

FLOOD RISK ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT 8C RIVERBANK, SPALDING, Lincs

FINAL REPORT

GEOFF BEEL CONSULTANCY

FEBRUARY 2022

GCB/MERCHANT

DISCLAIMER

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1.0 INTRODUCTION

- 1.1 A full planning application is to be submitted by G R Merchant Ltd on behalf of Ms Ally Bates for proposed residential development at 8C Riverbank, Spalding, Lincs.
- 1.2 A Flood Risk Assessment is required to accompany the planning application to meet the requirements and general principles contained in the Planning Practice Guidance to the National Planning Policy Framework (NPPF) and for approval by the Environment Agency.

The site is shown within Flood Zone 3 of the Environment Agency's Flood Map for Planning. The latest Flood Zone Maps have been created as a tool to raise awareness of flood risk with the public and partner organisations, such as Local Authorities, Emergency Services and Drainage Authorities. The Maps do not take into account any flood defences.

The site is also shown within Flood Zone 1 of the South East Lincs.Strategic Flood Risk Assessment Map (2017) and located in the Welland and Deepings Internal Drainage Board district.

- 1.3 Geoff Beel Consultancy was appointed on 18th February 2022 to undertake a Flood Risk Assessment.

2.0 LOCATION

- 2.1 The development site is located at 8C Riverbank,, Spalding. The National Grid Reference of the central point of the site is TF 24152115.
- 2.2 The position and extent of the site are shown on Fig 1 – Site Plan Proposed & Location Plan at the end of the document.
- 2.3 The site, located within the Welland and Deepings Internal Drainage Board district is shown within Flood Zone 3 as detailed on the Environment Agency Flood Map for Planning and in Flood Zone 1 of the South East Lincs. Strategic Flood Risk Assessment Map. (2017)

3.0 THE SITE AND SEQUENTIAL TEST

- 3.1 The site is a mixture of residential and commercial premises some 100 metres landward of the River Welland defences.
- 3.2 The area of development is approximately 0.09 hectare.
- 3.3 The proposed site layout consists the construction of 5 two-storey dwellings with vehicular access to both Cradge Bank Road and Riverbank.
- 3.4 The Sequential Test and Exception Test will require to be applied but the development may be permitted as the site is protected against the 1 in 100 year fluvial event by a combination of defences, pumping stations and sluice gates meeting the requirements of NPPF. The Sequential Test is met as the site is located in Flood Zone 1 of the South East Lincs. Strategic Flood Risk Assessment Flood Map (2017)

4.0 EXISTING FLOOD ALLEVIATION MEASURES

- 4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agency's 'Policy and Practice for the Protection of Floodplains' and is considered to be passive until such time as a flood greater than that for which the defences were designed occurs. The likelihood of flooding due to overtopping or failure of a flood defence embankments is considered to be small.
- 4.2 The site is located within the Welland and Deepings Internal Drainage Board protected by the River Welland defences to the 1 in 100 year return period flood event. The nearest 'main drain' open watercourse, the Little London Pipeline immediately north of the site. Land levels at the site vary between 2.92m and 3.50m aOD.
- 4.3 The site and surrounding land drains to the Little London Pipeline and hence the Hills Drain to the South Drove Drain some 1750 metres upstream of Pode Hole Pumping Station. The Pode Hole Pumping Station discharges into the Vernatts Drain which ultimately flows into the tidal River Welland.
- 4.4 The Vernatts Drain is an embanked high level carrier conveying the surface water run-off from some 16165 hectares of land into the tidal River Welland at Surfleet Seas End.

The Welland and Deepings IDB have recently completed a three year programme to raise and strengthen the Vernatts Drain embankments to accommodate with 450mm freeboard, the design flood level of 3.96 m aOD, estimated to be a 1 in 100 year return period event.

- 4.5 The South Drove Drain forms part of the comprehensive system of gravity and part pumped drainage providing an outfall from land and property situated between Spalding and Market Deeping.
- 4.6 Current maintenance standards within the Welland and Deepings Internal Drainage Board are generally very good.

During the operation and maintenance of its pumping stations, associated structures and channel systems, particularly those that could affect property, the Board seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought. However, bank slips, blocked culverts etc may occur from time to time and these matters are usually dealt with promptly.

- 4.7 The fluvial River Welland is located approximately 100 metres to the east of the site with a standard of protection of 1 in 100 years return period. The Crowland and Cowbit Washes are situated upstream on the opposite bank of the River Welland offering integrated protection to Spalding and the surrounding district.

