



Flood Risk Assessment

Queens Building

Actiform, Lowlands Road, Mirfield, WF14 8LX

April 2023

ENVIRONMENTAL AND
SUSTAINABILITY CONSULTANTS

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1.00 Introduction & Executive Summary

- 1.01 Encon Associates have prepared this Flood Risk Assessment to support a retrospective planning application for an extension to an existing commercial development (the “Development”) at Actiform, Lowlands Road, Mirfield (the “Site”). The Site lies within the administrative area of Kirklees Council as the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA). The local water and sewerage services provider is Yorkshire Water.
- 1.02 The National Planning Policy Framework (NPPF) requires site-specific Flood Risk Assessment (FRA) for new development proposed on the floodplains of rivers, at risk of coastal flooding, or over one hectare in area. To comply with the NPPF, the FRA must demonstrate that the Development will be safe for its lifetime, taking account of the vulnerability of its users and the foreseeable impacts of climate change, without increasing flood risk elsewhere, and where possible reducing overall flood risk.
- 1.03 Throughout this report, references are made to the Calder Catchment Strategic flood Risk Assessment Volume 1 (April 2016) and Volume 2 (July 2019), referred to as the SFRA.
- 1.04 The proposed building will measure approximately 20.2m x 12.2m, resulting in a footprint and roof area of no more than 247m². A floor space of less than 250m² means that this Development is classed as a minor extension in planning terms and should follow the Environment Agency’s standing advice for minor extensions.
- 1.05 Overall flood risk from all sources is considered to be high, with the primary risk of flooding being fluvial in nature from the River Calder and Calder and Hebble Navigation. Flood risk as a result of overland surface water flows is also high due to the Site and surrounding topography.
- 1.06 Notwithstanding, the Development is a modest extension to the Site and recommendations have been made (in accordance with the Environment Agency’s standing advice for minor extensions, as far as reasonably practicable) to ensure that the Development is resilient to flooding and that the users of the Development will be safe from flooding.
- 1.07 Due to the nature of the Development proposals being less than 250m² and the pre-developed impermeable conditions yard area, it is considered that there will be no material change to the catchment area, discharge rate or discharge volume and that the provision of Sustainable Drainage Systems (SuDS) to manage surface water discharge rate and volume is not required.

2.00 Site Context

Topography

- 2.01 The site is located within an established commercial and industrial setting adjacent to the Calder and Hebble Navigation. The Site is accessed from a private road to the east of the junction with Lowlands Road and Hurst Lane, which opens up into a yard area, which forms the main body of the Site, as shown in **Figure 1**.
- 2.02 Site levels have been estimated using LiDAR (Light Detection and Resonance) elevation data and are contained in Appendix A. Levels range from a high point of approximately 45.0m AOD at the entrance from Hurst Lane to a low point of approximately 42.4m AOD along the eastern boundary of the Site. Levels within the Site generally fall from a high area in the northwest to a lower area in the south east. The private road falls from a high point of approximately 45.0m AOD at the entrance from Hurst Lane to approximately 43.5m AOD at the entrance to the yard area. The level of the top of bank along the boundary with the Calder and Hebble Navigation ranges from 43.5m AOD at the entrance to the yard area to approximately 43.0m AOD at the northeast corner of the Site.



Figure 1: Site boundary on aerial imagery (Google Earth)

- 2.03 The existing conditions of the site comprise an area of hardstanding associated with an existing industrial development, several modular buildings, a large warehouse/factory building, storage of completed modular buildings and materials and a recently constructed storage building (the Development). The Development is

estimated to have a finished floor level of approximately 42.9m AOD, based on a 300mm upstand above the lowest external ground level, which has been estimated as 42.6m AOD.



Figure 2: Development with approximately 300mm upstand above external ground level

Geology

- 2.04 According to BGS 1:50,000 scale mapping, the underlying geology is comprised of PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE. There are superficial deposits of ALLUVIUM - CLAY, SILT, SAND AND GRAVEL, which is to be expected in a valley setting.

Hydrogeology

- 2.05 BGS 1:625,000 scale mapping shows a moderately productive Principal bedrock aquifer associated with the PENNINE LOWER COAL MEASURES FORMATION and SOUTH WALES LOWER COAL MEASURES FORMATION (UNDIFFERENTIATED), summarised as *regional, cyclic multi-layered aquifer with moderate yields from sandstones and many springs, mine water quality poor but elsewhere reasonable*.
- 2.06 The Aquifer Designation Map for England shows the site to be within the area of a Secondary A bedrock aquifer and a Secondary A superficial drift aquifer. The site lies within an area mapped as Medium to High Groundwater Vulnerability. The site lies outside of any Source Protection Zones.
- 2.07 The Cranfield Soil and Agrifood Institute Soilscales map indicates that the site is within Soilscape 21, described as *“loamy and clayey floodplain soils with naturally*

high groundwater". It is also suggested that surface water run-off drains to local groundwater, in turn feeding into rivers.

Hydrology

- 2.08 To the north of the Site lies the Calder and Hebble Navigation. To the south of the Site, and separated by dense woodland, a railway line, existing industrial development and a flood storage area, is the River Calder, a designated statutory main river. The River Calder is under the authority of the Environment Agency, and the Calder and Hebble Navigation is under the authority of the Canal and Rivers Trust.
- 2.09 The Site is within the natural catchment of the Calder and Hebble Navigation and the River Calder.

3.00 Development Proposal

- 3.01 An extension to the existing commercial/industrial development within the Site is proposed. The extension is proposed to be a standalone building within the existing yard and storage area towards the eastern boundary of the Site and is proposed to consist of a flexible manufacturing space and flexible material storage space.
- 3.02 The proposed building will measure approximately 20.2m x 12.2m, resulting in a footprint and roof area of no more than 247m². A single floor level is proposed at ground floor, and there are no proposals for any floor levels above this. The floor space of less than 250m² means that this Development is classed as a minor extension.
- 3.03 The building is proposed to be accessed from the north-western elevation by way of a single pedestrian door and two larger roller shutter doors.
- 3.04 The continued use of the Site for commercial/industrial purposes firmly places the Development in the flood risk vulnerability classification of 'less vulnerable'.
- 3.05 Proposed Site and Development plans are contained in Appendix B.

4.00 flood Risk Assessment

Fluvial and Tidal flooding

- 4.01 As shown in **Figure 3**, the site falls within flood zone 3, which is classed as an area with a high probability of flooding from rivers or the sea. The Site is sufficiently inland and elevated above the sea as to not be at risk of flooding from the sea. The primary source of flood risk to the Site is from the surrounding rivers and watercourses.

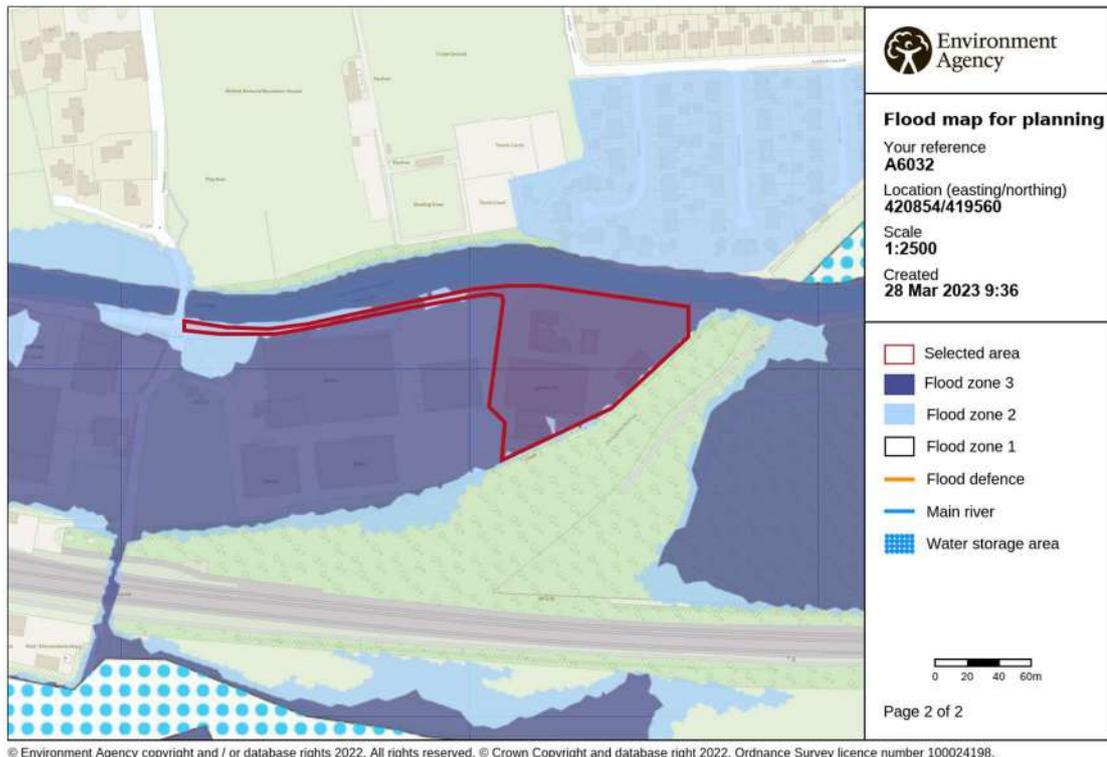


Figure 3: EA flood Map for Planning extract

- 4.02 Flood zone 3 is further divided into flood zone 3a (high risk) and flood zone 3b (functional floodplain), however the EA don't distinguish the difference within the mapping provided. The functional floodplain is defined as land where water has to flow or be stored in times of flood and should be identified within the LPA's Strategic Flood Risk Assessment (SFRA) in agreement with the EA.
- 4.03 As part of the SFRA, a further indicative flood zone has been delineated as flood zone 3ai. Flood zone 3ai includes developed land with the same level of risk as flood zone 3b, where water would flow or be stored in times of flooding, if not already constrained by development. According to the NPPF, this is part of flood zone 3a, but following discussions with the local authorities and the EA, it was agreed that flood zone 3a should be subdivided. Identification of flood zone 3ai allows the LPA to assess risk within flood zone 3a in more detail showing areas where existing

development is likely to be restricting flood flows and water storage that would otherwise be within the functional floodplain.

- 4.04 At the site location, the LPA has defined the difference between flood zone 3a, 3ai and 3b and clearly illustrates the site within flood zone 3ai within Map W of the SFRA (Appendix C). With regard to the NPPF, this is part of flood zone 3a.
- 4.05 With the site being classified as flood zone 3a and the proposed use being classified as “less vulnerable” to flood risk, it can be considered that the Development is principally appropriate for the flood zone, subject to passing the Sequential Test.
- 4.06 The Sequential Test aims to steer new development to areas of lower flood risk by assessing other available sites within lower risk flood zones. In accordance with Paragraph: 027 Reference ID: 7-027-20220825 of the FRCC-PPG, the Sequential Test is not required to be applied to small non-residential extensions (with a footprint of less than 250m²) as specified in footnote 56 of the NPPF. As such, there is no requirement for a Sequential Test for these Development proposals.
- 4.07 In accordance with Paragraph: 079 Reference ID: 7-079-20220825 of the FRCC-PPG, the Exception Test is not required to be applied “less vulnerable” development within flood zone 3a. As such, there is no requirement for an Exception Test for these Development proposals.
- 4.08 According to the long term flood risk mapping service provided by the EA (**Figure 4**), the Site is in an area with a high risk of flooding from rivers. High risk means that the area has an annual chance of flooding of greater than 3.3%. The probability of flooding takes into account the effect of flood defences in the area.

