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ENVIRONMENT

Hargreaves Land Limited (HL)
Planning Application 1 at Lincolnshire Lakes (North)
Scunthorpe
Flood Risk Assessment

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Notice

EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). It has been produced on behalf of Hargreaves Land Limited (HL) in respect of a hybrid planning application for the proposed residential led development known as Planning Application 1 at Lincolnshire Lakes (North), Scunthorpe (approximate grid reference: SE 86702 09504).

This report demonstrates that the Proposed Development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented.

The Environment Agency (EA) Flood Map for Planning shows the Site is situated across Flood Zones 1, 2 and 3 attributed to the River Trent; however, areas of Flood Zone 3 are shown to benefit from a reduced risk of flooding from rivers and sea due to defences. To assess the risk of fluvial and tidal flooding to the Site over the lifetime of development, hydraulic model information for the Tidal Trent (2023) Model has been obtained from the EA and updated by BWB Consulting. The Site is shown to be located outside of all modelled events for both fluvial dominated and tidal dominated scenarios in the defended conditions scenarios.

Breach scenarios have also been undertaken to determine the risk to the Site during a residual flood risk event for both the fluvial and tidal dominated scenarios. The results show the Site is removed from the fluvially dominated breach scenario, whilst the south of the Site is shown to be partially impacted during the extreme tidally dominated 1 in 200-year 2125 Upper End event. However, based on the existing topography, the areas of proposed development are shown to be removed from flooding.

In accordance with the local guidance, site ground levels are shown to be sufficiently raised above the fluvial and tidal design peak flood level. Therefore, it is recommended that finished floor levels are raised a minimum of 150mm above existing ground levels to help mitigate against any residual flood risk. Ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.

Based on the available data, the Site is considered to be at a high risk of flooding from groundwater. Should shallow groundwater be encountered during construction, a groundwater specialist should be consulted, and appropriate dewatering should be employed as necessary. Foundation types should be designed with appropriate consideration of the onsite groundwater levels.

The Site has been assessed against other sources of flood risk including canals, reservoirs and large waterbodies, surface water and sewers. The overall risk posed by these sources is considered low. Raising of levels and profiling of external levels is expected to provide a level of mitigation for residual risks from these sources.

The Site is located outside of both the fluvial and tidal dominated design flood extents attributed to the River Trent. Therefore, the Site is not considered to displace the fluvial or tidal floodplain.

The Proposed Development will increase the area of impermeable surfaces, increasing the rate of runoff from the Site prior to mitigation. Therefore, it is proposed to incorporate surface water attenuation as part of the development proposals. Foul water from the Proposed Development is expected to be drained separately to surface water.

In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the Proposed Development could proceed without being subject to significant flood risk. Moreover, the Proposed Development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the Site.

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1. INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). The FRA has been produced on behalf of Hargreaves Land Limited (HL) in respect of a planning application for the proposed residential led development known as Planning Application 1 at Lincolnshire Lakes (North)Scunthorpe, hereafter, referred to as the 'Site'.

1.2 This FRA is intended to support a hybrid planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. Summary information is included as **Table 1.1**.

Table 1.1: Site Summary

Site Name	Planning Application 1 at Lincolnshire Lakes (North)
Location	Scunthorpe
NGR (approx.)	SE 86702 09504
Application Site Area (ha)	56.5 (approx.)
Development Type	Residential – More Vulnerable Local Centre – Less Vulnerable
Flood Zone Classification	Flood Zone 1, 2, and 3
NPPF Vulnerability	More Vulnerable
Anticipated Development Lifetime	100+ years
Environment Agency Office	East Midlands and Lincolnshire and Northamptonshire
Lead Local Flood Authority	North Lincolnshire Council
Local Planning Authority	North Lincolnshire Council

Sources of Data

i. Topographical Survey by BWB Consulting Ltd (reference: LIN-BWB-00-ZZ-M2-G-0001);
ii. 1m Environment Agency (EA) 2022 Light Detection and Ranging (LiDAR) Data;
iii. EA Consultation and Tidal Trent (2023) Hydraulic Model Information;
iv. North Lincolnshire Council Consultation;
v. Scunthorpe & Gainsborough Water Management Board Consultation;

vi. North and North East Lincolnshire Strategic Flood Risk Assessment;
vii. North Lincolnshire Preliminary Flood Risk Assessment;
viii. North Lincolnshire Council Preliminary Flood Risk Assessment Addendum;
ix. Humber River Basin District Flood Risk Management Strategy;
x. North Lincolnshire Local Development Framework – Core Strategy;
xi. North Lincolnshire Local Plan
xii. Lincolnshire Lakes Area Action Plan;
xiii. Lincolnshire Lakes Area Action Plan Flood Risk Assessment;
xiv. Anglian Water Sewer Records;
xv. British Geological Survey (BGS) Drift & Geology Maps;
xvi. BGS Groundwater Data; and
xvii. Phase 2 Geo-Environmental Assessment undertaken by BWB Consulting in 2023 (reference: LLP1-BWB-XX-XX-T-G-0002_Ph2).

Existing Site

1.3 The Site is situated within North Lincolnshire, located approximately 2.7km southwest of Scunthorpe town centre. The Site is bisected by Brumby Common Lane. In a wider site context, the Site is bound to the north and south by greenfield land comprising agricultural and forested land, to the east by Scotter Road and existing residential development, and to the west by the M181 / A1077(M).

1.4 The River Trent is located approximately 2.1km west of the Site, beyond the M181/ A1077(M) and a number of Internal Drainage Board (IDB) drains are shown to be located within and surrounding the Site. The Site's location is illustrated within **Figure 1.1**.

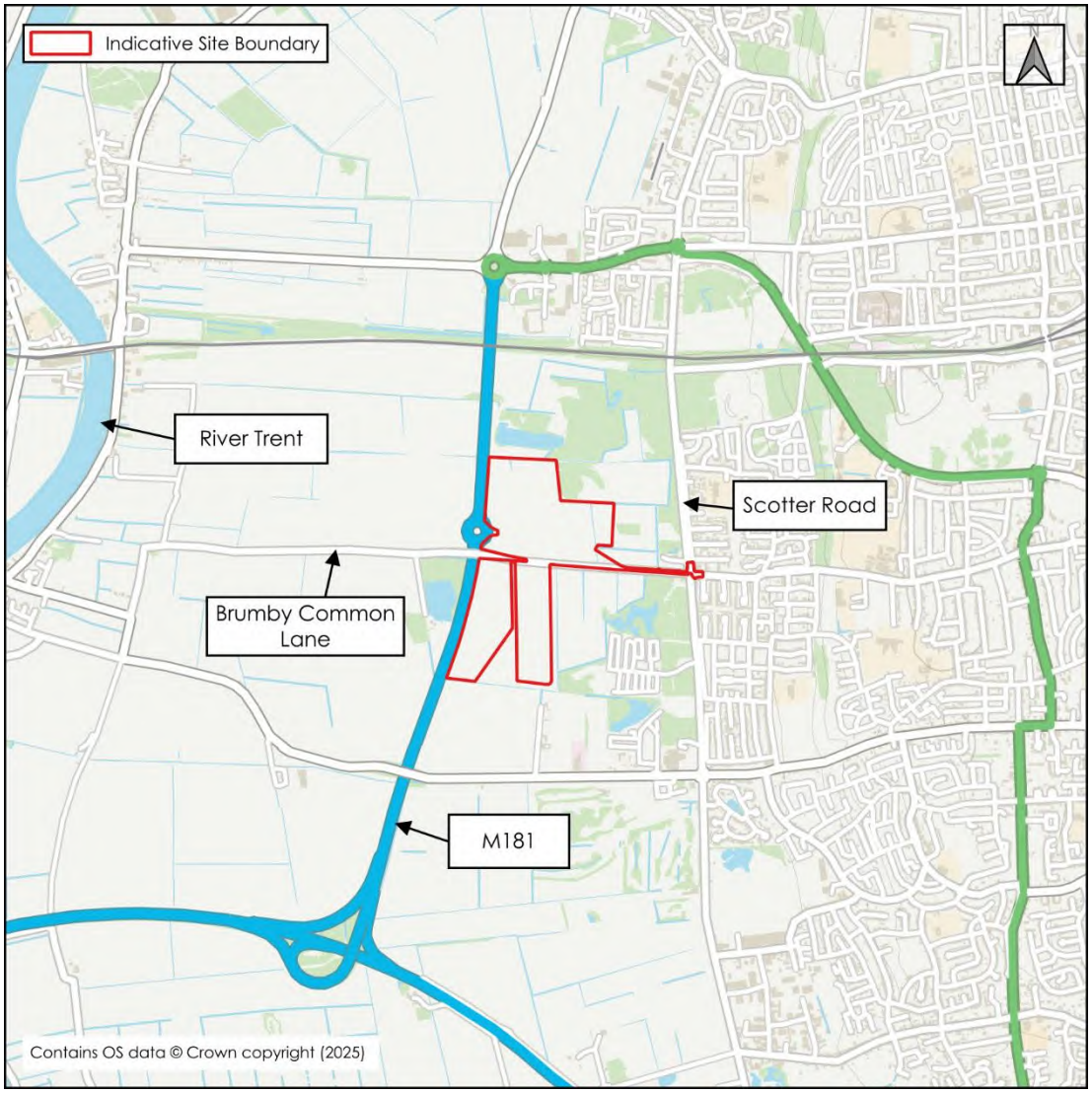


Figure 1.1: Site Location

1.5 A topographical survey has been undertaken and included as **Appendix 1**. The survey shows the Site is relatively flat with levels ranging from approximately 2 metres Above Ordnance Datum (m AOD) to 3m AOD. A network of IDB drains is present across the Site, with depths typically at least 2m according to the topographical survey.

1.6 The Site currently comprises arable land which is understood to be mainly used for agriculture.

Proposed Development

1.7 The Proposed Development comprises a hybrid application for the following development:

- Full planning application for the construction of a new vehicular access off the M181/A1077(M) roundabout, a pedestrian and cycle link to Scotter Road, a foul pumping station, earthworks and 'off-plot' drainage, ecological and associated landscaping and infrastructure works.

- Outline planning application, with all matters reserved, for the development of up to 550 residential dwellings (Use Class C3), a local centre (Use Class E) and associated 'on-plot' landscaping, drainage and other infrastructure works.

1.8 The area subject to the outline planning application is shown in **Figure 1.2**.

Figure 1.2: Area Subject to Outline Planning Application

1.9 The Illustrative Masterplan is included as **Appendix 2**.

2. FLOOD RISK PLANNING POLICY & GUIDANCE

National Planning Policy Framework

2.1 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The PPG is also available online[2].

2.2 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

2.3 The PPG also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing a FRA.

2.4 The PPG includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3). Table 2 and Table 3 are recreated within **Appendix 3** of this report for reference.

2.5 This FRA is written in accordance with the NPPF and the PPG.

Flood Map for Planning

2.6 With particular reference to planning and development, the Flood Map for Planning identifies Flood Zones in accordance with Table 1 of the PPG. Further details on the Flood Zone classifications are outlined in **Table 2.1**.

Table 2.1: Flood Zone Classifications

Flood Zone	Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability). All land outside of Flood Zone 2 and 3.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.
Flood Zone 3b (The Functional Floodplain)	Flood Zone 3b (The Functional Floodplain) is defined as land where water must flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

[1] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended December 2024.
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance, amended February 2024.

