

Chartered CIVIL ENGINEERS

1 The Grove
Felpham
West Sussex
PO22 7EY



Flood Risk Assessment

for

**Replacement of Existing Bungalow with
1 No. Chalet Bungalow
(to approved design FP/259/17/HH)**

at

**22 North Way
Felpham
Bognor Regis
West Sussex
PO22 7BT**

Project: FC2790
Date: Nov 2018
Author: MH
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Flood Risk Assessment

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A	Location Plan & Site Plan EA Flood Map for Planning 01/11/18 EA Product 4 Detailed Flood Risk Information dated 22/11/18 EA Cover letter dated 22/11/18 Site Node Points Plan Flood Map for Planning (Rivers & Sea) Modelled Flood Outlines – Undefined Fluvial Modelled Flood Outlines – Defended Tidal Modelled Flood Outlines – Undefined Tidal Defra Website Surface Water Flood maps Extent of Flooding Depth of Flooding Velocity of Flood Water	AMD 236/01
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Flood Risk Assessment

1. Introduction

- 1.1 We have been appointed, by Chris Kleanthous, to provide a Flood Risk Assessment to accompany the proposed planning application to Arun District Council (ADC Ref FP/249/18/PL), for the replacement of an existing Bungalow with a new Chalet Bungalow (to approved design FP/259/17/HH) at 22 North Way, Felpham, Bognor Regis, PO22 7BT.
- 1.2 The Flood Risk Assessment (FRA) study has been prepared for this site in accordance with the requirements of The National Planning Policy Framework (NPPF) (with particular reference to Chapter 14 “Meeting the challenge of climate change, flooding and coastal, the NPPF Technical Guidance on flood risk). It is also consistent with the latest guidance issued by the EA on the preparation of FRA’s and follows guidance issued by the EA on the preparation of FRA’s and Flood Evacuation Plans.
- 1.3 This FRA report assesses the risk of flooding to the site with reference to the types of potential flooding and the potential impact of the development on flood risk, allowing for climate change impact to 2115. The scale and nature of the FRA is considered appropriate to the scale and nature of the proposed development.
- 1.4 Flood risk maps and flood levels acquired from the Environment Agency (EA) have been used in the preparation of this report.

2. Existing Site Use

2.1 Site Setting

- 2.1.1 The site, a residential dwelling is situated at 22 North Way, Felpham, Bognor Regis, PO22 7BT. A site location plan, AMD 236/01 is shown in Appendix A.

2.2 Site Topography

- 2.2.1 No topographical survey has been carried out to date.
- 2.2.2 A fair representation of the site layout is shown on the EA site Node Points Layout plan, Appendix A
- 2.2.3 From inspection of the EA product 4 Flood Risk data, namely the Fluvial Undefended water levels and depths the site node points have corresponding external ground levels of 1.51 and 1.42m AOD.
- 2.2.4 The existing dwelling's ground floor is envisaged to be approximately 0.9m above external ground levels at 2.41m AOD.

2.3 Watercourses

- 2.3.1 The site's northern boundary is adjacent to an EA designated main river, acting as a tributary to the Aldingbourne Rife, as shown on EA Site Node point layout Plan, Appendix A. The existing dwelling is within 10m of this watercourse.
- 2.3.2 In addition, the site is situated approximately 100m east of the Aldingbourne Rife.

2.4 Hydrology & Geology

- 2.4.1 The EA Groundwater Sources Map on the Magic maps via the EA web site indicates that the site lies outside a ground water source protection zone.
- 2.4.2 In addition, magic maps appear to suggest that the site is situated within a:
- 2.4.2.1 Groundwater Vulnerability - Major Aquifer High
 - 2.4.2.2 Loamy and clayey floodplain soils with natural high groundwater

2.5 Existing Drainage

- 2.5.1 The existing dwelling's drainage is understood to be a combined system which connects to the foul/combined sewer system within North Way.
- 2.5.2 The extent and nature of the existing drainage system is proposed to be confirmed following planning consent through a CCTV drainage survey.
- 2.5.3 Given the nature of the soil anticipated within the site, soil infiltration rates are not anticipated to be good. Furthermore, given the sites proximity to watercourses the ground water tables are likely to be relatively high, which has also been highlighted within the information obtained from Magic Maps, within paragraph 2.4.

2.6 Indicative Flood Risk

- 2.6.1 Indicative flood maps obtained from the Environment Agency website are shown in Appendix A.
- 2.6.2 The flood map indicates that the site is situated entirely within a Flood Zone 3, defined as defined as having;
 - a greater than 1% chance of river flooding (greater than 1 chance in 100 in any year), or
 - from the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year
- 2.6.3 The flood risk maps are based on no flood defences being present.

3. Existing Flood Risk

3.1 River and Tidal Flooding

- 3.1.1 Detailed flood risk maps and data, comprising flood levels and flood depths, have been obtained from the Environment Agency via email dated 22nd November 2018, as shown in Appendix A.
- 3.1.2 The flood map for planning (River and Sea) clearly shows the site within a Flood Zone 3.
- 3.1.3 The undefended fluvial flood risk map indicates that the site is situated entirely within a Flood Zone 3 – High probability, defined as having;
- a 1 in 100 or greater annual probability of river flooding in any year
 - Modelled flooding for a 1 in 100-year storm return period with 35% climate change allowance results in a site flood level of 1.63m AOD and a flood depth of 0.21m
- 3.1.4 The defended tidal flood risk map indicates that the site is situated entirely within a Flood Zone 3 – High probability, defined as having;
- a 1 in 200 or greater annual probability of sea flooding in any year
 - Modelled flooding for a 1 in 200-year storm return period (year 2115) results in a site flood level of 2.05m AOD and a flood depth of 0.68-0.76m
- 3.1.5 The undefended tidal flood risk map indicates that the site is situated entirely within a Flood Zone 3 – High probability, defined as having;
- a 1 in 200 or greater annual probability of sea flooding in any year
 - Modelled flooding for a 1 in 200-year storm return period (year 2115) results in a site flood level of 4.29m AOD and a flood depth of 2.83-2.93m
- 3.1.6 These detailed flood risk maps show that the site lies within a Flood Zone 3.
- 3.1.7 The EA within their letter to ABMH Civils Ltd, dated 22/11/18, have confirmed that

‘There are no formal raised fluvial flood defences in the vicinity of the site.

Under normal conditions flow from the Aldingbourne Rife is conveyed under the sea wall via two gravity outfall structures which have tidal flaps. When tidal conditions and river flows dictate, flow is pumped over the sea wall by Felpham pumping station to discharge into a stilling bay on the upper foreshore.

The coastal defences are predominantly shingle ridges with some sections also having additional protection from wave return walls, wide promenades, and rear splash walls.

Arun District Council are responsible for maintenance of some of the sea defences in Bognor Regis.’

3.1.8 Our understanding is that the sea defences have been designed to cater for an event of flooding from the sea with a 0.5% (1 in 200) chance in any given year, though this is yet to be confirmed with Arun District Council.

