

Land at Dragon Parc engineering works FCA

Version 2

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Contract

This report describes work commissioned by Huntley Wood Investments Ltd, by an email dated 21st September 2019. Kate Drewett and Amy Evans of JBA Consulting carried out this work.

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Purpose

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Abbreviations

AEP	Annual Exceedance Probability
BGS	British Geological Survey
DAM	Development Advice Map
FCA	Flood Consequence Assessment
FRMP	Flood Risk Management Plan
LDP	Local Development Plan
MTCBC	Merthyr Tydfil County Borough Council
NRW	Natural Resources Wales
PPW	Planning Policy Wales
TAN-15	Technical Advice Note 15

1 Introduction

1.1 Terms of Reference

JBA Consulting were commissioned in September 2019 to prepare a Flood Consequence Assessment (FCA) in support of proposed engineering works as part of a flood mitigation strategy at land at Dragon Parc, Abercanaid.

1.2 FCA Requirements

This FCA follows Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk¹ (TAN-15). Where appropriate the following aspects of flood risk will be addressed in all planning applications over its expected lifetime:

- The likely mechanisms of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation of the site
- The rate of rise of flood water through the site
- Velocities of floodwater across the site
- The impacts of the proposal on flood risk elsewhere

¹ Welsh Assembly Government. Planning Policy Wales. Technical Advice Note 15: Development and Flood Risk. July 2004.

2 Site Description

2.1 Site location

The land at Dragon Parc was formerly a factory site in Abercanaid, Merthyr Tydfil. The brownfield site is bound to the south and west by an unnamed link road with residential dwellings beyond. To the north, the site is bound by commercial units and to the east by the Afon Taff. Table 2-1 and Figure 2-1 summarise the key characteristics of the site. This FCA provides an assessment of flood risk in relation to the proposed engineering works to facilitate the regeneration of the site.

Table 2-1 Site Description

Site Name	Dragons Park
Site Area	78 ha
Existing Land-use	Brownfield
Purpose of development	Flood mitigation
OS-NGR	SO05400420
Country	Wales
County	Merthyr Tydfil, Glamorgan
Local Planning Authority	Merthyr Tydfil County Borough Council
Lead Local Flood Authority	Merthyr Tydfil County Borough Council

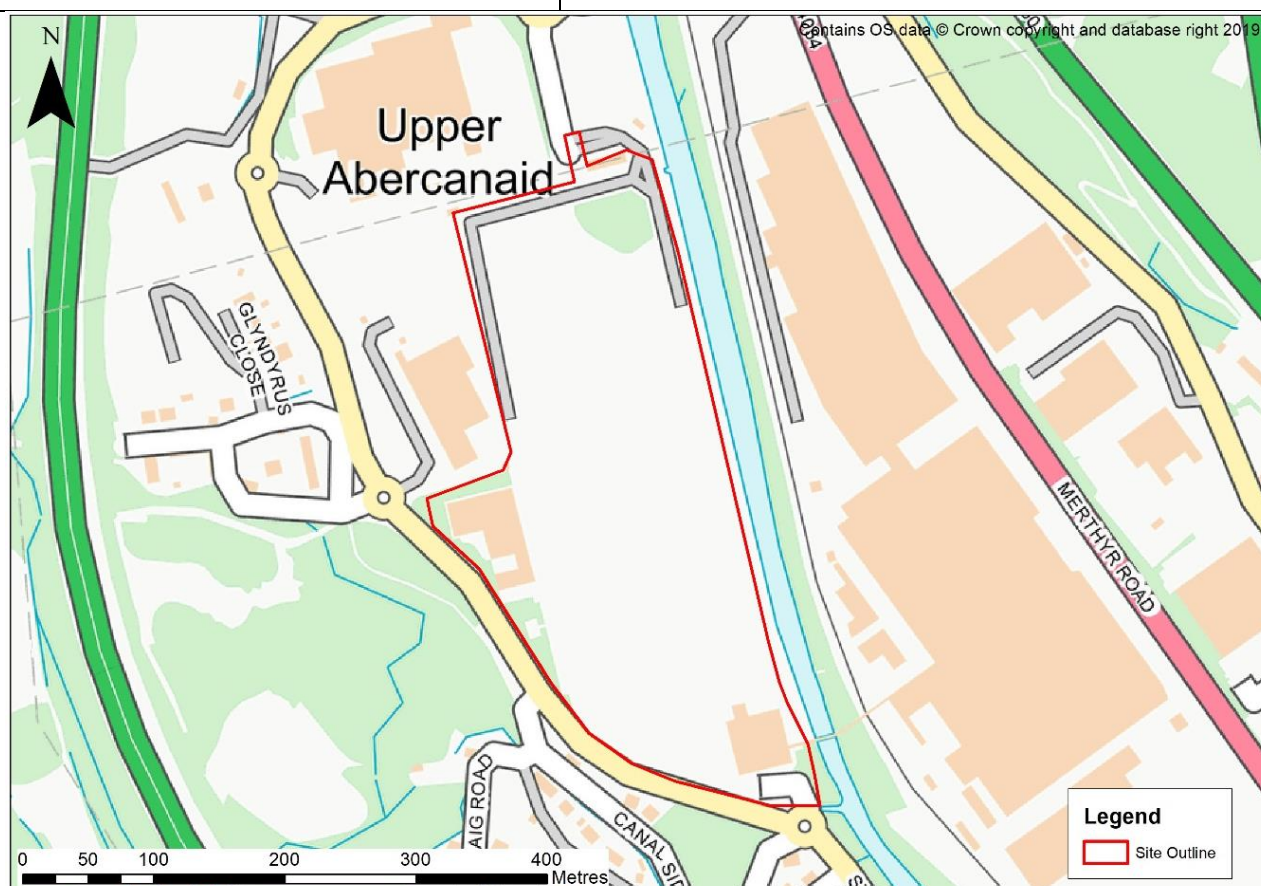


Figure 2-1 Site location

2.2 Site topography and existing land use

The brownfield site is currently vacant, following the demolition of the former factory as shown in Figure 2-2. Elevations across the site generally decrease from north (157mAOD) to south (153mAOD) and from west (160mAOD) to east (157mAOD) across the site. A steep bank is present on the western boundary forming a sloping topography from approximately 160mAOD to 157mAOD into the site. Lower elevations are present at the most southern section of the site, as shown in the LiDAR data in Figure 2-3. Outside the eastern site boundary, the bank steeply drops by ~6m into the Afon Taff channel.

Two access points currently exist to the site, one to the north via the Abercanaid Industrial Estate roundabout and one from to the south via an unnamed link road which connects to Stanfield Close.



