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Geological & Geotechnical Consultants

Dewsbury & District Hospital

Flood Risk Assessment (April 2023)

Prepared for Darwin Group Ltd

Geological & Geotechnical Consultants

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Rev.	**Date**	**Description**	**Prep.**	**Chkd.**	**Apr.**
0	14/04/23	First issue	RN	DH	WR

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Executive Summary

Site Information	
Client	Darwin Group Ltd
Project	Dewsbury and District Hospital
OS Co-ordinates	423224mE, 422777mN
Site Size	Approximately 0.16 hectares
Site Description	The Site is currently a temporary car park and is covered in asphalt with a small amount of soft landscaping at the perimeter. The Site is within a hospital and is surrounded by Historic Buildings.
Current and Historic Site Uses	By 1894 it was located on a disused colliery and the adjacent land was developed as Dewsbury Union Workhouse. By 1996 the adjacent Boothroyd Centre was developed and the building that was on site was demolished.
Proposed Development	Construction of single-storey modular building It is assumed that the building with be at a level that is equal to or greater than the current topography.
Historical Flooding	There are no records of historical flooding relating to the Site.
Flood Risk	
Fluvial Flood Risk	Assessed as Low Risk in Flood Zone 1.
Tidal Flood Risk	Assessed as Low Risk
Surface Water Flood Risk	Assessed as Low Risk
Groundwater Flood Risk	Assessed as Limited Potential for Groundwater Flooding to Occur at Surface
Other Flood Risks	Flooding from existing sewers and drains can present a flood risk. Installation of any new drainage can present an additional risk of flooding. Flooding from water mains has a potential risk.
Flood Risk Vulnerability	The Site is located in Flood Zone 1. The Site is not recorded as a Critical Drainage Area. The Site drainage needs to be designed to manage surface water run-off.
Conclusions	The proposed development could result in a net increase in the impermeable surface areas subject to design of the landscaping.

	Careful design of the Site drainage is required to manage surface water runoff. An assessment of the surface water drainage capacity is required to ensure this is adequate for the development. The FRA has concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the development site or to other third-party land and is therefore compliant with the National planning Policy Framework.

Contents

Figures

Appendices

1 Introduction

1.1 Project Details

Key Geosolutions Ltd has been commissioned to undertake a Site-Specific Flood Risk Assessment (FRA) to provide an assessment of the potential sources and effects of flooding in order to satisfy the requirements of the National Planning Policy Framework (NPPF). This report has been prepared in accordance with the guidelines set out in the National Planning Practice Guidelines (NPPG) and Planning Policy Statement 25: Development and Flood Risk (PPS25).

The aim of this FRA is to demonstrate that the Site can be developed safely, without exposing the development to an unacceptable degree of flood risk or increasing the flood risk to third parties.

The proposed new building is a single storey modular building approximately 50m x 30m in area that is at a level equal to or greater than the current sites topography.

1.2 Project Information

The following ground investigation and design information has been provided:

- 180598-DGL-01-00-DR-A-1135_Site Constraints Plan, 12th December 2022
- 180598-DGL-01-00-DR-A-1150_Existing Site Plan, 14th December 2022
- 180598-DGL-01-00-DR-A-1160(P1) _Proposed Site Plan, 14th December 2022
- 180598-DGL-01-00-DR-A-1170_Site Logistics Plan.pdf, 6th December 2022

The following services information has been provided for the project:

- DDH Site Plan 2021 – 21st April 2021
- 425124 Dewsbury Hospital Full Utility Search – 7th February 2023
- 03 Dewsbury Topo A_USP-A1 – Underground Utility Survey - 28th February 2023

The following publicly available information has been used to inform the desk study:

- Envirocheck® Report, February 2023
- BGS 1:50,000 Bedrock and Superficial Map, Sheet 77, 2003
- https://check-long-term-flood-risk.service.gov.uk/ (accessed on 09/02/2023)
- https://flood-map-for-planning.service.gov.uk/ (Accessed 11/04/23)
- https://www.gov.uk/guidance/flood-risk-and-coastal-change (Accessed 11/04/23)
- https://www.kirklees.gov.uk/beta/planning-policy/strategic-flood-risk-assessment.aspx (accessed on 11/04/23)

2 Site Description

2.1 Site Location

The Site is located at Dewsbury and District Hospital, which is managed by the Mid Yorkshire Hospitals NHS Foundation Trust. The site of the new building is located at National Grid Reference 423224mE, 422777mN adjacent to the existing Boothroyd Clinical Centre and is shown on Figure 2.1-1. The postcode for the Site is WF13 4HS. The Site currently contains a car park and is bordered by soft landscaping along the western border. The approximate site boundary is shown in Figure 2.1-2.

Figure 2.1-1: Site Location Plan

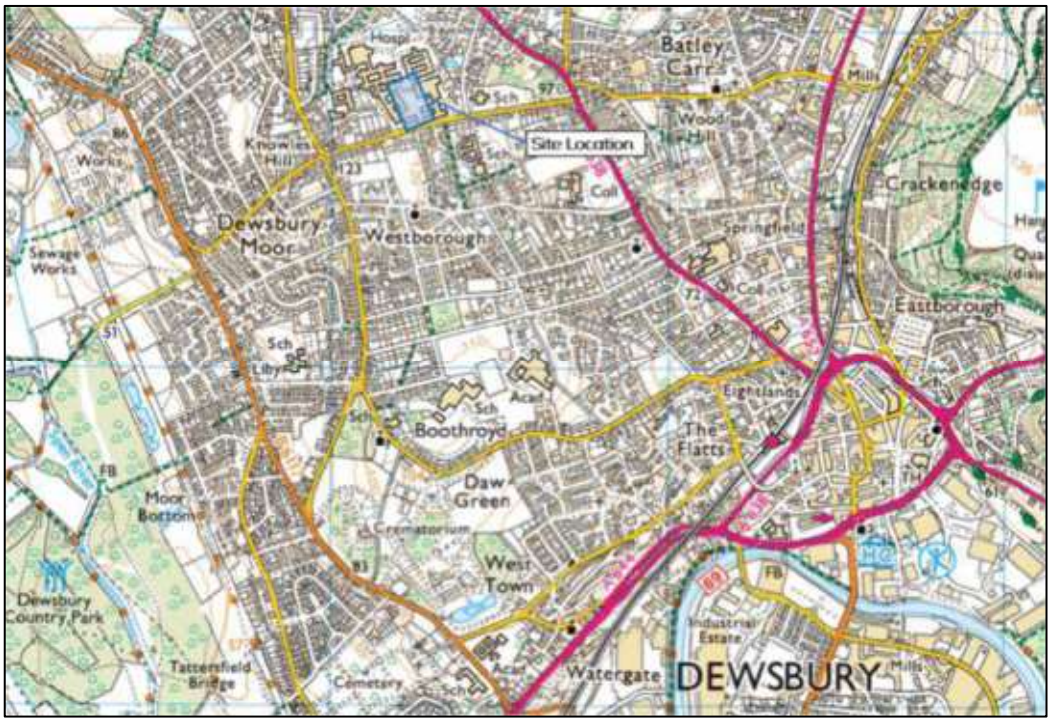


Figure 2.1-2: Site Boundary

2.2 Site Topography

The topographical survey is shown on drawing 'Dewsbury Topo A_USP-A1', which is provided in Appendix A. It is to be noted that the levels on the survey are not to Ordnance Datum but are to a local datum. Therefore, the values can only be used to work out height differences locally across the Site. Using Ordnance Survey contour data, it is estimated that the Site is at approximately 117mAOD.

The topography of the Site falls gently towards the eastern boundary. The level difference across the Site is approximately 1.2m.

The adjacent Boothroyd Medical Centre to the west is approximately 0.75m higher than the car park. A vehicle ramp runs from the car park to the building.

2.3 Geology, Hydrogeology & Hydrology

2.3.1 Geology

The BGS Solid and Drift Geology Map for the area (Sheet 77, 2003) and the Envirocheck® Geological map show the Site to be located on a fault system called the Thornhill Fractures. This fault system is mapped in the south-western corner of the Site.

On the western side of the fault the bedrock is Birstall Rock Formation which is described as sandstones with pebbles of ironstone, coal, sandstone, mudstone, and common streaks of shaly coal.

To the east of the fault lies the Pennine Lower Coal Measures (PLCM) Formation, which consists of interbedded grey mudstones, siltstones, sandstones, and various coal seams.

Both the Birstall Rock Formation and PLCM Formation are part of the Pennine Coal Measures Group and were deposited approximately 308-319 million years ago.

Multiple coal seams are mapped adjacent to the Site. No superficial deposits were noted to be present on the Site.