3.1.9 If the sea defences were not there, this site would be at risk of flooding as per the undefended tidal flood map. An area of land may benefit from the presence of a flood defence even if the defence has been overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

3.1.10 It should be highlighted that there are no known planned improvements in this area to the existing defences.

3.1.11 In conclusion, the flood risk from fluvial/tidal sources is considered to be high.

3.2 Flood Risk from Overland Flows

3.2.1 The area adjacent to the site is predominantly urbanised.

3.2.2 The EA's definition is '*Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.*'

3.2.3 Defra's website maps for long term flood risk information show that the site is situated within an area of low risk of surface water flooding, with a flood depth of 0.3-0.9m and flood velocity of 0.25m/s, as shown in Appendix A

3.2.4 In conclusion the flood risk from overland surface water flood flows is considered to be low.

3.3 Flood Risk from Reservoirs

3.3.1 Defra's website maps for long term flood risk information show that the site is not situated within an area of risk surface water flooding from reservoirs.

3.3.2 In conclusion the flood risk from reservoir flood flows is considered to be low.

3.4 Flood Risk from Groundwater

3.4.1 Given the topography adjacent to the site, the flood risk from groundwater is considered to be low.

3.5 Flood Risk from Artificial Drainage

- 3.5.1 The site is within an urban setting which can be severely affected from the flooding from manholes and gullies associated with drainage systems serving these urban areas.
- 3.5.2 However, it is considered that any flooding from these sources would manifest themselves as overland flows, and therefore the flood risk to the site, as highlighted previously for overland flows, is regarded as being low.
- 3.5.3 In conclusion, the flood risk from artificial drainage is considered to be low.

3.6 Flood Risk from Infrastructure

- 3.6.1 There are no known flood defences, canals or reservoirs on higher ground close to the site that could cause flooding to the proposed site were they to fail.
- 3.6.2 In conclusion flood risk from infrastructure is considered to be low.

3.7 Flood History

- 3.7.1 The EA have no record of previous flooding events affecting the site.
- 3.7.2 In addition, the client's family have owned the site for a number of years and similarly have no recollection of flooding affecting the site.

3.8 Overall Conclusion of Existing Flood Risk

- 3.8.1 The site is situated within a Flood Zone 3
- 3.8.2 Given that the site is within a Flood Zone 3, the overall flood risk to the site is considered to be high.

4. Proposed Development

4.1 Introduction

- 4.1.1 The site layout plan, as shown on AM Design's drawing 236/01 Appendix A, and proposed floor and elevations, as shown on AM Design's drawings 236/04A & 05A, Appendix B.
- 4.1.2 The proposed development consists of a replacement of existing bungalow with a new chalet bungalow. The new chalet bungalow design was previously approved by the planning authority, Arun District Council (ADC), as a significant modification/extension of the existing dwelling under planning approval reference FP/259/17/HH.
- 4.1.3 The scheme is now being resubmitted for planning approval due to an enforcement action brought about by ADC, in which the previous planning consent is deemed to have been breached.
- 4.1.4 However, the proposed chalet bungalow being submitted for planning approval is understood to be same design that was previously approved by ADC.

4.2 NPPF Vulnerability Classification

- 4.2.1 The proposed changes will not change the current land use as defined by NPPF Technical Guidance, and hence will not change the flood risk to the dwelling as a whole.
- 4.2.2 The Flood Risk Vulnerability Classification as defined in NPPF Technical Guidance Table D,2 for the existing site use will have 'More Vulnerable' classification based on the existing dwelling use.
- 4.2.3 The proposed use of the site will remain unaltered.

4.3 Drainage

- 4.3.1 The proposed development will require the existing positive drainage to be diverted around the dwelling with an altered connection to the sewer system, via on site connections. It is envisaged that this system can connect to the sewer system via gravity.
- 4.3.2 Given the existing drainage system on site, and the tight layout on site, it is envisaged that any new/diverted drainage system is likely to be retained as a combined system, though separate systems would be preferable and should be explored at detailed design stage to see if they are viable/practical given the constraints and existing arrangements.
- 4.3.3 The proposed dwelling will result in no increase in additional impermeable areas, and thus surface water flows, from the scheme previously approved.

4.4 Proposed Development Flood Risk

4.4.1 Flood Plain Storage Displacement

- 4.4.1.1 The proposed development by virtue of a replacement dwelling within a Flood Zone 3 will effectively displace existing flood plain storage.
- 4.4.1.2 However, this structure is no larger than the previously approved dwelling (FP/259/17/HH) and thus in effect will result in no increase in displaced flood storage volumes.
- 4.4.1.3 In fact, the building is proposed to be elevated above ground levels and therefore the void beneath the ground floor slab and the existing ground could be utilised for flood storage, thus providing a significant betterment from the current approved scheme. Flood flows could be permitted to flow in and out from under the building via grilled/meshed openings within the exterior wall level enabling the void to provide additional flood storage as a when required.

4.4.2 Flood Depth & Flood Flows

- 4.4.2.1 The proposed replacement dwelling will pose no greater risk of flooding than it is at present.
- 4.4.2.2 The current approved scheme's ground floor level, (FP/259/17/HH) intended to match the existing bungalow's elevated ground floor level, which was measured at 0.9m above existing ground levels, at 2.41m AOD.
- 4.4.2.3 The proposed replacement dwelling is proposed to have a ground floor level of 2.66m AOD, resulting in an increase in the proposed ground floor level from existing/previously approved dwellings of 250mm.
- 4.4.2.4 Defra's vulnerable developments standing advice, as stated on their website, states that

*'Ground floor levels should be a minimum of whichever is higher of:
300mm above the general ground level of the site
600mm above the estimated river or sea flood level'*

- 4.4.2.5 The modelled, 1 in 100-year storm return period with 35% climate change allowance, undefended fluvial flood level is 1.63m AOD. The proposed ground floor level at 2.66m AOD would provide a minimum clearance of 1.03m from predicted flood levels during this flood event, which is in excess of Defra's minimum requirements (600mm).

- 4.4.2.6 The model defended tidal flood level is 2.05m AOD, for a 200-year storm return period (year 2115). The proposed ground floor level at 2.66m AOD would provide a minimum clearance of 0.61m from predicted flood levels during this flood event, which is just in excess of Defra's minimum requirements (600mm).
- 4.4.2.7 The modelled undefended tidal flood level is 4.29m AOD, for a 1 in 200-year storm return period (year 2115). The proposed ground floor level at 2.66m AOD would result in 1.63m of flooding above the proposed ground floor level.
- 4.4.2.8 Given that sea defences do exist and are maintained by the local authority, Arun District Council, and are anticipated to be sufficient to cater for a 1 in 200-year storm return period (year 2115), it is anticipated that the undefended tidal flood level of 4.29m AOD is unlikely to be experienced, during the life span of the building, unless a catastrophic event and failure of the defences occurs.
- 4.4.2.9 It is therefore concluded that providing a ground floor level 600mm above the undefended tidal flood level at 4.89m ($4.29 + 0.6\text{m}$), approximately 3.38m above existing site levels would be deemed unviable.
- 4.4.2.10 The proposed ground floor level at 2.66m AOD provides the requisite protection and clearances/freeboard for the modelled undefended fluvial and defended tidal (2115) flood levels.
- 4.4.2.11 The chalet bungalow will have an upper floor area, with a ground floor to first floor dimension of 2.4m, thus having a first floor level of 5.06m AOD. This would provide a safe refuge area for the occupants/residents in the event of an undefended tidal flood event (2115) with a flood level of 4.29m AOD, providing a clearance of 0.77m above predicted flood levels.
- 4.4.2.12 It should be noted that these figures are best estimates of flood levels based on certain parameters within the modelled events provided by the EA.
- 4.4.2.13 Given the current modelling that has taken place, an event outside the scope of the recent study could cause a flood event, with the ground floor being flooded.
- 4.4.2.14 Although the site is protected by flood defences, should these be breached then a sudden and swift influx of flood water would soon flow into the site.
- 4.4.2.15 It should also be noted that the replacement building will provide a slightly higher ground floor level at approximately 1.15m above external ground level, than the existing building's ground floor level, 0.9m above external ground level.