Figure 2-2: Existing land-use

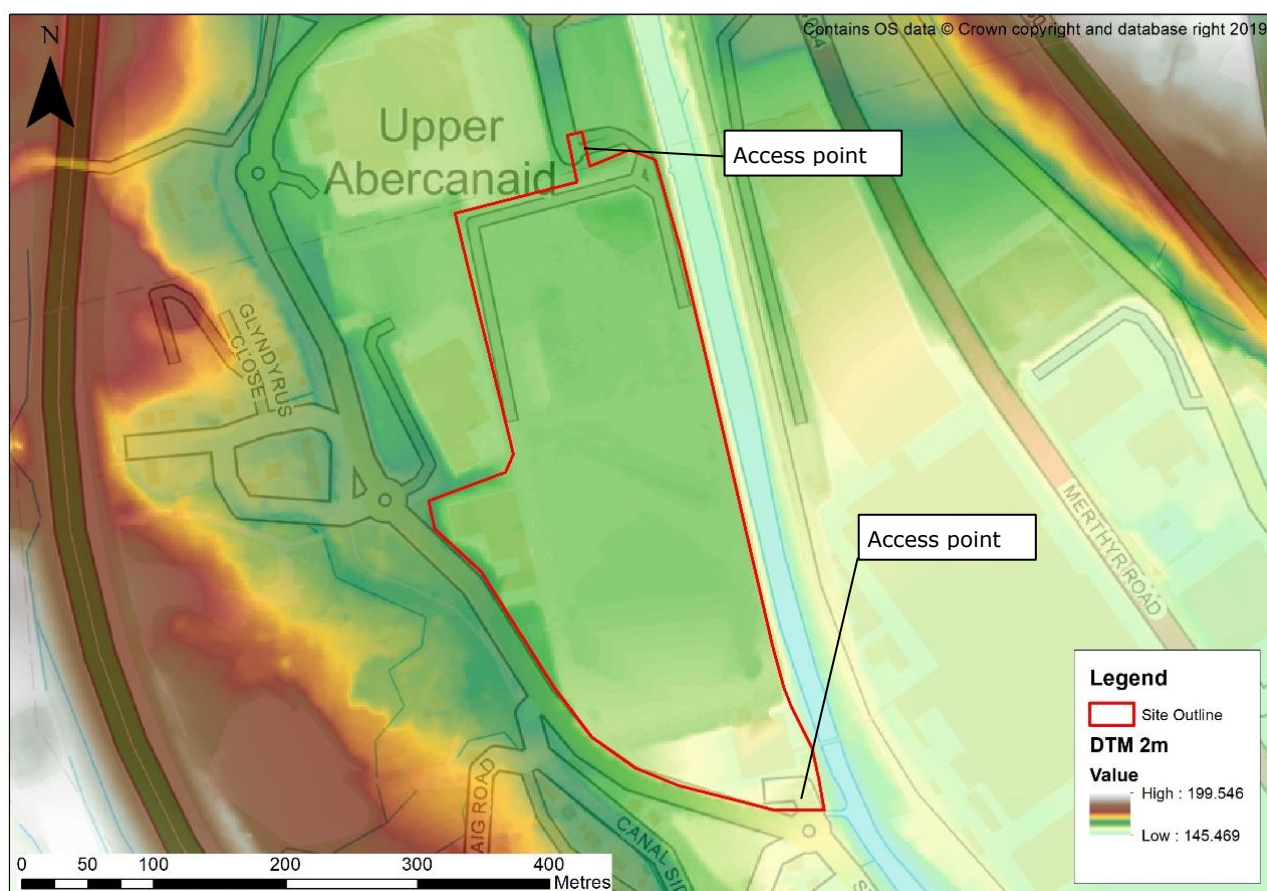


Figure 2-3 Topography of the site

2.3 Site soils and geology

The existing site is largely surfaced with rubble and made ground as shown in Figure 2-2. However, the British Geological Survey (BGS) Geology of Britain² viewer was consulted to identify local underlying geological conditions. The site is part of the South Wales Middle Coal Measures Formation, which consists of mudstone, siltstone and sandstone. The majority of the site is underlain by superficial deposits of Alluvium, consisting of clay, silt, sand and gravel – the western part of the site is underlain by Till.

The soils of the site were determined from the Cranfield University Soilscape viewer³, The site soils are described as slowly permeable wet very acid upland soils with a peaty surface.

2.4 Watercourse and drainage networks

The site is bounded to the east by the Afon Taff which flows in a southerly direction before flowing into the Seven Estuary approximately 60km downstream. To the west of the site a small 'ordinary watercourse', the Nant Canaid, enters a culverted system which approximately follows the site boundary to discharge into the Afon Taff at the site's southern boundary as shown in Figure 2-4. Photos of the culvert inlet and outlet are shown in Figure 2-5.

Small drainage gullies are present parallel to the internal access roads to capture surface water run-off which is conveyed into the combined sewers located beneath the site.

2 BGS Geology of Britain viewer <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> Accessed 09/08/2019

3 Cranfield University Soilscape Viewer <http://www.landis.org.uk/soilscales> Accessed 09/08/2019

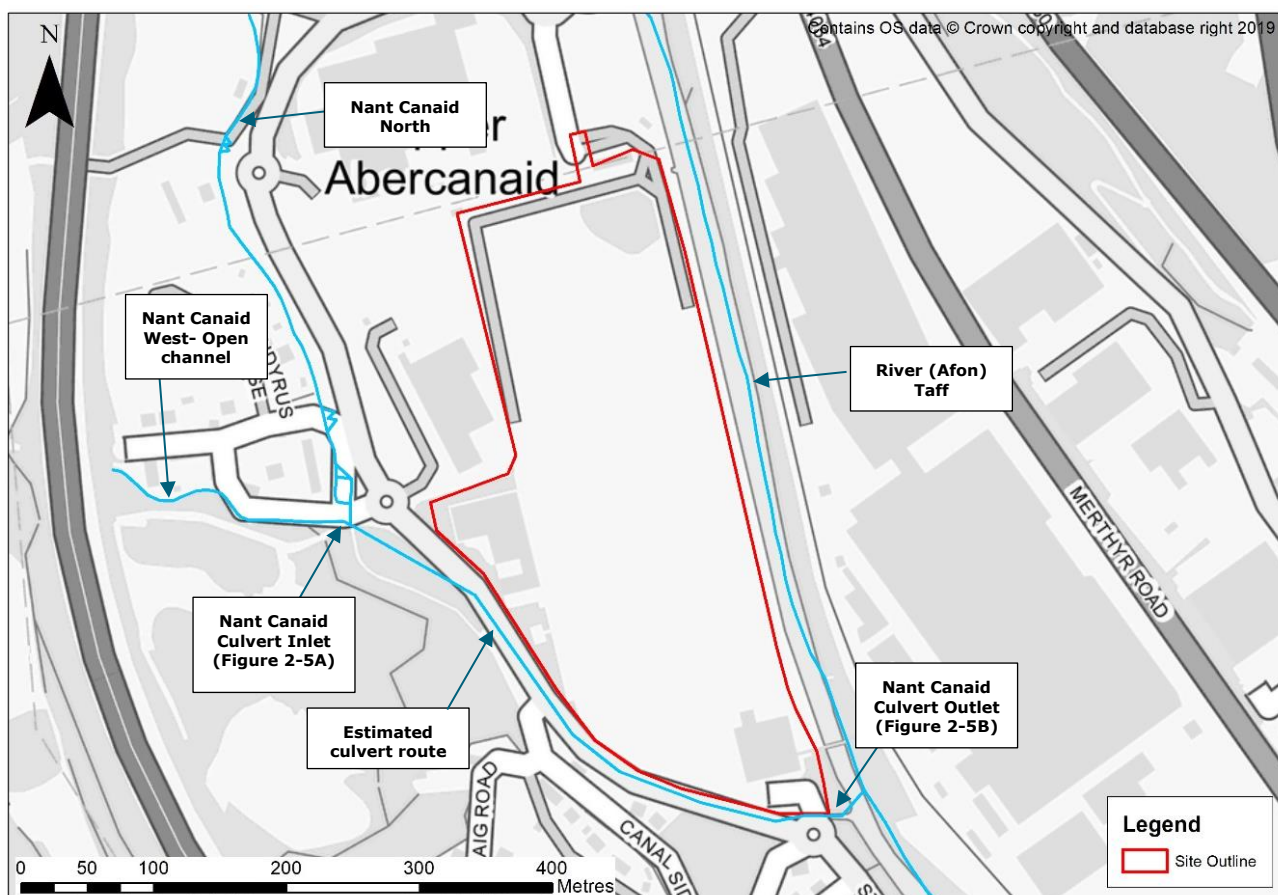
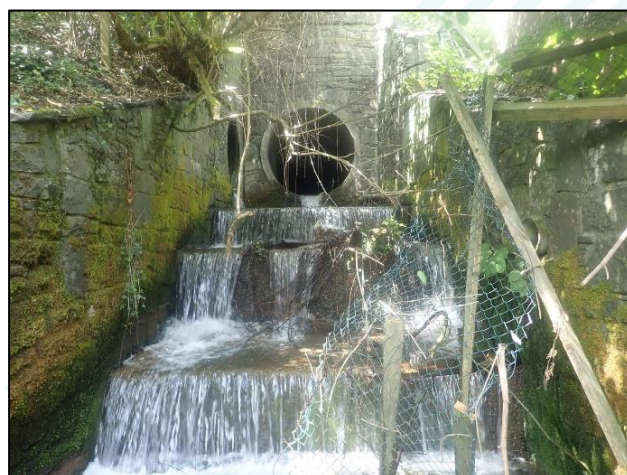


