Flood Risk Assessment

21T2034 – Cleator Moor Innovation Quarter – Area 3

CMIQ-BGP-02-XX-RP-C-FRA002

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Flood Risk Assessment

Project: Cleator Moor Innovation Quarter – Area 3

Client: Copeland Borough Council

LLFA: Cumbria County Council

BGP Job No: 21T2034

Document Checking:

Prepared By: J Herbert – Design Engineer

Checked By: J Conway – Director

Issue	Date	Status	Checked for Issue
001	05/11/2021	First Draft	JC
002	23/03/2022	Planning	JC

Contents

Appendices

1. Introduction

1.1. This Flood Risk Assessment has been prepared in accordance with the requirements of The National Planning Policy Framework (Ministry of Housing, Communities and Local Government - February 2019) [The Framework] and the Planning Practice Guidance to the National Planning Policy Framework Website (Launched 6th March 2014) [The Technical Guidance].

1.2. This report has been prepared to supplement the planning application for the proposed development on land off Bowthorn Road, Cleator Moor, Cumbria. See Appendix A for the site location plan.

1.3. The proposals are to construct light industrial, general industrial and storage and distribution units on the greenfield site that was previously used as agricultural grazing land.

1.4. This report (Area 3) forms part of an overall development, associated Areas 1 and 2 are reviewed and assessed within BGP Flood Risk Assessment (001 & 003) March 2022.

2. Existing Site Description and Location

2.1. Site Location

2.1.1 Site Name: Leconfield Industrial Estate

2.1.2 Site Address: Land off Bowthorn Road, Cleator Moor

2.1.3 OS Grid Reference: E: 301854, N: 515384

2.1.4 National Grid Reference: NY018153

2.2. Site Description

2.2.1 Site Area: 13.3 Ha.

2.2.2 Existing Land Use: Agricultural grazing land

2.2.3 Proposed Land Use: Industrial Use, Offices and Warehousing. (Class B2).

2.2.4 Local Planning Authority: Copeland Borough Council

2.2.5 Sewer Undertaker: United Utilities (UU)

2.2.6 At approximately 13.3 Ha in size the Greenfield site is located approximately 5.15km southeast of Whitehaven and approximately 18km southwest of Cockermouth. The site is currently an overgrown greenfield. The site is bound by Nor Beck to the south, Bowthorn Road to the west, fields to the north and Birks Road to the east.

2.3. Flood Zone (Table 1 NPPF)

2.3.1 The development lies for the majority within Flood Zone 1 however, there is a large area to the south west area of site within Flood Zone 3. (See Appendix C for Flood Maps).

2.4. NPPF Site Classification (Table 2 NPPF)

2.4.1 The vulnerability classification for 'Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure' is "Less Vulnerable".

2.5. Flood Zone "Compatibility" (Table 3 NPPF):

2.4.2 Table 1 from the National Planning Policy Framework has been included below, this table is to determine what development is suitable within the associated flood zone. As noted previously elements of the site area are located within Flood Zone 3. However, it is proposed that all development plots and associated infrastructure are to be constructed wholly within Flood Zone 1. As such, the proposed development has been assessed within Table 1 as being within Flood Zone 1. The Flood Zone 3 area is to remain soft landscaping and be recreational space.

Table 1 – NPPF Flood Zone Compatibility (Table 3 within NPPF)

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	Yes	Yes	Yes	Yes	Yes
Flood Zone 2	Yes	Exception test required	Yes	Yes	Yes
Flood Zone 3a	Exception test required	No	Exception test required	Yes	Yes
Flood Zone 3b	Exception test required	No	No	No	Yes

2.5.1 The proposal to construct 'Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure' is "Less Vulnerable" on land off Bowthorn Road is acceptable in terms of flood risk in accordance with Table 3 of the NPPF (above).

2.6. Sequential Test

2.6.1 Typically a sequential test is required where sites located within Flood Zone 2 or 3, this is to compare the site you're proposing to develop with other available sites to find out which has the lowest flood risk.

2.6.2 As the sites buildings and infrastructure are located within Flood Zone 1, this confirms the designation for the site. The sequential test does not need to be applied.

3. Definition of the Flood Hazard

3.1. Tidal Flood Risk

The site is approximately 5.5km from the sea and located between elevations of approximately 76m AOD to 84m AOD. It is therefore considered that the site will not be affected by flooding from the sea.

The risk of flooding from the sea is categorised as **LOW**.

3.2. Fluvial Flood Risk

The nearest named watercourse is Nor Beck, which is located to the sites southwestern boundary running from east to west through the site then along the southwestern boundary where it converges with Bowthorn Beck and is culverted. From the point it converges it is culverted and drains west then south ultimately converging with the River Keekle.

A further watercourse is located to the northwestern boundary, Bowthorn Beck. This drains north into site and west where it converges with Nor Beck.

There are no other named or unnamed watercourses within close proximity to site.

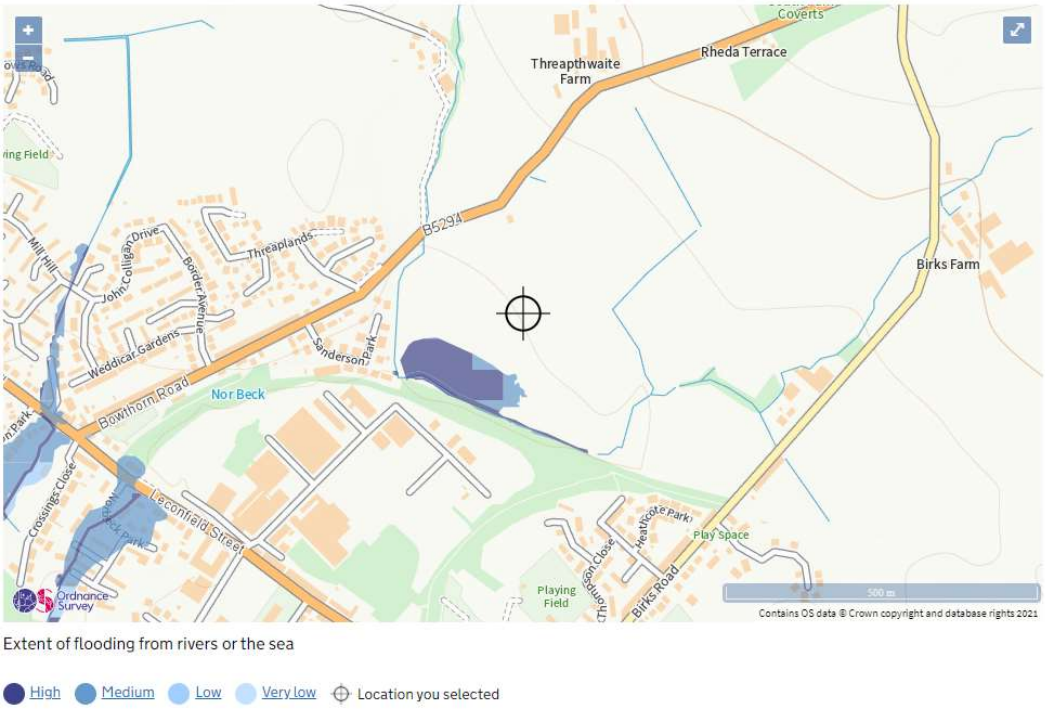

Figure 1 – Environment Agency Flood Map for Planning

The Copeland Borough Council Strategic Flood Risk Assessment (SFRA) Level 1 2018 report has been reviewed. This states that there has been two recorded incidents of flooding since 1999, the last major event being during 2007. It notes that a study at Nor Beck has been completed which recommends increasing the capacity of the culvert at Cleator along with upstream storage to reduce the risk of flooding from Nor Beck. It is unknown whether this work has been done.

Area of New Development
The Environment Agency 'Flood Map for Planning' (Figure 1 and Appendix C) shows that the proposed area of new development is within a Flood Zone 1, a very low risk area of flooding. Flood Zone 1 is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year. See Appendix E for details.

It is considered that the risk of flooding to the area of new development from fluvial sources is categorised as **LOW.**

Area of Soft Landscaping (FZ3)
The Environment Agency 'Flood Map for Planning' (Figure 1 and Appendix C) shows that the area of existing soft landscaping is within a Flood Zone 3 at high risk of flooding. High risk means that each year this area has a chance of flooding of greater than 3.3% each year.

It is to be noted that adjacent Nor Beck watercourse a vast area is susceptible to High risk of flooding from rivers or sea. The area within the high risk zone is at the lowest elevation of site at approximately 76.0m AOD. High risk means that each year this area has a chance of flooding of greater than 3.3%. See Appendix E for details.

The Environment Agency Product 4 River Level information has been sourced through the freedom of information act. This is reviewed within Section 5 of this report.

It is considered that the risk of flooding to the site from fluvial sources is categorised as **HIGH.**

3.3. Surface Water Flood Risk

Intensive rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in localised flooding.

