
JNP GROUP
CONSULTING ENGINEERS

DOCUMENT CONTROL SHEET

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Contents

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 JNP Group has been commissioned by J26@M62 to prepare a flood risk assessment for the proposed commercial development of Brookside Works in Cleckheaton, West Yorkshire.

1.1.2 This report assesses flood risk at the development site from all potential sources and describes the measures adopted in the master planning process to manage such risks. It has been prepared in compliance with current policies and best practices.

1.2 Policy Framework and Key Stakeholders

1.2.1 The *National Planning Policy Framework* (NPPF) (February 2019) sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed.

1.2.2 In areas at risk of flooding or for sites of one hectare (ha) or more, developers must undertake a site-specific flood risk assessment to accompany applications for planning permission (or prior approval for certain types of permitted development).

1.2.3 In decision-taking, local planning authorities must ensure a sequential approach to site selection and master planning is followed so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk.

1.2.4 Where development needs to be in locations where there is a risk of flooding, local planning authorities and developers must ensure development is appropriately flood resilient and resistant, safe for its users for the development's lifetime, and will not increase flood risk elsewhere.

1.2.5 The Environment Agency (EA) is a statutory consultee on applications where there is a risk of flooding from the sea or main rivers.

1.2.6 Lead local flood authorities (unitary authorities or county councils) are responsible for managing local flood risk from ordinary watercourses, surface water or groundwater, and for preparing local flood risk management strategies. Local planning authorities work with lead local flood authorities to ensure local planning policies are compatible with the local flood risk management strategy.

1.2.7 Kirklees Council (KC) is the lead local flood authority (LLFA) and the local planning authority (LPA).

1.2.8 Where relevant, local planning authorities and developers must also take advice from:

- Internal drainage boards; to identify the scope of their interests.
- Sewerage undertakers; to ensure they can assess the impact of new development on their assets and plan any required improvements. Yorkshire Water (YW) is the local sewerage undertaker.

- Reservoir undertakers; to avoid an intensification of development within areas at risk from reservoir failure and ensure they can assess the cost implications of any reservoir safety improvements required due to change in land use downstream of their assets.
- Navigation authorities; in relation to developments adjacent to, or which discharge into, canals (especially where these are impounded above natural ground level).

1.3 Sources of Information

1.3.1 This flood risk assessment has been based on the following sources of information:

- Bespoke topographic survey shown on drawing BRKWC-NJA-XX-XX-DR-A-OP_002 P2, August 2018;
- British Geological Survey's *Geoindex Tool*;

  (*http://mapapps2.bgs.ac.uk/geoindex/home.html)*
- DEFRA / EA's aquifer and source protection data

  (*https://magic.defra.gov.uk/MagicMap.aspx*)
- EA's Flood Map for Planning;

  (*https://flood-map-for-planning.service.gov.uk/*)
- EA's Long Term Flood Risk Information;

  (*https://flood-warning-information.service.gov.uk/long-term-flood-risk/map*)
- Calder Catchment Strategic Flood Risk Assessment (April 2016);
- EA's detailed flood risk information (Products 4);
- Phase 1 Geo-environmental Report (B21147-JNP-XX-XX-RP-G-0002 P01, June 2021);
- YW's Developer Enquiry.

2 DEVELOPMENT SITE

2.1 Location

2.1.1 The site is located off Brick Street, Cleckheaton, West Yorkshire approximately 0.8 km southwest of Cleckheaton town centre (see Figure 2.1).