- 4.4.2.16 The EA's minimum level of flood protection for replacement buildings in this locality, from inspection of EA's responses to similar developments such as 31 Rife Way (ADC Ref FP/21/17/PL), would be to have a raised ground floor 300-600mm above existing ground levels, twinned with flood resilience measures.
- 4.4.2.17 The fact that both existing and proposed ground floors are in excess of 300-600mm above existing ground levels, demonstrates that the minimum EA flood protection in terms of ground floor level is already being adhered to.

4.4.3 Mitigation

4.4.3.1 The following aspects should be implemented to reduce flood risk:

4.4.3.2 External Areas

- Hard paved areas reduced as much as possible, with more porous surfacing incorporated within the proposals, or paved areas discharged to landscaped areas.
- Flood flow routes established around the dwelling leading off site, to watercourses and highways.
- Consideration of separating the existing drainage system into storm and foul drainage systems if space allows.
- the proposed surface water runoff from the development should be redirected to the watercourse/main river along the site's northern boundary, if land ownership/permissions are available, and space is present within the site to facilitate this preferred outlet.
 - However, the existing drainage is understood to be combined discharging to the sewer network within the highway, North Way. The proposed impermeable areas are not anticipated to be increased from previously permitted schemes which have been approved by Building Control to connect to the sewer system.

4.4.3.3 Ground Floor

- The current modelled defended tidal flood level (2115) is 2.05m AOD.
- Proposed ground floor level is 2.66m AOD, which is 1.15m above existing ground level to brick dimensions, achieving a min 600mm freeboard for the defended tidal flood level (2115) and the undefended fluvial flood level (SRP 100yr + 35% CC)
- Provide access points just above existing ground levels to the void under the ground floor slab to enable the void areas to be utilised for flood storage.
 - Flood flows would flow in and out from under the building via gridded/meshed openings within the exterior wall level enabling the void to provide additional flood storage as a when required.

- During the works it may also be worth considering making the works at ground floor level below 4.89m AOD to be flood resilient, thereby minimising the disruption and damage following an undefended tidal flood event, whilst at the same time acknowledging that the likelihood of this occurring, or occurring to this severity is regarded as extremely low given that the sea defences are currently maintained by ADC.
 - Designing the building to allow water to pass through the property to avoid structural damage by:
 - Using materials with low permeability
 - Making it easy for water to drain away after flooding
 - Making sure there's access to all spaces to enable drying and cleaning.
 - Main services to be positioned as high as possible, providing as greater level of protection as is practical for the residents.

4.4.3.4 General issues

- Enrolling with the EA to receive Flood Alerts
- Developing a Flood Evacuation plan for the residents

4.5 Climate Change

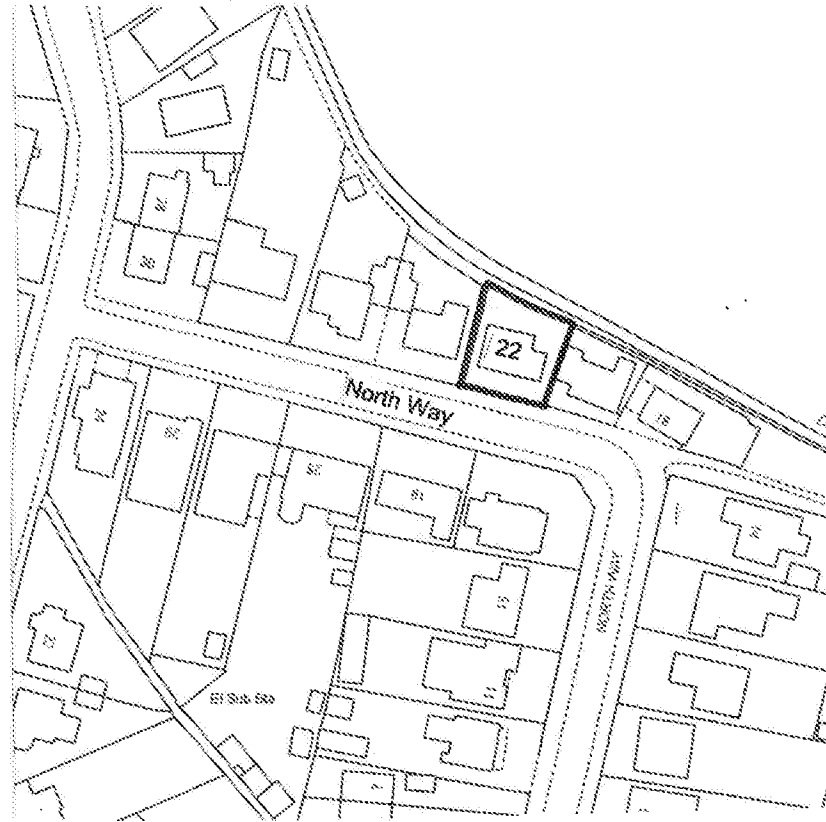
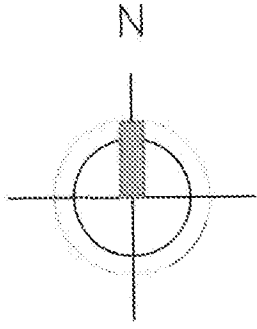
- 4.5.1.1 It is generally accepted that climate change will result in more frequent, short duration, high intensity rainfall and more frequent periods of long duration rainfall. These factors have the potential to alter the flood risk of the proposed site.
- 4.5.1.2 It is assumed that the flood levels indicated by the EA within their website have taken climate change into account for the period up to the year 2115, in line with the recommendations of NPPF Technical Guidance, which equates to the estimated life of the development.

