



Lily Farm Vineyard Knowle

Flood Risk Assessment

March 2024



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Document title	Flood Risk Assessment
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Project name	Lily Farm Vineyard, Knowle
Project number	0085
Client	Mr W Pratt

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1. INTRODUCTION

- 1.1 This document has been prepared in support of planning application for development at the site of Lily Farm Vineyard. The location of the site is shown in Figure 1.



Figure 1. Location Plan ©Environment Agency

- 1.2 The development comprises:
- A new single storey dwelling
 - An extension to one of the existing vineyard buildings.
 - Provision of a small timber cycle shelter.
- 1.3 Drawings of the proposed development are included in Appendix A.

2. REVIEW OF PLANNING POLICY

- 2.1 Flood maps provided by the Environment Agency (EA), an extract of which is included as Figure 2 below, indicate that the site lies partially within flood zones 2 & 3. The full map is included in Appendix A.



Figure 2. Extract from Flood Map for Planning (Rivers & Sea) ©Environment Agency

- 2.2 The Government's Planning Practice Guidance defines vulnerability classes for different types of development. Buildings used for dwellings are defined as 'More vulnerable'. Such buildings should only be constructed in flood zones 2 or 3 if it can be shown that they pass the Sequential Test; the purpose of which is to steer development to areas of lowest flood risk.
- 2.3 In certain instances it is not necessary to apply the Sequential Test. Planning applications for minor development and changes of use do not need to apply the test but the applicant will need to demonstrate (by means of a Flood Risk Assessment (FRA)) that the site is safe for users and does not increase flood risk elsewhere.
- For this purpose minor development is classed as non-residential extensions with a footprint less than 250m².
- 2.5 The principles of the Sequential Test have been applied to the proposed development; the dwelling has been located in flood zone 1 and the modifications to the winery facilities have been limited to the existing enclosure, as shown in Figures 3 and 4.

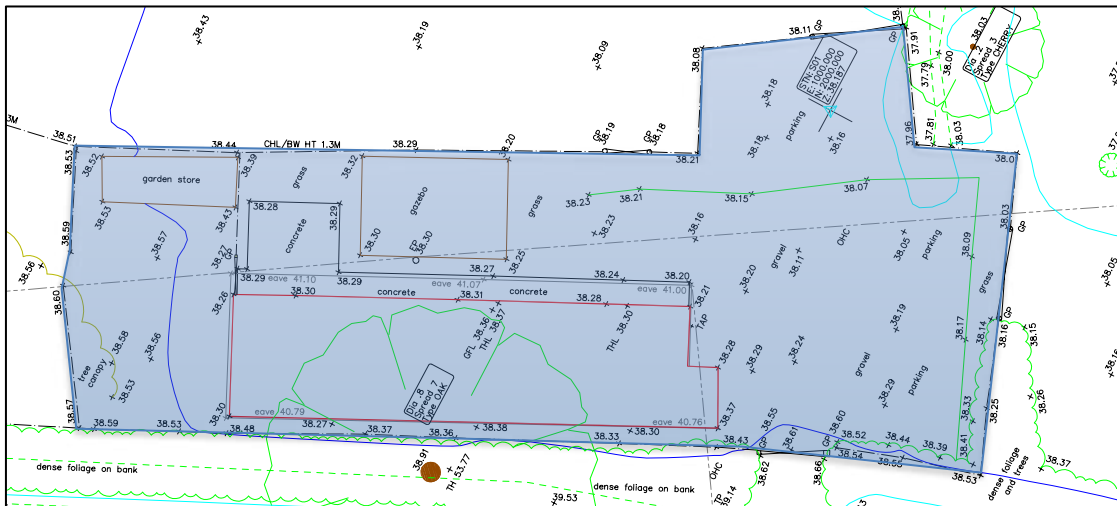


Figure 3. Existing Vineyard Building and Works Enclosure

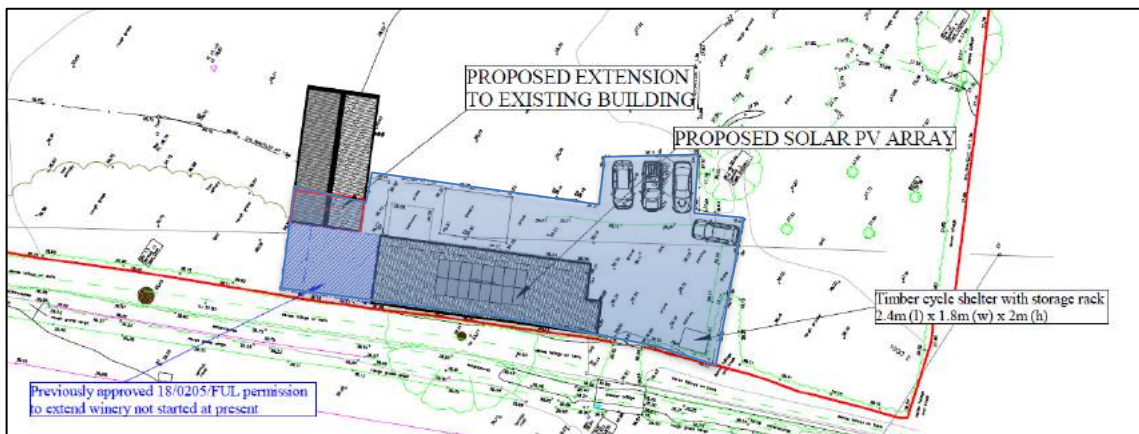


Figure 4. Proposed Vineyard Building and Works Enclosure

3. ASSESSMENTS

3.1 The EA's FRA Guidance Note 3 (ref: 3-1) sets out a number of assessments that should be undertaken when considering flood risk. The following sections address each assessment.

3.2 *Consideration of whether the site falls within the functional flood plain* – the NPPF notes the following:

“The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.”

On the basis of a walkover survey of the site it appears that the watercourse shown on the EA's flood maps has been diverted to flow along Dalditch Lane at some time in the past. The watercourse as shown is now at a higher level than some of the areas within the site. However, the presence of a hedge bank between the site and the watercourse prevents much of the site flooding during the 20year return period flood.

3.3 *Flood alleviation measures already in place.* The property does not benefit from formal flood defences. However, the presence of a hedge bank between the left bank of the watercourse and the site generally prevents the flow of water from Dalditch Lane entering the site for less extreme events.

3.4 *Information about all potential sources of flooding that may affect the site.* The following sub-sections consider sources of flooding.

3.4.1 *Rivers and streams* – an unnamed watercourse flows along the eastern side of Dalditch Lane and presents the main flood risk to the site.

3.4.2 *The Sea* – the site is at an elevation of approximately 40mAOD and is not at risk of flooding from the sea.

3.4.3 *Surface water runoff* – the extract from the EA's surface water flood map shown in Figure 5 below indicates that the site is at a low risk of flooding from this source (i.e. less frequently than once in every 100years on average). Surface water flowpaths are similar to fluvial flowpaths across the site.



Figure 5. Extract from Flood Map for Planning (Surface Water)©Environment Agency

- 3.4.4 *Sewers* – the site has suffered no reported sewer flooding.
- 3.4.5 *Groundwater* – the Level 1 SFRA (ref: 3-2) quotes 2004 DEFRA groundwater flooding maps which showed no incidents of groundwater flooding in East Devon. The topography of the site is such that groundwater flooding would not be expected to present a risk to proposed development.
- 3.5 *The impact of flooding*
- 3.5.1 *The speed of flooding* – a simple hydraulic calculation (see Appendix C) indicates that peak flow velocities for the 100year flood event (including an allowance for climate change) are approximately 1.8m/s. Corresponding flow depths are in the order of 0.45m. This combination of depth and velocity represents a significant hazard for some people according to DEFRA’s 2006 report Flood Risks to People (ref: 3-3).
- 3.5.2 *The order in which the location might flood* – the presence of the hedge bank between the site and the watercourse generally prevents floodwater entering the site for lower intensity rainfall events. However, the site access does permit water to flow onto the site and results in the area to the southeast of the existing vineyard buildings being the first area to flood. More-extreme flood events have the potential to result in out of bank flows entering the site through site accesses to neighbouring properties to the north of the site. Once within the site floodwater flows along a natural depression to the north east of the existing vineyard building as shown indicatively in Figure 6.

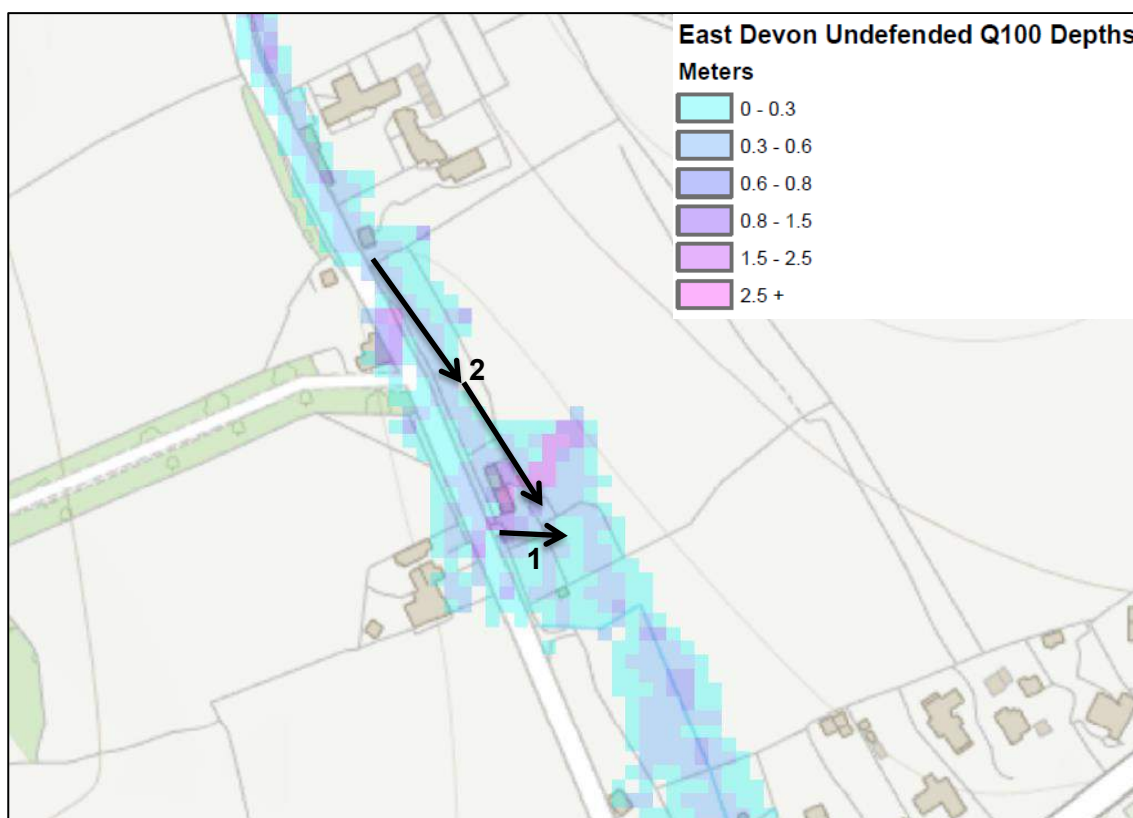


Figure 6. Location and Order of Flowpaths

In terms of the flood risk to buildings; the two existing vineyard buildings would be the first and only enclosed buildings to flood. The proposed cycle shed would flood at the same time. The proposed dwelling is not predicted to be impacted by the 1 in 1000 year flood event.

- 3.5.3 *The likely duration of flood events* – the characteristics of the catchment upstream of the site are as follows:
- area, approximately 3.5km²
 - distance to the head of the catchment is approximately 2km
 - average gradient upstream of site approximately 1 in 15

These characteristics indicate that the duration of flooding at the site is likely to be in the order of 1-3 hours.

- 3.5.4 *The economic, social and environmental consequences of flooding on occupancy of the site* – it is proposed to construct the new dwelling on land within flood zone 1. Therefore, the consequences of flooding are as follows:

economic – the proposed extension of the vineyard building would have a beneficial impact. The extension will be more flood-resilient than the existing building and will assist business continuity in the event of a flood;

social – access/egress to/from the dwelling may be limited for periods of up to 3hours during and in the immediate aftermath of severe rainfall events (say greater than 1 in 10years return period);

environmental – formalisation of storage areas for plant, machinery and stock will have a beneficial impact on the environmental aspects of flooding.

- 3.5.5 *Information on extent and depth of previous flood event or on flood predictions* – data received from the EA includes a map showing the extent of flooding at the site in September 1960 and July 1968, an extract of which is included in Figure 7.



Figure 7 – Extent of Historic Floods (Source: EA)

- 3.5.6 *An assessment of how users of the development can avoid exposure to hazardous flooding in and around the development, including whether safe access and exit can be provided for routine and emergency access under both frequent and extreme flood conditions* – the proposed dwelling will be in flood zone 1 with a finished floor level of 40.00mAD (approximately 450mm above the 1000year flood level). However, access to the dwelling will cross flood zone 3. This is likely to limit access/egress to/from the dwelling for periods of up to 3hours during and in the immediate aftermath of severe rainfall events (say greater than 1 in 10years return period).

Flood risk to visitors to the vineyard will be managed in accordance with a flood management plan. The plan will be activated in the event of severe weather warnings and will include protocols for evacuating the site and/or taking temporary refuge in the proposed dwelling. A template for a flood management plan is included in Appendix D.

- 3.5.7 *An assessment of how the layout and form of development can be used to reduce or minimise flood risk* – the proposed dwelling has been located in Flood Zone 1 and will not be at risk of flooding.

