Medworth Energy from Waste
Combined Heat and Power Facility

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Environmental Statement Chapter 12 Hydrology Appendix 12A: Flood Risk Assessment

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Executive summary

This Flood Risk Assessment (FRA) accompanies the Environmental Statement (ES) for the proposed Energy from Waste (EfW) Combined Heat and Power (CHP) Facility (the 'EfW CHP Facility'). The EfW CHP Facility is located on the industrial estate, Algores Way, Wisbech, Cambridgeshire.

The Proposed Development comprises the EfW CHP Facility, CHP Connection, Access Improvements, Grid Connection and associated Temporary Construction Compound (TCC). At the PEIR stage two options for the Grid Connection were considered: connection to Walpole Substation (Option 1) and connection to Walsoken Substation (Option 2), both using a mixture of underground cables and overhead lines. Option 2 was effectively part of Option 1, with a minor extension along Broadend Road. Following statutory consultation, a single Grid Connection was chosen. This extends to a new Walsoken Substation located immediately to the south of the Walsoken DNO Substation and the Grid Connection is composed of an underground cable only.

All potential sources of flooding have been considered in this assessment. Tidal flooding from the River Nene (which is located approximately 0.6km to the west of the Order limits boundary) represents the greatest potential flood risk posed to the Proposed Development. This is associated with large swathes of the Proposed Development, as it is located in Flood Zone 3a, including the entirety of the EfW CHP Facility Site.

Detailed tidal flooding information provided by the Environment Agency indicates that the Proposed Development would remain dry during the design flood event (0.5% AEP plus climate change), as it benefits from the protection offered by the raised tidal defences along the banks of the River Nene. The Proposed Development is also predicted to remain dry during the 0.1% Annual Exceedance Probability (AEP) tidal overtopping plus climate change event. As the entire Proposed Development is predicted to remain dry during the design tidal flood event, there is no potential for the development to increase tidal flood risk elsewhere.

Parts of the Proposed Development are however potentially at residual risk of tidal flooding during 'breach' events, i.e., failure of the raised tidal defences protecting the area. This includes part of the EfW CHP Facility Site, CHP Connection Corridor, TCC, Water Connections and Grid Connection and the entirety of the Access Improvements Sites. Flood risk management measures are proposed to address this residual risk to the site, as summarised below.

Other potential flood risks identified include: the potential to impact flow conveyance in the Internal Drainage Board (IDB) drains, in and around the site, as a result of permanent and/or temporary watercourse crossings, the potential for increase in surface water run-off rates and volumes, and groundwater flooding of excavations and groundwater uplift forces in the waste bunker for the operational site.

Suitable flood risk management measures have been identified to address the potential risks identified, including residual risks. These include the preparation of an **Outline Flood Emergency Plan (Volume 7.9)**, minimum finished floor levels for the EfW CHP Facility, stand-off distances from IDB drains, an **Outline Drainage Strategy** (**Appendix 12F** of **ES Chapter 12: Hydrology Volume 6.4**) for the operational development to ensure run-off is

limited to greenfield rates and the preparation of a Water Management Plan for the construction phase (with an Outline Water Management Plan forming part of the **Outline Construction Environmental Management Plan (CEMP) (Volume 7.12)**). Risks during decommissioning would be similar to those encountered during construction and would be mitigated in a similar manner. The specification of future mitigation measures for the decommissioning phase would need to take account of the changes in the flood hazard baseline relating to climate change, land use change, and the planning and regulatory requirements prevailing at the time. The flood risk management measures would be secured by a combination of consents from the IDBs (**List of Other Consents and Licences** (**Volume 5.4**)), **Outline CEMP** (**Volume 7.12**), Development Consent Order (DCO) Requirements (**Draft DCO** (**Volume 3.1**)) and Decommissioning Plan (secured by a DCO Requirement (**Draft DCO** (**Volume 3.2**)).

In addition, the Essential Infrastructure elements of the proposals would remain operational (whilst waste and consumables are available on site) and safe in times of flood. The **Outline Flood Emergency Plan (Volume 7.9)** will safely take the EfW CHP Facility offline, if required, until access is restored. The development proposals are appropriate for the flood zone classifications, and, on this basis, the Exception Test is deemed to have been passed.

Evidence is provided to demonstrate that the Sequential Test has been passed, and a sequential approach has been applied in the selection process and will be applied as the development proposals are taken forward into further detail following granting of the DCO.

In conclusion, this FRA demonstrates that the requirements of EN-1, EN-3 and EN-5, and the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG) with respect to flood risk have been met, and the flood risk management measures identified would be secured through appropriate requirements of the DCO if approved.

Contents

1. Introduction

1.1 Purpose of this report

1.1.1 This Flood Risk Assessment (FRA) accompanies the Environmental Statement (ES) for the proposed Energy from Waste (EfW) Combined Heat and Power (CHP) Facility together with CHP Connection, TCC Access Improvements, Water Connections and Grid Connection centred on the industrial estate at Algores Way, Wisbech, Cambridgeshire (the 'Proposed Development'). This FRA has been prepared in accordance with relevant National Policy Statements (NPS) (NPS EN-1, EN-3 and EN-5) the emerging revised Energy National Policy Statement, the National Planning Policy Framework (NPPF)[1] (NPPF, 2021) and associated Planning Practice Guidance (PPG)[2], and relevant local plan policies. Consultation with key stakeholders, including the Environment Agency, Hundred of Wisbech (Middle Level Commissioners) Internal Drainage Board (HWIDB), King's Lynn IDB (KLIDB), Cambridgeshire County Council (CCC), Norfolk County Council (NCC) and Anglian Water has also informed baseline data gathering and the development of the FRA.

1.2 Context

1.2.1 In accordance with the National Planning Policy Framework (NPPF, 2021), Paragraph 164 states that a site-specific FRA is required for development proposals that are:

- One hectare (ha) or greater located in Flood Zone 1;
- All proposals for new development located in Flood Zone 2 and 3;
- All proposals for new development located in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

1.2.2 In this case an FRA is required as the Proposed Development is within Flood Zones 2 and 3. The site area is also over 1ha, and parts of the development are within a critical drainage area.

1.2.3 This FRA demonstrates how flood risk to the Proposed Development and any increased flood risk to third parties due to that development, will be managed over the lifetime of the development, taking climate change into account.

[1] Department of Communities and Local Government. National Planning Policy Framework. London: Department of Communities and Local Government, 2021.
[2] Department for Communities and Local Government. Planning Practice Guidance. 2014.

1.3 Terminology

Annual Exceedance Probability (AEP)

1.3.1 In this report, the probability of a flood occurring is expressed in terms of Annual Exceedance Probability (AEP), which is the inverse of the annual maximum return period. For example, the 1 in 100-year flood can be expressed as the 1% AEP flood, i.e., a flood that has a 1% chance of being exceeded in any year.

1.3.2 **Table 1.1 Flood Zone definitions and associated annual exceedance probability** is provided to clarify the use of the AEP terminology as well a description of the Flood Zone definitions as set out in the NPPF flood risk and coastal change guidance.

Table 1.1 Flood Zone definitions and associated annual exceedance probability

Flood Zones	Probability of flooding	AEP	Definition
Flood Zone 1	Low Probability	<0.1% AEP of river or sea flooding	Land with less than 1 in 1,000 probability of flooding from rivers or the sea, in any given year.
Flood Zone 2	Medium Probability	1% - 0.1% AEP of river flooding 0.5% – 0.1% AEP of sea flooding	Land with between a 1 in 100 and 1 in 1,000 probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 probability of sea flooding.
Flood Zone 3	High Probability	>1% AEP of river flooding >0.5% AEP of sea flooding	Land having a 1 in 100 or greater probability of river flooding in any year; or Land having a 1 in 200 probability or greater of sea flooding in any year.
Flood Zone 3b	Functional Floodplain	The 5% AEP (or 1 in 20 annual probability) event is often used to help define Flood Zone 3b, the 'functional floodplain', but is not part of the definition	This zone comprises land where water has to flow or be stored in times of flood. 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.

1.4 Sources of information and consultation

1.4.1 A summary of the desktop data used to inform the assessment is provided in **Table 1.2 Sources of desktop information used in this assessment**.

Table 1.2 Sources of desktop information used in this assessment

Desktop data	Source of desktop data	Details of the information
Aerial imagery	Google Maps	Aerial views of the Proposed Development area and surrounding areas to inform baseline conditions.
Ordnance Survey (OS) maps	Ordnance Survey	Baseline information on the hydrological context including topography, drainage and water features.
1m resolution 2019 LiDAR data	GOV.UK Open Data [3]	Baseline information on topography and ground elevations.
Topographic survey	MVV	Baseline information on topography ground elevations at the EfW CHP Facility Site.
Bedrock and superficial geology	British Geological Survey[4]	Baseline information on bedrock, superficial and borehole geology data.
Flood Map for Planning	Environment Agency[5]	Map providing baseline information on the flood risk from rivers and the sea for the Proposed Development.
Long term flood risk map	Environment Agency[6]	Maps providing baseline information on the flood risk from rivers and sea, surface water and artificial sources.
Detailed flood mapping	Environment Agency Data Request	Document NR200026 (Product 4) which included Flood Maps for Planning, historical flood extents, tide data and tidal overtopping and breach modelling simulation results. The Environment Agency also provided the depth results of the breach modelling in the format of raster files.
Historical flood information	Cambridgeshire County Council	Information requested and provided regarding local flooding. CCC provided information on surface water flood events.
LLFA and LPA planning documents	Various online sources including websites of County Councils	Includes Strategic and Preliminary Flood Risk Assessments (SFRAs and PFRAs), Catchment Management Plans and Sustainable Drainage Systems (SuDS) guidance.
Internal Drainage Board (IDB) drainage network	HWIDB and KLIDB	Shapefiles for HWIDB and KLIDB adopted drains.

[3] GOV.UK Open Data, 2019. Composite DTM 2019 - 1m
[4] British Geological Survey, 2021. Geology of Britain Viewer.
[5] Environment Agency, 2021. Flood Map for Planning.
[6] Environment Agency, 2021. Long term flood risk map.

Desktop data	Source of desktop data	Details of the information
Soilscapes	Cranfield Soil and Agrifood Institute, LANDIS soilscape viewer[7]	Map providing baseline information on soil characteristics for the Proposed Development.
Phase 1 Geoenvironmental Desk Study and Interpretative Report	Chapter 13: Geology, Hydrogeology and Contaminated Land (awaiting data)	Baseline geological and hydrogeological information.

1.4.2 Consultation with key stakeholders regarding the scope of this assessment and acquisition of data to support this assessment has included the following activities:

- Virtual meetings with Anglian Water on 2 April 2020 and 25 February 2021 to introduce the Proposed Development and discuss proposals regarding the potable water requirements, surface water drainage and foul drainage strategy.
- Virtual meetings with KLIDB on 15 July 2020 and 6 April 2021 to introduce the Proposed Development and discuss the potential stand-off distances and crossings of IDB drains for the Grid Connection element of the Proposed Development. A further virtual meeting on 26 November 2021 discussed the selected Grid Connection route, and how this would affect IDB drain crossings, as well as surface water management at Walsoken Substation.
- A meeting with HWIDB at the EfW CHP Facility Site on 20 August 2020 to introduce the Proposed Development and develop an understanding of the local IDB drainage network, discuss the proposed surface discharges from the EfW CHP Facility, and potential crossings of IDB drains. This was followed by email exchanges and a further virtual meeting on 25 March 2021 to provide an update on the Proposed Development and discuss the proposed water discharges from the EfW CHP Facility and potential stand-off distance and crossings of IDB drains. A further virtual meeting on 14 December 2021 discussed changes to the cable route following the finalisation of the single route option and how this would affect IDB drain crossings and stand-off distances, as well as culverts on New Bridge Lane and the A47.
- Email exchanges with NCC regarding historical flooding information and supplementary guidance on drainage policy (11 January 2021). This was followed by a virtual meeting on 01 March 2022 to provide an update on the Proposed Development, discuss comments on PEIR submission and agree on the approach for surface water drainage at Walsoken Substation.
- Email exchanges with CCC regarding historical flooding information and supplementary guidance on drainage policy (15 January 2021). This was followed by a virtual meeting on 19 April 2021 to discuss the proposed surface water drainage for the EfW CHP Facility. A further virtual meeting on 26 October 2021 discussed development updates and agreed on finished floor

[7] Cranfield Soil and Agrifood Institute, 2021. LANDIS soilscape viewer.

levels (FFLs) and flood vulnerability classifications across the EfW CHP Facility Site.

- Email exchanges with the Environment Agency regarding historical flooding and Product 4 data for the area (3 February 2021). This was followed by a virtual meeting on 21 April 2021 to introduce the Proposed Development and discuss the flood risk sources and potential mitigation measures. The Environment Agency agreed with the proposed approach to the assessment of flood risk undertaken in the Draft FRA in an email dated 19 May 2021. A further virtual meeting on 19 October 2021 discussed development updates, agreed on proposed vulnerability classification for the proposed development, agreed on FFLs and confirmed that floodplain compensation is not required, as the EfW CHP Facility is protected by flood defences.

1.4.3 An overview of the discussions with the various stakeholders is presented in **Appendix 12B: Stakeholder engagement** of **Chapter 12: Hydrology (Volume 6.4).**

1.5 Structure of this report

1.5.1 The report is structured as follows:

- Section 2 – Site Description, Development Proposals and Planning Context;
- Section 3 – Flood Risk Assessment;
- Section 4 – Detailed Tidal Flood Risk Assessment
- Section 5 – Surface Water Management;
- Section 6 – Flood Risk Management;
- Section 7 – Planning Requirements; and
- Section 8 – Conclusions.

1.5.2 The figures are embedded within the main body of the report while various supporting documents are presented at the end of the report in the form of appendices. These are as follows:

- **Annex A** contains the topographic survey for the EfW CHP Facility Site; and
- **Annex B** contains the detailed tidal flooding information provided by the Environment Agency.

1.5.3 Terms and abbreviations used in this report are explained in **Appendix 1F Terms and Abbreviations** of **ES Chapter 1: Introduction (Volume 6.2)**.

2. Site Description, Development Proposal and Policy Context

2.1 Introduction

2.1.1 This section provides an overview of the Proposed Development's site location and characteristics (**Section 2.2**), a description of the Proposed Development (**Section 2.3**) and establishes the planning policy context for the assessment of flood risk (**Section 2.4**).

2.2 Development Proposal

2.2.1 The Proposed Development comprises the following key elements:

- The EfW CHP Facility;
- CHP Connection;
- Temporary Construction Compound (TCC);
- Access Improvements;
- Water Connections; and
- Grid Connection.

2.2.2 A summary description of each Proposed Development element is provided below. A more detailed description is provided in **ES Chapter 3: Description of the Proposed Development (Volume 6.2)** of the ES. A list of terms and abbreviations can be found in **Appendix 1F Terms and Abbreviations** of **Chapter 1 Introduction, (Volume 6.4)**.

- EfW CHP Facility Site: A site of approximately 5.3ha located south-west of Wisbech, located within the administrative areas of Fenland District Council and Cambridgeshire County Council. The main buildings of the EfW CHP Facility would be located in the area to the north of the Hundred of Wisbech Internal Drainage Board (HWIDB) drain bisecting the site and would house many development elements including the tipping hall, waste bunkers, boiler house, turbine hall, air cooled condenser, air pollution control building, chimneys and administration building. The gatehouse, weighbridges, 132kV switching compound and laydown maintenance area would be located in the southern section of the EfW CHP Facility Site.
- CHP Connection: The EfW CHP Facility would be designed to allow the export of steam and electricity from the facility to surrounding business users via dedicated pipelines and private wire cables located along the disused March to Wisbech railway. The pipeline and cables would be located on a raised, steel structure.

- TCC: Located adjacent to the EfW CHP Facility Site, the compound would be used to support the construction of the Proposed Development. The compound would be in place for the duration of construction.
- Access Improvements: includes access improvements on New Bridge Lane (road widening and site access) and Algores Way (relocation of site access 20m to the south).
- Water Connections: A new water main connecting the EfW CHP Facility into the local network will run underground from the EfW CHP Facility Site along New Bridge Lane before crossing underneath the A47 (open cut trenching or horizontal directional drilling (HDD)) to join an existing Anglian Water main. An additional foul sewer connection is required to an existing pumping station operated by Anglian Water located to the northeast of the Algores Way site entrance and into the EfW CHP Facility Site.
- Grid Connection: This comprises a 132kV electrical connection using underground cables. The Grid Connection route begins at the 132kV switching compound in the EfW CHP Facility Site and runs underneath New Bridge Lane, before heading north within the verge of the A47 to the Walsoken Substation on Broadend Road. From this point the cable would be connected underground to the Walsoken DNO Substation.

2.3 Existing Site Characteristics

2.3.1 The EfW CHP Facility Site, CHP Connection, TCC, Access Improvements, Water Connections, and the Grid Connection are collectively known as the Proposed Development. A description of the baseline conditions for each area of the Proposed Development is described below. A site walkover was carried out by Wood on 19 October 2020. Photographs of the walkover are provided in **Appendix 12C: Site visit photos (Volume 6.4)** of **Chapter 12: Hydrology**.

Land Use

EfW CHP Facility Site

2.3.2 The EfW CHP Facility Site is located in the south-west of Wisbech, centred at National Grid Reference (NGR) TF 45564 07955 (**Figure 2.1ii: Proposed Development elements (EfW CHP Facility Site and surroundings)**). The site is occupied by a waste and aggregates recycling and waste transfer station (WTS) operated by Mick George Ltd within an existing industrial estate and is currently accessed via Algores Way. The area is predominantly brownfield land surfaced with compacted gravel hardstanding. Drainage ditches adopted by the HWIDB run through the centre and along the north, east and south edges of the EfW CHP Facility Site. The topsoil which previously covered the WTS was scraped back from the working area when its current use was first established and now forms perimeter bunds. The surface of the WTS is predominantly hardstanding/compacted surfaces.

2.3.3 The south-east section of the EfW CHP Facility Site is unoccupied scrubland owned by Fenland District Council. It is separated from the current waste and aggregates recycling and transfer station by an earth bund and trees.

2.3.4 The EfW CHP Facility Site area is bounded directly to the north by warehouses and other industrial business units. Residential areas of Wisbech lie beyond the industrial estate further to the north and the east. To the east is the existing main access to the EfW CHP Facility Site, located along Algores Way and connecting to the wider road network via Weasenham Lane. Adjacent to this are further industrial warehouses. The southern edge of the EfW CHP Facility Site is bounded by New Bridge Lane and the western edge is bounded by scrubland and vegetation. Within this vegetation lies the disused March to Wisbech Railway (**Figure 2.1iv: Proposed Development location (EfW CHP Facility Site and surroundings)**).

CHP Connection

2.3.5 The proposed CHP Connection (**Figure 2.1ii: Proposed Development elements (EfW CHP Facility Site and surroundings)**) would run north from the EfW CHP Facility Site, along the route of the disused March to Wisbech Railway. The route will cross Weasenham Lane via a pipe-bridge terminating at the Nestlé Purina pet food manufacturing factory, which is itself accessed from Coalwharf Road/Somers Road. The CHP Connection Corridor includes disused infrastructure from the old railway line, including track, and self-setting vegetation. The CHP Connection Corridor is bounded on both sides by industrial uses other than at its north eastern end where the rear gardens of residential properties on Victory Road, Great Eastern Road, Burdett Road, Hillburn Road and Oldfield Lane back onto it.

Temporary Construction Compound

2.3.6 The TCC (**Figure 2.1ii: Proposed Development elements (EfW CHP Facility Site and surroundings)**) is currently undeveloped greenfield land. The area would be located adjacent to the eastern boundary of the EfW CHP Facility, separated by a HWIDB adopted drain. The TCC will initially be accessed from the north via Algores Way, but once Access Improvements are implemented New Bridge Lane will also offer access for construction traffic.

Access Improvements Site

2.3.7 The existing EfW CHP Facility Site is accessed from Algores Way. This access point will be reconfigured to provide staff and visitor car and pedestrian access to the EfW CHP Facility. It is proposed to create a new access/egress to the EfW CHP Facility Site for HGVs from New Bridge Lane, located on the southern boundary of the site.

2.3.8 Direct vehicular access to Cromwell Road along New Bridge Lane from the proposed New Bridge Lane site access is not currently possible. New Bridge Lane crosses the disused March to Wisbech Railway and in this location the road narrows and bollards are in place to prevent vehicular access. Improvements to, and the reopening of, this road for vehicular access are required to facilitate

access off New Bridge Lane, along with dopped kerbs to assist pedestrian's crossing.

2.3.9 As a consequence, the Access Improvements Site covers a section of New Bridge Lane on the south-west edge of the EfW CHP Facility (**Figure 2.1ii: Proposed Development elements (EfW CHP Facility Site and surroundings)**). New Bridge Lane is bounded by industrial premises and connects to Cromwell Road (B198 road) in the west, which in turn connects to the A47.

Water Connections

2.3.10 A new water main would be required to connect the EfW CHP Facility into the local network (**Figure 2.1ii: Proposed Development elements (EfW CHP Facility Site and surroundings)**). The water main would run underground from the southern boundary of the EfW CHP Facility Site southeast along New Bridge Lane before either entering an orchard and then crossing underneath the A47 by horizontal directional drilling (HDD) or crossing the A47 and the southern end of New Bridge Lane by an open cut and fill arrangement, to join an existing water main. The water main would be constructed by the Applicant or Anglian Water. A foul water connection is required from an existing pumping station operated by Anglian Water located to northeast of the Algores Way site entrance and into the EfW CHP Facility.

Grid Connection

2.3.11 The Grid Connection is contained entirely within areas of public highways, underneath New Bridge Lane, the western verge of the A47 and beneath Broadend Road. It crosses a small number of HWIDB and KLIDB adopted drains (**Figure 2.1i: Proposed Development elements** and **Figure 2.1iii: Proposed Development location**).

Topography

EfW CHP Facility Site, CHP Connection Corridor, Access Improvements, TCC and Water Connections

2.3.12 The topography across the EfW CHP Facility Site is generally flat and low lying, with a very gradual slope towards New Bridge Lane in the south. Ground elevations obtained from LiDAR are shown on **Figure 2.2i: LiDAR topography elevations (Proposed Development)** and **Figure 2.2ii: LiDAR topography elevations (EfW CHP Facility Site and surroundings)**. The topographical survey for the EfW CHP Facility Site is provided in **Annex A: Topographic survey for the EfW CHP Facility Site.** The topography is discussed below for the different development elements. The areas of higher elevation are generally associated with road infrastructure and the areas of lower elevation (below sea level) are associated with watercourses, such as the River Nene and the IDB drainage network.

- EfW CHP Facility Site: ground levels are typically within 1.5 to 2.5m AOD. Areas of high elevation (up to 6m AOD) in the north-west and southern areas are associated with soil/aggregate bunds reflecting the current site activities.

Ground levels are slightly higher (2.25-2.5m AOD) in the area to the north of the IDB drain which bisects the site compared to the southern area (1.5 – 2m AOD). The IDB drains which surround and bisect the site are depressed below the level of the site (<-3 – 1m AOD).

- TCC: ground levels are typically within 1.5 to 2.25m AOD. The ground elevation slopes very slightly to the south. A small area of higher elevation (4m AOD) is shown on the southern edge. Lower elevations (around 0.6m AOD) are shown for the drainage ditch which runs across the centre and southern edge of this area.
- CHP Connection Corridor: ground levels are typically within 2 to 4m AOD. The ground elevation rises along the connection route from south to north. Areas of lower elevation (0 to 2m AOD) relate to drainage ditches on the western side of the connection route.
- Access Improvements: ground levels are typically within 2 to 3m AOD. Areas of lower elevation (-1 to 0m AOD) relate to IDB drains along and crossing New Bridge Lane.
- Water Connections: ground levels are typically similar to those recorded for the Access Improvements Site, for the potable supply and typical with those of the EfW CHP Facility for the foul water connection.

Grid Connection

2.3.13 The topography along the Grid Connection Corridor is flat and low lying. Ground elevations obtained from LiDAR are shown on **Figure 2.2i: LiDAR topography elevations (Proposed Development).**

2.3.14 There is a slight slope in the centre of the corridor, towards a high point at the junction between the A47 and the A1101, 1.5km the east of the EfW CHP Facility, where the land is over 3m AOD. At either end of the Route the land generally ranges between 1 and 2.25m AOD, with some low areas of elevation are related to drainage ditches adjacent and to and crossed by the Grid Connection Route.

Hydrology and Drainage

EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements, and Water Connections

2.3.15 The EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements, and Water Connections is within the catchment of the River Nene which is designated as a Main River. The River Nene flows in a north easterly direction, approximately 0.6km to the west of the EfW CHP Facility Site (**Figure 2.3i: Water Environment (Proposed Development)** and **Figure 2.3ii: Water Environment (EfW CHP Facility Site and surroundings)**). The Nene is artificial and highly modified, as it flows north through Wisbech, and has been cut through and against the slope of the surrounding land. The tidal limit of the River Nene is the Dog-in-a-Doublet sluice which forms the upstream limit of the tidal defences for the River Nene to the north of Whittlesey (about 19.8km south-west (upstream) of

the Proposed Development). The stretch of the Nene near the Proposed Development is therefore tidally influenced.

2.3.16 The Environment Agency was contacted to obtain river flow data within the Study Area and indicated that no data is available. The closest permanent flow gauging station is on the River Nene (River Nene at Orton[8]) is approximately 32km (upstream) of the EfW CHP Facility Site. The data indicates a mean flow rate of 9.3m^3/s (1939 to 1996).

2.3.17 The EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements, and Water Connections are situated within an area served by an extensive network of artificial drainage channels (Ordinary watercourses) under the control and management of the HWIDB (**Figure 2.3ii: Water Environment (EfW CHP Facility Site and surroundings)**). The IDB system provides a network of arterial watercourses that form a primary role in managing water levels and reducing flood risk within its district. The HWIDB drains discharge into the River Nene via a pumping station approximately 3.5km downstream from the EfW CHP Facility Site. The HWIDB's drainage network plan is provided in **Appendix 12D: IDB drainage plans (Volume 6.4)** of **Chapter 12: Hydrology** of the ES.

2.3.18 HWIDB adopted drains flow adjacent to the north (between nodes 34 and 47), east (between nodes 47 and 46) and south (between nodes 43 and 44 and nodes 48 and 49) edges of the EfW CHP Facility Site (**Graphic 2.1: Extract from the HWIDB's District plan showing the IDB adopted watercourses, flow direction, node numbers and separation dam (pink circle) near EfW CHP Facility Site (Order limits)**). A short stretch of the drain between nodes 46 and 47 is culverted to allow vehicular access to the existing waste transfer site from Algores Way. The HWIDB adopted drain between nodes 33 and 46 bisects the EfW CHP Facility Site.

2.3.19 The HWIDB advised during the consultation meeting held on 20 August 2020 of the importance of the watercourse between nodes 33 and 46 in transferring flows from Cromwell Road and Boleness Road sub-catchments (to the west and to the east of the EfW CHP Facility). This drain is culverted for a short distance in the west of the EfW CHP Facility Site to provide vehicular access to the southern portion of the EfW CHP Facility Site. This drain also includes a 'separation dam' structure which controls flows (photo provided in **Appendix 12C: Site visit photos** of **Chapter 12: Hydrology** (**Volume 6.4**) of the ES).

2.3.20 The HWIDB drains flow southwards, passing under the A47 before continuing to discharge into the River Nene via a pumping station approximately 3.5km downstream from the Order limits boundary.

2.3.21 The HWIDB advised that the EfW CHP Facility Site is within a Critical Drainage Area. This is an area which has critical drainage problems, and which has been notified to the Lead Local Flood Authority (CCC) by the Environment Agency.

2.3.22 The CHP connection corridor is bordered (watercourse between nodes 31 and 36) and crossed (watercourse between nodes 63 and 62) by HWIDB adopted drains.

[8] UK Centre for Ecology and Hydrology, 2021. National River Flow Archive.]

2.3.23 The TCC area is bordered to the west by the IDB adopted drains (open drains) flowing north to south (between nodes 47 and 46 and 45 and 48).

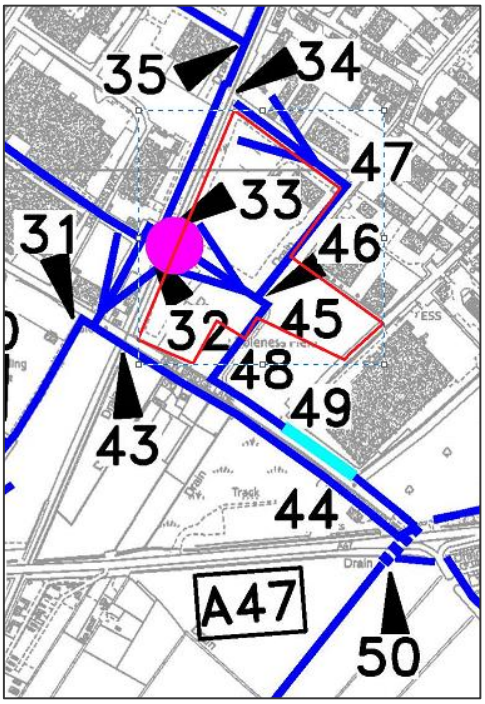
2.3.24 The Access Improvements area is crossed by an IDB drain to the north (between nodes 33 and 43) and bordered by IDB drains on the southern edge (between nodes 43 and 44) and northern edge (between nodes 48 and 49).

2.3.25 The Water Connections area is crossed by two IDB drains, which meet in the west of the area. An IDB drain runs south-east, parallel to the north of New Bridge Lane (between nodes 49 and 50) and this joins the IDB drain which runs west, parallel with the verge on the northern side of the A47 (between drains 51 and 50). These drains meet in culverts beneath the junction of the two roads.

2.3.26 Construction of the EfW CHP Facility Site, TCC, Access Improvements and Water Connections includes the following watercourse crossings (**Figure 2.3i: Water Environment (Proposed Development)**).

- Two permanent vehicle crossings (culvert) of the HWIDB drain bisecting the EfW CHP Facility site and two temporary pedestrian crossings (culvert or bridge) of HWIDB drains on eastern edge of EfW CHP Facility Site.
- Replacement and extension of culverted HWIDB drain in New Bridge Lane as part of Access Improvement works.
- One permanent crossing by the Water Connections of a HWIDB drain near the A47 (crossing above culverted watercourse by open trench or crossing below watercourse by HDD, depending on route. The east water main route is entirely open cut including the A47 crossing whilst the west water main route comprises both open cut to the north of the A47 and HDD beneath the A47).

Graphic 2.1 Extract from the HWIDB's District plan showing the IDB adopted watercourses, flow direction, node numbers and separation dam (pink circle) near EfW CHP Facility Site (shown with a red line)[9]



Grid Connection

2.3.27 The Grid Connection is split between the catchments of the designated main rivers of the Nene to the west and the Great Ouse to the east. The boundary between the catchments aligns with the IDB district areas. The section of the Grid Connection within the KLIDB area, to the East of Elm High Road (A1101), drains to the Great Ouse.

2.3.28 At its closest, the River Great Ouse, flows from south to north approximately 10km east of the Grid Connection Route (**Figure 2.3i: Water Environment (Proposed Development)**). Smeeth Lode Drain and Rands Drains (ordinary Watercourses) flow approximately 2.75km and 4.25km East of the Grid Connection and join the River Great Ouse 11.8km north-east of the route at Walsoken. Like the River Nene, the River Great Ouse is also tidally influenced far upstream and past the Proposed Development.

2.3.29 The Environment Agency was contacted to obtain river flow data near the Grid Connection and indicated that no data is available.

2.3.30 Similar to the EfW CHP Facility Site, the Grid Connection is within an area served by an extensive network of artificial drainage channels (Ordinary Watercourses) under the control and management of IDBs (IDB drains) and CCC and NCC (non-IDB drains). The majority (56%) of the Grid Connection lies within the KLIDB district, the remainder within the HWIDB district (44%) (**Figure 2.3i: Water**

[9] Mapping provided by Hundred of Wisbech IDB on email dated 25th January 2021 (**Appendix 12D: IDB drainage plans (Volume 6.4**) of **Chapter 12: Hydrology** of the ES)

Environment (Proposed Development)). The KLIDB drains are pumped into the River Great Ouse via Islington pumping station about 6km east of the Grid Connection. The KLIDB's adopted drains are shown on **Figure 2.3i: Water Environment (Proposed Development)**. The KLIDB's drainage network plan is provided in **Appendix 12D: IDB drainage plans (Volume 6.4)** of **Chapter 12: Hydrology** of the ES.

2.3.31 Construction of the Grid Connection includes the following watercourse crossings (**Figure 2.3i: Water Environment (Proposed Development), Figure 2.3ii: Water Environment (EfW CHP Facility Site and surroundings) and Figure 2.3iii: Water Environment (Grid Connection)).**

- Two permanent crossings by the underground cable of HWIDB drains which are culverted beneath the A47; and
- Three permanent crossings by the underground cable of KLIDB drains which are culverted beneath the A47.

