

Client: Dr James Shorrock

Spalding Dental Surgery Flood Risk Assessment



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DOCUMENT CONTROL			
Revision	Author Initials	DATE OF ISSUE	REASON FOR ISSUE
V1	TBP	21-12-17	First draft for comment

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1 Executive Summary

This report provides a Site-specific Flood Risk Assessment for the proposed extension to the Dental Surgery, off Camel Gate in Spalding.

The site is within Flood Zone 3. However, being a minor non-residential extension to a building of less than plan area of 250m² does not require a Sequential Test to be satisfied.

Potential sources of flooding have been identified and assessed as follows:

1. Fluvial and/or Tidal flooding has been assessed in the Strategic Flood Risk Assessment for South Lincolnshire as being very low likelihood within the lifetime of the project. Such flooding would result in flood depths at the site of between 250 and 500mm. This risk will be managed by incorporation of Flood Resilient design features into the building and development of a Flood Warning and Evacuation Plan.
2. There is a low risk of Surface Water flooding in the car-park of the site to a depth of 300mm identified on the EA Flood Maps. This risk will be incorporated into the design of the finished car-park levels to ensure that flood waters can be managed and stored on site without impacting on flood risk to others.

In conclusion, flood risk 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 development at Spalding Dental Surgery. 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 Dr James Shorrocks, of Spalding Dental Surgery, Camel Gate, Spalding, to prepare a Flood Risk Assessment (FRA) to accompany the planning application for an extension to the Surgery.

2.1 Site Location

The site is at Camel Gate, adjacent to the A15 Holbeach Road bridge over the Coronation Channel. The postcode for the site is PE12 6ES and the approximate centre of the site is National Grid Reference TF26272392.

2.2 Site Description

The site is on the eastern bank of Coronation Channel. The existing Dental Surgery is a two storey building, situated in a plot of circa 0.18-ha, which is largely gravel surfaced for car-parking.

To the west of the site is the bank of the Coronation Channel, which is a man-made relief channel that runs around the south and east of Spalding. Ordnance Survey Maps show spot levels in the vicinity of the site show ground levels to be circa 4.3m AOD.

2.3 Proposed Development

The proposed development is a single storey extension to the Dental Practice, which will be used for treatment, waiting rooms and office space.

