



Resilience and
Flood Risk

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Small Drove, Weston

FLOOD RISK ASSESSMENT

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1.0 Introduction

RAB Consultants has prepared this Flood Risk Assessment (FRA) in support of the proposed development at Small Drove, Weston.

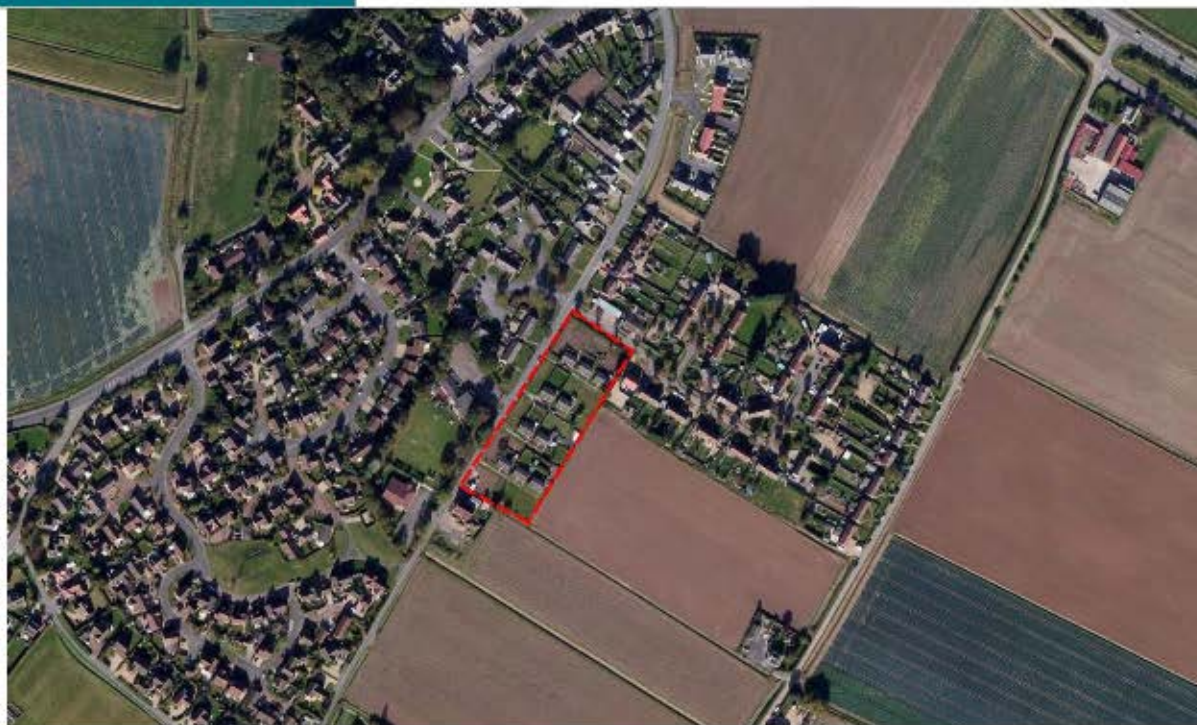
The development site is located in Flood Zone 3 in accordance with the Environment Agency's Flood Map for Planning (Rivers and Sea). The Planning Practice Guidance for the National Planning Policy Framework (NPPF) requires a site specific FRA to be carried out for developments located in Flood Zones 2 and 3 and for those which are 1 hectare (ha) or greater in size. A site specific FRA is required to ensure that the development is safe from flooding and will not increase the risk of flooding elsewhere.

2.0 Site details

2.1 Site location

TABLE 1: SITE LOCATION

Site address:	Small Drove, Weston, Spalding PE12 6HS
Site area:	8,400m ²
Existing land use:	Existing Bungalows and garden areas.
OS NGR:	TF 29259 24823
Local Planning Authority:	South Holland District Council



2.2 Site description

The site currently comprises of 10 bungalows and associated garden areas. Access to the site is from Small Drove (Appendix A).