2.7 The Site is shown to be located within Flood Zones 1, 2 and 3, as shown in **Figure 2.1**. However, areas of Flood Zone 3 are shown to benefit from a reduction in risk of flooding from rivers and sea due to defences.

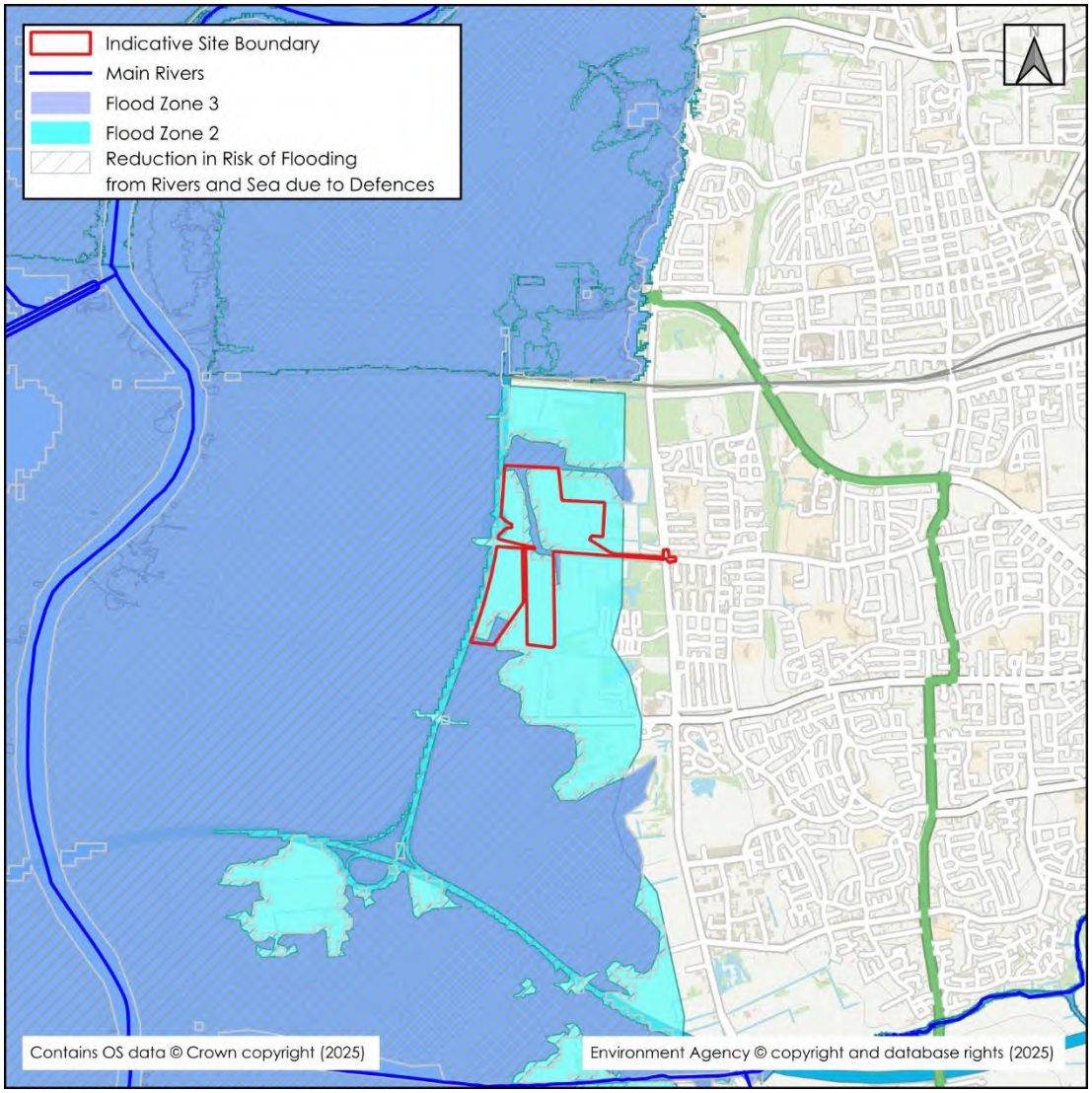


Figure 2.1: Flood Map for Planning

The Design Flood

2.8 The PPG identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.9 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) and surface water (pluvial) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200 chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

Peak River Flow

2.10 Predicted future changes in peak river flows caused by climate change are provided by the EA[3], with a range of projections applied to regionalised 'River Basin Districts', which are further subdivided into Management Catchments.

2.11 The Site falls within the Lower Trent and Erewash Management Catchment of the Humber River Basin District. **Table 2.2** identifies the relevant peak river flow climate change allowances from this Management Catchment.

Table 2.2: Peak River Flow Climate Change Allowances for the Lower Trent and Erewash Management Catchment within the Humber River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Upper End	29%	38%	62%
Higher Central	18%	23%	39%
Central	13%	17%	29%

2.12 When determining the appropriate allowance for use in a FRA the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.3** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

[3] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed January 2025.

Table 2.3: Application of Appropriate Peak River Flow Climate Change Allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance where a location may fall within Flood Zone 2 or 3 in the future.				
2	Use the higher central allowance	Use the central allowance			
3a	Use the higher central allowance	Development should not be permitted	Use the central allowance		
3b	Use the higher central allowance	Development should not be permitted			Use the central allowance
If development is considered appropriate by the local authority when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the higher central allowance.					

2.13 The Site is located within Flood Zones 2 and 3, the Proposed Development is classified as 'More Vulnerable', and it has an anticipated lifespan of at least 100 years. Therefore, the Central allowance for the '2080s' epoch will be considered.

2.14 Therefore, to ensure the Proposed Development is designed adequately for its lifetime an allowance of 29% will be applied to the design flood to identify flood risk mitigation measures.

Sea Level Rise

2.15 It is predicted that future changes in climate conditions will result in the global sea level continuing to rise, which will change the frequency and magnitude of high-water events. Predicted future changes in sea levels are provided by the EA[4], with a range of projections applied to River Basin Districts.

2.16 As above, the Site falls within the Humber River Basin District and **Table 2.4** states the relevant sea level rise allowances.

[4] Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed January 2024.

Table 2.4: Sea Level Allowances for the Humber River Basin District for each epoch in mm per year

Allowance		2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative Rise 2000 to 2125 (m)
Higher Central	Per Year	5.5	8.4	11.1	12.4	-
	Total	193	252	333	372	1.15
Upper End	Per Year	6.7	11.0	15.3	17.6	-
	Total	235	330	459	528	1.55

2.17 The climate change guidance states that for FRAs, both the Higher Central and Upper End allowances should be assessed in order to understand the range of impact. With a development design horizon of at least 100 years, the sea level rise up to 2125 needs to be considered - a cumulative sea level rise from 2000 of 1.15m (Higher Central) to 1.55m (Upper End).

Strategic Flood Risk Assessment

2.18 A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.19 The North and North East Lincolnshire SFRA[5] has been reviewed in the production of this FRA. The SFRA provides strategic information in the form of fluvial and surface water flood risk mapping, as well as records of historical flooding. It also includes flood risk policy and guidance for the area. Information from the Level 1 SFRA will be referenced within **Sections 3** where applicable.

Preliminary Flood Risk Assessment

2.20 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities (LLFAs).

2.21 The North Lincolnshire PFRA[6] considers flooding from surface water runoff, groundwater, ordinary watercourses, and canals. It also references the historical river flooding which occurred in the local area in 2007. Information from the PFRA will be referenced within **Section 3** where applicable.

2.22 The North Lincolnshire Council PFRA Addendum[7] has also been reviewed in the production of this FRA. The PFRA Addendum provides an update to the 2011 PFRA,

[5] North and North East Lincolnshire Strategic Flood Risk Assessment (North Lincolnshire Council and North East Lincolnshire Council, June 2022)
[6] North Lincolnshire Preliminary Flood Risk Assessment (Entec, June 2011)
[7] North Lincolnshire Preliminary Flood Risk Assessment Addendum (North Lincolnshire Council, December 2017)

however, upon review, no applicable information in relation to flood risk at the site was identified. Key findings from the PFRA Addendum include:

i. There have not been any significant flood events in North Lincolnshire since 2011, however, this does not preclude smaller or more recent flood events; and

ii. The current understanding of flood risk has changed as a result of work undertaken following the 2007 flood event. This has reduced risk in impacted areas compared to that presented in the 2011 PFRA.

Local Flood Risk Management Strategy

2.23 A Local Flood Risk Management Strategy (LFRMS) is prepared by an LLFA to help understand and manage flood risk at a local level.

2.24 The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.

2.25 The North Lincolnshire Council LFRMS[8] has been reviewed, however, no applicable information in relation to flood risk at the Site was identified.

River Basin Flood Risk Management Plan

2.26 Flood Risk Management Plans (FRMPs) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs. FRMPs set out how risk management authorities will work with communities to manage flood and coastal risk. Risk management authorities include the EA, Natural Resources Wales, local councils, IDBs, Highways England and LLFAs.

2.27 The first FRMPs were published in March 2016 and were subsequently updated in December 2022. They describe actions to manage flood risk across England between 2021 to 2027.

2.28 The Site is located within the Humber River Basin District, and the Humber River Basin District FRMP[9] has been reviewed. The objective to "review the Tidal Trent hydraulic model based on the outputs of the Humber Strategy in Nottinghamshire, North Lincolnshire and Lincolnshire" has been considered in this report.

Section 19 Flood Investigation Reports

2.29 Under their duties of the Flood and Water Management Act 2010, LLFAs have a responsibility to publish reports of investigations of flood incidents. A Section 19 Flood Investigation report is a public statement of the circumstances of a historical flood event and what parties have a role in managing the risks. The investigation does not always give an in-depth analysis of the flood risk or mechanisms, but it can provide a valuable record of past events.

[8] North Lincolnshire Council Local Flood Risk Management Strategy (North Lincolnshire Council, August 2016)
[9] Humber River Basin District Flood Risk Management Plan 2021 to 2027 (Environment Agency, December 2022)

2.30 North Lincolnshire Council have published two Section 19 reports on their website, which document the flooding that occurred in November 2016 and November 2019. The reports have been reviewed in relation to the site's location, but no evidence of flooding at the site was identified.

2.31 The November 2019 event[10] impacted one property located at Rochester Close, situated adjacent to the eastern site boundary. This flood event was attributed to a period of intense rainfall exceeding the surface water sewer capacity.

Local Plan

2.32 The North Lincolnshire Local Development Framework – Core Strategy[11] has been reviewed in the production of this FRA. The Core Strategy sets out the long term spatial planning framework for the development of North Lincolnshire up to 2026 by providing strategic policies and guidance to deliver the vision for the area.

2.33 The North Lincolnshire Local Plan[12] was adopted in May 2003 and has since been superseded by the adoption of the Core Strategy. However, a number of policies were saved which must be considered alongside the updated Core Strategy. North Lincolnshire Council is currently preparing a new Local Plan for North Lincolnshire which will eventually supersede both the 2003 Local Plan and the Local Development Framework plans.

2.34 The Core Strategy is supported by a number of Development Plan Documents, including the Lincolnshire Lakes Area Action Plan[13] (AAP) which is a site specific plan which sets out how Lincolnshire Lakes development should be achieved. The Lincolnshire Lakes AAP should be read alongside the adopted Core Strategy.

2.35 The Lincolnshire Lakes AAP Flood Risk Assessment[14] has been prepared to support the AAP, informing the scheme in relation to flood risk associated with the River Trent and local land drainage. Information from the Lincolnshire Lakes AAP Flood Risk Assessment will be referenced within **Section 3** and **4** where applicable.