Geology, hydrogeology, and soils

2.3.32 The geology and hydrogeology baseline for the Proposed Development is described in detail in **Chapter 13: Geology, Hydrogeology and Contaminated Land (Volume 6.2)** of the ES. A summary of the relevant elements for this FRA are provided below.

EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections

2.3.33 The EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements, and Water Connections are underlain by made ground, Tidal Flat Deposits (clay and silt), Glaciofluvial Deposits (dense gravelly sand) and Glacial Till (stiff sandy gravelly clay). The solid geology underlying the area comprises the Ampthill Clay Formation (mudstone). Groundwater is present within the made ground and Tidal Flat deposits at shallow depth (<1mbgl) and appears to be influenced by water levels in the IDB drains.

2.3.34 The 2020 site investigation at the EfW CHP Facility Site[10] encountered groundwater in silt/clay (Tidal Flat Deposits) at 2.7m and 4.5m below ground level (bgl) in trial pits. This investigation also found perched groundwater in made ground at 0.32m bgl. Groundwater on the site was noted to be influenced by nearby drainage channels. Based on the available information dewatering will be required during excavations and any underground works on the EfW CHP Facility Site. The groundwater environment is of low sensitivity due to the underlying superficial deposits and bedrock being classed as unproductive strata with a negligible significance for water supply.

2.3.35 Online EA mapping indicates that both the superficial deposits and the Ampthill Clay Formation are classified as Unproductive Aquifers. These are rock layers or drift deposits with low permeability that have negligible significance for water

[10] Wood (2020), Wisbech Phases 1 and 2 Geoenvironmental Desk Study and Interpretative Report, Draft Report, July 2020 (41310-WOOD-XX-XX-RP-OC-0001_S3_1).

supply or river base flow. The EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections do not lie within a Source Protection Zone (SPZ) for a public water supply.

2.3.36 The LANDIS soils database indicates that the EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections are underlain by loamy and clayey soil of coastal flats, with naturally high groundwater.

Grid Connection

2.3.37 Similar to the EfW CHP Facility Site, the Grid Connection is underlain by Tidal Flat Deposits, Glaciofluvial Deposits, Glacial Till and Ampthill Clay Formation. BGS boreholes show groundwater encountered at shallow depths (3m bgl) in the Tidal Flat Deposits. Both the Tidal Flat Deposits and the Ampthill Clay Formation are classified as Unproductive Aquifers. Groundwater is likely to be present within the Tidal Flat deposits at shallow depth. The Grid Connection does not lie within a SPZ for a public water supply.

2.3.38 The Grid Connection is underlain by loamy and clayey soil of coastal flats, with naturally high groundwater.

2.4 Planning Context

Introduction

2.4.1 The purpose of this section is to identify the key policy documents that define the scope of this assessment. The section is structured in a hierarchical order, from national policy down to local guidance.

Planning Act 2008

2.4.2 The Proposed Development is a Nationally Significant Infrastructure Project (NSIP) under Part 3 Section 14 of the Planning Act 2008 (hereafter referred to as the '2008 Act') by virtue of the fact that the generating station is located in England and has a generating capacity of over 50 megawatts (see section 15(2) of the 2008 Act). Planning consent for NSIPs are made by submission of a Development Consent Order (DCO) application to the Planning Inspectorate (PINS), with the ultimate decision made by the Secretary of State (SoS).

National policies

Overarching NPS for Energy (EN-1)

2.4.3 NPSs set out government planning policy for NSIPs in England and Wales. The Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change, 2011a) establishes national policy for energy infrastructure and have effect on the decisions by the SoS for Business, Energy and Industrial Strategy (BEIS) on applications (DCOs) for energy developments that fall within the scope of the NPSs. In September 2021 the Draft NPS EN-1 (Department of Energy and Climate Change, 2021) was published for consultation.

2.4.4 Sections of EN-1 that are relevant to this assessment are as follows:

- Section 5.7 of EN-1 and Section 5.8 of Draft EN-1, which discuss flood risk, setting out the minimum requirements of an FRA as well as information on the application of the Sequential and Exception tests; and
- Section 4.8 and Section 4.9 of Draft EN-1 which discuss climate change adaptation.

2.4.5 The minimum requirements for all FRAs, irrespective of the development type, as taken from Planning Policy Statement 25: Development and Flood Risk (PPS25) (Department for Communities and Local Government (2006 and update in 2010)), are set out in paragraph 5.7.5 of EN-1 (Department of Energy and Climate Change, 2011a) and paragraph 5.8.7 of Draft EN-1. These are set out in **Table 2.1: EN-1 and Draft EN-1 Minimum FRA requirements** below, together with the location in which they are addressed in this assessment.

Table 2.1 EN-1 and Draft EN-1 Minimum FRA requirements

EN-1 Minimum FRA Requirements		Section of this Report
Scope of FRA	EN-1 and Draft EN-1: Be proportionate to the risk and appropriate to the scale, nature and location of the project.	1, 6, 7
Assessment	EN-1 and Draft EN-1: Consider the risk of flooding arising from the project in addition to the risk of flooding to the project.	3, 4
Climate change	EN-1 and Draft EN-1: Take the impacts of climate change into account, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made.	4, 5
Approach	EN-1 and Draft EN-1: Be undertaken by competent people, as early as possible in the process of preparing the proposal.	8
Flood risk management infrastructure	EN-1 and Draft EN-1: Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure.	3, 4
Vulnerability and safe access	EN-1 and Draft EN-1: Consider the vulnerability of those using the site, including arrangements for safe access.	6, 7
Assessment	EN-1: Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made. Draft EN-1: Consider and quantify the different types of flooding (whether from natural and human sources and	3, 4

EN-1 Minimum FRA Requirements		Section of this Report
	including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration.	
Assessment	Draft EN-1: Identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management.	3, 4
Assessment	EN-1 and Draft EN-1: Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes.	3, 4
Residual risks	EN-1 and Draft EN-1: Include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project.	4, 6, 7
Surface water runoff	EN-1 and Draft EN-1: Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems.	5, 7
Assessment	EN-1: Consider if there is a need to be safe and remain operational during a worst-case flood event over the development's lifetime. Draft EN-1: Detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere	4, 6,7
Baseline	EN-1 and Draft EN-1: Be supported by appropriate data and information, including historical information on previous events.	2, 3

2.4.6 PPS25 Development and Flood Risk was withdrawn in March 2014 and replaced by the relevant sections of the NPPF and its supporting PPG on Flood Risk and Coastal Change. Whilst much of the detailed guidance for flood risk assessment developed in PPS25 remains valid, it should be noted that the NPPF PPG constitutes the most appropriate contemporary source of such guidance. Consequently, where further detail for assessment of the flood risk is provided in NPPF and is of relevance to this assessment, reference has been made to NPPF, as discussed further below.

2.4.7 EN-1 (Department of Energy and Climate Change, 2011a) and Draft EN-1 also include a number of additional requirements that are specific to Energy Infrastructure. Those that are of potential relevance to the assessment are set out in **Table 2.2: EN-1 and Draft EN-1 requirements relating to flood risk, and the location in which the requirements are addressed in this report,** together with

the location of this report in which they are addressed, or the other ES documents in which they are addressed, where appropriate.

Table 2.2 EN-1 and Draft EN-1 requirements relating to flood risk, and the location in which the requirements are addressed in this report

EN-1 Requirements		Section of this Report
Policy	The development proposal should be in line with any relevant national and local flood risk management strategies (paragraph 5.7.9 of EN-1 and 5.8.11 of Draft EN-1).	2.4, 7
Flood risk	EN-1: Where necessary, the development should be appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development (paragraph 5.7.9). Draft EN-1: the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in 5.8.18). The project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development (paragraph 5.8.11)	6, 7
Operation of the site	EN-1: The development should be designed to remain operational when floods occur (paragraph 5.7.24). Draft EN-1: The project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in 5.8.18) (paragraph 5.8.11)	6, 7
Functional floodplain	EN-1 and Draft EN-1: The development should not result in a net loss of functional floodplain storage or impede water flows (within Flood Zone 3b) (paragraph 5.7.24 of EN-1 and paragraph 5.8.14 Draft EN-1).	4
Flood warning and evacuation plan	EN-1: Flood warning and evacuation plans should be in place for those areas at an identified risk of flooding. The applicant should take advice from the emergency services when producing an evacuation plan for a manned energy project as part of the FRA. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the FRA (paragraph 5.7.25). Draft EN-1: The applicant should take advice from the local authority planning team, emergency services and, where appropriate, from local resilience forum when producing an evacuation plan for a manned energy project as part of the FRA (paragraph 5.8.26)	6

EN-1 Requirements		Section of this Report
Climate change	EN-1 and Draft EN-1: The impacts of climate change should be considered when planning the location, design, build, operation and, where appropriate, decommissioning of the development (paragraph 4.8.5 of EN-1 and paragraph 4.9.6 of Draft EN-1).	4, 5, 6
Climate change	EN-1: PINS should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures (paragraph 4.8.6). Draft EN-1: The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk Assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure (paragraph 4.9.7).	4, 5, 6
Climate change	EN-1: As a minimum, the applicant should consider the emissions scenario that the Independent Committee on Climate Change suggests the world is currently most closely following – and the 10%, 50% and 90% estimate ranges. These results should be considered alongside relevant research which is based on the climate change projections (paragraph 4.8.7). Draft EN-1: Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time. Applicants should be able to demonstrate that proposals have a high level of climate resilience built-in from the outset. They should also be able to demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections (paragraph 4.9.8)	6
Climate change	EN-1 and Draft EN-1: Where energy infrastructure has safety critical elements, the applicant should apply the high emissions scenario (high impact, low likelihood) to those elements (paragraph 4.8.9 of EN-1 and paragraph 4.9.10 of Draft EN-1).	2.4
Climate change	EN-1 and Draft EN-1: The applicant should demonstrate that there are no critical features of the development which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections (paragraph 4.8.8 of EN-1 and paragraph 4.9.9 of Draft EN-1).	4.2

EN-1 Requirements		Section of this Report
Climate change/adaptation	EN-1 and Draft EN-1: Adaptations to climate change to protect against flood risk may give rise to additional impacts, such as consequential impacts on coastal change (paragraph 4.8.4 of EN-1 and paragraph 4.9.4 of Draft EN-1).	6
Adaptation	EN-1 and Draft EN-1: The potential consequential impacts of adaptation measures, including those addressing flood risk, should be considered by PINS in relation to the application as a whole (paragraph 4.8.10 of EN-1 and paragraph 4.9.11 of Draft EN-1).	6
Adaptation	EN-1 and Draft EN-1: Appropriate mitigation or adaptation measures to cover the estimated lifetime of the development should be identified (paragraph 4.8.6 of EN-1 and paragraph 4.9.7 of Draft ES-1). Any adaptation measures should be based on the latest set of UK Climate Projections, the Government's latest UK Climate Change Risk Assessment, when available and in consultation with the Environment Agency (paragraph 4.8.11 of EN-1 and 4.9.12 of Draft EN-1	6
Drainage and Sustainable Drainage Systems (SuDS)	EN-1: The applicant should give priority to the use of SuDS and make provision for their adoption and maintenance (paragraphs 5.7.9 and 5.7.10). Draft EN-1: Sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards) are to be used in the design unless there is clear evidence that their use would be inappropriate (paragraphs 5.8.11 and 5.8.12).	5
Drainage and SuDS	EN-1 and Draft EN-1: For construction work which has drainage implications, approval for the project's drainage system will form part of the DCO issued by PINS. The proposed drainage system should comply with any National Standards published by Ministers under Paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010 (paragraph 5.7.10 of EN-1 and paragraph 5.8.12 of Draft EN-1).	5
Drainage and SuDS	EN-1 and Draft EN-1: Site layout and surface water drainage systems should be designed to cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without any adverse impacts (paragraph 5.7.20 of EN-1 and paragraph 5.8.22 of Draft EN-1).	5
Drainage and SuDS	EN-1: The volumes and peak flow rates of surface water leaving the site should be no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect (paragraph 5.7.21). Draft EN-1: The surface water drainage arrangements must	5

EN-1 Requirements		Section of this Report
	also account for the predicted impacts of climate change throughout the developments lifetime, on volumes and peak flow rates (paragraph 5.8.23).	
Sequential Test	EN-1: The PPS25 Sequential Test and sequential approach should be applied (paragraphs 5.7.9, 5.7.12 and 5.7.13). Draft EN-1: The Sequential Test and sequential approach should be applied (paragraphs 5.8.11 and 5.8.15). If essential energy infrastructure has to be located in such areas for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage and will not impede water flows (paragraph 5.8.14).	2.4, 7.1
Exception Test	The PPS25 Exception Test, where necessary, should be applied (paragraphs 5.7.14 to 5.7.17 of EN-1. Paragraphs 5.8.16 to 5.8.19 of Draft EN-1 explain how the test is to be applied).	2.4, 7.2

2.4.8 In addition to the requirements listed in **Table 2.1 EN-1 and Draft EN-1 Minimum FRA requirements** and **Table 2.2 EN-1 and Draft EN-1 requirements relating to flood risk, and the location in which the requirements are addressed in this report**, EN-1 also details the following points:

- Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, PINS may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure (paragraph 5.7.17);
- Where adaptation measures would have adverse effects, these could be implemented should the need arise, rather than at the outset of the development (paragraph 4.8.12); and
- If any adaptation measures give rise to consequential impacts, PINS should consider the impact of the latter in relation to the application as a whole and the impacts guidance set out in Part 5 of the NPS (paragraph 4.8.10).

NPS for Renewable Energy Infrastructure (EN-3)

2.4.9 EN-3 (Department of Energy and Climate Change, 2011b) covers nationally significant energy from biomass and/or waste (>50 megawatts (MW)) infrastructure, which applies to the Proposed Development.

2.4.10 EN-3 supports the recovery of energy from the combustion of waste. The Draft NPS EN-3 was published in September 2021. No additional requirements relating to flood risk and/or drainage are included in either document beyond those already covered in EN-1.

NPS for Electricity Networks Infrastructure (EN-5)

2.4.11 The technology specific NPS EN-5 (Department of Energy and Climate Change, 2011c) covers the electricity transmission and distribution network. Section 2.4 of EN-5 (Department of Energy and Climate Change, 2011c) provides further clarification on climate change adaptation but provides no additional guidance with respect to the assessment of flood risk. The Draft NPS EN-5 was published in September 2021.

2.4.12 With respect to climate change adaptation, paragraph 2.4.1 of EN-5 advises that as climate change is likely to increase risks to the resilience of electricity network infrastructure, applicants should set out to what extent the proposed development is expected to be vulnerable to extreme weather, including flooding, and, as appropriate, how it would be resilient, particularly for substations that are vital for the electricity transmission and distribution network. Similar policy guidance is contained within paragraph 2.6.1 in the Draft EN-5.

National Planning Policy Framework (and associated Planning Practice Guidance)

2.4.13 The NPPF acts as guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications. This is supported by online PPG.

2.4.14 Although NPPF and the associated PPG are not directly applicable to NSIP developments, they do provide additional relevant guidance on a range of issues, including the definition of flood zones, development vulnerability classifications, compatibility of development types and flood zones, the design flood and residual risk.

2.4.15 Associated guidance on providing the appropriate allowances for the effects of climate change to be used in FRAs is provided by the Environment Agency, also on the UK Government website[11]. The climate change allowances provided are predictions of anticipated change for peak river flow by river basin district; peak rainfall intensity; sea level rise; and offshore wind speed and extreme wave height. They are based on climate change projections and different scenarios of carbon dioxide (CO_2) emissions to the atmosphere. There are different allowances for different epochs or periods of time over the next century. This guidance is used as the basis for evaluating the effects of climate change on flood risk over the lifetime of the Proposed Development in this FRA.

Local plans and policies

2.4.16 Local plans, policies and guidance relevant to this FRA are summarised in **Table 2.3: Local Plans, policies and guidance.**

[11]Gov.uk, 2021, Flood risk assessments climate change guidance, accessed 17/02

Table 2.3 Local Plans, policies and guidance

Policy/ Plan/Guidance	Key Provisions
Policy/Plan	
Cambridge and Peterborough Waste Local Plan 2021	Policy 22 (Flood and Water management) states that development will only be permitted where it can be demonstrated that it would not have a significant impact upon surface and groundwater, water abstraction, groundwater, increased flood risk. The document is supported by document which include for the consideration of strategic flood risk.
Fenland Local Plan May 2014, adopted by Fenland District Council on 8 May 2014 **Policy LP14 – Responding to Climate Change and Managing the Risk of Flooding in Fenland**	Part (A) Resource Use, Renewable Energy and Allowable Solutions: The Policy recommends that all developments incorporate on site renewable and/or decentralised renewable or low carbon energy sources, water saving measures and measures to help the development withstand the longer-term impacts of climate change. Part (B) Flood Risk and Drainage: The Policy requires that: • All development proposals should adopt a sequential approach to flood risk from all forms of flooding; • Sustainable Drainage Systems (SuDS) are used to ensure that runoff from the site (post development) is to greenfield runoff rates for all previously undeveloped sites and for developed sites (where feasible); • The discharge of surface water from developments should be designed to contribute to an improvement in water quality in the receiving water course or aquifer in accordance with the objectives of the Water Framework Directive; and • All proposals should have regard to the guidance and byelaws of the relevant Internal Drainage Board, including, where appropriate the Middle Level Strategic Study and should help achieve the flood management goals from the River Nene and Great Ouse Catchment Flood Management Plans.
Fenland Local Plan May 2014, adopted by Fenland District Council on 8 May 2014 **Policy LP16 - Delivering and Protecting High Quality Environments across the District**	The Policy sets out the following requirements with respect to hydrology: • Makes a positive contribution to the local distinctiveness and character of the area, enhances its local setting, responds to and improves the character of the local built environment, provides resilience to climate change, reinforces local identity and does not adversely impact, either in design or scale terms, on the street scene, settlement pattern or the landscape character of the surrounding area; • Provides well designed hard and soft landscaping incorporating sustainable drainage systems as appropriate; • Identifies, manages and mitigates against any existing or proposed risks from sources of noise, emissions, pollution, contamination, odour and dust, vibration, landfill gas and protects from water body deterioration; • The site is suitable for its proposed use with layout and drainage taking account of ground conditions, contamination and gas risks arising from previous uses and any proposals for land remediation, with no significant impacts on future users, groundwater or surface waters; and complements and enhances the quality of riverside settings, including ecological value, re-naturalisation where possible, and navigation.

Policy/ Plan/Guidance	Key Provisions
Norfolk Core Strategy and Minerals and Waste Development Management Policies DPD 2011	Policy DM4 Flood Risk requires that an FRA is provided for all development in Flood Zones 2 and 3. The Council will expect development to not give rise to an increase in flood risk through site layout, design and access.
King's Lynn and West Norfolk Local Development Framework – Core Strategy 2011	Policy CS14 supports the provision of sustainable drainage systems.
King's Lynn and West Norfolk Local Development Framework Site Allocations and development Management Policies 2016	Policy DM 21 states that applications for development in Flood Zones 2 and 3 will need to be accompanied by a flood risk assessment which makes allowance for climate change.
Guidance	
Borough Council of King's Lynn and West Norfolk Strategic Flood Risk Assessment, SFRA, Level 1 (2018)	Provides up to date information and guidance on flood risk for the Borough area, taking into account the latest flood risk information and the current state of national planning policy.
Borough Council of King's Lynn West Norfolk SFRA, Level 2 (2019)	Provides a community-based assessment of flood risk across identified communities within the Borough area, informs the Sequential Test, provides guidance for developers to complete the Exception Test and provides an assessment of residual risk and climate change.
Cambridgeshire County Council, Cambridgeshire's Local Strategy for Flood Risk 2015-2020 (2015)	The Strategy's main focus is on flooding from surface water, groundwater and ordinary watercourses, such as streams and ditches. Although the risk of flooding from rivers remains the responsibility of the Environment Agency, this strategy looks at the interaction between all forms of flood risk. The public consultation of the draft Cambridgeshire Flood Risk Management Strategy for 2021-2027 has concluded and the updated strategy is expected to be published in 2022.
Cambridgeshire County Council, CCC, Cambridgeshire Preliminary Flood Risk Assessment, PFRA (2017)	Provides a high-level overview of flood risk and historical flooding from a variety of flood sources which in Cambridgeshire are principally associated with surface runoff, groundwater, and ordinary watercourses. Areas that have high levels of flood risk from a variety of sources are identified and managed at a local scale through the local flood risk management strategies within Cambridgeshire County Wide Surface Water Management Plan.
Cambridgeshire Surface Water Management Plan, SWMP (Countywide Update 2014)	Provides a review of historical flood incidents and identifies wetspot priority areas to assist the County Council in taking actions and allocating resources for future investigation.

Policy/ Plan/Guidance	Key Provisions
Cambridgeshire Flood & Water Supplementary Planning Document, SPD (2016)	Provides guidance on the approach that should be taken to design new developments to manage and mitigate flood risk and include sustainable drainage systems (SuDS).
Environment Agency, Great Ouse Catchment Flood Management Plan (2011)	Provides an overview of the flood risk in the River Great Ouse Catchment and sets out the preferred plan for sustainable flood risk management over the next century.
Environment Agency, River Nene Catchment Flood Management Plan (2009)	Provides an overview of the flood risk in the River Nene Catchment and sets out the preferred plan for sustainable flood risk management over the next century.
Fenland District Council, SFRA Level 1 (2011)	Provides an overview of the flood risk issues throughout Fenland in order to facilitate a sequential approach during the allocation of sites for future development.
Fenland District Council, Wisbech Level 2 SFRA (2012)	Sets out flood risk issues in Wisbech in more detail than the District wide Level 1 SFRA. This report considers the existing flood defence infrastructure in the town and assesses the risk of flooding in the event of defence failure. A series of maps indicates the range of possible flood events, whilst considering future climate change.
Norfolk County Council, Norfolk Local Flood Risk Management Strategy (2015)	Provides an overview of flood risk and how it can affect the population and assets across Norfolk, before providing more detail on the risk within eight regions across the county. This document also lays out the aims of LLFA in reducing risk through objectives and policies as well as how measures and funding can achieve this
Norfolk County Council, Preliminary Flood Risk Assessment (2011)	Provides a high-level overview of the potential risk of flooding from local sources, as well as provides mapping of past events and potential future areas at risk.
Wisbech Level 2 SFRA (2012)	The Wisbech SFRA considers the existing flood defence infrastructure in Wisbech and assesses the risk of flooding were these to fail. The results are shown on a series of maps in the Appendix which indicate a range of possible flood events taking the effects of climate change into account.

The Sequential Test

2.4.17 The Sequential Test is set out in EN-1 as follows: *"Preference should be given to locating projects in Flood Zone 1 in England. If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2. If there is no reasonably available site in Flood Zones 1 or 2, then NSIPs can be located in Flood Zone 3 subject to the Exception Test."* A similar definition is also provided in NPPF.

2.4.18 EN-1 and NPPF also require that a sequential approach should be applied to the layout and design when allocating land for development and land use types within development sites.

The Exception Test

2.4.19 The Exception Test, as set out in paragraph 160 of the NPPF, is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. The need for the Exception Test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in the NPPF PPG.

2.4.20 EN-1 states that *"If, following application of the sequential test, it is not possible, consistent with wider sustainability objectives, for the project to be located in zones of lower probability of flooding than Flood Zone 3 or Zone C, the Exception Test can be applied. The test provides a method of managing flood risk while still allowing necessary development to occur."*

2.4.21 The PPG for the NPPF provides further information on the circumstances under which the Exception Test should be applied.

2.4.22 Policy 164 of the NPPF states that: *"for the Exception Test to be passed it must be demonstrated that:*

a) the development would provide wider sustainability benefits to the community that outweigh flood risk;

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall."

2.4.23 The flood risk vulnerability classification for the construction and operational phases of the proposed development are set out in **Table 2.4 Application of the flood risk vulnerability and flood zone 'compatibility' matrix to the Proposed Development**. The classification for the operational EfW CHP Facility was agreed with CCC at a consultation meeting on 26 October 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES.) and is shown on **Figure 2.4: Flood risk vulnerability classification for the EfW CHP Facility (operational phase)** as set out in **Table 2.4 Application of the flood risk vulnerability and flood zone 'compatibility' matrix to the Proposed Development**, the TCC, watercourse crossings and all non-power generation elements of the EfW CHP Facility are considered appropriate for the Flood Zones in which they would be located. However, the Essential Infrastructure elements of the Proposed Development including construction activity areas, the power generation elements of the EfW CHP Facility, the CHP Connection and the Grid Connection require Part 2 of the Exception Test to be passed in order to be considered appropriate development in Flood Zone 3a.

Table 2.4 Application of the flood risk vulnerability and flood zone 'compatibility' matrix to the Proposed Development

Development type	Flood risk vulnerability classification[1]	Flood Zone(s)	Flood risk vulnerability and flood zone 'compatibility'
Construction Phase			
TCCs (offices, welfare facilities)	Less Vulnerable	1, 2 and 3a	✓
Construction activity areas (access routes, Access Improvements site, and working areas)	Less Vulnerable[2]	1, 2 and 3a	✓
Watercourse crossing points	Water compatible	1, 2 and 3a	✓
Operational Phase			
EfW CHP Facility (power generation elements, weighbridge, internal roads)	Essential Infrastructure[4]	3a	Exception Test required[3]
EfW CHP Facility (all non-power generation elements, e.g., site office, car park, laydown and maintenance area)	Less Vulnerable	3a	✓
EfW CHP Facility (open space)	Water Compatible	1,2 and 3a	✓
Access improvements	Essential Infrastructure	2 and 3a	Exception Test required[3]
Water Connections	Water Compatible	2 and 3a	✓
Grid Connection	Essential Infrastructure[5]	1, 2 3a	✓ Exception Test required[3]
CHP Connection	Essential Infrastructure[5]	3a	Exception Test required[3]
Walsoken Substation	Essential Infrastructure[5]	2	✓

Notes:
✓ Development is appropriate
X Development should not be permitted
1) Definition of flood zones is provided in Table 1.1 Flood Zone definitions and associated annual exceedance probability
2) The Planning Practice Guidance does not explicitly categorise the vulnerability of access routes and working areas to be used for construction purposes, therefore, given that these are for electricity transmission infrastructure which only becomes Essential infrastructure once the site is operational, it is considered that Less Vulnerable is the most appropriate classification.
3) In Flood Zone 3a Essential Infrastructure should be designed and constructed to remain operational and safe in times of flood.
4) Under the Planning Practice Guidance, the EfW CHP Facility is classified both as 'Less Vulnerable' (Waste treatment (except landfill* and hazardous waste facilities) and Essential Infrastructure (electricity generating power stations). As a conservative approach, the power generation elements of the EfW CHP Facility have been classed as Essential Infrastructure, non-power generating elements as Less Vulnerable development and open space as water compat ble development. This was agreed with CCC, at a consultation meeting on 26 October 2021.
5 The Planning Practice Guidance does not explicitly categorise the vulnerability of electricity transmission infrastructure, however it is considered that Essential Infrastructure is the most appropriate classification.

3. Flood Risk Assessment

3.1 Introduction

3.1.1 The assessment will use the source-pathway-receptor approach, whereby all three of those elements must exist for there to be a risk to be assessed. The presence of a source is initially screened in **Section 3.2** below. Where a potential source is identified, the risk itself will be assessed with respect to the likelihood and consequence of flooding in the subsequent sub-sections. Where a detailed assessment is required, this is provided in **Section 4**. Where necessary, appropriate flood risk management measures will be set out in **Sections 5 and 6** to address the identified risks.

3.2 Screening of all potential sources of flood risk

3.2.1 **Table 3.1 Screening of all potential sources of flood risk** provides an initial screening of all potential flood risk across the Proposed Development area. Those that are screened in as posing a potential flood risk are then considered further in the subsequent sections.

Table 3.1 Screening of all potential sources of flood risk

Source of Flooding	Potential Connection to Proposed Development area	Screened In?
Tidal	The primary flood risk to the Proposed Development is from tidal sources (River Nene to the west and to a lesser degree the River Great Ouse to the east). The majority of the Proposed Development is located within Flood Zone 3 (high risk of tidal flooding) **(Figure 3.1i Environment Agency Flood Map for Planning (Overview))** and **(Figure 3.1ii Environment Agency Flood Map for Planning (EfW CHP Facility Site and surroundings))**. A detailed assessment of tidal flooding is provided in **Section 4.**	Yes
Fluvial	The detailed tidal flooding information provided by the Environment Agency **(Annex B: Detailed tidal flooding information provided by the Environment Agency)** advises that the Proposed Development is not considered to be at risk of fluvial flooding from main rivers. Fluvial flood risk from the IDB network is considered under surface water flood risk below.	No
Surface water flood risk – run-on	The Environment Agency's Surface Water Flood Risk Map **(Figure 3.2i Environment Agency Surface Water Flood Risk Map (EfW CHP Facility Site and surroundings) and Figure 3.2ii Environment Agency Surface Water Flood Risk Map (Grid Connection))** shows limited/very low risk of flooding from surface water run-on across the Proposed Development. This is likely due to the extensive drainage network provided by the IDB drains, which allow surface water to drain from the fields into the nearby channels. This indicates that, for the most part, it will be surface water runoff originating from the development proposals which will be the primary surface water consideration. Nevertheless, the low risk posed to the proposed development from surface water run-on is discussed further in **Section 3.3**. It will also be	Yes

Source of Flooding	Potential Connection to Proposed Development area	Screened In?
	necessary to ensure that the Proposed Development does not impede the drainage management functions provided by the IDB for its adopted drainage network. This is also covered in **Section 3.3**.	
Surface water flood risk – runoff	As discussed above, effective management of surface water runoff originating from the development proposals (during both construction and operational phases) will be the primary surface water consideration. Surface water runoff is considered further in **Section 3.4**	Yes
Groundwater	The Proposed Development area is underlain by Unproductive Aquifers (Tidal Flat Deposits, Glaciofluvial Deposits and Glacial Till over Ampthill Clay Formation). Groundwater is present at shallow depths within the Tidal Flat Deposits. The Proposed Development straddles two IDB districts **(Figure 2.3i Water Environment (Proposed Development))**, in which shallow groundwater is likely to be in continuity with the managed water levels in the drainage network. This indicates that the risk of groundwater flooding at the Proposed Development is anticipated to be limited to excavations below existing ground level, which include the waste bunker at the EfW CHP Facility and excavations associated with the construction phase. For the EfW CHP Facility Site, the most notable potential risk is to the proposed waste bunker, which could be liable to groundwater flooding, or be at risk of groundwater uplift (floating) if not adequately engineered to avoid this. It is anticipated that the management of groundwater in excavations during construction phase would be managed through standard construction practices, and in line with the measures set out in **Chapter 12: Hydrology** and **Chapter 13: Geology, Hydrogeology and Contaminated Land (Volume 6.2)** of the ES.	Yes
Sewer	The EfW CHP Facility Site, CHP Connection Corridor, Access Improvements, TCC and Water Connections are located within an industrial estate (except for northern end of CHP Connection Corridor, which borders a residential area) **(Figure 2.1ii Proposed Development elements (EfW CHP Facility Site and surroundings))**, and therefore whilst the potential for sewer flooding could exist, the risk at the site is considered to be low. Any surcharged water would drain to nearby more low-lying areas to the south and/or would be intercepted by the local HWIDB drainage network. The Grid Connection is situated away from developed areas, and it is anticipated that there are few sewer drainage networks in this area. Any flows from surcharging from minor sewer systems associated with nearby farm buildings would be expected to be minimal and intercepted by the IDB drainage network. On this basis sewer flooding is not considered to be a significant risk and is not considered further in the FRA.	No
Artificial	The updated[12] Environment Agency Flood Risk from Reservoirs Mapping now shows the flood risk from a reservoir failure for two hydrological scenarios. The maps show the maximum flood extent for a "dry-day", where river levels are at normal levels, and a "wet-day" where reservoir flooding occurs alongside wider river flooding. The updated mapping shows that no part of the Proposed Development area is within an area that would be affected by an extreme event of a breach to the Whittlesey Washes flood storage reservoir, which lies to the south-west **(Figure 3.3 Environment Agency Reservoir Flood Risk Map)**. The dry-day scenario shows no extent within the Proposed	No

[12] The Environment Agency's reservoir flood maps were updated in November 2021, Gov.uk

Source of Flooding	Potential Connection to Proposed Development area	Screened In?
	Development area, with flooding of land only extending approximately 600m south-west of the EfW CHP Facility. The mapped extent does extend further north but is limited to drainage channels approximately 15m south-west of New Bridge Lane. The wet-day scenario also shows an absence of the flood extent from the Proposed Development area, only extending to within approximately 600m south-west. Prior to the update of the Reservoir flood maps in November, the Reservoir flood extent extended across the EfW CHP Facility, TCC, Access Improvements Area, Water Connections and sections of the Grid Connection. The Environment Agency were consulted on these changes, and they agreed that their updated model was cleared to be used in this assessment.	

3.3 Historical Flooding

3.3.1 Records of local historical flooding reported in the SFRA and provided by the Environment Agency and CCC are summarised below. The information provided indicate that the Proposed Development was not flooded during any of the flood events listed below.