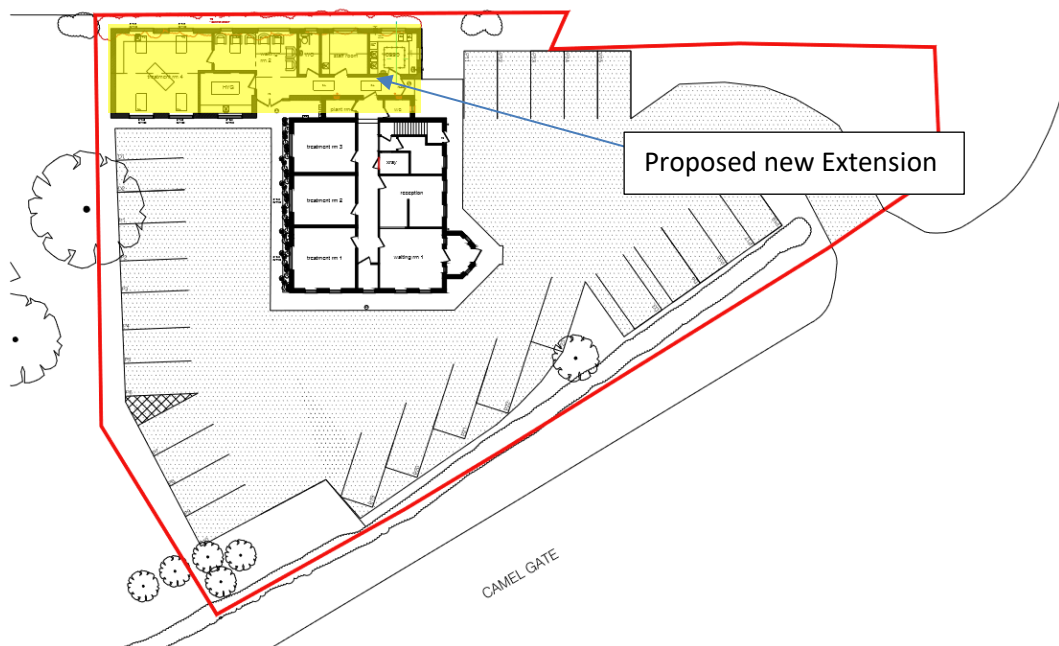


Figure 1 – Extract of Architect's Plans annotated to show extent of proposed extension

2.4 Access, Infrastructure and Services

No changes are proposed to the existing access, which is via an entrance gate from Camel Gate.

Foul water from the site is already connected to the public sewers in Camel Gate and the proposed extension will be drained similarly.

2.5 Existing Drainage and Watercourses

The site is off Camel Gate on the eastern bank of Coronation Channel. The channel was built in the early 1950's and officially opened in 1953 to alleviate flooding in and upstream of Spalding. Water from the River Welland enters the channel south of Spalding through Cowbit Road Sluice. The channel is approximately 2-km long and flows around the southern and eastern sides of Spalding, returning flows to the river through the Marsh Road Sluice, which is approximately 300m north-west of Spalding Dental Surgery.

To the north of Spalding and downstream of Marsh Road Sluice (and Fulney Lock), the River Welland is tidal.

The Lincolnshire Fens used to be subject to severe flooding both from high tides and raised river levels after heavy rain. After floods in 1953, major improvement work was carried out including upgrading sluice gates, flood barriers and drainage channels. Around Spalding tidal defence on the rivers and drains is provided by sluice gates which close on the rising tide, preventing flood water ingress, but open during low tide periods allowing rivers and drains to discharge freely into the tidal reaches and thus into the Wash. Fulney Lock and Marsh Road Sluice both provide defence against the high tide levels.

3 Flood Risk

3.1 Context and purpose of this 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.

In accordance with Table 1 in NPPF-TG (contained in Appendix A) and with reference to the Environment Agency on-line flood maps (see Fig 2 below), the Dental Surgery, Camel Gate, Spalding is in Flood Zone 3.