Figure 2.3-1: Extract from BGS Drift & Solid Geology Sheet 77

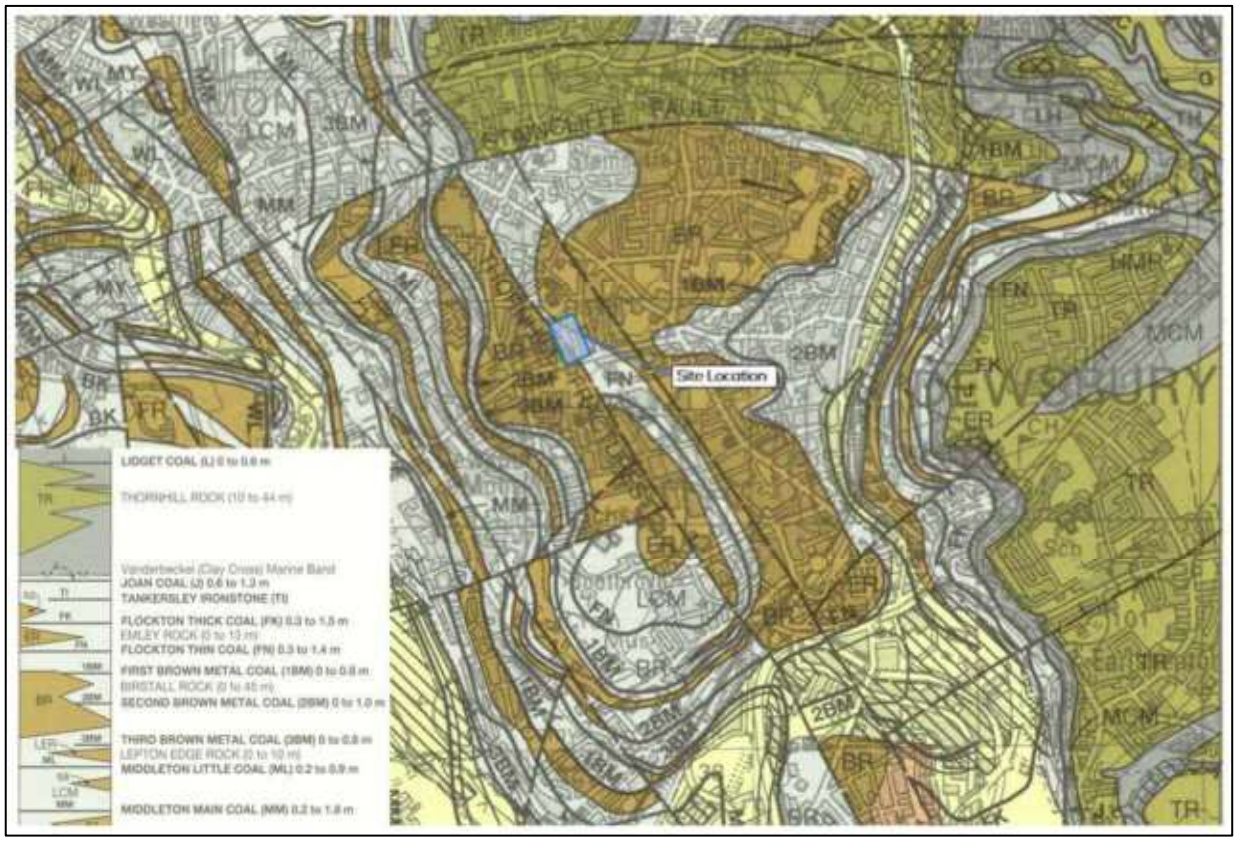
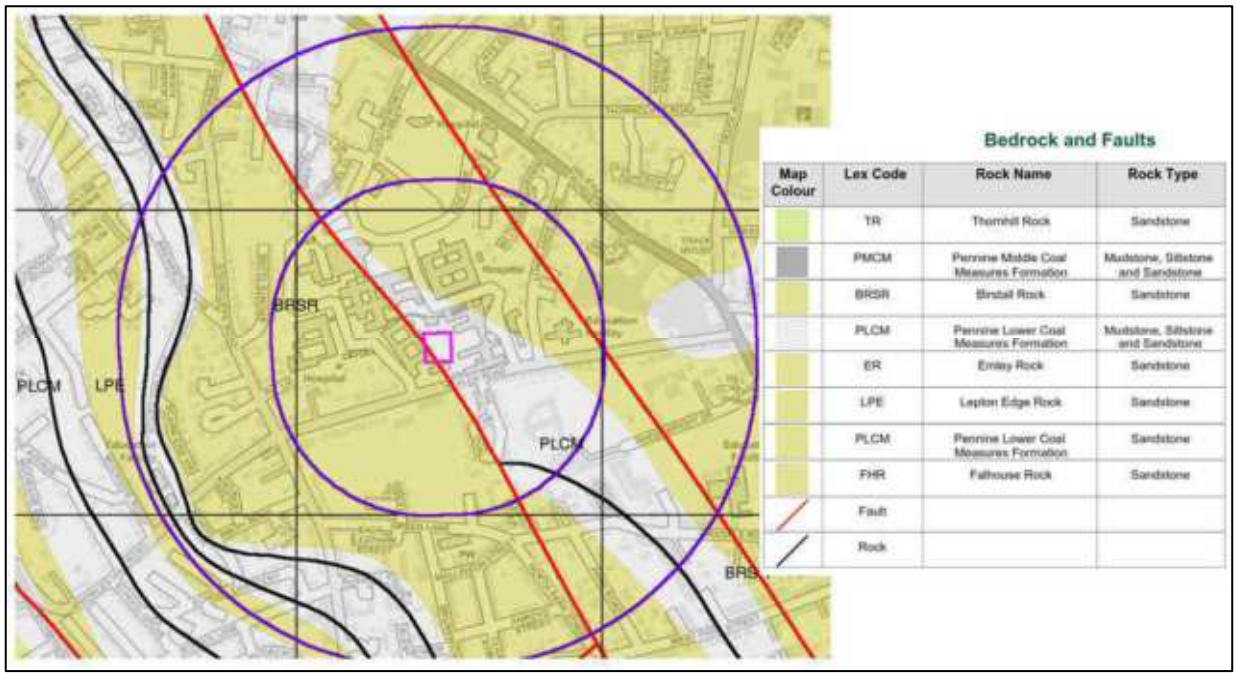


Figure 2.3-2: Enivrocheck® 1:10,000 Geological Map



An intrusive ground investigation was undertaken by Key Geosolutions Ltd (KGS) in March 2023 to include six windowless sample boreholes and two trial pits at various locations within the Site. The exploratory hole logs from this investigation are included in Appendix B.

Shallow Made Ground was encountered to depths of approximately 0.3-0.7mbgl in the majority of the exploratory holes with the exception of BH01 and BH02 where deeper Made Ground was encountered to depths of approximately 1.3m and 1.5mbgl respectively.

Below the Made Ground, soft to stiff, orangish brown and grey mottled clay was encountered to depths of approximately 1.5-2.1mbgl. This clay contained occasional gravel sized coals throughout.

Below the clay, extremely weak friable mudstone was encountered in TP01B and BH03, 4, 5 & 6 at approximately 1.8-2.1mbgl. This is interpreted as the weathered Pennine Lower Coal Measures Formation.

2.3.2 Hydrogeology

During the KGS site visit in March 2023, no groundwater was encountered in any of the exploratory holes. However, groundwater monitoring is ongoing, and the results of the monitoring will be reported under separate cover when completed.

A soakaway test was undertaken as part of the ground investigation. When the test pit was excavated no groundwater was encountered. The test pit was infilled with water. The level of the water in the soakaway pit rose by 140mm over an 18-hour period. Snow was present on the ground during the test. It was concluded that the water level rise was due to meltwater infiltrating through the Made Ground and into the test pit. It was determined, from the results of the soakaway test that the Site will be unsuitable for the use of soakaways and infiltration systems.

The site is not located within an Environment Agency (EA) Source Protection Zone for groundwater and the underlying ground is classified as a Secondary A aquifer with medium vulnerability.

2.3.3 Hydrology

With reference to the 1:50,000 Ordnance Survey map for the Site, the nearest surface water feature is a pond c.127m to the north-east of the Site. The River Spen, a tributary to the River Calder, is located 1,273m west of the Site.

2.4 Proposed Development

It is proposed to build a new one storey modular building, approximately 50m x 30m in area, on the car park adjacent to the existing Boothroyd Medical Centre. It is assumed that the building with be at a level that is equal to or greater than the current topography.

A small area of soft landscaping near the Boothroyd Centre is to be removed and a small area of soft landscaping will be created in the south-eastern corner of the new building. The development proposal is shown in Figure 2.4-1, full drawings of the proposed development are provided in Appendix 2.

The proposed development will include a single building with approximately 1,500m² of roof area, 570m² of hard landscaping and 70m² of soft landscaping.

Figure 2.4-1: Proposed Building Location

2.5 Current Surface Water Management

The locations of existing foul and surface water sewers are provided from the GPR survey in Appendix 1. It is however noted that many of the sewers were not able to be traced for their full distance through the Site and various surface water drains are marked but there are no pipes traced from them.

Yorkshire Water has supplied the public waste water network sewers but there is no information about the waste water within the Site boundary. This is included in Appendix 4.

2.5.1 Existing Foul Drainage

Existing 150mm diameter public foul sewers run across the western, northern, and southern boundaries of the Site. These all flow into a 300mm diameter pipe that runs approximately north-south along the eastern border under the road.

2.5.2 Existing Surface Water Drainage

An existing 300mm diameter public surface water sewer runs across the northern boundary of the Site. 150mm diameter sewers are present at the eastern boundary of the Site, however, the GPR survey was unable to trace them for their full distance. The carpark to the east of the Site contains various surface water gullies. The outflow pipes from these don’t appear on the GPR survey.

3 Flood Risk Assessment

3.1 Sequential & Exception Test

Guidance of the requirements for requirements for site-specific flood risk assessment are provided of the government's Flood Risk and Coastal Change website.

The flood map for planning shows that the proposed development is within Flood Zone 1. Developments within Flood Zone 1 are defined as having a low risk of flooding with less than a 1 in 1000 annual probability of flooding from rivers and / or the sea.

As the site is in an area of low flood risk it passes the Sequential Test, and an Exception Test is not required (Diagram 2).

3.2 Climate Change

Climate change has important implications for the assessment and management of flood risk. The NPPF requires that climate change is considered when making an assessment of flood risk posed to future development.

Climate change has the potential to affect all identified sources of flooding at the Site. The likely impacts of climate change include increased severity of rainfall events as well as wetter winters leading to higher groundwater levels and increased frequency and severity of surface water flooding.

This assessment is undertaken, where relevant, in the following sections.

3.3 Environment Agency Flood Map for Planning

The Environment Agency Flood Risk Mapping, available on their website, identifies the entire area of the Site as being situated in Flood Zone 1.

Flood Zone 1 zones are at a very low risk of flooding with less than a 1 in 1000 annual probability of flooding from rivers and / or the sea.

The Site and hospital grounds are at a distance and elevation above the higher risk Flood Zone 2 and 3 areas mapped to the west and east of the Site. Therefore, it is not anticipated that the impacts of climate change on peak river flow will affect this rating.