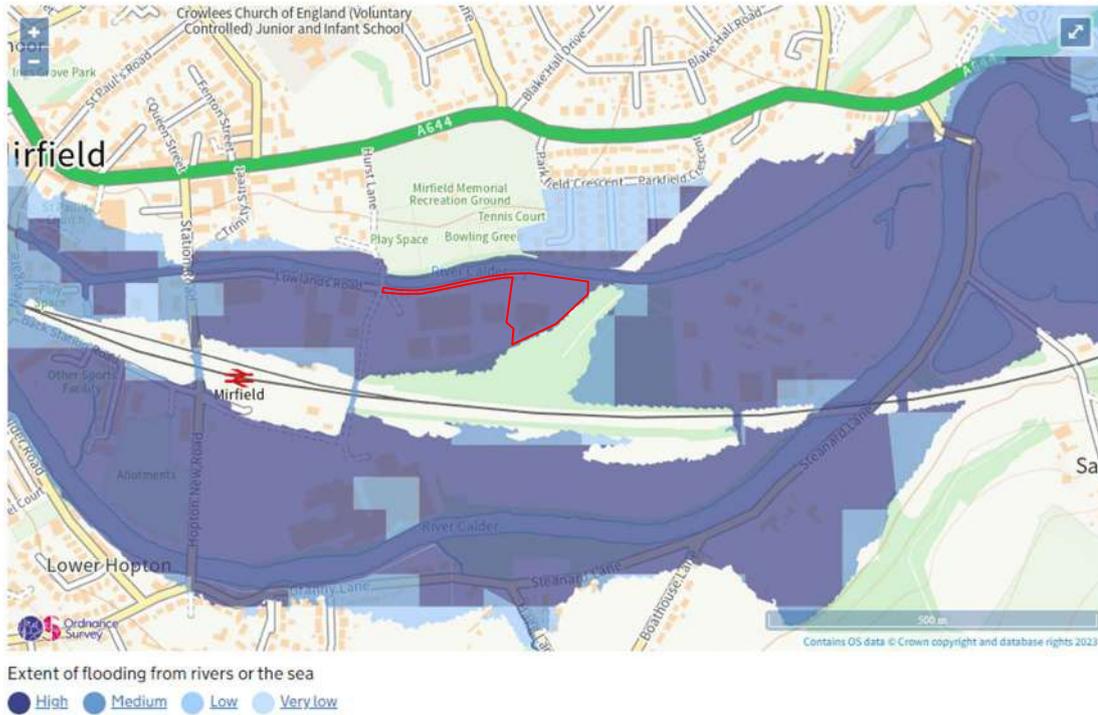


Figure 4: EA long term flood risk map

- 4.09 Information has been provided by the EA, in response to a Freedom of Information request, to inform this FRA (as contained in Appendix D).
- 4.10 Fluvial hydraulic data has been provided for a range of annual exceedance probabilities from 50% to 0.1%. Climate change allowances were updated on 27th July 2021. The latest climate change predictions for peak river flow in the Aire and Calder Management Catchment are as indicated in Figure 5 below. For “less vulnerable” development within flood zone 3a, it is recommended to use the central allowance to assess peak river flow. As such, climate change allowance for peak river flow should be 23%. The climate change allowance included within the hydrological study is 20%, which closely matches the current predictions and is considered sufficient for use to assess flood risk to the Site and Development.

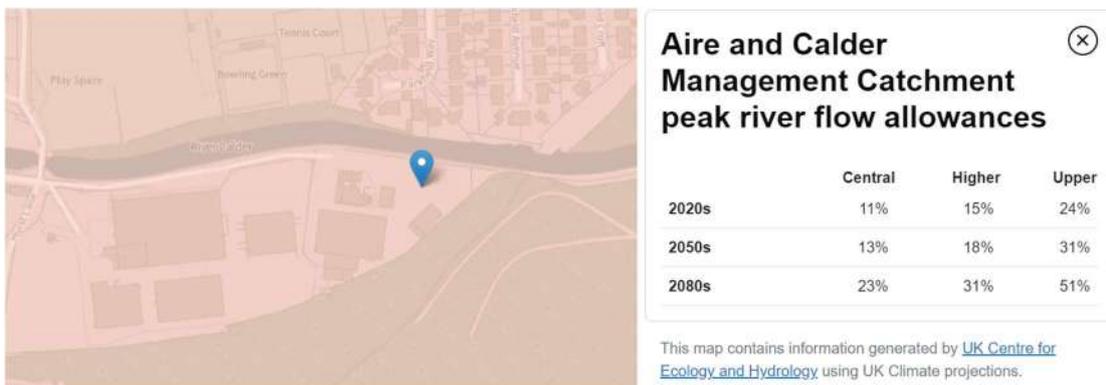


Figure 5: Peak river flow allowances (taken from <https://environment.data.gov.uk/hydrology/climate-change-allowances>)

- 4.11 In order to ensure that the Development and users will be safe for its lifetime, the finished ground floor level should be set above the 1% AEP flood level with an allowance for climate change (the design flood event), which equates to 44.09m AOD.
- 4.12 The Development, however, has an approximate finished floor level of 42.9m AOD. As such, it is expected that the Development will experience flooding during the design flood event and in more frequent flooding events.

Table 1: Flood extent and depth at Site and Development (based on closest node point EA1231293_INT_728_1)

| Annual exceedance period (AEP) | Flood level (m AOD) | Site affected | Development affected | Maximum flood depth at Development (m) |
|--------------------------------|---------------------|---------------|----------------------|--|
| 4% (defended) | 43.4 | Yes | Yes | 0.5 |
| 3.3% (defended) | 43.45 | Yes | Yes | 0.55 |
| 2% (defended) | 43.56 | Yes | Yes | 0.66 |
| 1% (defended) | 43.65 | Yes | Yes | 0.75 |
| 1% +20% CCA (defended) | 43.79* | Yes | Yes | 0.89 |
| 0.1% (defended) | 45.05 | Yes | Yes | 2.15 |
| 1% (undefended) | 43.63 | Yes | Yes | 0.73 |
| 0.1% (undefended) | 45.07 | Yes | Yes | 2.17 |

*Design flood level

- 4.13 Be that as it may, minor extensions within flood zone 3 should follow the EA's standing advice for minor extensions, which relates to advice on the setting of floor levels and measures to improve flood resistance and resilience.
- 4.14 The floor level of the Development should be no lower than existing floor levels on the Site and, where possible, should be at least 300 mm above the design flood level, as above.

- 4.15 Where the floor level cannot be raised at least 300mm above the design flood level, flood resistance and resilience measures will need to be used up to at least 300mm above the design flood level.
- 4.16 Flood water can put pressure on buildings, causing structural issues. Due to the anticipated depth of flood water at the Development, a flood entry strategy is recommended, whereby flood water is designed to enter into the building to reduce imposing hydrostatic pressure on the building structure.
- 4.17 To reduce this lateral force, the building should be designed to allow flood water to pass relatively freely through the structure, whilst maintaining security of the building. This can be achieved by incorporating narrow openings at the bottom of thresholds or by opening doors in the event of a flood warning or a flood on the Site.
- 4.18 Entry of flood water can result in damage to internal fixtures, fittings and décor. As such, it will be key to design the building extension with this in mind. To mitigate against damage to the building and its contents in more extreme flooding events, the building should be made appropriately flood resistant and resilient by the incorporation of the following techniques where reasonably practicable:
- All floor mounted fixtures should be able to be moved with relative ease and speed to avoid damage during a flood.
 - All electrically sensitive equipment, wiring, components and sockets should be at least 600mm above the estimated flood level to reduce the risk of electrocution to users and emergency services. This should also include fuse boxes (or consumer units) and electric meters where possible.
 - Storage and racking should be designed to be no lower than the design flood level to minimise the risk of damage to stored items during a flood.
 - Impermeable materials should be used up to the design flood level to avoid the risk of damage to the building during a flood.
 - Ensuring that there is adequate access to all spaces that are at risk of flooding to enable drying and cleaning following a flood.
 - Ensuring that floors are flat and sealed or that sumps and pumps are fitted (as required) to facilitate the removal of water following a flood.
- 4.19 The above recommendations do not comprise an exhaustive list of the measures that can be incorporated. Standards for the installation and retrofit of resistance measures are available in British Standard 851188-1:2019+A1:2021, and a full suite of good practice flood resilience measures is available in CIRIA C790A, C790B and C790C. Standards for materials and design approaches that will speed the recovery of buildings after flooding are available in British Standard 85500:2015.

- 4.20 It is recommended that flood resistance and resilience measures are considered, discussed with the building contractor and coordinated with all contractors to ensure that the effects of flooding on the building and users are minimised.
- 4.21 In the event of a flood occurring (or notice of a flood warning or severe flood warning) during occupancy of the Site and Development, users of the Site should move to a safe place at a higher elevation, either within an upper area in the existing buildings on the Site or to a lower flood risk area off of the Site.
- 4.22 Flood warnings are provided by the EA for areas at risk of flooding. The site is located in the flood warning area for *River Calder at Mirfield - Calder View to Steanard Lane* and the *Lower River Calder catchment*. Flood warnings can be received by signing up to the flood Warning Service or by phoning the 24-hour floodline service, details of which are provided at <https://www.gov.uk/sign-up-for-flood-warnings>. There are four levels of flood warning as detailed in **Figure 6**, below.

| Flood Warning Symbol | What it means | What to do |
|---|---|---|
|  | <p>Flood Alerts are used to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and make early preparations. It is issued earlier than a flood warning, to give customers advice notice of the possibility of flooding, but before we are fully confident that flooding in Flood Warning Areas is expected.</p> | <ul style="list-style-type: none"> ✓ Be prepared to act on your flood plan ✓ Prepare a flood kit of essential items ✓ Monitor local water levels and the flood forecast on the Environment Agency website ✓ Stay tuned to local radio or TV ✓ Alert your neighbours ✓ Check pets and livestock ✓ Reconsider travel plans |
|  | <p>Flood Warnings warn people of expected flooding and encourage them to take action to protect themselves and their property.</p> | <ul style="list-style-type: none"> ✓ Move family, pets and valuables to a safe place ✓ Turn off gas, electricity and water supplies if safe to do so ✓ Seal up ventilation system if safe to do so ✓ Put flood protection equipment in place ✓ Be ready should you need to evacuate from your home ✓ 'Go In, Stay In, Tune In' |
|  | <p>Severe Flood Warnings warn people of expected severe flooding where there is a significant threat to life.</p> | <ul style="list-style-type: none"> ✓ Stay in a safe place with a means of escape ✓ Co-operate with the emergency services and local authorities ✓ Call 999 if you are in immediate danger |
| <p>Warnings no longer in force</p> | <p>Informs people that river or sea conditions begin to return to normal and no further flooding is expected in the area. People should remain careful as flood water may still be around for several days.</p> | <ul style="list-style-type: none"> ✓ Be careful. Flood water may still be around for several days ✓ If you've been flooded, ring your insurance company as soon as possible |

Figure 6: EA flood warnings

- 4.23 The nearest area of lower flood risk is on Hurst Lane to the north of the River Calder and immediately outside of the Site following a bridge over the River Calder (however, this is only accessible on foot due to the presence of gates). By vehicle, the nearest area of lower flood risk is on Station Lane to the north of the River Calder, which is accessible by following Lowlands Road out of the Site.
- 4.24 Due to the nature of the Development proposals being less than 250m² and the pre-developed impermeable conditions yard area, there will not be a material change to the existing catchment area and, subsequently, there will be no material change to the discharge rate or volume from the Site. As such, it is considered that the provision of SuDS to manage surface water discharge rate and volume is not required.
- 4.25 Compensatory floodplain storage would normally be required within flood zone 3 where development would result in the raising of ground levels and the displacement of flood water from a 1% AEP + CCA design flood. However, as the building is to be operated with a flood entry strategy, it is considered that there will be negligible displacement of flood water in the event of a flood. As such, compensatory floodplain storage is not considered to be required for the Development.

