

FLOOD RISK ASSESSMENT

&

SUDS Strategy for Planning

New Climate change allowances appropriately addressed

Commercial PPG “Less Vulnerable” extension
building;
No change to site operations or sensitivity

At:

Greencell Extension, West Marsh Road,
Pinchbeck, Spalding PE11 3UG

June 2019

Flood Response Management Plan “PPG Less Vulnerable”:

- Not being at / avoiding the site during potential flood events
 - EA Flood Warning
- Clear procedure (response and evacuation route) included for when on the site and there is the likelihood of flooding / inundation
 - Knowing when it is safe and appropriate to return to the site

ARK Ltd

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If this report has been released electronically, the appendices referred to herein can be found in the annexed zip folder/s as .pdf or .dwg files. If this report has been released in hard copy the appendices will be bound into the back of this report. Plans may be annexed separately as A1 or A0 copies where a bound-in A3 copy is not appropriate.

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1.0 Scope

This report contains the details of a Flood Risk Assessment carried out by Ark Environmental Consultancy Limited ("ARK Ltd") at Greencell Extension, West Marsh Rd, Pinchbeck, Spalding PE11 3UG, henceforth referred to as "the site" in this report.

This report has been prepared for Greencell Ltd Kings Hill and must not be relied upon by any other party without the explicit written permission of ARK Ltd.

All parties to this report do not intend any of the terms of the Contracts (Right of Third Parties Act 1999) to apply to this report.

Please note this report does not purport to provide definitive legal advice nor can it be used to demonstrate that the site will never flood in the future.

The Executive Summary contains an overview of key findings and conclusions. However, no reliance should be placed on the Executive Summary until the whole of the report has been read.

Other sections of the report may contain information which puts into context the findings noted within the Executive Summary.

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2.0 Executive Summary

This FRA has been carried out in accordance with the National Planning Policy Framework (NPPF) & PPG. It is to be used to assist the Local Planning Authority (LPA) and Environment Agency (EA) when considering the flooding issues of the proposed development as part of a planning application.

The proposed development is a commercial extension (attached) on a vacant plot adjacent to existing commercial property located in FZ3 partly defended large tidal floodplain.

This is categorized as a "Less Vulnerable" landuse in accordance with the NPPF / PPG classifications; the NPPF Exception Test does not need to be passed. The main source of flooding is tidal large floodplain managed by the network of drains / watercourses.

- No new footprint within 25m of top of bank of an EA main watercourse
- Ramsey IDB managed area: no high risk areas identified
- Less Vulnerable is appropriate at this location
- No flood impedance or increase in ground levels within the floodplain: no flood compensation considered necessary given tidal principal source
- Reduces flood risk overall: SUDS and flood storage within the site increased

A Flood Response Management Plan is included, which considers people would be safe in the event of the flood, principally by:

- Not being at / avoiding the site during potential flood events using EA Flood Warning
- Having a clear procedure (response and evacuation route) for when on the site and there is the likelihood of flooding / inundation
- Knowing when it is safe and appropriate to return to the site

Given ability to employ a flood response management plan that avoids the hazard, together with suitable evacuation procedures, as long as the flood resilient measures are incorporated, users understand the flood response management procedures and sign up to and understand

the Environment Agency Flood Warning scheme, it is considered likely that the proposed development can be constructed and operated safely in flood risk terms without increasing flood risk elsewhere and is therefore appropriate development in accordance with the NPPF/PPG.

3.0 Introduction

The site boundary is provided in the location plan in Appendix A.

The FRA combined a desktop study, review of available information, consultations and an assessment of all sources of flooding posed to and from the site and proposed development, in accordance with National Planning Policy Framework (NPPF). Appropriate flood mitigation measures were then considered, either as already incorporated within the scheme or recommended for inclusion at detailed design stage. The suitability of the proposed development was also reviewed in the context of the NPPF and the technical guidance accompanying the NPPF.