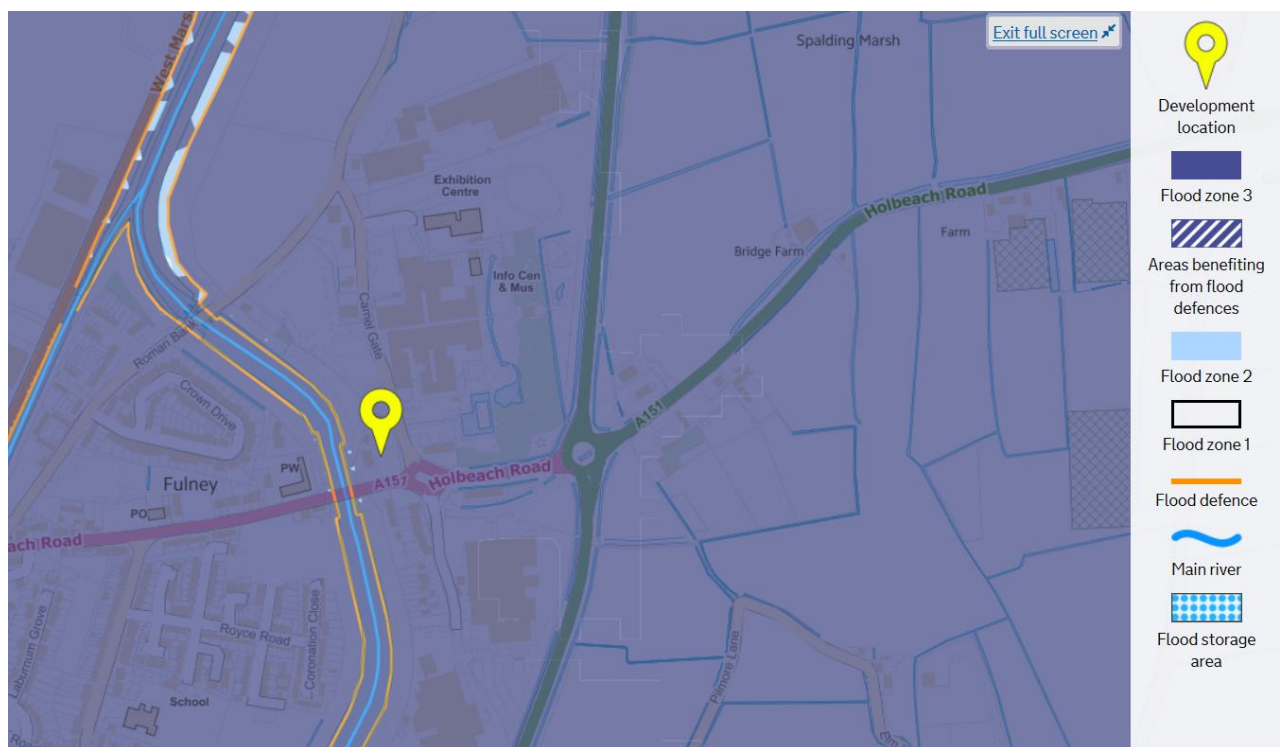


Figure 2 – Extract of the online Environment Agency Flood Plain Maps

It should be noted however, that Flood Zones are defined ignoring the presence of Flood Defences and water management controls. 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 Strategic Flood Risk Assessment

In 2010, South Holland District Council engaged a consultant to prepare a Strategic Flood Risk Assessment (SFRA). The 2010 report has been superseded by the South East Lincolnshire SFRA, which was produced in March 2017.

The 2010 report contained a long term analysis of flood risks along the River Welland and predicted flood water levels that can be expected, taking account of Climate Change.

The 2010 SFRA produced for the South Holland District Council (SHDC) provides estimates of the likely flood levels and freeboard available along the River Welland and other local water-courses, including Coronation Channel. Tables in the 2010 SFRA show the following details of the defence bank on the east side of the Coronation Channel between chainage 0 km and 2.0 km. The defence level at the A151 Bridge (adjacent to the site) is 6.14m AOD.

Coronation Channel	2007	2115
<u>Peak 1 in 100 year</u>		
Extreme tide level	4.32m AOD	4.69m AOD
Freeboard	1820mm	1450mm
<u>Peak 1 in 1,000 year</u>		
Extreme tide level	4.34m OD	4.69m OD
Freeboard	1800mm	1450mm

Water levels in the Welland below Peakirk (upstream of Spalding) are automatically monitored and correlate the above data. Whilst typical water levels are between 2.21m AOD and 2.66m AOD, the highest recorded water level was 4.29m AOD (recorded on 11-04-1998), with a recent high recorded on 13-12-2014 of 3.58m AOD.

Downstream of the Marsh Road Sluices, the River Welland is tidal and according to the 2010 SFRA the eastern bank provides defence to levels of 7.30m.

River Welland	2007	2115
<u>Peak 1 in 200 year</u>		
Extreme tide level	5.98m AOD	7.12m AOD
Freeboard	1320mm	180mm
<u>Peak 1 in 1,000 year</u>		
Extreme tide level	6.32m OD	7.46m OD
Freeboard	980mm	-0.16mm

4 Flood Risk Assessment - Sequential Test

4.1 Vulnerability Classification

In accordance with NPPF-TG Table 2 (Contained in Appendix B), sites that are 'Buildings used for shops, financial, professional and other services' shall be classified as "Less Vulnerable". In accordance with Table 1 of NPPF (and as summarised in Fig 3 below), the proposed use is appropriate for Flood Zone 3.

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	✓	✗	✗	✗

Figure 3 – Summary of NPPF Table 1

In accordance with NPPF-TG Table 1 (Contained in Appendix A), less vulnerable developments in Flood Zone 3 can be considered acceptable and do not require an Exception Test to be undertaken.

