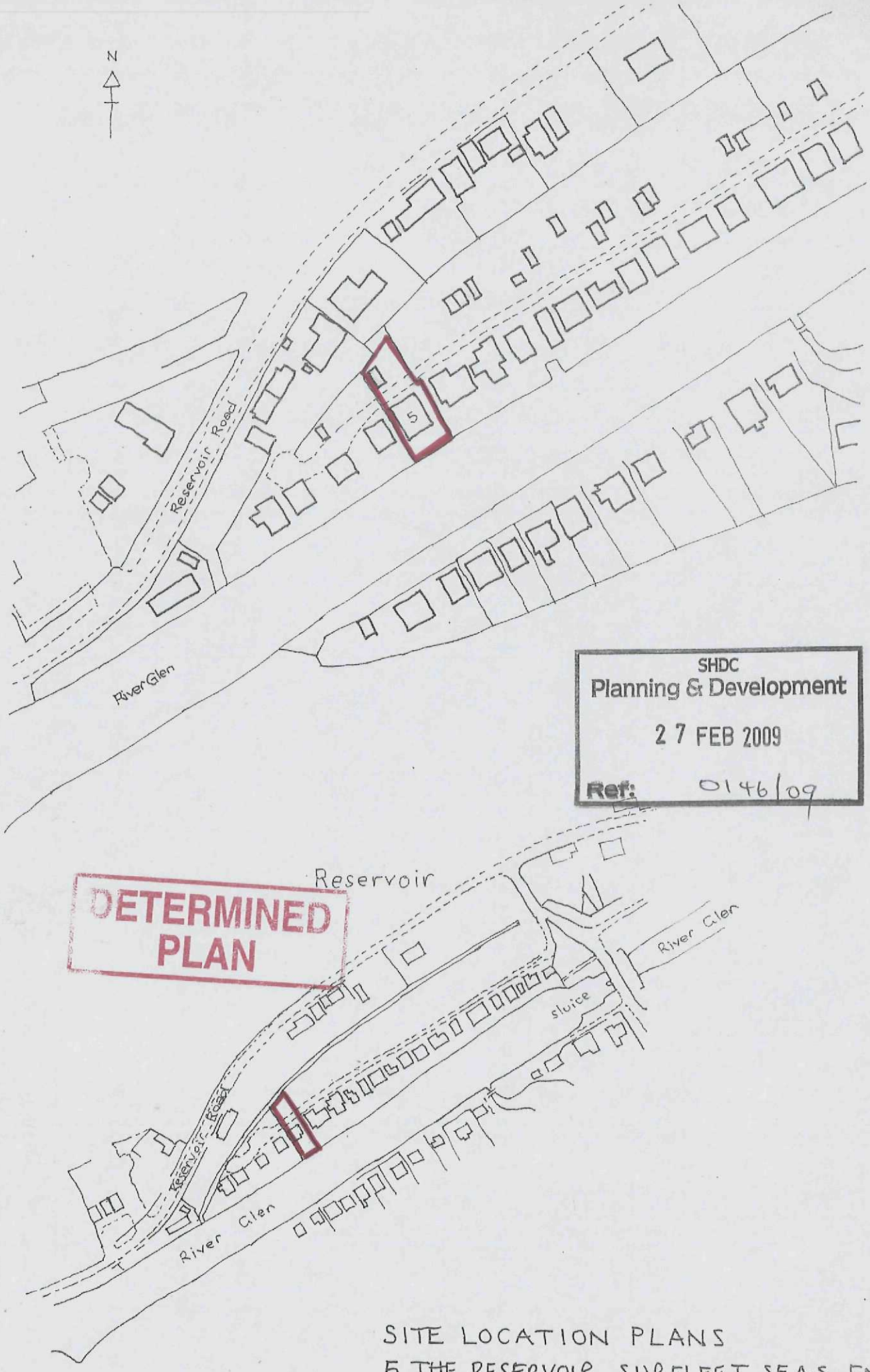
Site Levels at Marina Villa	
Existing - pre build level	
No 5 Marina Villa	200mm
No 4	300mm
No 6	420mm
Proposed site levels	
No 5 Marina Villa	1200mm
No 4 - difference in height	900mm
No 6 - difference in height	780mm

DETERMINED PLAN

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DETERMINED PLAN

SITE LOCATION PLANS
5 THE RESERVOIR, SURFLEET SEAS END

PPS 25 FLOOD RISK ASSESSMENT FOR THE EXTENSION OF AND ALTERATIONS TO A BUNGALOW AT 5 THE RESERVOIR, SURFLEET SEAS END, SPALDING, LINCOLNSHIRE PE11 4DJ

INTRODUCTION

DETERMINED
PLAN

The Government has placed increasing priority on the need to take full account of the risks 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 PPS 25: Development and Flood Risk, 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.

PPS 25 expects planning decisions to recognise the importance of flood plains and to avoid inappropriate development on undeveloped and undefended flood plains. The Government acknowledges, however, that there has been massive historic development alongside water corridors, and that it would be unreasonable to place a blanket ban on the development of land in those situations where some continuing development is necessary for wider sustainable development reasons, taking into account the need to avoid social or economic blight. This is particularly relevant in lowland eastern England.

The Environment Agency's flood maps show areas that are at risk, from fluvial and tidal flooding. These maps show the limits of the flood plain of the area that could be affected by flood events, over topping or breaching of flood defences. They are based on the approximate extent of floods with a 1% annual probability of exceedance (1 in 100 year flood) for rivers and 0.5% annual probability of exceedance (1 in 200 years flood) for coastal areas under present expectations or the highest known flood. However they do not take into account of the presence of defences or the likelihood that flood return intervals will be reduced by climate change.

1. Site description

The site is located on the north bank of the River Glen, in amongst over twenty other such riverside sites at Surfleet Seas End, and is in a flood Zone 3b area and lies within the administrative area of South Holland District Council. A Zone 3b area is defined by PPS25 as functional floodplain, ie land where water has to flow or be stored in times of flood. This particular area is designed to flood in extreme circumstances only, with a 0.1% risk. (See Appendix **Plan 1.**)

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27 FEB 2009
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It is essential that any development is protected from this level of flood risk, and that any development does not result in net loss of floodplain storage capacity, does not impede water flow, and does not increase risk elsewhere. The site's river frontage measures 11.3 metres, and its length, back from the river, is around 34 metres. The site contains a single bungalow and a garage. A lane that gives access to all of these riverside properties bisects the plot between the bungalow and the garage.

The National Grid Reference for the site is TF 278291.

This application is classified as 'minor', applying the Town and Country Planning (Flooding) (England) Direction 2007, as the development is for less than 10 dwellings.

The proposed development site is shown to be within Flood Zone 3b, "High Probability" as detailed on the Environment Agency's Flood Zone Maps without defences, and as defined in Table D1 of Planning Policy Statement 25 (PPS25).

Applying the Flood Risk Vulnerability Classification in Table D2 of PPS25, the proposed development is classified as more vulnerable, with Table D1 of PPS25 stating that such uses should only be permitted in this zone if the Sequential Test, and if necessary, the Exception Test is passed (as summarised in PPS25 Table D3).

The current proposal is to extend and renovate the existing bungalow, and in doing so, to reduce the risk of the property being subject to flooding.