Table 2.1: Site Location

OS X	OS Y	Site Area (ha)	Nearest Postcode
418188	424920	1.6	BD19 5EH

Figure 2.1: Site Location

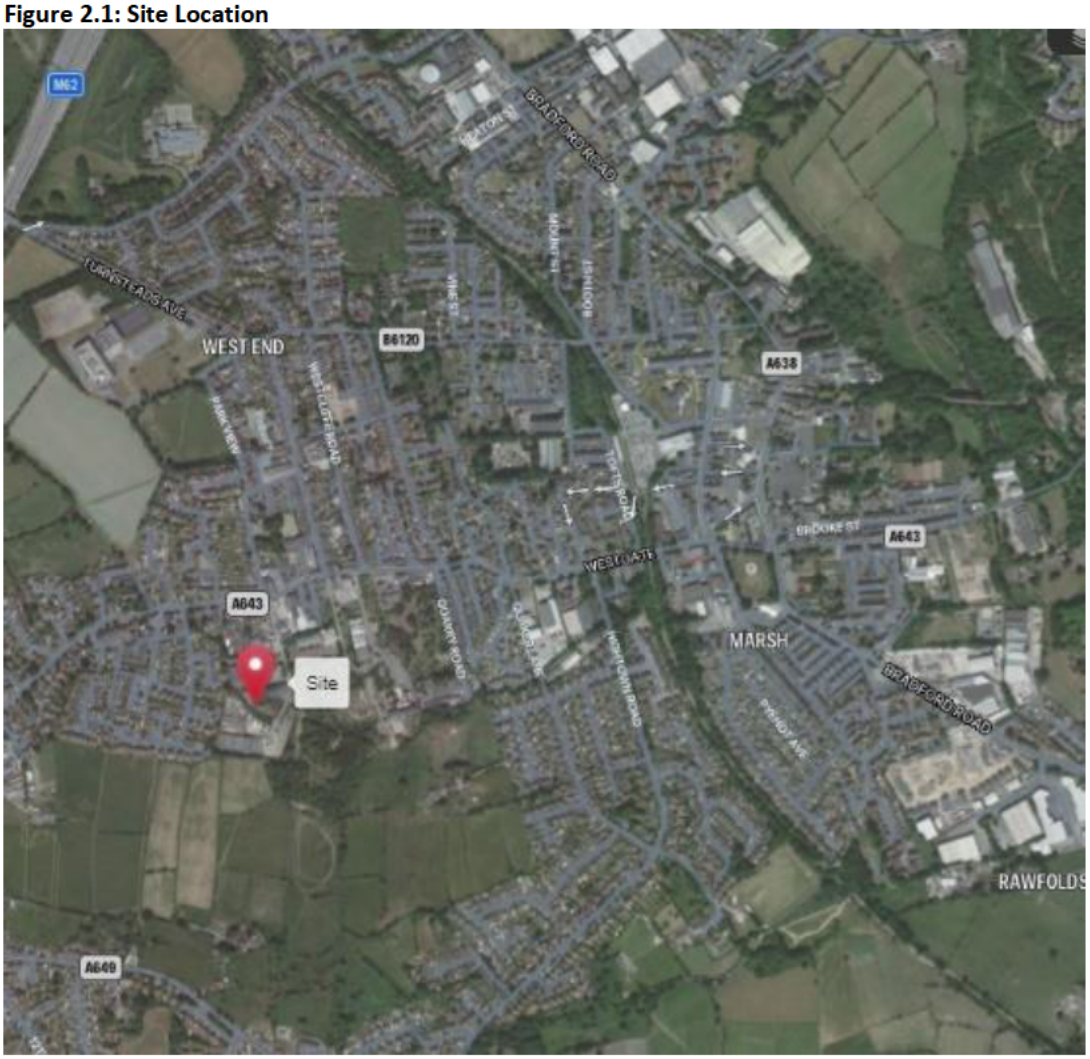


Table 2.2: Surrounding Land Use

Direction	Land Use
North	Residential, mobile plant storage
East	Brownfield sites & greenfield
South	Greenfield
West	Residential

2.1.2 Site walkovers were completed in June 2015 and January 2021. In January 2021, the boundaries of the site were a palisade fence on the northern and eastern boundaries of the site, mature trees were present along the southern boundary of the site, past this open arable farmland was present. Along the western boundary of the site, residential properties and associated gardens were present.

2.1.3 Adjacent land uses were industrial units to the north, disused land to the east, agricultural land to the south and residential properties to the west of the site.

2.1.4 Entering the site in the north east corner, the general topography sloped from this corner to a high point along the southern boundary where industrial units were situated.

2.1.5 There were existing buildings to the south and north east of the site, which were used as workshops.

2.1.6 At the time of the site walkover in 2021, it was noted that large stockpiles of spoil, brick, stone and general waste were present in the central and eastern areas of the site. Furthermore, landscaping of the top of these stockpiles was noted to have created further vehicle parking spaces.

2.1.7 Ground coverage was estimated to be 80% soft standing areas and 20% hardstanding. The hardstanding on the site was in poor condition.

2.1.8 There was a pond within the north eastern region of the site. On the day of the walkover, this pond area had standing water, this was of cloudy white colour with refuse present within the water.

2.1.9 The central and eastern spoil areas of the site appeared to have been recently landscaped, no vegetation was noted on these piles. The site featured a number of small trees located on the northern edge of the pond.

2.1.10 Refuse was noted to be within the lower area of the pond. General building refuse and plastic was noted on the edges of the 'new' car parking areas.

2.2 Topography

2.2.1 A topographical survey of the site was undertaken in 2016 and is included in Appendix A. The topography of the site varied considerably across the site. The low point was formed by the natural course of the Blacup Beck which crossed the site from west to east in the northern part of the site. Land to the north of this sloped very gently from the entrance gate towards the Beck.

2.2.2 To the south of the Beck, the land rose very gently towards a steep bank running north west to south east across the middle of the site, with much higher ground to the south. Between the Beck and the bank was an area of marshy ground at c. 97.0m above Ordnance Datum (aOD). The bank rose from this level to c. 103.5m aOD and the site then rose to the southern site boundary at c. 104.0m aOD.

2.2.3 A steep bank was present to the southern and western site boundaries with ground levels to the south c. 108m aOD and to the west c. 104.0m to 108m aOD.

2.2.4 The land to the south east of the road that crossed the site rose steadily from the beck to the site boundary.

2.2.5 Since the topographical survey was undertaken, works have been undertaken on the site including some reprofiling. This has extended higher ground in the southern part of the site towards the pond area. An up to date topographical survey is currently not available.

2.3 Geology

2.3.1 The geology of the site has been determined by reference to the 1:50,000 scale British Geological Survey (BGS) online Geoindex Tool (**http://mapapps2.bgs.ac.uk/geoindex/home.html**).

2.3.2 The eastern half of the site is shown to be underlain by made ground. However, made ground is likely to be more widespread across the site.

2.3.3 No superficial geology is recorded below the site.

2.3.4 The underlying bedrock is the Pennine Lower Coal Measures Formation. The BGS describe this stratum as *'Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.'* The outcrop is further sub-divided into three areas; the southwest corner is underlain by mudstone, siltstone and sandstones and is separated from similar strata in the southeast by a fault. The northern part of the site is underlain by the Clifton Sandstone (part of the Lower Coal Measures).

2.3.5 Coal measures are not shown to outcrop on the site, however an unnamed seam outcrops immediately to the south of the site.

2.3.6 Online borehole records held by the BGS have been consulted. 15 borehole records are available within 250m of the site, all of which are located to the west of the site. The closest boreholes encountered between 0.3m and 2.9m of fill or made ground over Coal Measures strata. Coal seams were not present in these boreholes.

2.3.7 The deepest borehole to the west, located 164m west, encountered two coal seams, both 0.2m thick at depths of 1.0m and 5.7m bgl.

2.3.8 Groundwater was not recorded in the closest, shallower boreholes but was noted at 16.0m bgl in the deeper borehole to the west.

2.3.9 There is one water well recorded 533m to the north-east of the site. The depth of this well is 79.9m, abstracting from the Pennine Coal Measures Group. No further information is provided on this well.

2.3.10 The Aquifer Maps contained in the Groundsure Report indicates that the site is underlain by a Secondary A Aquifer. The aquifer status refers to the Pennine Lower Coal Measures.

2.3.11 The Environment Agency define a Secondary A Aquifer as:

"Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers."

2.3.12 The site's proximity to groundwater Source Protection Zones (SPZs) was determined by reference to defra's Magic Map website. There are no groundwater Source Protection Zones (SPZs) on, or within 500m, of the site.

2.4 Hydrology

2.4.1 The nearest surface water feature is the Blacup Beck crossing the north-eastern part of the site. This is classified by the Groundsure Report as a '*inland river not influenced by normal tidal actions*'. Blacup beck is recorded as being both on the ground surface and underground.