4.2 The purpose of a Sequential Test

As set out in the National Planning Policy Framework, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The flood zones are the starting point for this sequential approach. Zones 2 and 3 are shown on the Environment Agency flood map with Flood Zone 1 being all the land falling outside Zones 2 and 3.

Where there are no reasonably available sites in Flood Zone 1, local planning authorities determining planning applications for development at any particular location should consider the flood risk vulnerability of land uses (see Appendix B) and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the Exception Test if required.

4.3 Sequential Test

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

Paragraph 8.3.2 and 8.3.3 of the South Linc SFRA state that the NPPF does not require a Sequential Test to be undertaken for applications for minor developments, which includes Minor Non-residential Extensions with a footprint of less than 250m². This is confirmed in Paragraph 10 of the NPPF-TG, which states that minor developments are unlikely to raise significant flood risk issues unless they would either have an adverse effect on a watercourse, floodplain or its flood defences, or would impede access to flood defence

and management facilities; or where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.

In this case, the proposed extension is a non-residential extension of 135m², which will not have detrimental effect on the flood-plain and is less than the requirement for the Sequential Test to be needed.

Indeed, there are no sites within 2-km of the proposal with a lower flood risk and as identified in Paragraph 8.1.4 of the South Lincs SFRA, large parts of the South Holland district lie within Flood Zone 3.

4.3.1 Flood risk to the development

The potential sources of flooding to the site are:-

1. **Failure or overtopping of tidal defences of the River Welland.** As identified in Section 3.2 above, according to the 2010 SFRA, the east bank of the River Welland, which is approximately 0.3 km from the site, is at a level of 6.14m AOD, which is sufficient to provide a 1 in 200 year standard of protection. If the eastern bank of the tidal section of the River Welland breached then the maps in the 2017 SFRA (See Fig 4 below) indicate flood depths of between 0.25m and 0.5m could occur at this site in a 1% Fluvial/0.5% Tidal event in 2115.