The nature of the work is threefold. First, a poorly constructed and uninsulated shell is to be upgraded to a highly insulated timber frame construction. Second, the floor of the building is to be raised the necessary amount above ground level and a mezzanine floor introduced to obviate potential problems that may be caused by the occasional sudden river level rise and the one in a thousand year event respectively. Third, the owner intends to build in features specifically designed to be flood resilient, such as openings in the sub-floor walls to allow the passage of flood water beneath the building, and also to improve the environmental performance of the house, such as solar panels and, if allowed, a water source heat pump.

2. Building footprint

While it wouldn't normally be allowed to extend the building footprint in a Zone 3b area, four Land Drainage consents (references 2007/00104, 2007/00153, 2007/00165 and 2007/00221) recently obtained from the Environmental Agency for the work described above include for a

small increase in floor area, allowed primarily in order to be able to increase wall thickness, and therefore insulation levels, thus offering an overall environmental improvement.

3. Safe access and egress

Access and egress to and from the proposed house would be via a shallow ramp that begins over 19 metres from the river bank, adjacent to the access lane leading to Reservoir Road, (which is at a level of circa 7.0m ODN) rising to the new raised ground floor level by the time it reaches the entrance frontage, which is also the river frontage. Thus anyone, even someone in a wheelchair, could make their way to the access lane without coming into contact with rising waters. In extreme conditions the mezzanine provides a safe refuge above any foreseeable flood level, providing a safe place to stay until the flood recedes. (See Appendix **Plan 2.**)

4. Drainage Authorities

Environment Agency.

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

- From the River Glen (Main River).

The Environment Agency is responsible for reducing the risk of flooding from designated main rivers and from the sea.

The Flood Zone Maps identify river catchments over 3 sq. km. These maps are a theoretical estimate of areas that could be inundated should no defence exist. In practice current standards of protection would result in flood envelopes substantially less than shown by these maps. The maps make no allowance for local, site specific features

The flood zone maps show that the site of the proposed development is considered at risk from fluvial flooding. These maps indicate that the area would be flooded without flood defences, which are in place along the coastal edge (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). (See Appendix **Map 1.)**

The site lies within Flood Zone 3b (High Probability). Surfleet Reservoir is an area of flood storage where flood flows are stored if the flood event coincides with a high tide in the tidal River Welland.

From information supplied by the Environment Agency Ref CCN/2008/20331 the Welland Catchment Strategic Model 2007 has identified the following Fluvial flood levels: (See Appendix **Map 2.)**

	1in 100 year Present Day	1 in 100 year plus climate change (2108)
Glen 467	4.12mODN	5.06mODN
Glen 704	4.12mODN	5.06mODN

The altered property will have a ground floor level of 5.21mODN, i.e. 150mm above the 1 in 100 year flood level to ensure that the property will not be subject to flooding.

With the flood level in the River Glen being subject to tidal levels in the River Welland, this high level should be limited to a period of 2 hours either side of high tide. As theses tide levels are predictable well in advance adequate warning will be given.

The tidal defences protecting this site consist of earth embankments that are in good condition and provide protection. These banks are inspected regularly by the Environment Agency to ensure that any potential defects are identified early.

5. Welland and Deepings Internal Drainage Board

The proposed development site is located within the catchment area of Welland and Deepings Internal Drainage Board. The Board is therefore responsible to operate and maintain the arterial lowland fluvial system.

The Board's nearest watercourse to the site is their Vernatt's Drain which is 300m to the south-east. The 1 in 100 year flood level for the Vernatt's Drain at Vernatt's Bridge, which is a tidal sluice into the River Welland, is 3.70mODN with an embankment level of 6.00mODN. The freeboard available should be capable of retaining the climate change in flow. Flows into the Vernatt's Drain are controlled and limited by the pump capacity at Pode Hole Pumping Station and this inflow can be reduced if it appears that the design maximum flows are likely to be exceeded. The rapid inundation situation within the IDB areas does not apply.

6. Historic Flooding

The site has flooded historically, notably at Easter 1998, and flooding of the reservoir also occurred in November 2000, when 12 properties were flooded. As the site is within a designated flood storage reservoir, the site will be subject to flooding in the future when the reservoir is used to store flood waters. (See Appendix **Map 3**.)

7. Levels

From a topographical survey, the ground level adjacent to the River Glen is 3.43mODN, top of bank is 4.11mODN, adjacent to frontage of the building is 4.09mODN and the access road at the back of the building 3.85mODN. The existing ground floor is 4.14mODN. In order for the building ground floor level to be above the 1 in 100 year level plus climate change the proposed floor is to be at a level of 5.21mODN, which includes a freeboard of 150mm. (See Appendix **Plan 3.**)

8. Sequential test

Para 4.36 of the Practice Guide to PPS 25 states that where it is proposed to redevelop a property in an existing flood risk area, the consideration of alternative sites is not likely to be a realistic option. The existing bungalow is to be extended and renovated with the ground floor being set 1.07m higher than the existing. There will also be accommodation above the 1 in 200 year predicted flood level in the form of a mezzanine, which reduces the risk to residents. The site is brownfield in accordance with PPS3, and the FRA shows the building to be safe from flooding.

9. Flood resilient construction

The proposed works include the provision of a masonry base supported on wide strip footings that effectively float on the ground using the snow shoe principal. The masonry will be substantial enough to withstand a sudden flood surge, although this type of flooding has not been experienced on this site; rather a gentle inundation when the water level overflows the river banks is what occasionally happens. So as not to lose water storage space on site, and to relieve the masonry walls of water pressure from one side only, gaps are to be left in the masonry to allow the through-flow of water. These gaps are there not to allow for a surge, which doesn't happen, but to let water to sit in storage underneath the building and to allow the water to press on to the supporting walls from both sides, thus equaling out the pressure to produce no lateral force on the walls. No calculation of the bore of the holes is supplied with this FRA because the holes are not there to allow a surge of so many litres per minute; rather they are sized and located to allow the gentle passage of water and to *discourage* any rushing of water.

Building services that are water sensitive, such as electrics, can and will be located above a worst case scenario flood level, min. 500mm above finished floor level, which is itself above the predicted 1 in 100 year flood level plus climate change.

10. Evacuation plan

Evacuation of the house in the event of a flood can happen in two ways. First, the aforementioned ramp can be used to get to the access lane from which escape can be made to higher ground. Second, a boat secured to Mr Douglas' landing stage could be used in the unlikely event of the access lane being submerged before any warning is heeded.

11. Resistance to expected hydrostatic/hydrodynamic pressures

The proposed scheme incorporates masonry base walls that will be designed by a structural engineer to resist the lateral loads imposed by flood water. These walls will incorporate holes designed to allow a flood surge to pass under the house without causing damage to the structure. Calculations for these design criteria will be submitted at Building Regulations stage.

12. Avoidance of reliance on emergency services

All of the measures described above are designed to allow not only safe egress from the house in the event of a flood, but also the protection of property and services within the house, as it is often the loss of such property and services that requires the intervention of emergency services. The alterations are designed to make a self-sufficient and defensible building, which the current building is most certainly not.