- 4.8 Fluvial flood levels of the River Welland at Little London Road Bridge are as follows:

	Present	Present + Climate Change
1%	4.39	4.68
0.1%	4.40	4.68

- 4.9 Maintenance standards of the Environment Agency's main rivers and defences are well maintained and regularly inspected for their asset condition.

5.0 POTENTIAL SOURCES OF FLOODING

- 5.1 Four potential sources of flooding have been identified as a result of this assessment:

- a) local blockages to existing IDB main drain system.
- b) storm return period of 1 in 25 years being exceeded
- c) failure of Pode Hole Pumping Station
- d) overtopping and breaching of the fluvial River Welland defences

- 5.2 The probability of flooding from source a) is low due to the maintenance standards already achieved and managed by the IDB.

The probability of flooding from b) is also low due to the Welland and Deepings IDB main drain design standard incorporating a minimum 900mm freeboard to the lowest land level which provides adequate storage in events greater than 1 in 50 years.

- 5.3 Failure of Pode Hole Pumping Station may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment. The probability of such an occurrence is also considered to be low.

Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1 in 100 year events, caused no flooding to any residential properties at the time and the Boards policy is to provide a standard of drainage which satisfies NPPF requirements of a 1 in 100 year return period for fluvial protection inclusive of the effects of climate change and development. The Boards policy regarding the connection of future developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

The probability of the site flooding from this potential source is also considered to be low.

- 5.4 The possible overtopping and breaching of the fluvial River Welland flood defences which may affect the site under extreme conditions is also considered to be very low. The present standard of defence of 1 in 100 years would most probably have to be exceeded to create such conditions. This is confirmed by the Residual Depth Map for year 2115 in Fig. 6 of this assessment.
- 5.5 The River Welland defences to the left hand bank for a distance of 1000 metres upstream of the Spalding Yacht Club and also downstream of the Club premises and immediately on the river frontage to the development site consist of vertical steel sheet piling with concrete capping beam which would not be considered for any breach scenario.

It can therefore be shown that the crest level of the left hand bank is a minimum of 6.07m aOD. The Crowland and Cowbit Washes Cradge Bank on the opposite side of the river is at a minimum of 5.00m aOD. The left hand bank defence has a very shallow riverside slope of a 1 in 20 gradient so any erosion caused by velocity and wave action would be limited, if at all.

The estimated flood level inclusive of climate change for the 1% and 0.1% return period events is 4.68m aOD which would provide freeboard of 1.39 metres to the Deeping High Bank flood defence. This is considered more than adequate freeboard to avoid any breach occurring to the defence by overtopping and scouring of the landward slope.

It is highly unlikely that on both flood events, the Crowland and Cowbit Washes would be totally full of water.

- 5.6 The development site is shown as unaffected by any floodwaters as a result of a breach to the River Welland defences as shown on the Residual Depth map in year 2115 of Fig 6 in this assessment.

It is recommended that proposed floor levels of the development should be 300mm above existing ground level to safeguard against the remote possibility of a breach or overtopping of the River Welland defences. Flood resilient measures will also be incorporated into the design and construction of the dwellings up to 300mm above finished floor level.

6.0 EXTENT OF KNOWN FLOODING

- 6.1 During the preparation of this assessment, no evidence was discovered of the site being flooded or of any adjoining properties.

7.0 PROBABILITIES AND TRENDS OF FLOODING

- 7.1 The probability of this development flooding from localised drainage systems is very low. It is also intended to construct floor levels 300mm above ground level with flood resilient measures incorporated.
- 7.2 The probability of the site flooding with water from any Welland and Deepings river system is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and the location of the site. Similarly the same standard is provided by the Environment Agency's main river and defences.
- 7.3 If under very extreme events, levels of floodwater from any Environment Agency or Welland and Deepings river or arterial systems rose to such an extent that the site was affected, the situation would not be sudden. It is very probable that sufficient time would be available to take precautionary actions to limit the extent and potential impact of flooding.
- 7.4 The water levels in the drainage channels will tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the raising of floor levels above existing ground level will be appropriate for the design life of the development (ie 100 years).
- 7.5 Safe and dry access to and from the site would be available in a north easterly direction via Riverbank to Little London Road Bridge where land levels have risen to 5.30m aOD.