The extension to the vineyard will be constructed in accordance with the principles of flood resilient construction set out in the DCLG guide Improving the Flood Resilience of New Buildings (ref 3-3).

- 3.5.8 *Estimates of how climate change could affect the probability and intensity of flood events* – EA guidance indicates that climate change could increase the 100year flood flow by up to 61%. The potential impact of this would be to increase the extent of the 100year flood zone towards the 1000year zone. The gradient of the site is such that this will have minimal impact on the extent of the site susceptible to flooding. However, more frequent flooding of the lower areas of the site is likely as a result of the impact of climate change. Peak flood depths and velocities are also likely to increase.
- 3.5.9 *Consideration of the proposal relative to any existing SFRA* – in preparing this report the author has reviewed East Devon District Council's Level 1 SFRA (ref 3-4).
- 3.5.10 *Volume of surface water runoff likely to be generated* – it is proposed to dispose of all runoff from the new development by means of infiltration. Therefore, there will be no increase in the volume of surface water runoff from the site.
- 3.5.11 *Proposals for surface water management* – surface water arising from an increase in impermeable surfaces will be disposed of by means of infiltration. Since the site is located in an area of high permeability soils (an essential condition for a successful vineyard) there is a high level of confidence that this means of disposal will be feasible.
- An indicative design has been prepared for a soakaway to serve the proposed dwelling based on an infiltration rate of 10^{-4} m/s. Calculations are included in Appendix C. The actual infiltration rate will be confirmed prior to construction in accordance with the methodology set out in BRE Digest 365.
- 3.5.12 *Capacity of any drains or sewers* – there will be no impact on the capacity of drains and sewers, since the proposal will not change the rate of surface water discharge.
- 3.5.13 *Impact of any displaced water* – the proposed extension to the vineyard buildings will result in a loss of flood storage of approximately 4.5m^3 (0.3m deep x 15m^2). This will be compensated by reducing the ground level in the area shown in Figure 8.

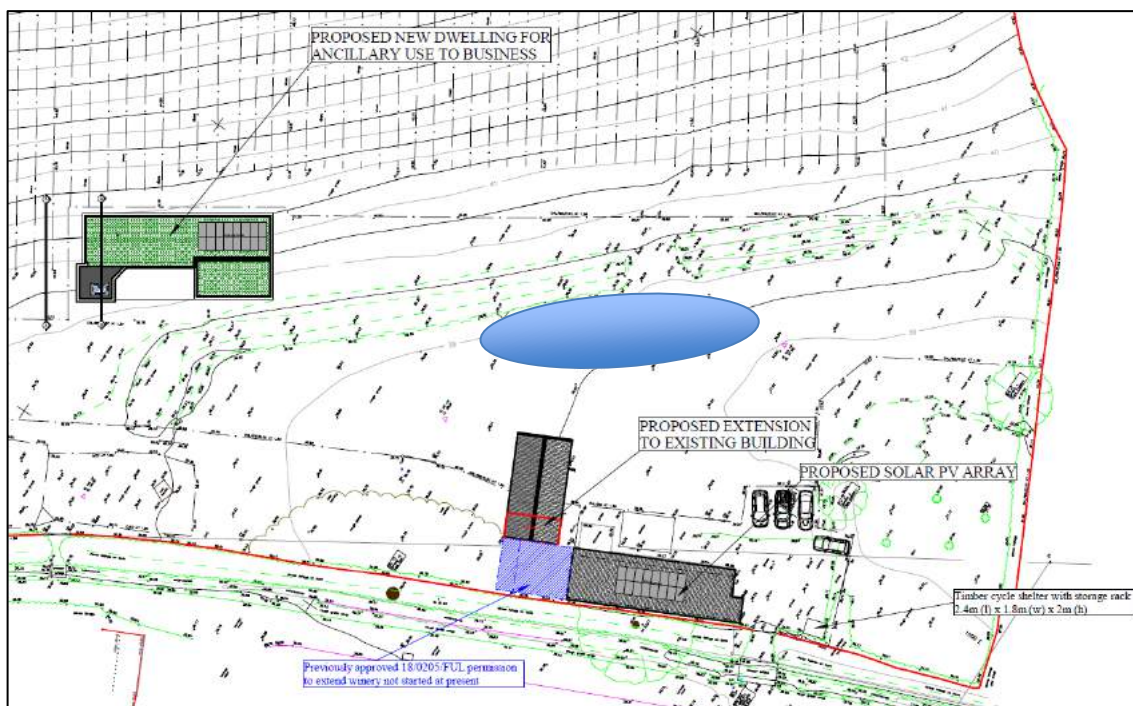


Figure 8. Flood Storage Compensation Area

3.5.14 *Potential impact on form or structure of rivers or coastal areas* – there will be no impact on the form or structure of rivers as a result of the proposed works.

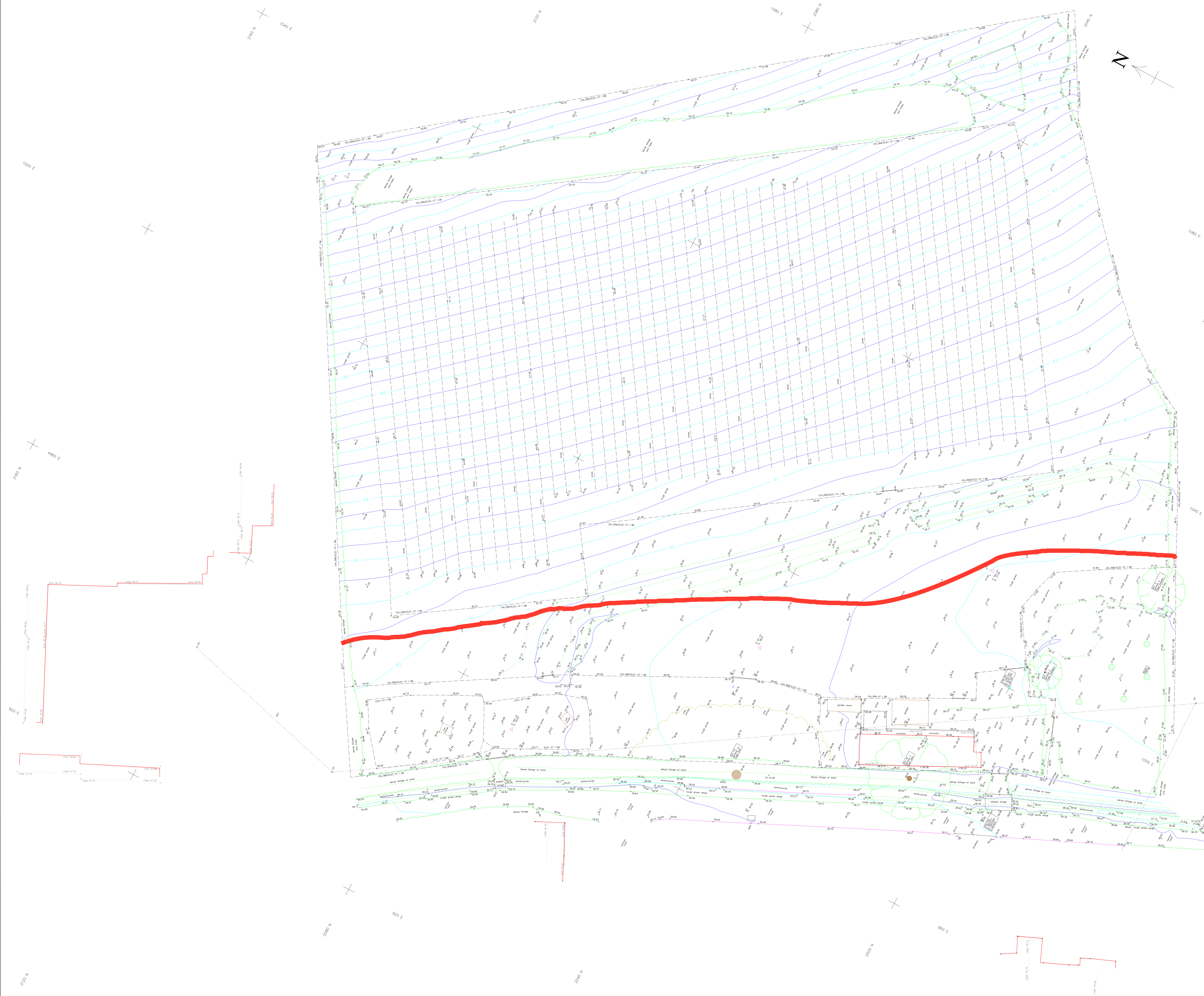
3.5.15 *Residual risks to the site after the construction of any necessary defences* – it is not proposed to construct any defences.

References:

- 3-1 EA FRA Guidance Note 3 http://www.environment-agency.gov.uk/static/documents/Utility/FRAGuidanceNote3_v3.1.pdf
- 3-2 East Devon District Council Strategic Flood Risk Assessment Level 1 SFRA (September 2008)
- 3-3 Flood Risks to People, Phase 2, FD2321/TR2 Guidance Document – DEFRA (March 2006)
- 3-4 Improving the Flood Resilience of New Buildings, Flood Resilient Construction – DCLG (May 2007)

APPENDIX A
DRAWINGS

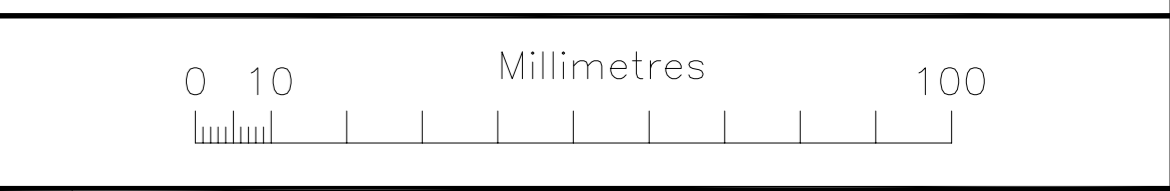
Topographic Survey
Existing and Proposed Site Block Plans
Proposed Plans and Sections (Dwelling)
Proposed Plans and Sections (Vineyard Buildings)



- Notes
1. This survey has been computed and drawn on an arbitrary local grid which has been orientated approximately North.
 2. All levels are in metres and relate to Ordnance Datum. With levels tied via GPS link to OS Active Network. Station 01 has been assigned a level of 35.187m.
 3. This survey was surveyed for a scale of 1:200, any subsequent enlargements should be verified on site.
 4. Whilst every care has been taken, no responsibility can be accepted for errors or omissions caused by detail obscured or not accessible at the time of this survey.
 5. Visible features in the vicinity of the boundaries, as shown on this survey, may not represent the extent of legally conveyed ownership.

Legend

AC	Air Conditioning Unit	MKR	Marker Post
AE	Aerial	MP	Milepost
AV	Air Valve	MS	Milestone
BS	Beltline Beacon	NB	Notice Board
BL	Bed Level	OHC	Overhead Cable
BOL	Bollard	P	Post
B	Borehole	B/W	Barbed Wire Fence
BSS	Bus Stop	P/C	Post and Chain Fence
BT	BT Inspection Chamber	P/R	Post and Rail Fence
C/B	Close Boarded Fence	P/W	Post and Wire Fence
C/L	Chain Link Fence	PBOX	Post Box
C/I	Corrugated Iron	PM	Parking Meter
C/PL	Corrugated Plastic	RE	Rodding Eye
CATV	Cable Television	RD	Road Gully
CB	Control Box	RS	Railway Signal
CCTV	Close Circuit TV	RP	Reflector Post
CL	Cover Level	RTS	Road Sign
CPS	Concrete Paving Slabs	RS	Road Traffic Signal
DK	Drop Kerb	RWP	Rain Water Pipe
DF	Damp Proof Course	SC	Stop Cock
EP	Electricity Pole	S/F	Security Fencing
ER	Earth Road	SOS	Security Telephone
EK	Electricity Pole	SP	Sign Post
FH	Fire Hydrant	SPC	Speed Camera
FL	Floor Level	SV	Survey Station
fws	Foul Water Sewer	SV	Stop Valve
G	Gully	SVP	Soil & Vent Pipe
G 0.8	Girth of Tree 0.8m	sws	Storm Water Sewer
GB	Grit Bin	T	Telephone Call Box
GP	Gate Post	TH	Threshold Level
CV	Gas Valve	T	Trap
H 0.8	Height of Tree 0.8m	TP	Telegraph Pole
IF	Iron Railing Fence	T/P	Timber Piling Fence
IW	Interwoven Fence	TOW	Top of Wall Level
IC	Inspection Cover	UTR	Unable to Raise
I	Invert Level	V	Valve
JB	Junction Box	VP	Vent Pipe
KO	Kerb Outlet	W/M	Wiremesh Fence
LB	Letter Box	WM	Water Meter
LP	Lamp Post	WSV	Water stop valve
MH	Manhole		



