Client: **Tom Clark**

3-5 Rectory Road, Tydd St Mary
Flood Risk Assessment



Image from Google Street View

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1 Executive Summary

This report provides a Site-specific Flood Risk Assessment for a proposal to convert 3-5 Rectory Road to two cottages.

The proposed development is smaller than 1-ha in area, but is in Flood Zone 3 and hence there is a need for a Flood Risk Assessment to be carried out. The development is defined as 'More Vulnerable', which is acceptable in Flood Zone 3 areas if the Exception Test is passed.

The most significant flood risks are from:
1) Breach of River Nene tidal defences

The risk of flooding from all sources has been assessed to be very low.

In conclusion, flood risk has been completely mitigated and should not present a reason for objection to the development.

Disclaimer: *This study is a risk-based assessment of the proposal based on the information that was available to Parsons Consulting Engineers Ltd. and is intended for the sole purpose of supporting the Planning Application for the proposed conversion of 3-5 Rectory Road, Tydd St Mary. If either further information is found that contradicts the basis of this report or that alterations are made to the development or the water management in place then the conclusions of this report would be invalidated and Parsons Consulting Engineers Ltd would accept no liability whatsoever.*

2 Introduction

2.1 The Brief

Parsons Consulting Engineers Ltd has been commissioned by Tom Clark to prepare a Flood Risk Assessment (FRA) to accompany the planning application for conversion of 3-5 Rectory Road, Tydd St Mary into two dwellings. The property was formerly 3-dwellings, but was converted to single dwelling more than 35-years ago.

2.2 Context and purpose of a Flood Risk Assessment

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied, including policy on appropriate consideration of flood risk for new developments. In addition to this, the National Planning Policy Framework – Technical Guidance (NPPF-TG) provides additional guidance on planning policy for the development of sites at risk of flooding. The general objective is to favour developments in areas with the lowest risk of flooding.

Local Planning Authorities have the authority to control development in accordance with their local plans, which are required to incorporate the policy and guidance from the NPPF and NPPF-TG.

2.3 The Site and Proposed Development

The site already accommodates a two storey dwelling. The site is located in the centre of Tydd St Mary. The existing dwelling opens directly onto Rectory Road and has dwellings either side and gardens to the rear.

The postcode for the site is PE13 5QL and the approximate centre of the site is at National Grid Reference TF 44267 18571.

Figure 1 below identifies the site on plan.

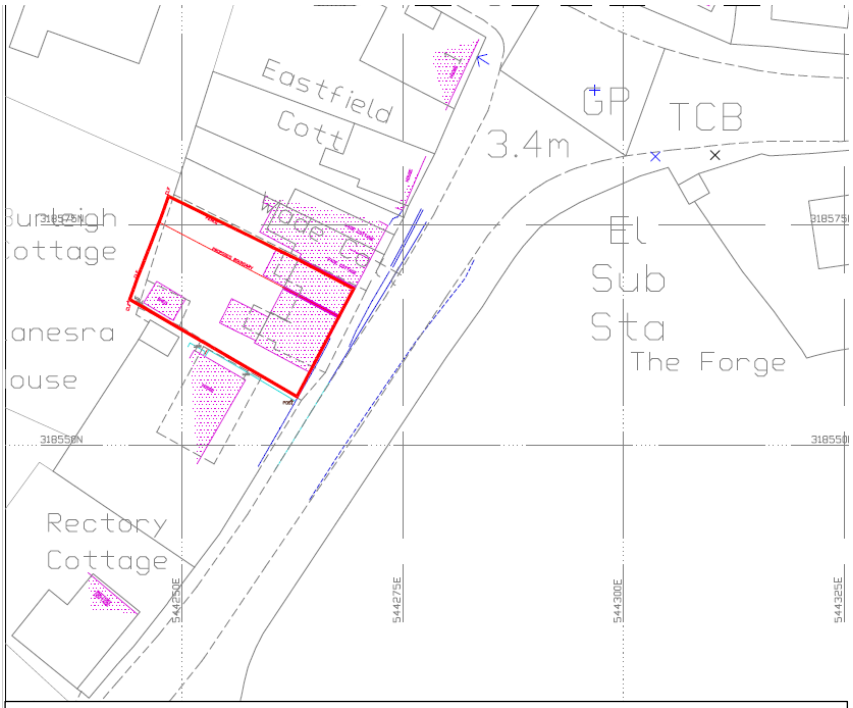


Figure 1 – Plan of Existing Site

3 Requirement for Flood Risk Assessment

3.1 Flood Zone

Environment Agency flood zone mapping identifies areas at risk of fluvial flooding with three levels of probability / risk:

- Flood Zone 1 is a low probability zone that comprises land assessed as having less than 0.1% annual probability of flooding from a river or coastal source
- Flood Zone 2 is a medium probability zone that includes land assessed as having between 0.1% and 1% annual probability of flooding from river or coastal source
- Flood Zone 3 is areas where the risk of flooding from river or coastal source is greater than 1% annually. It should be noted that this flood zone is sub-divided into two categories: Flood Zone 3a and 3b, where the latter is in respect to 'Functional Flood Plains' that will regularly be used to accommodate flooding.

In accordance with Table 1 in NPPF-TG (contained in Appendix A), the proposed development site is in an area classified Flood Zone 3a. Figure 2 below shows an extract of the EA Flood Map.

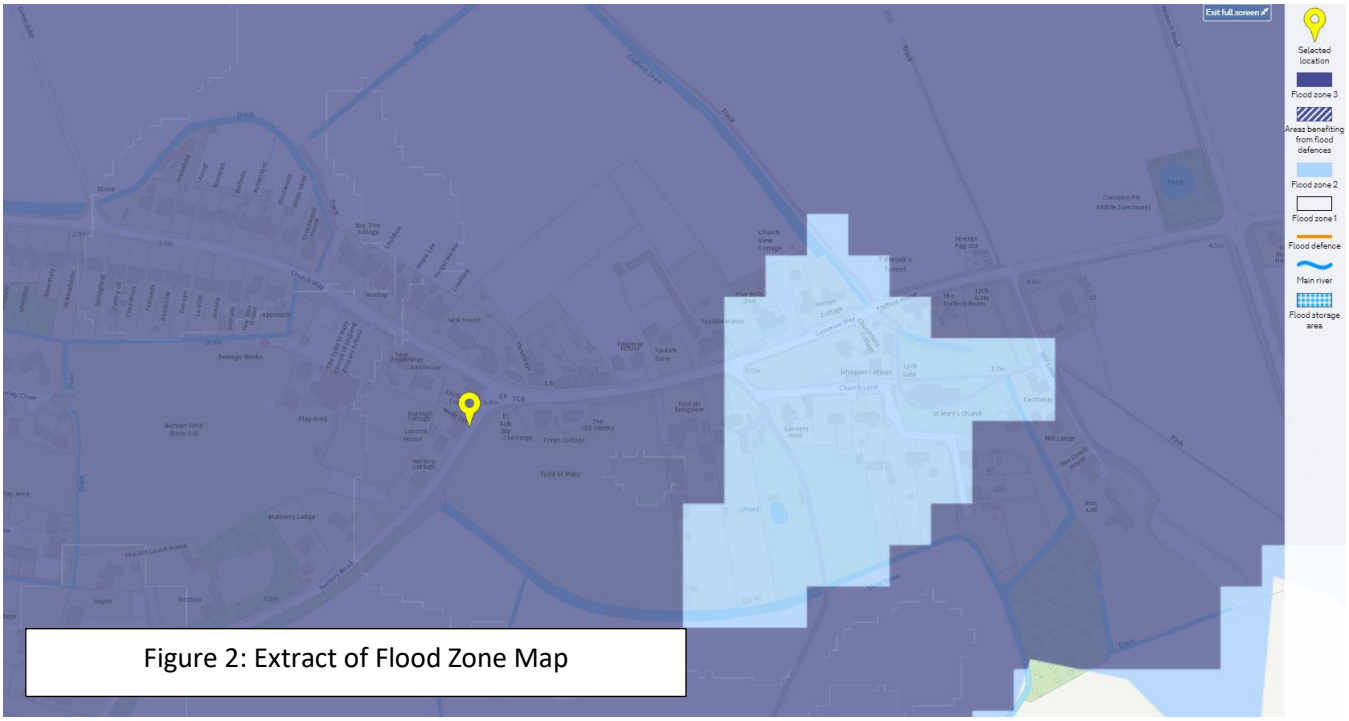


Figure 2: Extract of Flood Zone Map

It should be noted that the EA Flood Maps do not take account of Flood Defences, which serve to mitigate and considerably reduce the risk of flooding from rivers and the sea.