2.4.2 An investigation by JA Construction Project Management in April 2016 noted the following:

- The watercourse (noted as Black Cut Beck in the report) was shown on a land registry report as culverted across the north east of the site, with no pond present on the site at that point (Appendix B).
- In the early 1980s, the culvert is assumed to have collapsed or become blocked, and the watercourse found an alternative route across the site forming the pond. This did not affect site operations at the time.
- An application was made to Kirklees Council in 2015 to reinstate the culvert to facilitate site development. The application was granted (with conditions) and works commenced in 2016. A post construction site inspection noted discoloured water and subsequent testing concluded the water was contaminated with sewage. The sediment in the former pond is also therefore considered to be contaminated. The source is anecdotally thought to be a foul water cross connection from upstream of the site.

2.4.3 Historical maps included in the Phase 1 Geo-environmental report also confirm that the pond was not present on-site until c. 1985.

2.4.4 The Blacup Beck is therefore culverted across the site, in a 1200mm diameter pipe, following the route shown in Figure 2.2 below.

Figure 2.2 Route of Culverted Blacup Beck (red line)

Note: route shown on a previous site layout

2.4.5 The route and elevation of the Beck should be confirmed by survey, and documentation obtained to confirm that the reinstatement of the culvert is acceptable to Kirklees Council.

3 PROPOSED DEVELOPMENT

3.1.1 The proposed development is for the retention of the existing commercial buildings on site and construction of a number of new commercial units in the north, west, centre and south west of the site (Figure 3.1 and Appendix C). The central "bowl" will be used to locate rows of storage units, accessed via a dedicated ramped road. This could provide the potential for a terraced storage or small office facility created out of containers.

3.1.2 Under Table 2 of the *Flood Risk and Coastal Change Guidance* (March 2014), the proposed commercial development is classified as less vulnerable.

Figure 3.1: Proposed Development

4 FLOOD RISK ASSESSMENT

4.1 Overview

4.1.1 All potential sources of flood risk at the development site have been assessed based on the information listed in Section 1.3 and are summarised in Table 4.1. The key sources of flood risk to the proposed development are further described in the ensuing sections.

Table 4.1: Potential Sources of Flood Risk

Source	Flood Risk
Coastal	*Low risk. The site is c. 100 m aOD.*
Fluvial	Low risk in general, Flood Zone 1. Medium to high risk (Flood Zone 2 and 3) in the north east of the site.
Surface Water	Very low risk in general, but low to high risk along the route of the Blacup Beck and in the south of the site.
Groundwater	*Low risk. SFRA indicates site is in an area where less than 25% of the 1km² square is at risk of groundwater emergence.*
Sewers	*Low risk. SFRA indicates no registered incidents in area.*
Infrastructure Failure	*Very low risk.*

4.2 Climate Change

4.2.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

4.2.2 In accordance with the EA's guidance Flood Risk Assessment: Climate Change Allowances (July 2021), the proposed development with anticipated life span into the 2080's (2070 to 2115) must take account of the following allowances:

- Peak River Flows (Aire and Calder Management Catchment)
  - Central..... 23%
- Peak Rainfall Intensity
  - Upper End 40%

4.3 Fluvial Flood Risk

4.3.1 Fluvial flooding occurs when a catchment area receives greater than usual amounts of water (e.g. rainfall or snow melt). When the converging runoff exceeds the conveyance capacity of the receiving channel, water spills onto the surrounding floodplains and fluvial flooding occurs.

4.3.2 Fluvial flooding usually occurs hours or days after heavy and / or prolonged rainfall and its effects often last several hours or days.

4.3.3 Besides posing a direct flood risk to floodplain areas, high water levels in watercourses can exacerbate other sources of flood risk by surcharging / locking outfalls, thus preventing the normal discharge of flows or even back flowing into tributary drainage systems.

4.3.4 The Blacup Beck crosses the north eastern part of the site. This is classified as an ordinary watercourse at the site, becoming a main river to the east.

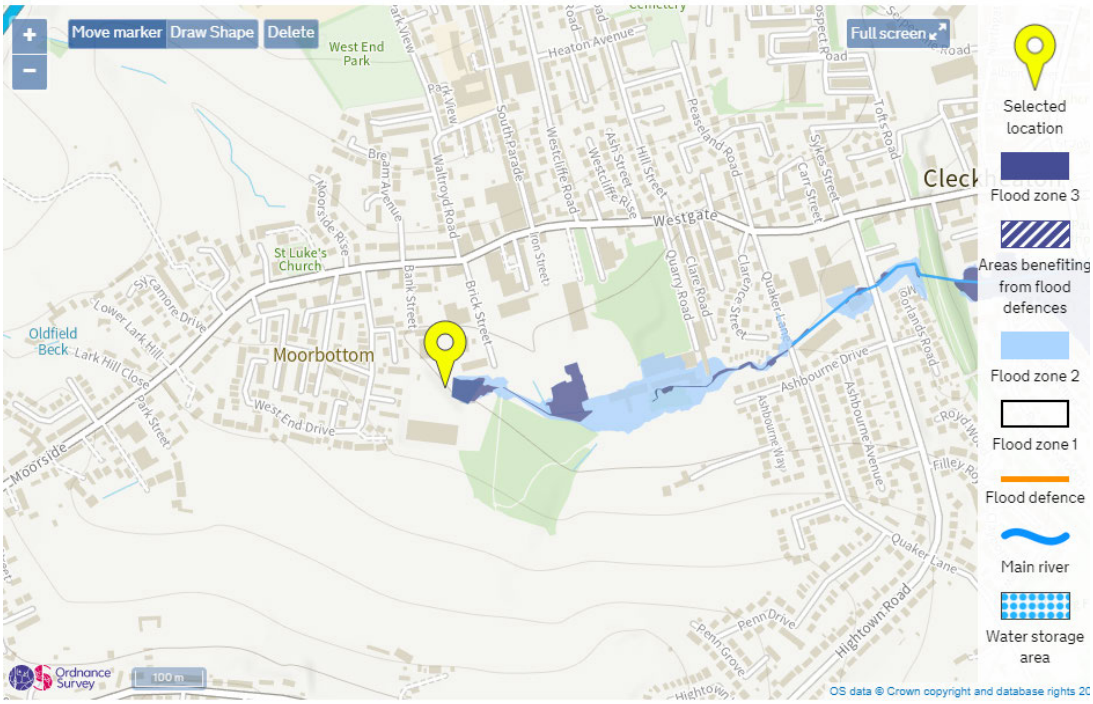
4.3.5 In accordance with the EA's *Flood Map for Planning* (Figure 4.1 and Appendix D), most of the development site is in Food Zone 1. However, significant areas near the Blacup Beck are In Flood Zones 2 and 3.

