FLOOD RISK ASSESSMENT FOR PROPOSED DWELLING ADJACENT TO 74 RESERVOIR ROAD, SURFLEET SEAS END, SPALDING, PE11 4DH



Proposed site from Reservoir Road

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Revision A: 23rd March 2015: Paragraphs on Sequential and Exception Test amended.

This flood risk assessment has been prepared solely to support the planning application for the proposed new dwelling at 74 Reservoir Road, Surfleet Seas End, Spalding. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete.

FLOOD RISK ASSESSMENT FOR PROPOSED DWELLING AT

74 RESERVOIR ROAD, SURFLEET SEAS END, SPALDING, PE11 4DH

Introduction

An application has been made for planning permission to construct a new dwelling on a site west of 74 Reservoir Road, Surfleet Seas End, Spalding.

The site is within Flood Zone 3(a) indicating a high risk of a 1 in 200 year or greater annual probability of tidal flooding from the River Welland, as shown on the Environment Agency's (EA) Flood Zone map. These maps do not take into account existing flood defences.

The Planning Application requires a flood risk assessment to be carried out as required in the Technical Guidance to the National Planning Policy Framework (NPPF) Development and Flood Risk. The site is within a defended area as specified on the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) and is located in the Welland and Deepings Internal Drainage Board district.

Application Site

The development is located approximately 1 mile east of the new A16 road at Surfleet, three miles north of Spalding city centre. The National Grid Reference of the site is 527830 329110.

The position and extent of the site is shown on the plan at the end of this document.

The proposed development is within Flood Zone 3(a) "High Probability" as detailed on the Environment Agency's flood zone maps without defences, as defined in Table 1 of the Technical Guidance to the National Planning Policy Framework. Applying the flood risk vulnerability classification in Table 2 of the Guidance the development is classified as "more vulnerable" and the Table 3 states that the development of a new dwelling requires the sequential and exception test to be considered.

Sequential Test

As the proposed development is located in Flood Zone 3(a) the NPPF requires the sequential test to be applied to determine if there are any reasonably available and suitable alternative sites for this type of development. This site may be considered as a windfall site and there may be some others available in Surfleet Seas End. However they are unlikely to have a lower flood risk than the site proposed, as the whole of this area is within Flood Zone 3(a), is at a similar level, and therefore will have the same flood risk.

Exception Test

The Sequential Test has demonstrated that it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding. Therefore the Exception Test must be applied and for this to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by the Strategic Flood Risk Assessment; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking into account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

Both parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

The first section will be demonstrated by the Supporting Planning Statement.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere, which will confirm that the second section is passed.

Strategic Flood Risk Assessment

Consultants have produced a Strategic Flood Risk Assessment (SFRA) for the South Holland District Council (SHDC). This document provides details of the flood risk in the Council's area. Reference to the maps in this document give the following information for the flood risk and hazard at the site for the 1% fluvial event and 0.5% tidal event.

Actual Peak Depth	Present day	Zero
	Year 2115	0 – 500mm
Actual Risk Extent	Present day	Low to medium risk, reliant on flood defences
	Year 2115	High
Actual Peak Velocity	Present day	No velocity
	Year 2115	Greater than 0.25m/sec
Residual Peak Depth	Present day	Zero
	Year 2115	0 – 500mm
Residual Risk Extent	Present day	Low to medium risk, reliant on flood defences
	Year 2115	High
Residual Peak Velocity	Present day	No velocity
	2115	0 – 0.1m/sec

1. **The maximum flood level in the fluvial section of the River Glen shown in the SFRA are as follows:**

Year	2007	2115
1 in 100 year	4.13	4.65
1 in 1,000 year	4.65	4.68

The bank level on this side of the river at chainage 0.4km is shown to be 4.83m OD.

