

LAND OFF STEPHENSON AVENUE, SPALDING, LINCOLNSHIRE

FLOOD RISK ASSESSMENT

Job Number: FRA 23 1114

Date: September 2023

Client: Euro-Tel Design



INCREASING LAND VALUE

LK
GROUP

LK Consult Document Verification

Site Address	Land off Stephenson Avenue, Spalding, Lincolnshire, PE11 3SW		
Report Title	Flood Risk Assessment		
Job Number	FRA 23 1114	Document Ref.	FRA 23 1114 - FRA - R0
Date Issued	September 2023	Report Version	R0
Prepared By	Jenna Lowe – Flood Risk Engineer	Reviewed By	Mark Jones- Associate

Revision Record

Revision No.	Date	Nature of Revision	Approved By

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EXECUTIVE SUMMARY

Scope and Background

This Flood Risk Assessment (FRA) has been undertaken by LKC to support a planning application for the development of land off Stephenson Avenue, Spalding. The development comprises a fibre cabin on concrete base with associated car parking

LKC has prepared this FRA in line with the NPPF and Technical Guidance where appropriate.

In considering the proposals the following key principles have therefore been applied:

- Identification of flood risks.
- Protection of users of the new development.
- No increased flood risk to third parties.

Consultations

The Environment Agency (EA) has been consulted to inform the preparation of this report. They have provided a more detailed flood map and the adjacent modelled flood levels for the River Welland to the south east of the site.

Lincolnshire County Council - Lead Local Flood Authority (LLFA) and Anglian Water (AW) were also consulted concerning flood risk.

All relevant consultees have confirmed that there is a Negligible to Low risk of flooding to this site from all sources except fluvial sources which poses a Medium to High risk of flooding.

Flood Risk

EA flood maps indicate that the site is potentially vulnerable to fluvial flooding from the Vernatt's Drain and River Welland, southeast of the site.

The site is shown on the EA Flood Zone Mapping website as being in a Defended Flood Zone 3 (PPG Table 1).

The site is in a defended Flood Zone 3 – Medium risk - annual probability of flooding of 1.0% or greater from rivers.

The SFRA indicates that the hazard maps should be utilised to measure the potential depth of flooding at any location.

Mitigation

Design

Site falls will be arranged to allow reasonably level access for occupants and visitors and allowing the site to be free-draining in case of local ponding at times of heavy rainfall. Vulnerable equipment should be set as high as practical above the flood level giving regard to necessary access for the less-able.

The development will not result in a reduction in flood plain storage compared to the existing situation.

Access

Access close to the site is lower than the potential flood levels and the requirement for an evacuation plan will need to be discussed with the LPA to discuss safe access to and from the site from Stephenson Avenue.

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1 Introduction

1.1 Background

LKC were commissioned by Euro-Tel Design Ltd to carry out an FRA for land off Stephenson Avenue, Spalding, Lincolnshire. The report was undertaken in support of a future planning application to redevelop the site for commercial use.

The report will address the vulnerability to flooding from all possible sources and will also consider the impact of the development on surface water runoff accounting for climate change and the potential to increase flood risk elsewhere. The issues of actual flood risk are discussed in Section 4.

Government policy with respect to development in flood risk areas is contained within the Department of Communities and Local Government National Planning Policy Framework¹ and accompanying Technical Guidance of March 2012 (revised to the Planning Practice Guidance (PPG)², which supersedes Planning Policy Statement 25 (PPS25) 'Development and Flood Risk'. The guidance on Climate Change allowance issued by the Environment Agency in June 2022 has also been considered.

LKC has prepared this FRA in line with the NPPF and the PPG where appropriate. The level of detail entered into any flood risk assessment is dependent upon the scale and potential impact of the proposed development, and the vulnerability classification of the proposed land-use.

1.2 Site Details

A summary of the general site details is presented in Table 1-1. Plans, Drawings and Figures are provided in Appendix A. Figure 1 indicates the site location and boundary. Figure 2 indicates the proposed development.

Site Details	
Location	Land off Stephenson Avenue, Pinchbeck, Spalding, Lincolnshire, PE11 3SW. Centred at approximate National Grid Reference 525230E, 324395N.
Area	Approximately 0.18 Ha.
Topography	4.91 metres above ordnance datum (AOD) in the north of the site and 3.05m AOD in the south. The site is sloping down from the north towards the southern boundary.
Current Land Use	<u>Site</u> Maintained grassland, bounded by chain link fencing. <u>Surrounding Area/ Boundary Treatment</u> North: Industrial Estate. East: Car park and field beyond. South: Commercial property and Vernatt's Drain. West: Industrial units.
Proposed Development	Fibre booster cabin on concrete base with associated maintenance car parking. Access will be from Stephenson Avenue.

Table 1-1: Summary of site details.

¹ DCLG (2021). "National Planning Policy Framework." Department of Communities and Local Government. July 2021.

² DCLG (2016). "Planning Practice Guidance" <http://planningguidance.communities.gov.uk>, November 2016.

2 Site Setting

2.1 Vulnerability

As an initial phase in identifying whether a site is potentially at risk of flooding, LKC has consulted the EA's Flood Zone Mapping website. This mapping is (often) based on coarse scale modelling and provides only an initial indication of the flood risk to a site. The EA Flood Zone maps were developed using a very coarse Digital Elevation Map (DEM) and are superseded by a more detailed analysis of modelled flood levels and topographic survey levels.

The Flood Zones divide the floodplain into three categories of flood risk, and do not take flood defences into account. The NPPF defines the Flood Zones as:

- Flood Zone 1 – Very Low Risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000).
- Flood Zone 2 – Low Risk, with annual probability of flooding of 0.1 to 1.0% from rivers and 0.1 to 0.5% from the sea.
- Flood Zone 3 – Medium to High risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.

The Flood Zone Mapping indicates the site as being within a Defended Flood Zone 3 in the PPG (paragraph 065, Table 1) so under current regulations a Flood Risk Assessment will be necessary to accompany the Planning Application.

The proposed development is for commercial infrastructure and this is classified within the 'Highly Vulnerable' category in the PPG (paragraph 066, Table 2).

2.2 The Sequential and Exception Tests

The NPPF requires that the Sequential Test be applied to development proposals in Flood Zones 2 or 3 to determine if there are any 'reasonably available' and suitable alternative sites at lower flood risk. The Sequential Test is outside this scope of works and shall be undertaken by others.

Notwithstanding the above, the principles outlined in the Sequential Test guidance should be applied for developments within the site such that, for example, dwellings are situated on a high part of the site when there is a risk of local surface water flooding. The issues of actual flood risk are discussed below. The issues of safety and reduction in flood risk to others required by an Exception Test are also addressed in this document.

The Local Planning Authority (LPA) will make the final decision with regard to any planning application.

2.3 Environmental Setting

LKC has undertaken a review of public domain information including British Geological Survey data, Environment Agency data, historical mapping, and aerial photography to provide a summary of the environmental setting of the site. This is summarised in Table 2-1 below.

Summary of the Environmental Setting			
Geology	Superficial		Tidal Flat Deposits (Clay and silt).
	Bedrock		Oxford Clay Formation (Mudstone).
	BGS Boreholes		BH Ref: TF22SW144, 130m W: Silty clayey topsoil to 0.70m, slightly sandy silty Clay to 1.10m, very silty fine Sand to 2.00m and slightly silty fine to medium Sand to 2.20m. BH Ref: TF22SE75, 215m N: Slightly sandy silty clayey topsoil to 0.30m, slightly sandy very silty Clay to 0.80m, very silty fine to medium Sand to 1.20m, wet medium dense clayey very silty fine to medium Sand to 1.90m and silty fine to medium Sand to 2.00m. (Water struck at 2.00mbgl rising to 1.90mbgl).
	Defra Soilscape Mapping		Type 21 – Loamy and clayey soils of coastal flats with naturally high groundwater.
Hydro-geology	Aquifer Designation	Superficial	Unproductive Strata.
		Bedrock	Unproductive Strata.
	Source Protection Zone (SPZ)		Site not within an SPZ.
Hydrology	All adjacent and internal surface water		Vernatt's Drain is approximately 80m south of the site. The River Welland is approximately 650m south east of the site. The Blue Gowt Drain is approximately 840m north of the site.
	Flooding		Defended Flood Zone 3.
Site History			Historical mapping indicates that the site has consisted of pastureland from the earliest available mapping in 1887. The surrounding area remained vacant until the industrial buildings within the surrounding site vicinity were built after the latest available mapping in 1968. The Lincolnshire Loop railway line was present to the west and is no longer present on current mapping. The Anglo-Scottish Sugar Beet Factory, Sewerage Works and associated settling ponds were present to the east. The Vernatt's Drain is present to the south and River Welland beyond.

Table 2-1: Summary of the Environmental Setting.

2.4 Site and Access Levels

A topographic survey of the site was not provided, therefore opensource LiDAR levels have been extracted to OS GPS datum, and information is included on the drawings in Appendix B. The site elevation ranges from 4.91m AOD in the north to 3.05m AOD in the south. The final site levels and ground floor levels of the facility have not yet been determined. The proposed access would join Stephenson Avenue at around 3.14m AOD.

3 Consultation

Information from all relevant consultees is summarised in Table 3-1 below.

Relevant correspondence / information is provided in Appendices C (EA) and D (others).

For modelled levels refer to extracted Level table and node location map in Appendix C.

