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Flood risk, water and environment

Flood Risk Assessment
AEG02870_PE11_Pinchbeck_01

Site Address: Lingarden Bulbs
Wardentree Park
Pinchbeck
Spalding
PE11 3ZN

UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

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Summary

Development Description	Existing	Proposed
Development Type	Brownfield site/ Commercial premises	Siting of a fibre PoP installation
EA Vulnerability Classification	Less Vulnerable	Essential Infrastructure
Ground Floor Level	Topographic survey indicates that the proposed cabin is to be sited on ground between 3.35m AOD and 3.43m AOD.	No change
Site Size	Approximately 113.57 m²	No change
Risk to Development	**Summary**	**Comment**
EA Flood Zone	Flood Zone 3	
Flood Source	Fluvial/Tidal	River Welland
SFRA Available	South East Lincolnshire Strategic Flood Risk Assessment (South East Lincolnshire Joint Strategic Planning Committee, 2017)	
Management Measures	**Summary**	**Comment**
Ground floor level above extreme flood levels	Yes	EA have stated that the site is not considered to be at risk of flooding from main rivers. Furthermore, site is located outside EA modelled 1:1000 year (2115) tidal breach extent. However, FFLs of the PoP will be set 0.8m above external ground levels adopting a conservative approach. Furthermore, water sensitive equipment is raised 2.055m above ground levels within the PoP. Any equipment below this is fibre cabling and can be submerged.
Safe Access/Egress Route	N/A[1]	It is expected that site will be unmanned the majority of its use,

		though on receipt of a flood warning the site should be evacuated and any planned maintenance to any installed fibre infrastructure should only continue after the warning is lifted.
Flood Resilient Design	Recommended	Section 5 of this report.
Flood Warning & Evacuation Plan	Recommended	The managers of the site should sign up for the Pinchbeck and the West of Spalding EA Flood Warning Service and/or for Lower Welland EA alert service (fluvial) and for Tidal Welland between Fulney and Fosdyke Bridge EA warning service, and/or for the areas near the tidal River Welland, tidal River Nene, and the Wash EA alert service.
Offsite Impacts	**Summary**	**Comment**
Displacement of floodwater	N/A	EA have stated that the site is not considered to be at risk of flooding from main rivers. Furthermore, site is located outside EA modelled 1:1000 year (2115) tidal breach extent.
Impact on hydraulic performance of channels	None	River Welland (EA main river) is located approximately 865m southwest of the site. River Glen (EA main river) is located approximately 2595m north of the site.

[1] not required for this assessment. [2] data not available.

1. Introduction

1.1. Aegaea were commissioned by Up Connect to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

1.3. The site of the proposed development is Lingarden Bulbs, Wardentree Park, Pinchbeck, Spalding, PE11 3ZN (Figure 1).

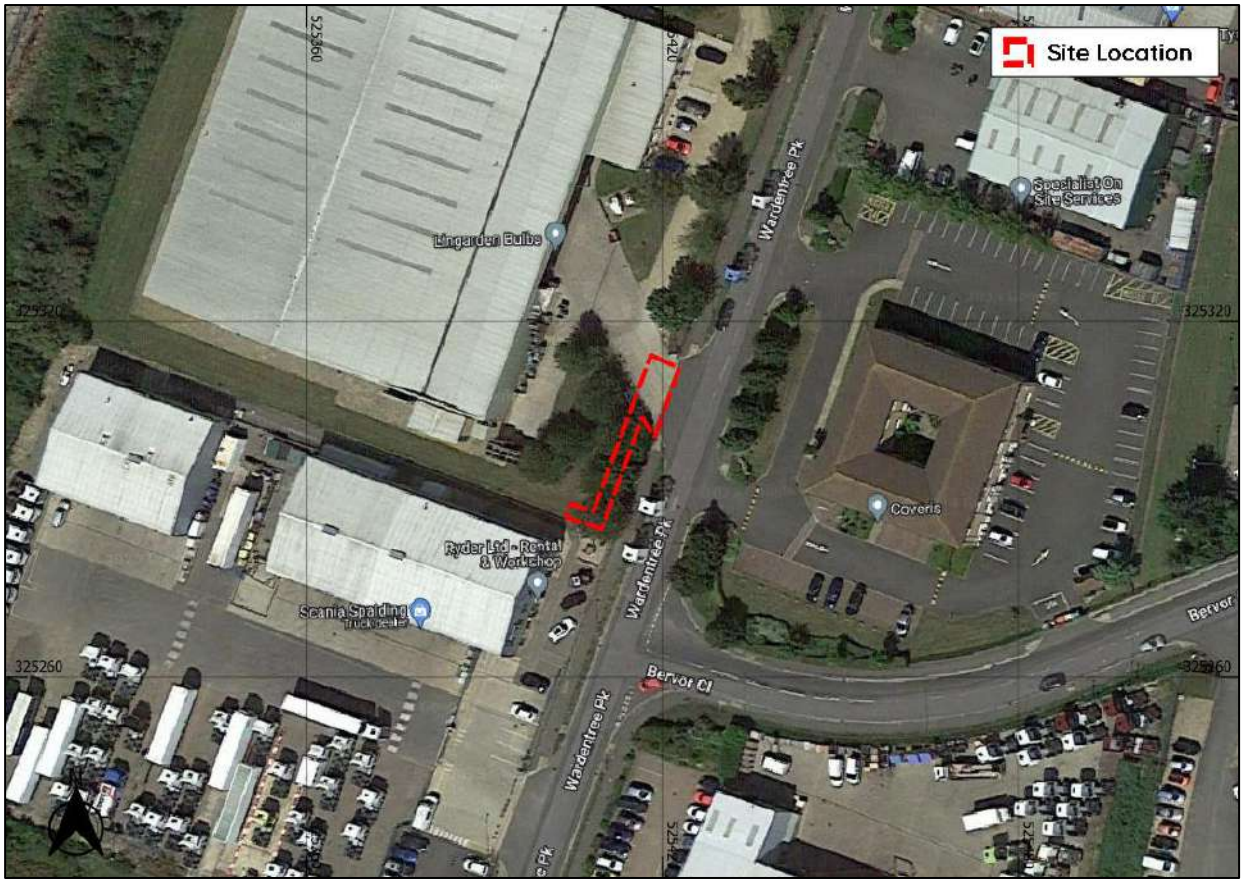


Figure 1: Site Location (Base map and data from Google Hybrid Mapping ©)

1.4. The existing site is a brownfield site/ commercial premises. It is understood that the proposed development is for the siting of a fibre PoP installation. The development proposal is shown in Figure 2. A full set of development proposals can be found in Appendix A of this report.

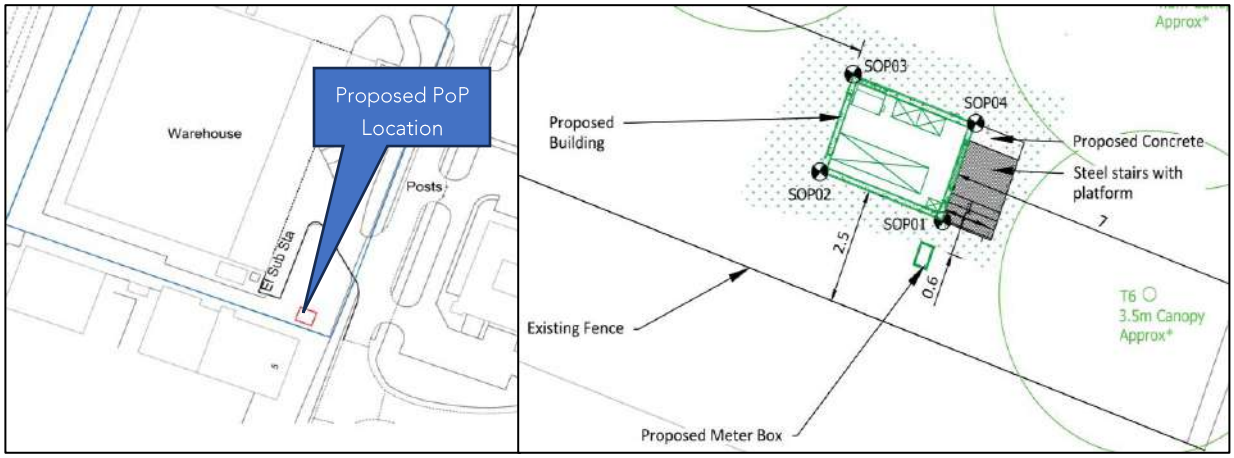


Figure 2: Development Proposal

1.5. A topographic survey of the site has been carried out (see Appendix B). Comparison of the topographic survey (MK Surveys Ref 32864, July 2023) and the proposed site layout (Parsons Consulting Engineers Ltd Design 22060-42-005 rev P3 Site Plan) indicates that the proposed fibre PoP is to be sited on ground between 3.35m AOD and 3.43m AOD. The lowest land level within the redline boundary is 3.18m AOD.

1.6. Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model (1m resolution) has been utilised to visualise the existing ground levels on the site and within the surrounding vicinity (Figure 3).

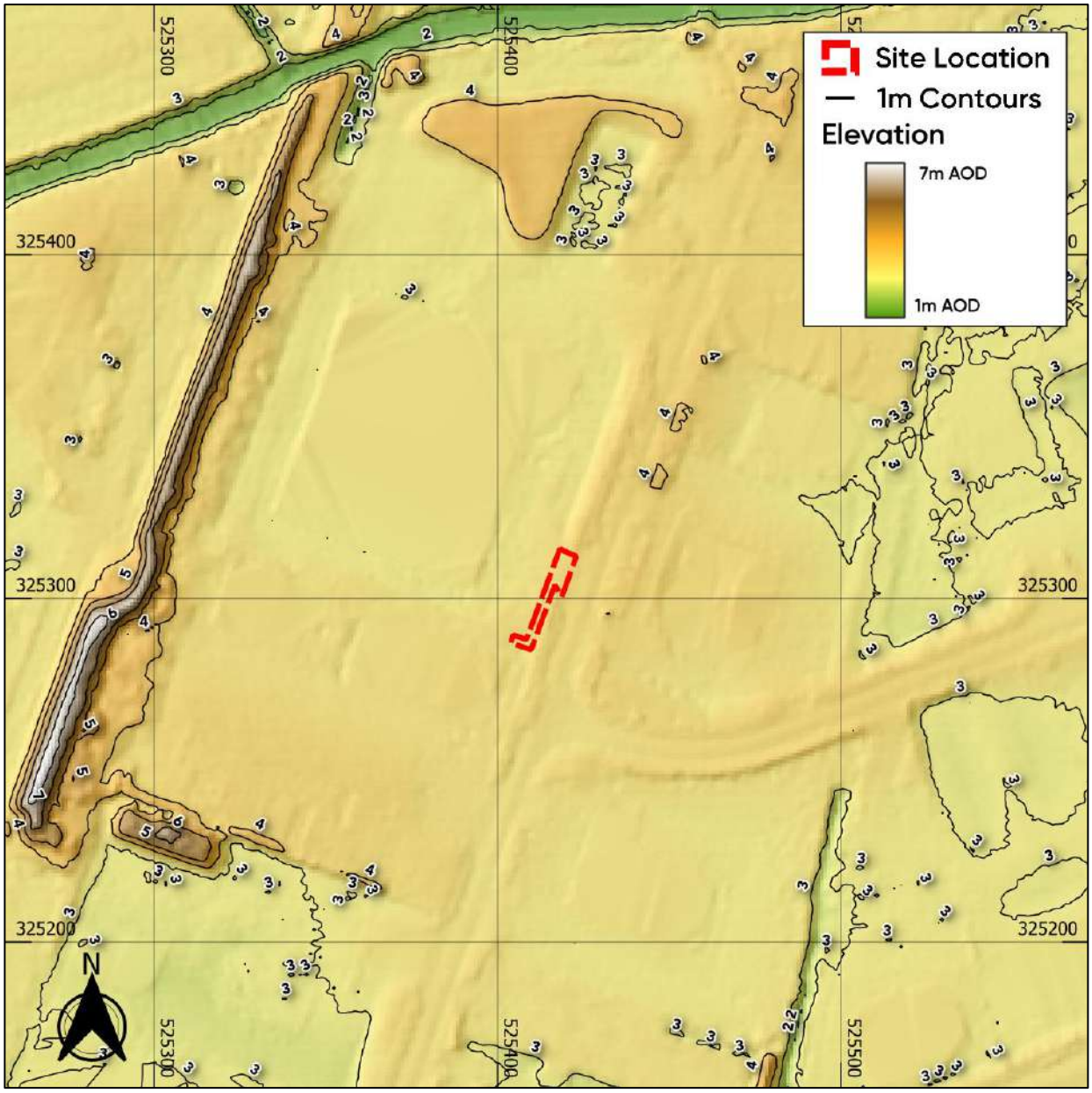


Figure 3: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.7. South Holland District Council is the Local Planning Authority (LPA) for the site and is the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Lincolnshire and Northamptonshire region.

Planning Policy and Guidance

1.8. UK government planning guidance states[1] that an FRA is required for developments which are:

- *in flood zone 2 or 3 including minor development and change of use*
- *more than 1 hectare (ha) in flood zone 1*
- *less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)*
- *in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency*

1.9. The site is located within Flood Zone 3 (fluvial/tidal). According to NPPF Footnote 55 an FRA is required.

1.10. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Fluvial/tidal flood risk
- Surface water flood risk
- Risk of flooding from other sources

[1] **https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment**

2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework[2] (NPPF) (DLUHC, 2021) which includes UK Government policy on development and flood risk states:

> *"159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*
>
> *167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*
>
> *a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
>
> *b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
>
> *c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

[2] https://www.gov.uk/guidance/national-planning-policy-framework, **last updated July 2021**

d) *any residual risk can be safely managed; and*

e) *safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

2.3. Footnote 55 of the NPPF states:

> *"A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 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; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use."*

2.4. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

Flood Zone	Definition
Zone 1 Low Probability	Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to 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). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

2.5. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

Local Planning Policy

2.6. South East Lincolnshire Local Plan (2011- 2036), adopted in March 2019 prepared by the Local Planning Authority, South Holland District Council jointly with Boston Borough Council and Lincolnshire County Council, sets out the policies for development in the local area. The proposed site lies under the jurisdiction of this LPA and therefore will be required to adhere to the local plan policies. The policy related to flood risk is replicated below:

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 development1 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 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.

Sequential and Exception Tests

2.7. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.

Sequential Test

2.8. It is noted that the proposed development is Essential Infrastructure to provide fibre connectivity to the surrounding area and thus there is an overriding need for the development to be located within the immediate vicinity of the site/ area it is to provide connectivity to. As such, it may not be appropriate to locate the development on another site at a lower risk of flooding.

Exception Test

2.9. The Exception Test is applied to sites based on the Flood Zone and the nature of the development. As the proposed development consists of a fibre PoP installation, it would be classed as 'Essential Infrastructure' in line with government development use classes.

2.10. The Flood Risk Vulnerability Classification table[3] provided below in Table 2 shows Flood Zone 3 is only an appropriate location for 'Essential Infrastructure' uses without an Exception Test. The PPG states that "In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood".

2.11. Table 2 shows which vulnerabilities are appropriate in each Flood Zone.

2.12. Table 2 shows Flood Zone 3 is only an appropriate location for 'Essential Infrastructure' uses without an Exception Test. The PPG states that "In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood".

Table 2: Flood Risk Vulnerability Classification

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

Summary

2.13. This flood risk assessment has been prepared with due consideration to the above local and national policy.

3 https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2

3. Consultation and Review

Consultation

3.1. Consultation has been undertaken with the EA Lincolnshire and Northamptonshire region. EA flood model data has been requested and the data was received in the form of tidal breach model dataset. This data has been reviewed in order to determine a more accurate depiction of flooding at the site.

Documents and Online Mapping

3.2. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.

3.3. The following sources of information have been reviewed for this assessment:

- Flood Map for Planning on the Environment Agency website *https://flood-map-for-planning.service.gov.uk/*
- Long Term Flood Risk Information on the Environment Agency website *https://www.gov.uk/check-long-term-flood-risk*
- National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2021)
- Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
- Geoindex Onshore (British Geological Survey, 2022)
- South East Lincolnshire Local Plan 2011-2036[4] (South East Lincolnshire Joint Strategic Planning Committee, 2019)

4 http://www.southeastlincslocalplan.org/

- South East Lincolnshire Strategic Flood Risk Assessment[5] (South East Lincolnshire Joint Strategic Planning Committee, 2017)

Strategic Flood Risk Assessment (SFRA)

3.4. The SFRA, published in 2017, provides the evidence base for the Local Planning Authority South Holland District Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.

3.5. The SFRA mapping provided by South Holland District Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

5 https://www.sholland.gov.uk/article/5307/Planning-Policy

4. Sources of Flood Risk

Fluvial/Tidal

4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

4.2. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the riverbank or river defences when tide levels are high.

4.3. Based on the EA datasets, the site is identified as being susceptible to tidal flooding rather than fluvial flooding. The EA have also stated:

> *This site is not considered to be at risk of flooding from main rivers.*

Main Rivers

4.4. The following watercourses are designated as EA main rivers and are located within the vicinity of the site:

- River Welland is located approximately 865m southwest of the site.
- River Glen is located approximately 2,595m north of the site.

Ordinary Watercourses

4.5. The followings are ordinary watercourses within the vicinity of the site:

- Blue Gowt Drain. The watercourse collects and carries water from a large part of the parish between the Glen and the Vernatts to the Glen at Surfleet Seas End. The watercourse is located approximately 153m north of the site.
- Vernatt's Drain (artificial river). The watercourse runs from the pumping station at Pode Hole to Surfleet Seas End. The watercourse is located approximately 507m southeast of the site.