4.0 Purpose of the Report

This FRA has been carried out in accordance with National Planning Policy Framework (NPPF). It is to be used to assist the Local Planning Authority (LPA) and Environment Agency (EA) when considering the flooding issues of the proposed development as part of a planning application.

The report provides the following information:

- An assessment of the flood risk posed to the site based on flood information and mapping provide by the EA and Strategic Flood Risk Assessment (SFRA);
- An assessment of the proposed development in terms of surface water run-off; and
- Proposals for measures to mitigate the flood risks posed to and from the development where appropriate.

5.0 Report Information Sources

The information source used to undertake this FRA has been collected from the following sources:

- British Geological Survey Website
- EA Website
- South Holland District Council (SHDC) (Joint) Strategic Flood Risk Assessment (2018 as updated);
- SHDC (Joint) Preliminary Flood Risk Assessment (PFRA) (2011);
- Welland and Deepings Area Internal Drainage Board (site not in South Holland IDB as site is on west area of Welland)
- Lincolnshire County Council (LCC) Sustainable Design and Construction Policies
- Internet mapping and searches.

6.0 Overview of British Legislation

6.1 National Planning Policy

Note: where this report refers to NPPF 2019 this also cover the PPG 2018.

The National Planning Policy Framework (NPPF) and PPG supercede all Planning Policy Statements (PPS's) and remaining Planning Policy Guidance (PPG's). Flood risk is retained as a key development consideration.

The Sequential and Exception Tests are retained as part of the NPPF/PPG. The accompanying NPPF Technical Guidance also includes Tables 2 and 3 to assist with flood risk vulnerability classifications and development suitability.

7.0 Local Policy

Local Authorities consider flood risk through relevant environmental and climate change policies which enforce the requirements of the NPPF.

The Strategic Flood Risk Assessment (SFRA) is a key source of flood risk specific information for the area. The SFRA provides a more detailed review of flood risks and recommendations for ensuring developments can be constructed and operated safely in accordance with the NPPF. Greater detail of the SFRA is provided in the report.

8.0 Site Status and Environmental Setting

8.1 Site Location and Status

The planning application boundary is c. 0.20 hectares in total (plot and access). The site is located on the east side of West Marsh Road, adjacent and south of the roundabout junction of the B1180 and the A16.

The site location plan can be seen in Appendix A.

8.2 Current Site Description

The following description is based on information made available from internet mapping and aerial photography.

The site is currently occupied by a vacant majority porous plot as part of an operating commercial site for ripening natural produce. The site's surrounding is predominantly industrial / commercial.

Drained marshland / Fens.

The site is in EA FZ3 undefended tidal / fluvial large floodplain: Vernatt's Drain is 40m to the east; 140m further east is River Welland.

