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FLOOD RISK ASSESSMENT
FOR INDUSTRIAL DEVELOPMENT ON
LAND ADJACENT TO SURFLEET BANK, SURFLEET

FINAL REPORT

ECL1181/ P&R

DATE DECEMBER 2023

ELLINGHAM CONSULTING LTD
Email: tim@ellinghamconsulting.co.uk

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Naylor Farms in respect of a plant based protein extraction facility and Anaerobic Digester Plant and associated infrastructure at Surfleet Bank, Surfleet.

A planning application for the proposed development is to be submitted by Portess and Richardson Architects.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is situated at land adjacent to Surfleet Bank, Surfleet, Lincolnshire, PE11 4DP. The National Grid Reference of the site is 52764/33057.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the eastern side of Surfleet Bank. Woad Farm is to the south east of the site. The site is an area of agricultural land. The area of development is approximately 14.3 hectares.

A topographic survey has been undertaken and is provided in Attachment 1. The site is flat with ground levels typically between +3.2m OD and +3.5m OD. The carriageway level of Surfleet Bank alongside the site is +4.2m OD to +5.0m OD.

The site is in the Welland and Deepings Internal Drainage Board's (IDB) district. Surface water at the site would naturally drain through soakaway and hence to the IDB drain system. There are riparian watercourses on the northern and eastern boundaries of the site. Surfleet Marsh Drain, and IDB Main Drain, forms the southern boundary of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by Oxford Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of a new Plant Based Protein extraction facility, research building and Anaerobic Digester Plant and ancillary office space together with landscaping, SuDs features, car park and associated infrastructure. The Proposed Site Plan is provided in Attachment 2.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding.

2.5 Available Flood Risk Information

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located within Flood Zone 3, an area with a high probability of flooding.

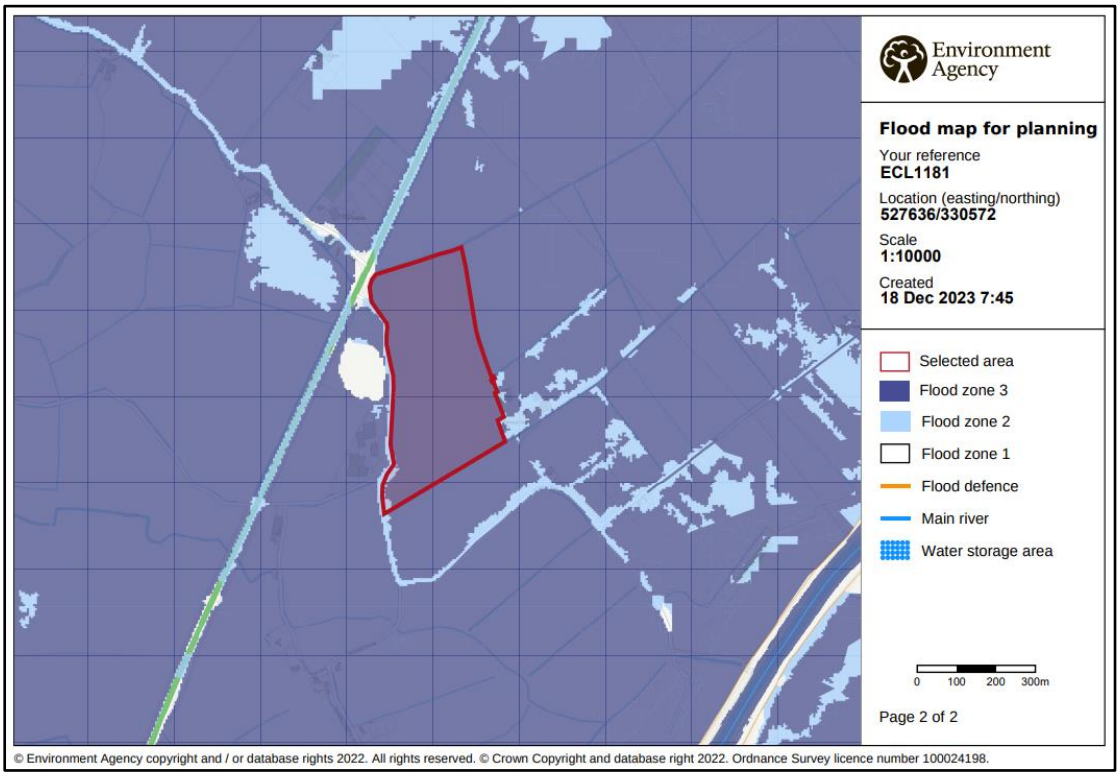


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site is in an area with a very low risk of flooding from rivers or the sea (annual probability less than 0.1%);
- in general, the site has a very low risk of surface water flooding (annual probability less than 0.1%) with small pockets having a low risk and flood depths up to 0.3m; and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	Year 2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is in the 'Danger for Some' area	The site is in the 'Danger for Some' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal event	The peak flood depth at the site is between 0.0m and 0.25m	The peak flood depth at the site is between 0.0m and 0.25m

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of general industry and is classified as 'Less Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'Less Vulnerable' therefore the development is appropriate, and it is not necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3a. As such, opportunities to undertake the development at an alternative site with a lower flood risk are limited and there are no known sites available for development in the limited areas of lower flood risk. In this context it is noted that SE Lincolnshire Local Plan commercial allocations are within flood risk areas due to the lack of availability of sites within areas of lower flood risk. At this location it is not possible to position the development on higher ground within the proposed site.