4.6. The watercourses are shown in Figure 4. There are no other watercourses within the vicinity of the site.

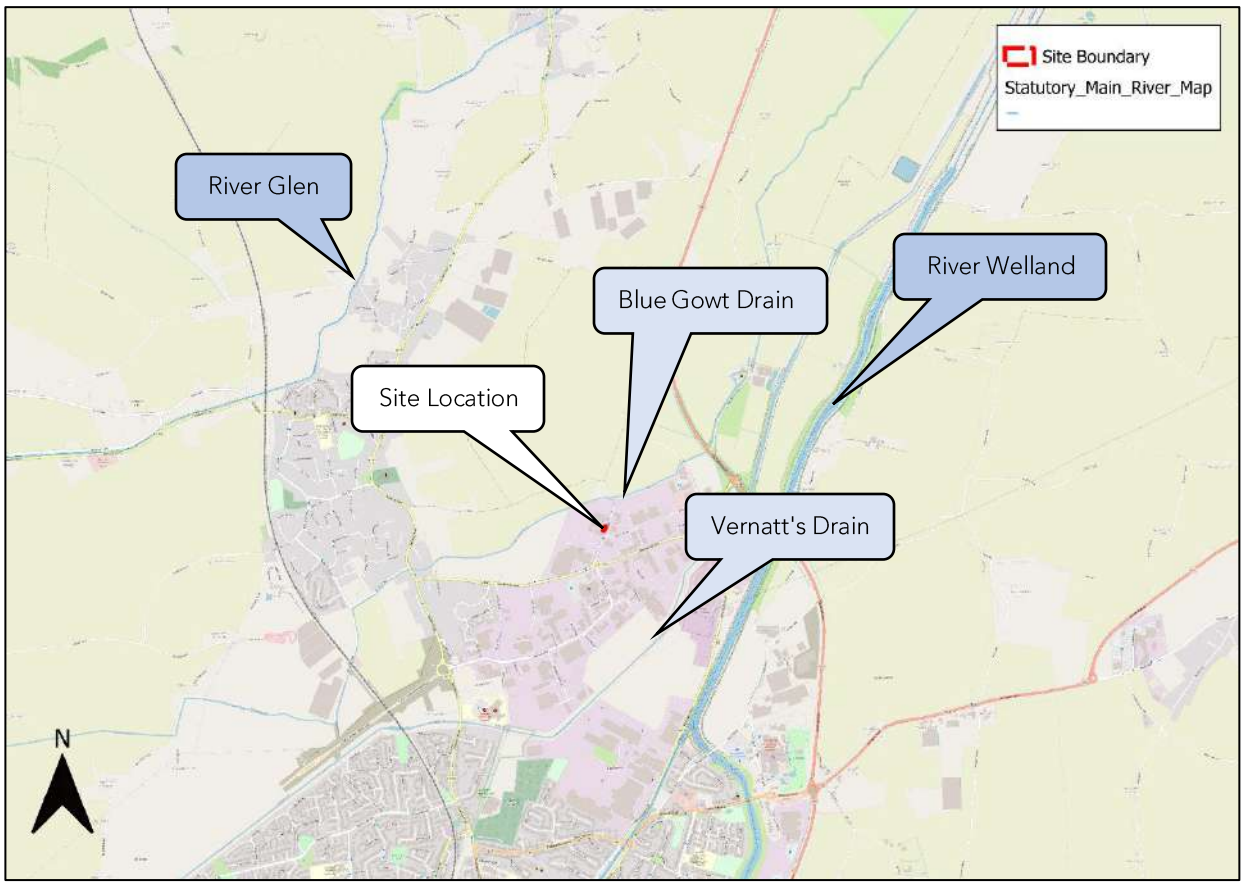


Figure 4: EA main rivers and ordinary Watercourses (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

EA Flood Map for Planning

4.7. The EA Flood Map for Planning (Figure 5) shows the site is located within Flood Zone 3 (fluvial/tidal). Flood Zone 3 denotes a risk of flooding from fluvial sources greater than 1 in 100 (1%) and greater than 1 in 200 (0.5%) from tidal sources.

4.8. The EA have stated:

> *In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.*

4.9. There are EA identified tidal flood defences located to the east of the site and the southwest of the site along River Welland. According to the EA data, the existing tidal defences protecting this site consist of earth embankments. These 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. Regular inspections are conducted to promptly detect and address any potential defects in the defences.

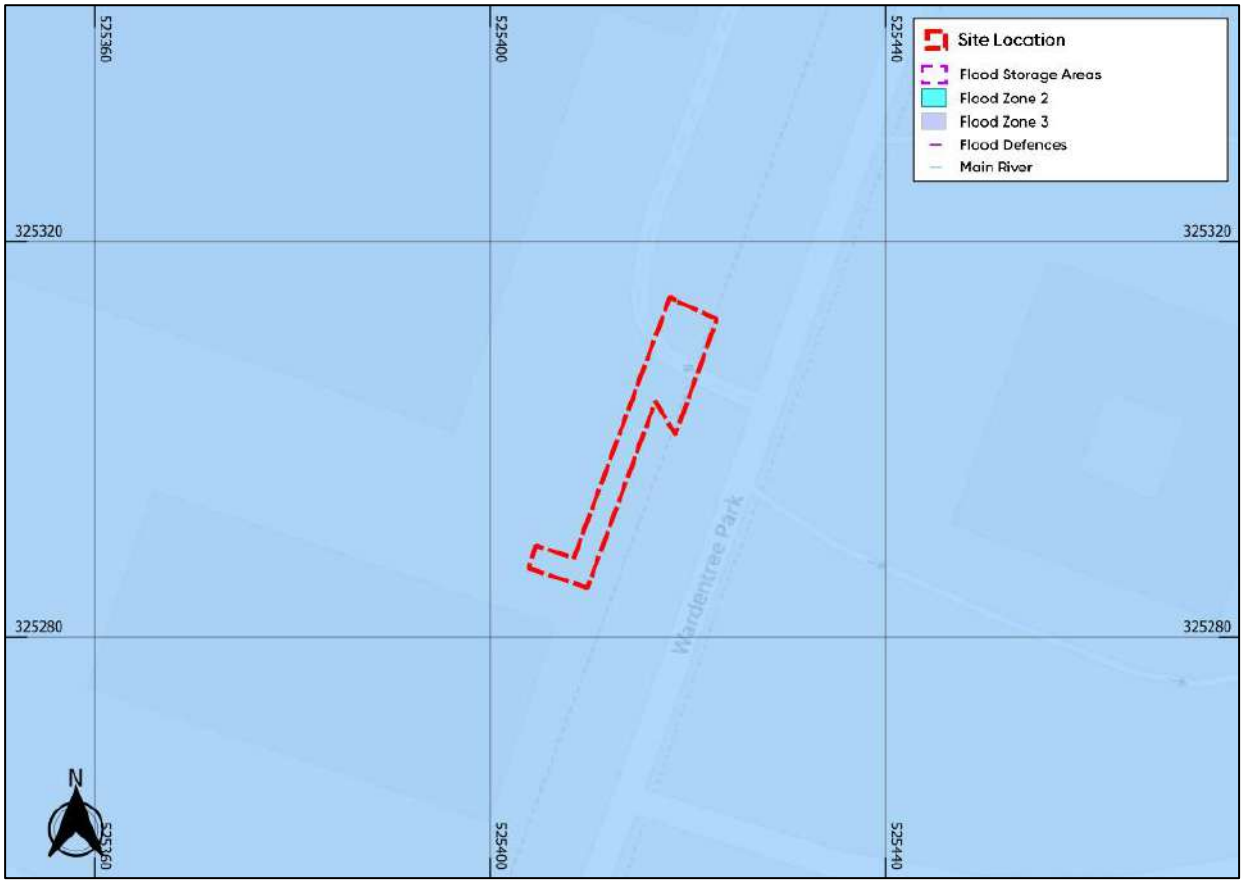


Figure 5: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

Breach Model EA Data

4.10. The EA have provided Product 4 data for the Tidal Welland (2016, 2115). This model contains both overtopping and breach scenarios for 0.5%AEP and 0.1%AEP return periods.

4.11. The EA have stated:

> *Your site is not affected by overtopping of the defences for the present day (2006) and climate change (2115) scenarios, though may be at risk from breaching.*

4.12. As such, the risk of tidal flooding following defence overtopping is considered low.

4.13. However, there is a risk of flooding following defence breach. The EA have modelled breaches at the below locations relative to the site location. The nearest breach location to the site is approximately 500m-900m south/ southeast of the site as shown in Figure 6.

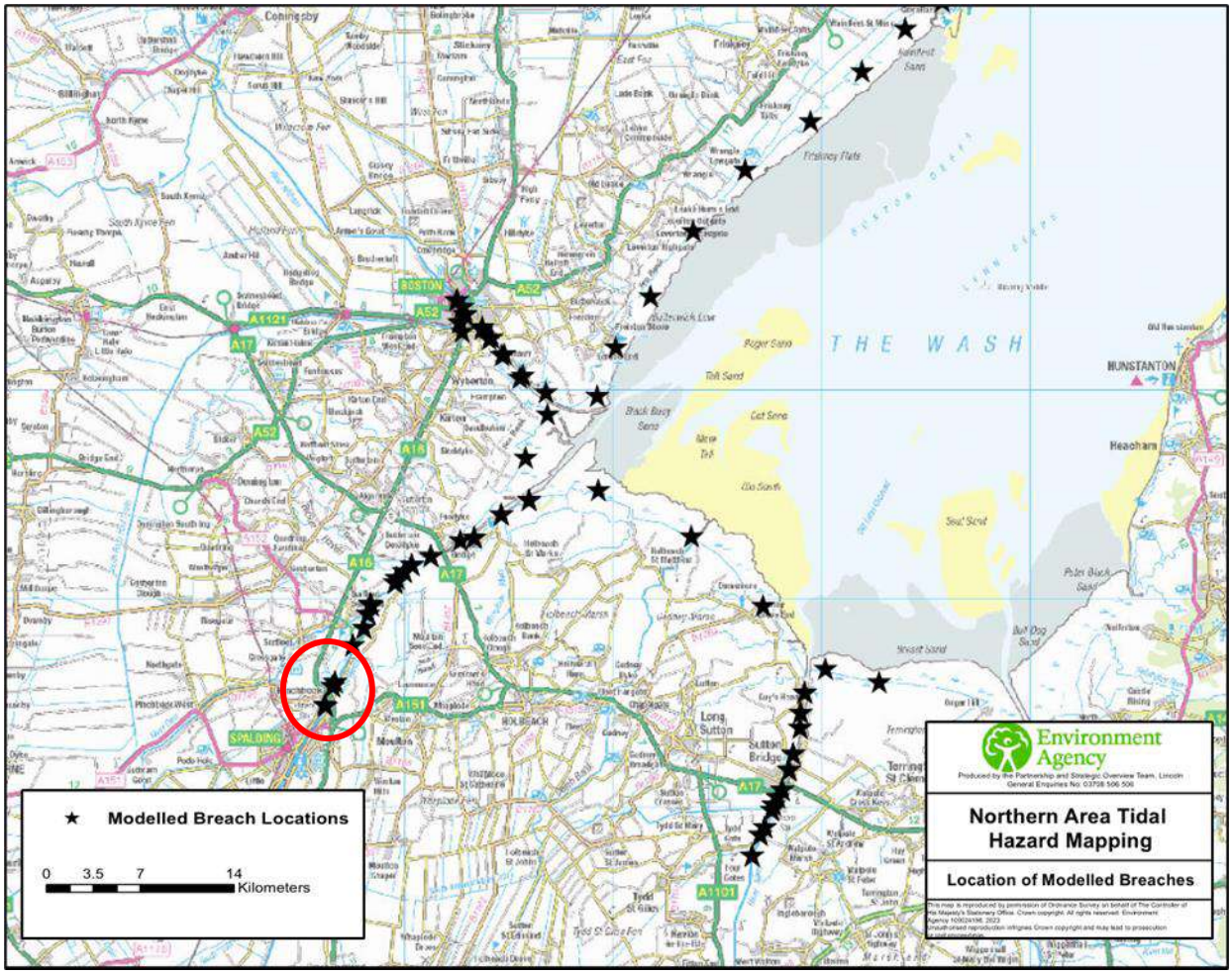


Figure 6: Modelled Breach Locations – Nearest breach location to the site is shown in red circle

4.14. The data show that the site is unaffected in the modelled 0.5%AEP (2115) and 0.1%AEP (2115) breach events.

4.15. Figure 7 presents the maximum flood hazard and depth grids for the modelled 0.5% AEP breach (2115) flood event. As depicted in the figure, the site remains unaffected during this event.

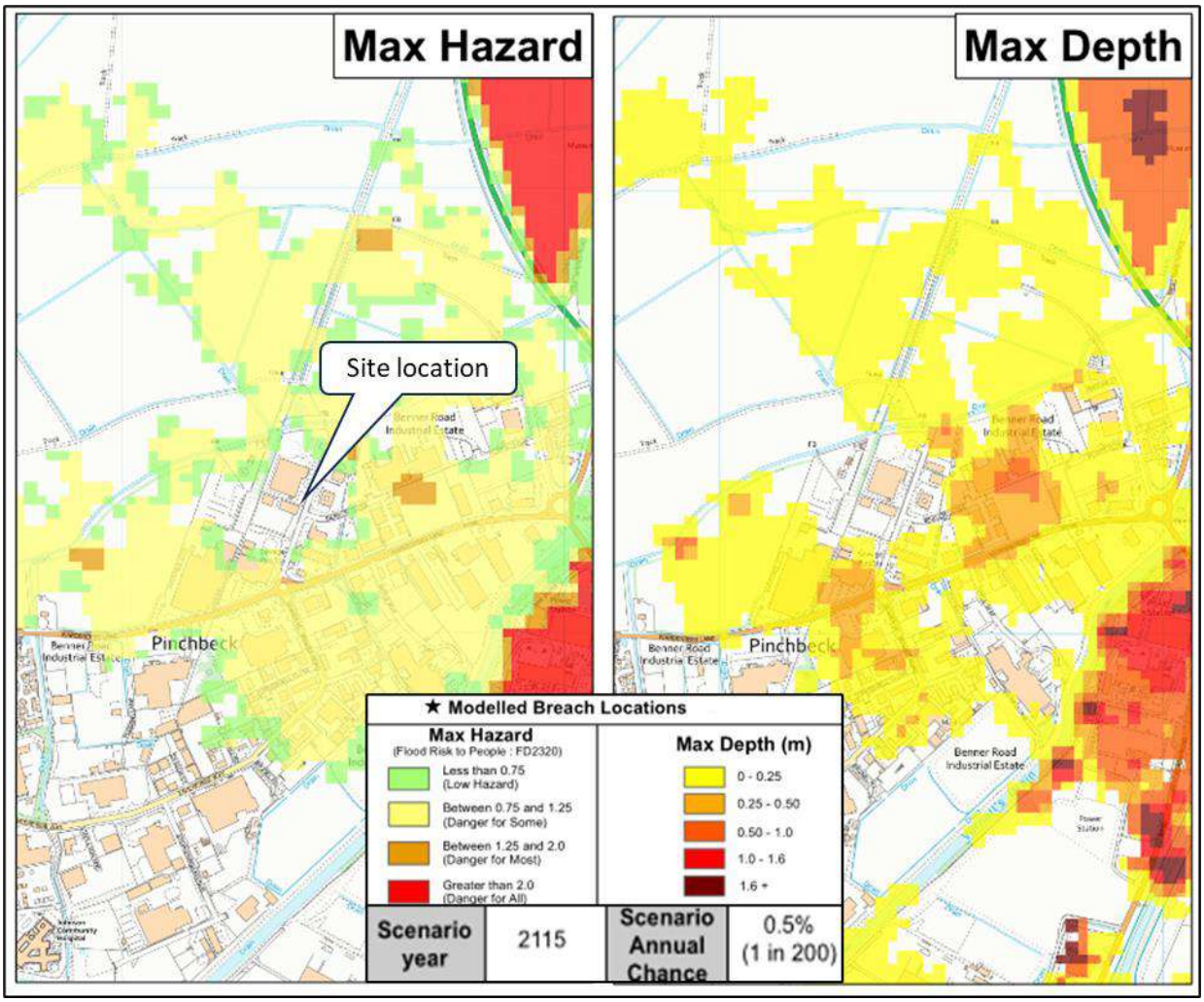


Figure 7: EA data breach flood map (hazard and depth) (0.5%AEP) event.

4.16. Figure 8 presents the maximum flood hazard and depth grids for the modelled 0.1% AEP breach (2115) flood event. As depicted in the figure, the site remains unaffected during this event.