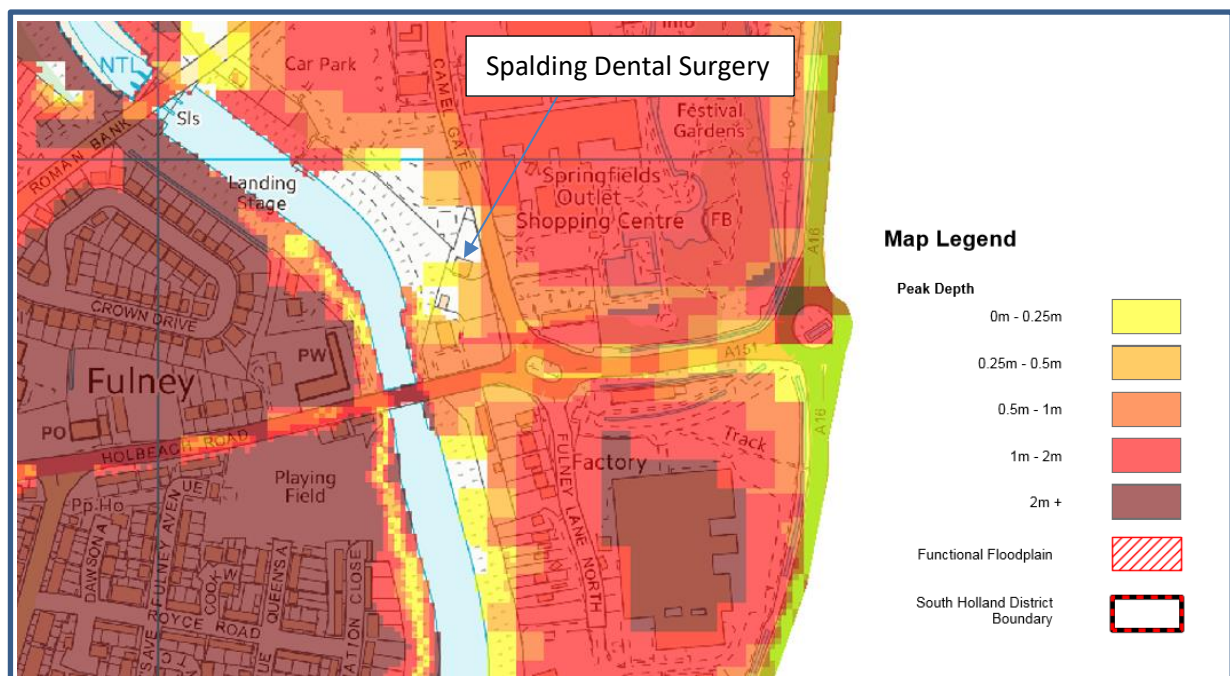


Figure 4 – Extracts from 'Update of Strategic Flood Risk Assessment – Residual Peak Depth, Spalding – Year 2115, 1% Fluvial / 0.5% Tidal Event Probability'

2. **Overtopping of the Coronation Channel.** The 2010 SFRA states that the maximum design water level in the Coronation Channel is 4.69m AOD, which is well below the defence level adjacent to the Dental Surgery (6.14m AOD). The lowest defence level occurs 1.7km upstream at the disused railway bridge, where the bank is at a level of 5.42m. As such, this point would provide a release for excess water well away from the site. Noting that the SFRA has estimated that the Coronation Channel has sufficient

capacity to retain upto 24-hours of flow, it is considered that there is no risk of the Coronation Channel over-topping the banks adjacent to the Surgery.

3. **Breach of the Coronation Channel.** In the highly unlikely event that the banks of the Coronation Channel were to be breached adjacent to the Dental Surgery, it would result in significant discharges of high velocity water, which has potential to cause significant flooding locally. The A16, which skirts the eastern side of Spalding and is higher than surrounding ground, would act as flood defence to the wider Fens, impounding water in the site and area occupied by Springfields Shopping Centre. Under such circumstances, personnel and patients of the Dental Surgery would have the ability to seek refuge in the upper floor of the existing building to await rescue.
4. **Flood risk to the development – Flood Risk from Surface Water.** According to the Environment Agency's detailed plans, there is a medium risk of surface water flooding (up to 300mm depth) occurring along Camel Gate, which due to topography, will tend to flow northwards towards the low lying area at the junction with Roman Bank.

There are also areas to the south and west of the existing building, which include the area of the proposed extension, that are at low risk of flooding up to 300mm depth (See Figure 5 below).