Rev.	Description	By	Date	Chk'd	Auth

Purpose of issue	Rev.	Date	Authorised

BLACKDOWN SURVEYS

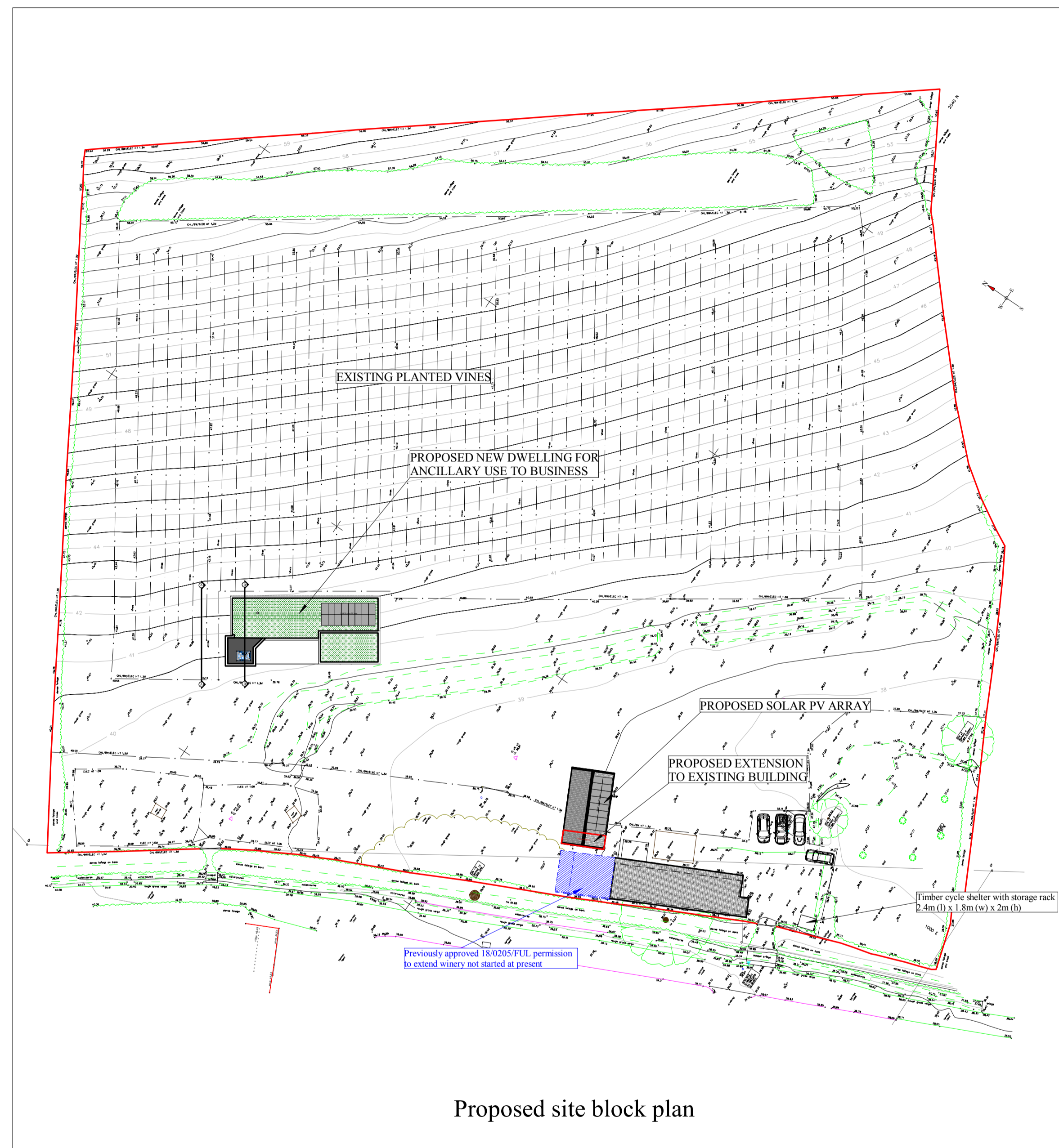
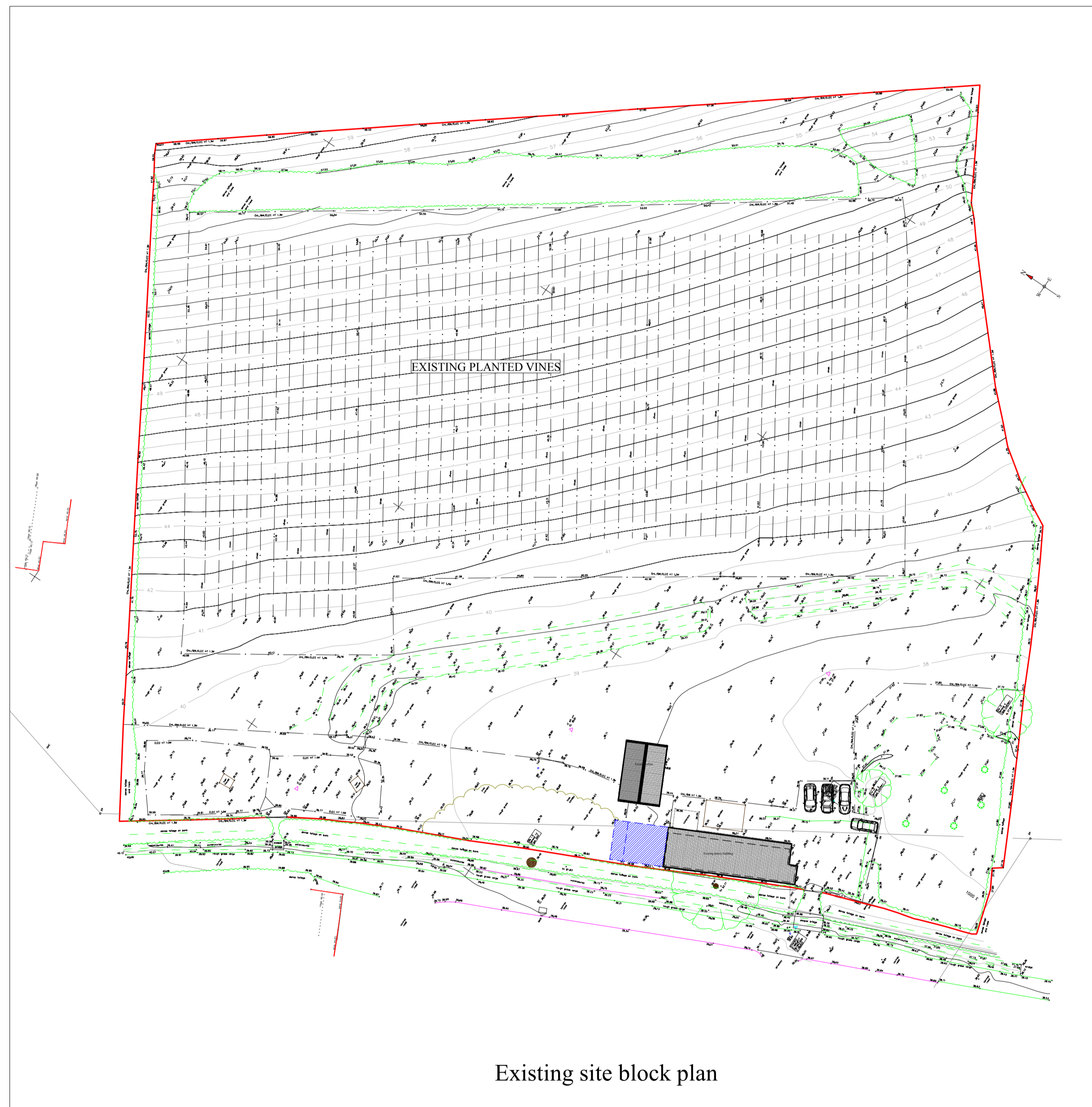
48 Manstone Avenue
 Sidmouth
 Devon
 EX10 9TF
 Tel: 01395 576944
 www.Blackdownsurveys.co.uk

Client
 Mr & Mrs A Pratt

Project
 Lily Farm Vineyard
 Budleigh Salterton
 Devon

Title
 Topographic Survey

Original Scale	Drawn	Checked	Authorised
AO@1:200	CPF	Draft	CPF
Date 15.05.15	Date 18.05.15	Date 18.05.15	Date 18.05.15
Drawing Number	2015_060_01		Rev
Sheet No. 1 of 1			



NOTES
 This drawing does not form the basis of any contract. Builders / Contractors must verify all dimensions, levels, pitches/falls, drainage and surfaces before commencing respective aspects of works. Any discrepancies from this drawing and associated site are to be reported immediately to Adrian Board for verification prior to proceeding with work. Use figured dimensions only, this drawing is not to be scaled for building purposes.
 The integrity and stability of any existing structure is to be maintained at all times whilst construction works are in progress and this is the responsibility of the builder / contractor undertaking the works.
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 The Client is responsible for ensuring compliance with other current legislation / legal acts / covenants where appropriate.
 This drawing must be read in conjunction with any structural engineers specification.
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Issue	(E-pdf online application or by email)									
Date										
Client										
Town Planning										
Building Control										
Structural engineer										
Quantity Surveyor										
Contractor										
Electrical engineer										
Mechanical engineer										
Heating engineer										

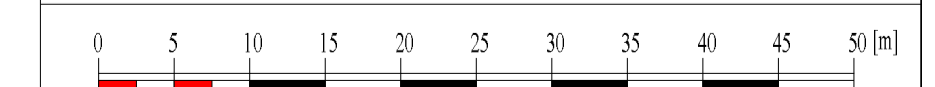
Issue	Date	By	Revision

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 Mob:07917 604 934

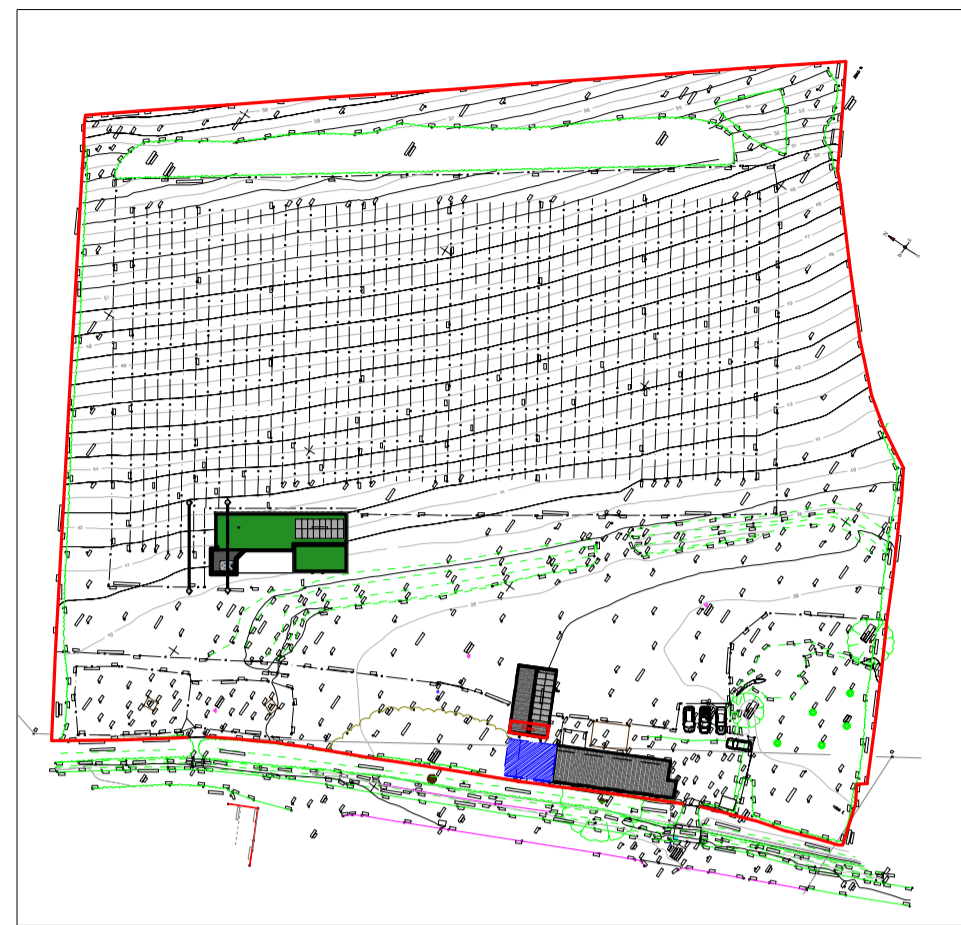
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 Existing and proposed site block plans

Address:
 Lily Farm Vineyard,
 Dalditch Lane,
 Knowle, Budleigh Salterton,
 EX9 7AH

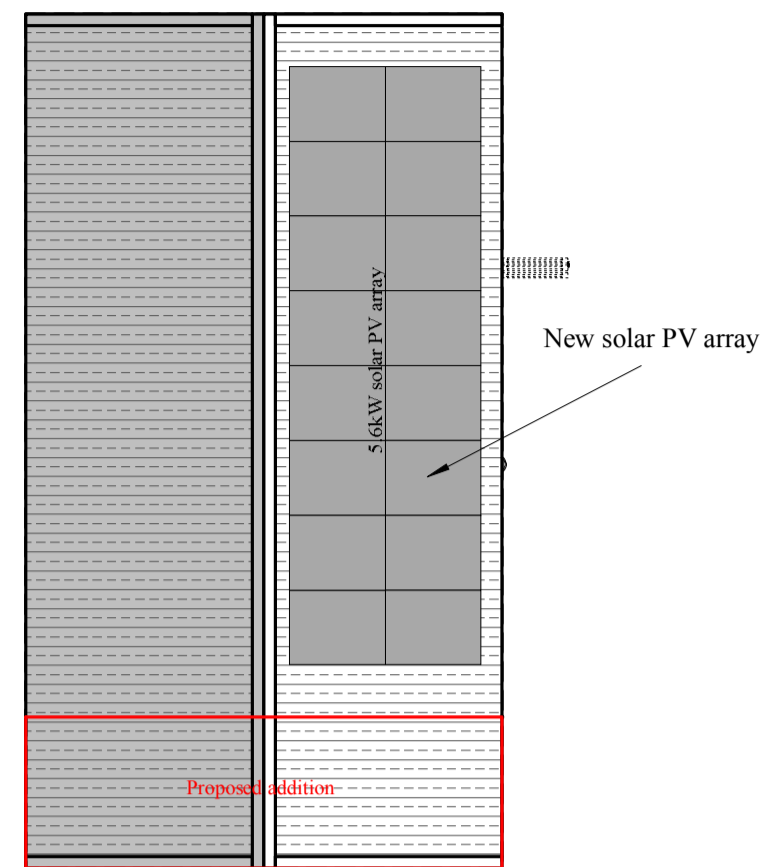
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 — Site boundary



