

PROPOSED STORAGE BUILDINGS,
WASTE TRANSFER STATION, GIBSON
LANE, MELTON, EAST YORKSHIRE

FLOOD RISK ASSESSMENT AND
SURFACE WATER DRAINAGE
STRATEGY

Prepared for

Wastege Waste Management
Limited

December 2022
Ref:231/02/wwts/fra/1222

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**PROPOSED STORAGE BUILDINGS, WASTE TRANSFER
STATION, GIBSON LANE, SOUTH MELTON,
EAST YORKSHIRE**

**FLOOD RISK ASSESSMENT AND SURFACE WATER
DRAINAGE STRATEGY**

Prepared for

**Wastege Waste Management
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1. Introduction

- 1.1 This report has been prepared in response to instructions from C A Barr Architects acting on behalf of Wastege Waste Management Limited. The report presents the results of a Flood Risk Assessment (FRA) and Surface Water Drainage Strategy related to proposed development of new storage buildings at Wastege Waste Transfer Station, Gibson Lane, Melton, East Yorkshire. Although there is no history of flooding at the Site it is partially located in a high risk flood zone. The assessment has been undertaken as a requirement of the planning process and to support an application for planning permission for the development.
- 1.2 The primary objective of this FRA is to evaluate the potential risk of flooding from all sources and the consequent implications for Site operation and safety. Assessments have been undertaken of potential flood risk related to:
- (i) Flooding from rivers and sea
 - (ii) Flooding from surface water
 - (iii) Flooding from groundwater
 - (iv) Flooding from sewers and drainage infrastructure
- 1.3 Flood risk assessment has been based on analysis of published Government data sources, additional hydrological references, Site survey and consultation, ground level survey and independent hydrological analysis. Where information is available or can be derived, an assessment has been made of the potential implications of climate change effects on flood risk at the Site. Reference has been made to current Government climate change allowances for river flow, sea level and rainfall intensity.
- 1.4 Critical flood defence or drainage control structures have been identified and an assessment has been made of Site vulnerability in relation to a failure of such features to meet design performance standards or provide the design standard of protection.
- 1.5 Where potential flood hazard is identified, an assessment of operational vulnerability has been undertaken in relation to the definition of 'less vulnerable' development. Where relevant, further analysis has been undertaken in relation to flood hazard to personnel and any proposed Site safety provision.

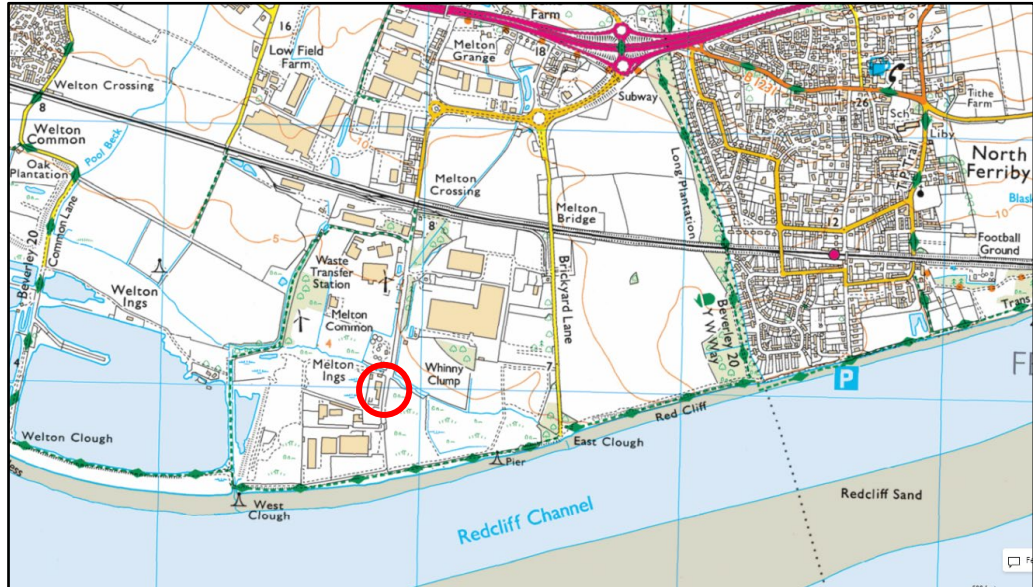
- 1.6 During preparation of this report the Environment Agency has been consulted in order to establish the availability of Site-specific flood data.
- 1.7 Flood hazard analysis has been informed by reference to a number of published data sources that include the following:
- Environment Agency flood maps and modelling outputs;
 - East Riding of Yorkshire Level 1 Strategic Flood Risk Assessment (SFRA) 2019;
 - Humber Flood Risk Management Strategy (2008);
 - Local planning policy documents;
 - British Geological Survey; and
 - Ordnance Survey;
- 1.8 As defined in the NPPF, commercial developments are defined as ‘less vulnerable’ development for the purpose of flood vulnerability assessment. National standards¹ confirm that such development should not be at risk of flooding during a 1:100yr fluvial flood event or a 1:200yr tidal flood event, including allowance for climate change. This FRA has therefore been referenced to the 1:200 year flood hazard from all sources.
- 1.9 In May 2022 the Government published new climate change allowances for flood risk assessment². Allowances relate to river and sea level changes and rainfall intensity changes for a range of future timescales. For the purpose of this FRA, climate change allowances for rainfall depth and sea level rise have been applied to hydrological calculations.
- 1.10 Where there is potential flood hazard, either current or in response to future climate change effects, consideration has been given to on-Site flood risk management and any requirement for formalised flood warning and emergency response procedures.
- 1.11 The Environment Agency has been consulted prior to the preparation of this FRA. The Agency has also provided Site-specific flood data which has been used to evaluate flood risk and support definition of flood protection measures at the Site. Reference has been made to the East Riding of Yorkshire Council (ERYC) Strategic Flood Risk Assessment (SFRA).

2. Site location and flood risk status

- 2.1 The Site is located on Gibson Lane in South Melton, East Yorkshire approximately 400m north of the River Humber. Site location is shown on Figure 1. The Site, which extends to approximately 1.2ha, is accessed directly from Gibson Lane. Surrounding land is primarily subject to light industrial use with manufacturing and storage facilities to the south and west, sewage works to the immediate north and recovered land to the east.

¹ National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

² Environment Agency 2022. Flood Risk Assessments: Climate change allowances.

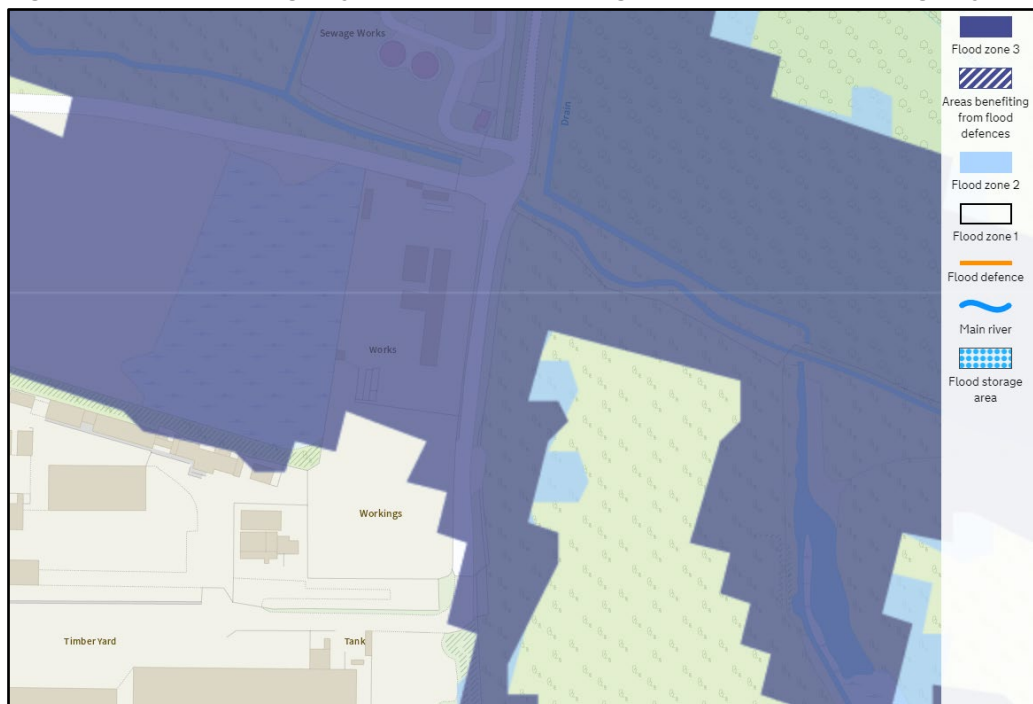
Figure 1: Site location © Ordnance Survey

- 2.2 The River Humber flows west to east towards the Humber Estuary, approximately 400m south of the southern Site boundary. All local surface water drainage systems discharge to the river. A surface water drainage channel, known locally as 'Old Drain' is situated at the northern Site boundary. The drain, which flows west to east beneath Gibson Lane, outfalls to the River Humber at East Clough. FEH catchment mapping indicates that, at the downstream Site boundary, Old Drain drains a catchment area of 0.51km², extending northwards to include the western side of Humber Industrial Estate. Site location in relation to local hydrology is shown on Drawing 231/01/01 which accompanies this report. An aerial view of the Site and surrounding area is presented as Figure 2.