Groundwater flooding

- 4.26 Groundwater flooding can occur due to prolonged rainfall in low-lying areas where highly permeable strata are present at shallow depth below ground. This type of flooding is associated with the water table rising above ground level, leading to more persistent inundation. Groundwater flooding can also occur due to ceasing of groundwater abstractions, resulting in groundwater rebound.
- 4.27 Map W of the SFRA (Appendix C) illustrates the Site to be in an area of high groundwater flooding susceptibility, based on a 1km² grid and geological and hydrogeological conditions. This source of information does not assess the likelihood of groundwater flooding occurring, nor does it take into account the potential effects of groundwater rebound. It is recognised that the data source is based on a large area and that the consequences of groundwater flooding are likely to be isolated to small areas within the grid.
- 4.28 The topographical, geological and hydrogeological conditions suggest that the groundwater table is likely to be at a shallow depth or near to the surface level. Due to the low lying nature of the Site and the extensive surrounding watercourse network, it is very likely that the groundwater table aligns closely with the water level in the surrounding watercourses.

- 4.29 The development is not proposed to have any subterranean spaces, which will limit the risk of flooding to the Development from groundwater. The finished ground floor level is set above the surrounding ground level by approximately 300mm, which will help to reduce the risk of groundwater flooding from entering the building. As such, there is a low risk of groundwater flooding to the Development.

Canal and Reservoir flooding

- 4.30 As above, the Site is shown to be at risk of flooding from rising water levels within the Calder and Hebble Navigation, however this is linked to fluvial flooding within the River Calder.
- 4.31 The Site is elevated slightly above the top of the bank of the canal; therefore it is considered that the Site is at low risk of flooding as a result of a breach of canal lock gates or an uncontrolled release of water from the canal.
- 4.32 The EA's Risk of Flooding from Reservoirs' map indicates areas where peoples' lives would be in danger as a result of an uncontrolled release of water from a reservoir or static body of water. In terms of the probability of occurrence, the EA acknowledges in their flood map annotations that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925 with all large reservoirs inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensures that reservoirs are inspected regularly, and essential safety work is carried out.
- 4.33 The EA Risk of flooding from Reservoirs map (**Figure 7**) indicates that the Site is at risk from this source when river levels are normal and when there is also flooding from rivers. This is due to the vast number of reservoirs within the upper reaches of the River Calder catchment. As such, the Site is considered to be at risk of flooding from this source, however the extremely low likelihood of a flood from this source suggests that no further mitigation measures are required.

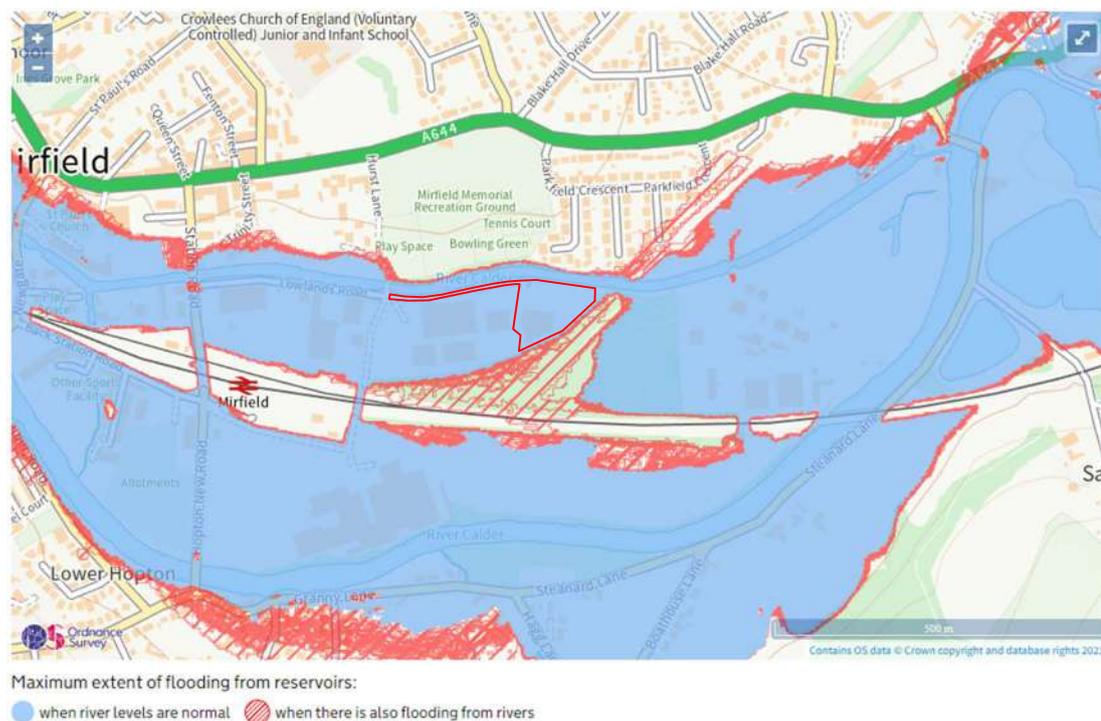


Figure 7: EA flood Risk from Reservoirs (site indicated in red)

Sewer flooding

- 4.34 Sewer flooding can occur due to pipe network capacity being overwhelmed in low-lying areas, where storm water mixes with foul water within combined sewers, or where overland flows enter the foul sewer network.
- 4.35 Public sewer records have been provided by Yorkshire Water (Appendix and illustrate no sewers within the Site. The nearest public sewers are a 1200mm diameter brick combined sewer to the east of the Site, which is separated from the Site by the embankment of a disused railway line, and much smaller diameter combined and surface water sewers within a residential area to the north of the Site, which are separated from the Site by the Calder and Hebble Navigation.
- 4.36 The SFRA includes historical sewer flooding incidents, which are illustrated on Map W of the SFRA. The Site is not included within the extent of these incidents. It is considered that there is a low risk of sewer flooding to the Site and Development.

Surface Water flooding

- 4.37 Intense rainfall, particularly in urban areas, can create runoff which temporarily overwhelms the capacity of the local drainage systems. Under these conditions, localised 'flash' flooding can occur. In addition, surface water sewers can flood into foul sewers and overload both the surface water and combined sewer networks. This type of flooding is especially problematic when these systems become overloaded simultaneously.

4.38 The EA flood map for surface water (FMfSW) divides England and Wales into areas with a very low, low, medium and high risk of pluvial flooding. These are classified as having the following probability of occurring in any given year:

- High - greater than 3.3% chance
- Medium - between 1% and 3.3% chance
- Low - between 0.1% and 1% chance
- Very low - less than 0.1% chance

4.39 The data used to assess pluvial flood risk is taken from the National Generalised Model and should not be used as a sole means of assessing the flood risk to a specific site from surface water. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

4.40 The available data (**Figure 8**) illustrates that the Site and Development are at risk of surface water flooding.



Figure 8: EA updated flood Map for Surface Water (site indicated in red)

4.41 In a high risk scenario, there is predicted to be a small pocket of surface water flooding within the Site, that appears to be generated from the surrounding hardstanding within the Site and would be below 300mm depth. The flood water would be very slow moving.



Figure 9: High risk surface water flooding - extent & depth

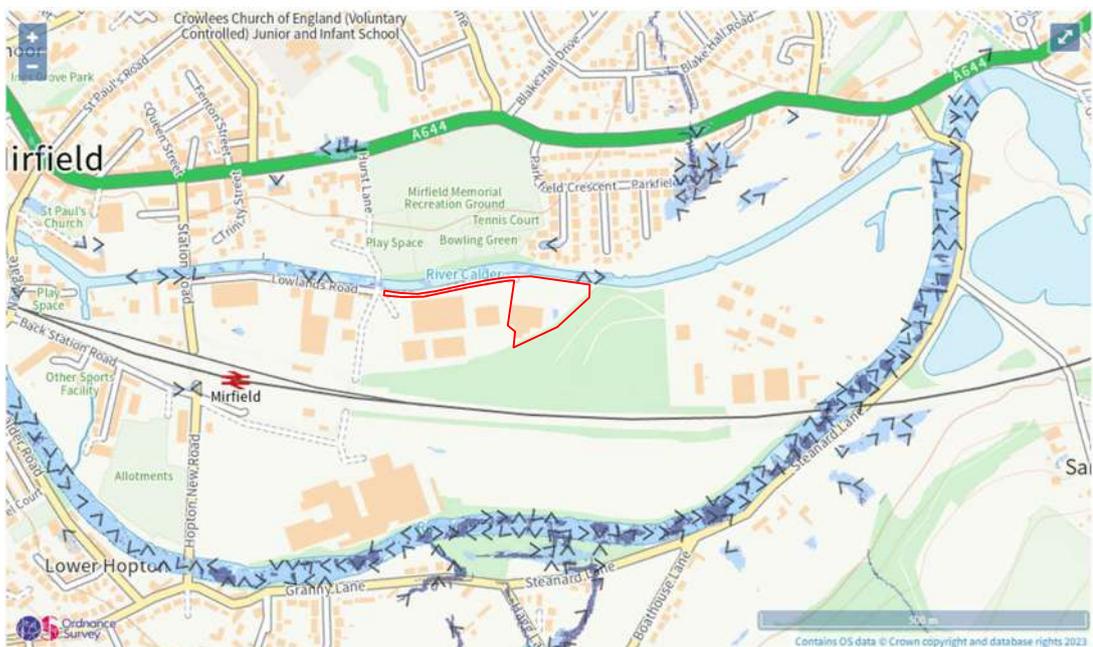


Figure 10: High risk surface water flooding - velocity & direction

4.42 In a medium risk scenario, there is predicted to be a larger area of surface water flooding within the Site, which would cover most of the yard area. It appears to be generated from the surrounding hardstanding within the Site but would have a depth of between 300mm and 900mm. The flood water would be slow moving.



Figure 11: Medium risk surface water flooding - extent & depth



Figure 12: Medium risk surface water flooding - velocity & direction

4.43 In a low risk scenario, almost all of the yard area would be affected by surface water flooding. The flood water appears to be generated from the surrounding

hardstanding within the Site as well as from off of the Site to the west and, potentially, from the Calder and Hebble Navigation. Flood water in this scenario is expected to accumulate to over 900mm depth, and there would be faster moving flood water.