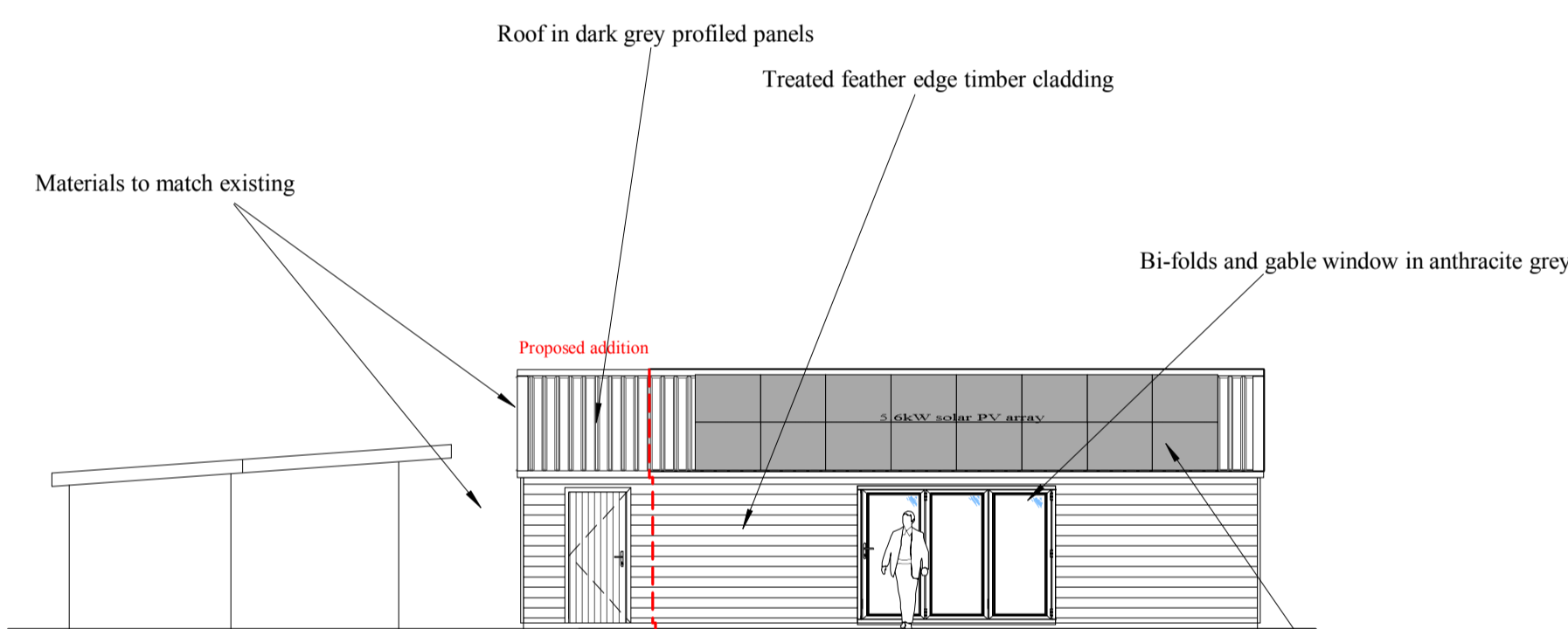
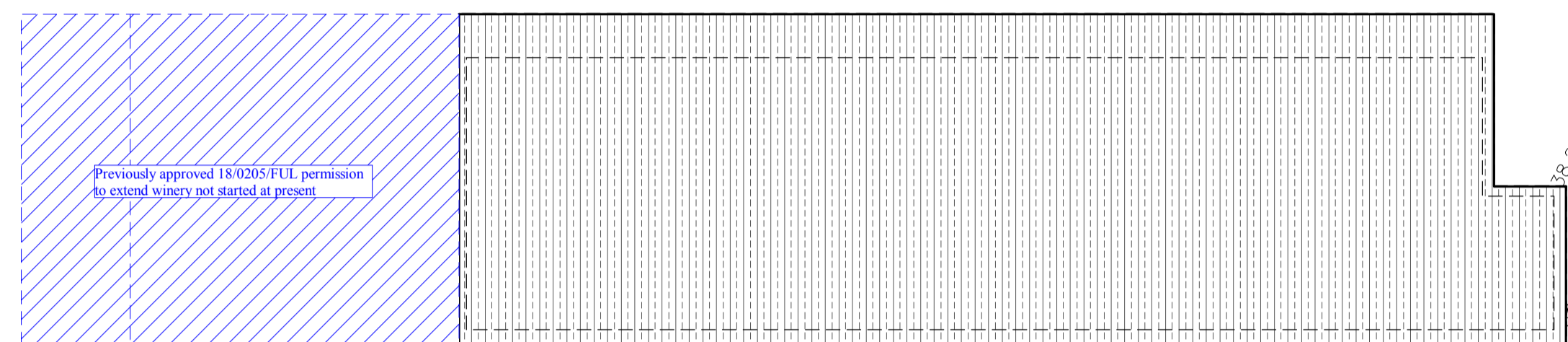
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 Date:11/03/24 Sheet size: A1



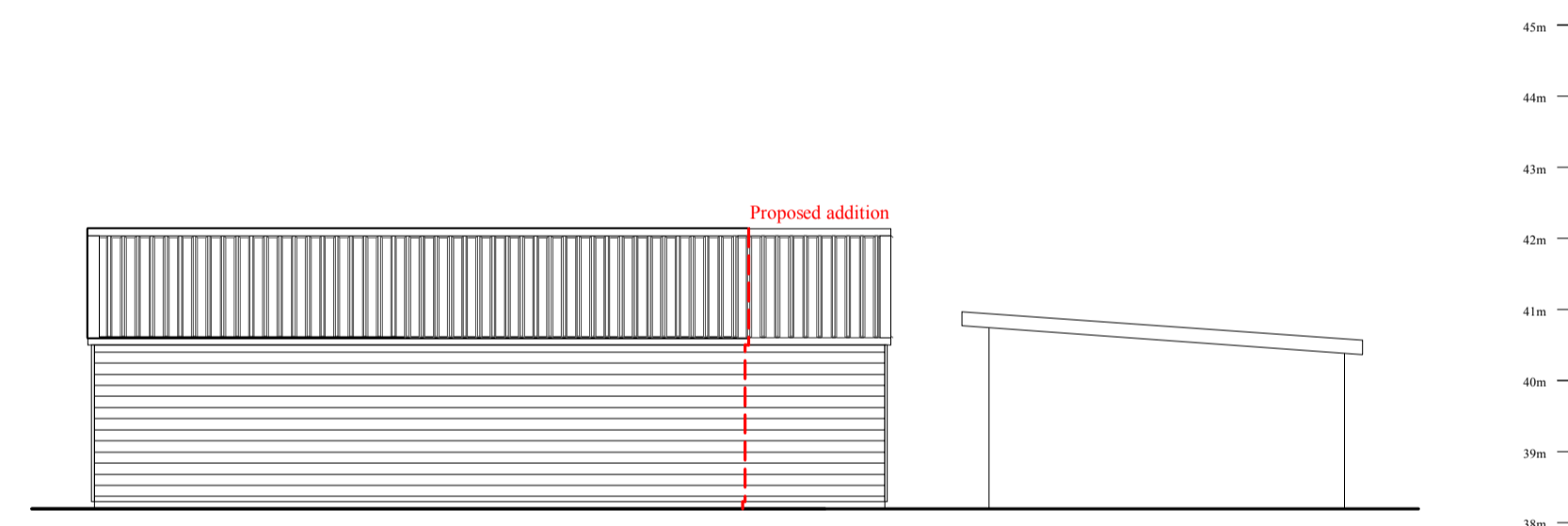
Proposed Site Block Plan (1:1250)



