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FLOOD RISK ASSESSMENT

TULIP QUEEN – LINCS GATEWAY SERVICES



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OSPREY CHARGING NETWORK LTD

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Appendix A – Proposed Development (x1 page)
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Executive Summary

Client	Osprey Charging Networks Ltd
Site	The site is located on land near the Lincs Gateway Services, Spalding Bypass, Lincolnshire, PE12 6FY, (NGR: TF 24342 19662). It is in the existing carpark north of the Tulip Queen by Marston's Inns and the A1165. Land to the north, south and west of the site are predominantly agricultural lands.
Development Description and Planning Policy	The proposed development is for the erection of substation, 4 ultra-rapid electric vehicle charge points and associated electrical infrastructure.
Flood Sources & Flood Risk	According to the EA 'Flood Map for Planning' the site is in Flood Zone 3a and is therefore at risk from fluvial flooding assuming no flood defences exist; however, the site benefits from existing flood defences comprising embankments and flood storage areas which protect the area of interest and adjoining land up to 5.7mAOD level. The site is protected from fluvial flooding for the 1% AEP, 1% AEP +20% cc, 0.1% AEP and 0.1% AEP t +20% cc events. The risk of fluvial flooding is therefore assessed to be **low**. The risk of coastal and tidal flooding are also assessed to be low. Other sources of flood hazards assessed in this flood risk assessment (FRA) included: • Ordinary watercourses – **low risk** • Groundwater – **low risk** • Sewers – **low flood risk** • Surface Water – **low risk** • Flooding from the possible failure of existing artificial infrastructure – **low risk** It is the conclusion of this FRA the development is suitably safe from flooding.
Flood Risk Management Measures	As the site is assessed to have a low risk of flooding from the sources assessed, no interventions or mitigations are required; however, it is recommended that the following measures are implemented if practicable as a precaution: • To reduce impermeable areas where practicable utilising permeable surfacing (lined or unlined) if confirmed to be appropriate by soakaway tests. • To enhance and upgrade the existing surface water drainage where practicable.

1 Introduction

1.1 Overview

Clarkebond (UK) Ltd has been commissioned by Osprey Charging Network Ltd to provide a Flood Risk Assessment (FRA), to support planning application for the proposed development as per the Environment Agency requirements and other relevant guidance for the erection of rapid electric vehicle charging points and associated electrical infrastructure at the Lincs Gateway Services, Spalding Bypass, Lincolnshire, PE12 6FY, (NGR: TF 24342 19662).

The report has been undertaken in accordance with flood risk policy in the National Planning Policy Framework (NPPF, December 2023) and guidance found in the Flood Risk and Coastal Change National Planning Policy Guidance (NPPG). The assessment of flood risk was informed by the Level-1 Strategic Flood Risk Assessment (SFRA) 2017 for the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) – South Holland District Council and Southeast Lincolnshire Joint Planning Unit, Environment Agency (EA) data and information available on government websites.

The main purpose of the report is to provide sufficient flood risk information to ensure the development is safe from flooding and would not pose a risk to third parties, with a particular focus on the management of surface water runoff.

1.2 Site Location and Description

The proposed development is for the erection of substation, 4 ultra-rapid electric vehicle charge points and associated electrical infrastructure. The site (~ 0.025ha) is located on land near the Lincs Gateway Services, Spalding Bypass, Lincolnshire, PE12 6FY, (NGR: TF 24342 19662). It is in the existing carpark north of the Tulip Queen by Marston's Inns and the A1165. Land to the north, south and west of the site are predominantly agricultural lands. **Figure 1** below shows the site location.

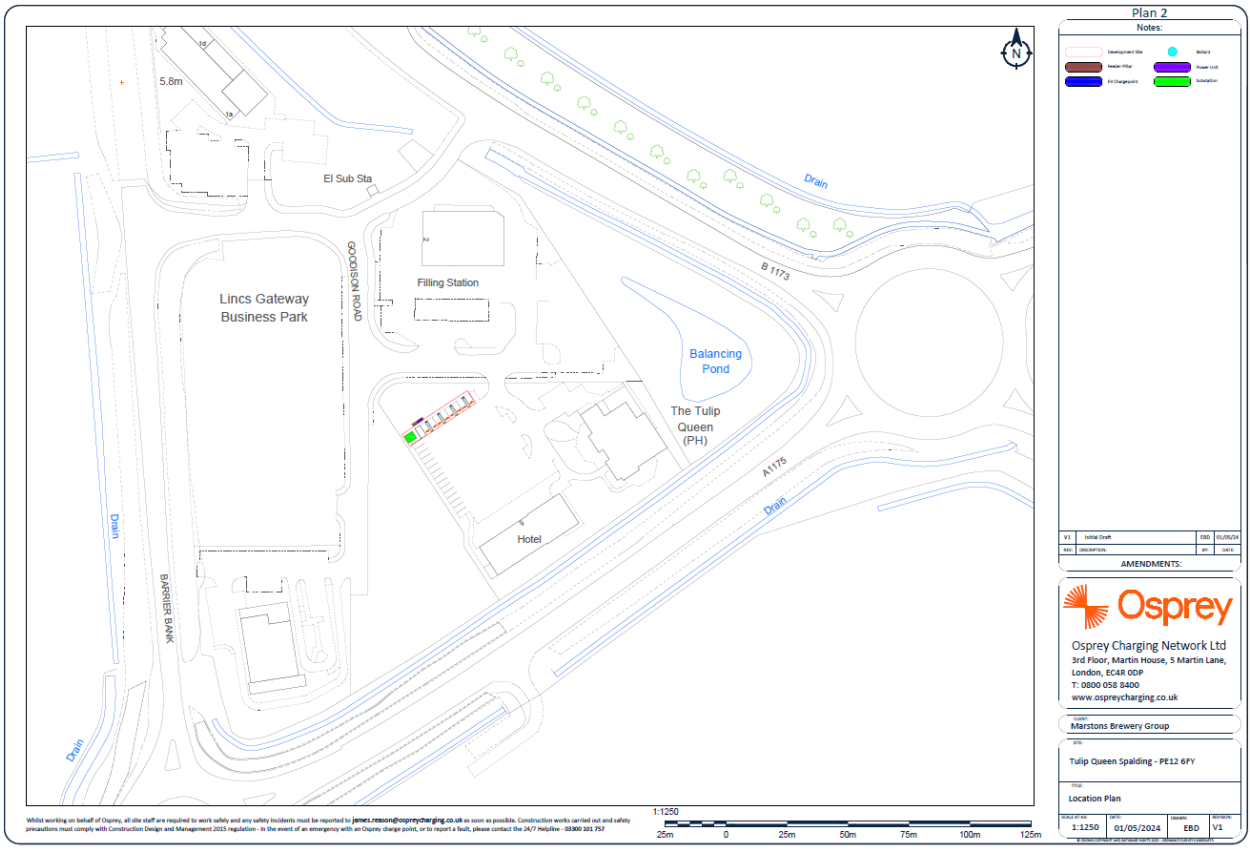


Figure 1: Site location plan

A copy of the proposed layout is included as **Appendix A.**

1.3 Objectives

The main objectives of this FRA report, as recommended in the NPPF, are:

- To assess the site suitability in terms of the Sequential Test and, if required, the Exception Test.
- To identify the probability of flooding at the development.
- To assess the compatibility of the development with the flood risk zone.
- To identify the consequence of flooding at the development and suitable mitigation measures if required.
- Demonstrate that the development will not increase flood risk elsewhere, and where possible, will reduce flood risk.

1.4 Limitations

The information, views and conclusions drawn concerning the site are based, in part, on information supplied to Clarkebond by other parties. Clarkebond has proceeded in good faith on the assumption that this information is accurate. Clarkebond accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to Clarkebond from others.

2 Planning and Flood Risk Policy Review

2.1 Overview of National Planning Policy Framework (NPPF)

National policy on planning and flood risk is set out in paragraphs 158 to 175 of the NPPF (2023) which is also supplemented by National Planning Practice Guidance (NPPG) for flood risk and coastal change, which was last updated in August 2022. The overarching aim of the NPPF is to ensure inappropriate development in areas at risk of flooding are avoided, which is achieved via application of the Sequential Test.

2.1.1 Sequential Test Process

The aim of the sequential test to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. Paragraph 23 of the NPPG states *'This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding.'* If the location of the low-risk area is not suitable due to wider sustainability objectives then progressively higher risk areas (Flood Zone 2/Flood Zone 3) can be considered, provided the development will be suitably safe from flooding and does not increase flood risk in other areas.

The process for undertaking the Sequential Test is shown in **Figure 2 and 3**. **Table 1** (taken from Table 1 of NPPG) details the corresponding meaning of flood zones in relation to flood risk.

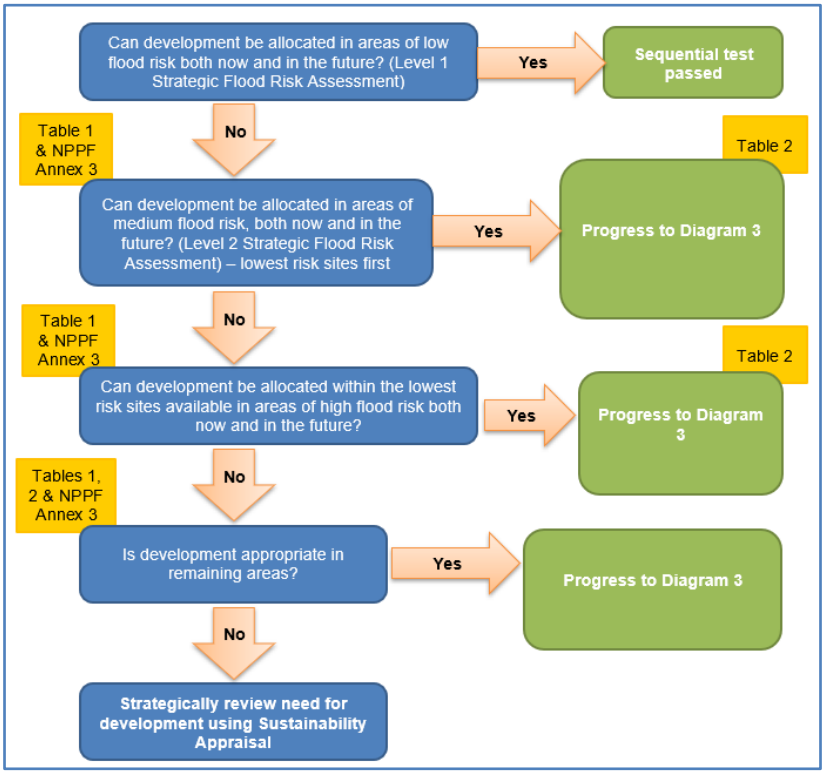


Figure 1: Process of the Sequential Test (Diagram 2 - PPG Paragraph 025)