5. Summary

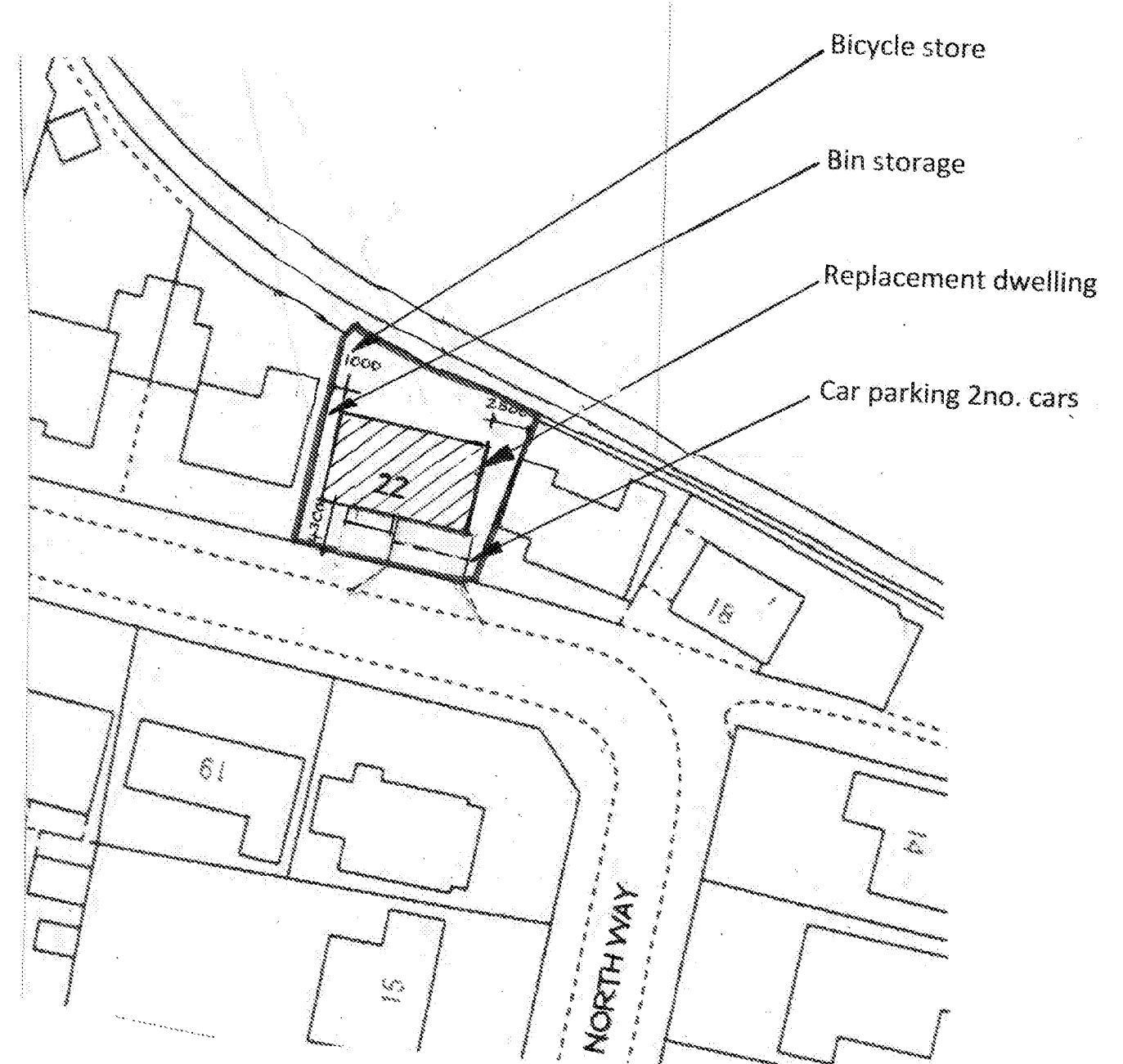
- 5.1 This report has found the following overall conclusions;
- 5.2 The site is situated within a Flood Zone 3 (1% AEP plus CC), which is deemed to have a High Probability of flooding from fluvial/tidal sources.
- 5.3 As noted on the EA website the site benefits from sea defences which protect the area against a tidal flooding with a 0.5% chance of happening each year.
- 5.4 The proposed ground floor level at 2.66m AOD provides the requisite protection and clearances/freeboard for the modelled undefended fluvial and defended tidal (2115) flood levels.
- 5.5 The modelled undefended tidal flood level is 4.29m AOD, for a 1 in 200-year storm return period (year 2115). The proposed ground floor level at 2.66m AOD would result in 1.63m of flooding above the ground floor level.
- 5.6 Given that sea defences do exist and are maintained by the local authority, Arun District Council, and are anticipated to sufficient to cater for a 1 in 200-year storm return period (year 2115), it is anticipated that the undefended tidal flood level of 4.29m AOD is unlikely to be experienced, during the life span of the building, unless a catastrophic event and failure of the defences occurs. It is therefore concluded that providing a ground floor level to cater for this scenario is deemed impractical.
- 5.7 It is also deemed that providing a ground floor level 600mm above the undefended tidal flood level at 4.89m ($4.29 + 0.6\text{m}$), approximately 3.38m above existing site levels would be deemed unviable.
- 5.8 The proposed ground floor level at 2.66m AOD provides the requisite protection and clearances/freeboard for the modelled undefended fluvial and defended tidal (2115) flood levels.
- 5.9 The chalet bungalow will have an upper floor area, with a ground floor to first floor dimension of 2.4m, thus having a first floor level of 5.06m AOD. This would provide a safe refuge area for the occupants/residents in the event of an undefended tidal flood event (2115) with a flood level of 4.29m AOD, providing a clearance of 0.77m above predicted flood levels.
- 5.10 A number of mitigation measures have been proposed encompassing external areas and drainage, ground floor and general issues, which should be implemented or considered during detailed design stage.
- 5.11 It is considered that these conclusions meet the requirements of The National Planning Policy Framework (NPPF) (with particular reference to Chapter 14 "Meeting the challenge of climate change, flooding and coastal, the NPPF Technical Guidance on flood risk).

A

- A Location Plan & Site Plan AMD 236/01
 - EA Flood Map for Planning 01/11/18
 - EA Product 4 Detailed Flood Risk Information dated 22/11/18
 - EA Cover letter dated 22/11/18
 - Site Node Points Plan
 - Flood Map for Planning (Rivers & Sea)
 - Modelled Flood Outlines – undefended Fluvial
 - Modelled Flood Outlines – Defended Tidal
 - Modelled Flood Outlines – undefended Tidal
 - Defra Website Surface Water Flood maps
 - Extent of Flooding
 - Depth of Flooding
 - Velocity of Flood Water



LOCATION PLAN 1:1250



SITE BLOCK PLAN 1:500

AMdesign

ARCHITECTURE DESIGN DEVELOPMENT

Leeza Aldis-Hobbs

ARB RIBA SPAB

Mob:

e-mail:

PROJECT
**22 NORTH WAY
FELPHAM
WEST SUSSEX
PO22 7BT**
PROJECT STAGE
PLANNING

DRAWING
**LOCATION PLAN
SITE PLAN**

DRAWING No
236/01

REVISION

SCALE 1:1250 1:500
DATE OCT 2017

DRAWN LA
CHECKED

LETTER	REVISION	DATE

This scheme is subject to town planning and all other necessary consents. All dimensions and levels to be checked on site. This drawing is to be read in conjunction with other relevant drawings and documents. Report all discrepancies to the Architect before work commences. AM Design is the trading name of AM Design Ltd © AM Design Ltd. All rights reserved.

