

**PROPOSED CONVERSION OF OUTBUILDINGS AT WELLAND HOUSE,
30 HIGH STREET, SPALDING, PE11 1UB**

FLOOD RISK ASSESSMENT



Existing Building adjacent to Welland House

S M Hemmings B Sc C Eng MICE MIWEM,
69 Charlotte Way,
Peterborough,
PE3 9ER

This flood risk assessment has been prepared solely to support the planning application for the proposed conversion of outbuildings at 30 High Street, 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.

Introduction

An application has been made to South Holland District Council to convert two existing outbuildings at 30 High Street Spalding for residential use. A photograph of the building adjacent to Welland House is on the first sheet and the rear building is shown below.



The site is within Flood Zone 3 on the Environment Agency's 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.

The site is within the defended area of the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the South Holland Internal Drainage Board district.

Application Site

The development is located on the eastern side of the River Welland. The National Grid Reference of the site is 525230 322970.

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.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, the development is classified as "more vulnerable" in Table 3 of the Guidance, which states that residential use is only permitted after the sequential and exception test is followed.

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 in a lower flood risk zone for this type of development. This site may be considered as a windfall site and there may be some others available in the Spalding area. The development complies with the South Holland District Council's policy note on flat conversions. It is also likely to have a lower flood risk than many others in Spalding, as the whole of this area is within Flood Zone 3(a).

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 risks, 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 and compliance with South Holland District Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

Strategic Flood Risk Assessment

The following information about the flood risk at the location of the proposed development has been gained from the maps produced for the South Holland District Council Strategic Flood Risk Assessment:

1. Report Maps

- Map 5 indicates the site to be low or medium risk and protected by flood defences.
- Map 6 indicates the peak depth is zero for the present day 1% / 0.5% tidal event probability.
- Map 7 indicates the peak velocity is zero for the present day 1% fluvial / 0.5% tidal event probability.

- Map 8 indicates the risk extent is zero for the present day 1% fluvial / 0.5% tidal event probability.
- Map 10 indicates the actual risk extent for the 0.1% event probability is low but reliant upon protection by flood defences.
- Map 12 indicates the actual risk extent for the year 2055 for the 1% fluvial / 0.5% tidal event probability is high.
- Map 13 indicates the site is within the high probability band for the year 2115 for the 1% fluvial / 0.5% tidal event probability.
- Map 14 indicates the actual risk extent for the year 2115 for the 0.1% event probability is low, and indicates that this flooding would develop more than 3 hours after any breach occurs.
- Map 16 indicates the site is not within a rapid inundation zone.

2. Flood Maps Table D1

- The maps illustrate the actual flood hazard which is as follows:

For the present day	Depth of flooding ... zero
	Extent of flooding .. zero
	Hazard Nil
	Velocity ... Nil
For year 2115	Depth of flooding ... zero
	Extent of flooding ...zero
	Hazard ... Nil
	Velocity .. Nil

- The maps also illustrate the residual flood hazard which is as follows:-

For the present day	Depth of flooding ...Between 0.5 and 1.0m
	Extent of flooding .. Medium or High
	Hazard ... Significant
	Velocity .. 0 to 0.1m / sec
For the year 2115	Depth of flooding ...
	Front building: Between 0.5m and 1.0m
	Rear building: Between 1.0m and 1.5m
	Extent of flooding .. High probability
	Hazard ... Significant
	Velocity .. 0 to 0.1m / sec

3. Maximum flood levels:

Maximum flood levels in the River Welland and the Coronation Channel are shown in the reports as follows:

	Present	Present + Climate Change
1 in 100 year	4.32	4.69
1 in 1,000 year	4.34	4.69

- The minimum freeboard on the east bank of the Coronation Channel is 70mm.
- The maintenance standards of these banks are good and defences are well maintained and regularly inspected.

4. Extreme tide levels

The extreme tide levels in the section of the Coronation Channel and River Welland between Fulney Lock and Marsh Road Sluice are shown in the report as follows:

	2007	2055	2115
1 in 100 year	5.98	6.31	7.12
1 in 1,000 year	6.32	6.65	7.46

The lowest bank level on the left bank of the Coronation Channel is 6.88m OD.