- EfW CHP Facility Site (including CHP Connection and Access Improvements, TCC):
  - During the 31 January and 1 of February 1953, a North Sea Storm surge caused North-west Europe's most severe coastal floods in living memory. This included tidal flooding from the River Nene in Wisbech.
  - On the 11 and 12 January 1978, a storm surge caused extensive coastal flooding along the Wash coast and flooding from the River Nene in Wisbech. Flood waters reached a depth of 1.5m. The majority of the flood extent was to the north of Freedom Bridge, which crosses the River Nene, approximately 700m north of the CHP Connection.
  - Anglian Water records show three sewer flooding incidents in Wisbech, in a small area to the north of the Thomas Clarkson Community College (approximately 1.2km north-east of the EfW CHP Facility Site), outside of the Proposed Development.
  - In 2014 surface water flooding was reported in the village of Elm, approximately 2km south-east of the EfW CHP Facility Site.
  - In 2014, several properties were flooded in Oldfield Lane, approximately 20m west of the CHP Connection.
  - During the consultation meeting with HWIDB on 14 December 2022 the HWIDB indicated a flood event in December 2020, near the culverted drains beneath the junction of the A47 and New Bridge Lane, to the southeast of the EfW CHP Facility. A culvert improvement scheme by National Highways to alleviate flooding in the area is currently on hold.
- Grid Connection:

- Regular surface water flooding in Coldhorn Crescent, caused by drainage issues. Coldhorn Crescent is approximately 2km north-west of Walsoken Substation on Broad End Lane.

3.3.2 It is worth noting that incidents of historical flooding are rarely recorded at the time for undeveloped areas, so it is not possible to categorically confirm that the EfW CHP Facility Site, and the Grid Connection in particular, has not suffered from flooding in the past.

3.4 Tidal Flooding

3.4.1 Tidal flood risk is discussed in detail in **Section 4**.

3.5 Surface Water Flooding

3.5.1 Surface water flooding occurs when the intensity of rainfall is greater than the local drainage and infiltration capacity, causing water to flow overland. Where low-points or barriers to flow are present, particularly deep areas of flooding may occur. These areas are not limited to river corridors or floodplains.

3.5.2 As described in **Section 2.2**, the majority of the Proposed Development and surrounding area are located within the HWIDB and KLIDB districts **(Figure 2.3i Water Environment (Proposed Development)**, i.e., areas that are artificially drained as a result of historical land reclamation and ongoing management for agricultural purposes as well as protection of settlements and infrastructure.

3.5.3 For the purposes of this assessment, consideration of the conveyance of the IDB drainage network has been dealt with under this 'surface water flooding' section to ensure that all matters of interest to the IDBs remain together in this report.

EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections

3.5.4 The Environment Agency's Surface Water Flood Risk Map **Figure 3.2i: Environment Agency Surface Water Flood Risk Map (EfW CHP Facility Site and surroundings)** and **Figure 3.2ii Environment Agency Surface Water Flood Risk Map (Grid Connection)** gives an indication of the broad areas likely to be at risk of surface water flooding at present, i.e., areas where surface water would be expected to flow or pond. It defines areas at Very Low (less than 0.1% AEP), Low (between 0.1% and 1% AEP), Medium (between 1% and 3.3% AEP) and High (greater than 3.3% AEP) probability of surface water flooding.

3.5.5 The Environment Agency's Surface Water Flood Risk Map shows that the majority of the EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements, and Water Connections are at Very Low risk of flooding from this source (**Figure 3.2i: Environment Agency Surface Water Flood Risk Map (EfW CHP Facility Site and surroundings)**). The map also shows small areas of Low to Medium surface water flood risk within the EfW CHP Facility Site, TCC and Access Improvements site and Low to High surface water flood risk within the

CHP Connection Corridor. These areas of Low to High risk correspond to topographic low areas and the IDB drainage network.

3.5.6 The temporary and permanent changes in ground cover associated with the Proposed Development have the potential to increase the overall extent of lower permeability surfaces. In the absence of effective surface water management measures, these could lead to increases in peak runoff rates and consequent increases in flood risk to third party Receptors downstream. To address this, surface water management measures will be implemented, as discussed in **Section 5**.

3.5.7 For the construction phase, such changes in surfaces would be associated with the EfW CHP Facility construction site itself, TCC and temporary access routes. For the operational development such changes would be associated with the EfW CHP Facility Site itself, and any permanent access improvements (the CHP Connection would have a negligible footprint and the TCC would be restored to its previous use).

3.5.8 It will also be necessary to ensure that the conveyance of the IDB drainage network is not adversely affected by the EfW CHP Facility, which includes a number of permanent and temporary watercourse crossings. Flood risk management measures are set out in **Section 6** which seek to ensure no temporary or permanent changes to watercourse flow conveyance as a consequence of the development.

3.5.9 The EfW CHP Facility Site is within a Critical Drainage Area (as notified to the local planning authority by the Environment Agency). This is an area which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency. This consideration has been taken into account when developing the approach to surface water management set out in **Section 5**.

Grid Connection

3.5.10 The Environment Agency's Surface Water Flood Risk Map covering the Grid Connection is presented on **Figure 3.2ii: Environment Agency Surface Water Flood Risk Map (Grid Connection).** This shows that the majority of the Grid Connection corridor is at Very Low risk of flooding from this source. The map also shows small areas of Low to High surface water flood risk within the Grid Connection corridor, which correspond to topographic low areas and the IDB drainage network.

3.5.11 In terms of the permanent development, the Grid Connection will be fully underground. The only aspects of the permanent infrastructure for the Grid Connection which could increase surface runoff rates would be any permanent development at the connection to the Walsoken Substation at its northern end (for which details are not currently available for assessment). With appropriate surface water management measures defined in **Section 5** it will be possible to ensure there is no increase in risk associated with surface water runoff and therefore no increase in downstream flood risk.

3.5.12 If not appropriately designed, any new watercourse crossings that are required either for temporary access for the construction of the underground cable, or permanent crossings which carry the underground cable itself, have the potential to adversely affect flow conveyance within the affected watercourses and therefore to influence flood depths. Flood risk management measures to address this potential risk are set out in **Section 6**.

3.6 Groundwater Flood Risk

3.6.1 Groundwater flooding occurs as a result of water issuing to the surface from the underlying aquifers. This tends to occur after long periods of sustained high rainfall, with areas most at risk being situated on permeable geology and in low-lying positions compared to the local water table.

3.6.2 The EfW CHP Facility Site, CHP Connection, TCC, Access Improvements and Water Connections are underlain by Unproductive Strata (Tidal Flat Deposits, Glaciofluvial Deposits and Glacial Till over Ampthill Clay Formation). Groundwater is present at shallow depths within the Tidal Flat Deposits.

3.6.3 Shallow groundwater is likely to be in continuity with the managed water levels in the IDB drainage network. This indicates that the risk of groundwater flooding at the EfW CHP Facility Site, CHP Connection, TCC and Access Improvements is anticipated to be limited to excavations (where works will be required below existing ground level). These will include the waste bunker at the EfW CHP Facility Site which could extend to a depth of 14m below finished floor level (FFL). This could therefore be liable to groundwater flooding if not sealed appropriately or be at risk of groundwater uplift (floating) if not adequately engineered to avoid this.

3.6.4 Without design consideration there is a risk of flotation of the bunker structure due to uplift as a result of the high groundwater table level. A design solution would include ensuring that there is sufficient dead weight within the concrete walls and base of the bunker to resist uplift. Alternatively, the design of piled foundations can be undertaken to resist uplift forces (tension) due to the hydrostatic pressures which are developed due to the presence of high groundwater levels. The design solution may comprise a combination of the above solutions but will be confirmed at the detailed design stage and will include adequate factors of safety in the design. This will be secured through the **Outline CEMP (Volume 7.12).**

3.6.5 Additionally, without design consideration there is also a risk of groundwater ingress into the bunker due to high groundwater table levels. Assuming that the structure will be constructed from reinforced concrete, then the RC design can limit the damage caused by the effects of buoyancy by controlling the extent of induced cracking by limiting crack widths through adequate design and detailing of the reinforced concrete, and the use of appropriate factors of safety in the design and provision of suitable movement joints. The use of proprietary waterproof membranes and compounds can also be used to prevent water ingress. The design solution will be determined at the detailed design stage and will be secured through the **Outline CEMP (Volume 7.12).**

3.6.6 Groundwater could also be encountered during the construction phase in temporary excavations, for example, trenches associated with the cable route. It is

anticipated that the management of groundwater in excavations during the construction phase would be managed through standard construction practices, and in line with the environmental embedded measures for the construction phase set out in **Chapter 12: Hydrology** (**Volume 6.2**) of the ES and secured through the **Outline CEMP** (**Volume 7.12**).

4. Detailed Tidal Flood Risk Assessment

4.1 Introduction

4.1.1 This section provides a detailed assessment of tidal flood risk for the Proposed Development. The proposed approach to the assessment of flood risk is set out in **Section 4.2** followed by a description of the Environment Agency tidal flood data used as the basis for the assessment in **Section 4.3.** The assessment of tidal flood risk is provided in **Section 4.4** for the construction and operational phases and in **Section 4.5** for the decommissioning phase. Tidal flood risk is considered firstly for the EfW CHP Facility Site, CHP Connection Corridor, Access Improvements, TCC and Water Connections then for the Grid Connection.

4.2 Approach

4.2.1 As identified in **Table 3.1 Screening of all potential sources of flood risk** above, tidal flooding from the River Nene represents the greatest potential flood risk posed to the Proposed Development. This is associated with large swathes of the Proposed Development being located in Flood Zone 3a, including all of the EfW CHP Facility Site (see **Figure 3.1i: Environment Agency Flood Map for Planning (Overview) and 3.1ii: Environment Agency Flood Map for Planning (EfW CHP Facility Site and surroundings)**). Whilst the Environment Agency's Flood Map for Planning provides the locations of flood defences (also shown in **Figure 3.1i: Environment Agency Flood Map for Planning (Overview)**), the Flood Zones do not account for the presence of any flood defences (or any allowance for climate change). The assessment of flood risk should take into account the benefit provided by the defences, as well as the anticipated effects of climate change over the lifetime of the Proposed Development, as discussed further below.

4.2.2 The Environment Agency were consulted on and agreed with the proposed approach to the assessment of flood risk undertaken in this FRA. This is discussed below.

Functional floodplain

4.2.3 The Wisbech Level 1 and Level 2 SFRAs and Borough Council of King's Lynn and West Norfolk Level 2 SFRA indicate that the majority of the Proposed Development is located within Flood Zone 3a. The Proposed Development has no-interaction with the functional floodplain (Flood Zone 3b), which is confined to the channel of the River Nene through the presence of flood defences.

Design flood

4.2.4 In order to meet the requirements of the Exception Test, it will be necessary to demonstrate that the development will be safe for its lifetime (taking into account the vulnerability of its users), without increasing flood risk elsewhere, and where possible, will reduce flood risk overall. The NPPF PPG advises that the suitability

of the proposed development should be assessed, and mitigation measures designed (if any) against the 'design flood'[13]. For tidal risk, the design flood is the 0.5% AEP event. It is this event (including an allowance for climate change, and accounting for the benefit provided by the flood defences), against which the assessment of flood risk (and determination of suitable mitigation measures) will be based.

4.2.5 Essential Infrastructure in Flood Zone 3a is subject to an additional Exception Test requirement, which requires that the development should be designed and constructed to remain operational and safe in times of flood. In this case, operational is considered to be the ability to continue to produce electricity, heat and power during the design flood event. The PPG provides advice on what is required to demonstrate that the development will be safe, which includes that people will not be exposed to hazardous flooding from any source and that any residual risk can be overcome. Exposure to hazardous flooding includes access and egress to the site, including the free movement of people during the design flood, as well as the potential to evacuate before a more extreme flood, throughout the lifetime of the development. Where it is not possible to provide access routes above design flood levels, limited depths of flooding may be acceptable, provided that the proposed access is designed with appropriate signage etc to make it safe. Residual risk is discussed further below.

Residual Risk

4.2.6 As identified above, the PPG advises that, for a development to be considered safe, it is necessary to demonstrate that any residual risk can be overcome. Residual flood risk is defined in the PPG as those risks which remain after applying the sequential approach to the location of development and taking mitigating actions. Examples include:

- a breach of a raised flood defence; and
- a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence.

4.2.7 The PPG also provides advice on how residual risk should be assessed. It advises that where the residual risk is relatively uniform, such as within a large area protected by embanked flood defences, the SFRA should indicate the nature and severity of the risk remaining and provide guidance for residual risk issues to be covered in site-specific flood risk assessments. This FRA has sourced the same residual risk data from the Environment Agency as used in the Level 2 SFRA for Wisbech, as explained further below.

4.2.8 The Environment Agency were consulted on and agreed with the proposed approach to the assessment of flood risk undertaken in this FRA. However, they also advised that for Essential Infrastructure in Wisbech, they would like to see residual risk considered up to the 0.1% AEP plus climate change breach event. It is acknowledged that this is beyond the requirements set out in the national PPG

[13] Ministry of Housing, Communities & Local Government, 2014. Planning Practice Guidance: Flood Risk and Coastal Change

but is reflective of internal Environment Agency guidance for assessing risks to Essential Infrastructure in the local area. The 0.1% AEP has therefore been included in the assessment of residual risks below.

4.3 Environment Agency tidal flood data

Overview

4.3.1 Detailed tidal flooding information has been provided by the Environment Agency to support this assessment, including their 'Product 4' output, which is included in **Annex B: Detailed tidal flooding information provided by the Environment Agency**. This included the following information relating to the initial red line boundary for the Proposed Development:

- Information on historical floods (described in **Section 3.3**);
- Tidal flood defence information (described in **Section 4.4**);
- Extreme modelled water levels (discussed below); and
- Tidal flood hazard model results from the Tidal Nene Hazard Mapping Study (2011) (discussed in **Section 4.4**).

4.3.2 Tidal hazard mapping has been provided for two timeframes, 2011 and 2115 (representing a climate change model run).

Extreme tidal water levels and climate change

4.3.3 Extreme tidal levels at Wisbech were provided by the Environment Agency (East Coast and Wash: Immingham to the West Lighthouse). Climate change allowances for the Anglian River Basin District for increase in sea level, as per Environment Agency guidance[14], have been added to these peak water levels. These are summarised in **Table 4.1 Extreme tidal levels at Wisbech (m AOD)**.

Table 4.1 Extreme tidal levels at Wisbech (m AOD)

		Extreme tidal levels at Wisbech (m AOD)				
Year		**2006**	**2066**	**2066**	**2115**	**2115**
Climate change allowance		**Base data**	**Higher central**	**Upper end**	**Higher central**	**Upper end**
AEP Event	0.5% AEP	5.78 (+0mm)	6.22 (+441mm)	6.34 (+558mm)	6.82 (+1,037mm)	7.16 (+1,378mm)

Notes: Base data obtained from Environment Agency Product 4 for Wisbech at NGR: 546110, 309940. The base year is 2006. The levels are still water levels. Base data water levels for the 0.1% AEP event were not provided/available.
Climate change allowances are provided in backets after the extreme water levels. A higher central allowance is based on the 70th percentile, which is exceeded by 30% of the projections in the range. The Upper end allowance is based on the 95th percentile which is exceeded by 5% of the projections in the range.

[14] Environment Agency, 2016. Guidance: Flood risk assessments: climate change allowances. Last updated on 22 July 2020

4.3.4 This FRA is required to assess flood risks for the lifetime of the development, which is proposed to have a lifetime of 40 years, i.e., operational to 2066. These are increases in peak water level of 441 mm (approximately 0.44 m) and 558 mm (approximately 0.56 m) for the higher central and upper end allowances respectively. This in turn translates into extreme water levels in the River Nene at Wisbech (in the channel) of approximately 6.22 m AOD and 6.34 m AOD for the 0.5% AEP event in 2066.

4.3.5 The existing tidal hazard modelling provided by the Environment Agency, (included in **Annex B: Detailed tidal flooding information provided by the Environment Agency**) only considered two timeframes, a base year of 2011 and a climate change scenario of 2115. As indicated in **Table 4.1 Extreme tidal levels at Wisbech (m AOD)** increases in peak water level of 1,037mm (approximately 1.0m) and 1,378mm (approximately 1.4m) apply for the higher central and upper end allowances in 2115 respectively. These in turn translate into extreme water levels in the River Nene at Wisbech (in the channel) of approximately 6.82m AOD and 7.16m AOD for the 0.5% AEP event in 2115. These in-channel water levels in 2115 are 600mm (higher central) and 820mm (upper end) higher than the water levels required to be considered for this assessment. It is therefore considered to be a very precautionary approach to use the 2115 peak water levels and model results in this assessment, as they effectively include approximately 600mm of freeboard in the peak in-channel water level itself.

4.4 Risks during Construction and Operation

EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections

Tidal flood defences

4.4.1 Large swathes of Fenland District are reliant on tidal flood defences (and pumped drainage) to manage flood risk. The Environment Agency has advised (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES) that the tidal defences along the River Nene, protecting the EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections consist of earth embankments and concrete floodwalls. The defences are in fair condition and provide a level of protection of 0.5% AEP in the present day. The Environment Agency inspect these defences routinely to ensure potential defects are identified and, if required, rectified.

Flood hazard mapping

4.4.2 The flood hazard mapping in **Annex B: Detailed tidal flooding information provided by the Environment Agency** provides flood depths, hazard rating and velocity of floodwater in the floodplain in and around Wisbech. The mapping indicates that:

- **Design flood (overtopping only)**: there is very little overtopping of defences predicted near the EfW CHP Facility Site for any of the modelled events. The existing tidal defences nearby would not be overtopped during the 0.5% AEP

event (present day and climate change in 2115) and therefore the EfW CHP Facility Site, CHP Connection Corridor, TCC, Access Improvements and Water Connections would remain dry[15]. There is also no flood risk to the Site during the 0.1% AEP overtopping event in 2115. In accordance with the PPG, the **design flood** is defined as the 0.5% AEP overtopping event plus climate change to 2066 tidal flood, so for the design flood, the EfW CHP Facility Site, CHP Connection Corridor, Access Improvements, TCC and Water Connections are not at risk of flooding from overtopping of defences.

- **Residual risk (breach)**: areas of the EfW CHP Facility Site, CHP Connection Corridor and TCC and the entirety of the Access Improvements are at **residual** tidal flood risk if the tidal defences were breached during the 0.5% and 0.1% AEP events for both the present day and in 2115. The flood mapping indicates that flood water during the breach event is likely to propagate via the IDB drain bisecting the EfW CHP Facility Site.
- **Residual risk (a severe flood event):** as reflected by its location in Flood Zone 3a, the EfW CHP Facility Site and CHP Connection Corridor and large areas of the Access Improvements and TCC could be at **residual** tidal flood risk during an event that exceeds the flood management design standard and particularly during an event that exceeds those modelled by the Environment Agency, for example a flood of a magnitude greater than the 0.1% AEP event and/or catastrophic widespread failure of the flood defences (not just a localised breach).

4.4.3 Upon request (following review of the Product 4 information), the Environment Agency provided GIS files of the flood modelling to enable these to be interrogated further. Flood depth grids were provided, but no flood levels (to m AOD), hazard, velocity or ground level grids were supplied. Selected flood depth results have been presented in **Figure 4.1i: Residual risk (EfW CHP Facility Site and surroundings): 0.5% AEP (1:200) breach flood depth** and **Figure 4.1ii**: **Residual risk (EfW CHP Facility Site and surroundings): 0.1% AEP (1:1000) breach flood depths** across the Proposed Development. A number of floodplain locations have been identified in **Figure 4.1i: Residual risk (EfW CHP Facility Site and surroundings): 0.5% AEP (1:200) breach flood depth** and **Figure 4.1ii: Residual risk (EfW CHP Facility Site and surroundings): 0.1% AEP (1:1000) breach flood depths** to enable flood depths to be presented in **Table 4.2: Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)** and **Table 4.3: Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data)** below.

4.4.4 In the absence of flood water levels to m AOD, or the elevation grid used for the modelling (against which the flood depths would have been determined), it was necessary to estimate peak floodplain water levels using alternative sources of

15 A small pocket of flooding is predicted approximately 500m to the north-west of the EfW CHP Facility Site, associated with minor overtopping of the defences site during the 0.5% and 0.1% AEP events in 2115, but this is only for a very short section of the defence and presumably only for a short period of time judging by the limited extent of flooding, of which there is none in the vicinity of the EfW CHP Facility Site.

elevation data, such as LiDAR and the topographic survey of the EfW CHP Facility Site. It was found that the flood extents correlated well with the Environment Agency's open-source LiDAR (sourced separately), and therefore the LiDAR information was used to determine water levels in preference to the topographic survey of the EfW CHP Facility Site (which itself is included in **Annex A: Topographic survey for the EfW CHP Facility Site.** This allowed estimated water levels at each of the floodplain locations indicated in **Figure 4.1i: Residual risk (EfW CHP Facility Site and surroundings): 0.5% AEP (1:200) breach flood depth** and **Figure 4.1ii**: **Residual risk (EfW CHP Facility Site and surroundings): 0.1% AEP (1:1000) breach flood depths** to be estimated, as presented in **Table 4.2 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)** and **Table 4.3 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data)** below.

Table 4.2 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)

Floodplain location ID on Figures 4.1i and 4.1ii	Existing ground elevation from LiDAR (m AOD)	Modelled flood level and depth in 0.5% AEP plus climate change to 2115 event			
		Design flood (overtopping of defences)		Residual risk (breach of defences) *	
		Flood depth (m)	Flood level (m AOD)	Flood depth (m)	Flood level (m AOD)
EfW CHP Facility Site					
1	2.40	0.0	0.0	0.06	2.47
2	2.53	0.0	0.0	0.00	2.53
3	2.48	0.0	0.0	0.06	2.55
4	1.93	0.0	0.0	0.60	2.53
5	1.97	0.0	0.0	0.57	2.54
TCC					
6	1.88	0.0	0.0	0.54	2.42
7	2.17	0.0	0.0	0.36	2.53
Access Improvements site					
8	2.09	0.0	0.0	0.66	2.74
9	2.09	0.0	0.0	0.06	2.15

Notes: * The flood model considers the consequences of a breach only and does not consider the likelihood of breaches occurring. The model assessed the impact of multiple breach durations individually but assumed that breaches do not occur simultaneously. Results from individual breach scenarios were overlaid results in order to find the maximum flood depths. Values in this table have been rounded to 2 decimal places.

Table 4.3 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data)

Floodplain location ID on Figures 4.1i and 4.1ii	Existing ground elevation from LiDAR (m AOD)	Modelled flood level and depth in 0.1% AEP plus climate change to 2115 event			
		Design flood (overtopping of defences)		Residual risk (breach of defences) *	
		Flood depth (m)	Flood level (m AOD)	Flood depth (m)	Flood level (m AOD)
EfW CHP Facility Site					
1	2.40	0.00	0.00	0.09	2.49
2	2.53	0.00	0.00	0.00	2.53
3	2.48	0.00	0.00	0.08	2.56
4	1.93	0.00	0.00	0.62	2.55
5	1.97	0.00	0.00	0.59	2.57
TCC					
6	1.88	0.00	0.00	0.56	2.44
7	2.17	0.00	0.00	0.37	2.55
Access Improvement Site					
8	2.09	0.00	0.00	0.68	2.76
9	2.09	0.00	0.00	0.08	2.17

Notes: * The flood model considers the consequences of a breach only and does not consider the likelihood of breaches occurring. The model assumes that breaches do not occur simultaneously and overlaid results in order to find the maximum values. Values in this table have been rounded to 2 decimal places.

Tidal risk assessment

4.4.5 **Table 4.2 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)** and **Table 4.3 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data**) confirm that the EfW CHP Facility Site, CHP Connection Corridor, TCC and Access Improvements remain dry during the design flood event (0.5% AEP overtopping event plus climate change). As set out in the PPG, it is the design flood against which the

development should be assessed, and mitigation measures (if any) designed[16]. It also remains dry during the 0.1% AEP overtopping event (plus climate change). As the site is not affected by flooding for either 0.5% or 0.1% plus climate changes scenarios, there is therefore no potential for changes in ground levels associated with the Proposed Development to increase flood risk elsewhere. This is due to the lack of pathways between the source (tidal floodwater) and the potential Receptors (off-site third parties in the vicinity of the EfW CHP Facility Site). As such, there is no potential for loss of floodplain storage, floodplain compartmentalisation or impacts on floodplain (or in-channel) conveyance during the design flood event as a result of the Proposed Development.

4.4.6 **Table 4.2 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)** and **Table 4.3 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data)** also confirm that the EfW CHP Facility Site is at residual risk of flooding during a breach event (0.5% and 0.1% AEP breach event plus climate change). Maximum flood depths in the part of the EfW CHP Facility Site where the majority of the infrastructure would be located (the area to the north of the IDB drain which bisects the Site) range between zero (dry) and 0.1m. This is associated with a peak water level estimated to be around 2.6m AOD for the 0.1% AEP breach event in 2115 (floodplain location IDs 1 to 3), and 2.5m AOD for the 0.5% AEP breach event in 2115. Owing to the Site gently sloping to the south, maximum flood depths would be greater in the southern part of the Site, with depths up to 0.7m identified (also associated with a peak water level in the region of 2.6m AOD for the 0.1% AEP breach event in 2115 (floodplain location IDs 4 and 5). Similar maximum depths and water levels were identified at the TCC and Access Improvements site[17].

4.4.7 Potential Receptors who could be at residual flood risk include construction workers and activities, the operational site (including workers and visitors), maintenance activities and decommissioning works. Flood risk management measures to address the residual risk associated with the flood depths identified above during the residual risk event are set out in **Section 6**.

Grid Connection

4.4.8 The Environment Agency Flood Map for Planning (**Figure 3.1i: Environment Agency Flood Map for Planning (Overview)** and **Figure 3.1ii Environment Agency Flood Map for Planning (EfW CHP Facility Site and surroundings))** shows that the majority of the Grid Connection Corridor is located within Flood Zone 1. Of the approximately 4300m long Grid Connection, which spans between the EfW CHP Facility Site and Walsoken Substation, approximately 2770m (~64%) is within Flood Zone 1. Although the remaining 1530m of the Grid Connection

[16] Gov.uk – Flood risk and coastal change guidance

[17] Greater maximum flood depths may be present, but a representative selection in the vicinity of the EfW CHP Facility Site have been presented. The depths are also in reference to the existing pre-development topography, and this is subject to change as a result of the Proposed Development. This approach is considered appropriate given the risk is residual.

crosses through areas of Flood Zones 2 and 3, the permanent infrastructure (underground cable) will be resilient to flooding.

4.4.9 The connection point itself, at Walsoken Substation is within Flood Zone 2. The connection would be via an underground cable connection within the Walsoken Substation. Electrical network infrastructure will be contained within a compound, of approximately 120m^2, surrounded by a palisade fence, accessed via an existing UKPN access road immediately to the west. This infrastructure is mapped as being at risk to tidal flooding due to its location in Flood Zone 2, however similarly to the EfW CHP Facility, these zones do not account for the presence of flood defences.

Tidal flood defences

4.4.10 The Product 4 data provided by the Environment Agency (**Annex B: Detailed tidal flooding information provided by the Environment Agency**)) indicates that the primary source of flooding to the Grid Connection is from the tidal River Nene. The data also indicates that the defences protecting the Grid Connection consist of earth embankments and concrete floodwalls. The defences are in fair condition and provide a level of protection ranging between 0.67% AEP and 0.5% AEP depending on location.

Flood hazard mapping

4.4.11 The flood hazard mapping in **Annex B: Detailed tidal flooding information provided by the Environment Agency** indicates that:

- **Design Flood (overtopping only):** there is no flood risk to the Grid Connection during the design flood event associated with tidal overtopping of the flood defences in the River Nene for the 0.5% AEP (present day and climate change event in 2115). The Grid Connection also remains dry during the 0.1% AEP plus climate change event in 2115;
- **Residual Risk (breach):** the majority of Grid Connection is not at residual flood risk during breach of the defences in both the 0.5% AEP event (present day) and 0.1% AEP plus climate change event in 2115. However, part of the southern section, specifically, almost the entirety of New Bridge Lane is at risk (modelled flood depths between 0 (dry) to 1m) and sections of surrounding IDB drains which cross the Grid Connection. The Walsoken Substation, which houses the only above-ground infrastructure is not at risk of residual flooding, with closest extent approximately 300m to the west.

Tidal risk assessment

4.4.12 The Grid Connection will remain entirely dry during the design flood event (0.5% AEP plus climate change overtopping event). As a result, there is no scope for the Proposed Development to result in an increase in flood risk during the design flood event. This includes both the construction and operational phase.

4.4.13 Some sections of the Grid Connection route could be at risk during a residual risk event, associated with breach of the raised flood defences and/or a particularly severe overtopping event in excess of the design flood. However, there would be

no risk to the permanent grid connection infrastructure itself on the basis of it being resilient to flooding. Vulnerable elements would be buried and sealed underground.

4.4.14 Therefore, tidal flood risks associated with the operational phase of the Grid Connection have been scoped out of the assessment, on the basis that the permanent infrastructure associated with the Grid Connection would be resilient to even the most extreme flooding and would not increase flood risk elsewhere. Therefore, no specific mitigation measures, or future adaptation measures, are proposed in relation to the operational phase.

4.4.15 With respect to the residual risks of tidal flooding of certain sections of the Grid Connection during the construction phase, these would be managed through an appropriate Flood Emergency Response Plan for the Grid Connection consistent with the **Outline CEMP (Volume 7.12).** Given the extensive areas of tidal Flood Zone 3a both to the east and west of the Grid Connection, and the widespread flooding of the surrounding area that could result if such an extreme tidal flood event occurred, it is recommended that such a plan be applied across the Grid Connection construction site, to enable evacuation where this could require access across the floodplain.

4.5 Risks during Decommissioning

4.5.1 Risks during decommissioning would be similar to those encountered during construction. However, if climate change occurs as anticipated, the flood hazard baseline would be altered compared to that which will apply during construction. Current allowances for climate extend to 2115, 45 years after the end of the 40-year period design lifetime of the EfW CHP Facility in 2066.

4.5.2 Decommissioning works would require re-assessment at the time based on best available information, and under prevailing planning regime at the time prior to commencement of works. The higher level of risk such as this could be addressed through more stringent mitigation, such as a more precautionary emergency flood plan for example in accordance with a decommissioning plan secured by a DCO Requirement (**Draft DCO Volume 3.1**).

5. Drainage Strategy

5.1 Introduction

5.1.1 This section summarises the strategy for managing runoff and pumped groundwater from the Proposed Development in a sustainable manner, in accordance with the requirements to manage surface water flood risk on-site, not increase flood risk elsewhere, and where possible, reduce flood risk overall. Further details are provided in **Appendix 12F: Outline Drainage Strategy (Volume 6.4)**.

5.2 Overview of Drainage Strategy Scope

5.2.1 The need for sustainable surface water management for the Proposed Development is set out in the NPPF and the Defra Non-Statutory Technical Standards for Sustainable Drainage Systems (Defra, 2015). Best practice guidance is provided in the CIRIA SuDS manual (CIRIA, 2015). At the local level, guidance is provided by CCC as the LLFA, who has prepared the following strategies: Cambridgeshire Surface Water Management Plan (2014), Cambridgeshire Flood and Water Supplementary Planning Document (2016), and Surface Water Drainage: Local Guidance for Planning Applications (Sequential Test and Exception Test) and Surface Water Drainage Guidance for Developers (2018). In addition, the Proposed Development is located in the HWIDB and KLIDB districts and the EfW CHP Facility Site within a Critical Drainage Area.

5.2.2 The creation of the hardstanding surfaces associated with the buildings and vehicle movement areas within the EfW CHP Facility Site has the potential to increase surface water runoff rates and volumes and modify runoff pathways. The creation of temporary and new permanent infrastructure associated with the CHP Connection and Grid Connection must also be considered. Appropriate management of surface water will therefore be necessary to ensure risks to on-site and off-site (down-gradient) third party Receptors are appropriately addressed.

5.2.3 A water management system will be designed for the site to address surface water runoff (surface water originating from within the site); surface water run-on (surface water originating from outside of the site, if any); and any groundwater ingress to temporary excavations or permanent underground structures (which it is anticipated would be dealt with alongside surface water).

5.2.4 Initial conceptual strategies for the EfW CHP Facility were developed by the designers for the construction and operational phases at PEIR stage. These have been developed into the Outline Drainage Strategy (**Chapter 12 Hydrology Appendix 12F Drainage Strategy** (**Volume 6.4**)) to accompany the ES. The detailed design of these systems is to be developed subsequent to approval of the DCO and will form a Requirement of the DCO (**Draft DCO** (**Volume 3.1**)).

5.2.5 A SuDS system for the Proposed Development has been established to meet runoff storage and treatment requirements. This has been achieved using a number of SuDS features, including permeable paving, filter drains, swales and

storage in the form of detention basins. Initial estimates of surface water run-off attenuation volumes for the construction and operational phases of the Proposed Development and a description of the SuDS key design criteria and requirements are provided in **Chapter 12 Hydrology Appendix 12F: Outline Drainage Strategy (Volume 6.4)**.