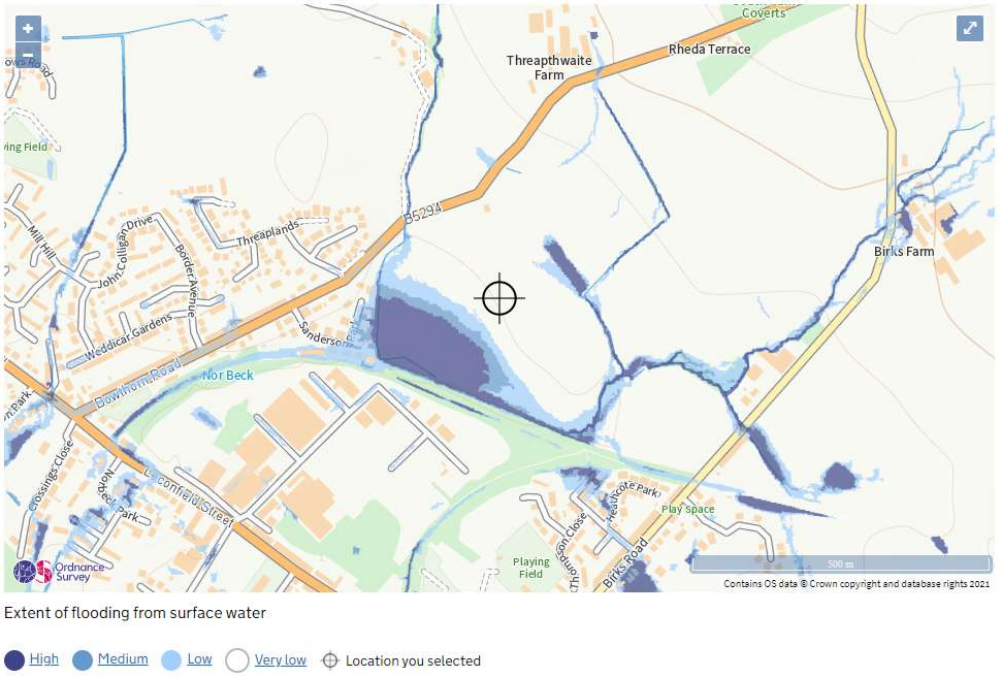

Figure 2 – Environment Agency Surface Water Flooding Map for Planning

Figure 2 'Surface Water Flooding Map for Planning' shows that the site is for the majority at 'Very Low' (<0.1%) risk to surface water flooding with vast area towards the southwest of the site adjacent Nor Beck at high risk (above 3.3%).

From the Defra Lidar Survey Data information available, Area 3 (southeast of Nor Beck) varies in level throughout. The level to the eastern boundary is approximately 87.0m AOD, this falls to the north-western extent adjacent Nor Beck at a level of 79.0m AOD. This equates to a gradient of approximately 1 in 25. The level from northern to southern extent is relatively level. Nor Beck being at the lower elevation 79.0m confirms the findings of Figure 2.

Area 3 (northwest of Nor Beck) varies in level throughout, with a gradual mound located towards the eastern extent adjacent Nor Beck. The highest point of this mound is 84.0m AOD, this falls southeast toward Nor Beck at a level of 79.0m AOD. This equates to a gradient of 1 in 19. The northern boundary adjacent Bowthorn Road varies significantly, falling from east to west from 85.0m AOD to 76.0m AOD. This equates to a gradient of 1 in 31. A large expanse of Area 3 is relatively level at 76.0m AOD to the southwestern boundary adjacent Nor Beck and Bowthorn Beck. This is the lowest elevation and is at high risk meaning that each year this area has a chance of flooding of greater than 3.3%.

It is noted that the surface water flooding occurs due to the Nor Beck and Bowthorn Beck confluence, at which point Nor Beck is culverted. From the point it is culverted it drains west then south ultimately converging with the River Keekle. Based on the flood maps it is evident that the Nor Beck culvert restricts surface water flows and backs up into the field hence the map indications. The flooding is considered fluvial flood risk rather than surface water, however in accordance with the maps provided the category noted below has been provided.

Based on the above, the existing risk of flooding from overland sources is categorised as **HIGH.**

3.4. Groundwater Flood Risk

Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks.

A 'Phase 1 Desk Study' has been carried out by Solmek dated September 2021. (Report No. S210806).

The geology of the site and the wider area is complex – the majority of the site is shown to be underlain mostly by solid geology of Whitehaven Sandstone most likely comprising of cross-bedded sandstones with mudstone and siltstone with thin coal seams and limestone, however the southeast is underlain by Pennine Middle Coal Measures for mudstone, siltstone & sandstone.

The report states that 'BGS Borehole NY01NW463 is located in the northwest portion of the site and shows topsoil to a depth of 0.40m, underlain by firm organic sandy silty clay to a depth of 1.10m. This is shown to be underlain by stiff to very stiff sandy silty clay with fine to coarse gravel to a depth of 4.0m, underlain by moderately weathered thinly bedded fine grained moderately weak micaceous sandstone to a depth of 4.50m where the borehole was terminated'.

The Envirocheck Report states that there is Limited Potential for Groundwater Flooding to Occur.

Therefore, the risk of flooding to the proposed site from ground water is therefore categorised as **LOW**.

3.5. Flooding from Sewers

See Appendix D for locations of existing United Utilities public drains. A series of United Utilities combined drains and manholes are located through the site adjacent Nor Beck. Two

combined sewers enter through the western boundary and one through the eastern boundary, they converge adjacent Nor Beck watercourse toward the centre of site. From the point the sewers converge it is understood to be 600mm diameter in line with United Utilities pre-development response. The sewers drains west adjacent Nor Beck and offsite through the existing residential development beyond site.

Therefore, the main sources of flood risk from sewers will be from the United Utilities adopted sewers, any existing private drainage and all proposed drainage. These sources include:

- Any flooding from the UU combined sewers noted above throughout the site would flow away from the proposed development due to the elevation of the site being higher than the surrounding levels where UU combined sewers are located.
- Combined sewers are less prone to flooding and the likelihood of the sewers flooding is minimal as it is adopted and maintained by UU.
- All proposed drainage is to be designed in accordance with current best practices and follow the requirements of the Lead Local Flood Authority in order to obtain planning permission. As such, the proposed drainage system would need to be designed in order to prevent flooding to buildings for rainfall events up to and including the 1 in 100-year event with an additional 40% increase allowance for climate change. Therefore, the expected risk of flooding from proposed drainage would be low.

Based on the above the risk of flooding from sewers is categorised as **LOW**.

3.6. Flooding from Artificial Sources

Based on the Environment Agency map 'Flood Risk from Reservoirs' the site is not at risk from any artificial sources such as reservoirs.

The risk of flooding from artificial sources is categorised as **LOW**.

4. Probability of Flooding

4.1. The Environment Agency maps have been reviewed (see Appendix C). The entirety of the developed site area is identified as being in Flood Zone 1 as categorised by the National Planning Policy Framework (NPPF) and Technical Guidance.

4.2. Flood Zone 1 describes the land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year.

4.3. The Copeland Borough Council Strategic Flood Risk Assessment (SFRA) Level 1 2018 report has been reviewed. This states that there has been two recorded incidents of flooding since 1999, the last major event being during 2007. It notes that a study at Nor Beck has been completed which recommends increasing the capacity of the culvert at Cleator along with upstream storage to reduce the risk of flooding from Nor Beck. It is unknown whether this work has been done.

4.4. The previous section describes other flood hazards and the risk they pose to this project. A summary of the existing flood risk and the mitigation required is provided within Table 2 over page.

4.5. Based on the previous section the overall assessment of the probability of flooding to the site is **LOW**.

Table 2 – Summary of existing flood risk and mitigation strategies

Flood Risk Source	Current Risk Level	Mitigation Requirement during detailed design	Risk Level following Mitigation
Tidal and Fluvial Flooding **(Area of New Development)**	LOW	Mitigation measures not required – within Flood Zone 1.	LOW
Tidal and Fluvial Flooding **(Area of Soft landscaping)**	HIGH	All proposed development is located within Flood Zone 1 and is outside of Flood Zone 3. Fluvial Flooding is to remain as status quo post development and no mitigation is required. It is noted that any existing ground level changes within the Flood Zone 3 (1in 100 year) area are to have flood compensatory storage volumes offset on a level for level basis should this be required. However, based on the proposed site plan this is anticipated to be minimal.	HIGH
Surface Water **(Area of New Development)**	LOW	Mitigation measures not required – within Flood Zone 1.	LOW
Surface Water **(Area of Soft landscaping)**	HIGH	All proposed development is located within Flood Zone 1 and is outside of Flood Zone 3. Surface Water Flooding is to remain as status quo post development and no mitigation is required. It is noted that any existing ground level changes within the Flood Zone 3 (1in 100 year) area are to have flood compensatory storage volumes offset on a level for level basis should this be required. However, based on the proposed site plan this is anticipated to be minimal.	HIGH
Groundwater	LOW	Mitigation measures not required.	LOW
Sewer Flooding	LOW	Any flooding from UU sewers within the surrounding area due to blockages or following intense rainfall periods would be directed away from site as the development is located at a higher elevation than surrounding drains. Mitigation measures: • Ensure all proposed drainage is designed in accordance with best practices with an allowance for climate change. • Design proposed levels to direct surface water around buildings or structures that could form a barrier and away from building entrances.	LOW
Artificial Sources	LOW	The site is not at risk from any artificial sources according to the EA map 'Flood Risk from Reservoirs'.	LOW

5. Climate Change

5.1. NPPF Planning Practice Guidance website provides information on the impacts of climate change, which include sea level changes, river flash flooding and more frequent high intensity, short-duration rainfall. These are based on the Environment Agency current recommendations.

5.2. As concluded previously the risk of flooding to the development from all but two sources is low. The risk of Fluvial and Surface water flooding is high with the area of existing soft landscaping. Therefore, it is to be acknowledged that the wider site is at risk of flooding from these sources.