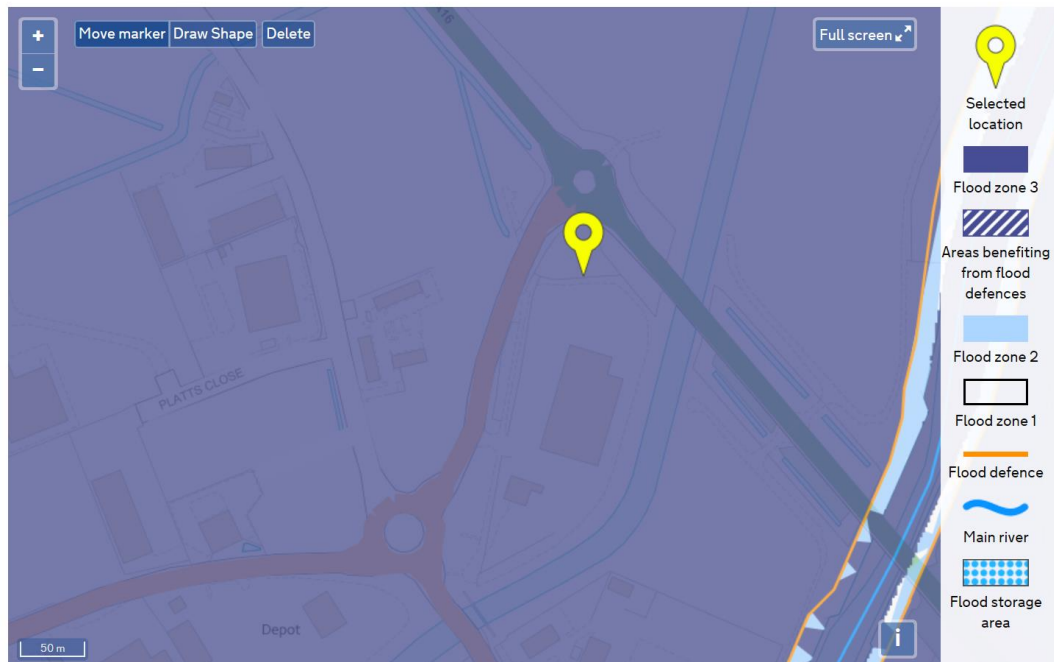
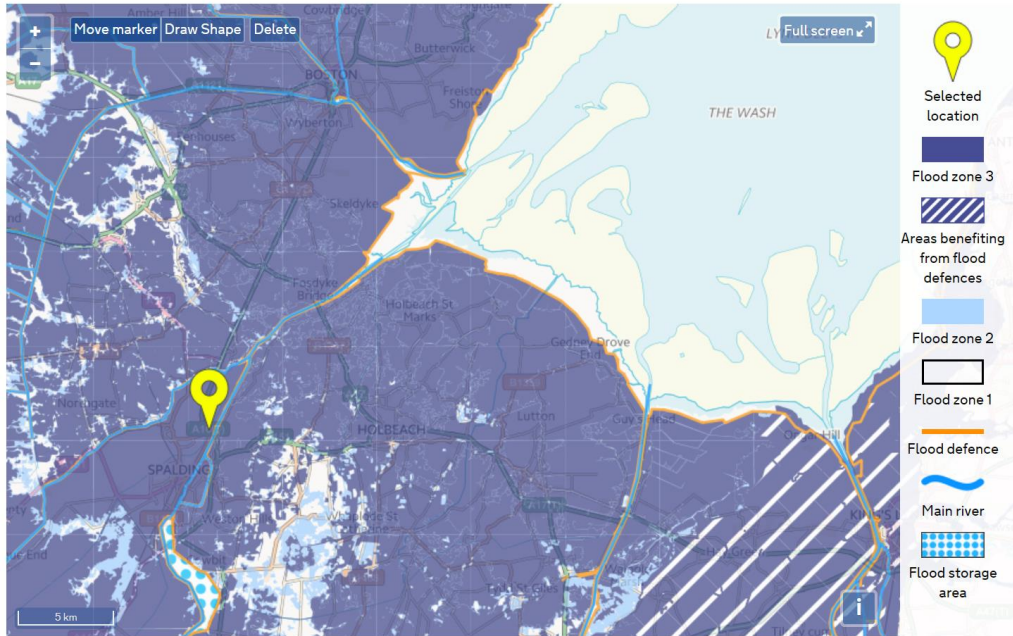
The site is within the large expanse of drained marshland which has enabled urbanization and agriculture in this area using a heavily managed network of drains through pumping stations and storage in the drains and watercourses and controlled overspill as necessary.

SFRA

The SFRA mapping is used where appropriate in the following sections.; the available EA mapping is more up to date and relevant.

8.3 EA Data and SFRA Hazard

The site is in the tidal / fluvial floodplain of drained marshland.



8.4 Welland and Deepings Area Internal Drainage Board

- No works within 16m of top of bank of Vernatt's Drain
 - This is appropriate design and mitigation
- Drainage rates will apply as for existing operation (likely increase in the commercial rates paid to IDB)

No additional modelling is considered necessary based on EA / IDB guidance given the nature and location of the scheme and flood setting at the site.

The correct response is to ensure designs are flood resilient (warehouse will be inherently resilient) and also do not impede flood flows so no compensation is required; water entry is inherent in the style of industrial buildings proposed.

