0000	2.43E-06	2.43E-06
34:45:00	0.0000	0.0000	0.0000	0.0000	2.42E-06	2.42E-06
35:00:00	0.0000	0.0000	0.0000	0.0000	2.41E-06	2.41E-06
35:15:00	0.0000	0.0000	0.0000	0.0000	2.4E-06	2.4E-06
35:30:00	0.0000	0.0000	0.0000	0.0000	2.39E-06	2.39E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:45:00	0.0000	0.0000	0.0000	0.0000	2.38E-06	2.38E-06
36:00:00	0.0000	0.0000	0.0000	0.0000	2.37E-06	2.37E-06
36:15:00	0.0000	0.0000	0.0000	0.0000	2.36E-06	2.36E-06
36:30:00	0.0000	0.0000	0.0000	0.0000	2.35E-06	2.35E-06
36:45:00	0.0000	0.0000	0.0000	0.0000	2.34E-06	2.34E-06
37:00:00	0.0000	0.0000	0.0000	0.0000	2.33E-06	2.33E-06
37:15:00	0.0000	0.0000	0.0000	0.0000	2.31E-06	2.31E-06
37:30:00	0.0000	0.0000	0.0000	0.0000	2.3E-06	2.3E-06
37:45:00	0.0000	0.0000	0.0000	0.0000	2.29E-06	2.29E-06
38:00:00	0.0000	0.0000	0.0000	0.0000	2.28E-06	2.28E-06
38:15:00	0.0000	0.0000	0.0000	0.0000	2.27E-06	2.27E-06
38:30:00	0.0000	0.0000	0.0000	0.0000	2.26E-06	2.26E-06
38:45:00	0.0000	0.0000	0.0000	0.0000	2.25E-06	2.25E-06
39:00:00	0.0000	0.0000	0.0000	0.0000	2.24E-06	2.24E-06
39:15:00	0.0000	0.0000	0.0000	0.0000	2.23E-06	2.23E-06
39:30:00	0.0000	0.0000	0.0000	0.0000	2.22E-06	2.22E-06
39:45:00	0.0000	0.0000	0.0000	0.0000	2.21E-06	2.21E-06
40:00:00	0.0000	0.0000	0.0000	0.0000	2.2E-06	2.2E-06
40:15:00	0.0000	0.0000	0.0000	0.0000	2.19E-06	2.19E-06
40:30:00	0.0000	0.0000	0.0000	0.0000	2.18E-06	2.18E-06
40:45:00	0.0000	0.0000	0.0000	0.0000	2.17E-06	2.17E-06
41:00:00	0.0000	0.0000	0.0000	0.0000	2.16E-06	2.16E-06
41:15:00	0.0000	0.0000	0.0000	0.0000	2.16E-06	2.16E-06
41:30:00	0.0000	0.0000	0.0000	0.0000	2.15E-06	2.15E-06
41:45:00	0.0000	0.0000	0.0000	0.0000	2.14E-06	2.14E-06
42:00:00	0.0000	0.0000	0.0000	0.0000	2.13E-06	2.13E-06
42:15:00	0.0000	0.0000	0.0000	0.0000	2.12E-06	2.12E-06
42:30:00	0.0000	0.0000	0.0000	0.0000	2.11E-06	2.11E-06
42:45:00	0.0000	0.0000	0.0000	0.0000	2.1E-06	2.1E-06
43:00:00	0.0000	0.0000	0.0000	0.0000	2.09E-06	2.09E-06
43:15:00	0.0000	0.0000	0.0000	0.0000	2.08E-06	2.08E-06
43:30:00	0.0000	0.0000	0.0000	0.0000	2.07E-06	2.07E-06
43:45:00	0.0000	0.0000	0.0000	0.0000	2.06E-06	2.06E-06
44:00:00	0.0000	0.0000	0.0000	0.0000	2.05E-06	2.05E-06
44:15:00	0.0000	0.0000	0.0000	0.0000	2.04E-06	2.04E-06
44:30:00	0.0000	0.0000	0.0000	0.0000	2.03E-06	2.03E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
44:45:00	0.0000	0.0000	0.0000	0.0000	2.02E-06	2.02E-06
45:00:00	0.0000	0.0000	0.0000	0.0000	2.02E-06	2.02E-06
45:15:00	0.0000	0.0000	0.0000	0.0000	2.01E-06	2.01E-06
45:30:00	0.0000	0.0000	0.0000	0.0000	2E-06	2E-06
45:45:00	0.0000	0.0000	0.0000	0.0000	1.99E-06	1.99E-06