TABLE 2: SITE PHOTOGRAPHS



FIGURE 1: VIEW ACROSS THE SITE LOOKING NORTH EAST.



FIGURE 2: VIEW OF SMALL DROVE LOOKING NORTH



FIGURE 3: VIEW OF SMALL DROVE LOOKING SOUTH



FIGURE 4: VIEW OF AN ADJACENT IDB DRAIN SOUTH OF THE SITE.

2.3 Development proposal

It is proposed to demolish the existing bungalows and construct 35 dwellings with associated parking and landscaped areas. (Appendix B).

3.0 Flood Risk

3.1 Sequential test

According to the Environment Agency's Flood Map for Planning the site lies in Flood Zone 3; which is described in the NPPF as land having a 1 in 100 or greater annual probability of river flooding (1% or greater Annual Exceedance Probability, AEP); or land having a 1 in 200 or greater annual probability of sea flooding (0.5% AEP or greater).

The NPPF follows a sequential risk-based approach in determining the suitability of land for development in flood risk areas, with the intention of steering all new development to the lowest flood risk areas. NPPF Planning Practice Guidance (PPG) Table 2 confirms the 'Flood risk vulnerability classification' of a site, depending upon the proposed usage. This classification is subsequently applied to Table 3 'Flood risk vulnerability and flood zone compatibility' to determine whether:

- The proposed development is suitable for the flood zone in which it is located; and
- Whether an Exception Test is required for the proposed development

The proposed development is classed as a 'more vulnerable' development in accordance with NPPF PPG. The development is therefore appropriate for the Flood Zone. However, both a sequential test and exception are required. The report is included in Appendix C.

3.2 Flooding history

South Holland District Council's updated Strategic Flood Risk Assessment reports no flood events since the construction of the Coronation Chancel through Spalding in 1953, which diverts excess water around Spalding. Prior to construction, parts of the town were prone to flooding. Post-construction and with the coastal flood defence scheme in place, it is understood that the town and development site have not been flooded. The system was severely tested by a tidal event in January 1978, where the flood level was near the 0.5% AEP level and was accompanied by strong winds and wave action.

The site owner has no knowledge of flooding at the site.

3.3 Fluvial (Rivers)

The proposed development site lies approximately 2.75km East of the River Welland, which flows to the north east through Spalding. The River Welland, Weston, Spalding and large areas of Lincolnshire around the wash are strongly influenced by coastal flooding, Weston however benefits from a flood defence scheme.

A data request was made to the Environment Agency. The Environment Agency modelled data is for in-channel levels, which will be high due to the flood defences containing the water level in times of flood (Appendix D). The Environment Agency advised that the FRA should assess the flood risk and the mitigation required from the South Holland Strategic Flood Risk Assessment (SFRA); including residual depth maps and climate change (2115 maps). This assessment includes the sea, main rivers, Internal Drainage Board systems and flood defences.

The 1% AEP fluvial / 0.5% AEP coastal with climate change residual flood map (Figure 6) shows no flooding at the proposed development. This reflects the consequences arising from direct overtopping of defences, where this would occur, together with breach failure which is assumed at any point along the defences. The residual flood map for the 0.1% AEP 2115 indicates that even in this extreme event there would be no flooding at the site (Figure 7).

Basic FRA Map centred on TF 29259 24811 - created January 2017 [Ref: CCN-2016-32641]