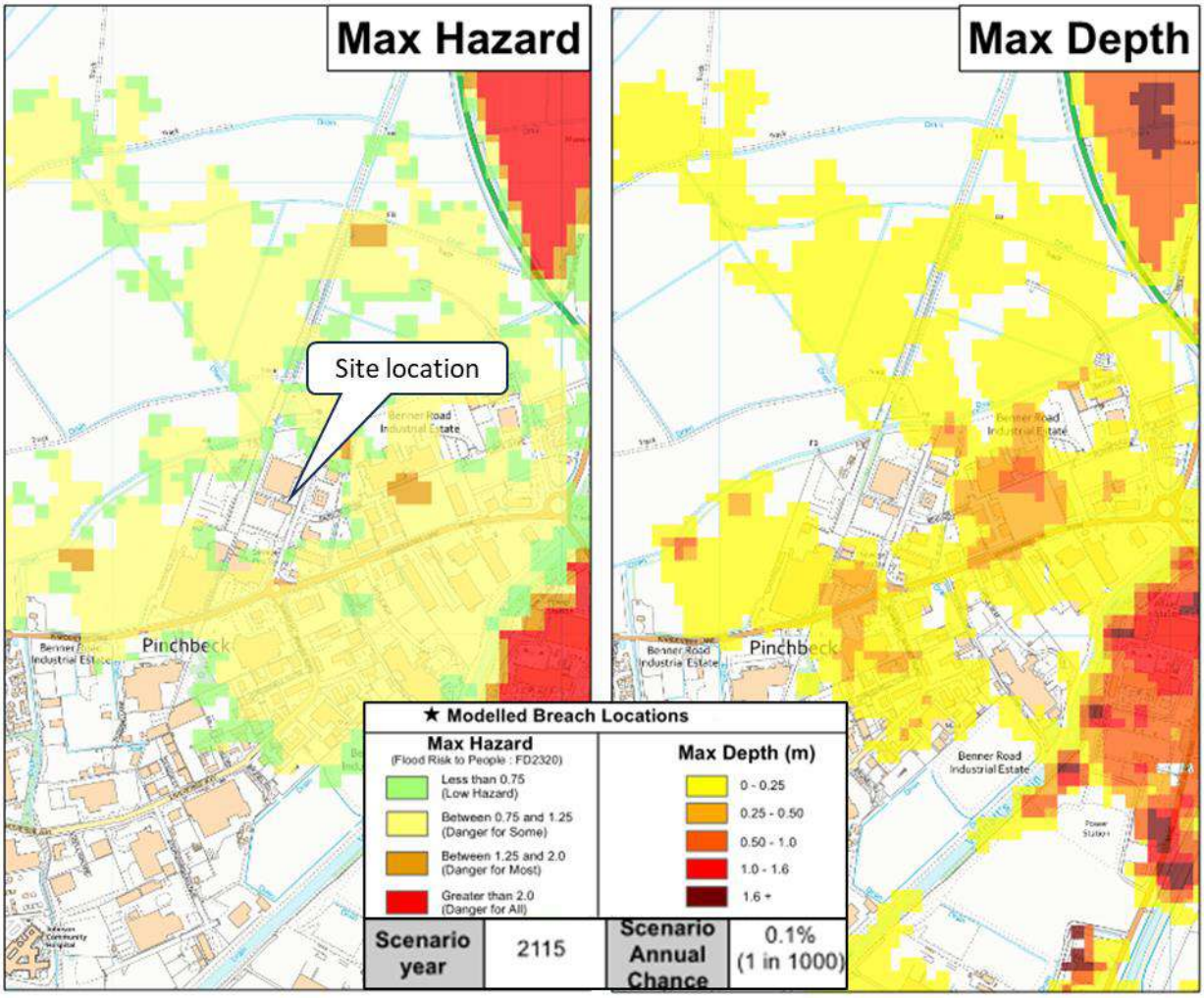


Figure 8: EA data breach flood map (hazard and depth) (0.1%AEP) event.

4.17. As such, in addition to being at low risk from tidal overtopping events, the risk of flooding to the site based on the modelled breach locations is also considered low.

Historical Fluvial and Tidal Flooding

4.18. The EA Recorded and Historical Flood Outlines shows that there is no record of historical fluvial/tidal flooding on-site (Figure 9).

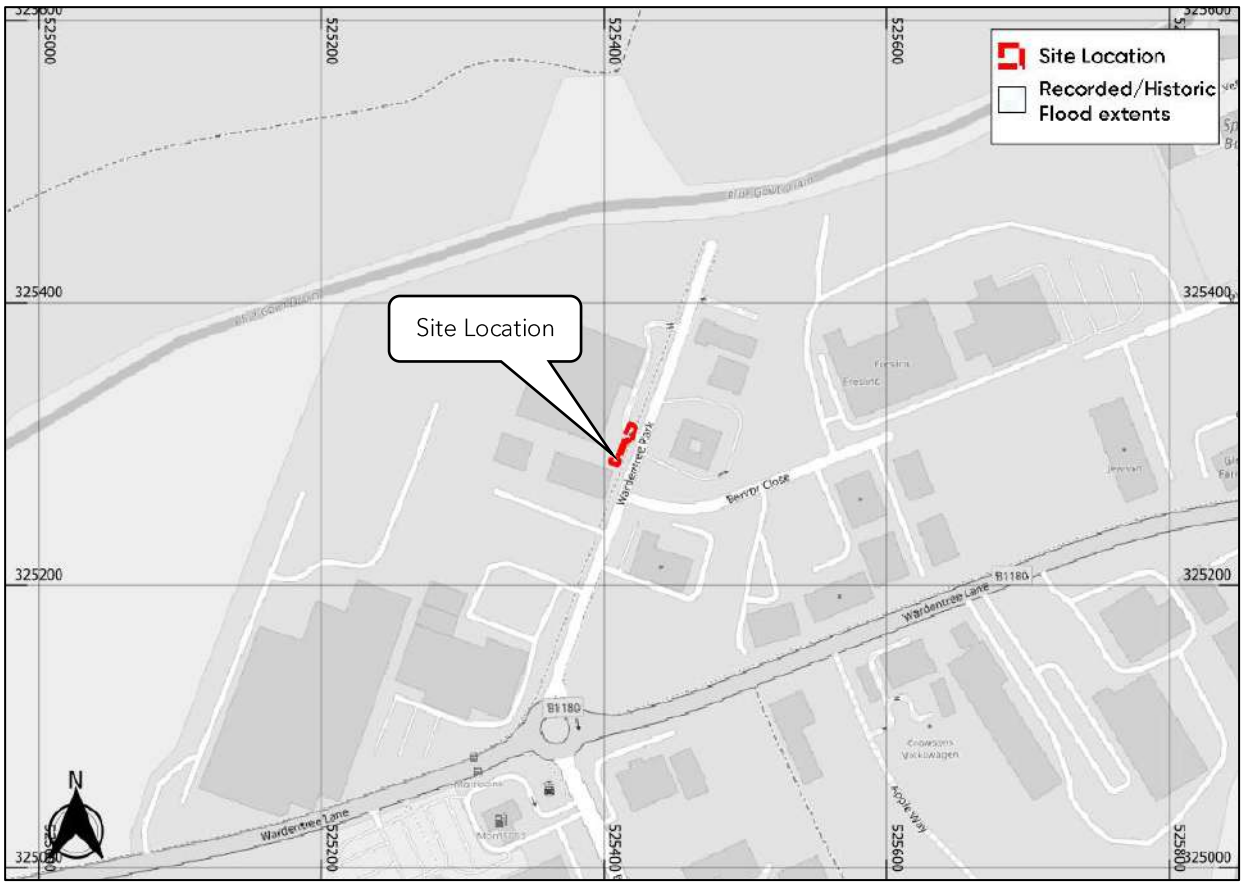


Figure 9: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.19. Although the site is located in Flood Zone 3. It has been shown the 'actual risk' of flooding from tidal sources is considered to be low given the tidal flood defences located to the east of the site and the southwest of the site along River Welland. Furthermore, the site is at low risk from tidal overtopping events and the risk of flooding to the site based on the modelled breach locations is also considered low.

Canals

4.20. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.

4.21. Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions.

However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

4.22. Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

4.23. There are no canals identified within 1000m of the site. The risk of flooding to this site from canals is considered to be low.

4.24. The risk of flooding to this site from canals is considered to be low.

Pluvial

4.25. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

4.26. Annual surface water flood risk is labelled by the EA as:

- 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
- 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
- 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
- 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).

4.27. Examination of the EA's Flood Risk from Surface Water mapping for High Risk, Medium Risk, and Low Risk AEP flood events shows the site is not affected in all the modelled surface water flood events as shown in Figure 10.

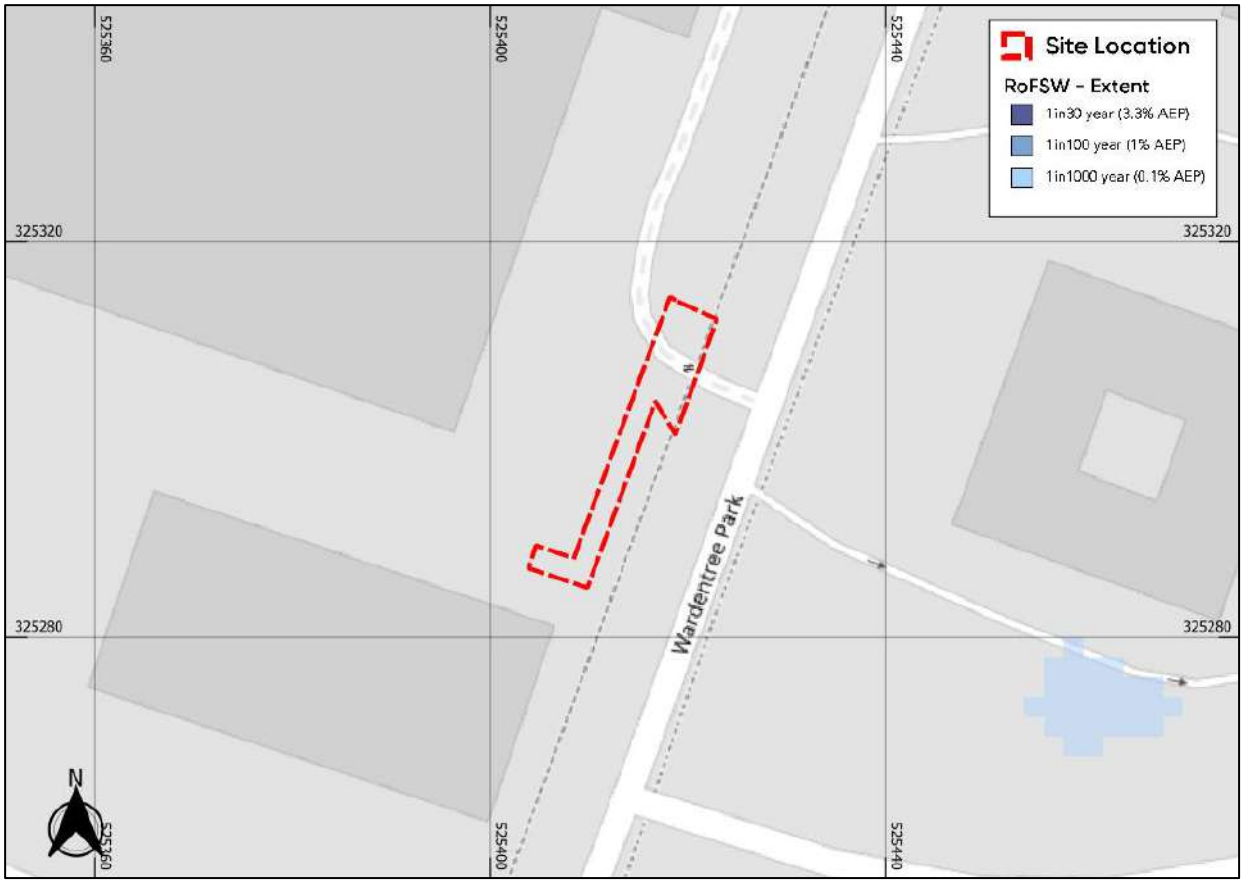


Figure 10: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.28. Based on the information above, the risk of flooding from surface water is considered to be very low.

Reservoirs

4.29. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain floodwater. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

4.30. According to the EA's Flood Risk from Reservoirs mapping the site is outside modelled flood extents in the event of reservoir flooding (Figure 11).

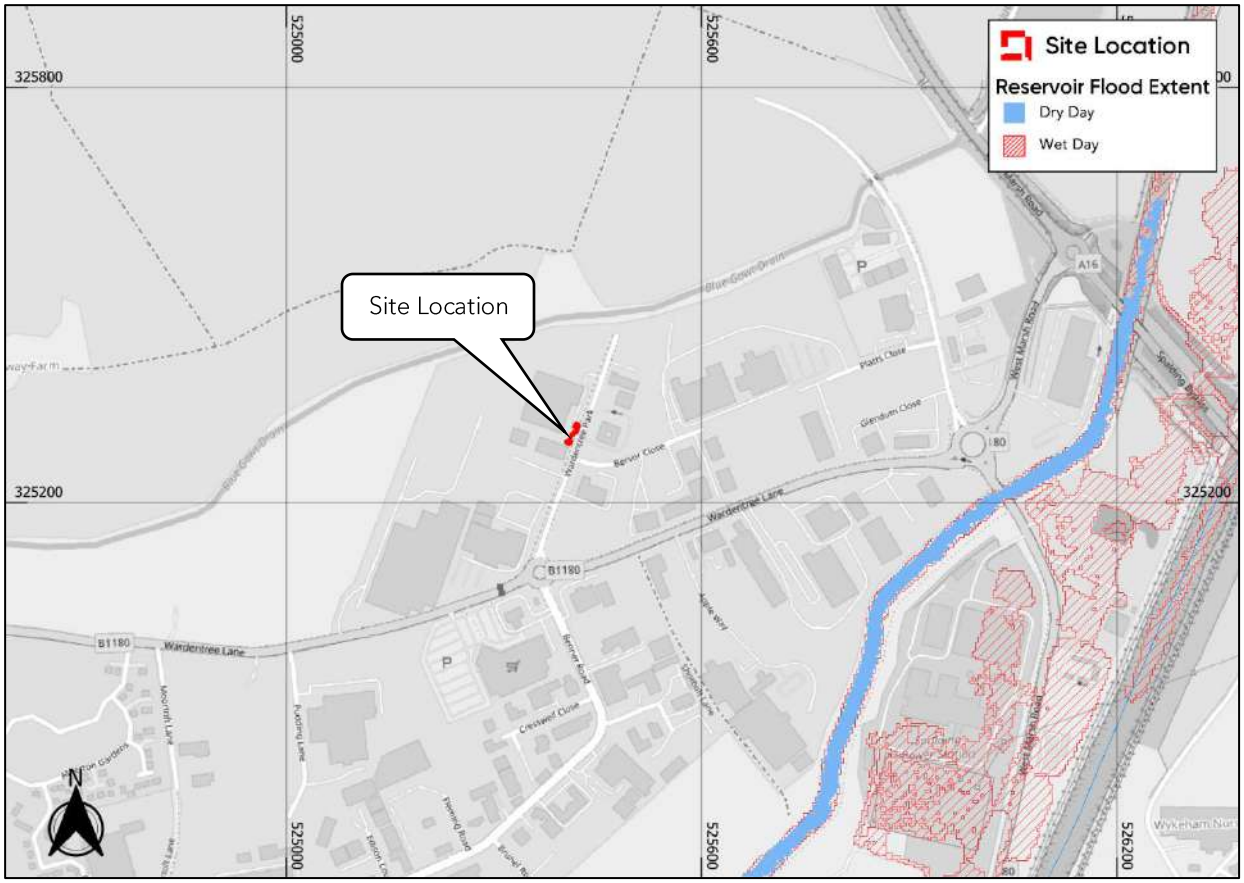


Figure 11: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.31. Based on the information above, the risk of flooding from reservoir source is considered to be low.

Groundwater

4.32. Groundwater flooding occurs in areas where underlying geology is permeable, and water can rise within the strata sufficiently to breach the surface.

4.33. The British Geological Survey's (BGS) mapping shows superficial deposits of Tidal Flat Deposits composed of day and silt underlying the site. The bedrock underlying the site is Oxford Clay Formation composed of mudstone.

4.34. Historical BGS borehole Ref: TF22NE36 is located approximately 141m northwest of the site. The record confirms that the geology at this location composed of clay, sand, mudstone and gravel. The below ground water level was recorded at 2.2m.

4.35. As the development proposals is for the establishment of a fibre PoP installation and doesn't not include any proposed subterranean features, the risk from groundwater to the development is considered to be low.

Sewers

4.36. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.

4.37. Local policy documentation does not identify the site as being in a Critical Drainage Area.

4.38. The proposed equipment to be raised above the ground level - therefore any sewer flooding within the vicinity of the site is unlikely to affect the proposed equipment. The development is therefore considered to be at low risk of flooding from sewers.

5. Flood Risk Mitigation

Fluvial/Tidal

5.1. Although the site is located in Flood Zone 3. It has been shown the 'actual risk' of flooding from tidal sources is considered to be low given the tidal flood defences located to the east of the site and the southwest of the site along River Welland. Furthermore, the site is at low risk from tidal overtopping events and the risk of flooding to the site based on the modelled breach locations is also considered low.

5.2. Although the EA data shows that the site is unaffected in the modelled 0.5%AEP (2115) and 0.1%AEP (2115) breach and overtopping flood events, given the nature of this development, it is recommended that flood mitigation measures are implemented to adopt a conservative approach.

5.3. FFLs of the PoP will be set 0.8m above external ground levels adopting a conservative approach. Furthermore, water sensitive equipment is raised 2.055m above ground levels within the PoP. Any equipment below this is fibre cabling and can be submerged.

5.4. As such, based on the data available at the time of writing the proposed PoP should remain operational for its lifetime in the 1 in 1000 year +CC event.

5.5. As a further precaution and risk reduction, the managers of the site should sign up for the Pinchbeck and the West of Spalding EA Flood Warning Service and/or for Lower Welland EA alert service (fluvial) and for Tidal Welland between Fulney and Fosdyke Bridge EA warning service, and/or for the areas near the tidal River Welland, tidal River Nene, and the Wash EA alert service. These services allow site managers to register an address, which is at risk of flooding, along with contact details so that in the event of a flood being forecast, the site owner will be sent an alert directly to their chosen method of contact.

5.6. The fibre infrastructure would likely remain unmanned for the majority of its use, though on receipt of a flood warning the site should be evacuated and any planned maintenance to any installed fibre infrastructure should only continue after the warning is lifted.

Pluvial, Reservoirs, Groundwater and Sewers

5.7. Flood risk from the above sources is considered to be low, therefore mitigation measures are not recommended.

Increase to Flood Risk Elsewhere

5.8. The EA have stated that the site is not considered to be at risk of flooding from main rivers. Furthermore, site is located outside EA modelled 1:1000 year (2115) tidal breach extent. As such the proposal should not increase flood risk elsewhere through displacement of flood waters.