Locate the new buildings in lowest flood risk feasible and assume 600mm depth of flooding: to address fluvial / tidal and also the partial NO - VERY LOW EA hazard surface water risk area:

How to address new Climate Change?

Defra issued new basin level changes to climate change allowances in Feb 2016; the EA are in the process on an area basis of deciding on prescriptive methodologies to apply these new allowances. The new allowances are greater than the previous standard 20% added to the EA's modelled 1in100year (usually). The new allowances are between 40% and 70%.

One method previously agreed on other schemes is to, when these data are available: take the difference between the 1in100year and the 1in100year + cc (old 20%) and use that as a pro rata value to work out what 40% to 70% would be and then add that to the 1in100year.

Or the EA provide their own area specific guidance, such as a specified uplift.

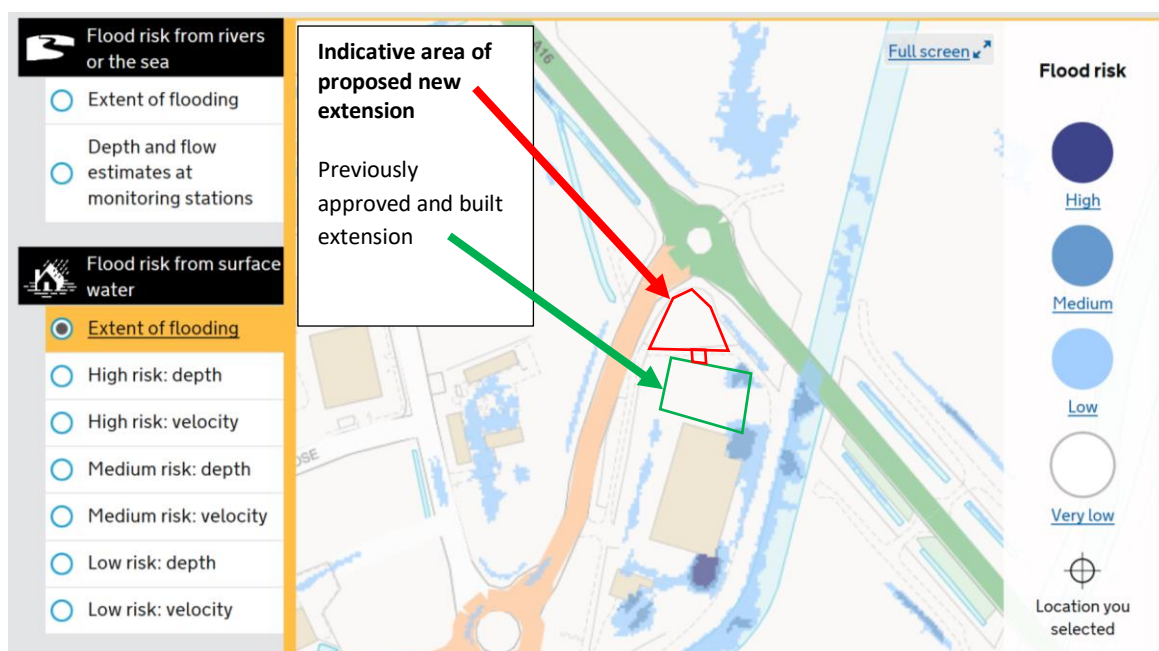
None of these options is available given the flood setting and low hazard.