2.36 Key policies from the Core Strategy, North Lincolnshire Local Plan, and Lincolnshire Lakes AAP relating to flood risk are summarised below:

<u>Core Strategy</u>

CS19: Flood Risk

2.37 *" The council will support development proposals that avoid areas of current or future flood risk, and which do not increase the risk of flooding elsewhere. Development in areas of high flood risk will only be permitted where it meets the following prerequisites:*

[10] FLOOD INVESTIGATION REPORT, FLOOD AND WATER MANAGEMENT ACT – SECTION 19 EVENTS OF NOVEMBER 2019 (North Lincolnshire Council, n.d)
[11] North Lincolnshire Local Development Framework – Core Strategy (North Lincolnshire Council, June 2011)
[12] North Lincolnshire Local Plan (North Lincolnshire Council, Adopted May 2003)
[13] Lincolnshire Lakes Area Action Plan (North Lincolnshire Council, May 2016)
[14] Lincolnshire Lakes Area Action Plan Flood Risk Assessment (Mott MacDonald, August 2019)

i. *It can be demonstrated that the development provides wider sustainability benefits to the community and the area that outweigh flood risk.*

ii. *The development should be on previously used land. If not, there must be no reasonable alternative developable sites on previously developed land.*

iii. *A flood risk assessment has demonstrated that the development will be safe, without increasing flood risk elsewhere by integrating water management methods into development.*

2.38 *In addition, development will be required, wherever practicable, to incorporate Sustainable Urban Drainage Systems (SuDS) to manage surface water drainage. "*

North Lincolnshire Local Plan

DS14 - Foul Sewage and Surface Water Drainage

2.39 *"The Council will require satisfactory provision to be made for the disposal of foul and surface water from new development, either by agreeing details before planning permission is granted, or by imposing conditions on a planning permission or completing planning agreements to achieve the same outcome."*

DS16 - Flood Risk

2.40 *"Development will not be permitted within floodplains where it would:*

i. *increase the number of people or buildings at risk; or*

ii. *impede the flow of floodwater; or*

iii. *impede access for the future maintenance of watercourses; or*

iv. *reduce the storage capacity of the floodplain; or*

v. *increase the risk of flooding elsewhere; or*

vi. *undermine the integrity of existing flood defences.*

2.41 *Unless adequate protection or mitigation measures are undertaken."*

Lincolnshire Lakes Area Action Plan

POLICY F1: STRATEGIC FLOOD MITIGATION STRATEGY

2.42 *"The AAP flood mitigation strategy will be based on a combination of flood defence improvement works to the River Trent right bank defences and land raising of the proposed built development areas. A comprehensive management strategy is required that ensures new development is defended in line with national planning policy. Any further flood risk management proposals will have to be agreed by the Environment Agency and North Lincolnshire Council. Existing communities should not be put at greater risk but given greater protection."*

POLICY L2: STRATEGIC DRAINAGE STRATEGY

2.43 "*The strategic drainage strategy for the AAP will include the following measures:*

i. *Creation of new swales, small ponds and/or ditches to drain the new development areas in a way that is sensitive to the opportunities to enhance the ecology of the drainage system.*

ii. *The re-sizing or re-grading of existing (non-IDB) watercourses and/or ditches in a way that is sensitive to the opportunities to enhance the ecology of the drainage system.*

iii. *The diversion or abandonment of existing IDB watercourses (only where necessary).*

iv. *Controlled discharge from the lakes to the IDB network at no more than 1.4l/s/ha.*

v. *Smaller arterial drainage features that will serve individual plots, or a combination of plots, served by local collector systems that would then discharge into the swales/watercourses and ultimately the lakes.*

vi. *Channelling of discharge of surface water from highways to reach the lakes where necessary.*

vii. *All development proposals are required to ensure consistency with the wider lakes and surface water management strategy.*

viii. *Drainage infrastructure should promote biodiversity enhancement. Surface water run-off must be 'polished', possibly by reedbeds, to ensure that lakes are not polluted by surface water.*"

3. POTENTIAL SOURCES OF FLOOD RISK

3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the Site in its current condition, and the impacts which the Proposed Development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the Proposed Development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial and Tidal (Main Rivers)			X		The Site is located in Flood Zones 2 and 3 attributed to the River Trent. Updated hydraulic model outputs from the EA Tidal Trent (2023) model shows the site is situated outside of all modelled fluvial events including the 1 in 100-year + 29% design event (with 1 in 2-year tidal Influence). The Site is removed from the 1 in 100-year + 29% design event floodplain when considering the residual risk breach scenario.
			X		Updated hydraulic model outputs from the EA Tidal Trent (2023) model shows the Site is removed from the tidal dominated floodplain extents in all modelled events, including the 1 in 200-year event (2125 Upper End, with 1 in 2-year fluvial Influence). The Site is partially impacted during the residual risk breach scenario in the extreme 1 in 200-year 2125 Upper End event.
Artificial (IDB Drains)			X		Land drainage modelling undertaken by Mott MacDonald within the Lincolnshire Lakes AAP FRA (2019) demonstrates that the existing IDB pumped system is capable of managing flood risk.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Canals			X		The Stainforth and Keadby Canal is located approximately 3.1km northwest of the site. In the event of a breach or overtopping event, flows are expected to be conveyed in an easterly direction and intercepted by the River Trent.
Pluvial runoff			X		The Site is shown to be at a low risk of pluvial flooding.
Groundwater	X				The Site is shown to fall within an area predicted to be at a high susceptibility to groundwater flooding.
Reservoirs and waterbodies				X	The Site is shown to fall outside of the area at risk of reservoir failure for both 'dry-day' and 'wet-day' scenarios. The Site is considered to be at a low risk of flooding from surrounding large waterbodies.
Sewers			X		In the event of exceedance, flows from nearby sewers could be directed towards the Site. However, flows are expected to be intercepted by the surrounding IDB drains.
Effect of Development on Wider Catchment			X		The Proposed Development will not result in impedance of flow routes or loss of floodplain.
		X			The Proposed Development will increase the area of impermeable surfaces leading to a potential increase in runoff prior to mitigation.

Fluvial and Tidal Flood Risk

3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

3.3 River systems may also be subject to tidal influences. Inundation of low-lying areas may occur where river systems are influenced by seasonal high tides, storm surges and storm driven wave action.

Historical Flooding

3.4 The EA Recorded Flood Outlines mapping shows three previously recorded flood outlines have impacted the site in March 1947. All three events were attributed to the tidal Trent exceeding its channel capacity when no raised defences were present. An extract of mapping is included as **Figure 3.1**.

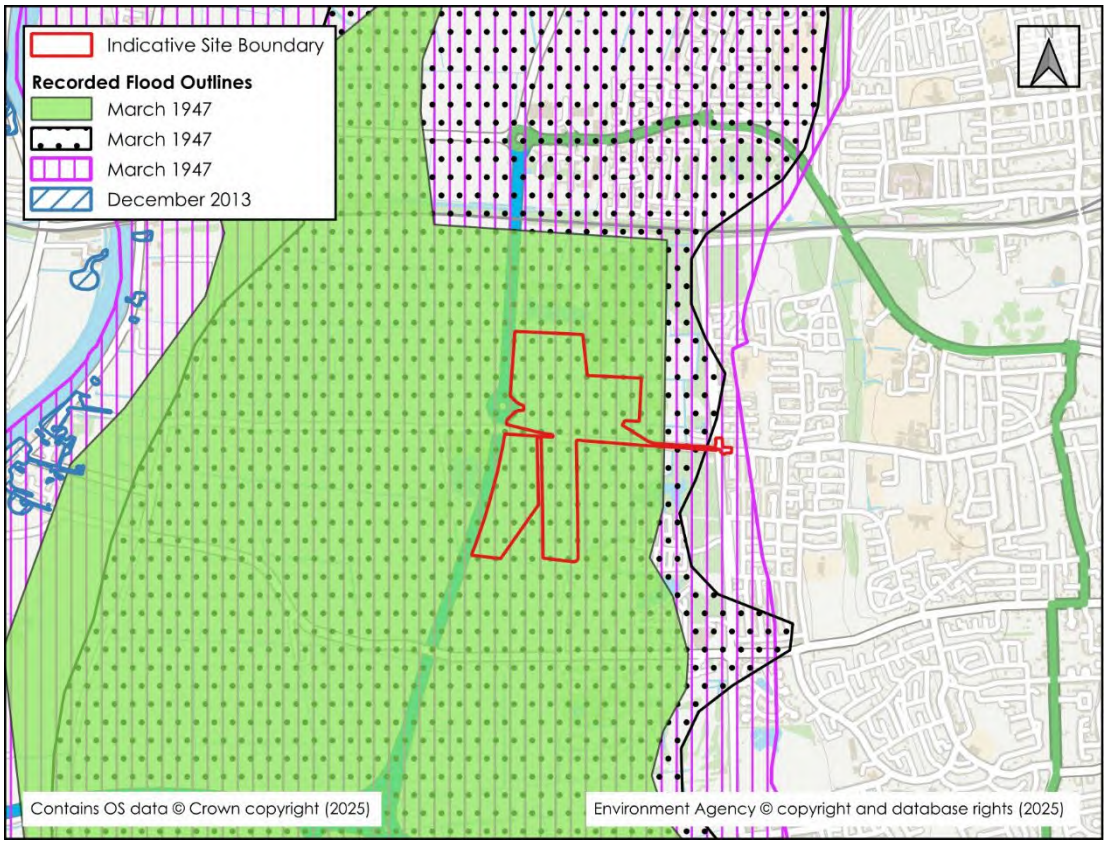


Figure 3.1: EA Recorded Flood Outlines

3.5 The North Lincolnshire PFRA states that widespread flooding occurred in June 2007 attributed to intense rainfall. Past flooding mapping included within the PFRA shows the site was not significantly affected.

3.6 Interactive mapping prepare by North Lincolnshire Council as part of the North and North East Lincolnshire SFRA shows there have been no previously recorded flood events which have impacted the Site, excluding those reported by the EA.

Main Rivers

3.7 The Site is located approximately 2.1km east of the River Trent, which is a designated EA Main River. The River Trent is tidally influenced by the Humber Estuary from the mouth of the river to Cromwell Lock, located approximately 48km south of the Site. Along this reach, flooding can be caused by a combination of high tides and abnormal river flows following a significant storm event.

3.8 The Site is shown to be located within Flood Zones 2 and 3 attributed to the River Trent, which is land at a medium to high risk of fluvial / tidal flooding. The Flood Zone 2 extent appears to correlate with the EA Recorded Flood Outline attributed to flooding of the River Trent in March 1947.

3.9 The Flood Map for Planning also identifies the Site to be located in an area where there is a reduction in risk of flooding from rivers and sea due to defences. Specifically, the River Trent defences at this location offer a 1 in 100-year Standard of Protection (SoP). The DEFRA Asset Information and Maintenance System (AIMS)[15] define the defences as embankments and spillways which were reported to have been installed in 2013.

3.10 To assess the risk of fluvial and tidal flooding to the site over the lifetime of development, the Tidal Trent (2023) hydraulic model has been obtained from the EA and updated by BWB Consulting.

EA Tidal Trent 2023 Model

3.11 The EA provided the Tidal Trent (2023) hydraulic model for use within this study. The model was updated by Jacobs in 2023 with updates for the latest Extreme Water Level data and to understand the risk from potential breaches of defences.