6. Conclusions

6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at Lingarden Bulbs, Wardentree Park, Pinchbeck, Spalding, PE11 3ZN. It has been written to support a planning application and has been prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.

6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

Source of Flooding	Flood Risk Summary
Fluvial/Tidal	The site is located in Flood Zone 3 (high risk from fluvial/tidal flooding). The EA data show that the site is unaffected in the modelled 0.5%AEP (2115) and 0.1%AEP (2115) breach and overtopping events. The nearest breach location to the site is approximately 500m-900m south/ southeast of the site. FFLs of the PoP will be set 0.8m above external ground levels adopting a conservative approach. Furthermore, water sensitive equipment is raised 2.055m above ground levels within the PoP. Any equipment below this is fibre cabling and can be submerged. As such, based on the data available at the time of writing the proposed PoP should remain operational for its lifetime in the 1 in 1000 year +CC event.
Pluvial Reservoirs Groundwater Sewers Canals	The proposed development is considered to be at low risk from other sources.

6.3. The site is located within Flood Zone 3 (fluvial/tidal), however its proposed vulnerability according to government guidelines (essential infrastructure) is considered appropriate for the Flood Zone without the need of the Exception test. The development would remain safe (and operational), and the development will not increase flood risk elsewhere subject to the recommendations outlined in this report.

6.4. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

Appendix A - Development Proposals

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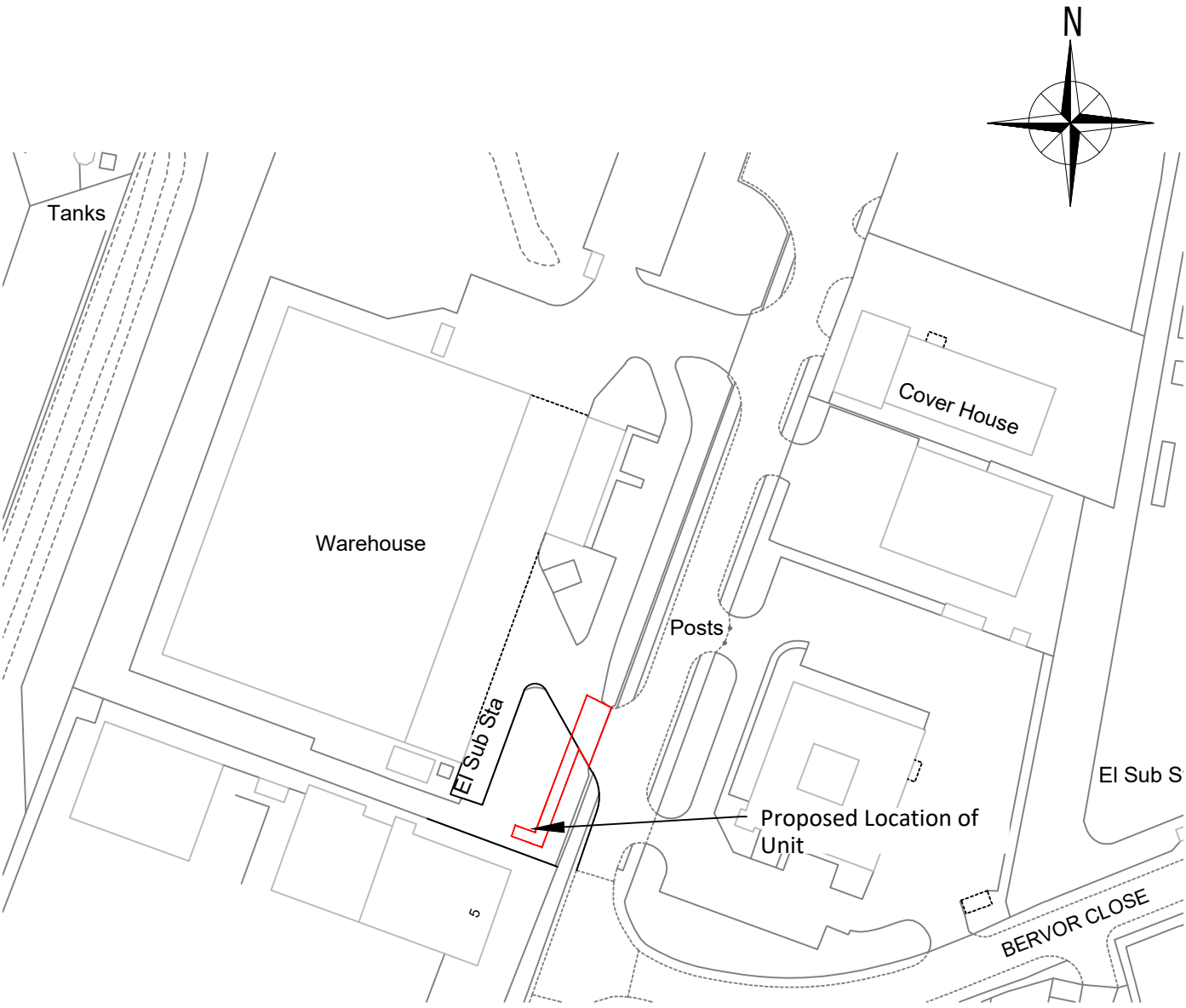
Project: Spalding, Lingarden Bulbs
PE11 3ZN

Title: Location Plan

Drawing No.	Rev	Drawn	Scale	Date
22060-42-001	P2	AJP	1:1250 @ A4	July 2023
		Checked TBP		Status Preliminary
		Approved TBP		

Rev	Amendments	Rev by	Date
P2	'PoP' location moved	AJP	07-23

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Location Plan

(Scale 1:1250)

0 20 40 60 80 100M

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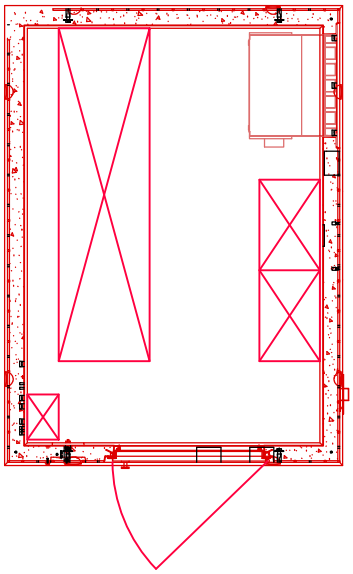
Project	Title
Spalding, Lingarden Bulbs PE11 3ZN	Floor Plan

Drawing No.	Rev	Drawn	AJP	Scale	Date	July 2023
22060-42-002	P1	Checked	TBP	1:50 @ A4	Status	Preliminary
		Approved	TBP			

Rev	Amendments	Rev'd By	Date

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Kiosk Floor Plan

(Scale 1:50)

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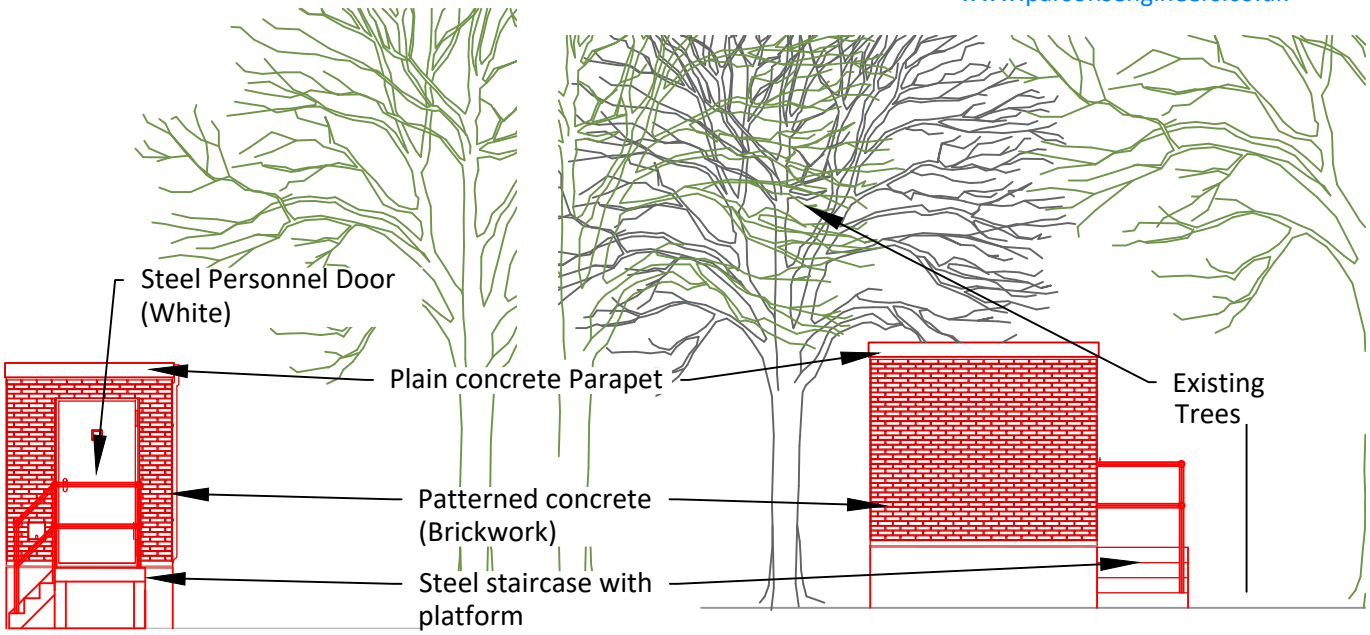
Project	Title
Spalding, Lingarden Bulbs PE11 3ZN	Elevations

Drawing No.	Rev	Drawn	Scale	Date	
22060-42-003	P3	AJP	1:100 @ A4	July 2023	
		Checked TBP		Status	Preliminary
		Approved TBP			

P3	'PoP' location amended	AJP	07/23

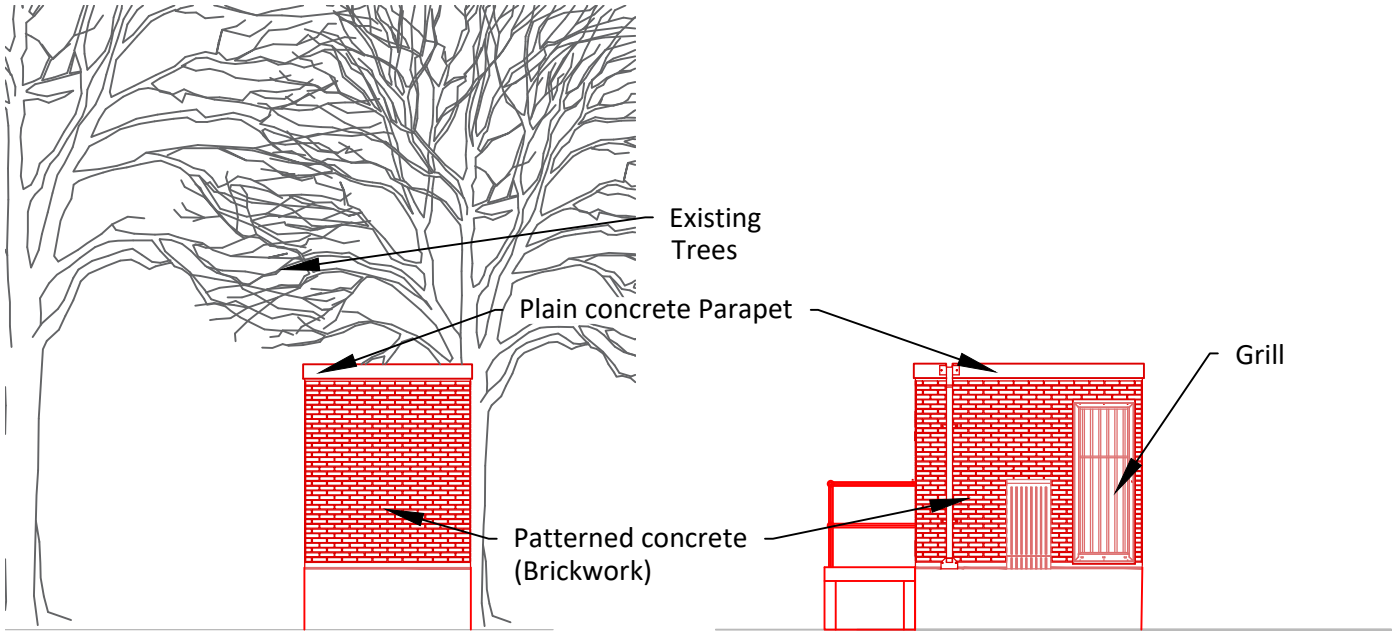
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South East Elevation

South West Elevation



North West Elevation

North East Elevation

Elevations

(Scale 1:100)

0 1 2 3 4 5m

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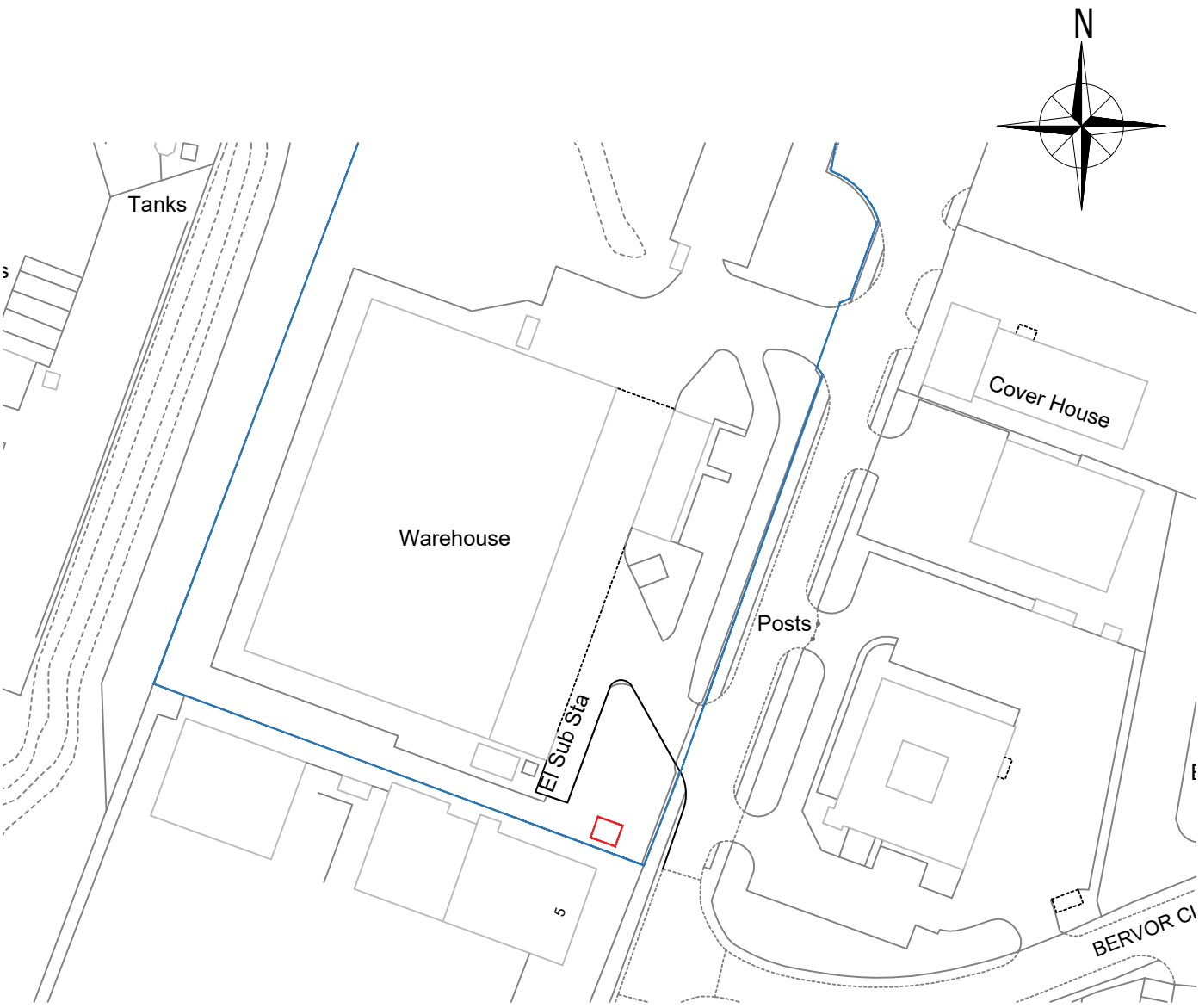
Project: Spalding, Lingarden Bulbs
PE11 3ZN

Title: Lease Plan

Drawing No.	Rev	Drawn	Scale	Date
22060-42-004	P2	AJP	1:1250 @ A4	July 2023
		Checked TBP		Status Preliminary
		Approved TBP		