2. **The extreme tide levels in the section of the River Welland at chainage 16.1km is shown in the report as follows:**

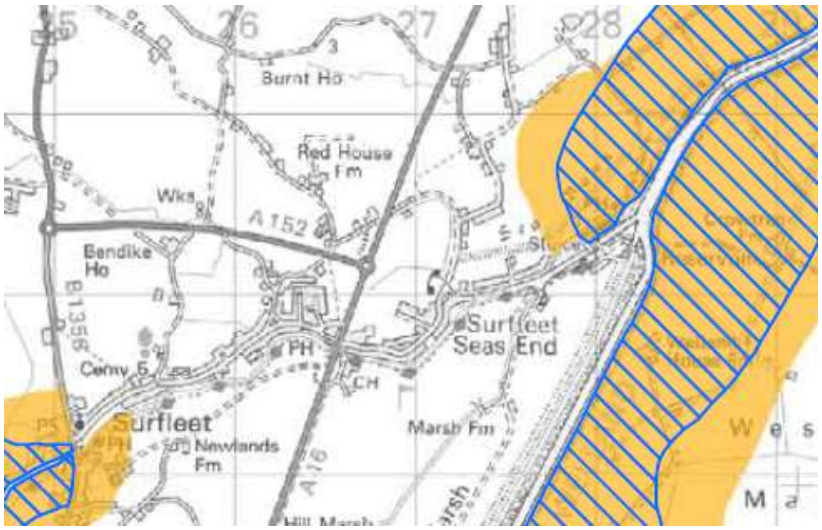
	2007	2055	2115
1 in 100 year	5.99	6.32	7.13
1 in 1,000 year	6.32	6.65	7.46

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The bank levels of the west bank of the tidal River Welland north and south of the River Glen outfall are at a level of approximately 7.50m OD and above, but the bank level at 16.1km, the River Glen outfall is shown to be 7.05m OD.

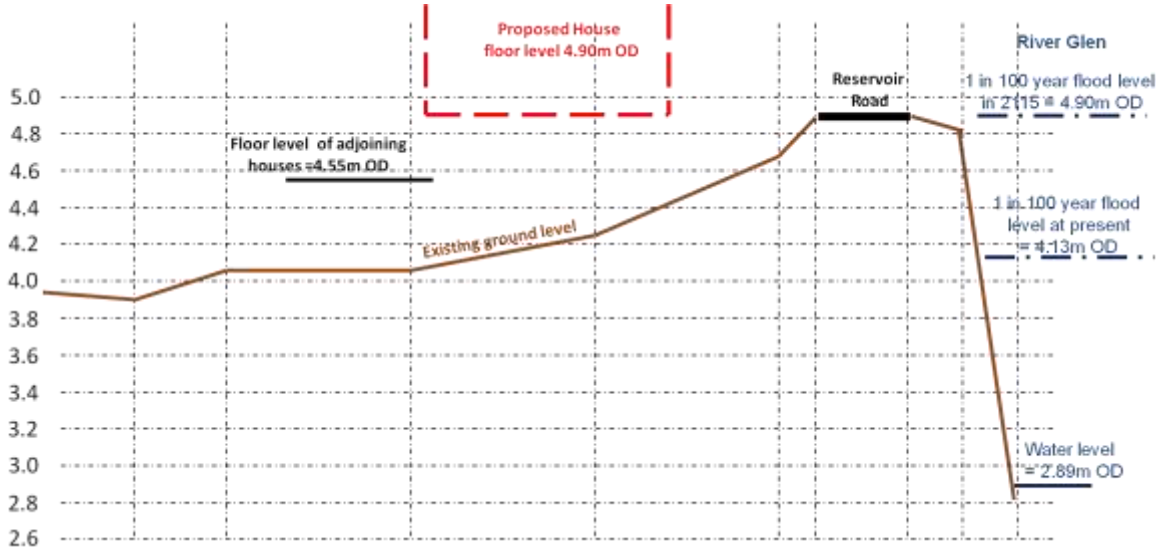
3. **Rapid Inundation Zone:**

The maps in the SFRA show that the site is not within the rapid inundation zone.



Site Levels

Levels have been taken of the site which are shown on the section below. The level of the River Glen on 4th August was 2.89m OD and the ground level of the site adjacent to Reservoir Road is 4.25m OD and the site slopes down to a level of 4.05m at the rear of the site. The fields behind the site are slightly lower at a level of 3.90m OD.



It is proposed that the finished floor level of the new building should be a minimum of 4.90m OD.

Existing Flood Alleviation Measures

The site is 400 metres from the tidal sluice at Surfleet Seas End where the River Glen discharges into the tidal section of the River Welland. Both are main river and maintained by the Environment Agency.