The lowest bank level on the right bank of the tidal River Welland is 7.57m OD.

Existing Flood Alleviation Measures

The site is within a defended flood plain, as defined in Appendix 1 of the Environment Agency's "Policy and Practice for the Protection of Flood Plains" and is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding due to overtopping or failures of the defences is considered to be very low.

The site is approximately 20 metres from the River Welland, which is the main river and maintained by the Environment Agency.

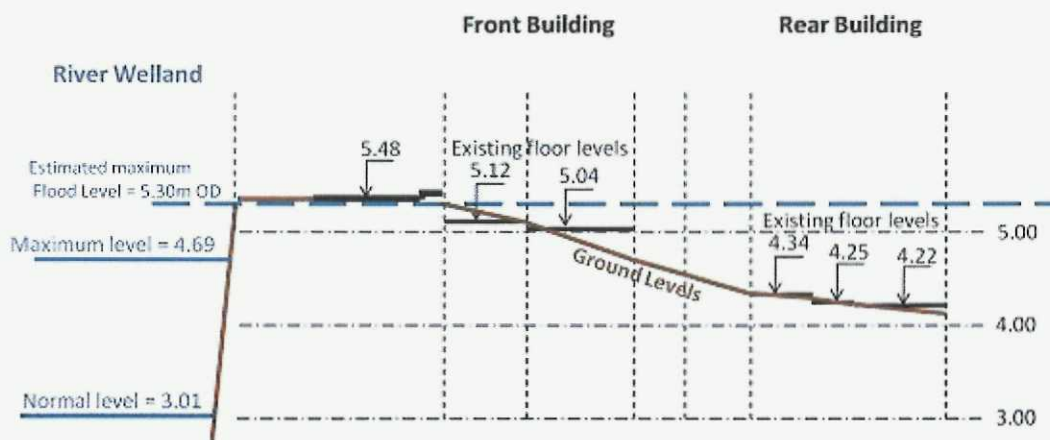
The site is approximately 0.9 km south of the tidal defences of the River Welland and Coronation Channel.

The area between the River Welland and the Coronation Channel is drained by surface water sewers maintained by Anglian Water, which discharge either into the River Welland or into drainage channels maintained by South Holland Internal Drainage Board. The water levels in the IDB channels are controlled by Clay Lake Pumping Station, which is operated by South Holland IDB, and discharges into the Coronation channel.

Proposed Levels of Buildings

The level of High Street in front of the site is 5.48m OD. The floor level in the front building is 5.12m OD and 80mm lower to east at 5.04m OD, and the floor level of the rear building ranges from 4.34m OD to 4.22m OD.

The west – east section below shows all of these levels, which can also be seen on the plan on sheet 12.



Potential Sources of Flooding

The following sources of flooding have been identified:

1. Failure or overtopping of the tidal defences.
2. Overtopping of the River Welland.
3. Overtopping or breaching of the Coronation Channel.
4. Failures of Clay Lake Pumping Station (IDB)
5. Blockages in Exeter Drain (IDB)
6. Blockages in local surface water sewers (highway or Anglian Water)