Figure 3.3-1: Environment Agency Flood Risk Mapping 1:2,500

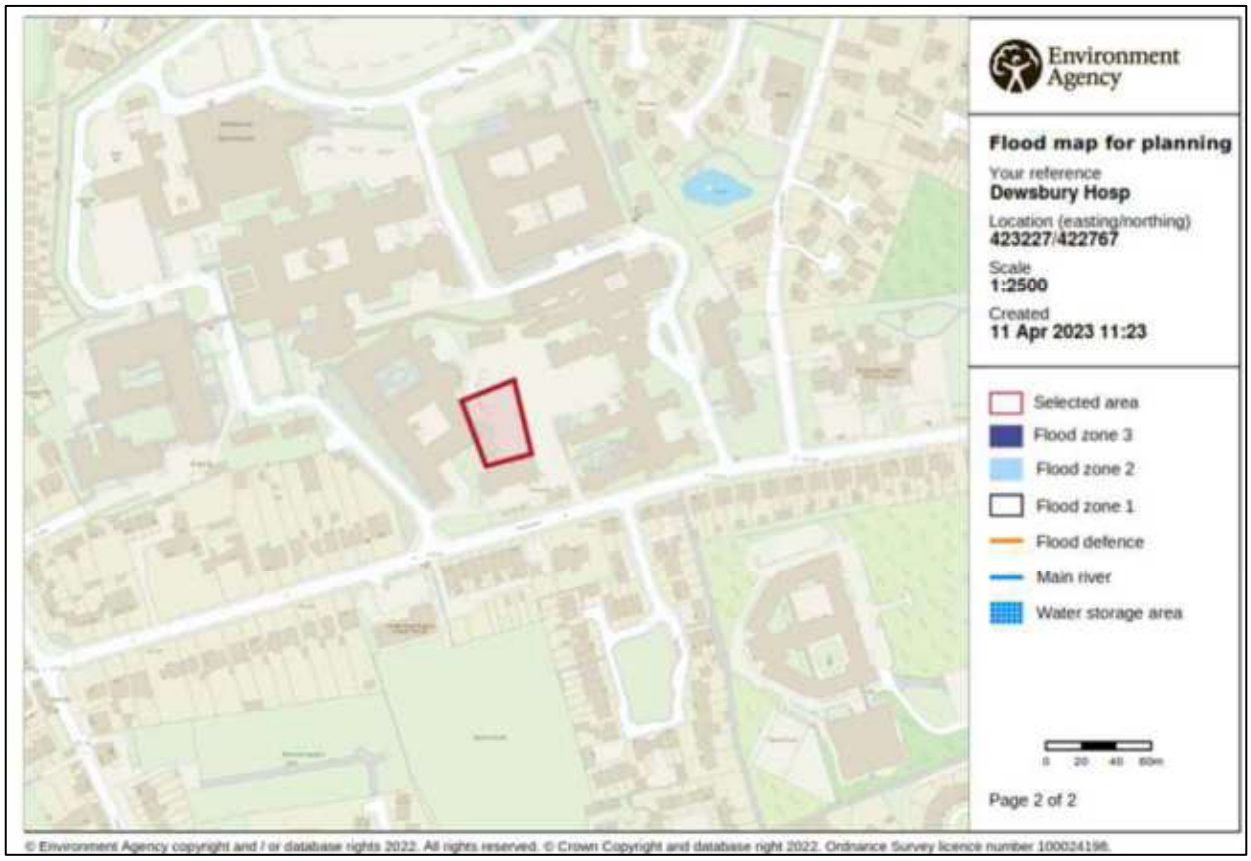
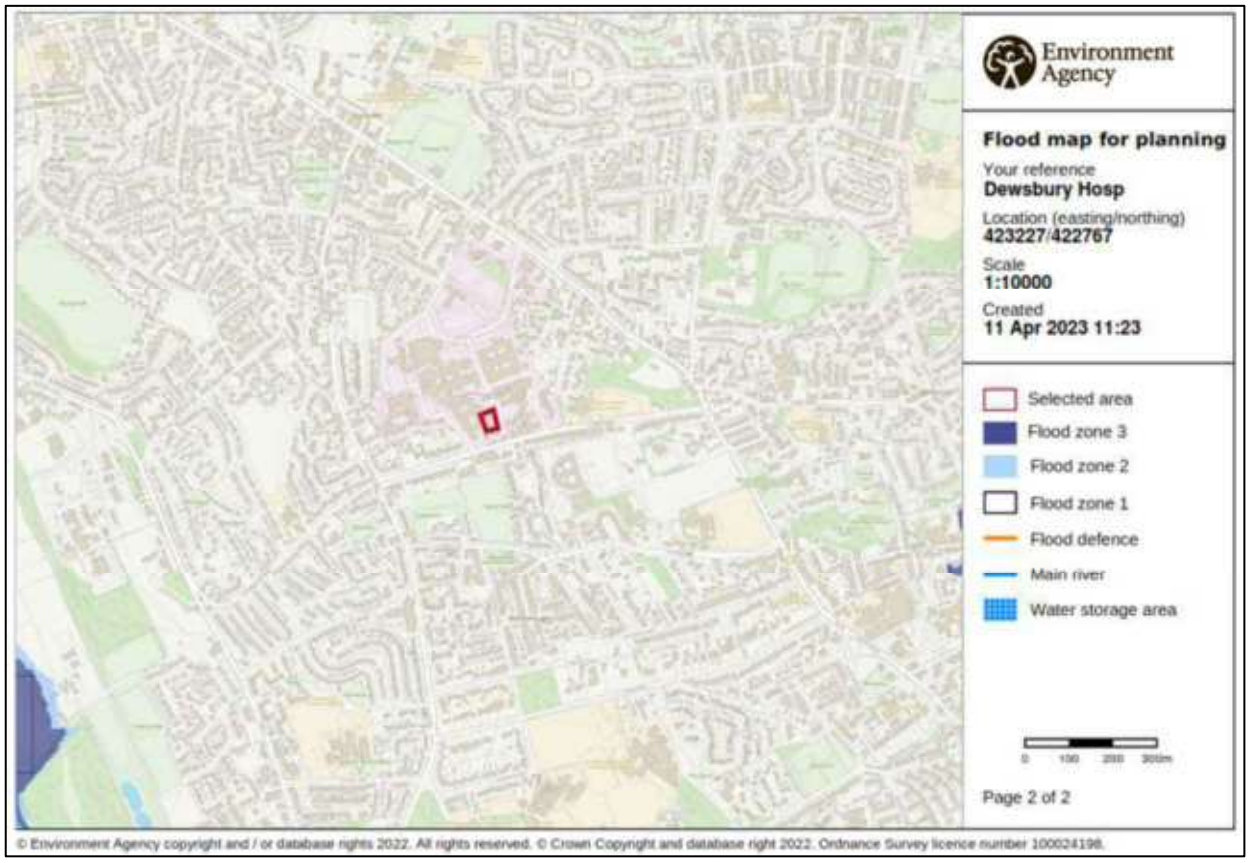


Figure 3.3-2: Environment Agency Flood Risk Mapping 1:10,000



3.4 Flood Risk Mapping

3.4.1 Surface Water

The Environment Agency's Flood Risk from Surface Water maps show the risk of flooding in the following scenario's:

- High Risk: 1 in 30-year flood
- Medium Risk: 1 in 100-year flood
- Low Risk: 1 in 1000-year flood
- Combined extents of all three scenarios noted above.

Figure 3.4-1: Surface Water Flood Risk – High Risk

Figure 3.4-2: Surface Water Flood Risk – Medium Risk

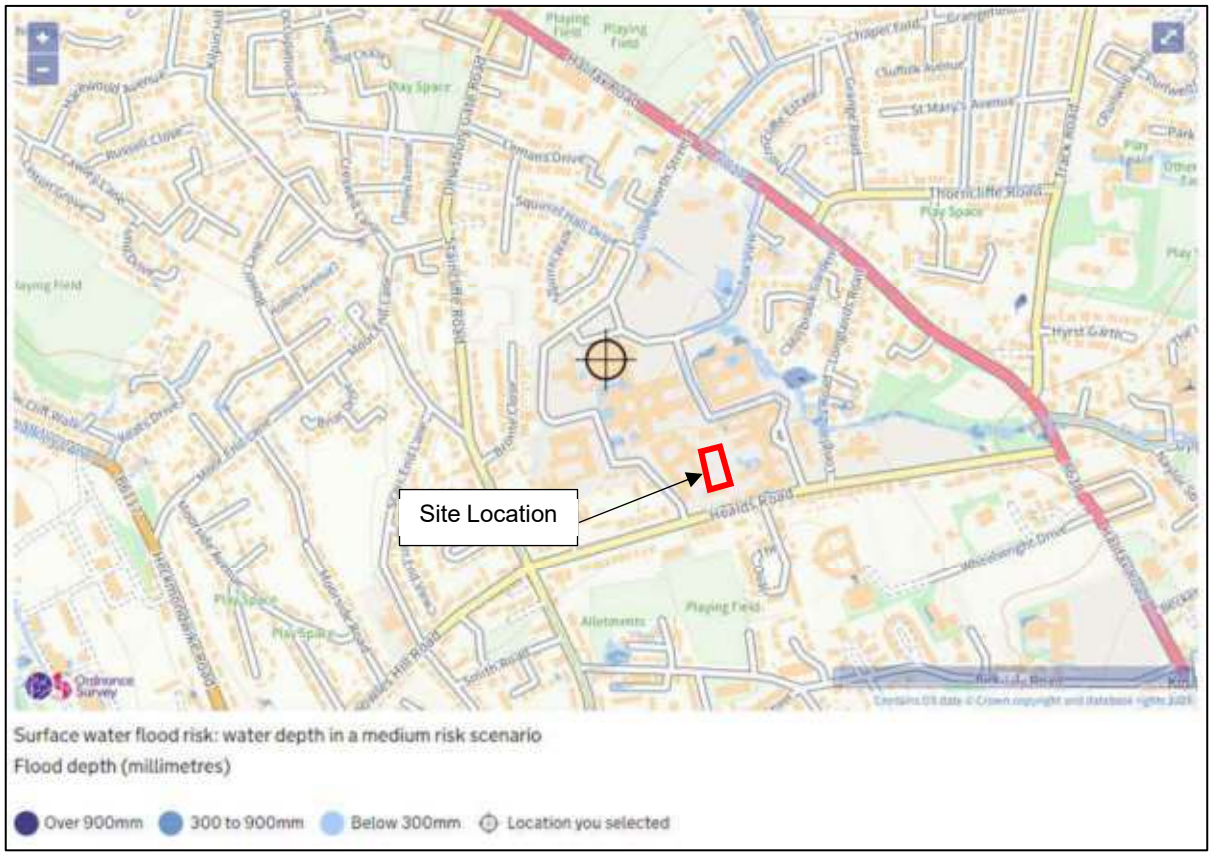


Figure 3.4-3: Surface Water Flood Risk – Low Risk

Figure 3.4-4: Surface Water Flood Risk – Combined Risk

A small area of localised low risk surface water flooding can be seen on the adjacent car park to the east of the Site but generally the Site and surrounding hospital have low/no risk of surface flooding.

For developments with a lifetime beyond 2100, high-risk (1 in 30-year flood) should allow for +40% allowance for climate change and medium-risk rainfall events (1 in 100-year flood) should allow for +45%.

3.4.2 Rivers and Sea

Due to the distance from the coast and a minimum Site level of approximately 117.0mAOD. There is no tidal flood risk influence.

The Site is located on a hill approximately 65.0m higher than the nearest river (The Spen) to the west. There is no fluvial flood risk influence.

Figure 3.4-5: Extent of flooding from rivers or the sea

3.4.3 Reservoirs

The Site is located on an area where there is no mapped risk for flooding due to reservoirs. However, the area adjacent to the Site to the east show's potential for flooding from reservoirs to occur when river levels are normal. The flood risk for the Site is considered low.

Figure 3.4-6: Extent of flooding from reservoirs

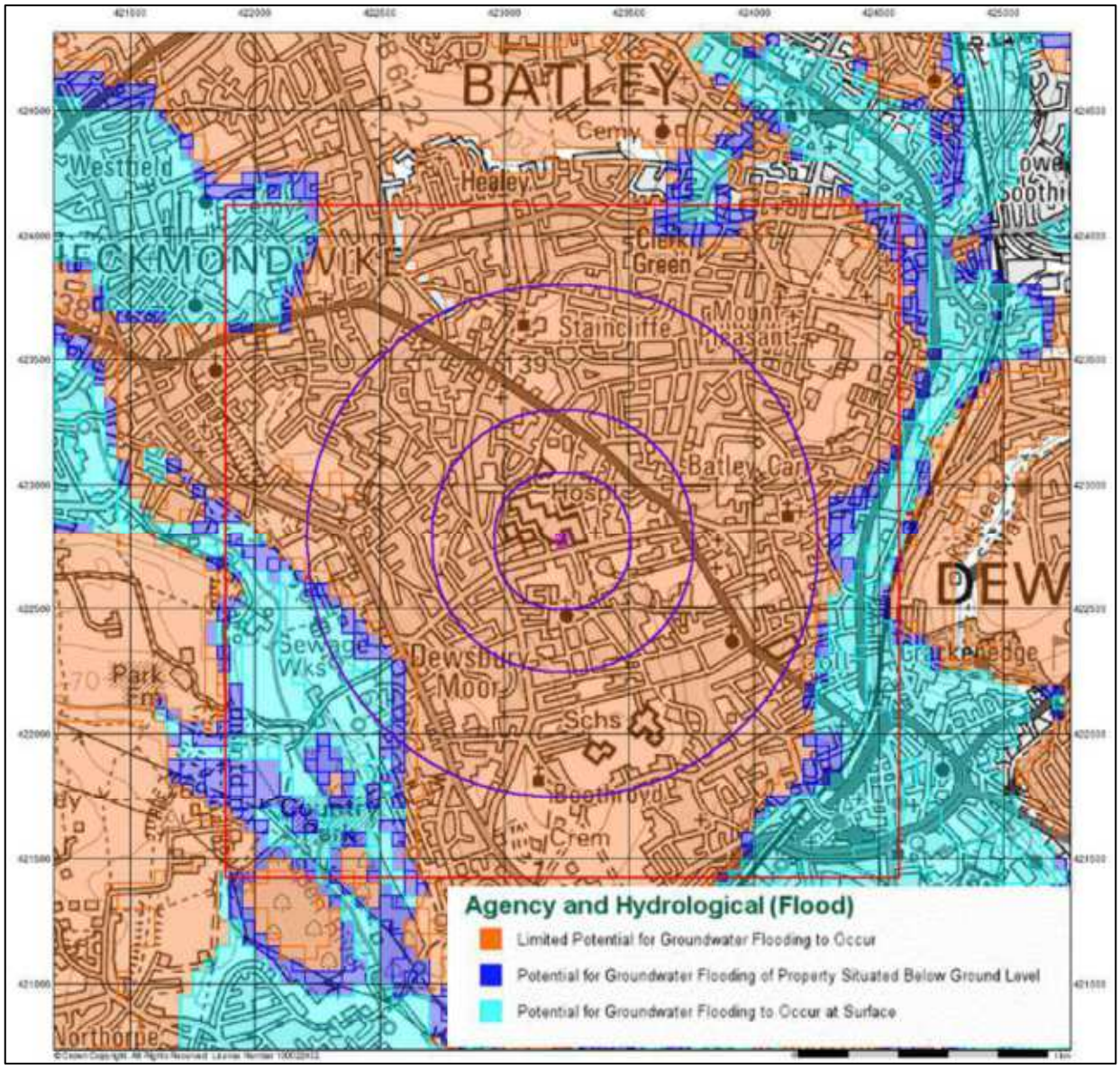
3.4.4 Groundwater

No groundwater was encountered during the ground investigation.