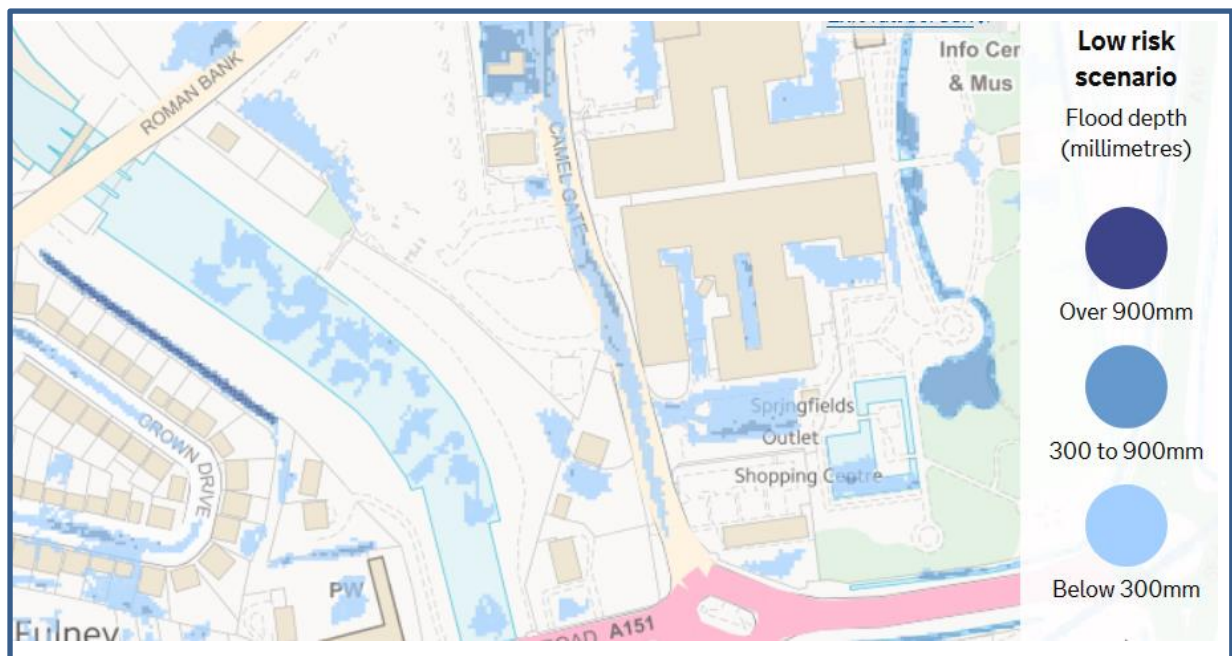


Figure 5 – Extract of Detailed View of EA Flood Maps for Surface Water

This flood risk will be managed by reconfiguration of the car-park to provide flood plain compensation. Finished floor levels will be set at a suitable level to avoid flooding from surface water and the new extension will adopt the principles of flood resilient design.

4.3.2 Impact of Climate Change

Paragraph 13 of the NPPF-TG requires that the impact of climate change on flooding from land, rivers and sea be considered. Table 5 in the NPPF-TG (contained in Appendix C) provides guidance as to the increase in key climatic parameters that should be considered for project life-times.

The development is proposed to have a 100-year lifetime. The 2017 SFRA takes account of the increase in sea, river and rainfall levels within the Flooding Maps provided and as such these are inherently included in this assessment.

4.3.3 Impact upon flood risk elsewhere

The proposal will occupy approx 135m² of Flood Plain and will alter the current Surface Water flood areas, which have a low risk of flood depths up to 300mm. 41m³ of compensatory attenuation volume is to be provided by lowering the car-parks around the existing building by 100mm and providing kerbs to contain surface water.

The above provisions will ensure that the development has no impact on the flood risk elsewhere.

4.4 Summary of the Flood Risk Assessment

In summary, Flood Risk Assessment has identified that:

1. The likelihood of flooding occurring due to the banks of either the Coronation Channel or the River Welland being over-topped is less than 0.1% (1 in 1000 chance).
2. There is a very remote chance that significant flooding could occur if the banks of the Coronation Channel were to be breached. In this event, occupants of the Dental Surgery would be able to retreat to the first floor of the Surgery and await rescue.
3. There is an existing low risk of surface water flooding identified on the site. Flood compensation volume shall be provided in the car-park to ensure that the proposal neither increases the risk of flooding elsewhere, nor is at risk of flooding from Surface Water.

5 Design considerations to mitigate residual flood risks

5.1 Residual Risks

Residual risks are those remaining after applying the sequential approach and taking mitigating actions. It is the responsibility of those planning development to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed.

For Spalding Dental Surgery the residual risks are:

1. Breach of the Coronation Channel banks causing sudden and significant flooding of the site.
2. Failure/blockage of on-site drainage, resulting in localised flooding during storm events.
3. Failure of building services, causing internal flooding.

5.2 Managing Residual Flood Risk

5.2.1 Breach of Coronation Channel

As described previously, in the event of breach of the Coronation Channel banks, sudden and significant flooding can be expected. Due to the very low likelihood of this scenario occurring, it is not considered necessary to provide flood defences, but is considered to be prudent and cost effective to adopt flood resilient design principles.

In addition, it is recommended that a flood **Warning and Evacuation Plan** should be developed to ensure that staff are aware of the risks and the procedure that should be adopted if a flood incident occurs. Advice on production of this plan is included in Appendix D.