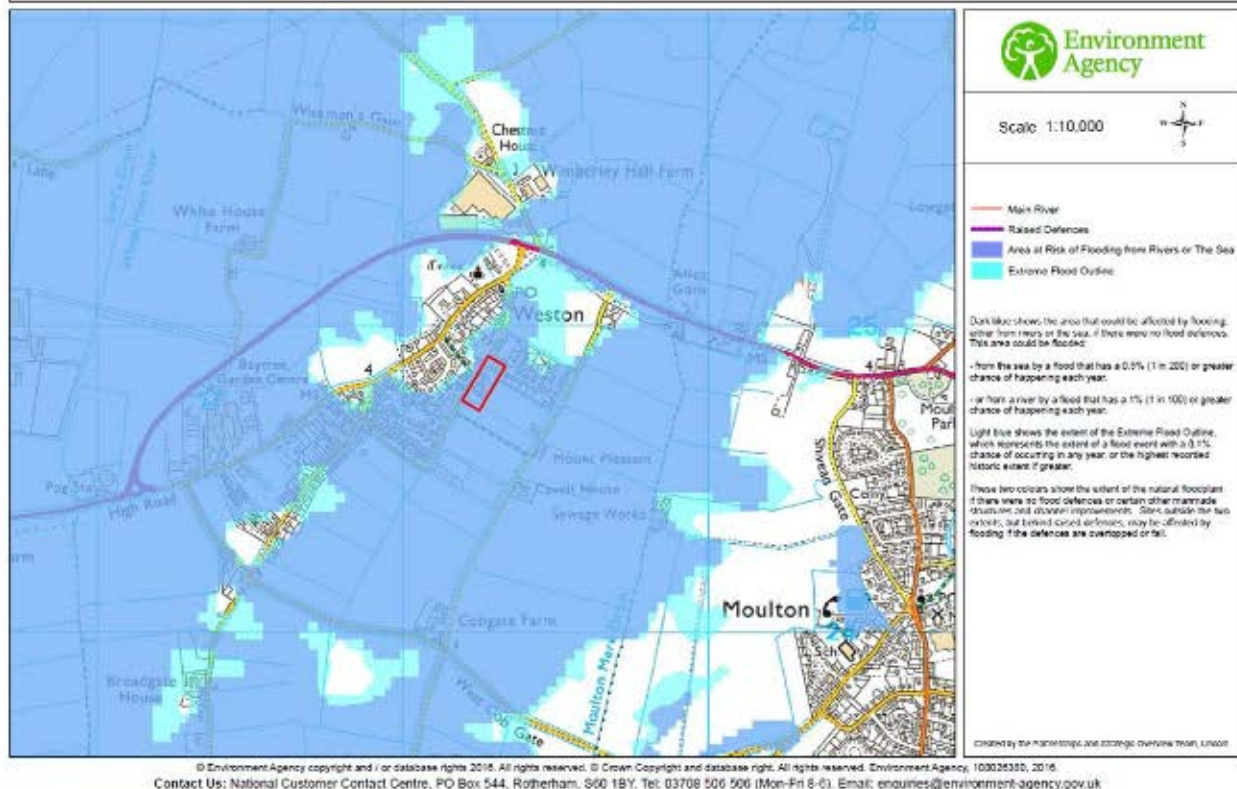


FIGURE 5: ENVIRONMENT AGENCY FLOOD MAP

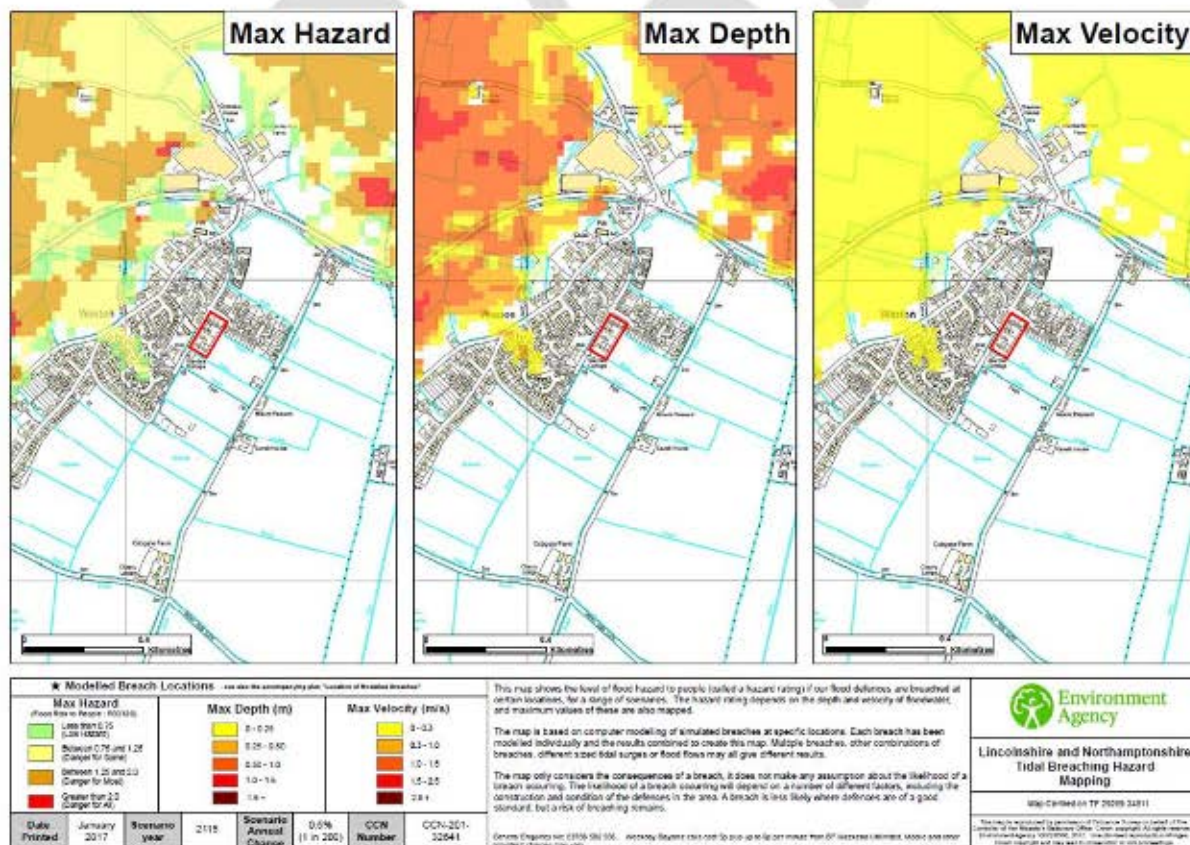


FIGURE 6: SCREENSHOT FROM THE SFRA RESIDUAL FLOOD MAP 0.5% AEP YEAR 2115

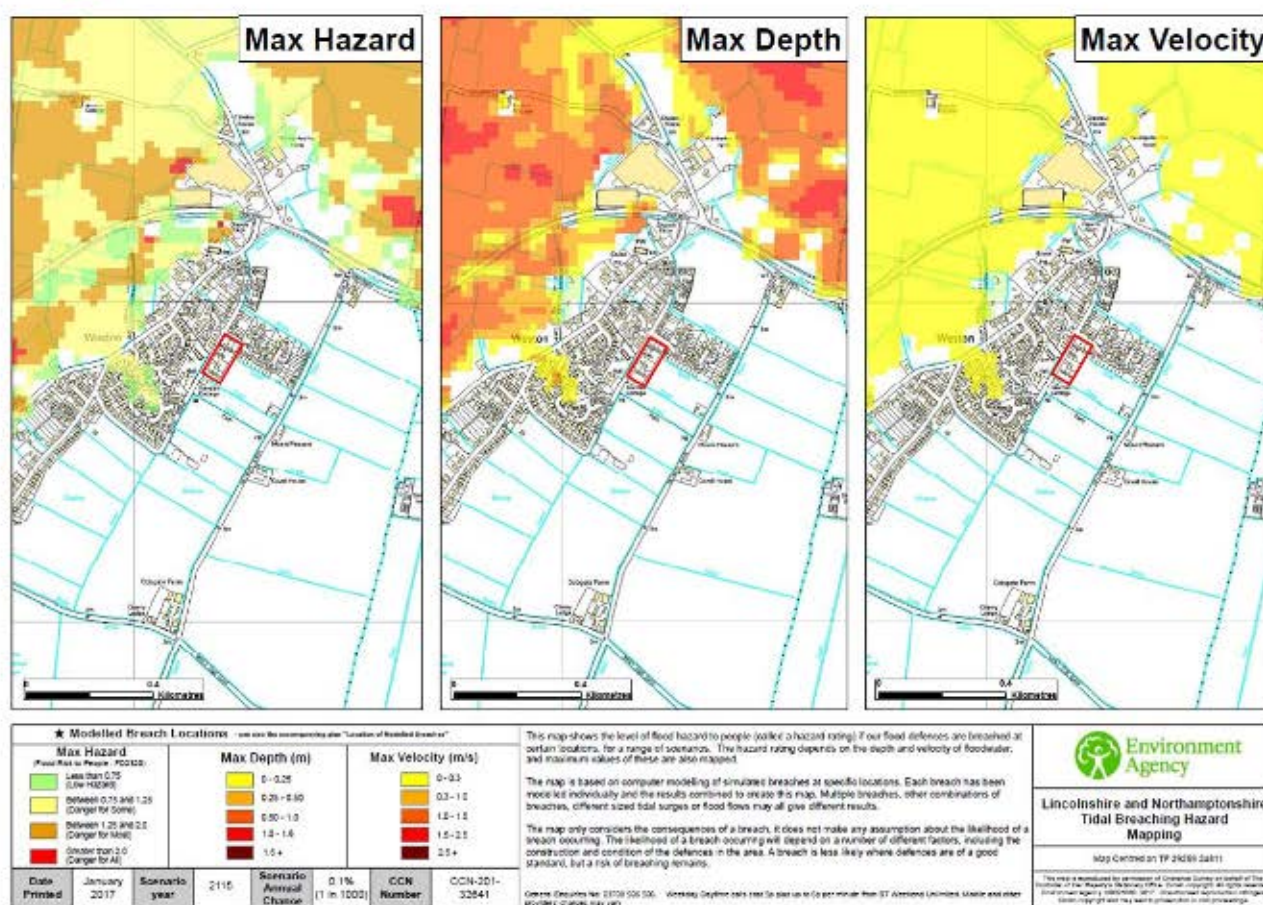


FIGURE 7 - SCREENSHOT FROM THE SFRA RESIDUAL FLOOD MAP 0.1% AEP YEAR 2115

3.3.1. Climate Change Impact on Fluvial Risk

The Environment Agency guidance document 'Flood risk assessments: climate change allowances' was released in February 2016 and included statistical increases in peak fluvial flows by river basin district and allowance categories based on epochs and development vulnerability classification. Referring to the NPPF PPG, the development is classified as 'more vulnerable' and has an expected lifetime of 100 years; therefore, given the site is within the Anglian catchment, the 'higher central' (+35%) and 'upper end' (+65%) allowance categories apply.