5.3. The Environment Agency Product 4 River Level information has been sourced through the freedom of information act to determine the highest river levels (m. AOD) plus climate change and flow (m^3/s) that must be designed about. The node selected to assess against is NB2_13b.2 due to its locality to the proposed development and the design life of the buildings which is 60 years in accordance with commercial/industrial development.

5.4. In accordance with Gov UK climate change allowances for a 60 year design life building the *'Total potential change anticipated for the '2080s' (2070 to 2115)'* is Upper end 40% which must be allowed for in addition to the 1 in 100 year event.

5.5. The Environment Agency Product 4 River Level information provides the highest river levels for the 1 in 100 year event plus a range of climate change such as, 20%, 30%, 35% and 70% as indicated within Table 3 below.

Table 3 – Annual Probability of Flooding

Node Point	1%+Climate Change (+70%)				1%+Climate Change (+35%)			
	Defended		Undefended		Defended		Undefended	
Map ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow
NB2_C2d.2	70.78	2.65	70.78	2.65	70.61	2.62	70.61	2.62
NB2_C2c.2	71.75	2.65	71.75	2.65	71.60	2.62	71.60	2.62
NB2_C1c.2	74.24	2.65	74.24	2.65	74.08	2.62	74.08	2.62
NB2_C1a.2	76.69	2.65	76.69	2.65	76.46	2.62	76.46	2.62
NB2_7a.2	81.54	4.12	81.54	4.12	81.48	3.33	81.48	3.33
NB2_6a.2	83.35	3.88	83.35	3.88	83.26	3.10	83.26	3.10
NB2_13b.2	77.73	5.25	77.73	5.25	77.47	4.45	77.47	4.45
NB2_12b.2	77.73	8.27	77.73	8.27	77.48	8.12	77.48	8.12
NB2_10b.2	78.46	4.98	78.46	4.98	78.37	3.94	78.37	3.94
NB2_10a.1	79.77	4.59	79.77	4.59	79.68	3.70	79.68	3.70
Level data in mAOD (metres above ordnance datum).								
Data taken from Ehen 201								

5.6. In accordance with the 1 in 100 year + 35% climate change event and the node in closest locality to the development (NB2_13b.2) a level of 77.470m AOD has been determined. This level remains the same in both the defended and undefended scenario due to the absence of defence measures.

5.7. Given the highest river level determined is 77.470m, all floor levels must be set at least 600mm above this level (78.070m). Additionally the proposals must be located outside of the zone affected by the 1 in 100 year event plus 35% climate change. It is noted that all proposed buildings and associated infrastructure are located outside of this zone according to the proposed site plan.

5.8. It is noted that any changes to existing ground level within the Flood Zone 3 (1 in 100 year) area are to have flood compensatory storage volumes offset elsewhere onsite on a level for level basis should this be required. However, based on the proposed site plan this is anticipated to be minimal.

5.9. See Section 7 for Flood Mitigation measures.

6. Detailed Development Proposals

6.1. The proposals are to construct light industrial, general industrial and storage and distribution units on the greenfield site that was previously used as agricultural grazing land. See Appendix A for the site location plan.

6.2. The proposed site layout within Appendix B shows the extents of access roads and building positions. The access roads may or may not be put up for highways adoption, if they remain private they will be maintained by a private management company. The buildings and car parking will be accessed directly off the new road.

6.3. The current use means that the surface water drainage discharge rate will need to be kept as close as practicable to Greenfield rates as per the Cumbria County Council SuDS Adoption Guidance for Major Developments. The surface water discharge rate is subject to approval by the Cumbria County Council Lead Local Flood Authority and Environment Agency.

6.4. The proposed attenuation is to be designed to store surface water for rainfall events up to and including the 1 in 100 year with an allowance for climate change based on current Environment Agency recommendations. This volume will be based on the proposed impermeable surfaced area and the surface water discharge rate to be agreed with the Lead Local Flood Authority and Environment Agency.

6.5. Further details of the proposed drainage works are available in the 'Drainage Philosophy' report (20T2034 – Drainage Philosophy 002 March 2022) by BGP that is submitted as part of this planning application.

7. Flood Risk Management Measures

As stated in previous sections, the site is at low risk of flooding from tidal, sewer, groundwater and artificial sources post development. The site remains at high risk of flooding from fluvial and surface water sources post development as the area of flooding remains unchanged. All impermeable areas will be positively drained via a suitable drainage system.

The finished floor level of the new units will be set 600mm min. above the highest river level noted within Section 5 and therefore any surface water would be directed towards the curtilages of the site.

Surface water attenuation will be provided within the proposal to accommodate the 1 in 100 year storm, with an allowance for climate change based on current Environment Agency recommendations.

8. Off Site Impacts

The proposals for this site should not increase the flood risk elsewhere off site for the following reasons: -

- The proposed surface water discharge rate will be restricted as close as reasonably practicable to Greenfield runoff rates and agreed with the Lead Local Flood Authority and Environment Agency.
- The impermeable areas within the site will be positively drained via a proposed drainage network.
- The site will allow extreme rainfall event flow routes to pass along the site perimeter, retaining flora and fauna.

9. Residual Risks

Recommendations have been made within Section 7 to mitigate against any flood sources that pose any significant risk to the proposed site. All sources of flooding have been considered and the conclusion is that any residual risks are negligible.

10. Conclusions

From the analysis throughout it can be seen that the risk to the proposed units and associated infrastructure on the greenfield land off Bowthorn Road within Leconfield Industrial Estate is **LOW** from all forms of flooding as from two. Flood risk from Fluvial and Surface Water remain **HIGH** following mitigation as categorised in the Framework and Technical Guidance. However, as the development infrastructure is located wholly within Flood Zone 1 at **LOW** risk this confirms the flood designation for the area of proposed development.

The proposed uses of land are appropriate in this Flood Zone. (Tables 1, 2 & 3 of the Technical Guidance).

This report has been prepared with reference to the information available at the time of writing. The summary and recommendations may be revised upon receipt of additional or further information.

Report No: CMIQ-BGP-02-XX-RP-C-FRA002

Report Title: Flood Risk Assessment – Cleator Moor Innovation Quarter – Area 3

James Herbert – Design Engineer
Date: 23/03/2022

Jim Conway – Director
Date: 23/03/2022

For and on behalf of Billinghurst George & Partners

Appendix A

Site Location Plan

- DO NOT SCALE -

Issued for Planning	JJH	P01	JC	05.11.2021
AMENDMENT	BY	REV	CHK	DATE

Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

In instances where this drawing completes or partly completes a contract, Billinghurst George & Partners will consider that it's product has been validated, unless in a period not exceeding 90 working days, the client advises to the contrary.

Client
Copeland Borough Council

Project
Cleator Moor Innovation Quarter

Project No.
21T2034

Drawing Title
Overall Site Location Plan

Drawn	Date	Checked	Date	Size	Scale	Class.	Rev.
JJH	Nov 2021	JC	Nov 2021	A3	1:5000	90.4	P01

Location	Originator	Volume	Level	Type	Role	Unique No.
CMIQ	BGP	00	XX	DR	C	00100

File Reference
CMIQ-BGP-00-XX-DR-C-90.4-00100

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Appendix B

Proposed Site Layout

ISO A0 - 841mmx 1189mm

PROPOSED SITE PLAN

SITE PLAN - PROPOSED
SCALE: 1 : 1250

0 10 20 30 40 50 m

DATE	REVISION	REV	DR	CH
03/11/21	FIRST ISSUE FOR PLANNING REVIEW	P01	JS	DS
09/11/21	REVISION 2	P02	JS	DS
10/12/21	Amended to Tetra Tech Comments	P03	JS	DS
11/01/22	UPDATED GRAPHICS	P04	JS	DS
25/01/22	UPDATED SITE NAMES AND PLOTS	P05	JS	DS
16/02/22	UPDATED PLOT 1.4 to E1a	P06	JS	DK

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Keyplan

North Arrow

True North

Consultants

NORR
NORR Consultants Limited.
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Drawn	Date
MCli	01/09/21
Checked RS	Date 01/09/21

Scale
1 : 1250 @ A0

Client
COPELAND BOROUGH COUNCIL

Project
CLEATOR MOOR INNOVATION QUARTER

Drawing Title
PROPOSED SITE PLAN

Sheet Status
S3 - FOR REVIEW

Project No. IANC21-0043

Drawing No. CMIQ-NOR-MP-ZZ-DR-A-90002

Rev. P06

Appendix C

Environment Agency Flood Maps

Flood map for planning

Your reference	Location (easting/northing)	Created
Site B	**301913/515763**	**27 Oct 2021 11:02**

Your selected location is in flood zone 1, an area with a low probability of flooding.