Source	Details	
EA	Flood Zone 3: Medium risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.	
	Modelled Levels for River Welland Nearest Node: Spalding_Channel 259 (approx. 650m SE) Tidal Flood Level: Marsh Road (approx. 815m E)	Level of 4.52m for 1% annual probability event. Level of 4.68m for 1% event with 20% climate change allowance. Level of 4.56m for 0.1% annual probability event. Level of 5.98m for 200-year probability event.
	Breach Assessment	The most likely location for a breach of the defences is adjacent to the River Welland to the east of the development location, the effect on the site is likely to be limited.
	Records of Flooding	No records of flooding recorded in the area.
	Records of Flood Warning Service	The site is located within a Flood Warning Area.
	Surface Water Flooding	Very Low risk of surface water flooding up to a depth of 300mm across the entire site.
	Flooding from reservoirs	No risk from reservoirs.
	Additional Information	The existing fluvial defences reducing the risk of flooding from main river to the 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. The existing tidal defences are in fair condition and reduce the risk of flooding to a 1% (1 in 100) chance of occurring in any year.
	No information provided at the time of writing.	
Lincolnshire County Council (LLFA)	Possible or known incidents of highway flooding	Unaware of any current flooding problems associated with Stephenson Avenue.
Anglian Water (AW)	Likely conditions for connecting into their sewerage system	Anglian Water Wastewater Development department was contacted regarding sewer flooding history for the site. Anglian Water confirmed that they did have records of internal or external sewer flooding of properties in the vicinity of the site as a result of overloaded sewers.

Table 3-1: Summary consultee information.

Source	Details	
Strategic Flood Risk Assessment (SFRA)	Hybrid SFRA ³	The site has no history of flooding. The area is protected from flooding by an extensive network of raised engineering defences. The SFRA indicates that the site has a very low residual flood hazard rating. The site has less than the minimum 0.75 (Low Hazard) chance of flooding for the 0.1% residual flood hazard event. The SFRA also indicates that the minimum ground floor levels of commercial developments are set at a minimum of 300mm above the 1% annual probability (1 in 100 year) flood level including an allowance for Climate Change. The hazard mapping indicates a depth of flooding on the adjacent highway of less than 0.25m for the potential flood level.
Preliminary Flood Risk Assessment (PFRA) ⁴	The Preliminary Flood Risk Assessment (PFRA) ³ for the area indicates that there are no records of flooding for the area which conforms with information supplied by the EA.	

Table 3-1: Summary consultee information (continued).

³ Hybrid Strategic Flood Risk Assessment: South East Lincolnshire; 'South East Lincolnshire SFRA' (2017).

⁴ Preliminary Flood Risk Assessment: Lincolnshire Council; 'Preliminary Flood Risk Assessment', (2011).

4 Assessment of Flood Risk

4.1 Flood Zones

The detailed flood map provided by the EA indicates that the site is in a Defended Flood Zone 3.

A direct comparison was made between the provided EA flood levels at this location and the LiDAR levels.

The EA design flood levels are higher than the site. It can be reasonably concluded on the evidence above that the site is in a Defended Flood Zone 3 for the purposes of this assessment.

Comparison of the modelled data and LiDAR data indicates that the 0.5% (200-year plus CC) flood level and the 1% (100-year) fluvial flood level would affect the site.

The extents of the 0.1% (1000-year) flood level cover the development (see Appendix C).

4.2 Sources of Flooding

The risk of flooding from the following flood sources has been considered:

Fluvial – The EA has confirmed the study area is within a Defended Flood Zone 3. Therefore, the flood risk associated with this source is considered significant and should be considered further in terms of vulnerability and flood resilience. The flood hazard mapping indicates that during a breach of the defences the site would be outside of the areas that would flood but would be affected by shallow flooding within its lifetime by shallow flooding. The flood risk associated with this source is considered Medium.

Tidal – The Study area is close to the sea and tidally influenced water bodies. The site is defended from tidal flooding and is below the current 200-year tidal flood level. It is a significant distance from the flood defences and the potential breach location. Over the lifetime of the development if the level of the flood defence is not maintained there is some potential for tidal flood waters to reach the development. Therefore, the flood risk associated with this source is considered Low.

A breach assessment was undertaken for the area adjacent to Marsh Road to the east which showed that the site would not be flooded for many hours.

Pluvial (Rainfall) – The surface water flood risk maps show small areas adjacent to the western boundary in the adjacent highway that have the potential to flood during prolonged heavy rainfall. These areas are associated with natural depressions that are likely to be positively drained following the development process. These areas need consideration within the detailed design or there is the potential to have areas of standing water in gardens and landscaped areas not positively drained if overland flow routes are not considered. Therefore, the risk of flooding from pluvial sources is Very Low but should be considered further during the detailed design.

Surface Water (Overland flow) – This relates to surface water entering the site. Surface water arising from the north of the study area is likely to be intercepted by the highway drains and therefore pose no threat to the development. If there was a drainage failure causing overland flow it would flow towards the southern boundary.

Therefore, the flood risk of flooding from surface water sources is considered Very Low.

Groundwater – The BGS has groundwater records for the study area in the form of borehole records. The records show the water table is recorded at approximately 2.10-1.90mbgl. This makes it possible for groundwater flooding to occur. Therefore, the flood risk associated with this groundwater sources is considered Low as the natural topography will cause any groundwater to be shed towards the southern boundary.

Sewers – Correspondence with Anglian Water states that no property within the vicinity of the site is at risk of internal flooding due to overloaded public sewers. The highway to the west would intercept any overland flow before it enters the site. Therefore, the flood risk associated with sewers is considered Very Low.

Artificial sources – According to the EA online maps, the study area is not at risk from reservoir flooding. Therefore, the flood risk associated with artificial sources is considered Negligible.

4.3 Summary of Flood Risk

Source of Flooding	Risk Assessment Level
Fluvial	Medium
Tidal	Low
Pluvial (Rainfall)	Very Low
Surface Water	Very Low
Groundwater	Low
Sewers	Very Low
Artificial Sources	Negligible

Table 4-1: Summary of Existing Risk Level.

The site is located within a Defended Flood Zone 3 and has a Medium risk of flooding from fluvial sources. A Negligible to Low risk of flooding from all other sources have been identified for the site. The assessments of a range of measures that are feasible for the site are outlined in Section 5.

5 Mitigation Measures

5.1 Proposed Site levels and Developments Level

Current SFRA guidance recommends that the minimum ground floor levels of commercial developments are set at a minimum of 300mm above the 1% annual probability (1 in 100 year) flood level including an additional fluvial allowance for climate change. It is generally accepted that vehicle parking can be accommodated within the flood zone with suitable safeguards. The 'design' flood level for the site should therefore be the 1% annual probability event with allowance for climate change plus an allowance for freeboard. The predicted flood depth on the adjacent highway is less than 0.25m

On the basis of the information provided, this design flood level should be taken as 3.25mAOD. Normal SFRA recommendation is to set the minimum vulnerable equipment level for the development at a minimum of 300mm above the 'design' level, or 3.55mAOD. The lowest levels on site have an approximate level of 3.09m AOD which is below this level.

5.2 Safe Access

Safe and dry access may not be available via Stephenson Avenue (3.07mAOD) to the west at 1.45m below the 1% annual probability event (4.52m AOD). The proposed vehicular access is within Flood Zone 3 therefore a formal evacuation plan may be required.

5.3 Flood Resistance and Resilience

The development proposed may be subject to flooding at more extreme events than those considered. Flood resilience measures should be included into the construction to aid recovery after any event. If utilised, typical measures would include solid floors, use of suitable materials and services fed from above with outlets at high level. The need can be discussed and agreed with building control officers during detailed design. All vulnerable equipment should be raised above the predicted flood level.

5.4 Residual Risk

It is impossible to completely guard against flooding since extreme events greater than the design standard event are always possible. However, ground floor levels should be set 300mm above the predicted depth of flooding for the 1% plus climate change event level. Overland flow routes should be considered in case of drainage failure and the extreme events.

6 Conclusions

The site is currently an area of maintained grassland. The proposal is the development of a fibre cabin and associated car parking.

The site is shown on published mapping to be located within the EA's Defended Flood Zone 3. Comparison of LiDAR data with the EA modelled flood level data indicates that the whole site is in Flood Zone 3 – Medium Risk of fluvial flooding.

A Medium Risk of flooding from fluvial sources and a Negligible to Low risk of flooding from all other sources have been identified from information provided by the EA, BGS and LLFA.

