

FLOOD RISK ASSESSMENT FOR A REPLACEMENT HOUSE AT 15 THE RESERVOIR, SURFLEET SEAS END, SPALDING, LINCOLNSHIRE PE11 4DJ

INTRODUCTION

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 Their expectations relating to flooding are contained in the now withdrawn PPS 25: Development and Flood Risk, although we understand that this document may still be used as a basis for assessing flood risk to development sites.

While 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 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.**)

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 15.15 metres, and its length, back from the river, is around 35 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 proposal is to replace the existing bungalow with a single storey house with its floor raised above the required flood risk height. The proposed house will be built to high environmental standards, unlike the existing house on the site, and a replacement garage will have solar panels on its roof. The existing house on the site effectively sits on the ground whereas the proposed building will be raised above it, allowing the passage of flood water beneath the building. Thus the building footprint is effectively reduced to almost zero in respect of its effect in terms of flooding.

2. Safe access and egress

Access and egress to and from the proposed house would be via a shallow ramp that begins over 16 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.

3. 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 (2108)		1 in 100 year plus climate change
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. 1000mm 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 these 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.

4. 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.

5. 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.**)

6. 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.**)

7. 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 proposed house is to be set with its ground floor at the same level as its neighbour at number 5 and 6, which itself has been the subject of a similar flood risk assessment. The site is brownfield in accordance with PPS3, and the FRA shows the building to be safe from flooding at the proposed level.

8. 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.

9. 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 landing stage could be used in the unlikely event of the access lane being submerged before any warning is heeded. Third, a set of steps by the back door leading to the roof.

10. 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.

11. 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 proposal is designed to make a self-sufficient and defensible building, which the current building is most certainly not.