Figure 2-4 Watercourses and site location



A



B

Figure 2-5 Nant Canaid culvert inlet (A) and outlet (B)

2.5 Review of existing flood risk data

A review of the existing flood risk data related to the site has been undertaken. The main sources of current risk have been published by Natural Resources Wales (NRW) and within the Merthyr Tydfil County Borough Council (MTCBC) Flood Risk Management Plan (FRMP) (2015)⁴. Table 2-2 below summarises these findings.

Table 2-2 Summary of the current flood risk based on existing flood risk data

Source of Flooding	Onsite Presence	Description
Fluvial	✓ (see section 2.6)	The site is partially located in Flood Zones 2 and 3.
Tidal	x	The site is not at risk of tidal flooding
Surface Water	✓ (see section 08)	The boundaries of the site are subject to medium to high risk of surface water flooding according to NRW mapping. The north-western part of the site is shown to be at low to high risk of surface water flooding.
Reservoirs	✓ (see section 9)	The site is at risk of flooding from reservoirs according to NRW mapping.
Groundwater	x (see section 2.10)	The site is at low risk of flooding from groundwater
Canals	x	The site is not at risk of flooding from canals
Sewers	x	The site is at a low risk of flooding from sewers

⁴ Merthyr Tydfil County Borough Council, 2015. Flood Risk Management Plan
<https://www.merthyr.gov.uk/media/1810/mtcbc-frmp.pdf> Accessed 09/10/2019

2.6 Existing flood zone mapping (fluvial risk)

Figure 2-6 shows the NRW Flood Zones within Abercanaid. Parts of the site are located within Flood Zones 2 and 3. Zone 3 describes areas which are predicted to flood in events more frequent than the 1% annual exceedance probability (AEP) event. Zone 2 describes areas which are predicted to flood in events more frequent than the 0.1% AEP but less frequent than the 1% AEP event. The source of the flood zone mapping is unknown, however, the site is not thought to be at risk from flooding from the Afon Taff, as it is raised well above the predicted extreme flood level of the Taff.

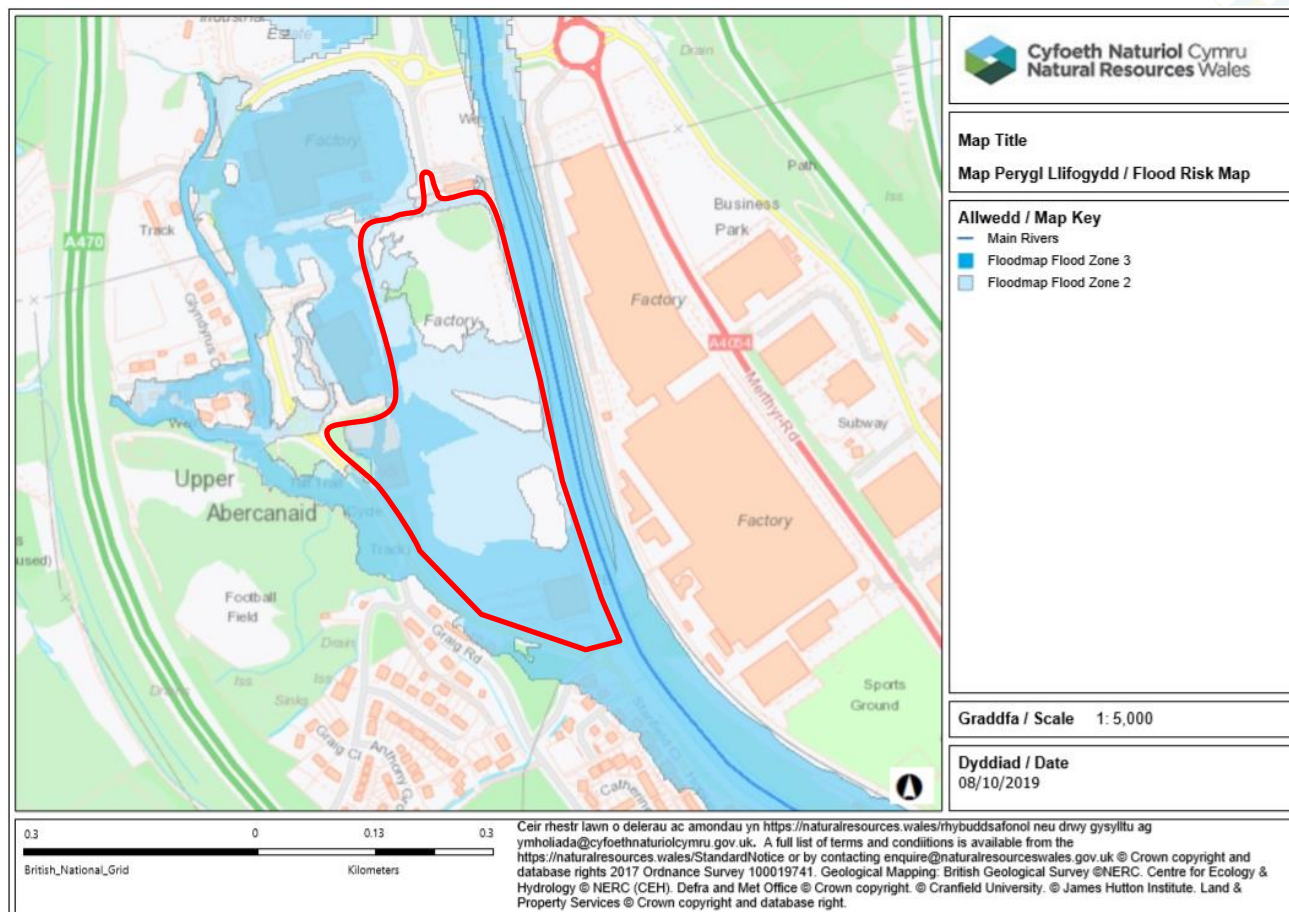


Figure 2-6 NRW Flood Risk Zones

2.7 Historical flooding

NRW's map of historic flood outlines, shown in Figure 2-7, illustrates that the site has not previously flooded. However, MTCBC's FRMP states that flooding from the Nant Canaid to Lewis Square and Glyndyrus Close has occurred historically, due to the inadequacy of the culvert inlet.