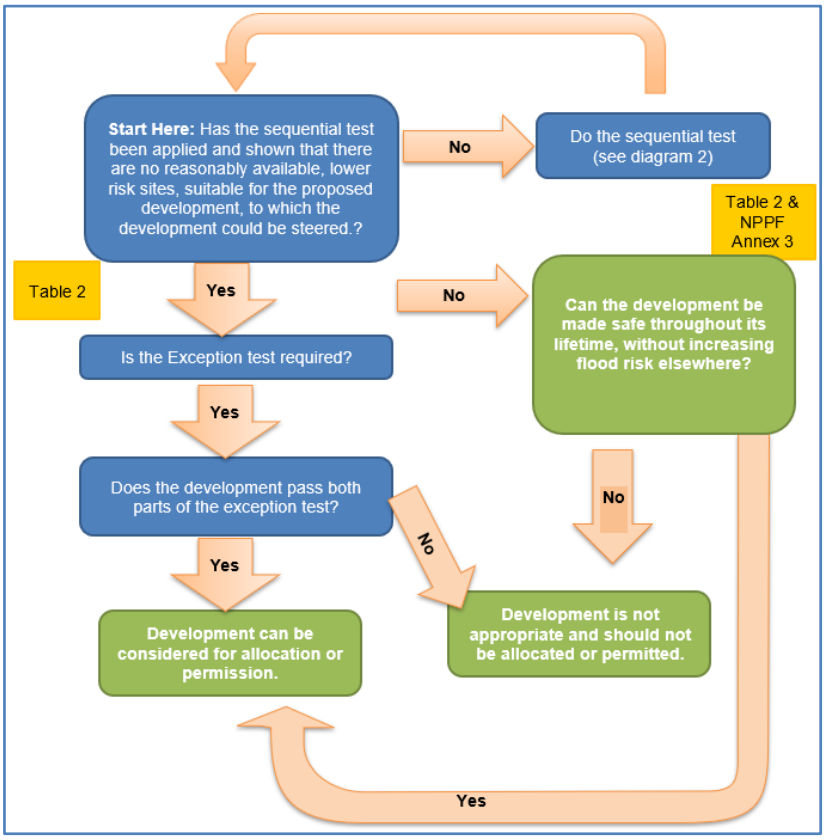


Figure 2: Process of Sequential Test (Diagram 3 - PPG Paragraph 025)

Table 1: Definition of Flood Zones (as defined by the NPPG)

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b).
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map).
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map).
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea must flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or

	• land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

Certain development may require an Exception Test before it is considered acceptable.

2.1.2 Development Vulnerability and Flood Zone Compatibility

After undertaking the Sequential Test, the vulnerability of development to flooding must be considered so that more vulnerable uses are given priority for lower risk land. Refer to Table 2 (Paragraph 079) of NPPG which shows the Flood risk vulnerability and flood zone *'incompatibility'* and requirements for the Exception Test.

The proposed development can be classified as 'Essential Infrastructure', according to Annex 3: Flood risk vulnerability classification in the NPPF. Essential infrastructure is permitted in Flood Zone 1 and 2. The development is also permitted within flood zone 3a providing an exception test is passed.

Essential utility infrastructure include infrastructure for electricity supply including generation, storage and distribution systems such as electricity generating power stations, grid and primary substations storage.

2.1.3 Design Flood Event

The development should be flood resistant and resilient including having safe access for the following extreme flood events, also known as the *'design flood'* (taken from Paragraph 002 of NPPG):

- river flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year);

or

- tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year),

plus, an appropriate allowance for climate change.

Climate change is projected to increase the likelihood of flooding from most flood sources and therefore an assessment of the effects of climate change should be considered over the estimated lifetime of the development.

The lifetime of a non-residential development is accepted as 75 years in accordance with NPPG; from a baseline of **2024** (this means assessing the flood level up to **2099** on later).

2.2 Flood Risk Assessment Requirements

Footnote 59 of the NPPF states that a site-specific FRA is required for all developments in Flood Zone 2 or 3. In Flood Zone 1, an assessment should accompany all proposals involving:

- sites of 1 hectare or more
- land which has been identified by the Environment Agency as having critical drainage problems
- land identified in a strategic flood risk assessment as being at increased flood risk in future
- land that may be subject to other sources of flooding
- where its development would introduce a more vulnerable use.

The focus of FRAs for the higher risk zones is to fully assess the extent, depth, and hazard of flood waters, detail the required mitigation to manage flood risk (e.g., floor levels and access, evacuation routes, compensatory storage) and outline a surface water management plan.

FRAs for sites where the risk of flooding from rivers or the sea is classified as low (Flood Zone 1) will still need to assess all other sources of flood risk but will have a strong focus on management of surface water runoff.

2.3 Relevant Local Planning Policy

Local planning policy provides more specific detail on development requirements based on the flood risk in the local county or borough. Although these policies will broadly be in line with national policy, where additional requirements are required, this will take precedence.

A list of relevant planning policy documents that were consulted during this FRA include:

- Lincolnshire Preliminary Flood Risk Assessment (PFRA), 2011
- Southeast Lincolnshire Strategic Flood Risk Assessment March 2017
- Southeast Lincolnshire Local Plan
- Joint Lincolnshire Flood Risk and Water Management Strategy 2019-2050

2.3.1 Lincolnshire Preliminary Flood Risk Assessment (PFRA), 2011:

The purpose of the Preliminary Flood Risk Assessment (PFRA), 2011 was to:

- identify areas where flood risk is significant in terms of human health, economy and the environment
- assist in the development of Lincolnshire's flood risk management strategy

2.3.2 Southeast Lincolnshire Strategic Flood Risk Assessment March 2017

The Southeast Lincolnshire Strategic Flood Risk Assessment (SFRA) (March 2017) is used to undertake the Sequential Test for flood risk in South Holland. Advice on how the Sequential Test should be applied for planning applications can be found on pages 12 and 13 of the strategic flood risk assessment report (revised December 2017).

The PFRA and FRAs for Lincolnshire were reviewed during 2017, using all relevant flood risk data and information.

2.3.3 Southeast Lincolnshire Local Plan (2011-2036)

A new Local Plan was produced jointly with Boston Borough Council and Lincolnshire County Council. The plan was submitted to the Secretary of State on 23 June 2017 and underwent an examination in public. The Plan was adopted on 8th March 2019.

The plan identifies land and allocates sites for different types of development such as housing and employment, in order to meet the area's needs, as well as identifying those areas of land which must be protected from development - perhaps because of their historic or environmental importance. It also covers a wide range of other planning related matters in the form of policies, against which planning applications can be judged.

According to policy 3.4.8, a development will make buildings and places more resilient to flooding by, for example, raising the floor level, and adapting the internal materials, electrical circuits and plumbing to

cope better with any flood event. These issues may be successfully incorporated in buildings that follow traditional or contemporary design in accordance with Building Regulations.

In addition, owing to flood risk new activities may need to be deterred in certain areas based on their intrinsic hazard from water. The hazard may result from a combination of the activity type, its duration and the potential for failure of flood-control measures.

Policy 4: Approach to Flood Risk

Development proposed within an area at risk of flooding (Flood Zones 2 and 3 of the Environment Agency's flood map or at risk during a breach or overtopping scenario as shown on the flood hazard and depths maps in the Strategic Flood Risk Assessment) will be permitted, where:

1. It can be demonstrated that there are no other sites available at a lower risk of flooding (i.e. that the sequential test is passed). The sequential test will be based on a Borough or District wide search area of alternative sites within the defined settlement boundaries, unless local circumstances relating to the catchment area for the development justify a reduced search area, i.e. there is a specific need for the development in that location. The sequential test is not required for sites allocated in the Local Plan, minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site).
2. It can be demonstrated that essential infrastructure in FZ3a & FZ3b, highly vulnerable development in FZ2 and more vulnerable development in FZ3 provide wider sustainability benefits to the community that outweigh flood risk.
3. The application is supported with a site-specific flood risk assessment, covering risk from all sources of flooding including the impacts of climate change and which:
    a. demonstrate that the vulnerability of the proposed use is compatible with the flood zone;
    b. identify the relevant predicted flood risk (breach/overtopping) level, and mitigation measures that demonstrate how the development will be made safe and that occupants will be protected from flooding from any source;
    c. propose appropriate flood resistance and resilience measures (following the guidance outlined in the Strategic Flood Risk Assessment), maximising the use of passive resistance measures (measures that do not require human intervention to be deployed), to ensure the development maintains an appropriate level of safety for its lifetime;
    d. include appropriate flood warning and evacuation procedures where necessary (referring to the County's evacuation routes plan), which have been undertaken in consultation with the authority's emergency planning staff;
    e. incorporates the use of Sustainable Drainage Systems (SuDS) (unless it is demonstrated that this is not technically feasible) and confirms how these will be maintained/managed for the lifetime of development (surface water connections to the public sewerage network will only be permitted in exceptional circumstances where it is demonstrated that there are no feasible alternatives);
    f. demonstrates that the proposal will not increase risk elsewhere and that opportunities through layout, form of development and green infrastructure have been considered as a way of providing flood betterment and reducing flood risk overall;
    g. demonstrates that adequate foul water treatment and disposal already exists or can be provided in time to serve the development;
    h. ensures suitable access is safeguarded for the maintenance of water resources, drainage and flood risk management infrastructure.

Development in all flood zones, and development over 1 hectare in size in Flood Zone 1, will need to demonstrate that surface water from the development can be managed and will not increase the risk of flooding to third parties.

Change of use of existing buildings will be supported providing they do not pose an increase in risk to people. Change of use that would result in self- contained ground floor residential accommodation in areas of hazard rating 'danger for some', 'danger for most' and 'danger for all' will not be supported. In these areas unrestricted access to a habitable room above the flood level and an emergency evacuation plan will be required.

Caravans, mobile homes and park homes intended for permanent residential use will not be permitted in areas at risk of flooding. Caravan, chalet, log cabin, camping and touring sites at risk of fluvial flooding where there is a 'danger for most' and 'danger for all' will not be permitted. Occupancy of caravan, chalet, log cabin, camping and touring sites at risk of tidal flooding will not be permitted to open between 1st November in any one year and the 14th of March in the succeeding year.
No development will be permitted within a 50m buffer from the toe of the raised Witham Haven Banks (flood defences), as shown on the indicative Plan contained in Appendix 10, to allow access for construction and maintenance.

Flood risk management infrastructure shall be provided at the strategic level, where development opportunities allow, to reduce the hazard and probability of flooding.

2.3.4 Joint Lincolnshire Flood Risk and Water Management Strategy 2019-2050

This replaces the previous Joint Flood Risk & Drainage Management Strategy 2012- 2025. The purpose of the strategy is to manage the impact of flood risk to people, businesses and the environment across Lincolnshire. The basic contents of the Strategy are outlined in legislation as follows:

- The risk management authorities operating in the LLFA's area
- The flood risk and coastal erosion functions that may be exercised by those authorities relating to the area
- Objectives for managing flood risk in the area
- Measures proposed to meet those objectives
- How and when the measures are to be implemented
- Costs and benefits of the measures and how they are to be paid for
- Assessment of local flood risk (meaning from surface runoff, groundwater and ordinary watercourses)
- How and when the strategy is to be reviewed
- How the strategy contributes to the achievement of wider environmental objectives

3 Background Information

3.1 Site levels

Site levels have been generated by using an EA composite digital terrain model (DTM) produced from EA Light Detection and Ranging (LiDAR) data. Site levels were found to be relatively flat – from 2.8mAOD at the western end to 2.5mAOd at the eastern (refer to **Figures 5a to 5d**). The crest of the embankment and riverbank west of the site which comprise the existing flood defence are approximately 5.7mAOD.