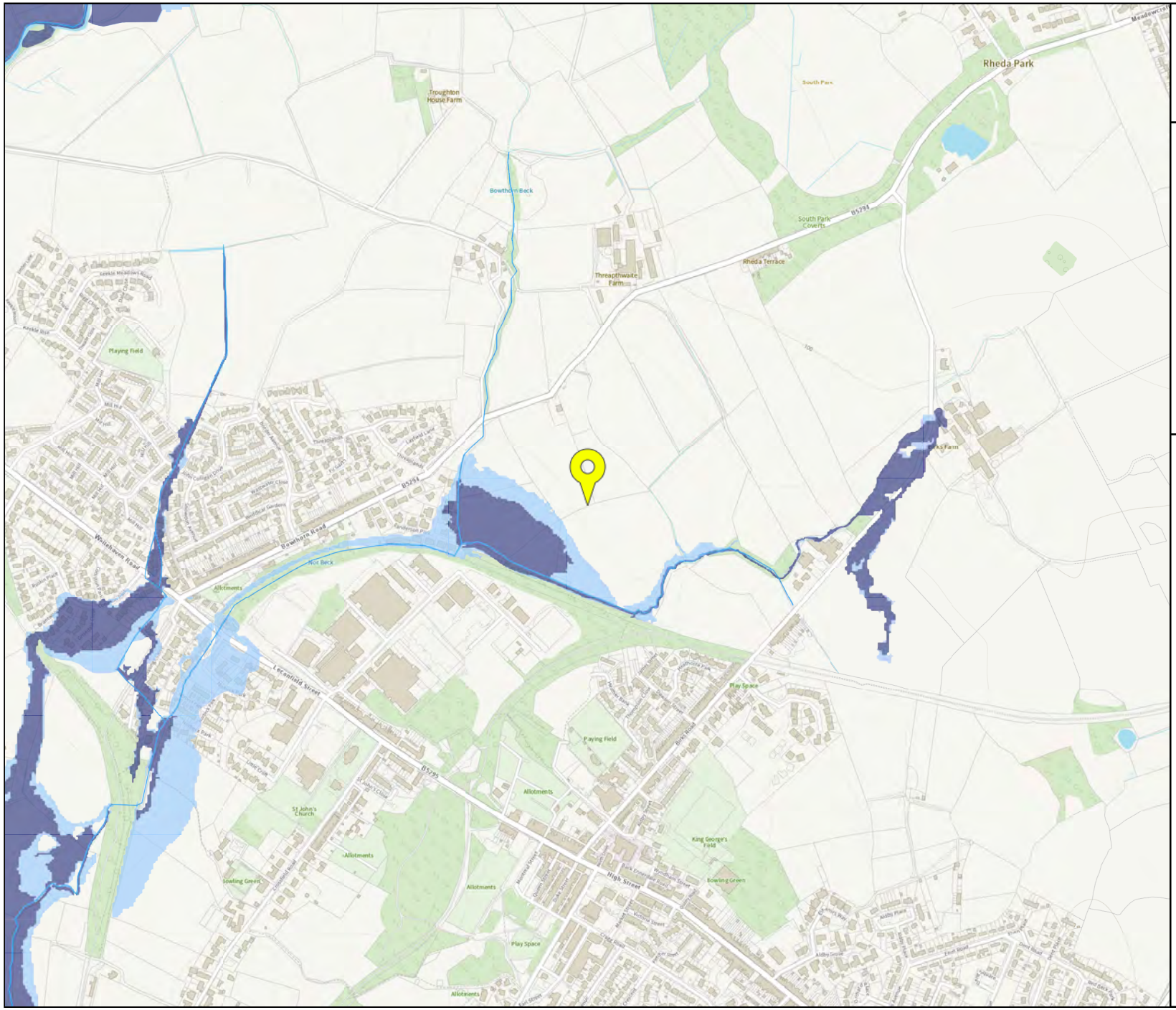
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Site B

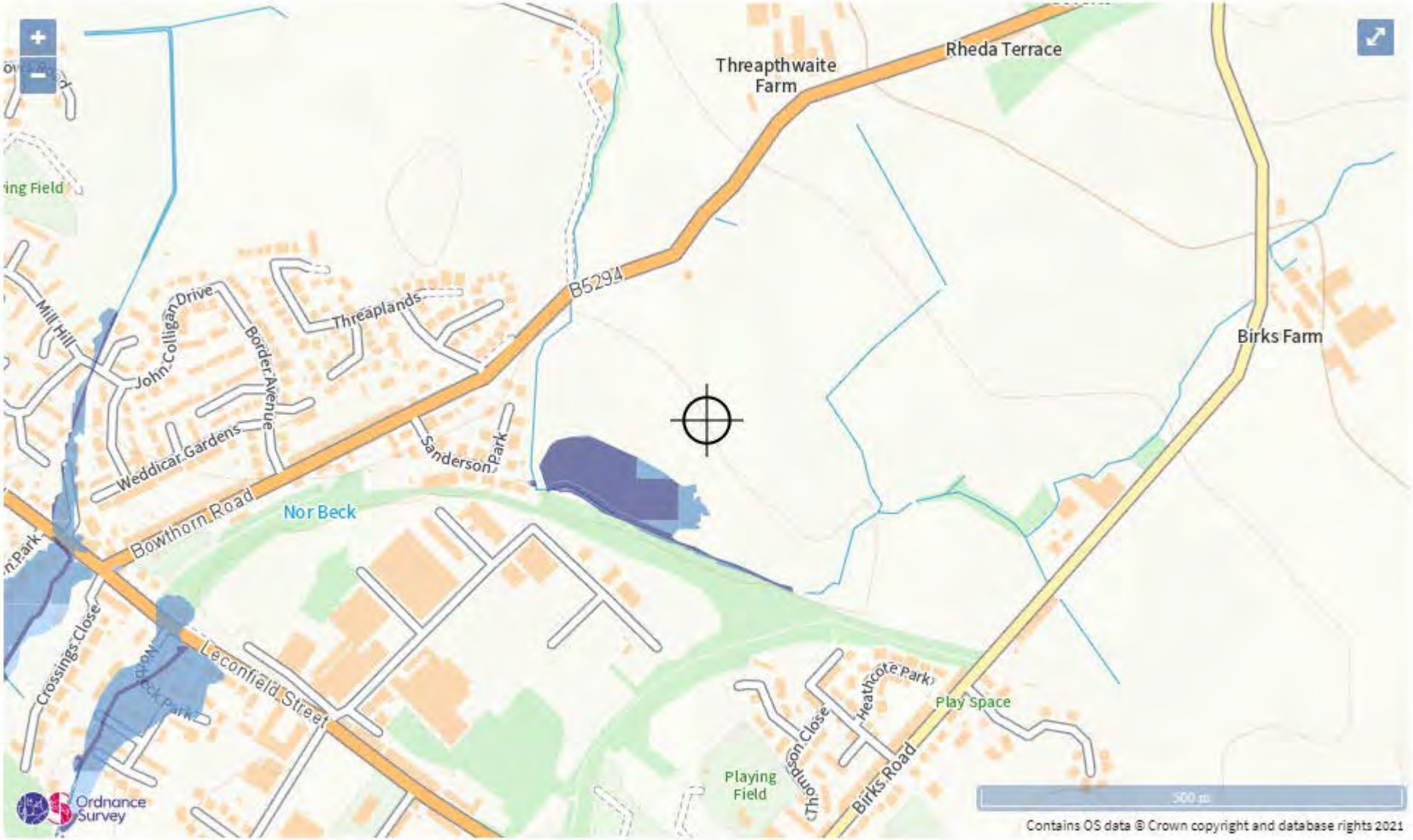
Location (easting/northing)
301913/515763