This Flood Risk Assessment provides an evidenced assessment of the risk of flooding to the site from rivers, surface water, reservoirs and any other localised source. The objective is to allow the Planning Authority to determine whether the mitigations proposed are adequate to manage the risk of flooding to the development and any consequences elsewhere.

3.2 Vulnerability Classification

The proposed development works are classified as 'More Vulnerable' development. Therefore, in accordance with Table 1 of NPPF (and as summarised in the table below), the proposed use is appropriate for Flood Zone 3a if both the Sequential Test and the Exception Test is passed.

Flood Risk Vulnerability classification (See Table 2 of NPPF)		Type of Development				
		Essential Infrastructure	Water Compatible	Less Vulnerable	More Vulnerable	Highly Vulnerable
Flood Zone (See Table 1 of NPPF)	Zone 1 (Low Risk)	✓	✓	✓	✓	✓
	Zone 2 (Medium Risk)	✓	✓	✓	✓	Exception Test required
	Zone 3a (High Risk)	Exception Test required	✓	✓	Exception Test required	✗
	Zone 3b (Functional Flood Plain)	Exception Test required	✓	✗	✗	✗

Summary of NPPF Table 1

3.3 Sequential Test

The NPPF seeks to position new developments in locations with the lowest flood risk.

As this development merely involves alteration of an existing building the Sequential Test is deemed satisfied.

3.4 Exception Test

It should be noted that by reason of the Flood Defences in place along the River Nene the risk of flooding is reduced to less than 0.1% (equivalent to a Flood Zone 2). As such it can be considered that the Exception is not required.

Notwithstanding the above point, the site contributes towards housing supply in a sustainable available location. By reason of this positive impact it is considered that the benefits of the scheme outweigh the flood risk and the Exception test can be considered to be passed.

4 Potential sources of flooding

4.1 Fluvial Tidal Flooding

The River Nene tidal defences between Sutton Bridge and Wisbech were improved after the 1978 tidal surge event to a level of 7.00m AOD. The highest recorded tide level during the event was 5.60m AOD at Wisbech.

The Environment Agency has recently carried out the River Nene Tidal Strategic Study between the Dog in Doublet sluices at Peterborough and its outfall into the Wash at the Nene Lighthouses. Modelled flood levels at the lighthouses are as follows:

1 in 100 year return period	5.86m AOD
1 in 200 year return period	6.01m AOD
1 in 1000 year return period	6.35m AOD

The Strategic Study concluded that improvement works are cost effective to meet Defra levels of service in order to sustain the existing tidal defences over the next 50 years to a 1 in 200 year standard. The more recent tidal surge event of 5th December 2013 reached a level of 6.10m AOD (equivalent to 1 in 500 year event) at Sutton Bridge and the town and surrounding area were protected by the improved defences.

The risk of overtopping or breaching of the River Nene tidal defences which are approximately 2.00-kms from the site is considered to be low.

More recent updated Tidal Hazard Mapping produced by the Environment Agency since the 5th December 2013 surge event in conjunction with the Kings Lynn & West Norfolk Borough Council shows the site to be within an area at risk of flooding in the event of a tidal defence breach.

The probability of the site flooding with water from the tidal River Nene main river is between 0.5% and 1%. If the trend of climate change anticipated to occur continues over the next 100 years, without any further improvements to the main river tidal defences, there is a low risk of overtopping at the 1 in 200 year return period event.

In order to satisfy the agreed protocol between the Environment Agency and Kings Lynn & West Norfolk Borough Council for development within Tidal Hazard areas the following flood resilience measures should be incorporated into the design and construction of the dwellings.

- Electrical sockets/switches will be raised 500mm above finished floor level.
- All sleeping accommodation is at first floor level providing safe refuge

4.2 Flooding of the IDB Drainage System

The nearest 'main drain' (Known as Angle Drain) is located approximately 50m south of the property site draining in a southerly direction to Tydd Pumping Station.

Drainage in the region is managed by the North Level IDB. Drainage channels discharge to the North Level Main Drain, which flows to Tydd Gote Pumping Station. The pumping station lifts flows into the tidal stretch of the River Nene approximately 8-km from the outlet into The Wash.