Figure 13: Low risk surface water flooding - extent & depth

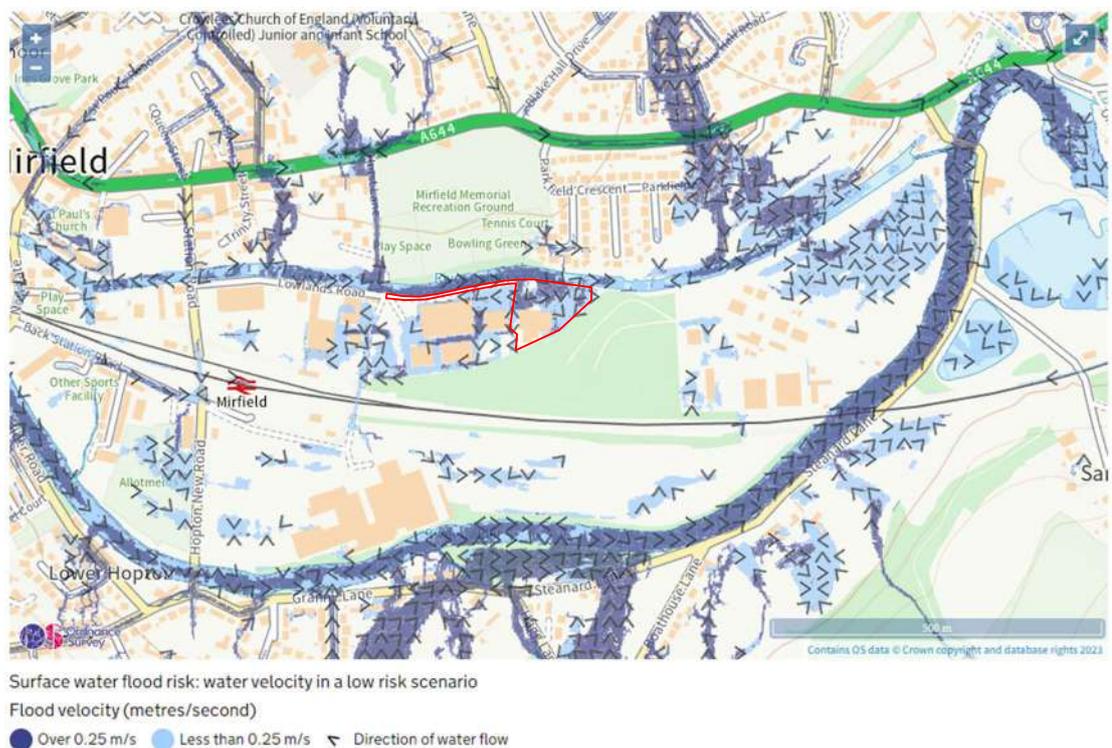


Figure 14: Low risk surface water flooding - velocity & direction

4.44 The Development is proposed to be located within the areas with the highest depth of flooding in each scenario. Whilst it is understood that this is required for

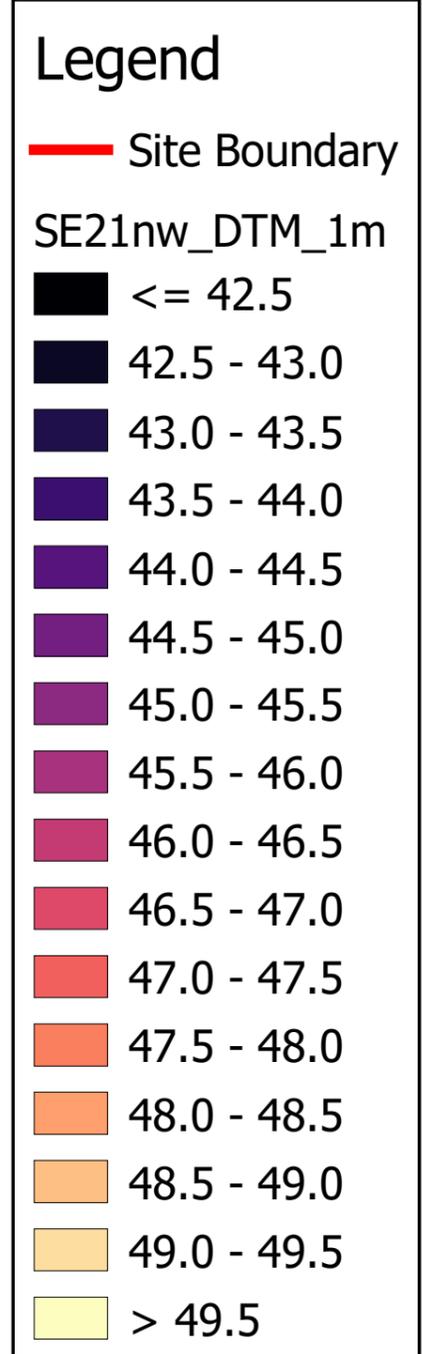
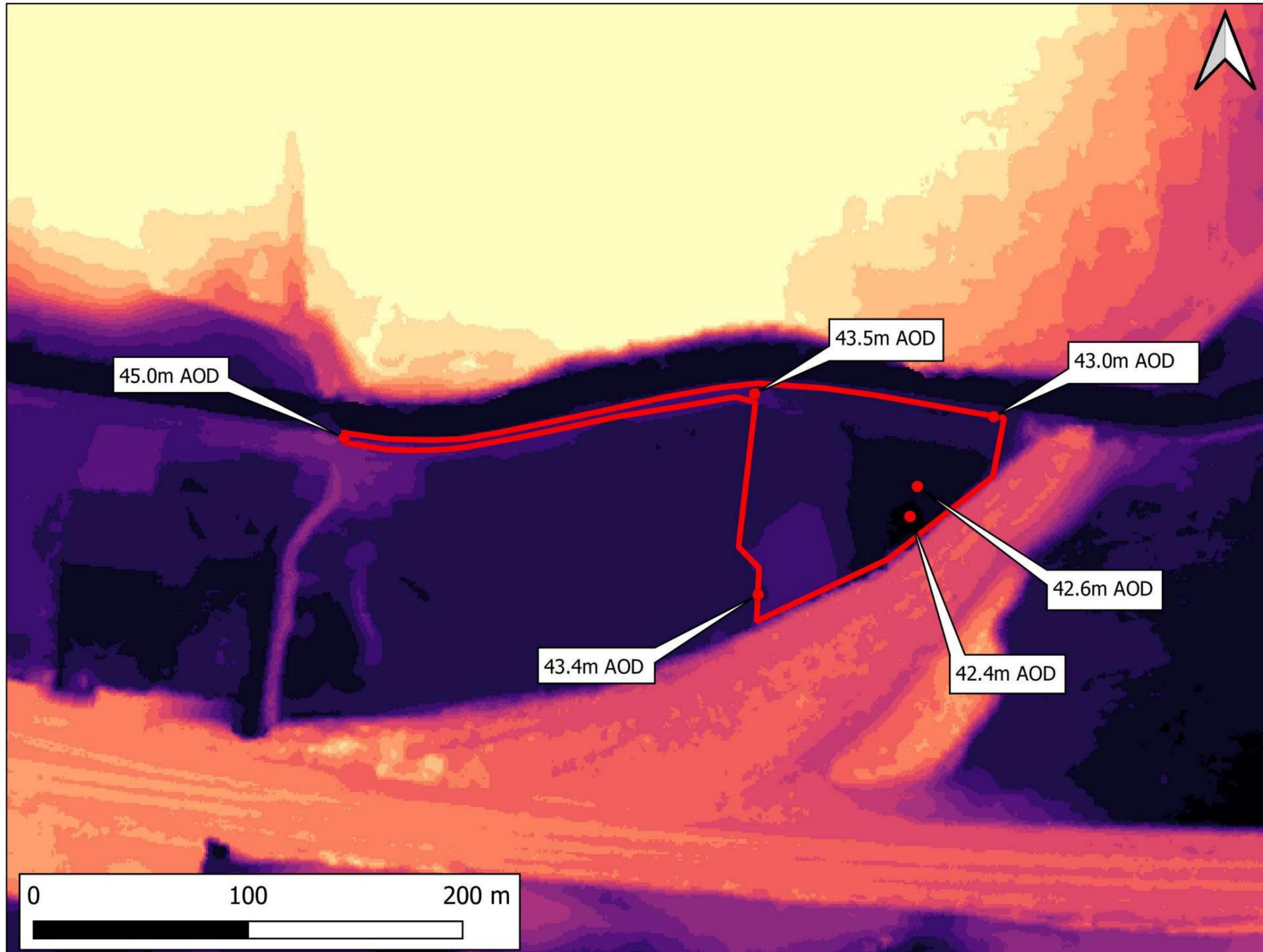
operational purposes, mitigation will need to be provided to reduce the risk to the Development and its users to as low as reasonably practicable. The flood risk mitigation as discussed within the section on fluvial and tidal flooding, is considered to also be appropriate for mitigating the effects of surface water flooding.

5.00 Conclusion

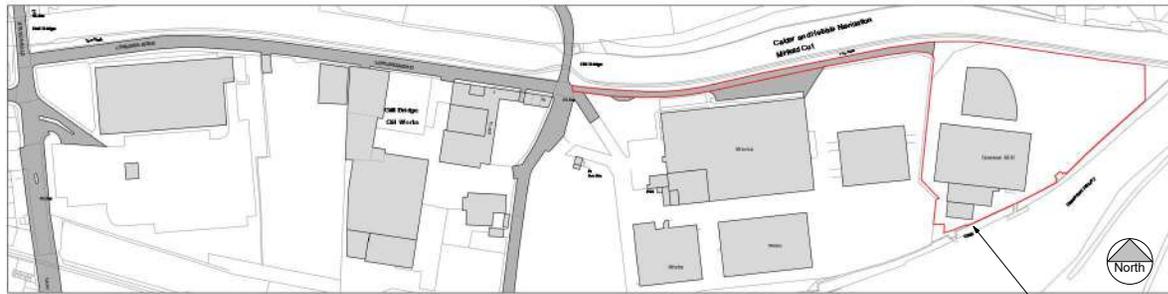
- 5.01 Encon Associates have prepared this flood Risk Assessment to support a retrospective planning application for an extension to an existing commercial development at Actiform, Lowlands Road, Mirfield.
- 5.02 The site is located in flood zone 3ai (flood zone 3a in accordance with the NPPF), and the proposed use of the site places it within the 'less vulnerable' flood risk vulnerability classification. "Less vulnerable" development is principally appropriate for flood zone 3a and the Development proposals are exempt from the Sequential and Exception Tests.
- 5.03 Overall flood risk from all sources is considered to be high, with the primary risk of flooding being fluvial in nature from the River Calder and Calder and Hebble Navigation. Flood risk as a result of overland surface water flows is also high due to the Site and surrounding topography.
- 5.04 Notwithstanding, the Development is a modest extension to the Site, and recommendations have been made to ensure that the Development is resilient to flooding and that the users of the Development will be safe from flooding.
- 5.05 Due to the nature of the Development proposals being less than 250m² and the pre-developed impermeable conditions yard area, there will not be a material change to the existing catchment area and, subsequently, there will be no material change to the discharge rate or volume from the Site. As such, it is considered that the provision of SuDS to manage surface water discharge rate and volume is not required.
- 5.06 Compensatory floodplain storage would normally be required within flood zone 3 where development would result in the raising of ground levels and the displacement of flood water from a 1% AEP + CCA design flood. However, as the building is to be operated with a flood entry strategy, it is considered that there will be negligible displacement of flood water in the event of a flood. As such, compensatory floodplain storage is not considered to be required for the Development.
- 5.07 Planning approval for the Development proposals should not be withheld for flood risk reasons.