Scale
1:10000

Created
27 Oct 2021 11:02

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 100 200 300m

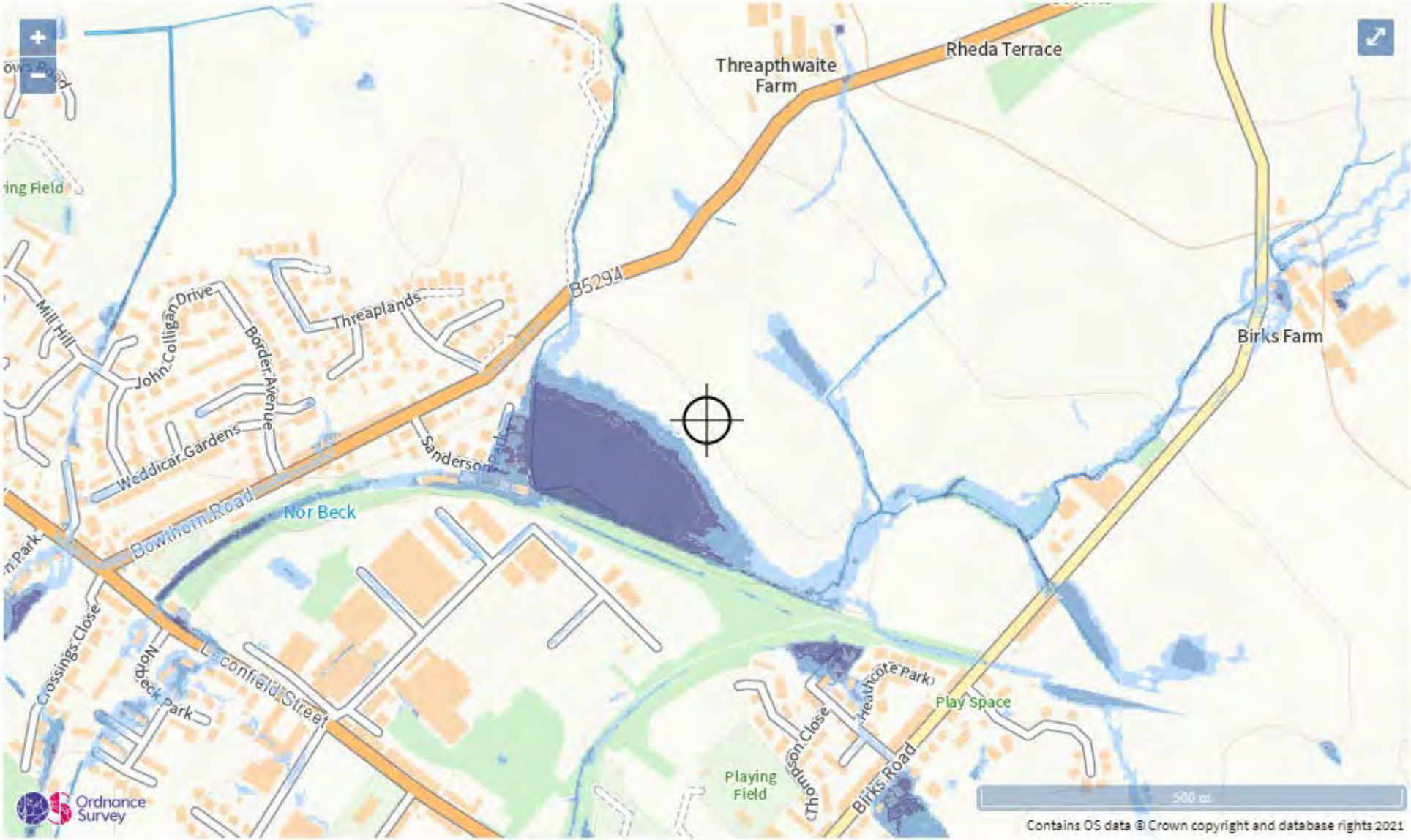


Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected

Extent of flooding from surface water

High Medium Low Very low Location you selected



Surface water flood risk: water depth in a low risk scenario

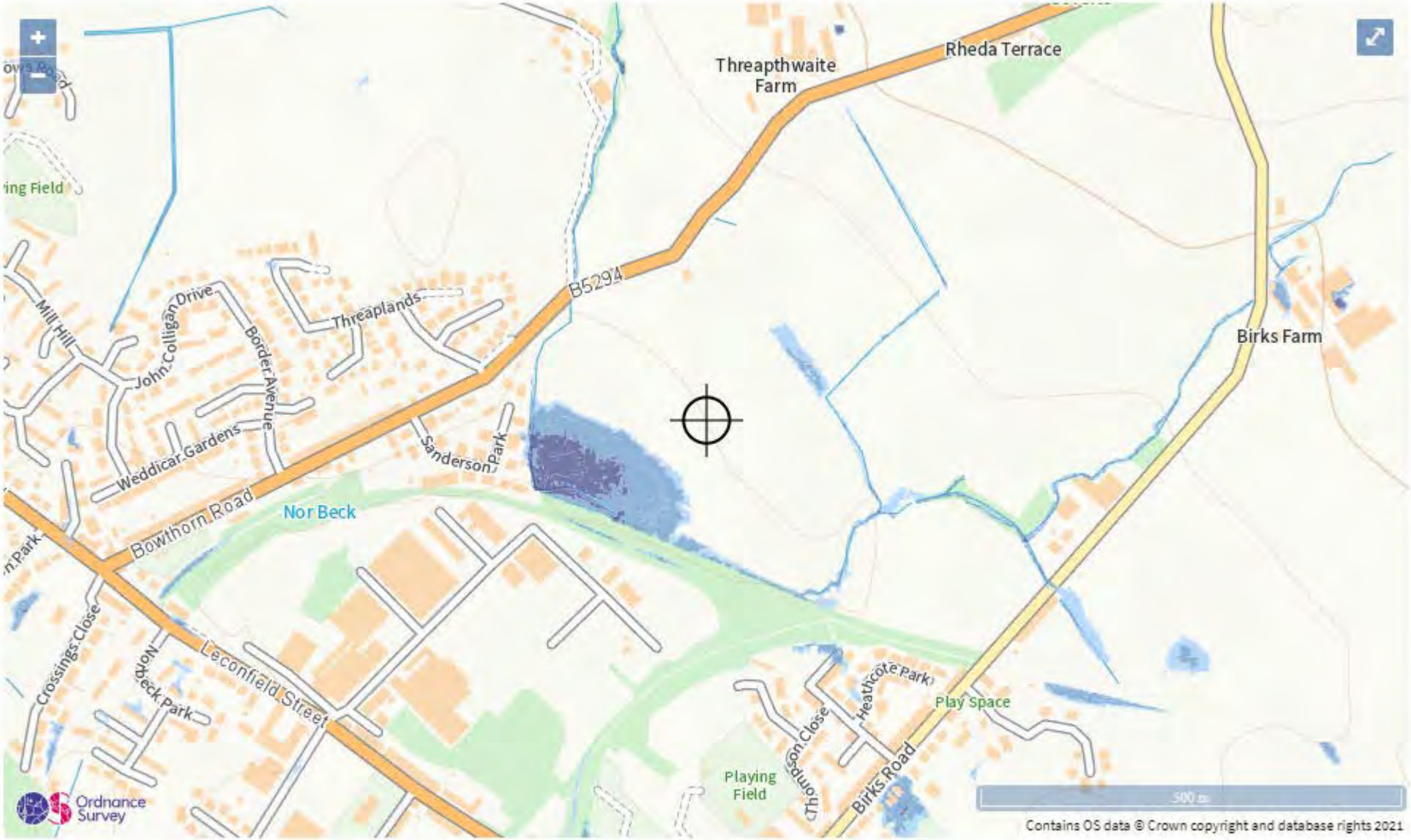
Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

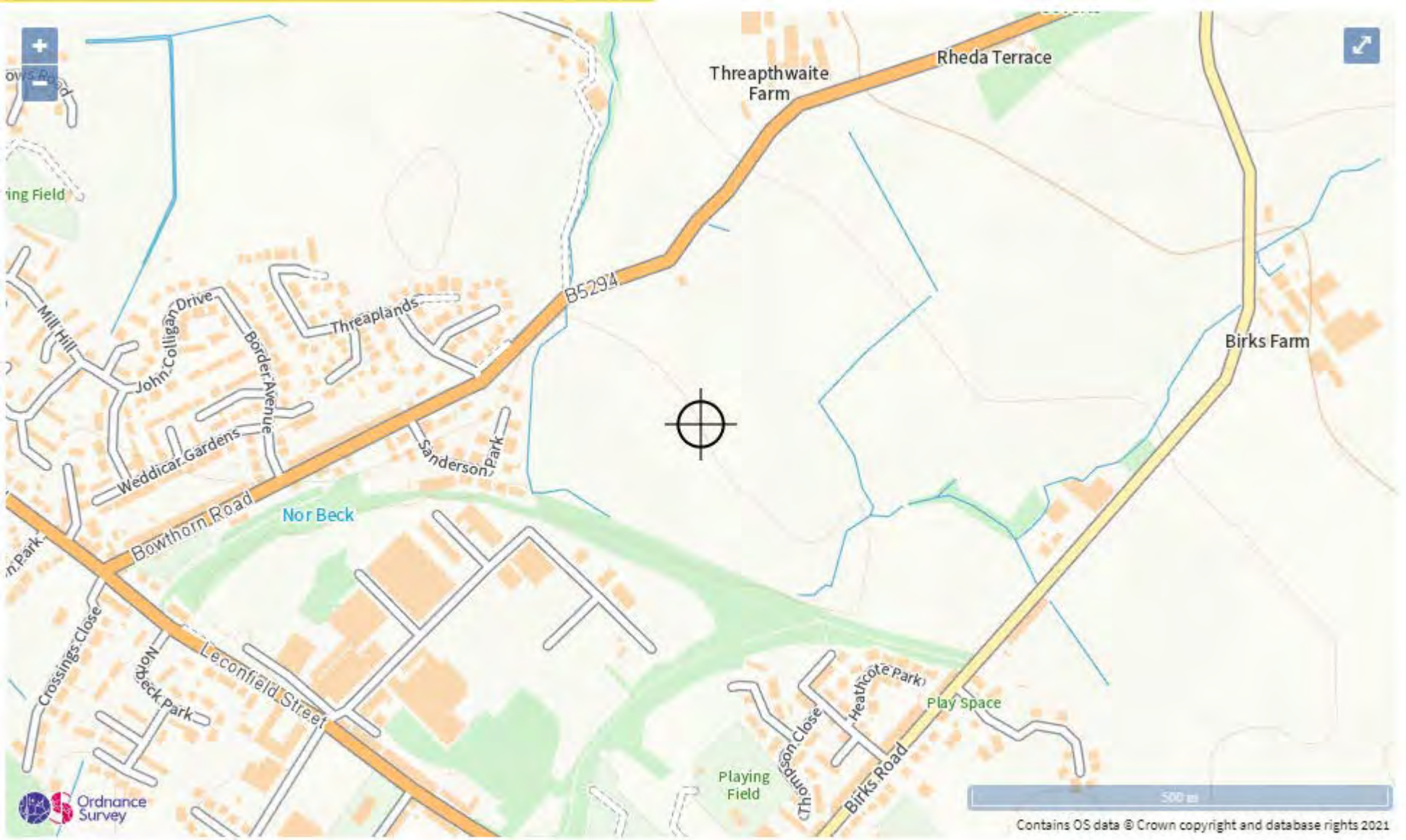
Over 900mm | 300 to 900mm | Below 300mm | Location you selected