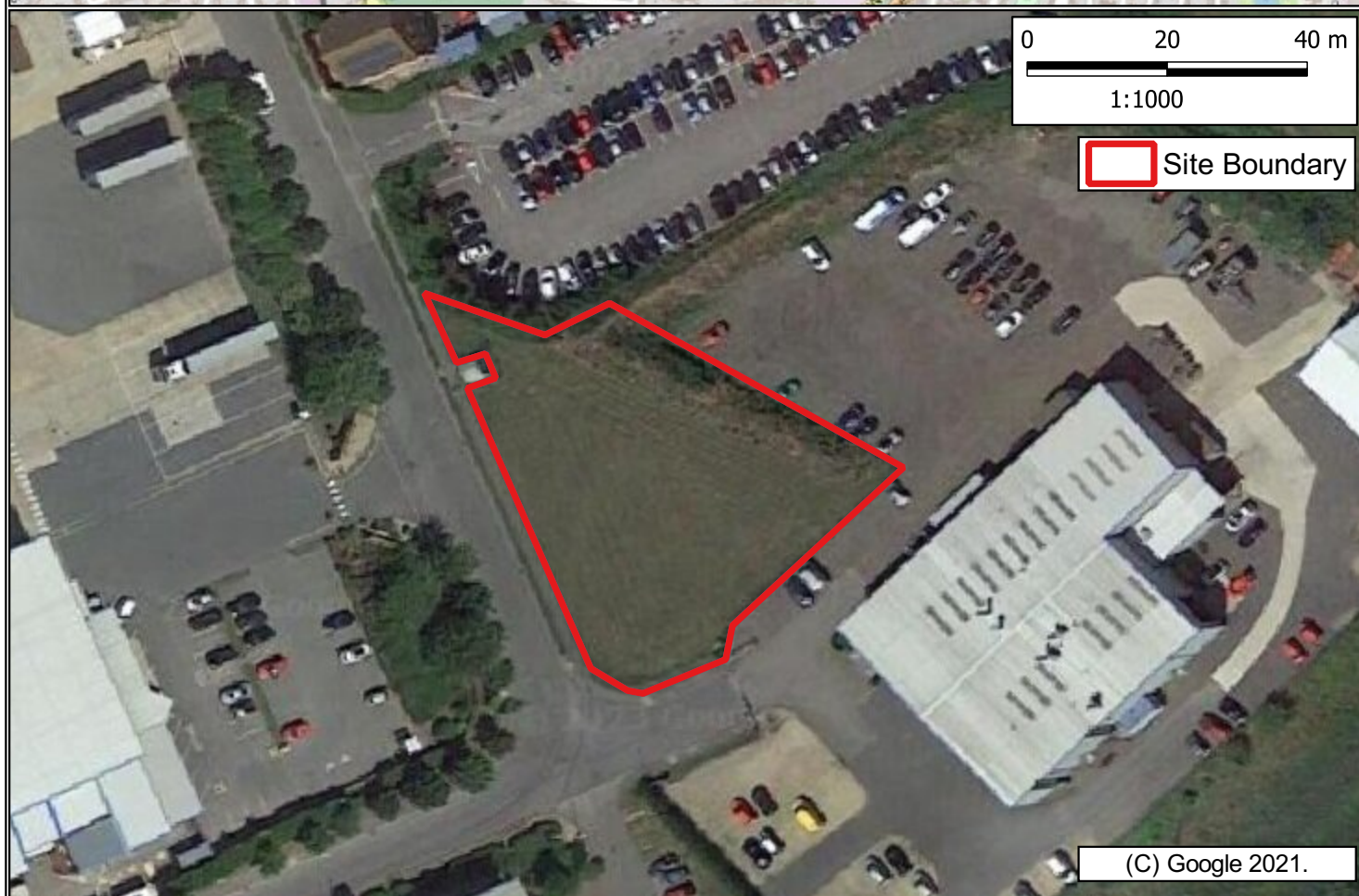
An assessment of these risks in conjunction with the development proposals have resulted in the following recommendations for the safe development of the site:

- » The finished floor level should be set at a nominal height above the finished ground levels to allow for overland flow routes in extreme events and drainage failures.
- » Pedestrian and vehicular safe access to and from the site is not achievable under all conditions via the access road off Stephenson Avenue.
- » The developer should consult with the Local Planning Authority if a flood evacuation plan is required.

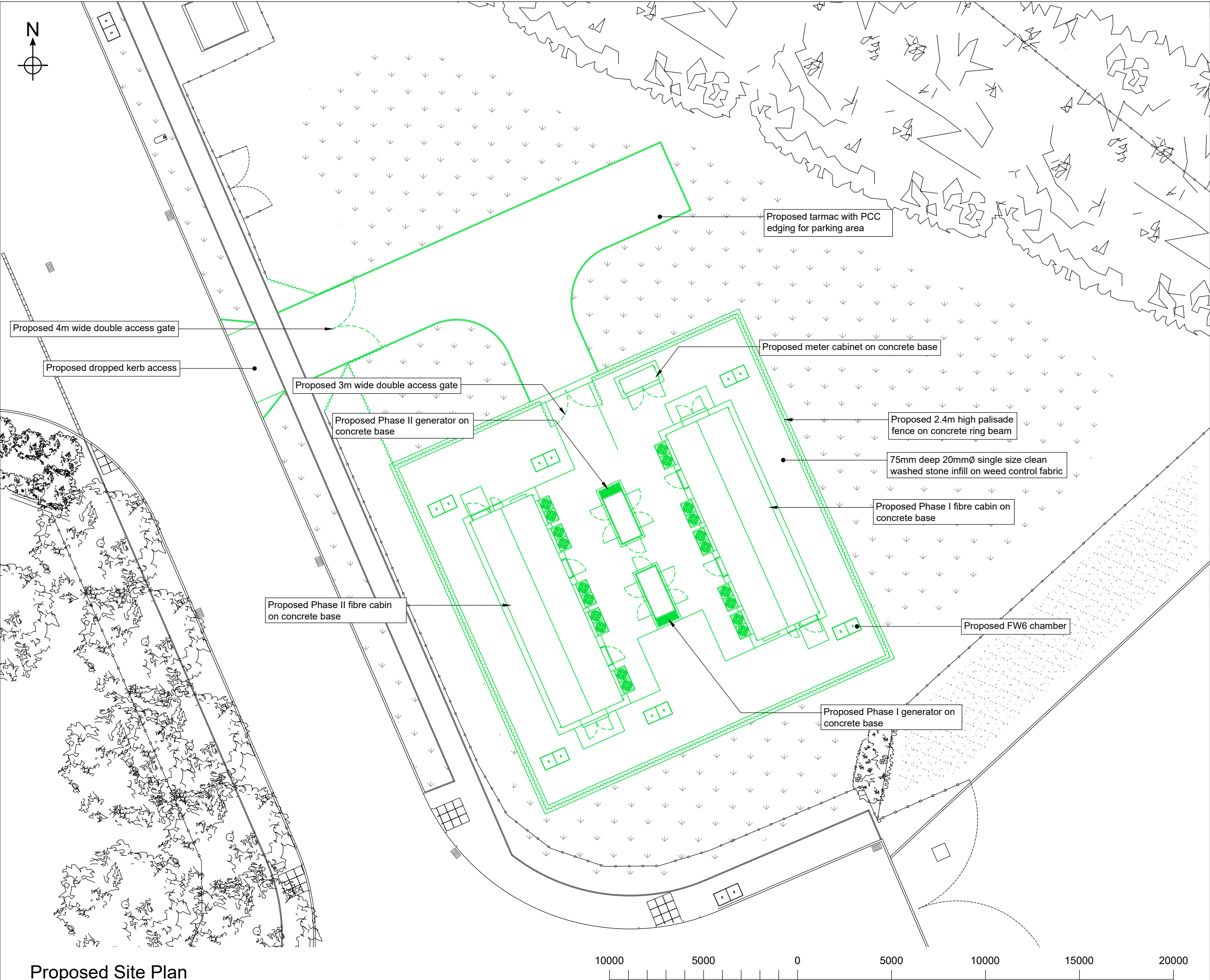
Further details on the proposed mitigation measures are provided in Section 5. All proposed measures should be agreed with the Local Authority prior to commencement of the development.

Appendix A

Figures, Plans and Drawings



Client: Euro-Tel Design				Title: Site Location & Boundary Plan		
Site: Land off Stephenson Avenue, Spalding				Scale (see scale bar): 1:12,500 & 1:1,000 @ A4		
Job No.: FRA 23 1114	Drawn By: JL	Checked By: MJ	Drawn: Aug 2023	Figure: 1	Revision:	



Proposed Site Plan
(Scale 1:200)

ORIGINAL SCALE AT A3 - 1:200 ALL DIMENSIONS IN MILLIMETRES

- NOTES
- 1. This drawing to be read in conjunction with full PL drawing series.
 - 2. All dimensions are in mm unless otherwise noted.

A	GENERAL ARRANGEMENT ISSUE	03.08.23	RFS
REV	DESCRIPTION OF REVISION	DATE	BY



2 Charnwood House, Marsh Road, Bristol BS3 2NA
tel :0117 966 5526 web: euro-tel.design.com



15 BEDFORD STREET, LONDON WC2E 9HE WWW.CITYFIBRE.COM

Drawing Title PROPOSED SITE PLAN		
Site Location LAND ADJACENT AT STEPHENSON AVE. STEPHENSON AVENUE SPALDING PE11 3SW		
Drawn by RFS	Checked by SB	Approved by JR
Date Drawn 03.08.23	Date Checked 03.08.23	Date Approved 03.08.23
Site Code SPA1	Drawing Number P1808-285-PL-005-A	

324450N

525150E

324400N

324350N

525200E

525250E

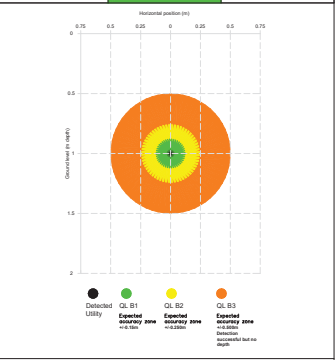


Station	Easting	Northing	Level
ST01	525199.167	324403.343	3.205
ST02	525223.916	324348.918	3.071

NOTES
JOB No. : 3344
SURVEY DATE : 04-03-2023
SURVEYED : P.S.
Utility record drawings available at time of survey.

DISCLAIMER
ELECTRO-MAGNETIC TECHNIQUES AND/OR GROUND PENETRATING RADAR HAVE BEEN USED IN THE LOCATION OF UNDERGROUND SERVICES. THE RESULTS ARE NOT GUARANTEE AND FINAL EXAMINATIONS SHOULD BE CARRIED OUT TO CONFIRM SERVICE IDENTIFICATION, POSITIONS AND PARTICULARS. SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICES INFORMATION CANNOT BE GUARANTEED. THROUGH ALL REASONABLE EFFORTS, WHEN MADE, SEARCHING AVAILABLE RECORD DRAWINGS, THE COMPLETENESS OF THE UNDERGROUND SERVICES INFORMATION CANNOT BE GUARANTEED. THE RESULTS OF SURVEY DO NOT DIFFERENTIATE BETWEEN LIVE AND DEAD SERVICES SUCH AS ALL SERVICES SHOULD BE TREATED AS LIVE.
WHERE SERVICES ARE NON-METALLIC, POSITIONS TAKEN FROM RECORDS, TRENCH SEARS AND SURFACE DETAIL WHERE QUOTED, DEPTH ESTIMATIONS ARE GENERALLY TO THE CENTRE OF THE SERVICE. DEPTHS TO GRAPY TRENCHES AND SEARS ARE GENERALLY TO HIGHEST LEVEL MAIDS.
PIPE SIZES WHICH CANNOT BE OBTAINED BY VISUAL SURVEY ARE TAKEN FROM RECORD DRAWINGS OR MARKER PLATES WHERE AVAILABLE.
WHERE GROUND PENETRATING RADAR HAS BEEN USED IT WILL PRIMARILY HAVE BEEN TO IDENTIFY UNDERGROUND UTILITIES. IF POSSIBLE WE WILL ALSO IDENTIFY UNDERGROUND STRUCTURES, TANKS ETC. BUT CANNOT GUARANTEE TO HAVE LOCATED ALL SUCH ITEMS.
THE USE OF RADAR CAN BE LIMITED BOTH BY SURFACE CONDITIONS AND ALSO BY SOIL TYPE. DEPTH ESTIMATES WOULD NOT NORMALLY BE PROVIDED FOR SERVICES LOCATED WITH GPR.