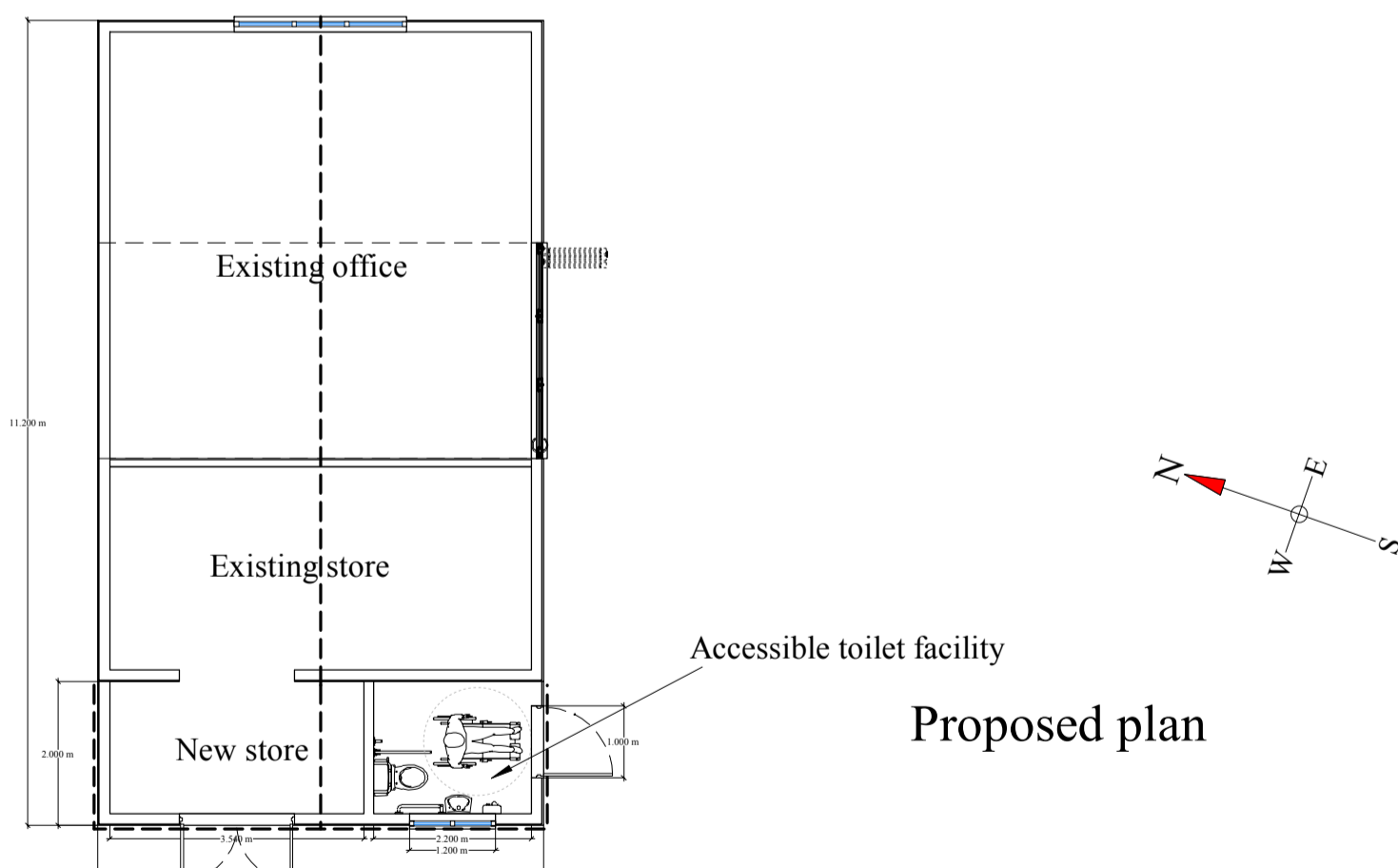
Proposed roof plan



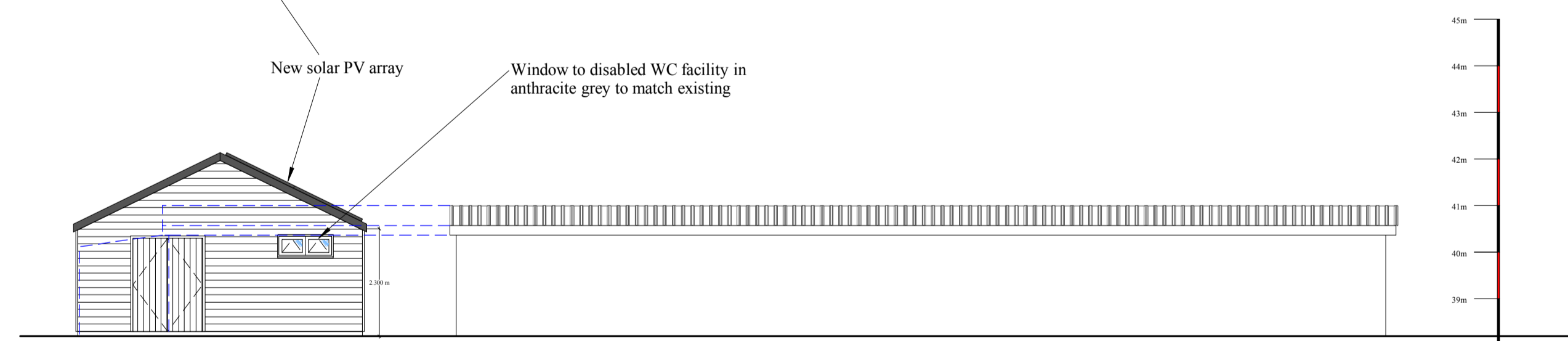
Proposed South Elevation



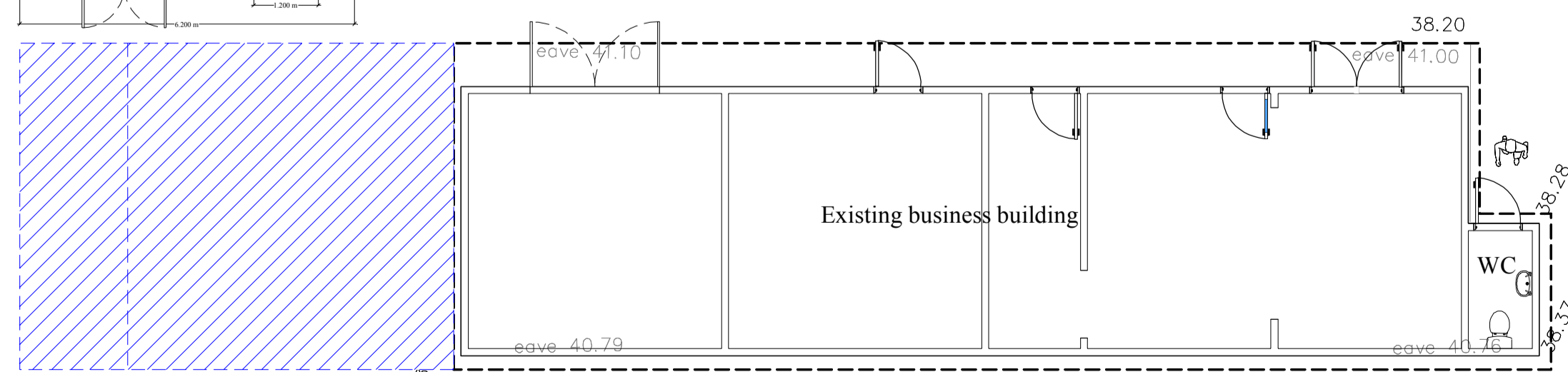
Proposed North Elevation



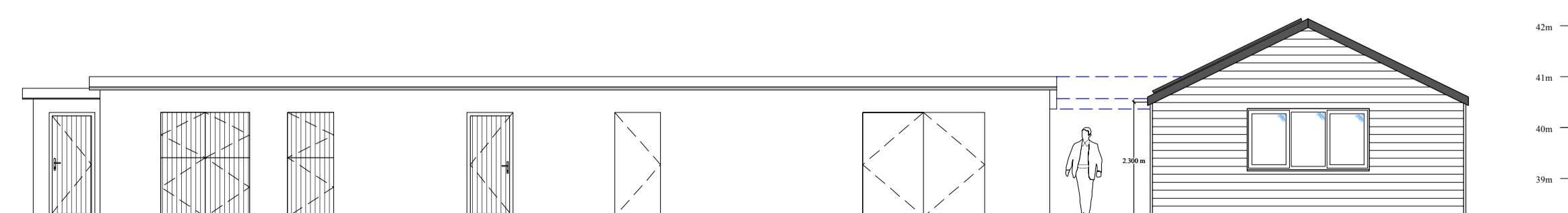
Proposed plan



Proposed West elevation



Proposed East Elevation



NOTES
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 All building construction is to comply with the current Building Regulations whether or not specifically stated on this drawing.
 The Client is responsible for ensuring compliance with other current legislation / legal acts / covenants where appropriate.
 This drawing must be read in conjunction with any structural engineers specification.
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Issue	(E-pdf online application or by email)		
Date			
Client			
Town Planning			
Building Control			
Structural engineer			
Quantity Surveyor			
Contractor			
Electrical engineer			
Mechanical engineer			
Heating engineer			

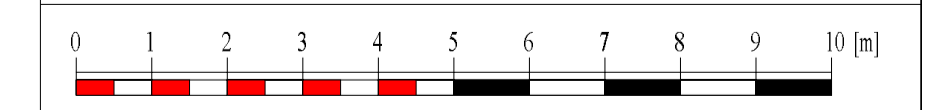
Issue	Date	By	Revision

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Description:
 Proposed plans and elevations of the winery building, office and stores with site block plan.
 Proposal to extend existing office and stores to create disabled access toilet facility and additional store and solar PV array.

Address:
 Lily Farm Vineyard,
 Dalditch Lane,
 Knowle, Budleigh Salterton,
 EX9 7AH

Notes and Key:
 — Site boundary



Drawing stage: Planning
 Drawing No: LFV.03.24.03
 Scale: 1:100 @ A1 Drawn by: AB
 Date: 11/03/24

APPENDIX B
EA DATA

Flood risk assessment data



Location of site: 305052 / 82925 (shown as easting and northing coordinates)

Document created on: 21 December 2023

This information was previously known as a product 4.

Customer reference number: 64EEC96KFCTE

Map showing the location that flood risk assessment data has been requested for.



Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.






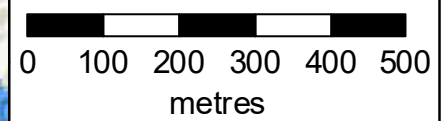
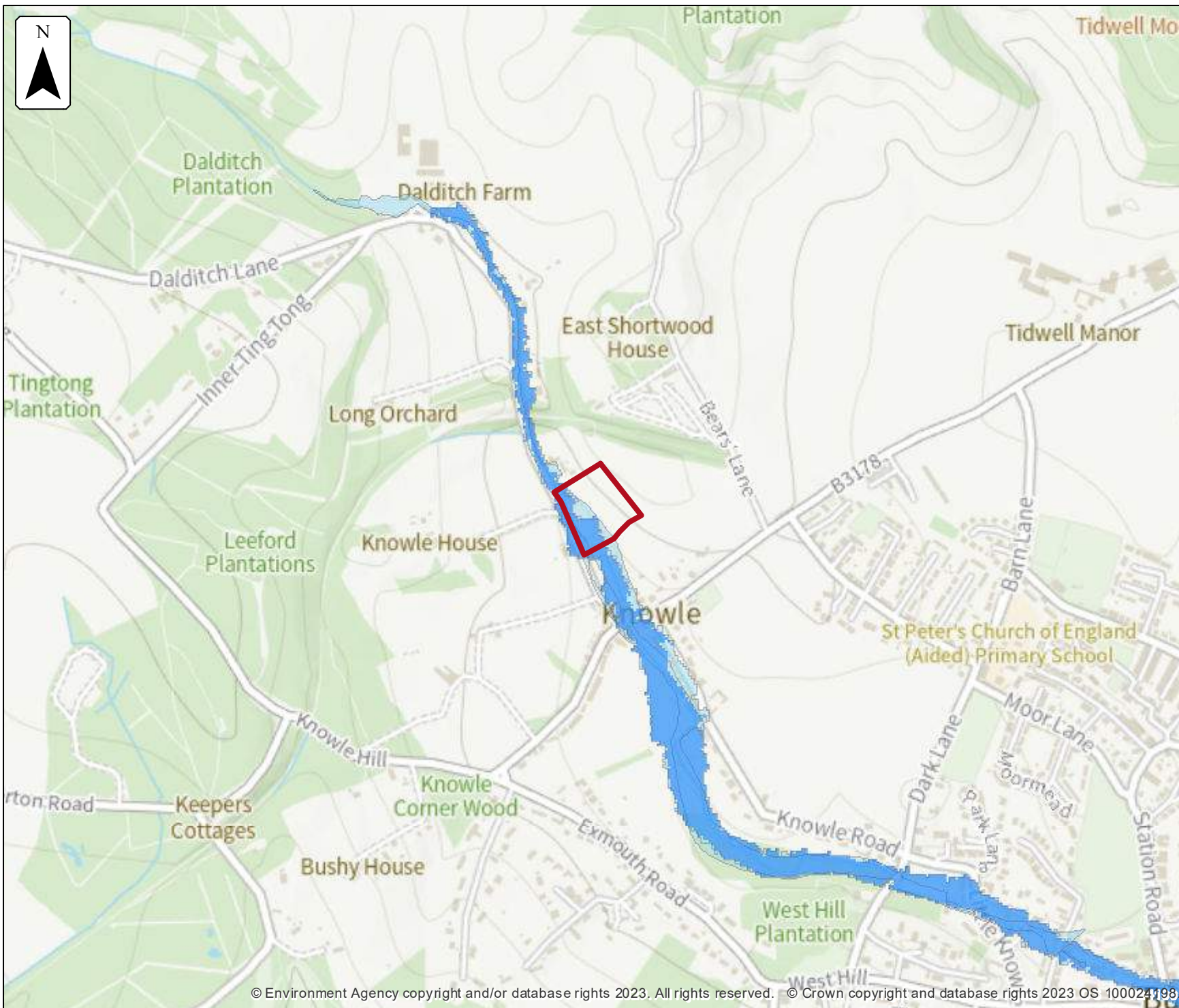
Flood map for planning

Location (easting/northing)
305052/82925

Scale
1:10,000

Created
21 Dec 2023

-  Selected area
-  Flood zone 3
-  Flood zone 2



Historic Information

The map below is an indicative outline of areas that have previously flooded.

Historic outlines may not be visible where they overlap. You can download the outlines separately via the link below.

[Download recorded flood outlines in GIS format](#)

Our historic flood event outlines:

- are an indication of the geographical extent of an observed flood event. We map flooding to land, not individual properties.
- do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.
- are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.
- do not provide a definitive record of flooding.

It is possible that there will be an absence of data in places where we have not been able to record the extent of flooding. It is also possible for errors to occur in the digitisation of historic records of flooding.

In addition to the Historic Flood Map we also hold historic flood information locally.

We have records of this area flooding in: **1960**

Please see attached maps/photographs if available.

Remember that other flooding may have occurred that we do not have records for.

Please note that our records are not comprehensive. Therefore, we advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage provider for the area.



Historic flood map

Location (easting/northing)
305052/82925

Scale
1:10,000

Created
21 Dec 2023

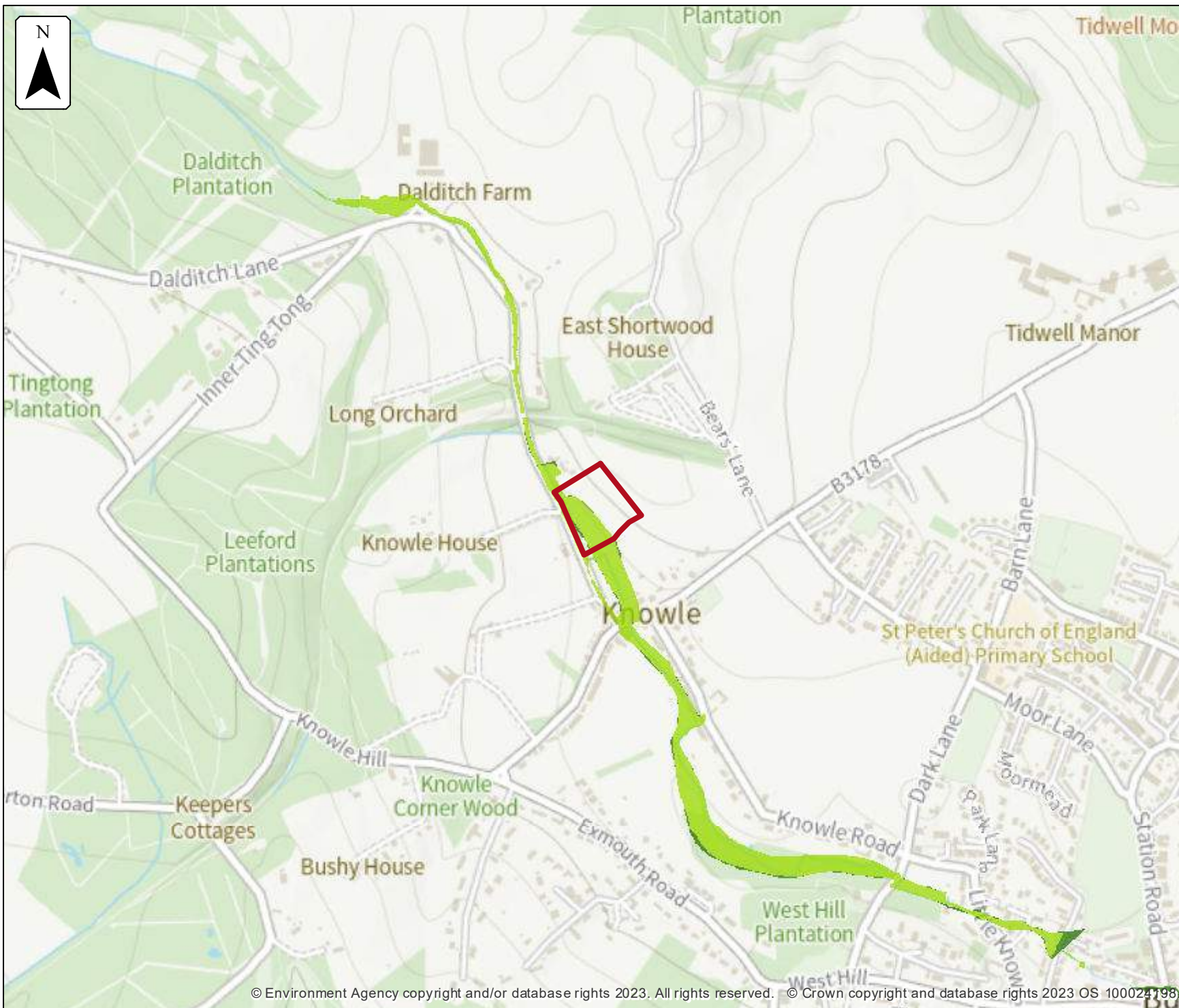
 Selected area

 Main river

Date of flood event

 July, 1968

 September, 1960



Modelled data

About the models used

Model name: JFLOW

Date: 2007

Model name: Devon Hydrology Strategy

Date: 2012

This model contains the most relevant data for your area of interest.