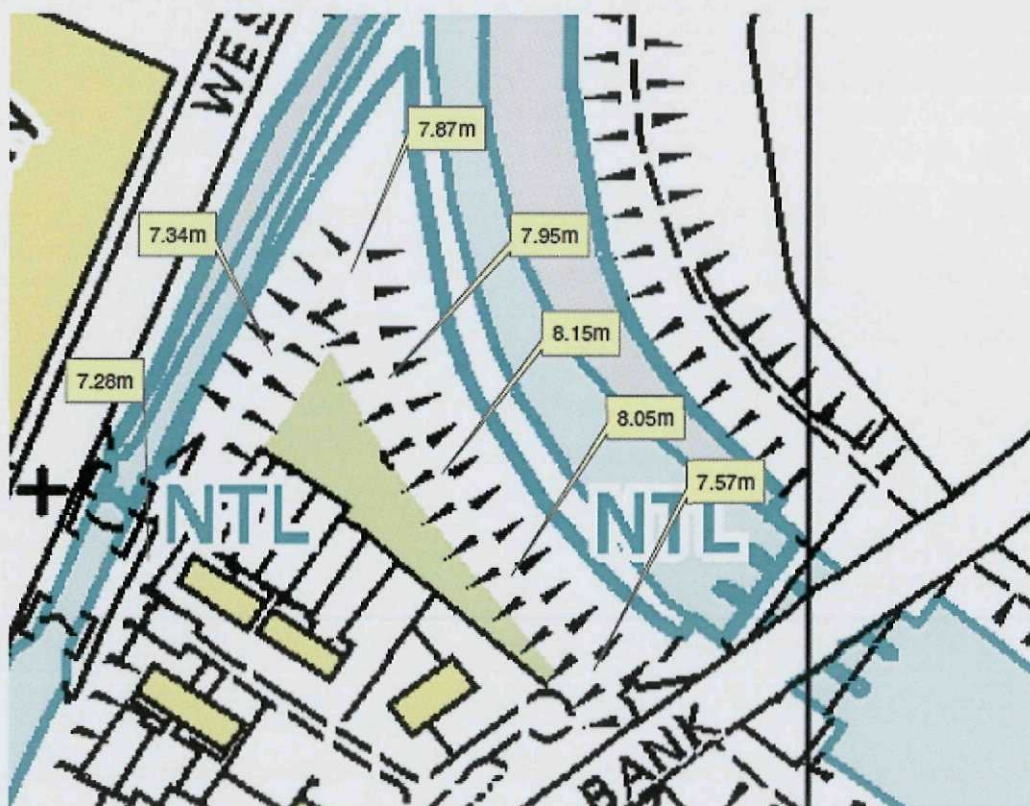
1. Failure or overtopping of tidal defences.

There is a short length of tidal defences on the Coronation Channel west of Marsh Road Sluice and on the River Welland north of Fulney Lock that defends the area between the River Welland and the Coronation Channel from tidal flooding. The SFRA states that the defences are adequate to withstand a 1 in 200 year (0.5%) probability event for present day and in the future in 2115 some of the banks would be overtopped with a 0.5% probability event.

Crest levels of this bank have been surveyed and these are shown below. These levels range from 7.28m OD near Fulney Lock to above 8.00m OD on the main section of bank. The low level of 6.88m OD mentioned in the SFRA was not found.

All the surveyed levels are higher than the 1 in 200 year extreme tide level in 2115 of 7.12m OD stated in the SFRA.

These banks are well maintained and have a top width of at least 4.0 metres, and it is reasonable to assume that during the next one hundred years, considering the assets that are protected by this bank, further maintenance and capital works will be carried out on the tidal banks to ensure a continuing minimum defence standard of 1 in 200 years.



If a breach occurred in the tidal bank during a 1 in 200 year event in the year 2115 flood water would flow southwards and start to flood the whole area between the Coronation Channel and the River Welland. The hazards of this will be considered later in the report.

2. Overtopping of the River Welland.

The west bank of the River Welland is at an approximate level of 5.50m O.D. east of the building. The highest predicted fluvial level for a 1 in 1000 year event in the fluvial River Welland in 2115 is 4.69m OD. Further south the banks have a minimum level of 5.00m OD and the land levels then gradually fall away eastwards.

The banks on this length are at least 15 metres wide with a road and footpaths parallel to the river. Therefore the possibility a breach to occurring in this section of the bank of the river and flooding the building from this source can be discounted.

3. Overtopping or Breaching of the Coronation Channel

The area between the River Welland and the Coronation Channel is protected from flooding by banks on the west side of the channel, which are approximately 2.0m to 3.0m above the land. The top level of these banks are at a level of 5.40m OD, which gives a freeboard of at least 700 mm above the 1 in 1,000 year maximum design level in the channel.

If a breach occurred in the channel the maximum water level in the flooded area could reach between 4.0 m and 4.1 m OD for the present day situation and between 4.3m and 4.4 m OD if climate change is allowed for. As the lowest proposed floor level of the converted building will be 4.50m OD the risk of flooding from this source can be discounted.