5.3 Summary of Drainage Strategy

Introduction

5.3.1 The Outline Drainage Strategy (**Chapter 12 Hydrology Appendix 12F: Outline Drainage Strategy (Volume 6.4)** has been undertaken in accordance with requirements of the NPPF and NPS EN-1 (and Draft NPS EN-1) to manage surface water flood risk at the Proposed Development, not increase flood risk elsewhere, and where possible, reduce flood risk overall during the construction and operational phases. Consultation responses from HWIDB, KLIDB, CCC and NCC were also taken into account in the development of this strategy.

5.3.2 A SuDS system for the Proposed Development has been established to meet the treatment requirements set out in the CIRIA SuDS Manual C753. This is achieved by using a number of SuDS features including swales, permeable paving and detention basins. Attenuation storage will also be provided on site in detention basins or underground tanks (where spatial constraints are a limiting factor) to control the discharges into watercourses to greenfield runoff rates as agreed with HWIDB, KLIDB and NCC. The indicative proposals for SuDS components will be confirmed at the detailed design stage.

Construction Phase:

- EfW CHP Facility Site and TCC:
  - Surface water runoff will be collected by temporary French drains and perimeter swales and attenuated in three detention basins (EfW CHP Facility Site) and an underground tank (TCC). Pumped groundwater from the deeper excavations (waste bunker) will be managed in the surface water drainage system. Attenuated and treated runoff (and any pumped groundwater) in SuDS features will be discharged into the HWIDB network at greenfield runoff rates.
- Walsoken Substation:
  - Surface water runoff will be collected and treated by temporary drainage ditches (or swales), with straw bales placed in the base of the drainage ditches, and would pass through a small attenuation basin, before being discharged into a nearby NCC or KLIDB drainage ditch at greenfield runoff rates.
- Grid Connection:
  - Excavation time will be kept to a minimum to minimise water ingress and dewatering requirements. If dewatering of the excavations is required appropriate treatment will be provided before discharge to surface or

groundwater, and this could include the use of silt busters (or similar), if necessary.

- Access Improvements at New Bridge Lane:
  - Surface water runoff is to be collected by temporary cut-off drainage ditches (or swales), with straw bales, before being discharged into the HWIDB drain located on the southern edge of New Bridge Lane.

Operational Phase:

- EfW CHP Facility Site:
  - Surface water runoff will be collected and attenuated underground with further attenuation and treatment occurring in a swale, detention basin and filter strip. Attenuated and treated runoff will be discharged into the HWIDB network at greenfield runoff rates. Runoff from the car park will be attenuated beneath the permeable paved surfaced area, before discharging into the HWIDB drain at greenfield runoff rates.
- Walsoken Substation:
  - Surface water runoff will be allowed to infiltrate to the ground via permeable paving and soakaways. Further investigation of the viability of infiltration will be undertaken prior to construction. If infiltration into the ground is not a viable solution, then surface water flows will be attenuated and treated prior to discharge into a nearby NCC or KLIDB drainage ditch at greenfield runoff rates.
- Grid Connection:
  - Scoped out, as the permanent infrastructure would be entirely underground and would not affect surface runoff rates.
- Access Improvements at New Bridge Lane:
  - It is proposed that surface water runoff from the improved section of New Bridge Lane and new entrance into the EfW CHP Facility Site will discharge into the HWIDB drain south of New Bridge Lane.

6. Flood Risk Management

6.1 Introduction

6.1.1 This section sets out the flood risk management measures required to address all potential flood risks (including residual risks) identified in **Sections 3 and 4** (those which will not be resolved through the management of surface water set out in **Section 5**.

6.1.2 It is anticipated that the flood risk management measures would be secured via DCO Requirement(s).

6.2 Flood risk management measures

Construction Phase

6.2.1 The flood risk management measures for the construction phase of the Proposed Development are set out in **Table 6.1 Proposed flood risk management measures to be implemented during the construction phase for the Proposed Development.**

6.2.2 As outlined in **Sections 3 and 4**, the primary flood risk to the construction works and temporary development is from tidal sources and surface water runoff.

6.2.3 The EfW CHP Facility, TCC and Grid Connection will remain entirely dry during the design tidal flood event (0.5% AEP plus climate change overtopping event) but would be at risk of flooding during a residual risk event associated with breach of the raised flood defences (0.5% and 0.1% AEP breach event plus climate change) and/or a particularly severe overtopping event in excess of the design flood. This particularly involves the presence of construction personnel and plant in these areas. As agreed with the EA at a consultation meeting on 19 October 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology (Volume 6.4)** of the ES), the residual tidal flood risk during the construction phase will be managed by implementing an appropriate Emergency Flood Response Plan (flood risk measure ID10, **Table 6.1 Proposed flood risk management measures to be implemented during the construction phase for the Proposed Development**) and secured through a DCO Requirement, via the **Outline CEMP (Volume 7.12)**.

6.2.4 Construction works and temporary development in and around watercourses and in floodplain areas has the potential to change watercourse flow conveyance and impede the ongoing maintenance of the drains. Stand-off distances from the IDB drains (flood risk measure ID1, **Table 6.1 Proposed flood risk management measures to be implemented during the construction phase for the Proposed Development** have been agreed at consultation meetings with the HWIDB on 25 March 2021 and 14 December 2021 and KLIDB on 26 November 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES).

6.2.5 Surface water runoff from the EfW CHP Facility construction area, TCC and Grid Connection (underground cable and Walsoken Substation) will be managed through appropriate drainage measures (including SuDS and discharge rates) outlined in the Water Management Plan for the construction phase, as summarised in **Section 5**. This will be prepared in accordance with the Outline Water Management Plan included in the **Outline CEMP (Volume 7.12)**, which forms part of the documentation supporting the ES (flood risk measures ID2, ID3 and ID4). The principles of the proposed drainage measures have been agreed at consultation meetings with CCC on 26 October 2021 and HWIDB on 25 March 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES).

6.2.6 All temporary watercourse crossings (three crossings proposed at the EfW CHP Facility) have the potential to adversely affect flow conveyance within the affected HWIDB drains and therefore to influence flood depths. As agreed with the HWIDB at a consultation meeting on 14 December 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES), the specification of appropriately sized culverts will ensure that the conveyance capacity of the IDB ditch network is maintained, or indeed may be improved where culverts of insufficient capacity are upgraded (flood risk measure ID6).

6.2.7 Direct disturbance of watercourses and/or deposition of sediment arising from temporary construction activities in watercourses could also reduce flow conveyance and potentially increase flood risk. A range of construction phase measures would be implemented to control silt-laden runoff from working areas and minimise direct channel disturbance (flood risk measures ID7 and ID8).

Table 6.1 Proposed flood risk management measures to be implemented during the construction phase for the Proposed Development

Ref no.	Development element	Flood risk management measure	Reason
1	EfW CHP Facility Site, CHP Connection, TCC Access Improvements, Water Connections and Grid Connection	A minimum stand-off distance from the edge of HWIDB adopted drains of 6m (on both sides of the drain) will be provided to ensure ongoing access for maintenance of the IDB drains. This applies to all construction works associated with the EfW CHP Facility Site and TCC with the exception of hardstanding and car park area (which are acceptable to HWIDB within the 6m strip). A minimum stand-off distance from the edge of the HWIDB and KLIDB adopted drains of 9m (on both sides of the drain) will be provided where possible for all construction works associated with the Grid Connection and Access Improvements to ensure ongoing access for maintenance of the IDB drains. HWIDB and KLIDB advised that depending on the specific drain conditions the stand-off distance can potentially be reduced (e.g., where	To minimise the risk of any impacts to watercourses, including impacting flood flow conveyance.

Ref no.	Development element	Flood risk management measure	Reason
		it is impractical to provide the 9m stand-off distance along the cable route). KLIDB indicated that a stand-off distance of 5m can be considered. A Consent would be sought from HWIDB and KLIDB for any construction works within the 9m IDB byelaw distances.	
2	EfW CHP Facility Site, TCC, CHP Connection, Access Improvements, Water Connections and Grid Connection	Implementation of an appropriate Water Management Plan for the construction phase of the EfW CHP Facility and Grid Connection, utilising SuDS principles, including attenuation storage where necessary to ensure any discharge into the IDB drains is limited to greenfield rates (as agreed with HWIDB). This would be secured through a DCO Requirement, via the CEMP. The Outline Water Management Plan for the construction phase is provided within the **Outline CEMP (Volume 7.12)** which form part of the documentation supporting the ES.	To ensure no increase in flood risk downstream.
3	Working areas – EfW CHP Facility Site and TCC	Surface water runoff from the EfW CHP Facility Site and TCC (along with any groundwater dewatered from excavations, such as the waste bunker) is to be discharged to HWIDB drains (rather than the Anglian Water sewer). Discharge infrastructure is subject to a Consent from the HWIDB. Discharges would be temporarily halted if a flood alert or flood warning is in place downstream.	To prevent any increase in sewer flood risk and in watercourses downstream.
4	Working areas – Grid Connection and Water Connections	Groundwater dewatered from excavations along the Grid Connection (e.g., excavations associated with the underground cable) will be discharged to adjacent grassed/vegetated agricultural land, away from watercourses as far as possible. If infiltration is not possible, and discharge to the IDB drains is required, this will be subject to a Consent from the HWIDB or KLIDB and dewatering would be suspended if a flood alert or flood warning is in place downstream.	To prevent any increase in flood risk downstream.
5	Grid Connection and Water Connections – underground cable construction	The underground cable will be constructed in 200m long discrete sections with the excavation of the open-cut trenches and reinstatement process completed within the same night.	Minimise changes in watercourse flow conveyance.
6	Watercourse crossings – temporary (access crossings)	Where culverts are to be used to enable access at temporary watercourse crossings over IDB drains (three proposed temporary crossings at the EfW CHP Facility), these will be	Maintain existing conveyance capacity of the IDB network.

Ref no.	Development element	Flood risk management measure	Reason
		appropriately sized to maintain existing flow conveyance. Where existing culverts already exist nearby, similarly sized culverts may be suitable. Multiple pipes will not be used. Circular culverts will have concrete bedding in locations where ground conditions suggest that settlement could occur. These will be subject to Consents with HWIDB and/or KLIDB.	
7	Topsoil stockpiles - EfW CHP Facility Site and TCC	Stockpiles will be present for the shortest practicable timeframe, with materials being reinstated as the construction work progresses. Stockpiles which remain present for three months or longer will be carefully managed using seeding techniques. This will be secured through a DCO Requirement, via the Outline CEMP.	To prevent sedimentation of watercourses (and thus reduction in watercourse flow capacities). To prevent loss of topsoil in a major flood event, thereby reducing the availability of material for reinstatement.
8	Topsoil stockpiles – Grid Connection and Water Connections	No/limited stockpiles will be present along the cable route. If necessary, excess excavated soil will be transported and stockpiled in the TCC. This will be secured through a DCO Requirement, via the **Outline CEMP (Volume 7.12)**.	To prevent sedimentation of watercourses (and thus reduction in watercourse flow capacities). To prevent loss of topsoil in a major flood event, thereby reducing the availability of material for reinstatement.
9	Access routes, working areas, TCC and Water Connections	Once constructed, all temporary access route and temporary working area construction material will be removed and the ground reinstated to its pre-construction state (or similar), with the soil stockpile material used to backfill any excavations (to a level slightly above natural ground level to allow for settlement). This will be secured through a DCO Requirement, via the **Outline CEMP (Volume 7.12)**.	To return the temporary access routes, working areas and TCC to a pre-development condition, in terms of their rainfall infiltration and runoff generation characteristics.
10	Areas located in, or requiring access, via the floodplain.	An Emergency Flood Response Plan would be prepared and implemented for the construction phase, including safe access and egress routes where required. The Preparation of an Emergency Flood Response Plan is secured via a DCO Requirement, as part of the **Outline CEMP (Volume 7.12)**.	For the safety of site operatives who may be working within the floodplain, or may need to cross it to access/egress the part of the Order limits boundary they are working in.

Operational Phase

6.2.8 The flood risk management measures for the operational phase of the Proposed Development are set out in Table 6.2 Proposed flood risk management measures for the Proposed Development during the operational phase.

6.2.9 As outlined in **Sections 3 and 4**, the primary flood risk to the operational development (EfW CHP Facility and Walsoken Substation) is from tidal sources and surface water runoff. As discussed previously, flood risks associated with the operational phase of the CHP, Access Improvements and Water Connections and Grid Connection (underground cable) have been scoped out of the assessment, on the basis that the permanent infrastructure associated with them would be resilient to even the most extreme flooding and would not increase flood risk elsewhere. Therefore, no specific mitigation measures, or future adaptation measures, are proposed in relation to the operational phase.

6.2.10 The EfW CHP Facility will remain entirely dry during the design flood event (0.5% AEP plus climate change overtopping event) but is at risk of flooding during a residual risk event associated with breach of the raised flood defences (0.5% and 0.1% AEP breach event plus climate change) and/or a particularly severe overtopping event in excess of the design flood. The Walsoken Substation remains dry both during the design and residual flood events. There is no potential for loss of floodplain storage, floodplain compartmentalisation or impacts on floodplain (or in-channel) conveyance during the design flood event. As agreed with the EA at a consultation meeting on 19 October 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES), the residual tidal flood risk at the EfW CHP Facility will be managed by:

- Raising ground levels taking into account the flood risk vulnerability classification of the different elements of the EfW CHP Facility such that if flooding does occur operation of the EfW CHP Facility remains unaffected. The minimum FFLs agreed with the EA at a consultation meeting on 19 October 2021 (**Appendix 12B**: **Stakeholder Engagement (Volume 6.4)** of **Chapter 12: Hydrology** of the ES) are shown on **Figure 6.1: Minimum Finished Floor Levels (FFLs) for the EfW CHP Facility (operational phase)** and provided in **Table 6.2**: **Proposed flood risk management measures for the Proposed Development during the operational phase** (flood risk measure ID11). Compliance with this is secured through a DCO Requirement.
    - Essential infrastructure: 2.6m AOD (0.1% AEP plus climate change tidal breach event (**Table 4.3 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.1% AEP event in 2115 (Environment Agency Product 4 data)**).
    - Less Vulnerable Development: 2.5m AOD (0.5% AEP plus climate change tidal breach event) (**Table 4.2 Maximum flood depths and estimated water levels in the floodplain at EfW CHP Facility Site for the 0.5% AEP event in 2115 (Environment Agency Product 4 data)**).
    - Water Compatible Development: no land raising required
    - Site access roads: no land raising required. During the design event the EfW CHP Facility and access roads are dry, the EfW CHP Facility remains

operational and there is safe access and egress to and from the site. For the residual risk event (i.e., involving the breach or overtopping of flood defences along the River Nene) the proposed minimum FFLs would ensure the EfW CHP Facility remains dry whilst the surrounding area would be flooded, including wider access roads (modelled flood depth 0.1 to 0.6m). In the case of the residual flooding event the EfW CHP Facility would continue to be operated by the on-shift personnel whilst waste feedstock and consumables already on site are available, and sufficient storage capacity for residues is present (approximately 11 days). Should flooding persist for longer than this, a routine site shutdown would be carried out (in line with the **Outline Flood Emergency Management Plan** (**Volume 7.9**)). In this event it is expected that there would be resilience in the system provided by National Grid to continue to supply energy to consumers.

- Implementing an appropriate Emergency Response Plan for Flood Events (flood risk measure ID18).

6.2.11 Ground levels at the EfW CHP Facility Site are proposed to be raised higher than the minimum FFLs to assist the materials balance for the site as follows:

- Area to the north of HWIDB drain bisecting the site: 3m AOD;
- Area to the south of the HWIDB drain bisecting the site: 2.6m AOD to 3m AOD except for the southern edge of this area where ground levels will slope down to the elevation of New Bridge Lane at about 2 to 2.2m AOD.

6.2.12 The proposed permanent watercourse culvert crossings (one upgraded crossing and one new crossing of the HWIDB drain bisecting the EfW CHP Facility and one upgraded crossing of the HWIDB drain on New Bridge Lane to the west of the EfW CHP Facility) have the potential to adversely affect flow conveyance within the affected HWIDB drains and therefore to influence flood depths. As agreed with the HWIDB, the specification of appropriately sized culverts will ensure that the conveyance capacity of the IDB ditch network is maintained, or indeed may be improved where culverts of insufficient capacity are upgraded (flood risk measures ID16 and ID17). All permanent cable crossings of the culverted drains beneath the A47 will be placed above the culverts using open cut installation method with additional protection provided where a minimum 900mm cover depth is not possible (flood risk measure ID15) as agreed at consultation meetings with the HWIDB on 14 December 2021 and KLIDB on 26 November 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)**) and will be controlled subject to consent obtained from those IDBs.

6.2.13 The development of permanent infrastructure in and around watercourses and in floodplain areas has the potential to change watercourse flow conveyance and impede the ongoing maintenance of the drains. Stand-off distances from the IDB drains (flood risk measure ID12) have been agreed at consultation meetings with the HWIDB on 25 March 2021 and 14 December 2021 and KLIDB on 26 November 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)**).

6.2.14 Surface water runoff from the EfW CHP Facility and Walsoken Substation will be managed through appropriate drainage measures (including SuDS and discharge rates) outlined in the outline drainage strategy. The details of this will be prepared in accordance with that strategy (flood risk measure ID13 and 14). The principles

of the proposed drainage measures have been agreed at consultation meetings with CCC on 26 October 2021 and HWIDB on 25 March 2021 (**Appendix 12B: Stakeholder engagement (Volume 6.4)**).

Table 6.2 Proposed flood risk management measures for the Proposed Development during the operational phase

Ref no.	Development element	Flood risk management measure	Reason
11	EfW CHP Facility	The minimum FFL of the different elements of the EfW CHP Facility Site are set out below. This would be secured through a DCO Requirement. - Essential infrastructure: 0.1% AEP plus climate change tidal breach event (2.6mAOD) - Less Vulnerable Development: 0.5% AEP plus climate change tidal breach event (2.5mAOD) - Water Compatible Development: no land raising required. .	To address the residual risk of tidal flooding to the EfW CHP Facility.
12	EfW CHP Facility Site	A minimum stand-off distance from the edge of HWIDB adopted drains of 6m (on both sides of the drain) will be provided to ensure ongoing access for maintenance of the IDB drains. This applies to all permanent development associated with the EfW CHP Facility with the exception of hardstanding and car park area (which are acceptable to HWIDB within the 6m strip). Consent would be sought, where necessary, for any permanent infrastructure within the 9m IDB byelaw distances (for both HWIDB and KLIDB).	To minimise the risk of any impacts to watercourses, including impacting flood flow conveyance, and to ensure ongoing access for maintenance of the IDB drains.
13	EfW CHP Facility	Detailed drainage design for the operational EfW CHP Facility, utilising SuDS principles, including attenuation storage where necessary, to ensure discharge rates into the HWIDB drains are limited to greenfield rates. This would be secured through a DCO Requirement. The detailed design will be prepared in accordance with the Outline Drainage Strategy (**Appendix 12F: Outline Drainage Strategy (Volume 6.4)**) for the operational EfW CHP Facility, which forms part of the documentation supporting the ES.	To ensure no increase in flood risk downstream.
14	EfW CHP Facility Site	Surface water runoff from the EfW CHP Facility Site is to be discharged to HWIDB drains (rather than the Anglian Water sewer). Discharge infrastructure is subject to a Land Drainage Consent from the HWIDB. Discharges would be temporarily halted if a flood alert or flood warning is in place downstream.	To prevent any increase in sewer flood risk and in watercourses downstream.

Ref no.	Development element	Flood risk management measure	Reason
15	Watercourse crossings – permanent cable crossings (Grid Connection)	All permanent cable crossings of the culverted drains beneath the A47 will be placed above the culverts using open cut installation method. Strike plates will be used where a minimum 900mm cover depth is not possible at the crossings.	Maintain existing conveyance capacity.
16	Watercourse crossings – permanent (access) crossings	All permanent watercourse crossings will be appropriately sized to maintain existing flow conveyance. Consent for the works will be obtained from the HWIDB under Section 23 of the Land Drainage Act 1991, for works which may obstruct flows of an Ordinary Watercourse.	Maintain existing conveyance capacity.
17	Separation dam structure in HWIDB drain – EfW CHP Facility Site	The separation dam structure in the IDB drain bisecting the EfW CHP Facility will be moved to the open section of the drain as agreed with HWIDB. Consent for the works will be obtained from the HWIDB under Section 23 of the Land Drainage Act 1991, for works which may obstruct flows of an Ordinary Watercourse.	Allow maintenance works on the separation dam.
18	Occupants and visitors to the EfW CHP Facility	A Flood Emergency Management Plan for the operational EfW CHP Facility would be prepared and implemented for the operational phase, secured via a DCO Requirement consistent with the **Outline Flood Emergency Management Plan (Volume 7.9)**.	To address the residual risk of flooding to the EfW CHP Facility from both tidal and artificial sources.

Decommissioning Phase

6.2.15 Some of the measures included in **Table 6.1 Proposed flood risk management measures to be implemented during the construction phase for the Proposed Development** could be required for the eventual decommissioning of the EfW CHP Facility, CHP Connection and Grid Connection, such as a Flood Emergency Management Plan for the decommissioning phase. However, specific flood risk mitigation requirements for this phase would need to be specified when the details of such works are known. Furthermore, specification of future mitigation measures would need to take account of the changes in the flood hazard baseline relating to climate change, land use change, and the planning and regulatory requirements prevailing at the time.

6.3 Flood Emergency Management Plan

6.3.1 The Flood Emergency Management Plan consistent with the **Outline Flood Emergency Management Plan (Volume 7.9)** will be secured by a DCO Requirement (**Draft DCO** (**Volume 3.1**)). Measures for construction are also set out in the **Outline CEMP** (**Volume 7.12**) and include the following elements:

- Register with the Met office email alert service and Environment Agency's Flood Warning Service.

- Define evacuation routes from flood risk areas which should be clearly communicated with all site operatives.
- Specify the circumstances under which evacuation of flood risk areas would take place. It is suggested that appropriate triggers for evacuation might be receipt of a Met Office Severe Weather Warning for heavy rain or an Environment Agency Flood Warning for the area (construction works may be suspended in such weather in any case, reducing the likelihood of occupation at such times of elevated flood risk).
- Make the construction area safe prior to evacuation – this would include appropriate storage of equipment and materials and securing items to prevent them being mobilised in flood water.
- Remove critical plant, equipment and polluting materials from the floodplain. This could include raising critical items or polluting materials above the design flood level to removing them from the floodplain completely to suitable alternative locations for the duration of the flood event. At the construction storage the contractor would identify the need (or not) to remove equipment or polluting materials from the working areas based on the flood warnings or alerts received.

6.3.2 The Flood Emergency Management Plan should be finalised before commencement of works on site. A separate plan consistent with the **Outline Flood Emergency Management Plan (Volume 7.9)** would be required for the operational phase (coverage, actions and responses would be different). All personnel should be briefed on the contents of this plan as part of the site induction process.

7. Planning Policy Requirements

7.1 The Sequential Test

EfW CHP Facility Site

7.1.1 Although the EfW CHP Facility is within Flood Zone 3a, the development area is considered to be a suitable location with no reasonably available alternative suitable sites at a lower risk of flooding for the reasons below, and as such passes the NPPF's Sequential Test.

- **Flood zone**: the EfW CHP Facility Site is not within Flood Zone 3b;
- **Proximity to potential heat and electricity customers.** There are a number of existing commercial operations within the industrial area on the south side of Wisbech (where the EfW CHP Facility would be located) which have requirements for steam and/or electricity which could be met by the EfW CHP Facility. Wisbech also represents one of only two locations in the east of England identified by the Department for Business, Energy & Industrial Strategy as possessing three large heat loads[18] (the other being Norwich). The Draft NPS EN-3 introduces reference to locating 'EfW Plants' in an area where the proposed plant would not lead to an over-capacity of EfW Waste treatment at a national or local level. The **Waste Fuel Availability Assessment (Volume 7.3)** which accompanies the DCO application demonstrates that there is an under-supply of waste treatment facilities both nationally and locally (the region).
- **Safeguarded Waste Management Area.** The EfW CHP Facility Site is an existing safeguarded Waste Management Area in Cambridgeshire and Peterborough Minerals and Waste Local Plan (Policy 10) and is consistent with the locational strategy as it lies within the settlement boundary of Wisbech (Policy 4). The closest other safeguarded Waste Management Area within the settlement boundary of Wisbech is approximately 0.5km to the east of the EfW CHP Facility but is too small to accommodate the EfW CHP Facility of the type and size proposed (3.5ha). The other Waste Management Area located approximately 2.5km to the north and alongside the River Nene is close to residential areas and does not benefit from proximity to larger users of heat. It is noted that the majority of the EfW CHP Facility Site was previously allocated in Cambridgeshire County Council and Peterborough City Council's Site-Specific Proposals Plan, under Policy SSPW1C, for waste management use, including 'New Waste Management Technologies'. It was also safeguarded in a Waste Consultation Area, designated under Policy SSP W8D and the overarching Core Strategy Policy CS30 Waste Consultation Areas.
- **Good access to the strategic highway network.** The EfW CHP Facility Site is located approximately 1km from the A47, a National Trunk Road. Access to the A47 would be via New Bridge Lane and Cromwell Road. This route avoids

[18] Dept for Business, Energy & Industrial Strategy. UK CHP Development Map. Website. Accessed 13 April 2022.

a requirement for the majority of construction and operational vehicles to travel through substantially built-up areas to access the EfW CHP Facility Site. NPS EN-3 and the Draft NPS EN-3 recognise government encouragement of multi-modal transport expecting materials to be transported by water or rail where possible recognising that their use will be determined by the economics of the scheme. The EfW CHP Facility Site lies adjacent to the disused March to Wisbech Railway for which there are plans to reinstate. Land has been set aside within the site for a future rail connection.

- **Prioritise brownfield area**: the EfW CHP Facility is a brownfield site currently used for waste-related and similar commercial activities.

CHP Connection

7.1.2 Supporting the selection of the EfW CHP Facility Site is the ability of the site selected to provide a CHP Connection along the disused March to Wisbech Railway to the Nestlé Purina Pet Food factory. There are few other options for providing this CHP Connection from the EfW CHP Facility Site, but in any case, the disused railway is raised above surrounding ground levels for much of its route (above 3m AOD) and thus provides the lowest flood risk CHP Connection option. Further information on the how the CHP Connection design developed is provided in ES **Chapter 2: Alternatives (Volume 6.2)**.

Grid Connection

7.1.3 A sequential approach has been taken in determining the location of the Grid Connection, with flood risk being considered in the route selection process along with the numerous other technical, environmental and socio-economic constraints. This sought to ensure that it is sited in the lowest flood risk areas, where possible, whilst acknowledging the expansive floodplains of the Fens in the wider area, and the need to reach an existing substation in order to connect to the wider electricity network.

7.1.4 Three Grid Connection options were considered at the scoping stage, two covering a 132kV connection to Walpole Substation and a 400kV connection option into the 400kV line to the east of Wisbech. At the PEIR stage a further Grid Connection option (connection to the Walsoken Substation) was assessed: The Grid Connection to Walsoken Substation was selected for assessment at final ES stage on the merits of a wide range of technical, cost, environmental, and socio-economic factors, including flood risk. This option is marginally preferred on flood risk grounds because of a shorter route through Flood Zones 2 and 3 and the connection point itself (at Walsoken) is not at residual tidal flood risk. Further information on how the Grid Connection developed is provided in ES **Chapter 2: Alternatives (Volume 6.2)**.

7.2 The Exception Test

7.2.1 The requirements of the Exception Test were set out in **Section 2.4** of this report, along with the flood risk vulnerability and flood zone 'compatibility' matrix in **Table 2.4 Application of the flood risk vulnerability and flood zone 'compatibility'**

matrix to the Proposed Development which confirmed that the Exception Test needs to be passed for the Essential Infrastructure elements of the Proposed Development located in Flood Zone 3a, i.e.:

- EfW CHP Facility Site (power generation elements, weighbridge, internal roads)
- Grid Connection; and
- CHP Connection.

Wider sustainability benefits

7.2.2 Part 1 of the Exception Test requires the Proposed Development to provide wider sustainability benefits to the community that outweigh flood risk. As stated in EN-1 (Department of Energy and Climate Change, 2011a), this would include the benefits (including need) for the infrastructure.

7.2.3 The Proposed Development would make a significant contribution to delivering critical energy and waste infrastructure for the UK, in accordance with National Policy. Within the local area spatial scope defined in the **Waste Fuel Availability Assessment (Volume 7.3)** which accompanies the application there is calculated to be a shortfall of around 2.5 million tonnes of Household, Industrial and Commercial waste per annum up to 2030 (waste which is otherwise going to landfill). At the national level this shortfall rises to 2.8 million tonnes taking into account Government targets to increase recycling. The local area shortfall will reduce to around 1.8 million tonnes per annum by 2035 but it is clear to see that with ambitious growth agendas, residual waste will continue to be generated and will need to be suitably treated in accordance with the Waste Hierarchy consistent with its diversion to EfW facilities. The Proposed Development supports movement up the Waste Hierarchy and could also assist in reducing part of the amount of residual waste currently exported overseas and all waste diverted from landfill or export would instead be used to generate renewable energy and heat.

7.2.4 The Proposed Development would handle up to 625,600 tonnes of residual (non-recyclable) waste per annum and would be able to export up to 55 Megawatt electrical (MWe) and potentially up to 50 Megawatt thermal (MWth) of steam (heat) energy. **Chapter 14: Climate (Volume 6.2)** of the ES sets out the Greenhouse Gas (GHG) emission assessment which has been undertaken with respect to the Proposed Development. The assessment concludes that the GHG impact of the Proposed Development will have a **beneficial Significant effect** in that it would have net GHG emissions below zero, causing an indirect reduction in atmospheric GHG emissions. This is considered to be a positive impact on the UK Government meeting its carbon budgets/targets. This conclusion is reached without consideration for the potential to supply heat and electrical power to nearby businesses.

7.2.5 NPS EN-1 encourages at paragraph 4.6.8 the utilisation of useful heat to displace conventional heat generation from fossil fuel sources as it is often more efficient than the alternative electricity/heat generation mix. The Proposed Development seeks consent to construct and operate a CHP Connection to serve local businesses should they require it.

7.2.6 Reducing waste to landfill, extracting useful energy from and it reducing fossil fuel use supports reductions in CO_2 emissions and mitigates against climate change, a key sustainability benefit.

7.2.7 It is therefore concluded that the Proposed Development has passed Part 1 of the Exception Test.

Flood Risk

7.2.8 Part 2 of the Exception Test requires that the Proposed Development would be safe, without increasing flood risk elsewhere (subject to the exception below) and, where possible, would reduce flood risk overall. Essential Infrastructure in Flood Zone 3a should also be designed and constructed to remain operational and safe in times of flood.

7.2.9 Part 2 of the Exception Test is considered to be passed, without the need for any additional mitigation on the basis that:

- The EfW CHP Facility is considered to be safe for its lifetime (2026 to 2066). As discussed in **Section 4**, tidal flood modelling indicates that the EfW CHP Facility Site would remain dry during the design flood event (0.5% AEP plus climate change overtopping event). It would also remain dry during the 0.1% AEP plus climate change overtopping event and there is safe access and egress to and from the site;
- The residual flood risk can be mitigated. The flood risk management measures set out in **Section 6** (specifically ID 11, **Table 6.2 Proposed flood risk management measures for the Proposed Development during the operational phase**) would ensure the EfW CHP Facility would remain dry during the 0.1% plus climate change residual risk event (breach of the tidal defences) whilst the surrounding area would be flooded including wider access roads (modelled flood depth 0.1 to 0.6m). In the occurrence of a flooding event the EfW CHP Facility will continue to be operated by the on-shift personnel whilst waste feedstock and consumables already on site are available, and sufficient storage capacity for residues is present (approximately 11 days) before being taken through a routine shutdown should the flood event be expected to persist in line with the Flood Emergency Management Plan as agreed with CCC at a consultation meeting on 26 October 2021. In this event it is expected that there would be resilience in the system provided by National Grid to continue to supply energy to consumers (although it is noted these may also be flooded).
- The increase in ground levels associated with measure ID 11 will also contribute to the ability of the site to drain under gravity (an approach that avoids the need for pumping is preferred, to be confirmed at detailed design stage of the drainage strategy), by increasing the elevation of the site above the surrounding drainage network.
- The EfW CHP Facility would not increase flood risk elsewhere. As the Proposed Development remains dry during the design flood, there is no potential to increase flood risk elsewhere. This is due to the lack of pathway between the source (tidal floodwater) and the potential Receptors (off-site third

parties in the vicinity of the Proposed Development). As such, there is no potential for loss of floodplain storage, floodplain compartmentalisation or impacts on floodplain (or in-channel) conveyance during the design flood event.