Figure 2: Aerial view of the Site and surrounding area © Ordnance Survey

- 2.3 Site hydrological survey has established that adjacent to the Site boundary, Old Drain is intensely overgrown with dense vegetation along both sides of Gibson Lane. It is understood from site management that the drainage direction in the drain may have been reversed at some time in the past, indicating shallow bed gradient. Land to the west of the Site is mapped as marshland.
- 2.4 Existing ground level at the Site is detailed on the Site topographic survey, a copy of which is included at Appendix A. The Site is essentially flat with minimal topographic variation. Across the majority of the Site ground levels vary within the range 3.4m AOD to 3.8m AOD. Within the area of the Site proposed for development, ground level varies from a minimum of 3.43m AOD to a maximum of 3.77m AOD.
- 2.5 The Site is situated on the north bank of the River Humber which is tidal at this location. The current Environment Agency Flood Map for Planning indicates that the proposed development Site is designated Flood Zone 3 and therefore at high risk of tidal or fluvial flooding. There are no formal flood defences along the north bank of the River Humber at the closest point to the Site. Flood extents mapping in the surrounding area indicates that higher ground between the Site and the river would provide protection against direct inundation from the river and that overtopping of Old Drain may be the primary source of flood risk at the Site.

Figure 3: Environment Agency Flood Map for Planning extract © Environment Agency



- 2.6 As indicated on the Flood Map for Planning, surrounding land to the north, east and west is also designated Flood Zone 3 and therefore considered to be at high risk of fluvial or tidal flooding. The Environment Agency long term flood risk mapping, which takes account of any existing flood defences, reconfirms the flood risk status of the Site with parts of the Site at risk of flooding during flood events of between 1:30yrs (3.3%AEP) and 1:100yrs (1%AEP).

3. Development and flood risk policy

- 3.1 National policy related to development and flood risk is defined in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). In preparing a site-specific flood risk assessment consideration should also be given to the relevant local authority Strategic Flood Risk Assessment (SFRA) as recommended in the NPPF. The current version of the East Riding of Yorkshire Council (ERYC) Level 1 Strategic Flood Risk Assessment was published in November 2019. The SFRA contains detailed technical data designed to support incorporation of flood risk issues in the Local Plan.
- 3.2 The NPPF aims to direct new development to locations at lowest flood risk, wherever possible. A sequential approach to assessment of development suitability is based on consideration of development vulnerability to flood hazards. Local planning policy, as defined in the SFRA, is consistent with the objectives of the NPPF.
- 3.3 Local policy related to development and flood risk is currently set out in the ERYC Local Plan Strategy Document (April 2016) under policy ENV6 Managing Environmental Hazards. The relevant extracts from the policy are included on the following page.
- 3.4 The application Site constitutes a previously developed site. The proposed development will be equipped with a sustainable surface water drainage system that will restrict any off-Site surface water discharge to greenfield rates. Further details are provided at Section 7. The proposed development would have no adverse impact on flood risk in the surrounding area and could therefore be established in full compliance with Policy ENV6.
- 3.5 Additional guidance on development and flood risk is provided in the ERYC Supplementary Planning Document: Flood Risk Sequential and Exception Test (November 2021). This guidance sets out the appropriate approach to the application of the Sequential Test and provides detail related to the preparation of a site-specific FRA.
- 3.6 The information contained within this FRA is intended to demonstrate that the proposed development could be established in full accordance with both national and local policy and practice with regard to development and flood risk. The consideration of alternative locations and the proposal to drain surface water to ground as part of a sustainable drainage system is consistent with Policy ENV6.
- 3.7 Environment Agency flood zone maps do not separate Flood Zone 3 into Flood Zone 3a and Flood Zone 3b (the functional floodplain). The SFRA does include differentiation between 3a and 3b. The SFRA flood maps confirm that there no areas designated Flood Zone 3b within the Site boundary.
- 3.8 The proposed commercial development would be classified as 'less vulnerable' development with regard to the flood risk vulnerability classifications in the NPPF. Table 3 of the NPPF Planning Practice Guidance (PPG) confirms that less vulnerable development is considered to be 'appropriate development' in Flood Zone 3a subject to passing the Sequential Test. There is no requirement to undertake the Exception Test.

Policy ENV6: Managing environmental hazards

- A. Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment.

Flood risk

- B. The risk of flooding to development will be managed by applying a Sequential Test to ensure that development is steered towards areas of lowest risk, as far as possible. The Sequential Test will, in the first instance, be undertaken on the basis of the East Riding of Yorkshire Strategic Flood Risk Assessment (SFRA) and the Environment Agency's Flood Map, within appropriate search areas. Where development cannot be steered away from Flood Zone 3, the sub-delineation of Zone 3a, detailed within the relevant SFRA, will be used to apply the Sequential Test, with preference given to reasonably available sites that are in the lower risk/hazard zones. Where necessary, development must also satisfy the Exception Test.
- C. If, following application of the Sequential Test, it has not been possible to successfully steer development to Flood Zone 1 or a sequentially preferable site, a Sequential Approach will be taken to site layout and design, aiming to steer the most vulnerable uses towards the lowest risk parts of the site and upper floors.
- D. Flood risk will be proactively managed by:
- I. Ensuring that new developments:
 - i. limit surface water run-off to existing run-off rates on greenfield sites, and on previously developed land reduce existing run-off rates by a minimum of 30%, or to greenfield run-off rate;
 - ii. do not increase flood risk within or beyond the site;
 - iii. incorporate Sustainable Drainage Systems (SuDS) into major development proposals and proposals at risk of flooding, unless demonstrated to be inappropriate;
 - iv. do not culvert or otherwise build over watercourses, unless supported by the Risk Management Authority;
 - v. have a safe access/egress route from/to Flood Zone 1 or establish that it will be safe to seek refuge at a place of safety within a development;
 - vi. incorporate high levels of flood resistant and resilient design if located in a flood risk area;
 - vii. are adequately set-back from all watercourses including culverted stretches; and
 - viii. adhere to other relevant SFRA recommendations.
 2. Supporting proposals for sustainable flood risk management, including the creation of new and/or improved flood defences, water storage areas and other schemes, provided they would not cause unacceptable adverse environmental, social, or economic impacts.
 3. Supporting the removal of existing culverting and returning these sections to open watercourse.
 4. Designating areas of Flood Zone 3b (Functional Floodplain) and safeguarding land for current and future flood risk management, on the Policies Map.

© East Riding of Yorkshire Council

Sustainable drainage

- 3.9 ERYC Local Plan Policy ENV6 sets out a requirement to incorporate sustainable drainage systems into new development, where possible. ERYC has produced specific guidance³ on the implementation of SuDS principles for new development. Reference

³ ERYC (2016). Sustainable Drainage Systems (SuDS) & Surface Water Drainage Requirements For New Development. Design and Maintenance: Combined Planning Note and Standing Advice. September 2016.

is also made to the current Defra non-statutory standards⁴ for sustainable drainage. ERYC guidance confirms that, for previously developed sites, sustainable drainage systems should seek to achieve a 30% net reduction in the peak rate of runoff, including allowance for climate change.

- 3.10 As detailed at Section 7 of the report, the proposed development would be equipped with a sustainable drainage system designed in accordance with both local and national standards to ensure no adverse impact on external flood risk.

4. Proposed development

- 4.1 The Wastege Waste Transfer Station is established within a 1.2ha site near the southern end of Gibson Lane at Melton Ings. As shown on Figure 2, the Site currently contains several industrial buildings and large areas of hardstanding. The proposed development comprises the erection of two storage buildings to be established on areas of existing hardstanding to the west of existing buildings at the Site. As a consequence of development on existing hardstanding there would be no increase in the area of impermeable surfaces at the Site. Development design drawings are included for reference at Appendix B. A view of the proposed development area is shown in Figure 4.

Figure 4: Image of proposed development area © Google



- 4.2 As indicated on drawings at Appendix B, the proposed storage buildings would be established close to the western Site boundary with access from the central yard area. There would be no net increase in impermeable area. As discussed in detail at Section

⁴ Defra 2015. Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems. March 2015

7 of this report, the buildings would be drained to a newly installed subsurface drain that would drain via a new stormwater attenuation tank to the existing on-Site sump and pumping station, for regulated off-Site discharge to Old Drain, as at present.

- 4.3 The proposed development would lead to no change in the existing surface water runoff characteristics from the Site. However, in accordance with ERYC SuDS policy, the new drainage system would be designed to achieve a minimum 30% net reduction in peak discharge rate, including climate change allowance and therefore make a net contribution to reduction in local flood risk.

5. Flood hazard assessment

- 5.1 In accordance with the requirements of the NPPF, consideration needs to be given to identification of all potential flood risks to the proposed development including, tidal flood risk from the River Humber and the potential risk of flooding from groundwater and surface water sources. These issues are considered in the following sections of this report.

Flood history

- 5.2 The Environment Agency has confirmed that there are no records of flooding at the Site. However, The historic flood records included with the ERYC SFRA indicate that land to the immediate south of the Site was subject to flooding in response to a tidal surge in 2013.

