Flood Risk Assessment

21T2034 – Cleator Moor Innovation Quarter – Area 1
CMIQ-BGP-01-XX-RP-C-FRA001

Billinghurst George & Partners
Civil & Structural Engineers, Building Surveyors
Wellington House, Wellington Court, Preston Farm, Stockton-on-Tees, TS18 3TA
T: 01642 876 470 E: consulting@bgp-teesside.co.uk @BGPconsulting

Flood Risk Assessment

Project: Cleator Moor Innovation Quarter – Area 1

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 Leconfield Street, Cleator Moor, Cumbria. See Appendix A for the site location plan.

1.3. The proposals are to construct light industrial, general industrial, storage and distribution, education and food/beverage units on the brownfield site that was previously used for industrial purposes.

1.4. This report for Area 1 forms part of an overall development, associated Area 2 and Area 3 are reviewed and assessed within BGP Flood Risk Assessment (002 & 003) March 2022.

2. Existing Site Description and Location

2.1. Site Location

2.1.1 Site Name: Leconfield Industrial Estate – Area 1

2.1.2 Site Address: Land off Leconfield Street, Cleator Moor

2.1.3 OS Grid Reference: E: 301680, N: 515490

2.1.4 National Grid Reference: NY016154

2.2. Site Description

2.2.1 Area 1 Site Area: 17.60 Ha

2.2.2 Impermeable Eastern Area: 2.7755 Ha

2.2.3 Impermeable Western Area: 0.920 Ha

2.2.4 Existing Land Use: Industrial Estate

2.2.5 Proposed Land Use: Light industrial, general industrial, storage and distribution, education and food/beverage.

2.2.6 Local Planning Authority: Copeland Borough Council

2.2.7 Sewer Undertaker: United Utilities (UU)

2.2.8 At approximately 17.60 Ha in size the Brownfield site is located approximately 5.15km southeast of Whitehaven and approximately 18km southwest of Cockermouth. The site is currently an in-use industrial estate, part of which is currently unused and has had buildings demolished previously. The site is bound by Leconfield Street to the south-southwest and trees to the northern and eastern boundaries. Residential properties are located beyond the northern boundary and greenfield beyond the eastern boundary.

2.3. Flood Zone (Table 1 NPPF)

2.3.1 The development lies within Flood Zone 1. (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):

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 industrial units, offices and warehousing on land off Leconfield Street is acceptable in terms of flood risk in accordance with Table 3 of the NPPF (above).

2.6. Sequential Test

2.6.1 As the site is located within Flood Zone 1, 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 81m AOD to 85m 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 adjacent the northeast boundary, running from southeast to northwest converging with Bowthorn Beck which runs from north to south. From the point it converges it is culverted and drains from east to west then south ultimately converging with the River Keekle.

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 report has been reviewed. This states that there are no incidents of historical flooding within the site.

The Environment Agency 'Flood Map for Planning' (Figure 1 and Appendix C) shows that the proposed site is unaffected by this or any other watercourse and is wholly within Flood Zone 1. Flood Zone 1 is land that is assessed as having less than a 1 in 1000 (0.1 percent) chance of flooding each year.

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

3.3. Overland 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 a small area towards the northwest of the site at medium risk (between 1% and 3.3%).

The central eastern area of the site is relatively flat at an approximate level of 83.150m AOD, falls existing to provide drainage falls. The north-western area of site falls southeast to northwest from 82.0m AOD to 81m AOD, this equates to a gradient of approximately 1:150. The lowest point of the site is the south western corner and the highest point of the site is the southern corner at 85.0m, an isolated area of elevation.

It is acknowledged that a medium risk area of surface water flooding is indicated within the west area within Figure 2 above is at the lowest elevation of site. It is anticipated that through the development of the site and introduction of positive drainage systems throughout that this will be alleviated.

The low risk areas of flooding are located throughout the existing highway infrastructure and will likely remain as status quo post development unless reactive maintenance works are carried out to clear likely blockages.

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

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 2 Site Investigation' have been carried out by Solmek dated March 2022. (Report No. S220141).