- The EfW CHP Facility would not increase flood risk elsewhere. SuDS will be incorporated into the development, with appropriate attenuation to ensure run-off is limited to greenfield rates as set out in **Section 5**. As this existing site is previously developed, with areas of compacted and likely impermeable ground the existing surface water run-off rates are likely to be higher than the greenfield rate and as such the implementation of the SuDS scheme may actually reduce surface water flood risk in the surroundings.

8. Conclusions

8.1.1 This FRA has been prepared in accordance with NPS EN-1, EN-3 and EN-5, the NPPF and its associated PPG, and all other relevant national and local policy and guidance. It has been undertaken by suitably qualified and competent people, and in liaison with the relevant risk management authorities, including the Environment Agency, the HWIDB, KLIBD, Anglian Water and the LLFA (CCC). All potential sources of flooding have been considered, including the risks posed to and from the EfW CHP Facility and the Grid Connection, over the full development lifetime, and where a risk has been identified, sufficient flood risk management measures, in line with best practice, have been proposed. The approach taken in this FRA is considered to be proportionate to the risk and appropriate to the scale, nature and location of the project.

8.1.2 It is concluded that the Proposed Development, with the flood risk management measures described above in place, would not be subject to an unacceptable level of flood risk, nor would it increase flood risk elsewhere. It would not result in any loss of functional floodplain storage or impede water flows.

8.1.3 The operational development would be resilient to the most extreme climate change allowances that are considered feasible over the development's lifetime, and therefore the identification of future adaptation measures is not considered to be necessary.

8.1.4 Sufficient evidence to demonstrate that the Sequential Test has been passed has been provided, and a sequential approach has been applied.

8.1.5 In accordance with the guidance in the NPPF, the development proposals are appropriate for the flood zone classifications, and where necessary the Exception Test has been passed.

8.1.6 With due consideration of the protection provided by the raised tidal defences, and both the EfW CHP Facility Site and the CHP Connection and Grid Connection predicted to remain dry during the 0.5% AEP plus climate change design tidal event.

8.1.7 Suitable flood risk management measures have been identified to address the risks identified, including residual risks, comprising the preparation of Flood Emergency Management Plan for flood events, minimum finished floor levels for the EfW CHP Facility, stand-off distances from IDB watercourses, a Drainage Strategy for the operational development to ensure run-off is limited to greenfield rates consistent with the Outline Drainage Strategy and the preparation of a Water Management Plan consistent with the Outline Water Management Plan (**Outline CEMP (Volume 7.12**)) for the construction phase.

8.1.8 In conclusion, this FRA demonstrates that the requirements of all relevant planning policy with respect to flood risk have been met, and the flood risk management measures identified would be secured through the Requirements of the DCO if approved.

Figures

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Wisbech
The Hudson Leisure Centre
Wisbech Park
Chapnall Field
Great Boleness Field
Little Boleness Field
South Bridge Field
The Railway Line
Three Lakes Nurseries
Walnut Lodge
Elm
Redmoor Drain
Estover Lodge

Key

- Order limits
- EfW CHP Facility Site
- CHP Connection
- Temporary Construction Compound
- Grid Connection
- Access Improvements
- Water Connections

King's Lynn IDB

- Adopted watercourse
- Culvert

Hundred of Wisbech IDB

- Adopted watercourses
- Culverts

0 200 400 600 800 m

Scale at A3: 1:12,500

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.1i
Proposed Development elements

June 2022

wood.

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Key

- Order limits
- EfW CHP Facility Site
- CHP Connection
- Temporary Construction Compound
- Grid Connection
- Access Improvements
- Water Connections

Hundred of Wisbech IDB

- Adopted watercourse
- Culvert

0 100 200 300 400 m

Scale at A3: 1:7,500

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment
Figure 2.1ii
Proposed Development elements (EfW CHP Facility Site and surroundings)

June 2022

wood.

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The Hudson Leisure Centre
Wisbech Park
Chapnall Field
Great Boleness Field
Little Boleness Field
South Bridge Field
The Railway Line
Three Lakes Nurseries
Walnut Lodge
Paradise
Elm
Redmoor Drain
Key
Order limits
King's Lynn IDB
Adopted watercourse
Culvert
Hundred of Wisbech IDB
Adopted watercourse
Culvert
0 200 400 600 m
Scale at A3: 1:12,500

Client
Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment
Figure 2.1iii
Proposed Development location
June 2022
wood.
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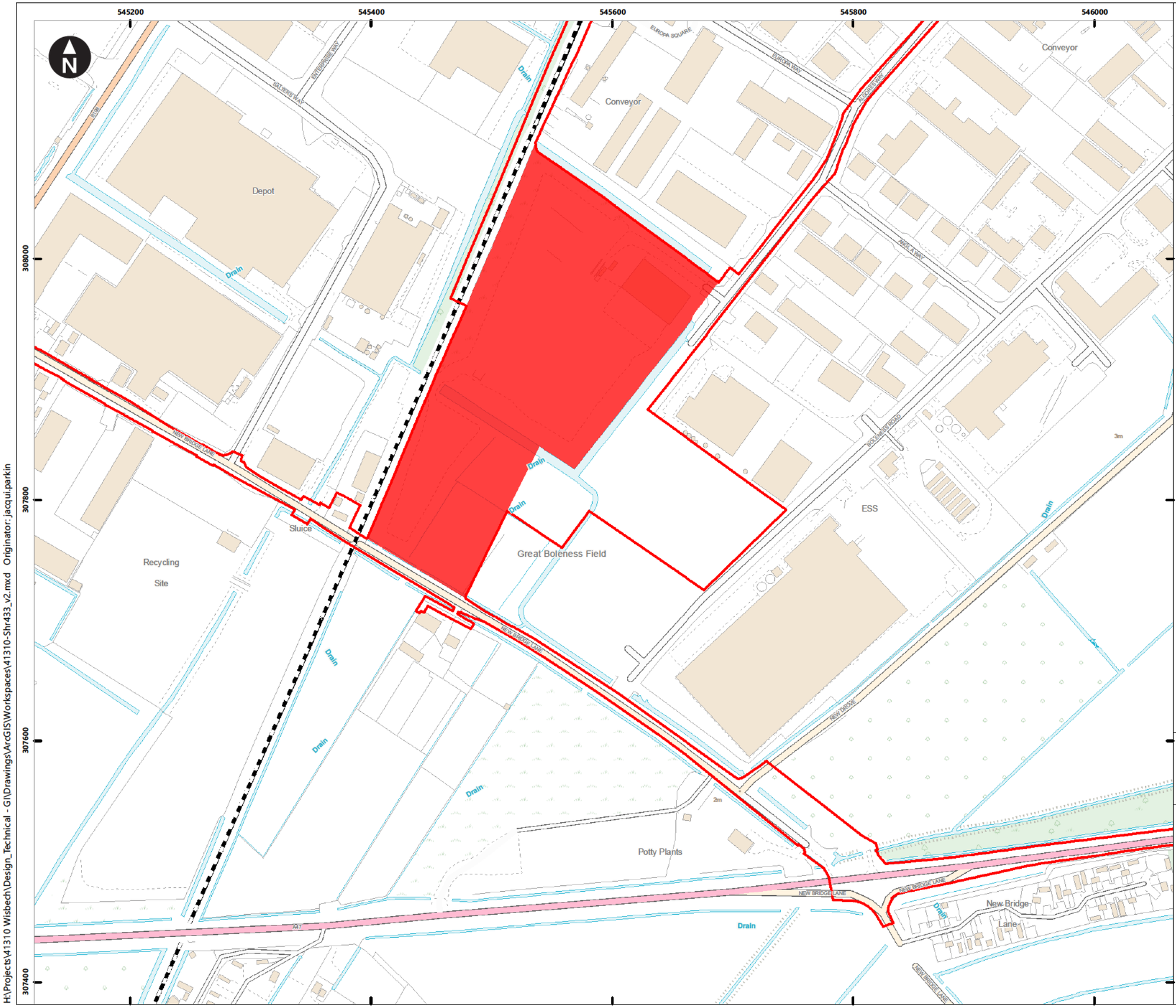
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Drain
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Drain
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Sluice
Recycling
Site
Great Boleness Field
ESS
Potty Plants
New Bridge
Lane
3m
2m
A47
NEW BRIDGE LANE
NEW BRIDGE LANE
NEW BRIDGE LANE
NEW BRIDGE LANE
NEW BRIDGE
EUROPA SQUARE
EUROPA WAY
SOLUTIONS WAY
ENTERPRISE WAY
ANGLIA WAY
SOLUTIONS ROAD
B198
Order limits
EfW CHP Facility Site
Disused Wisbech to March Railway
0
50
100
150 m
Scale at A3: 1:3,000
© Crown copyright and database rights 2021 Ordnance Survey 0100031673
Client
Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A- Flood Risk Assessment
Figure 2.1iv
Proposed Development location (EfW CHP Facility Site and surroundings)
June 2022
wood.
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311000 310000 309000 308000 307000 306000

N

Key

Order limits

1m LIDAR DTM Elevation (mAOD)

- < -3
- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 4.5
- 4.5 - 5.0
- 5.0 - 5.5
- 5.5 - 6.0
- 6.0 - 6.5
- 6.5 - 7.0
- > 7.0

0 250 500 750 1,000 m

Scale at A3: 1:20,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.2i
LiDAR topography elevations (Proposed Development)

June 2022

wood.

41310-Shr434_v2

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545500

546000

308000

307500

N

Key

Order limits

1m LIDAR DTM Elevation (mAOD)

- < -3
- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 4.5
- 4.5 - 5.0
- 5.0 - 5.5
- 5.5 - 6.0
- 6.0 - 6.5
- 6.5 - 7.0
- > 7.0

0 50 100 150 m

Scale at A3: 1:3,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.2ii
LiDAR topography elevations (EfW CHP Facility Site and surroundings)

June 2022

wood.

41310-Shr435_v2

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544000 545000 546000 547000 548000 549000

310000 309000 308000 307000 306000

see inset

Pumping station

Gravity outfall and overspill

Key

- Order limits
- EfW CHP Facility Site
- CHP Connection
- Temporary Construction Compound
- Grid Connection
- Access Improvements
- Water Connections
- Study Area
- Main River
- Ordinary Water Crossings
- Ordinary (non-IDB) watercourses

King's Lynn IDB

- Adopted watercourse
- Culvert
- Watercourse crossing (underground cable)

Hundred of Wisbech IDB

- Adopted watercourses
- Culverts
- Watercourse crossing (underground cable)
- Ponds
- Other structures

0 200 400 600 800 1,000 1,200 m

Scale at A3: 1:20,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.3i
Water environment (Proposed Development)

June 2022

wood.

41310-Shr436_v2

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545000
546000
547000
309000
308000
N
B1542
Magazine La
North Brink
South Brink
Cromwell Rd
B198
Oldfield La
Victory Rd
Cordon St
Elm Rd
A1101
Railway Rd
Prospect Pl
Sandall Rd
Churchill Rd
Willow Way
River Nene
Cox's La
Weasenham La
Regal Rd
Great Boleness Field
Expa Way
Anglia Way
Saffers Way
New Drove
Boleness Rd
Little Boleness Field
Elm High Rd
Elm Low Rd
Potty Pl
South Bridge Field
The Railway Line
Redmoor La
New Bridge La
Hallowell Rd
Key
Order limits
EfW CHP Facility Site
CHP Connection
Temporary Construction Compound
Grid Connection
Access Improvements
Water Connections
Study Area
Main River
Ordinary Water Crossings
Ordinary (non-IDB) watercourses
King's Lynn IDB
Adopted watercourse
Culvert
Watercourse crossing (underground cable)
Hundred of Wisbech IDB
Adopted watercourses
Culverts
Watercourse crossing (underground cable)
Ponds
Other structures
0
200
400 m
Scale at A3: 1:8,000
Contains OS data © Crown Copyright and database right 2020
Client
Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment
Figure 2.3ii
Water environment (EfW CHP Facility Site and surroundings)
June 2022
wood.
41310-Shr437_v2
H:\Projects\41310 Wisbech\Design_Technical - GIS\Drawings\ArcGIS\Workspaces\41310-Shr437_v2.mxd Originator: jacqui.parkin

547000
547500
548000
548500
309000
308500
308000

Sixth Ave
Eighth Ave
Money Bank
Orchard Dr
Quaker La
Stow La
Peckover Dr
Penrose Gardens
Rhone Pl
Arles Ave
Mansell Rd
Queen Elizabeth Dr
Falklands Dr
Meadowgate La
Broad En
Green La
Walnut Lodge
Three Lakes Nurseries
Westmead Ave
Hunters Rowe
Elm High Rd
Elm Low Rd
Elmfield Dr

Key

- Order limits
- Grid Connection
- Study Area
- Ordinary (Non-IDB) watercourses
- Ponds

King's Lynn IDB

- Adopted watercourse
- Culvert
- watercourse crossing (underground cable)

0 50 100 150 200 250 m

Scale at A3: 1:6,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.3iii
Water environment (Grid Connection)

June 2022

wood.

41310-Shr438_v2

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545400 545500 545600 545700

308100 308000 307900 307800

N

New Bridge Lane

Key

- Order limits
- Essential infrastructure - power generating elements, weighbridge, internal access roads
- Less vulnerable - site office, car park, laydown maintenance area
- Water compatible - open spaces

Notes:
The flood risk vulnerability classification for EfW CHP Facility was agreed with Cambridgeshire County Council on a consultation meeting dated 26/10/21.

Elements of the EfW CHP Facility are shown on Chapter 3 Figure 3.6: EfW Facility Site Layout

0 20 40 60 80 m
Scale at A3: 1:1,500

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 2.4
Flood risk vulnerability classification for EfW CHP Facility (operational phase)

June 2022

wood.

41310-Shr385_v2

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544500 545000 545500 546000 546500 547000 547500 548000 548500 549000

310000 309500 309000 308500 308000 307500 307000 306500

Key

- Order limits
- Environment Agency Main River
- Flood defences
- Flood Zone 3
- Flood Zone 2
- Flood Zone 1

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 3.1i
Environment Agency Flood Map for Planning (Overview)

June 2022

wood.

41310-Shr439_v2

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545000 545500 546000 546500 547000

309000 308500 308000 307500

N

Key

- Order limits
- Environment Agency Main River
- Flood defences
- Flood Zone 3
- Flood Zone 2
- Flood Zone 1

0 100 200 300 400 m

Scale at A3: 1:8,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 3.1ii
Environment Agency Flood Map for Planning (EfW CHP Facility Site and surroundings)

June 2022

wood.

41310-Shr440_v2

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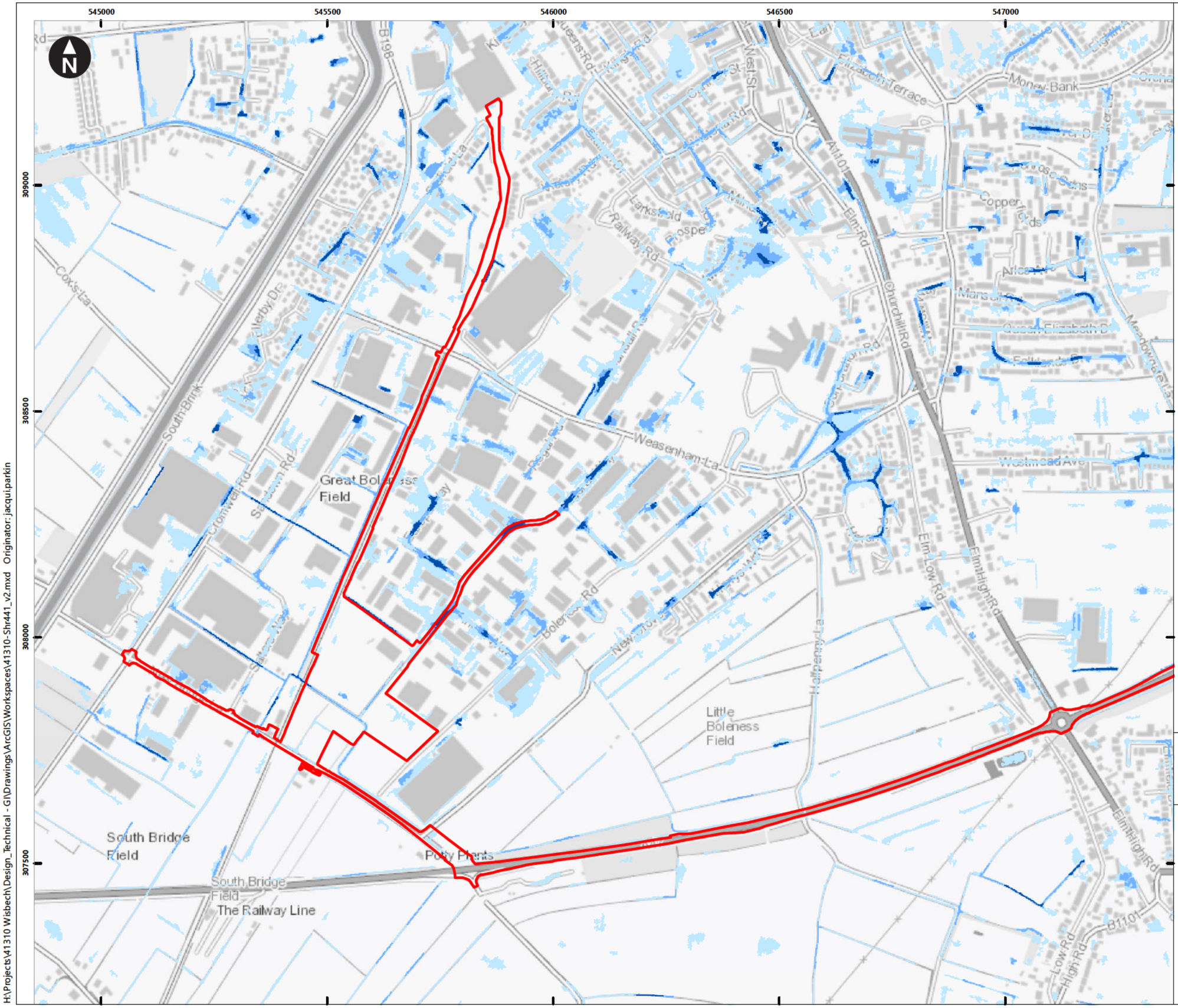

Key

Order limits

Risk of Flooding from Surface Water - Extent

- > 3.33% AEP - High risk of surface water flooding
- 3.33% AEP to 1% AEP - Medium risk of surface water flooding
- 1% AEP to 0.1% AEP - Low risk of surface water flooding
- < 0.1% AEP - Very low risk of surface water flooding

0 100 200 300 400 m

Scale at A3: 1:8,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 3.2i
Environment Agency Surface Water Flood Risk Map (EfW CHP Facility Site and surroundings)

June 2022

wood.

41310-Shr441_v2

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546500 547000 547500 548000 548500

309500 309000 308500 308000 307500

N

Bush La
Sandy La
Broad End Rd
Paradise
Money Bank
Green La
Walnut Lodge
Three Lakes Nurseries
Westmead Ave
Meadowgate La
Gray's La
A1101
Elm Rd
Church Hill Rd
Elm Low Rd
Elm High Rd
Veasenham La
Little Boleness Field

Key

Order limits

Risk of Flooding from Surface Water - Extent

- > 3.33% AEP - High risk of surface water flooding
- 3.33% AEP to 1% AEP - Medium risk of surface water flooding
- 1% AEP to 0.1% AEP - Low risk of surface water flooding
- < 0.1% AEP - Very low risk of surface water flooding

0 100 200 300 400 m

Scale at A3: 1:8,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 3.2ii
Environment Agency Surface Water Flood Risk Map (Grid Connection)

June 2022

wood.

41310-Shr442_v2

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544500 545000 545500 546000 546500 547000 547500 548000 548500

309000 308500 308000 307500 307000 306500 306000 305500

N

Key

Order limits

Risk of Flooding from Reservoirs - Extent

Normal river levels

Also flooding from rivers

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 3.3
Environment Agency Reservoir Flood Risk Map

June 2022

wood.

41310-Shr443_v2

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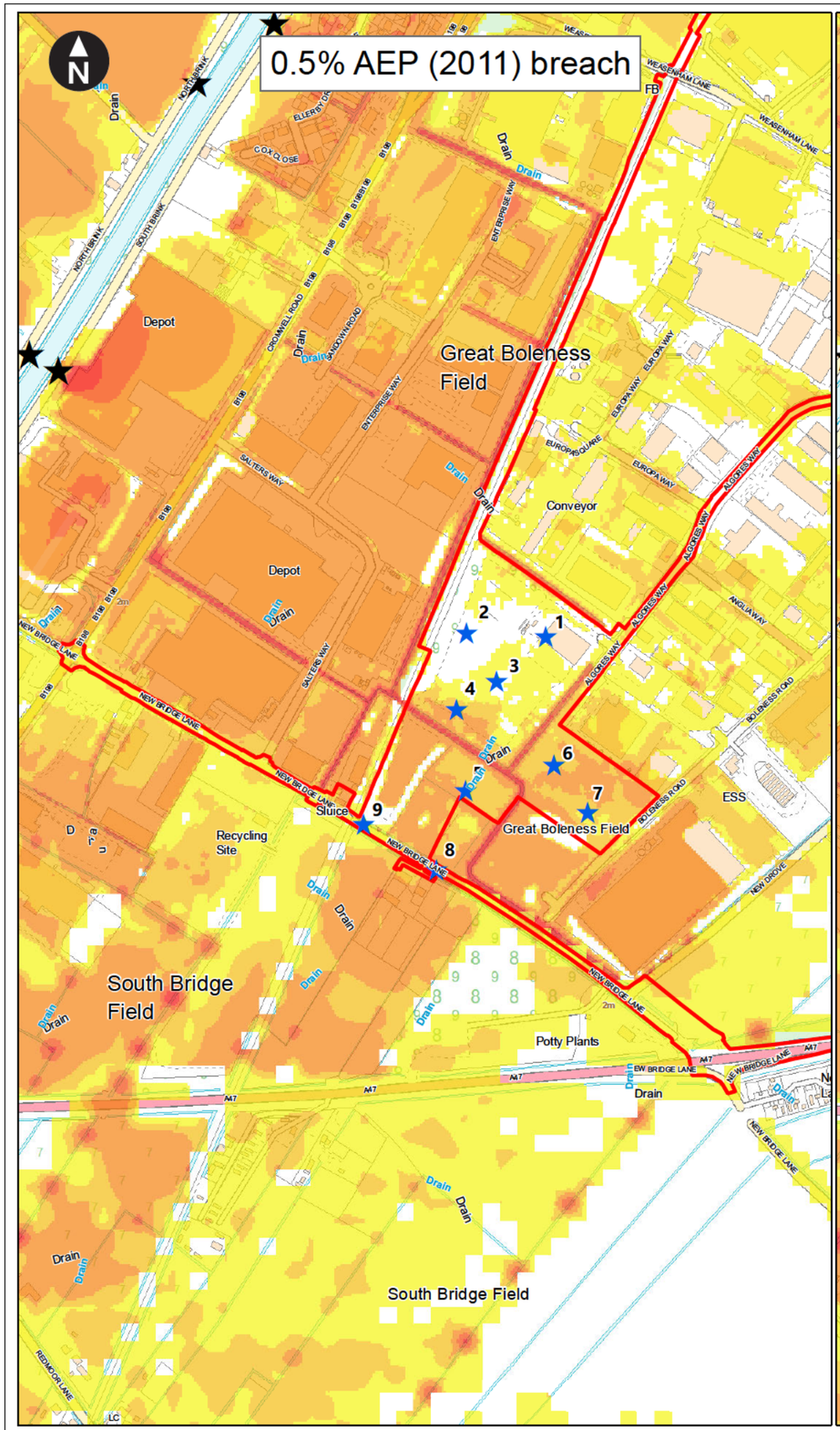

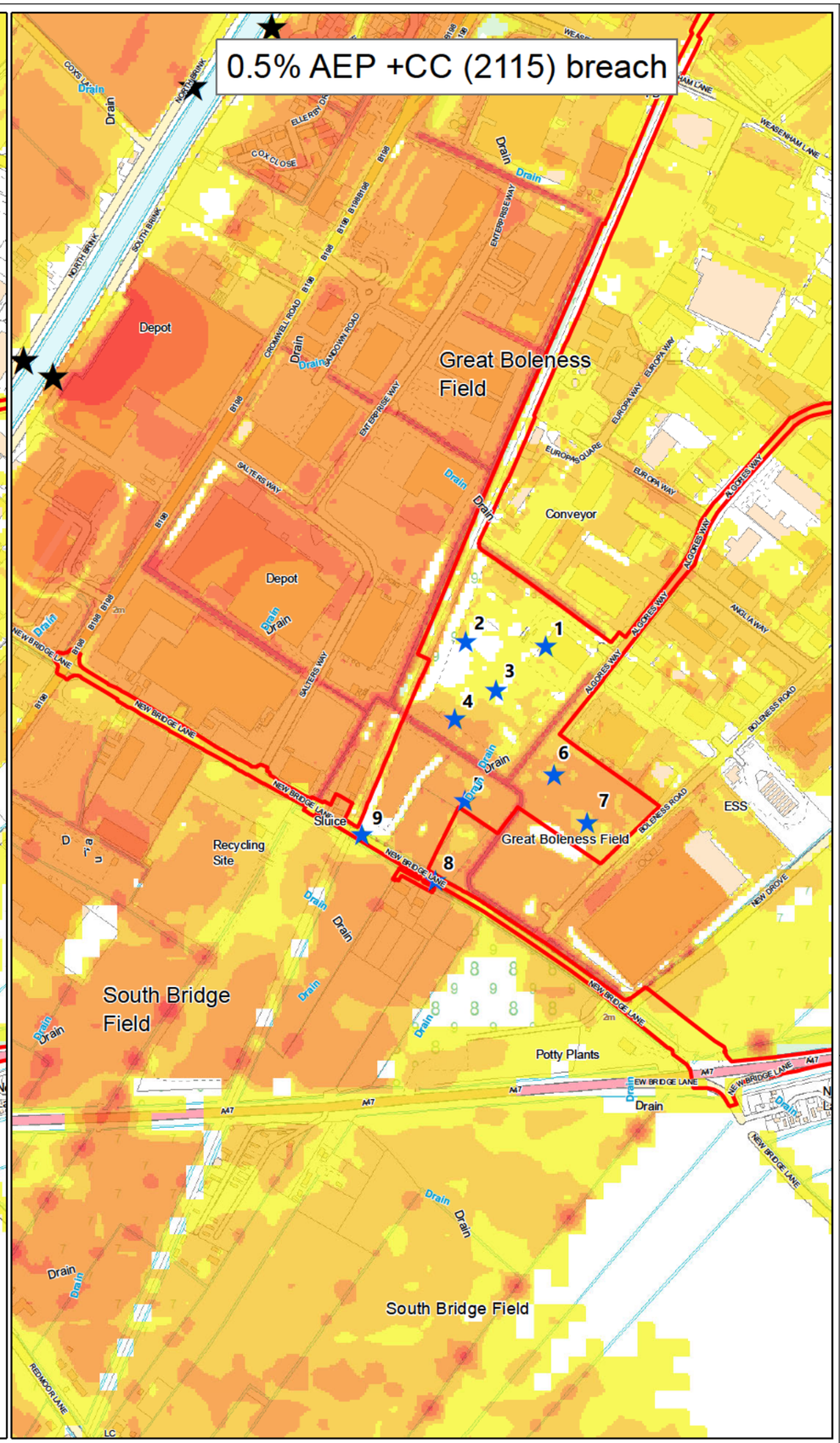

Key

- Order limits
- Floodplain location IDs
- BreachLocations

Flood depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1.0 - 1.6
- 1.6 +

0 100 200 300 m

Scale at A3: 1:6,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 4.1i
Residual risk (EfW CHP Facility Site and surroundings): 0.5% AEP (1:200) breach flood depths

June 2022

wood.

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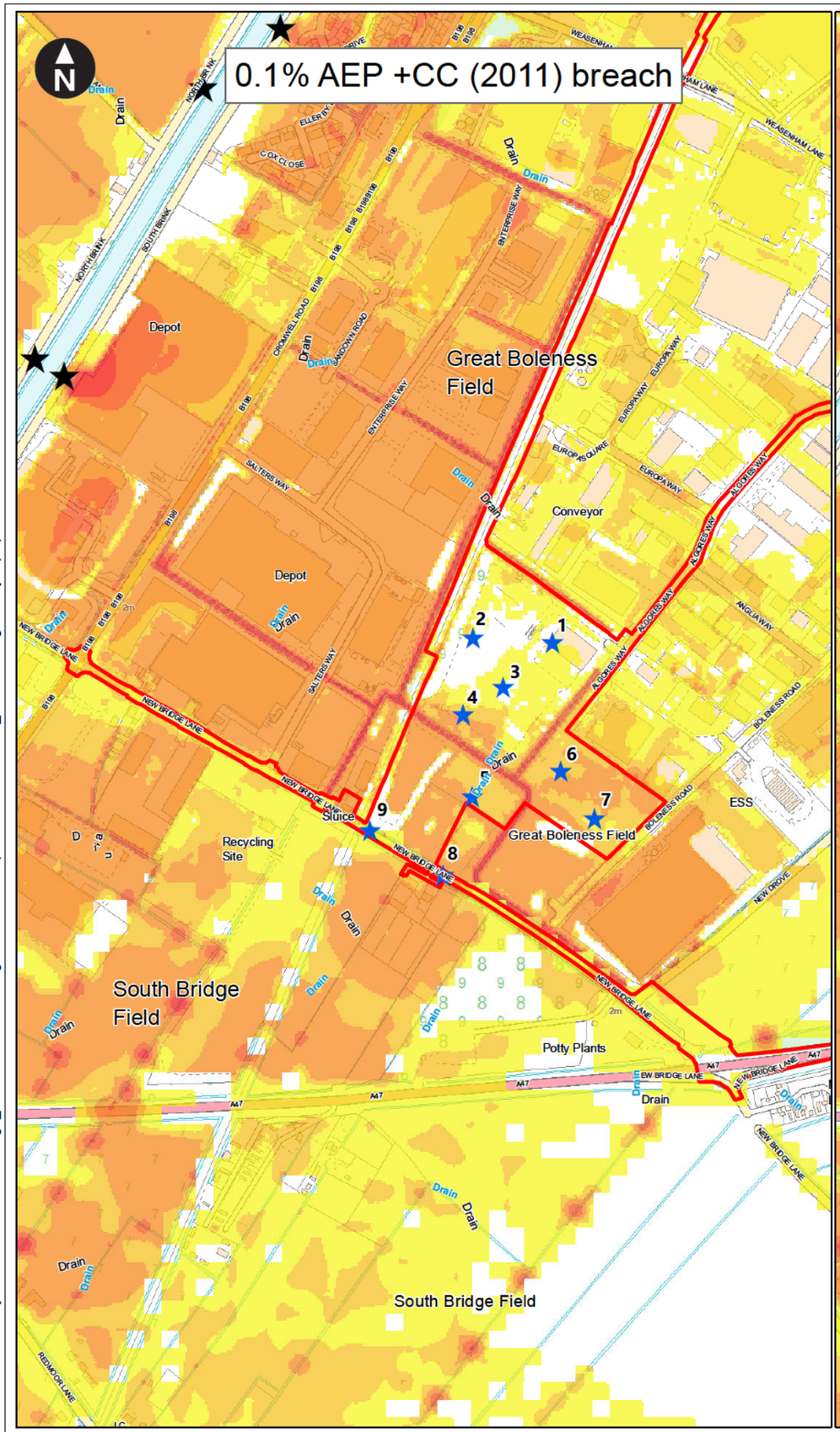

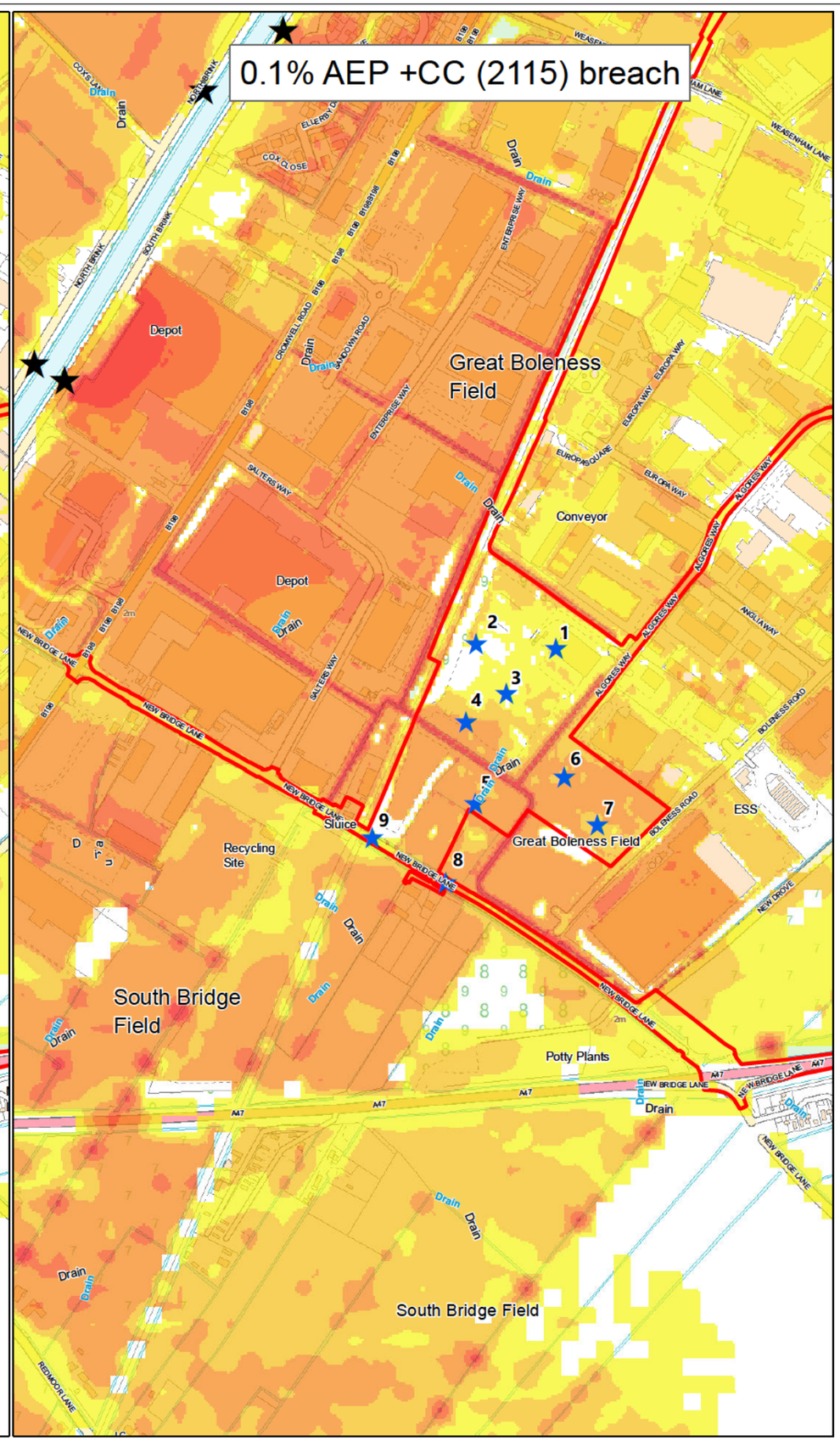

Key

- Order limits
- Floodplain location IDs
- Breach location

Flood depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1.0 - 1.6
- 1.6 +

0 100 200 300 m

Scale at A3: 1:6,000

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 4.1ii
Residual risk (EfW CHP Facility Site and surroundings): 0.1% AEP (1:1000) breach flood depths

June 2022

wood.