Flooding from rivers and sea

- 5.3 The Site is situated 400m from the River Humber and the northern Site boundary is adjacent to Old Drain. Environment Agency flood risk mapping indicates that the Site is at high risk of fluvial and/or tidal flooding. The location of 'areas benefitting from flood defences' on the flood map suggests that the primary flood risk at the Site may come from indirect tidal inundation or out-of-bank flow in Old Drain.
- 5.4 Environment Agency mapping identifies the presence of flood defences on the north bank of the River Humber. Current mapping indicates that existing flood defences do not extend as far east as Gibson Lane, although existing ground level south of the Site appears to be above predicted tidal flood level. Environment Agency records indicate that this area, in common with formal defences to the west, provides a standard of protection (SOP) of 1:20yrs.
- 5.5 The Environment Agency has provided information on modelled tidal flood water elevation in the vicinity of the Site for a range of event frequencies. Details are included at Appendix C. It is noted that model data represents in-channel flood levels. The closest predicted 1:200 year tidal flood level is 5.86mAOD. Available information indicates that existing ground level at the development site is approximately 3.8mAOD, with intervening ground level in excess of 5.50mAOD.

- 5.6 On the basis of in-channel tidal flood levels and the assumption of no defences, available tidal flood level data suggests that the Site could be at risk of inundation to a depth of up to 2.06m in response to a 1:200yr tidal flood event in the River Humber.
- 5.7 Although the Site is not considered to benefit directly from the protection of formal flood defences it is located in a defended area and therefore flood risk assessment is required to include consideration of the potential implications of a local defence breach. The impacts of a defence breach close to the Site are considered in the 2012 River Humber North Bank Tidal Modelling Study prepared by Mott MacDonald on behalf of the Environment Agency. Extracts from the outputs are included at Appendix C.
- 5.8 The 2012 breach modelling provides information on the extent, timing and depth of flooding that would result from a defence breach immediately adjacent to the Site as shown on maps included at Appendix C. Modelling indicates that the development area would be inundated with flood water within a period of less than two hours to a depth of 1-2m, increasing to over 2m over a period of several hours. Flood flow velocity is also predicted to be high creating a combined flood hazard consistent with the 'danger to all' definition.

Surface water flooding

- 5.9 Information related to risk of surface water flooding at the Site is available on current Environment Agency surface water flood maps, an extract from which is included as Figure 5. The map demonstrates that the Site is at low risk of surface water flooding. The two areas within the Site that are designated as being at 'low' risk of surface water flooding represent local low points on the Site surfacing.

Figure 5: Environment Agency surface water flood risk mapping © Environment Agency



Groundwater flooding

- 5.10 The ERYC SFRA incorporates mapping to indicate risk of groundwater emergence across the East Riding of Yorkshire administrative area. The SFRA indicates that the Site is at moderate risk of groundwater emergence at surface with a 25%-75% chance.
- 5.11 The Site is underlain by Made Ground above Alluvium which is underlain at depth by mudstone bedrock. Available records indicate that the Alluvium consists of a highly variable mixture of clay, silt and sand with high lateral variability and occasional peat deposits. The Alluvial deposits have some potential for storage and transmission of groundwater. The presence of marshland to the west of the Site and Welton Ings within 500m suggests the presence of shallow groundwater within the Alluvium.
- 5.12 Although the Site is situated in a moderately high groundwater flood risk area the potential for groundwater levels to rise significantly are likely to be constrained by the nearby presence of the large open groundwater body at Welton Ings and the local drainage network, e.g. Old Drain, Common Drain, etc. that receive groundwater baseflow. The presence of low permeability river bed siltation is likely to limit the potential for groundwater level rise during periods of fluvial flooding in the River Humber.

Flooding from stormwater drainage infrastructure

- 5.13 The internal Site surface water drainage system discharges to Old Drain via a pumped outlet. It is understood that the drainage system is designed to accommodate runoff from a 1:30yr storm event without surface flooding. In response to a more extreme storm event there would be potential for temporary accumulation of excess surface water at surface.
- 5.14 At present, excess surface water from the western side of the Site, including the proposed development area, drains naturally by overland flow towards the western Site boundary and adjacent marshland, without flood risk to people or property. The proposed development would not change the existing overland flow regime. At the eastern side of the Site excess surface water tends to accumulate locally at surface with eventual drainage via the pumped outfall. Locally ponded surface water in this area would not represent a risk to the proposed development.

6. Flood risk management

- 6.1 The proposed development consists of two new material storage buildings that would be used for the storage of non-hazardous materials. Such facilities are considered to be less vulnerable to the effects of flooding. It is accepted that with extreme tidal flood water depth of up to 2m, it is unlikely to be technically feasible to provide full protection against flooding of the development Site. With low vulnerability to the effects of flooding, no additional flood defence measures are proposed in relation to the proposed development.

- 6.2 With no risk to property, the primary flood risk management consideration would be management of risk to personal working at the Site. It is noted that the proposed development represents an extension to existing buildings and would not introduce any new activities, operations or personnel to the Site.
- 6.3 Flood hazard assessment has demonstrated that the Site is potentially at risk of floodwater inundation to a depth of up to 2.0m during an extreme fluvial or tidal flood event, depending on flood mechanism. The Site has a high flood hazard rating resulting in potential 'danger for all'. A flood risk management strategy is therefore required to provide adequate protection for personnel operating at the Site.
- 6.4 Current Government climate change allowances (May 2022) indicates that, for a nominal design life of 50 years, the appropriate allowance for sea level rise in the Humber area is 0.424m.
- 6.5 It is understood that the Site is already registered with the Environment Agency flood warning scheme for the area and that there is a management commitment to continue registration.
- 6.6 The majority of existing buildings on the Site are single storey buildings. However, the office building has a first floor that is established at an elevation of over 2m above existing ground level and could therefore function as a place of safety in the event of the most severe floodwater inundation at the Site.
- 6.7 The southern part of the Site consists of an elevated stocking area which, as shown on Environment Agency Flood Map for Planning, is above predicted flood level and outside high risk flood zones. Site survey allowed confirmation that this area is established at approximately 3.0m above adjacent yard level and can be accessed directly from the proposed development area.
- 6.8 The southern part of the Site can provide an additional place of safety in the event of flooding. The area would form part of a large dry island outside the flood zone. The area is linked to surrounding land at similar topographic elevation, including several large industrial and commercial buildings that could provide temporary accommodation during extreme conditions if required.
- 6.9 In the event of a defence breach adjacent to the property the Site could be inundated to a depth of up to 2.0m within a timescale of less than two hours. Breach modelling indicates that, depending upon the exact location of the breach, flood water would tend to drain onto the Site from a westerly direction and flood water depth on Gibson Lane which connects the Site to the safe area would remain at less than 0.5m for the first few hours post breach. If not possible to exit the Site safely in a northerly direction along Gibson Lane it should be possible to move south along Gibson Lane to the safe area.
- 6.10 It is concluded that during all flood events it should be possible to move from the Site along Gibson Lane to either a northerly off-site location or the southern place of safety as long as evacuation from the Site occurs within the first few hours i.e. less than 4 hours, following awareness of imminent flooding.

- 6.11 The requirement for rapid site evacuation in the event of flooding confirms the high importance of (i) effective and reliable flood warning, and (ii) a well-developed and communicated flood emergency evacuation plan. It is understood that the Site already has an established flood emergency evacuation plan that would remain applicable to the proposed development.

7. Off-Site impacts

- 7.1 Flood risk assessments undertaken in accordance with the requirements of the NPPF must include consideration of potential off-site impacts of any proposed development on a site. Specific reference is made to (i) surface water management, (ii) flood flow conveyance and (iii) flood storage.

Surface water management

- 7.2 The proposed development would not introduce any additional impermeable surfaces to the Site and would not therefore result in any increase in the peak rate or volume of surface water runoff from the Site. The current informal yard drainage by overland flow around the western side of the Site would be replaced by a positive drainage system that would convey clean roof water to the existing Site drainage system with pumped outlet to Old Drain.
- 7.3 The proposed surface water drainage system would be established in accordance with the principles of sustainable drainage as set out in national guidance and ERYC SuDS policy and practice guidance. In accordance with ERYC SuDS policy, the proposed drainage system would result in a net reduction in the peak rate of off-Site discharge to Old Drain with potential beneficial impact on downstream flood risk.

Flood flow conveyance

- 7.4 The development is situated in an area that does not have a significant flood flow conveyance role. The presence of the proposed development would have no adverse impact of the passage of flood water through the Site or surrounding area.

Flood storage

- 7.5 The proposed development has a surface footprint of approximately 480m². With a 1:200yr extreme flood water depth of approximately 2m, the proposed development could result in loss of up to 960m² of floodplain storage. Given the extensive area potentially subject to tidal inundation during an extreme tidal flood event, the estimated loss of storage is considered to be negligible. It is noted that with respect to tidal flooding, there is not normally a requirement to provide compensatory storage.

8. Surface water drainage strategy

- 8.1 The proposed development would be equipped with a positive surface water drainage system that would collect roof water from each storage building for drainage to the existing Site drainage system.

8.2 ERYC Local Plan Policy ENV6 sets out a requirement to incorporate sustainable drainage systems into new development, where possible. ERYC has produced specific guidance⁵ on the implementation of SuDS principles for new development. Reference is also made to the current Defra non-statutory standards⁶ for sustainable drainage. ERYC guidance confirms that, for previously developed sites, sustainable drainage systems should seek to achieve a 30% net reduction in the peak rate of runoff, including allowance for climate change.