8.0 IMPACTS OF FLOODING

- 8.1 No significant impacts of flooding are anticipated.
- 8.2 Floor levels of the development will be raised 300mm above existing ground levels offering additional protection against impacts arising from any extreme short duration, localised events. Surface water drainage will be discharged to soakaway designed to BRE365 specification and Building Regulations approval.
- 8.3 The general location of the site within the catchment is such that if flooding occurred from any of the Environment Agency or Welland and Deepings river systems, then probably 2 to 3 days warning time would be available.
- 8.4 No displacement of water from the site will affect any adjoining properties and agricultural land.

9.0 RESIDUAL RISK – EXTREME EVENTS

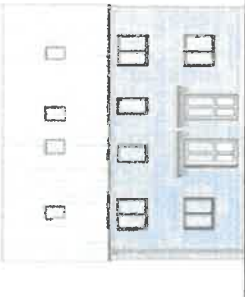
- 9.1 The residual risk from extreme events is very low on this site, because of its location, within a pumped sub-catchment of the Welland and Deepings IDB area and its location 100 metres from the River Welland fluvial defences consisting of vertical steel sheet piling and concrete capping beam.
- 9.2 The site is within Flood Zone 1 according to NPPF classification with a very low risk of flooding due to the current standards of drainage and flood defence and land levels. The site is not located within a Functional Flood Plain of any 'main river' or 'main drain' as defined in NPPF. The Environment Agency Flood Map for Planning has been produced irrespective of existing flood defences and standards of protection.
- 9.3 South Holland District Council and Boston Borough Council in conjunction with the Environment Agency and the local IDB's within the Councils area have carried out the South East Lincs. Strategic Flood Risk Assessment of the whole District by appointed Consulting Engineers.

The South East Lincs. Strategic Flood Risk Assessment has produced more definitive Flood Risk Maps than those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences for years 2002 and 2052 to account for the effects of climate change.

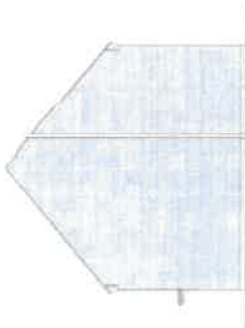
Breach scenarios of embankments failing and/or being overtopped have also been carried out to establish Flood Risk Zones.

10.0 CONCLUSIONS AND RECOMMENDATIONS

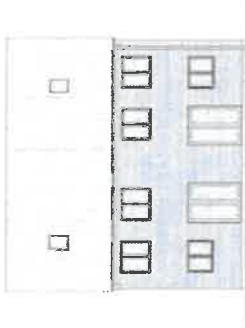
- 10.1 As a result of the assessment, the following conclusions have been reached:-
- The proposed development is not in a Functional Floodplain as defined by NPPF. It is located in the Passive Floodplain protected by defences to a 1 in 100 year return period.
 - The site is in Flood Zone 1 with the actual risk flooding from any Environment Agency river system being very low.
 - Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.
 - Floor levels will be raised 300mm above existing ground level and flood resilient techniques incorporated into the design and construction of the proposed dwellings.
 - On site surface water drainage will be discharged to soakaway to BRE365 specification and Building Regulations approval.