APPENDIX A
TOPOGRAPHIC SURVEY

LiDAR Elevation Data (centred on 420385, 419555) Scale 1:2500
Created 5th April 2023 under the Open Government licence v3.0



APPENDIX B
PROPOSED SITE PLANS



1 EXISTING SITE LOCATION
1 : 1250



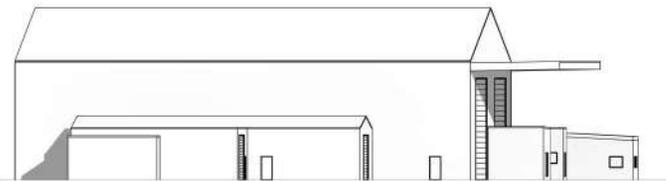
2 EXISTING SITE PLAN.
1 : 500



3 Existing East Elevation
1 : 200



4 Existing North Elevation
1 : 200



5 Existing South Elevation
1 : 200



6 Existing West Elevation
1 : 200

| No. | Record Change | Date |
|-----|--|----------|
| 1 | Scale bar & Title bar added along with amended Site plan and floor plan. | 15/02/23 |



Actiform
Queens Buildings Lowlands Road Mirfield WF18 8LX
www.actiformgroup.co.uk

PROJECT

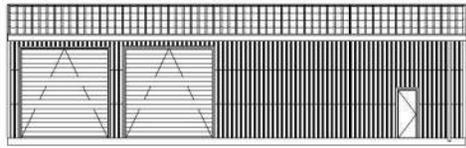
Queens Buildings Lowlands Road Mirfield WF18 8LX - New Storage Facility Proposed Plan

CLIENT

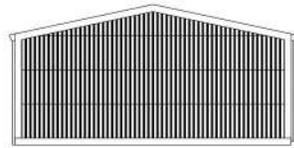
Actiform

| | | |
|---|------------------|-----------------------|
| DRAWN BY MD | CHECKED BY SD | DATE 29/11/22 |
| SCALE (B A1) As indicated | | PROJECT NUMBER 007 |
| DRAWING NUMBER 007-ACT-XX-EE-OG-A-0001-P02 | | DT55 |

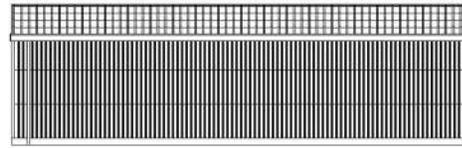
Please note, illustration of room uses including but not limited to fit/discard
kitchens and fittings are shown for illustrative look and feel purposes only
unless otherwise specified in the scope.



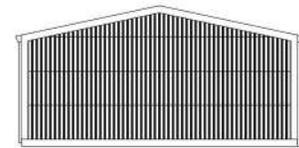
1 Proposed North Elevation.
1 : 100



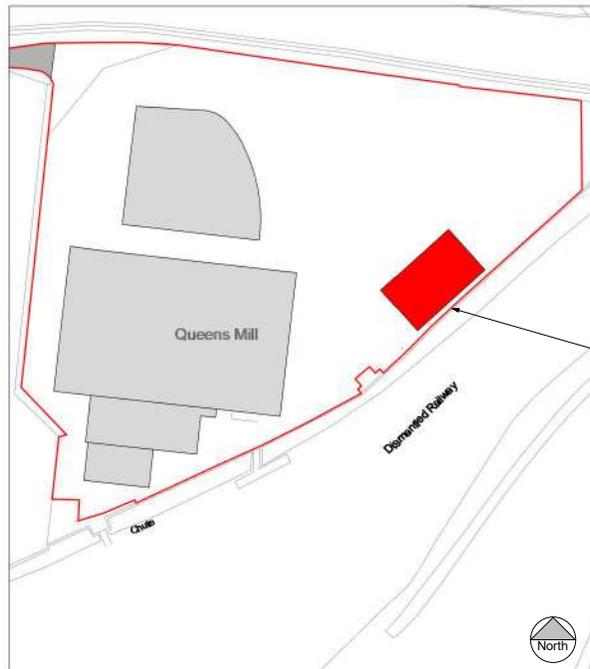
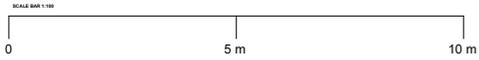
2 Proposed East Elevation.
1 : 100



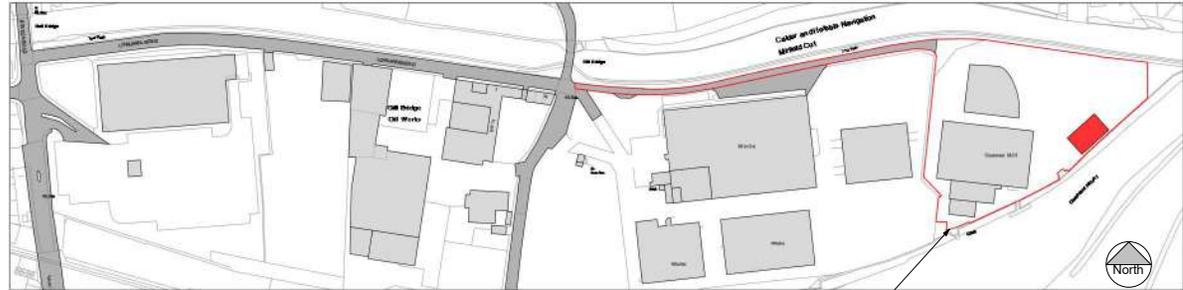
3 Proposed South Elevation.
1 : 100



4 Proposed West Elevation.
1 : 100



5 PROPOSED SITE PLAN.
1 : 500



Proposed Location

Site Boundary

6 PROPOSED SITE
1 : 1250

| No. | Record Change | Date |
|-----|--|----------|
| 1 | Scale bar & Title bar added along with amended Site plan and floor plan. | 15/02/23 |



PROJECT
Queens Buildings Lowlands Road Mirfield WF14 8LX
WF18 8LX - New Storage Facility Proposed Plan

CLIENT
Actiform

| | | |
|----------------|------------------|------------------|
| DRAWN BY MD | CHECKED BY SD | DATE 29/11/22 |
|----------------|------------------|------------------|

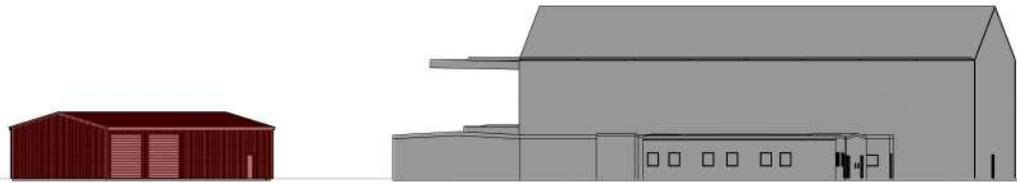
SCALE (B A1)
As indicated

PROJECT NUMBER
007

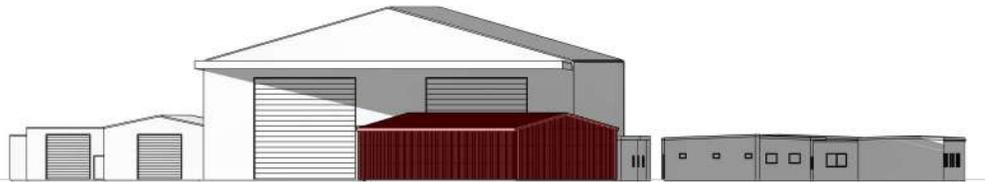
DRAWING NUMBER
007-ACT-XX-EP-DG-A-0002-P02

QTS5

Please note, illustration of room uses including but not limited to fitted loose furniture and fittings are shown for illustrative look and feel purposes only, unless otherwise specified in the scope.



1 Proposed North Elevation
1 : 200



2 Proposed East Elevation
1 : 200



3 Proposed South Elevation
1 : 200



4 Proposed West Elevation
1 : 200



5 PROPOSED SITE PLAN
1 : 500

Proposed Location

| No. | Record Change | Date |
|-----|--|----------|
| 1 | Scale bar & Title bar added along with amended Site plan and floor plan. | 15/02/23 |



PROJECT
Queens Buildings Lowlands Road Mirfield WF18 8LX - New Storage Facility Proposed Plan

CLIENT
Actiform

| | | |
|----------------|------------------|------------------|
| DRAWN BY MD | CHECKED BY SD | DATE 29/11/22 |
|----------------|------------------|------------------|