Potential Sources of Flooding

The following sources of flooding have been identified:

1. Flooding from the River Glen.
2. Overtopping of the tidal River Welland.
3. Flooding from failure of IDB systems.

1. Flooding from the River Glen

Flooding could occur if the bank, which incorporates the road, were to breach when levels in the River Glen are high. The level of the bank shown in the SFRA is 4.83m OD, and the level taken at the same time as the site levels was 4.89m OD. The maximum predicted level in the River Glen at this location is 4.12m OD for a 1 in 1000 year event at the present time. Therefore at the present time there is adequate freeboard and a robust bank with a 7.0 metre top on which a tarmaced road is laid. Therefore the risk of a breach occurring at this location can be considered extremely low.

However the SFRA indicates that the 1 in 1000 year level for the year 2115 will be 4.68m OD. The EA have carried further modelling which predicts the 1 in 1000 year level in 2115 will be 4.96m OD. This will cause some overtopping unless the bank is raised at some time over the next 100 years.

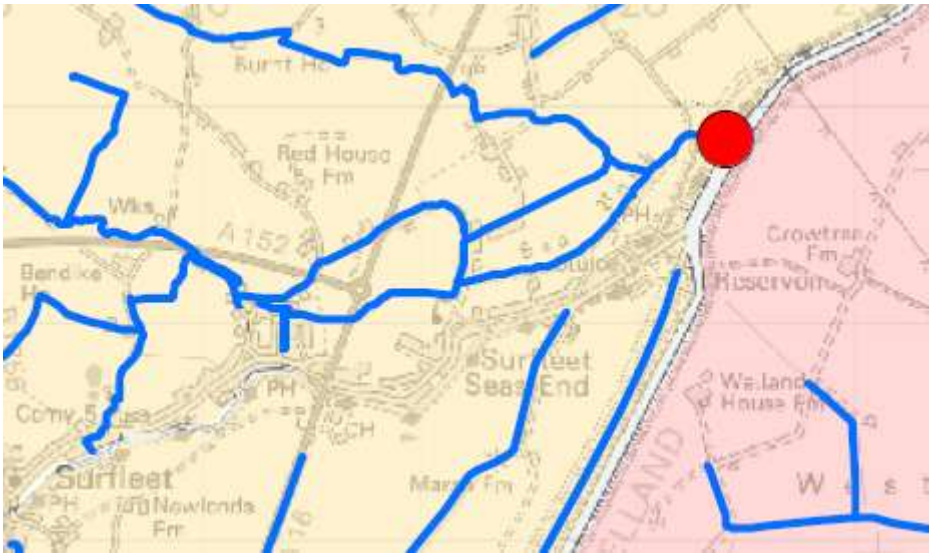
2. Flooding from the tidal River Welland

The River Welland is tidal in the section adjacent to the River Glen outfall sluice. The SFRA states that the defences are adequate to withstand a 1 in 200 year (0.5%) probability event for present day. In the future in 2115 some of the banks would be overtopped with a 0.5% probability event.

It is reasonable to assume that within the next 100 years the tidal defences will be raised to continue to provide a 1 in 200 year level of protection to this area.

The development site could be affected if the west bank of the tidal Welland north of Surfleet Seas End were to breach. This would send flood water into Surfleet Marsh and flood water could flow south westwards and reach the Development site. However there is a large area of land at lower level which would flood before the development site which is higher.

3. Flooding due to failure of IDB Systems.



There is a system of IDB drainage channels which drain the fenland area north of the site. These lead to Surfleet Marsh Pumping Station where the water is pumped into the tidal River Welland. This pumping station provides an overall standard of protection to the area of between 1 in 50 and 1 in 100 years. There is an IDB drain, called Old Beach East Drain, immediately north of the site which runs eastwards to the pumping station. Welland and Deepings IDB have stated that the 1 in 100 year predicted maximum level at Surfleet Marsh Pumping Station is 1.75m OD, which is 2.25m lower than the lowest ground levels on the site.

It is expected that Welland and Deepings IDB will continue to review predicted 1 in 100 year levels over the next 100 years to ensure that freeboards are retained in the future.