Since this is small scale development it is beyond the scope of the project to re-model flood levels at the site. It is unlikely that the SFRA modelling includes the new allowances, however given no flooding is predicted for even the 0.1% AEP 2115 extreme event then the inclusion of the new climate change allowances is not expected to flood the site with a 1% AEP event.

3.4 Flood defence breach or overtopping

3.4.1. Breach risk

The 1% AEP fluvial / 0.5% AEP coastal plus climate change and 0.1% AEP residual flood maps, which include a breach scenario, show no flooding at the proposed development site (Appendix C).

3.4.2. Overtopping risk

The 1% AEP fluvial / 0.5% AEP coastal plus climate change and 0.1% AEP residual flood maps, which include overtopping, show no flooding at the proposed development site (Appendix C).

3.5 Coastal/tidal

The risk has been assessed in conjunction with section 3.3.

3.6 Pluvial (Surface water)



FIGURE 8 -SCREEN SHOT TAKEN FROM THE ENVIRONMENT AGENCY'S SURFACE WATER FLOOD MAP

Figure 8 indicates that the surface water risk for the south of the site is very low (a chance of flooding in less than 1 in 1,000). It identifies an area of high risk (a chance of flooding of greater than 1 in 30) and medium risk (a change of flooding between 1 in 30 and 1 in 100) in the north of the site. Both of these locations are shown to have an expected flood depth of less than 0.3m, with the high risk area having an expected velocity of over 0.25m/s.