3.12 The model has since been updated by BWB Consulting in December 2024 to run in the latest software, include the site-specific topographical data and apply the latest climate change allowances. Aside from these changes, the EA provided modelling information and approach was retained. Further information is outlined within the accompanying hydraulic modelling technical note (reference: LLP1-BWB-ZZ-XX-RP-YE-0002_TN1), included as **Appendix 4**.

Fluvial Dominated Flood Risk (Defended Conditions)

3.13 The updated model was simulated for the 1 in 30-year, 1 in 100-year, 1 in 100-year +29% climate change and 1 in 1000-year events, inclusive of a 1 in 2-year tidal surge applied to all events. Baseline fluvial defended model extents are shown within **Figure 3.2**.

[15] AIMS Spatial Flood Defences: https://environment.data.gov.uk/asset-management/id/asset/51447 (Department for Environment Food & Rural Affairs, 2021)

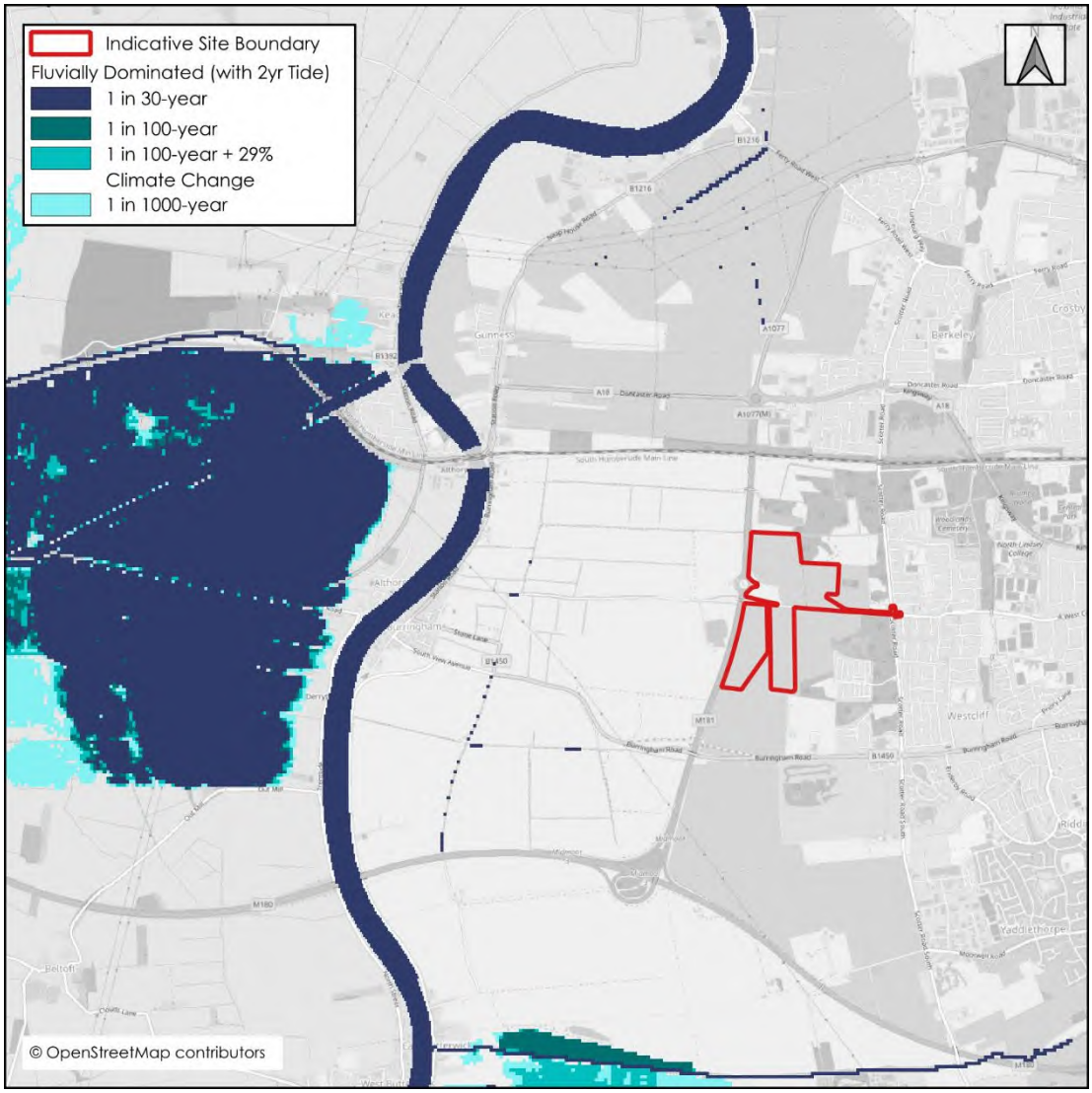


Figure 3.2: Fluvial Dominated Baseline Flood Extents

3.14 The Site is shown to be removed from the fluvial dominated floodplain in all modelled events. The modelled floodplain extents, including the 1 in 100-year + 29% design event, remain within the River Trent channel in proximity to the Site. This is expected to be as a result of the defences on the right bank of the River Trent which are understood to have crest levels of 6.1m AOD to 6.4m AOD.

3.15 Overall, the Site is considered to be at a low risk of fluvial flooding attributed to the River Trent in the defended conditions.

Tidal Dominated Flood Risk (Defended Conditions)

3.16 The updated model was also simulated for the 1 in 200-year and 1 in 200-year 2125 Higher Central and Upper End scenarios, inclusive of a 1 in 2-year fluvial flow applied to all events. Baseline tidal defended model extents are shown within **Figure 3.3**.

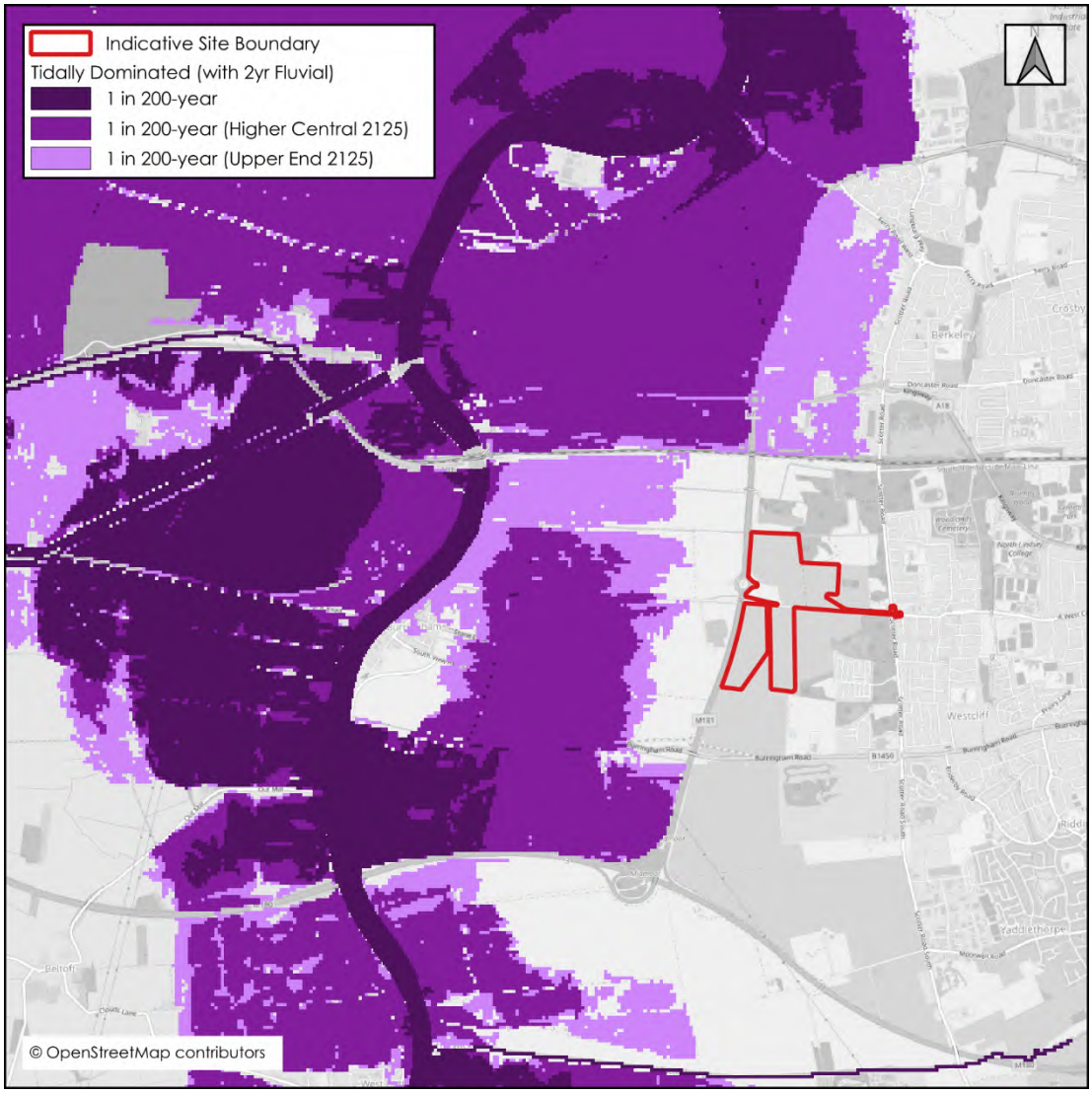


Figure 3.3: Tidal Dominated Baseline Flood Extents

3.17 The Site is also shown to be removed from the tidal dominated floodplain extents in all modelled events. The floodplain does exceed the right bank of the River Trent in proximity to the Site location; however, the M181/A1077(M) is a topographical barrier and therefore the floodplain extents do not impact the Site.

3.18 During the extreme 1 in 200-year 2125 Upper End event, the peak flood level closest to the Site is 1.94m AOD. Beyond the IDB drains and isolated low spots, the Site is shown to be raised above this level, based on the topographical survey.

3.19 Overall, the Site is considered to be at a low risk of tidal flooding attributed to the River Trent.

Breach Scenario

3.20 In order to understand the residual risk to the Site in the event of a breach of the River Trent defences, additional hydraulic modelling scenarios were undertaken.

3.21 Consultation with the EA in November 2024 confirmed that a new breach event had been simulated which was not provided as part of the original Tidal Trent 2023 model issue. Therefore, the EA provided the associated model files for Breach location 43 and noted that the study should incorporate this breach if it provided the most conservative results at the study site.

3.22 A breach scenario has been undertaken at location 43 for both the fluvial and tidal dominated scenarios, the breach model extents are shown within **Figure 3.4** and **Figure 3.5**.