8.3 Basic standards for SuDS design at greenfield sites is stated in the current Defra Non-statutory technical standards (NSTS) for sustainable drainage systems for greenfield sites as follows:

S3 *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*

S4 *Where reasonably practicable, for developments which were previously developed, the runoff volume from the development to any drain, sewer or surface water body for the 1 in 100 year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for the event.*

8.4 Sustainable drainage systems (SuDS) are generally based on a stormwater management train that assigns priority to local control of surface water. SuDS systems should be designed to optimise control at the earliest stage in this sequence.

- Prevention: Good site management, best practice approaches to minimise the risk of flooding or migration of pollutants to surface water;
- Source control: control of runoff at or close to the source using permeable surfaces, filter trenches or swales etc.;
- Site control: local facilities that receive surface runoff to attenuate off-site discharge i.e. balancing ponds etc.;
- Regional Control: larger ponds and wetlands used to control flow and quality prior to final discharge to receiving water.

8.5 National Standards define the appropriate SUDS approach to final discharge destination as the following in order of preference:

⁵ ERYC (2016). Sustainable Drainage Systems (SuDS) & Surface Water Drainage Requirements For New Development. Design and Maintenance: Combined Planning Note and Standing Advice. September 2016.

⁶ Defra 2015. Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems. March 2015

1. Discharge into the ground
 2. Discharge to a surface water body
 3. Discharge to a surface water sewer
 4. Discharge to a combined sewer
- 8.6 Hydrogeological assessment, as summarised at Section 5, has indicated that the Site is underlain by Alluvium that consists of a variable mix of clay, silt and sand. The ground infiltration capacity of Alluvium is variable and dependent on local composition. Although it is possible that alluvial deposits beneath the Made Ground that is present beneath the proposed development area may have adequate infiltration capacity for use of soakaways or other forms of infiltration device for surface water disposal, local evidence has demonstrated the presence of a shallow water table. Adjacent marshland and the rest water level in the nearby Welton Ings indicate that the groundwater level in the Alluvium beneath the Site is likely to be too shallow to allow surface water disposal to ground.
- 8.7 Surface water runoff from the proposed development would be drained to the existing Site drainage system for final discharge to Old Drain. Discharge to a watercourse is the highest available SuDS preference.
- 8.8 As a previously developed Site, national SuDS standard establish a requirement for no increase in the peak rate or volume of surface water discharged from the Site for storm events with a frequency of up to 1:100yr. However, ERYC SuDS policy establishes a requirement for a 30% reduction in the peak runoff rate from new development on previously developed sites, including allowance for climate change.
- 8.9 A requirement to restrict off-Site discharge to 70% of the current rate introduces a requirement for on-Site storage to attenuate peak flows. The proposed SuDS scheme for the development incorporates improvement on the ERYC minimum requirement of 30% reduction, including climate change allowance, by incorporation of storage designed to restrict off-Site discharge to the greenfield rate for the Site, including climate change allowance, for all storm events up to the 1:100yr+climate change event. In accordance with current Government guidance for a design life of 50 years, climate change allowance has been set at 10%.
- 8.10 The on-Site stormwater attenuation capacity required to attenuate peak flows to greenfield rates has been estimated by application of the IH124 methodology. Full details are included at Appendix D. The analysis indicates a requirement for minimum on-Site storage capacity of 12m³. This would be achieved by installation of an underground tank or modular storage system within the development drainage system.
- 8.11 The proposed development drainage system is shown on Drawing 231/02/02 which is included with this report. The scheme incorporates the following components.
- Guttering and downpipes from roof areas
 - Sub-surface drainage pipework
 - On-line attenuation storage tank
 - Restricted outfall
 - New connection to existing on-Site pumping chamber

- 8.12 All subsurface drainage pipework would be nominal 150mm diameter, laid at a gradient of approximately 1:200. The storage tank would consist of a relatively shallow rectangular tank or linear crate system to ensure adequate fall to the pumping chamber. As the discharge rate from the system would be fixed at 2l/s for most storm events, it is proposed that the restricted outfall is achieved by reduced diameter pipework on the downstream side of the attenuation tank. Discharge pipeline would connect to the existing on-Site pumping chamber via an existing inlet pipe.
- 8.13 The proposed surface water drainage system would provide drainage for the proposed roof areas only. Runoff would therefore be restricted to clean roof water. Water quality management requirements have been considered in relation to guidance set out in the SuDS Manual (CIRIA C753). For commercial/industrial roof water the relevant pollution hazard indices are as follows:
- Suspended solids – 0.3
Metals – 0.2
Hydrocarbons – 0.05
- 8.14 Reference to the potential treatment function of a detention basin, has been used as the closest SuDS component to an attenuation tank. SuDS mitigation indices for discharges to surface waters are as follows:
- Suspended solids – 0.5
Metals – 0.5
Hydrocarbons – 0.6
- 8.15 It is apparent that the treatment function that would be provided within the proposed Site drainage system would exceed the minimum treatment requirements as set out in the SuDS Manual.
- 8.16 It is concluded that the proposed surface water drainage scheme for the proposed development, as shown on Drawing 231/02/02, would achieve net reduction in off-Site surface water discharge rates to greenfield rates. This approach would exceed the requirements of both national and local SuDS policy and guidance.

9. Summary and conclusions

- 9.1 Flood risk assessment has been undertaken to support a planning application for development of two new storage buildings at Wastege Waste Transfer Station, Gibson Lane, South Melton, East Yorkshire. The assessment has included review of local development and flood risk policy and detailed analysis of potential flood hazards. The study has been informed by a Site hydrological review and analysis of Site-specific flood data provided by the Environment Agency.
- 9.2 The assessment has concluded that there are unlikely to be any flood risk policy related constraints on the development. There is no requirement to pass the Exception Test.

- 9.3 Flood hazard analysis has demonstrated that the proposed development Site is at low risk of flooding from surface water and drainage infrastructure but is at moderate risk of groundwater flooding and high risk of tidal flooding from the nearby River Humber.
- 9.4 The proposed development can be considered to be 'less vulnerable' to the effects of flooding and therefore no formal flood protection measures are required or proposed.
- 9.5 The southern part of the Site is established above maximum flood level under all flooding conditions and therefore provides a place of safety in the event of extreme flooding. Subject to early warning and rapid implementation of emergency evacuation procedures it should be possible to evacuate the Site to a place of safety via the adjacent Gibson Lane. Internal office accommodation may provide an alternative place of safety.
- 9.6 The development is unlikely to have any adverse impact on surface water drainage, flood storage or flood flow conveyance and should therefore have no adverse effect on flood risk at the Site or surrounding area. The development would incorporate a sustainable surface water drainage system (SuDS) that would restrict off-Site discharge to greenfield rates.
- 9.7 Subject to continued implementation of the Site-wide Flood Warning and Emergency Evacuation Plan, this assessment has demonstrated that the proposed development could be operated without unacceptable risk to on-Site personnel and that safe access/egress to and from the Site could be achieved via the existing Site access roads.
- 9.8 It is concluded that the proposed development could be established in compliance with national planning guidance, ERYC planning policy and the development control requirements of the Environment Agency.