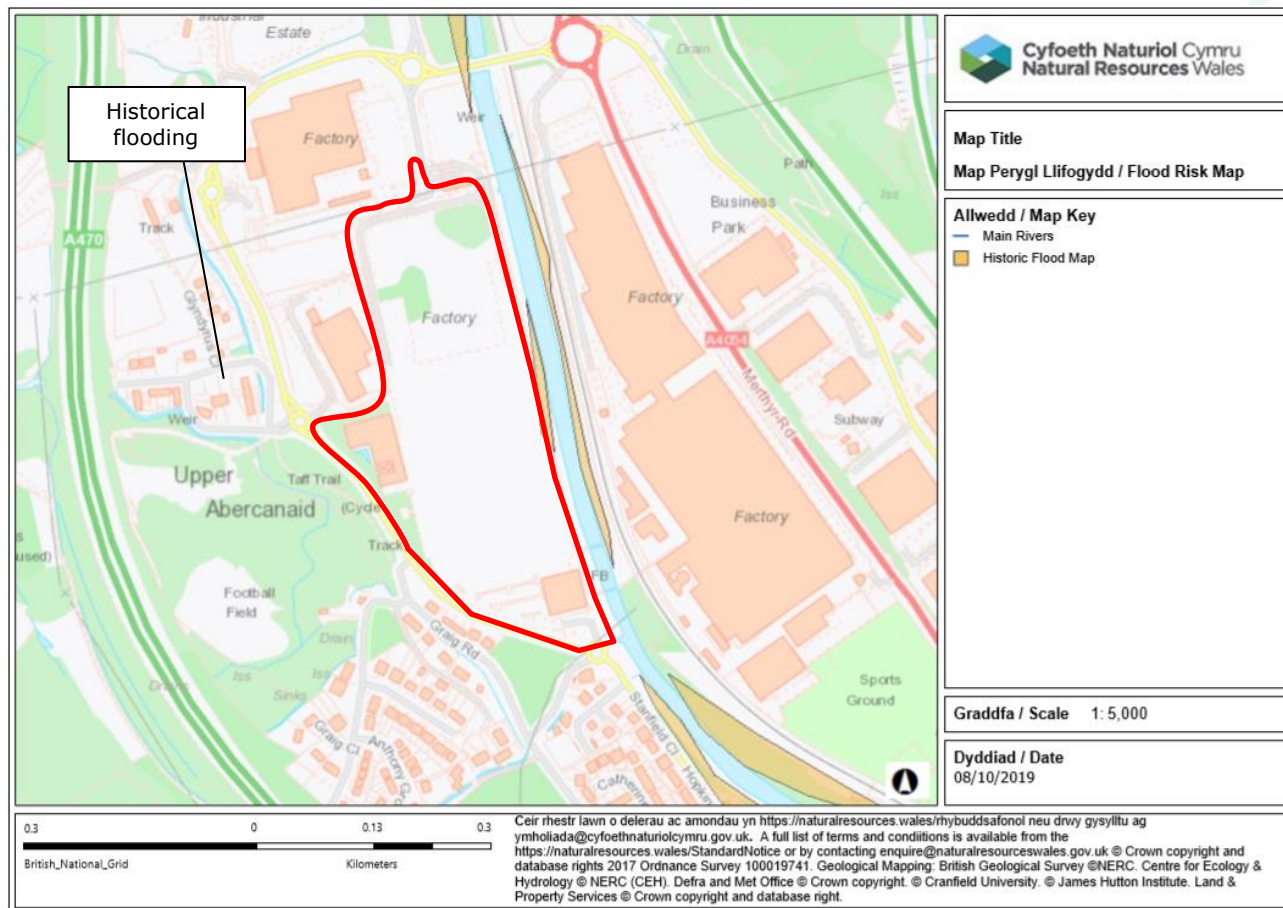


Figure 2-7 NRW Historic Flood Map

2.8 Risk of surface water flooding

According to NRW's flood map for surface water the site has localised areas at low to high risk of surface water flooding at the boundaries and the north-western area of the site, as shown in Figure 2-8. Gullies located along internal access roads convey surface water flow into combined sewers and prevent it from entering the rest of the site. Future development of the site should adopt a sustainable drainage strategy to manage surface water flows.

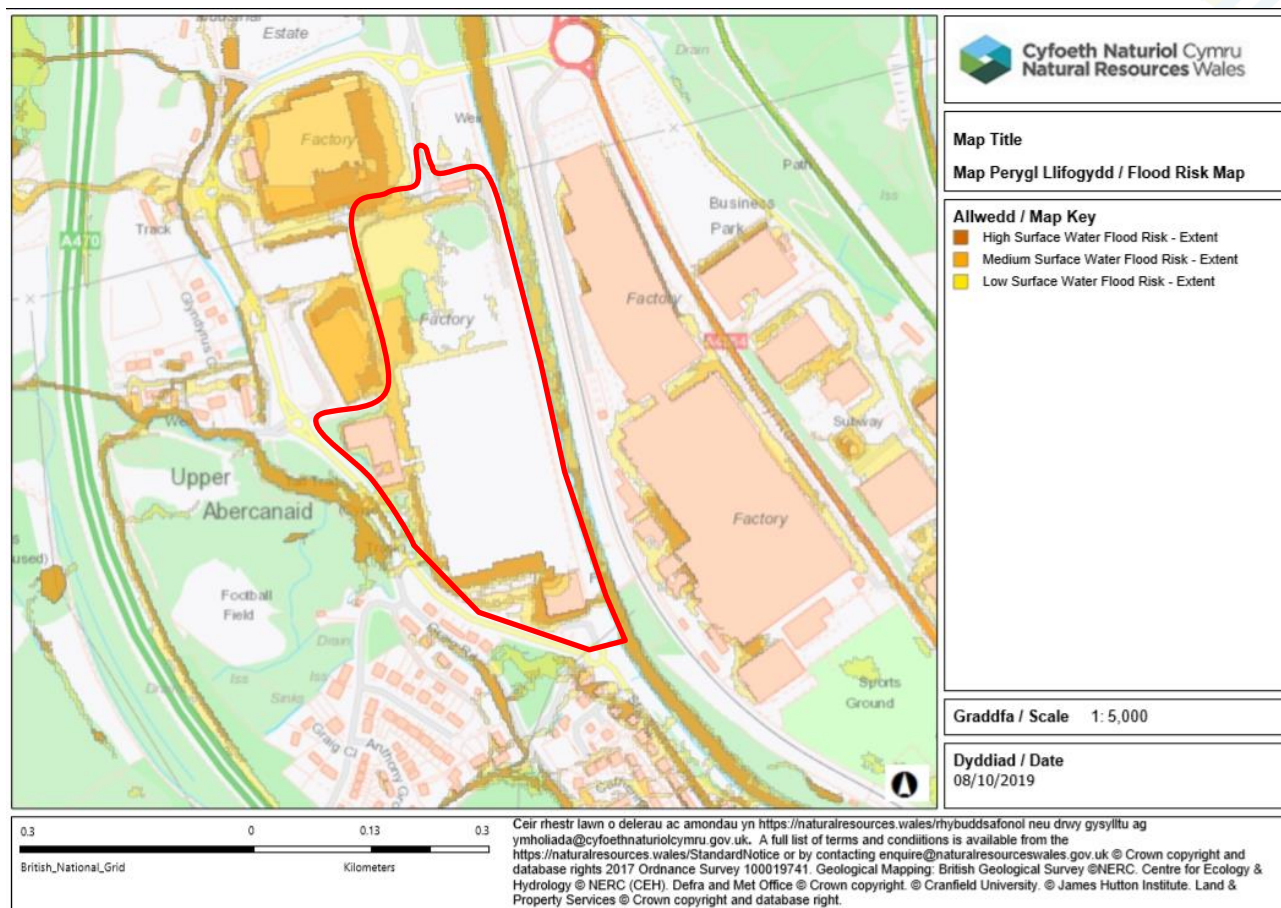


Figure 2-8 NRW Flood Risk Map for Surface Water

2.9 Risk of flooding from reservoirs

NRW flood risk mapping illustrates that the site could experience flooding as a result of reservoir failure as shown in Figure 2-9,. The flood extent is derived from the potential failure of five reservoirs which are located over 7km upstream of the site.