545400 545500 545600 545700

308100 308000 307900 307800

N

New Bridge Lane

Key

- Order limits
- Essential infrastructure - minimum FFL 2.6 mAOD
- Less vulnerable - minimum FFL 2.5 mAOD
- Water compatible - no requirements for land raising

Notes:
The flood risk vulnerability classification for EfW CHP Facility was agreed with Cambridgeshire County Council on a consultation meeting dated 26/10/21.

Minimum FFLs were agreed with the Environment Agency on a consultation meeting dated 19/10/21.

Elements of the EfW CHP Facility are shown on Chapter 3 Figure 3.6: EfW Facility Site Layout.

0 20 40 60 80 m

Scale at A3: 1:1,500

Client

Medworth CHP Limited
Medworth Energy from Waste Combined Heat and Power Facility DCO
Environmental Statement
Appendix 12A - Flood Risk Assessment

Figure 6.1
Minimum Finished Flood Levels (FFLs) for EfW CHP Facility (operational phase)

June 2022

wood.

41310-Shr386_v2

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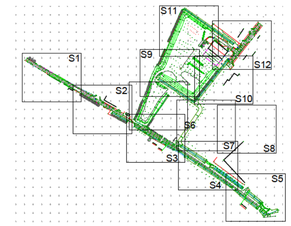
Annex A
Topographic survey for the EfW CHP Facility Site

Notes :Layouts



Topographical Surveys

The description and heights of trees should be used as a guide only

All below ground survey details have been identified from above ground therefore all details relating to these will be approximate only

Some features or location may not have been surveyed due to obstructions or not reasonably visible at the time of the survey

General

This drawing shows the existing topography of New Bridge Lane, Algores Way and the Existing Frimstone Site at Wisbech

Survey Carried out 6th to the 9th November 2019

Station	Easting	Northing	Level
AG1	547795.344	308045.286	2.005
AG2	547806.844	307962.188	2.005
AG3	547808.304	307921.720	2.159
AG4	547885.167	307925.934	2.151
AG5	547923.513	307926.211	2.154
AG6	547923.513	308026.211	2.234
FY2	547462.527	307979.001	5.423
FY3	547511.538	307978.905	4.939
FY4	547511.538	307978.905	4.939
NB1	547880.359	307979.269	2.247
NB2	547880.359	307979.269	2.247
NB3	547879.951	307933.543	2.150
NB4	547879.951	307933.543	2.150
NB5	547819.429	307882.337	2.230
NB6	547819.429	307882.337	2.230
NB7	547804.650	307743.981	2.397
NB8	547795.930	307756.543	2.366
NB9	547795.930	307756.543	2.366
NB10	547728.408	307737.995	2.302
NB11	547291.653	307621.838	2.332
NB12	547291.653	307621.838	2.332
NB13	547173.511	307583.418	2.408
NB14	547149.067	307569.610	2.407
NB15	547149.067	307569.610	2.407
NB15A	547214.500	307605.504	2.373
NB16	547811.610	307952.430	2.222
NB17	547811.610	307952.430	2.222
OC1	547058.571	307544.159	2.580
OC2	547137.818	307562.326	2.704
OC3	547137.818	307562.326	2.704
RF1	547847.008	307965.118	4.736
RF2	547816.710	307959.647	4.830
RF3	547816.710	307959.647	4.830
RF4	547859.048	307967.946	4.656

SURVEY GRID AND LEVEL DATUM

Ordnance Survey (OS) national grid coordinates have been established for survey control point FY2 using GNSS and related to OSTN15(GB).The survey grid is orientated to Grid North with a scale factor of 1.000
All levels relate to the Ordnance Survey (OS) level datum using GNSS OSGM15 (GB)
All levels refer to AOD

Revision	Details	Date
B	Text Edited	13/11/19
A	Topographical Survey	12/11/19

Disclaimer:

This plan should only be used for its original purpose. MFM accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions and or level information shown should be checked on site prior to design and construction.

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.

All dimensions in metres

MFM Land Surveys & Engineering Services Ltd

321 Smeeth Road, Marshland St James,PE14 8EP
Tel:01945 430203 - [redacted]

Client:

MVV Environment Ltd
Devonport EfW CHP Facility
Creek Road
Plymouth
PL5 1FL

Project Title:

Development Site between New Bridge Lane & Algores Way

Drawing Title:

Topographical Survey of New Bridge Lane, Algores Way & The Existing Frimstone Site
Sheet 1 of 1
Master Survey Layout

Scale:	Sheet Size:	Drawn:	Date:
1:1250	A1	M.M	12.11.2019

Drawing Number:	Revision:
16170242-MVV-FY-3D-MasterTopo	B

Annex B
Detailed tidal flooding information provided by the Environment Agency;

Ana Braid
[redacted]

Our ref: NR200026

Date: 14 January 2021

Dear Ana

Provision of Flood Risk Information for Medworth Energy from Waste Combined Heat and Power Facility.

Thank you for your request to use 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 risks, such as the consequences 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.

1. Flood Map

The attached map includes the current Flood Map for your area. The Flood 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 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 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. History of Flooding

A copy of the Historic Flood Event Outlines Map showing the extent of previous recorded flooding in your area is attached. This only covers information we hold and 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 organisations, such as the Lead Local Flood Authority (ie top tier council), Local Authority or Internal Drainage Board (where they exist), may have records.

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

5.1 Tidal Defence Information – Grid Connection Corridor

The existing tidal defences protecting this site consist of earth embankments and concrete floodwalls. They are in fair condition.

Due to the extensive search area, this protection varies from a 0.67% (1 in 150) chance and a 0.5% (1 in 200) chance of occurring in any year. If you would like more information regarding the SoP then please provide site specific information.

5.1.1 Tidal Defence Information – EfW Site

The existing tidal defences protecting this site consist of earth embankments and concrete floodwalls. They are in fair condition and reduce the risk of flooding (at the defence) to a 0.5% (1 in 200) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

5.2 Tidal Flood Levels

The attached table shows our current best estimate for extreme tide levels.

Levels for the Humber Estuary have an assessment date of 2014, with others having an assessment date of 2017, which should be used in any consideration of future increases due to climate change.

6. Modelled 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. Hazard mapping is also available for fluvial flood risk in Northampton, Lincoln, Wainfleet and some isolated rural locations.

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

6.1 Hazard Mapping – Breaching

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.

- Year 2011 0.5% (1 in 200) chance
- Year 2011 0.1% (1 in 1000) chance
- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

6.2 Hazard Mapping – Overtopping

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from simulated overtopping of defences for the following scenarios:

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

Your site is not affected by overtopping of the defences for the present day (2006) scenarios.

7. 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 February 2016. 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.

8. 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

9. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. 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 James Beckett using the details below.

Yours sincerely,

p.p. [redacted]

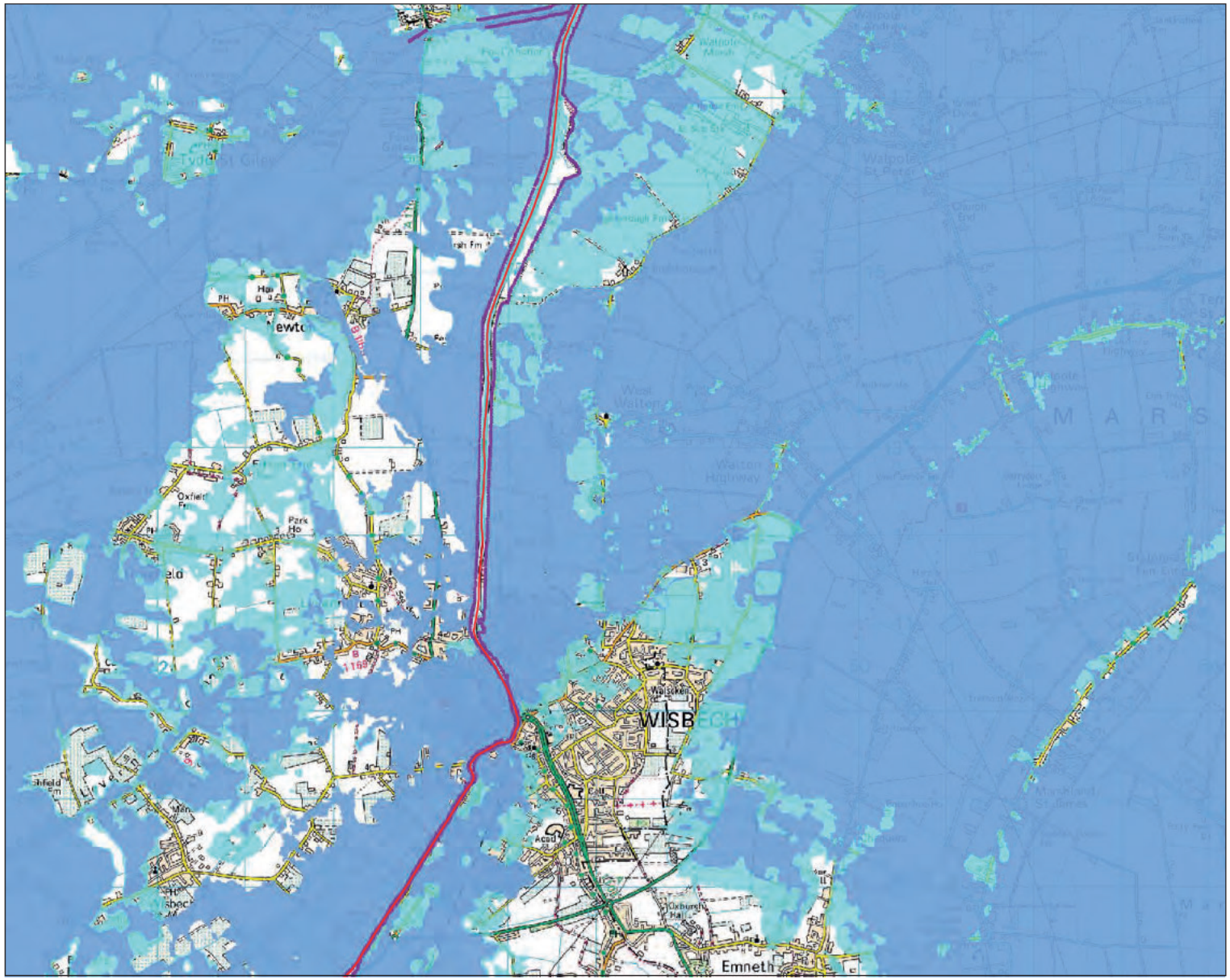
Alistair Windler
Partnerships and Strategic Overview Team Leader –Welland and Nene

[redacted]

Enc.
Flood Map (2 Maps)
Historic Flood Extent Map
Estimated Tide Levels
Tidal Breach Locations Map
Wisbech Breach Locations Map
Hazard Mapping – Breaching (8 maps)
Hazard Mapping – Overtopping (2 maps)

Ceres House, Searby Road, Lincoln, LN2 4DT
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Flood Map centred on TF 47231 12524 - created January 2021 [Ref: NR200026]



Environment Agency

Scale 1:45,000

N

Legend

- Main River
- Raised Defences
- Flood Storage Areas
- Area 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.

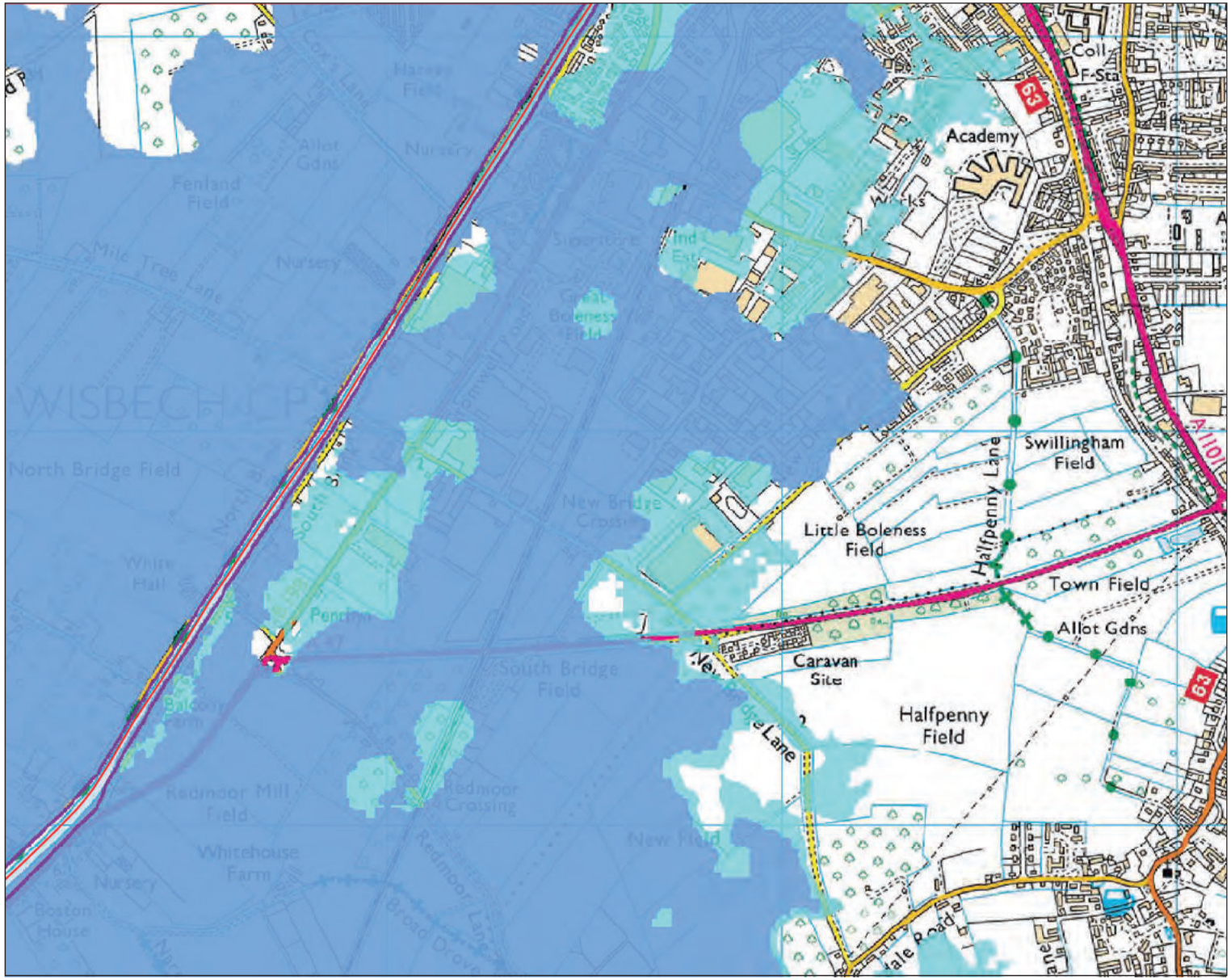
Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

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

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

Flood Map centred on TF 47231 12524 - created January 2021 [Ref: NR200026]



Environment Agency

Scale 1:10,000

N

Legend

- Main River
- Raised Defences
- Flood Storage Areas
- Area 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:

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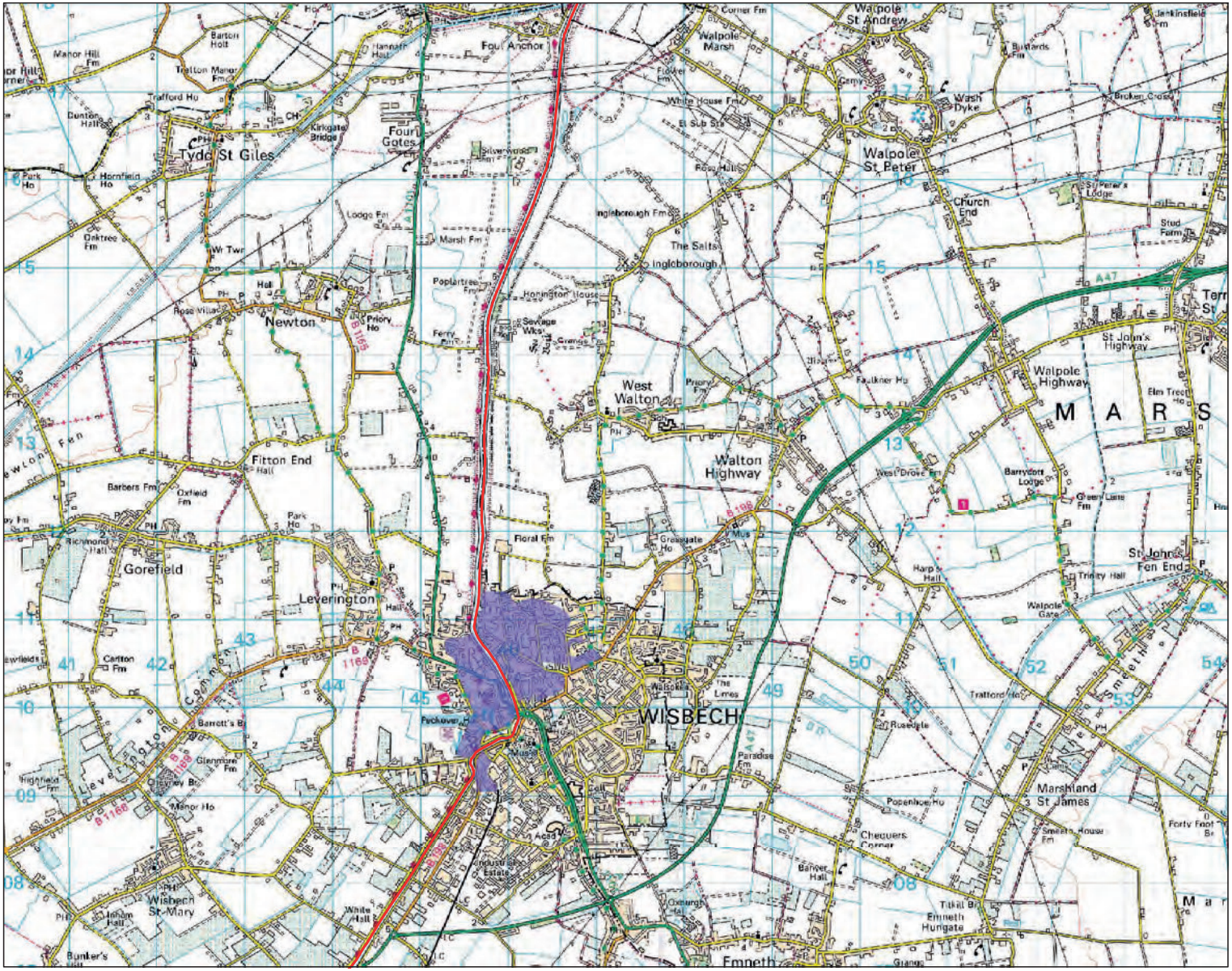
Historic Flood Map centred on TF 47231 12524 - created January 2021 [Ref: NR200026]



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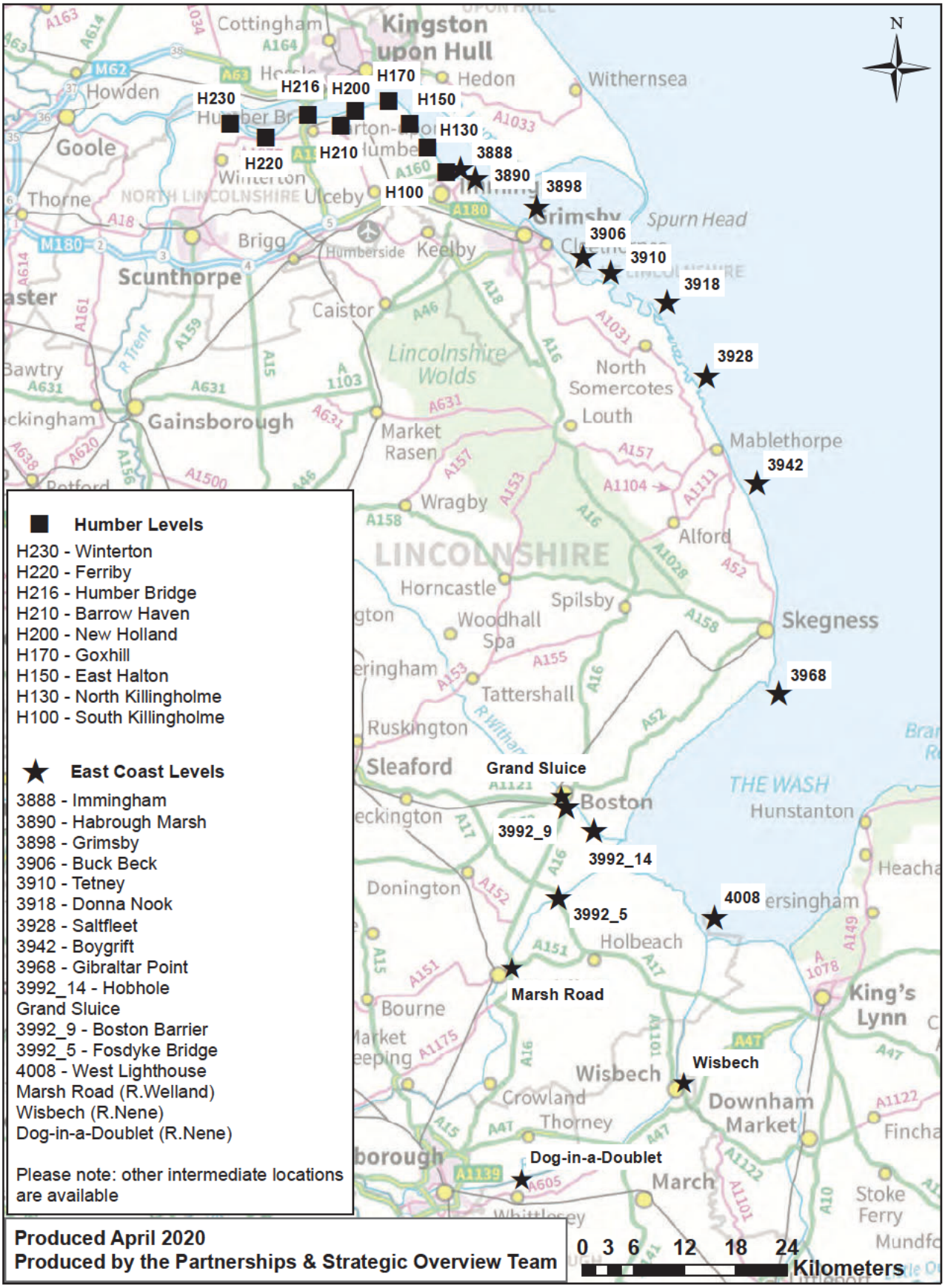
Tidal Level Location Map
Lincolnshire & Northamptonshire Area



Humber Levels

H230 - Winterton
H220 - Ferriby
H216 - Humber Bridge
H210 - Barrow Haven
H200 - New Holland
H170 - Goxhill
H150 - East Halton
H130 - North Killingholme
H100 - South Killingholme

East Coast Levels

3888 - Immingham
3890 - Habrough Marsh
3898 - Grimsby
3906 - Buck Beck
3910 - Tetney
3918 - Donna Nook
3928 - Saltfleet
3942 - Boygrift
3968 - Gibraltar Point
3992_14 - Hobhole
Grand Sluice
3992_9 - Boston Barrier
3992_5 - Fosdyke Bridge
4008 - West Lighthouse
Marsh Road (R.Welland)
Wisbech (R.Nene)
Dog-in-a-Doublet (R.Nene)

Please note: other intermediate locations are available

Produced April 2020
Produced by the Partnerships & Strategic Overview Team

Humber Estuary

2014 Interim Water Level Profile

REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL METRES ODN																			
				1			10			50			100			200			300			1000		
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound		
				5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%	5%	50%	95%
H230	Winterton	493420	422830	5.13	5.14	5.15	5.47	5.51	5.56	5.67	5.74	5.82	5.74	5.83	5.92	5.81	5.90	6.00	5.84	5.94	6 03	5.94	6.02	6.06
H220	Ferriby	497550	421150	5.03	5.04	5.05	5.38	5.42	5.47	5.59	5.67	5.77	5.67	5.77	5.89	5.74	5.86	6.00	5.78	5.91	6.06	5.91	6.04	6.19
H216	Humber Bridge	502478	423914	4.97	4.98	4.99	5.33	5.37	5.42	5.55	5.64	5.74	5.64	5.75	5.88	5.72	5.86	6.02	5.75	5.92	6.10	5.88	6.09	6.31
H210	Barrow Haven	506380	422620	4.91	4.92	4.93	5.27	5.31	5.36	5.50	5.60	5.72	5.60	5.73	5.89	5.69	5.86	6.08	5.74	5.94	6.18	5.87	6.17	6.51
H200	New Holland	508020	424330	4.86	4.87	4.88	5.21	5.26	5.31	5.45	5.55	5.67	5.55	5.68	5.84	5.64	5.81	6.03	5.68	5.89	6.13	5.82	6.12	6.47
H170	Goxhill	511970	425440	4.66	4.67	4.68	5.00	5.04	5.09	5.24	5.34	5.46	5.33	5.47	5.65	5.43	5.61	5.85	5.47	5.69	5.96	5.62	5.95	6.37
H150	East Halton	514450	422870	4.58	4.59	4.60	4.91	4.96	5.01	5.15	5.25	5.38	5.25	5.39	5.57	5.34	5.53	5.77	5.39	5.62	5 90	5.54	5.89	6.33
H130	North Killingholme	516530	420000	4.50	4.51	4.52	4.82	4.87	4.92	5.05	5.15	5.28	5.15	5.28	5.46	5.24	5.42	5.66	5.29	5.51	5.78	5.43	5.77	6.19
H100	South Killingholme	518700	417120	4.41	4.41	4.42	4.72	4.77	4.82	4.95	5.05	5.17	5.05	5.18	5.35	5.14	5.32	5.55	5.18	5.40	5.67	5.33	5.66	6.08
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

NOTE:

- The base date for the data is 2014.
- 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.
- The information is due to be updated in mid-2020
- *The levels for Immingham are taken from the 2018 Coastal Flood Boundary dataset.

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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

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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 [redacted]

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

- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier.
- 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 [redacted]

★ **Modelled Breach Locations**

0 3.5 7 14 Kilometres

This map indicates the location of where we have modelled the consequence of breaches in the defences along the coastline and tidal rivers. We have mapped the 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.
Weekday daytime calls cost 5p plus up to 6ppm from BT Weekend Unlimited. Mobile and other providers charges may vary

Environment Agency

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

Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

★ **Modelled Breach Locations**

0 0.5 1 2 Kilometres

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

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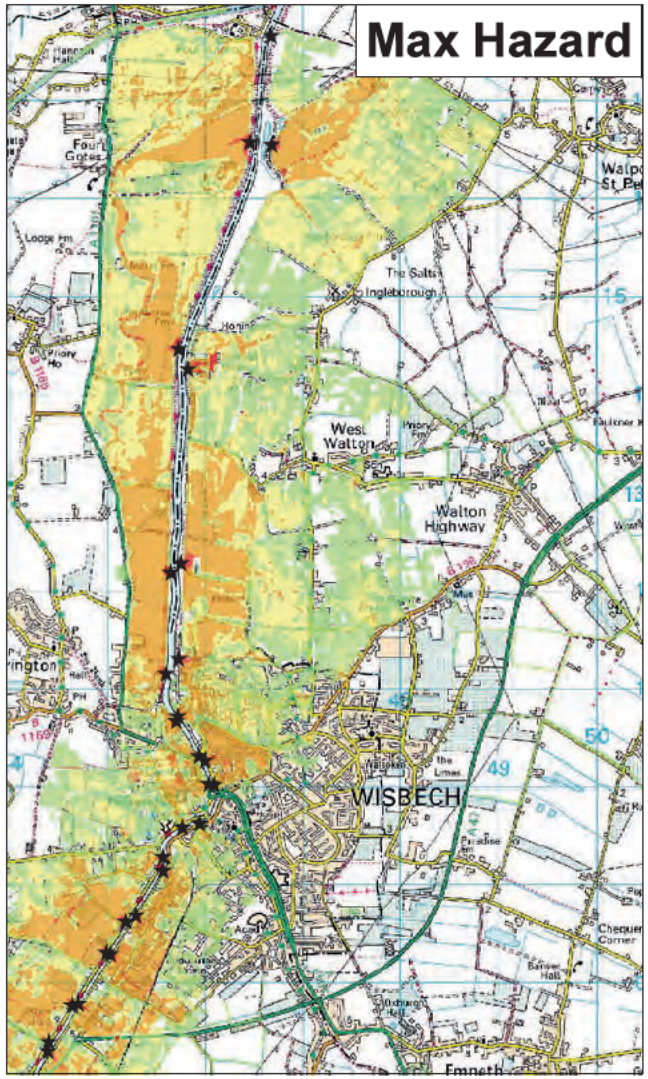
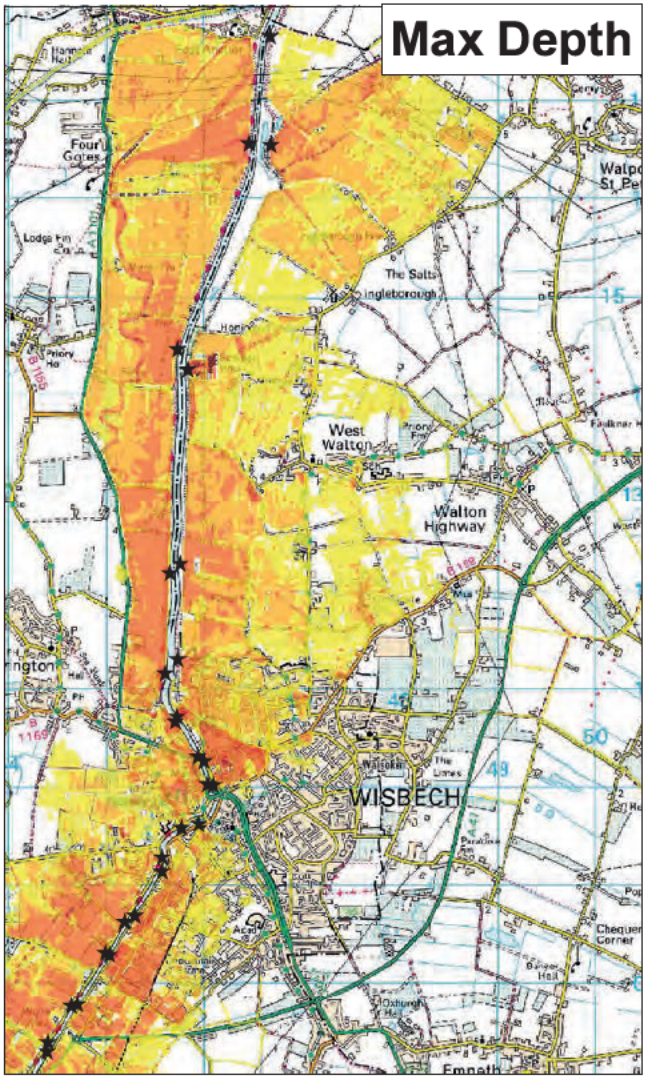
Environment Agency

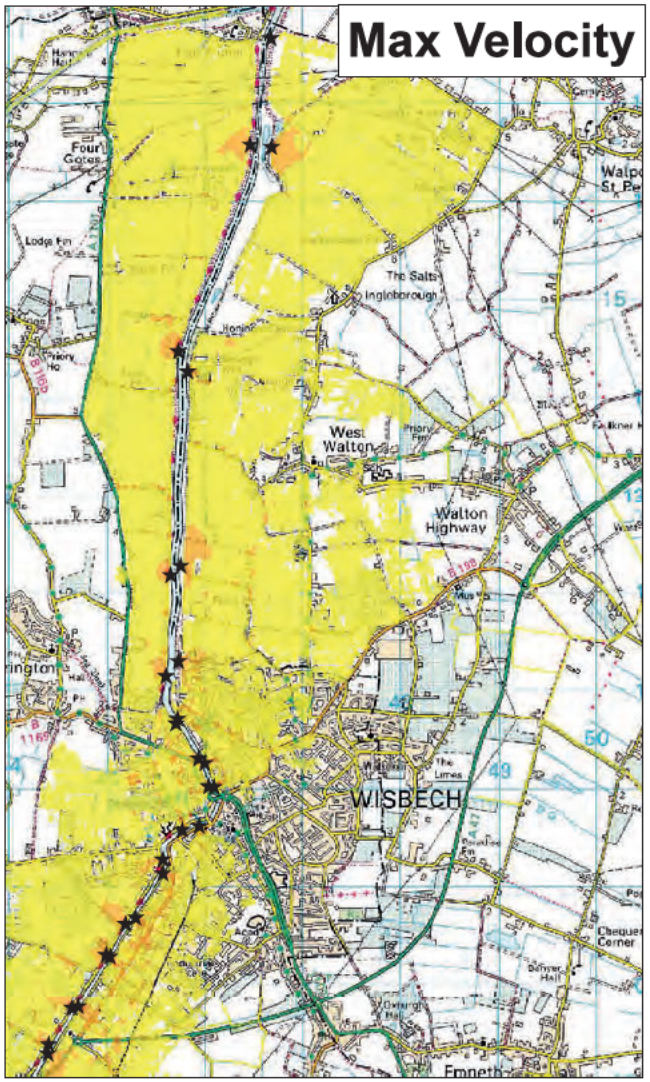
Produced by the Flood Risk Mapping & Data Management Team, Lincoln
General Enquiries No: 08708 506 506

Northern Area Tidal Hazard Mapping

Location of Modelled Breaches







★ **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	January 2021	Scenario year	2011	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	NR200026

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.