The IDB undertakes regular maintenance to the Tydd Gote Pumping Station, which maintains water levels below -1.65m AOD. Noting that ground levels at the site are in the vicinity of the Site are 3.0m AOD, there is not considered to be a significant risk of flooding at the site.

4.3 Ground Water

According to Borehole Records from British Geological Survey ground conditions in the region are generally sandy silty Clays. Ground water is controlled by the man-made drainage system and it can be assumed that there is no flood risk.

4.4 Overland Flows



Surface water flood risk: water depth in a low risk scenario
Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

The above extract from the EA Flood Map website shows that a depression opposite the Cottages has a low risk of surface water ponding occurring. These flows do not pose a risk to the property as lower lying land to the south-east provides a route for exceedance flows away from the development.

4.5 Failure of Tydd Gote Pumping Station

Failure of the Tydd Gote 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 North Level IDB 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.

5 Drainage Strategy

5.1 Proposed Drainage Strategy

5.1.1 Storm Water

The changes to the property have minor effect on the impermeable area being drained. Soakaways already exist to receive rain-water runoff.

5.1.2 Foul Water

Foul drainage currently drains to Anglian Water's public sewer. New connections will be applied for under Section 106 of the Water Industry Act.

6 Conclusion

6.1.1 Flood Risk Assessment

The development is deemed to satisfy the Sequential Test and Exception Test.

Key flood risk at the site is from breach of the tidal flood defences along the River Nene. In the event that this were to occur, emergency evacuation of the region would most likely occur. This risk is considered to be very low. For safety reasons all sleeping accommodation should be kept at first floor level and occupants should register for the EA Emergency Flood Alerts.

The property is not deemed at risk of flooding from any other source.

In consideration of all the information available, including that contained within the SFRA, the risk of flooding to the proposed development from all sources is low. The development does not increase the risk of flooding to adjacent properties.

Flood Risk Assessment prepared by:

Parsons Consulting Engineers Ltd.

Appendix A – NPPF-TG Table 1 – Flood Zones

Flood Zone 1 – Low Probability

Definition

This zone comprises land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%).

Appropriate Uses

All uses of land are appropriate in this zone.

Flood Risk Assessment requirements

For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention.

Policy Aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Flood Zone 2 – Medium Probability

Definition

This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.

Appropriate uses

Essential infrastructure and water-compatible, less vulnerable uses, and more vulnerable uses as set out in Table 2 (NPPF-TG), are appropriate in this Zone if the Exception test is passed. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.

Flood risk assessment requirements

All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Flood Zone 3a – High Probability

Definition

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Appropriate uses

The water-compatible and less vulnerable uses of land set out in Table 2 (NPPF-TG) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone.

The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in time of flood.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage

Flood Zone 3b – Functional Floodplain

Definition
This zone comprises land where water has to flow or be stored in times of flood.

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in Table 2 (NPPF-TG) that has to be there should be permitted in this zone. It should be designed and constructed to:

- Remain operational and safe for users in times of flood;
- Result in no net loss of floodplain storage;
- Not impede water flows; and
- Not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land with a lower probability of flooding.

Table 1: Flood Zones (Partial reproduction of Table 1 within NPPF-TG)

Appendix B – NPPF-TG Flood Risk Vulnerability Classification

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations, and water treatment works that need to remain operational in times of flood
- Wind turbines

Highly Vulnerable

- Police stations; ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use[1]
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classed as "essential infrastructure").

More Vulnerable

- Hospitals
- Residential institutions such as care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[2]

Less Vulnerable

- Police, ambulance and fire stations which are not required to be operational during a flood.
- Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable", and assembly and leisure.
- Land and buildings used for agriculture and forestry
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water Compatible

- Flood control infrastructure
- Water and sewage transmission infrastructure and pumping stations
- Sand and gravel working
- Docks, marinas and wharves
- Navigation facilities
- MoD defence installations
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring waterside location.
- Water-based recreation (excluding sleeping accommodation)
- Lifeguarding and coastguard stations
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan.*

[1] NPPF-TG states that: For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.

[2] As Footnote 1

Appendix C – NPPF-TG Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, off-shore wind speeds and wave heights

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall intensity	+5%	+20%	+30%	+40%
Peak river flow	+10%		+30%	
Off-shore wind speed		+5%		+10%
Extreme wave height		+5%		+10%