Surface water flood risk: water depth in a high risk scenario

Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm | Location you selected

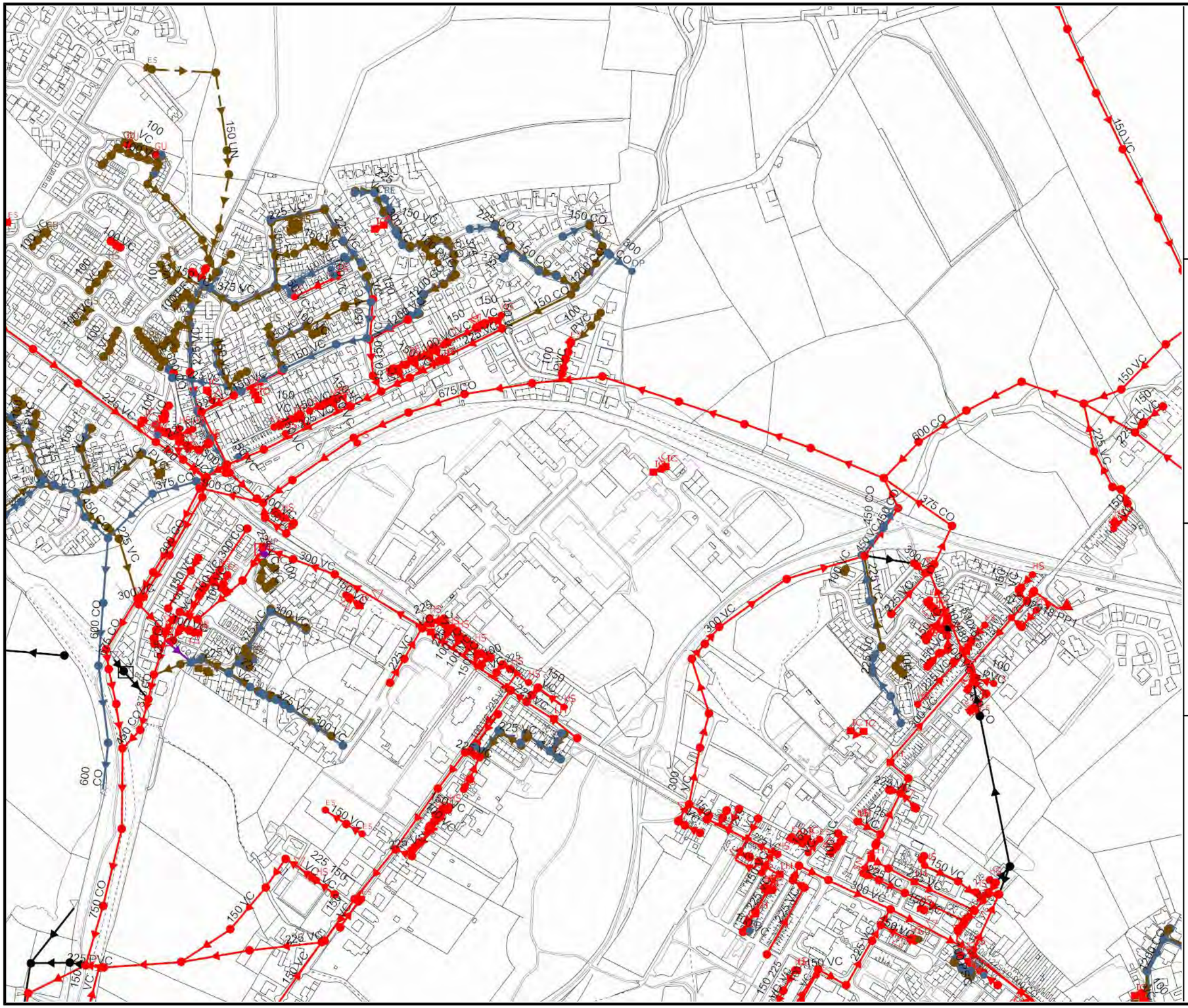


Extent of flooding from reservoirs

Maximum extent of flooding Location you selected

Appendix D

United Utilities Drainage Records



United Utilities

Water for the North West

SEWER RECORDS

Address or Site Reference

CAPITAL ALUMINIUM EXTRUSIONS LTD LECONFIELD INDUSTRIAL ESTATE, CLEATOR MOOR, CA25 5QB

Scale: 1:5000

Date: 21/09/2021

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Appendix E

Topographic Survey

DO NOT SCALE

Notes

1. All level information provided is indicative and is not to be relied upon for design.

Legend

- Site B Redline Boundary
- Proposed Building
- Flood Zone 2 Area
- Flood Zone 3 Area
- Flood Zone 3 (77.470m AOD) (1.0 AEP undefended/defended + 35% Climate Change)
- Contours (1m Intervals)

Issued as Information	JJH	P01	JC	20.10.2021
AMENDMENT	BY	REV	CHK	DATE

Rev P = Preliminary T = Tender C = Construction LCI = Last Construction Issue

Billinghurst George & Partners
CIVIL & STRUCTURAL ENGINEERS | BUILDING SURVEYORS
1st Floor, Wellington House, Wellington Court, Stockton-on-Tees, TS18 3TA
T 01642 876 470 @BGPconsulting E consulting@bgp-teesside.co.uk - W www.bgp-consulting.co.uk

Client
Copeland Borough Council

Project
Cleator Moor Innovation Quarter

Project No.
21T2034

Drawing Title
Site B - Indicative Lidar Data Plan

Drawn	Date	Checked	Date	Size	Scale	Class.	Rev.
JJH	Oct 2021	JC	Oct 2021	A1	1:1000	90.4	P01

Location	Originator	Volume	Level	Type	Role	Unique No.
CMIQ	BGP	02	XX	DR	C	02990

File Reference
CMIQ-BGP-02-XX-DR-C-90.4-02990

Appendix F

Environment Agency River Levels

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Environment Agency

Flood Zones Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

- Main River
- Areas Benefiting from Defences
- Flood Zone 3
- Flood Zone 2

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

ABD (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.

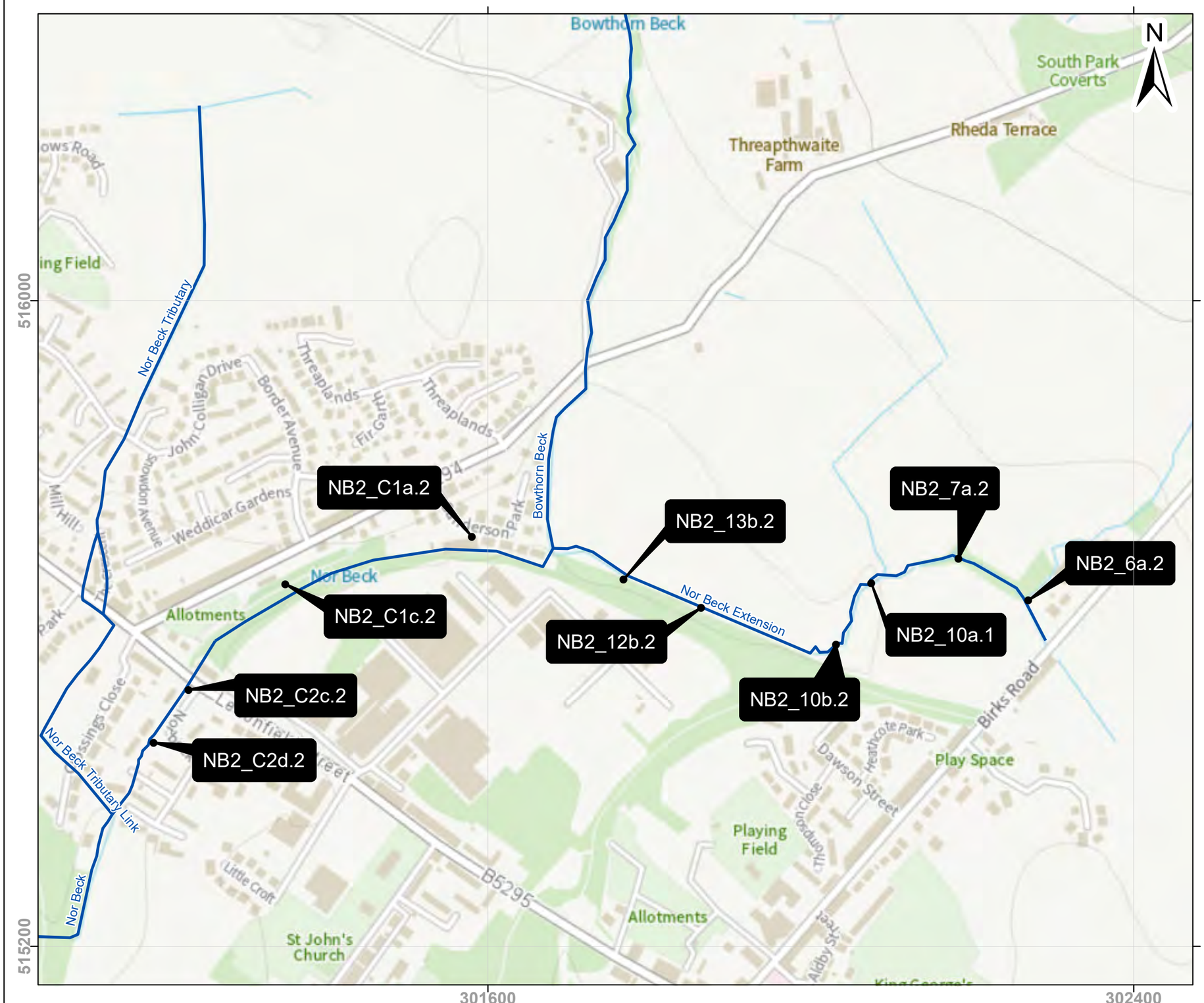
Modelled Water Levels Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