4.3.6 FZ3 is often split into FZ3a and FZ3b defined as a 1 in 100 year or greater fluvial event and the functional floodplain respectively. SFRAs often provide maps or the criteria used to delineate these two zones. The SFRA for Kirklees Council designates the FZ3 at the site as FZ3a.

4.3.7 The site does not benefit from formal flood defences.

4.3.8 The EA have indicated there is no known history of flooding at the site. Their on-line flood outlines map also confirms this.

Figure 4.1: EA Flood *Map for Planning*



4.3.9 Flood modelling data was requested from the EA in 2016. A request has been made to the EA for current data but a response has not been received to date. However, comparison of the current flood outlines on the EA website, and those provided in 2016 appear the same, so for the purposes of this report, it is assumed that the 2016 data is still valid.

4.3.10 The flood zones and associated data appear to reflect site conditions pre-reinstatement of the culvert. Therefore the basis for the designation of the flood zones does not appear to reflect the current configuration of the Beck.

4.3.11 The client has indicated that flow is not in an open watercourse as modelled, but a 1200mm diameter culvert. Levels on the culvert are not known, but assuming it follows the topography, the culvert would drop 2.25m in 75m from the north west of the site to where it passes below the site access road, i.e. 1 in 33 gradient. The capacity of the culvert with this configuration would be 7.43 m^3/s, 80% greater than the modelled 1 in 100 year + 20% climate change flow.

4.3.12 Due to the reinstatement of the culvert, the culvert can accommodate flows sub-surface and therefore the site is unlikely to flood as indicated on the EA website. Flow will be contained within the culvert passing beneath the site.

4.3.13 Clearly there is a discrepancy between EA data and site conditions, so some analysis of the EA modelling data has also been undertaken.

4.3.14 The EA flood data included modelled flood heights at points on site and downstream of the site from their River Spen model (2009). Node BLAC01_1521 is located close to the site boundary in the north west, BLAC01_1498 is located in the north of the site and several points (BLAC01_1451I, BLAC01_1450B, BLAC01_1423 and BLAC01_1403) are located close to where the Blacup Beck exits the site in the east. A map showing the node locations and all the data is included in Appendix D, the pertinent data is produced below in Table 3.1.

Table 3.1 Modelled flood levels (m aOD)

	Node	Flood return period (years)							
		5	10	25	50	75	100	100 + CC	1000
Max Stage m aOD	1521	97.95	98.151	98.265	98.312	98.339	98.357	98.435	98.749
	1498	97.71	97.999	98.089	98.116	98.129	98.138	98.176	98.317
	1451I	97.677	97.985	98.073	98.096	98.108	98.116	98.147	98.252
	1450B	97.249	97.371	97.534	97.615	97.659	97.689	97.813	98.115
	1423	97.123	97.358	97.523	97.603	97.648	97.678	97.802	98.103
	1403	95.94	95.991	96.071	96.108	96.129	96.137	96.183	96.47
Max Flow m3/s	1521	1.928	2.265	2.709	3.052	3.258	3.405	4.086	7.518
	1498	1.918	2.231	2.704	3.048	3.254	3.402	4.082	7.508
	1451I	1.817	2.12	2.66	2.981	3.168	3.3	3.906	6.903
	1450B	1.815	2.12	2.635	2.944	3.123	3.248	3.826	6.684
	1423	1.799	2.118	2.694	3.041	3.25	3.398	4.074	6.016
	1403	1.799	2.118	2.694	3.041	3.25	3.398	4.074	6.016

4.3.15 The EA data includes a 1 in 100 year plus climate change scenario; climate change was typically modelled at 20% which is not dissimilar to the 23% increase in flow considered appropriate from current guidance.

4.3.16 The 1 in 100 year plus climate change flood level for the site therefore varies between 98.435m aOD in the north and 96.183m aOD in the east. Flood levels have been extrapolated along the length of the Beck and the inundation area determined, plus the likely flood depth. It can be seen from this that much of the lower northern part of the site is at risk of flooding during a 1 in 100 year or greater event.

4.3.17 Should the culvert fail again, only the northern part of the site would flood, with the existing and proposed units inundated to a depth of up to 0.35m (Appendix E).