The groundwater flooding potential for the Site is determined in the Envirocheck report as being “Limited Potential for Groundwater Flooding to Occur at Surface”.

The Environment Agency website shows that the Site is not within a Groundwater Source Protection Zone.

Figure 3.4-7: Groundwater Flooding Risk Map



3.5 Flooding from other sources

Flooding from existing sewers and drains can present a flood risk which will generally relate to surface water flooding during extreme rainfall rather than foul sewer flooding. There are drains and sewers present on the Site.

Installation of any new drainage can present an additional risk of flooding. Any new drainage will have to be designed to modern British Standard, Building Regulation, Sewers for Adoption and SuDS legislation standards in full liaison with Yorkshire Water and Kirklees Council Flood Risk Management.

Flooding from water mains is a potential risk on Site. There is a private mains water pipe running underneath the access road and the proposed building location that supplies clean water to the adjacent buildings. There is also a risk from any internal pipe work during building works.

3.6 Local Authority Flood Risk Information

The local authority for the Site is Kirklees Council. A Strategic Flood Risk Assessment (SFRA) is available online (Calder Catchment Strategic Flood Risk Assessment) which also includes various flood risk assessment maps which can be found in Appendix 5. The report was done as part of a joint study with Wakefield and Calderdale Council in 2016 and has been reviewed below.

3.6.1 Flood Zones

The Strategic Flood Risk Assessment map created by Kirklees Council corelates with the Environment Agency Flood Map showing the Site to be within a Low-Risk Flood Zone 1 approximately 110m away from the nearest higher risk area.

3.6.2 Historic Flooding

Due to limited funding and a lack of foresight in appreciating the value of recording and assessing historic flood incidents has resulted in the Council possessing very limited and incomplete records of past flood events.

Kirklees Council has included the historic flood data from the Environment Agency on their map. The Site is not near any areas of historic flooding with the nearest being approximately 185m to the south-east.

3.6.3 Risk of Flooding from Surface Water

Kirklees Council has produced a Surface Water Management Plan (SWMP) for the district. The SWMP identifies several areas where the risk from surface water flooding could be significant and where future, more detailed, investigation work could be beneficial. This plan correlates with the EA Surface Water Flood maps.

There is potential for low-risk surface water flooding in the adjacent car park to the east of the Site.

3.6.4 Risk of Flooding from River & Sea

Kirklees Council has produced a map that shows the risk of flooding with various flood defences in place. This can be compared to the EA Flood Map for Planning which is ‘undefended’.

The Site is far from any high-risk areas and the risk is considered to be low.

3.6.5 Groundwater Flooding

The groundwater flooding map uses four susceptible categories to show the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring.

The Site is considered to be within a zone of no risk from groundwater flooding.

3.6.6 Flood Risk Management

The flood risk management map identifies the raised defences, areas benefiting from flood defences, flood storage areas and flood warning areas. Most areas situated around the River Calder are within a flood warning area and various sections of the river have both raised defences and flood storage areas.

The Site is outside of any flood risk management areas and so the risk from these items is considered low.

3.7 Flood Risk Mitigation

As the flood risk is assessed to be low from multiple sources no special flood risk mitigation is considered necessary. It is assumed standard practice of floor levels set a minimum 150 mm above the surrounding ground level for Building Regulations compliance, ground/paving levels sloping away from building edges and flush threshold doorways, and good drainage design avoiding manholes and gullies near to flush door thresholds will suffice. In addition, it is expected that adequate maintenance of existing and proposed drainage systems will be undertaken throughout the lifetime of the project.

4 Site Drainage Proposals

No details of the Site drainage proposals have been provided at this stage. It is anticipated that surface water run-off will be conveyed into the existing surface water drainage system for the wider site. The design of the Site drainage needs to ensure that appropriate provision is made to manage surface water run-off. An assessment of the existing surface water drainage system may be required to demonstrate that this has adequate capacity to accommodate surface water run-off from the development site. The Flood Risk Maps indicate that there are no current issues with managing surface water run-off at the Site.

5 Run-Off Assessment

The total site area is approximately 2,170m², at present the layout comprises mainly of a car park (c.2,110m²) with small amounts of soft landscaping (c.160m²) along the western border of the proposed building.

The proposed development will include a single building with approximately 1,500² of roof area, 600m² of hard landscaping and 70m² of soft landscaping.

The proposed development will give a net increase in the areas of impermeable surface of approximately 90m².

The site is not within a Critical Drainage Area.

6 Residual Risk

A Flood Risk Assessment should consider the residual risk to a proposed development for its intended lifecycle. In this case the proposed building is for a healthcare development and a 100-year lifecycle is assumed.

A residual risk of flooding associated with burst water mains from both existing and proposed water mains may result in flooding of open areas, access roads and dwellings.

The proposed development area lies outside of all areas mapped on the EA surface water flood risk. However, a residual risk of flooding from rainfall events in exceedance of the site drainage design and by run-off from surrounding areas, may result in on-site property flooding.

With the low all round flood risk and distance of the proposed building from any areas of higher risk the residual risk is therefore considered low.

7 Conclusions

The Environment Agency online flood risk mapping indicates that the Site is located within Flood Zone 1. There are no flood restrictions on developments in Zone 1 provided the development does not increase flood risk elsewhere.

The proposed development will include a single building with approximately 1,500m² of roof area, 600m² of hard landscaping and 70m² of soft landscaping.

The Flood Risk Mapping indicates that there is a very low of surface water flooding at the Site. The surface water drainage system for the development site must be designed to ensure that the development itself will not at be at risk of flooding and that there will be no increased risk of flooding to downstream properties from rainfall events up to a 1 in 100 year (+45% allowance for climate change).

The risk of flooding to the proposed development has been assessed in accordance with the requirements of the National Planning Policy Framework. This FRA has shown that the development can be constructed and operated safely without significantly increasing the flood risk of the Site and surrounding areas assuming that any recommendations outlined in this report are followed.

Appendix 1: Topographic and Services Survey

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Sheet Diagram

UTILITIES KEY

- SURVEY BOUNDARY
- FOUL DRAINAGE
- SURFACE DRAINAGE
- COMBINED DRAINAGE
- ELECTRIC CABLE
- TELECOM CABLE
- WATER PIPE
- GAS PIPE
- GAS 02
- CATV / CABLE TELEVISION
- COMMUNICATIONS CABLE
- TRAFFIC LIGHTS
- DUCTING
- UNIDENTIFIED
- EARTH CABLE
- PUMPING MAIN
- FUEL PIPE
- VENT PIPE
- OFFSET FILL PIPE
- VAPOUR RECOVERY
- GAUGE LINE
- RADAR TRACE
- RADAR AREA ANOMALY
- RADAR UTILITY TRACE
- RADAR UTILITY ANOMALY
- UNABLE TO SURVEY

ABBREVIATIONS

AR	-	ASSUMED ROUTE
BD	-	BACKDROP
CL	-	COVER LEVEL
CR	-	CABLE RISER
EM	-	ELECTROMAGNETIC
EOT	-	END OF TRACE
GPR	-	GROUND PENETRATING RADAR
FH	-	FIRE HYDRANT
HV	-	HIGH VOLTAGE
IL	-	INVERT LEVEL
LV	-	LOW VOLTAGE
MH	-	MANHOLE
MW	-	MONITORING WELL
NL	-	NOT LOCATED
OSA	-	OUTSIDE SURVEY AREA
PR	-	PIPE RISER
RWP	-	RAIN WATER PIPE
TFR	-	TAKEN FROM RECORDS
TP	-	TELEGRAPH POLE
UTGA	-	UNABLE TO GAIN ACCESS
UTL	-	UNABLE TO LIFT
UTR	-	UNABLE TO ROD
UTS	-	UNABLE TO SURVEY
UTT	-	UNABLE TO TRACE
VP	-	VENT PIPE
WWP	-	WASTE WATER PIPE

Rev	Details	Date	Drawn

Terrascan

Client: Darwin Group Ltd

Project: Dewsbury & District Hospital

Title: Underground Utility Survey

Job No: 04080

Scale:	Date:	Revision:
1:200@A1	27.02.23	001

Hillside Cottage,
Portway Hill,
Lamyatt,
Shepton Mallet,
BA4 6NJ
www.terrascanuk.co.uk

Appendix 2: Plan of Proposed Development

Calorifier House (Plant)

Staincliffe Wing

Boothroyd Centre

DN

DN

UP

DN

Fitton House

DN

Staincliffe Annexe

*** Trees indicatively shown ***

Key	
- - - -	Proposed Building

Existing_Site Plan

1 : 200

N

0m 4m 8m 12m 16m 20m

VISUAL SCALE 1:200 @ A1

Rev	Description	By	Chk	Date

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DarwinGroup Construction Has Evolved
Design — Engineering — Contracting — Offsite — Minor Works

London House, Shawbury Business Park, Shawbury, Shrewsbury, SY4 4EA

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PROJECT TITLE
Dewsbury and District Hospital

ADDRESS
Halifax Rd, Dewsbury WF13 4HS

DRAWING TITLE
Existing Site Plan

DRAWING REFERENCE

PROJECT	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	NUMBER
180598	DGL	01	00	DR	A	1150

INITIAL ISSUE DATE	INITIAL ISSUE BY	INITIAL CHECKED BY	GIFA
14/12/2022	HB	LS	1503 m²

SUITABILITY		SCALE	SHEET	REV
S4 (STATUS CODE)	For Stage 2 Approval	As indicated	A1	

19/12/2022 09:50:11

Calorifier House (Plant)

Staincliffe Wing

Boothroyd Centre

Remodelled ramp to suit egresses from new proposed building and existing Boothroyd Centre

Proposed Building

External platform at proposed building height with associated ramp and staircase

Ramp

External covered walkway link to exising Boothroyd Centre corridors, subject to budget and later stage development

Fitton House

Staincliffe Annexe

Surgeon
Anaesthetist
Anaesthetist
Surgeon

DN
UP
2221

*** Trees indicatively shown ***

N

0m 4m 8m 12m 16m 20m

VISUAL SCALE 1:200 @ A1

Proposed_Site Plan

1 : 200

Rev	Description	By	Chk	Date
P1	Updated for S2 Issue	HB	MYH NHST	20/12/22

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London House, Shawbury Business Park, Shawbury, Shrewsbury, SY4 4EA