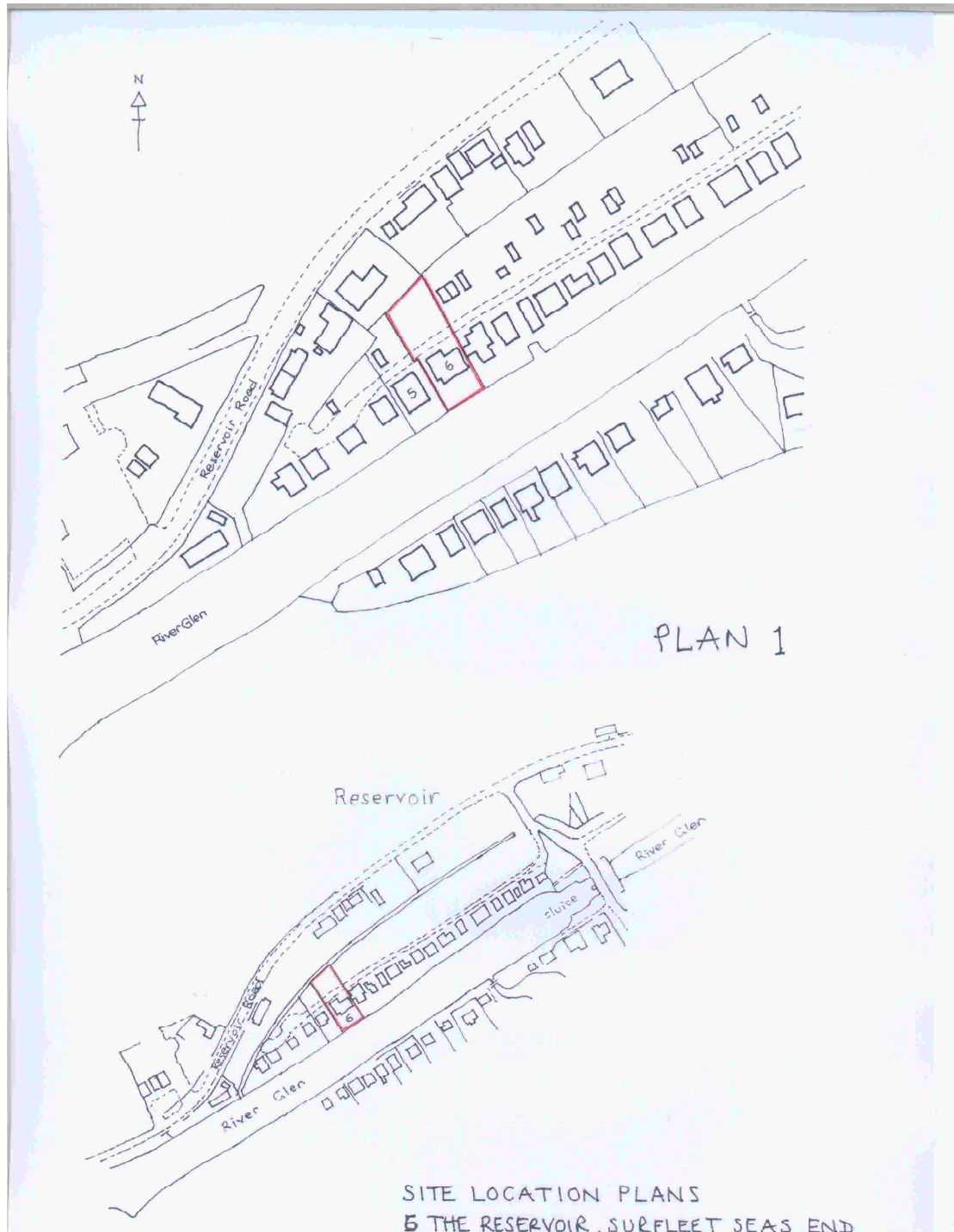
12. Conclusion

- 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 1 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 1000mm above the predicted flood level.
- 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 disabled 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.

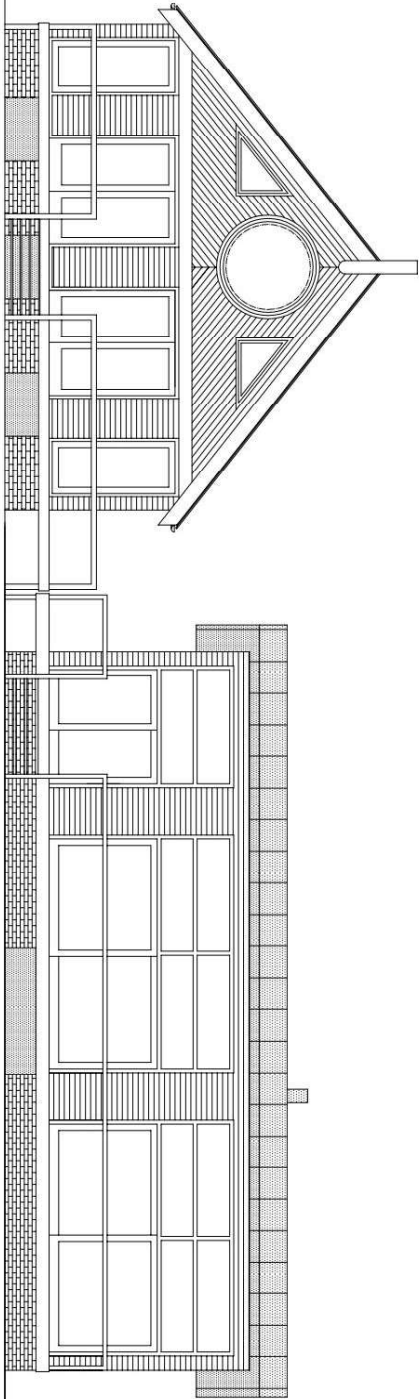
13. Appendices attached herein

- Plan 1 showing site location plans
- Drawing SSE04 showing a cross section and a comparative elevation with number 5
- Drawing SSE01 showing the proposed site layout and floor plan

(These drawings are also submitted separately as principal application documents.)