13. Conclusion

- The site lies within the High Probability Zone 3b, which is an area where water is stored in times of flood as stated in PPS25 and shown on the Environment Agency Flood Maps. The proposed Residential Use falls within the "More Vulnerable" uses of land as defined in Table D2 PPS25. As the proposals are to reduce the risk of flooding by raising the ground floor level above the predicted I in 100 year flood level with climate change, this reduces the risk to the occupants.

- The lowest proposed ground floor for the altered building is to be 5.21mODN, which is 150mm above the predicted flood, and with the property being provided with a mezzanine floor, a further safe refuge, above the maximum flood level, is provided for the occupants.

- There will be no loss of floodplain storage as the building is designed to allow flood storage beneath the building footprint.

- Flooding from other sources is unlikely to affect the site.

- Any impact of damage to the property can be foreseen and mitigated against by relatively simple design and construction techniques as suggested in paragraph 69 PPG 25;

- Floor levels for the development are to be set as high as practicable above ground level taking into account the need for disable access, use of the building and visual amenity issues.

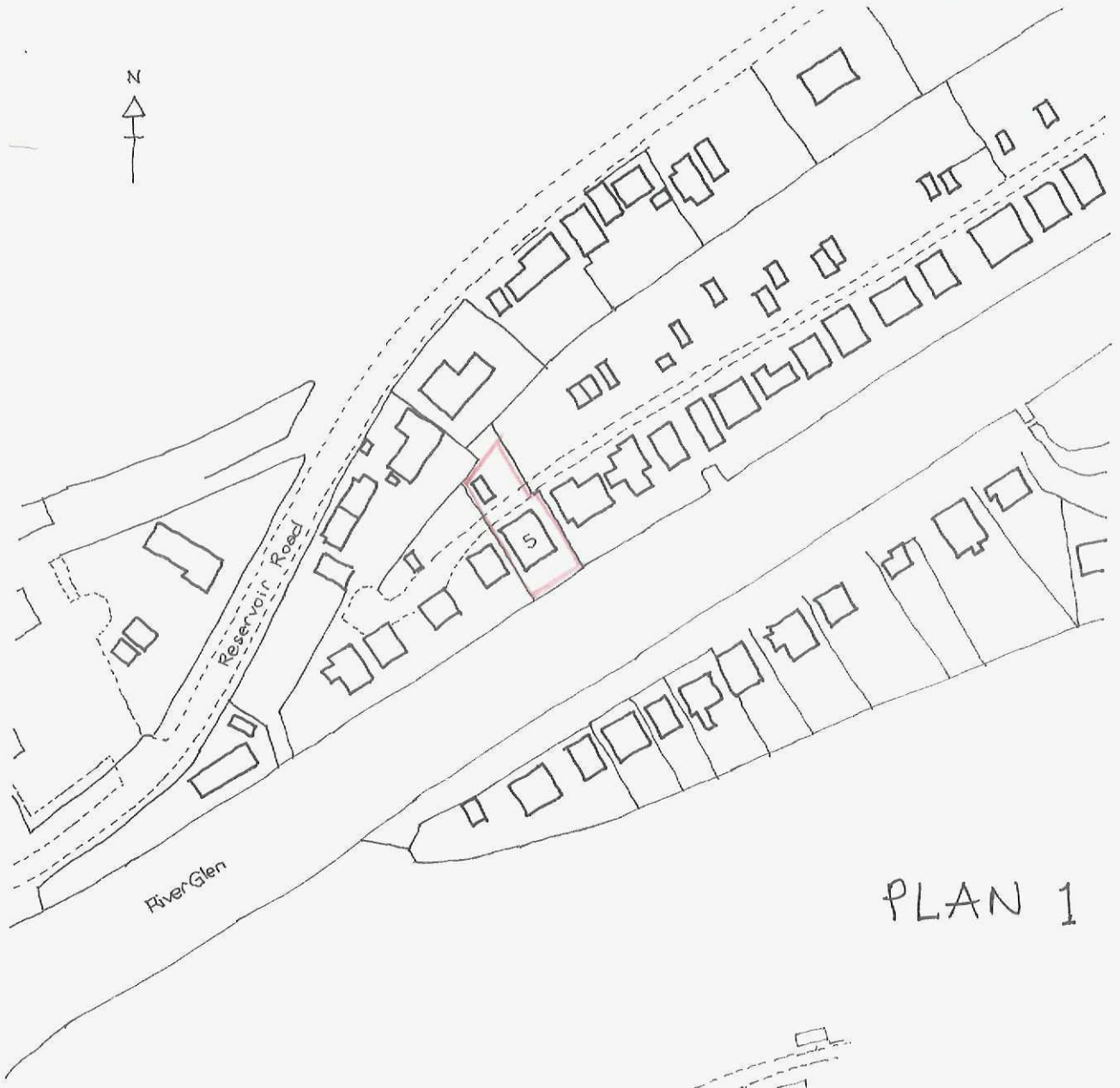
- The new ground floor and lower walls of the building will be of recoverable materials following a flood.

- All service circuits and outlets will be a minimum of 0.5m above ground floor level.

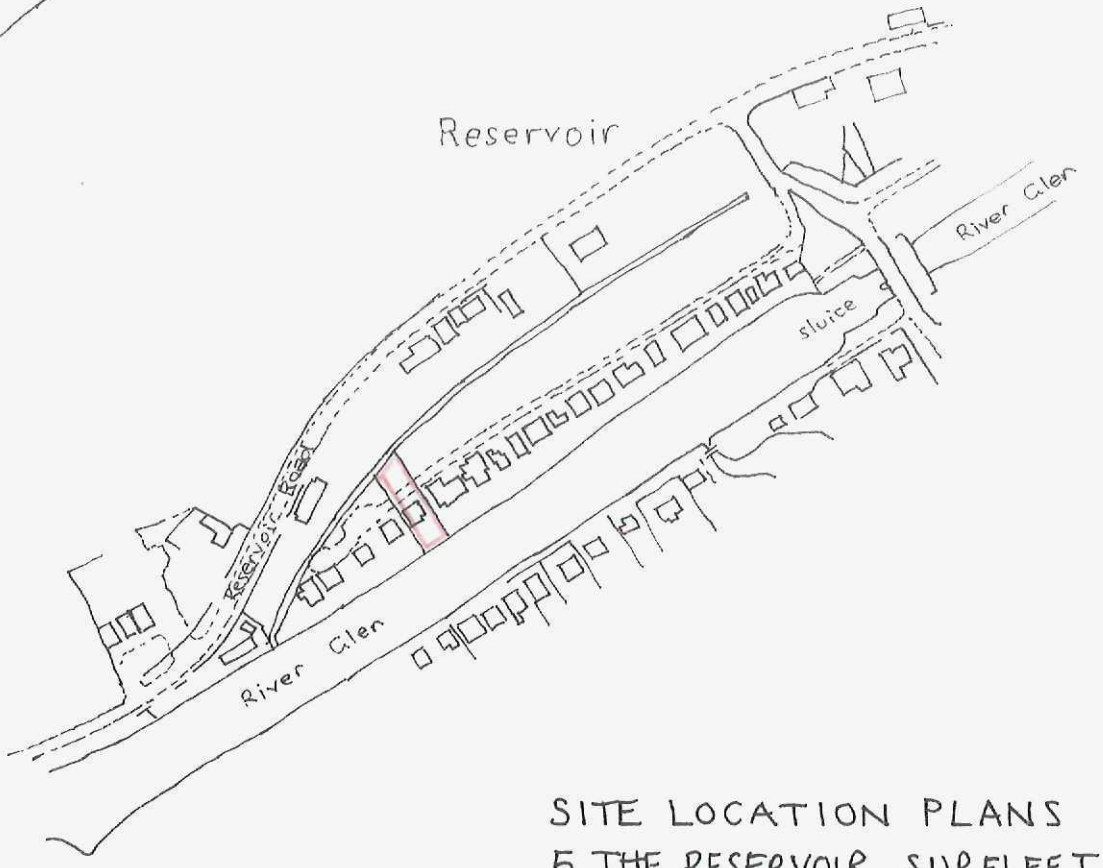
- There is a residual risk relating to any development in a flood risk area, particularly in an event with conditions of greater magnitude than those considered by this assessment.