Hence: precautionary approach: assume 600mm depth for flood resilience

EA New Surface Water Hazard Mapping

Note: this is surface water hazard hence no compensation required and design responses are not required other than flood resilience and resistance as necessary

- **Access & Egress: always in NO hazard**
- **NO / VERY LOW risk in all EA high risk scenario**
 - **Patchy areas of low risk (site is in drained marshland)**



8.5 Summary of other Flood Sources & Scheme

Flood Sources	Site Status	Comment on flood risk posed to / from the development
Groundwater	SFRA Indicates site is an area of lowest groundwater potential hazard	The proposed development will not increase the risk of groundwater flooding. Low Risk
Artificial Sources	Site is not within EA Reservoir Flood Warning area No other artificial sources with likely flood flowpaths that could reach the site	Low Risk
Surface Water / Sewer Flooding	Refer to EA's new surface water hazard data section above 2017 SFRA Site is not located in a Critical Drainage Area and in a EA NO / VERY LOW risk area Condition, depth and location of surrounding infrastructure uncertain	Increase in impermeable areas easily addressed given flood setting Development will not increase the peak flow or volume of discharge from the site: Access & egress always in NO risk Low Risk
Climate Change	Included in the flood modelling extents	Development will not significantly increase the peak flow and volume of discharge from the site Low risk posed to and from the development

Modelled Hazard

It is assumed that the site could likely flood in the future under varying flood events. The assessment therefore concentrates on the hazard rating and flood warning management including suitability of evacuation.

This is to ensure that people would be safe in the event of the flood, principally by:

- a) Not being at the site during potential flood events**
- b) Having a clear procedure (response and evacuation route) for when on the site and there is the likelihood of flooding**
- c) Knowing when it is safe and appropriate to return to the site**

DESIGN & Operation RESPONSE

Given the flood setting and nature of the scheme being Less Vulnerable, flood levels / depths are still considered instructive for the scheme;

- No change to site operations or sensitivity
- The scheme is not residential; there is no reason for persons to be at the site or return to the site in the event of the extreme future flood events reaching the site.
- The scheme will not have an impact on surrounding areas based on the EA and IDB data and scheme design (no flood compensation is required for new Less Vulnerable footprint)
- Retaining evacuation is considered an appropriate flood response for this type of scheme
- Given scheme is a commercial warehouse, the materials used will be inherently flood resilient

Design Response

- No new footprint within c. 16m of top of bank of IDB or EA watercourse
- No impact on IDB drainage network
- Small increase in impermeable areas easily addressed
- No raising of ground floor levels necessarily required given the type of use and the flood setting; unlikely to flood except in an extreme event

Flood resilient measures are inherent in the scheme and the buildings can be used to return the site to operation as quickly as possible in the event of a flood.

The flood depths and speeds are also instructive for the Flood Response Management Plan and hazard levels, which is the focus of this assessment.

- **Use EA worse case LOW risk surface water depths of <300mm**
- **Appropriate to use also as a precautionary approach for the fluvial / tidal risk**

Given the proposed continued site use this is considered appropriate given the flood response management feasible at the site.

Given the site is not within a rapid inundation area, evacuation is considered feasible and appropriate

9.0 Assessment of Proposed Development

9.1 Proposed Development

The proposed development can be seen in Appendix B.

The proposed development comprises

- commercial extension of one new building; all works PPG “Less Vulnerable”
- PPG Less Vulnerable inherently flood resilient
 - No flood compensation required
- Scheme is Less Vulnerable – water entry is considered appropriate hence no flood storage reduction
- Small increase in impermeable areas on the site
 - Addressed by local scale SUDS / discharge to watercourse regardless

Given the location of the building away from the flood source and the nature of the structures, floodwaters will be able to pass through unimpeded.

Preliminary Drainage Strategy

There will be a small increase in impermeable areas overall for the site; no extensive formal SUDS are considered necessary to meet the SUDS Guidance, national or local.

The development will:

- a) continue to discharge water in a controlled manner

No additional formal drainage strategy is considered necessary given the existing operation to be continued at the site.

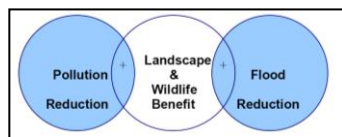
If required: add a landscaped swale area adjacent to the new building as an additional storage area of the peak runoff from the roof during storms; further quantification not considered necessary at this stage.

The drainage system will be extended to include the proposed extension as appropriate; this does not present a flood risk posed to or from the scheme.