A comparison of the surface water flood map and the topographic survey shows that there is a low point in the topography that matches the high risk location where surface water could pond. The low point has a level of 2.76mAOD, with surrounding ground rising to approximately 3.00mAOD before falling away again, which suggests a maximum ponded level of 3.00mAOD and depth of approximately 0.25m.

3.7 Artificial water bodies

The development site is not shown as being at risk of reservoir flooding on the Environment Agency's reservoir flood map (Figure 9). The site is not in close proximity to a raised canal.



FIGURE 9 - SCREEN SHOT TAKEN FROM THE ENVIRONMENT AGENCY'S FLOOD RISK FROM RESERVOIRS

3.8 Groundwater

South Holland District Council published an updates Strategic Flood Risk Assessment in January 2010. The report says:

'There are no reports of groundwater flooding occurring in the District. This issue is therefore taken as having no strategic significance in relation to flood risk'.

The site owner has no knowledge of groundwater flooding affecting the site.

Groundwater flooding is therefore not considered a significant risk to the site.

3.9 Sewers

South Holland district council's updated Strategic Flood Risk Assessment reports:

'Through consultation with Anglian water, as well as drawing on the Council's own local experience, it is found that flooding from sewers is limited to minor isolated cases. It is not of strategic significance as regards to flood risk'.

The site owner has no knowledge of sewer flooding affecting the site. Should sewer flooding occur then water is expected to pond in the low part of the site as discussed in Section 3.6.

4.0 Mitigation measures

4.1 Risk to buildings

4.1.1. Finished floor levels

It is recommended that a sequential approach is taken, locating the proposed dwellings to the lower surface water flood risk parts of the site, avoiding the lowest spot where the deepest surface water could pond.

- It is recommended that finished floor levels are set no lower than 3.5mAOD or 0.6m above local ground (whichever is higher) to mitigate risk from surface water flooding in the increased pluvial

flood risk area. Set finished floor levels no lower than 3.2mAOD or 0.3m above local ground (whichever is higher) to mitigate risk from surface water flooding.

4.1.2. Flood resistance

The site benefits from a high level of protection from the flood defences. The use of resistance measures to protect the building for residual risk is not considered appropriate, given the expected rarity of flooding and raised finished floor levels.

4.1.3. Flood resilience

The site benefits from a high level of protection from the flood defences. The incorporation of resilience in construction is not considered appropriate, given the expected rarity of flooding and raised finished floor levels.

4.2 Risk to occupiers

4.2.1. Safe access/egress

The development site and access receive a high level of flood protection. A safe dry access route will therefore be available in all but the most extreme of events.

Any surface water flooding on the access is expected to be shallow, less than 0.25m.

The residual risk will be managed by the implementation of a flood warning and evacuation plan (Appendix E).

4.2.2. Flood warning and evacuation plan

The site is included in a flood warning area and it is recommended that residents sign up to the Environment Agency flood warning for the River Welland, the Wash frontages and the far extent of Tidal Flooding from the Sash and tidal Estuaries.

4.3 Risk to others

4.3.1. Floodplain compensation

The 1% AEP fluvial / 0.5% AEP coastal plus climate change and 0.1% AEP residual flood maps, which included overtopping and breach, show no flooding at the proposed development site. As such no fluvial/tidal floodplain storage will be lost.

It is recommended that a sequential approach is taken, locating the proposed dwellings to the lower surface water flood risk parts of the site and minimising ground raising where the site is at risk from surface water flooding.

4.3.2. Surface water run-off

The SuDS Manual (2015), discusses the SuDS approach to managing surface water runoff which is intended to mimic the natural catchment process as closely as is possible. The approach sets out the design objectives in respect of SuDS:

- Use of surface water runoff as a resource;
- Manage rainwater close to where it falls (at source);

- Manage runoff on the surface (above ground);
- Allow rainwater to soak into the ground (infiltration);
- Promote evapotranspiration;
- Slow and store runoff to mimic natural runoff rates and volumes;
- Reduce contamination of runoff through pollution prevention and by controlling the runoff at source; and
- Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

Depending on the characteristics of the site and local requirements, these may be used in conjunction and varying degrees.