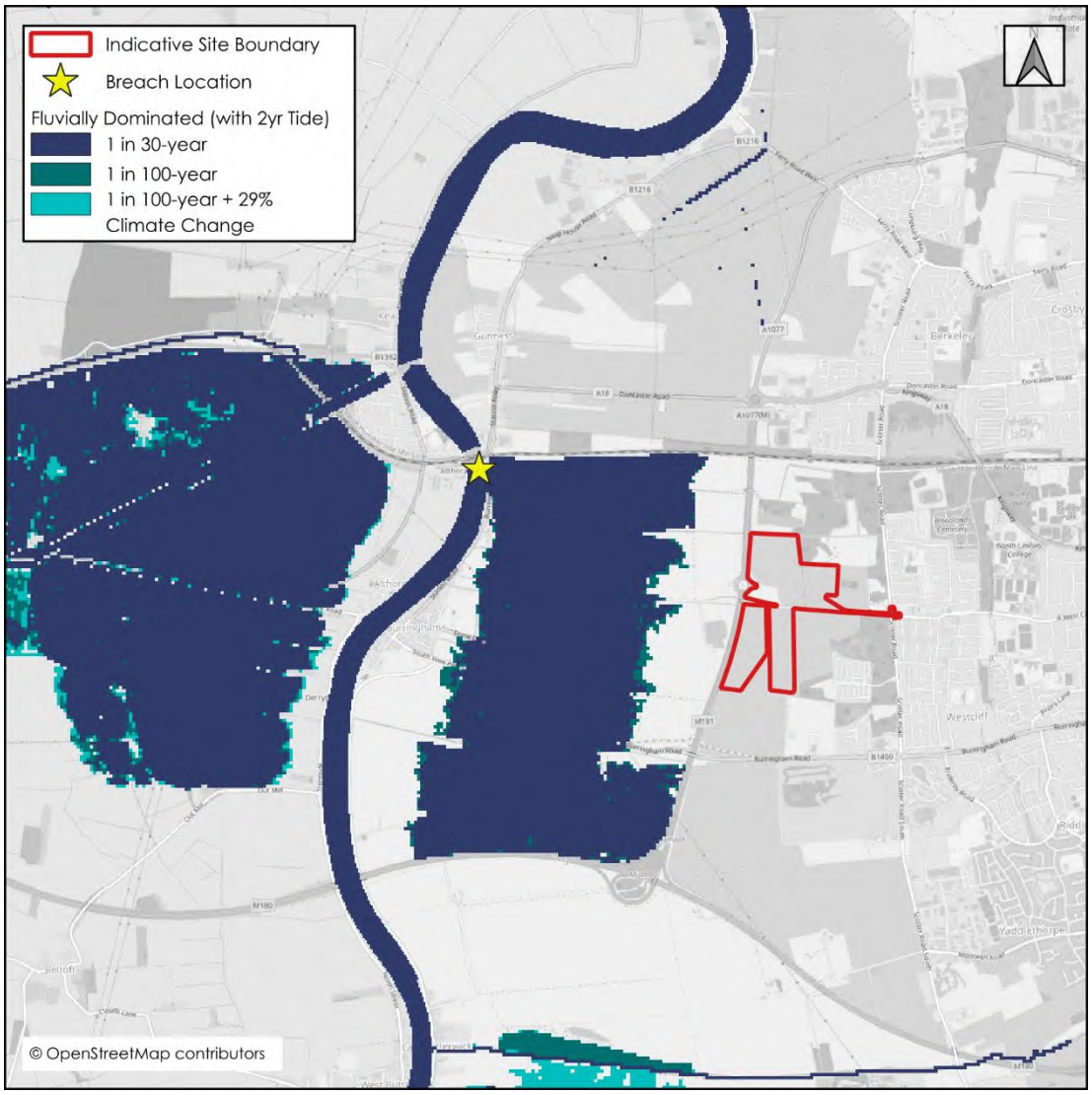


Figure 3.4: Fluvial Dominated Breach Flood Extents

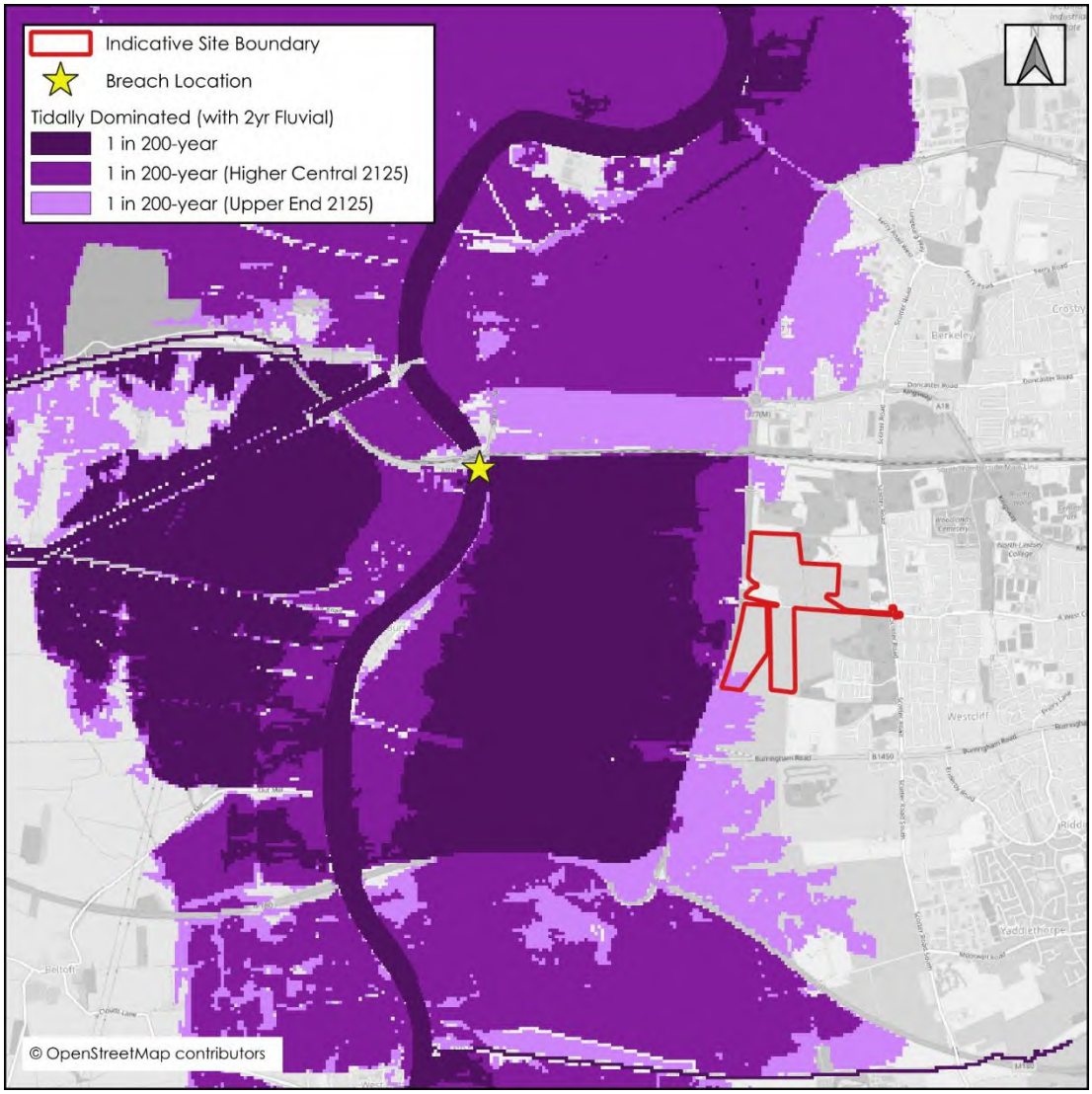


Figure 3.5: Tidal Dominated Breach Flood Extents

3.23 The results show the Site is removed from the fluvial dominated breach scenario extents, with the M181/A1077(M) and intervening ground levels acting as a topographical barrier between the floodplain and the Site.

3.24 The south of the Site is shown to be partially impacted during the extreme tidal dominated 1 in 200-year 2125 Upper End event. The peak flood level within the Site is approximately 2.50m AOD. Based on the existing topography, the areas of proposed development are shown to be removed from flooding.

3.25 Overall, there is a residual risk of flooding during the tidal dominated 1 in 200-year 2125 Upper End event. The River Trent defences are expected to be subject to a regular programme of inspection and maintenance works, such that the actual probability of a breach occurring is low. Mitigation measures for the residual risk are discussed in **Section 4**.

Flood Risk from Artificial Sources

IDB Drains

3.26 A network of IDB drains is shown to be present within and surrounding the Site. The IDB drains are understood to be maintained by the Scunthorpe and Gainsborough Water Management Board who maintain the water levels and pumping stations which ultimately outfall to the River Trent. The mapped extents of the IDB maintained watercourses in proximity to the Site are shown in **Figure 3.6**.

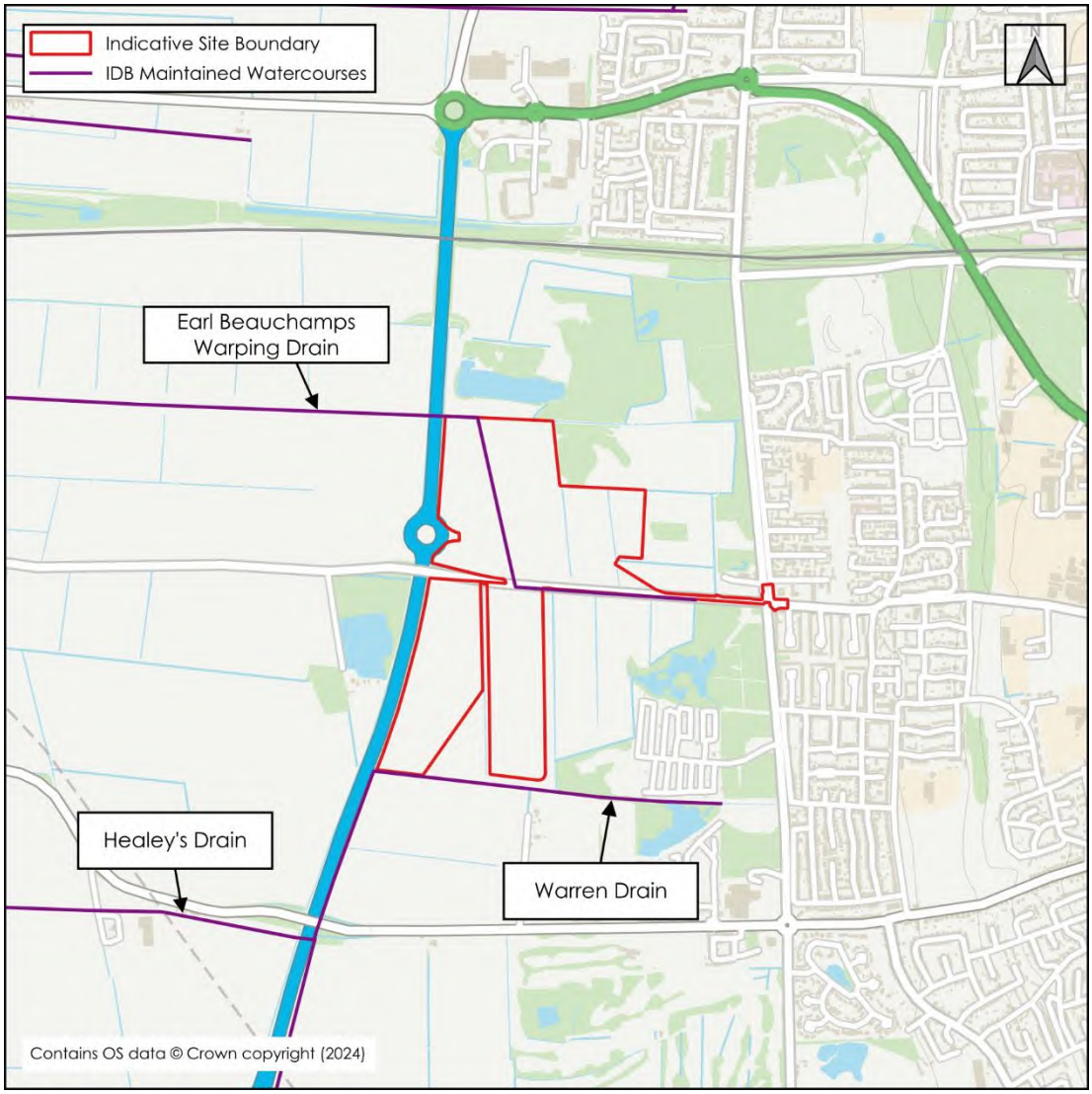


Figure 3.6: Mapped Extents of IDB Maintained Watercourses

3.27 The Flood Map for Planning does not identify watercourses with contributing catchment areas of less than 3km^2. In the absence of Flood Zones, the EA Risk of Flooding from Surface Water (RoFSW) mapping dataset can provide an indication of the potential floodplain associated with the IDB drains. An extract of mapping is included as **Figure 3.7**.

