

FLOOD RISK ASSESSMENT

Demolish Existing Dwelling & Erection of
a Replacement Dwelling

Furtherhold

Further Old Gate

Holbeach

Spalding

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RMA

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FLOOD RISK ASSESSMENT FOR DEMOLITION OF EXISTING DWELLING & ERECTION OF A REPLACEMENT HOUSE AND GARAGE, FURTHERHOLD, FURTHER OLD GATE, HOLBEACH, SPALDING.

INTRODUCTION

The Government has placed increasing priority on the need to take full account of the risk associated with flooding at all stages of the planning and development process. This seeks to reduce the future damage to property and the risk to life from incidents of flooding. Their expectations relating to flooding are contained in the National Planning Policy Framework July 2021, (NPPF), which identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications by avoiding inappropriate development in areas at risk from flooding and to direct development away from areas at highest risk.

The NPPF provides that development in areas at risk of flooding should be avoided and seeks to direct development away from areas at highest risk. There is a sequential, risk-based approach to the location of development avoiding where possible, flood risk to people and property managing any residual risk and taking account of the impacts of climate change.

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APPLICATION SITE

The site is located on land at Furtherhold, Further Old Gate, Holbeach, Spalding and lies within the administrative area of South Holland District Council. The National Grid Reference for the centre of the site is TF35542 43739.

Plan 1

This flood risk assessment has been prepared for a planning permission, for the demolition of an existing dwelling & the erection of a three storey 5 bed house and garage. **Plan 2**

The site would be classed as Non-Major Development applying the National Planning Policy Guidance (NPPG) as the site is to be developed for less than 10 dwellings.

The National Planning Policy Framework Guidance NPPG defines three levels of flood risk depending upon the annual probability of fluvial flooding occurring.

Zone 1 – Low Probability (<0.1%)

Zone 2 – Medium Probability (0.1 – 1.0%)

Zone 3 – High Probability (>1.0%)

The proposed development site is shown to be within an area of Flood Zone 3a 'High Probability' as detailed on the Environment Agency's Flood Zone Maps **without defences**, and as defined in Table 1 of NPPG. **Map1**

Table 1: Flood Zones Definition

Flood Zone 3- High Probability
Definition Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for uses in times of flood Flood Risk Assessments requirements All proposals in this zone should be accompanied by a Flood Risk Assessment. Policy aims Developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques. • relocate existing development to land with a lower probability of flooding. • create space for flooding to occur by allocating and safeguarding open space for flood storage.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed residential use for the site is classified as "More Vulnerable," in accordance with Table 1 More Vulnerable uses, as set out in Table 2, are appropriate in this zone subject to the exception test.

Table 2: Flood Risk Vulnerability Classification

More Vulnerable
• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons, and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels • Non-residential uses for health services, nurseries, and educational establishments • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravan and camping, subject to a specific warning and Evacuation Plan.

Site Levels

From the Lidar DTM 1m data to OS datum, the average level for the site is taken to be 2.69m ODN. **Plan 2**

DRAINAGE AUTHORITIES

Environment Agency

The Environment Agency has permissive powers for reducing the risk of flooding from designated main rivers and from the sea.

The following potential sources of flooding affecting the development site have been identified as:

- Tidal River Nene and The Wash
- Fluvial River Welland
- South Holland IDB Watercourses.

The flood zone maps indicate that the area would be flooded without flood defences.). The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. In some locations, such as around the fens and the large coastal floodplains there are many kilometres of raised flood defences. To meet the requirements of the National Planning Policy Framework, these defences are removed in their entirety to produce the Flood Map for Planning (Rivers and Sea). The map therefore shows the full extent of areas that would be at risk of flooding if no defences existed, and water could spread out across the floodplain.

Flood Zones

These maps show that the site is considered at risk from tidal flooding as it is all located within an area zoned as Flood Zone 3a. The maps indicate that the area would be flooded without flood defences, which are in place, (with an annual probability of more than 0.5% i.e., return frequency of less than 1 in 200 years for tidal flooding or more than 1.33% return frequency of less than 1 in 100 years for fluvial flooding). **Map 1**

Risk of Flooding from Rivers & Sea

The Risk of flooding from Rivers and Sea shows that the site is at Low risk. **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1.0%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. **Map 2**

Fluvial Flooding

The site is not considered to be at risk from fluvial flooding from the River Welland, as it is located some 8.2Km west of the site.

Tidal Flooding

The main risk of flooding is therefore from a breach to either the tidal River Nene defences which are located some 13.5m to the south of the site or the tidal defences to the Wash which are located some 15km to the east.

Tidal Defences

The existing tidal defences protecting this site consist of earth embankments which are supplemented by saltmarsh to maintain foreshore levels.

They are in good condition and reduce the risk of flooding (at the defence) to a 0.67% (1 in 150) chance of occurring in any year. The Environment Agency inspect these defences routinely to ensure potential defects are identified.

Schemes in the Area

There are no ongoing capital projects to reduce or sustain the current flood risk to this site.

Breach Analysis to Wash/ Nene Tidal Defences

From Lincolnshire & Northamptonshire Area Tidal Modal Analysis, levels for East Coast and Wash: Immingham to the West Lighthouse have an assessment date of 2017, which should be used in any consideration of future increases due to climate change. **Map 3**

Peak tide levels (2017) for the 1 in 200-year 50% confidence bound tide level is 5.82mODN at West Lighthouse And 5.78 at Wisbech.

Peak tide levels (2120) tide level a is 5.82mODN plus Higher Central climate change of 1025mm would be 6.85mODN at West Lighthouse and 6.81mODN at Wisbech.

Taking the precautionary approach, the Hazard Rating following a breach which in Flood Risk Assessment (FD 2320) Guidance for New Development Phase 2 R& D Technical Report these are classified as low <0.75, moderate 0.75-1.25, significant 1.25-2.50 and extreme >2.50 based upon an empirical measure of velocity and depth.

$$HR = d \times (v + 0.5) + DF$$

Where V = Flood flow velocity (m/sec) D = Flood depth (m)

DF = A debris factor included to represent the greater damage, or risk of injury to people, that can occur if debris is swept along with the water. = 0.5 for depths <0.25 or 1.0 for depths.