- Node Points
- Main River



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Node Point	Flood Flow (m^3s^{-1}) and Level (mAOD) data for a range of annual probability of flooding															
	0.1%				0.5%				1.0%				5.0%			
	Defended		Undefended		Defended		Undefended		Defended		Undefended		Defended		Undefended	
Map ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
NB2_C2d.2	70.74	2.65	70.74	2.65	70.52	2.54	70.52	2.54	70.44	2.48	70.44	2.48	70.11	2.37	70.11	2.37
NB2_C2c.2	71.72	2.65	71.72	2.65	71.45	2.54	71.45	2.54	71.32	2.48	71.32	2.48	70.90	2.37	70.90	2.37
NB2_C1c.2	74.24	2.65	74.24	2.65	73.80	2.54	73.80	2.54	73.55	2.48	73.55	2.48	72.93	2.37	72.93	2.37
NB2_C1a.2	76.68	2.65	76.68	2.65	76.05	2.54	76.05	2.54	75.69	2.48	75.69	2.48	74.86	2.40	74.86	2.40
NB2_7a.2	81.53	4.04	81.53	4.04	81.41	2.83	81.41	2.83	81.36	2.48	81.36	2.48	81.21	1.82	81.21	1.82
NB2_6a.2	83.34	3.80	83.34	3.80	83.19	2.63	83.19	2.63	83.14	2.30	83.14	2.30	83.03	1.69	83.03	1.69
NB2_13b.2	77.72	5.29	77.72	5.29	77.01	3.90	77.01	3.90	76.63	3.41	76.63	3.41	76.09	2.48	76.09	2.48
NB2_12b.2	77.72	8.67	77.72	8.67	77.03	7.46	77.03	7.46	76.69	6.55	76.69	6.55	76.27	2.35	76.27	2.35
NB2_10b.2	78.45	4.86	78.45	4.85	78.30	3.38	78.30	3.38	78.25	2.95	78.25	2.95	78.13	2.15	78.13	2.15
NB2_10a.1	79.77	4.50	79.77	4.50	79.62	3.14	79.62	3.14	79.57	2.75	79.57	2.75	79.46	2.02	79.46	2.02
Level data in mAOD (metres above ordnance datum). Flow data in m^3 per second																
Data taken from Ehen 2015																

Node Point	Flood Flow (m^3s^{-1}) and Level (mAOD) data for a range of annual probability of flooding															
	1%+Climate Change (+70%)				1%+Climate Change (+35%)				1%+Climate Change (+30%)				1%+Climate Change (+20%)			
	Defended		Undefended		Defended		Undefended		Defended		Undefended		Defended		Undefended	
Map ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
NB2_C2d.2	70.78	2.65	70.78	2.65	70.61	2.62	70.61	2.62	70.59	2.60	70.59	2.60	70.55	2.57	70.55	2.57
NB2_C2c.2	71.75	2.65	71.75	2.65	71.60	2.62	71.60	2.62	71.58	2.60	71.58	2.60	71.50	2.57	71.50	2.57
NB2_C1c.2	74.24	2.65	74.24	2.65	74.08	2.62	74.08	2.62	74.03	2.60	74.03	2.60	73.90	2.57	73.90	2.57
NB2_C1a.2	76.69	2.65	76.69	2.65	76.46	2.62	76.46	2.62	76.39	2.60	76.39	2.60	76.19	2.57	76.19	2.57
NB2_7a.2	81.54	4.12	81.54	4.12	81.48	3.33	81.48	3.33	81.47	3.21	81.47	3.21	81.43	2.97	81.43	2.97
NB2_6a.2	83.35	3.88	83.35	3.88	83.26	3.10	83.26	3.10	83.24	2.98	83.24	2.98	83.21	2.76	83.21	2.76
NB2_13b.2	77.73	5.25	77.73	5.25	77.47	4.45	77.47	4.45	77.40	4.31	77.40	4.31	77.17	4.04	77.17	4.04
NB2_12b.2	77.73	8.27	77.73	8.27	77.48	8.12	77.48	8.12	77.42	8.01	77.42	8.01	77.18	7.73	77.18	7.73
NB2_10b.2	78.46	4.98	78.46	4.98	78.37	3.94	78.37	3.94	78.35	3.80	78.35	3.80	78.32	3.52	78.32	3.52
NB2_10a.1	79.77	4.59	79.77	4.59	79.68	3.70	79.68	3.70	79.67	3.57	79.67	3.57	79.64	3.30	79.64	3.30
Level data in mAOD (metres above ordnance datum). Flow data in m^3 per second																
Data taken from Ehen 2015																

Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

0.1% AEP defended = 92.82 mAOD
0.5% AEP defended = 92.82 mAOD
1.0% AEP defended = 92.82 mAOD
5.0% AEP defended = 92.82 mAOD

0.1% AEP defended = 77.72 mAOD
0.5% AEP defended = 77.01 mAOD
1.0% AEP defended = 76.6 mAOD
5.0% AEP defended = 75.65 mAOD

0.1% AEP defended = 77.72 mAOD

0.1% AEP defended = 74.78 mAOD

0.1% AEP defended = 72.9 mAOD

0.1% AEP defended = 77.72 mAOD
0.5% AEP defended = 77.01 mAOD

0.1% AEP defended = 71.81 mAOD

0.1% AEP defended = 81.5 mAOD
0.5% AEP defended = 81.37 mAOD
1.0% AEP defended = 81.32 mAOD
5.0% AEP defended = 81.17 mAOD

0.1% AEP defended = 78.24 mAOD
0.5% AEP defended = 78.05 mAOD
1.0% AEP defended = 78.0 mAOD
5.0% AEP defended = 77.89 mAOD