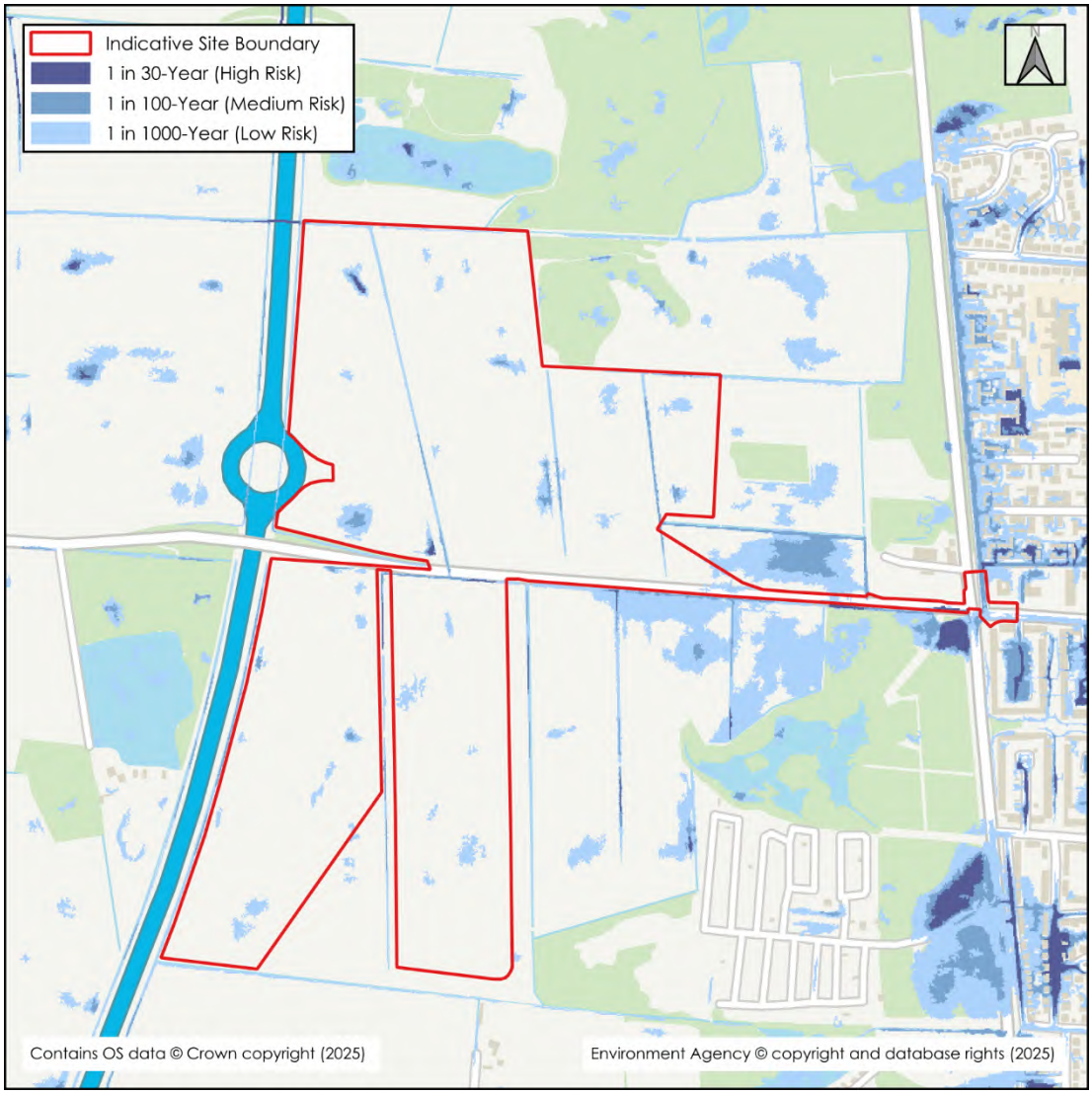


Figure 3.7: Risk of Flooding from Surface Water Mapping

3.28 The mapping shows that the surface water extents attributed to the drains pose an overall low risk of flooding to the Site, with low to high risk flows shown to be contained to the channels. Where low risk flows (1 in 1000-year) are shown away from the drain alignments, these are associated with topographical low points at the Site.

3.29 Land drainage hydraulic modelling has been undertaken by Mott MacDonald (reference: 358811-MMD-XX-00-RP-C-0023) in support of the Lincolnshire Lakes AAP Flood Risk Assessment to determine the risk associated with artificial drainage. The model outputs demonstrate that the existing pumped IDB system is capable of handling runoff from the Lincolnshire lakes area, and adequately mitigates flood risk, as long as a sufficient surface water drainage strategy is implemented based on the Lincolnshire Lakes AAP guidance.

3.30 Overall, IDB drains are considered to pose a low risk of flooding to the Site.

Canals

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

3.32 Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

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

3.34 The Stainforth and Keadby Canal is located approximately 3.1km northwest of the Site. A review of EA LiDAR data shows that the canal is situated at approximately the same level as the Site, ranging from 2m AOD to 4m AOD.

3.35 In the event of a breach or overtopping event, flows are expected to be conveyed in an easterly direction in accordance with the local topography and intercepted by the River Trent. Based on the Tidal Trent (2023) Model outputs, the River Trent is considered to pose a low risk of flooding to the site.

3.36 The North Lincolnshire PFRA states that British Waterways are not aware of any records of historical flooding associated with the canal.

3.37 Overall, the Site is considered to be at a low risk of flooding from canals.

Pluvial Flood Risk

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

3.39 RoFSW mapping has been collated and published by the EA, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 3.7**.

3.40 The mapping shows the Site is at an overall low risk of pluvial flooding, with small, localised areas of low to high risk ponding shown across the Site associated with existing topographical low points identified on the topographical survey.

3.41 Low to high risk surface water flow routes are shown to align with the IDB drains as discussed in the **Flood Risk from Artificial Sources** section above.

3.42 The Site access route via the M181/A1077(M) to the west is shown to be at a low risk of surface water flooding.

3.43 There are no previously recorded surface water flood events which have impacted the Site or surrounding area within the north Lincolnshire PFRA or the North and North East Lincolnshire SFRA.

3.44 Overall, the Site is considered to be at a low risk of pluvial flooding.

Groundwater Flood Risk

3.45 Groundwater flooding occurs when the water table rises above ground elevations, or it rises to depths containing basement level development. It is most likely to happen in low lying areas underlain by permeable geology. This is most common on regional scale chalk aquifers, but there may also be a risk on sandstone and limestone aquifers or on thick deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.46 BGS mapping shows the Site is predominantly underlain by Mercia Mudstone Group (Mudstone), with a small portion of the eastern boundary underlain by Penarth Group (Mudstone). The EA class the Mercia Mudstone Group as a Secondary B Aquifer, whereas the Penarth Group is classified as a Secondary (Undifferentiated) Aquifer.

3.47 Secondary B Aquifers comprise lower permeability layers that may store and yield limited amounts of groundwater. Secondary (undifferentiated) aquifers occur where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.

3.48 Superficial deposits of Warp (Clay and Silt) and Sutton Sand Formation (Sand) are mapped within the Site. These are designated by the EA as Secondary A Aquifers which comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.

3.49 The 'Areas Susceptible to Groundwater Flooding' mapping included within the North Lincolnshire PFRA show the site is situated across cells with >=75% of the area susceptible to groundwater flooding. It should be noted that the mapping is based on strategic scale mapping that uses a 1km^2 grid. It identifies areas susceptible to flooding from groundwater at a broad scale on the basis of geological and hydrogeological conditions. Therefore, the classification could potentially be based on another area within the particular cell. The high groundwater susceptibility is likely to be in continuity with the water levels of the River Trent and IDB drains.

3.50 BGS Groundwater Flooding data, included as **Figure 3.8**, shows the majority of the Site is situated within an area with the potential for groundwater flooding to occur at surface.

Figure 3.8: BGS Groundwater Flooding

3.51 A Phase 2 Geo-Environmental Assessment was undertaken by BWB Consulting in 2023 (reference: LLP1-BWB-XX-XX-T-G-0002_Ph2). A number of intrusive trial pits were taken at the site, with water strikes recorded between 1.50 metres (m) and 2.70m below ground level (bgl). Subsequent groundwater monitoring showed groundwater levels at the site to range between 0.94m and 1.62m bgl.

3.52 In the event of groundwater exceedance, flows are expected to be routed towards the nearest IDB drains following the general topography.

3.53 There are no previously recorded groundwater flood events which have impacted the Site or surrounding area within the North Lincolnshire PFRA or the North and North East Lincolnshire SFRA.

3.54 Overall, based on the available data, the Site is considered to be at a high risk of groundwater flooding. Recommended mitigation measures to address the groundwater flood risk are discussed in **Section 4**.

Flood Risk from Reservoirs and waterbodies

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

3.56 To help identify this risk, reservoir failure flood risk mapping has been prepared by the EA, this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide.

3.57 There are two flooding scenarios shown on the reservoir flood maps: a 'dry-day' and a 'wet-day'. The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet-day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme flood.

3.58 The reservoir failure flood risk mapping shows the Site falls outside of the area at risk of reservoir failure for both 'dry-day' and 'wet-day' scenarios.

3.59 OS mapping shows a number of large waterbodies to be situated in close proximately to the Site location. Given the flat nature of the Site and surrounding topography, if an exceedance event were to occur, flows from the waterbodies are expected to be routed towards the nearest IDB drains following the general topography.

3.60 Overall, the Site is considered to be at a low risk of flooding from reservoirs and large waterbodies.

Flood Risk from Sewers

3.61 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.62 The local sewerage undertaker is Severn Trent Water, a copy of their asset plans is included as **Appendix 5**.

3.63 The sewer records show a public surface water and foul water network is situated to the east of the Site, located within the existing residential development. Sewerage assets are shown to pass through the far eastern portion of the Site which overlaps with Scotter Road and West Common Lane.

3.64 Public surface water sewers are shown to be directed in a westerly direction towards the Site, and ultimately outfall to a wetland area and pond known as Brumby Common. Public foul sewers are shown to be directed in a south-westerly direction towards a pumping station located within an existing residential area, known as Parkland, located approximately 700m south of the Site.

3.65 Depth to invert level information is not available for the assets closest to the Site, however, depths to invert levels of the reported assets range between 1.5m to 4.3m for both public surface water and foul sewerage assets.

3.66 In the event of exceedance of the nearest assets, flows could be conveyed in a south-westerly direction towards the Site following the general topography. However, flows are expected to be intercepted by the surrounding IDB drains.