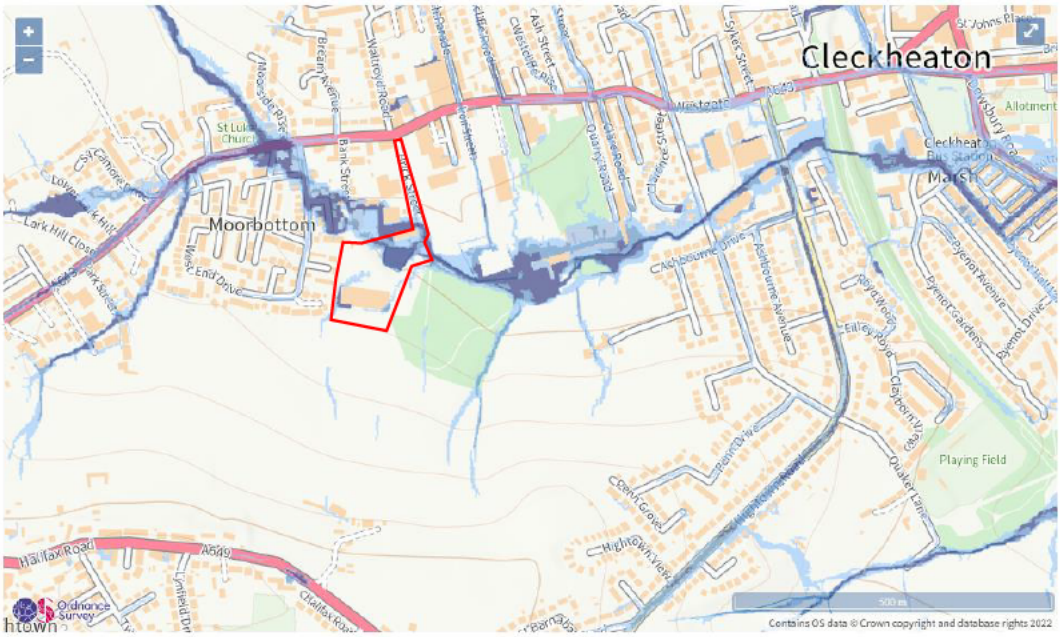
4.4 Surface Water Flood Risk

4.4.1 Surface water flooding is a description for excessive overland flows that have yet to enter a natural or manmade receptor (e.g. aquifer, watercourse or sewer). Surface water flooding also occurs when the amount of runoff exceeds the capacity of the collecting system and spills onto overland flow routes.

4.4.2 Surface water flooding is usually the result of very intense, short lived rainfall events, but can also occur during milder, longer lived rainfall events, when collecting systems are at capacity or the ground is saturated. It often results in the inundation of low points in the terrain.

4.4.3 In accordance with the EA's *Long Term Flood Risk Information* (Figure 4.2 and Appendix D), the development site is mostly at very low (< 0.1% AEP) risk of surface water flooding. However, significant areas near prominent overland flow paths are at low (0.1% to 1.0% AEP), medium (1.0% to 3.3% AEP) and high (> 3.3% AEP) risk of surface water flooding.

Figure 4.2: Flood Risk from Surface Water



4.4.4 There are two areas of the site shown to be at risk of surface water flooding.

4.4.5 In the south west corner, surface water is shown to be flowing onto the site; the catchment for this overland only extends a short distance to the south of the site. In the southern part of the site, this and water from the higher ground appears to collect to the rear of the building. This spreads across the western side of the site from the western end of the building before presumably infiltrating into the ground. Water from the eastern end of the building flows along the eastern site boundary to the Beck.

4.4.6 Most of the northern, lower part of the site, is shown to be at high risk of surface water flooding. Flow mostly follows the route of the Beck to the southeast with limited flow also down Brick Street and into the site.

4.4.7 The depth of flooding is predicted as over 900mm in the marshy area, and up to 900mm in other areas. The velocity of the flood waters is predicted to be over 0.25m/s, flowing towards the valley of the Beck.

4.4.8 Currently, the northern part of the site and parts of the southern higher part of the site are considered to be at risk of surface water flooding. An improved drainage strategy will be adopted for the new development which will improve the site drainage and control site run-off.

5 FLOOD RISK MANAGEMENT

5.1 Sequential and Exception Tests

5.1.1 The sequential, risk-based approach to the location of development is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim is to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible.

5.1.2 Application of the sequential approach in the master planning process, in particular application of the *Sequential Test*, helps ensure that development can be safely and sustainably delivered, and developers do not waste resources promoting proposals which are inappropriate on flood risk grounds.

5.1.3 The *Sequential Test* ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The aim is to steer new development to Flood Zone 1 (areas with a low probability of sea or river flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of sea or river flooding), applying the *Exception Test* if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of sea or river flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the *Exception Test* if required.

5.1.4 Table 2 of the *Flood Risk and Coastal Change Guidance* categorises different types of uses and development according to their vulnerability to flood risk. Table 3 of the *Flood Risk and Coastal Change Guidance* (Table 5.1) maps these vulnerability classes against flood zones to indicate where development is appropriate and where it should not be permitted.

Table 5.1: Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zone	Flood Risk Vulnerability				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test	✓	✓	✓
Zone 3a	Exception Test	×	Exception Test	✓	✓
Zone 3b	Exception Test	×	×	×	✓

Key:

✓ Development is appropriate

× Development should not be permitted

5.1.5 Flood Zones 1, 2 and 3a are present on site. New development is mainly located in the areas of the site classified as Flood Zone 1, except for the container storage units in the centre of the site and the northern units.

5.1.6 The *Exception Test* is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

5.1.7 Essentially, the two parts of the *Exception Test* require proposed development to show that it will:

- Provide wider sustainability benefits to the community that outweigh flood risk; and
- Be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

5.1.8 The ensuing sections describe how the sequential approach to the location of development and, where necessary, the second part of the *Exception Test* have been implemented in the proposed development's master planning.

5.2 Fluvial Flood Risk

5.2.1 As indicated in Chapter 4, the flood zones do not reflect the current site topography and configuration of the Beck. As the culvert carrying the Beck has been reinstated on-site, and this has sufficient capacity to convey flows to at least 1 in 100 year plus climate change storms, fluvial flooding is not predicted to occur on-site.

5.2.2 Most of the proposed new units are located in the Flood Zone 1 part of the site. Should the culvert fail, and flooding occur, as the base of these storage units are raised above flood levels, they would not be affected by flooding. The existing and new units along the north could be inundated to a depth of 0.35m. It is recommended that permanent / demountable flood defences are considered to mitigate this risk.

5.2.3 Although there is a loss of flood plain storage from the mapped Flood Zone 3 area, this is not considered to accurately reflect the current site condition and therefore loss of flood plain is not considered further.

5.2.4 The development site is in an area covered by the EA's flood warning system, which should allow users enough time to deploy flood defences and / or evacuate the site before accesses become impassable.

5.3 Surface Water Flood Risk

5.3.1 There are some areas of the site that are predicted to be at risk of surface water flooding. The site currently does not have a surface water sewerage system. Development will include the provision of such a system which will remedy current drainage issues without increasing flood risk off-site. The drainage strategy will be developed further with the detailed design.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1.1 JNP Group has been commissioned by J26@M62 to prepare a Flood Risk Assessment for the proposed commercial development of Brookside Works in Cleckheaton, West Yorkshire.