46:00:00	0.0000	0.0000	0.0000	0.0000	1.98E-06	1.98E-06
46:15:00	0.0000	0.0000	0.0000	0.0000	1.97E-06	1.97E-06
46:30:00	0.0000	0.0000	0.0000	0.0000	1.96E-06	1.96E-06
46:45:00	0.0000	0.0000	0.0000	0.0000	1.95E-06	1.95E-06
47:00:00	0.0000	0.0000	0.0000	0.0000	1.94E-06	1.94E-06
47:15:00	0.0000	0.0000	0.0000	0.0000	1.94E-06	1.94E-06
47:30:00	0.0000	0.0000	0.0000	0.0000	1.93E-06	1.93E-06
47:45:00	0.0000	0.0000	0.0000	0.0000	1.92E-06	1.92E-06
48:00:00	0.0000	0.0000	0.0000	0.0000	1.91E-06	1.91E-06
48:15:00	0.0000	0.0000	0.0000	0.0000	1.9E-06	1.9E-06
48:30:00	0.0000	0.0000	0.0000	0.0000	1.89E-06	1.89E-06
48:45:00	0.0000	0.0000	0.0000	0.0000	1.88E-06	1.88E-06
49:00:00	0.0000	0.0000	0.0000	0.0000	1.88E-06	1.88E-06
49:15:00	0.0000	0.0000	0.0000	0.0000	1.87E-06	1.87E-06
49:30:00	0.0000	0.0000	0.0000	0.0000	1.86E-06	1.86E-06
49:45:00	0.0000	0.0000	0.0000	0.0000	1.85E-06	1.85E-06
50:00:00	0.0000	0.0000	0.0000	0.0000	1.84E-06	1.84E-06
50:15:00	0.0000	0.0000	0.0000	0.0000	1.83E-06	1.83E-06
50:30:00	0.0000	0.0000	0.0000	0.0000	1.83E-06	1.83E-06
50:45:00	0.0000	0.0000	0.0000	0.0000	1.82E-06	1.82E-06
51:00:00	0.0000	0.0000	0.0000	0.0000	1.81E-06	1.81E-06
51:15:00	0.0000	0.0000	0.0000	0.0000	1.8E-06	1.8E-06
51:30:00	0.0000	0.0000	0.0000	0.0000	1.79E-06	1.79E-06
51:45:00	0.0000	0.0000	0.0000	0.0000	1.79E-06	1.79E-06
52:00:00	0.0000	0.0000	0.0000	0.0000	1.78E-06	1.78E-06
52:15:00	0.0000	0.0000	0.0000	0.0000	1.77E-06	1.77E-06
52:30:00	0.0000	0.0000	0.0000	0.0000	1.76E-06	1.76E-06
52:45:00	0.0000	0.0000	0.0000	0.0000	1.75E-06	1.75E-06
53:00:00	0.0000	0.0000	0.0000	0.0000	1.75E-06	1.75E-06
53:15:00	0.0000	0.0000	0.0000	0.0000	1.74E-06	1.74E-06
53:30:00	0.0000	0.0000	0.0000	0.0000	1.73E-06	1.73E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:45:00	0.0000	0.0000	0.0000	0.0000	1.72E-06	1.72E-06
54:00:00	0.0000	0.0000	0.0000	0.0000	1.72E-06	1.72E-06
54:15:00	0.0000	0.0000	0.0000	0.0000	1.71E-06	1.71E-06
54:30:00	0.0000	0.0000	0.0000	0.0000	1.7E-06	1.7E-06
54:45:00	0.0000	0.0000	0.0000	0.0000	1.69E-06	1.69E-06
55:00:00	0.0000	0.0000	0.0000	0.0000	1.69E-06	1.69E-06
55:15:00	0.0000	0.0000	0.0000	0.0000	1.68E-06	1.68E-06
55:30:00	0.0000	0.0000	0.0000	0.0000	1.67E-06	1.67E-06
55:45:00	0.0000	0.0000	0.0000	0.0000	1.66E-06	1.66E-06
56:00:00	0.0000	0.0000	0.0000	0.0000	1.66E-06	1.66E-06
56:15:00	0.0000	0.0000	0.0000	0.0000	1.65E-06	1.65E-06
56:30:00	0.0000	0.0000	0.0000	0.0000	1.64E-06	1.64E-06
56:45:00	0.0000	0.0000	0.0000	0.0000	1.63E-06	1.63E-06
57:00:00	0.0000	0.0000	0.0000	0.0000	1.63E-06	1.63E-06
57:15:00	0.0000	0.0000	0.0000	0.0000	1.62E-06	1.62E-06