The heavily regulated nature of statutory reservoirs means that the probability of reservoir failure is extremely low. It is therefore reasonable to conclude that the risk of reservoir failure flooding at the site is very low.

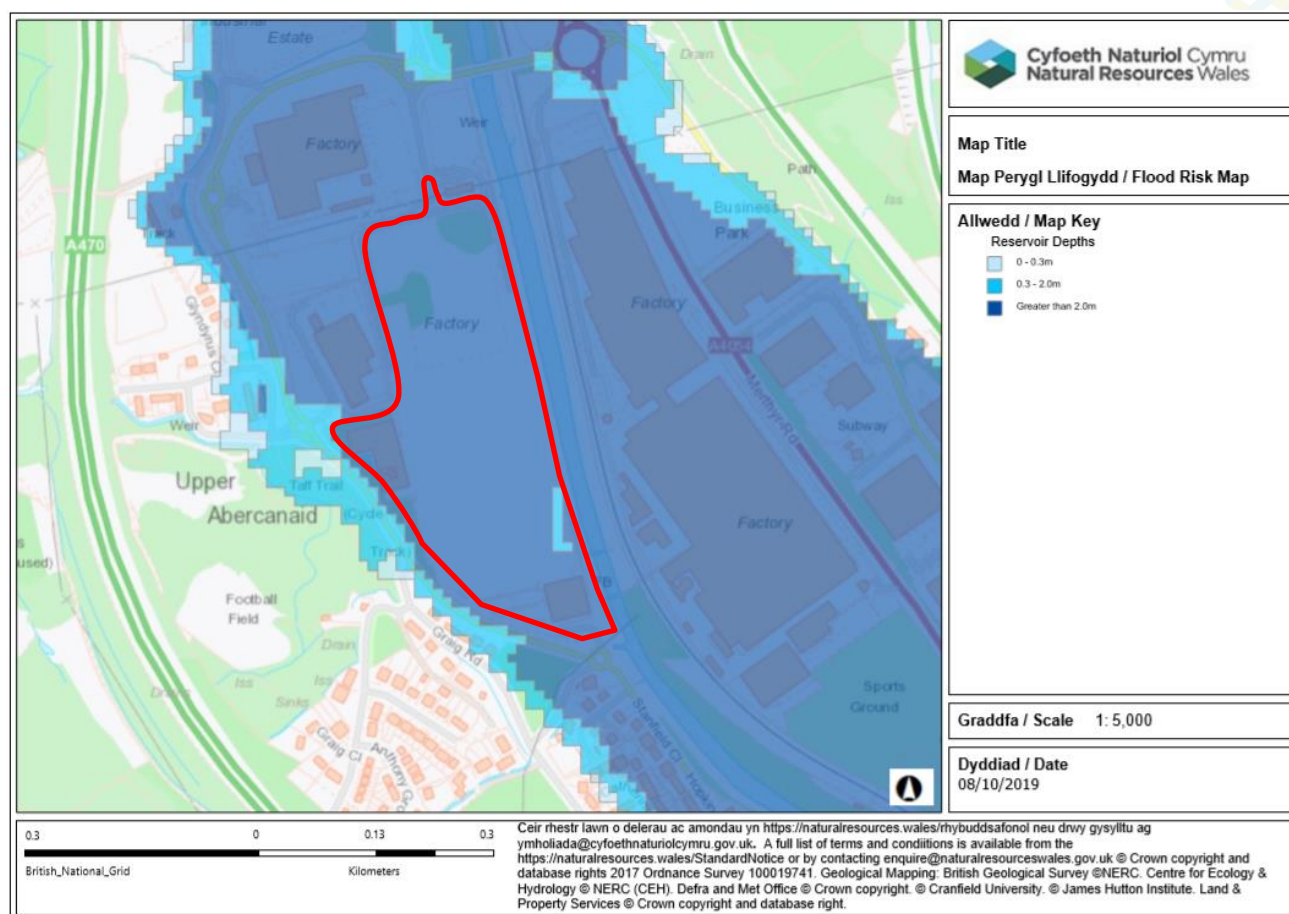


Figure 2-9 NRW Flood Risk Map for Reservoirs

2.10 Risk of flooding from groundwater

Groundwater flooding is caused by unusually high groundwater levels. It occurs as excess water emerging at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and can result in significant damage to property. The risk of groundwater flooding depends on the nature of the geological strata underlying the site, as well as on the local topography. Groundwater flooding is described as “not a major problem” in the MTCBC’s FRMP.

Old mine workings exist to the west of the site (west of the A470). The MTCBC’s FRMP states that “occasionally water from old mine workings discharges at unexpected locations particularly on hillsides below the workings”. However, it is believed any groundwater discharge would be captured by the network of watercourses which flow eastwards and south-eastwards towards the site and therefore the risk of groundwater flooding from old mine workings is considered to be ‘very low’.

2.11 Risk of flooding from sewers

There are a number of combined sewers along the boundaries of the site as shown in the Welsh Water sewer plan in Figure 2-10. There have been no known incidents of flooding associated with these sewers on or within proximity to the site.