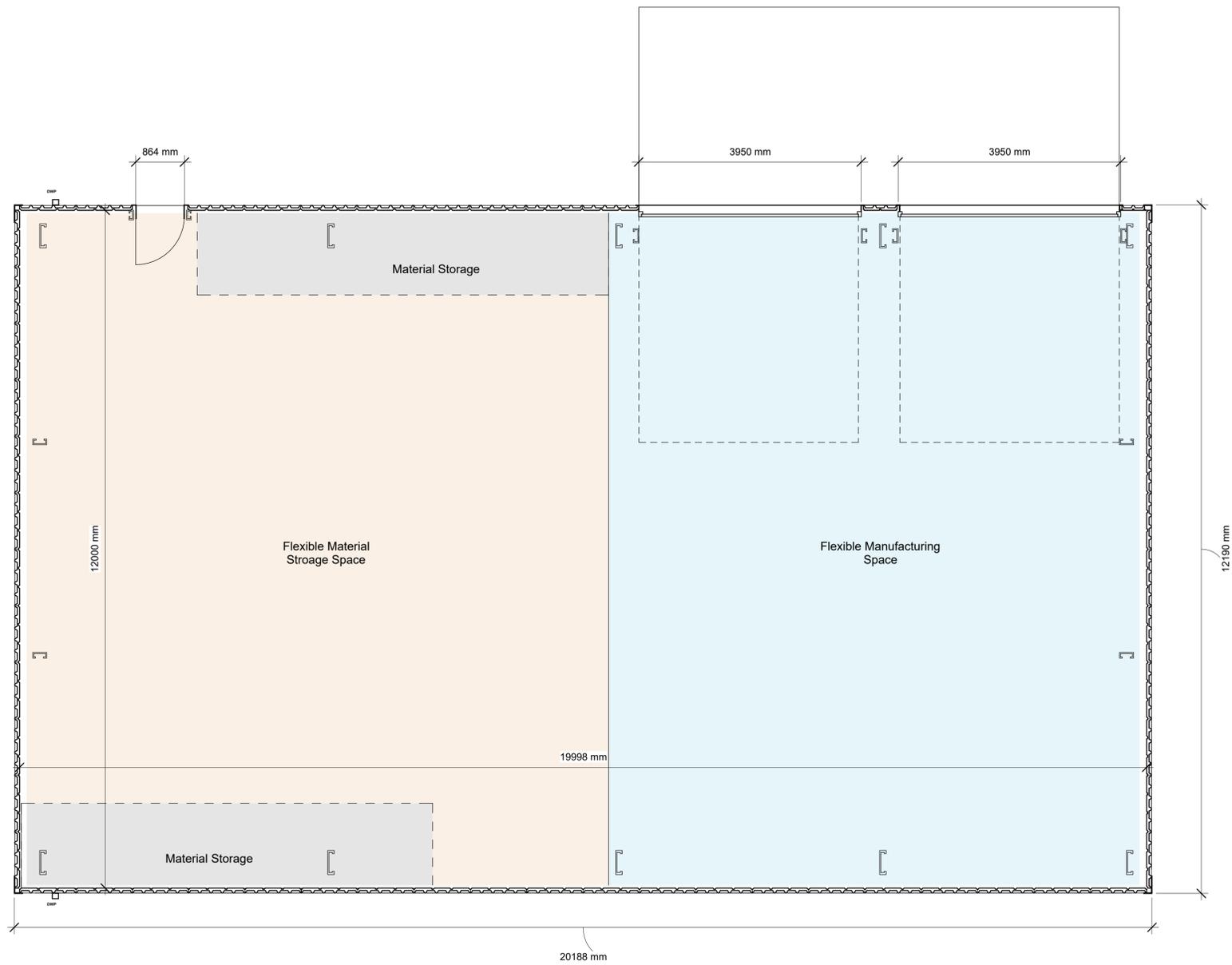
SCALE (B A1)
As indicated

PROJECT NUMBER
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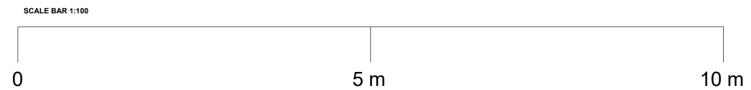
DRAWING NUMBER
007-ACT-XX-EP-OG-A-0003-P02

Q155

Please note, illustration of room uses including but not limited to fire/escape routes and fittings are shown for illustrative look and feel purposes only, unless otherwise specified in the scope.



1 Proposed Floor Plan
1 : 50



| No. | Record Change | Date |
|-----|--|----------|
| 1 | Scale bar & Title bar added along with amended Site plan and floor plan. | 15/02/23 |



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PROJECT
Queens Buildings Lowlands Road Mirfield
WF18 8LX - New Storage Facility Proposed
Plan

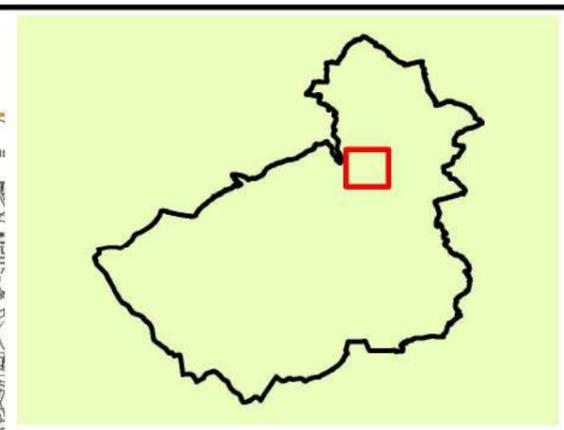
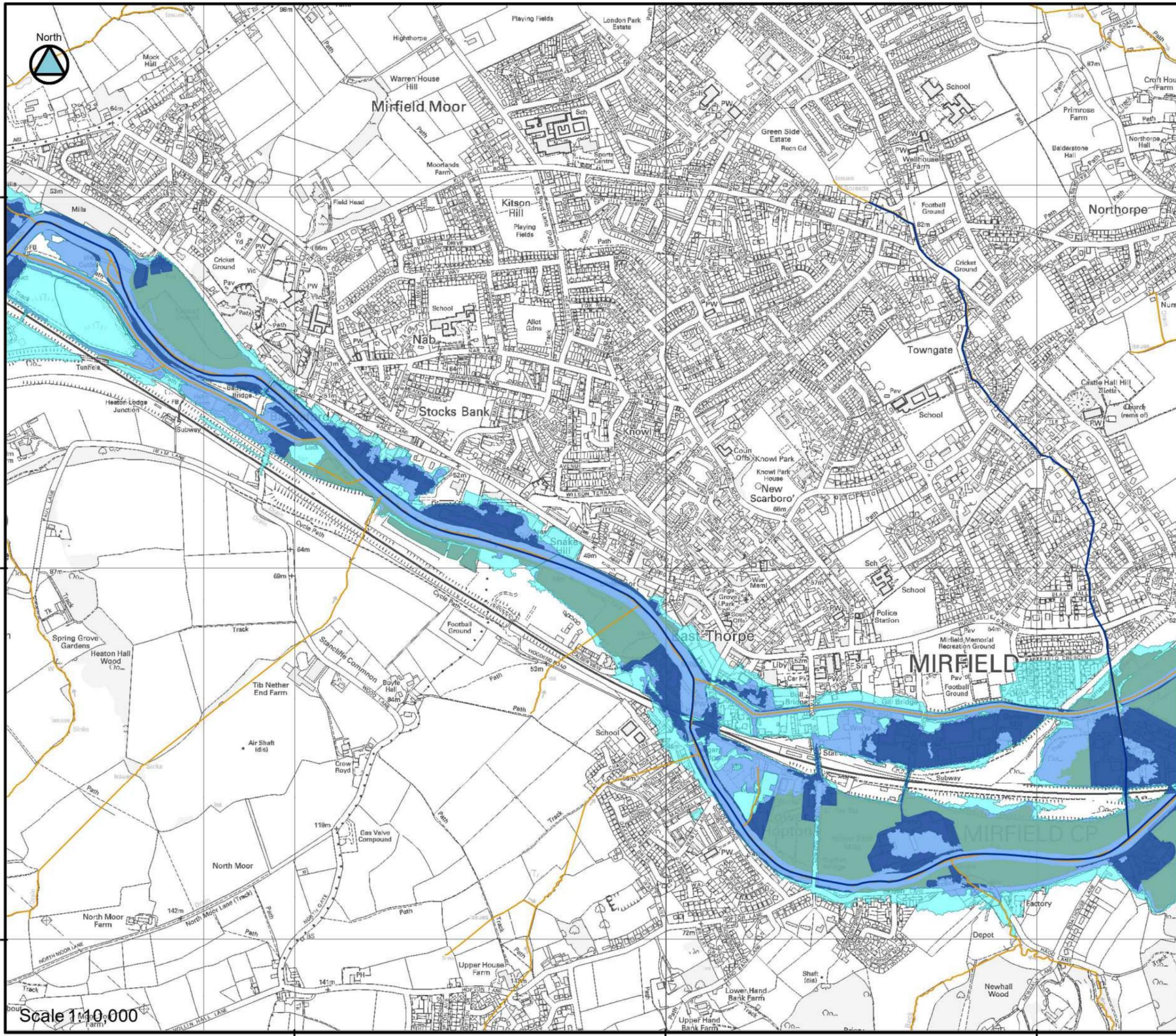
CLIENT
Actiform

| | | |
|------------------------|-----------------------|------------------|
| DRAWN BY MD | CHECKED BY SD | DATE 29/11/22 |
| SCALE (@ A1) 1 : 50 | PROJECT NUMBER 007 | |

DRAWING NUMBER
007-ACT-XX-EP-DG-A-0004-P03 OT55

Please note, illustration of room uses including but not limited to fitted floor furniture and fittings are shown for indicative 'look and feel' purposes only, unless otherwise specified in the scope.

APPENDIX C
ENVIRONMENT AGENCY HYDRAULIC DATA



LEGEND

- Choose Option Flood Zones
- Council boundary
 - Main River
 - Detailed River Network
- Flood Zones**
- Flood Zone 3b
 - Flood Zone 3ai
 - Flood Zone 3a
 - Flood Zone 2

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STRATEGIC FLOOD RISK ASSESSMENT
 For
KIRKLEES COUNCIL
 MAP_W

421000

420000

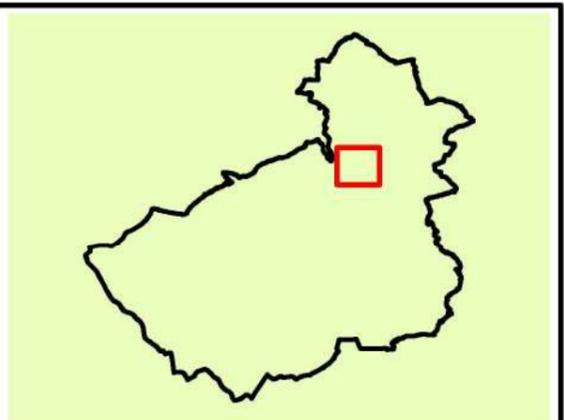
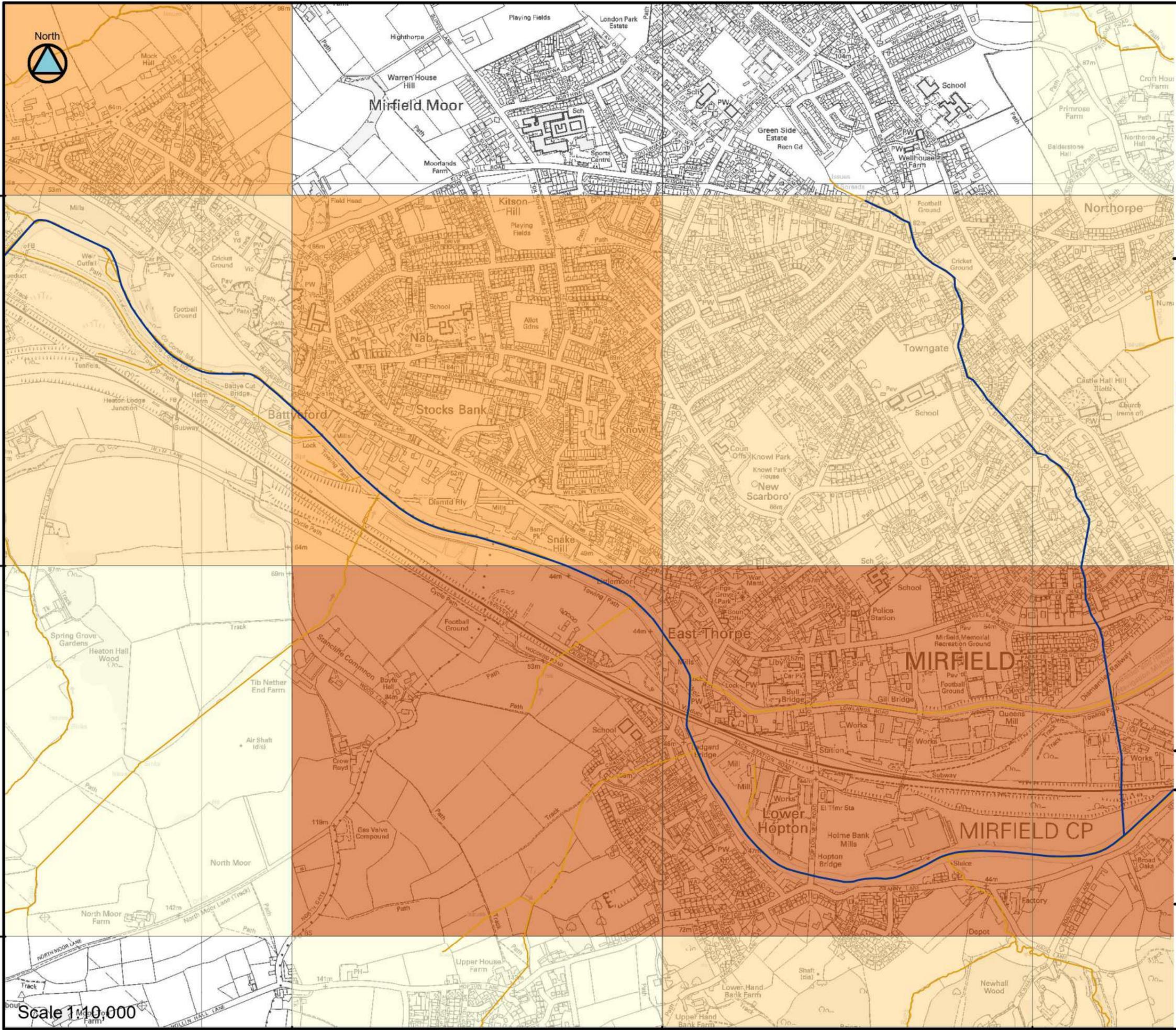
419000