P2	'PoP' location amended	AJP	07/23

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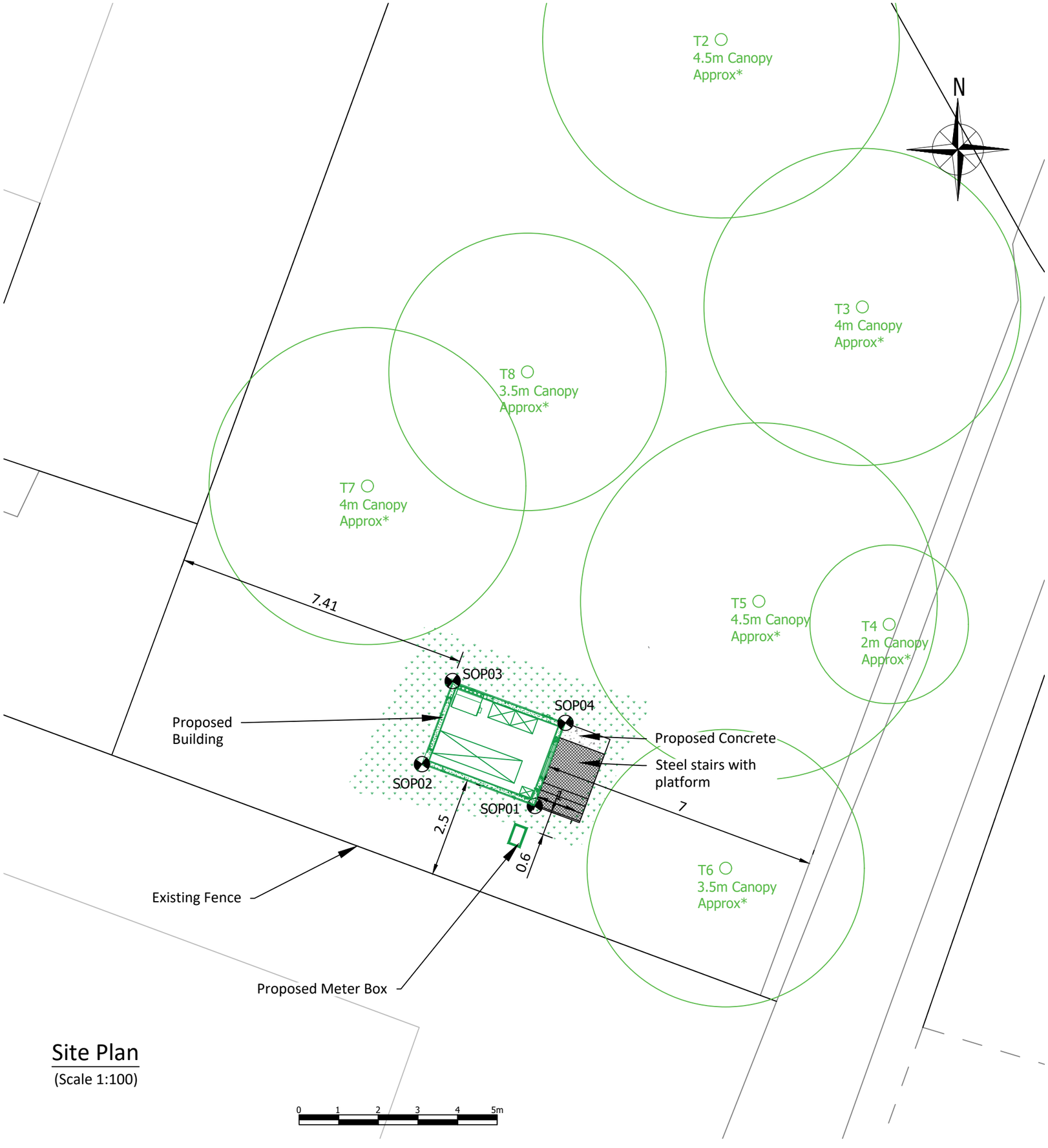


Lease Plan
(Scale 1:1250)

0 20 40 60 80 100M

Key

- Landlords Title
- Legal Demise
- Extent of vehicular and pedestrian access within Landlords Title



Site Plan
(Scale 1:100)

CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015

THE CONTRACTORS ATTENTION IS DRAWN TO THE ABNORMAL RISKS IDENTIFIED BELOW, ANNOTATED ON THE DRAWING AND EXPLAINED IN THE ASSOCIATED DESIGN RISK REGISTERS

LEGEND

- YOU MUST NOT DO
- HAZARD OR DANGER
- YOU MUST DO
- CAUTION

ABNORMAL RISKS IDENTIFIED:

Setting Out Points	Eastings	Northings
SOP01	525404.948	325287.605
SOP02	525402.097	325288.660
SOP03	525402.873	325290.756
SOP04	525405.724	325289.701

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NOTES

1. All dimensions are in millimetres unless stated otherwise.

2. This drawing to be read in conjunction with all other relevant drawings and specifications.

3. All proprietary items to be installed in strict compliance with manufacturers instructions and recommendations.

*Drawings stated are relative to point A. Accuracy of ordnance mapping is such that no reliance should be given to the relative position of features shown on the drawing.

P3	'PoP' location amended	AJP	07/23
P2	Unit raised	AJP	07/23
P1	Preliminary Issue	AJP	05/23

Project: Spalding, Lingarden Bulbs PE11 3ZN

Title: Proposed Site Plan

Job No: 22060-42

Drawing No: 22060-42-005 Rev: P3

Status: Preliminary

Scale: As Stated Date: 07/23

Project Engineer: TBP

Drawn By: AJP

Checked By: TBP

Approved By:

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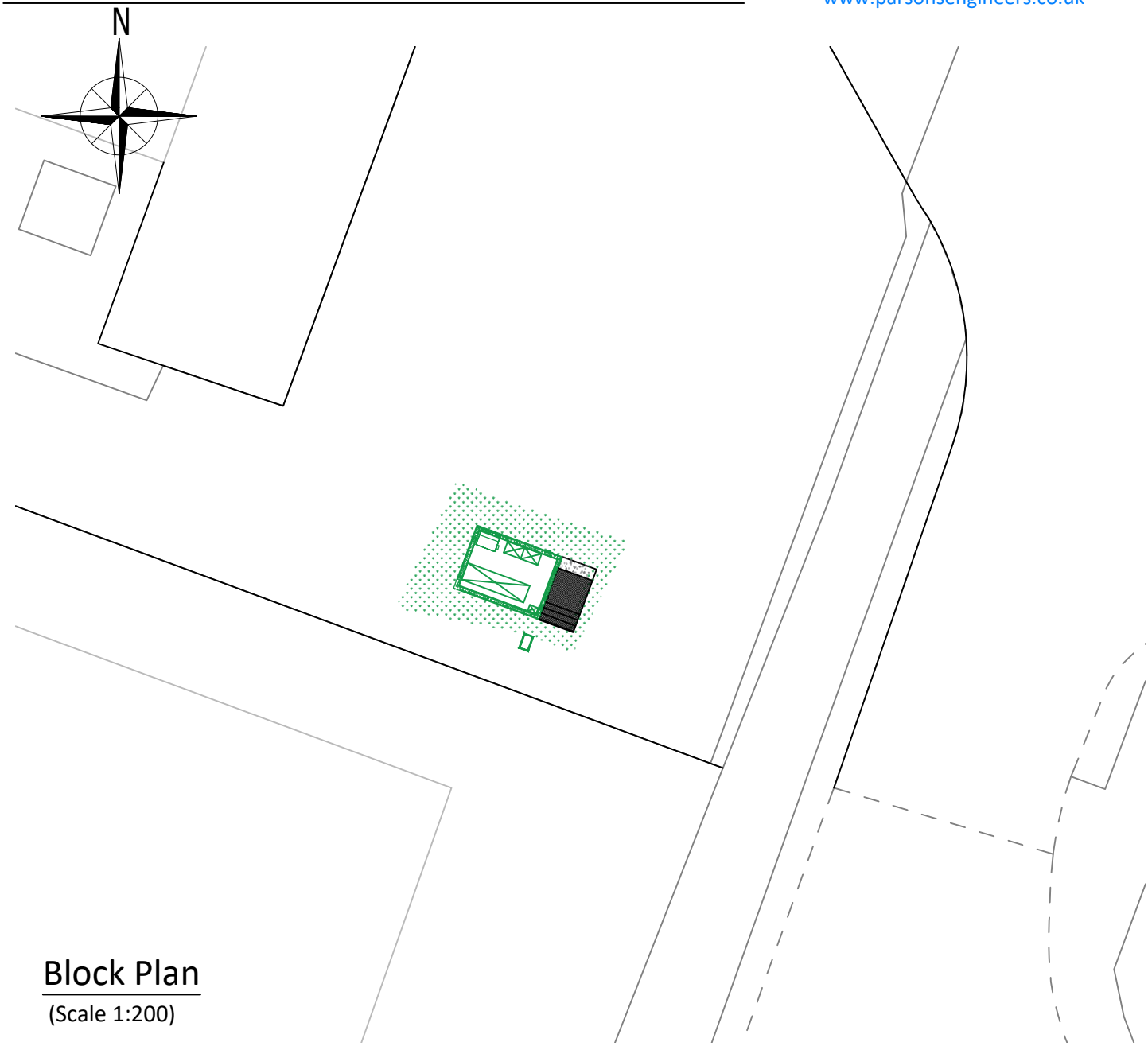
Project: Spalding, Lingarden Bulbs
PE11 3ZN

Title: Block Plan

Drawing No.	Rev	Drawn	Scale	Date
22060-42-006	P3	AJP	1:200 @ A4	July 2023
		Checked TBP		Status Preliminary
		Approved TBP		

P2	Unit raised and stairs added	AJP	07/23
P3	'PoP' location amended	AJP	07/23

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Block Plan

(Scale 1:200)

NOTES

1. All dimensions are in metres unless stated otherwise.

3. This drawing to be read in conjunction with all other relevant drawings and specifications.

4. All proprietary items to be installed in strict compliance with manufacturers instructions and recommendations.

Appendix B - Topographic Survey

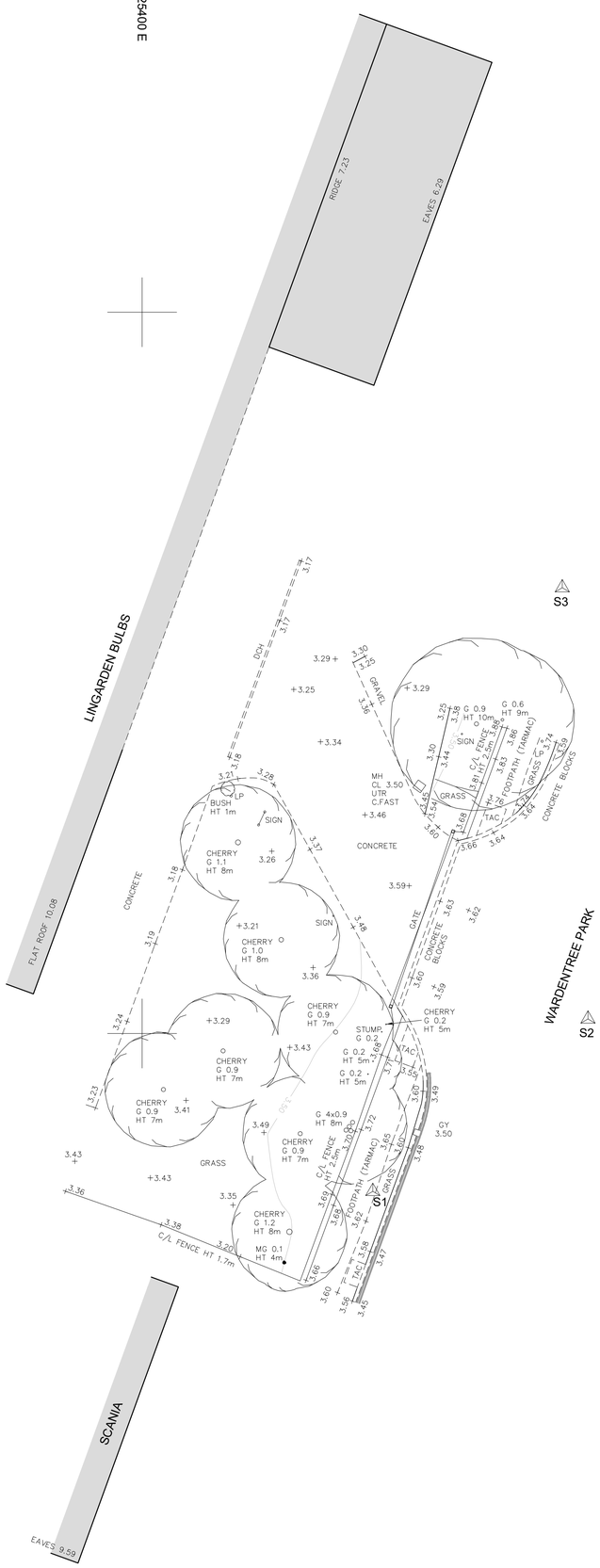
525350 E

525400 E

525450 E

325350 N

325300 N



Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99979 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.

Coordinate Table

Station	Description	Easting	Northing	Level
S1	Hilti Nail	525415.991	325289.055	3.633
S2	Hilti Nail	525430.908	325301.007	3.681
S3	Hilti Nail	525429.125	325330.900	3.881

TOPOGRAPHICAL KEY

SURVEY STATION 5
BANKING (TOP / BOTTOM)
HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
TREES (SPREAD & GIRTH SHOWN TO SCALE)
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR 25.50
SPOT LEVEL + 127.13
SONAR LEVEL ○ 127.13
BORE HOLE BH
TRIAL HOLE TH

GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
AVERAGE	Av.
BACK DROP	BD
BASE LEVEL	BL
BELISHA BEACON	BB
BOLLARD	BO
BOLLARD LIGHT	BOL
BRICK	BK
BUS STOP	BS
CABLE RISER	CR
CABLE TV COVER	CATV
CABLES TO GROUND	CTG
CATCH PIT	CP
CONTROL BOX	CB
COVER LEVEL	CL
CROSSING CONTROL BUTTON	CCB
DAMP PROOF COURSE	DPC
DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
EARTH ROD	ER
FIRE HYDRANT	FH
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GULLY	GY
HARD BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
P-TRAP	PT
POST	PO
POST BOX	P.BOX
RODDING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
SOIL VENT PIPE	SVP
SURFACE WATER	SW
TACTILE PAVING	TAC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TOP OF WALL	TOW
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	B/W
CLOSE BOARDED FENCE	C/B
CONCRETE PANEL FENCE	CPL
CORRUGATED IRON FENCE	CI
CHAIN LINK FENCE	C/L
CHESTNUT PALING	CNP
IRON RAILINGS	I/R
LARCH LAP FENCE	L/L
POST AND RAIL FENCE	P/R
POST AND WIRE FENCE	P/W
WIRE MESH FENCE	W/M

Revision	Description	Surv. by	Check. by	Appr. by	Date

0m 2 4 6 8 10 12 14 16 18 20 22

Topographical Survey

Client:

Aegaea Limited

Wardentree Park
Spalding
Lincolnshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A1	1	July 2023

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
32864	-	KF	AS	NL

mksurveys

www.mksurveys.com www.surveys4bim.co.uk
Head Office: Milton Keynes t: 01908 565561 e: mail@mksurveys.co.uk

Appendix C - EA Data (Tidal Welland (2016, 2115).

Lisa Slater
lisa@aegaea.com

Our ref: CCN-2023-317510

Date: 28/07/2023

Dear Lisa,

Provision of Flood Risk Information for Wardentree Park, Pinchbeck, Spalding.

Thank you for your request for our flood risk information for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risk, such as consequence of a breach in defences.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Please read the letter in full as the information covered has been updated in **June 2023.**

1. Flood Map for Planning

The attached map includes the current Flood Map for Planning for your area. 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. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map for Planning also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map for Planning only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

2. Recorded Flood Outlines

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change. It is possible other flooding may have occurred which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

3. Schemes in the area

There are no ongoing capital projects to reduce or sustain the current flood risk to this site.

4. Fluvial Flood Risk Information

This site is not considered to be at risk of flooding from main rivers.

The site may be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

5. Tidal Flood Risk Information

This site is considered to be at risk from tidal flooding.

5.1 Tidal Defence Information

The existing tidal defences protecting this site consist of earth embankments.

They are in fair condition and reduce the risk of flooding (at the defence) to a 1% (1 in 100) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

Refer to paragraph 3 for details of any ongoing capital projects to reduce the flood risk to this site.

5.2 Tidal Flood Levels

The attached data sheets show our current best estimate for extreme tide levels.

Please read the information notes on the data sheets.

5.3 Tidal Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available along the full coastal / tidal floodplain, except the tidal Witham Haven in Boston (upstream of Hobhole) where only breaching and not overtopping has been modelled and the tidal River Welland upstream of Fosdyke Bridge where neither breaching nor overtopping are available.

The number of locations we have this information for is expected to increase in time.

Detailed Hazard Mapping is available within the 2017 Update of South Holland Strategic Flood Risk Assessment. This can be downloaded via the following link:
http://www.southeastlincslocalplan.org/water/

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from breaching of the defences at specific locations for the scenarios below. For some locations the breach mapping also includes flooding from overtopping if this is expected in that scenario. The location of modelled tidal breaches is shown on a separate attached map.

5.3.1 Tidal Hazard Mapping – Breaches

- Year 2006 0.5% (1 in 200) chance
- Year 2006 0.1% (1 in 1000) chance
- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

5.3.2 Tidal Hazard Mapping - Overtopping

Your site is not affected by overtopping of the defences for the present day (2006) and climate change (2115) scenarios, though may be at risk from breaching.

6. Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at LNplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at
https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals.

General advice on flood risk assessment for planning applications can be found on GOV.UK at https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

Climate change will increase flood risk due to overtopping of defences. Please note, unless specified otherwise, the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in **July 2021**. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

7. Data Licence and Other Supporting Information

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

This information is provided in accordance with the Open Government Licence which can be found here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Further information on flood risk can be found on the GOV.UK website at:
https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

8. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. The Flood Map for Surface Water can be viewed at https://www.gov.uk/check-long-term-flood-risk

Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact Annabelle Webster using the email address below and quoting our CCN reference number above.