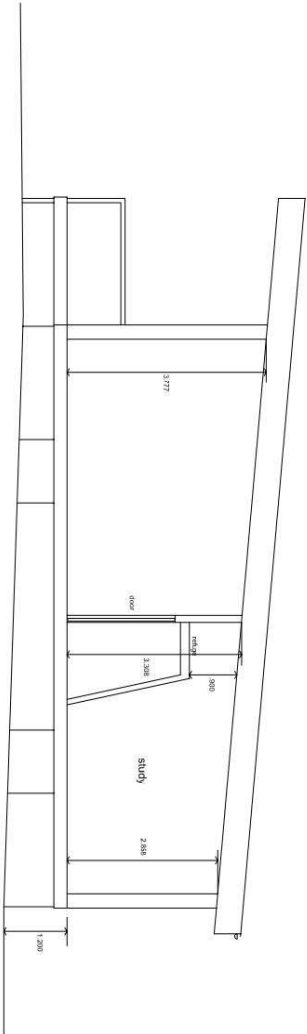
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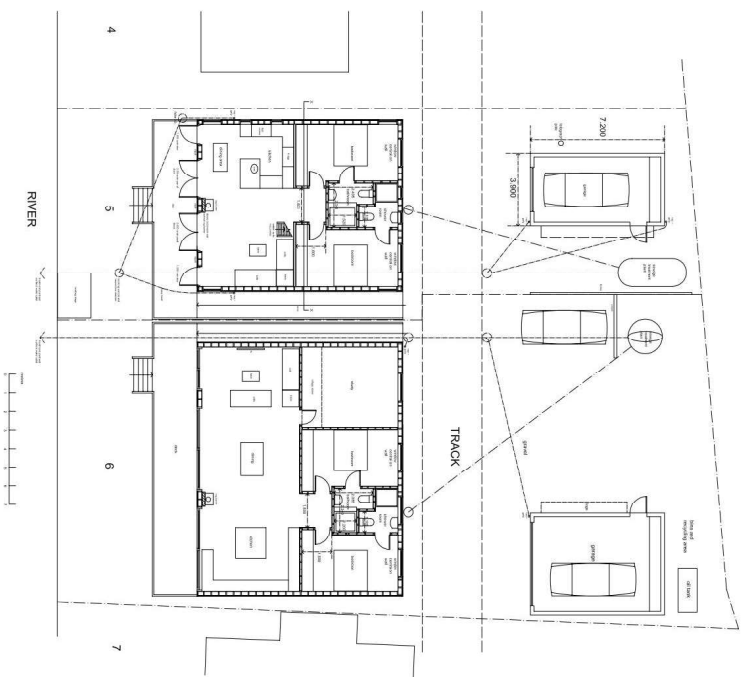
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CROSS SECTION

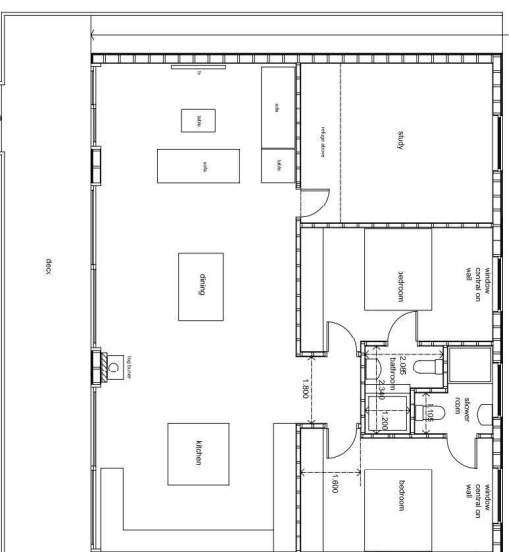


Revisions			
JEFF SOWERBY ARCHITECT			
2010 Award Rural Standard 10/107 - awarded upon delivery, submission of all			
email: jps@jeffsowerby-architect.co.uk telephone: 0117 268 8883			
Client			
CHRIS DOUGLAS			
Job title			
PROPOSED NEW HOUSE AND			
GARAGE AT THE RESERVOIR,			
SOUTHERN SEAS END			
Drawing title			
NURSERY ELEVATIONS OF			
NUMBERS 5 AND 6 - CROSS			
SECTION			
Scale	Drawing no.	Revision	Date
1:50	SSE04		20.06.2019

Do not make any drawing without the approval of the architect's consent.



1:100 SITE LAYOUT



1:50 HOUSE FLOOR PLAN

Architect		JEFF SOWERBY ARCHITECT	
Client		CHRIS DOUGLAS	
Project		FARMHOUSE RENOVATION AND GARAGE AT THE RESERVE, SUNNYSIDE BEACH RD	
Drawing No		HOUSE PLAN AND SITE LAYOUT	
Scale		AS SHOWN	
Date		14/09/2019	