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Flood risk assessment

Proposed extension to general multi-purpose building, B1, B2, B8 and agricultural use.

**Clough Farm
Goole Road
Swinefleet DN14 8AR**

Mr. J F Austwick

**Project ref 1337 FRA
Dec 2020**

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Flood Risk Assessment

This FRA to be read in conjunction with the submitted application plans, available to view on the ERYC public access web site.

The Proposal

To erect an extension to a general multi-purpose building use class B1, B2, B8 and agriculture.

Predominantly the building will be used for the storage of agricultural and none agricultural product/items, alongside the farm and haulage uses already established on the site. Other uses may be possible in the future.

The building may also be used for secure storing of agricultural and haulage equipment.

Physical

The site is situated south of the River Ouse and on the western side of the village of Swinefleet. The site is generally flat.

Access to the site is via a short stoned access/track from the A161, Swinefleet Goole Road.

The site consists of a single storey brick and tile dwelling with various steel and timber framed structures.

The site is enclosed by the A161 to the North, Quay Lane to the West, and open farm land to the South and East.

The proposal site is approx 2.5 to 3.0m AOD. Defence embankments to the south of the river and east of Swinefleet Warping Drain are shown to be 6.00m AOD

Flood Zone Classification

Making reference to the Flood map for planning GOV.UK web site, the proposed building will be situated in an area of a flood risk zone 3a fluvial and tidal dominated, but benefiting from adjacent flood defence embankments.





Flood map for planning

Your reference
DN14 8AR

Location (easting/northing)
476646/421720

Created
8 Dec 2020 16:49

Your selected location is in flood zone 3 – an area with a high probability of flooding that benefits from flood defences.

This means:

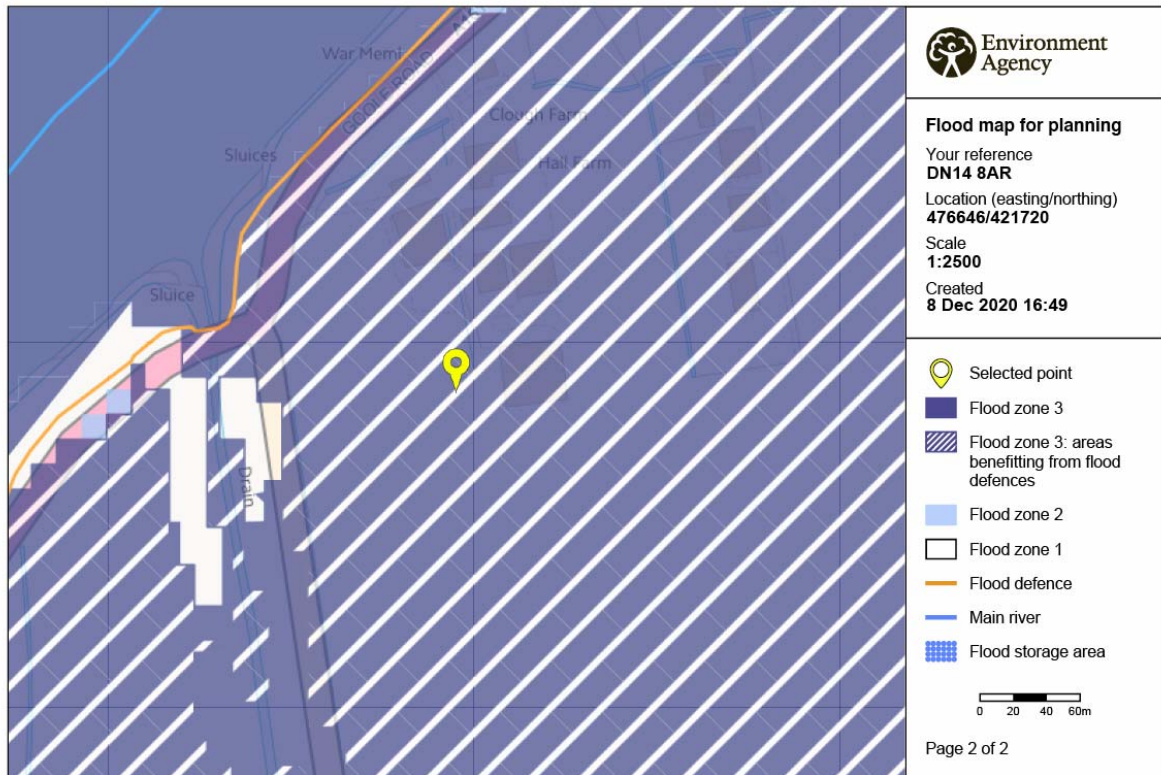
- you may need to complete a flood risk assessment for development in this area
- you should ask the Environment Agency about the level of flood protection at your location and request a Flood Defence Breach Hazard Map (You can email the Environment Agency at: enquiries@environment-agency.gov.uk)
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (find out more at www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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Flood map for planning extract GOV.UK © zones.