14. Appendix

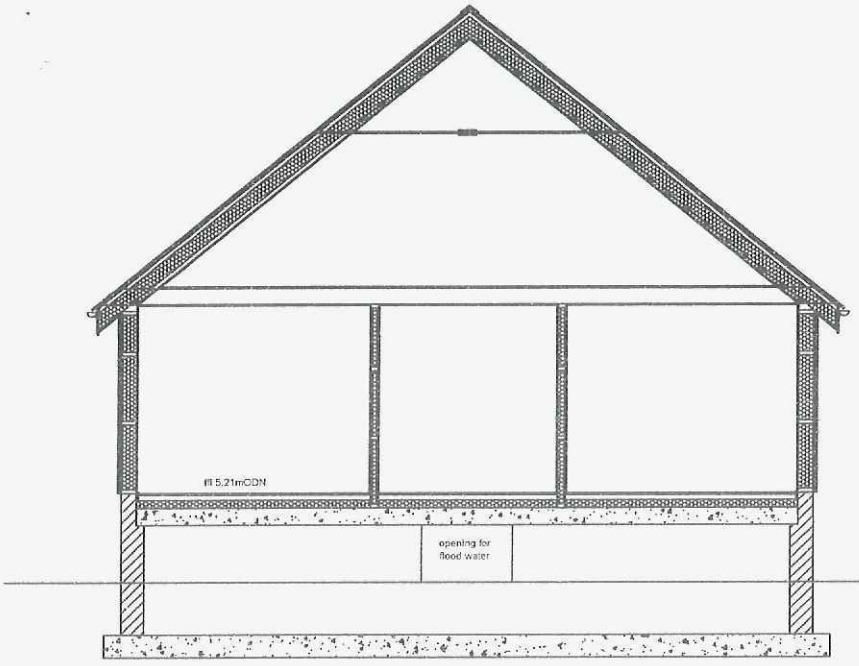
Plan 1	Site Location Plan
Plan 2	Plan and section through proposed building
Map 1	Extract from Environment Agency Flood Map
Map 2	Flood Levels Welland Catchment Strategic Model 2007
Map 3	Historic Flood Extent
Plan 3	Comparative footprints of existing and proposed buildings with site levels