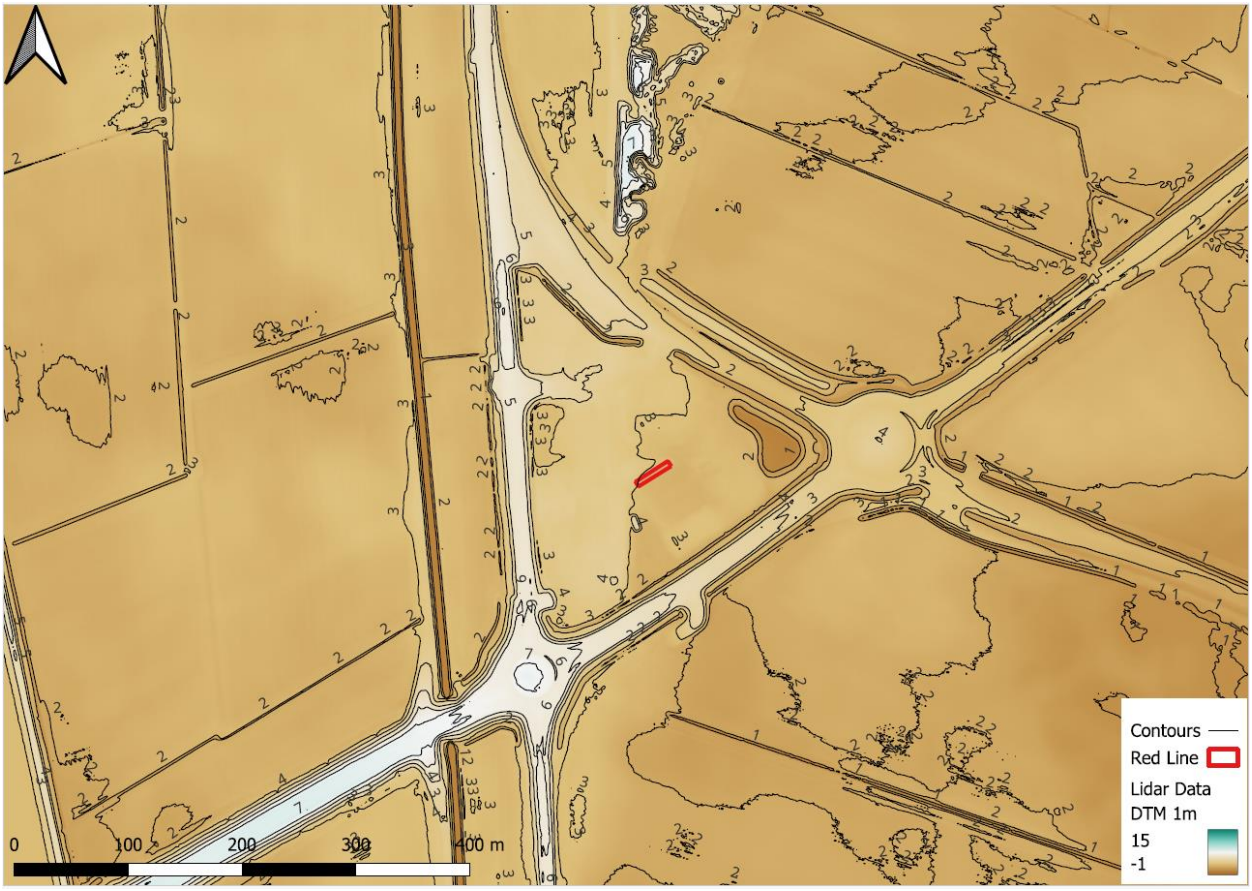


Figure 4a: Showing Ground Levels and Contours (from LIDAR)

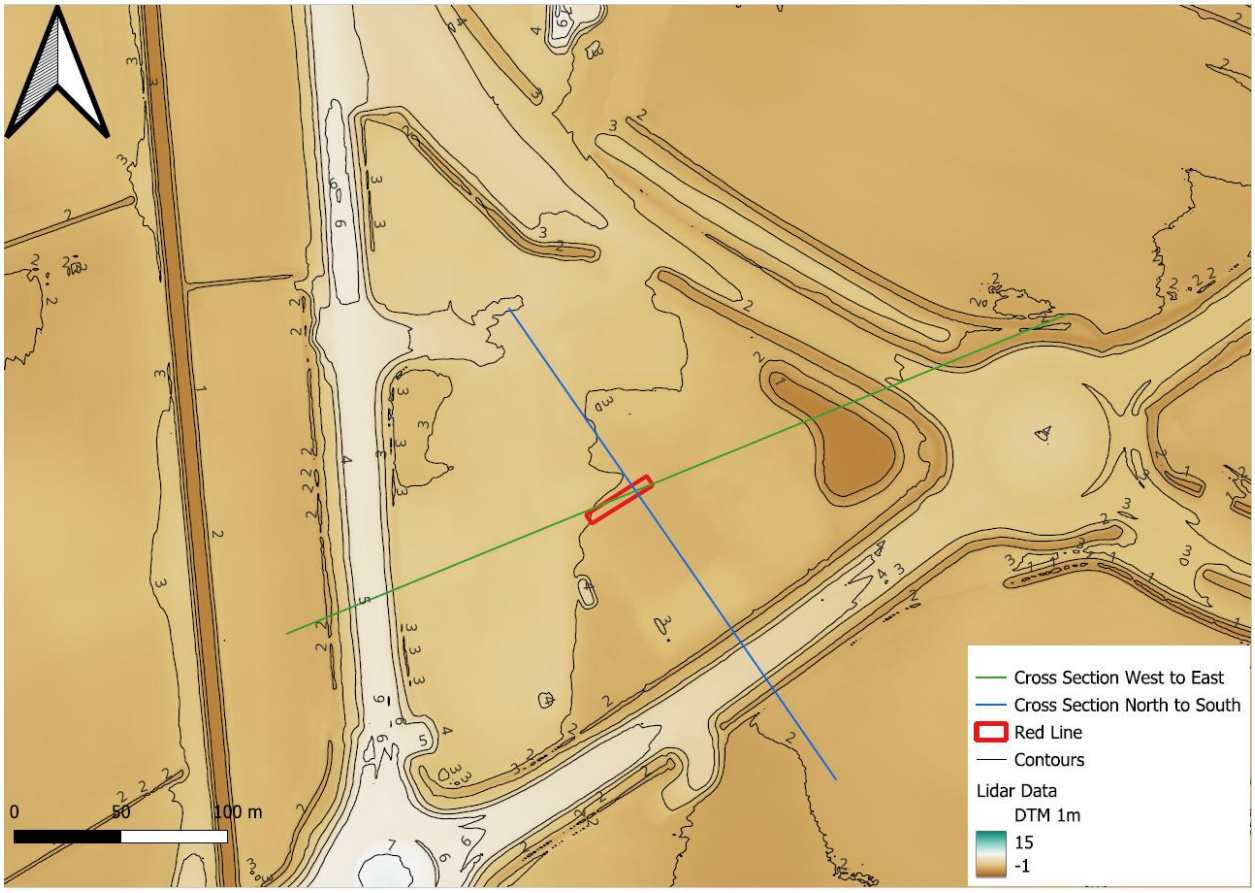


Figure 4b: Locations of Cross-sections

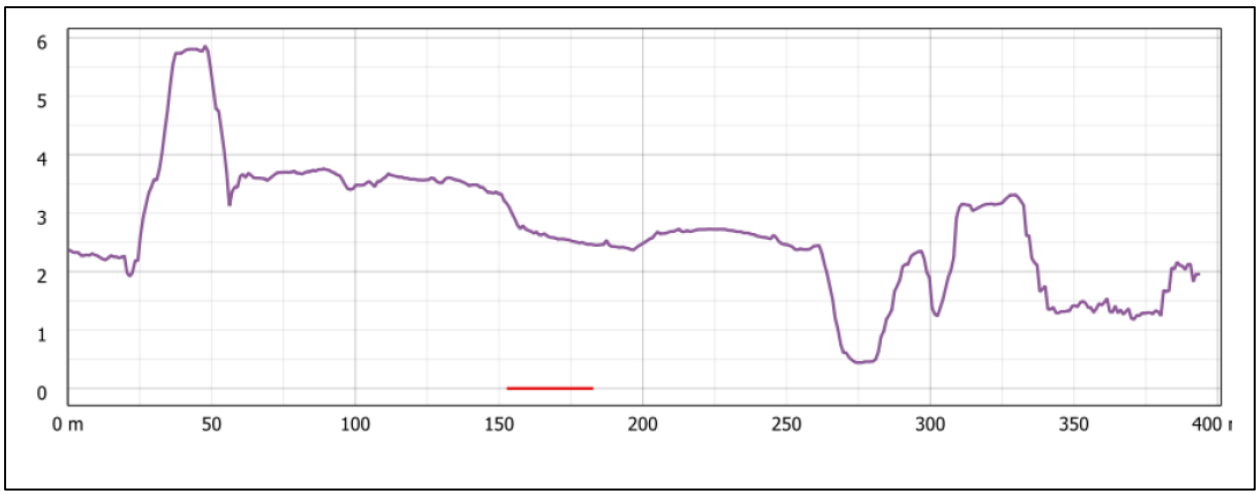


Figure 4c: Showing Cross-section Levels Profile from west to east

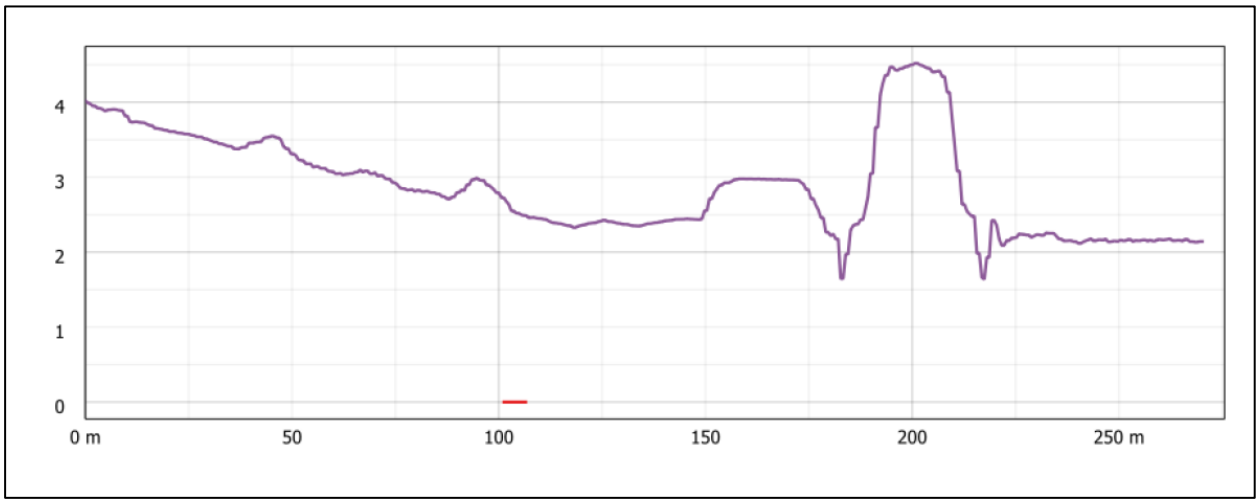


Figure 4d: Showing Cross-section Levels Profile from northwest to southeast

3.2 Existing Sewers

According to Anglian Water sewer records, there are no public sewers located in the vicinity of the site. There may however be private drainage that serves the existing carpark and structures near the site. Anglian Water sewer plan can be found in **Appendix B**.

3.3 Hydrology

There are 2 minor drains on the land adjacent to Lincs Gateway Services – one along the boundary of B1173 and A1175 and one roughly flowing from south to north that is approximately 25m west of the site (see **Figure 5a**). Tulip Queen balancing pond also exists near the eastern boundary of land adjacent to Lincs Gateway Services. The wider area comprises several watercourses including Soke Dyke and major and minor drains; some of the major drains include New River Drain and South Drove Drain.