Flood map for planning

Your reference
22 North way

Location (easting/northing)
494695/99855

Created
1 Nov 2018 5:34

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

This means:

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

Notes

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

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

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

Your reference

22 North way

Location (easting/northing)

494695/99855

Scale

1:2500

Created

1 Nov 2018 5:34

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

0 20 40 60m

Page 2 of 2

Mark Hobbs
Abmh Civils Ltd
1 The Grove
Felpham
Bognor Regis
PO22 7EY

Our ref: SSD105695
Your ref:
Date: 22/11/2018

Dear Mark Hobbs,

Enquiry Regarding Product 4 for Flood Risk Assessment for 22 North Way, Felpham, Bognor Regis, PO22 7BT

Thank you for your enquiry which was received on 01 November 2018.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The site is in an area located within Flood Zone 3 as shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences

There are no formal raised fluvial flood defences in the vicinity of the site.

Under normal conditions flow from the Aldingbourne Rife is conveyed under the sea wall via two gravity outfall structures which have tidal flaps. When tidal conditions and river flows dictate, flow is pumped over the sea wall by Felpham pumping station to discharge into a stilling bay on the upper foreshore.

The coastal defences are predominantly shingle ridges with some sections also having additional protection from wave return walls, wide promenades, and rear splash walls.

Arun District Council are responsible for maintenance of some of the sea defences in Bognor Regis. Therefore we advise to contact them as well.

Model Information

The models used were the 2015 Aldingbourne Flood Risk Mapping Study with the 2017 new climate change update, and the 2016 Emsworth to Littlehampton Coastal Modelling which were completed by JBA Consulting.

Flood History

We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Arun District Council** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for 22 North Way, Felpham, Bognor Regis, PO22 7BT.
Licence	<u>Open Government Licence</u>
Information Warnings	None.
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2018 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

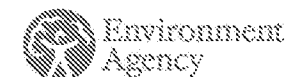
- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Eleonora Pilla
Environment Agency FCRM Officer
West Sussex Partnership & Strategic Overview Team

Flood Map for Planning (Rivers and Sea) created 21/11/2018



Scale 1: 10,000



Flood Map for Planning (Rivers & Sea)

- ~~~~ Sealed Main Rivers
- Defences
- ~~~~ Flood Storage Areas
- ☒ Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Product 4 Flood Risk Data Requested by: Abmh Civils Ltd
Site: 22 North Way, Felpham, Bognor Regis, PO22 7BT

Table 1: Water Levels: Fluvial Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD				
			Undefended Annual Exceedance Probability				
	Eastings	Northings	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494697	99851	-	-	1.72	2.19	1.99
2	494700	99862	-	1.63	1.72	2.18	1.97

Table 2: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
			Undefended Annual Exceedance Probability			
	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494697	99851	3.05	3.65	4.29	3.31
2	494700	99862	3.04	3.64	4.29	3.30

Table 3: Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
			Defended Annual Exceedance Probability			
	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494697	99851	-	-	2.05	-
2	494700	99862	-	-	2.05	-

Table 4: Water Depths: Fluvial Undefended

Node Ref	NGR		Modelled Flood Depths in Metres				
			Undefended Annual Exceedance Probability				
	Eastings	Northings	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494697	99851	-	-	0.21	0.68	0.47
2	494700	99862	-	0.21	0.30	0.76	0.55

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Table 5: Water Depths: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Undefended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494697	99851	1.58	2.19	2.83	1.85
2	494700	99862	1.68	2.28	2.93	1.95

Table 6: Water Depths: Tidal Defended

Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Defended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494697	99851	-	-	0.60	-
2	494700	99862	-	-	0.69	-

All levels taken from: Fluvial: Aldingbourne Rife, 2015. Tidal Emsworth to Littlehampton Coastal Model, 2016.

Produced on: 22/11/2018

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

Office Address: Guildbourne House, Chatsworth Road, Worthing BN11 1LD.

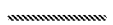
01903 83700 500 500. Email: environment@arundistrictcouncil.gov.uk
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Legend

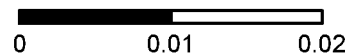


Main River



Node_Points

Scale: 1:500



Kilometers





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N

Legend

 Main River

 1% AEP (Undefended Fluvial)

 0.1% AEP (Undefended Fluvial)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

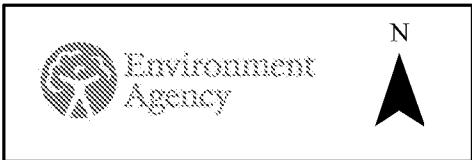
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00.2250.45

Kilometers



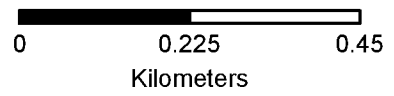


Legend

- Main River
- 1% AEP Plus Climate Change (35%) (Un defended Fluvial)
- 1% AEP Plus Climate Change (45%) (Un defended Fluvial)
- 1% AEP Plus Climate Change (105%) (Un defended Fluvial)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000





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Legend

- Main River
- 0.5% AEP (Defended Tidal)
- 0.5% AEP (2070) NPPF (Defended Tidal)
- 0.5% AEP (2115) NPPF (Defended Tidal)
- 0.1% AEP (Defended Tidal)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