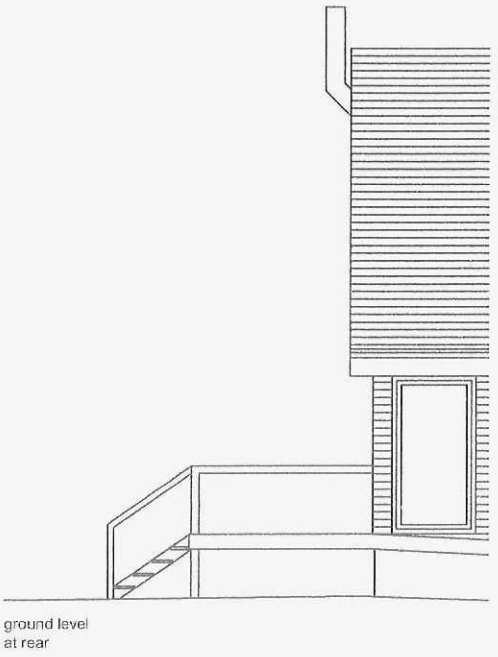
PLAN 1



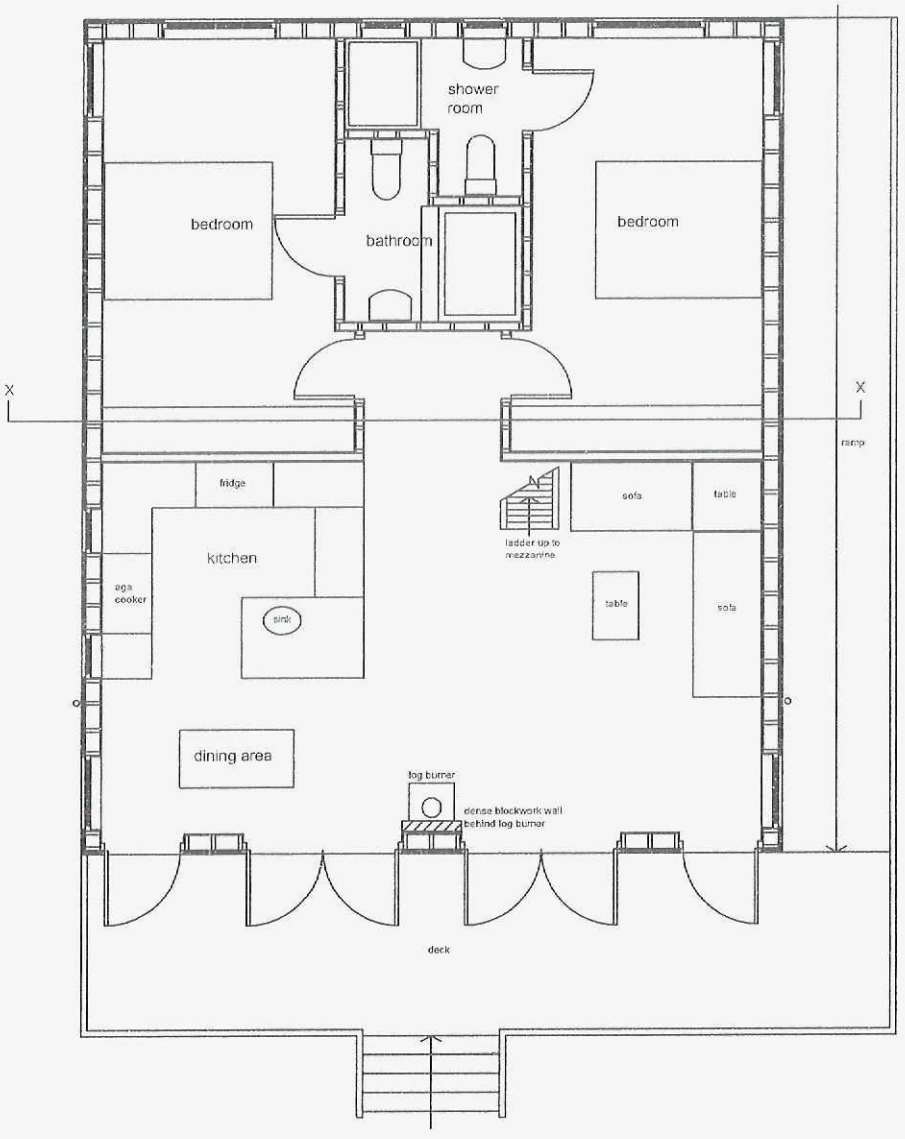
SITE LOCATION PLANS
5 THE RESERVOIR, SURFLEET SEAS END



SECTION X-X



PART EAST ELEVATION

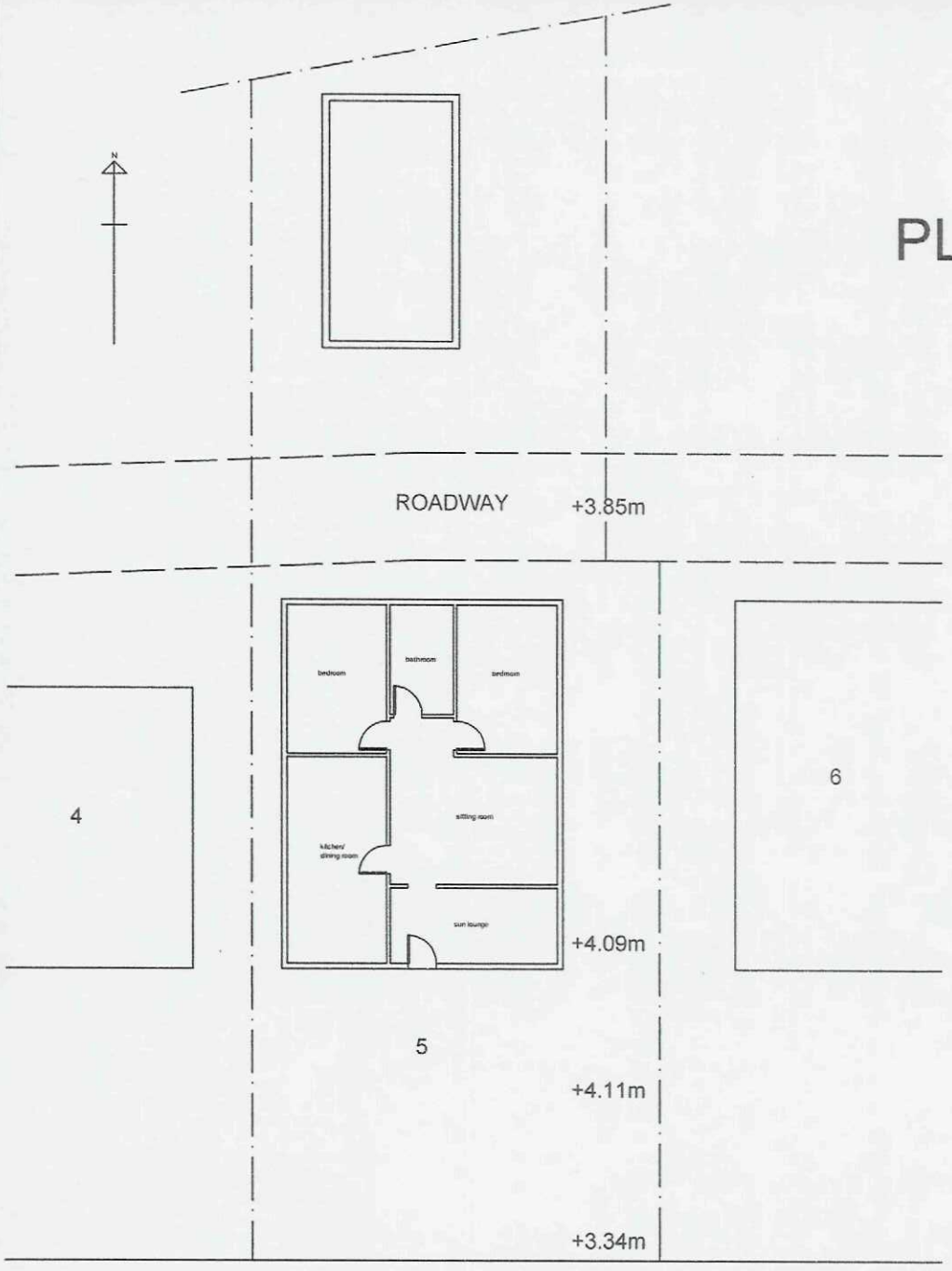


GROUND FLOOR PLAN



PLAN 2

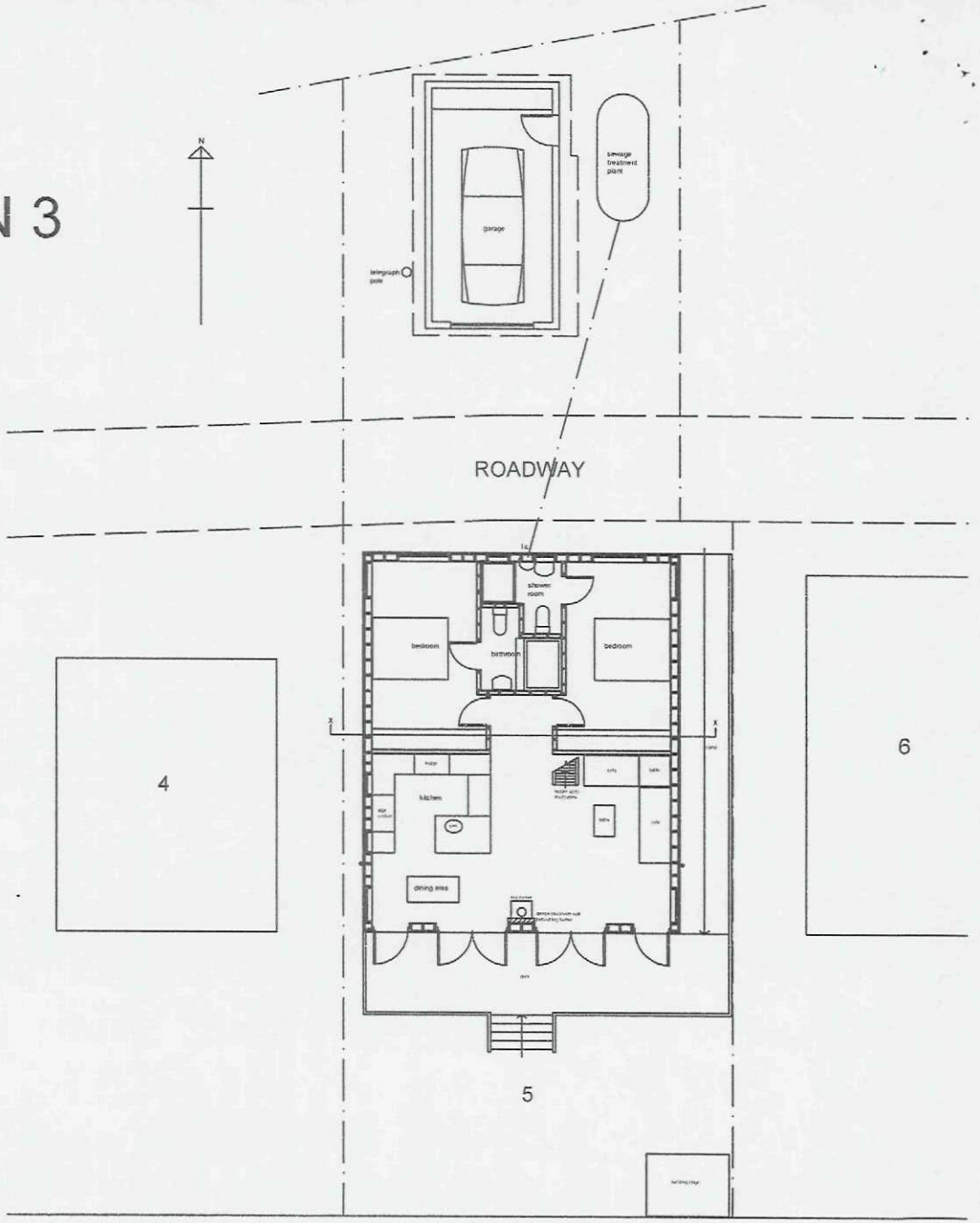
PLAN 3



RIVER GLEN

SITE LAYOUT AND HOUSE PLAN AS EXISTING

1:200



RIVER GLEN

SITE LAYOUT AND GROUND FLOOR PLAN
AS PROPOSED

Environment Agency

FLOOD MAP

- Main River
- Raised Defences
- Areas Benefitting from Defences
- Flood Storage Areas
- Area at Risk of Flooding from Rivers or The Sea
- Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded.

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.

- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

Floodline
0845 988 1188

Environment Agency
Anglian Region Northern Area
Waterside House
Waterside North
Lincoln
LN2 5HA

Tel : 08708 506506

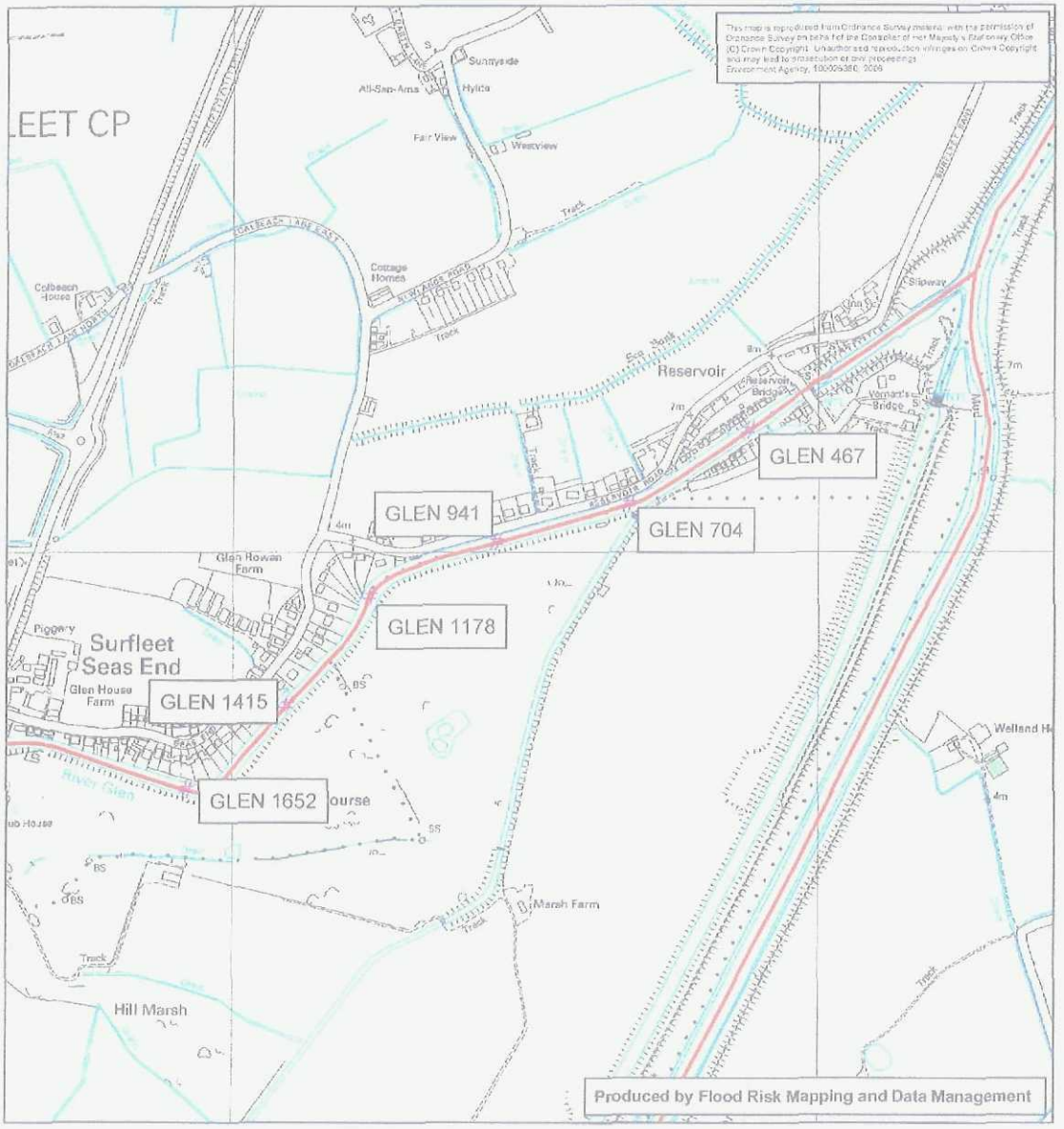
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Scale:1:5,000