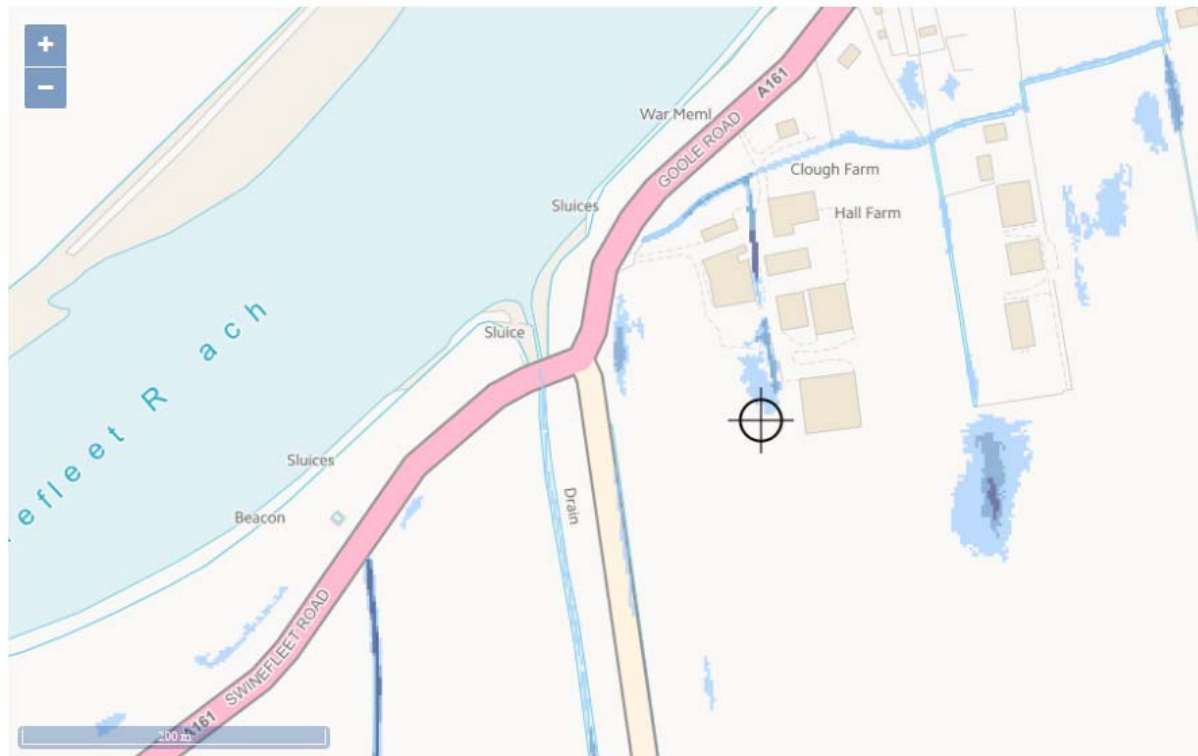
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Extent of flooding from rivers or the sea

● High ● Medium ● Low ● Very low ⊕ Location you selected

Flood map for planning extract GOV.UK © rivers and sea



Extent of flooding from surface water

● High
 ● Medium
 ● Low
 Very Low
 ⊕ Location you selected

Flood map for planning service GOV.UK, map extract surface water ©

Historical Events.

There are no Section 19 reports on the ERYC website which make direct reference to the site area.

Making reference to the ERYC level 1 SFRA documents, Map appendix C 'June 2007 event' and Map B 'Historical River flooding'; show no record of historical flood events on the site.

Current Info from riverlevels.uk website:-

Nearest monitoring station, River Ouse at Goole

The usual range of the River Ouse at Goole is between 0.00m and 4.83m.