5.2.2 Flood Resilient Buildings

Flood-resilient buildings are designed to reduce the consequences of flooding and facilitate recovery from the effects of flooding sooner than conventional buildings. This may be achieved through the use of water-resistant materials for floors, walls and fixtures and the siting of electrical controls, cables and appliances at a higher than normal level.

5.2.3 Flood Alerts

The Environment Agency provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods (such as email, text or phone) where the risks and impacts of flooding are high. Indirect warnings (via media broadcasts on local radio and television) are provided to all flood risk areas, even those at low risk of flooding.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Flood-line Service providing advice and information on flooding contact: tel 0345 988 1188.

The owners of the Dental Surgery should register with the Environment Agency Flood-line Warning Service to receive any future flood warnings (www.gov.uk/sign-up-for-flood-warnings).

6 Conclusion

The proposed development is an extension to an existing building that falls below the threshold to require a Sequential Test to be applied.

There is a low risk of surface water flooding in the location of the development, which can be managed within the design levels within the site.

Risks of flooding from Fluvial and Tidal sources have been assessed by the Strategic Flood Risk Assessments undertaken by others previously. These studies conclude that within the lifetime of the project there is less than 1% risk of flooding from Fluvial and 0.5% risk from Tidal sources, which would result in flood depths of circa 250mm-500mm. This risk will be managed by incorporating Flood Resilient design features into the development.

In the highly unlikely event of a breach of the flood defences in the vicinity of the Dental Surgery, occupants would be able to seek refuge in the upper floor of the surgery.

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 use¹ • 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, <i>subject to a specific warning and evacuation plan.</i>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, <i>subject to a specific warning and evacuation plan.</i>

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%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Off-shore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Appendix D – Warning and Evacuation Plan Guidance

The following guidance is provided to help organisations prepare a suitable **Warning and Evacuation Plan** for their site.

Key requirements

The **Warning and Evacuation Plan** for the site should consider the following key matters:

<i>How will a warning be received?</i>	It is recommended that organisations register with Flood Warnings Direct to receive early warnings and allow for preparations and managed evacuation of the premises in advance.
<i>What will happen when a warning is received?</i>	The Warning and Evacuation Plan should be implemented to make the premises safe and evacuate in advance of the flood conditions occurring.

The plan should include as a minimum the following matters:

- Details of the site
- Visitor briefings on arrival and notices in the Retreats
- Alarm and communication system
- Evacuation methods and routes
- Staff training and responsibilities
- Attendance recording

Further guidance is provided below in relation to the considerations and operation of the Plan.

Receiving Early Warnings

It should be noted that the proximity of the site to the Coronation Channel / River Welland means that in the event that the flood defences are either over-topped or breached it is possible that flood waters may become fast flowing and deep in a very short period of time.

The EA operate a Flood Forecasting and Warning Service in areas at risk of flooding from rivers or the sea, which relies on direct measurements of rainfall, river levels, tide levels, inhouse predictive models, rainfall radar data and information from the Met Office. This service operates 24 hours a day, 365 days a year.

The Environment Agency (EA) and Met Office provide flood warnings up to five days in advance. These warnings should be coupled with specific on site systems to provide a useful system of escalation to specific actions.

Flood Warnings Direct (FWD)

Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to you by telephone, mobile, email, SMS text message and fax. Sign up for Floodline Warnings Direct by calling Floodline on 0845 988 1188 or going online

If flooding is forecast, warnings are issued using a set of four easily recognisable codes, as follows:

Flood Warning Codes	What it means	When it's used	What to do
 Flood Alert	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding.	• Be prepared to act on your flood plan. • Prepare a flood kit of essential items. • Monitor local water levels and the flood forecast on our website.
 Flood Warning	Flooding is expected. Immediate action required.	Half an hour to one day in advance of flooding.	• Move family, pets and valuables to a safe place. • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place.
 Severe Flood Warning	Severe flooding likely. Danger to life.	When flooding poses a significant threat to life.	• Stay in a safe place with a means of escape. • Be ready should you need to evacuate from your home. • Co-operate with the emergency services. • Call 999 if you are in immediate danger.
Warnings no longer in force	No further flooding is currently expected in your area.	When river or sea conditions begin to return to normal.	• Be careful. Flood water may still be around for several days. • If you've been flooded, ring your insurance company as soon as possible.