Produced by the Flood Risk Mapping and Data Management Team, Lincoln. September 2008.

MAP 1



LABEL	EASTING	NORTHING	2yr	5yr	10yr	25yr	50yr	75yr	100yr	200yr	1000yr	100yr inc climate change	1000yr inc climate change
GLEN 467	527879	329204	3.72	3.96	4.04	4.09	4.10	4.11	4.12	4.13	4.16	5.06	5.19
GLEN 704	527675	329079	3.73	3.96	4.05	4.09	4.11	4.11	4.12	4.13	4.17	5.06	5.20
GLEN 941	527448	329015	3.73	3.96	4.05	4.10	4.11	4.12	4.13	4.14	4.18	5.06	5.20
GLEN 1178	527235	328924	3.74	3.96	4.05	4.10	4.12	4.12	4.13	4.15	4.19	5.06	5.21
GLEN 1415	527093	328738	3.74	3.96	4.06	4.10	4.12	4.13	4.14	4.16	4.20	5.06	5.21
GLEN 1652	526922	328595	3.75	3.96	4.06	4.11	4.13	4.13	4.15	4.16	4.21	5.07	5.21

Environment Agency

Levels mODN

Welland Catchment Strategic Model 2007

September 2008

MAP 2

Environment Agency

Historic Flood Extent

Legend

Main River

Easter 1998 on the River Glen at Surfleet

Floodline
0845 988 1188

Environment Agency
Anglian Region Northern Area
Waterside House
Waterside North
Lincoln
LN2 5HA