PAS 128 : 2014		
SURVEY CATEGORY	QUALITY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL
TYPE B - DETECTION	QL-B4	A UTILITY SEGMENT WHICH IS SUSPECTED TO EXIST BUT HAS NOT BEEN DETECTED AND THEREFORE BEING ALIAS AN ASSUMED ROUTE. NO DETECTION PROPOSED.
	QL-B3	POSITION OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (GPR OR GPR DETECTION WITH LIMITED CONFIDENCE IN DEPTH)
	QL-B2	POSITION AND DEPTH OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (GPR OR GPR DETECTION WITH CONFIDENCE IN DEPTH)
	QL-B1	POSITION AND DEPTH OF THE UTILITY DETECTED BY MULTIPLE GEOPHYSICAL TECHNIQUES. (GPR + GPR DETECTION)

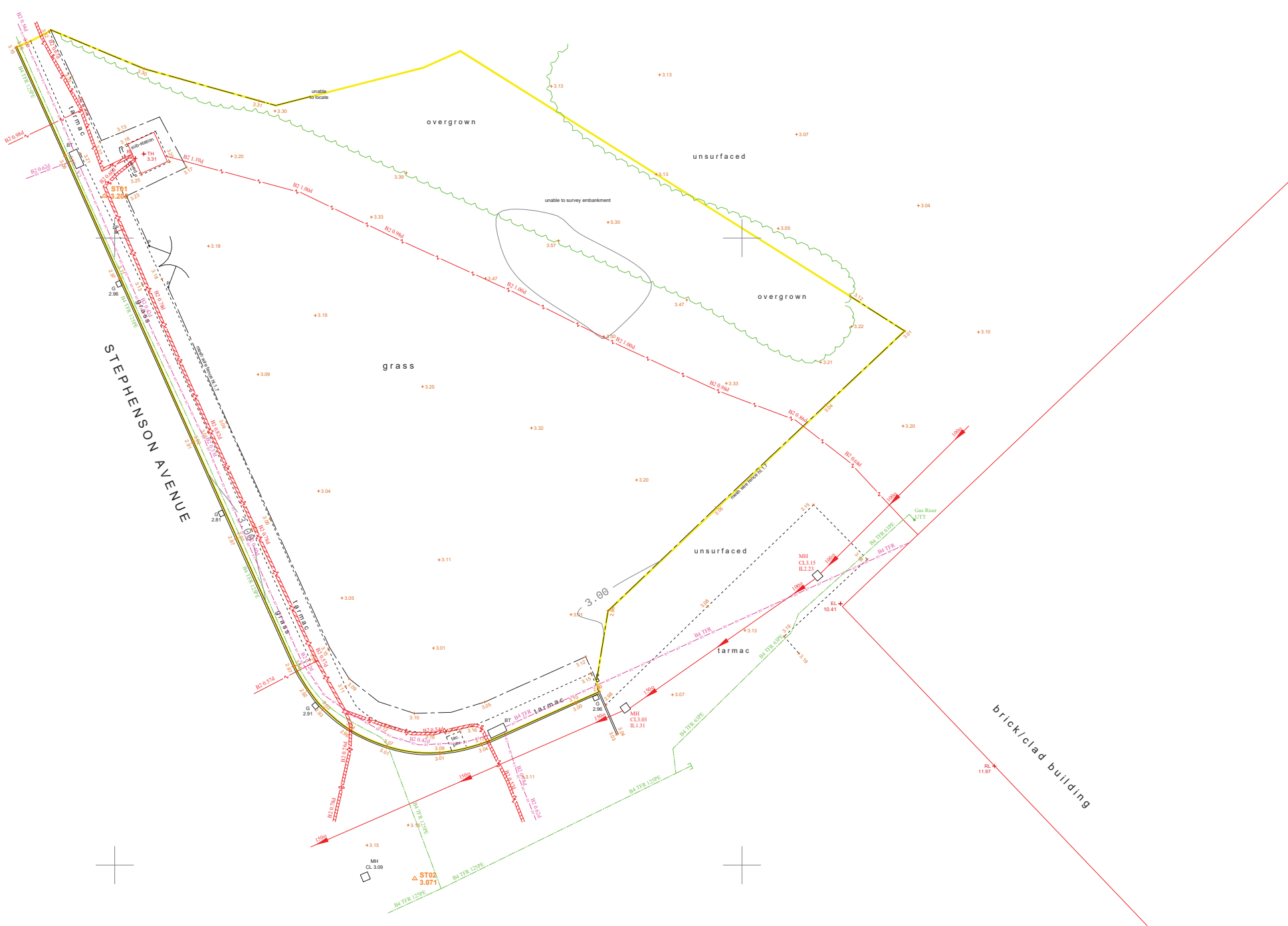


ABBREVIATIONS			
AR	ASSUMED ROUTE	PE	POLYETHYLENE
BD	BACKDROP	PR	PIPE RISER
BL	BLOCKED	PVC	POLYVINYL CHLORIDE
BTIC	BT INSPECTION CHAMBER	RE	RODDING EYE
CI	CAST IRON	RWP	RAIN WATER PIPE
CL	COVER LEVEL	ST	STOP TAP
CP	CABLE PIT	SV	STOP VALVE
CR	CABLE RISER	SVP	SOIL VENT PIPE
EM	EARTH MAT	TFR	TAKEN FROM RECORDS
EP	ELECTRICITY POLE	TL	TRAFFIC LIGHTS
EOT	END OF TRACE	TP	TELEGRAPH POLE
FE	FENCE EARTH POINT	UTL	UNABLE TO LOCATE
FH	FIRE HYDRANT	UTR	UNABLE TO RAISE
GV	GAS VALVE	UTS	UNABLE TO SURVEY
GY	GULLY	UTT	UNABLE TO TRACE
IC	INSPECTION CHAMBER	VP	VENT PIPE
IL	INVERT LEVEL	VR	VAPOUR RECOVERY
LP	LAMP POST	WL	WATER LEVEL
MH	MANHOLE	WM	WATER METER
NPV	NO PIPES VISIBLE	WO	WASHOUT VALVE
OSA	OUTSIDE SURVEY AREA	WWP	WASTE WATER PIPE

LEGEND	
	BOREHOLE (BH)
	BOREHOLE PROPOSED LOCATION
	BT
	CABLE TV CATV
	CLOSED CIRCUIT TV
	COMMS
	EARTH
	EMPTY DUCT
	FIBRE OPTICS
	GAUGE LINES
	TRAFFIC SIGNALS
	ELECTRIC HV
	ELECTRIC
	FUEL LINES
	OFFSET FILL
	VENT
	FUEL PIPE
	GAS
	WATER
	OIL
	COMPRESSED AIR
	RADAR TRACE
	UNKNOWN TRACE
	DRAINAGE FOUL
	DRAINAGE SURFACE
	OUTFALL
	RISING MAIN
	END OF TRACE
	SURVEYED AREA

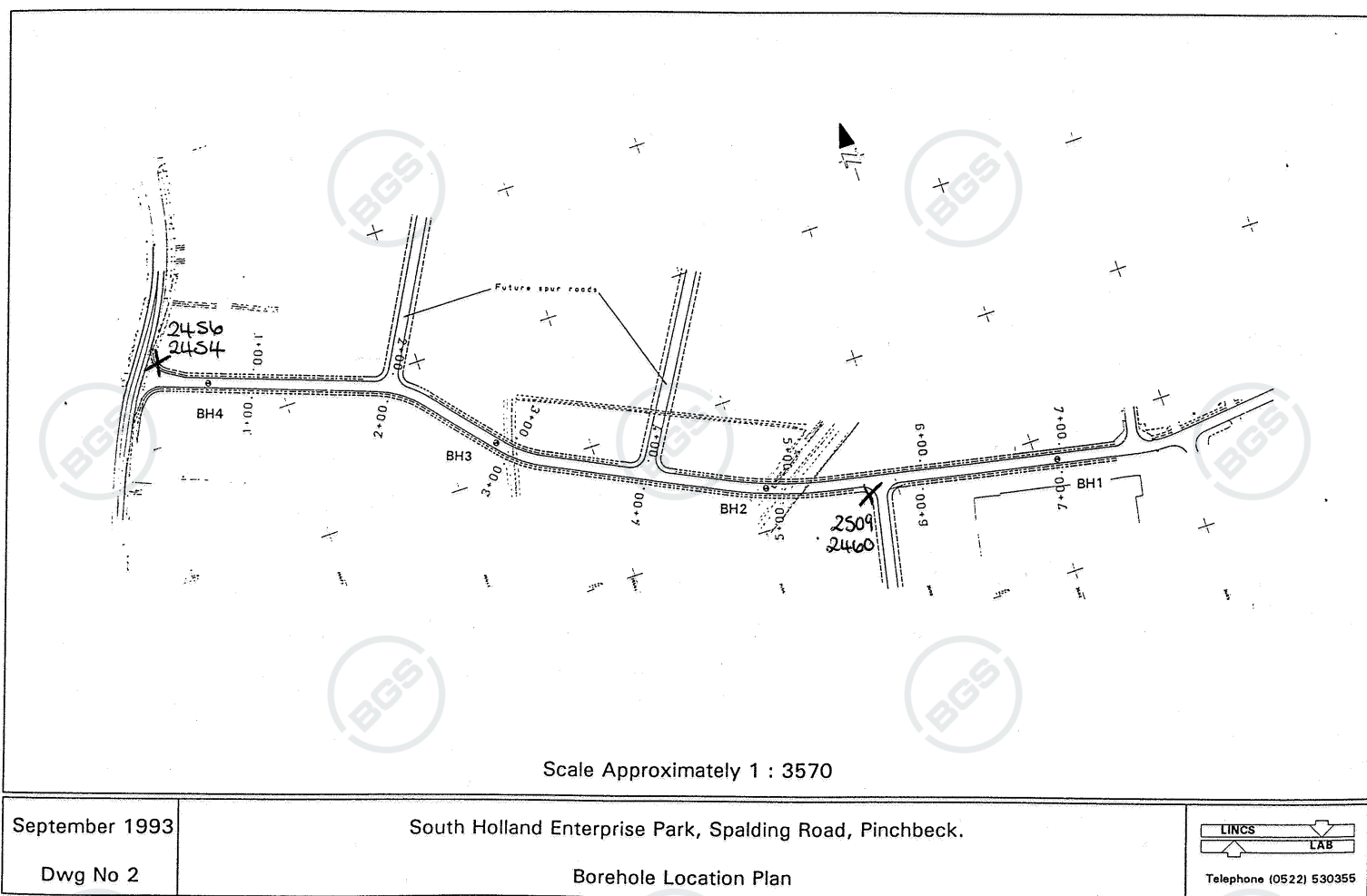
groundscan
Unit 4, The Old Glove Factory,
Bristol Road,
Sherborne,
Dorset DT9 4HP
Tel: 01935 389123
Website: www.groundscan.co.uk
Company Reg: 07847795