FRONT ELEVATION



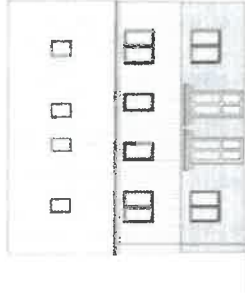
RIGHT SIDE ELEVATION



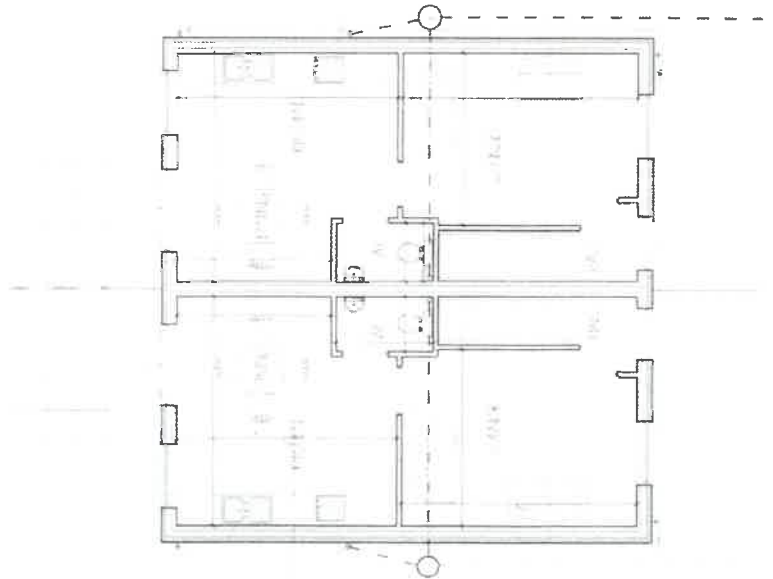
REAR ELEVATION



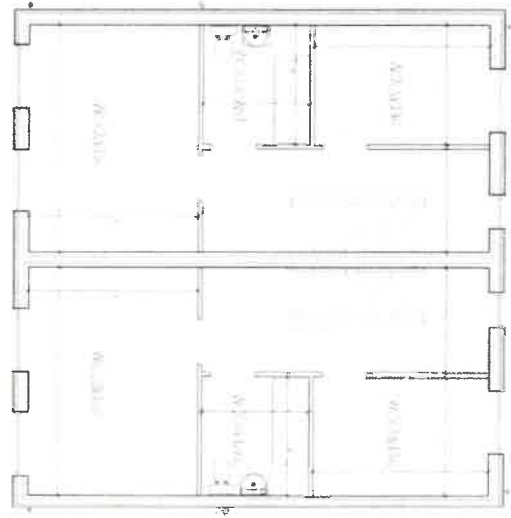
LEFT SIDE ELEVATION



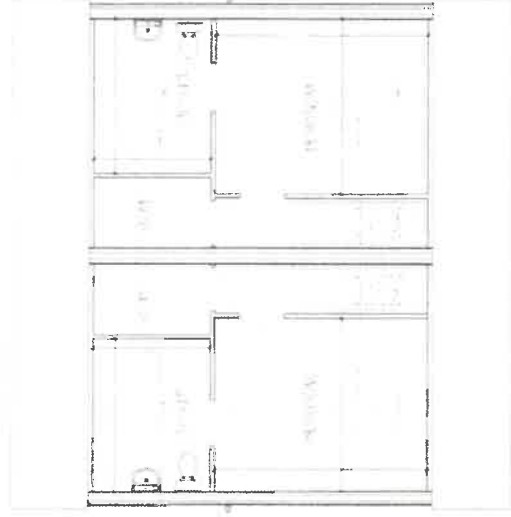
FRONT ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

G. R. MERCHANT LTD.
 1. 1000 AVENUE ROAD
 ARCHITECTURAL, STRUCTURAL
 AND LAND DRAINAGE
 CONSULTANTS
 4100 Highway 100
 Suite 100, Suite 100
 Markham, Ontario, L3R 9V3
 Phone: (905) 477-0000
 Fax: (905) 477-0001
 Website: www.gmerchant.com

NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CANADIAN NATIONAL BUILDING CODE (NBC) AND ALL APPLICABLE BY-LAWS.

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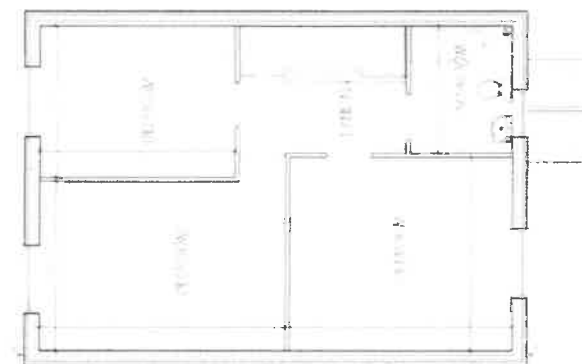
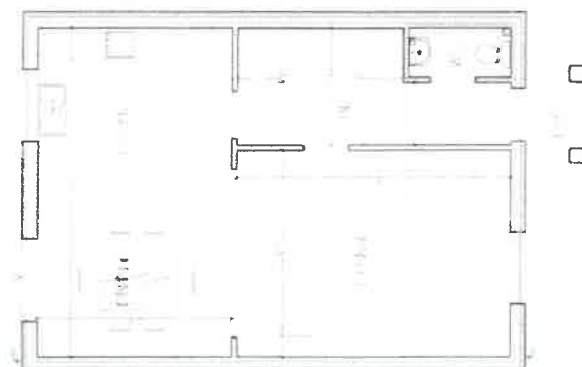
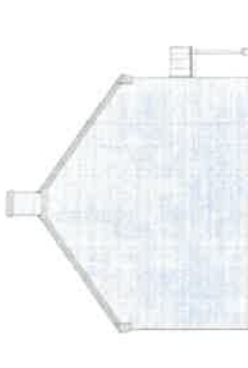
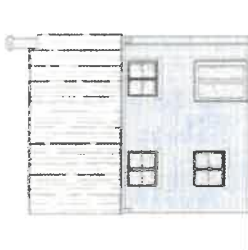
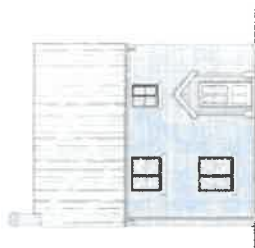
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 Fax 01408 93746