9.1b SUDS Hierarchy Check

Concept SUDS Strategy

The following diagram indicates the philosophy behind the proposed SUDS strategy, and is taken from the EA's SUDS guidance:



(Source: Environment Agency, 2009)

Table 3 indicates the SUDS Hierarchy Appraisal for the site and proposed development:

Table 3: Site Specific SUDS Appraisal

SUDS Hierarchy	SUDS Technique	Potential Benefits			Site Specific			
		Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	?	Scheme Specific SUDS Suitability Appraisal and Comment		
Most Sustainable Least Sustainable	Living Roofs	•	•	•	*	Lightweight structure however suggests not feasible		
	Ponds / Basins	•	•	•	x	Not considered necessary and also not possible to incorporate on site given nature of site and operations and flood setting		
	Swales	•	•	•	*	Not considered necessary but could easily be landscaped adjacent to the new build if required		
	Infiltration Techniques	•	•		x	Not considered necessary and also not possible to incorporate on site given nature of site, geology, watertable and operations and flood setting		
	Permeable Surfaces and Filter Drains	•	•		x	Not considered necessary and also not possible to incorporate on site given nature of site and operations and flood setting		
	Tanked Systems	•			*	Not considered necessary		

Key:

Potentially suitable at the site: * Incorporated in the scheme: ✓ Not suitable / possible at the site:

9.2 Flood Resilience

As per previous correspondence with planning officers and as agreed:

The FRA provides the recommended resilient measures that can be incorporated; it will depend on the construction team as to what construction will actually need to be undertaken as part of detailed design.

This does not invalidate the points and recommendations of this FRA. The FRA cannot simply specify the exact measures that need to be changed; they are not required of the assessment at this stage to validate the assessment.

The scheme is a warehouse / commercial building hence inherently flood resilient; it will utilize the flood resilient techniques recommended in the NPPF Technical Guidance where appropriate and also the recommendations that have previously been issued by various councils:

If any of these elements are added:

- Plasterboards if required will be installed in horizontal sheets rather than conventional vertical installation methods to minimise the amount of plasterboard that could be damaged in a flood event
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property
- The ground floor levels will be raised above existing ground level where feasible
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event
- If required: airbricks / air vents will be raised to as high as is feasible and practicable
- Waterproofing will be installed as necessary and above the main floor slab and tied in to the walls where appropriate, to reduce the turnaround time for returning the property to full operation after a flood event.
- The ground floor waterproofing will be extended to an appropriate level above existing ground levels
- **Sensible storing of any materials easily damaged by water at higher levels within the building as necessary i.e. produce on raised internal structures**

9.3 Refuge and Evacuation

Based on the likely flood risk and nature of the proposed development and non-permanent residence at the site, it is considered the following flood response management will likely mean the site can be operated safely in flood risk terms.

The site is just east of an EA Flood Warning area.

Range of Flood Events

The following section provides the recommended flood response given the different flood scenarios at the site.

It is a clear cut flood response: a) evacuation b) non site attendance and evacuation.

Prior Warning

- 1. Before Attending Site consult the EA / IDB flood warning**
- 2. Do not attend site if Flood Warning in operation**

All site users will consult the EA flood warning before attending site

If upon advice from the EA early warning of potential overtopping from the River Erewash the preferred response is not to attend site, avoiding the hazard at the site.

Late Fluvial Flood Warning and/or Whilst on site Areas Inundating

- 1. Upon observation of inundation, evacuate using access to the west**

The recommended evacuation route to Flood Zone 1:

- North and West on B1180
- Continue west and south heading towards Bourne
- Via Spalding and A151 / Bourne Road
- Continue west and reach Bourne: into unrestricted FZ1

This route does go through lower hazard areas as identified in the EA mapping.

It is recommended that the future tenants understand and sign up to the EA Flood Warning scheme.

No return to site until the EA Flood Warning indicates the all clear and upon observation the floodwaters have receded from the site.