The River Welland has defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) tidal event including climate change. The site therefore has a low probability of flooding and is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.0km north west of the tidal River Welland downstream of Spalding. The River Glen, a tributary of the River Welland, is 1.3km to the south of the site. The defences on the River Welland and the River Glen are the responsibility of the Environment Agency.

The site is 8km from the coastal defence which is the responsibility of the Environment Agency. There is a secondary defence between the site and the sea defence.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by Welland and Deepings IDB. Surfleet Marsh Drain, an IDB maintained watercourse, forms the southern boundary of the site. The site and the surrounding land drains via Surfleet Marsh Pumping Station into the Risegate Eau. The Risegate Eau discharges to the tidal River Welland at the Risegate Eau Pumping Station.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Board's assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the Welland and Deepings IDB's and the Environment Agency's defences are generally good.

4.2 Sources of Flooding

A summary of the sources of flooding is provided in Table 2.

Source of Flooding	Level of Risk
Drainage Network Flooding	The risk is assessed in Section 4.3.
Surface Water Flooding	Based upon the EA maps the risk is low.
Fluvial Flooding	The site is not at risk of fluvial flooding.
Tidal Flooding	The risk is assessed in Section 4.3 and 4.5.
Reservoir Flooding	The risk of a breach is assessed in Section 4.6.
Groundwater Flooding	There is no evidence to suggest the site is at risk of groundwater flooding.

Table 2 – Sources of Flooding

4.3 Probability of Flooding

The probability of flooding associated with blockages in the Welland and Deepings IDB drainage system is low due to the maintenance standards achieved and managed by the IDB. Failure of Surfleet Marsh or Risegate Eau Pumping Station would increase the level of risk within the catchment.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the Welland and Deepings IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The River Welland tidal defences provide protection during the 0.5% annual probability (1 in 200 chance each year) tidal event. The 0.5% annual probability (1 in 200 chance each year) water level at Fossdyke Bridge is +5.99m OD.

The site benefits from defences on the Lincolnshire coastline. The Environment Agency advised that the defences are in a fair condition and reduce the risk of flooding (at the defence) to a 1% (1 in 100) chance of occurring in any year.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased tide levels.

The River Welland tidal defences provide protection during the 0.5% annual probability (1 in 200 chance each year) event inclusive of the effects of climate change. The estimated tide level during this event is +7.13m OD and typical defence levels are in excess of +7.5m OD. In summary the existing systems and defences are appropriate for the design life of the development (i.e. 100 years).

The standard of protection provided by the Wash coastal defences will reduce over time. Extreme sea levels along the Lincolnshire coast are estimated to increase by approximately 1m over the next 100 years.

4.6 Residual Risks

The Tidal Breach Hazard Mapping shows that the site is at risk during a breach during the 0.5% annual probability (1 in 200 chance each year) present day scenario.

The maximum flood depth at the site during the 0.5% annual probability (1 in 200 chance each year) event in 2115 is between 0.0m and 0.25m. An extract from the Environment Agency's breach hazard mapping is shown below in Figure 3.