Extent of known Flooding

There is no history of flooding having occurred over this section of the north bank of the River Glen for the last thirty years at least.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency tidal River Welland is very low. In an extreme event water levels in the River Glen could rise and flood the property but any effect on this location would not be sudden and there would be time for residents to take precautionary measures to limit the impact of any flooding that may occur.

Residual Risk – Extreme Events

The residual risk from extreme events is very low on this site. The major risk to the site is from high levels in the River Glen. The present levels of the banks of the River Glen along the stretch from Surfleet Seas End to West Pinchbeck are as low as 4.28m OD and overtopping of the river will begin to occur above this level. Details of these levels are shown in Appendix A.

Summary of Risk of Flooding to the Site from the River Glen

The major risk of flooding at this site is from high levels in the River Glen following heavy rainfall. The site is 400 metres from the sluice that opens to discharge the River Glen into the tidal section of the River Welland. Flow out of the sluice is not possible during the period of high tide in the River Welland and therefore levels in the River Glen will rise during this period. However as soon as discharge is possible into the tidal River Welland levels in the River Glen will immediately begin to fall.

There is a risk that the bank of the River Glen in front of the site could be overtopped. If this occurred flood water would run through the site and discharge onto the lower land behind the site. The risk of breaching to this section of bank can almost be discounted because surfacing on the road and the level of the land immediately behind the road.

The Environment Agency has indicated that the maximum predicted level in a 1 in 100 year event would be 4.09m OD at the present time. This would not cause flooding at this location.

PPS25 and the Technical Guide to the National Planning Policy Framework indicates that an FRA should consider climate change over the next 100 years. The Guide indicates the following increases should be allowed for:

Parameter	**1990 to 2025**	**2025 to 2055**	**2055 to 2085**	**2085 to 2115**
Peak rainfall intensity	*+5%*	*+10%*	*+20%*	*+30%*
Peak river flow	*+10%*	*+20%*		

Using this guidance the EA has indicated that maximum 1 in 100 year levels in 2115 will be 4.90m OD.
However if we look carefully at the recorded bank levels of the River Glen in SHDC SFRA which are tabulated at every 100 metres along both banks we find in the first 6.0km of the River Glen that there are:

31 instances on the left bank with bank levels less than 4.90m OD.

18 instances on the right bank with bank levels less than 4.90m OD.

3 instances on the left bank with bank levels less than 4.40m OD.

7 instances on the right bank with bank levels less than 4.40m OD.

Therefore there could be approximately 4.9km of banks of the Glen below a level of 4.90m OD. and 1.0km of banks below 4.40m OD.

Details of these levels and chainages are shown in Appendix A on page 9.

Therefore it seems to be impossible for the water level to reach a level of 4.90m OD in the River Glen in 2115 unless bank levels along a long length of the river are increased to above 5.00m OD. At a level of 4.40 m OD water will be flowing over long lengths of banks and this will be limiting the increase of water levels further.

There is a possibility that the EA could carry out a bank raising scheme in the next 100 years. However then they will need to take into account that any bank raising would increase the flood risk to existing properties at Surfleet Reservoir. Any scheme for improvement would need to look at flood storage rather than bank raising.

Therefore the risk of the River Glen causing flooding at the location of the development site is remote if the levels of the banks are not raised in the future.

Summary of Risk of Flooding to the Site from the tidal River Welland

There is a risk that the west bank of the River Welland north of Surfleet Seas End could breach and flood water would flow into the area between the banks of the River Glen to the south, possibly the A16 road and the A17 to the north.

The SFRA indicates that this flood water would be 0 – 500mm depth in 2115. Even if depths in excess of this occurred the proposed house with a floor level of 4.90m OD would be 1.0 metre above the ground level of the field north of the proposed house. Therefore the risk of flooding from this source can be considered to extremely low, that is lower than 1 in 1000 years.

Conclusions

The following conclusions can be made:

- The site is in flood zone 3(a) it will not be at risk of flooding from a 1 in 1000 year event at the present time.
- The site is in flood zone 3(a) and is at risk of flooding from a 1 in 100 year event in 2115 if you consider the predicted level given by the Environment Agency. However the River Glen is not a typical river with a functional flood plain along all of its length. It is an embanked watercourse for most of its length which will overtop when there are high levels which will limit the increase in water levels.
- Any flooding that does occur will happen very slowly and give residents of the building adequate time to escape to higher land.
- There is a safe safety route from the site onto land within 50 metres to the east which is at a level of 7.00m OD.
- In a flood risk area there is always a risk of an event occurring of greater magnitude than has been considered in this flood risk assessment.