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

0.1% AEP defended

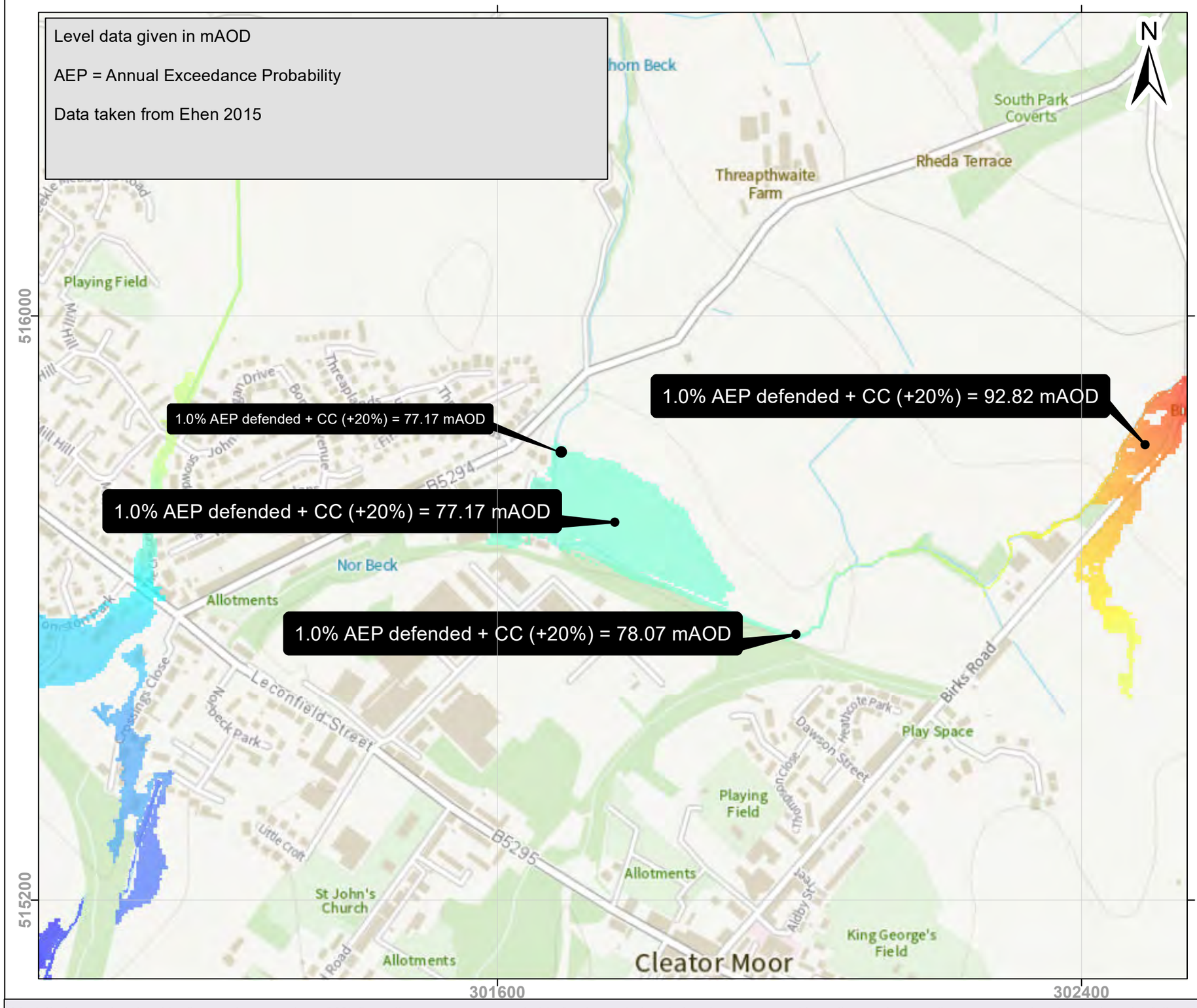
Value

96.8473
86.1404
75.5581
64.9757

Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015



Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

1.0% AEP defended + 20% Climate Change

Value

96.089

85.5745

75.1822

64.7899

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

N

1.0% AEP defended + CC (+30%) = 92.82 mAOD

1.0% AEP defended + CC (+30%) = 77.40 mAOD

1.0% AEP defended + CC (+30%) = 81.45 mAOD

1.0% AEP defended + CC (+30%) = 77.40 mAOD

1.0% AEP defended + CC (+30%) = 77.37 mAOD

1.0% AEP defended + CC (+30%) = 78.06 mAOD

516000

515200

301600

302400

Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

1.0% AEP defended + 30% Climate Change

Value

96.153

85.6301

75.2295

64.829

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

1.0% AEP defended + CC (+35%) = 92.82 mAOD

1.0% AEP defended + CC (+35%) = 77.47 mAOD

1.0% AEP defended + CC (+35%) = 74.49 mAOD

1.0% AEP defended + CC (+35%) = 81.41 mAOD

1.0% AEP defended + CC (+35%) = 77.47 mAOD

1.0% AEP defended + CC (+35%) = 71.64 mAOD

1.0% AEP defended + CC (+35%) = 78.15 mAOD

516000

515200

301600

302400

N

Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

1.0% AEP defended + 35% Climate Change

Value

96.154

85.6321

75.2326

64.833

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

1.0% AEP defended + CC (+70%) = 92.82 mAOD

1.0% AEP defended + CC (+70%) = 77.73 mAOD

1.0% AEP defended + CC (+70%) = 77.73 mAOD

1.0% AEP defended + CC (+70%) = 74.80 mAOD

1.0% AEP defended + CC (+70%) = 71.84 mAOD

1.0% AEP defended + CC (+70%) = 81.47 mAOD

1.0% AEP defended + CC (+70%) = 78.19 mAOD

1.0% AEP defended + CC (+70%) = 71.84 mAOD

516000

515200

301600

302400

N

Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

1.0% AEP defended + 70% Climate Change

Value

96.445

85.9087

75.4948

65.081

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

0.1% AEP undefended = 92.82 mAOD
0.5% AEP undefended = 92.82 mAOD
1.0% AEP undefended = 92.82 mAOD
5.0% AEP undefended = 92.82 mAOD

0.1% AEP undefended = 77.72 mAOD

0.1% AEP undefended = 77.72 mAOD
0.5% AEP undefended = 77.01 mAOD
1.0% AEP undefended = 76.6 mAOD
5.0% AEP undefended = 75.65 mAOD

0.1% AEP undefended = 81.5 mAOD
0.5% AEP undefended = 81.37 mAOD
1.0% AEP undefended = 81.32 mAOD
5.0% AEP undefended = 81.17 mAOD

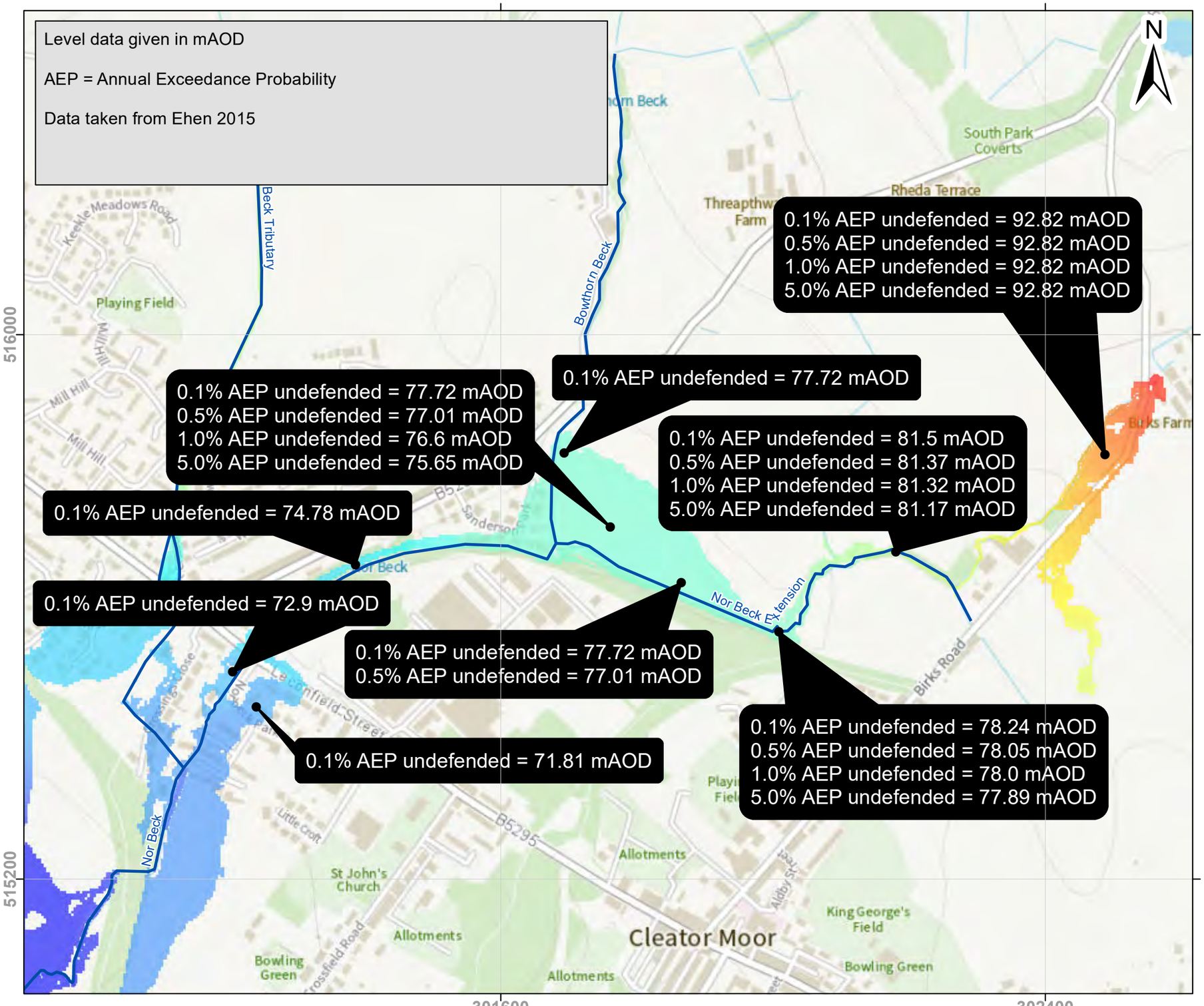
0.1% AEP undefended = 74.78 mAOD

0.1% AEP undefended = 72.9 mAOD

0.1% AEP undefended = 77.72 mAOD
0.5% AEP undefended = 77.01 mAOD

0.1% AEP undefended = 71.81 mAOD

0.1% AEP undefended = 78.24 mAOD
0.5% AEP undefended = 78.05 mAOD
1.0% AEP undefended = 78.0 mAOD
5.0% AEP undefended = 77.89 mAOD



Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

0.1% AEP undefended

Value

96.8473
86.1403
75.5577
64.9752

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Level data given in mAOD

AEP = Annual Exceedance Probability

Data taken from Ehen 2015

N

1.0% AEP undefended + CC (+70%) = 77.73 mAOD
1.0% AEP undefended + CC (+35%) = 77.47 mAOD
1.0% AEP undefended + CC (+30%) = 77.40 mAOD

1.0% AEP undefended + CC (+70%) = 77.73 mAOD
1.0% AEP undefended + CC (+35%) = 77.47 mAOD
1.0% AEP undefended + CC (+30%) = 77.40 mAOD
1.0% AEP undefended + CC (+20%) = 77.17 mAOD

1.0% AEP undefended + CC (+70%) = 92.94 mAOD
1.0% AEP undefended + CC (+35%) = 92.94 mAOD
1.0% AEP undefended + CC (+30%) = 92.94 mAOD
1.0% AEP undefended + CC (+20%) = 92.87 mAOD

1.0% AEP undefended + CC (+70%) = 77.73 mAOD
1.0% AEP undefended + CC (+35%) = 77.47 mAOD
1.0% AEP undefended + CC (+30%) = 77.40 mAOD
1.0% AEP undefended + CC (+20%) = 77.17 mAOD

516000

515200

301600

302400

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Environment Agency

Modelled 2D Data Map

Cleator Moor

Produced: 23 Jul 2021
Our Ref: CL224166
NGR: 301758, 515754

Key

Main River

1.0% AEP undefended + 70% Climate Change

Value

96.445
85.9087
75.4948
65.081

Appendix G

Reference Documents List

The National Planning Policy Framework (March 2012)	Communities and Local Government
The Technical Guidance to the NPPF (March 2012)	Communities and Local Government
Flood Risk Assessment Guidance Note 1	Environment Agency
Copeland Level 1 SFRA	JBA