You will need to consider the [latest flood risk assessment climate change allowances](#) and factor in the new allowances to demonstrate the development will be safe from flooding.

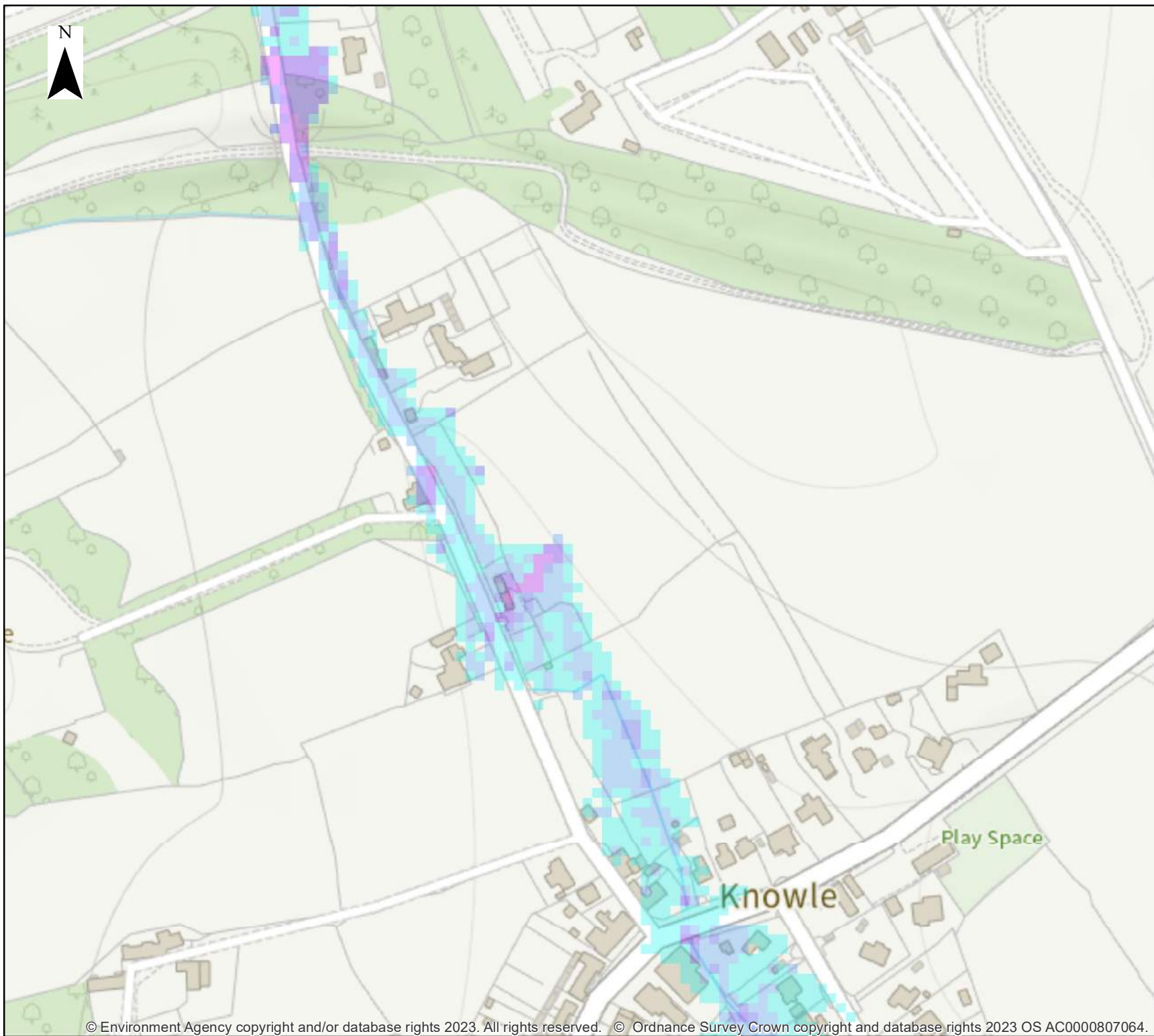
Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.



Undefended Modelled Fluvial Depth Map

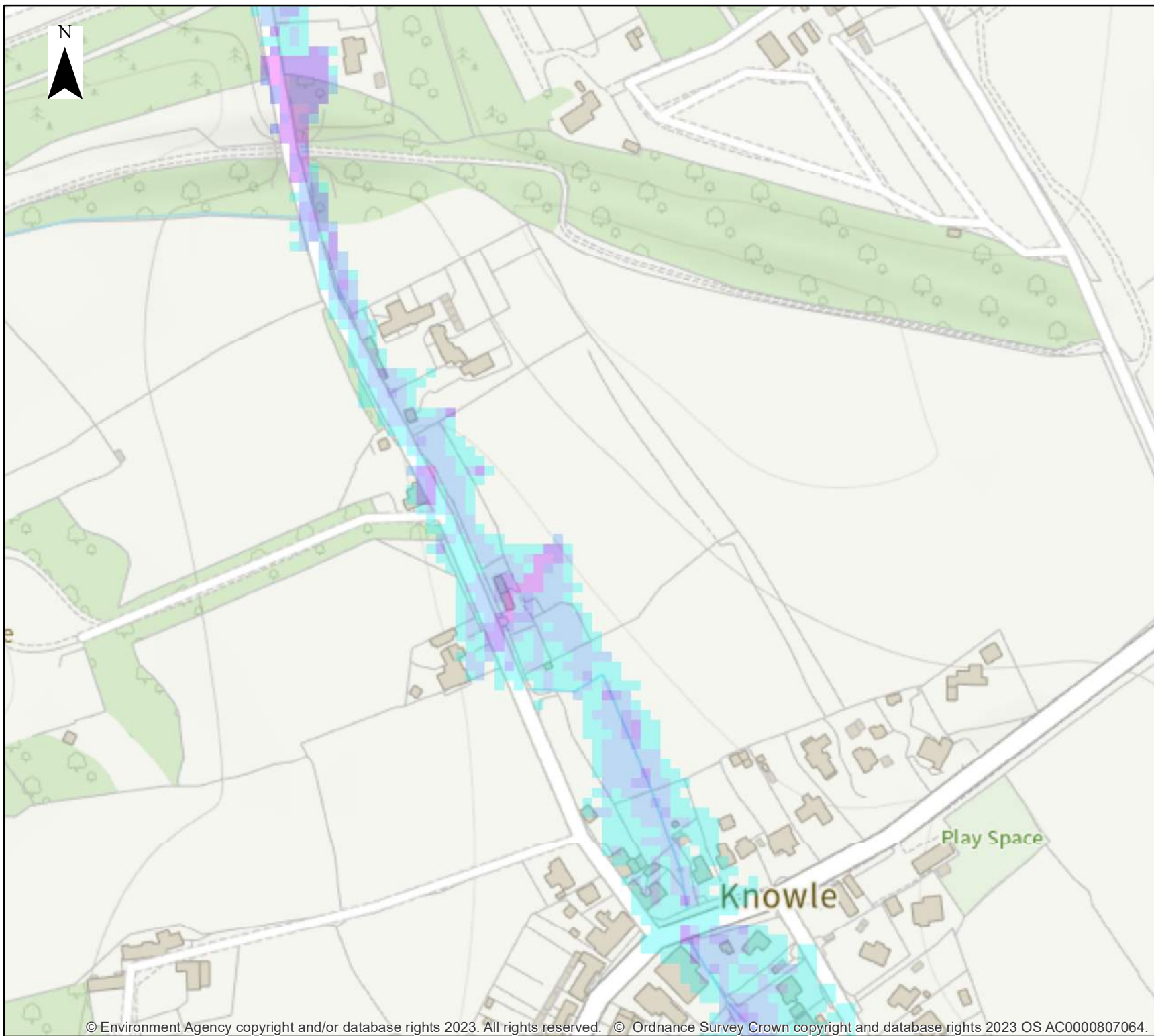
Location (easting/northing)
305052/82925

Scale Created
1:2,600 21 Dec 2023

Model name
JFLOW 2007

Legend
East Devon Undefended Q100 Depths
Meters

0 - 0.3
0.3 - 0.6
0.6 - 0.8
0.8 - 1.5
1.5 - 2.5
2.5 +



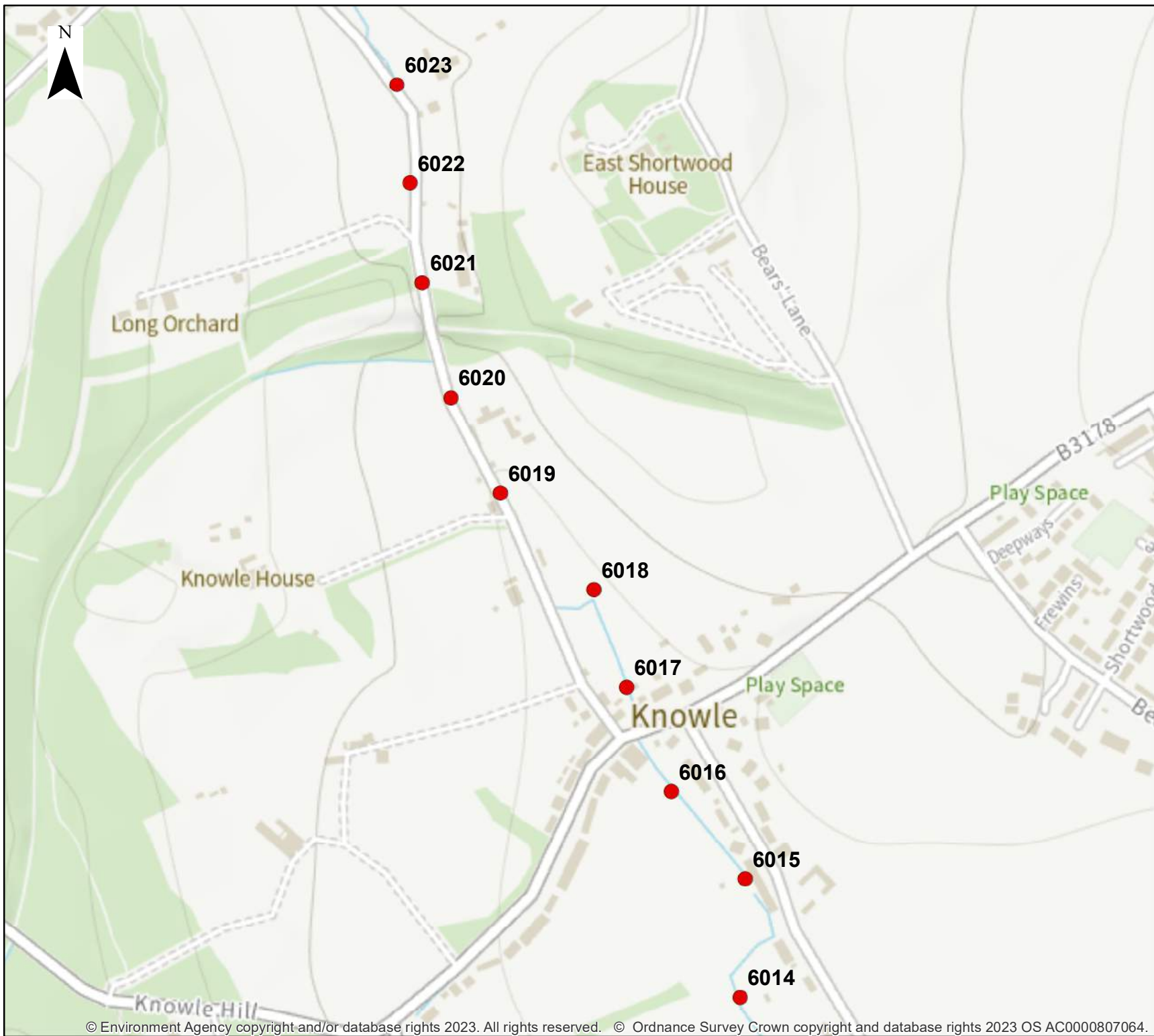
Undefended Modelled Fluvial Depth Map

Location (easting/northing)
305052/82925

Scale Created
1:2,600 21 Dec 2023

Model name
JFLOW 2007

- Legend**
East Devon Undefended Q1000 Depths
Meters
- 0 - 0.3
 - 0.3 - 0.6
 - 0.6 - 0.8
 - 0.8 - 1.5
 - 1.5 - 2.5
 - 2.5 +



Flow Node Map

Location (easting/northing)
305052/82925

Scale Created
1:5,000 21 Dec 2023

Model name
**Devon Hydrology Strategy
 2012**

Legend

- Devon Hydrology Strategy Nodes

Modelled Flood Flows

Node Reference	Easting	Northing	Area (km ²)	Modelled Flood Flows, in m ³ /s (undefended model run)							Source	Confidence
				QMED	10yr	25yr	50yr	100yr	250yr	1000yr		
6014	305216	82447	4.54	2.60	4.37	5.56	6.63	7.89	9.94	14.12	TrendAnalysisRegion_C2a2_B	Medium_Trend
6015	305221	82563	4.14	2.40	4.04	5.13	6.12	7.29	9.18	13.04	TrendAnalysisRegion_C2a2_B	Medium_Trend
6016	305148	82649	3.81	2.23	3.76	4.77	5.69	6.78	8.54	12.13	TrendAnalysisRegion_C2a2_B	Medium_Trend
6017	305104	82752	3.7	2.18	3.66	4.65	5.55	6.61	8.33	11.83	TrendAnalysisRegion_C2a2_B	Medium_Trend
6018	305072	82848	3.66	2.16	3.63	4.61	5.50	6.55	8.25	11.72	TrendAnalysisRegion_C2a2_B	Medium_Trend
6019	304980	82943	3.63	2.14	3.60	4.58	5.46	6.50	8.19	11.63	TrendAnalysisRegion_C2a2_B	Medium_Trend
6020	304931	83037	3.51	2.08	3.50	4.45	5.30	6.31	7.96	11.30	TrendAnalysisRegion_C2a2_B	Medium_Trend
6021	304903	83150	3.47	2.06	3.46	4.40	5.25	6.25	7.88	11.19	TrendAnalysisRegion_C2a2_B	Medium_Trend
6022	304891	83248	3.39	2.02	3.40	4.31	5.14	6.13	7.72	10.96	TrendAnalysisRegion_C2a2_B	Medium_Trend
6023	304878	83345	3.14	1.89	3.18	4.04	4.81	5.73	7.22	10.26	TrendAnalysisRegion_C2a2_B	Medium_Trend