57:30:00	0.0000	0.0000	0.0000	0.0000	1.61E-06	1.61E-06
57:45:00	0.0000	0.0000	0.0000	0.0000	1.6E-06	1.6E-06
58:00:00	0.0000	0.0000	0.0000	0.0000	1.6E-06	1.6E-06
58:15:00	0.0000	0.0000	0.0000	0.0000	1.59E-06	1.59E-06
58:30:00	0.0000	0.0000	0.0000	0.0000	1.58E-06	1.58E-06
58:45:00	0.0000	0.0000	0.0000	0.0000	1.58E-06	1.58E-06
59:00:00	0.0000	0.0000	0.0000	0.0000	1.57E-06	1.57E-06
59:15:00	0.0000	0.0000	0.0000	0.0000	1.56E-06	1.56E-06
59:30:00	0.0000	0.0000	0.0000	0.0000	1.56E-06	1.56E-06
59:45:00	0.0000	0.0000	0.0000	0.0000	1.55E-06	1.55E-06
60:00:00	0.0000	0.0000	0.0000	0.0000	1.54E-06	1.54E-06
60:15:00	0.0000	0.0000	0.0000	0.0000	1.53E-06	1.53E-06
60:30:00	0.0000	0.0000	0.0000	0.0000	1.53E-06	1.53E-06
60:45:00	0.0000	0.0000	0.0000	0.0000	1.52E-06	1.52E-06
61:00:00	0.0000	0.0000	0.0000	0.0000	1.51E-06	1.51E-06
61:15:00	0.0000	0.0000	0.0000	0.0000	1.51E-06	1.51E-06
61:30:00	0.0000	0.0000	0.0000	0.0000	1.5E-06	1.5E-06
61:45:00	0.0000	0.0000	0.0000	0.0000	1.49E-06	1.49E-06
62:00:00	0.0000	0.0000	0.0000	0.0000	1.49E-06	1.49E-06
62:15:00	0.0000	0.0000	0.0000	0.0000	1.48E-06	1.48E-06
62:30:00	0.0000	0.0000	0.0000	0.0000	1.47E-06	1.47E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
62:45:00	0.0000	0.0000	0.0000	0.0000	1.47E-06	1.47E-06
63:00:00	0.0000	0.0000	0.0000	0.0000	1.46E-06	1.46E-06
63:15:00	0.0000	0.0000	0.0000	0.0000	1.45E-06	1.45E-06
63:30:00	0.0000	0.0000	0.0000	0.0000	1.45E-06	1.45E-06
63:45:00	0.0000	0.0000	0.0000	0.0000	1.44E-06	1.44E-06
64:00:00	0.0000	0.0000	0.0000	0.0000	1.44E-06	1.44E-06
64:15:00	0.0000	0.0000	0.0000	0.0000	1.43E-06	1.43E-06
64:30:00	0.0000	0.0000	0.0000	0.0000	1.42E-06	1.42E-06
64:45:00	0.0000	0.0000	0.0000	0.0000	1.42E-06	1.42E-06
65:00:00	0.0000	0.0000	0.0000	0.0000	1.41E-06	1.41E-06
65:15:00	0.0000	0.0000	0.0000	0.0000	1.4E-06	1.4E-06
65:30:00	0.0000	0.0000	0.0000	0.0000	1.4E-06	1.4E-06
65:45:00	0.0000	0.0000	0.0000	0.0000	1.39E-06	1.39E-06
66:00:00	0.0000	0.0000	0.0000	0.0000	1.38E-06	1.38E-06
66:15:00	0.0000	0.0000	0.0000	0.0000	1.38E-06	1.38E-06
66:30:00	0.0000	0.0000	0.0000	0.0000	1.37E-06	1.37E-06
66:45:00	0.0000	0.0000	0.0000	0.0000	1.37E-06	1.37E-06
67:00:00	0.0000	0.0000	0.0000	0.0000	1.36E-06	1.36E-06
67:15:00	0.0000	0.0000	0.0000	0.0000	1.35E-06	1.35E-06
67:30:00	0.0000	0.0000	0.0000	0.0000	1.35E-06	1.35E-06
67:45:00	0.0000	0.0000	0.0000	0.0000	1.34E-06	1.34E-06
68:00:00	0.0000	0.0000	0.0000	0.0000	1.34E-06	1.34E-06
68:15:00	0.0000	0.0000	0.0000	0.0000	1.33E-06	1.33E-06
68:30:00	0.0000	0.0000	0.0000	0.0000	1.32E-06	1.32E-06
68:45:00	0.0000	0.0000	0.0000	0.0000	1.32E-06	1.32E-06
69:00:00	0.0000	0.0000	0.0000	0.0000	1.31E-06	1.31E-06