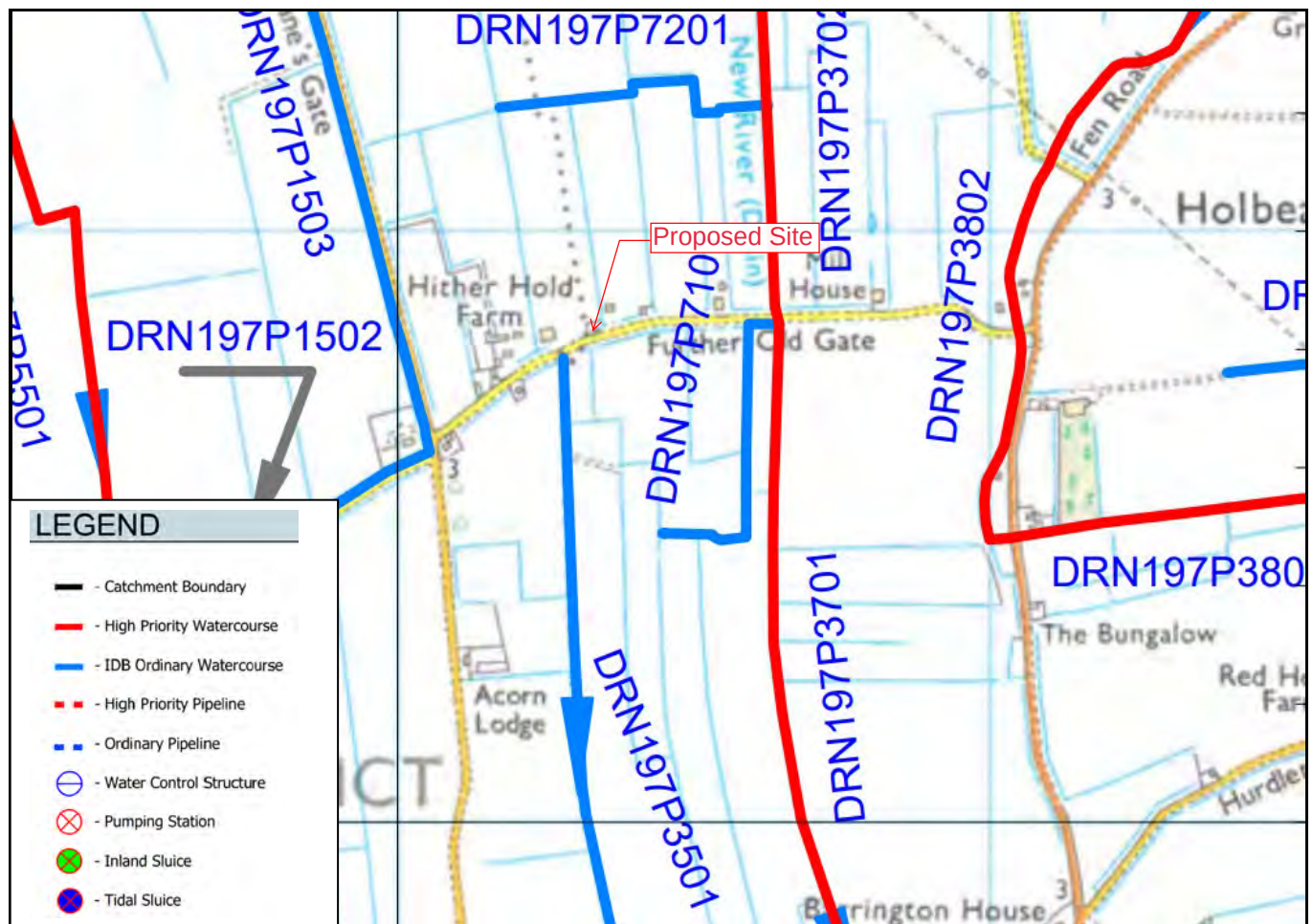
For the degree of Flood Hazard to be classified as low HR must be <0.75

Flood Hazard			Description
	<0.75	Low	Caution – Flood Zone with shallow flowing water or deep standing water.
	0.75 – 1.25	Moderate	Danger for Some - (i.e. children) Danger Flood Zone with deep or fast flowing water.
	1.25 – 2.0	Significant	Danger for Most – Danger Flood Zone with deep fast flowing water.
	>2.0	Extreme	Danger for All – Extreme Danger Flood Zone with deep fast flowing water.

The 2017 Update to SHDC, SFRA has carried out a Tidal & Fluvial Hazard Mapping, for the district, following a breach to the defences. The present-day Residual Flood Hazard, Depth and Velocity District – present day 1% fluvial and 0.5% Tidal Event Probability Maps show that the site where the proposed development is to be located is within an area of no hazard. **Map 4**

The Hazard, Velocity and Depth Maps, for year 2115, also shows that the site is within a hazard area less than 0.75 (Low hazard), depth of flow 0 – 0.25m and velocity 0 – 0.3m/sec. **Maps 5, 6 & 7.**

South Holland Internal Drainage Board



The proposed development site is located within the catchment area of South Holland Internal Drainage Board. The Board is responsible to operate and maintain the arterial fluvial system.

The site is within Board's catchment Little Holland W and the nearest watercourse to the site is Drain No DRN197P3501, Hither Old Farm Drain located to the south-west of the site.

The Board's prior written consent will be required for any of the following works:

- No person without the previous consent of the Board shall erect any building or structure, whether temporary or permanent, or plant any tree, shrub, willow or other similar growth within 9 metres of the landward toe of the bank where there is an embankment or wall or within 9 metres of the top of the batter where there is no embankment or wall, or where the watercourse is enclosed within 9 metres of the enclosing structure.
- No person shall, without the previous consent of the Board, for any purpose, by means of any channel, siphon, pipeline or sluice or by any other means whatsoever, introduce any water into the District or, whether directly or indirectly, increase the flow or volume of water in any watercourse in the District.
- The erection or alteration of any mill dam, weir or other like obstruction to the flow, or erection or alteration of any culvert within the channel of a riparian watercourse.

At detailed planning stage an application to discharge the outfall from the package treatment unit into a drain will be submitted to the Board.

Finished Floor Levels

The minimum mitigation measures required for developments that do not have ground floor sleeping shall be determined by the flood depths arising from the 2115 1% scenario and with sleeping on the ground floor sleeping shall be determined by the flood depths arising from the 2115 0.1% scenario. The finished floor Level FFL of any new dwellings shall be informed by the flood depths.

Flood Risk Mitigation Policy to ensure 'safe' development. Requirements for FFL:

- depths of 0 – 0.25m FFL to be set 300mm above the existing ground level.

The Environment Agency recommendation in this band is for the FFL to be set 300mm above the existing ground level.

This is in accordance with Cell F8 South-East Lincolnshire Standing Advice Matrix.

It is therefore proposed that the ground floor level for the residential accommodation be set at 3.00mODN..

When analysing the Lidar DTM 2m levels around the site in the wider area, these are shown to be in the region of 2.70mODN which would be an appropriate level to use, and are shown to be within a no hazard area..

FLOODING FROM OTHER SOURCES

Flooding is a natural process and can happen at any time from sources other than watercourses and the sea.

- Flooding from land can occur from intense rainfall, often over short duration of time that is unable to soak into the ground or enter the drainage system. However, with the dwelling ground floor level being raised 300mm above the ground and the natural topographic nature of the ground being flat, with no high ground around the site together this will not cause any rapid inundation of the site and is likely only lead to local ponding of shallow depth and low velocity following the natural land contours. It is concluded that flooding from this source is limited to minor isolated cases and is not of strategic significance as regards to flood risk.
- The area is not known to suffer from any groundwater problems. With the floor level of the dwelling being raised 300mm above the ground level the risk of flooding from ground level is minimal.
- Flooding from sewers can occur from overloading from heavy rainfall caused by blockages or having inadequate capacity. There are no public sewers in the vicinity of the site.
- Non-natural or artificial sources of flooding such as reservoirs, lakes, or canals where water is stored above natural ground level could cause flooding if the structure fails or is over topped. There are no known sources within the vicinity of the site.

SURFACE WATER FLOODING

The site for the proposed flats is not shown on the Low-Risk scenario Surface Water flood maps, for the 1 in 1000-year event, to be affected from surface water flooding. This type of flooding is usually short lived and associated with heavy downpours of rain, thunderstorms etc. **Map 8**

The maps for surface water and revised maps for river and sea flooding define the risk as High, Medium, Low and Very Low. The chance of flooding for the area defined in any given year is shown below:

- **High:** greater than 1 in 30 (3.3%).
- **Medium:** between 1 in 100 (1%) and 1 in 30 (3.3%).
- **Low:** between 1 in 1000 (0.1%) and 1 in 100 (1%).
- **Very Low:** less than 1 in 1000 (0.1%)

Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area.

There is a caveat on the Defra Data website, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they

are indicative, these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

The Environment Agency and the Lead Local Flood Authority (custodians of the surface water flood risk dataset) have subsequently confirmed that the published high-level data should not be used on a site-specific basis and that mapping is only suitable for National to County Scale use.

SEQUENTIAL APPROACH

When applying the sequential approach for flood risk in accordance NPPF the site would fall into Flood Zone 2 (Medium Probability) as the site is shown to be within the flood plain as shown on the Environment Agency's Flood Map without defences in place.

The Environment Agency categorise land into one of three Flood Zones.

- Flood Zone 1 is land outside the 0.1% floodplain (with a chance of flooding of less than 0.1% chance in any given year) – Low Probability.
- Flood Zone 2 is land that falls between the 1 in 100-year extent and the 1 in 1000-year extent (a chance of flooding between 1% and 0.1% in any given year) – Medium Probability.
- Flood Zone 3a is land which falls within the 1 in 100-year flood extent (has a 1% chance of a flood occurring in any given year) – High Probability.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed development for residential use is classified as, "More Vulnerable" with Table 1 of NPPG stating that such uses are appropriate in this zone (as summarised in Table 3 NPPG).

Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Flood Zone 1	✓	✓	✓	✓	✓
	Flood Zone 2	✓	✓	Exception Test Required	✓	✓
	Flood Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Flood Zone 3b Functional Floodplain	Exception Test Required	✓	✗	✗	✗

Sequential Test and Exceptions Test

NPPF Guidance Paragraphs 159 – 169 requires development within high areas of flood risk be determined using a sequential risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account the impacts of climate change.

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The NPPF states that development should not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. It is important to note that the Sequential Test does not specifically mean that sites such as this cannot be developed, rather that sites at less risk should be developed first.

The proposal for the development is to erect a replacement dwelling.

The proposed development is made safe from flood risk by ensuring the ground floor level of the proposed new dwelling is above the predicted residual flood levels for a 1 in 200-year event in 2115 for this area.

In order for the Exceptions Test to be passed, it must be demonstrated that the proposed development will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

With regard to the first point of the Exception Test, the development would provide some wider sustainability benefits to the community through a contribution (albeit small) towards housing supply, and other benefits including generating employment during the construction period.

This FRA is in support of the development and indicates that the second part of the Exceptions test is satisfied, also that the development would be safe for the lifetime of the development (100 years) and not increase flood risk elsewhere.

This Flood Risk Assessment in terms of making the development safe, would result in a finished floor level being set at 3.00mODN. This would be sufficient to mitigate against flood risk and demonstrates that the development will be safe for its lifetime, and it will not increase flood risk elsewhere.

Given the above, it is concluded that the Sequential and Exceptions Test are satisfied.

CLIMATE CHANGE

Global warming is now recognised that it is likely to affect the frequency and severity of extreme events as both tidal and fluvial flooding. The Climate change allowances in the NPPF Guidance was updated on the 20th of July 2021.

Peak River Flow Allowances

For flood risk assessments use the Management Catchment Climate Changes for the peak river flow map. Management catchments are sub-catchments of River Basin Districts.

The site is located within the Welland Management Catchment within the Anglian River Basin District, for sites within Flood Zone 2 or 3a and for “More Vulnerable” land uses, the Central allowances figures, in the Table below, should be used.

Peak River flow allowances within the Management Catchment Allowances				
River Basin District /Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015 to2039)	Total potential change anticipated for '2050s' (2040 to2069)	Total potential change anticipated for '2080s' (2070 to2115)
Anglian/ Welland	Upper End	17%	28%	55%
	Higher Central	4%	10%	26%
	Central	4%	10%	22%

The effect of global warming on peak rainfall allowances is given in Table 1.

Table 1 Peak Rainfall Intensity

Table 1 Peak rainfall intensity allowance in small and urban catchments (1961 to1990 baseline)			
Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

The annual sea rise due to climate change is given in NPPF and the recommended contingency allowances are stated in Table 2.

Table 2 Peak Sea Level Rise

Table 2 Peak Sea level allowance for each epoch in (mm) per year with cumulative sea level rise for each epoch in brackets (use 1981to 2000 baseline)						
Area of England) (Use River Basin	Allowance	2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125	Cumulative Rise 2000 to 2125 (m)
Anglian	Higher Central	5.8 (203mm)	8.7 (261mm)	11.6 (348mm)	13 (390mm)	1.20m
Anglian	Upper End	7 (245mm)	11.3 (339mm)	15.8 (474mm)	18.1 (543mm)	1.6m

DRAINAGE STATEMENT

Applications for developments where the proposals will result in the increase the amount of surface water run-off require that an appropriate drainage strategy to be undertaken to ensure that the surface water discharge mimics the existing pre-development regime.

Any proposed surface water drainage system will need to be designed to account for the effects of climate change over the lifetime of the development. Based on the recommendations the proposed drainage systems should be sized for the critical 1 in 100-year storm event and to allow for a 40% increase in rainfall intensity for climate change.

In accordance with recognised guidance, Part H of the Building Regulations 2010 and National Planning Policy Framework, there is a hierarchy of where surface water should discharge. This hierarchy should be followed where practicable, and is as follows:

- 1) Infiltration
- 2) Watercourse
- 3) Public sewer

Surface Water Drainage

Rainwater from the roofs of the proposed house and garage will be discharged into crate soakaways and these should be designed to BRE Digest 365 and approved under the Building Regulations.

Foul Water Drainage

Foul Water drainage will be collected in underground pipes serving the property and to discharge into a package treatment unit, which will be maintained by the owners of the property

As there is to be a positive drainage system capable of receiving flows from the development there is no likely impact on neighbouring property.

FLOOD RESILIENCE CONSTRUCTION

Any impact of damage to the properties can be foreseen and mitigated against by relatively simple design and construction techniques. There are two forms of flood protection works: -

- **Flood-resistance or proofing works**- these try to reduce the amount of water entering a building.
- **Flood-resilient works**: - these reduce the amount of damage caused by water entering the building.

The proposed development will have the following resilient measures incorporated in the construction in accordance with "Improving the flood performance of new buildings" CLG (2007).

- o The minimum ground floor level for the replacement dwelling shall be 300mm above the existing average ground level of the development set at 3.00mODN.
- o Water, electricity, and gas meters: should be located above the predicted flood level. Electrical services: electrical sockets, heating systems: boiler units and ancillary devices should be installed at least 500mm above the ground floor level to minimise damage to electrical services Electric ring

mains should be installed at high level with drops to ground floor sockets and switches.

- o The ground floor to be constructed with a solid concrete floor with no voids beneath and no low-level wall vents. However, if a beam type floor is to be used, provision should be incorporated for draining the under-floor void. The wall vents are to be fitted with 'Flood Angel' air bricks which allow air to free pass through as a usual, (complying with BS493:1995) but under flood conditions it shuts down when in contact with water. A removable mesh prevents the passage of debris which may otherwise impinge on the moving part.
- o Avoid the use of mineral fibre insulation to the ground floor level (walls & floor) and use a rigid closed cell material as these retain integrity and have low moisture take-up.
- o Where possible, all service entries should be sealed (e.g., with expanding foam or similar closed cell material). Closed cell insulation should be used for pipes which are below the predicted flood level.
- o As this site is in an area that is capable of receiving flood warnings from the Environment Agency Floodline Warning Direct system. It is recommended that the property residents contact the Environment Agency's Floodline on 0845 988 1188 to register the property to receive advance warning of flooding by telephone, mobile, fax, SMS text, email or pager. The Environment Agency aim to issue a 'severe flood warning' approximately 2 hours before existing defences are overtopped.

CONCLUSION

- o The site does have the protection of tidal/fluvial flood defences which are well maintained by the Environment Agency.
- o The site for the proposed development is shown to be within Flood Zone 3a as detailed on the Environment Agency's Flood Zone Maps without defences. Although the site is in flood zone 3, and the actual risk of the site flooding from any Environment Agency or IDB watercourse is very low. The site is only at risk of flooding if a breach occurs to the tidal defences during a high tide in 2115 and these are over 13.5Km distant from the site. No flooding would be likely to occur if a breach did not occur.
- o The Flood Risk Vulnerability Classification in Table 2 of NPPG the proposed residential development is classified as "More Vulnerable", with Table 1 of NPPG stating that such uses are appropriate in this zone subject to the Exceptions Test.
- o The 2017 Update to SHDC, SFRA has carried out a Tidal & Fluvial Hazard Mapping, for the district, following a breach to the defences. The present-day Residual Flood Hazard, Depth and Velocity District – present day 1% fluvial and 0.5% Tidal Event Probability Maps show that the site where the

proposed development is to be located is within an area of no hazard. The Hazard, Velocity and Depth Maps, for year 2115, also shows that the site is within a hazard area less than 0.75 (Low hazard), depth of flow 0 – 0.25m and velocity 0 – 0.3m/sec..