Client:	Euro-Tel Design
Survey Location:	Stephenson Avenue Pinchbeck, Spalding, PE11 3SW.
Survey type: Utility	Scale: 1:200@A1 Sheet: 1 of 1
Drawing ref: 3344	Date: 07-09-2023
Drawn/QA: A.B.	Issue: 1



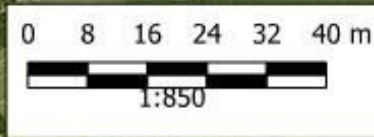
Appendix B

Site Information



TF 22 SW/144
2494 2442

Job Number: 21820				Site: Enterprise Way, Pinchbeck.				Trial Pit No.: 3				Sheet 1 of 1												
Remarks : Surface : Fallow agricultural land. No groundwater seepages encountered. Very wet sand in bottom of trial pit. Trial pit became unstable below 1.20m.				Location: See Plan				Orientation: N-S				Dimensions: Length: 2.20m, Width: 0.70m, Depth: 2.20m.												
				Client: Lindum Construction.				Face Logged: W																
Excavation Method: Back acter				Logged by: DJU				Log Scale: 2.5 m/page				Ground Level m AOD												
Date 0000	Depth of Casing (m)	Depth of Water (m)	Sample/Test			Change of Strata			Description of Strata	Penetration Test Blows	NMC %	Atterberg Limits				Density			Shear Strength		Chemical		Other Tests	
			No.	Type	Depth (m)	Legend	Depth below GL (m)	Re- duced Level OD (m)				Thick- ness of Stratum (m)	LL	PL	PI	CBR %	Bulk Mg/m ³	Dry Mg/m ³	Cu kPa	Øu	Type of Shear Test	SO ₄ g/l		pH
01/09			1	B	0.50-1.00		0.40		0.40	Brown sandy silty clayey TOPSOIL with rootlets and root fibres.														
							0.70		0.70	Soft to firm mottled orange brown and grey slightly sandy silty CLAY with occasional rootlets and root fibres. (TB)	22					2.0	1.964	1.61						
							1.10		0.90	Loose brown/grey very silty fine SAND (wet/very wet below 1.40m). (TB)														
							2.00		0.20	Loose/medium dense grey slightly silty fine to medium SAND (very wet). (TB)														
01/09							2.20			END OF TRIAL PIT.														
Scale As Shown Disturbed Samples W Water Sample D Small Bag B Large Bag T Tin J Jar Undisturbed Samples U100 105mm diameter U38 38mm diameter Groundwater: ▼ Struck ▽ Rose to Symbols PT Penetration Tests M Macintosh Probe Blow Count P Probe CBR Type of Shear Test V Shear vane SB Shear Box TX Triaxial (undrained) Cu Undrained Cohesive Strength Øu Internal Friction Angle Notes Geology : Refer to appendix at end of logs.																								
LINCS LAB Telephone (01522) 530355																								



KEY

-  Site Location
-  Oxford Clay Formation (Mudstone)

Sampling locations and features illustrated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client			
Euro-Tel Design			
Site			
Land off Stephenson Avenue			
Title			
Bedrock Geology			
Job No	Scale (note scale bar)	Pages	Rev
FRA 23 1114	1:850 @ A4		
Drawn By	Checked By	Date	
JL	MJ	Sept 2023	



KEY

 Site Location

 Tidal Flat Deposits
(Clay and silt)

Sampling locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client

Euro-Tel Design

Site

Land off Stephenson Avenue

Title

Superficial Geology

Job No.

FRA 23 1114

Scale (note some text)

1:850 @ A4

Figure

Rev

Drawn By

JL

Checked By

MJ

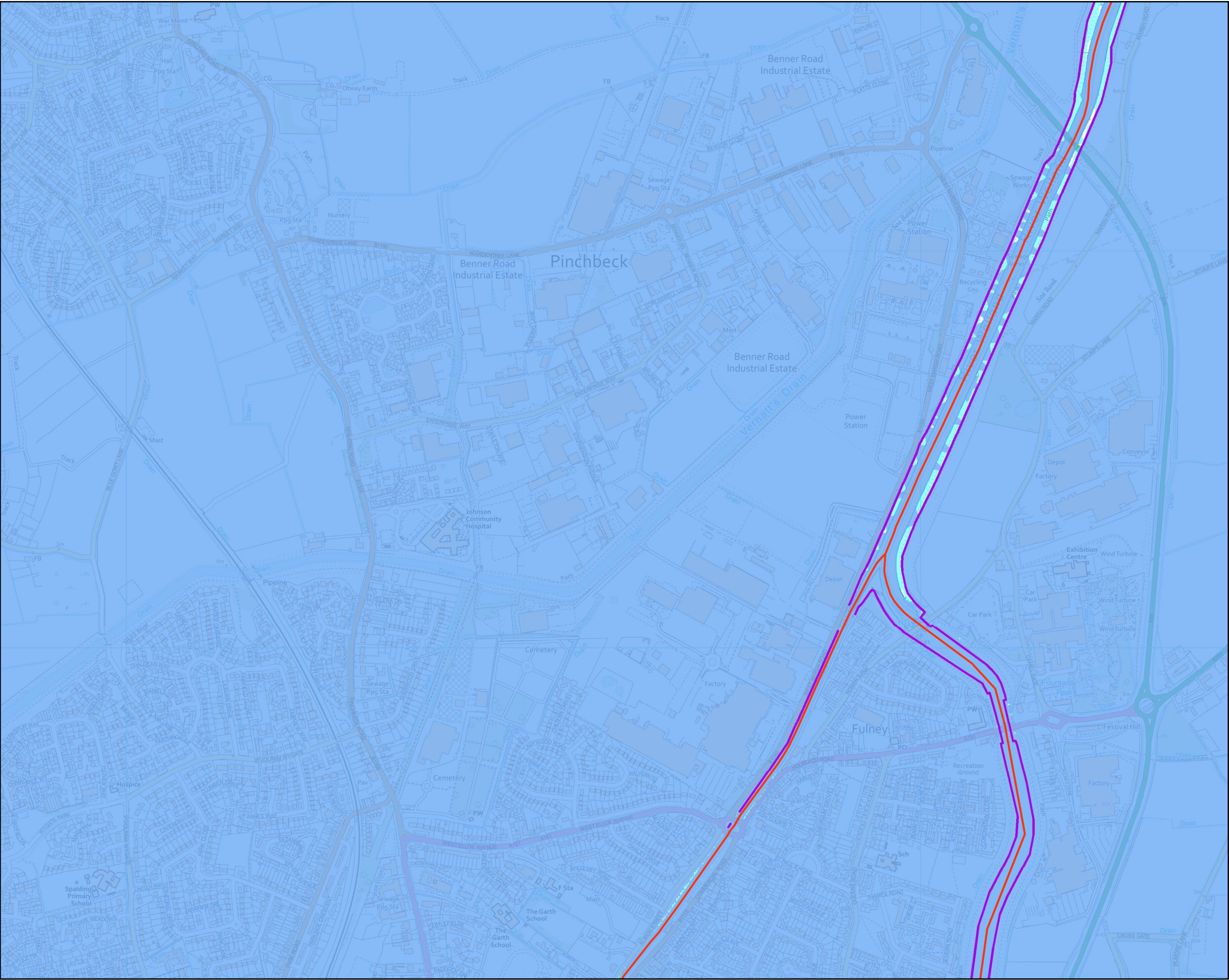
Date

Sept 2023

Appendix C

Environment Agency Data

Flood Map centred on TF 25229 24397 - created August 2023 [Ref: CCN-2023-320260]



Scale 1:10,000



- 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:

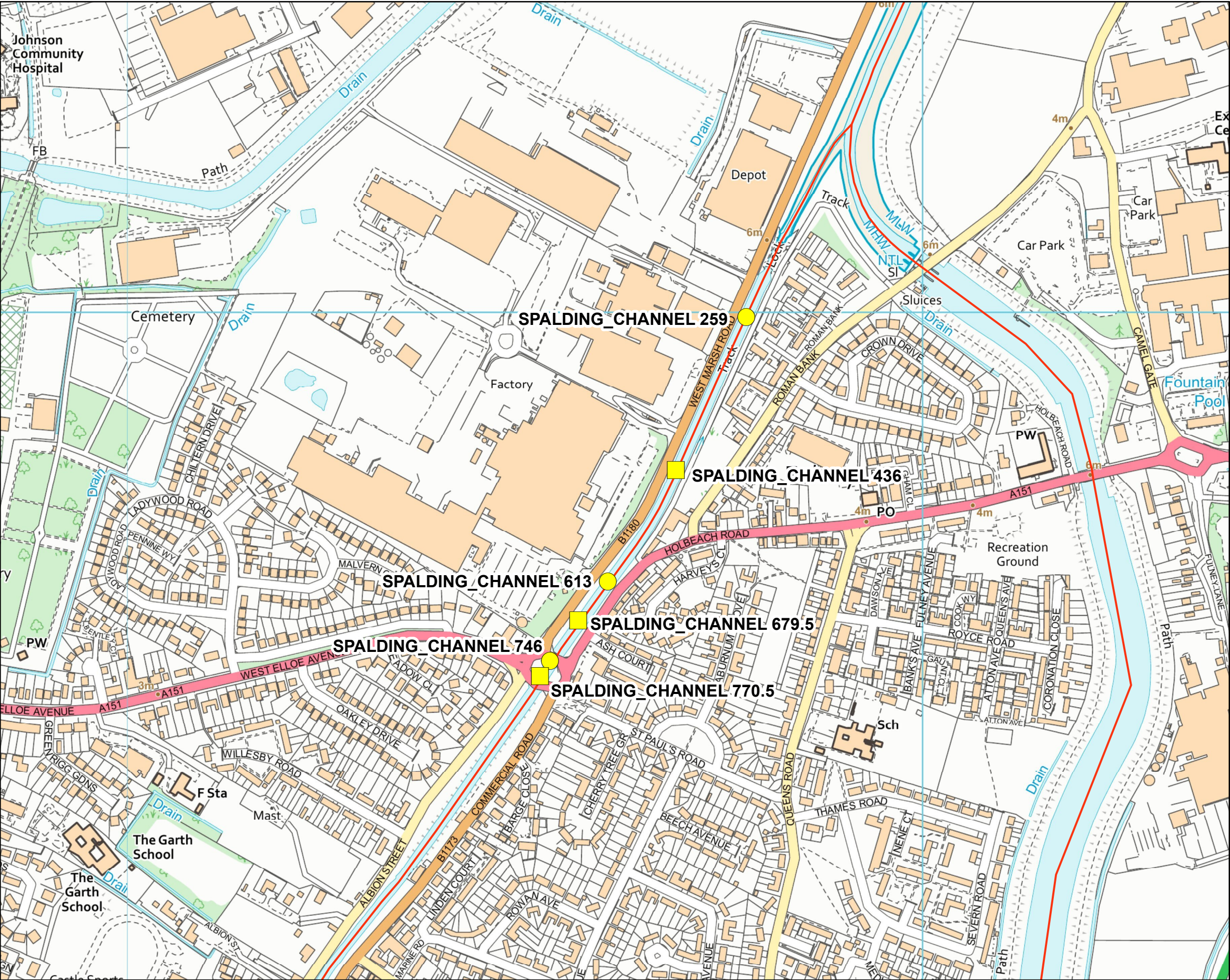
- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

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

Node Map centred on TF 25719 23820 - created August 2023 [Ref: CCN-2023-320260]



Scale 1:5,000

Legend

- Modelled Flows
- Modelled Levels
- Main Rivers

Created by the Partnerships and Strategic Overview Team, Kettering

Datasheet [Ref: CCN-2023-320260]
Model Name: Welland Catchment Strategic
Model Date: 2016

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

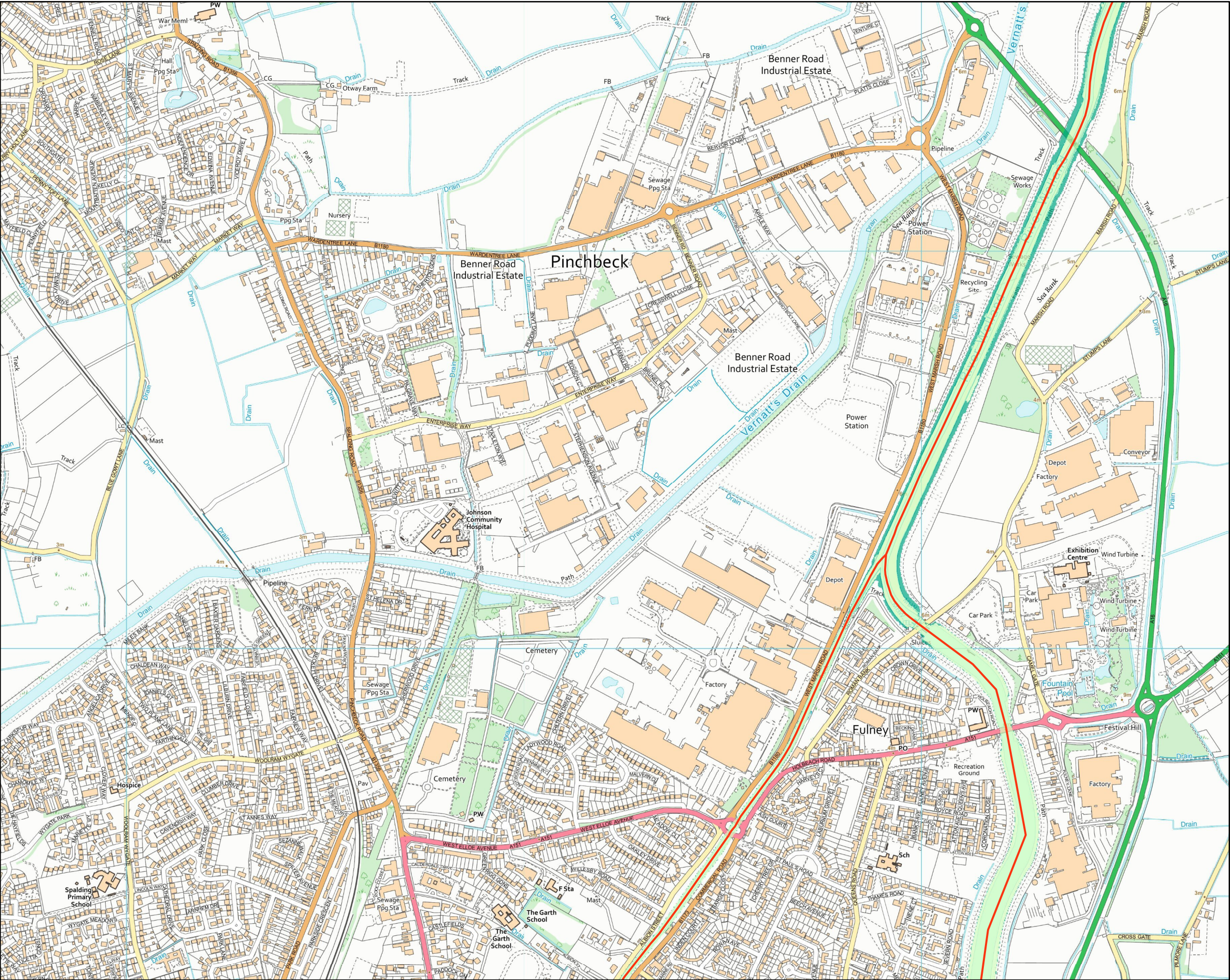
Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Water Levels (mODN)											
			50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1 in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
SPALDING_CHANNEL 259	525779	323995	3.70	4.00	4.17	4.45	4.50	4.51	4.52	4.52	4.68	4.53	4.56	4.68
SPALDING_CHANNEL 613	525605	323662	3.70	4.00	4.17	4.45	4.50	4.51	4.52	4.52	4.68	4.53	4.55	4.68
SPALDING_CHANNEL 746	525532	323562	3.70	4.00	4.17	4.45	4.50	4.51	4.52	4.52	4.68	4.53	4.55	4.68

Fluvial Flood Flows (m³/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m³/s).

Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Flows (m³/s)											
			50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	3.33% (1 in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
SPALDING_CHANNEL 436	525690	323802	0.71	1.06	0.91	1.06	1.02	1.03	1.15	1.17	1.65	1.10	1.07	1.93
SPALDING_CHANNEL 679.5	525567	323613	1.30	1.99	1.77	2.06	2.01	1.93	2.24	2.31	3.19	2.18	2.06	3.61
SPALDING_CHANNEL 770.5	525519	323543	1.48	2.26	2.04	2.37	2.31	2.21	2.56	2.65	3.65	2.50	2.35	4.07

Modelled Flood Extents (with defences) Model: Welland Catchment Strategic (2016)
centred on TF 25229 24397 - created August 2023 [Ref: CCN-2023-320260]