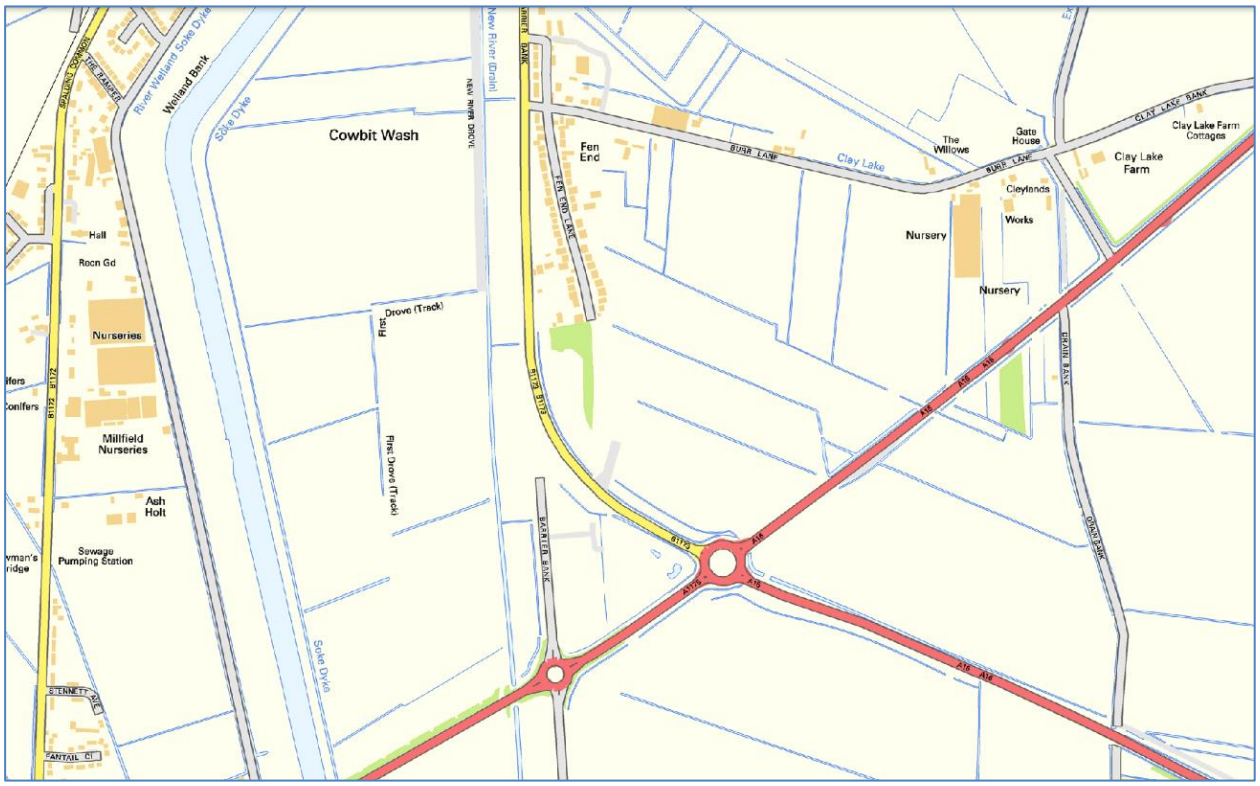


Figure 5a: Minor drains on Land adjacent to Lincs Gateway Services

The nearest main river, the River Welland is located approximately 620m west of the site (See **Figures 5b-5d**). Main rivers are those which the Environment Agency (EA) have jurisdiction over.

The River Welland is a lowland river in the east of England, and drains part of the Midlands eastwards to The Wash. It rises in the Hothorpe Hills, at Sibbertoft in Northamptonshire, then flows generally northeast to Market Harborough, Stamford and Spalding, to reach The Wash near Fosdyke. It is a major waterway across the part of the Fens called South Holland and is one of the Fenland rivers that were laid out with washlands. There are two channels between widely spaced embankments with the intention that flood waters would have space in which to spread. The Environment Agency is the navigation authority for the river, which is navigable as far upstream as Crowland.

14 miles (23 km) of the River below Spalding are tidal and have sea walls to protect the adjacent land from flooding, while 56 miles (90 km) that are fresh water run through low-lying land and are therefore embanked.

The Welland and Deepings Internal Drainage Board was formed in 1973 by the amalgamation of four smaller Boards. The Board maintains some 660 km of surface water drains and sewers and has 14 pumping stations and 3 tidal sluices. The Board also manages over 70 water level management structures.

The management of the lower river has been intimately tied up with the drainage of Deeping Fen, and the river remains important to the Welland and Deepings Internal Drainage Board, for whom it provides the final conduit to the sea for pumped water.

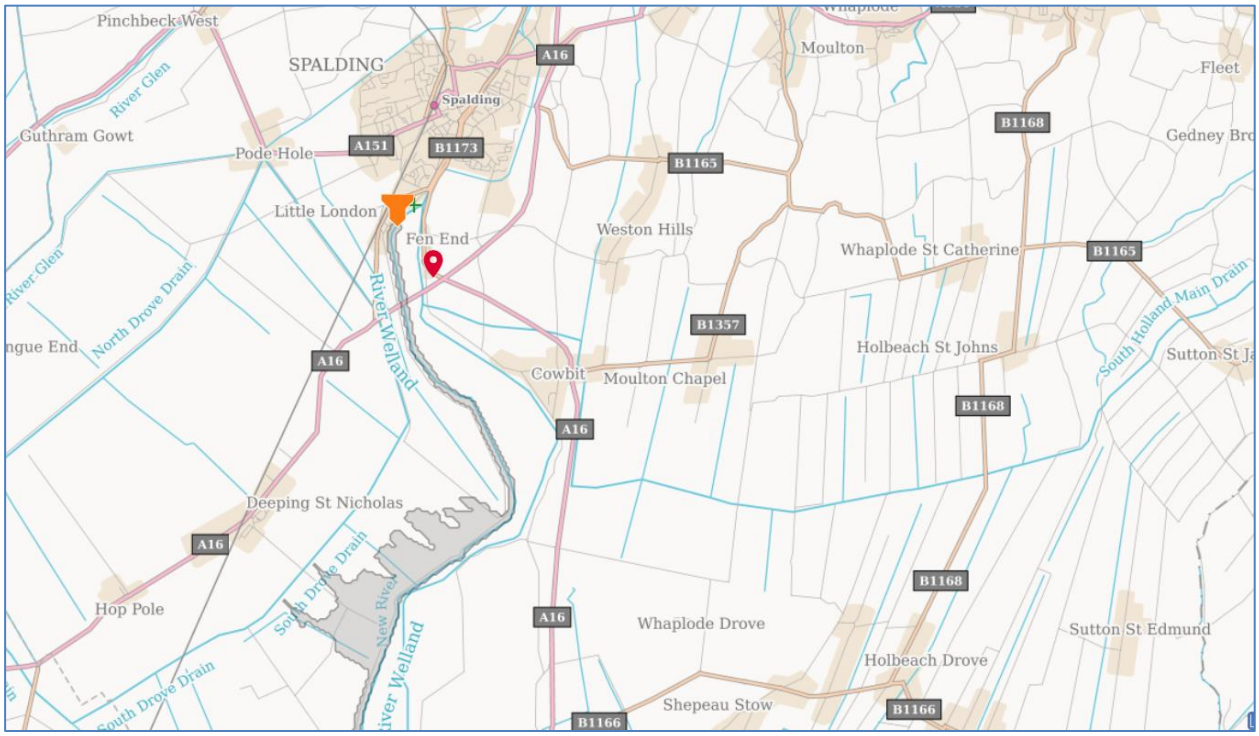


Figure 5b: Hydrological setting of the Proposed Site

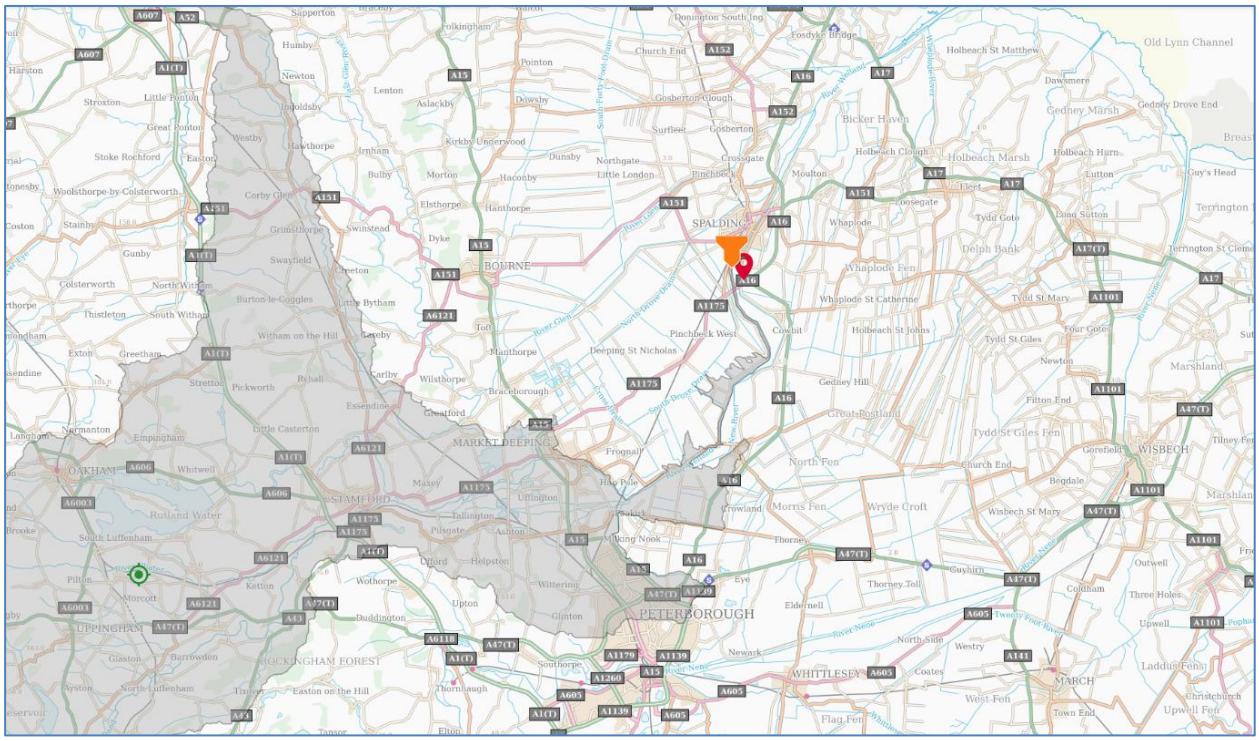


Figure 5c: River Welland Catchment 1



Figure 5d: River Welland Catchment 2

3.4 Geology, Groundwater, and Soils

The geology of the site is shown on the British Geological Survey (BGS) Geology viewer map. A review of the available data indicates that the anticipated geology can be summarised as follows:

Superficial deposits: Tidal Flat Deposits, 1 – comprising clay and silt.

Bedrock: The site is underlain by the Oxford Clay Formation, which comprises Mudstone – Silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules.

Soil type: According to Cranfield University's Soilscapes (soil-types viewer), the site is on 'Soilscape 21' which is described as loamy and clayey soils of coastal flats with naturally high groundwater. Its drainage is noted as 'naturally wet'.

4 Flood Risk Assessment

4.1 Flood Zones and Development Compatibility

The EA 'Flood Map for Planning' shows that the site is in Flood Zone 3, assuming no flood defences exist (see **Figures 6a and 6b**). The SFRA provided further clarification between Flood Zone 3a and Flood Zone 3b (the latter being areas of functional floodplain). According to the SFRA the site is within Flood Zone 3a meaning it has a greater opportunity for the development proposed. The Flood Map for Planning also shows the location of formal raised flood defences and flood storage reservoirs.