Yours sincerely,

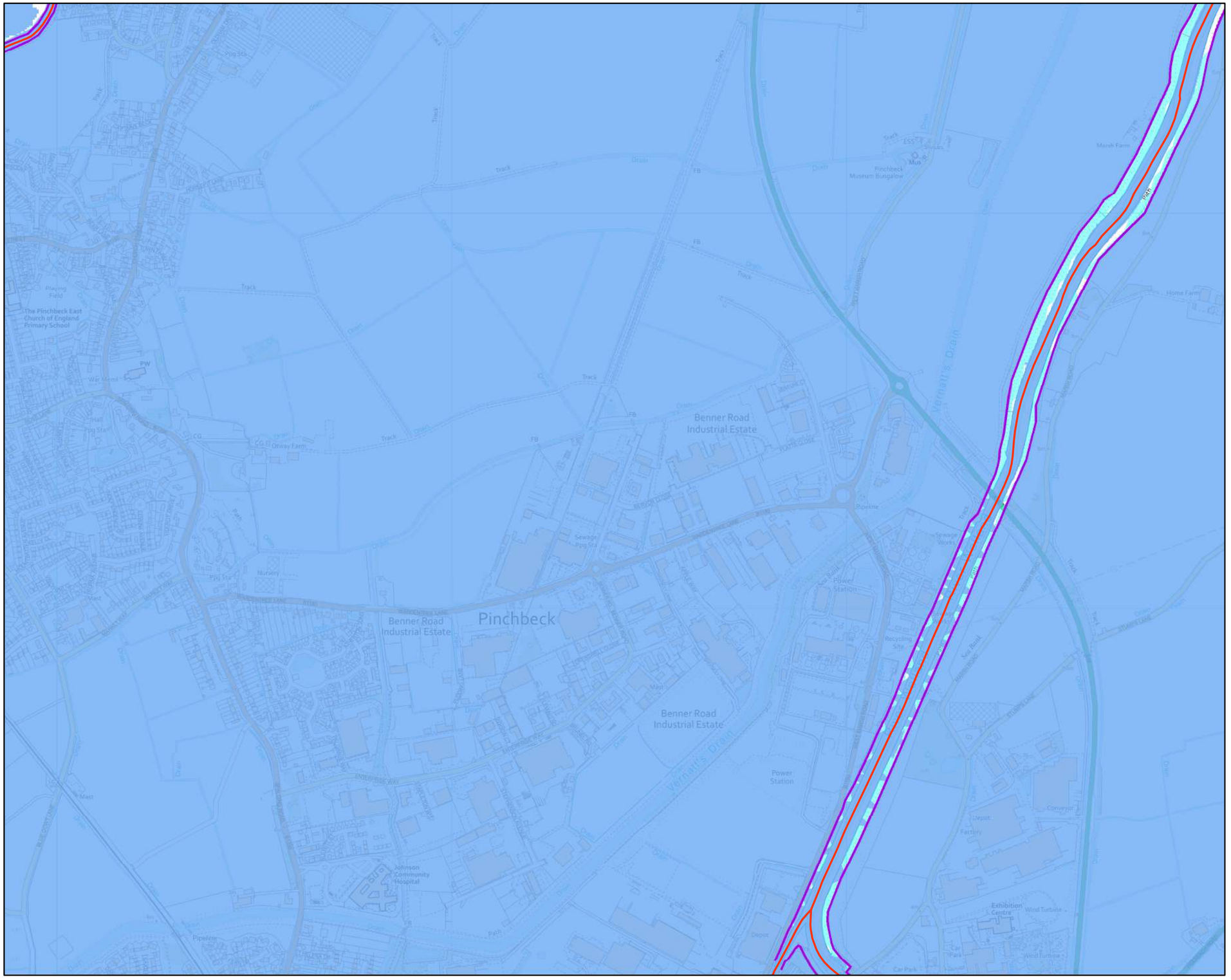


020 302 53535

for Alastair Windler
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map for Planning
Tidal Level Data Sheets - Map and Tables
Tidal Breach Points – Locations Map
Hazard Mapping – Breaching

Flood Map centred on TF 25413 25301 - created July 2023 [Ref: CCN-2023-317510]



Environment Agency

Scale 1:10,000

N

Legend

- Main Rivers
- Raised Defences
- Flood Storage Areas
- Areas at Risk of Flooding from Rivers or the Sea
- Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.

- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

East Coast and Wash - 2018 Coastal Flood Boundary [CFB] Dataset
Key Node Points



Environment Agency

Scale 1:550,000

N W E S

▲ East Coast and Wash

See separate data sheet for predicted flood levels

Created by the Partnerships and Strategic Overview Team, Lincoln

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East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

CFB Ref	Location	Easting	Northing	Annual Chance (1 in x) of Tide Level in metres ODN																		
				1			10			50			100			200			300			1000		
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound		
				2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%
3888	**Immingham**	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01
3890	**Haborough Marsh**	522100	416512	4.14	4.15	4.17	4.48	4.51	4.60	4.70	4.77	4.97	4.80	4.90	5.16	4.90	5.03	5.38	4.94	5.10	5.51	5.11	5.34	5.97
3898	**Grimsby**	529295	413162	3.98	3.99	4.01	4.31	4.34	4.43	4.53	4.60	4.80	4.61	4.71	4.97	4.71	4.84	5.19	4.74	4.90	5.31	4.88	5.11	5.74
3906	**Buck Beck**	534709	407369	3.87	3.88	3.90	4.19	4.23	4.31	4.41	4.50	4.68	4.50	4.61	4.86	4.61	4.75	5.10	4.64	4.82	5.22	4.80	5.05	5.66
3910	**Tetney**	538035	405537	3.85	3.86	3.89	4.17	4.22	4.30	4.40	4.50	4.67	4.49	4.61	4.86	4.60	4.75	5.10	4.63	4.82	5.21	4.80	5.06	5.66
3918	**Donna Nook**	544641	401997	3.82	3.83	3.86	4.14	4.19	4.27	4.38	4.48	4.65	4.47	4.60	4.85	4.58	4.74	5.10	4.63	4.82	5.22	4.81	5.08	5.68
3928	**Saltfleet**	549131	393360	3.78	3.79	3.82	4.11	4.16	4.26	4.36	4.46	4.64	4.47	4.59	4.86	4.57	4.74	5.11	4.63	4.83	5.25	4.83	5.11	5.74
3942	**Boygrift**	555131	380860	3.72	3.74	3.77	4.06	4.11	4.22	4.33	4.43	4.65	4.43	4.57	4.87	4.56	4.73	5.13	4.62	4.83	5.28	4.85	5.15	5.82
3968	**Gibraltar Point**	557652	356181	4.16	4.17	4.20	4.51	4.56	4.67	4.76	4.85	5.08	4.85	4.97	5.27	4.94	5.10	5.49	4.99	5.18	5.63	5.14	5.41	6.09
3992_14	**Hobhole**	535990	340116	4.96	4.97	5.01	5.40	5.44	5.56	5.66	5.76	5.98	5.78	5.90	6.20	5.88	6.04	6.44	5.92	6.11	6.57	6.03	6.31	6.99
	Grand Sluice*	532366	344510	4.93	4.94	4.98	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
3992_9	**Boston Barrier**	532754	342852	4.93	4.94	4.98	5.41	5.45	5.57	5.73	5.83	6.05	5.85	5.97	6.27	5.93	6.09	6.49	5.94	6.13	6.59	5.98	6.26	6.94
3992_5	**Fosdyke Bridge**	531886	332234	4.87	4.88	4.92	5.31	5.35	5.47	5.58	5.68	5.90	5.71	5.83	6.13	5.82	5.98	6.38	5.87	6.06	6.52	6.01	6.29	6.97
4008	**West Lighthouse**	550094	329971	4.87	4.88	4.91	5.21	5.26	5.37	5.46	5.56	5.78	5.56	5.68	5.98	5.66	5.82	6.21	5.71	5.90	6.35	5.86	6.14	6.81
-	**Marsh Road**	525988	324065	-	5.04	-	-	5.44	-	-	5.73	-	-	5.85	-	-	5.98	-	-	-	-	-	-	-
-	**Wisbech**	546110	309940	-	4.83	-	-	5.25	-	-	5.53	-	-	5.66	-	-	5.78	-	-	-	-	-	-	-
-	**Dog-in-a-Doublet**	527200	299287	-	3.67	-	-	4.00	-	-	4.22	-	-	4.32	-	-	4.42	-	-	-	-	-	-	-

See next page for notes

Customer services line: 03708 506 506
Calls to 03 numbers cost the same as calls to standard geographic numbers
(i.e. numbers beginning with 01 or 02)

Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

The following notes apply to all CFB sites (ie all on table excluding Marsh Road, Wisbech, Dog-in-a-Doublet)

- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at https://deframetadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590

The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These levels will be updated as their respective tidal river models are updated.

The following notes apply to Grand Sluice

- Grand Sluice remains the tidal limit for the River Witham.
- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier which raises for tides above this level.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at https://deframetadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590

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Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

KINGSTON UPON HULL to

Rotterdam (Europort)	11 hrs
Zeebrugge	12 hrs

★ **Modelled Breach Locations**

0 3.5 7 14 Kilometers

This map idicates the location of where we have modelled the consequence of breaches in the defences along the coastline and tidal rivers. We have mapped the maximum values of Hazard Rating (Danger to People), Depth and Velocity.

We have not assumed that all breaches occur at the same time, but have modelled each breach individually and overlaid the results to find the maximum values.

Our modelling only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. Our defences generally provide a good standard of flood defence but a risk of breaching remains.

Please contact the Environment Agency for information on how these maps are used in the management of flood risk.

General Enquiries No: 03708 506 506.
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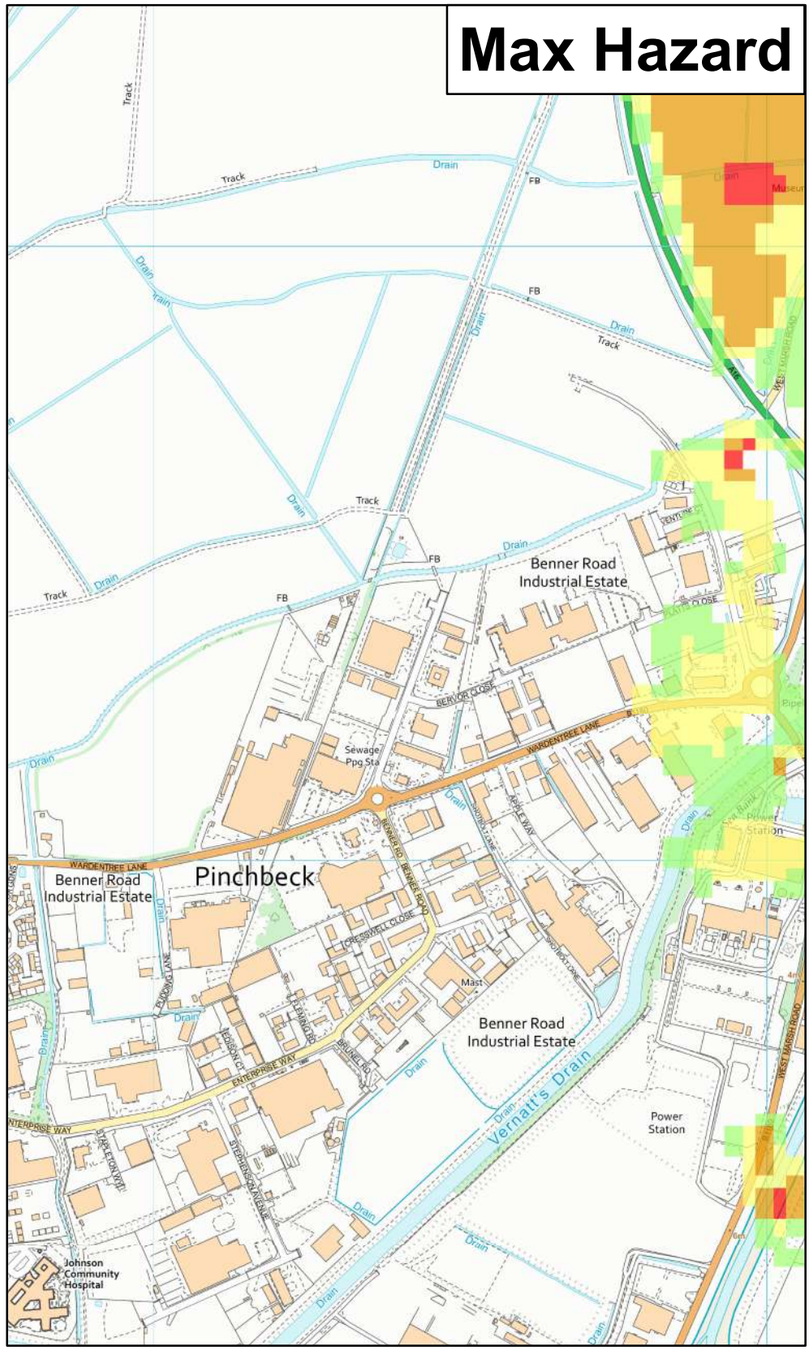
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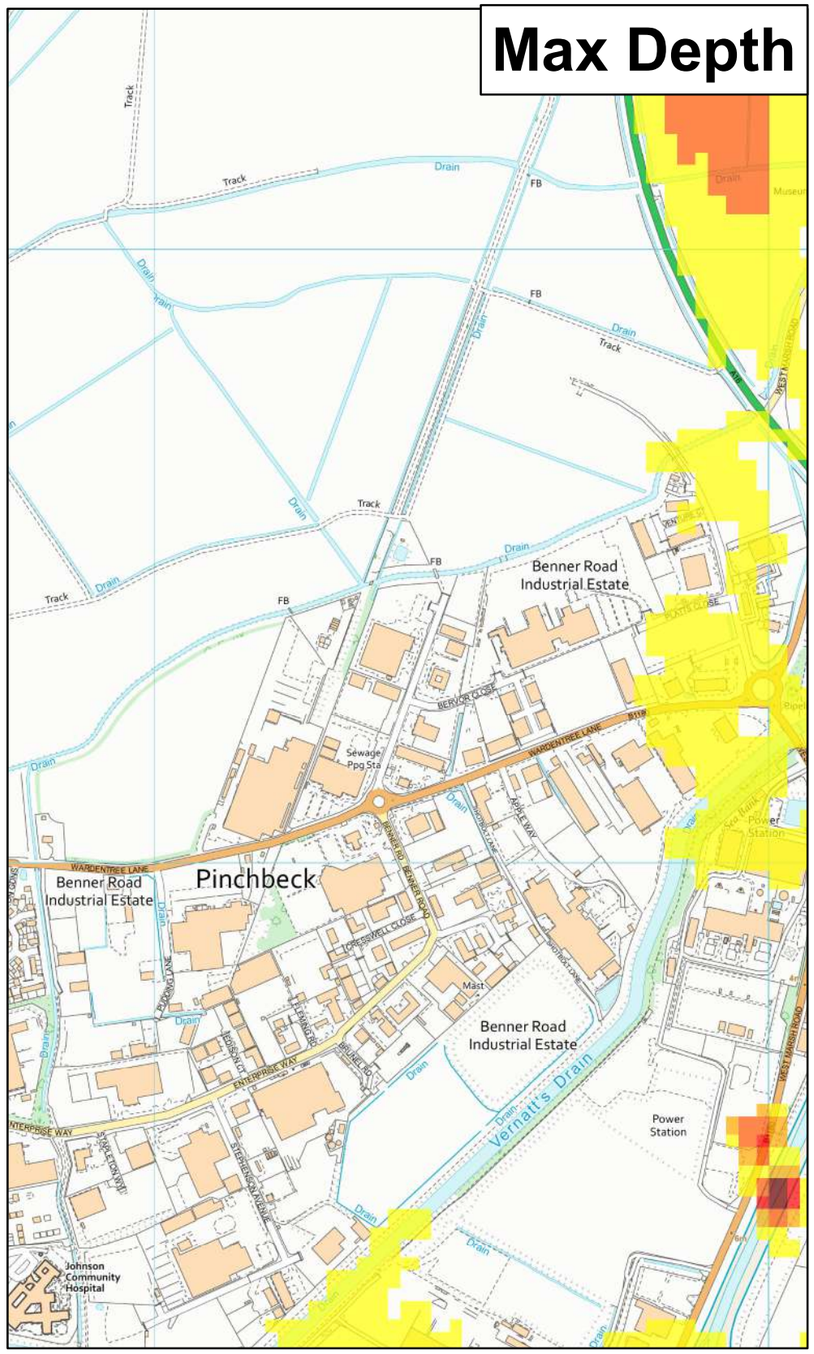
Produced by the Partnership and Strategic Overview Team, Lincoln
General Enquiries No: 03708 506 506