6.1.2 The site is brownfield, approximately 1.6 ha and is off Brick Street, Cleckheaton, West Yorkshire, approximately 0.8 km southwest of Cleckheaton town centre. The proposed development comprises the retention of the existing commercial buildings on site and construction of a number of new commercial units in the north, west, centre and south west of the site. The central "bowl" will be used to locate rows of storage units, accessed via a dedicated ramped road.

6.1.3 The site slopes from the north and south towards the route of the culverted Blacup Beck which crosses the site.

6.1.4 The eastern half of the site is shown to be underlain by made ground. However, made ground is likely to be more widespread across the site. No superficial geology is recorded below the site. The underlying bedrock is the Pennine Lower Coal Measures Formation.

6.1.5 The nearest surface water feature is the Blacup Beck crossing the north-eastern part of the site. The watercourse was culverted until c. 1985 when the culvert collapsed or was blocked and the Beck flowed across the site, forming a pond. The culvert was reinstated c. 2016 with the Beck currently flowing sub-surface in a 1200mm diameter culvert, which has a capacity in excess of the predicted 1 in 100 year plus climate change flow.

6.1.6 The route and elevation of the Beck should be confirmed by survey and documentation obtained to confirm that the reinstatement of the culvert is acceptable to Kirklees Council.

6.1.7 The EA maps show that the site is located in Flood Zones 1, 2 and 3; the Flood Zone 2 and 3 area is confined to the route of the Beck and the pond. The basis of this designation does not appear to reflect the current configuration of the Beck.

6.1.8 Most of the proposed new units are located in the Flood Zone 1 area. Existing and new units in the north of the site could be inundated to 0.35m depth should the culvert fail, and flooding occur.

6.1.9 Although there is a loss of flood plain storage from the mapped Flood Zone 3 area, this is not considered to accurately reflect the current site condition and therefore loss of flood plain is not considered further.

6.1.10 There are areas of the site predicted to be at risk of surface water flooding. The site currently does not have a surface water sewerage system. Development will include the provision of such a system which will remedy current drainage issues without increasing flood risk off-site. The drainage strategy will be developed further with the detailed design.

6.1.11 The Flood Risk Assessment section of this report demonstrates that the risk of flooding from all other sources (tidal, groundwater, sewer and reservoir) is low.

6.1.12 In conclusion, the proposed development is not at risk of flooding and does not increase flood risk off-site.

7 LIMITATIONS

7.1.1 The information, conclusions and recommendations presented within this report are deemed to be current at the time of issue. No guarantee can be given to the status of this information other than at the time of issuing. Where necessary, the user shall confirm the status of any applicable assessments and consents.

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APPENDIX A: TOPOGRPAHICAL SURVEY

Site as existing

1 : 500

Site Area 15285 m2
3.78 acres

rev	date	drawn	checked	description
P2	2021 08 04	szn	nj	Urban Green Space amended
P1	2021 03 29	szn	nj	Urban Green Space added

suitability: PL planning submission

client:	J26@M62 Ltd
project:	Brookside Works
location:	Brookside Works, Brick Street, Cleckheaton, BD19 5LD
drawing title:	Site as existing

date	drawn	checked	scale @A2	int job no
08/23/18	NJH	nj	1 : 500	20.161

drawing number: project origin zone level type role series number revision BRKWC-NJA-XX-XX-DR-A-OP_002 P2

Note: Do not Scale from this drawing. All dimensions to be checked on site

10 Castle Yard, Ilkley, LS29 9DT
T: 01943 608311
E: info@nj-architects.co.uk
W: www.nj-

RIBA Chartered Practice

NJ–A ARCHITECTS

APPENDIX B: LAND REGISTRY INFORMATION

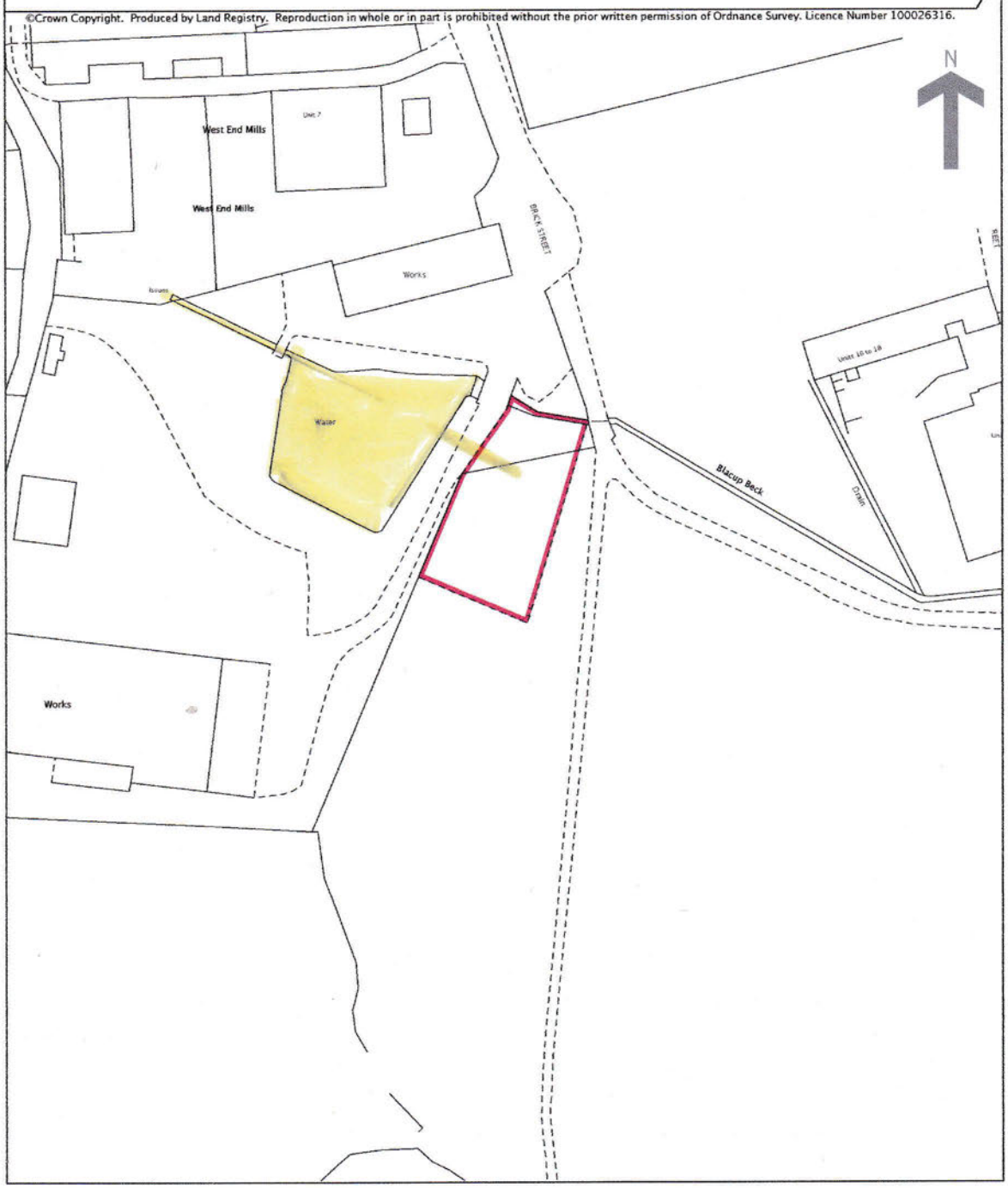
H.M. LAND REGISTRY		TITLE NUMBER	
		WYK204601	
ORDNANCE SURVEY PLAN REFERENCE	SE 1824	SECTION	Scale 1/1250
COUNTY WEST YORKSHIRE	DISTRICT KIRKLEES		© Crown copyright 1980