For S M Foster Associates Limited



Stephen M Foster
BSc MSc CGEOL MCIWEM CSi CEnv FIQ
Principal Consultant

Drawings



Approximate site boundary



CLIENT:
Waste Waste
Management Limited


PROJECT:
PROPOSED STORAGE BUILDINGS,
WASTE TRANSFER STATION,
GIBSON LANE, MELTON

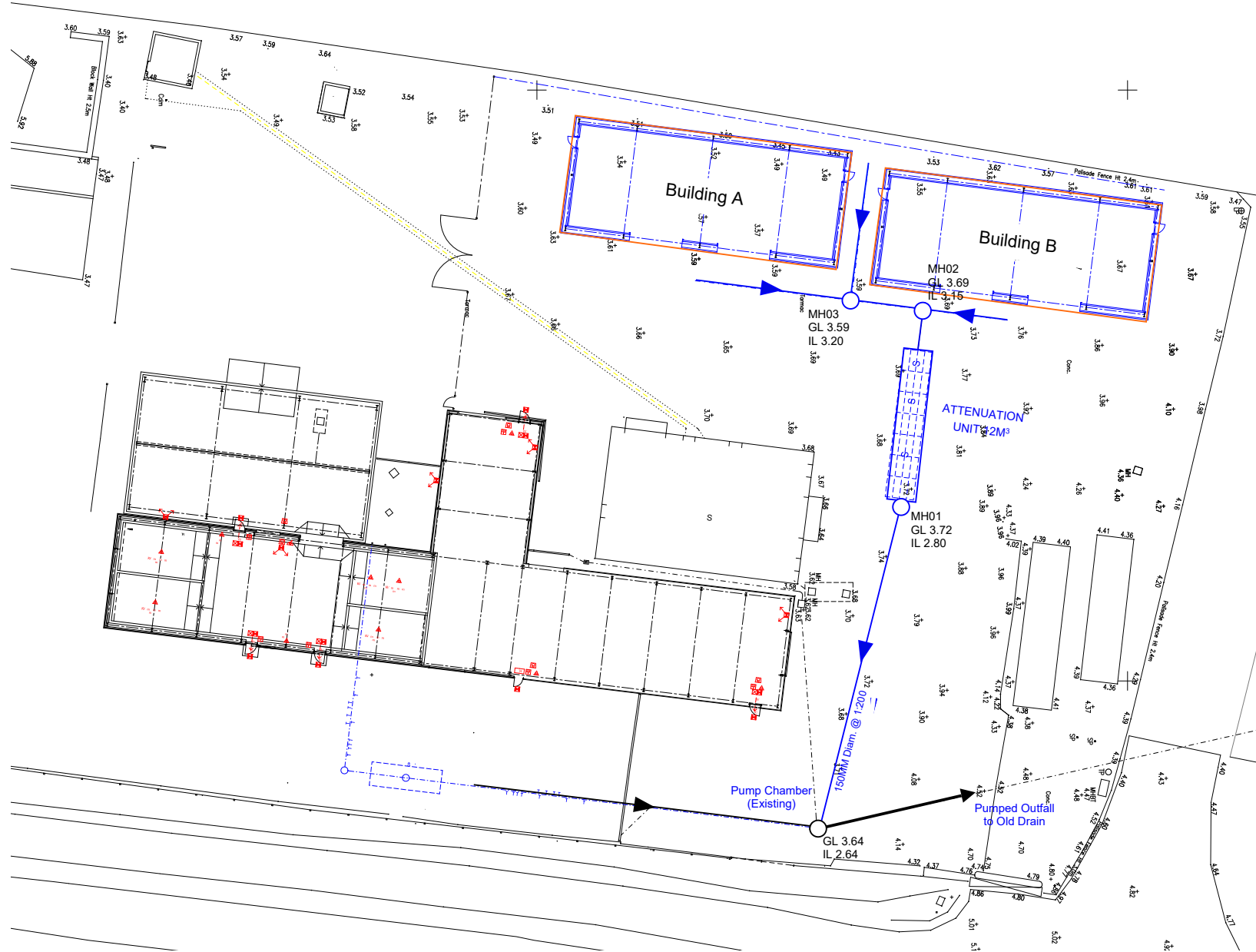
**FLOOD RISK ASSESSMENT
AND DRAINAGE STRATEGY**

Ref: 231/02/01/1222 Date: December 2022

Approved: smf Scale: 1:7,500 @A3

**DRAWING 231/02/01
SITE LOCATION AND LOCAL
HYDROLOGY**

 Approximate boundary of proposed development



CLIENT:
Wastege Waste Management Limited

PROJECT:
PROPOSED STORAGE BUILDINGS,
WASTE TRANSFER STATION,
GIBSON LANE, MELTON

**FLOOD RISK ASSESSMENT
AND DRAINAGE STRATEGY**

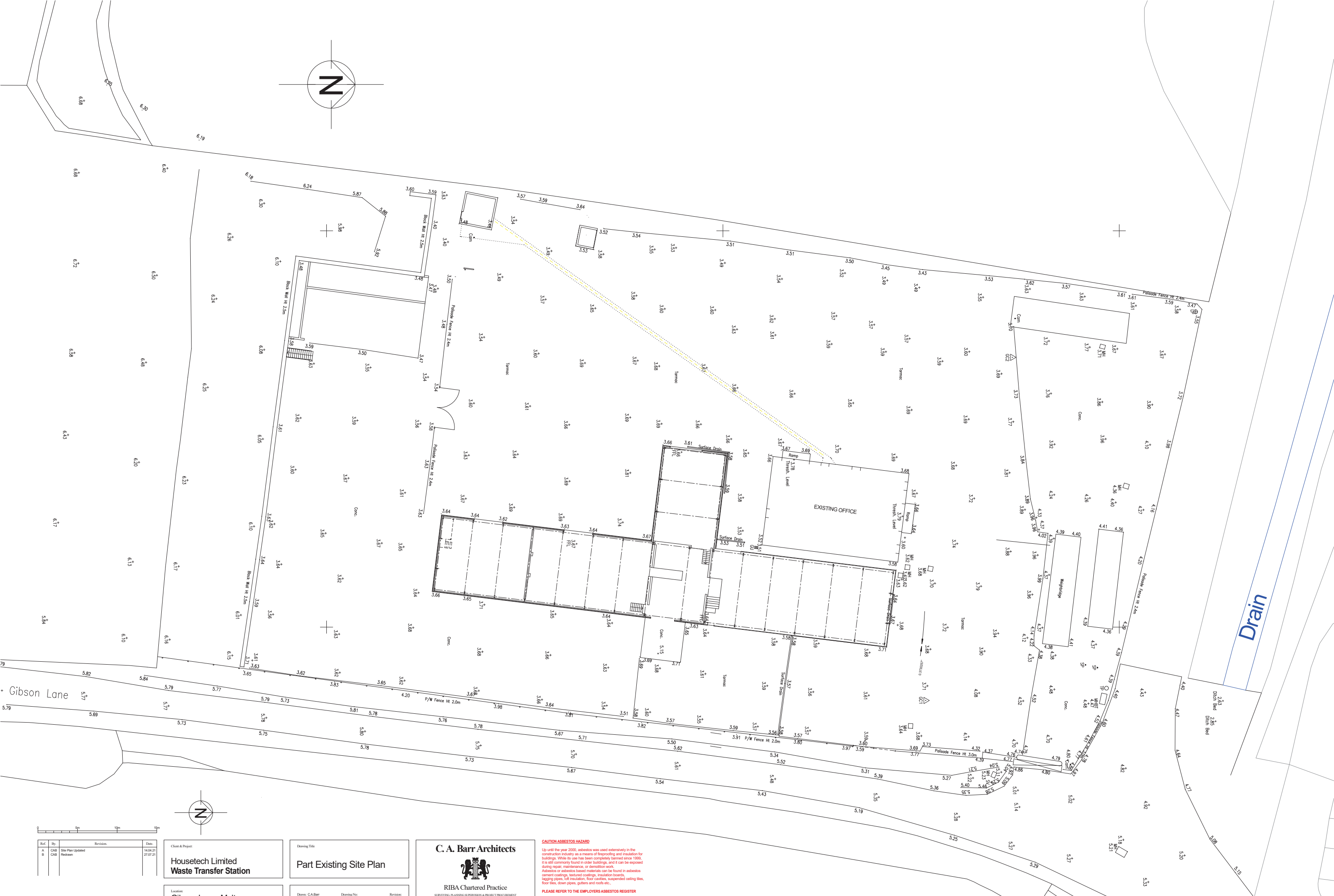
Ref: 231/02/02/1222 Date: December 2022

Approved: smf Scale: NTS

**DRAWING 231/02/02
INDICATIVE SURFACE WATER
DRAINAGE SCHEME**

Appendix A

Topographic survey



Ref.	By	Revision	Date
1	CAB	Site Plan Updated	14.04.21
2	CAB	Redrawn	27.07.21

Client & Project:
Housetech Limited
Waste Transfer Station

Drawing Title:
Part Existing Site Plan

C. A. Barr Architects

RIBA Chartered Practice
 SURVEYING, PLANNING, SUPERVISION & PROJECT PROCUREMENT
 14 THE LINC, 46-48 THE PARK, 42-42/43 THE WILLS, EAST YORKSHIRE, HU1 4JX
 Tel: 01482 333889 Fax: 01482 333889 Email: info@cabarr.co.uk
 Registered Office: 1 Parliament Street, Kingston upon Thames, M21 3AS
 Registered in England Company No: 02022402 Registered Company Name: C.A. Barr Limited

CAUTION ASBESTOS HAZARD
 Up until the year 2000, asbestos was used extensively in the construction industry as a means of fireproofing and insulation for buildings. While its use has been completely banned since 1985, it is still commonly found in older buildings, and it can be exposed during repair, maintenance, or demolition work. Asbestos or asbestos based materials can be found in asbestos cement coatings, textured coatings, insulation boards, lagging pipes, felt insulation, floor coatings, suspended ceiling tiles, floor tiles, down pipes, gutters and roofs etc.
PLEASE REFER TO THE EMPLOYERS ASBESTOS REGISTER

DO NOT SCALE FROM THIS DRAWING, IF IN DOUBT ASK.
 All dimensions are to be checked on site prior to the commencement of any works, and any error or omission is immediately reported to C.A. Barr Architects. All services shown are approximate only and the contractor is to establish their true position prior to the commencement of any works on site.