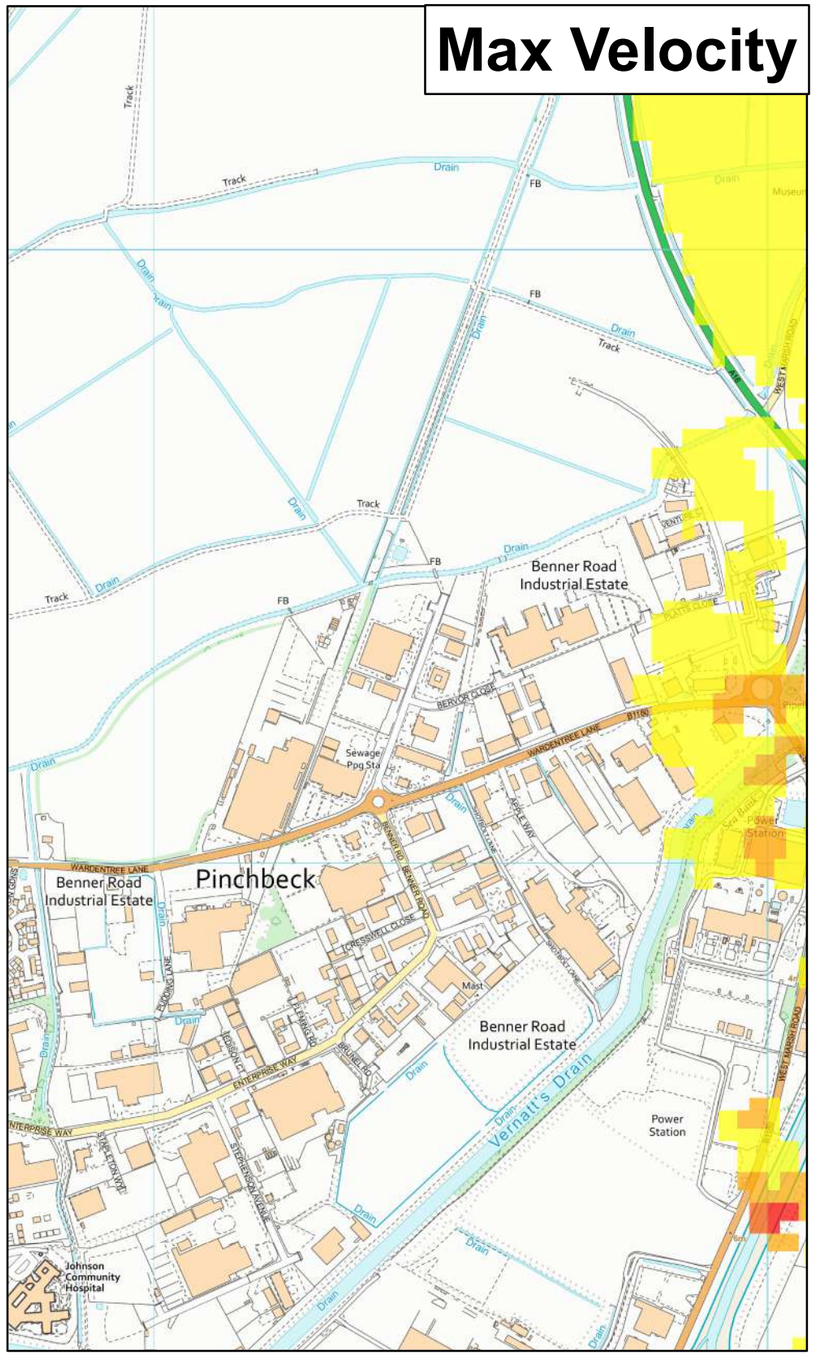
Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

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★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 1.6
- 1.6 +

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 +

Date Printed	July 2023	**Scenario year**	2006	**Scenario Annual Chance**	0.5% (1 in 200)	**CCN Number**	CCN-2023-317510

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

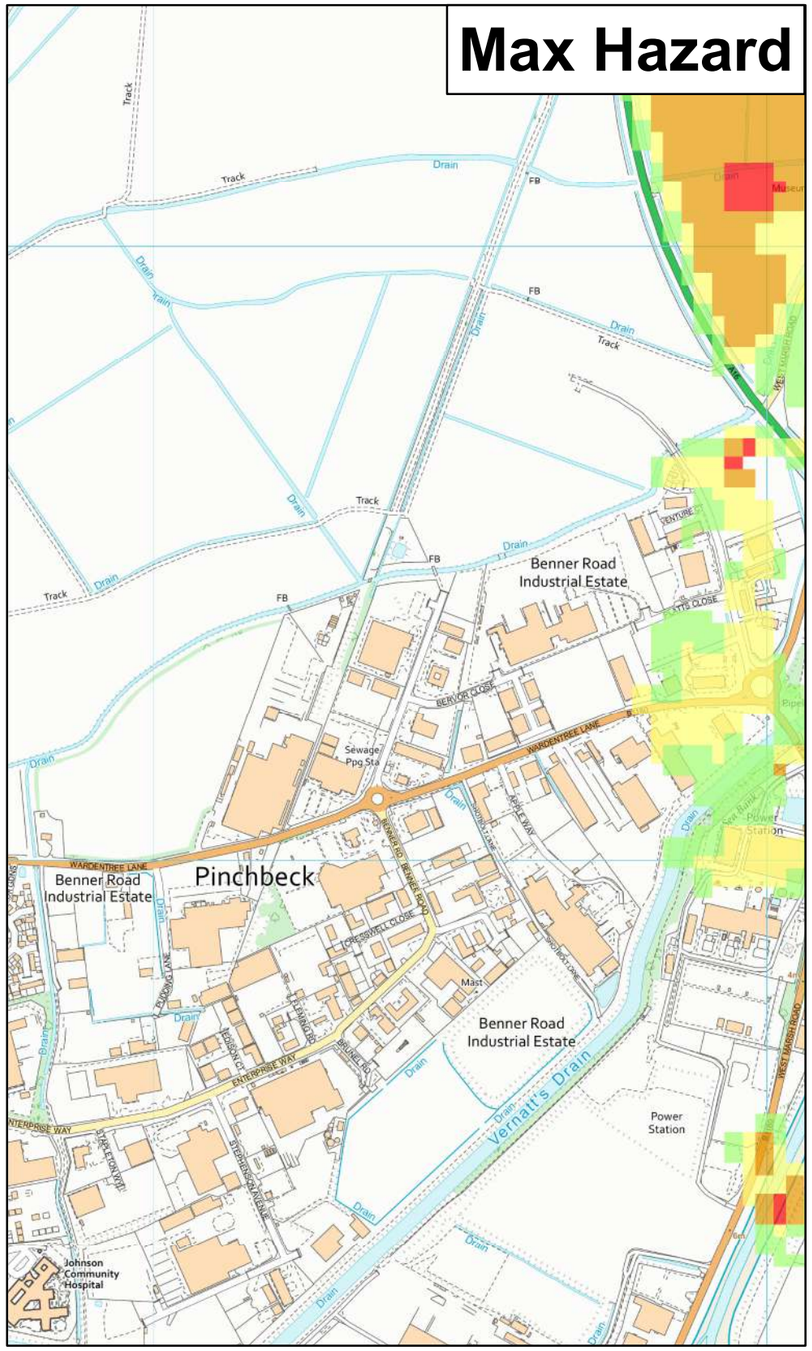
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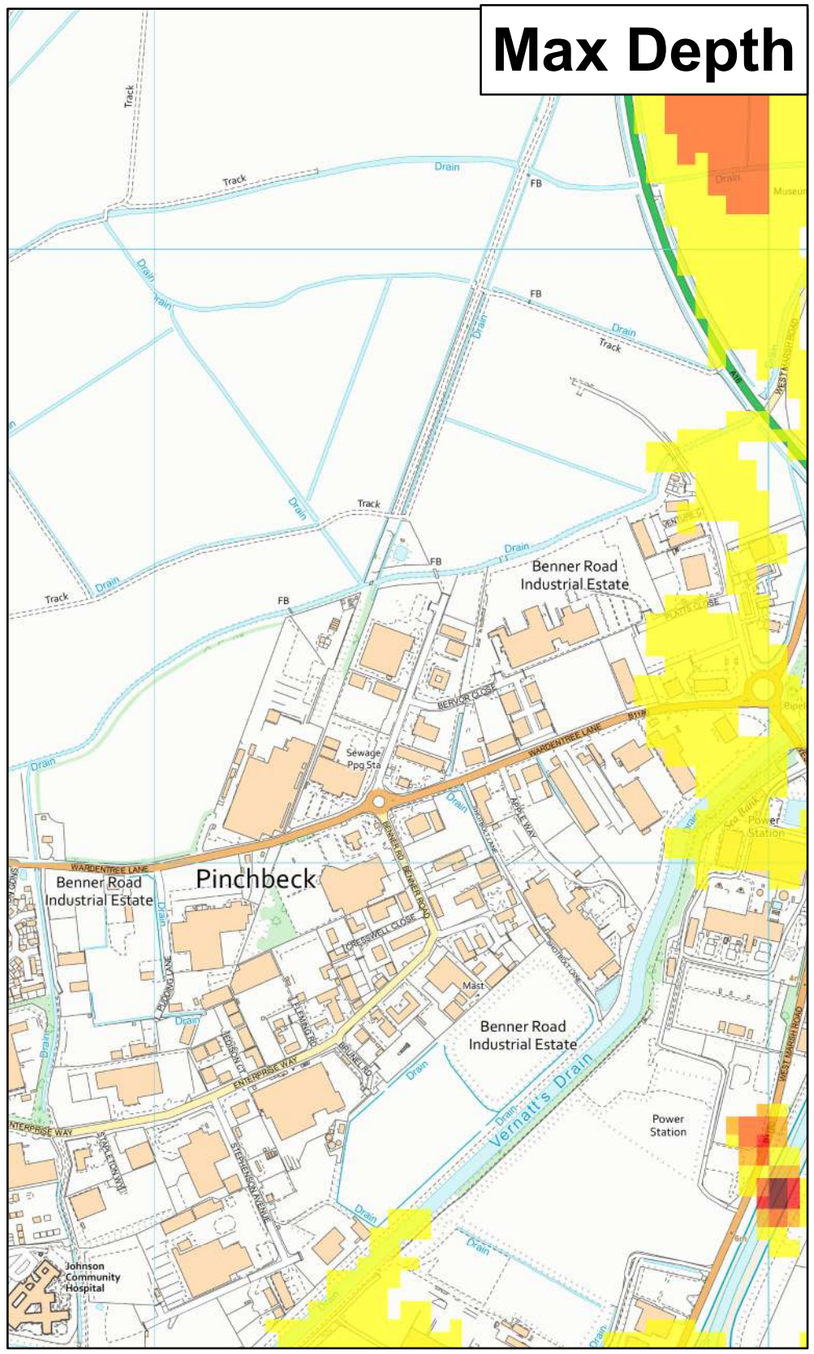
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

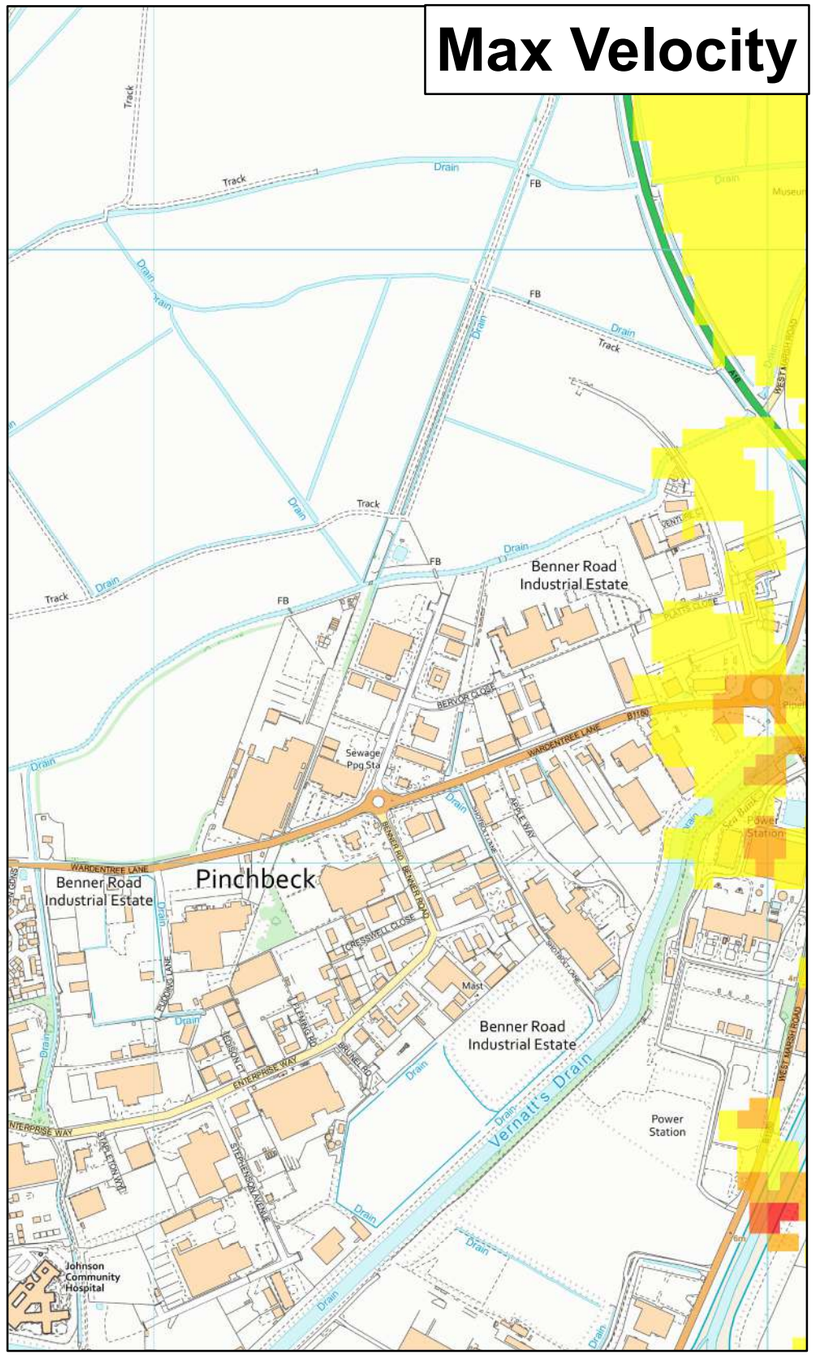
Map Centred on TF 25413 25301

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★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard (Flood Risk to People : FD2320)	Max Depth (m)	Max Velocity (m/s)
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.3
Between 0.75 and 1.25 (Danger for Some)	0.25 - 0.50	0.3 - 1.0
Between 1.25 and 2.0 (Danger for Most)	0.50 - 1.0	1.0 - 1.5
Greater than 2.0 (Danger for All)	1.0 - 1.6	1.5 - 2.5
	1.6 +	2.5 +

Date Printed	July 2023	**Scenario year**	2006	**Scenario Annual Chance**	0.1% (1 in 1000)	**CCN Number**	CCN-2023-317510

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

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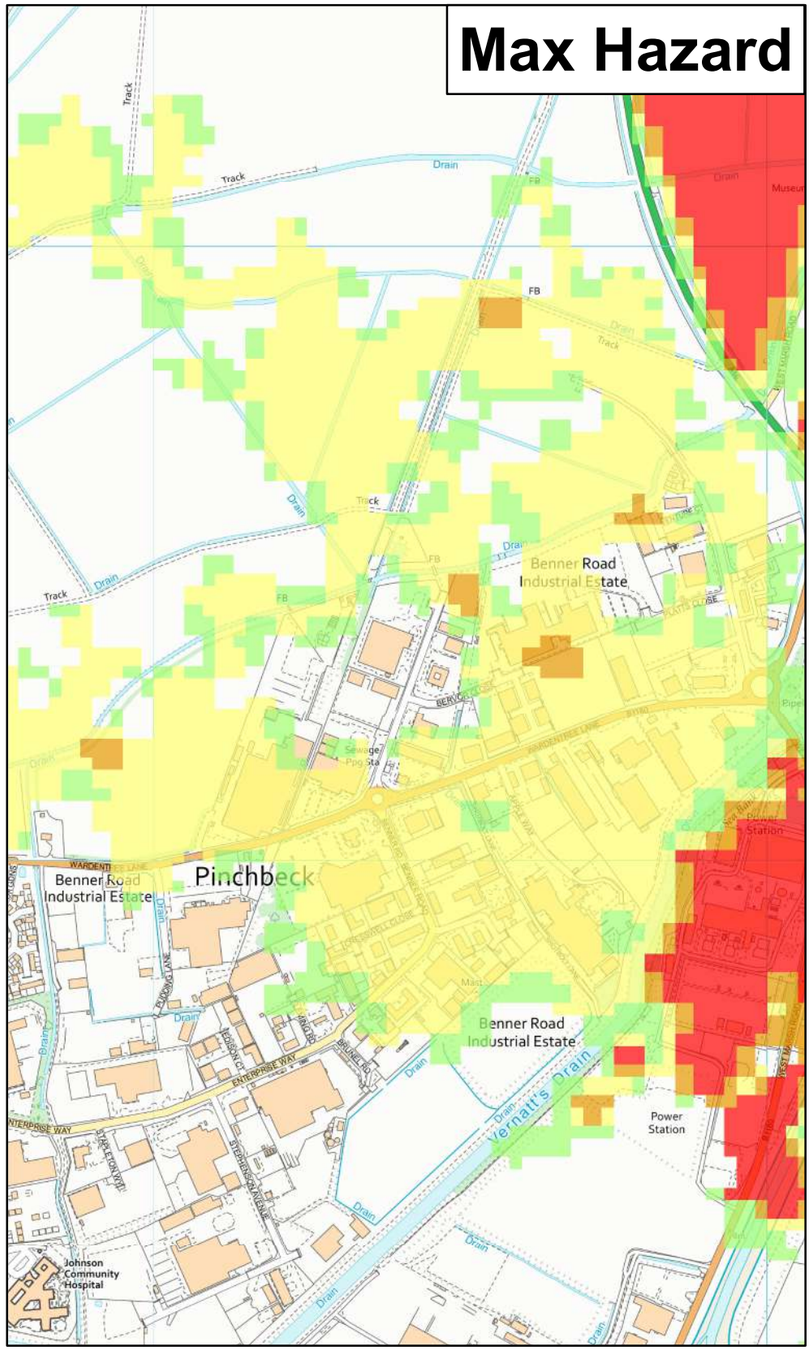
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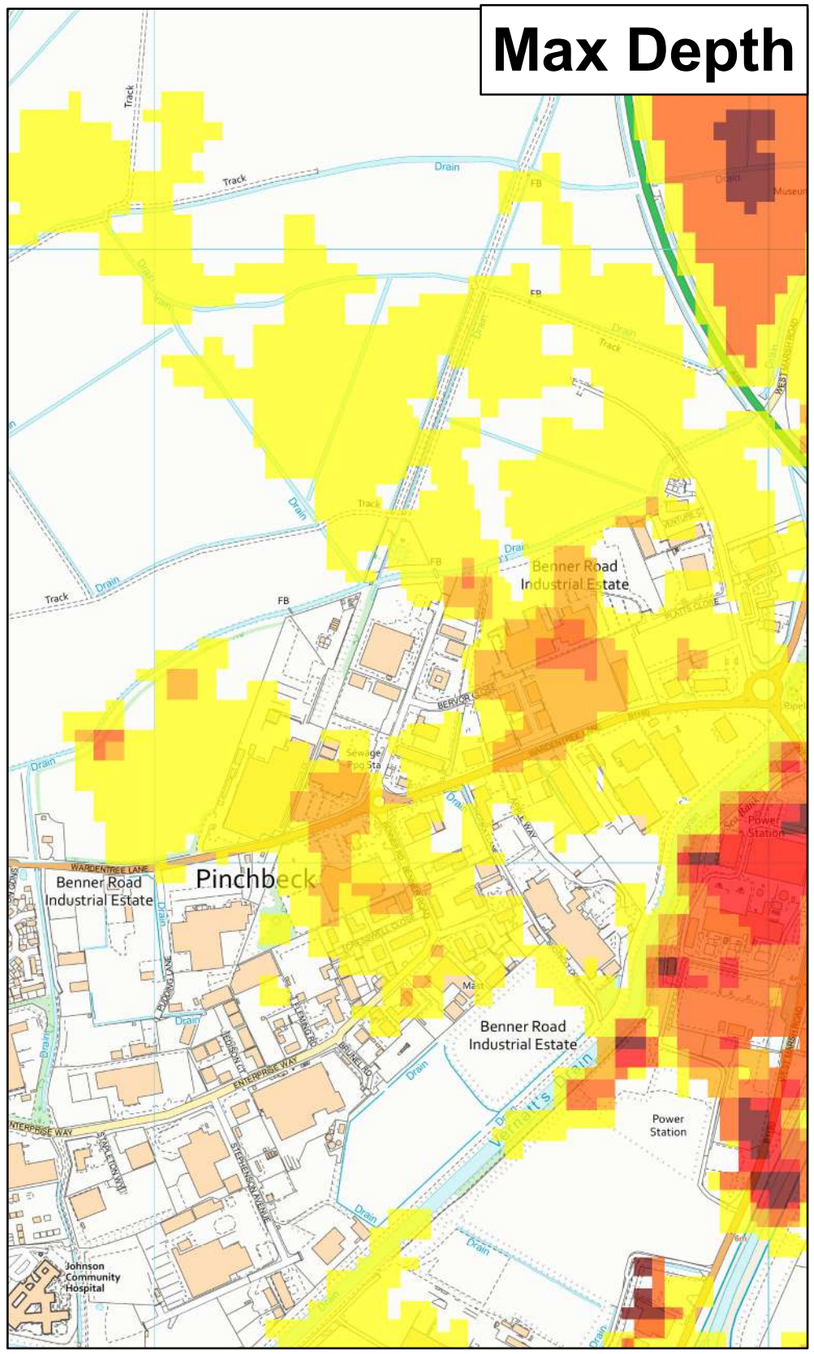
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