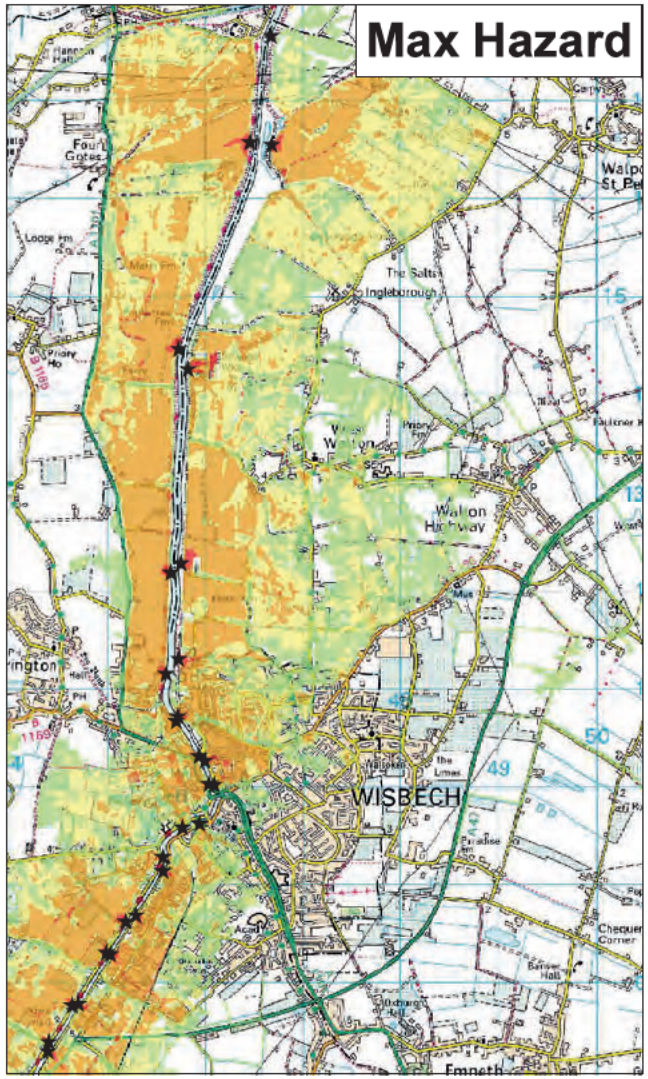
The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely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

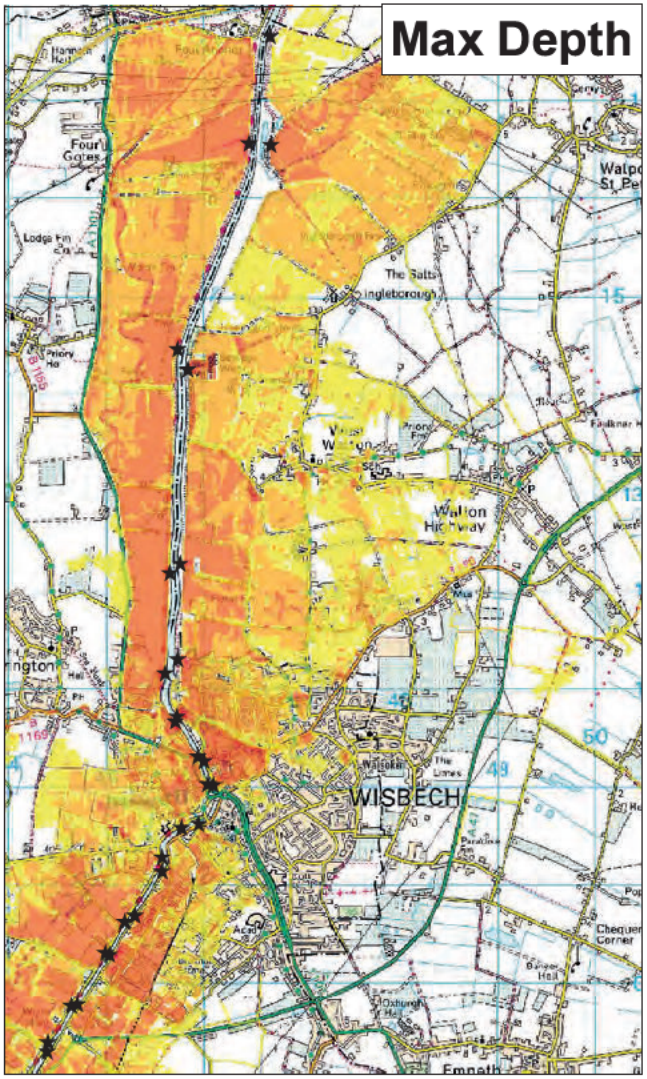
General Enquiries No: 03708 506 506, Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited, Mobile and other providers' charges may vary

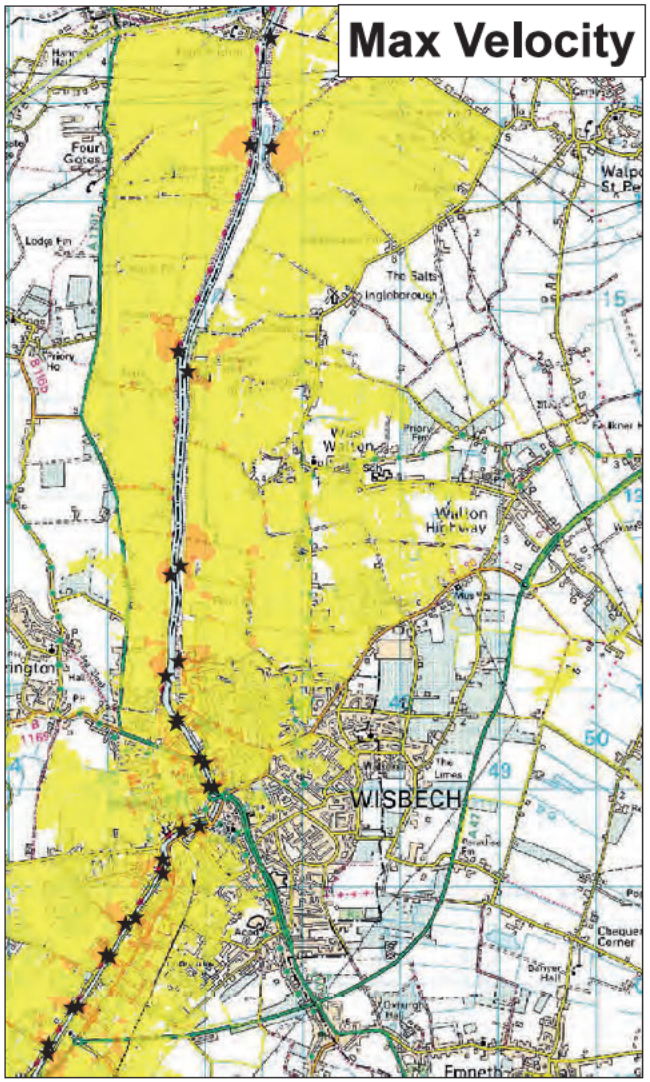
Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 47231 12524







★ **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	January 2021	Scenario year	2011	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	NR200026

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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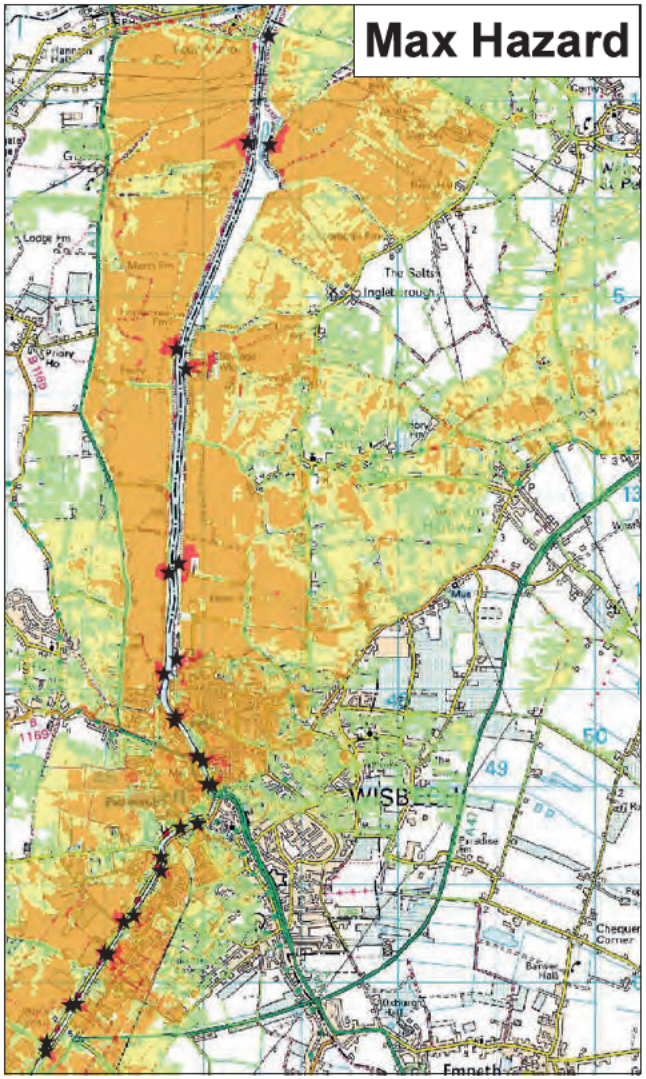
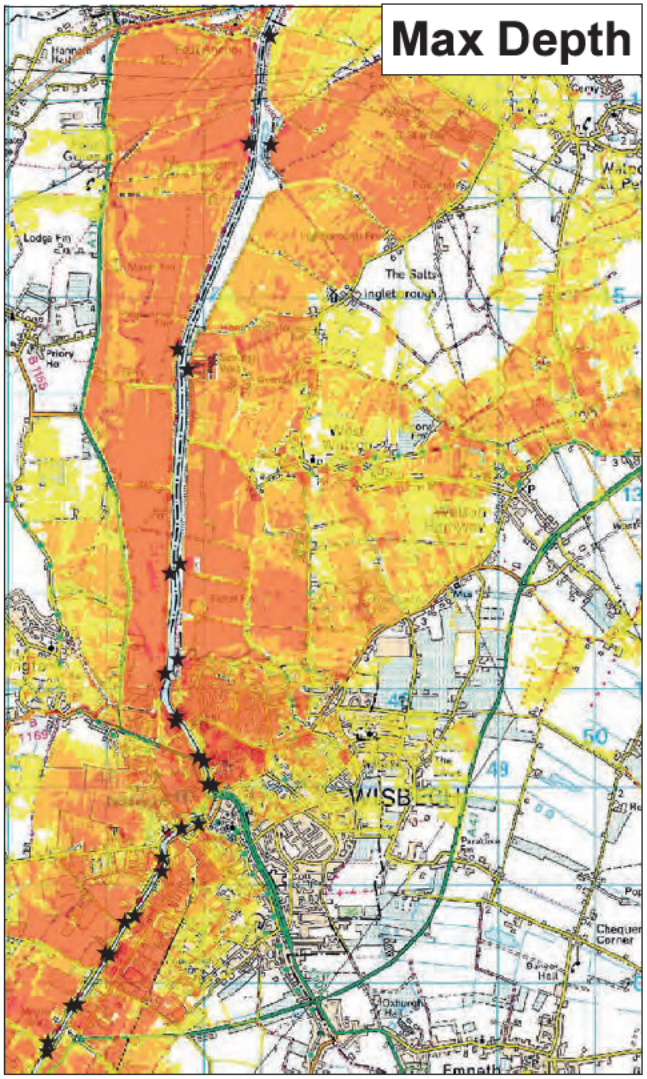
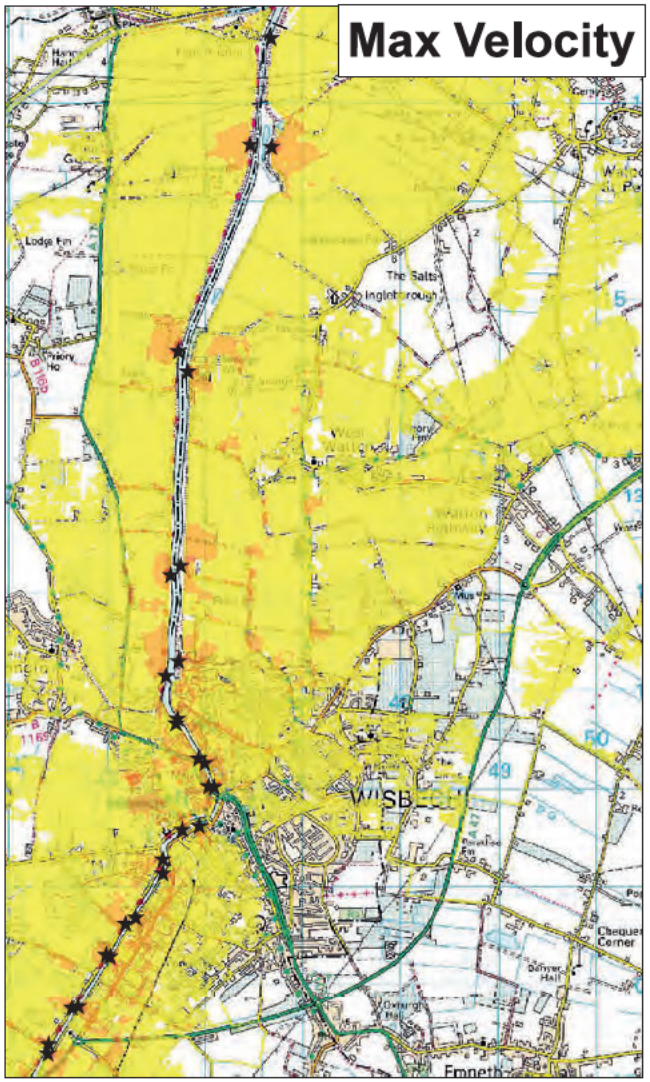
Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 47231 12524







★ **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	January 2021	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	NR200026

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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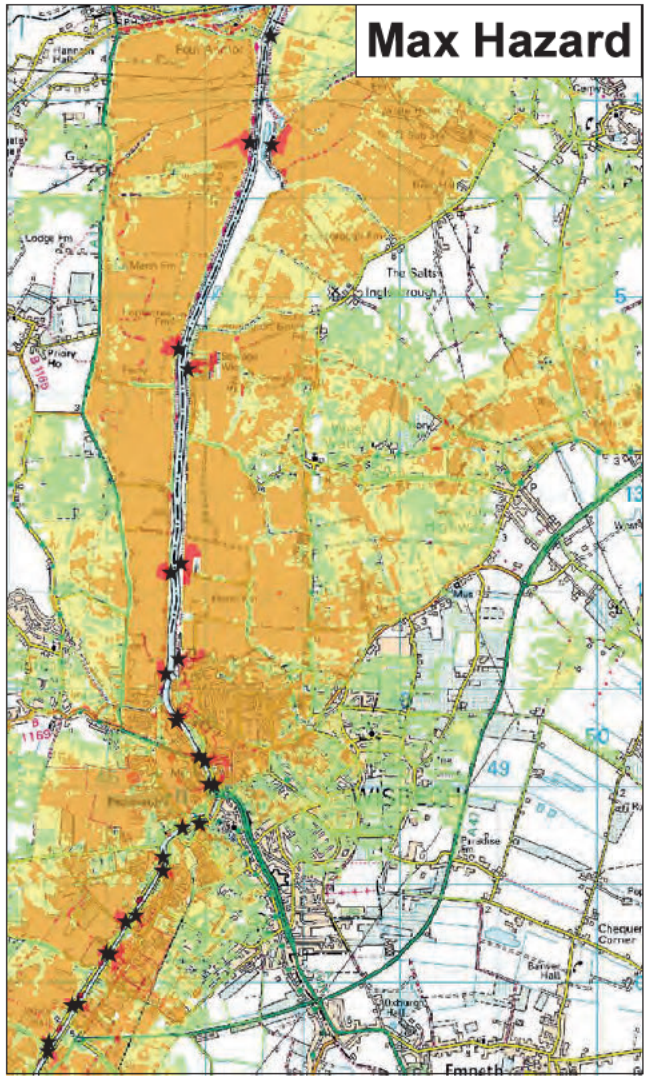
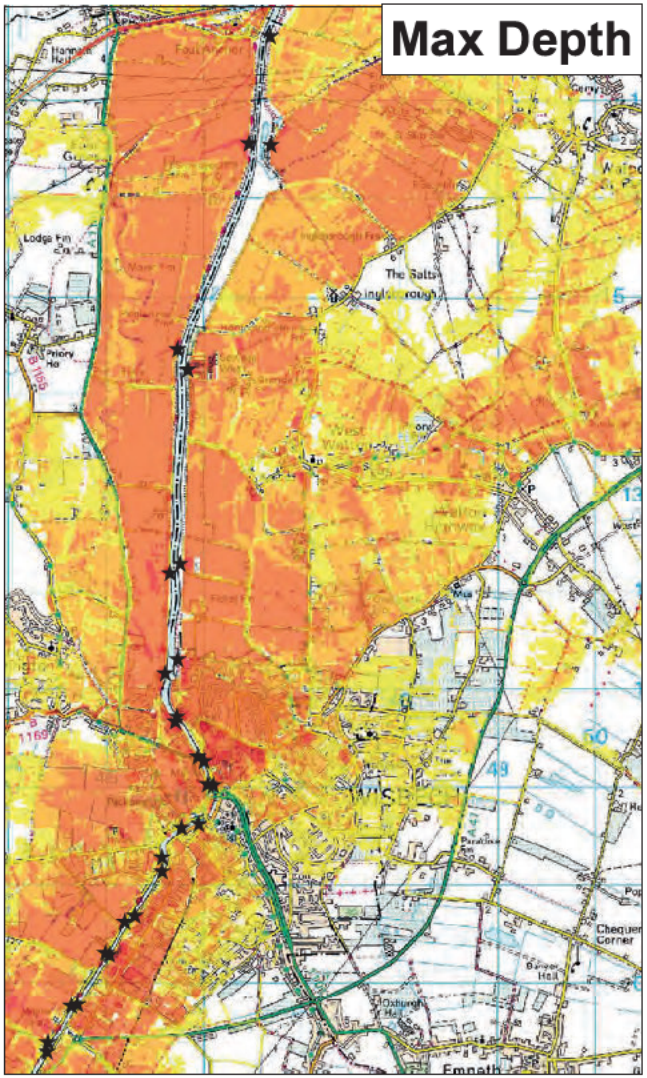
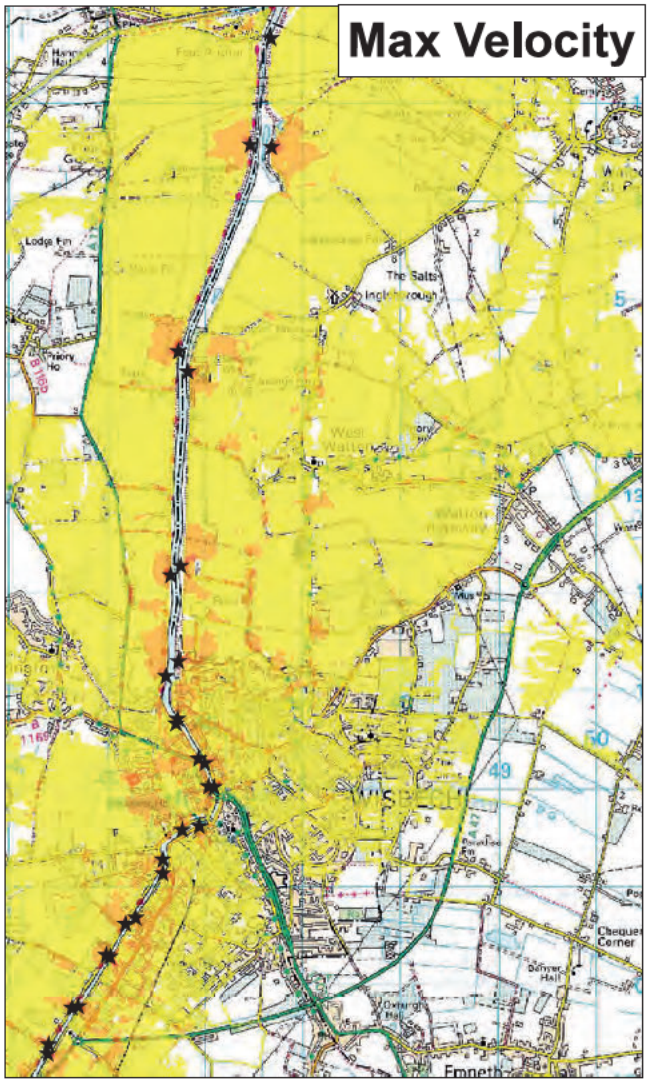
Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 47231 12524







★ **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)
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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	January 2021	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	NR200026

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.

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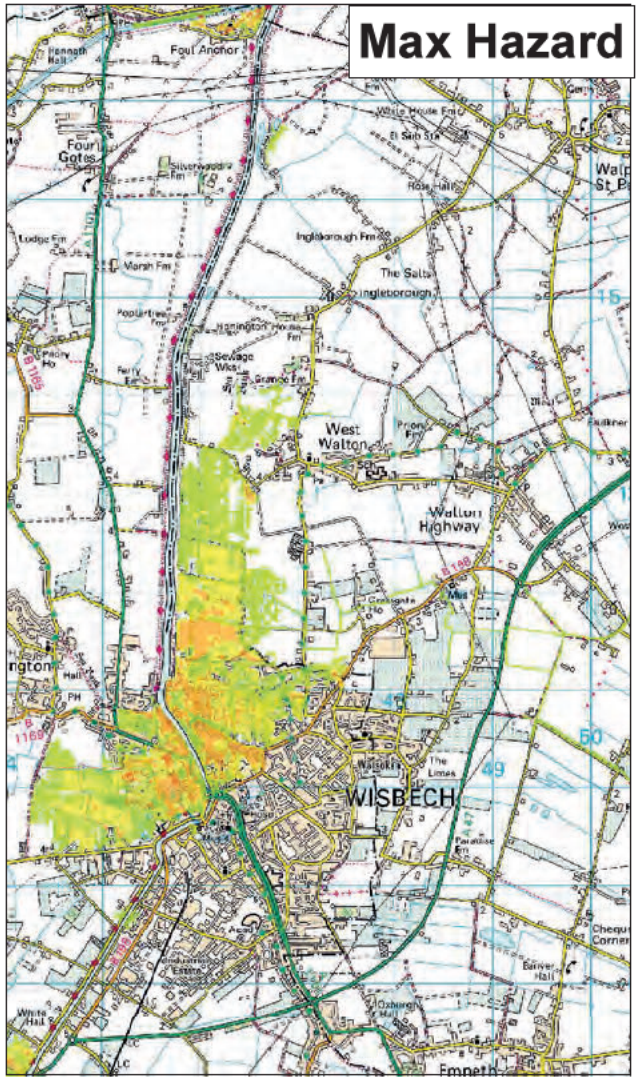
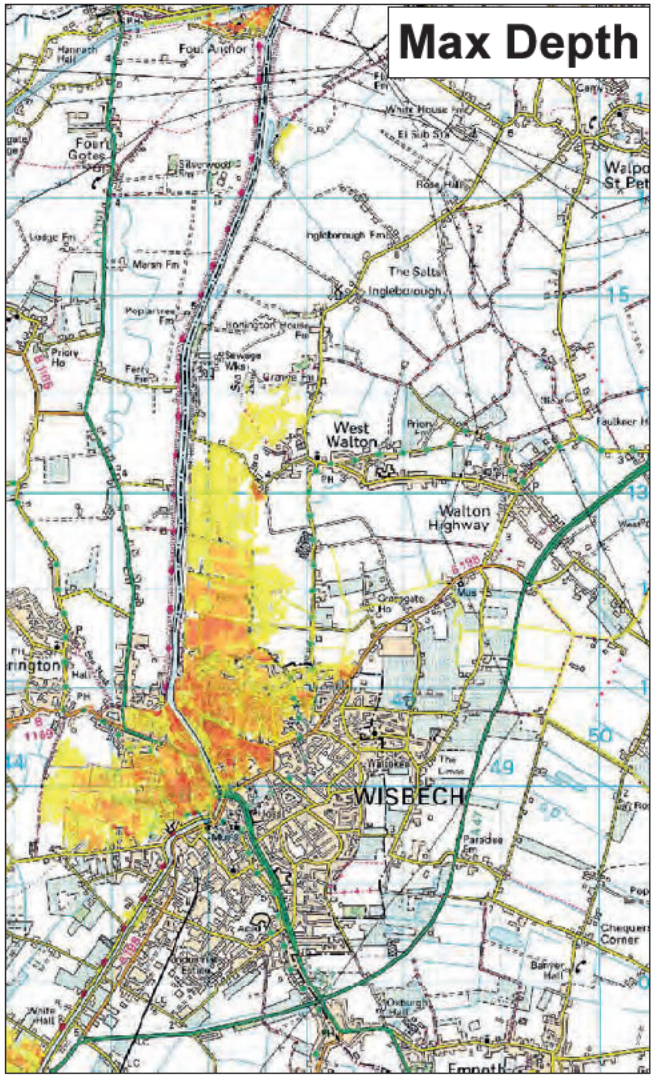
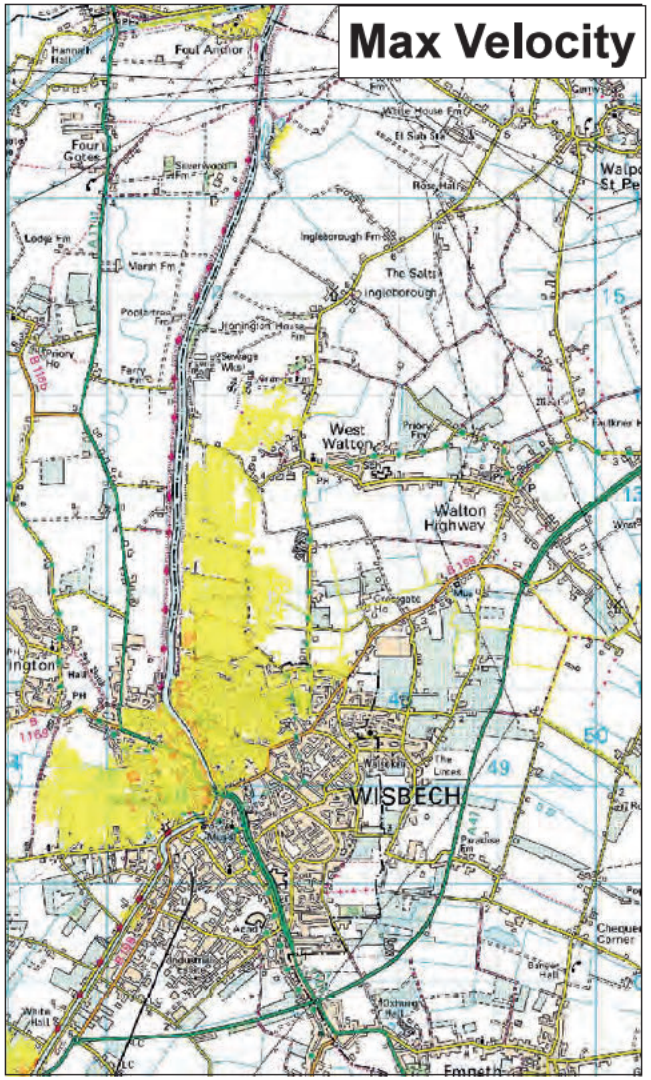
Map Centred on TF 47231 12524







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	January 2021	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	NR200026

The map is based on computer modelling of simulated overtopping of the main coastal defences for specific tidal scenarios. It does not include overtopping along the following tidal rivers which are currently being investigated: Witham Haven (upstream of Hobhole), and Welland (upstream of Fosdyke Bridge)

The map only considers the consequences of overtopping of the defences, and does not show the possible consequences of breaches of the tidal defences. Separate maps of the flood extent from just breaching of the defences are available.

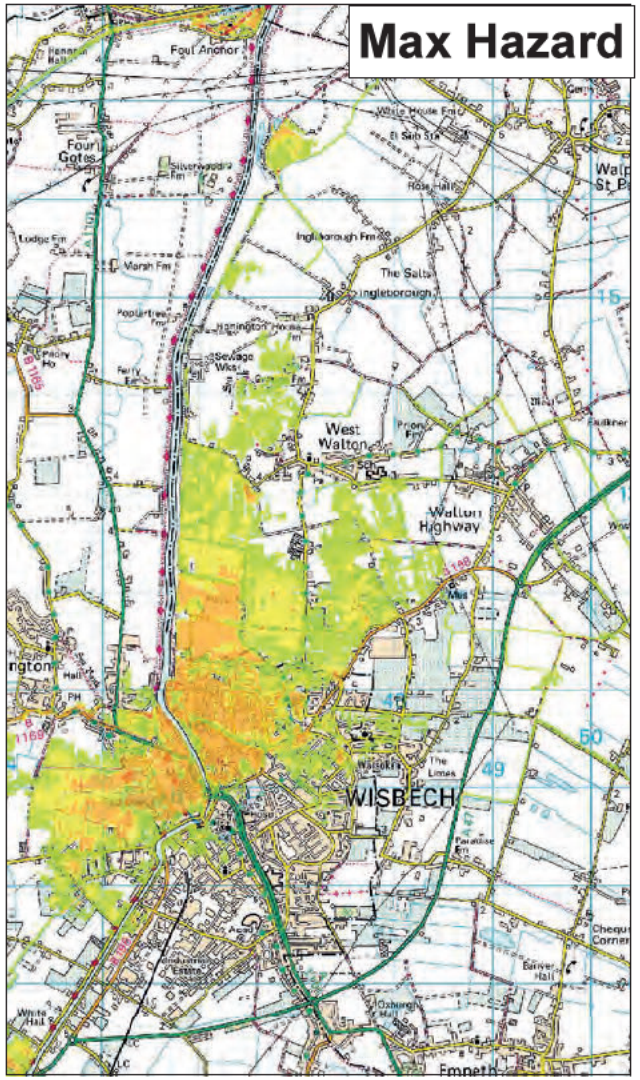
For future climate change scenarios it is assumed that defences remain at 2006 heights.