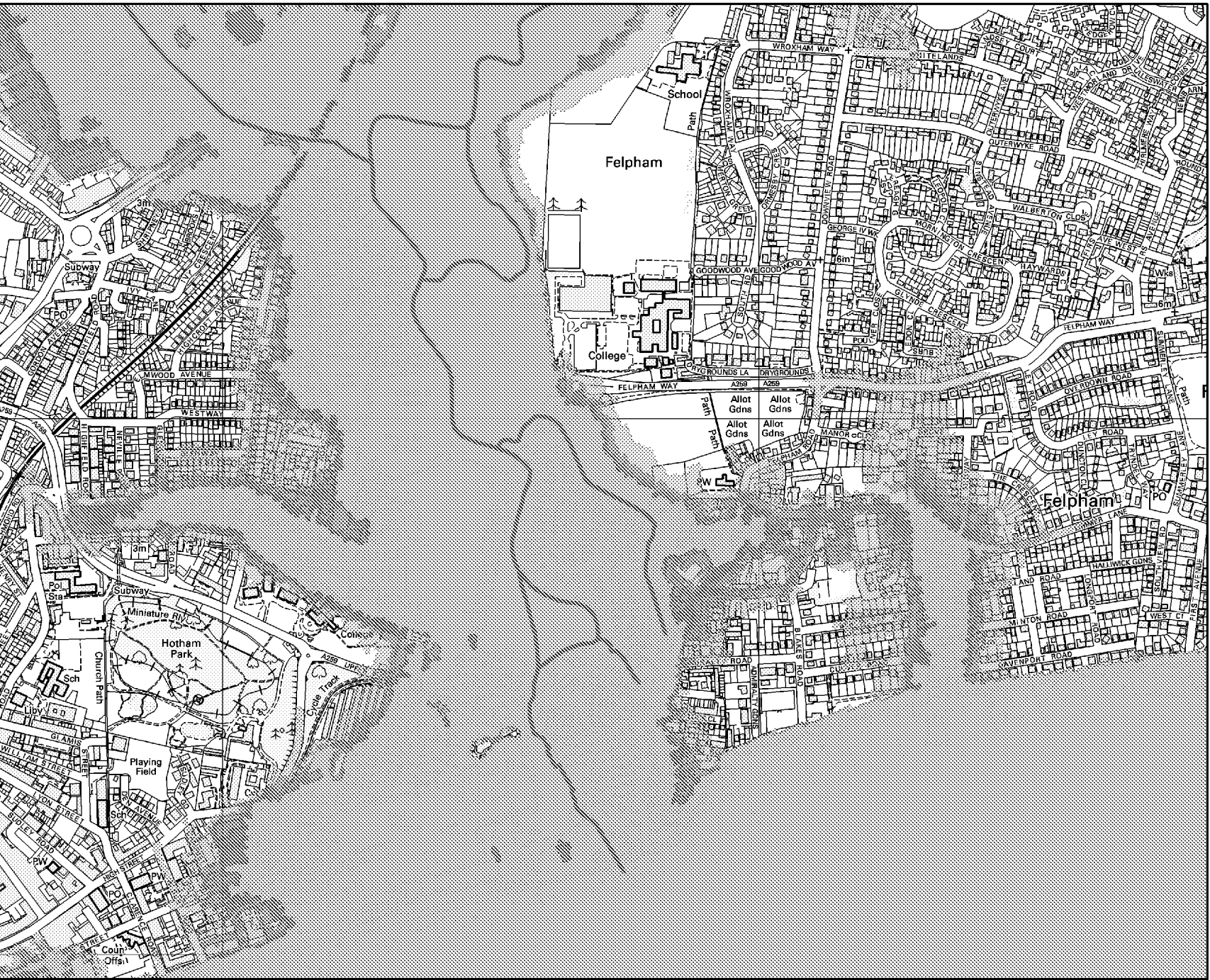
0

0.225

0.45

Kilometers







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Legend

- Main River
- 0.5% AEP (Undefended Tidal)
- 0.5% AEP (2070) NPPF (Undefended Tidal)
- 0.5% AEP (2115) NPPF (Undefended Tidal)
- 0.1% AEP (Undefended Tidal)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

00.2250.45

Kilometers

Basic view



Detailed view

Location

Enter a place or postcode in England



Flood risk from rivers or the sea

☐ Extent of flooding

☐ Depth and flow estimates at monitoring stations



Flood risk from surface water

☒ Extent of flooding

☐ High risk: depth

☐ High risk: velocity

☐ Medium risk: depth

☐ Medium risk: velocity

☐ Low risk: depth

☐ Low risk: velocity



Flood risk from reservoirs

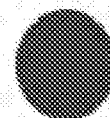
☐ Extent of flooding

☐ Flood depth



Full screen

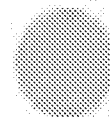
Flood risk



High



Medium



Low



Very low



Location you selected





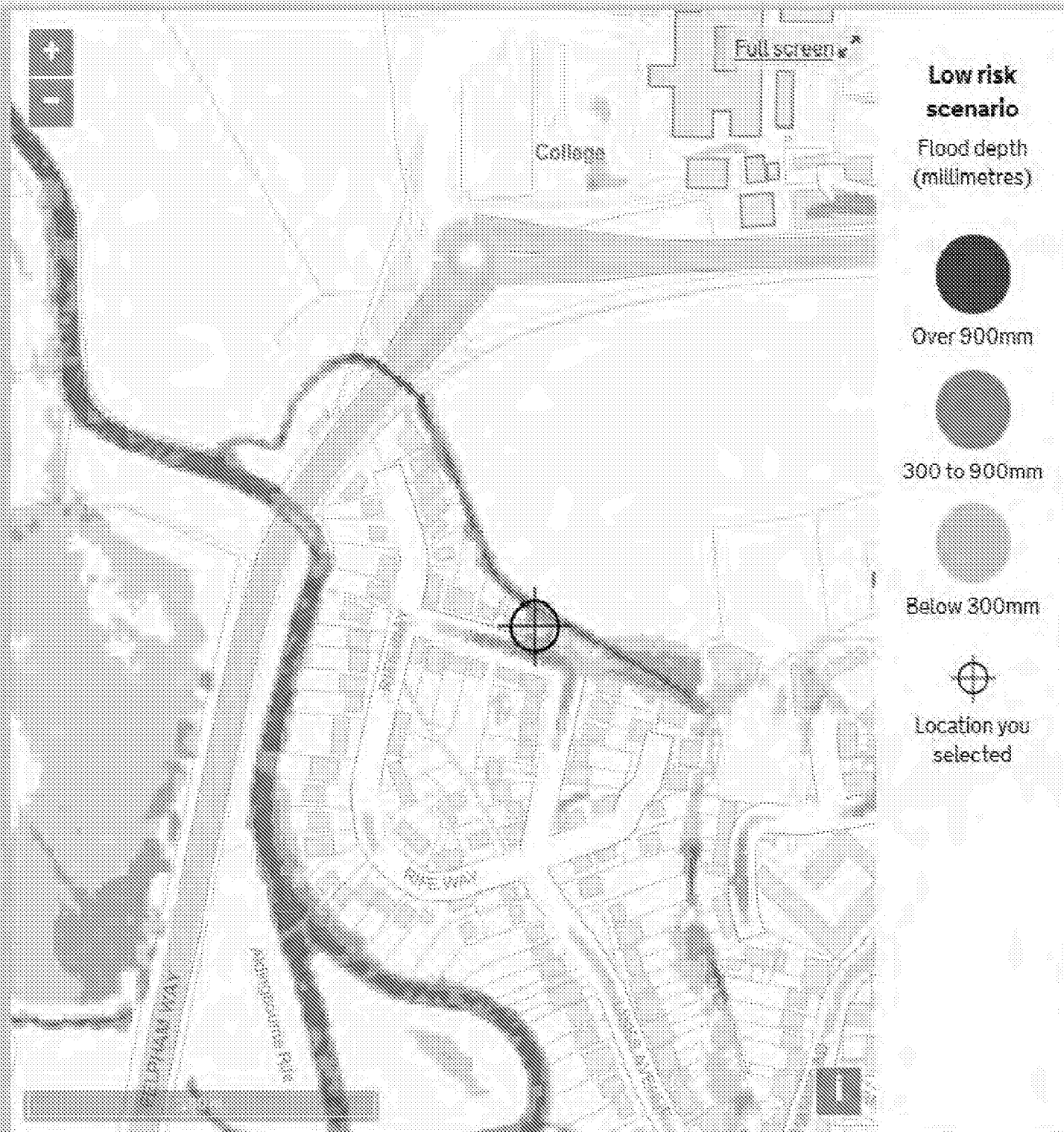
- ☐ Extent of flooding
- ☐ Depth and flow estimates at monitoring stations