The map indicates the area at risk of flooding, assuming no flood defences exist, for a flood with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. The existing fluvial defences reducing the risk of flooding to this site consist of Crowland-Cowbit Washes and embankment. They are in fair condition and provide protection against a flood event with a 1% chance of occurring in any year (1 in 100).

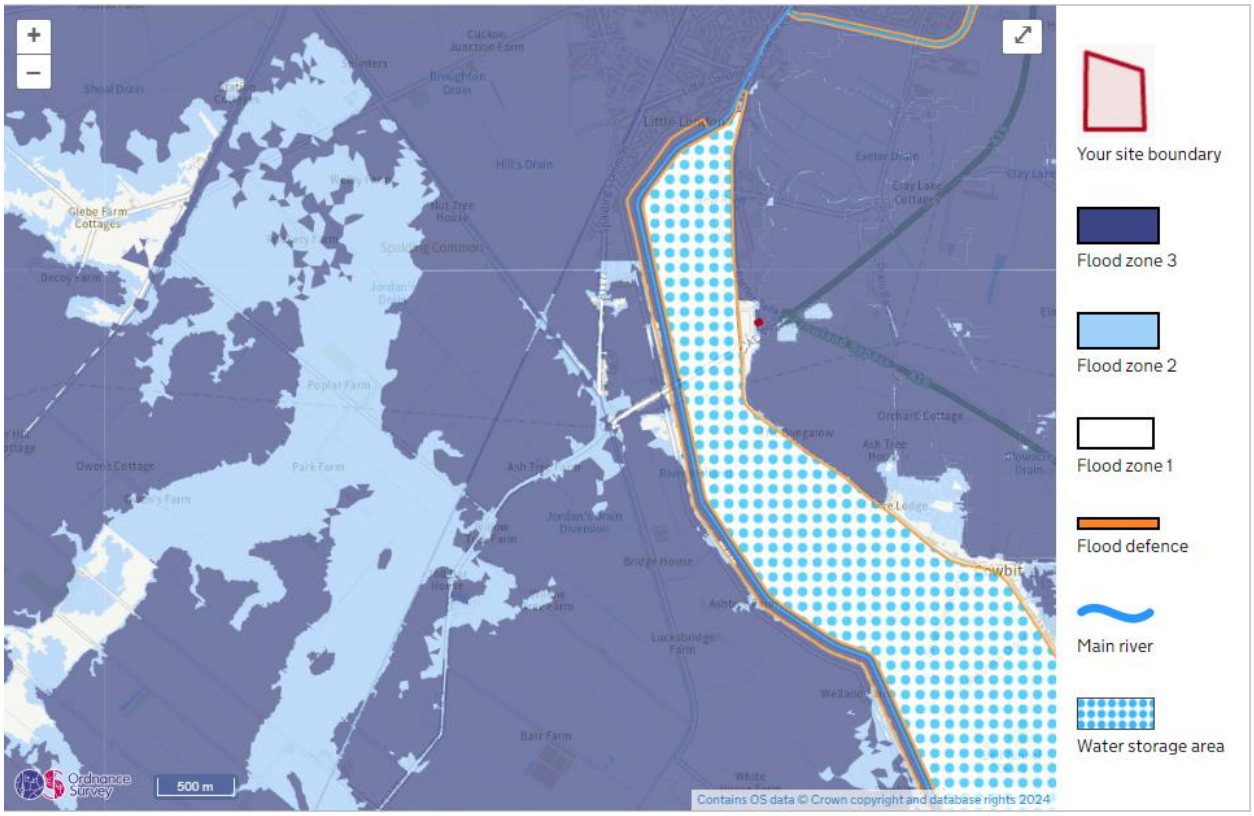


Figure 6a: EA Flood Map for Planning

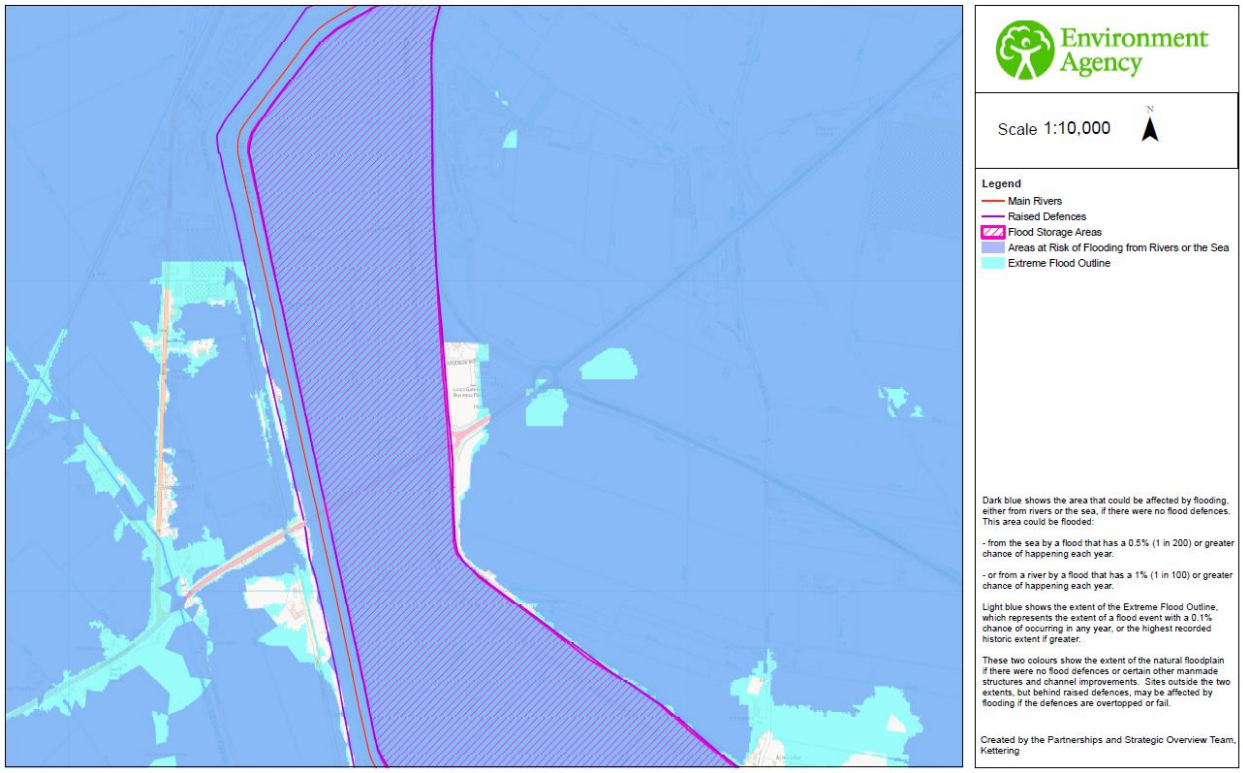


Figure 6b: EA Flood Map for Planning

The Proposal can be classified as a 'Essential Infrastructure', in accordance with Paragraph 079 of the NPPG. Essential Infrastructure is permitted in Flood Zone 3a providing it passes the sequential and exception tests.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zones	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a†	Exception Test required†	✓	X	Exception Test required	✓
	Zone 3b*	Exception Test required*	✓*	X	X	X

Table 2: Flood Risk Vulnerability and Flood Zone 'Compatibility'

"†" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

"*" In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, 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.

4.2 Impact of Climate Change

The NPPF states that the FRA should assess the increased risk posed by climate change over the lifetime of the development. As the site has already been identified to be in Flood Zone 3a, assuming no flood defences exist, the risk is likely to increase in the future because of climate change. EA guidance on climate change allowances to support the NPPF came into effect in February 2016 and were recently updated in 2022.

The range of allowances is based on percentiles. These are:

- central allowance based on the 50th percentile.
- higher central allowance based on the 70th percentile.
- upper end allowance based on the 95th percentile.

An allowance based on the 50th percentile is exceeded by 50% of the projections in the range. At the 70th percentile it is exceeded by 30%. At the 95th percentile it is exceeded by 5%.

According to NPPG (2022) when designing safe access, escape routes and places of refuge, it is specified to use the central allowance for all development types except for essential infrastructure to ensure the safety of people using the development. For essential infrastructure the guidance says that the higher central allowance should be used (refer to **Tables 3 and 4**).

4.2.1 Peak River Flow Allowances for Climate Change

The site is within the Welland Management Catchment; hence, peak river flow allowances with a development lifespan of 75 years based on NPPG guidance for 'essential Infrastructure'. For essential infrastructure located in Flood Zone 3a, the higher central allowance should be used to assess a range of allowances for fluvial flood events, as shown in **Table 3**.

Table 3: Welland Management Catchment peak river flow allowances

	Central	Higher Central	Upper End
2020s	5%	10%	22%
2050s	4%	10%	26%
2080s	17%	28%	53%

Table 4 shows the recommended allowances for peak rainfall intensity for different statistical likelihoods. The upper end allowances for the 1% and 3.3% annual exceedance probability events for the 2070s epoch should be assessed as part of any flood risk and strategic flood risk assessments, in the case of this development.

3.3% annual exceedance event	Central allowance	Upper end allowance
2050s	20%	35%
2070s	25%	35%
1% annual exceedance event	**Central allowance**	**Upper end allowance**
2050s	20%	40%
2070s	25%	40%

4.3 Sources of Flood Risk

In accordance with British Standards report 'BS 8533', the flood risk elements that need to be considered for any site are:

- Flooding from rivers (fluvial) – occurs when the flows exceed channel capacity or due to a failure of flood defences.
- Flooding from the sea (tidal / coastal flood risk) – tidal flooding is caused by the funnelling of tides along estuaries and rivers and coastal flooding occurs from wave action.
- Flooding from surface water (overland flow) – occurs when intense rainfall is unable to soak into the ground and runs over the ground surface, collecting in low-lying areas which are impermeable and / or not served by adequate drainage systems.
- Flooding from groundwater – occurs when water in the ground rises above surface elevations. Bedrock flooding typically occurs in low-lying areas underlain by permeable bedrock where pore spaces in the rock allow the water table to rise rapidly following extended periods of rainfall. Superficial deposit flooding may occur in unconsolidated deposits which lie on river floodplains following high in-bank river levels or in deposits underlain by low permeability bedrock.
- Flooding from sewers – occurs when the sewer is overwhelmed by heavy rainfall, becomes blocked, is of inadequate capacity or due to pumping station failure.
- Flooding from artificial structures – this is flooding from reservoirs, canals, and ponds due to infrastructure failure or breach.

4.4 Historic Flood Risk

According to the EA historic flood map the site has not been previously flooded in the past. **Figure 8** below shows the extent of the historic flood.