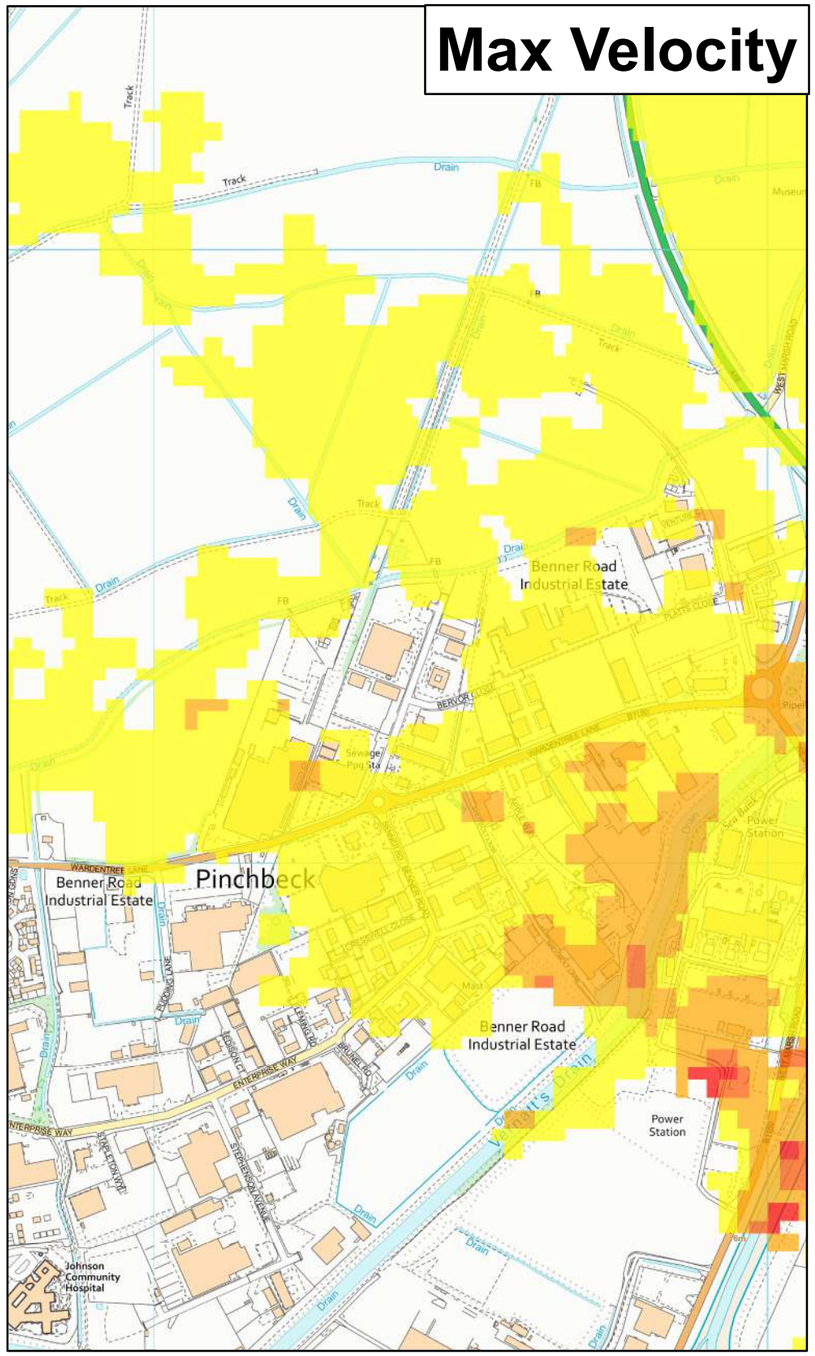
Map Centred on TF 25413 25301

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★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

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- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 1.6
- 1.6 +

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 +

Date Printed	July 2023	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2023-317510

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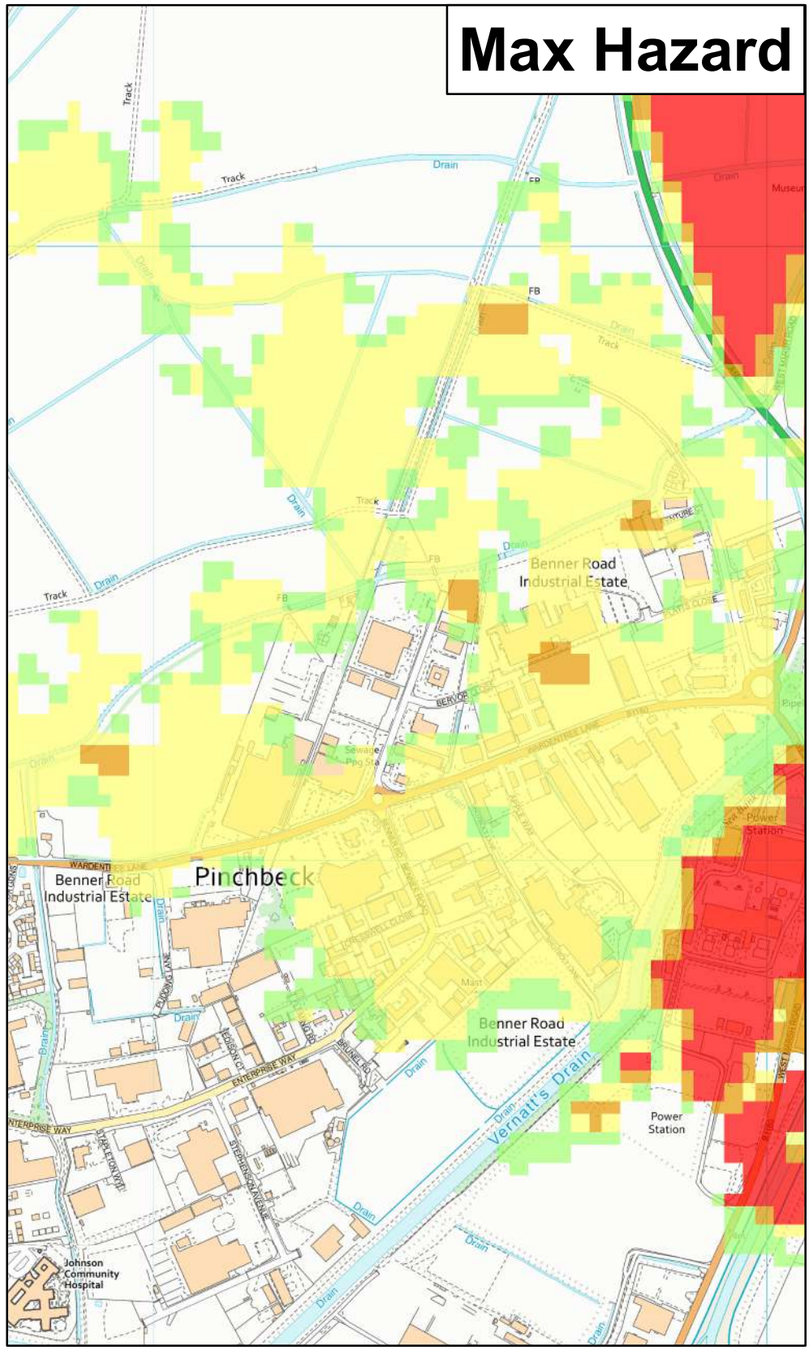
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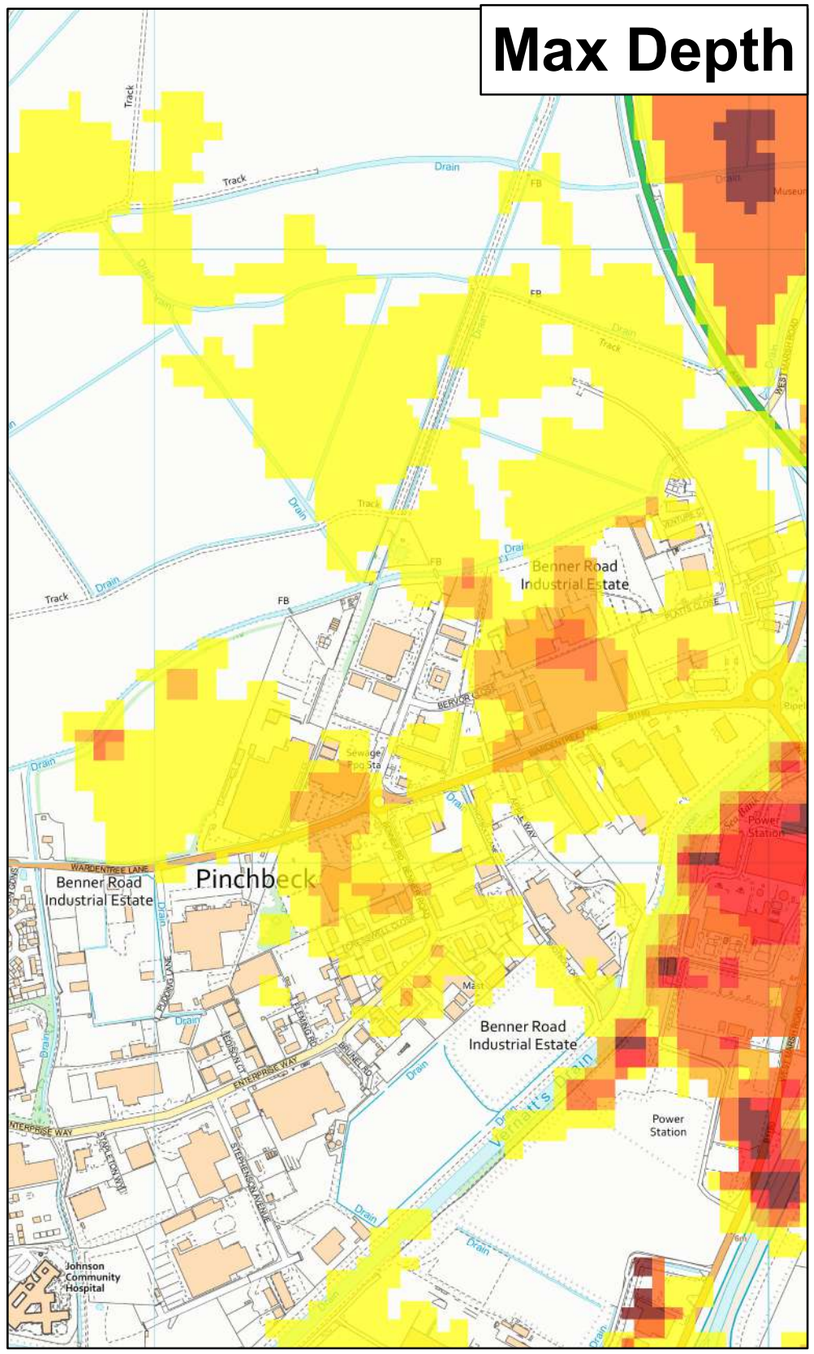
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

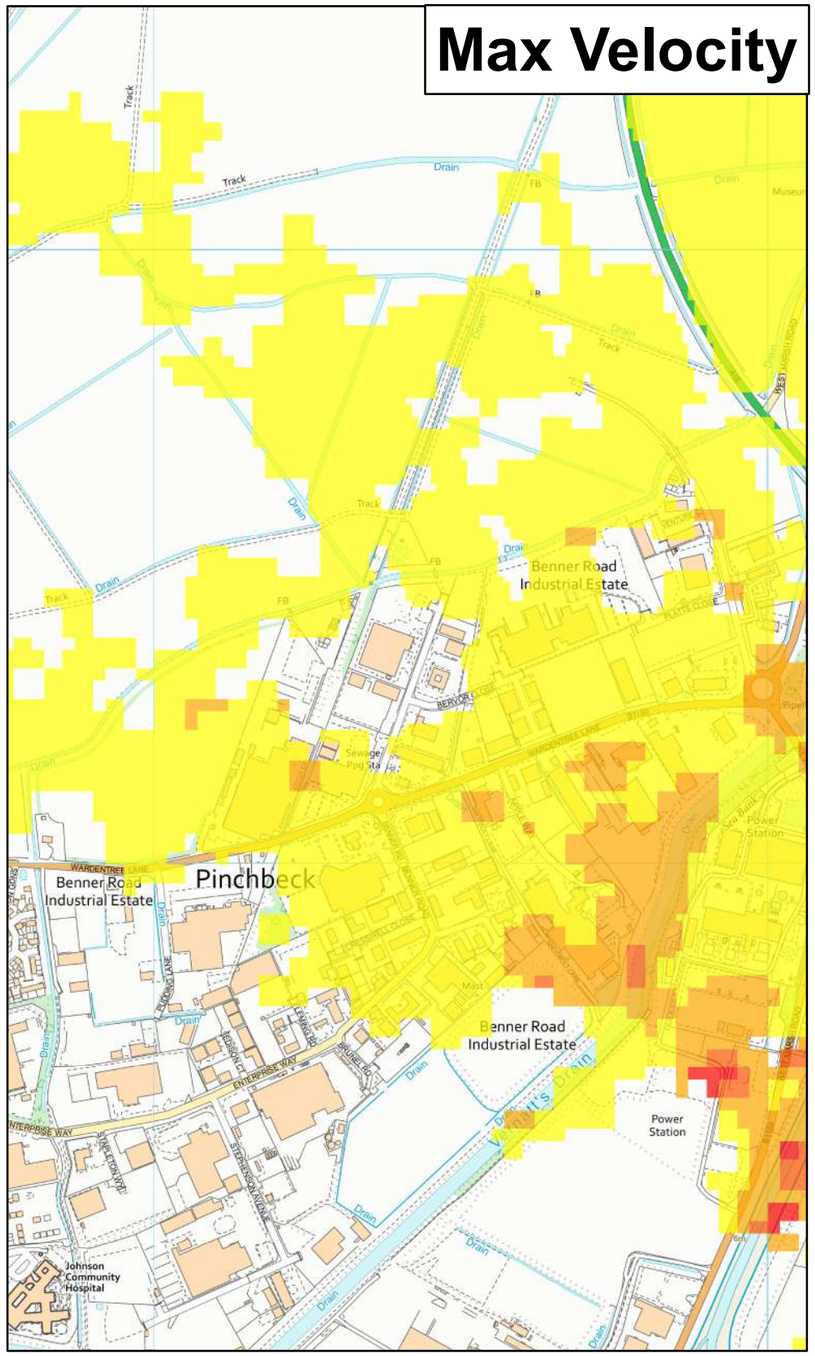
Map Centred on TF 25413 25301

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(Flood Risk to People : FD2320)

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- Between 1.25 and 2.0 (Danger for Most)
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Max Depth (m)

- 0 - 0.25
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- 0.50 - 1.0
- 1.0 - 1.6
- 1.6 +

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 +

Date Printed	July 2023	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2023-317510

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Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 25413 25301

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