3.67 The Anglian Water and Severn Trent Water DG5 database is included as part of the North Lincolnshire PFRA, reporting historical sewer flooding between 1990 and 2011. The mapping included as part of the PFRA shows a number of previous flood events to have impacted the residential development to the east and immediate surrounding area, however, the magnitude and exact locations of flooding are not provided.

3.68 Overall, the Site is considered to be at a low risk of sewer flooding. Mitigation measures for the residual risk are discussed in **Section 4**.

Effect of Development on Wider Catchment

Displacement of Floodplain

3.69 The Site is located outside of the fluvial dominated 1 in 100-year +29% climate change event, inclusive of a 1 in 2-year tidal surge event as well as the 1 in 200-year 2125 Upper End scenario, inclusive of a 1 in 2-year fluvial flow event attributed to the River Trent in the defended conditions. Therefore, the Site is not considered to displace the fluvial or tidal floodplain.

Development Land Use/Drainage Considerations

3.70 The Proposed Development will increase the area of impermeable surfaces at the Site. This will result in an increase in surface water runoff, which could increase flood risk downstream unless properly mitigated. Appropriate surface water management is discussed in **Section 4**.

4. FLOOD RISK MITIGATION

4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the Site and the Proposed Development. This section of the FRA sets out the mitigation measures which are to be incorporated within the Proposed Development to address and reduce the risk of flooding to within acceptable levels. Mitigation measures set out below are for the outline aspects of the development and are subject to further detail at the reserved matters stage.

Sequential Arrangement

4.2 The Site is shown to be located outside of the fluvial dominated 1 in 100-year +29% climate change event, inclusive of a 1 in 2-year tidal surge event as well as the 1 in 200-year 2125 Upper End scenario, inclusive of a 1 in 2-year fluvial flow event attributed to the River Trent under the defended conditions.

4.3 The Site is partially impacted during the tidal dominated 1 in 200-year 2125 Upper End breach event. However, this is a residual risk scenario and the area at risk is removed from the proposed developable area shown in **Figure 1.2**. The Site is also considered to be at a low risk of surface water flooding.

Development Levels

4.4 As outlined within the Lincolnshire Lakes AAP Flood Risk Assessment, finished flood levels for 'More Vulnerable' development should be set a minimum of 300mm above the tidal 1 in 200-year event inclusive of climate change. This level should also be reviewed against the fluvial 1 in 100-year plus an allowance for climate change level to demonstrate the developments' resilience to flooding; however, the Proposed Development is shown to be removed from the fluvial floodplain.

4.5 In accordance with the guidance, the peak flood level in proximity to the Site during the 1 in 200-year 2125 Upper End event is 1.94m AOD. Therefore, the minimum finished floor level should be 2.24m AOD.

4.6 Based on the topographical survey, where Proposed Development is located, ground levels are already sufficiently raised above the peak flood level. Therefore, it is recommended that finished floor levels are raised a minimum of 150mm above existing ground levels to help mitigate against any residual flood risk.

4.7 Ground levels should be profiled to encourage overland flows away from the built development and towards the nearest drainage point.

Groundwater Considerations

4.8 Based on the available data, the Site is shown to be at a high risk of groundwater flooding. Should shallow groundwater be encountered during construction, a groundwater specialist should be consulted, and appropriate dewatering should be employed as necessary. Foundation types should be designed with appropriate consideration of the on-site groundwater levels.

Safe Access and Egress

4.9 The Site access route via the M181/A1077(M) shown to be at a low risk of flooding from all sources. Therefore, safe access and egress can be achieved.

4.10 The Site access route via the M181/A1077(M) is shown to be partially impacted during the tidal dominated 1 in 200-year 2125 Upper End breach event; however, this is considered to be an extreme event and is a residual risk.

Proposed Crossings

4.11 It is proposed to implement additional crossings over the IDB drains within the site to facilitate access. At this stage, the proposed culverts are shown with a minimum diameter of 1.5m which is in accordance with the existing upstream culverts, as shown on the topographical survey (**Appendix 1**). The proposed culverts will therefore have the same conveyance capacity as the nearest upstream structures.

Flood Contingency Plan and Evacuation Procedures

Flood Warning and Evacuation

4.12 The Site is located within an EA Flood Warning area known as the 'River Trent at Scunthorpe'. It is recommended that the residents and occupiers sign up to receive EA Flood Warnings so that appropriate preparation can be made in the event of a potential flooding incident.

Safe Refuge

4.13 In the event of flooding, safe refuge can be achieved within the Proposed Development as all development is sufficiently raised above the nearest 1 in 200-year 2125 Upper End event flood level in the tidal dominated, defended conditions.

Surface Water and Foul Water Drainage

4.14 To mitigate the Proposed Development's impact on the current runoff regime, it is proposed to incorporate surface water attenuation and storage as part of the development proposals.

4.15 In brief, the Proposed Development will continue to discharge surface water to the local watercourses at the IDB drainage rate of 1.4l/s/ha. Attenuated surface water storage will be provided in the form of a SuDS detention basin with capacity for the 1 in 100-year storm with an allowance for climate change.

4.16 The development should be designed with exceedance in mind, and the Site topography should be used to convey excess overland flows towards the attenuation points.

4.17 It is proposed to drain used water from the Proposed Development separately to surface water.

4.18 Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement (reference: LLP1-BWB-ZZ-XX-RP-W-0003_SDS).

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated PPG. The FRA has been produced on behalf of HL in respect of a planning application for the proposed residential led development known as Planning Application 1 at Lincolnshire Lakes (North), Scunthorpe.

5.2 This FRA is intended to support a hybrid planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage.

5.3 This report demonstrates that the Proposed Development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**:

Table 5.1: Summary of Flood Risk Assessment

Flood Source	Risk & Proposed Mitigation Measures
Fluvial and Tidal	The Site is situated across Flood Zones 1, 2 and 3; however, areas of Flood Zone 3 are shown to benefit from a reduced risk of flooding due to river / sea defences. To assess the risk of fluvial and tidal flooding to the Site over the lifetime of development, hydraulic model information for the Tidal Trent (2023) Model has been obtained from the EA and updated by BWB Consulting. The Site is shown to be located outside of all modelled events for both fluvial dominated and tidal dominated scenarios in the normal, defended conditions. Breach scenarios have also been undertaken to determine the risk to the Site during a residual flood risk event for both the fluvial and tidal dominated scenarios. The results show the Site is removed from the fluvially dominated breach scenario, whilst the south of the Site is shown to be partially impacted during the extreme tidally dominated 1 in 200-year 2125 Upper End event. However, based on the existing topography, the areas of proposed development are shown to be removed from flooding. In accordance with the Lincolnshire Lakes AAP Flood Risk Assessment guidance, the minimum finished floor level should be 2.24m AOD (300mm above the 1 in 200-year tidal flood level including climate change). Existing site ground levels are shown to be sufficiently raised above this level. Therefore, it is recommended that finished floor levels are raised a minimum of 150mm above existing ground levels to help mitigate against any residual flood risk.
Groundwater	Based on the available data, the Site is considered to be at a high risk of flooding from groundwater. Should shallow groundwater be encountered during construction, a groundwater specialist should be consulted, and appropriate dewatering should be employed as necessary. Foundation types should be designed with appropriate consideration of the on-site groundwater levels.
Other Sources	The Site has been assessed against other sources of flood risk including canals, reservoirs and large waterbodies, surface water and sewers. The overall risk posed by these sources is considered low. Raising of levels and profiling of external levels will provide a level of mitigation for residual risks from these sources.

Impact of the Development	The Site is located outside of the fluvial dominated 1 in 100-year +29% climate change event, inclusive of a 1 in 2-year tidal surge event as well as the 1 in 200-year 2125 Upper End scenario, inclusive of a 1 in 2-year fluvial flow event attributed to the River Trent in the defended conditions. Therefore, the Site is not considered to displace the fluvial or tidal floodplain. The Proposed Development will increase the area of impermeable surfaces, increasing the rate of runoff from the Site prior to mitigation. Therefore, it is proposed to incorporate surface water attenuation as part of the development proposals. Foul water from the Proposed Development is expected to be drained separately to surface water.
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

5.4 In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the Proposed Development could proceed without being subject to significant flood risk. Moreover, the Proposed Development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the Site.

APPENDICES

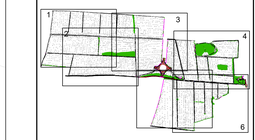
Appendix 1: Topographical Survey

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BT1	487175.553	409527.238	4.109
BT2	487177.791	409515.306	5.715
BT3	487188.029	409506.115	4.254
BWB01	486856.179	409481.027	2.679
BWB02	486576.583	409501.442	2.723
BWB03	486440.018	409511.019	2.944
BWB05	485784.931	409560.844	2.472
BWB06	485660.073	409566.250	2.281

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities

Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	MK	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Cali Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	Gas	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
Elec	Electric	GY	Gully	TS	Traffic Signal
EP	Electricity Post	Ht	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
FH	Fire Hydrant	IFL	Internal Floor Level	WM	Water Meter
FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev.
P2	23.10.24	Watercourse Details Added	DS	SS
P1	10.07.23	Provisional Issue	BC	SS

Issues & Revisions

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Client
Hargreaves Services PLC

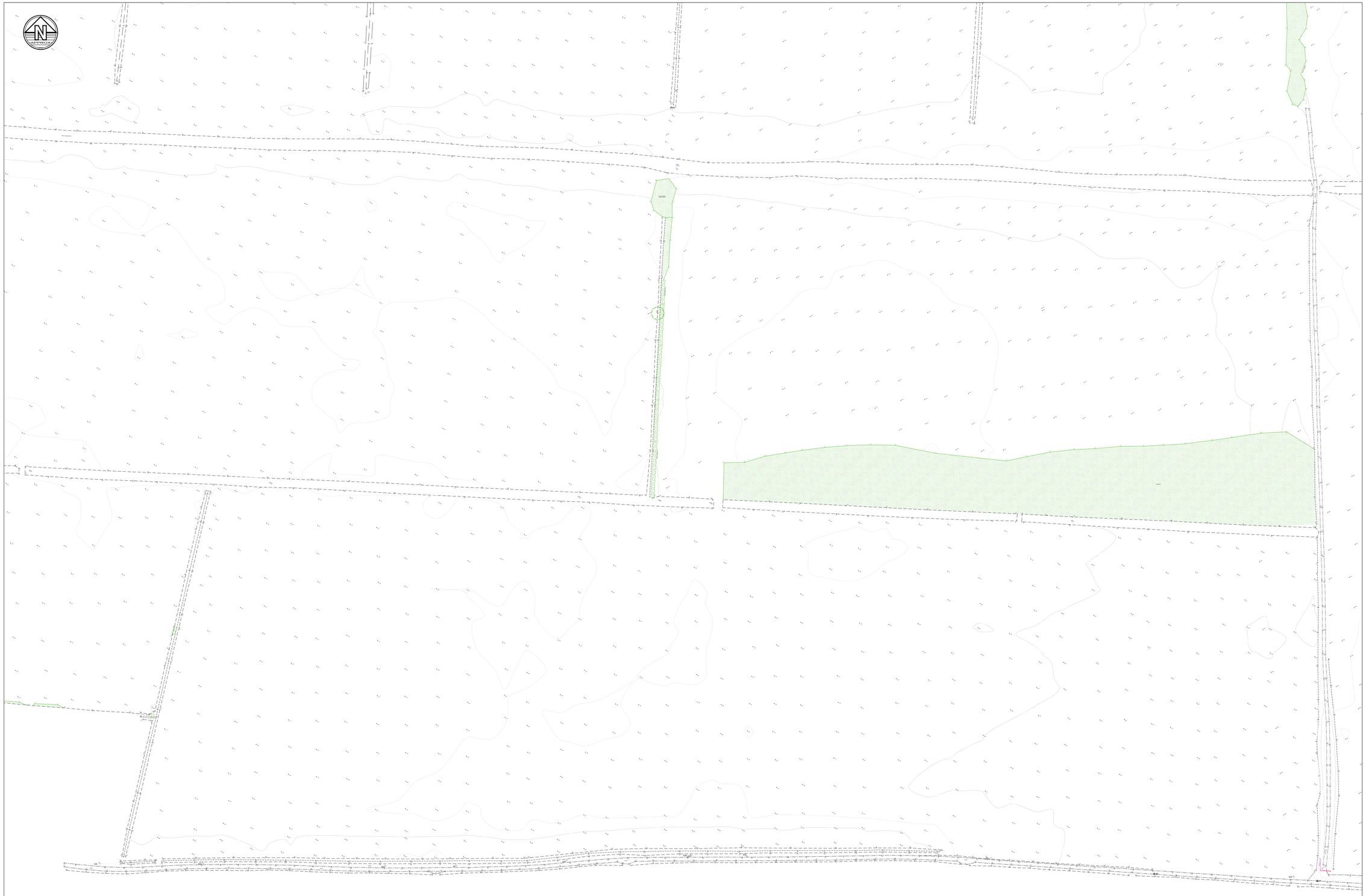
Project Title
Lincolnshire Lakes, Scunthorpe