4. Failure of Clay Lake Pumping Station

The South Holland IDB estimate that the Clay Lake Pumping Station provides a 1 in 50 year standard with a freeboard, which in effect provides a 1 in 100 year protection against flooding. The pumping station is maintained in good condition and should a failure occur the Drainage Board would quickly deploy temporary pumps to alleviate the situation. It is highly unlikely that any flooding from this source would extend as far as this site, as the flood water would need to rise above 4.50m OD, which is higher than the ground levels around the pumping station itself which would flood first.

Therefore flooding from this source can be discounted.

5. Blockages in Exeter Drain

The South Holland IDB has a regular annual maintenance programme and they remove weed growth from channels such as these twice each year. However, any flooding from this channel will not cause any flooding to the development site, as explained in (4) above.

Therefore flooding from this source can be discounted.

6. Blockages in local surface water sewers

Both Anglian Water and the Highways Authority maintain surface water drainage systems in this area. If there is a blockage in an underground surface water pipe there is a slight risk that a small amount of water could enter through the doorway but the main volume would discharge over the west footpath into the river.

Therefore the risk from this source can be considered extremely low.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties having been flooded in the last 50 years.

Probabilities and Trends of Flooding

The probability of this development being flooded from Environment Agency main river is very low. In an extreme event 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

The SFRA has calculated the consequences arising from a possible breach occurring at any point along the raised defences. Also considered were scenarios in which gates or other assets fail to operate allowing water to flow inland and cause flooding.

If the potential sources of flooding are considered again, it can be seen that all of the consequences of river flooding and failures in the internal drainage will not lead to the water level rising above 4.50m OD, and these would not cause any flooding to the converted properties.

The consequences of a breach of the tidal defences would cause greater flood depths in this area of Spalding. From the levels taken of the bank it can be seen that the bank will not be overtopped in a 1 in 200 year event in 2115.

If a breach occurred in the tidal bank of the River Welland or the Coronation Channel between Fulney Lock and Marsh Road Sluice flood water would flow into the area between the Coronation Channel and the River Welland. It is possible that the water level could reach a level of 5.30m OD, but it is unlikely to rise above this level as flood water would then flow into the River Welland. This would flood the ground floor of the rear property to a depth of 800mm. However the risk of a breach occurring in this short length is extremely low. Breaches are more likely to occur during an event with return period of 1 in 200 years or greater. However a breach could occur in any part of the tidal defences, and this would reduce water levels in the tidal Welland during the event.

Conclusions

The following conclusions can be made:

- The proposed development is not in a functional flood plain as defined by PPS 25.
- Although the site is in flood zone 3, the actual risk of the site flooding from any Environment Agency water course is low.
- There is no actual risk of flooding at the present time.
- The actual risk of flooding in 2115 in a 1 in 100 year event water is not predicted to overtop the tidal defences. You would also expect that the Environment Agency will if necessary increase the levels of these defences sometime in the next 100 years, considering how many properties are protected by this defence.

- The SFRA states there is a residual risk that the site could flood if a breach occurs in the tidal defences. Although the risk of a breach occurring is very low, it can be shown that if a breach 50 metres wide and 3.0 metres deep is assumed to form within minutes, then water levels in the area between the River Welland and the Coronation Channel could eventually reach 5.30m OD.
- If a breach occurred then the whole area between the Coronation Channel and the River Welland would start to fill with flood water. A major emergency would be called by the Authorities as there would be hundreds of houses at risk. When the water level reached 5.20m OD the water would start to flow into the River Welland and the Coronation Channel, which would limit the further increase in level of flood water. At the same time the level of the tide would be falling and the inflow of flood water would stop for around 6 hours until the next tide. Residents in the front building should not be affected by flood water. Residents in the rear building would be safe in upstairs bedrooms if they had not been able to escape before the flood water affected the building.
- The maps in the SFRA seem to overestimate the residual depth of flooding considering that these buildings are slightly higher than most buildings in this part of Spalding.
- It is proposed that the floor level of the front building should be raised to a level of 5.35m OD which is above the maximum predicted level for this area.
- If flooding were to occur in an extreme event residents of the buildings will be able to leave the area by walking north along High Street and crossing the footbridge to access the east side of the River Welland. From here they would be able to walk to the central part of Spalding where the land levels are higher, and the risk of flooding is low.
- 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