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www.darwingroupltd.co.uk

PROJECT TITLE
Dewsbury and District Hospital

ADDRESS
Halifax Rd, Dewsbury WF13 4HS

DRAWING TITLE
Proposed Site Plan

DRAWING REFERENCE

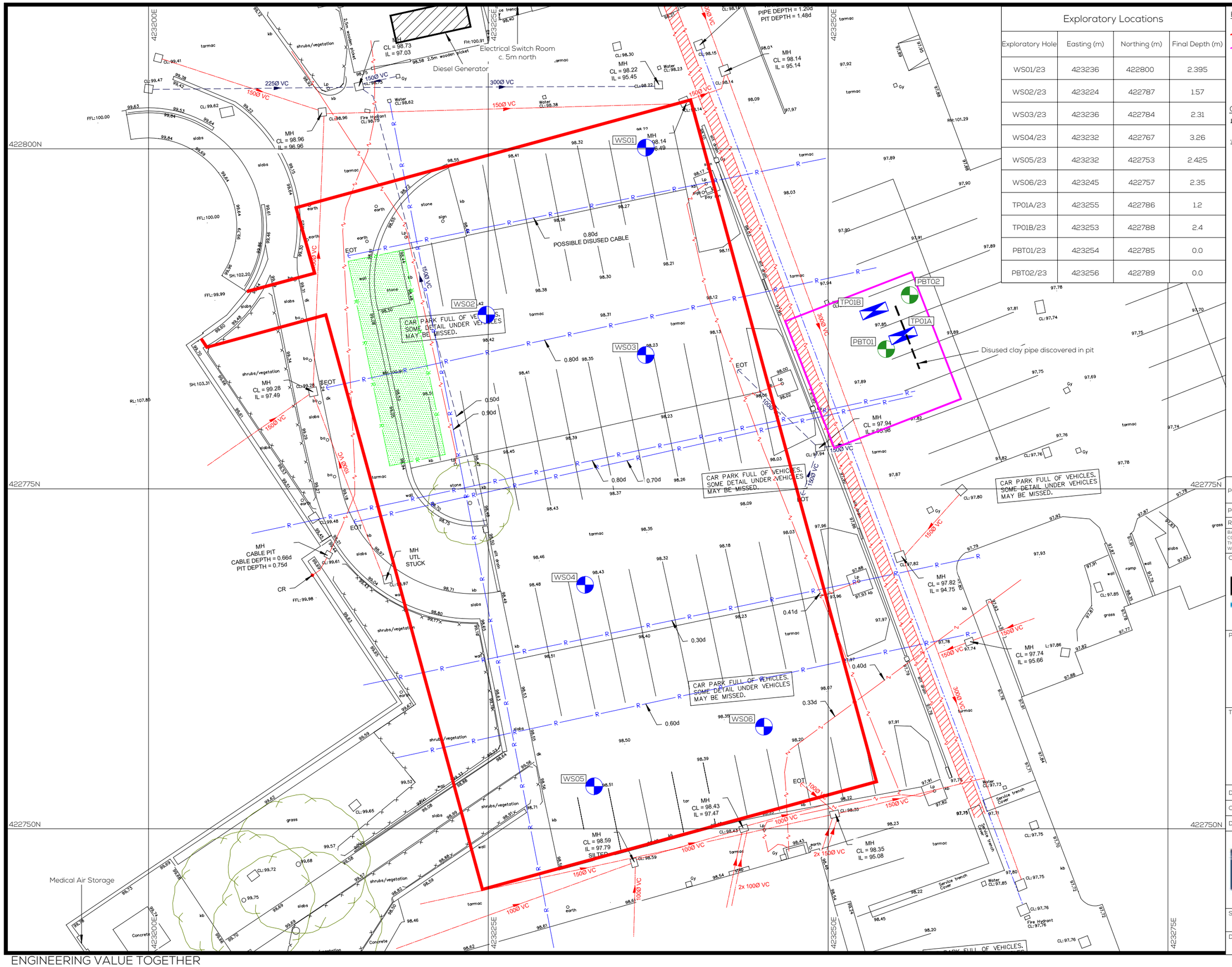
PROJECT	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	NUMBER
180598	DGL	01	00	DR	A	1160

INITIAL ISSUE DATE	INITIAL ISSUE BY	INITIAL CHECKED BY	GIFA
14/12/22	HB	LS	1503 m²

SUITABILITY		SCALE	SHEET	REV
S4 (STATUS CODE)	For Stage 2 approval	1 : 200	A1	P1

19/12/2022 10:04:42

Appendix 3: Exploratory Hole Plan and Logs



Exploratory Locations

Exploratory Hole	Easting (m)	Northing (m)	Final Depth (m)
WS01/23	423236	422800	2.395
WS02/23	423224	422787	1.57
WS03/23	423236	422784	2.31
WS04/23	423232	422767	3.26
WS05/23	423232	422753	2.425
WS06/23	423245	422757	2.35
TP01A/23	423255	422786	1.2
TP01B/23	423253	422788	2.4
PBT01/23	423254	422785	0.0
PBT02/23	423256	422789	0.0

KEY

- Proposed Building
- Crane Pad Location
- Exploratory Hole
- Proposed Plate Bearing Test
- Proposed Trial Pit

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. EXPLORATORY HOLE LOCATIONS ARE APPROXIMATE AND SHOULD BE CONFIRMED ON SITE.

REV.	AMENDMENTS	DRW.	CHK.	DATE
P02	UPDATED WITH ACTUAL LOCATIONS AND ADDED SITE NOTES	RN	DH	30/03/23
P01	FIRST ISSUE	RN	DH	01/03/23

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CLIENT

DarwinGroup
Construction Has Evolved

PROJECT

DEWSBURY & DISTRICT HOSPITAL

TITLE

BOREHOLE LOCATIONS

DRAWN:	DESIGN:
CHECKED:	APPROVED:
DATE: 30/03/23	SCALE: 1:250

KEY | GS
PART OF RICHTER

STATUS	SHEET SIZE
PRELIMINARY	A3
DRAWING NO. 9202-001-001	REV. P02

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

TRIAL PIT LOG

Project				TRIAL PIT No
Dewsbury - Dewsbury and District Hospital				**TP01A**
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
9202	11-03-23 12-03-23	97.90	E 423255 N 422786	
Contractor				Sheet
EvaBuild				1 of 1

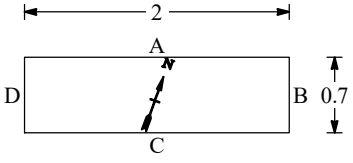
STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.10	Asphalt			
0.10-0.40	Loose dark brown sandy very gravelly CLAY with occasional brick and concrete, one 300mm long wooden plank, frequent brick fragments, rare coal gravels. [MADE GROUND]	0.10-0.40	J	
0.40-1.20	0.30 becoming firm slightly sandy slightly gravelly CLAY Firm grey and orangish brown mottled CLAY with frequent fine to medium gravel sized coal.	0.80-1.20	B	
	1.15 Struck a clay pipe. Left over night to see if in use before backfilling.			

PHOTOGRAPHS / DIAGRAMS

Photo 1 View of pit.

Photo 2 View of arisings.

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:37.5	Client Darwin Group Ltd	Method/ Plant Used Excavator	Logged By RN

UK TRIAL PIT LOG WITH PHOTOS 9202-001 TP LOGS.GPJ GINT STD AGS 3_1.GDT 30/3/23

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

TRIAL PIT LOG

Project				TRIAL PIT No
Dewsbury - Dewsbury and District Hospital				**TP01B**
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
9202	11-03-23 12-03-23	97.90	E 423253 N 422788	
Contractor				Sheet
EvaBuild				1 of 1

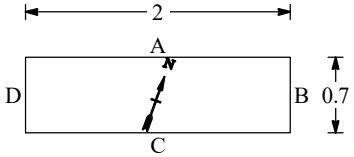
STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.15	Asphalt			
0.15-0.48	Loose dark brown slightly clayey sandy GRAVEL with brick, asphalt and concrete fragments, concrete slab, clay pipe and cobbles and two boulders of sandstone. sand is fine to coarse. Gravel is fine to coarse sandstone. [MADE GROUND]	0.20-0.50	B+J	
0.48-2.40	Soft orangish brown and light grey mottled CLAY	0.50-1.00	B	
	1.00 becoming firm brown and grey mottled			
	1.80 towards base becoming CLAY and extremely weak friable MUDSTONE with sandstone gravels and two tabular sandstone boulders. [WEATHERED PENNINE LOWER COAL MEASURES]	2.00-2.40	B+J	

PHOTOGRAPHS / DIAGRAMS

Photo 1 View of pit.

Photo 2 View of arisings.

Shoring/Support:
Stability:



GENERAL REMARKS

All dimensions in metres Scale 1:37.5	Client Darwin Group Ltd	Method/ Plant Used Excavator	Logged By RN

UK TRIAL PIT LOG WITH PHOTOS 9202-001 TP LOGS.GPJ GINT STD AGS 3_1.GDT 30/3/23

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER WS01

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423236 mE, 422800 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.2 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
					0.20 — 98.00	
	J	()			0.30 — 97.90 Loose pale brown very gravelly SAND with fragments of asphalt, brick and clay tile. Sand fine to coarse. Gravel Fine to medium. [MADE GROUND]	
0.5	J	()			Loose pale orangish brown clayey very sandy GRAVEL with rare sandstone cobbles. Sand fine to coarse. Gravel Fine to coarse sub-rounded sandstone. [MADE GROUND]	
	B	()				
					0.85 — 97.35 @0.75 with occasional clasts of rare soft orangish brown and grey mottled clay, brick fragments and rare coals	
1.0					Soft grey and brown mottled dark grey slightly sandy slightly gravelly CLAY with gravel sized coals. [MADE GROUND]	
	SPT	5-5-5-5 (20)			1.20 — 97.00	
					1.30 — 96.90 Soft reddish brown sandy CLAY with occasional gravel sized coals [MADE GROUND]	
1.5					Firm grey and brown mottled CLAY	
	B	()			@1.5 becoming stiff	
2.0					2.00 — 96.20	
	SPT	12-12-15-11 (50)				

Bottom of borehole at 2.40 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER WS02

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423224 mE, 422787 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.4 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
	J	()			0.14 — 98.26 Loose pale brown clayey very sandy GRAVEL with asphalt and brick fragments [MADE GROUND]	
0.5	B	()			0.37 — 98.03 Loose orange sandy GRAVEL with frequent brick fragments [MADE GROUND]	
					0.80 — 97.60 Soft grey and orangish brown mottled sandy very gravelly CLAY with frequent brick fragments and coal. [MADE GROUND]	
1.0	SPT	1-2-2-2 (7)				
1.5	SPT	50-0-0-0 (50)			1.50 — 96.90 @1.5m concrete cobble Bottom of borehole at 1.57 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

WELL NUMBER WS03

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423236 mE, 422784 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.2 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
					0.15 — 98.05	
	J	()			Loose pale brown slightly clayey sandy GRAVEL with asphalt fragments. Sand fine to coarse. Gravel fine to coarse rounded to sub-rounded. [MADE GROUND]	
0.5					0.30 — 97.90	
					Soft grey mottled dark grey and black slightly sandy slightly gravelly CLAY. Sand fine to coarse. Gravel fine rarely medium. [MADE GROUND]	
					@0.45 becoming firm	
					0.50 — 97.70	
					Firm orangish brown and light grey mottled CLAY	
1.0						
	B	()				
	SPT	3-3-3-3 (12)				
1.5	J	()				
					@1.6 becoming stiff brown and dark grey mottled	
					1.90 — 96.30	
2.0					Extremely weak friable brown and grey mottled MUDSTONE [WEATHERED PENNINE LOWER COAL MEASURES]	
					2.00 — 96.20	
	SPT	21-26-3-0 (50)				

Bottom of borehole at 2.31 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER WS04