69:15:00	0.0000	0.0000	0.0000	0.0000	1.31E-06	1.31E-06
69:30:00	0.0000	0.0000	0.0000	0.0000	1.3E-06	1.3E-06
69:45:00	0.0000	0.0000	0.0000	0.0000	1.29E-06	1.29E-06
70:00:00	0.0000	0.0000	0.0000	0.0000	1.29E-06	1.29E-06
70:15:00	0.0000	0.0000	0.0000	0.0000	1.28E-06	1.28E-06
70:30:00	0.0000	0.0000	0.0000	0.0000	1.28E-06	1.28E-06
70:45:00	0.0000	0.0000	0.0000	0.0000	1.27E-06	1.27E-06
71:00:00	0.0000	0.0000	0.0000	0.0000	1.27E-06	1.27E-06
71:15:00	0.0000	0.0000	0.0000	0.0000	1.26E-06	1.26E-06
71:30:00	0.0000	0.0000	0.0000	0.0000	1.26E-06	1.26E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
71:45:00	0.0000	0.0000	0.0000	0.0000	1.25E-06	1.25E-06
72:00:00	0.0000	0.0000	0.0000	0.0000	1.24E-06	1.24E-06
72:15:00	0.0000	0.0000	0.0000	0.0000	1.24E-06	1.24E-06
72:30:00	0.0000	0.0000	0.0000	0.0000	1.23E-06	1.23E-06
72:45:00	0.0000	0.0000	0.0000	0.0000	1.23E-06	1.23E-06
73:00:00	0.0000	0.0000	0.0000	0.0000	1.22E-06	1.22E-06
73:15:00	0.0000	0.0000	0.0000	0.0000	1.22E-06	1.22E-06
73:30:00	0.0000	0.0000	0.0000	0.0000	1.21E-06	1.21E-06
73:45:00	0.0000	0.0000	0.0000	0.0000	1.21E-06	1.21E-06
74:00:00	0.0000	0.0000	0.0000	0.0000	1.2E-06	1.2E-06
74:15:00	0.0000	0.0000	0.0000	0.0000	1.19E-06	1.19E-06
74:30:00	0.0000	0.0000	0.0000	0.0000	1.19E-06	1.19E-06
74:45:00	0.0000	0.0000	0.0000	0.0000	1.18E-06	1.18E-06
75:00:00	0.0000	0.0000	0.0000	0.0000	1.18E-06	1.18E-06
75:15:00	0.0000	0.0000	0.0000	0.0000	1.17E-06	1.17E-06
75:30:00	0.0000	0.0000	0.0000	0.0000	1.17E-06	1.17E-06
75:45:00	0.0000	0.0000	0.0000	0.0000	1.16E-06	1.16E-06
76:00:00	0.0000	0.0000	0.0000	0.0000	1.16E-06	1.16E-06
76:15:00	0.0000	0.0000	0.0000	0.0000	1.15E-06	1.15E-06
76:30:00	0.0000	0.0000	0.0000	0.0000	1.15E-06	1.15E-06
76:45:00	0.0000	0.0000	0.0000	0.0000	1.14E-06	1.14E-06
77:00:00	0.0000	0.0000	0.0000	0.0000	1.14E-06	1.14E-06
77:15:00	0.0000	0.0000	0.0000	0.0000	1.13E-06	1.13E-06
77:30:00	0.0000	0.0000	0.0000	0.0000	1.13E-06	1.13E-06
77:45:00	0.0000	0.0000	0.0000	0.0000	1.12E-06	1.12E-06
78:00:00	0.0000	0.0000	0.0000	0.0000	1.12E-06	1.12E-06
78:15:00	0.0000	0.0000	0.0000	0.0000	1.11E-06	1.11E-06
78:30:00	0.0000	0.0000	0.0000	0.0000	1.11E-06	1.11E-06
78:45:00	0.0000	0.0000	0.0000	0.0000	1.1E-06	1.1E-06
79:00:00	0.0000	0.0000	0.0000	0.0000	1.1E-06	1.1E-06
79:15:00	0.0000	0.0000	0.0000	0.0000	1.09E-06	1.09E-06
79:30:00	0.0000	0.0000	0.0000	0.0000	1.09E-06	1.09E-06
79:45:00	0.0000	0.0000	0.0000	0.0000	1.08E-06	1.08E-06
80:00:00	0.0000	0.0000	0.0000	0.0000	1.08E-06	1.08E-06
80:15:00	0.0000	0.0000	0.0000	0.0000	1.07E-06	1.07E-06
80:30:00	0.0000	0.0000	0.0000	0.0000	1.07E-06	1.07E-06