- It is proposed that the floor level of the front building should be raised to a minimum level of 5.35m OD.
- It is proposed that the floor level of the rear building should be raised to a minimum level of 4.50m OD.
- In any area at risk of flooding, even though in this case the risk is extremely low, it is preferable that a building in a defended area should be of two story construction with all bedrooms at first floor level. This will provide a refuge for residents if the building were to become flooded and ensure there is no danger to residents when they are asleep. However in this case as the risk of flooding to the front building is extremely low and as long as the ground floor

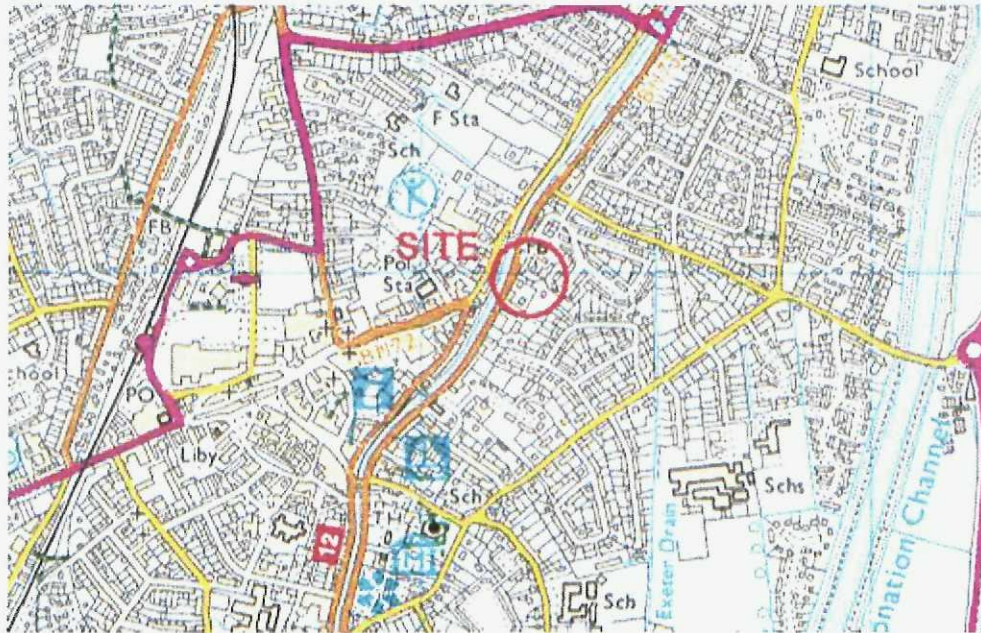
levels are raised to the recommended levels the proposed conversion is considered to be satisfactory.

- Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service. If a very high tide is predicted (greater than 6.50m OD) then the occupiers are advised that they should make preparations to monitor the situation and be prepared to evacuate the building immediately if flooding begins to take place. They should drive or walk to the central area of Spalding or be advised of a safer place to go.