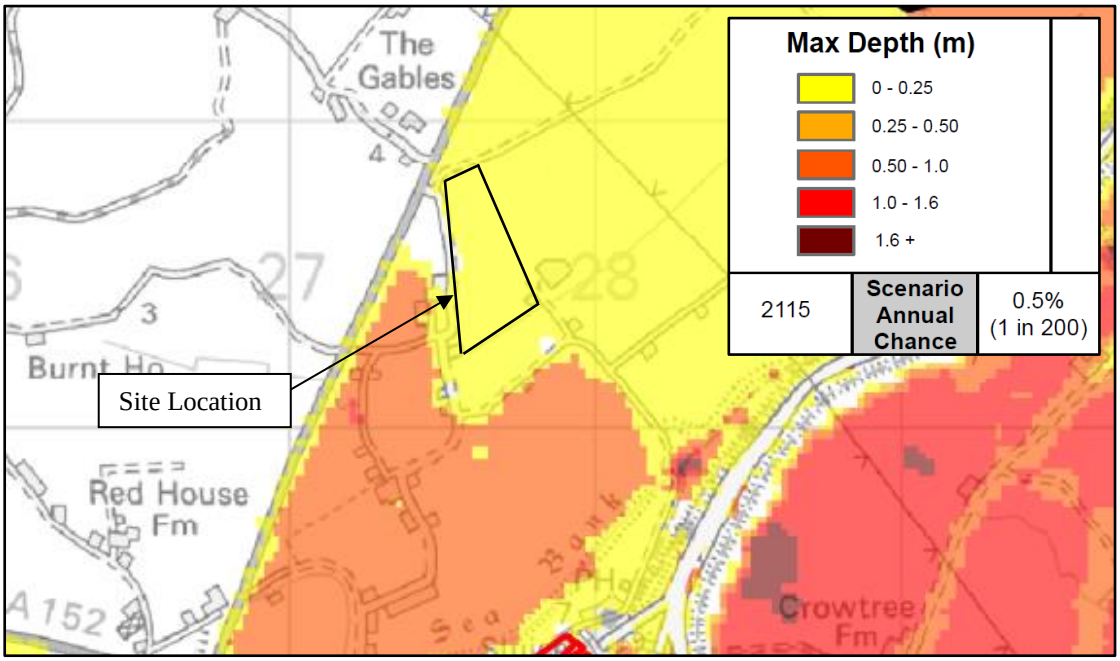


Figure 3 – Environment Agency 2115 Breach Hazard Map Maximum Flood Depth

The Tidal Breach Hazard Mapping for the 0.5% annual probability (1 in 200 chance each year) event including climate change shows that the site has a Flood Hazard indicating Danger for Some.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Surfleet Marsh or Risegate Eau Pumping Station would increase the risk.

The probability of tidal flooding from the River Welland tidal defences is less than 1% annual probability (1 in 100 chance each year) because of the standards of the existing flood defence systems. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development, it is not anticipated that the site would flood from overtopping of the defences.

Based upon the Breach Hazard Maps provided by the Environment Agency the maximum flood depth that could occur during the design life of the development due to a breach is 0.25m.

The proposed arrangement increases the impermeable area and therefore there is an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

Based upon the information available during the preparation of this flood risk assessment, to mitigate against the risk of a breach, the following flood resilience measures are recommended:

- there is a water entry strategy allowing flood water to enter the facility and drain freely from it;
- the main electrical supply and switchboard are elevated above the estimated level of flood water; and
- the user of the site should identify the actions to be undertaken in the event of receiving a flood warning.

The applicant will ensure that their employees are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The user of the facility should register with the Floodline Direct Warnings Service to receive any future flood warnings.

Should there be a failure of Surfleet Marsh or Risegate Eau Pumping Station and conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

Surface water run-off will be managed so that stormwater from the development will not affect any adjoining properties or increase the flood risk elsewhere. A surface water strategy has been prepared to support the application.

6.0 CONCLUSIONS

As a result of this assessment, the following conclusions have been reached.

- The proposed development consists of a new Plant Based Protein extraction facility, research building and Anaerobic Digester Plant and ancillary office space together with landscaping, SuDs features, car park and associated infrastructure at Surfleet Bank, Surfleet.

- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.

- The proposed development is in Flood Zone 3. The site benefits from defences on the River Welland which provide protection during the 1% annual probability (1 in 100 chance each year) fluvial event including climate change and the 0.5% annual probability (1 in 200 chance each year) tidal event including climate change.