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
80:45:00	0.0000	0.0000	0.0000	0.0000	1.06E-06	1.06E-06
81:00:00	0.0000	0.0000	0.0000	0.0000	1.06E-06	1.06E-06
81:15:00	0.0000	0.0000	0.0000	0.0000	1.05E-06	1.05E-06
81:30:00	0.0000	0.0000	0.0000	0.0000	1.05E-06	1.05E-06
81:45:00	0.0000	0.0000	0.0000	0.0000	1.05E-06	1.05E-06
82:00:00	0.0000	0.0000	0.0000	0.0000	1.04E-06	1.04E-06
82:15:00	0.0000	0.0000	0.0000	0.0000	1.04E-06	1.04E-06
82:30:00	0.0000	0.0000	0.0000	0.0000	1.03E-06	1.03E-06
82:45:00	0.0000	0.0000	0.0000	0.0000	1.03E-06	1.03E-06
83:00:00	0.0000	0.0000	0.0000	0.0000	1.02E-06	1.02E-06
83:15:00	0.0000	0.0000	0.0000	0.0000	1.02E-06	1.02E-06
83:30:00	0.0000	0.0000	0.0000	0.0000	1.01E-06	1.01E-06
83:45:00	0.0000	0.0000	0.0000	0.0000	1.01E-06	1.01E-06
84:00:00	0.0000	0.0000	0.0000	0.0000	1E-06	1E-06
84:15:00	0.0000	0.0000	0.0000	0.0000	9.99E-07	9.99E-07
84:30:00	0.0000	0.0000	0.0000	0.0000	9.95E-07	9.95E-07
84:45:00	0.0000	0.0000	0.0000	0.0000	9.9E-07	9.9E-07
85:00:00	0.0000	0.0000	0.0000	0.0000	9.86E-07	9.86E-07
85:15:00	0.0000	0.0000	0.0000	0.0000	9.82E-07	9.82E-07
85:30:00	0.0000	0.0000	0.0000	0.0000	9.77E-07	9.77E-07
85:45:00	0.0000	0.0000	0.0000	0.0000	9.73E-07	9.73E-07
86:00:00	0.0000	0.0000	0.0000	0.0000	9.69E-07	9.69E-07
86:15:00	0.0000	0.0000	0.0000	0.0000	9.64E-07	9.64E-07
86:30:00	0.0000	0.0000	0.0000	0.0000	9.6E-07	9.6E-07
86:45:00	0.0000	0.0000	0.0000	0.0000	9.56E-07	9.56E-07
87:00:00	0.0000	0.0000	0.0000	0.0000	9.51E-07	9.51E-07
87:15:00	0.0000	0.0000	0.0000	0.0000	9.47E-07	9.47E-07
87:30:00	0.0000	0.0000	0.0000	0.0000	9.43E-07	9.43E-07
87:45:00	0.0000	0.0000	0.0000	0.0000	9.39E-07	9.39E-07
88:00:00	0.0000	0.0000	0.0000	0.0000	9.35E-07	9.35E-07
88:15:00	0.0000	0.0000	0.0000	0.0000	9.3E-07	9.3E-07
88:30:00	0.0000	0.0000	0.0000	0.0000	9.26E-07	9.26E-07
88:45:00	0.0000	0.0000	0.0000	0.0000	9.22E-07	9.22E-07
89:00:00	0.0000	0.0000	0.0000	0.0000	9.18E-07	9.18E-07
89:15:00	0.0000	0.0000	0.0000	0.0000	9.14E-07	9.14E-07
89:30:00	0.0000	0.0000	0.0000	0.0000	9.1E-07	9.1E-07