Data in this table comes from the Devon Hydrology Strategy 2012

created

21/12/2023

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Devon Cornwall and the Isles of Scilly Environment Agency team at dcisenquiries@environment-agency.gov.uk for:

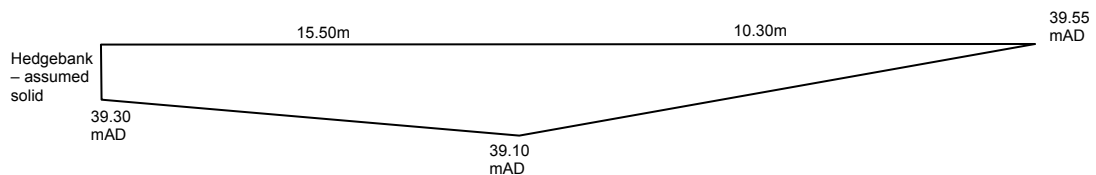
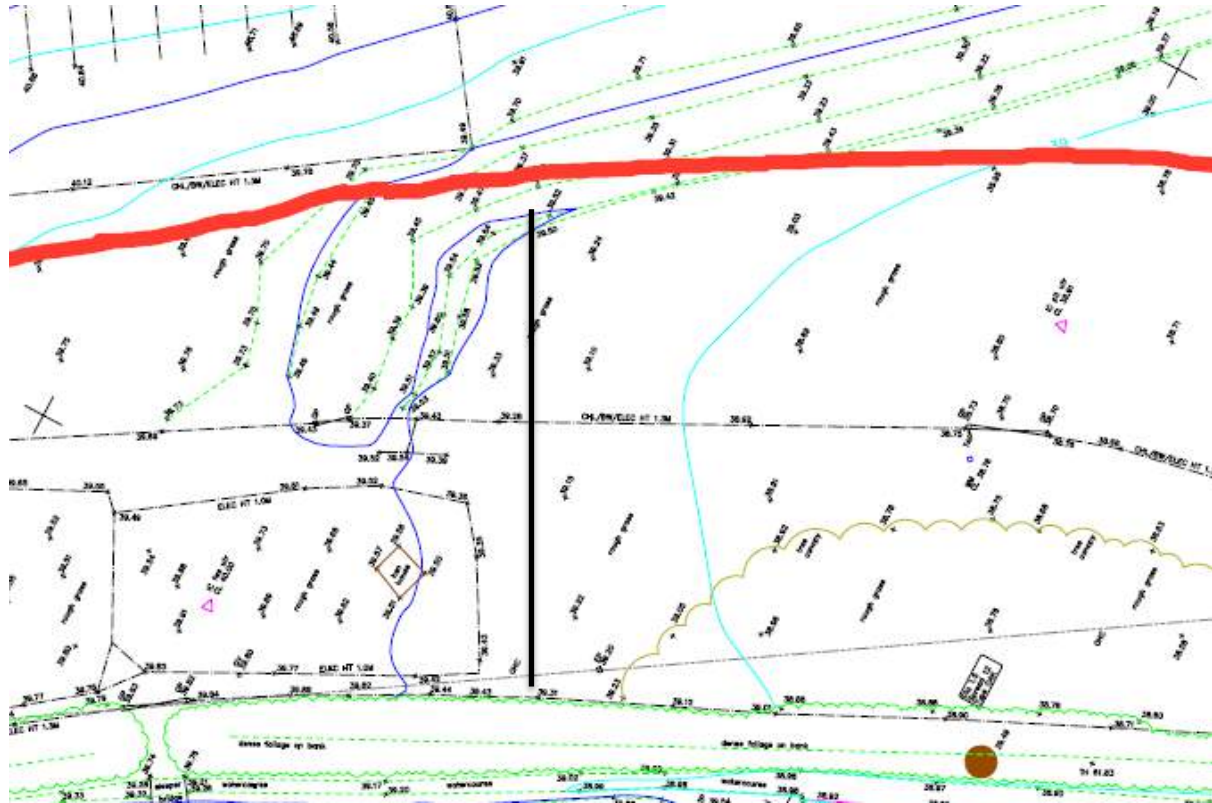
- [more information about getting a product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

APPENDIX C
CALCULATIONS

- 1. Estimate of Velocity of Floodwater**
- 2. Indicative Design for Soakaway to Serve Proposed Dwelling**

1. Estimate of Velocity of Floodwater

The following sketch is an indicative section across the flowpath of the 1000year return period flood immediately to the south of the proposed dwelling as shown by the black line.



This is the cross-sectional area of the flowpath available for flood water. It is highly conservative and ignores any flows along Dalditch Lane. Using the Manning formula it can be calculated that the capacity of the flowpath is approximately 15.8m³/s and the velocity 1.8m/s. This is based on the following parameters:

- Cross-sectional area = 8.8m²
- Wetted perimeter = 26m
- Gradient = 1 in 60
- Roughness = 0.035

2. Indicative Design for Soakaway to Serve Proposed Dwelling

The following calculation indicates that a 12m long x 0.6m wide x 1.0m deep infiltration trench filled with a free-draining granular material would be sufficient to dispose of runoff from the proposed dwelling.

Assumptions:

Contributing area = 2,40m² (includes allowance for future development)

Infiltration rate = 10⁻⁴m/s

South Lodge
Exminster
Devon EX6 8AT



Date 02/02/2024 16:43
File Infiltration trench.SRCX

Designed by Karl
Checked by

XP Solutions

Source Control 2020.1

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 3 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	39.924	0.924	11.6	2.0	Flood Risk
30 min Summer	39.885	0.885	11.2	1.9	Flood Risk
60 min Summer	39.708	0.708	8.9	1.5	Flood Risk
120 min Summer	39.502	0.502	6.3	1.1	O K
180 min Summer	39.392	0.392	4.9	0.8	O K
240 min Summer	39.322	0.322	4.1	0.7	O K
360 min Summer	39.243	0.243	3.1	0.5	O K
480 min Summer	39.197	0.197	2.5	0.4	O K
600 min Summer	39.167	0.167	2.1	0.4	O K
720 min Summer	39.145	0.145	1.8	0.3	O K
960 min Summer	39.117	0.117	1.5	0.3	O K
1440 min Summer	39.085	0.085	1.1	0.2	O K
2160 min Summer	39.062	0.062	0.8	0.1	O K
2880 min Summer	39.050	0.050	0.6	0.1	O K
4320 min Summer	39.036	0.036	0.5	0.1	O K
5760 min Summer	39.029	0.029	0.4	0.1	O K
7200 min Summer	39.024	0.024	0.3	0.1	O K
8640 min Summer	39.021	0.021	0.3	0.0	O K
10080 min Summer	39.019	0.019	0.2	0.0	O K
15 min Winter	39.963	0.963	12.1	2.1	Flood Risk
30 min Winter	39.838	0.838	10.6	1.8	Flood Risk
60 min Winter	39.608	0.608	7.7	1.3	O K
120 min Winter	39.396	0.396	5.0	0.9	O K
180 min Winter	39.298	0.298	3.8	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	11
30 min Summer	91.729	0.0	19
60 min Summer	58.739	0.0	34
120 min Summer	36.254	0.0	64
180 min Summer	26.900	0.0	94
240 min Summer	21.623	0.0	124
360 min Summer	15.914	0.0	184
480 min Summer	12.782	0.0	244
600 min Summer	10.774	0.0	306
720 min Summer	9.365	0.0	366
960 min Summer	7.499	0.0	486
1440 min Summer	5.473	0.0	722
2160 min Summer	3.985	0.0	1092
2880 min Summer	3.178	0.0	1436
4320 min Summer	2.306	0.0	2160
5760 min Summer	1.834	0.0	2840
7200 min Summer	1.536	0.0	3544
8640 min Summer	1.330	0.0	4288
10080 min Summer	1.178	0.0	5072
15 min Winter	136.560	0.0	11
30 min Winter	91.729	0.0	19
60 min Winter	58.739	0.0	34
120 min Winter	36.254	0.0	64
180 min Winter	26.900	0.0	94

South Lodge
Exminster
Devon EX6 8AT



Date 02/02/2024 16:43

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
240 min Winter	39.241	0.241	3.0	0.5	O K
360 min Winter	39.178	0.178	2.2	0.4	O K
480 min Winter	39.143	0.143	1.8	0.3	O K
600 min Winter	39.121	0.121	1.5	0.3	O K
720 min Winter	39.105	0.105	1.3	0.2	O K
960 min Winter	39.084	0.084	1.1	0.2	O K
1440 min Winter	39.062	0.062	0.8	0.1	O K
2160 min Winter	39.045	0.045	0.6	0.1	O K
2880 min Winter	39.036	0.036	0.5	0.1	O K
4320 min Winter	39.026	0.026	0.3	0.1	O K
5760 min Winter	39.021	0.021	0.3	0.0	O K
7200 min Winter	39.018	0.018	0.2	0.0	O K
8640 min Winter	39.015	0.015	0.2	0.0	O K
10080 min Winter	39.013	0.013	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
240 min Winter	21.623	0.0	124
360 min Winter	15.914	0.0	184
480 min Winter	12.782	0.0	246
600 min Winter	10.774	0.0	306
720 min Winter	9.365	0.0	366
960 min Winter	7.499	0.0	488
1440 min Winter	5.473	0.0	734
2160 min Winter	3.985	0.0	1088
2880 min Winter	3.178	0.0	1420
4320 min Winter	2.306	0.0	2124
5760 min Winter	1.834	0.0	2880
7200 min Winter	1.536	0.0	3552
8640 min Winter	1.330	0.0	4384
10080 min Winter	1.178	0.0	5152

South Lodge
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.024

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

South Lodge
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 Devon EX6 8AT



Date 02/02/2024 16:43

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Model Details

Storage is Online Cover Level (m) 40.000

Trench Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6
Infiltration Coefficient Side (m/hr)	3.60000	Trench Length (m)	12.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	39.000	Cap Infiltration Depth (m)	0.000

APPENDIX D
FLOOD MANAGEMENT PLAN TEMPLATE

Personal flood plan

Name



Are you signed up to receive flood warnings?

If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188**. This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?



Put important documents out of flood risk and protect in polythene

Look at the best way of stopping floodwater entering your property

Find out where you can get sandbags

Identify what you would need to take with you if you had to leave your home

Check your insurance covers you for flooding

Make a flood plan and prepare a flood kit

Identify who can help you/ who you can help

Understand the flood warning codes

What can you do if a flood is expected in your area?

Actions	Location
Home	
● Move furniture and electrical items to safety	
● Put flood boards, polythene and sandbags in place	
● Make a list now of what you can move away from the risk	
● Turn off electricity, water and gas supplies	
● Roll up carpets and rugs	
● Unless you have time to remove them hang curtains over rods	
● Move sentimental items to safety	
● Put important documents in polythene bags and move to safety	
Garden and outside	
● Move your car out of the flood risk area	
● Move any large or loose items or weigh them down	
Business	
● Move important documents, computers and stock	
● Alert staff and request their help	
● Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
● Inform your family or friends that you may need to leave your home	
● Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now



Environment
Agency

would your business stay afloat?

A guide to preparing your
business for flooding



Flooding is the most common and widespread natural disaster in the UK. Since 1998 there has been at least one serious flood every year. Businesses like yours are more likely to be flooded than destroyed by fire. As our climate changes we can expect to see more extreme weather – and more floods.

We aim to reduce the likelihood of flooding by managing land, rivers, coastal systems and flood defences. While we do everything we can to reduce the chance of flooding, it is a natural process and can never be completely eliminated.

By taking action to prepare in advance for flooding, most businesses can save between 20 and 90 per cent on the cost of lost stock and movable equipment, as well as some of the trouble and stress that goes with such an event.

This is a simple guide to some of the easy actions that you can take to make sure that your business is as well prepared as possible.

It tells you about how to find out if your business is at risk, our flood warning service and what our flood warning codes mean. It also has a simple template to use to design a flood plan for your company.

For more information about flooding, visit our website at www.gov.uk/flood or call Floodline on **0345 988 1188**.

Make sure that your business is prepared for flooding.

How do I find out if my business is at risk from flooding?

There are two quick and easy ways for you to find out if you're at risk.

call us on
0345 988 1188

Our Floodline service is open 24 hours, calls are charged at local rate. By taking your postcode, our operators will check and see if your business is in a flood risk area.

Look at our website

www.gov.uk/flood

You need to be aware of flooding and keep an eye on the water levels and weather situation at all times. You can do this by checking the flood forecasts and the river and sea levels on our website.

Our online flood map uses the latest technology and data gathered over many years to give the most accurate view of flooding in your area.

By entering your postcode you can find out if your business is at risk. Areas at risk from flooding are shown in dark blue and areas at risk from extreme flooding in light blue.

My business is at risk from flooding. What should I do now?

Start preparing now. If the weather conditions are right, flooding can happen at any time.