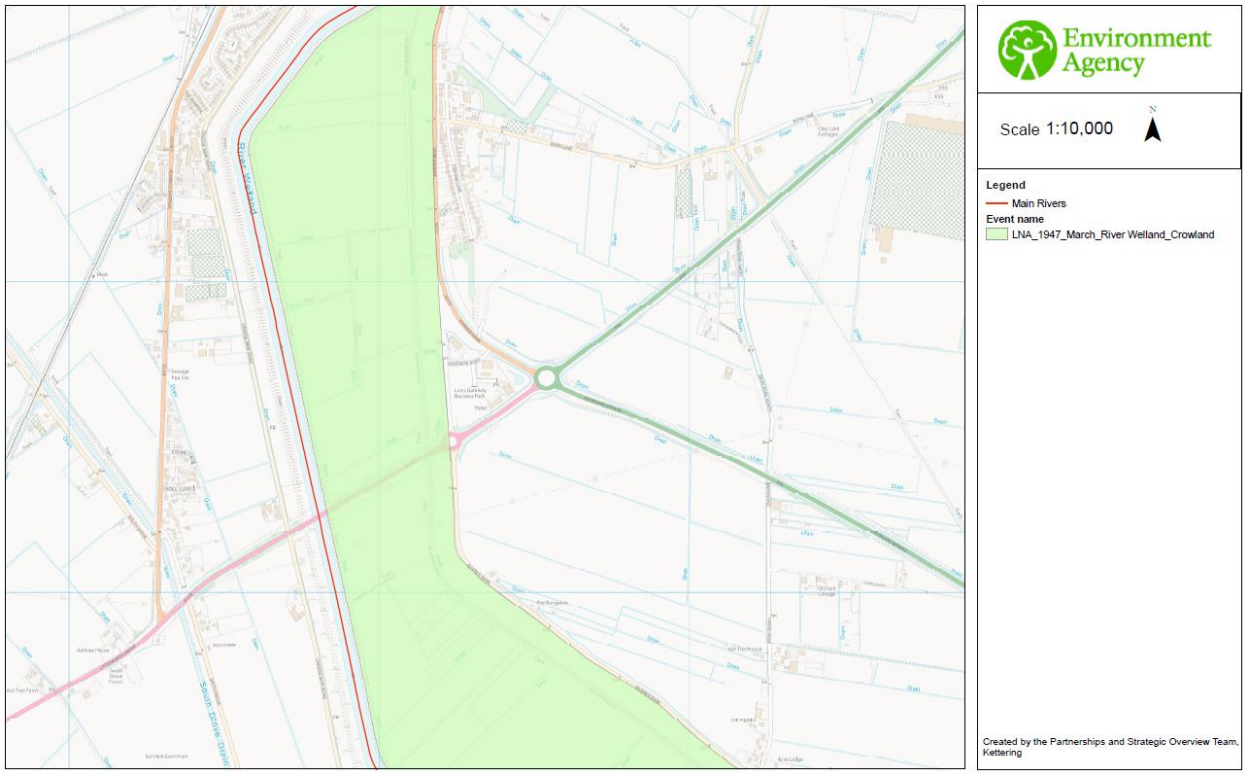


Figure 7: EA Historic Flood Map.

4.5 Fluvial/ Costal Flood Risk

This site is near to the Barrier Bank. This bank is a designated flood defence, it is essential that there are no adjustments or alterations to the bank at this location without prior consultation and approval (including relevant planning and permitting) from the Environment Agency.

4.6 Assessment of EA Flood Model Data

The embankment west of the site which comprises the existing flood defence is approximately 5.7mAOD compared to the existing ground levels at the site which range from 2.8 to 2.5mAOD. **Figures 8a and 8b** below show the levels of the crest of the flood defences west of the site relative to the existing levels on site.

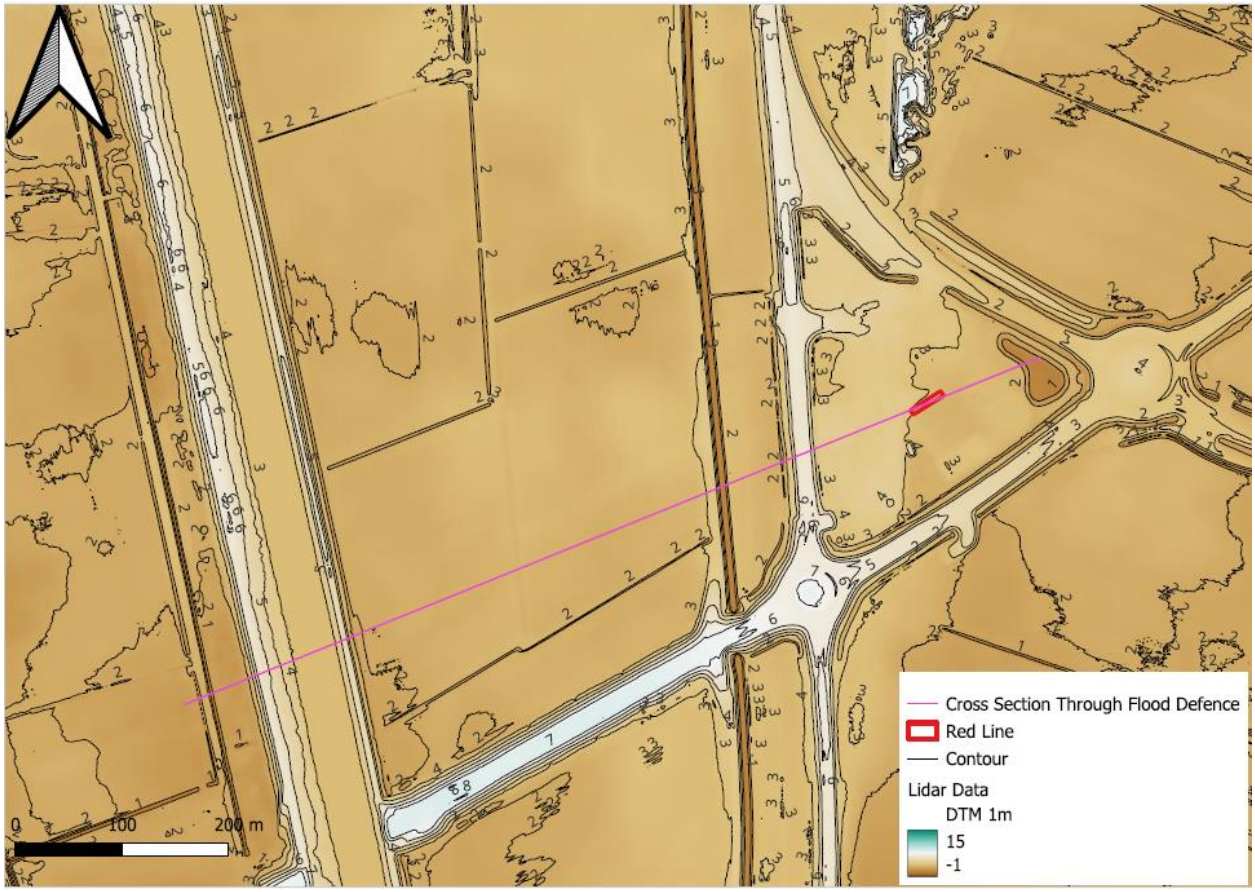


Figure 8a: Local Ground Levels including the Flood Defence Embankment West of the Site

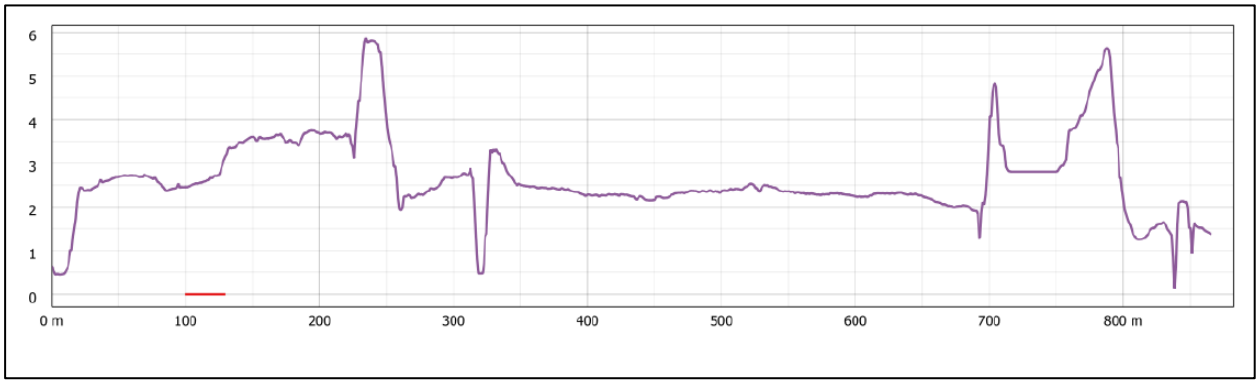


Figure 8b: Levels Profile of the Cross-section in Figure 8a from east to west

Product 4 model data (including flood depths, levels, and velocity) were obtained from the Environment Agency for the area of interest and surrounding areas.

This model data is from the 2016 Welland Catchment Strategic Review model. Refer to **Figures 9 and 10** and **Table 5** for the results of the flood modelling at the model nodes relevant to the site and a summary of the flood levels.

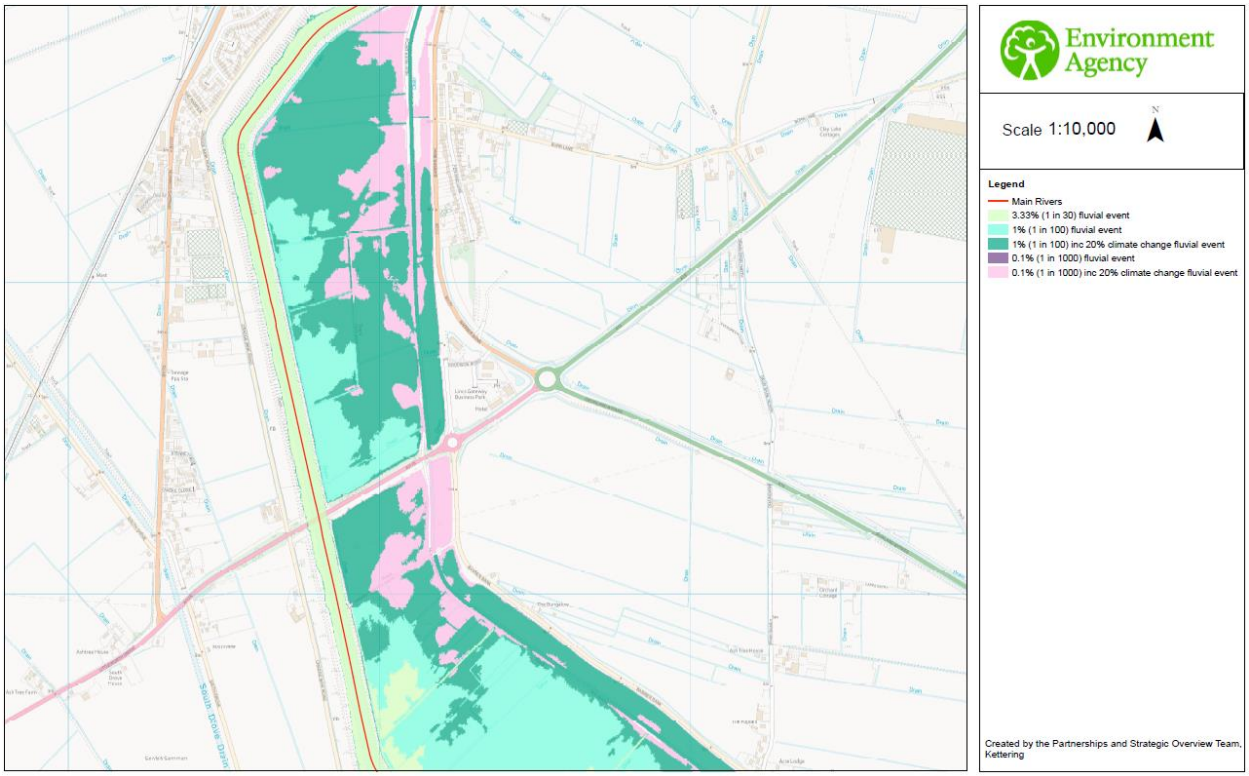


Figure 9: Flood Model Results Showing Flood Extents for Different Flood Events.