Recommendations

- In any area at risk of flooding, even though in this case the risk is extremely low, it is preferable that a proposed new building should be of two story construction with all bedrooms at first floor level. This will provide a refuge for residents if the building becomes flooded after a major breach of the tidal bank, and ensure there is no danger to residents when they are asleep.
- The ground floor level of the proposed building should be at least 4.90m OD, which is the same level as Reservoir Road in front of the site.
- Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service.
- On site surface water drainage should be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.
- Levels in the River Glen will only rise slowly and residents would have adequate time to prepare themselves for any event that could occur.

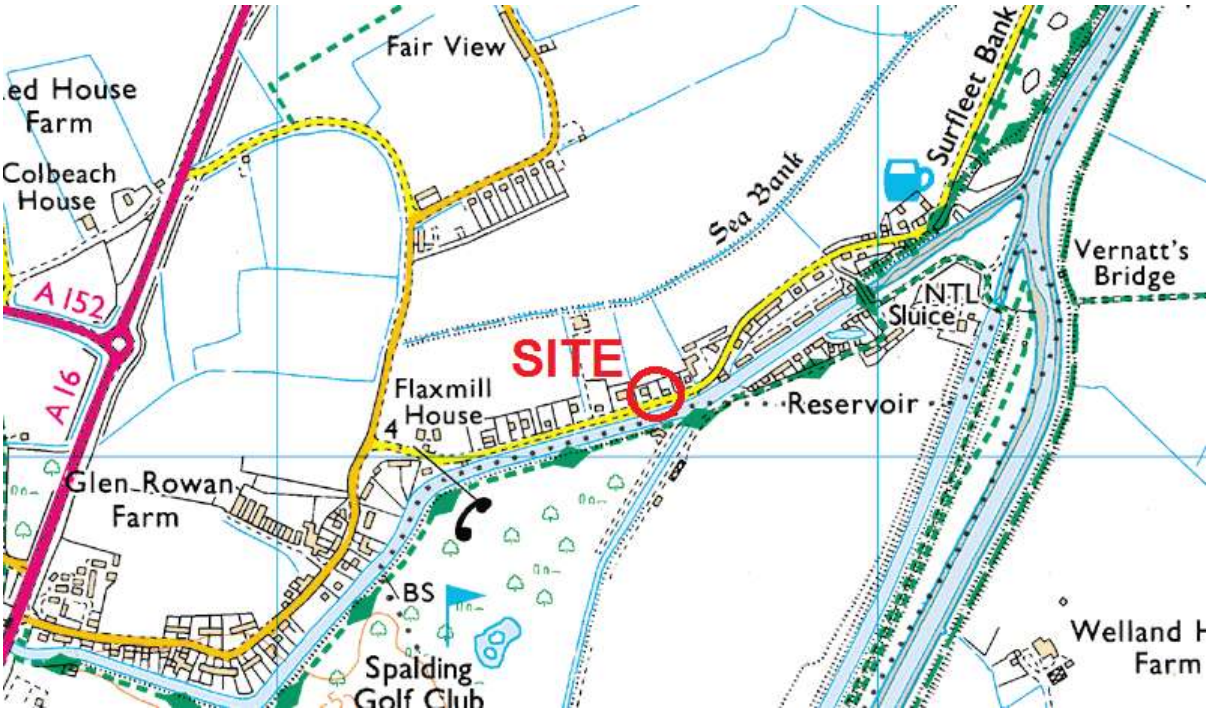
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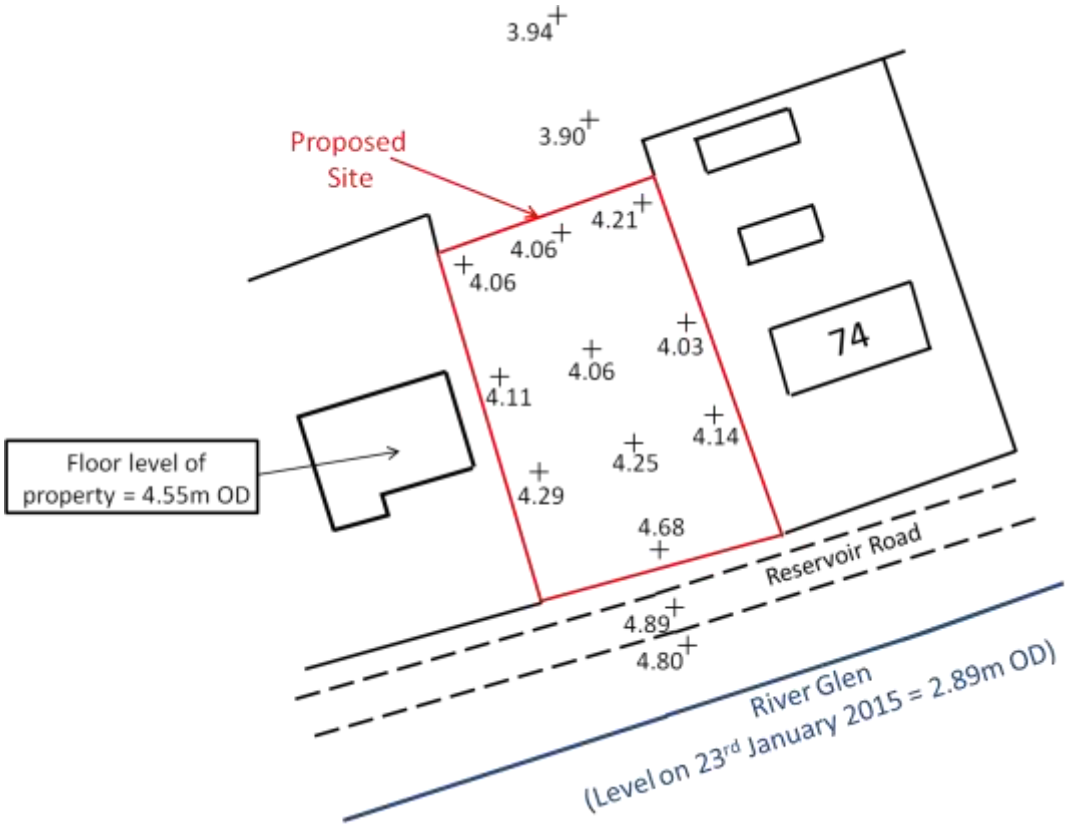
29th January 2015