- o The ground floor level for the replacement dwelling shall be set 300mm above the existing average ground level for the site to be set at a minimum of 3.00mODN. This accords with the Environment Agency's Flood Risk Mitigation Policy to ensure 'safe' development.
- o The proposed development is made safe from flood risk by ensuring the floor levels of the proposed dwelling is above the predicted residual flood levels in a 1 in 200-year event in 2115 for this area.
- o Any impact of damage to the property can be foreseen and mitigated against by relatively simple design and construction techniques. They will be constructed using materials which are flood resilient construction as outlined in the report.
- o Flooding from other sources is unlikely to impact the site.
- o With the property being three storey, the first-floor level provides a safe haven for the occupants.
- o No obvious constraints have been identified that may impact the proposed development and the type of mitigation measures that can be used to reduce the flood risk, there is no increase in the flood risk to others.
- o It is therefore concluded that the proposed development can be constructed, safely and sustainably, to meet the requirements of NPPF.

Flood map for planning

Your reference
Further Old G

Location (easting/northing)
534321/322833

Created
14 Feb 2022 14:41

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.

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

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

Map 1



Flood map for planning

Your reference
Further Old G

Location (easting/northing)
534321/322833

Scale
1:2500

Created
14 Feb 2022 14:41

-  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

Flood risk

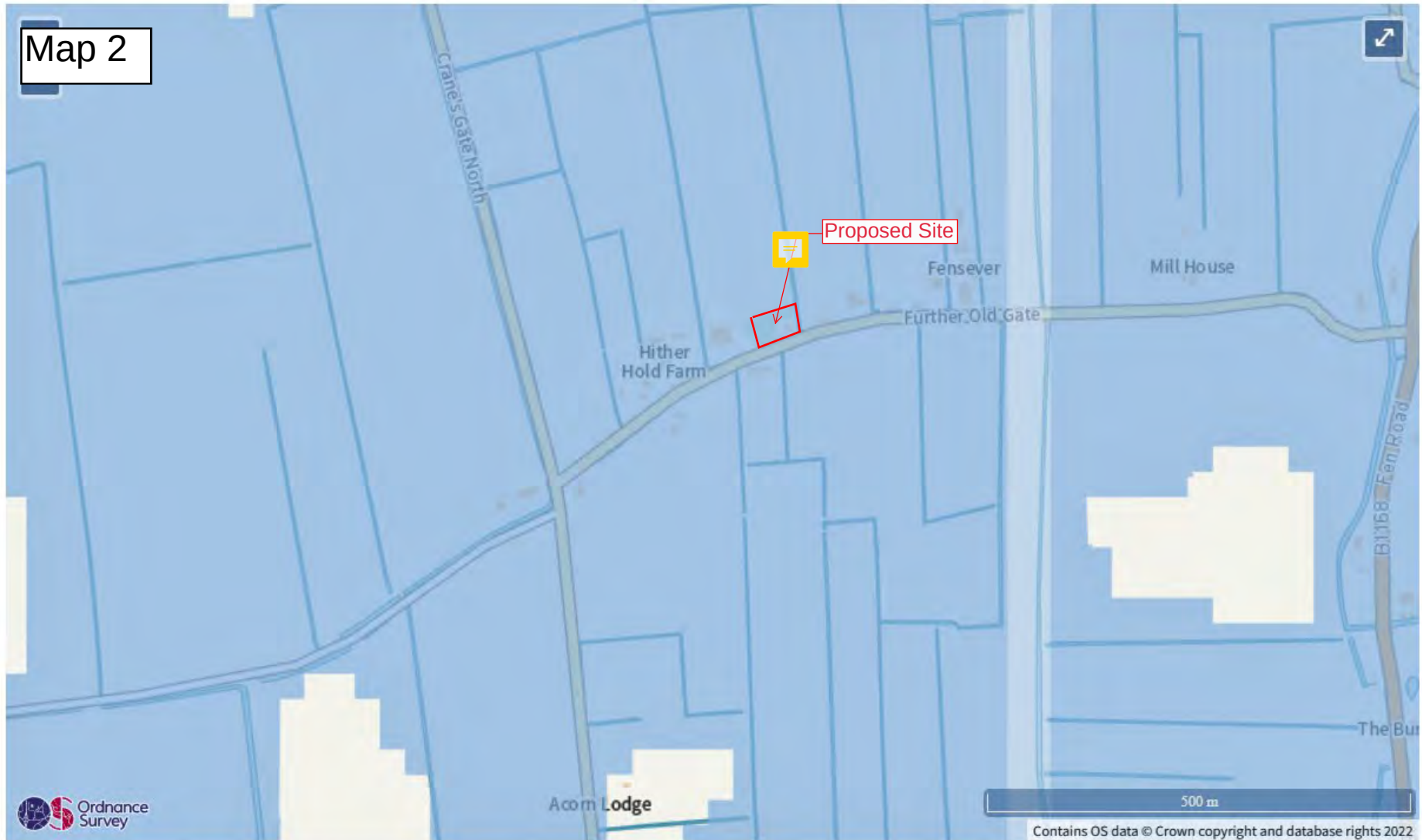
Extent of flooding



Location

Futherhold

Map 2



Extent of flooding from rivers or the sea

High Medium Low Very low

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

CFB REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL IN METRES ODN																						
				1			10			50			100			200			300			1000				
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound				
				2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%
3888	Immingham	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01		
3890	Haborough Marsh	522100	416512	4.14	4.15	4.17	4.48	4.51	4.60	4.70	4.77	4.97	4.80	4.90	5.16	4.90	5.03	5.38	4.94	5.10	5.51	5.11	5.34	5.97		
3898	Grimsby	529295	413162	3.98	3.99	4.01	4.31	4.34	4.43	4.53	4.60	4.80	4.61	4.71	4.97	4.71	4.84	5.19	4.74	4.90	5.31	4.88	5.11	5.74		
3906	Buck Beck	534709	407369	3.87	3.88	3.90	4.19	4.23	4.31	4.41	4.50	4.68	4.50	4.61	4.86	4.61	4.75	5.10	4.64	4.82	5.22	4.80	5.05	5.66		
3910	Tetney	538035	405537	3.85	3.86	3.89	4.17	4.22	4.30	4.40	4.50	4.67	4.49	4.61	4.86	4.60	4.75	5.10	4.63	4.82	5.21	4.80	5.06	5.66		
3918	Donna Nook	544641	401997	3.82	3.83	3.86	4.14	4.19	4.27	4.38	4.48	4.65	4.47	4.60	4.85	4.58	4.74	5.10	4.63	4.82	5.22	4.81	5.08	5.68		
3928	Saltfleet	549131	393360	3.78	3.79	3.82	4.11	4.16	4.26	4.36	4.46	4.64	4.47	4.59	4.86	4.57	4.74	5.11	4.63	4.83	5.25	4.83	5.11	5.74		
3942	Boygrift	555131	380860	3.72	3.74	3.77	4.06	4.11	4.22	4.33	4.43	4.65	4.43	4.57	4.87	4.56	4.73	5.13	4.62	4.83	5.28	4.85	5.15	5.82		
3968	Gibraltar Point	557652	356181	4.16	4.17	4.20	4.51	4.56	4.67	4.76	4.85	5.08	4.85	4.97	5.27	4.94	5.10	5.49	4.99	5.18	5.63	5.14	5.41	6.09		
3992_14	Hobhole	535990	340116	4.96	4.97	5.01	5.40	5.44	5.56	5.66	5.76	5.98	5.78	5.90	6.20	5.88	6.04	6.44	5.92	6.11	6.57	6.03	6.31	6.99		
	Grand Sluice*	532366	344510	4.93	4.94	4.98	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3		
3992_9	Boston Barrier	532754	342852	4.93	4.94	4.98	5.41	5.45	5.57	5.73	5.83	6.05	5.85	5.97	6.27	5.93	6.09	6.49	5.94	6.13	6.59	5.98	6.26	6.94		
3992_5	Fosdyke Bridge	531886	332234	4.87	4.88	4.92	5.31	5.35	5.47	5.58	5.68	5.90	5.71	5.83	6.13	5.82	5.98	6.38	5.87	6.06	6.52	6.01	6.29	6.97		
4008	West Lighthouse	550094	329971	4.87	4.88	4.91	5.21	5.26	5.37	5.46	5.56	5.78	5.56	5.68	5.98	5.66	5.82	6.21	5.71	5.90	6.35	5.86	6.14	6.81		
-	Marsh Road	525988	324065	-	5.04	-	-	5.44	-	-	5.73	-	-	5.85	-	-	5.98	-	-	-	-	-	-	-		
-	Wisbech	546110	309940	-	4.83	-	-	5.25	-	-	5.53	-	-	5.66	-	-	5.78	-	-	-	-	-	-	-		
-	Dog-in-a-Doublet	527200	299287	-	3.67	-	-	4.00	-	-	4.22	-	-	4.32	-	-	4.42	-	-	-	-	-	-	-		

See next page for notes

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

The following notes apply to all CFB sites (ie all on table excluding Marsh Road, Wisbech, Dog-in-a-Doublet)

- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These levels will be updated as their respective tidal river models are updated.