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
89:45:00	0.0000	0.0000	0.0000	0.0000	9.06E-07	9.06E-07
90:00:00	0.0000	0.0000	0.0000	0.0000	9.02E-07	9.02E-07
90:15:00	0.0000	0.0000	0.0000	0.0000	8.98E-07	8.98E-07
90:30:00	0.0000	0.0000	0.0000	0.0000	8.94E-07	8.94E-07
90:45:00	0.0000	0.0000	0.0000	0.0000	8.9E-07	8.9E-07
91:00:00	0.0000	0.0000	0.0000	0.0000	8.86E-07	8.86E-07
91:15:00	0.0000	0.0000	0.0000	0.0000	8.82E-07	8.82E-07
91:30:00	0.0000	0.0000	0.0000	0.0000	8.78E-07	8.78E-07
91:45:00	0.0000	0.0000	0.0000	0.0000	8.74E-07	8.74E-07
92:00:00	0.0000	0.0000	0.0000	0.0000	8.7E-07	8.7E-07
92:15:00	0.0000	0.0000	0.0000	0.0000	8.66E-07	8.66E-07
92:30:00	0.0000	0.0000	0.0000	0.0000	8.62E-07	8.62E-07
92:45:00	0.0000	0.0000	0.0000	0.0000	8.58E-07	8.58E-07
93:00:00	0.0000	0.0000	0.0000	0.0000	8.55E-07	8.55E-07
93:15:00	0.0000	0.0000	0.0000	0.0000	8.51E-07	8.51E-07
93:30:00	0.0000	0.0000	0.0000	0.0000	8.47E-07	8.47E-07
93:45:00	0.0000	0.0000	0.0000	0.0000	8.43E-07	8.43E-07
94:00:00	0.0000	0.0000	0.0000	0.0000	8.4E-07	8.4E-07
94:15:00	0.0000	0.0000	0.0000	0.0000	8.36E-07	8.36E-07