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423232 mE, 422767 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.4 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
					0.15 — 98.25	
0.5					Loose pale brown slightly clayey sandy GRAVEL with occasionaly brick fragments and one brick. Sand fine to coarse. Gravel fine to coarse sub-angular. [MADE GROUND]	
	J	()			0.70 — 97.70	
1.0					Firm orangish brown and light grey mottled CLAY	
	SPT	2-4-4-4 (14)				
1.5						
	B	()			@1.5 becoming stiff brown and grey mottled	
2.0					@1.9 with occasional coal fragments	
	SPT	4-5-7-7 (23)			2.10 — 96.30	
2.5					Extremely weak friable brown and grey mottled MUDSTONE [WEATHERED PENNINE LOWER COAL MEASURES]	
	B	()				
3.0					3.00 — 95.40	
	SPT	25-25-0-0 (50)				

Bottom of borehole at 3.26 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER WS05

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423232 mE, 422753 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.5 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
					0.15 98.35	
	J	()			Loose pale brown slightly clayey sandy GRAVEL with asphalt fragments and one brick at base. [MADE GROUND]	
					0.30 98.20	
0.5					Soft orangish brown and light grey mottled CLAY with occasional coal fragments. @0.5 becoming firm	
	J	()				
1.0						
	B	()			@1.0 becoming brown and grey mottled with frequent lithoclasts	
	SPT	3-5-5-6 (19)				
1.5					1.50 97.00	
	B	()			Extremely weak friable grey and brown mottled MUDSTONE. [WEATHERED PENNINE LOWER COAL MEASURES]	
2.0					2.00 96.50	
	SPT	12-12-14-12 (50)				

Bottom of borehole at 2.43 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER WS06

CLIENT Darwin Group Ltd **PROJECT NAME** Dewsbury & District Hospital

PROJECT NUMBER 9202 **PROJECT LOCATION** Dewsbury

DATE STARTED 11/3/23 **COMPLETED** 11/3/23 **CO-ORDINATES** 423245 mE, 422757 mN

DRILLING CONTRACTOR Regional Drilling **GROUND ELEVATION** 98.3 m **HOLE SIZE**

DRILLING METHOD Windowless Sampler **LOGGED BY** RN **CHECKED BY** DH

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (SPT N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	WELL DIAGRAM
					Asphalt	
					0.15 — 98.15	
					Loose dark brown slightly clayey sandy GRAVEL with asphalt and brick fragments, ash, bricks and wood [MADE GROUND]	
					0.40 — 97.90	
0.5	J	()			Firm orangish brown and light grey mottled CLAY with occasional coal fragments.	
1.0	B	()			@1.0 occasional mudstone laminations	
1.5	SPT	1-2-2-2 (7)				
					1.60 — 96.70	
	B	()			Extremely weak friable orangish brown and light grey MUDSTONE [WEATHERED PENNINE LOWER COAL MEASURES]	
2.0	SPT	16-20-14-0 (50)			2.00 — 96.30	

Bottom of borehole at 2.35 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Appendix 4: Public Water Network

YORKSHIRE WATER
PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the ***general*** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.

2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.

3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will ***generally*** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will ***generally*** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.

4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.

5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45o and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter *(see illustration below)*. Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.

6. All excavation works near to YW apparatus should be by hand digging only.

7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.

8. Adequate support must be provided where any works pass under YW apparatus.

9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.

10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.

11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.

12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.

13. ***Under no circumstances*** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.

14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.

16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.

17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.

18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

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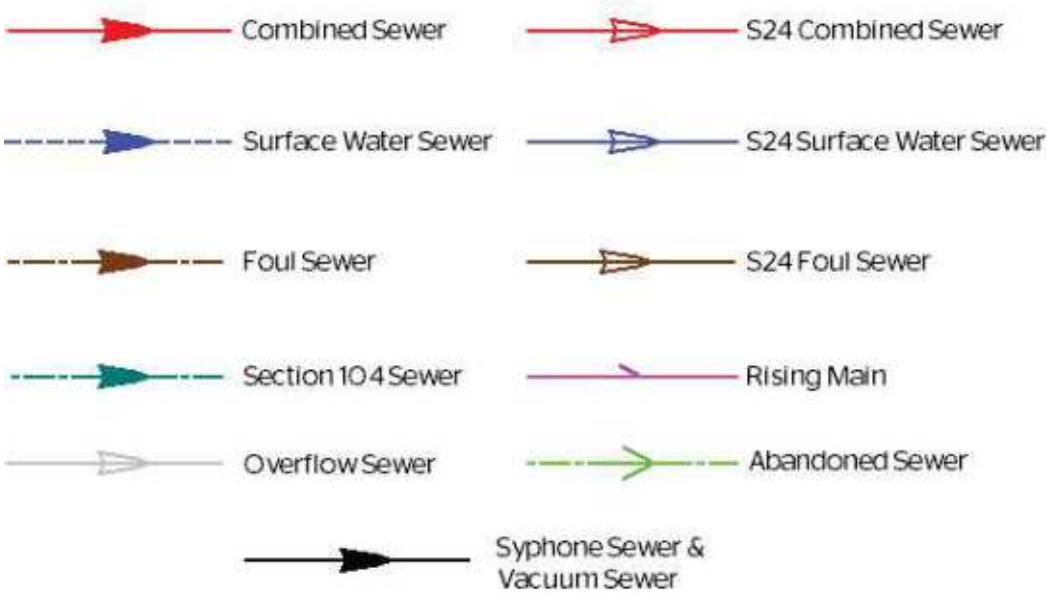
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trail holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

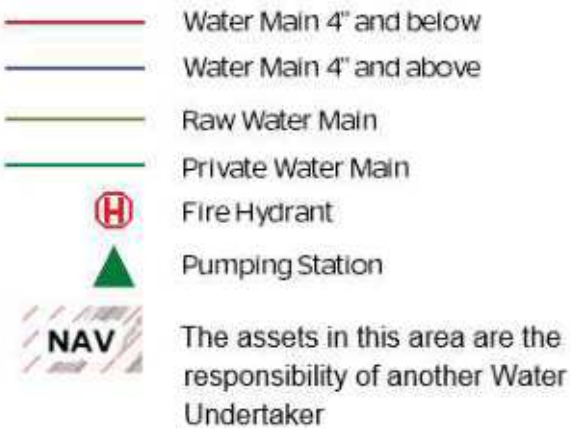
Property Identfier

Sewer Legend



Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend



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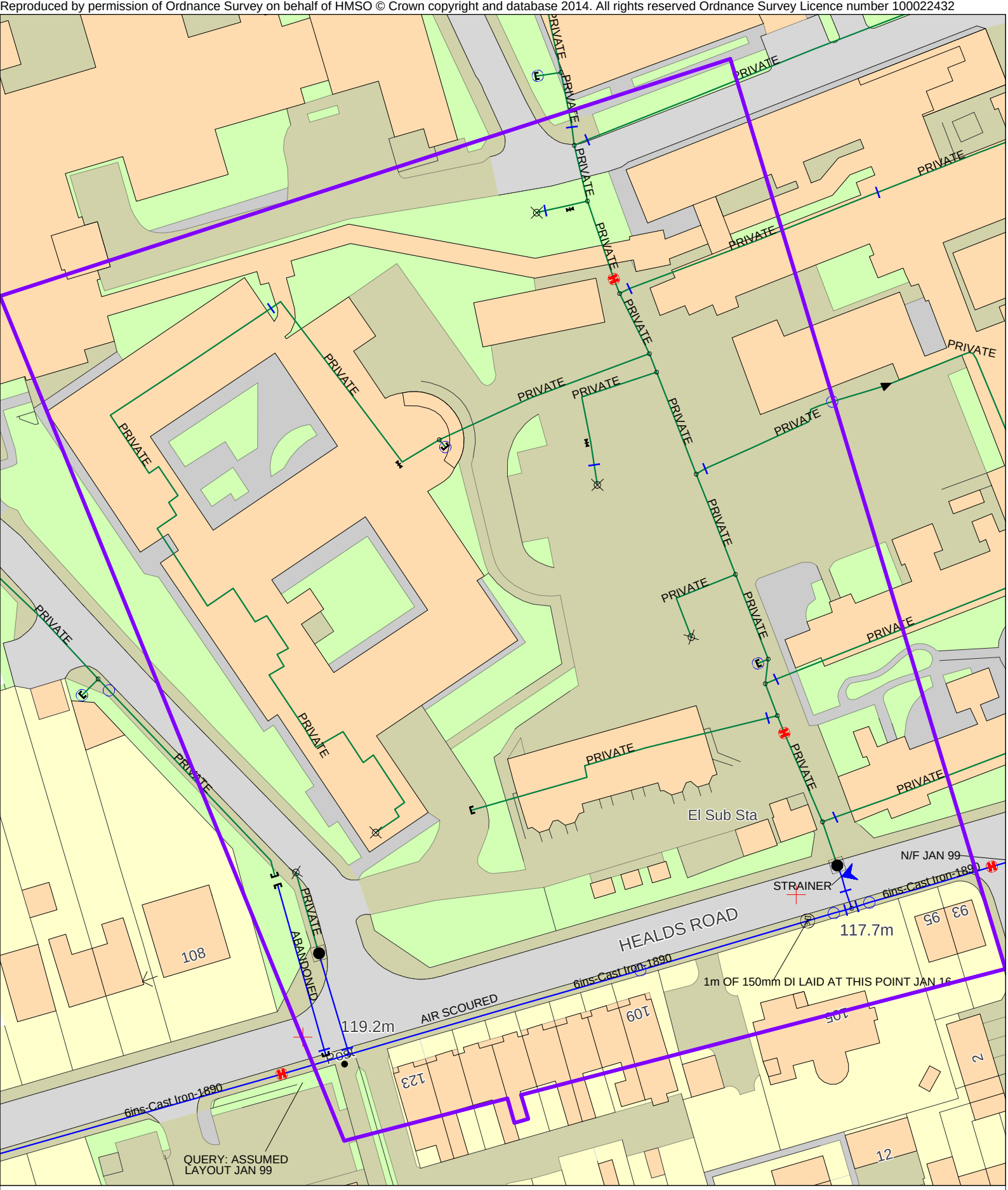

Public Clean Water Network 06/02/2023 15:57:37 OS Grid Coordinates: 423128 : 422664 Map Name : SE2322NW svcGISSafeMovePD

Registered office, Yorkshire water Services Limited. 1
Western House, Halifax Road, Bradford BD62SZ.
Registered in England and wales No. 2366682