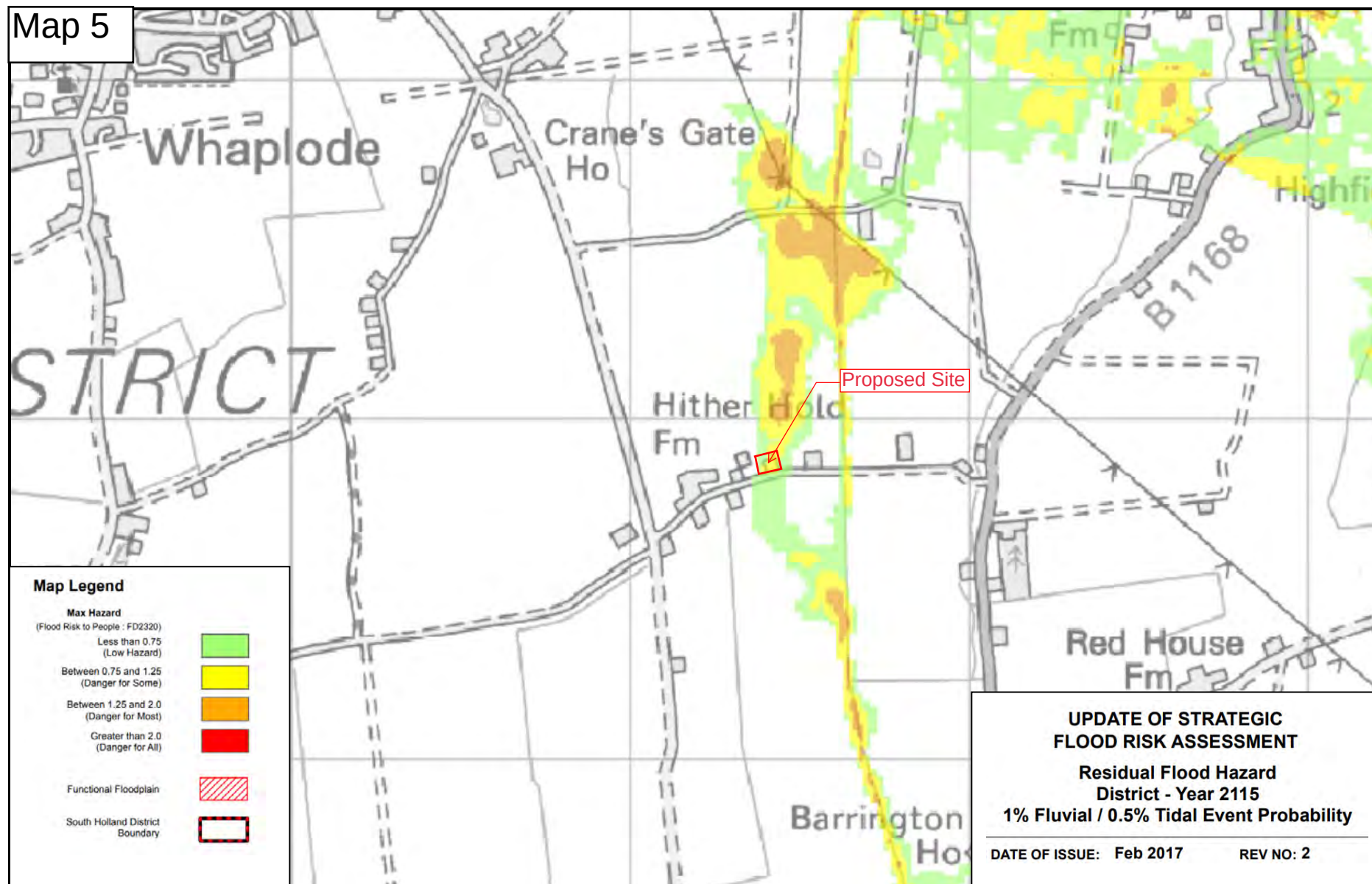
The following notes apply to Grand Sluice

- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at <https://deframetadadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590>