Remember, floods can happen at any time and any day – make sure you provide a number that can be contacted at all times – even out of working hours.

Sign up for flood warnings.

The first thing you should do is find out if you can receive flood warnings. In areas of high flood risk, we offer a service called Floodline Warnings Direct. This is a free, 24 hour service that sends automated flood warnings by telephone, SMS text, email, fax or pager.

To find out if you can receive this service, call Floodline on 0345 988 1188.

If your business isn't in an area covered by our warnings you can still check the latest flood warnings in force on our website.

When the situation is serious, flood warnings will also be broadcast on local television and radio news.

What practical steps can I take to protect my business?

Now that you've checked your risk and found out about flood warnings, it's time to start thinking about preparing a flood plan specifically for your business.

Taking simple steps can go a long way to protecting your business from flooding. Preparing a flood plan could:

- Significantly reduce financial losses, damage to property and business interruption;
- Help compliance with regulatory requirements (for example, Occupier's Liability Act 1984);
- Reduce exposure to civil or criminal liability;
- Enhance your company's image and credibility with employees, customers, suppliers and the community;
- Help fulfil your moral responsibility to protect employees, the community and the environment;
- Help you to obtain insurance cover.

What is a flood plan?

Just as many businesses have health and safety policies and contingency plans for an emergency, they should also have flood plans.

A flood plan is a written document that outlines how your business will respond to a flood.

This might include a list of steps you will take in case of a flood and the order you will take them in. It could also include the purchase of flood products and insurance.

A written plan can make information **easy** to access during a flood, **easy** to communicate to staff, and **easy** to remember.

Small businesses should make sure there is a plan of action in case of flooding. As the business owner, this may be your responsibility.

If your business is **medium sized**, flood preparation might be the responsibility of a team of people from different areas of the business.

If your business decides to have a flood planning team, this could be led by the business owner or Managing Director.

The leader of the flood planning team will need to let staff know about the plan once it is finished.

All members of the team should also keep a copy of important flood contacts at home for easy access.

Key areas to consider in your flood plan are:

- human resources;
- maintenance/facilities;
- finance and purchasing.

Once you have completed your plan don't forget about it. Look at it regularly and make sure it is up to date and in the event of a flood **use it**.



business flood plan



A written flood plan is recommended for businesses.

It should include:

- A list of important contacts, including Floodline, building services, suppliers and evacuation contacts for staff;
- A description or map showing locations of key property, protective materials and service shut-off points;
- Basic strategies for protecting property, preventing business disruption and assisting recovery;
- Checklists of procedures that can be quickly accessed by staff during a flood.

If a flood is imminent, your main priority is to make sure that your staff are safe. However there may be other actions that you can take to prepare your building and its contents to minimise damage and post-flood repair and restoration costs.

Business flood plan

Flood plan for _____ dated _____

Registered address _____

Postcode _____

Staff contact list

Name	Address	Telephone/mobile	Emergency contact	Emergency telephone and address

Note staff who may require assistance in the event of a flood.

Name	Office location

Key Locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Answer the following if applicable

	Description of location	How to protect from a flood (for example, move, cover, tie down)
First Aid Kit		
Oil based products (gasoline, oil, cooking oil etc.)		
Chemicals (including cleaning products)		

Protective actions

Identify stock, equipment and possessions that may need special protective measures, and describe the actions you will take to prevent damage in the event of a flood. We have suggested items and ways to protect them, but make sure you follow through on your plans.

think about:

- Computers;
- Tables / heavy furniture;
- Vehicles;
- Paper files;
- Electrical items;
- Chairs / stools;
- Databases;
- Soft furnishings;
- Computer files;
- Staff files.

ways to protect items

- Make a copy of important documentation and store in safe location;
- Raise items above ground level;
- Buy flood protection products;
- Buy new flood-resistant items;
- Move items to a safer location if possible – to an upper level of the building or off site.

Valuable item	Protective action	New location (if applicable)	Done
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>

Suggested basic building materials to help protect your property

If materials are not needed, leave the relevant section blank

Materials	Used for	Items to protect / where to use	Storage location	Done
Sand and sand bags (unfilled), shovel	Creating flood barriers (used with plastic sheeting)			<input type="checkbox"/>
Tools – hammer, nails, saw	Boarding up doors, windows and openings, creating shelves			<input type="checkbox"/>
Wood – plywood, blocks of wood	Boarding up doors, windows and openings, creating shelves			<input type="checkbox"/>
Sturdy plastic sheeting	Sandbag barriers, pulling up around furniture and appliances			<input type="checkbox"/>
Strong plastic bags	Putting around legs of tables and chairs			<input type="checkbox"/>
Pallets	Raising stored stock above flood level			<input type="checkbox"/>
Emergency power generator	Maintaining function of air conditioning units (can help dry out a building), running fridges and freezers, medical equipment if appropriate			<input type="checkbox"/>

Identify people who can help you before, during and after a flood, and what they can do.

We have suggested ways they might be able to help, but you'll need to discuss this with them.

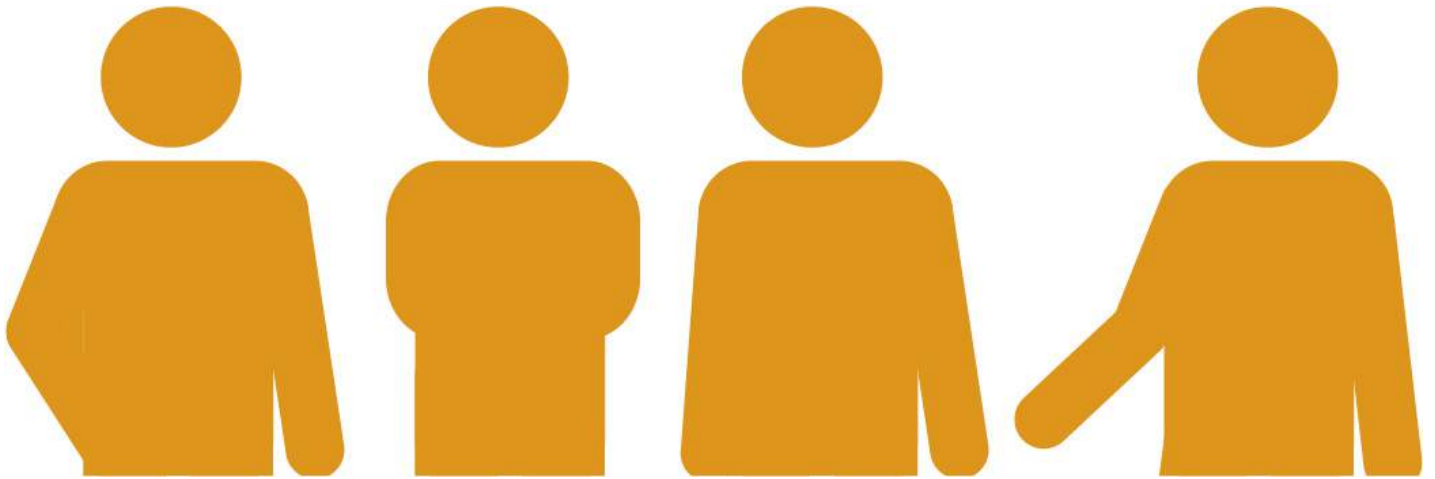
Name	Address	Telephone day	Telephone evening	Mobile

Ways people can help

- assistance with installing flood products;
- assistance with transporting stock/materials to new location if possible;
- provision of emergency storage;
- provision of emergency supplies or medical support if required.

discussion guide

This discussion guide sums up the key areas of flood planning. Some of this information can be found in this pack to help get you started.



Research

- Look at your existing business policies, and think about whether they are appropriate in the event of a flood.

Staff

- Make a list of **employees' contact details in the event of an evacuation**. This might include mobile telephone numbers, or numbers for their home or the home of a friend or relative;
- Think about staff who **may need special assistance** in the event of a flood (for example, elderly, deaf, blind etc.)

Security procedures

- **Locking windows, doors and setting the alarm**. You might need more than one person to help do this;
- Insurance policies – **Are you insured for flood damage**, business interruption and lost revenue?
- Employee manuals – You might **add flood safety to staff information packs**, or adapt job descriptions to include flood warden duties;
- Hazardous materials plan – You must ensure that **chemicals, oils and other substances in your possession are kept safe** and do not contaminate flood water;
- Health and safety assessment – Plan to **check the functioning of flood products and flood warning systems regularly**, just as you do for fire safety equipment.

Check codes and regulations that might apply to your business in the event of a flood. The following could provide guidance on the right actions to take:

- Occupational health and safety regulations;
- Environmental regulations.



Important contacts

Make a list of important telephone numbers, including contacts for gas, electricity, water and telephone providers.

Key locations

- **Know the location** of cut-off points for gas, electricity and water. Ideally, these should be marked on a map that is stored with your flood plan;
- Know the location of chemicals, oils or other materials that could be dangerous or contaminate flood water. These should be stored safe from floods and other damage.

Protective actions

- Note key stock, equipment and possessions that may need special protection from flood water;
- Consider things you may need during or after a flood (for example, sandbags, plastic sheeting, loudspeaker);
- See if it's **possible to move key operations**, such as shipping or customer services, to another building.

Suppliers and external links

- Identify products and services you won't need in the event of a flood, or which suppliers may not be able to provide. **Make back-up plans** or arrangements for short-notice cancellation of deliveries;
- Consider contracting in advance with companies whose help you may need after a flood.

business checklist

Are you prepared for flooding?

If you answer no to any of the questions overleaf, there may be more you can do to protect your business.

The individual sections will give you valuable information on effective actions you can take to prepare for a flood.



If you can answer yes, please , otherwise leave blank for no.

Know if you're at risk

- Do you know if you're at risk of flooding?
- Are flood warnings available in your area?
- Do you know how you can receive flood warnings?

Preparing a flood plan

- Do you know how your business will respond to a flood?
- Do you have a list of useful numbers including Floodline, local authority and insurance company?
- Do you know how to shut off your gas/electric/water supplies?
- Are your stock, fittings and valuable equipment stored above flood level?
- Have you developed flood contingency plans with suppliers and/or clients?
- Can you call someone to help you in the event of a flood?

Staff training and evacuation

- Are you aware of correct flood safety procedures for you and your staff?
- Have you trained your staff on flood safety procedures?
- Can your staff work quickly and efficiently to protect your business in the event of a flood?

Protecting your property

- Have you installed flood protection products?
- Do you have a stockpile of useful materials including plywood, plastic sheeting, sandbags (unfilled), sand, nails, hammer, shovel, blocks of wood and a saw?
- Have you installed non return valves in your toilets and drains?
- Do you and your staff have high ground where you can park your cars?
- Are your electrical sockets above flood level?
- Do you have computer equipment in the basement?

Flood insurance

- Do you have sufficient insurance cover in the event of a flood situation?
- Do you know what information your insurer will require to support a claim?

Evacuation

- Do you have an easy way to let your staff know about an evacuation?
- Do you know which roads will stay open in your area during a flood?
- Have you identified where staff can shelter in the event of a flood?
- Could you control staff panic during a flood?

understand your flood warning codes

Our warning service has three types of warnings - Flood Alert, Flood Warning and Severe Flood Warning - that will help you prepare for flooding and take necessary actions.

ONLINE FLOOD RISK FORECAST

What it means

Be aware.
Keep an eye on the weather situation.

When it's used

Forecasts of flooding on the Environment Agency website are updated at least once a day.

What to do

- Check weather conditions.
- Check for updated flood forecasts on our website.



FLOOD ALERT

What it means

Flooding is possible.
Be prepared.

When it's used

Two hours to two days in advance of flooding.

What to do

- Be prepared to act on your flood plan.
 - Prepare a flood kit of essential items.
 - Monitor local water levels and the flood forecast on our website.
-



FLOOD WARNING

What it means

Flooding is expected.
Immediate action required.

When it's used

Half an hour to one day
in advance of flooding.

What to do

- Move staff, stock and valuables to a safe place.
 - Turn off gas, electricity and water supplies if safe to do so.
 - Put flood protection equipment in place.
-



SEVERE FLOOD WARNING

What it means

Severe flooding.
Danger to life.

When it's used

When flooding poses a
significant risk to life.

What to do

- Stay in a safe place with means of escape.
 - Be ready should you need to evacuate.
 - Co-operate with the emergency services.
 - Call 999 if you are in immediate danger.
-

WARNING NO LONGER IN FORCE

What it means

No further flooding is
currently expected in
you area.

When it's used

When river or sea
conditions begin to
return to normal.

What to do

- Be careful. Flood water may still be around for several days.
 - If you've been flooded, ring your insurance company as soon as possible.
-

useful contacts

Fill in the contact details you may need if your business floods. Keep it in a safe place, where you can hold of it quickly.

	Company name	Telephone number/s
Environment Agency Floodline		0345 988 1188
Electricity supplier and meter number		
Gas supplier and meter number		
Water supplier and meter number		
Telephone provider		
Local authority emergency services		
Insurance company 24-hour number and policy number		
Insurance agent		
Local radio station for news alerts and weather updates		
Companies that may be able to help you after a flood		
Electrician		
Plumber		
Builder		
Equipment repair/suppliers		
Security services		
Water pumping services		
Emergency power suppliers		

**Would you like to find out more about us,
or about your environment?**

Then call us on

08708 506 506* (Mon-Fri 8-6)

email

enquiries@environment-agency.gov.uk

or visit our website

www.gov.uk/environment-agency

incident hotline 0800 80 70 60 (24hrs)

floodline 0345 988 1188 (24hrs)

*** Weekday Daytime calls cost 8p plus up to 6p/min from BT Weekend Unlimited. Mobile and other providers' charges may vary.**



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