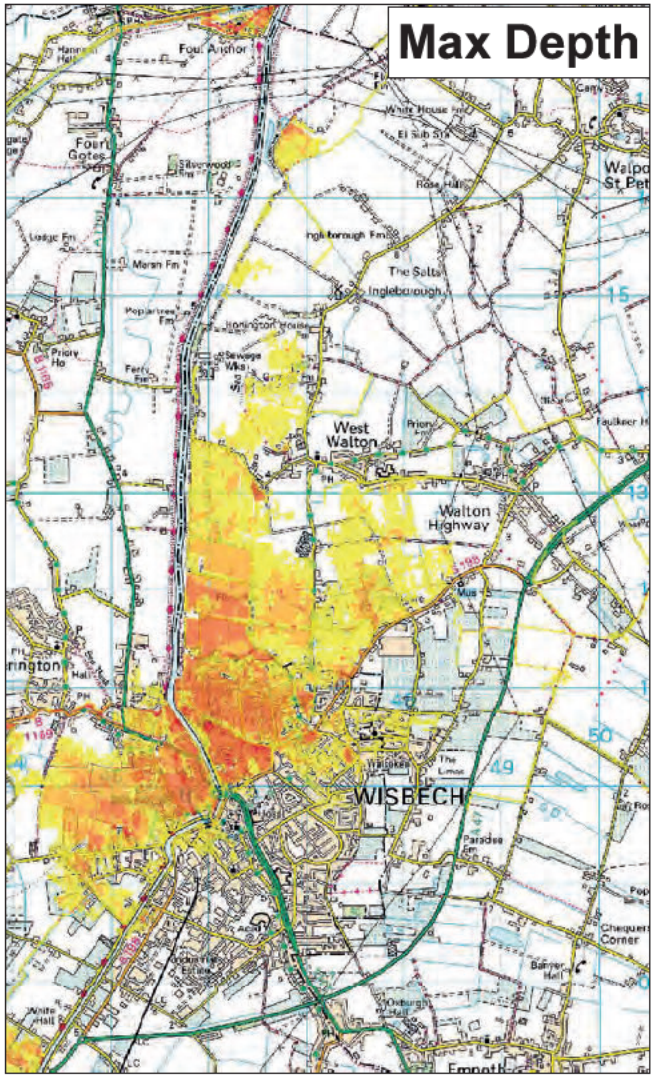
These maps do not replace the flood zone maps used in the National Planning Policy Framework (NPPF)

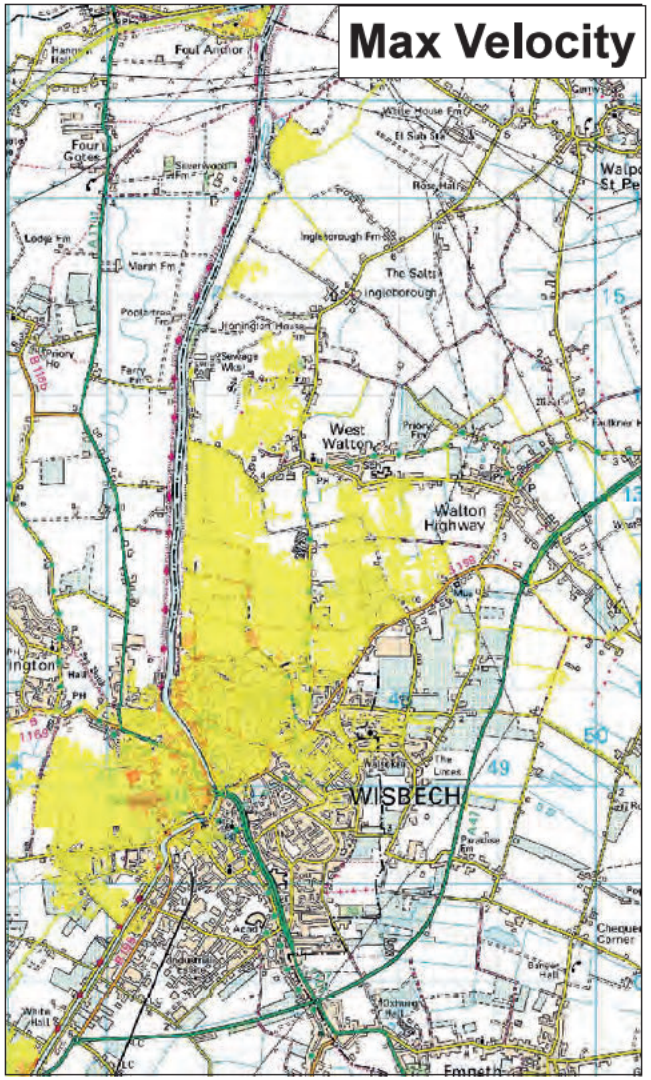
Environment Agency

Lincolnshire and Northamptonshire Tidal Overtopping Hazard Mapping

Map Centred on TF 47231 12524







Max Hazard
(Flood Risk to People : FD2320)

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- Between 0.75 and 1.25 (Danger for Some)
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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	January 2021	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	NR200026

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Environment Agency

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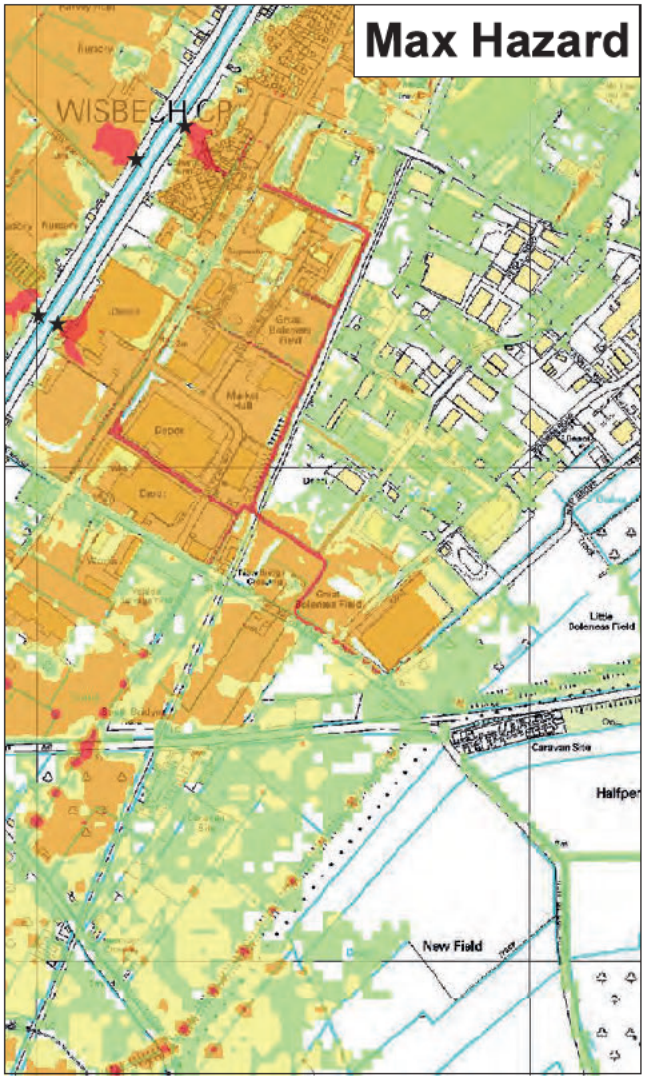
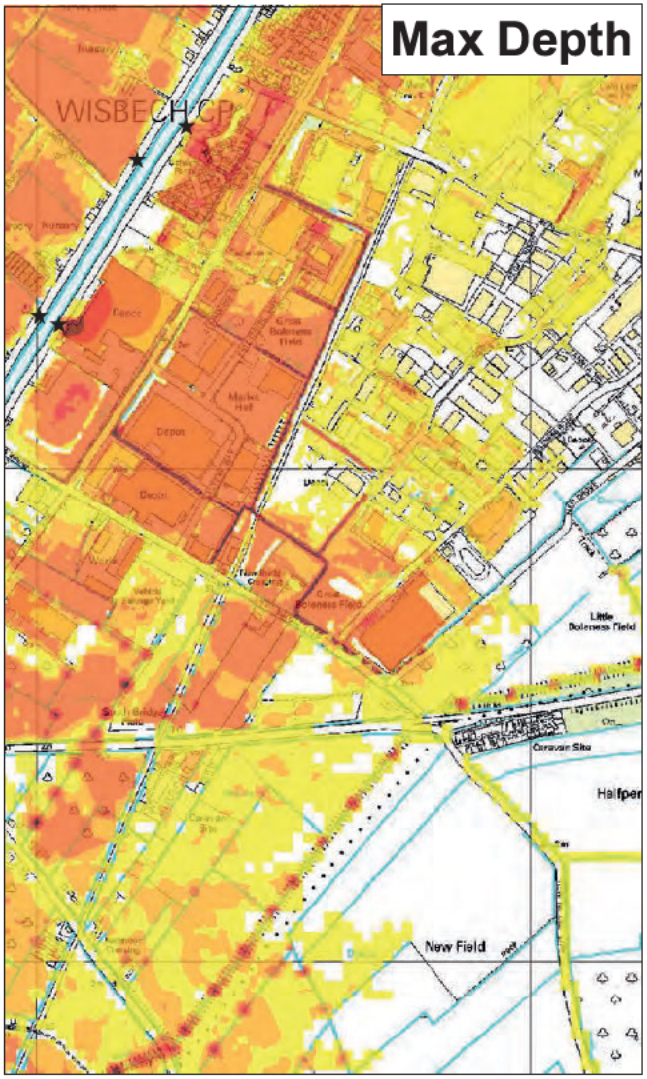
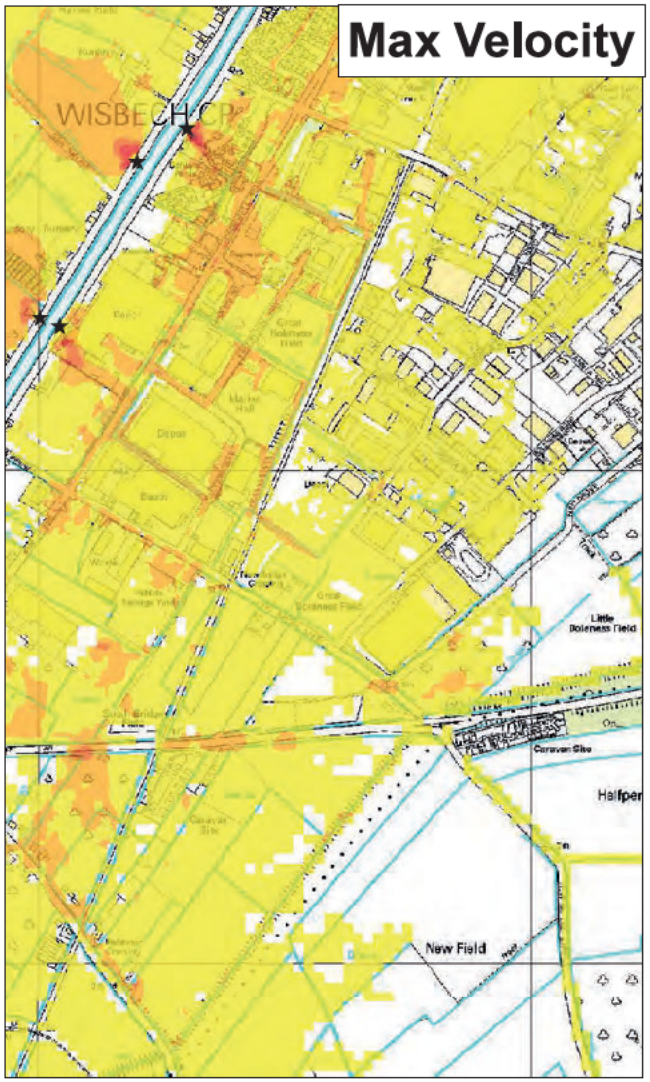
Map Centred on TF 47231 12524







★ **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
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Greater than 2.0 (Danger for All)	1.0 - 1.6	1.5 - 2.5
	1.6 +	2.5 +

Date Printed	January 2021	Scenario year	2011	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	NR200026

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.

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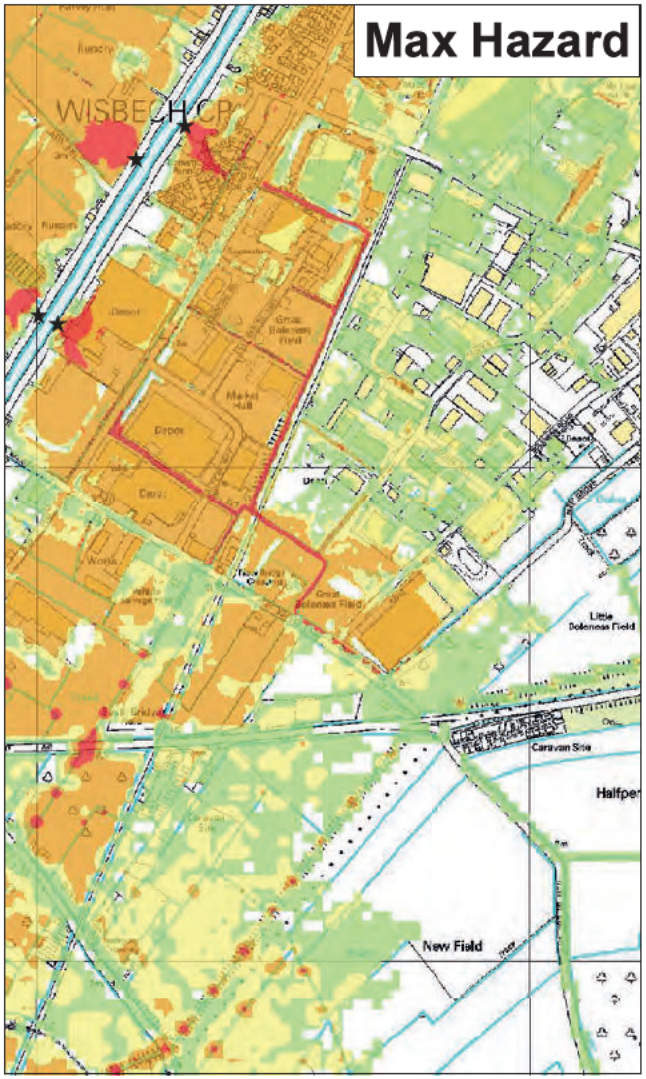
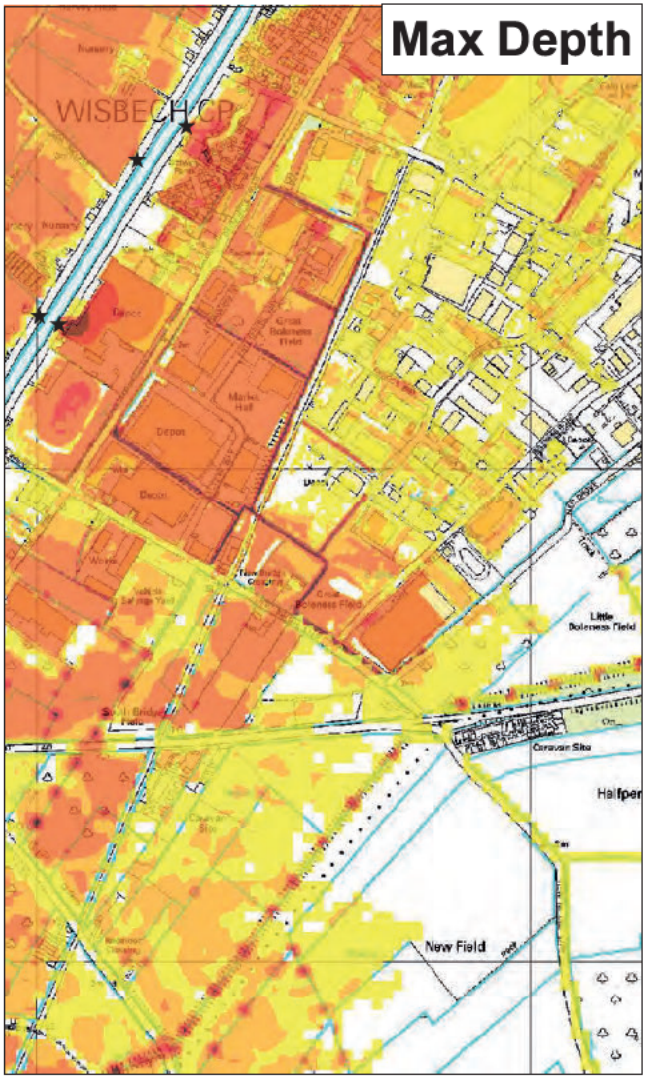
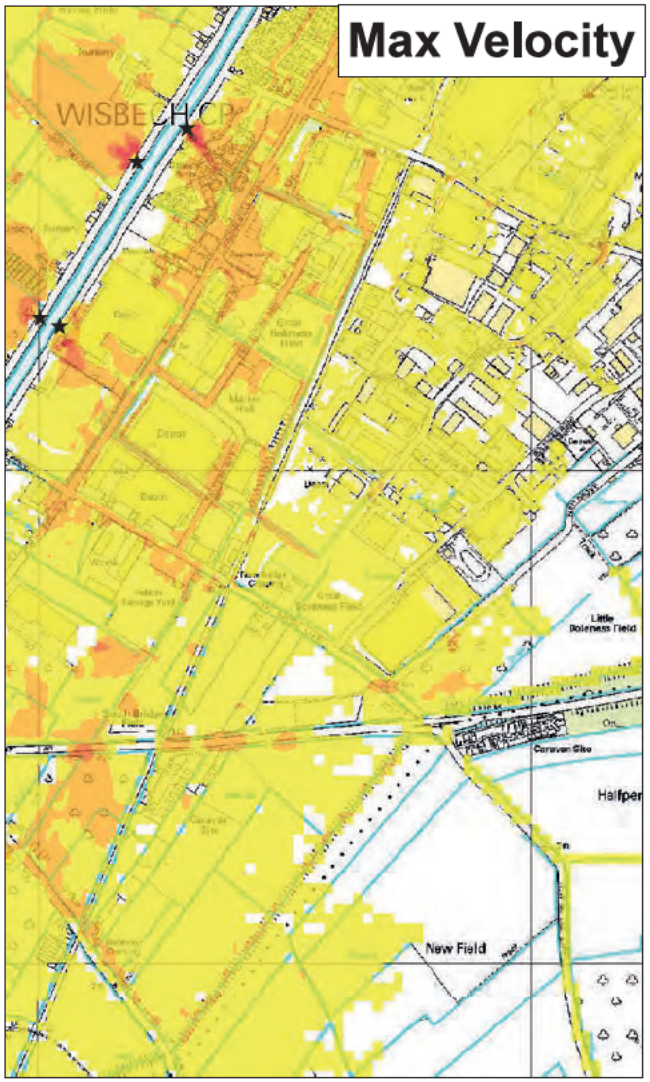
Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 45581 07852







★ **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
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Date Printed	January 2021	Scenario year	2011	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	NR200026

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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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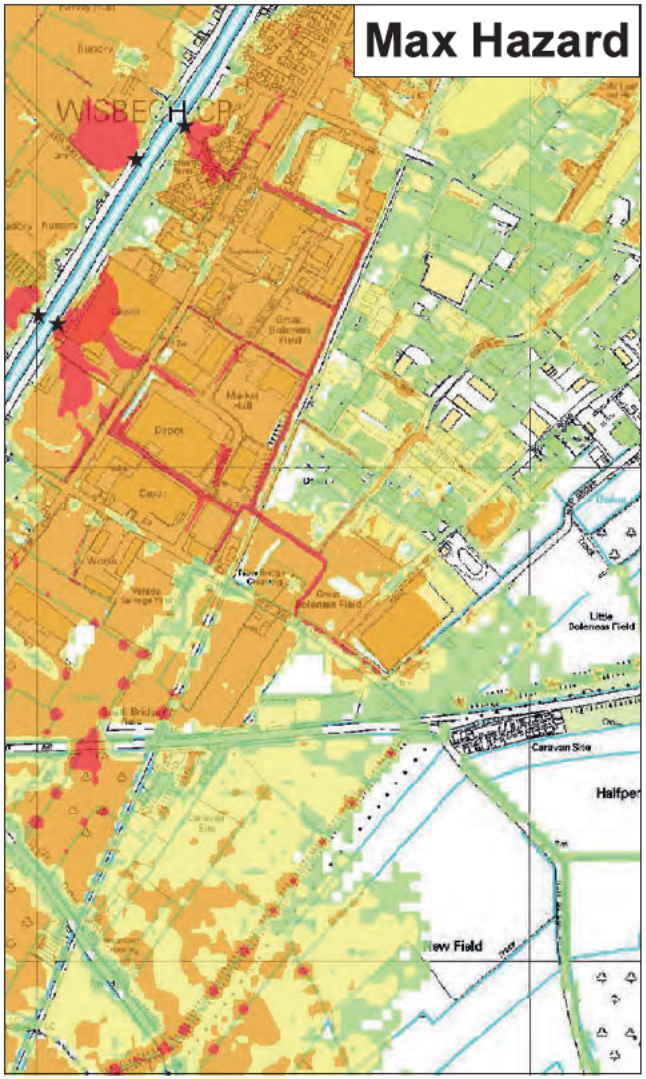
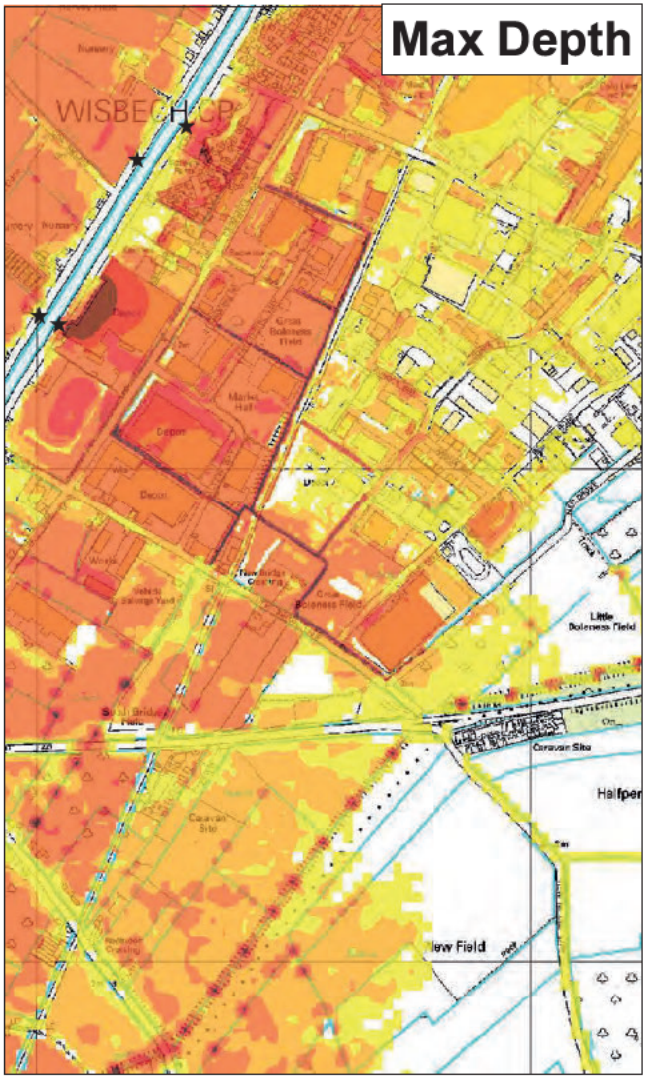
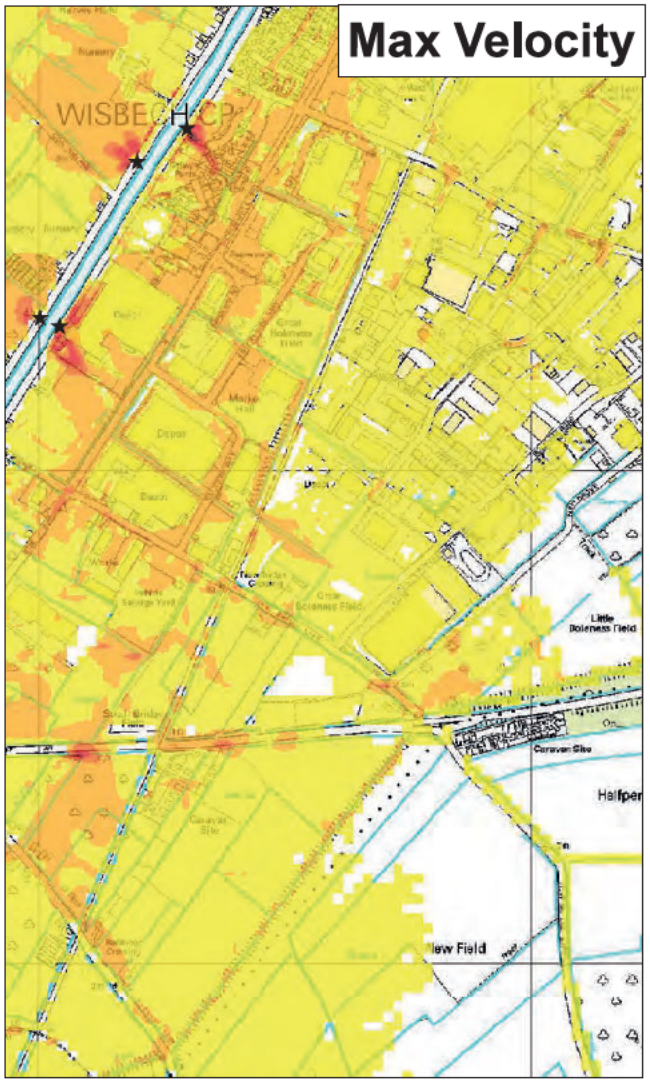
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 45581 07852







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Date Printed	January 2021	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	NR200026

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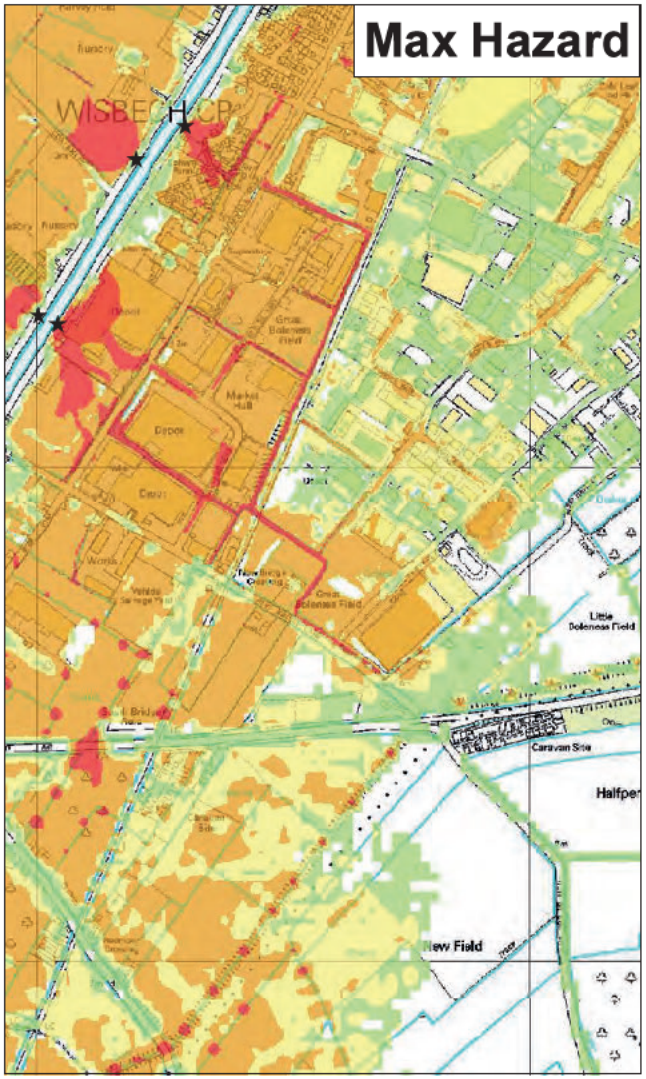

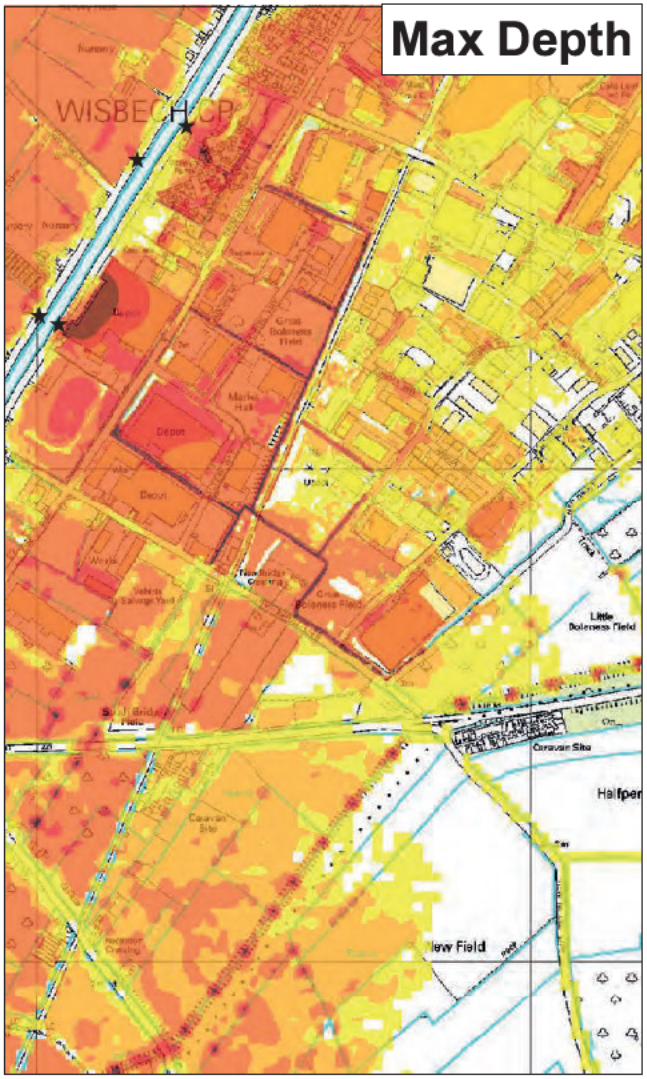

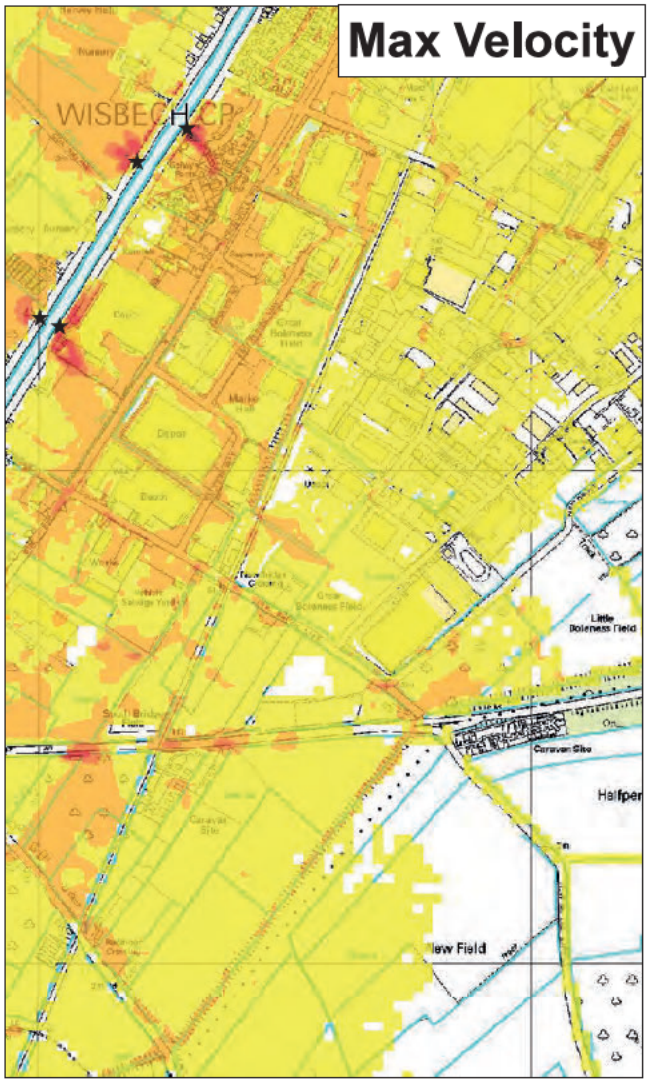

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