- ☐ Extent of flooding
- ☐ High risk: depth
- ☐ High risk: velocity
- ☐ Medium risk: depth
- ☐ Medium risk: velocity
- ☒ Low risk: depth
- ☐ Low risk: velocity



- ☐ Extent of flooding
- ☐ Flood depth
- ☐ Flood speed



Basic view ☒ Detailed view

Location

Enter a place or postcode in England



Flood risk from rivers or the sea

- ☐ Extent of flooding
- ☐ Depth and flow estimates at monitoring stations



Flood risk from surface water

- ☐ Extent of flooding
- ☐ High risk: depth
- ☐ High risk: velocity
- ☐ Medium risk: depth
- ☐ Medium risk: velocity
- ☐ Low risk: depth
- ☒ Low risk: velocity



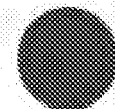
Flood risk from reservoirs

- ☐ Extent of flooding
- ☐ Flood depth
- ☐ Flood speed

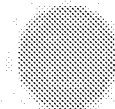


Low risk scenario

Flood velocity (metres/second)



Over 0.25 m/s



Less than 0.25 m/s



Direction of water flow

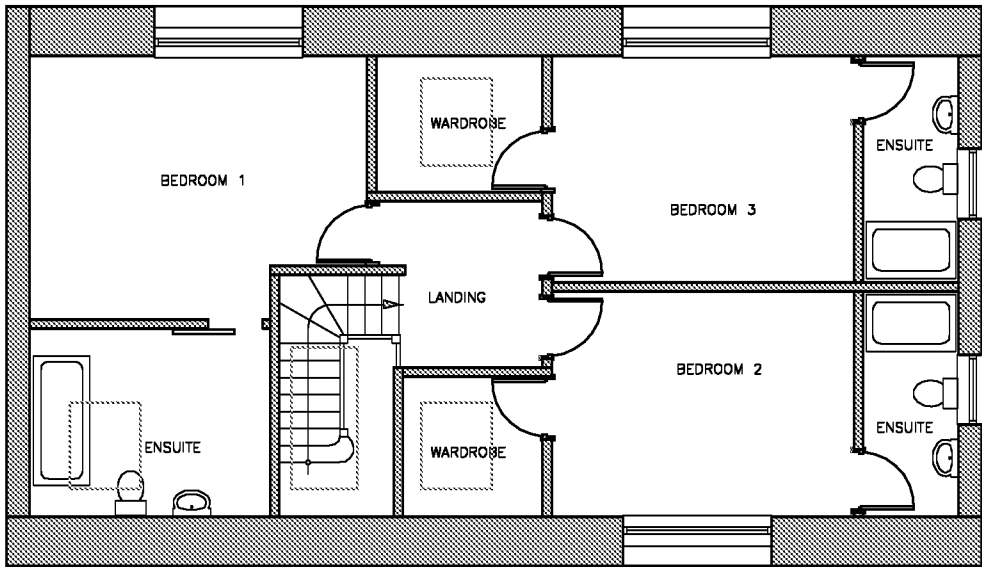


Location you selected

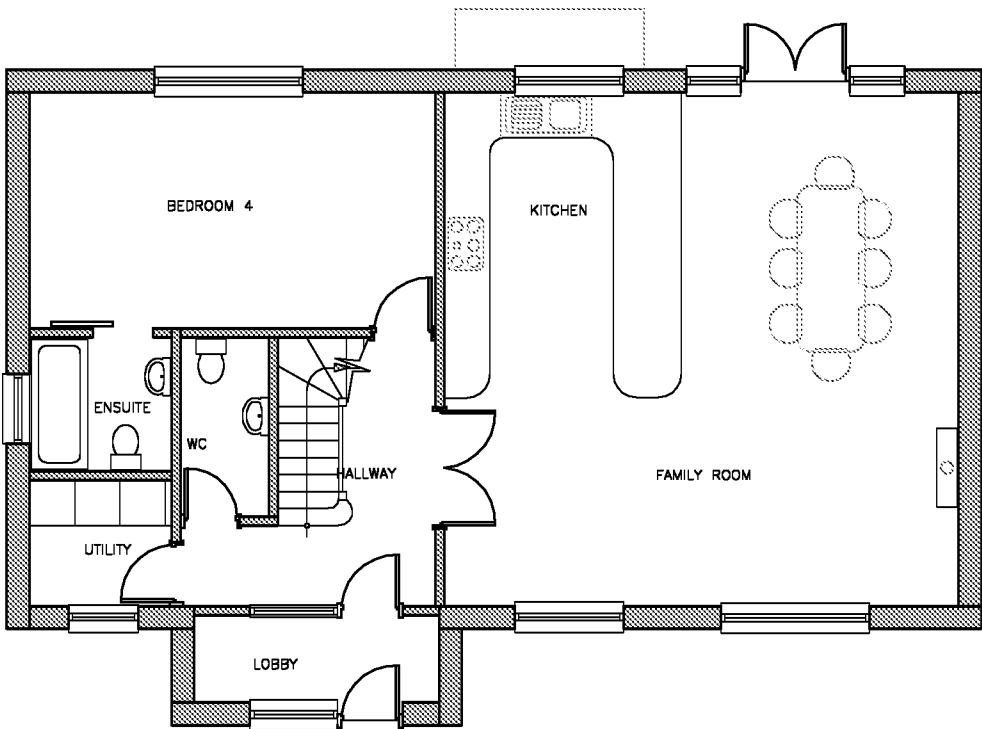
B

Proposed Development
Proposed Floor Plans
Proposed Elevations

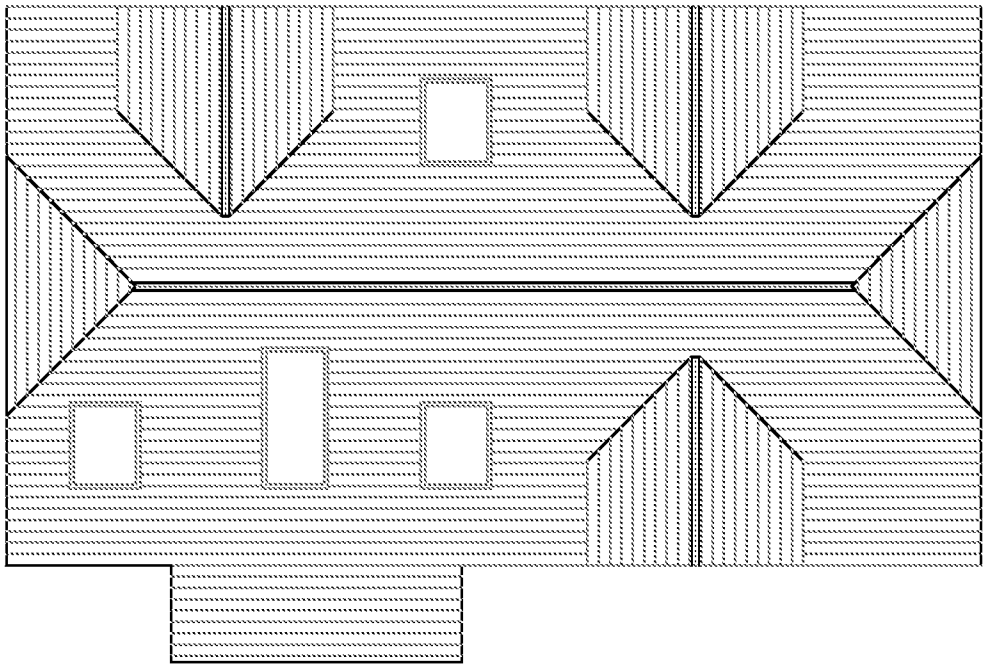
AMD 236/04A
AMD 236/05A



PROPOSED FIRST FLOOR PLAN 1:100



PROPOSED GROUND FLOOR PLAN 1:100



PROPOSED ROOF PLAN 1:100

AMdesign

ARCHITECTURE DESIGN DEVELOPMENT
eeza Aldis-Hobbs ARB RIBA SPAB

Job: [REDACTED]