Location:
Gibson Lane, Melton
East Yorkshire HU14 3HN

Drawn: C.A. Barr
 Date: 21.01.21
 Scale: 1:200 at A1

Drawing No:
A1-21004-02

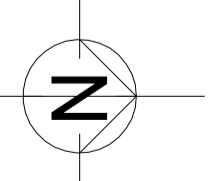
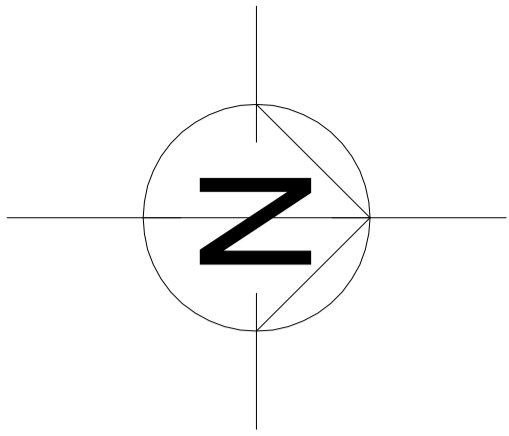
Revision:
B

Drain

Gibson Lane

Appendix B

Development design drawings



Ref.	By	Revision	Date

Client & Project:
**Wastege Limited
 Proposed Storage Buildings**

Drawing Title:
Part Existing Site Plan

Location:
**Gibson Lane, Melton
 East Yorkshire HU14 3HN**

Drawn: C.A.Barr
 Date: 20.10.21
 Scale: 1:200 at A1

Drawing No:
A1-22016-P1

Revision:
 -

C. A. Barr Architects



RIBA Chartered Practice

SURVEYING, PLANNING, SUPERVISION & PROJECT PROCUREMENT
 54 THE LINKS, QUARRY PARK, KINGSTON UPON HULL, EAST YORKSHIRE, HU14 4TX
 Tel: 01482 33099 Fax: 01482 33099 Email: info@cabarr.co.uk
 Registered Office: 1, Parliament Street, Kingston upon Hull, HU1 1AS
 Registered in England Company No: 0255241 Registered Company Name: C.A. Barr Limited

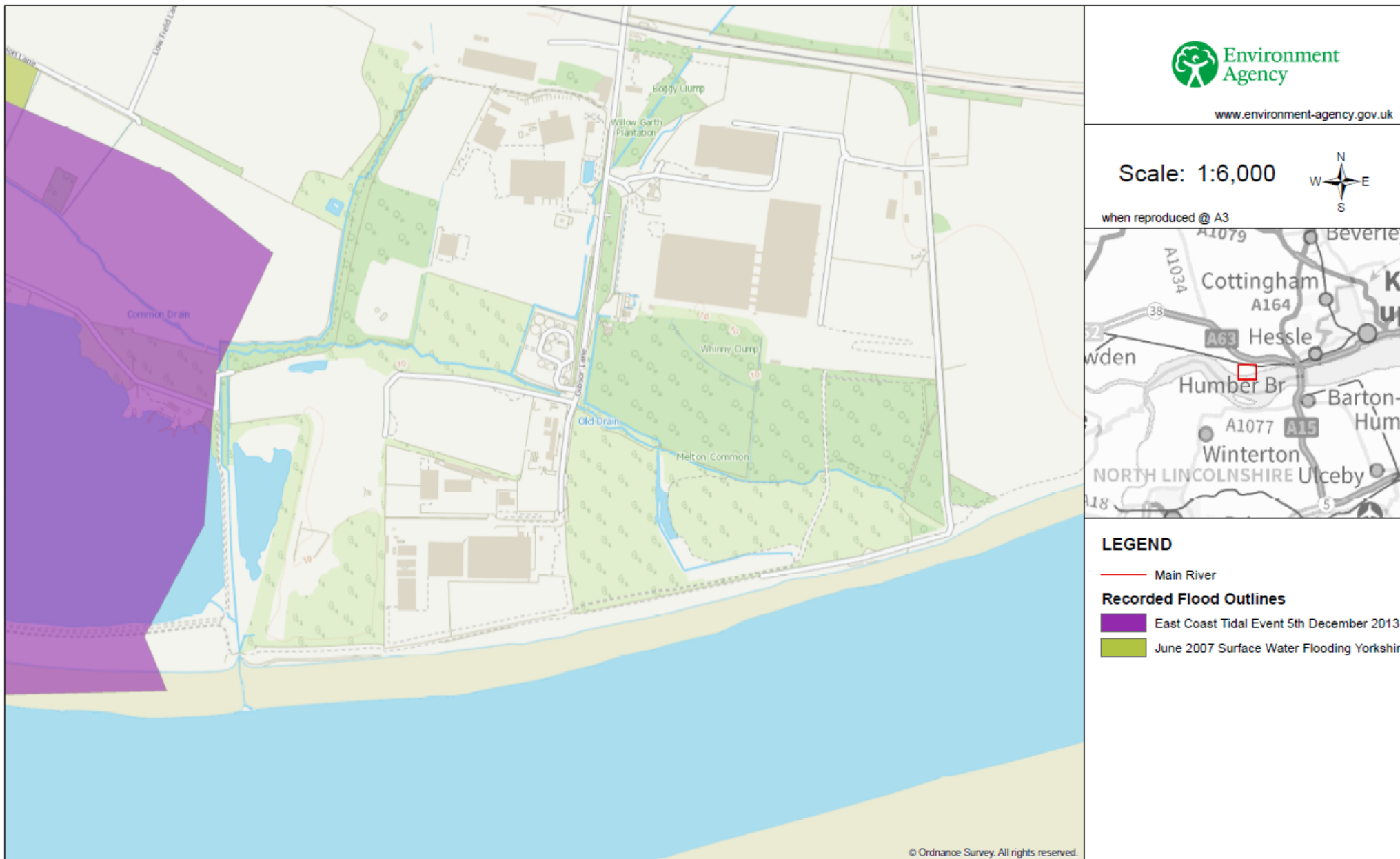
DO NOT SCALE FROM THIS DRAWING IF IN DOUBT ASK.
 ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORKS, AND ANY ERROR OR OMISSION IS IMMEDIATELY REPORTED TO C.A. BARR ARCHITECTS. ALL WORKS SHOULD BE APPROVED BY THE CONTRACTOR TO ESTABLISH THEIR TRUE POSITION PRIOR TO THE COMMENCEMENT OF ANY WORKS ON SITE.

Appendix C

Environment Agency flood data

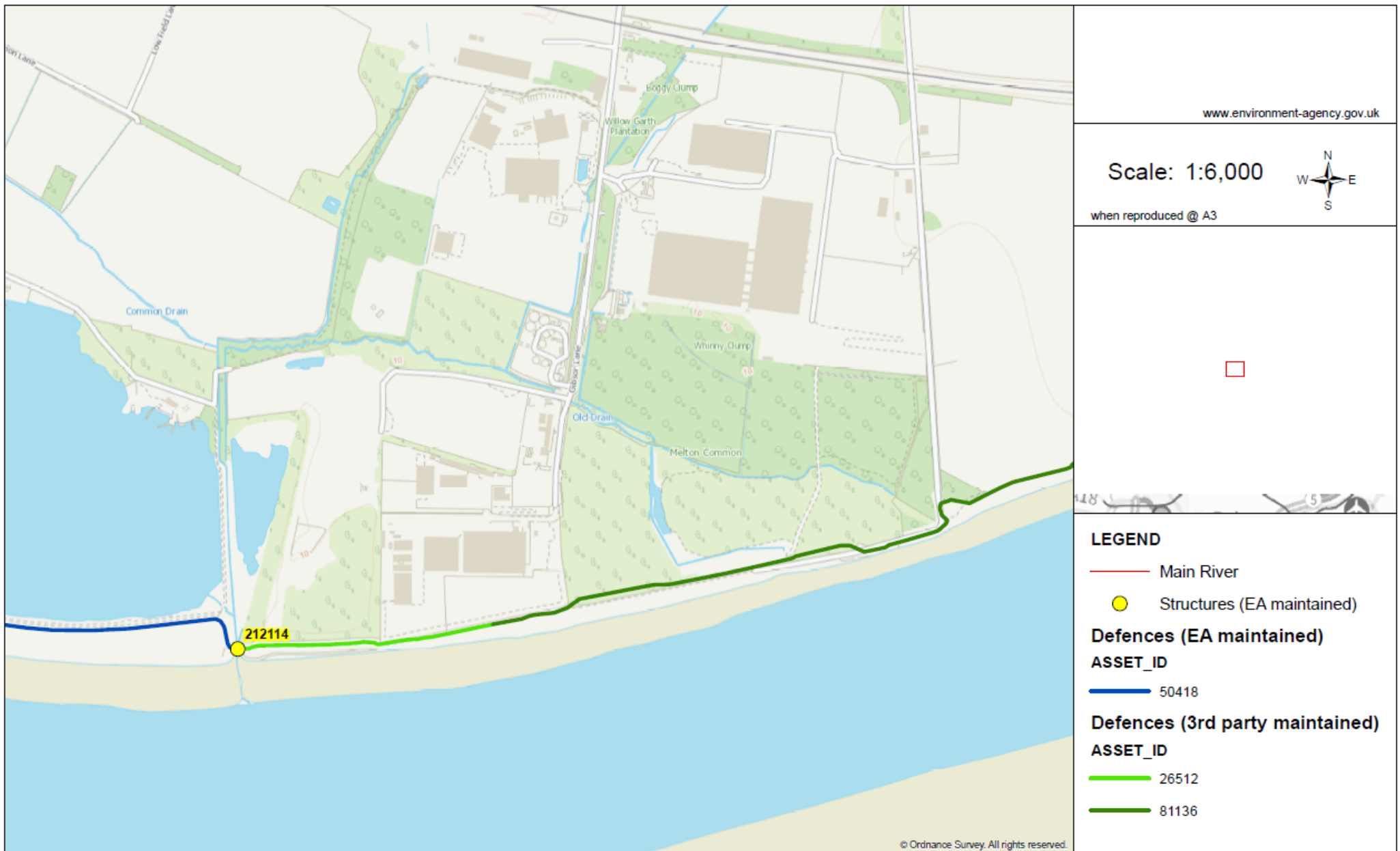
RFI/2021/228308 Flood History Map centred on your site at Gibson Lane, Melton, HU14 3HN