Scale 1:10,000

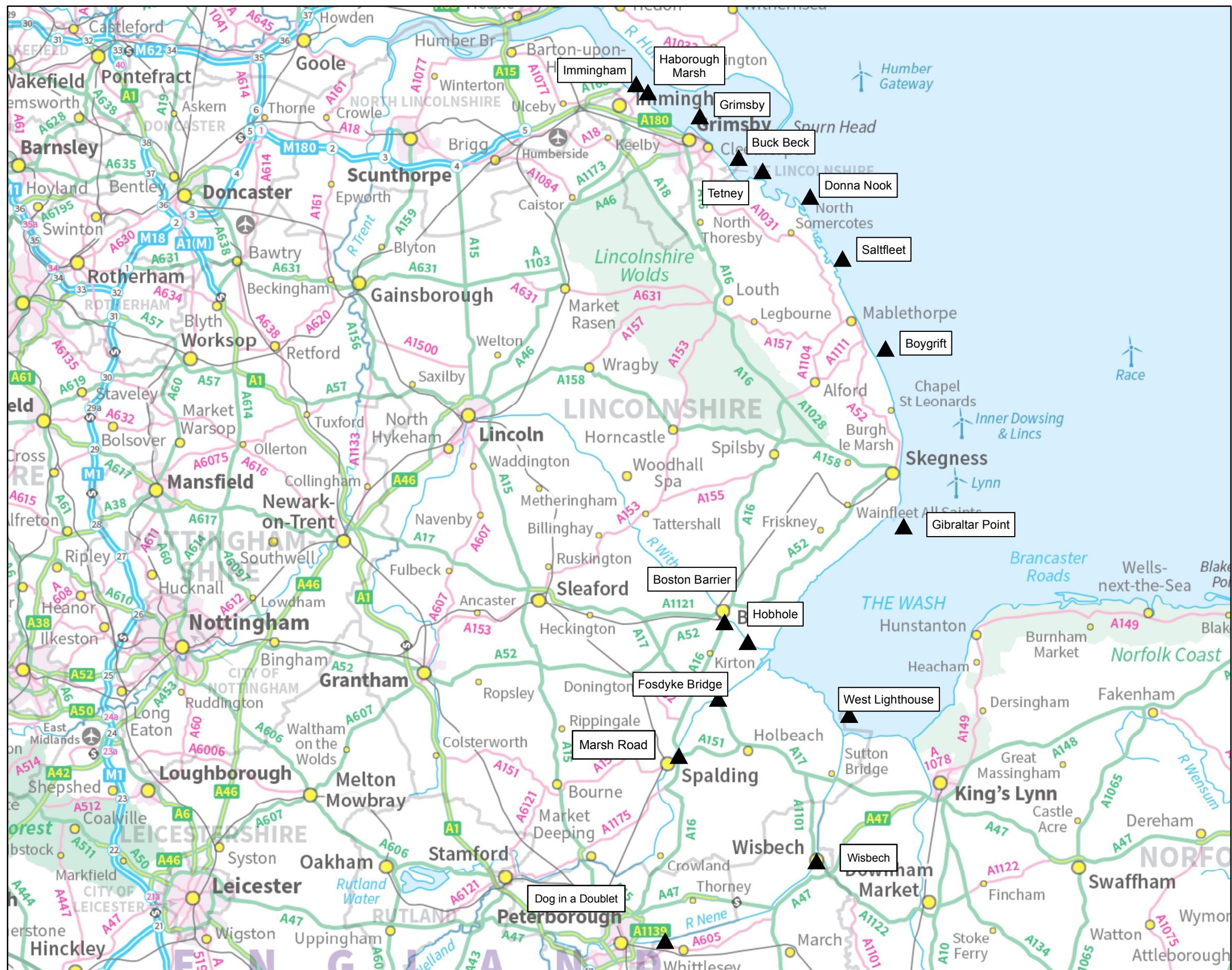
N

- Legend**
- Main Rivers
 - 3.33% (1 in 30) fluvial event
 - 1% (1 in 100) fluvial event
 - 1% (1 in 100) inc 20% climate change fluvial event
 - 0.1% (1 in 1000) fluvial event
 - 0.1% (1 in 1000) inc 20% climate change fluvial event

Created by the Partnerships and Strategic Overview Team, Kettering

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

Key Node Points



Scale 1:550,000



▲ East Coast and Wash

See separate data sheet for predicted flood levels

Created by the Partnerships and Strategic Overview Team, Lincoln

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



KEY



Site Location

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Client:

Euro-Tel Design

Site:

Land off Stephenson Avenue

Title:

Surface Water Risk

Job No.:

FRA 23 1114

Scale (see scale bar):

1:850 @ A4

Figure:

Rev:

Drawn By:

JL

Checked By:

MJ

Drawn:

Sept 2023

Appendix D

Consultee Correspondence

Jenna Lowe

From: FloodRisk <FloodRisk@lincolnshire.gov.uk>
Sent: 02 August 2023 14:51
To: Jenna Lowe
Subject: RE: FRA QUERY - FRA 23 1114 - Land off Stephenson Avenue, Spalding

Email reference: RD/0210-2023

Dear Jenna,

Thank you for your email with respect to the above subject.

I can confirm that we have forwarded our comments onto the Council's Development Management team who will provide a response in due course.

Yours sincerely,

Ryan Davies BSc, MSc, MCIWEM
Flood Risk Officer
Lincolnshire County Council
County Offices Newland, Lincoln, LN1 1YI

Phone: 01522 552222
Mobile: 07917 520900
Email: Ryan.Davies@lincolnshire.gov.uk
Teams: [Chat with me](#)
Website: www.lincolnshire.gov.uk/



From: Jenna Lowe <j.lowe@thelkgroup.com>
Sent: Wednesday, August 2, 2023 11:34 AM
To: FloodRisk <FloodRisk@lincolnshire.gov.uk>
Subject: FRA QUERY - FRA 23 1114 - Land off Stephenson Avenue, Spalding

Caution external: This email originated from outside of the council. Do not click on links or open attachments unless you are confident the email is legitimate

Dear Sir/Madam,

LK Consult Ltd. has been commissioned to undertake a Flood Risk Assessment (FRA), for land off Stephenson Avenue, Pinchbeck, Spalding, Lincolnshire. Nearest Postcode PE11 3SW, centred at approximate National Grid Reference 525229E, 324397N.

The area of interest appears to be within Flood Zone 3.

BGS data indicates that the site is within an area underlain by Tidal Flat Deposits - Clay and silt superficial deposits and Oxford Clay Formation – Mudstone bedrock.

The site location is attached to this email.

To complete the FRA, we would be grateful if you could supply us with the following, if available, for the vicinity of the site:

- Details of any flood defences in the immediate area, including their extent, crest levels (and datum), assumed level of standard, construction and maintenance regime, as well as any other structures which may influence the local hydraulics.
- Records of any historic flood events and potential sources of flooding from rivers, land drainage, groundwater, foul and surface water sewers on site and in the area.
- Any restrictions applied to ordinary watercourses and sewers in the area.
- Highway drainage restrictions and records.
- Indications if the site is within the Critical Drainage Area.
- Policies that may relate to Sustainable Drainage Systems (SuDS).

If you have any queries, please do not hesitate to get in touch.

We are, of course, happy to pay your reasonable charge for this service. Please let me know by return what information is available, what the charge will be, and we will pay the relevant fees by debit card as soon as possible.

Any advice or recommendations you may have regarding the potential discharges from the development of this site would also be appreciated.

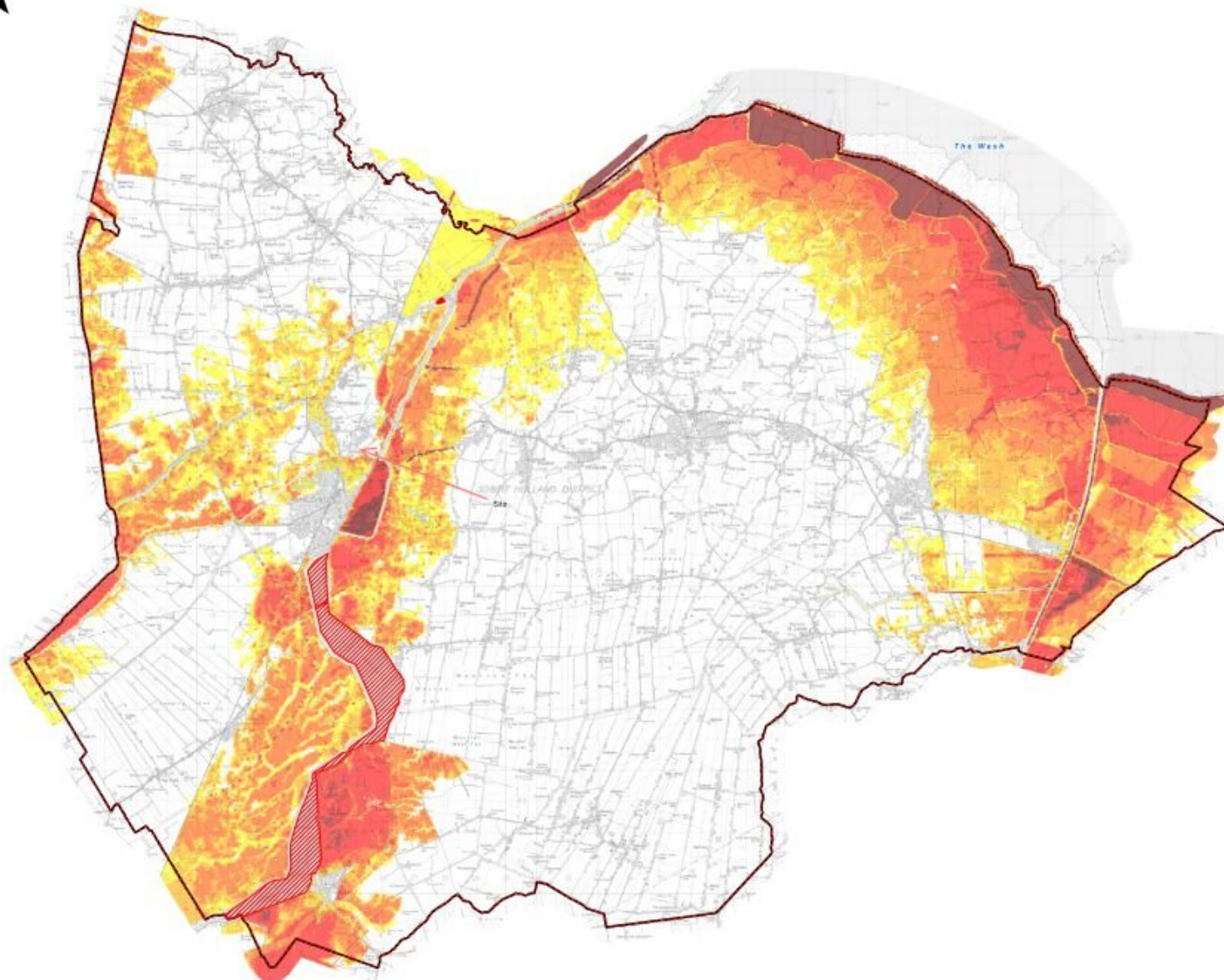
We will be in contact with all other relevant authorities to get a more complete understanding of the issues in the area.