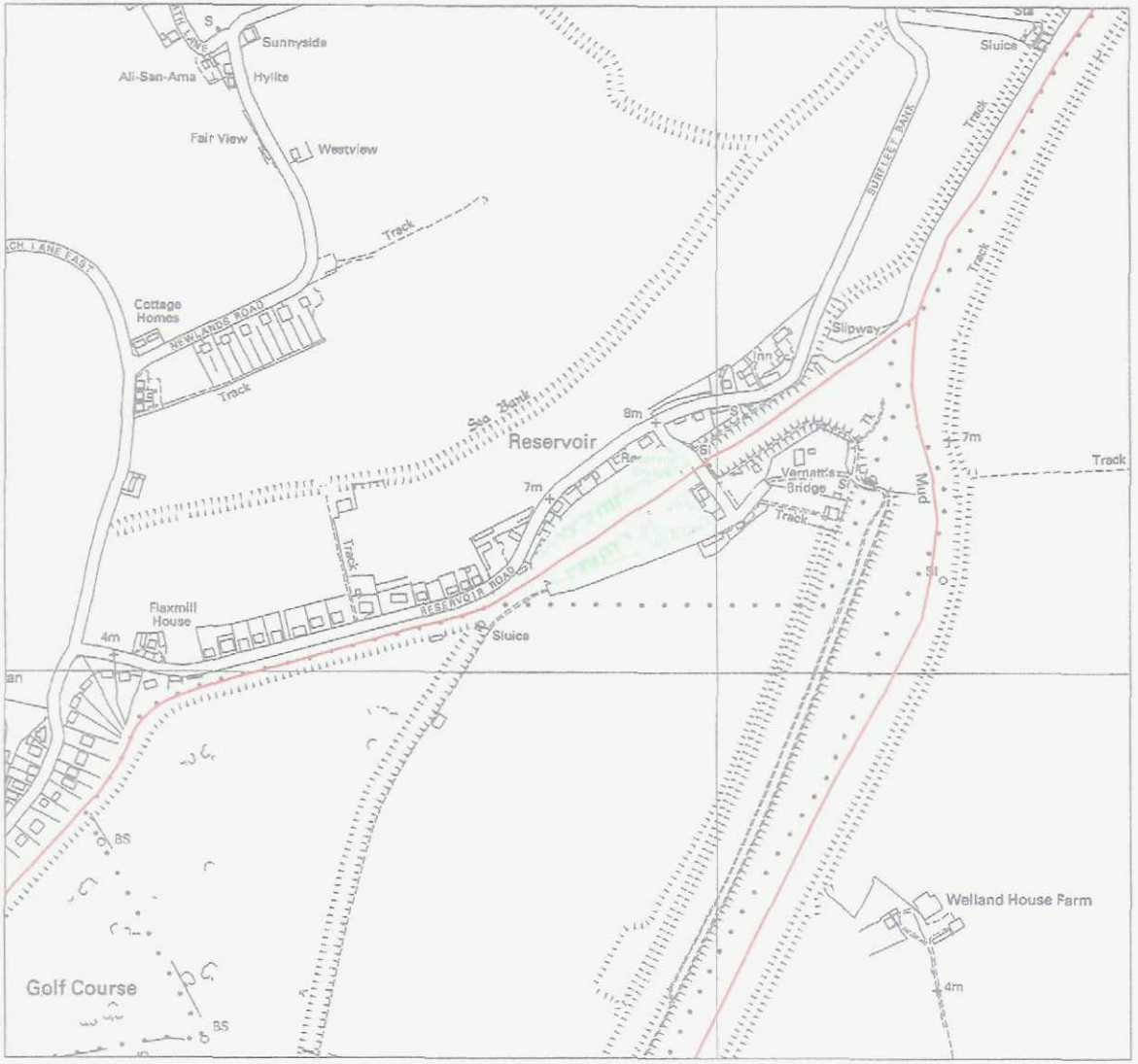
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Environment Agency, 100026380, 2008.

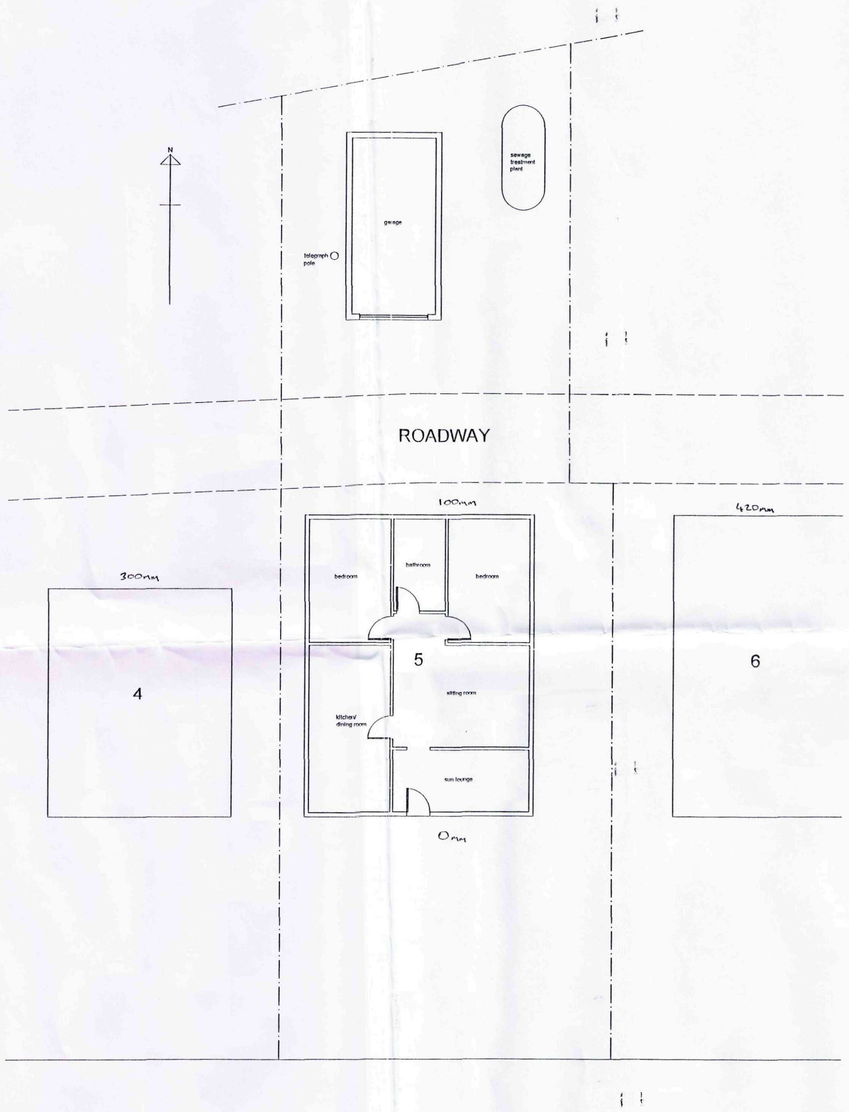
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September 2008

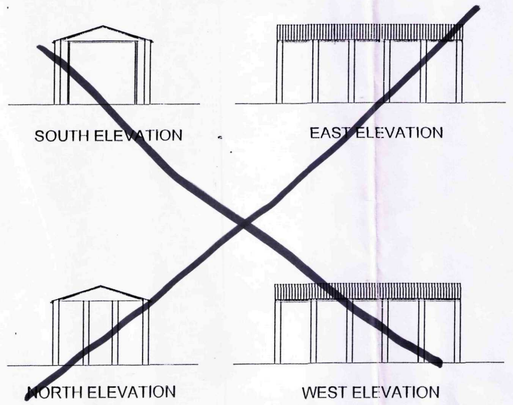
Produced by the Flood Risk Mapping and Data Management Team, Lincoln.