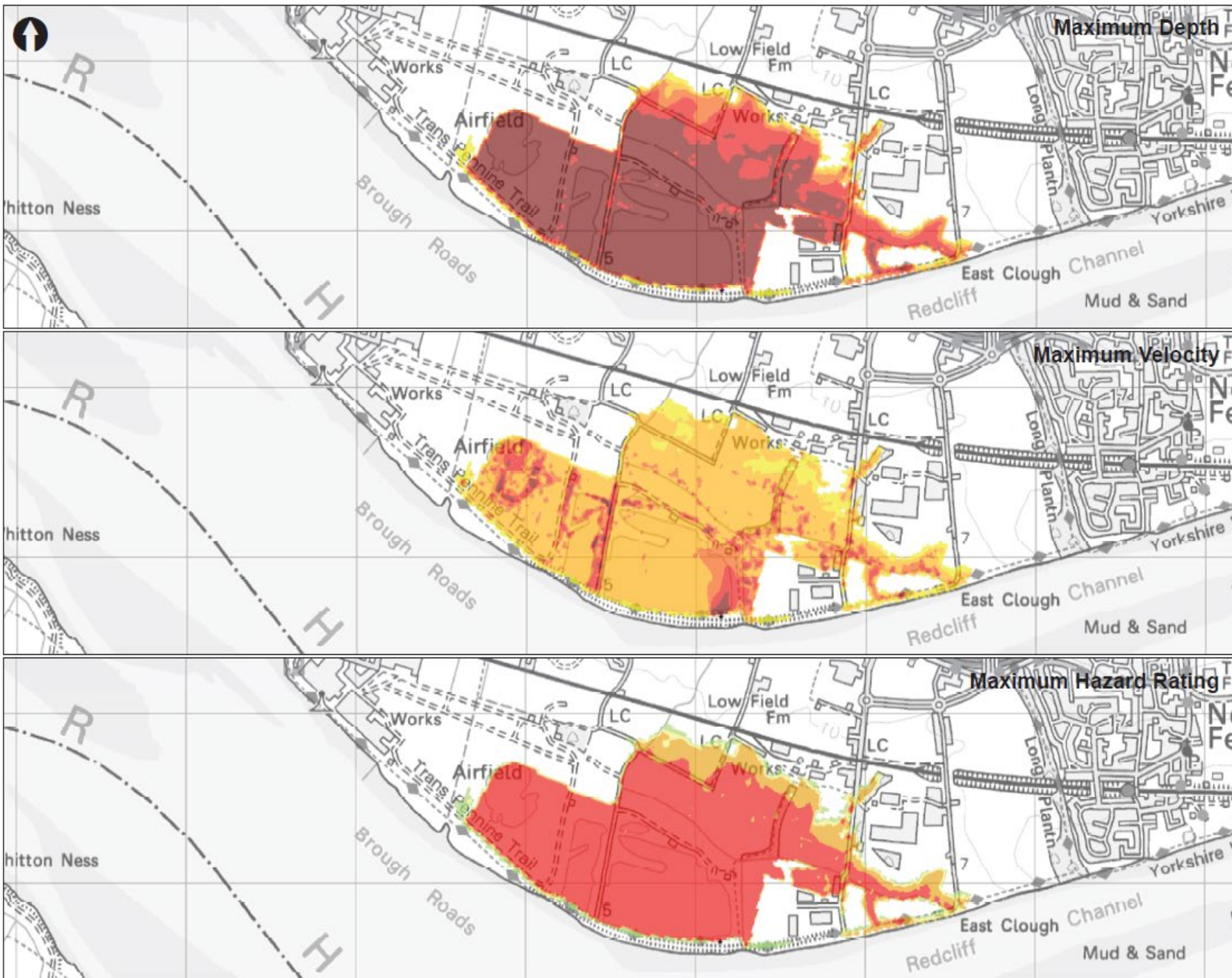
Date created: 05/10/2021



RFI/2021/228308 Assets Map centred on your site at Gibson Lane, Melton, HU14 3HN

Date created: 05/10/2021





Legend

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 2
- > 2

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1
- 1 - 1.5
- 1.5 - 2.5
- > 2.5

Max Hazard Rating

- 0 - 0.75
- 0.75 - 1.25
- 1.25 - 2
- > 2

Hazard Rating is calculated according to the Formulae based on the UK publication: DEFRA R&D Output: Flood Risk to People Phase Two: Draft PD551/TR1 and TR2 where: Hazard Rating = Depth x (Velocity + 0.2) x Debris Factor.

Maximum outputs shown in this map indicates the maximum value and extent defined for each output within the modelled time frame of 72 hours after a breach occurs.

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Environment Agency
 Flood Risk Management
 Environment Agency
 Customer House
 Any Junction Way
 Oxford Road
 York
 YO1 1PE
 www.environment.gov.uk

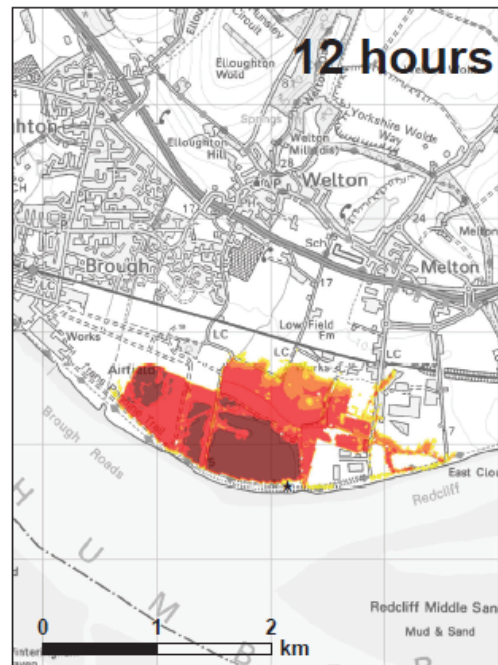
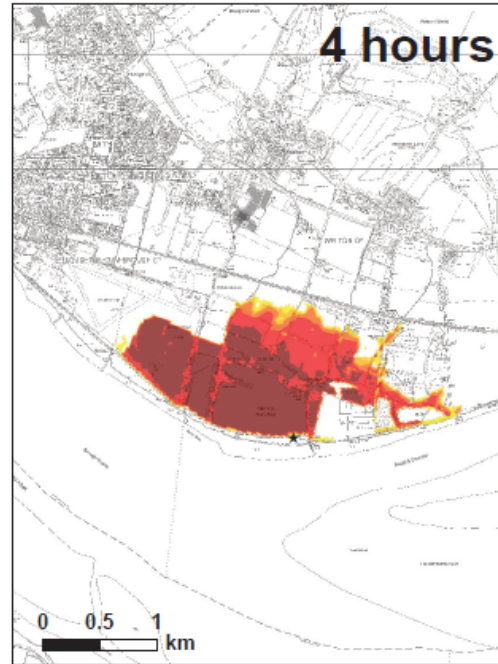
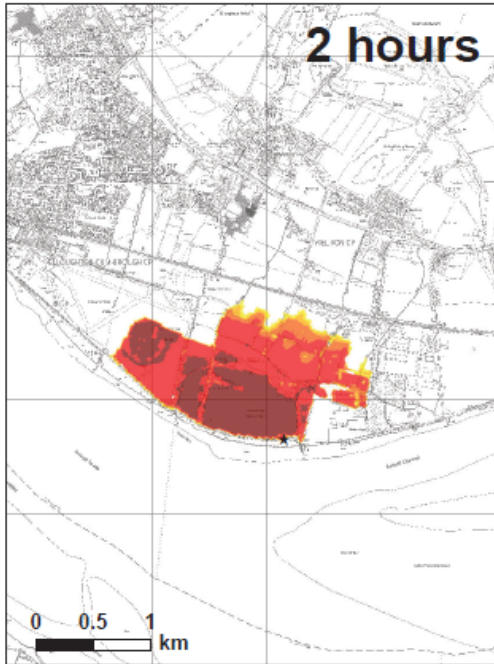
Mott MacDonald
 Disaster House
 Station Road
 Cambridge
 CB2 2PQ
 Tel: 01223 805000
 Fax: 01223 481007
 www.mottmac.com

Project Title
**North Bank Humber Modelling
 Breach Flood Mapping**

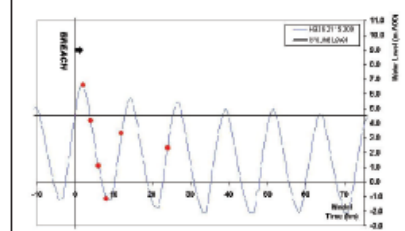
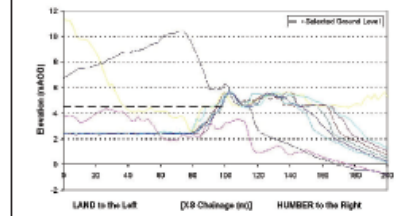
Map Title
**Maximum Depth, Velocity and
 Hazard Rating Maps**

Breach	HR66
Location	Wellton Water
Storm / Year	2115 / 200 year
Date / Revision	01/05/2012 / 1
Modelled	WJG - May 2012
Checked	MCP - May 2012
Approved	SYE - May 2012