Revision A: 23rd March 2015: Paragraphs on Sequential and Exception Test amended.

LOCATION PLAN



SITE PLAN AND LEVELS



APPENDIX A

RIVER GLEN DEFENCE CREST LEVELS BELOW 5.00m OD

Left Bank	
Chainage	Level
0.4	4.83
0.7	4.67
0.8	4.40
1.5	4.95
1.9	4.89
2.0	4.90
2.1	4.65
2.2	4.80
2.3	4.57
2.4	4.72
2.5	4.65
2.7	4.97
3.0	4.87
3.1	4.79
3.2	4.60
3.3	4.48
3.5	4.71
3.6	4.40
3.7	4.89
3.8	4.33
3.9	4.59
4.3	4.79
4.4	4.65
4.5	4.59
4.6	4.70
4.7	4.89
4.8	4.92
4.9	4.80
5.0	4.76
5.1	4.83
5.2	4.86
5.3	4.71
5.6	4.84
5.7	4.79
6.0	4.82

Right Bank	
Chainage	Level
2.3	4.92
2.4	4.63
3.3	4.89
3.4	4.25
3.9	4.97
4.0	4.90
4.1	4.95
4.2	4.72
4.3	4.64
4.4	4.61
4.5	4.54
4.6	4.82
4.7	4.42
4.8	4.59
4.9	4.43
5.0	4.35
5.1	4.37
5.2	4.39
5.3	4.96
5.4	4.28
5.5	4.28
5.6	4.70
5.7	4.38

Chainage is distance measured from Surfleet Sluice in kilometres

Levels are bank levels taken from SHDC SFRA.