Nighttime Flood Awareness (if security on-site)

If it is known there are / have been wet weather conditions

- a) the site should be evacuated as a precautionary measure
- b) the EA Flood Warning to the west should be checked before retiring for the night
- c) information from Middle Level Commissioners sought also
- d) if warning suggests conditions could deteriorate / weather conditions remain / become "wetter" the site should be evacuated

9.4 Flood Response Management

The EA have a clear set of warning levels. Tenants should read the plan and understand the response requirements.

Flood Safety Pack

All main site users / nighttime users should ensure a flood safety evacuation pack is kept in a safe and easily accessible place. This should include as a minimum:

- First aid kit & Torch

-
- Warm clothing or blanket
 - List of appropriate contact numbers
 - Bottled water
 - Waterproofs / Wellington boots
 - Non-perishable food

The most up to date EA procedural levels should be read and understood by all tenants:

9.5 Annual Monitoring

It is recommended that tenants should contact the EA on an annual basis to confirm the flood status of the property.

If the flood status has changed, this evacuation and refuge plan should be reviewed and updated by suitable flood risk consultants as appropriate.

9.6 Surface Water Runoff – Flood Risk from the Development

In accordance with the NPPF, this FRA also considers the risks posed from the development to surrounding areas.

Where these elements are required: the proposals will incorporate new low-water demand devices such that the increase in peak flow and volume of flow is likely to be negligible.

Given the small scale of the proposed development and SUDS feasible, it is considered likely that the development will have a negligible effect on surrounding infrastructure. There will not be any significant increase in overland flow from the site.

9.7 Climate Change including new Govnt allowances

The impact of climate change in accordance with the NPPF is likely to be an increase in the rainfall intensity in the future, which will increase peak storm flows to sewer. The proposed development will incorporate low flush and reduced water demand showers and toilets, such that the combined flows to sewer are likely to have a negligible impact. It is considered therefore that flows in the future are not likely to have a significant impact, even with an allowance for climate change.

There will not be an unacceptable impact on the receiving sewers.

9.8 Flood Storage

The increase in total footprint will not increase flood risk elsewhere and no flood compensation is required given:

- a) the flood setting and location of the proposed new build
- b) the nature of the new build being “Less Vulnerable” for storage which means water entry is an appropriate strategy as is standard for commercial schemes

9.9 Flood Risk Vulnerability

According to the NPPF / PPG retained Flood Risk Vulnerability Classification, the proposed commercial land use would be classified as a worse case as “Less Vulnerable.”

The NPPF also retained Flood Risk Vulnerability and Flood Zone “Compatibility” Classification; this states that a “Less Vulnerable” development in Flood Zone 3a / FZ2 or FZ1 does not require the Exception Test to be passed.

9.10 Sequential Test

Summary: the proposed extension is to an existing operation and hence there are no suitable alternatives as the operation needs to be at this site attached to the existing building.

There is no need for the Exception Test to be passed; the scheme is PPG compliant in principle given scheme type and flood setting.

Based on the data reviewed to date, the flood risk assessment recommends the scheme could be constructed and operated safely in flood risk terms without increasing flood risk elsewhere.

10.0 Conclusion

The site is considered to be generally at a low risk from all sources of flooding except for future fluvial / tidal flood events / general “overspill” from the heavily managed Welland drainage network.

The proposed development is categorised as “Less Vulnerable” in accordance with the NPPF; it is therefore an appropriate type of development within Flood Zone 3, 2 or 1 without the need to pass the Exception Test.

The proposed scheme can incorporate suitable flood resilient measures.

It is considered likely that the proposed development can be constructed and operated safely in flood risk terms without increasing flood risk elsewhere and is therefore appropriate development in accordance with the NPPF.

It is recommended that the property signs up to the EA Flood Warning scheme.

10.1 Recommendations for Further Work

1. Produce a Property Flood Evacuation Plan if deemed necessary
2. Secure extension of discharge licence with the EA / IDB
3. Sign up property to EA Flood Warning scheme

11.0 Appendices

- A. Site Location
- B. Block Plan and Scheme proposals

Appendices A & B