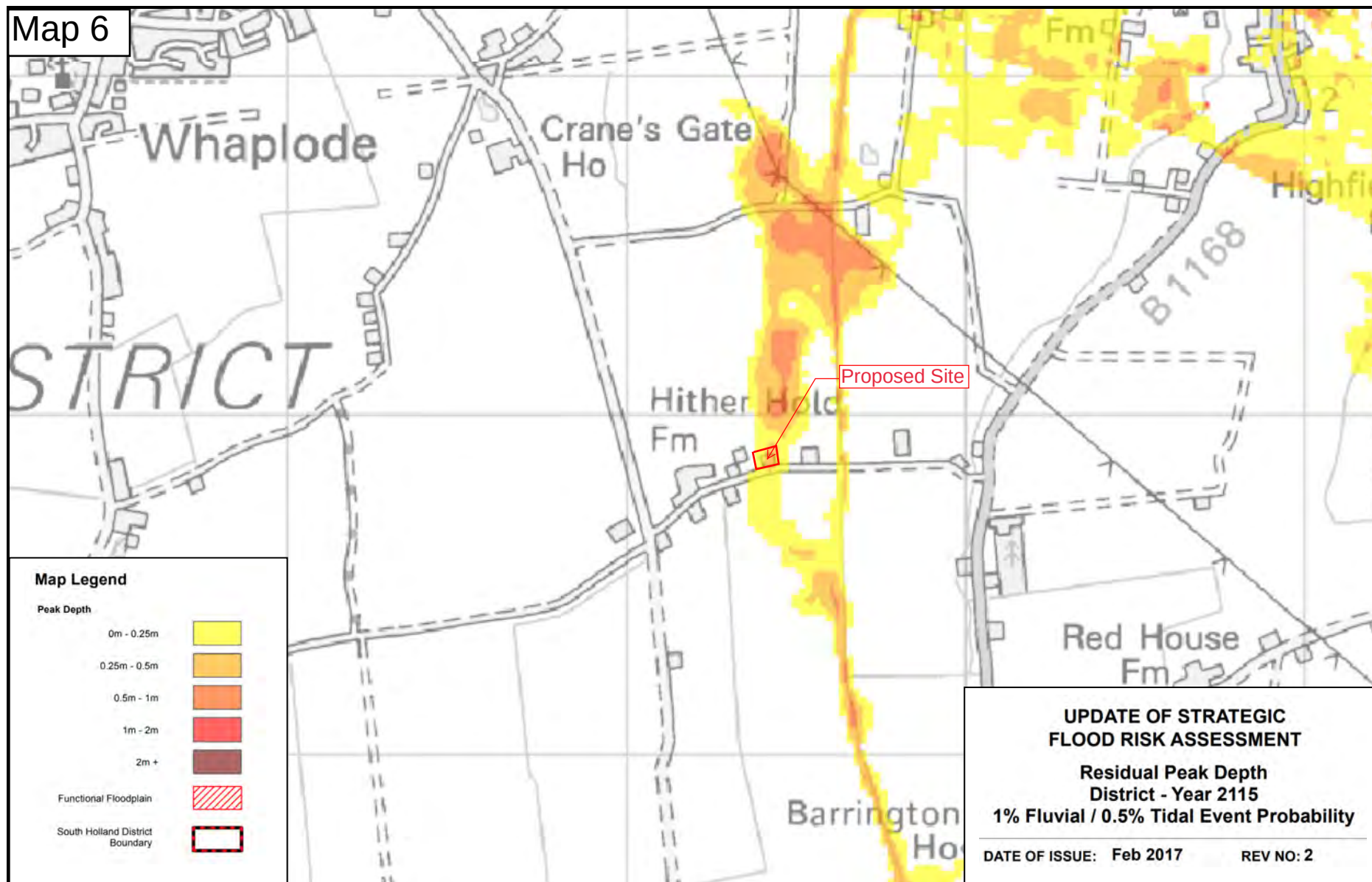
Map 4



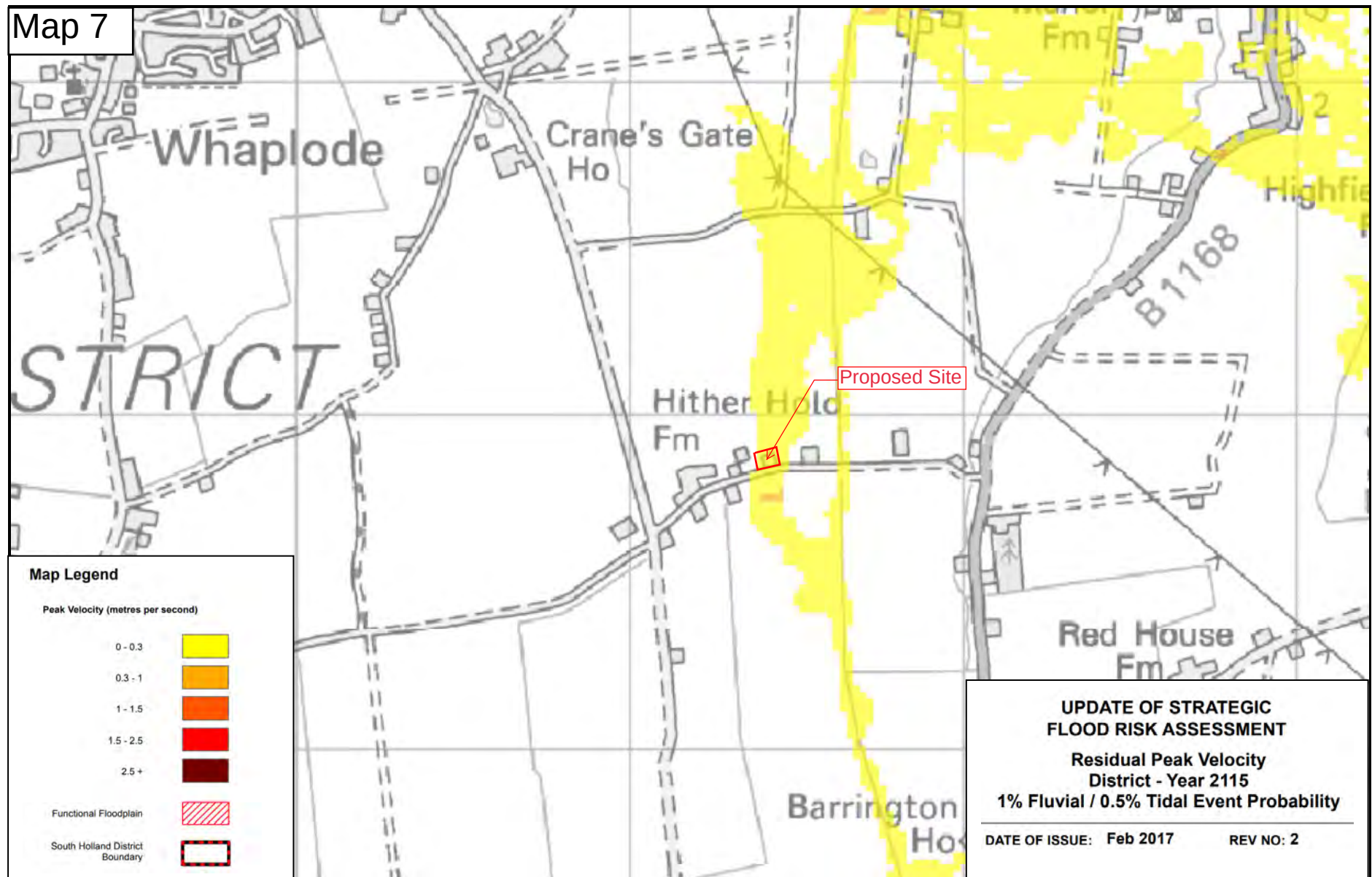
Map 5



Map 6



Map 7



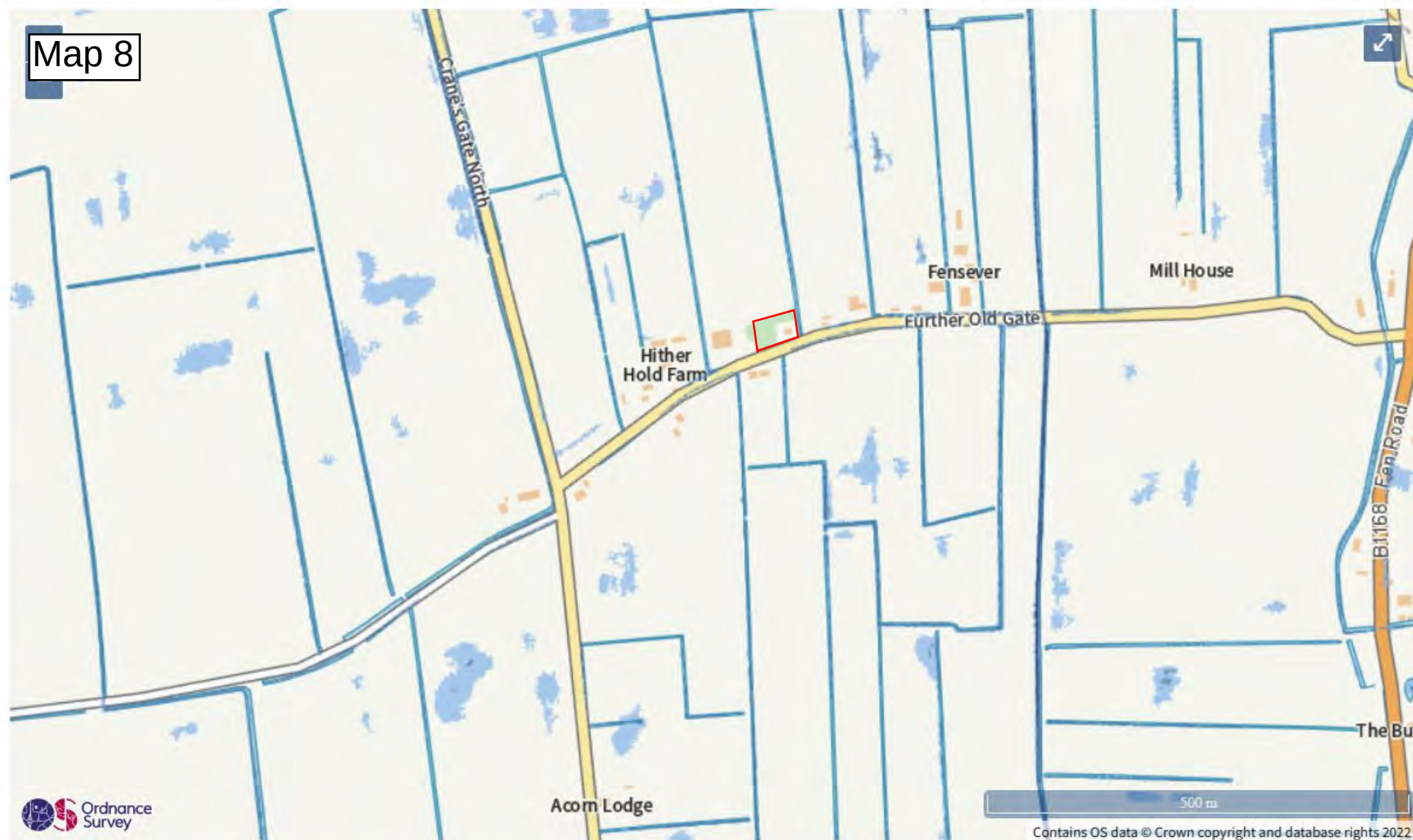
Flood risk

Low risk: depth

Location

Furtherhold