Drawing No.
 278050/CV/2/115/2001/HR66
 Drawing Scale at A1
 1:10,000



Location	Welton Water	
Breach	HB36	Legend Depth (m) at time shown
Type	Earth Bank	
Width	50	
Storm	2115	
Year	200 year	



ALL MAP TIMES ARE DISPLAYED AS TIME AFTER A BREACH OCCURRING

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 Environment Agency Flood Risk Management Environment Agency Coverdale House Amy Johnson Way C18N Moor York YO30 4JZ	 Mott MacDonald Damier House Station Road Cambridge CB1 2JG Tel: 01223 463500 Fax: 01223 461007 www.mottmac.com
---	---

PROJECT TITLE			
North Bank Humber Modelling Breach Flood Modelling			
MAP TITLE			
Depth Progression Map			
ISSUE	PREPARED BY	CHECKED BY	APPROVED BY
1	WJG	MKP	SYE
DATE	PURPOSE OF MAP		
01/05/2012	North Bank Humber Modelling		
MAP REFERENCE (PROJECT NR./FIGURE NR./REVISION)			
278050/2115/200/1/HB36			

2014 Interim Water Level Profile

The table below shows **still** water levels for locations around the Humber Estuary. It is important to note the following:

- The base date for the data is 2014.
- The data 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.
- The water level quoted is the 'Best Estimate' water level. Depending on the use of the data it may be necessary to carry out sensitivity testing. Upper and Lower 95% confidence bandings are available upon request.
- Levels for other annual chance scenarios are available if required.

REF	LOCATION	EASTING	NORTHING	ANNUAL CHANCE (1 IN X) OF TIDE LEVEL						
				METRES ODN						
				1	10	50	100	200	500	1000
H010	Spurn Head	539630	411084	4.11	4.44	4.71	4.83	4.96	5.13	5.28
H030	Tetney	535420	403180	3.94	4.29	4.56	4.69	4.82	5.00	5.15
H040	Patrington	533399	418557	4.11	4.45	4.72	4.85	4.98	5.16	5.30
H050	Buck Beck	532700	406580	4.03	4.36	4.62	4.74	4.87	5.04	5.18
H055	Sunk island	530007	415325	4.14	4.47	4.74	4.87	5.00	5.18	5.32
H060	Grimsby	527878	411346	4.10	4.43	4.70	4.82	4.95	5.13	5.27
H080	Harborough Marsh	520790	415740	4.26	4.61	4.88	5.01	5.14	5.32	5.47
H090	Immingham	519141	417449	4.26	4.61	4.88	5.01	5.14	5.33	5.47
H100	South Killingholme	518700	417120	4.41	4.77	5.05	5.18	5.32	5.51	5.66
H110	Thorngumbald	517714	425301	4.53	4.89	5.18	5.31	5.45	5.65	5.80
H120	Salt End	516844	427811	4.53	4.91	5.20	5.34	5.48	5.68	5.83
H130	North Killingholme	516530	420000	4.51	4.87	5.15	5.28	5.42	5.61	5.77
H131	Humber Sea Terminal	513511	428675	4.33	4.69	4.98	5.11	5.25	5.44	5.59
H140	Paull	516516	426331	4.56	4.94	5.23	5.37	5.51	5.71	5.87
H150	East Halton	514450	422870	4.59	4.96	5.25	5.39	5.53	5.73	5.89
H155	Hull King George	513950	428543	4.61	4.99	5.29	5.43	5.57	5.77	5.93
H170	Goxhill	511970	425440	4.67	5.04	5.34	5.47	5.61	5.80	5.95
H180	Hull Barrier	510194	428354	4.78	5.17	5.46	5.59	5.72	5.90	6.04
H190	Albert Dock	509346	427749	4.69	5.07	5.36	5.49	5.62	5.79	5.92
H200	New Holland	508020	424330	4.87	5.26	5.55	5.68	5.81	5.99	6.12
H210	Barrow Haven	506380	422620	4.92	5.31	5.60	5.73	5.86	6.03	6.17
H215	Hessle	503430	425870	4.97	5.35	5.62	5.73	5.83	5.97	6.06
H216	Humber Bridge	502478	423914	4.98	5.37	5.64	5.75	5.86	5.99	6.09
H220	Ferriby	497550	421150	5.04	5.42	5.67	5.77	5.86	5.97	6.04
H229	Brough	493792	425938	5.15	5.52	5.74	5.82	5.89	5.96	6.00
H230	Winterton	493420	422830	5.14	5.51	5.74	5.83	5.90	5.98	6.02
H250	Blacktoft	484247	424190	5.25	5.62	5.83	5.90	5.96	6.02	6.04
H270	Goole	474857	422960	5.46	5.85	6.07	6.15	6.21	6.27	6.29
T010	Burton Stather	486416	418432	5.29	5.66	5.88	5.95	6.01	6.07	6.09
T020	Flixborough	485739	414584	5.40	5.78	6.00	6.07	6.13	6.19	6.21
T030	Keadby	483557	411268	5.43	5.81	6.03	6.10	6.16	6.22	6.24
T040	Owston	481396	399455	5.48	5.87	6.09	6.16	6.22	6.28	6.30
T050	Gainsborough	481340	389770	5.07	5.41	5.60	5.67	5.72	5.77	5.79

Structures (EA Maintained) - RFI/2021/228308							
ASSET ID	ASSETS TYPE	DESCRIPTION	DESIGN STANDARD OF PROTECTION (SOP)	ASSET MAINTAINER	PROTECTION	TARGET CONDITION	OVERALL CONDITION
212114	control_gate	West Clough		environment_agency	coastal	3	3

Defences (EA Maintained) - RFI/2021/228308										
ASSET ID	DESCRIPTION	ASSET MAINTAINER	ASSETS TYPE	LENGTH (m)	ACTUAL Downstream Crest Level (mAOD)	ACTUAL Upstream Crest Level (mAOD)	PROTECTION	TARGET CONDITION	OVERALL CONDITION	DESIGN STANDARD OF PROTECTION (SOP)
50418	embankment	environment_agency	flood_risk_management	939.10	5.65	5.68	coastal	3	3	20

Defences (3rd Party Maintained) - RFI/2021/228308										
ASSET ID	DESCRIPTION	ASSET MAINTAINER	ASSETS TYPE	LENGTH (m)	ACTUAL Downstream Crest Level (mAOD)	ACTUAL Upstream Crest Level (mAOD)	PROTECTION	TARGET CONDITION	OVERALL CONDITION	DESIGN STANDARD OF PROTECTION (SOP)
26512	high_ground	private	flood_risk_management	458.08	4.51	5.84	coastal	3	5	20
81136	high_ground	private	flood_risk_management	1631.39	7.17	4.33	coastal	3	5	20

Appendix D

IH124 analysis

Print

Close Report



Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	<input type="text" value="Stephen Foster"/>
Site name:	<input type="text" value="Wastage"/>
Site location:	<input type="text" value="Melton"/>

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	<input type="text" value="53.71242° N"/>
Longitude:	<input type="text" value="0.53459° W"/>
Reference:	<input type="text" value="720275305"/>
Date:	<input type="text" value="Dec 12 2022 11:48"/>

Site characteristics		Methodology		
Total site area (ha):	0.048	esti	IH124	
Significant public open space (ha):	0	Q _{BAR} estimation method:	Calculate from SPR and SAAR	
Area positively drained (ha):	0.048	SPR estimation method:	Calculate from SOIL type	
Impermeable area (ha):	0.048	Soil characteristics	Default Edited	
Percentage of drained area that is impermeable (%):	100		SOIL type:	2 2
Impervious area drained via infiltration (ha):	0	SPR:	0.3 0.3	
Return period for infiltration system design (year):	10	Hydrological characteristics	Default Edited	
Impervious area drained to rainwater harvesting (ha):	0		Rainfall 100 yrs 6 hrs:	-- 63
Return period for rainwater harvesting system (year):	10	Rainfall 100 yrs 12 hrs:	-- 92.4	
Compliance factor for rainwater harvesting system (%):	66	FEH / FSR conversion factor:	1.2 1.2	
Net site area for storage volume design (ha):	0.05	SAAR (mm):	639 639	
Net impermeable area for storage volume design (ha):	0.05	M5-60 Rainfall Depth (mm):	20 20	
Pervious area contribution to runoff (%):	30	'r' Ratio M5-60/M5-2 day:	0.4 0.4	
* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q _{BAR} and other flow rates will have been reduced accordingly.		Hydrological region:	3 3	
		Growth curve factor 1 year:	0.86 0.86	
		Growth curve factor 10 year:	1.45 1.45	
		Growth curve factor 30 year:	1.75 1.75	
Design criteria		Growth curve factor 100 years:	2.08 2.08	
		Climate change allowance factor:	1.1	
		Urban creep allowance factor:	1	
Volume control approach	Use long term storage		Q _{BAR} for total site area (l/s):	0.08 0.08
Interception rainfall depth (mm):	5	Q _{BAR} for net site area (l/s):	0.08 0.08	
Minimum flow rate (l/s):	2			

Site discharge rates	Default	Edited	Estimated storage volumes	Default	Edited
1 in 1 year (l/s):	2	2	Attenuation storage 1/100 years (m ³):	12	12
1 in 30 years (l/s):	2	2	Long term storage 1/100 years (m ³):	0	0
1 in 100 year (l/s):	2	2	Total storage 1/100 years (m ³):	12	12

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.