Drawing Title
Existing SitePlan Sheet 1 of 6

Drawn:	B. Connelly		Reviewed:	S. Shreeves	
BWB Ref:	221423.00	Date:	10.07.23	Scale@A0:	1:1000

Drawing Status
Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LIN-BWB-00-01-DR-G-0001	**S2**	**P2**



Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BT1	487175.553	409527.238	4.109
BT2	487177.791	409515.306	5.715
BT3	487188.029	409506.115	4.254
BWB01	486856.179	409481.027	2.679
BWB02	486576.583	409501.442	2.723
BWB03	486440.018	409511.019	2.944
BWB05	485784.931	409560.844	2.472
BWB06	485660.073	409566.250	2.281

Notes

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3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
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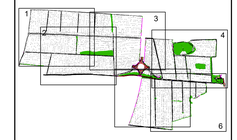
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities

Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
1 Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	MK	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Cat Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	Gas	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
Elec	Electric	GY	Gully	TS	Traffic Signal
EP	Electricity Post	Ht	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
FH	Fire Hydrant	IFL	Internal Floor Level	WM	Water Meter
FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	23.10.24	Watercourse Details Added	DS	SS
P1	10.07.23	Provisional Issue	BC	SS

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Client
Hargreaves Services PLC

Project Title
Lincolnshire Lakes, Scunthorpe

Drawing Title
Existing SitePlan Sheet 2 of 6

Drawn:	B. Connelly		Reviewed:	S. Shreeves	
BWB Ref.	221423.00	Date:	10.07.23	Scale@A0:	1:1000

Drawing Status
Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LIN-BWB-00-02-DR-G-0001	S2	P2

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BT1	487175.553	409527.238	4.109
BT2	487177.791	409515.306	5.715
BT3	487188.029	409506.115	4.254
BWB01	486856.179	409481.027	2.679
BWB02	486576.583	409501.442	2.723
BWB03	486440.018	409511.019	2.944
BWB05	485784.931	409560.844	2.472
BWB06	485660.073	409566.250	2.281

Notes

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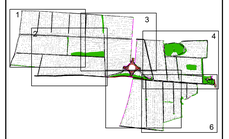
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities

Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
1 Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
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CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Cail Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	GA	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
Elec	Electric	GY	Gully	TS	Traffic Signal
EP	Electricity Post	Ht	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
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FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	23.10.24	Watercourse Details Added	DS	SS
P1	10.07.23	Provisional Issue	BC	SS

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Client
Hargreaves Services PLC

Project Title
Lincolnshire Lakes, Scunthorpe

Drawing Title
Existing SitePlan Sheet 3 of 6

Drawn:	B. Connelly		Reviewed:	S. Shreeves	
BWB Ref:	221423.00	Date:	10.07.23	Scale@A0:	1:1000

Drawing Status
Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LIN-BWB-00-03-DR-G-0001	S2	P2

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BT1	487175.553	409527.238	4.109
BT2	487177.791	409515.306	5.715
BT3	487188.029	409506.115	4.254
BWB01	486856.179	409481.027	2.679
BWB02	486576.583	409501.442	2.723
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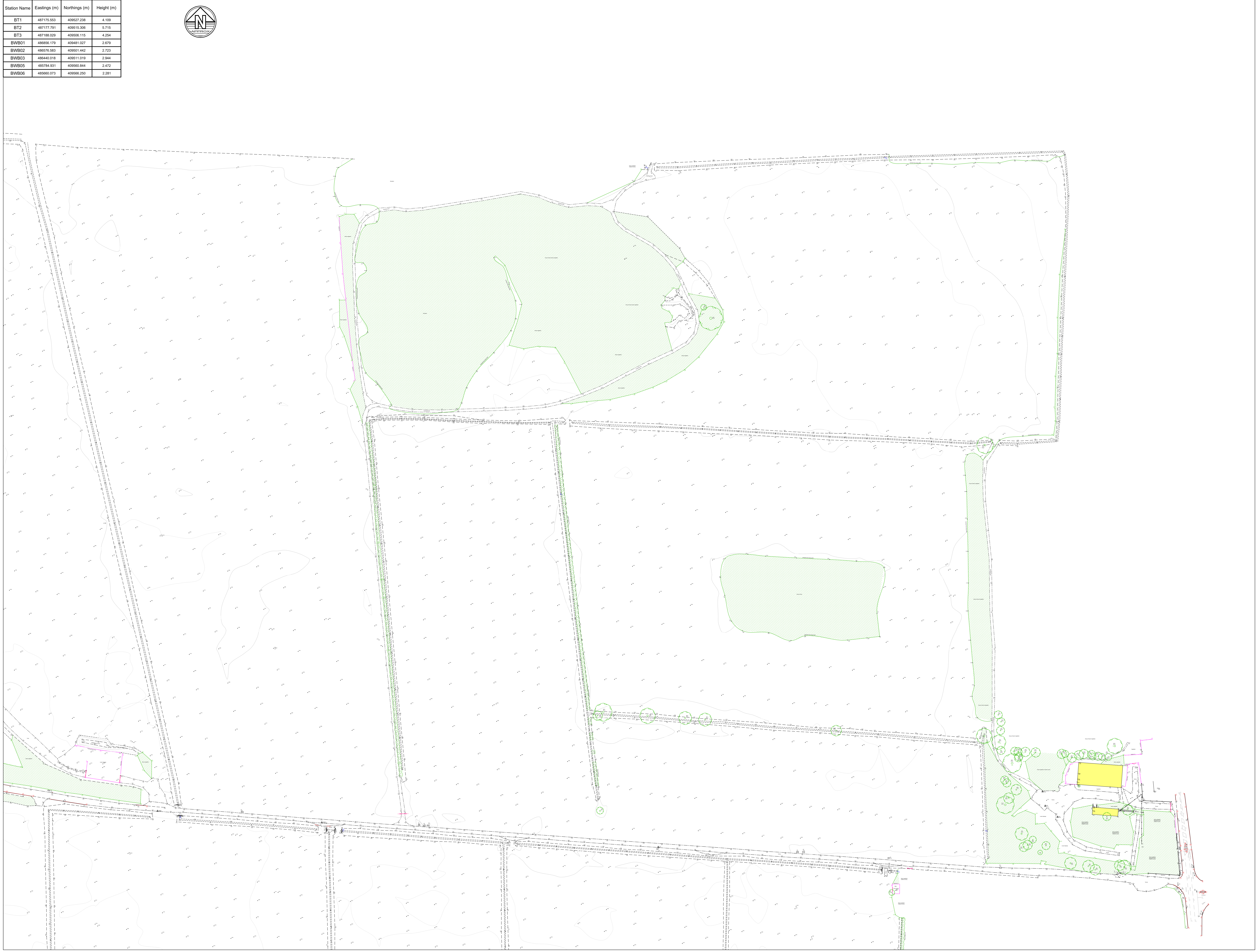
BWB06	485660.073	409566.250	2.281



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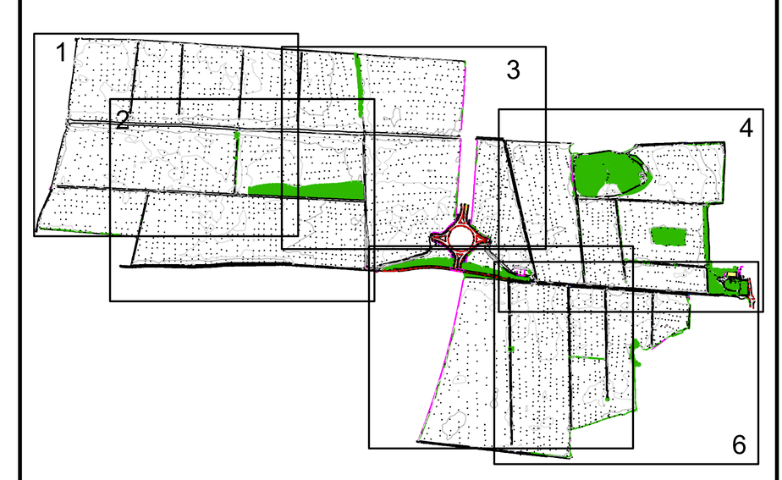
8. OS license number: 100022432

Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- 0.25 Flow direction and pipe diameter
- 1 Station and Name
- BH 1 Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- +50.00 Spot Level
- Assumed Surface Water Drainage Line
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AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
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BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
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C	Crest	FMR	Fence Metal Railing	PT	Post
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CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
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CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole		
		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
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EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	23.10.24	Watercourse Details Added	DS	SS
P1	10.07.23	Provisional Issue	BC	SS

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Client

Hargreaves Services PLC

Project Title

Lincolnshire Lakes, Scunthorpe

Drawing Title

Existing SitePlan Sheet 4 of 6

Drawn:	B. Connelly	Reviewed:	S. Shreeves
BWB Ref:	221423.00	Date: 10.07.23	Scale@A0: 1:1000

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LIN-BWB-00-04-DR-G-0001	S2	P2

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BT1	487175.553	409527.238	4.109
BT2	487177.791	409515.306	5.715
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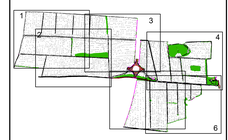

Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
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Overhead Utilities

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0.25 Flow direction and pipe diameter
Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
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Body of Water from OS
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Rev	Date	Details of issue / revision	Drw	Rev
P2	23.10.24	Watercourse Details Added	DS	SS
P1	10.07.23	Provisional Issue	BC	SS

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Client
Hargreaves Services PLC

Project Title
Lincolnshire Lakes, Scunthorpe

Drawing Title
Existing SitePlan Sheet 5 of 6

Drawn:	B. Connelly		Reviewed:	S. Shreeves	
BWB Ref:	221423.00	Date:	10.07.23	Scale@A0:	1:1000

Drawing Status
Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
LIN-BWB-00-05-DR-G-0001	S2	P2