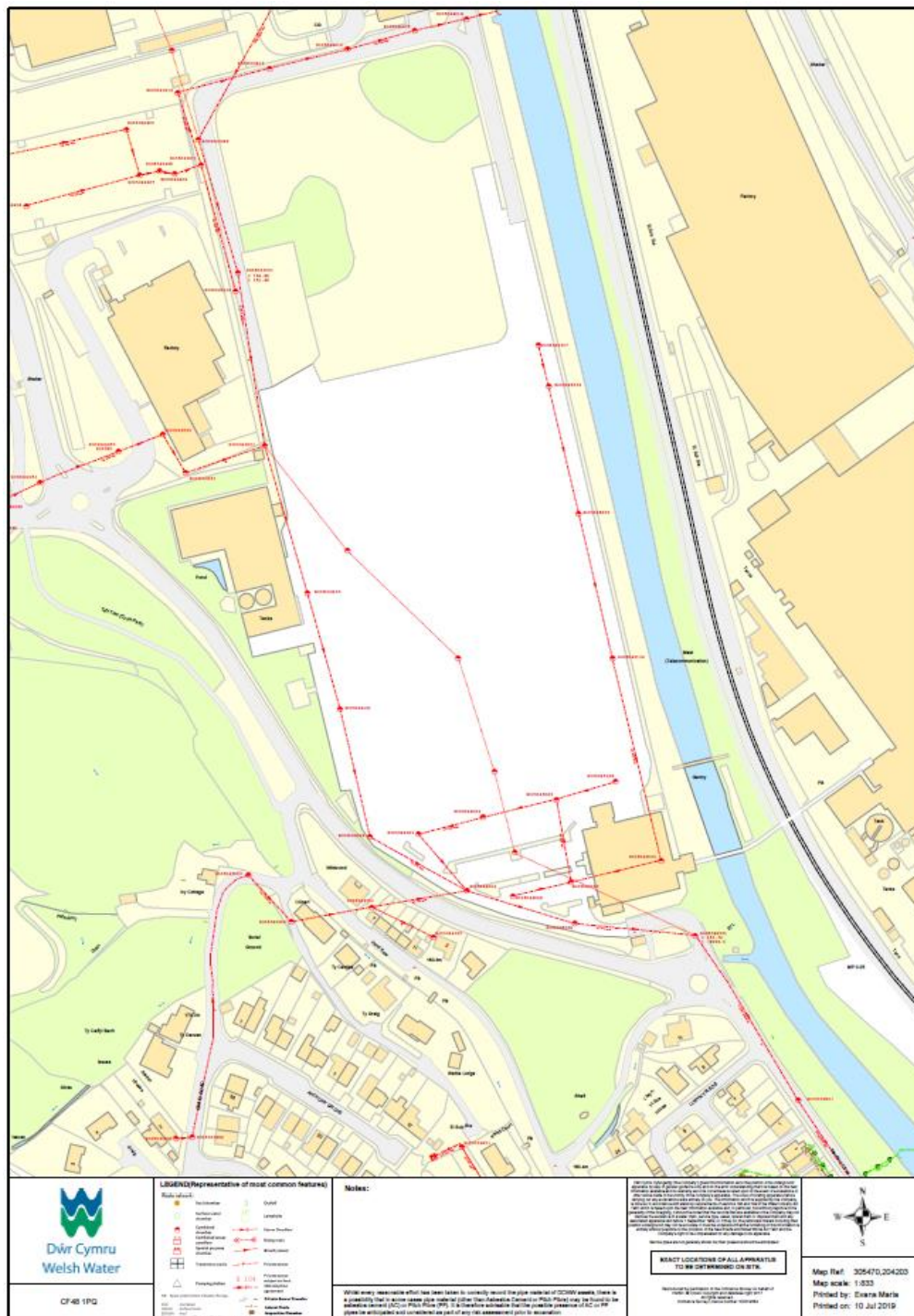


Figure 2-10 Welsh Water sewer plan

3 Planning Policy and Flood Risk

3.1 Welsh Government Development and Flood Risk

Planning Policy Wales (PPW) identifies flood risk as a significant consideration in land use planning. PPW is supported by TAN-15 which provides advice on matters including the use of Development Advice Maps (DAM) to trigger the need for a detailed FCA.

3.2 Development Advice Map

Figure 3-1 presents the NRW's Development Advice Map (DAM) for the site. The DAM is used to trigger different planning actions based on the precautionary assessment of flood risk. The northern area of the site mostly falls within Zone B of the DAM, whilst the southern section of the site falls within Zone C2.

TAN-15 designated Zone C2 as "Areas of the floodplain without significant flood defence infrastructure". The classification is used to "indicate that only less vulnerable development should be considered subject to application of Justification Test, including acceptability of consequences".

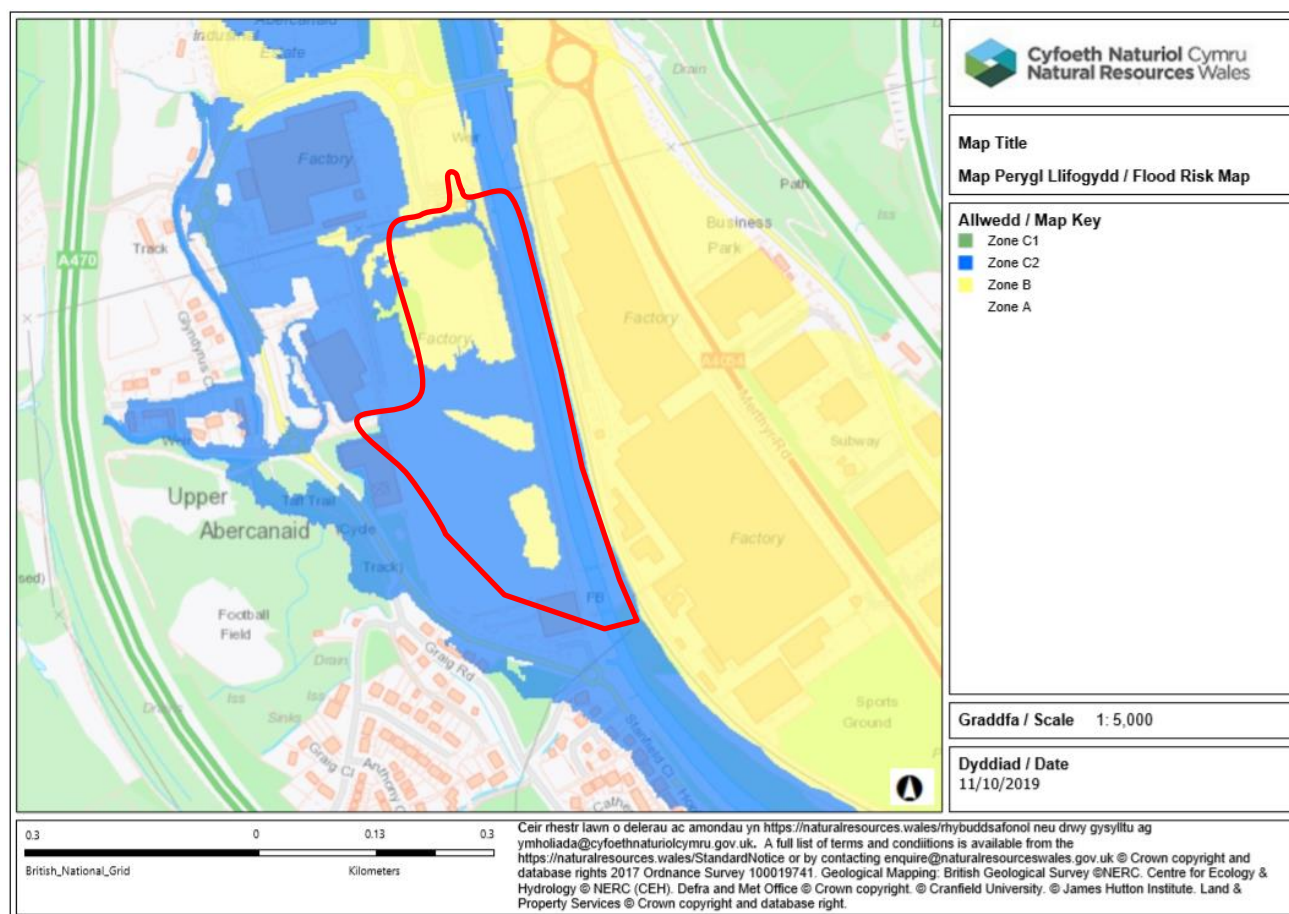


Figure 3-1 Welsh Government Development Advice Map

3.3 Development vulnerability

TAN-15 assigns one of three flood risk vulnerability classifications to development. These are: emergency services, highly vulnerable development and less vulnerable development as shown in Table 3-1 below. TAN-15 is more commonly applied towards proposed **property** developments. The aim of the proposed engineering works covered by this FCA are to provide flood mitigation to enable the site to be developed in the future. Therefore, the proposed engineering works does not fall into any of three stated vulnerability categories.

Table 3-1: TAN-15 vulnerability classifications

Development category Types	Development category Types
Emergency services	hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood
Highly vulnerable development	all residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites

Section 5.3 of TAN-15 states that exceptions to these categories such as 'water compatible development' will not be subject to the Justification Test but will be subject to the required demonstration of the Acceptability of Consequences as outlined in Section 7 of TAN-15. The application of Section 7 requires that "the consequences of flooding can be managed down to a level which is acceptable for the nature/type of development being proposed, including its effects on existing development." The Acceptability of Consequences with regards to third-party flood risk impact is discussed further in Section 4.

3.4 Local Development Plan

The Local Development Plan (LDP)⁵ is a land use document which sets out how the County Borough of Merthyr Tydfil will be developed over 15 years (2006–2021). The current LDP, was adopted in May 2011. The land at Dragon parc is brownfield in nature, within the settlement boundary and is covered by *Policy AS24 Business Employment Sites to be Protected*.