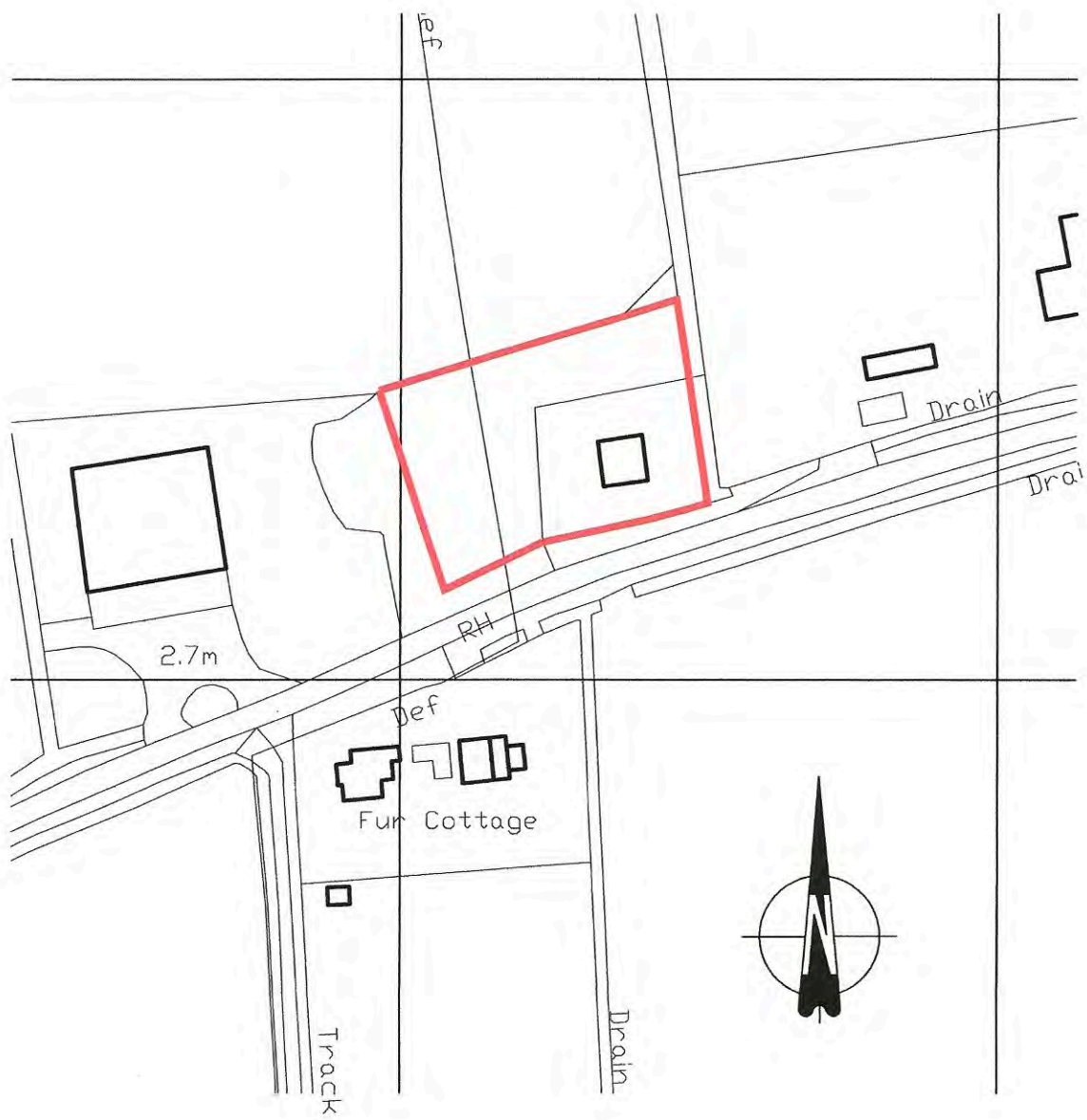
Map 8



Surface water flood risk: water depth in a low risk scenario

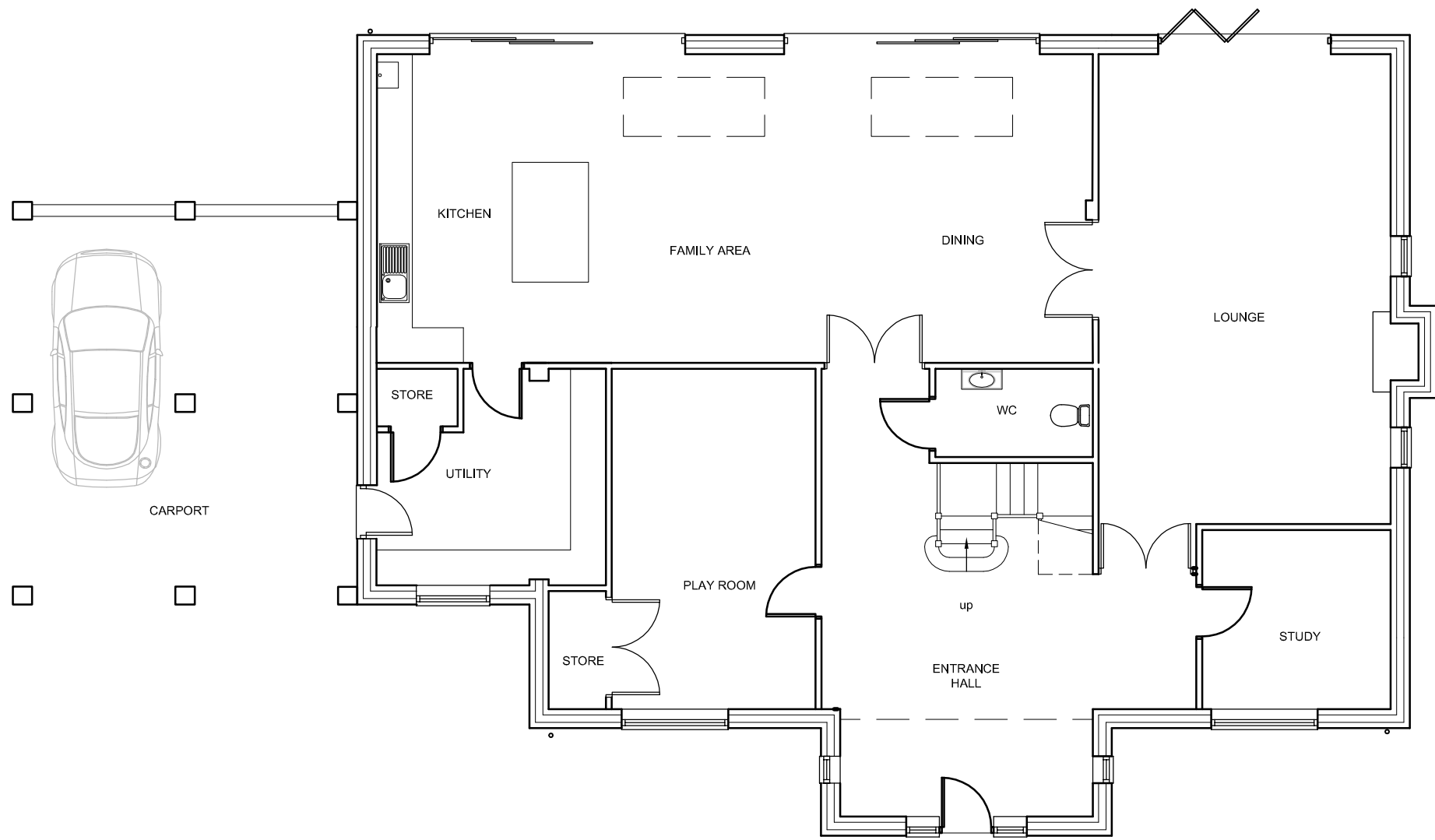
Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm



LOCATION PLAN 1:1250

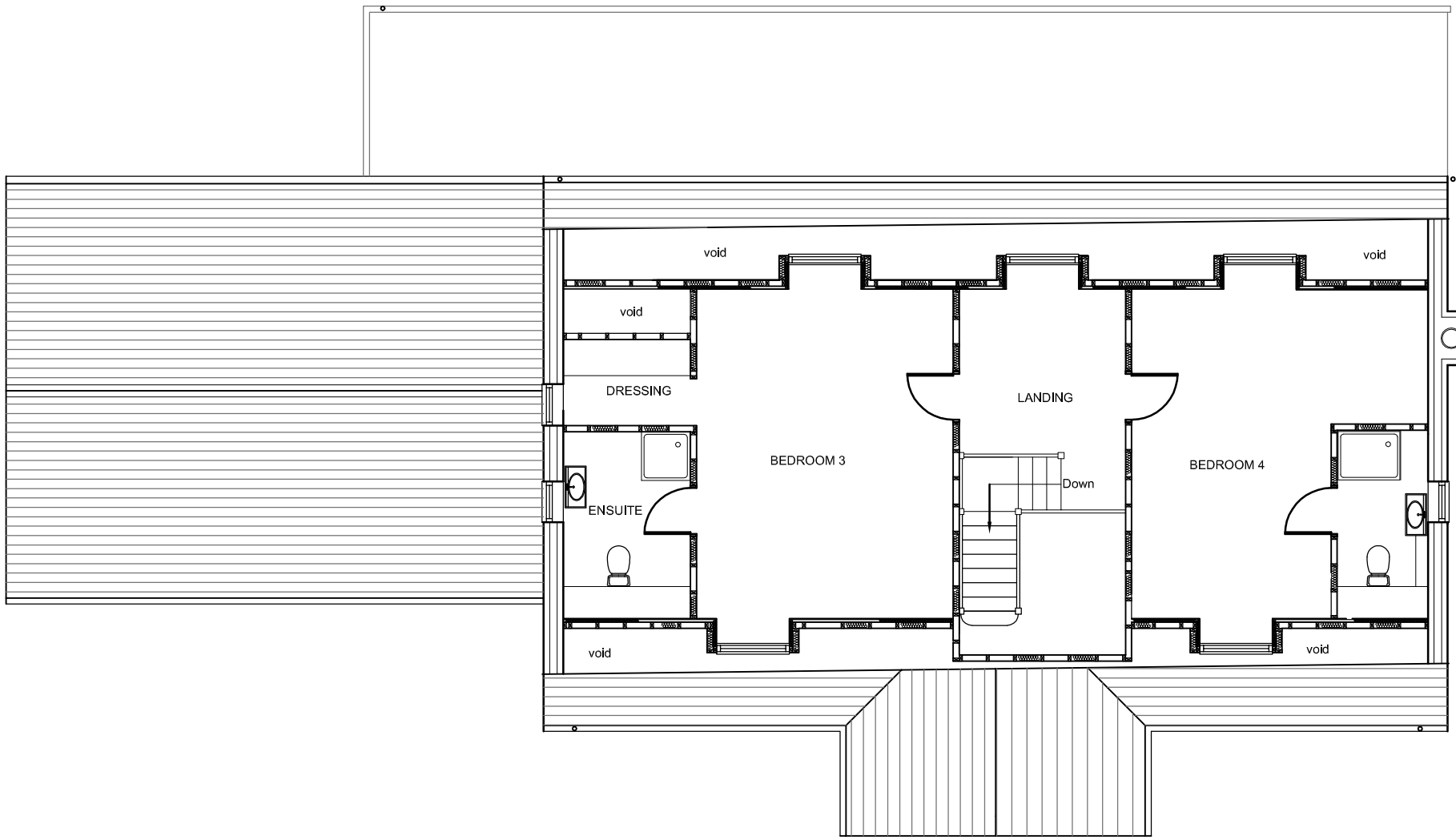
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GROUND FLOOR PLAN 1:100



FIRST FLOOR PLAN 1:100



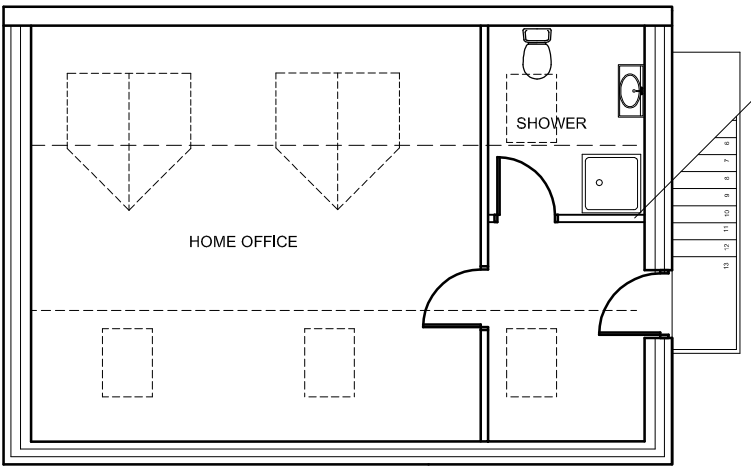
SECOND FLOOR PLAN 1:100



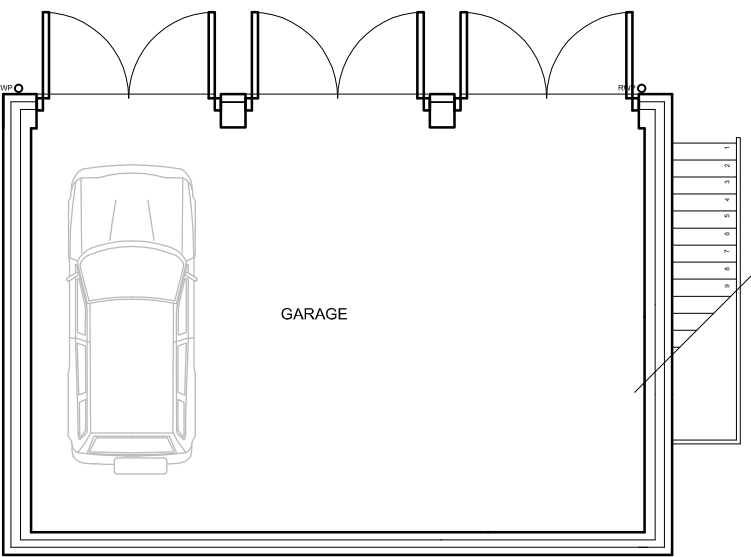
SITE PLAN 1:200

+2.73 Lidar 2mDTM levels to OS Datum

GARAGE



FIRST FLOOR PLAN 1:100



GROUND FLOOR PLAN 1:100

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Survey completed with limited access to certain areas. Where access was limited, estimations had to be made. All dimensions to be checked on site.

The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against all relevant Engineers and Architects drawings and all other specialist documentation provided.

C May 22 Further client changes to design.
B April 22 Further client changes to design.
A April 22 Major client changes to design.

THE

duffin

PARTNERSHIP

Construction Projects
Design and Build

PROJECT

PROPOSED DEVELOPMENT AT
FUTHERHOLD, FUTHER OLD GATE,
HOLBEACH, SPALDING, PE12 8QE

DRAWING TITLE

PROPOSED PLANS.

DATE
APRIL 2022

SCALE
SHOWN@A1

PROJECT No:
2020-213

DRAWING No:
10C

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