Printed from the ReFH2 Flood Modelling software package, version 3.2.7650.24314

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.82	No
BFIHOST19	0.84	No
PROPWET (mm)	0.32	No
SAAR (mm)	773	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

Description	Return period (yrs)	Urbanised peak flow (m^3/s)	Urbanised direct runoff (ML)	As-rural peak flow (m^3/s)	As-rural direct runoff (ML)
1 year	1	1.55E-05	0.000184444	1.55E-05	0.000184444
2 year	2	1.83E-05	0.000217862	1.83E-05	0.000217862
5 year	5	2.75E-05	0.000331605	2.75E-05	0.000331605
10 year	10	3.44E-05	0.00041572	3.44E-05	0.00041572
30 year	30	4.60E-05	0.000559087	4.60E-05	0.000559087
50 year	50	5.20E-05	0.000632496	5.20E-05	0.000632496
75 year	75	5.72E-05	0.00069593	5.72E-05	0.00069593
100 year	100	6.12E-05	0.000744376	6.12E-05	0.000744376
200 year	200	7.19E-05	0.000875308	7.19E-05	0.000875308
1000 year	1000	0.000106774	0.001301511	0.000106774	0.001301511

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.239	0.239	2.4	7.1	Flood Risk
30 min Summer	0.274	0.274	2.6	8.5	Flood Risk
60 min Summer	0.294	0.294	2.7	9.4	Flood Risk
120 min Summer	0.284	0.284	2.7	9.0	Flood Risk
180 min Summer	0.266	0.266	2.6	8.2	Flood Risk
240 min Summer	0.248	0.248	2.5	7.4	Flood Risk
360 min Summer	0.213	0.213	2.3	6.1	Flood Risk
480 min Summer	0.184	0.184	2.1	5.1	Flood Risk
600 min Summer	0.160	0.160	1.9	4.3	Flood Risk
720 min Summer	0.141	0.141	1.8	3.6	Flood Risk
960 min Summer	0.112	0.112	1.5	2.8	Flood Risk
1440 min Summer	0.079	0.079	1.2	1.9	Flood Risk
2160 min Summer	0.062	0.062	0.9	1.4	Flood Risk
2880 min Summer	0.053	0.053	0.7	1.2	Flood Risk
4320 min Summer	0.044	0.044	0.5	1.0	Flood Risk
5760 min Summer	0.038	0.038	0.4	0.8	Flood Risk
7200 min Summer	0.034	0.034	0.4	0.7	Flood Risk
8640 min Summer	0.031	0.031	0.3	0.7	Flood Risk
10080 min Summer	0.029	0.029	0.3	0.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.793	0.0	8.5	16
30 min Summer	95.205	0.0	11.4	28
60 min Summer	61.229	0.0	14.7	44
120 min Summer	36.862	0.0	17.7	78
180 min Summer	27.181	0.0	19.6	112
240 min Summer	21.796	0.0	20.9	144
360 min Summer	15.838	0.0	22.8	208
480 min Summer	12.554	0.0	24.1	268
600 min Summer	10.454	0.0	25.1	328
720 min Summer	8.987	0.0	25.9	388
960 min Summer	7.059	0.0	27.1	508
1440 min Summer	5.007	0.0	28.8	738
2160 min Summer	3.551	0.0	30.7	1100
2880 min Summer	2.794	0.0	32.2	1468
4320 min Summer	2.017	0.0	34.8	2204
5760 min Summer	1.618	0.0	37.3	2920
7200 min Summer	1.377	0.0	39.7	3672
8640 min Summer	1.216	0.0	42.0	4328
10080 min Summer	1.100	0.0	44.3	5008