SafeMove
A part of YorkshireWater

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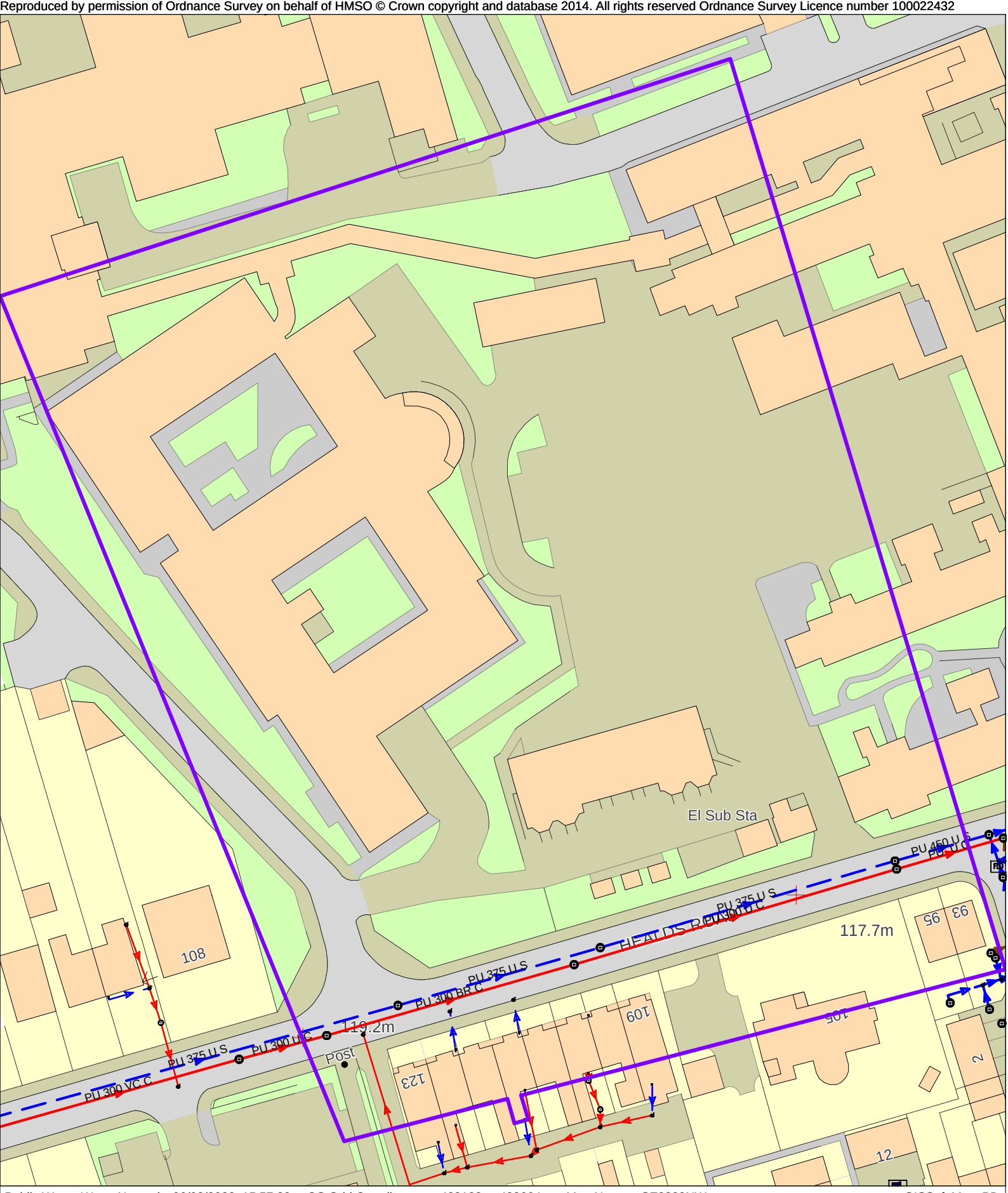
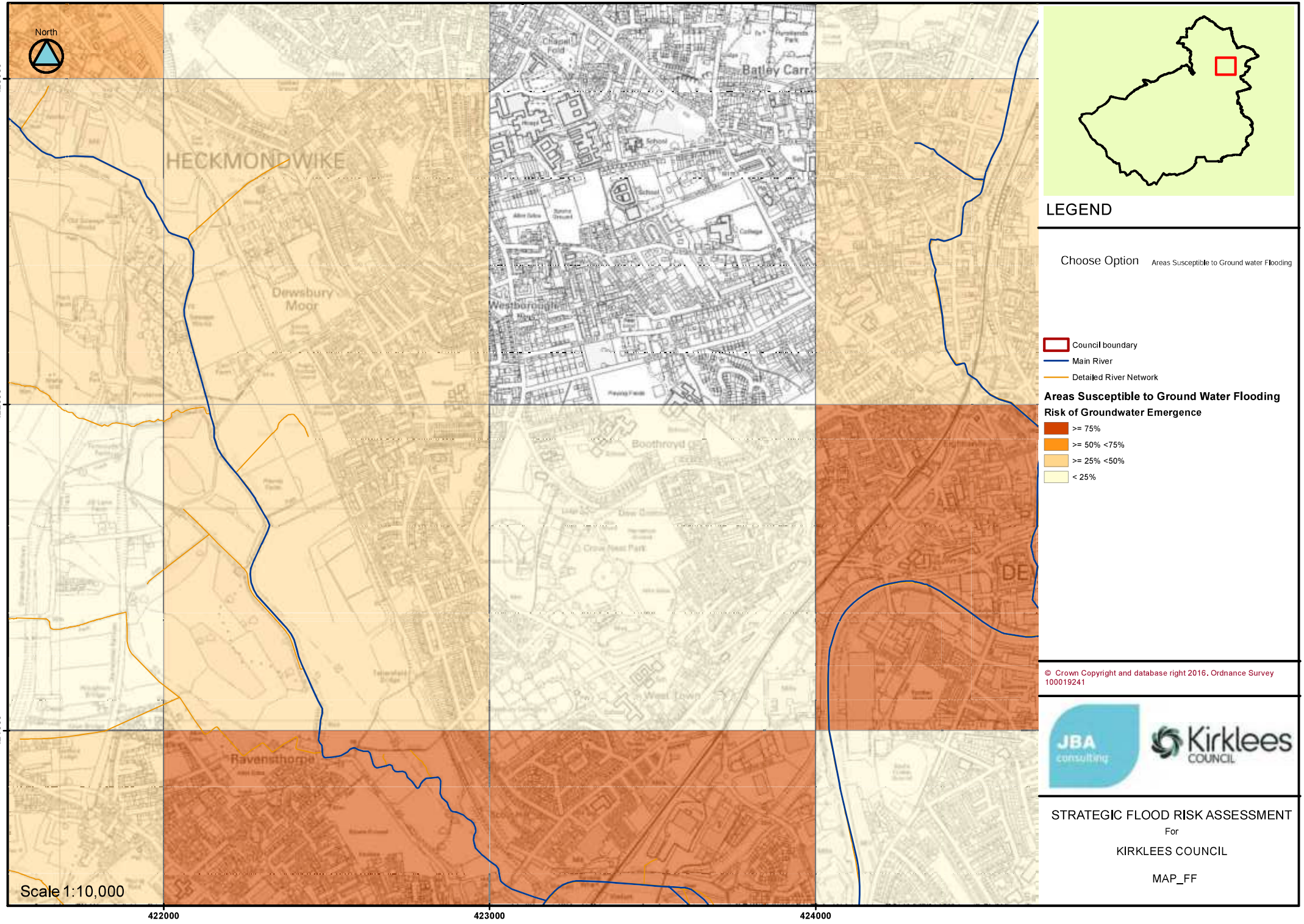


Public Waste Water Network 06/02/2023 15:57:39 OS Grid Coordinates: 423128 : 422664 Map Name : SE2322NW svcGISSafeMovePD

Registered office, Yorkshire water Services Limited. 1
Western House, Halifax Road, Bradford BD62SZ.
Registered in England and wales No. 2366682

SafeMove
A part of YorkshireWater

Appendix 5: Kirklees Council SFRA Maps



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

>= 75%

>= 50% <75%

>= 25% <50%

< 25%

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JBA consulting

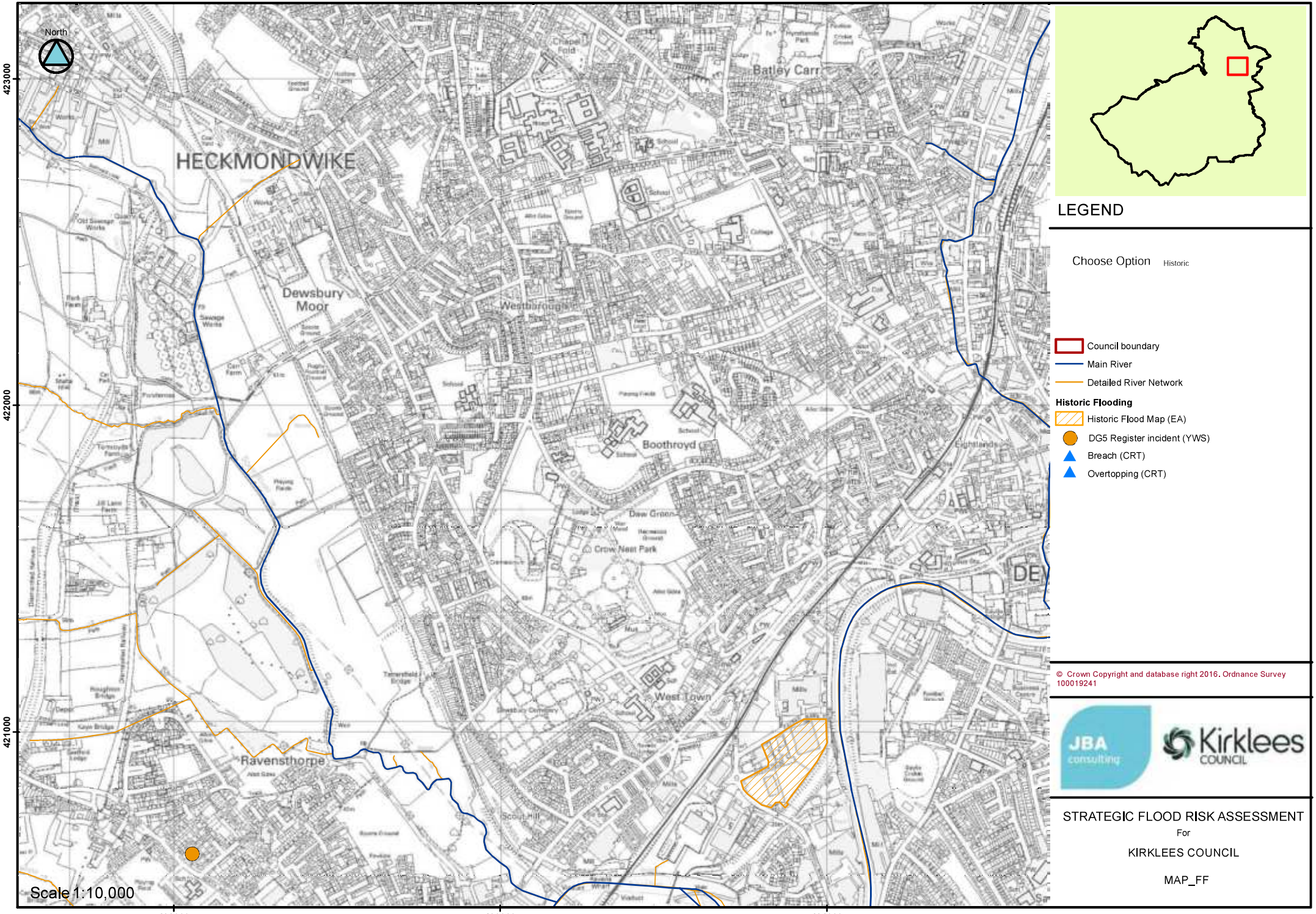
Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_FF