419000

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421000

Scale 1:10,000



LEGEND

- Choose Option Areas Susceptible to Ground water Flooding
- Council boundary
- Main River
- Detailed River Network
- Areas Susceptible to Ground Water Flooding Risk of Groundwater Emergence**
- $\geq 75\%$
- $\geq 50\% < 75\%$
- $\geq 25\% < 50\%$
- $< 25\%$

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STRATEGIC FLOOD RISK ASSESSMENT
 For
KIRKLEES COUNCIL
 MAP_W

421000

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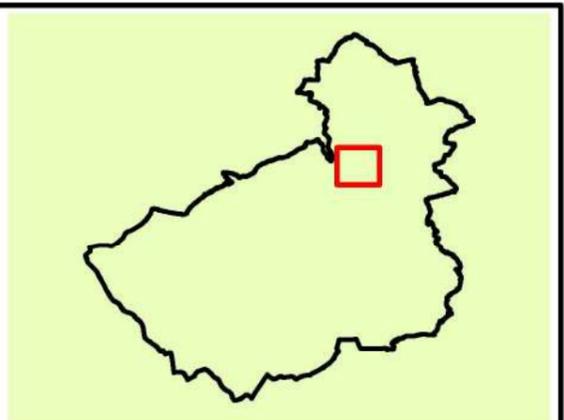
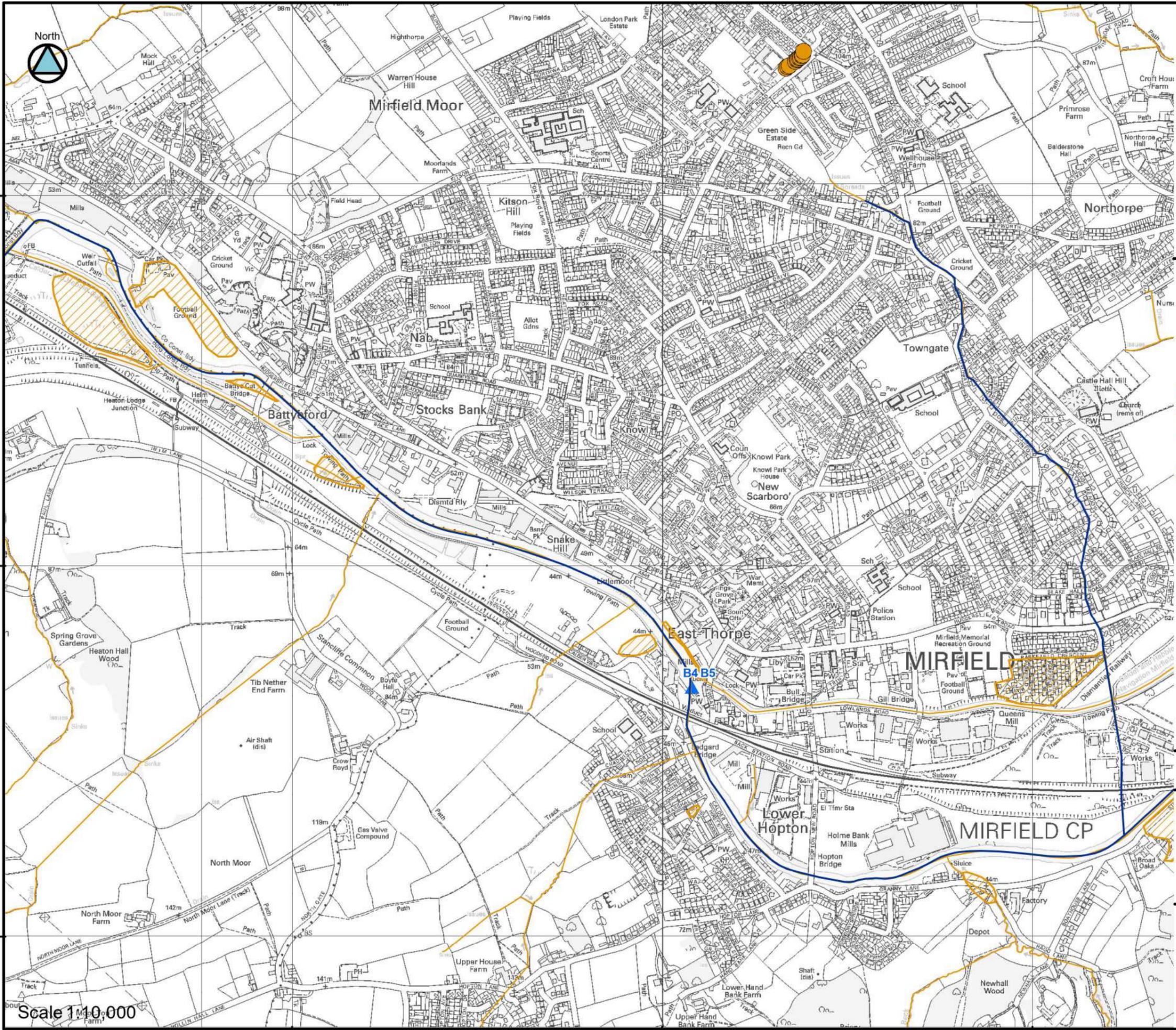
419000

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Scale 1:10,000





LEGEND

- Choose Option Historic
- Council boundary
- Main River
- Detailed River Network
- Historic Flooding**
- Historic Flood Map (EA)
- DG5 Register incident (YWS)
- Breach (CRT)
- Overtopping (CRT)

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STRATEGIC FLOOD RISK ASSESSMENT
 For
KIRKLEES COUNCIL
 MAP_W

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420000

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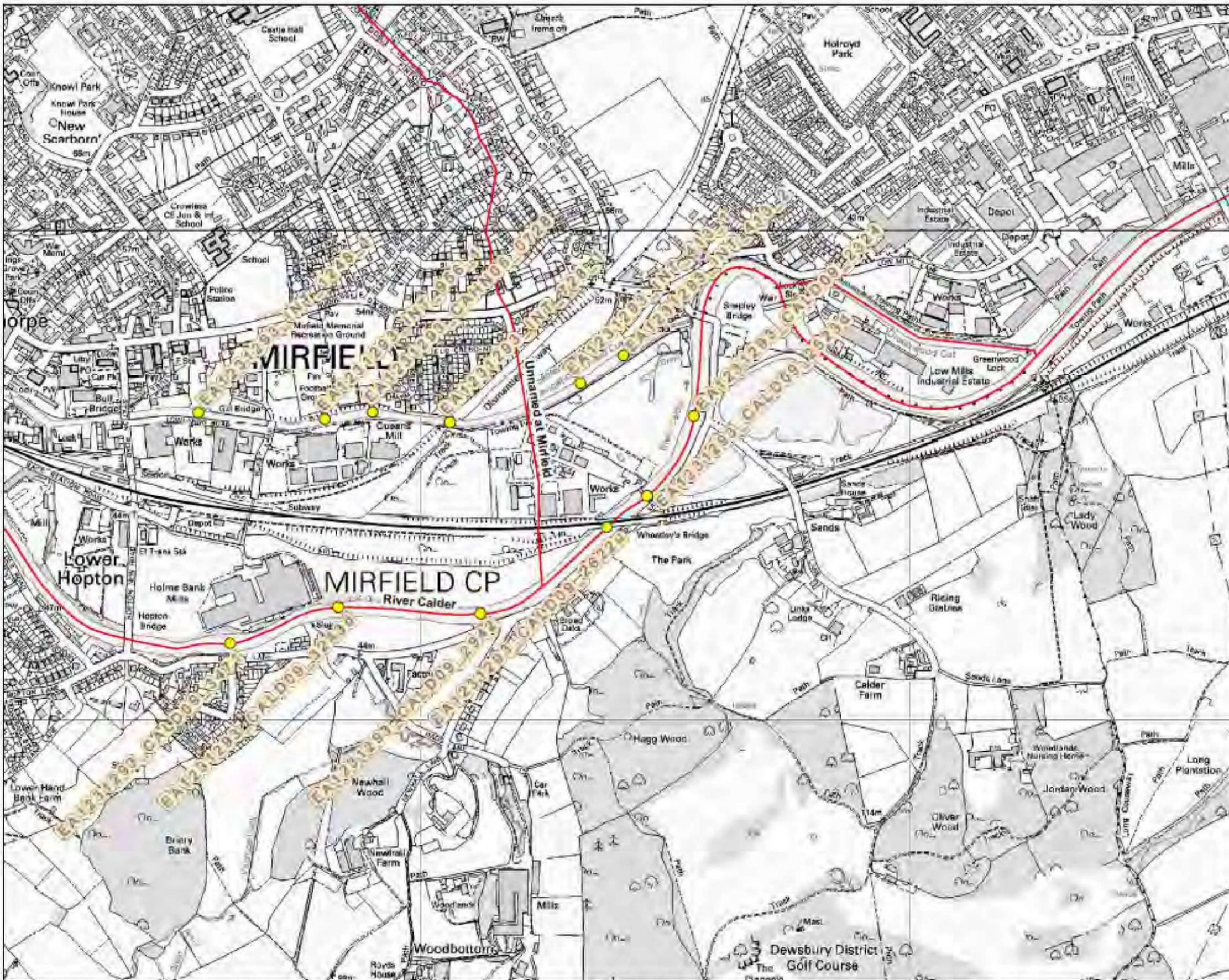
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APPENDIX C
SOUTHERN WATER PUBLIC SEWER RECORDS