E-mail: [REDACTED]

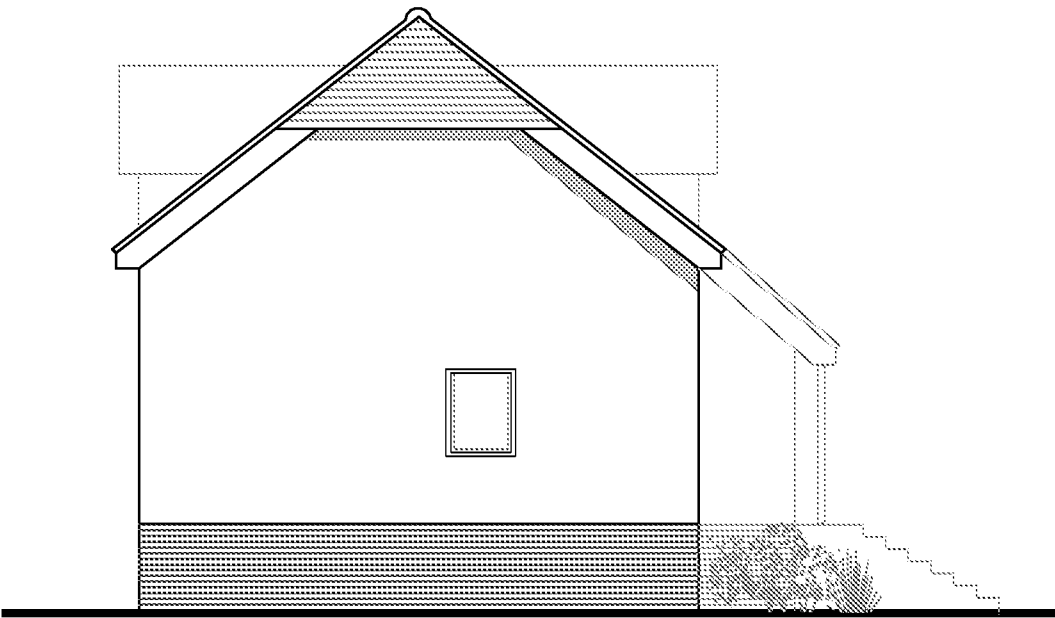
PROJECT
22 NORTH WAY
FELPHAM
WEST SUSSEX
PO22 7BT
PROJECT STAGE
PI ANNING

DRAWING
PROPOSED PLANS
DRAWING No
236/04A
REVISION
SCALE 1:100
DATE SEPT 2017
DRAWN LA
CHECKED

LETTER	REVISION	DATE
This scheme is subject to town planning and all other necessary consents. All dimesions and levels to be checked on site. This drawing is to be read in conjunction with other relevant drawings and documents. Report all discrepancies to the Architect before work commences.		



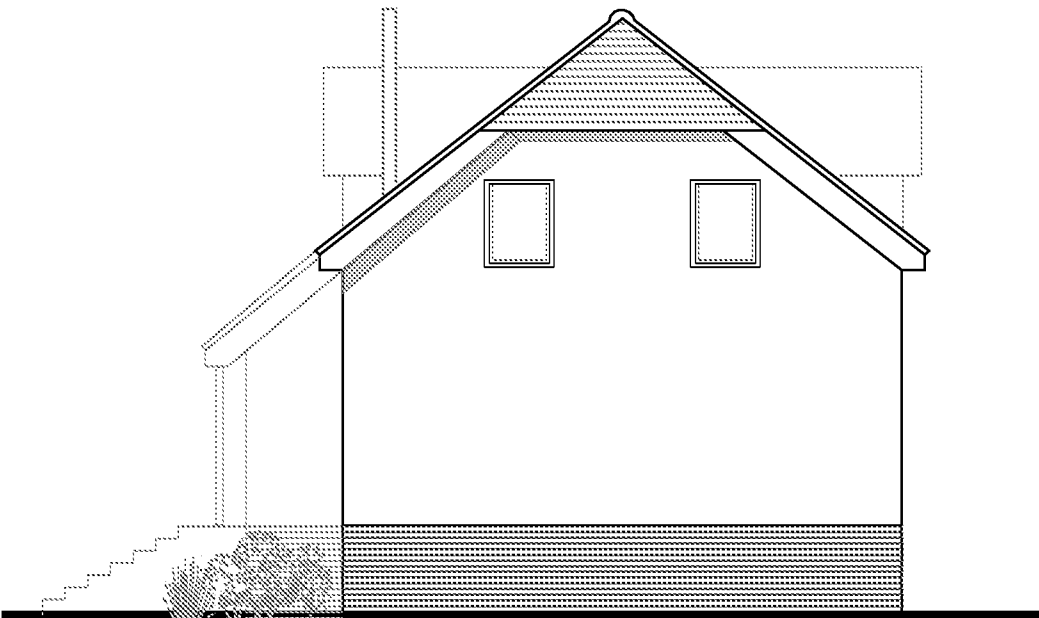
PROPOSED SOUTH ELEVATION 1:100



PROPOSED WEST ELEVATION 1:100



PROPOSED NORTH ELEVATION 1:100



PROPOSED EAST ELEVATION 1:100

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ARCHITECTURE DESIGN DEVELOPMENT
eeza Aldis-Hobbs ARB RIBA SPAB

Job:

E-mail:

PROJECT
22 NORTH WAY
FELPHAM
WEST SUSSEX
PO22 7BT

PROJECT STAGE
PLANNING

DRAWING
PROPOSED
ELEVATIONS

DRAWING No
236/05A

SCALE 1:100
DATE OCT 2017

REVISION
A

DRAWN LA
CHECKED

LETTER	REVISION	DATE
This scheme is subject to town planning and all other necessary consents. All dimensions and levels to be checked on site. This drawing is to be read in conjunction with other relevant drawings and documents. Report all discrepancies to the Architect before work commences.		