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	0.239	0.239	2.4	7.1	Flood Risk
30 min Winter	0.274	0.274	2.6	8.6	Flood Risk
60 min Winter	0.291	0.291	2.7	9.3	Flood Risk
120 min Winter	0.272	0.272	2.6	8.4	Flood Risk
180 min Winter	0.245	0.245	2.4	7.3	Flood Risk
240 min Winter	0.219	0.219	2.3	6.3	Flood Risk
360 min Winter	0.174	0.174	2.0	4.7	Flood Risk
480 min Winter	0.141	0.141	1.8	3.6	Flood Risk
600 min Winter	0.116	0.116	1.6	2.9	Flood Risk
720 min Winter	0.097	0.097	1.4	2.4	Flood Risk
960 min Winter	0.074	0.074	1.2	1.7	Flood Risk
1440 min Winter	0.058	0.058	0.8	1.3	Flood Risk
2160 min Winter	0.047	0.047	0.6	1.1	Flood Risk
2880 min Winter	0.041	0.041	0.5	0.9	Flood Risk
4320 min Winter	0.033	0.033	0.3	0.7	Flood Risk
5760 min Winter	0.029	0.029	0.3	0.6	Flood Risk
7200 min Winter	0.026	0.026	0.2	0.6	Flood Risk
8640 min Winter	0.025	0.025	0.2	0.5	Flood Risk
10080 min Winter	0.024	0.024	0.2	0.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	141.793	0.0	8.5	16
30 min Winter	95.205	0.0	11.4	29
60 min Winter	61.229	0.0	14.7	46
120 min Winter	36.862	0.0	17.7	84
180 min Winter	27.181	0.0	19.6	118
240 min Winter	21.796	0.0	20.9	152
360 min Winter	15.838	0.0	22.8	216
480 min Winter	12.554	0.0	24.1	276
600 min Winter	10.454	0.0	25.1	334
720 min Winter	8.987	0.0	25.9	392
960 min Winter	7.059	0.0	27.1	502
1440 min Winter	5.007	0.0	28.8	736
2160 min Winter	3.551	0.0	30.7	1104
2880 min Winter	2.794	0.0	32.2	1468
4320 min Winter	2.017	0.0	34.8	2176
5760 min Winter	1.618	0.0	37.3	2920
7200 min Winter	1.377	0.0	39.7	3672
8640 min Winter	1.216	0.0	42.0	4488
10080 min Winter	1.100	0.0	44.3	5152

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 422742 169555 SU 22742 69555
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.024

Time (mins) From:	To:	Area (ha)
0	4	0.024

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 0.300

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	21.0	0.300	45.0

Orifice Outflow Control

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 0.000

©1982-2020 Innovyze

APPENDIX G

Proposed Drainage Strategy

north

DISCHARGE TO THE MILL STREAM RESTRICTED TO 2.7l/s VIA FILTER DRAIN WITH 50mm PERFORATED PIPE

BASIN TOP WATER LEVEL

BASIN BASE

MILL STREAM WATER LEVEL RECORDED BY TOPOGRAPHIC SURVEY: 117.76mAOD

FILTER DRAIN MANAGING TERRACE RUNOFF

RAINWATER PIPE

0 4m 8m 20m

Metres 1:200

LEGEND

- PROPOSED BUILDING OUTLINE
- IMPERMEABLE HARDSTANDING
- FILTER DRAIN
- BASIN TOP WATER LEVEL
- BASIN BASE
- PIPE CONNECTION
- SURFACE WATER GULLY
- INSPECTION CHAMBER
- RAIN WATER PIPE

NOTES

1. BASEMAP ATTENUTATION BASIN LOCATION IS SUPERSEDED BY BLUE LINES INCLUDED IN LEGEND ABOVE.
2. ALL PROPOSALS ARE TO BE CONFIRMED DURING DETAILED DESIGN.

REV:	DESCRIPTION:	BY:	DATE:
01	UPDATED DRAINAGE	LG	19/01/23
-	FIRST ISSUE	LG	21/01/22

STATUS: FOR INFORMATION

CLIENT: RAMSBURY SARL

SITE: BRIDGE COTTAGE STITCHCOMBE

TITLE: PROPOSED DRAINAGE STRATEGY

calibro

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:200	19/01/23	LG	PG
PROJECT NO:	DRAWING NO:		REVISION:
21-256	60-100		01

Rev 01 | Copyright © 2023 Calibro Consultants Ltd
51 Whiteladies Road | Bristol | BS8 2NT T 0117 2441 970
E hello@calibro-consultants.com www.calibro-consultants.com



81 Whiteladies Road | Bristol | BS8 2NT
0117 2441 970
hello@calibro-consultants.com
www.calibro-consultants.com
Registered office as above
Registered in England & Wales: 9988524

ISO 9001 CERTIFIED
UKAS
British Assessment Bureau

Transport Planning | Flood Risk & Hydrology | Infrastructure & Drainage

IEMA Transforming the world to sustainability