Raising the Alarm on Site

On the site, an alarm should be raised when a specific warning or trigger is received. This alarm should be obvious to those using the site and they should be clear on how to respond. Alarms should also take into account those with sensory or mobility impairment.

Devising Evacuation Procedures & Routes

Identify in advance of flooding which individuals can be sent home, if safe to do so. Allow time for this to occur before any routes become affected by the flooding. Evacuation procedures should be developed which identify when and how evacuation takes place, if necessary signed routes may be required, (including the maintenance of signs and keeping evacuation routes clear). Consideration should be given to the road network around the site, especially if these are more likely to flood first and therefore affect evacuation time.

The evacuation procedures should include options for the evacuation of ALL people on site, (including those with restricted mobility). It should be assumed that visitors will not have local knowledge and will need to be guided to a safe route / location. It is also worth keeping in mind the need to have evacuation plans for any pets and livestock.

Shelter & Welfare If an evacuation is necessary, consider the location to which the site will be evacuated. It can be assumed that it will be cold, raining and dark. The shelter and welfare of those evacuated from the site needs to be considered and it must be assumed that support from the emergency services will not be immediately forthcoming. For Commercial Businesses it is recommended that business is suspended in advance and wherever possible customers alerted to the fact that the premises is closed so that they do not unnecessarily enter areas at risk of flooding.

Fail Safe and Places of Safe Refuge

In the event that the Flood Defences are breached without Warning either being received or acted upon, consideration of the actions that should be taken to preserve life should be considered. Wherever possible, a 'Place of Safe Refuge' should be identified such that all occupants can take immediate action to keep themselves safe without relying on intervention from outside and consideration given to means of escape. These details should be recorded and be a part of the training for the ***Warning and Evacuation Plan***.

If the decision is made that nominated individuals / critical workers are to remain safe on site, ensure risk assessments have been completed. Include details of how many people can be accommodated in this manner and the resources / equipment available to sustain them the necessary duration. Depending on the cause of flooding, people may need to stay for many hours. Consider their communications with management, emergency services and their families. - **Do not plan for or assume that the emergency services will rescue people from this location. The focus of any response from the emergency services will be to those who are immediately vulnerable and at most risk. It is probable that the emergency services will be stretched thin.**

Command and Control

Any staff on the site must be clear on their roles and responsibilities in response to flood warnings and flooding. There should be a single person in control of the site response to ensure all activities are coordinated. Any plans must be drawn up to work on a 24/7 basis.

If immediate flooding is forecast and the opportunity to safely evacuate is gone, preemptive flood protection tasks must be implemented (if time allows) and the formal instruction given to move to the area of safe refuge.

Site Re-occupation

It must be born in mind that before re-occupation occurs that the recovery of the area affected will be co-ordinated by the local authority supported by various agencies.

There may well be environmental hazards, loss of utilities and other such issues, which may have to be rectified before people are allowed back to premises.

Briefing/Training/Exercising

Whilst the risk of flooding is extremely low, it is through training that the right decisions and actions are taken to prevent unnecessary risks being taken. All personnel who work or are resident on site should be made aware of this plan and briefed / trained accordingly. Exercising of the plan and personnel is essential to avoid panic.

Health & Safety records should be kept listing which personnel have been trained and exercised.

The Plan will form part of the Health & Safety at Work Register maintained by the organisation.

Document Control

The Plan should be owned, maintained, and updated. All users should be reminded periodically to provide details of any changes that may materially affect the plan in any way.

Details of changes should be recorded and the documentation updated. This should be completed either through a re-issue of the plan or via an amendments record.

The plan should be reviewed at least every three years, or more regularly if required, for example, as a result of lessons identified after an activation event or exercise, following major changes of personnel or policy, or following any change to the flood risk or warning process.

Documentation control procedures should be in place to ensure that only the current version of the plan is in circulation.