The boundary between the points lettered A-B hereon is the site of the former boundary shown on the 1938 edition Ordnance Survey Map.

FILED PLAN H.M. LAND REGISTRY RJM 10/1980

Land Registry
Current title plan

Title number **WYK834656**
Ordnance Survey map reference **SE1824NW**
Scale **1:1250**
Administrative area **West Yorkshire : Kirklees**



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This title is dealt with by Land Registry, Nottingham Office.

APPENDIX C: PROPOSED DEVELOPMENT

0m 10m 20m 30m 40m 50m

VISUAL SCALE 1:500

N

Works

Sluice

Pond

15000

25000

3 to 8
Brookside Works

Urban Green Space

Track

THORN GARTH

WEST END DRIVE

Site as proposed

1 : 500

Site Area 15142.5 m2
3.75 acres

rev	date	drawn	checked	description
P4	2021 08 04	szn	nj	Urban Green Space amended
P3	2021 03 29	szn	nj	Urban Green Space added
P2	2021 01 25	szn	nj	Layout updated
P1	2020 07 08	NjH	nj	Layout updated following discussions with client

suitability: PL planning submission

client:	J26@M62 Ltd
project:	Brookside Works
location:	Brookside Works, Brick Street, Cleckheaton, BD19 5LD
drawing title:	Site as proposed

date	drawn	checked	scale @A2	int job no
06/19/20	NjH	nj	1 : 500	20.161

drawing number: project origin zone level type role series number revision
BRKWC-NJA-XX-XX-DR-A-OP_003 P4

Note: Do not Scale from this drawing. All dimensions to be checked on site

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0m 10m 20m 30m 40m 50m

VISUAL SCALE 1:500

N

THORN GARTH

WEST END DRIVE

15000

25000

12no cycles

existing public right of way

existing public right of way

existing public right of way

Urban Green Space

Track

Site as proposed_coloured

1 : 500

Site Area 15285 m2
3.78 acres

rev	date	drawn	checked	description
P4	2021 08 04	szn	nj	Urban Green Space amended
P3	2021 03 29	szn	nj	Urban Green Space added
P2	2021 01 25	szn	nj	Layout updated
P1	2020 07 08	NjH	nj	Layout updated following discussions with client

suitability: PL planning submission

client:	J26@M62 Ltd
project:	Brookside Works
location:	Brookside Works, Brick Street, Cleckheaton, BD19 5LD
drawing title:	Site as proposed_coloured

date	drawn	checked	scale @A2	int job no
06/18/20	NjH	nj	1 : 500	20.161

drawing number: project origin zone lev el type role series number BRKWC-NJA-XX-XX-DR-A-OP_004 revision P4

Note: Do not Scale from this drawing. All dimensions to be checked on site

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APPENDIX D: EA DATA

RFI: 16941 Flood Map for Planning for Brick Street, Cleckheaton Date Created: 27/07/16

www.environment-agency.gov.uk

Scale: 1:10,000

N W E S

when reproduced @ A3

LEGEND

- Main River
- Flood Map Flood Defences
- Flood Zone 3 (FZ3)
- Flood Zone 2 (FZ2)