The Council is required to monitor and review its LDP. The First Replacement Local Development Plan 2016-2031 was prepared in June 2018 and is currently out for public consultation. This replacement plan places the Dragon Parc site within the *Hoover Strategic Regeneration Area (Policy SW6)*. The *Hoover Strategic Regeneration Area* is a key regeneration site identified to facilitate a major mixed-use development containing:

"A significant proportion of housing (440 dwellings), new employment and local retail provision..."

5 Merthyr Tydfil County Borough Council, 2016. Local Development Plan 2006-2021
<https://www.merthyr.gov.uk/media/2165/merthyr-tydfil-local-development-plan-2006-2021-review-report-april-2016.pdf> Accessed 09/10/2019

4 Detailed Assessment of Fluvial Risk

4.1 Hydraulic modelling history

In 2017, Thomas Mackay Ltd. developed a 1D-2D ESTRY-TUFLOW hydraulic model of the River Taff and Nant Canaid at the study area. The baseline (existing) scenario was reviewed and accepted by NRW in May 2019.

JBA Consulting reviewed an updated the baseline model in October 2019 to better represent flood flows across the site and it is this updated model that has been used as the baseline scenario for this study (see Section 4.2). This was further updated to represent the proposed development (see Section 4.3).

4.2 Baseline flood model results

4.2.1 1% AEP plus climate change

The baseline modelling shows that the existing site is predicted to partially flood during the modelled 1% AEP event plus climate change, as shown in Figure 4-1. Maximum depths are generally less than 300mm and the northern section of the site is flood-free during this event.

The primary flooding mechanism is from a channel and culvert capacity exceedance of the Nant Canaid to the west of the site at Lewis Square. Once overtopping of the Nant Canaid North bank has occurred, flood water flows onto the access road along the northern edge of the site. Overtopping of the Nant Canaid West results in water flowing down the link road and entering the southern part of the site. The baseline modelling shows that no overtopping of the Afon Taff along the eastern site boundary occurs, up to and during the 0.1% AEP event.

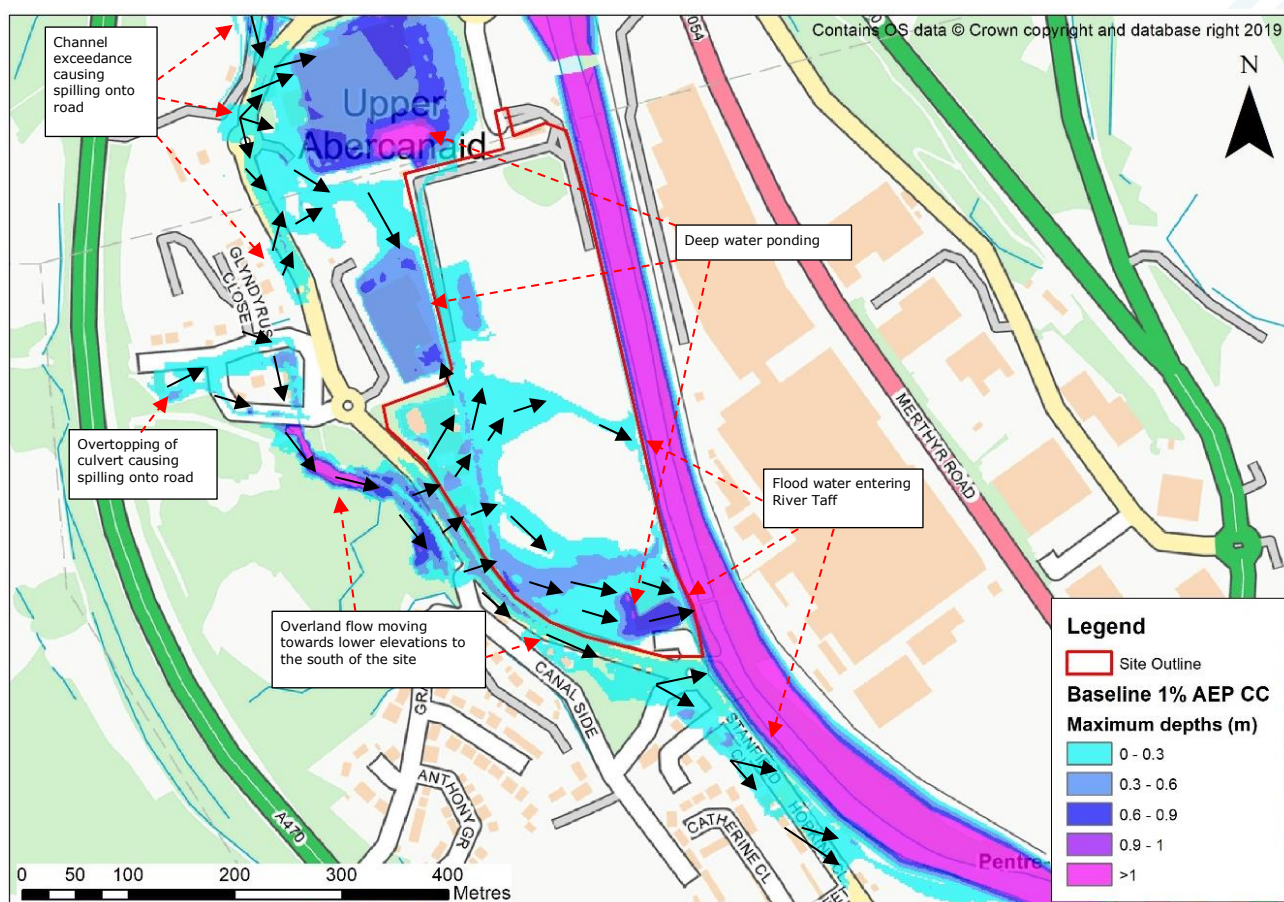


Figure 4-1 Baseline 1% AEP plus climate change Maximum Depths

4.2.2 0.1% AEP

During the 0.1% AEP event flood depths are predicted to be similar to those predicted in the 1% AEP event plus climate change, as shown in Figure 4-2.

The flood extent is predicted to increase to cover the majority of the central and southern sections of the site, whilst the north of the site remains largely flood-free. In this event, flood waters convey across the site and along the site road discharging into the Afon Taff at various points.