It has been between these levels for 90% of the time since monitoring began.

The typical recent level of the River Ouse at Goole over the past 12 months has been between -1.10m and 5.13m.

It has been between these levels for at least 150 days in the past year.

The highest level ever recorded at the River Ouse at Goole is 6.04m, reached on Thursday 5th December 2013 at 7:45pm.

Sequential test.

It was not considered necessary to search for alternative sites within or outside of the blue lined site area owned by the applicant.

The requirement is for a new extension to an existing building taking full advantage of existing site layout, infrastructure and security.

Siting away from the application site is not considered sustainable and would create additional security problems and traffic flow.

The proposal, using resilient construction, can flood and recover without too much interruption to normal use.

The proposed building as sited, is shown to satisfy 'the sequential test', as noted above and on the following pages



Aerial view of the farm, arrow indicates approx location of extension

The site is within an area classified as zone 3a

Table 1 Flood Zones

(taken from para 5 Technical Guidance to the NPPF)

Zone 1 - low probability

Definition

This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Appropriate uses

All uses of land are appropriate in this zone.

Zone 2 - medium probability

Definition

This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses

Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed.

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 (table 2) 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 times of flood.

Table 2 Flood Risk Vulnerability Classification.

Essential Infrastructure	<ul style="list-style-type: none"> • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> • 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. • Installations requiring hazardous substances consent¹.
More Vulnerable	<ul style="list-style-type: none"> • Hospitals. • Residential institutions such as residential 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 waste². • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> • 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. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants. • Sewage treatment plants (if adequate pollution control measures are in place).
Water Compatible	<ul style="list-style-type: none"> • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard 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.

The proposal is classified as 'general industry/storage/agricultural'. From the above table 2, the Flood Risk Vulnerability Classification of the proposal is 'Less vulnerable'.

Table 3 Flood Risk Vulnerability & Flood Zone Compatibility

Flood risk vulnerability classification (see table 2)	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓
	Zone 3a	Exception Test required	✓	*	Exception Test required
	Zone 3b functional floodplain	Exception Test required	✓	*	*

Key: ✓ Development is appropriate.
* Development should not be permitted.

Making reference to the above table 3, the proposed building classified as a 'less vulnerable' is appropriate for siting within Zones 1, 2 or 3a

The site and the proposed development is considered to be sequentially preferable in terms of flood risk.



Drain to the west of Quay Lane, view to south.

Key Sources of Flooding

Fluvial (Rivers)

- Inundation of floodplains from rivers and watercourses
- Inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels
- Overtopping of defences
- Breaching of defences
- Blockages of culverts
- Blockages of flood channels, or flood corridors.

Tidal

- Sea
- Estuary
- Overtopping of defences
- Breaching of defences
- Other flows (fluvial surface water) that could pond due to tide locking
- Wave action.

Surface water

- Sheet run-off from adjacent land (urban or rural)
- Surcharged sewers (Combined, foul or surface water sewers).

Groundwater

- Water table rising after prolonged rainfall to emerge above ground level remote from a watercourse.
- Most likely to occur in low-lying areas underlain by permeable rock (aquifers).
- Seepage direct into properties
- Groundwater recovery after pumping has ceased for mining or industry.

Infrastructure failure

- Reservoirs
- Canals
- Industrial processes
- Burst water mains
- Blocked sewers or failed pumping stations.

Fluvial and Tidal Flooding.

The likely extent of fluvial and tidal river flooding, without defences, is shown on the planning flood map for the area. The site is in an area having the benefit of raised flood defences.

Adjacent flood defences of earth embankment and steel sheet piled walls, are approx 6.0 to 6.50m AOD

The risk of flooding from rivers or the sea is considered 'low'

Overland Flows/Surface water from Pluvial Events

Presently much of the land adjacent to the proposal is grassed, or cropped.

Site and building run off is dealt with via existing surface water drains flowing into existing dykes surrounding the site.

The majority of the yard area is dealt with via natural soakaway through permeable stoned surfaces and land. The adjacent land is well drained having operational field drains flowing into the adjacent dykes.

The new proposals of minimal area, approx 372 m², will be drained into the existing surface water drainage system, an attenuation dyke. The dyke will be increase in length by 6.10m

All rainwater pipes will be sealed at ground level to prevent any likelihood of contaminated run off entering dykes/drains.