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

RFI: 16941 Node Location Map - Brick Street, Cleckheaton Date Created: 27/07/16

www.environment-agency.gov.uk

Scale: 1:4,000

N
W E
S

when reproduced @ A3

LEGEND

- Main River
- Node Locations

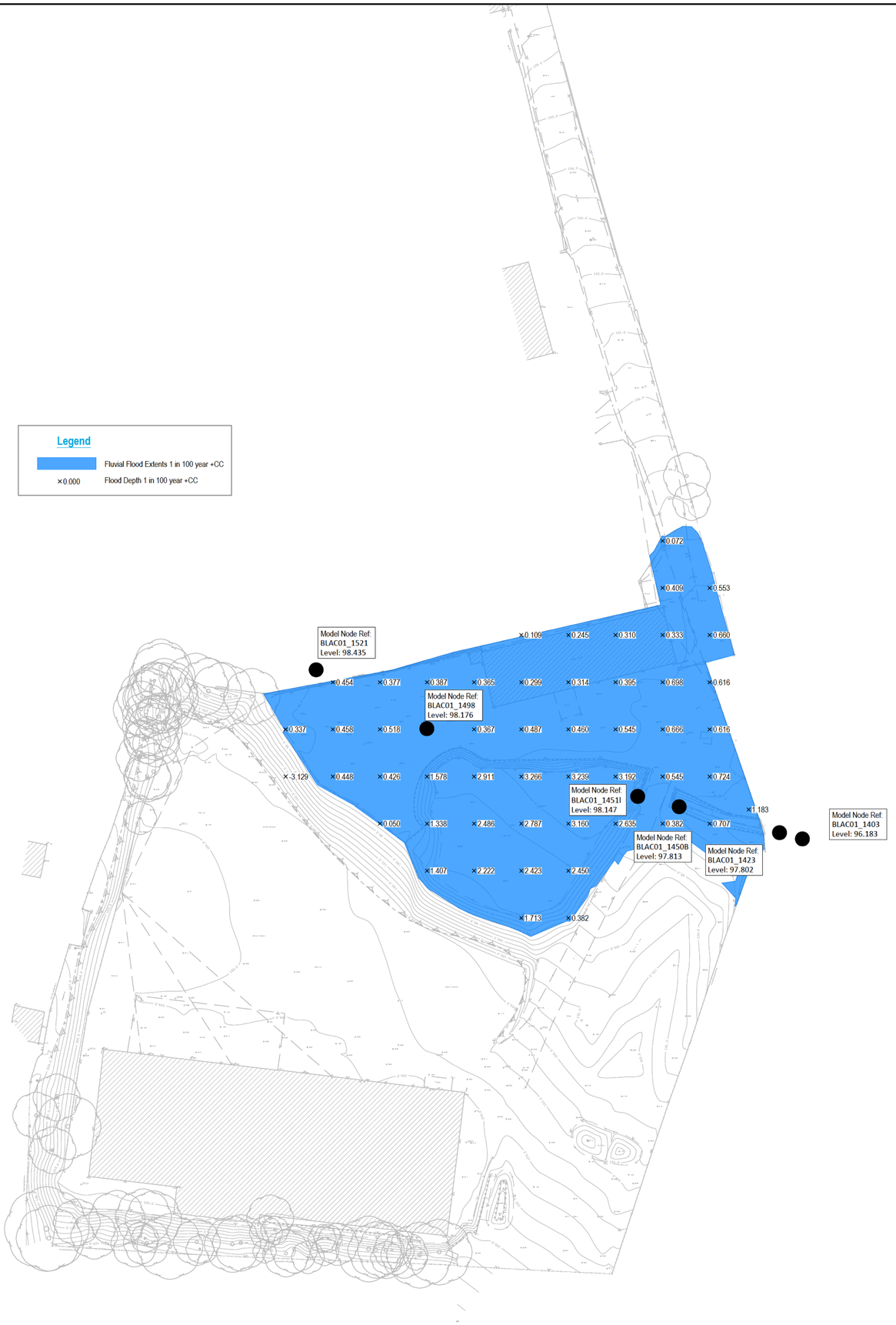
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

RFI: 16941

2009 River Spen Model Results

Label	20% annual probability		10% annual probability		4% annual probability		2% annual probability		1.33% annual probability		1% annual probability		1%+CC annual probability		0.1% annual probability	
	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)	Max Stage (mAOD)	Max Flow (m^3/s)
BLAC01_1521	97.95	1.928	98.151	2.265	98.265	2.709	98.312	3.052	98.339	3.258	98.357	3.405	98.435	4.086	98.749	7.518
BLAC01_1498	97.714	1.918	97.999	2.231	98.089	2.704	98.116	3.048	98.129	3.254	98.138	3.402	98.176	4.082	98.317	7.508
BLAC01_1423	97.231	1.799	97.358	2.118	97.523	2.694	97.603	3.041	97.648	3.25	97.678	3.398	97.802	4.074	98.103	6.016
BLAC01_1399	95.811	1.799	95.857	2.118	95.931	2.694	95.967	3.042	95.987	3.251	96.002	3.398	96.054	4.075	96.255	7.519
BLAC01_1330	94.682	1.793	94.73	2.059	94.772	2.503	94.802	2.794	94.819	2.96	94.831	3.074	94.886	3.591	95.123	5.912
BLAC01_1287	94.477	1.785	94.544	2.305	94.579	2.637	94.605	2.965	94.62	3.159	94.631	3.304	94.68	4.001	94.937	7.382
BLAC01_1272	93.304	1.787	93.506	2.312	93.623	2.633	93.739	2.965	93.806	3.163	93.854	3.308	94.075	3.995	94.884	5.813
BLAC01_1155	91.177	1.788	91.274	2.324	91.32	2.637	91.369	2.969	91.398	3.167	91.414	3.312	91.487	3.986	91.747	5.807
BLAC01_0977	89.342	1.769	89.512	2.374	89.715	2.716	89.915	2.906	90.057	3.045	90.157	3.141	90.602	3.515	91.239	5.94
BLAC01_0725	83.616	1.768	83.68	2.328	83.712	2.656	83.734	2.885	83.747	3.026	83.755	3.119	83.789	3.495	85	5.45
BLAC01_1403	95.94	1.799	95.991	2.118	96.071	2.694	96.108	3.041	96.129	3.25	96.137	3.398	96.183	4.074	96.47	6.016
BLAC01_1450B	97.249	1.815	97.371	2.12	97.534	2.635	97.615	2.944	97.659	3.123	97.689	3.248	97.813	3.826	98.115	6.684
BLAC01_1451I	97.677	1.817	97.985	2.12	98.073	2.66	98.096	2.981	98.108	3.168	98.116	3.3	98.147	3.906	98.252	6.903

APPENDIX E: FLOOD DEPTHS



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Rev	Date	Description	Drn / Chk'd / Appr'd
P01	10/03/2022	First Issue.	SH / SLL / SLL

Suitability: S2 - Suitable for Information

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Client: Quarters Development

Job: Bookside Works, Cleckheaton

Title: Flood Inundation Plan

Classification: FI_60_20
Scale @ A1: 1:500

Project - Originator - Volume/System - Level/Location - Type - Discipline - Number: B21147 - JNP - 92 - XX - DR - D - 2001
Document/Drawing Number
Revision: P01

JNP Group Internal Project Number: H01234

Complies to ISO 7200:2004 - JNP QA Ref: QD019 Rev 0


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