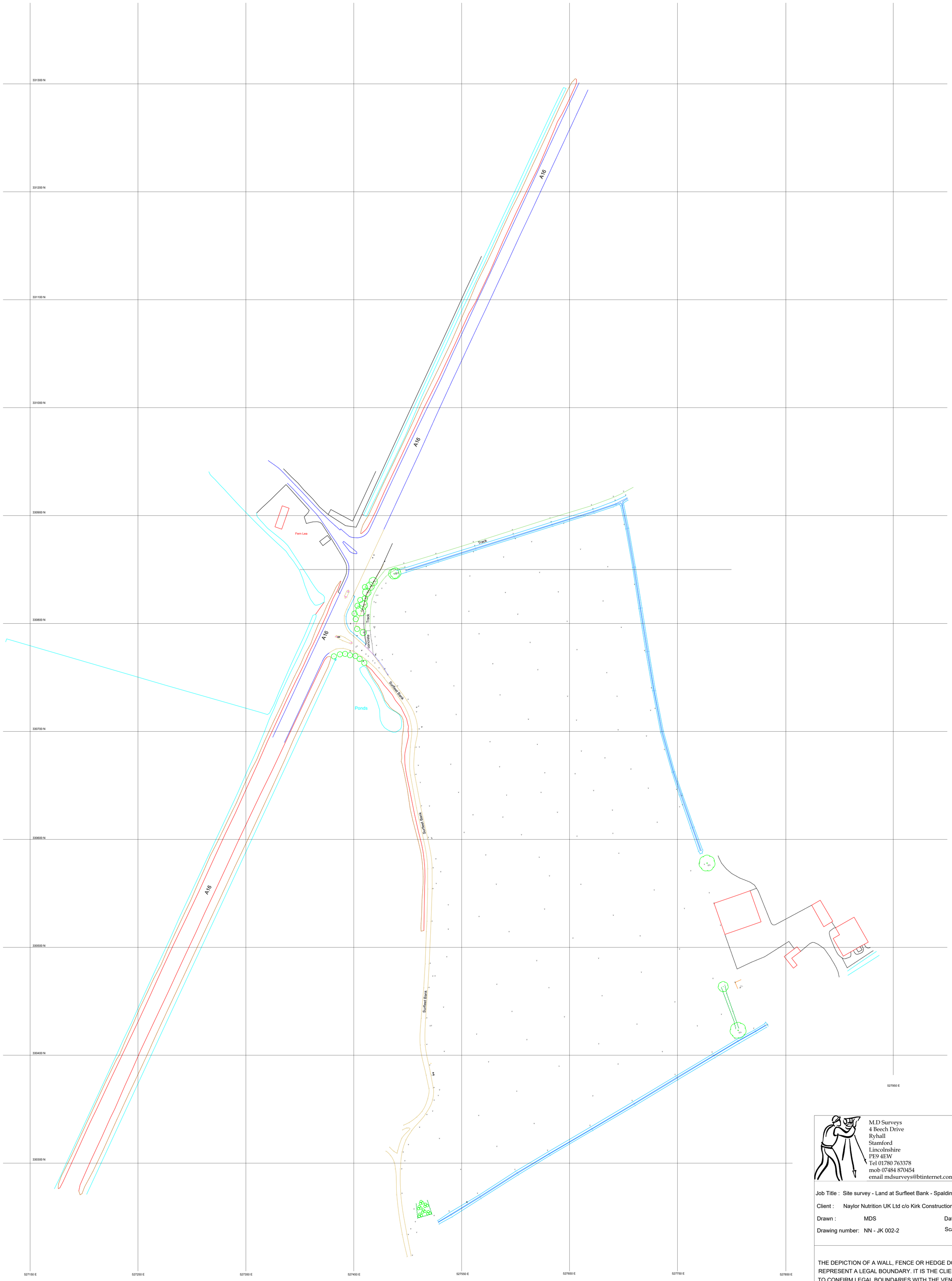
- There is a residual risk associated with a breach of the defences. During the design life of the development, including an allowance for climate change, the peak flood depth within the site is 0.25m.

- It is recommended that flood resilience measures are adopted to manage the risk of a breach. These include a water entry strategy, elevating services above the flood level, and reducing the vulnerability of people.

- The development passes the Sequential Test and is therefore suitable for the proposed location.

ATTACHMENT 1

TOPOGRAPHIC SURVEY
(Dwg NN – JK 002-2)



M.D Surveys
4 Beech Drive
Ryhall
Stamford
Lincolnshire
PE9 4EW
Tel 01780 763378
mob 07484 870454
email mdsurveys@btinternet.com

Job Title : Site survey - Land at Surfleet Bank - Spalding - Lincolnshire PE11 4DP

Client : Naylor Nutrition UK Ltd c/o Kirk Construction Limited

Drawn : MDS Date : 11th October 2023

Drawing number: NN - JK 002-2 Scale 1:1250 on A0

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All dimensions should be checked on site prior to design and construction.

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All tree heights and spreads are approximate We have tried to identify tree types, however, if tree species is critical specialist advise should be sought.

The data used for the computation of horizontal & vertical control for this survey was recorded using survey grade GPS receivers and corrected data from Trimble VRS Services using Geoid model OSTN15 with OSGM 15 . Station establishment was carried out in accordance with best practice guidelines issued by The Survey Association.

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ATTACHMENT 2

PROPOSED SITE PLAN
(DWG 3952 P01)

NOTES

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Red Line Boundary - 143,343sqm
AD Plant (Inside bund) - 33,135sqm
AD Plant (Including Bund) - 41,804sqm

SCALE 1:1000

Project	PROPOSED FACTORY AND AD PLANT
Address	LAND ADJACENT A16 SURFLEET LINCOLNSHIRE
Client	NAYLOR FARMS
Drawing	PROPOSED SITE PLAN
Date	DEC 2023
Scale	1:1000 @ A1 - 1:2000 @ A3
Project No.	3952
Drawing No.	P01
Revision	

P&R ARCHITECTS
Portess and Richardson Limited
193 Lincoln Road, Peterborough PE1 2PL
T. 01733 568116 E. p-r@portessarchitect.com
www.portessarchitect.com