The proposed works are not considered to bring about a large increase in outflows, no more than the land covered, consequently there is very little likelihood of additional flood risk to the proposal site or its neighbours.

There is little or no risk of overland flows/surface run off entering the site as a result of pluvial (rainfall) events on adjacent land/roads.

There is a possibility of overland flows from overtopping or breach of defences to the nearby River Ouse.

The ERYC SFRA documents indicate that this hazard is considered to be low to moderate.

Flooding due to Groundwater or Infrastructure Failure.

Infrastructure failure is unlikely; there are no reservoirs, canals or large industrial processes with pipelines etc. close to the site.

Blocked sewers or burst water mains can happen anywhere at any time and have to be dealt with as they occur.

Emerging ground water problems are not indicated on the GOV.UK mapping.

Flooding due to ground water or infrastructure failure is considered to be very low.

Climate Change

The NPPF requires consideration of the effects of climate change on the flood risk at the proposed site.

The effects of climate change, i.e. a rise in sea levels, possible increase in rainfall intensity during storms etc. might lead to increased flooding events from surface water and rivers flows.

The predicted increases in rainfall intensities are assumed to range from 5% by 2025 to 30% by 2115, the predicted useful life of the building is considered to be 60 years, given a generous life of 80 years sea levels may have increased by approx 900mm. Average river levels will not overtop the current embankments during this time.

For the predicted increases in sea levels in the east of England see table 4 These figures are very dependent on greenhouse gas emissions and the sensitivity of the global climate system. It should also be noted that land levels are rising in the North and West and sinking in the south east.

The introduction of electric powered vehicles after 2030 will likely reduce emissions, this will not have been taken into account in the current predictions, it will obviously have a positive effect on the outcome.

Table 4: Recommended contingency allowances for net sea level rises

	Net sea level rise (mm per year) relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, east midlands, London, south-east England (south of Flamborough Head)	4.0	8.5	12.0	15.0

The site is approx 2.5.to 3.0 m AOD and may be affected by a rise in sea level during the life of the building.

The proposed building is suitable for Zones 1, 2 and 3a.

It is very likely that Government and other agencies involved with flooding issues will continue to monitor and make improvements to defences and drainage networks in the intervening period, to prevent/alleviate any increase in the occurrence of flooding, in response to the predicted effects of climate change.

Overall, the risk of flooding to the site due to climate change is considered to be LOW/Moderate.

Flood Damage Reduction

Flood resilient construction is proposed, this will reduce the effects of very extreme flooding and allow clean up and recovery to be carried out quicker, with less cost and interruption to the buildings normal use.

NPPF extract,

Resilient construction is favoured because it can be achieved more consistently and is less likely to encourage occupiers to remain in buildings that could be inundated by rapidly rising water levels.

The proposed building should be constructed using resilient materials and construction methods.

- Concrete walling and Solid concrete floors with steel frame supports.
- Any Electrics wired down to approx 1400mm above floor level.
- Any electric outlets and meters min 1400mm above floor level

Site evacuation and places of safety.

Should there be a flooding event of an extreme nature, there is a place of elevated safety within the adjacent straw store at approx 7.50 m AOD

It is more than likely that flooding extent, depth and duration may not require evacuation to a place of safety, but registration with the EA's flood line emergency call service is advised.

Registration will enable advance notice of flood events, allowing time to relocate staff and if possible valuable equipment.

Any major over topping or embankment failure could result in shallow flood waters from the River Ouse approaching the site in less than 1 hour

The farm has the use of large agricultural tractors/loaders which can navigate flooded roads and fields.

Dependant on the location of any flood event, rapid exit via adjacent A161 heading west to Goole/M62, is considered to be the safest/shortest exit route to a place of relative safety.

Emergency and Evacuation plans need to be included in the farm's site operation procedures.

Conclusions and recommendations

If all recommendations/proposals as noted in this FRA are adopted, the proposed building extension is not considered to be at significant risk of flooding or to cause other buildings or land to flood.

The storage use of the proposal is considered to be suitable/safe in this location, for the life of the structure.

The proposal will not increase flood risk on the site or adjacent areas.

The floor level of proposal will be set at least 75 to 150 mm above adjacent yard level.

The flood resilience measures noted in this document should be included in the final building design. (see Flood damage reduction para)



River Ouse at Swinefleet

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