A surface water drainage strategy has been produced by William Saunders (CM/KW/11505/12.0) to manage and control surface water runoff in line with current best SuDS practice (Appendix F).

5.0 Conclusion

An assessment of flood risk has been made for a planning proposal to construct 35 dwellings on land at Small Drove, Weston.

The site is in Flood Zone 3 on the Environment Agency's flood map due to a combination of fluvial and coastal flooding, however the site is protected by flood defences.

Residual flooding, arising from both breach and overtopping of defences, is not expected to affect the site.

A part of the site is at risk from surface water flooding. This risk will be mitigated by applying a sequential approach to locating the proposed dwellings to the lower surface water flood risk parts of the site and setting an appropriate finished floor level.

The flood defences ensure safe access is available during a fluvial / tidal event. Any surface water flooding on the access is expected to be shallow. In the unlikely event of an extreme flood the residual risk to people will be managed through the implementation of a flood warning and evacuation plan.

The new impermeable areas requiring surface water drainage have the potential to increase runoff from the site. A drainage strategy has been produced by William Saunders to mitigate this.

It is concluded that the proposed development is appropriate for the flood risk and is not expected to increase the risk of flooding elsewhere.

6.0 Recommendations

- Adopt a sequential approach, locating the proposed dwellings to the lower surface water flood risk parts of the site, avoiding the lowest spot where the deepest surface water could pond.
- Set finished floor levels no lower than 3.5mAOD or 0.6m above local ground (whichever is higher) to mitigate risk from surface water flooding in the increased pluvial flood risk area. Set finished floor levels no lower than 3.2mAOD or 0.3m above local ground (whichever is higher) to mitigate risk from surface water flooding.
- Minimise ground raising where the site is at risk from surface water flooding.
- Residents should sign up for the Environment Agency flood warning service and implement the flood warning and evacuation plan given in Appendix E.



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Appendix A – Site location Plan

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Appendix B – Proposed Drawings

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Appendix C – Sequential and Exception Test

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Appendix D – Environment Agency Data

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Appendix E – Flood Warning and evacuation Plan

Flood Risk

Small Drove, Weston is within Flood Zone 3 (Land assessed as having a 1% or greater annual exceedance probability of river flooding) due to a combination of river and coastal flood risk, however the site is protected by flood defences.

In the unlikely event of flood defence failure flood modelling shows the site will still remain dry, however some areas of Pinchbeck, Spalding and large parts of Lincolnshire will flood, which could compromise access and egress from Weston.

There is still a residual risk of an extreme event affecting the site or access routes.

How Flood Warnings will be provided

The Environment Agency provides a free flood warning service 'Floodline Warnings Direct' for this area of Pinchbeck, which offers a minimum 2-hour flood warning lead time before the onset of flooding at the site. Residents will need to contact the Environment Agency to register to this service by calling Floodline on **0345 988 1188**.

After a receipt of a flood warning, you are recommended to call the Environment Agency Floodline 'dial and listen' service to hear further information. After dialling **0345 988 1188** you will be given the option of entering a quick dial code for the flood warning area that relates to you.

The quick dial code that relates to you is **0311414**. This will give you an automated response regarding any flood warnings that have been issued for this area. If you wish to speak to someone about flooding in relation to Small Drove, Weston you need to state that it is **The eastern areas of Spalding**.

Residents will be able to choose how they are contacted by the Environment Agency in the event of a flood, such as an automated telephone call, SMS text, email, fax or pager.

The Environment Agency use flood warning codes, each with specific public information / advice relating to it:



FLOOD ALERT

What it means: Flooding is possible. Be prepared.

When it's used: Two hours to two days in advance of flooding.

What to do for Small Drove.

The water level is rising but the risk of flooding on Small Drove is considered to be very low.