The Phase 2 Site Investigation reveals that made ground was relatively uniform across the site and was only penetrated within the boreholes, proven to a minimum depth of 1.30mbgl (BH06) and a maximum depth of 10.20mbgl (BH03). The made ground consisted of a variable surface covering generally of topsoil but locally comprising concrete or tarmac. This was then generally underlain by slag, initially in a granular form locally mixed with other granular materials (ash, brick, sandstone, clinker). This was in turn underlain by a fused slag which the excavator was unable to excavate through. Standard Penetration Tests within the slag each yielded N values of 50+ (refusal).

Perched groundwater was noted within TP06 at 0.40mbgl with groundwater strikes noted within the boreholes between 4.70 and 17.10mbgl.

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 225-300mm diameter United Utilities combined drains and manholes are located toward the primary access to site off Leconfield Street. The noted sewers drain from southeast to northwest along Leconfield Street in keeping with the topography of the highway.

A 675mm diameter United Utilities combined sewer is located toward the northwestern area of the overall site, which drains west then south.

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 located toward the primary access of site would flow away from the site due to the elevation of the site being higher than the surrounding levels. Combined sewers are less prone to flooding and the likelihood of the sewers flooding is minimal as it is adopted and maintained by UU.
- Any flooding from the UU combined sewer located west of the site would flow away from the site due to the elevation of the site being higher than the surrounding levels. 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 site 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 report has been reviewed. This states that there are no incidents of historical flooding within the site.

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 below.

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	LOW	Development areas are located in Flood Zone 1. No mitigation required.	LOW
Overland Flow	LOW	A positive sewage network will be designed for the site to direct flows from low lying areas into an attenuation system. This is expected to alleviate the potential ponding towards the west of the site.	LOW
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 from all sources is low. Therefore, these sources of flood risk are unlikely to be affected by climate change.

6. Detailed Development Proposals

6.1. The proposals are to construct light industrial, general industrial, storage and distribution, education and food/beverage units on the brownfield site that was previously used for industrial purposes. 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 adopted. At present they are maintained by the local authority. The new buildings and car parking will be accessed directly off the new and existing roads.

6.3. Minor highway works are proposed to the existing access off Leconfield Street at the southern boundary. These works will be carried out in accordance with Cumbria County Council Highways guidance.

6.4. The current use means that the surface water drainage discharge rate will need to be kept as close as practicable to Brownfield rates as per the Cumbria County Council SuDS Adoption Guidance for Major Developments.

6.5. 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 which is to be agreed with the Lead Local Flood Authority and the Environment Agency.

6.6. Further details of the proposed drainage works are available in the 'Drainage Philosophy' report (20T2034 – Drainage Philosophy 001 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, fluvial, sewer, overland, groundwater and artificial sources post development. All impermeable areas will be positively drained via a suitable drainage system.

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 Brownfield 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 through it can be seen that the risk to the proposed industrial development on the brownfield land off Leconfield Street within Leconfield Industrial Estate is **LOW** from all forms of flooding following mitigation as categorised in the Framework and Technical Guidance. This confirms the flood designation for the site.

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-01-XX-RP-C-FRA001

Report Title: Flood Risk Assessment – Cleator Moor Innovation Quarter – Area 1

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	23.03.2022
AMENDMENT	BY	REV	CHK	DATE

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

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Client Copeland Borough Council		**Drawn** JJH	**Date** March 2022	**Checked** JC	**Date** March 2022	**Size** A3	**Scale** 1:5000	**Class.** 90.4	**Rev.** P01
Project Cleator Moor Innovation Quarter	**Project No.** 21T2034	**Location** CMIQ	**Originator** BGP	**Volume** 00	**Level** XX	**Type** DR	**Role** C	**Unique No.** 00100	
Drawing Title Overall Site Location Plan		**File Reference** CMIQ-BGP-00-XX-DR-C-90.4-00100							

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

Appendix B

Proposed Site Layout

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

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NORR Consultants Limited.
An Ingenium International Company

Percy House, 8th Floor Percy Street,
Newcastle NE1 4PW
England, UK
norr.com

Drawn	Date
MCli	01/09/21
Checked	Date
RS	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
LEC	**301600/515522**	**22 Jul 2021 10:10**

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
LEC

Location (easting/northing)
301600/515522

Scale
1:10000

Created
22 Jul 2021 10:10

- 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

Flood risk

Extent of flooding

Location

Enter a place or postcode

Extent of flooding from rivers or the sea

High Medium Low Very low Location you selected

Flood risk

Extent of flooding

Location

Enter a place or postcode

Extent of flooding from surface water

High Medium Low Very low Location you selected

Flood risk

Low risk: depth

Location

Enter a place or postcode

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

Flood depth (millimetres)