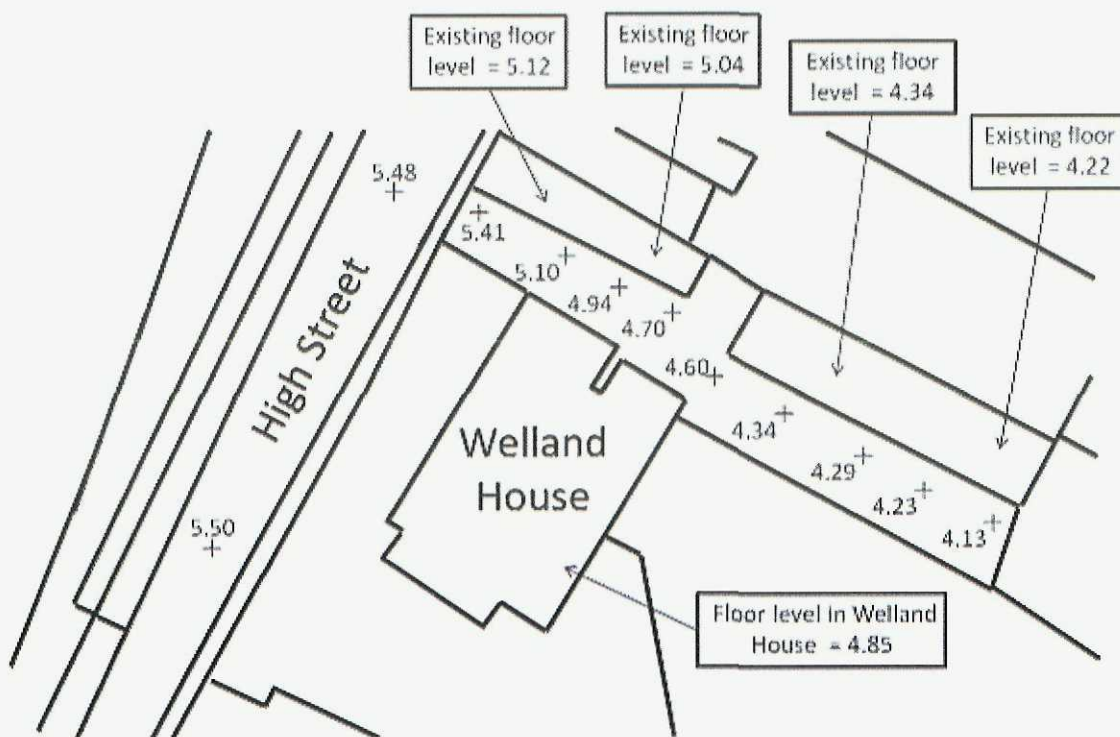
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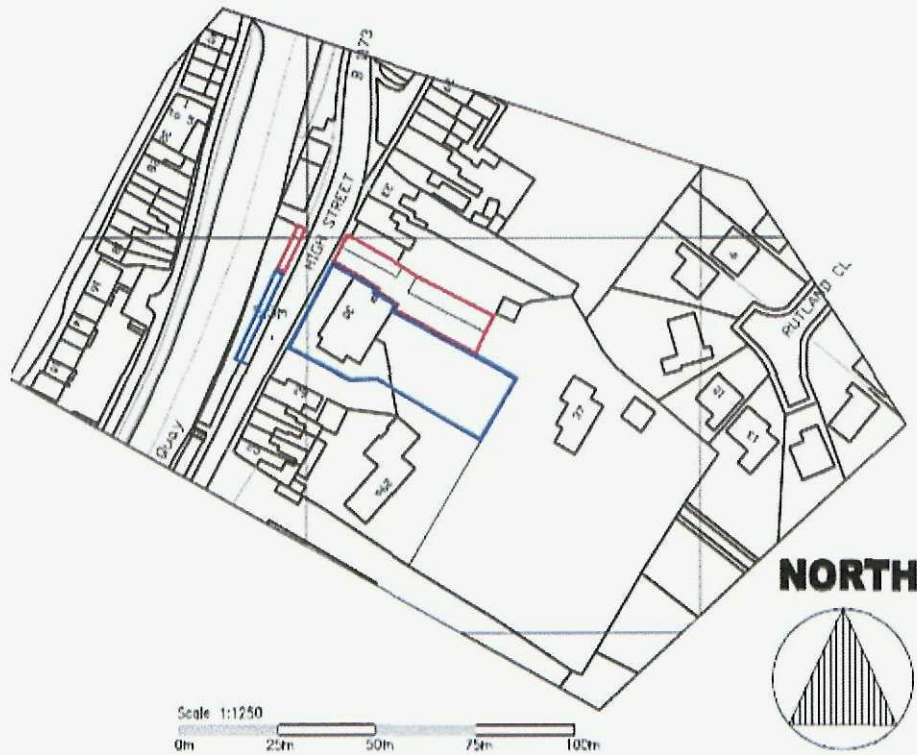
LOCATION PLAN



PLAN OF SITE LEVELS



AREA PLAN



BLOCK PLAN