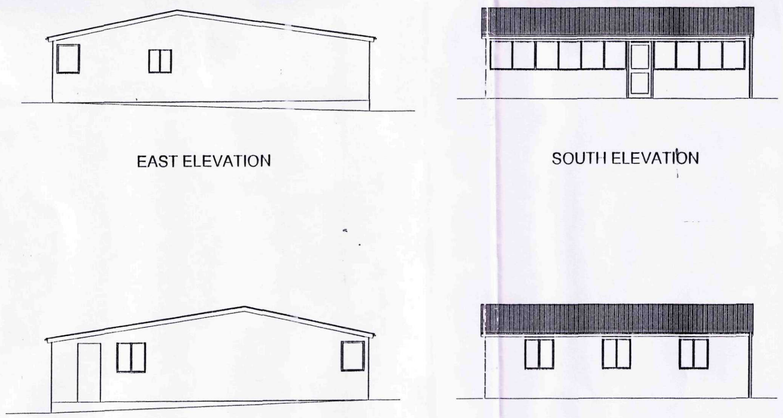
MAP 3
10



SITE LAYOUT AND HOUSE PLAN



GARAGE ELEVATIONS



HOUSE ELEVATIONS



Do not scale this drawing. Report any ambiguities to the architect immediately

DETERMINED PLAN

SHDC Planning & Development 27 FEB 2009 Ref: 0146/09

Revisions

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e-mail jeff@jeffsowerby.freeserve.co.uk telephone/fax 0114 258 6163

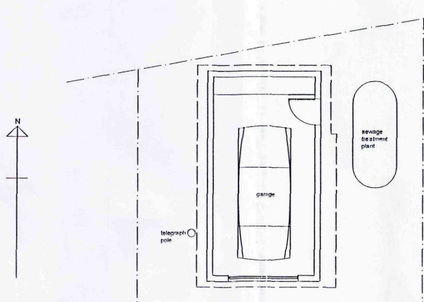
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Job title: [redacted]

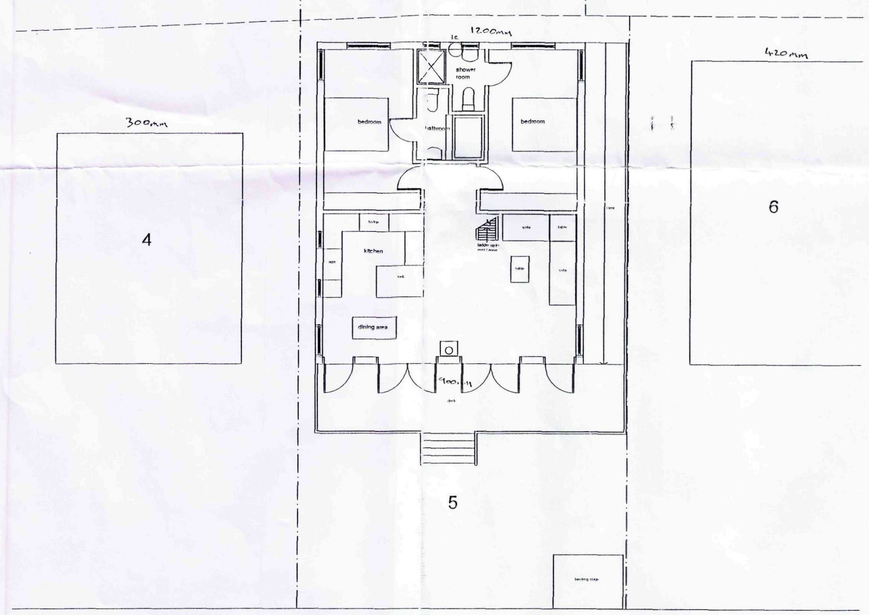
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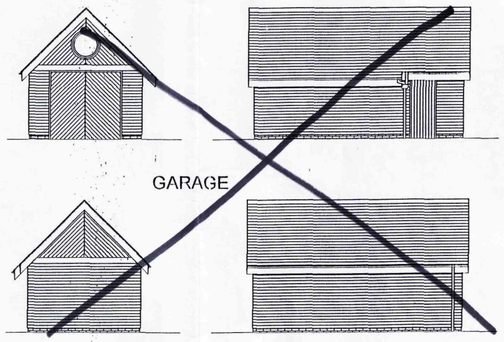


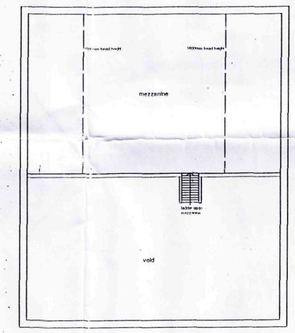
ROADWAY



RIVER

SITE LAYOUT AND GROU FLOOR PLAN

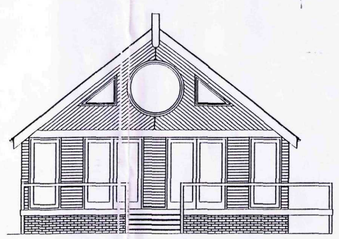




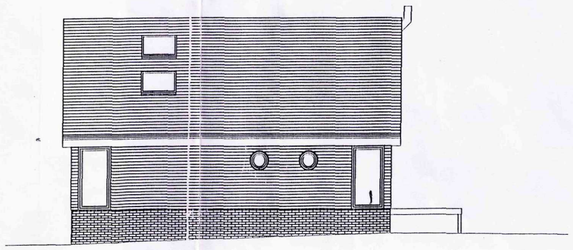
MEZZANINE PLAN

MATERIALS

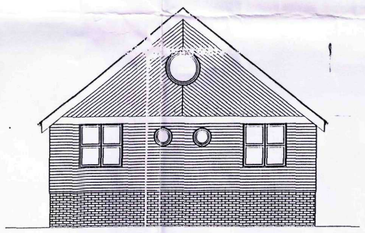
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walls: cedar boarding on red brick plinth
windows and doors: stained timber
ramp and deck: stained timber
rainwater goods: black pvc-u



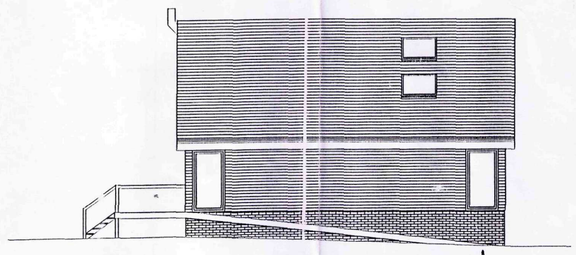
SOUTH ELEVATION



WEST ELEVATION



NORTH ELEVATION



EAST ELEVATION

DETERMINED PLAN

SHDC Planning & Development 27 FEB 2009 Ref: 0146/09

A 22.07.08 Roof lowered by one metre

Revisions

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Client: CHRIS DOUGLAS

Job title:

Drawing title: HOUSE [redacted] AS PROPOSED

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