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Flood map for planning

Your reference

Spalding

Location (easting/northing)

524146/321145

Scale

1:2500

Created

23 Feb 2022 12:17



Selected point



Flood zone 3



Flood zone 3: areas
benefiting from flood
defences



Flood zone 2



Flood zone 1



Flood defence



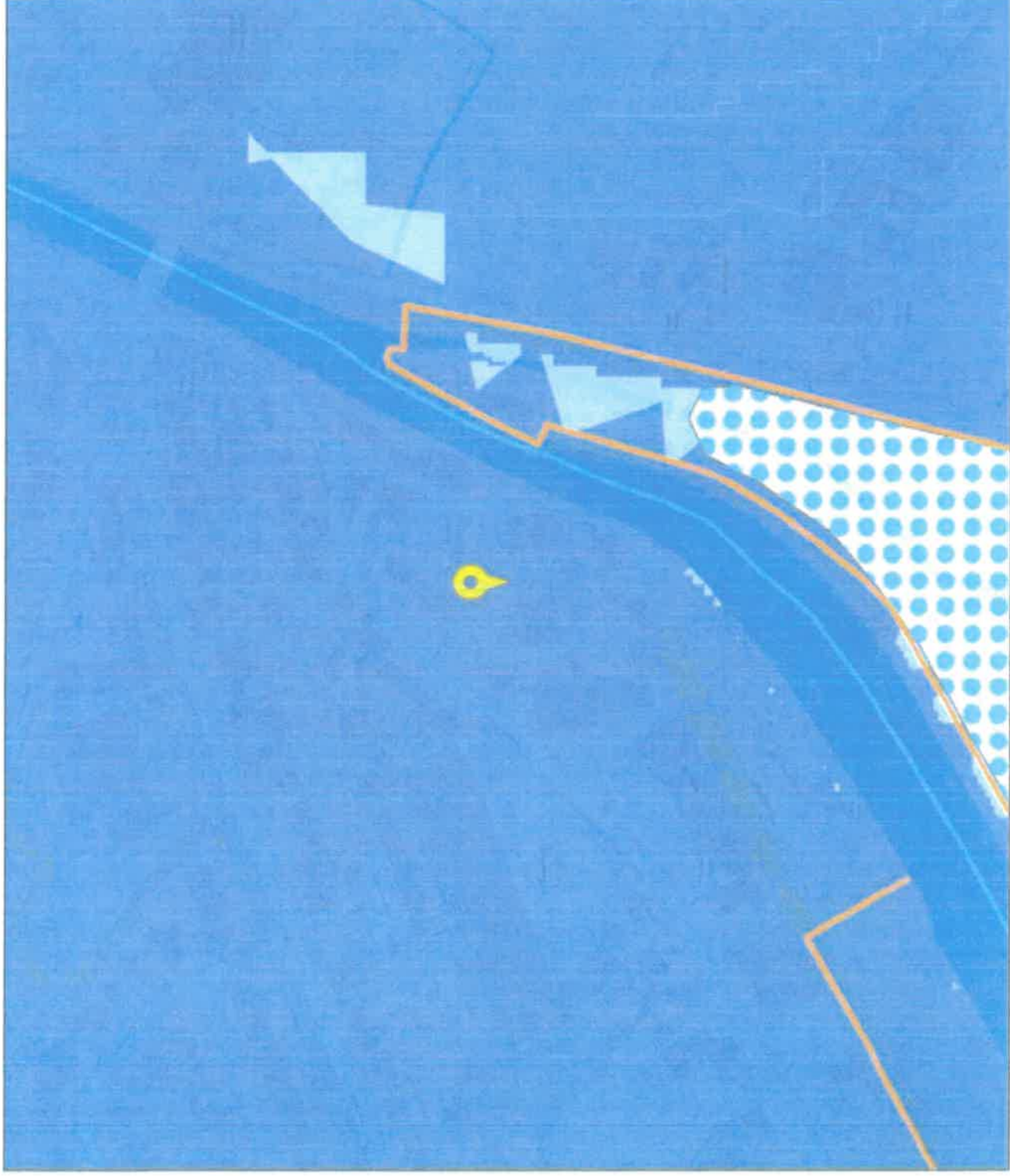
Main river



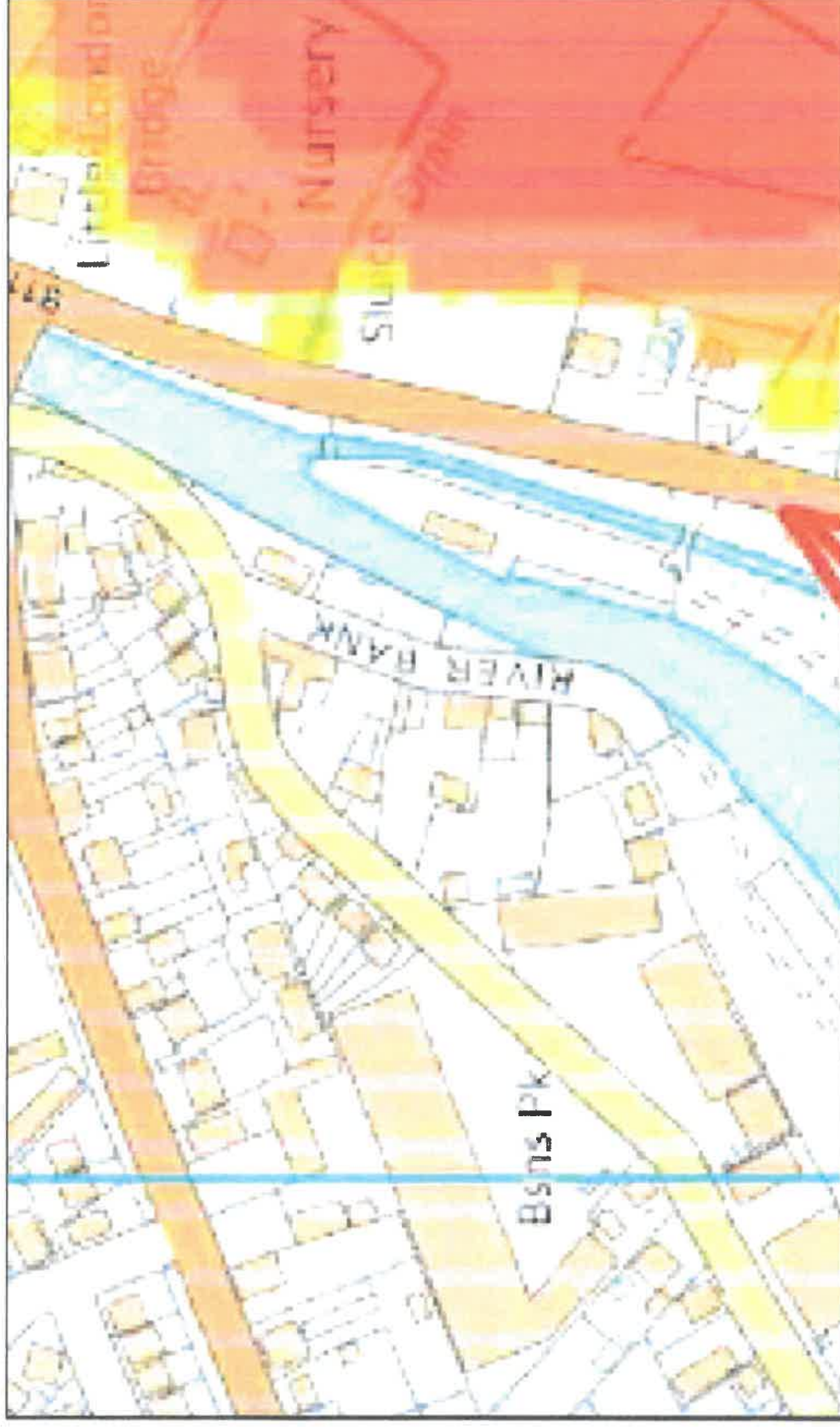
Flood storage area



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Residual Peak Depth – 0.5% Annual Probability Present Day



Residual Peak Depth – 0.5% Annual Probability Year 2115