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

Flood risk

Medium risk: depth

Location

Enter a place or postcode

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

Flood depth (millimetres)

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

Flood risk

High risk: depth

Location

Enter a place or postcode

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

Flood depth (millimetres)

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

Flood risk

Extent of flooding

Location

Enter a place or postcode

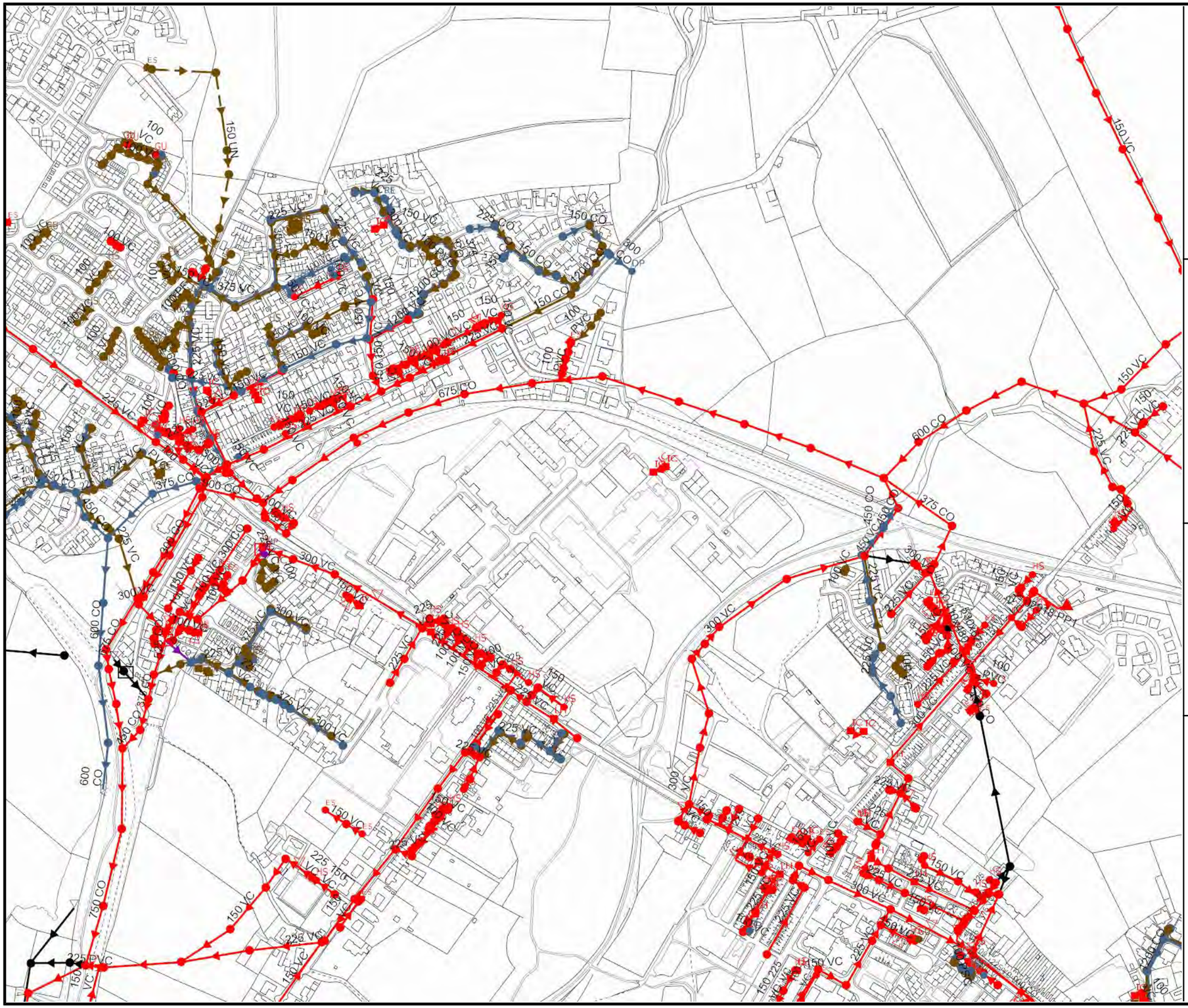
Extent of flooding from reservoirs

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

Appendix F

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