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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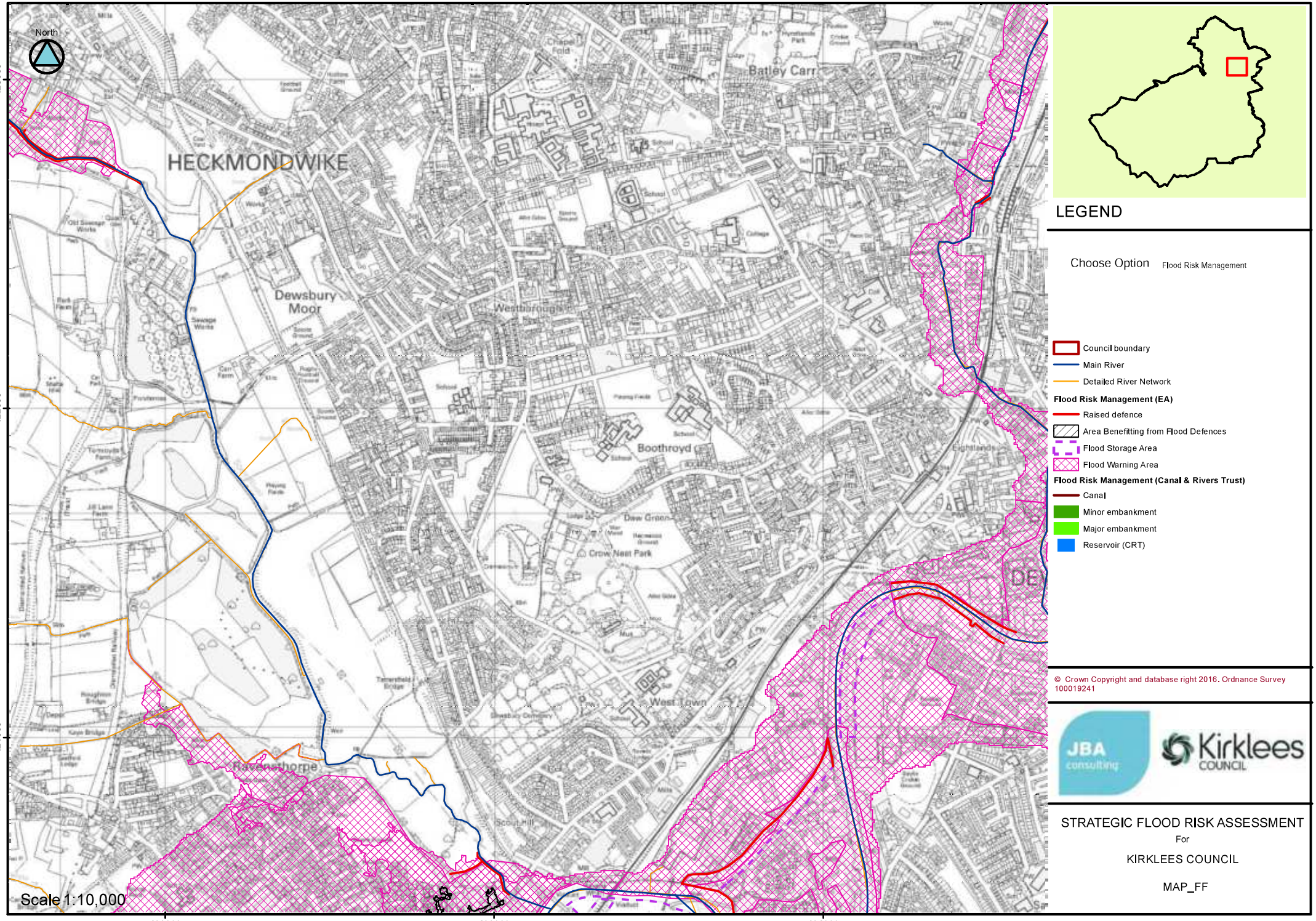
Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_FF



LEGEND

Choose Option Flood Risk Management

- Council boundary
- Main River
- Detailed River Network

Flood Risk Management (EA)

- Raised defence
- Area Benefitting from Flood Defences
- Flood Storage Area
- Flood Warning Area

Flood Risk Management (Canal & Rivers Trust)

- Canal
- Minor embankment
- Major embankment
- Reservoir (CRT)

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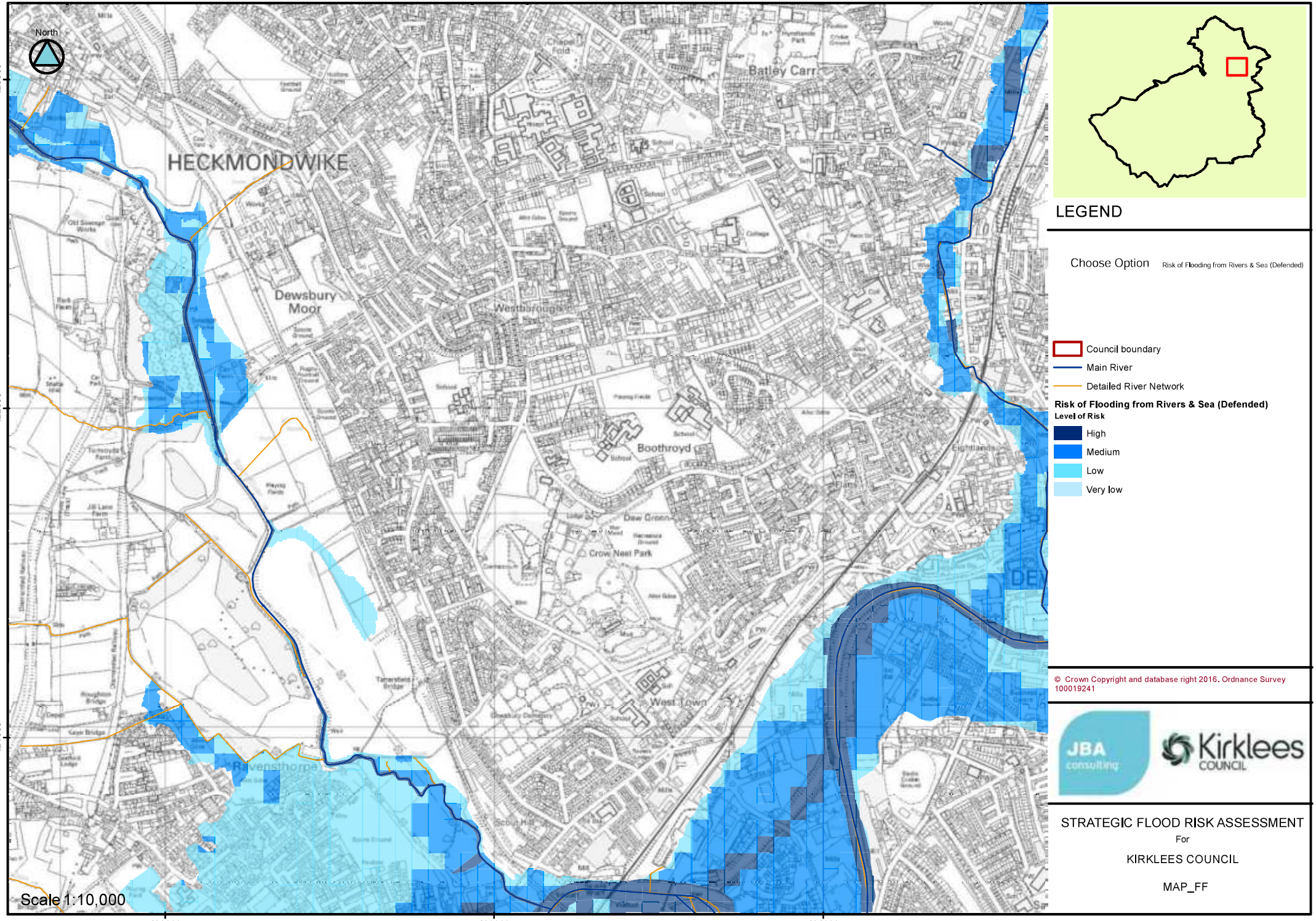

LEGEND

Choose Option — Risk of Flooding from Rivers & Sea (Defended)

- Council boundary
- Main River
- Detailed River Network

Risk of Flooding from Rivers & Sea (Defended)
Level of Risk

- High
- Medium
- Low
- Very low

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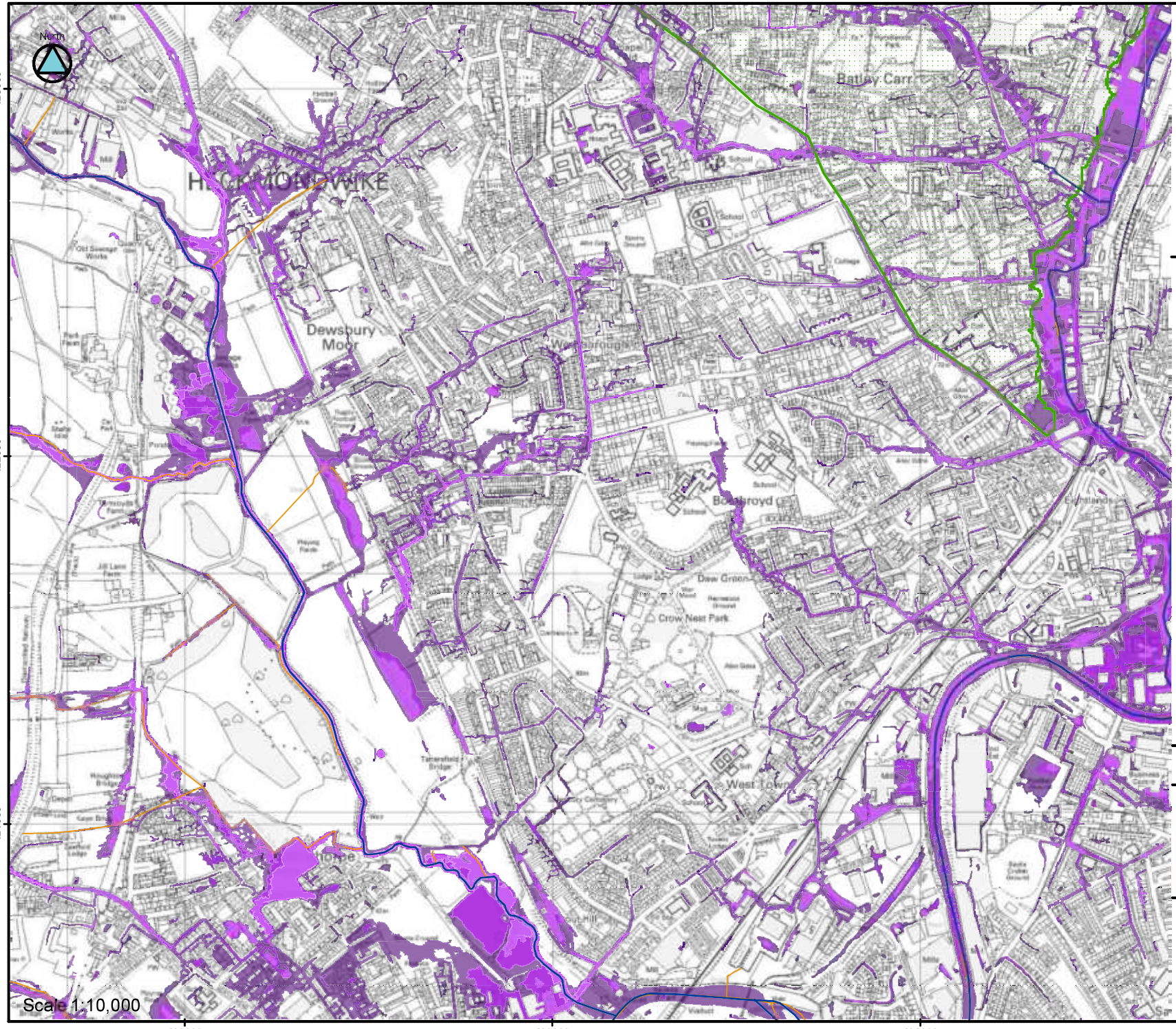

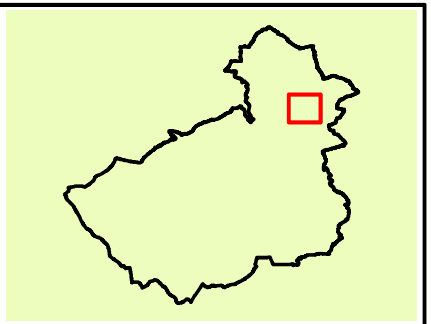

LEGEND

Choose Option — Updated Flood Map for Surface Water

- Council boundary
- Main River
- Detailed River Network

uFMfSW

- 30 year event
- 100 year event
- 1000 year event
- CDA indicative

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