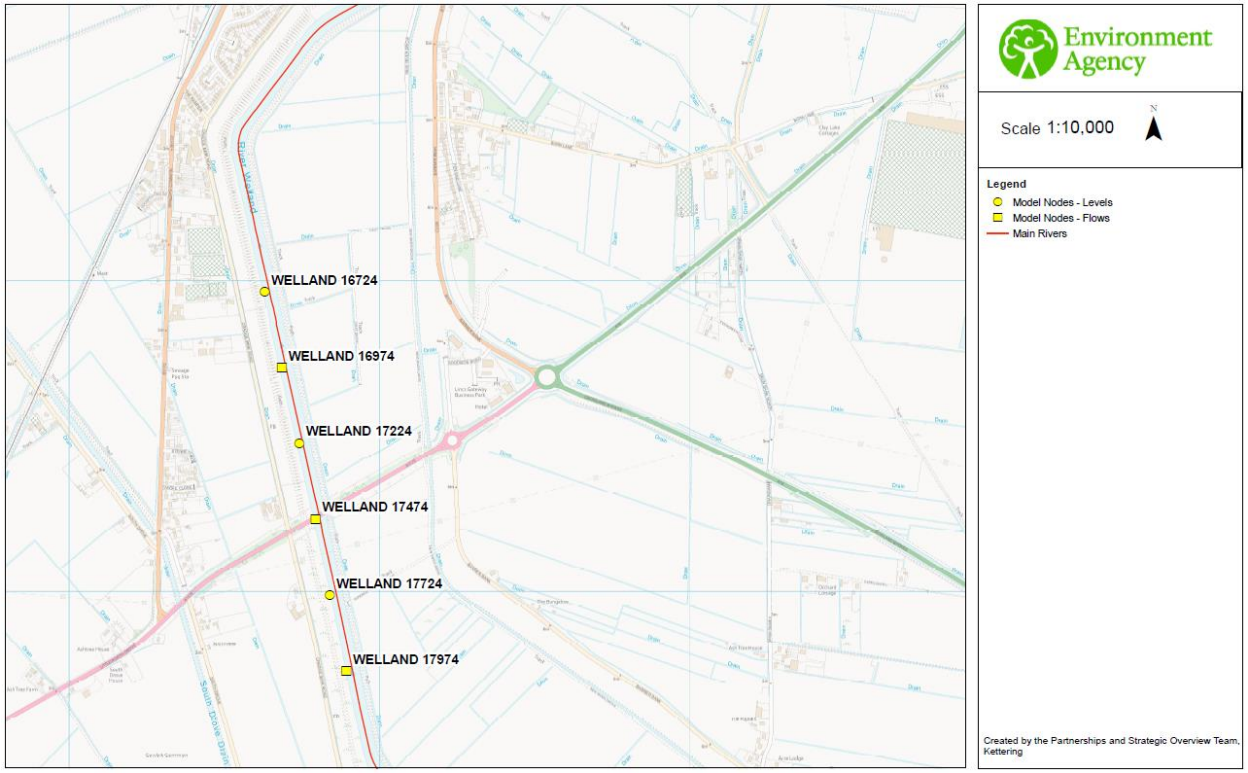


Figure 10: Flood model nodes relevant to the site

Node 'Welland 17224' is the flood model node relevant to the site (see **Figure 10**).

Table: 5: Fluvial Flood Levels (mODN).

They are measured in metres above Ordnance Datum Newlyn.

Node Label	1% AEP Event	1% AEP Event +20% cc	0.5% AEP Event	0.1% AEP Event	0.1% AEP Event +20% cc
	Max water level	Max water level	Max water level	Max water level	Max water level
WELLAND 16724	4.53mODN	4.66mODN	4.54mODN	4.55mODN	4.66mODN
WELLAND 17224	4.54mODN	4.66mODN	4.54mODN	4.56mODN	4.66mODN
WELLAND 17724	4.54mODN	4.65mODN	4.55mODN	4.56mODN	4.65mODN

It is clear from the flood levels in **Table 5** that flood levels in the River Welland for the 1% AEP, 1% AEP Event +20% cc, 0.1% AEP and 0.1% AEP Event +20% cc fluvial events respectively, are all appreciably lower than the top of the flood defence embankment (at 5.7mODN) west of the site (see **Figure 10** below).

Therefore, taking all the above scenarios and factors into account the risk of fluvial flooding from overtopping at the site is assessed to be **low**.

Coastal and tidal flooding are also assessed as **low** for the same reasons..

4.7 Other Sources of Flood Risk

Other sources of flooding assessed are:

- Ordinary watercourses (watercourses not under jurisdiction of EA)
- Groundwater
- Sewers (sewer and drain exceedance and pumping station failure)
- Surface Water Flooding
- Reservoirs, canals, and other artificial waterbodies

4.7.1 Ordinary Watercourse Flooding

There are no ordinary watercourses on site. There are 2 minor drains on the land adjacent to Lincs Gateway Services – one along the boundary of B1173 and A1175 and one roughly flowing from south to north that is approximately 25m west of the site (see **Figure 5a**). Tulip Queen balancing pond also exists near the eastern boundary of land adjacent to Lincs Gateway Services. However, these minor drains are part of the network of drains under the maintenance and management of Welland and Deepings Internal Drainage Board and are assessed to pose **low flood risk** to the proposed development.

4.7.2 Groundwater Flooding

Groundwater flooding typically occurs when water levels rise above surface elevations from underlying rocks or springs following prolonged rainfall. The two most common mechanisms of groundwater flooding are:

1. Bedrock Flooding – Occurs following extended periods of rainfall in areas underlain by a permeable bedrock outcrop. Typically, chalk aquifers pose the greater risk, where the large pore spaces in the rock allow the water table to rise rapidly. Settlements most at risk are those in low-lying areas and at the base of steep-sided valleys at the interface between permeable and impermeable strata (where the groundwater table is naturally closer to the ground surface).

2. Superficial Deposit Flooding – Occurs in permeable unconsolidated deposits (e.g., gravel) which lie on river floodplains following high in-bank river levels.

The SFRA has not identified any known significant groundwater flood risk areas locally. Also, a review of nearby boreholes indicated groundwater at depth of 3m or more below ground level. Therefore, based on the site geology and the fact that the proposal is not particularly sensitive to groundwater flooding (i.e., it does not include a basement or significant/sensitive below ground features), the risk from groundwater flooding is assessed to be **low**.

4.7.3 Sewer Flooding

Anglian Water is the statutory water undertaker and keeps a record of historic sewer flood events in a database called the DG5 register. The risk posed by sewers is assessed to be **low**. This is as a result of no previous incidents of sewer flooding and the absence of public sewers or water mains at or near the site.

4.7.4 Surface Water Flooding

Surface water flooding is caused by heavy rainfall events that cause significant surface runoff and ponding of accumulated water. For brownfield sites, surface water flooding can be impacted by the condition and or the capacity of the existing drainage system in place.

As can be seen from the EA surface water flood map data (**Figure 11**), the site is at a **'low' risk** of surface water flooding. This represents less than 0.1% annual probability of occurrence.

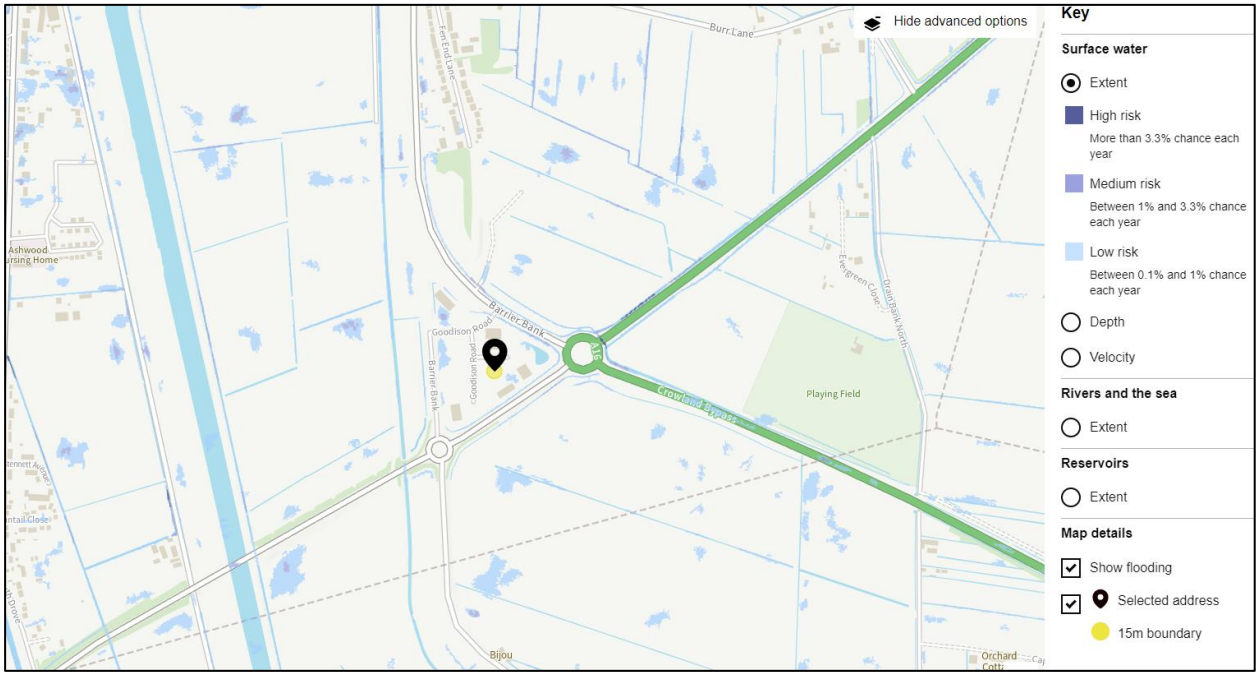


Figure 11: Surface Water Flood Map (EA)

4.7.5 Flooding from Failure of Existing Artificial Infrastructure

The risk posed to the site from the failure of artificial infrastructure is assessed to be **low**.

4.8 Impact of Development on Flood Risk Elsewhere

A key requirement of this FRA, along with assessing flood risk to the site, is to adequately assess the impact of the proposal on flood risk elsewhere. This involves determining the source of risk (e.g., changes to the site), the pathway of risk (e.g., re-direction of flow) and the receptors to the risk (e.g., nearby properties).

As the site is expected to be affected by the 1% AEP fluvial flood event and is at low of surface water flooding, any changes on site would not displace floodwater. Also, the proposal will be in an existing carparking area that is already impermeable so it will not increase surface water flood risk elsewhere. There is a small risk however, that the proposal could potentially increase the footprint of above-ground features. This will not increase flood risk elsewhere as the increase in footprint will be small.
Consequently, it is assessed that the risk of the impact of the development on flood risk elsewhere is **low.**

4.9 Cumulative Impact on Flood Risk

Under the new NPPF guidelines, the cumulative impact on flood risk from both the proposed development and surrounding developments must be assessed. This should involve determining where there are common flood sources, pathways, and receptors. Then assessing the scale and timings of any likely impacts.

It is judged that there is limited cumulative impact from the Proposal and other developments in the area. Due to the nature of the proposed development, it is assessed as unlikely to increase flooding elsewhere.