What you should do:

- Be prepared to act on your flood plan.
- Monitor local news and weather forecasts.
- Be aware of water levels. You can now see river levels on the Environment Agency's website. This information will show you what's happening to water levels in your area -

<http://www.environment-agency.gov.uk/homeandleisure/floods/riverlevels/default.aspx>

- Call Floodline on 0345 988 1188.
- Prepare a flood kit of essential items.



FLOOD WARNING

FLOODING IS EXPECTED. IMMEDIATE ACTION REQUIRED.

FLOOD WARNING

What it means: Flooding is expected. Immediate action required.

When it's used: Half an hour to one day in advance of flooding.

What to do for Small Drove.

You should take action when a flood warning is issued and not wait for a severe flood warning.

The water level is still rising, and flooding is expected. You should implement your flood warning and evacuation plan now.

What you should do:

- Evacuate the site if advised to do so by the emergency services and it is safe to do so.
- If the site is flooded and evacuation is not possible, people should stay in a high place with means of an escape.
- Call Floodline on 0345 988 1188 and monitor water levels.
- Turn off gas, electricity and water supplies if it is safe to do so. If you lose utility services, evacuate to the designated rest centre.
- Avoid walking or driving through floodwater, there could be hidden dangers, such as raised manhole covers (so have the potential to fall down a manhole).
- If in danger call 999 immediately. Listen to emergency services.



SEVERE FLOOD WARNING

**SEVERE FLOODING.
DANGER TO LIFE.**

SEVERE FLOOD WARNING

What it means: Severe flooding. Danger to life.

When it's used: When flooding poses a significant risk to life.

What to do for Small Drove.

Flooding is now posing a significant risk to life or disruption to the local community. Flooding at the site is expected.

What you should do:

- Act as with a Flood Warning.

- Evacuate the site if advised to do so by the emergency services and it is safe to do so.
- If the site is flooded and evacuation is not possible, people should stay in a high place with means of an escape.
- Call Floodline on 0345 988 1188 and monitor water levels.
- Turn off gas, electricity and water supplies if it is safe to do so. If you lose utility services, evacuate to the designated rest centre.
- Avoid walking or driving through floodwater, there could be hidden dangers, such as raised manhole covers (so have the potential to fall down a manhole).
- If in danger call 999 immediately. Listen to emergency services.

Emergency Flood Plan – Small Drove

A list of useful telephone numbers:	Environment Agency:	
	Floodline	0345 988 1188
	Quick dial code	0311414
	Environment Agency – General Enquires	03708 506 506
Useful numbers (for owners to include):	Emergency Services:	
	Lincolnshire Fire and Rescue	01522 582222
	Lincolnshire Police	101
	East Midlands Ambulance Service	0115 884 5000
	In an emergency, dial 999	
	Lincolnshire County Council	01522 552222
	South Holland District Council	01775 761161
	Insurance Company	
	Neighbours	
A Flood Kit: (This should be collected and stored in a place where it can be easily accessed).	<i>This should include:</i> Any key personal documents (Register, Insurance details, etc.); Torch (with spare batteries); Battery or wind-up radio; A mobile phone (with the useful telephone numbers already stored and a full battery); Rubber gloves; Wellington boots; Waterproof clothing; First aid kit; Blankets.	
Medication:	Do any residents need regular medication?	
Valuable belongings:	Get into the habit of storing these in a high place.	



Flood boards / sandbags:	Have a few flood boards and sandbags prepared to block doorways and airbricks.
Gas, Electricity and Water:	Ensure that you know how to turn these off, be aware that you may need to do this in the dark.
Motor Vehicles:	Is there anywhere that vehicle(s) could be stored (garage?) so that they do not cause any damage if they are moved by floodwaters?
Evacuation:	If flooding is severe, you may be evacuated. Think about what you need to take with you.
DON'T WAIT FOR A FLOOD TO SEE IF YOUR FLOOD PLAN WORKS <u>TEST IT NOW!</u>	

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Appendix E – William Saunders Drainage Strategy

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Appendix F – Topographic Survey

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