Regards
Jenna



Jenna Lowe MSc, BSc. (Hons)
Flood Risk Engineer
0161 763 7200 | 07467 957756
Manchester | London | Swindon | Liverpool | Glasgow
www.thelkgroup.com

I N C R E A S I N G L A N D V A L U E



NOTES

1. The potential flooding consequences shown on this map are primarily based on flooding from the sea and river levels taking into account the protection of current flood risk management measures such as flood defences.
2. This update only includes new flood risk information from River Great Ouse, River Glen (Fluvial) and Tidal Inundation mapping from the Environment Agency and the Flood and Defence (No. 1) Information System (FIDIS) for the update.
3. In addition to the potential flood extent shown on this map, there may be further flooding in low-lying rural areas.
4. The consequences designated as being a Potential Risk arise from direct overtopping of defences, where this would occur, together with breaches which are assumed to occur at any point along the defences.
5. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
6. Land within South Holland District is not considered.
7. This map shows the extent only of the flooding probability levels relevant to the map title.

Map Legend

Peak Depth



Functional Floodplain



South Holland District Boundary



2	Feb 17	Modeling and Mapping Update
1	Dec 16	Modeling and Mapping Update
REV	DATE	REMARKS

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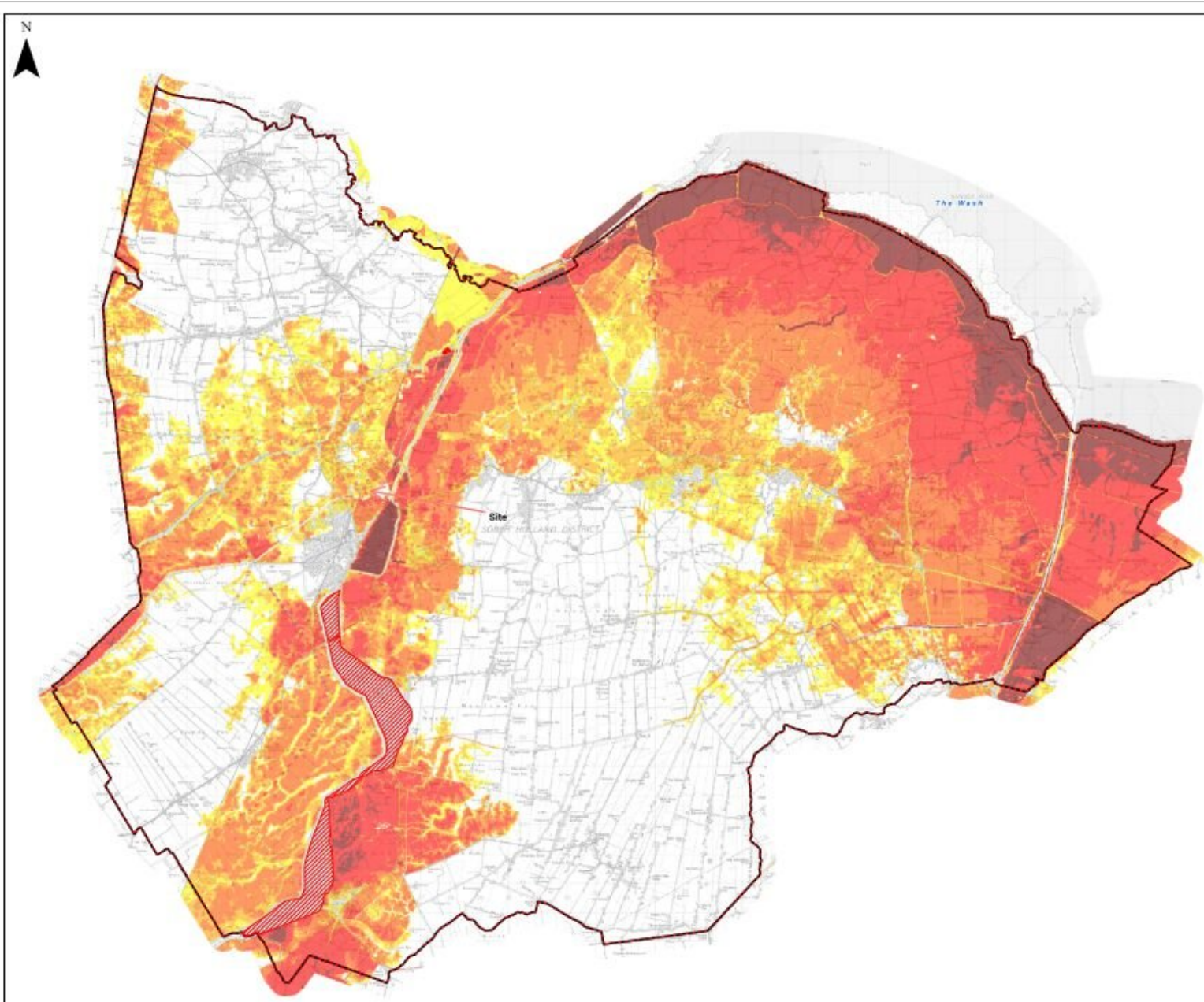


SOUTH HOLLAND DISTRICT COUNCIL
COUNCIL OFFICES
BURY ROAD
SALFORD
LINDOLNSHIRE
PE11 2SR

UPDATE OF STRATEGIC
FLOOD RISK ASSESSMENT
Residual Peak Depth
District - Present Day
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 REV NO: 2

SCALE: 1 : 60,000 @ A1 MAP NO:



NOTES

1. The potential flooding consequences shown on this map are primarily related to flooding from the sea and river flows taking into account the presence of current flood risk management measures such as flood defences.
2. This update only includes new flood risk information from River Witham (Fluvial), River Glen (Fluvial) and Tide height mapping (Fluvial/Tidal) River Witham and the Wash sea defences. No new information from the projected Drainage Basins and associated systems was used for this update.
3. In addition to the potential flood extents shown on this map, there may be further flooding in low lying rural areas.
4. The consequences designated as being a Potential Peak arise from direct overtopping of defences, where this would occur, together with inland flows which is assumed would occur at any point along the defences.
5. Potential floodplain consequences areas where water is intended to flow or be stored in times of flood.
6. Land outside South Holland District is not considered.
7. This map shows the extent only of the flooding probability levels relevant to the map title.

Map Legend

Peak Depth

- 0m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 2m
- 2m +

Functional Floodplain

South Holland District Boundary

REV	DATE	REMARKS
2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

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SOUTH HOLLAND DISTRICT COUNCIL
COUNCIL OFFICES
FERRY ROAD
SMAULDEN
LIMCUMSHIRE
PE11 2SS

UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT
Residual Peak Depth
District - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 REV NO: 2

SCALE: 1 : 60,000 @ A1 MAP NO:

Jenna Lowe

From: Planning Liaison <planningliaison@anglianwater.co.uk>
Sent: 03 August 2023 12:23
To: Jenna Lowe
Subject: RE: FRA QUERY - FRA 23 1114 - Land off Stephenson Avenue, Spalding

Good afternoon

Anglian Water are able to confirm that we have no records of flooding in the vicinity that can be attributed to capacity limitations in the public sewerage system. It is possible that other flooding may have occurred that we do not have records of, other organisations such as the Local Authority, Internal Drainage Board or the Environment Agency may have records.

Kind regards



Planning Liaison

Telephone: 07929 786955

Anglian Water Services Limited

Thorpe Wood House, Thorpe Wood, Peterborough, Cambridgeshire, PE3 6WT

From: Jenna Lowe <j.lowe@thelkgroup.com>
Sent: 02 August 2023 11:33
To: Planning Liaison <planningliaison@anglianwater.co.uk>
Subject: FRA QUERY - FRA 23 1114 - Land off Stephenson Avenue, Spalding

EXTERNAL MAIL - Please be aware this mail is from an external sender - THINK BEFORE YOU CLICK

Dear Sir/Madam,

LK Consult Ltd. has been commissioned to undertake a Flood Risk Assessment (FRA), for land off Stephenson Avenue, Pinchbeck, Spalding, Lincolnshire. Nearest Postcode PE11 3SW, centred at approximate National Grid Reference 525229E, 324397N.

The area of interest appears to be within Flood Zone 3.

BGS data indicates that the site is within an area underlain by Tidal Flat Deposits - Clay and silt superficial deposits and Oxford Clay Formation – Mudstone bedrock.

The site location is attached to this email.

To complete the FRA, we would be grateful if you could supply us with the following, if available, for the vicinity of the site:

- Records of any historic flood events and potential sources of flooding from foul and surface water sewers on site and in the area.

We will be in contact with all other relevant authorities to get a more complete understanding of the issues in the area.

Regards
Jenna



Jenna Lowe MSc, BSc. (Hons)
Flood Risk Engineer
0161 763 7200 | 07467 957756
Manchester | London | Swindon | Liverpool | Glasgow
www.thelkgroup.com

INCREASING LAND VALUE

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- » Geotechnical
- » Contaminated Land
- » Flood Risk and Drainage
- » Asbestos
- » Invasive Species
- » Land Remediation
- » Project Management
- » Land Drilling