4.10 Safe Access and Egress

Given that the entire local area including the main carriageways and access/egress all benefit from the existing flood defences up to the 5.7m AOD, and the fact that flood risks from all the sources of flood hazards are assessed to be **low**, the proposed development will have safe access and egress.

4.11 Mitigation and Management Requirements

4.11.1 Proposed Recommendations and Mitigation Measures

As the site is assessed to have a low risk of flooding from the sources assessed, no interventions or mitigations are required; however, it is recommended that the following measures are implemented if practicable as a precaution:

- To reduce impermeable areas where practicable utilising permeable surfacing (lined or unlined) if confirmed to be appropriate by soakaway tests.
- To enhance and upgrade the existing surface water drainage where practicable to make the proposed development suitably safe from surface water flooding

4.12 Summary Table

Flood Source	Current Level of Risk	Mitigation Required	Residual Risk
Fluvial/Tidal			
Ordinary Watercourse		None Required	
Groundwater		None required	
Sewer		None Required	
Surface Water		See precautionary recommendations in section **4.11.1**	
Artificial Infrastructure		Non required	
Flood Risk to Elsewhere		Low risk as site is already consisting of impermeable areas and the proposed development does not plan to increase this.	
Key		**High Risk** – Major constraint to development requiring active consideration in mitigation proposals	
		Moderate Risk – Issue requires consideration but not a significant constraint to development	
		Low – Issue requires some consideration and is not a significant constraint to development	
		Very Low - Issue requires little to no consideration and is not a significant constraint to development	
		Negligible Risk - No noticeable impact to site and not considered to be a constraint to development	

5 Summary and conclusion

According to the EA 'Flood Map for Planning' the site is in Flood Zone 3a and is therefore at risk from fluvial flooding assuming no flood defences exist; however, the site benefits from existing flood defences comprising embankments and flood storage areas which protect the area of interest and adjoining land up to 5.7mAOD level. The site is protected from fluvial flooding for the 1% AEP, 1% AEP +20% cc, 0.1% AEP and 0.1% AEP t +20% cc events. The risk of fluvial flooding is therefore assessed to be **low**.

The risk of coastal and tidal flooding are also assessed to be low.

Other sources of flood hazards assessed in this flood risk assessment (FRA) included:

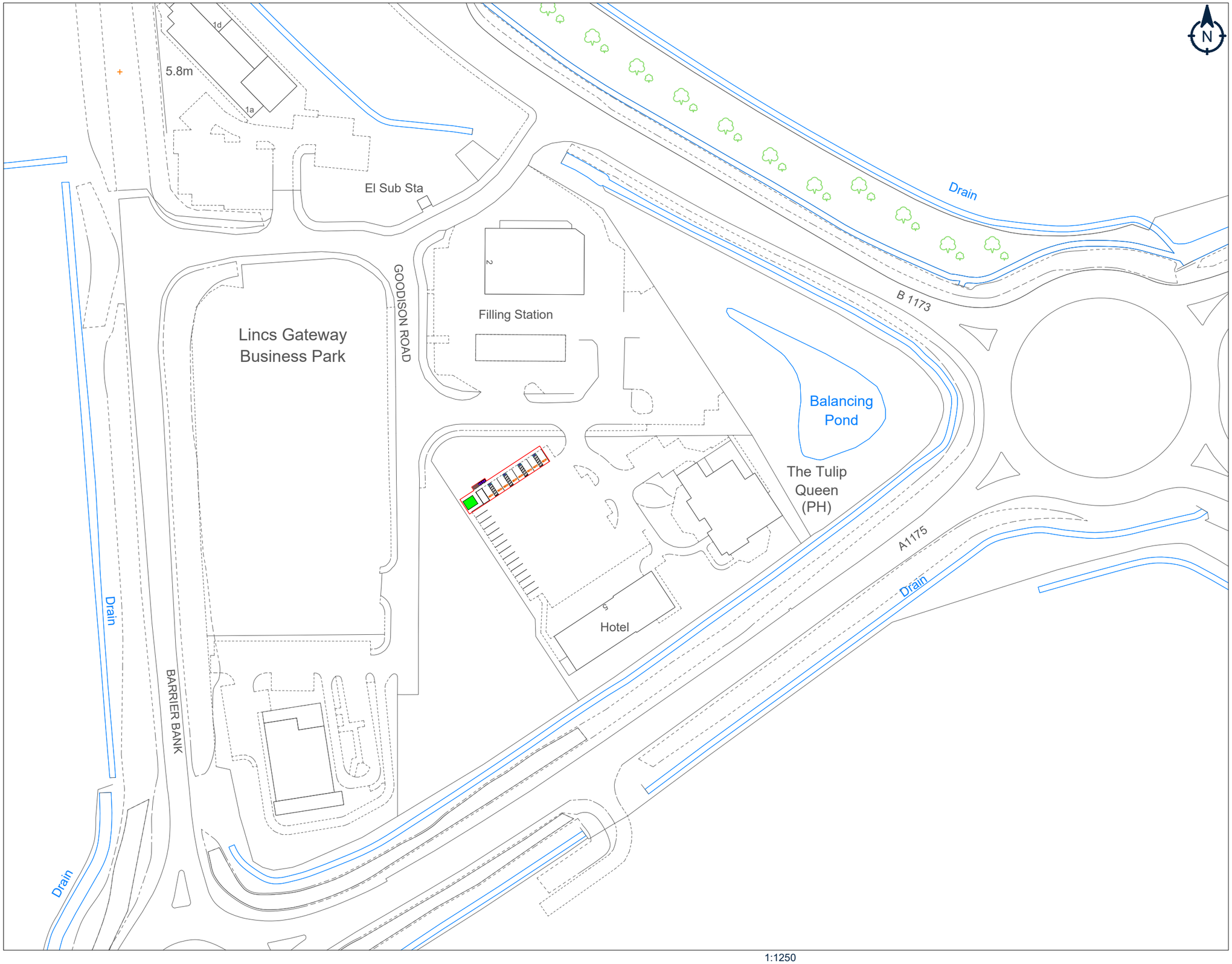
- Ordinary watercourses – **low risk**
- Groundwater – **low risk**
- Sewers – **low flood risk**
- Surface Water – **low risk**
- Flooding from the possible failure of existing artificial infrastructure – **low risk**

It is the conclusion of this FRA that the development is suitably safe from flooding.

This report has satisfied the objectives in Section 1.4, demonstrating that if the recommendations and mitigation measures proposed for the development are implemented, the site is not at a significant level of flood risk from any of the sources of flood hazards assessed and will not increase flood risk elsewhere.

Appendix A – Proposed Development (x1 page)

Plan 2



1:1250

25m 0 25m 50m 75m 100m 125m

Notes:

- Development Site
- Bollard
- Feeder Pillar
- Power Unit
- EV Chargepoint
- Substation

REV:	DESCRIPTION:	BY:	DATE:
V1	Initial Draft	EBD	01/05/24

AMENDMENTS:

Osprey Charging Network Ltd
3rd Floor, Martin House, 5 Martin Lane,
London, EC4R 0DP
T: 0800 058 8400
www.ospreycharging.co.uk

CLIENT: Marstons Brewery Group

SITE: Tulip Queen Spalding - PE12 6FY

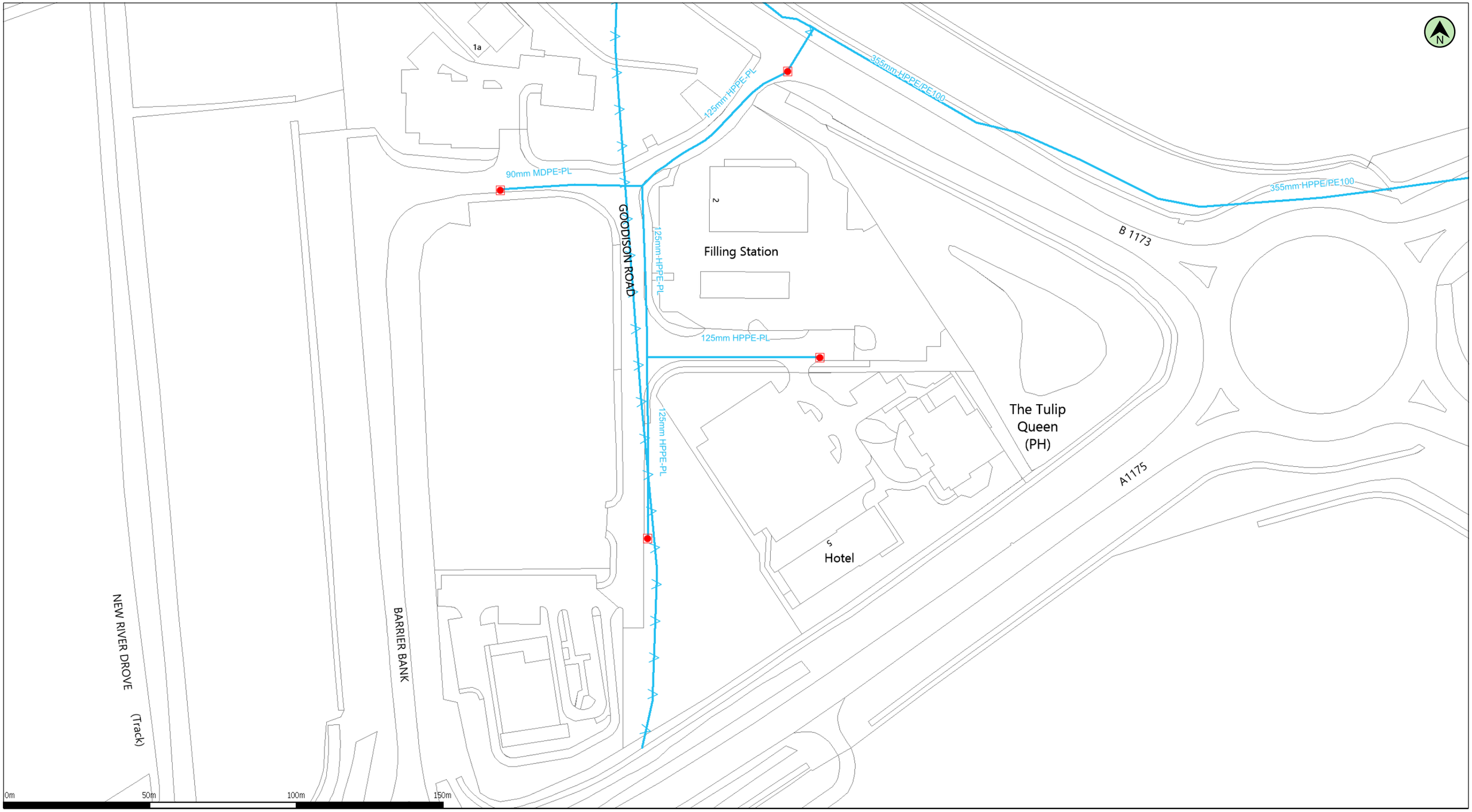
TITLE: Location Plan

SCALE AT A3:	DATE:	DRAWN:	REVISION:
1:1250	01/05/2024	EBD	V1

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Appendix B – Anglian Water Sewer Records (x2 pages)



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Date: 03/07/24 | Scale: 1:1250 | Map Centre: 524342,319662 | Data updated: 31/05/24 | Our Ref: 1510294 - 1

Clean Water Plan A3
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Potable Water
Raw Water
Decommissioned Water
Fitting
Hydrant

rosswright@clarkebond.com
Lincs Gateway

love every drop
anglianwater



digdat
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Wastewater Plan A3
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Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

rosswright@clarkebond.com
Lincs Gateway

love every drop
anglianwater

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