LEGEND

-  Node Points
-  Main River



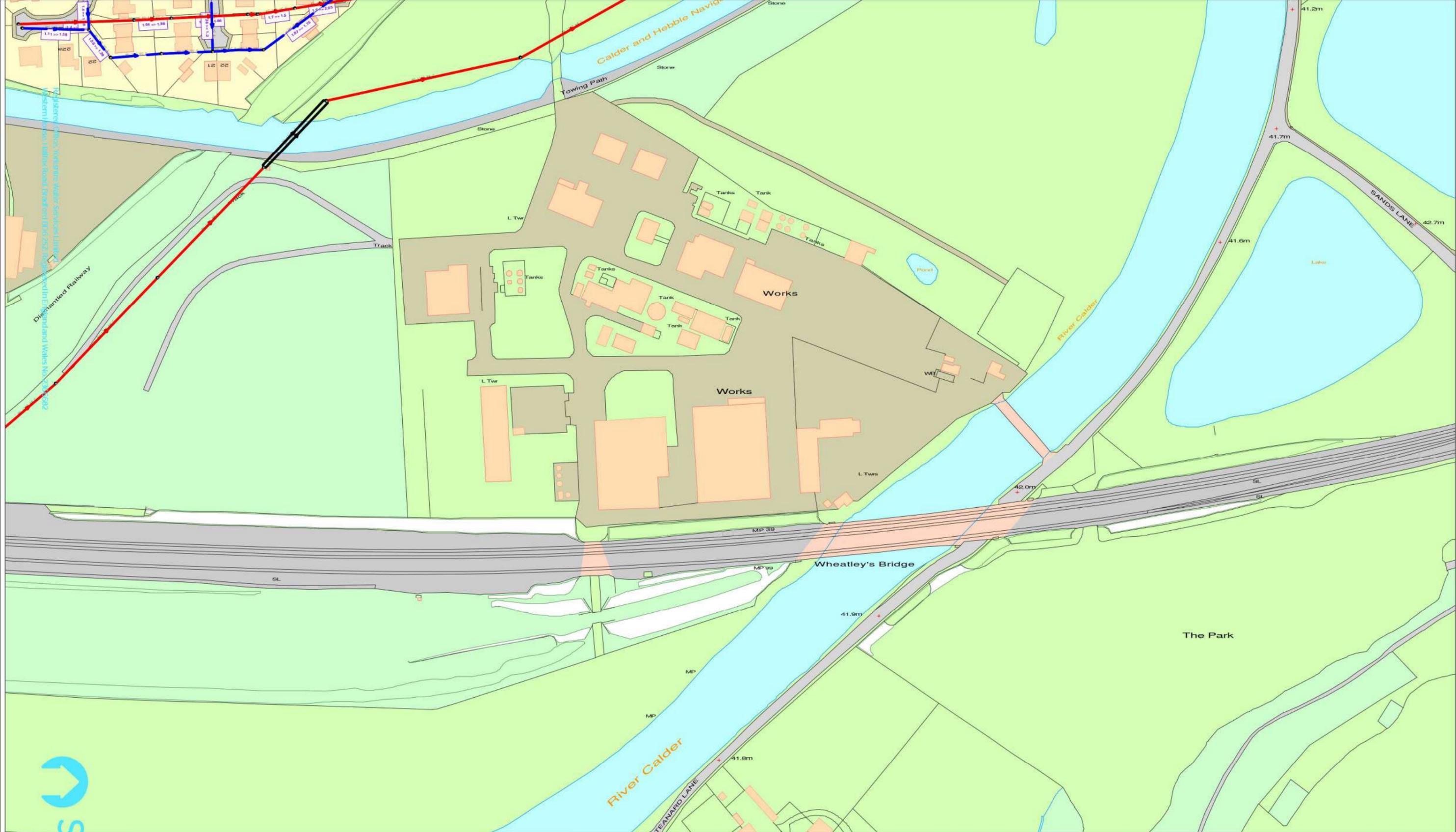
Node Point Information

| Node Point | Maximum Modelled Defended River Levels & Flows | | | | | | | | | | | |
|------------------------|--|--------|----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|
| | 1 in 2yr | | 1 in 5yr | | 1 in 10yr | | 1 in 25yr | | 1 in 30yr | | 1 in 50yr | |
| | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow |
| EA1231293_CALD09_3471 | 42.7 | 230.27 | 43.29 | 313.67 | 43.39 | 331.15 | 43.81 | 406.87 | 43.87 | 415.94 | 43.99 | 438.95 |
| EA1231293_CALD09_2942 | 42.26 | 230.74 | 42.79 | 302.75 | 42.92 | 312.48 | 43.4 | 356 | 43.45 | 363.45 | 43.58 | 378.96 |
| EA1231293_CALD09_2622u | 42.16 | 230.59 | 42.68 | 308.99 | 42.81 | 324.14 | 43.27 | 397.06 | 43.32 | 407.51 | 43.44 | 428.65 |
| EA1231293_CALD09_2324 | 41.7 | 230.67 | 42.01 | 311.38 | 42.08 | 327.63 | 42.42 | 372.05 | 42.49 | 373.66 | 42.64 | 376.27 |
| EA1231293_CALD09_2523d | 41.9 | 230.67 | 42.27 | 311.64 | 42.35 | 328.13 | 42.62 | 389.23 | 42.66 | 393.58 | 42.78 | 399.96 |
| EA1231293_CALD09_3243d | 42.51 | 230.75 | 43.07 | 313.04 | 43.17 | 328.22 | 43.62 | 387.95 | 43.68 | 394.98 | 43.8 | 409.4 |
| EA1231293_CAHN06_0728 | 42.84 | 0.79 | 42.95 | 0.83 | 43 | 0.98 | 43.4 | 4.47 | 43.46 | 5.07 | 43.58 | 6.55 |
| EA1231293_INT_1248_1 | 42.84 | 0.81 | 42.95 | 0.88 | 43 | 1.08 | 43.41 | 4.46 | 43.47 | 5.06 | 43.6 | 6.39 |
| EA1231293_INT_956_1 | 42.84 | 0.79 | 42.95 | 0.85 | 43 | 1.02 | 43.4 | 4.44 | 43.46 | 5.08 | 43.58 | 6.38 |
| EA1231293_INT_728_1 | 42.84 | 0.82 | 42.95 | 0.8 | 43 | 0.92 | 43.4 | 4.41 | 43.45 | 7.14 | 43.56 | 11.34 |
| EA1231293_INT_413_2 | 42.84 | 0.92 | 42.94 | 0.92 | 43 | 0.92 | 43.36 | 2 | 43.38 | 2.89 | 43.41 | 4.63 |
| EA1231293_INT_413_1 | 42.84 | 0.87 | 42.94 | 0.86 | 43 | 0.85 | 43.36 | 4.62 | 43.39 | 4.62 | 43.42 | 7.45 |

| Node Point | Maximum Modelled Defended River Levels & Flows | | | | | | | | | |
|------------------------|--|--------|------------|--------|--------------------------|--------|------------|--------|-------------|--------|
| | 1 in 75yr | | 1 in 100yr | | 1 in 101yr (100yr + 20%) | | 1 in 200yr | | 1 in 1000yr | |
| | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow |
| EA1231293_CALD09_3471 | 44.06 | 457.72 | 44.34 | 462.1 | 44.27 | 528.27 | 44.22 | 499.52 | 45.43 | 655.32 |
| EA1231293_CALD09_2942 | 43.65 | 391.56 | 43.77 | 454.52 | 43.87 | 443.79 | 43.85 | 420.05 | 44.73 | 666.45 |
| EA1231293_CALD09_2622u | 43.51 | 446.42 | 43.7 | 450.03 | 43.7 | 517.79 | 43.7 | 487.68 | 44.64 | 711.57 |
| EA1231293_CALD09_2324 | 42.74 | 377.74 | 42.72 | 415.59 | 43.09 | 383.1 | 42.98 | 365.77 | 43.93 | 514.49 |
| EA1231293_CALD09_2523d | 42.87 | 402.85 | 43.06 | 377.07 | 43.18 | 402.68 | 43.09 | 387.68 | 44.29 | 390.46 |
| EA1231293_CALD09_3243d | 43.89 | 420.51 | 44.13 | 453.08 | 44.16 | 462.6 | 44.1 | 442.16 | 45.26 | 632.08 |
| EA1231293_CAHN06_0728 | 43.65 | 7.97 | 43.67 | 9.19 | 43.84 | 17.26 | 43.78 | 13.53 | 45.23 | 23.89 |
| EA1231293_INT_1248_1 | 43.67 | 7.44 | 43.7 | 8.29 | 43.9 | 13.51 | 43.83 | 10.81 | 46.34 | 117.88 |
| EA1231293_INT_956_1 | 43.65 | 7.38 | 43.67 | 8.29 | 43.85 | 14.31 | 43.79 | 10.88 | 44.85 | 159.13 |
| EA1231293_INT_728_1 | 43.63 | 13.76 | 43.65 | 13.77 | 43.79 | 25.43 | 43.75 | 20.92 | 45.05 | 96.94 |
| EA1231293_INT_413_2 | 43.42 | 5.32 | 43.44 | 5.85 | 43.46 | 8.11 | 43.45 | 7.27 | 44.24 | 170.53 |
| EA1231293_INT_413_1 | 43.42 | 8.88 | 43.44 | 10.15 | 43.46 | 13.15 | 43.45 | 11.74 | 44.88 | 60.59 |

| Node Point | Maximum Undefended Levels and Flows | | | |
|------------------------|-------------------------------------|--------|-------------|--------|
| | 1 in 100yr | | 1 in 1000yr | |
| | Level | Flow | Level | Flow |
| EA1231293_CALD09_3471 | 44.07 | 453.67 | 45.44 | 656.36 |
| EA1231293_CALD09_2942 | 43.69 | 386.41 | 44.75 | 665.52 |
| EA1231293_CALD09_2622u | 43.56 | 443.62 | 44.64 | 714.26 |
| EA1231293_CALD09_2324 | 42.78 | 363.96 | 43.95 | 512.5 |
| EA1231293_CALD09_2523d | 42.91 | 382.3 | 44.3 | 390.4 |
| EA1231293_CALD09_3243d | 43.92 | 414.4 | 45.27 | 633.76 |
| EA1231293_CAHN06_0728 | 43.65 | 7.81 | 45.24 | 23.71 |
| EA1231293_INT_1248_1 | 43.67 | 7.26 | 46.35 | 119.06 |
| EA1231293_INT_956_1 | 43.65 | 7.21 | 44.86 | 160.53 |
| EA1231293_INT_728_1 | 43.63 | 13.7 | 45.07 | 97.44 |
| EA1231293_INT_413_2 | 43.42 | 5.38 | 44.15 | 171.57 |
| EA1231293_INT_413_1 | 43.43 | 8.95 | 44.9 | 43.27 |

APPENDIX C
PROPOSED DRAINAGE STRATEGY



420873 : 419212

Map Name : SE2019SE



Yorkshire Water,
 PO Box 500,
 Halifax Road,
 Bradford BD6 2LZ
 Contact Name :
 Search Advisor
 Contact Tel :

Title

Notes

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Partial Key

- Foul Sewer = F
- Combined Sewer = C
- Surface Water Sewer = SW
- Trade Sewer = TD
- Partially Separate = PS

Date Req :

Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Gen :