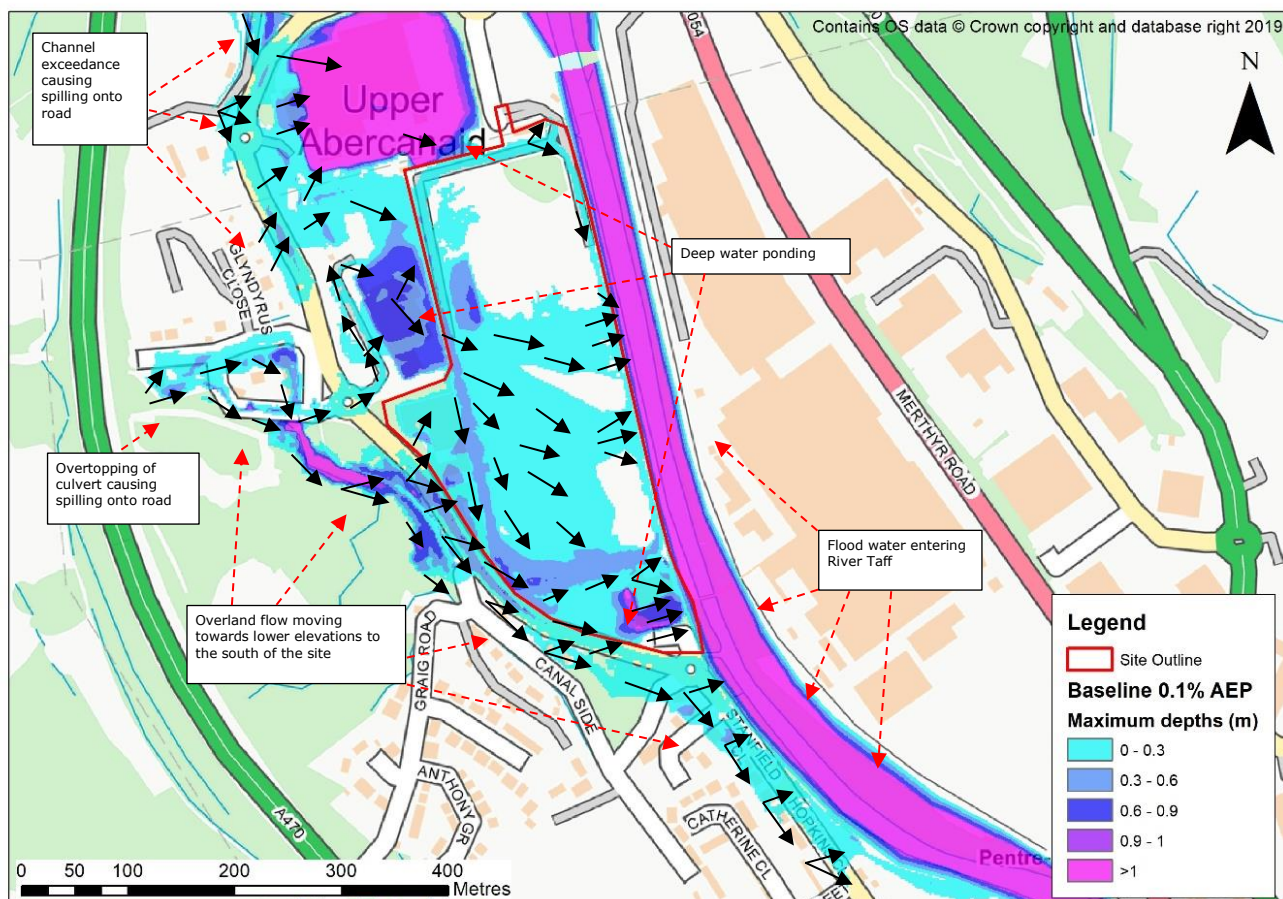


Figure 4-2 Baseline 0.1% AEP Maximum Depths

4.3 Proposed development

The proposed engineering works covered by this FCA have been designed to mitigate against the flood risk posed by the Nant Canaid. The proposed engineering works will improve the future development potential of the site and will include:

1. Site re-profiling to 157mAOD, with the southern section being raised to 155mAOD. The re-profiling has been designed to raise ground elevations across the site to be above the 0.1% AEP fluvial flood level.
2. A proposed 6m wide dry swale along the western boundary of the site with depth ranging between 0.19m in the north to 2m in the south. This feature will work to convey floodwater around the site and into the Afon Taff and is also designed to prevent an increase in flood risk to third-party areas caused by the site re-profiling.
3. A pair of new 2.4m wide pre-cast box culverts at the southern end of the site that will convey water from the swale into a new outfall structure that will discharge into the Afon Taff.

Figure 4-3 shows the proposed engineered extents with more detail included in Appendix A.

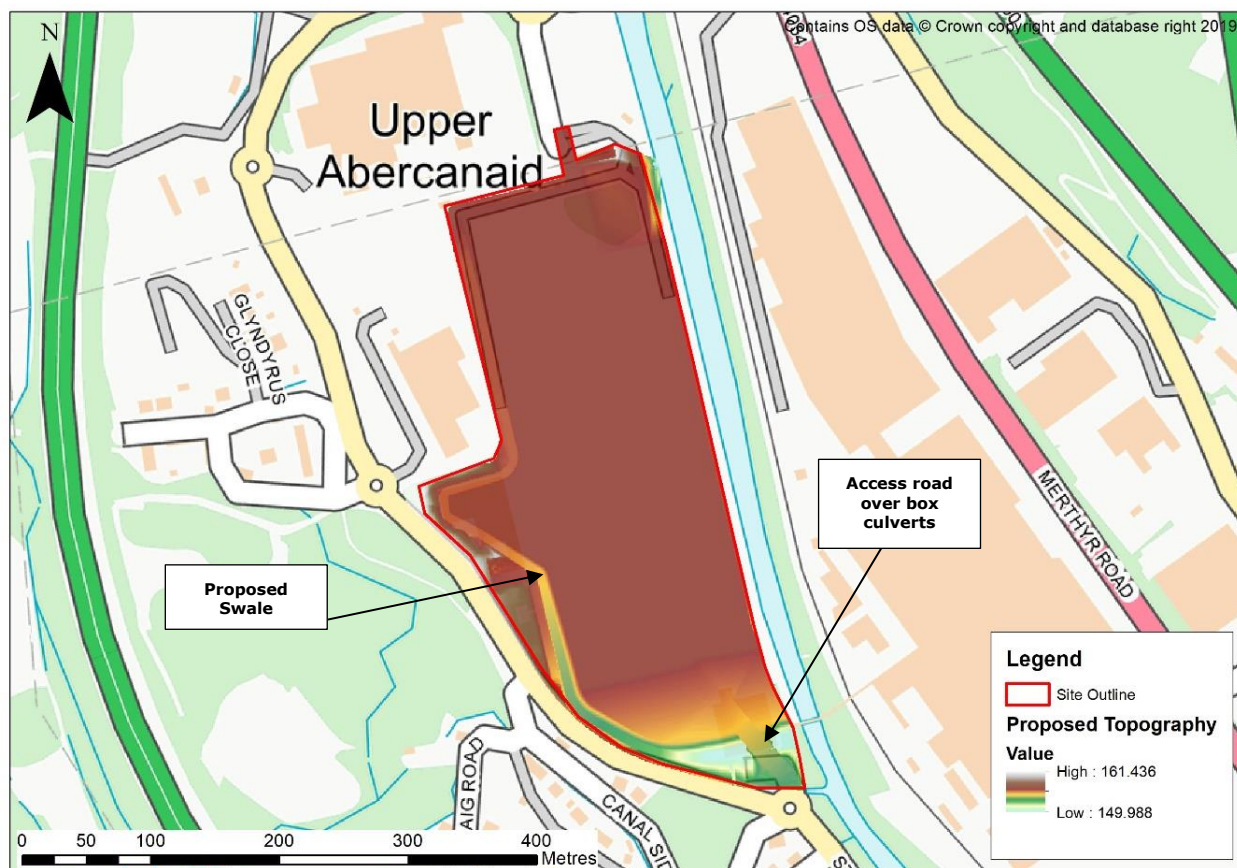


Figure 4-3 Proposed swale and site re-profiling

4.4 Post-developed flood model results

The proposed engineering works were incorporated into the 2D model domain using a proposed Digital Elevation Map (DEM). The proposed culvert was represented in the 1D model domain with SX links. The proposed model scenario was simulated for the 1% AEP plus climate change and the 0.1% AEP events (including scenarios with 30% and 95% blockage of the existing culverts).

4.4.1 1% AEP plus climate change

During the proposed scenario, the flow from the Nant Canaid is conveyed via the swale to the lower lying area at the south east of the site where it enters the Afon Taff at a single discharge point upstream of the existing culvert outfall. The volume of water entering the Afon Taff is unchanged compared to the baseline. The majority of the site is flood free in the proposed 1% AEP plus climate change event as shown in Figure 4-4.

TAN-15 Section 7 indicates that any new development should not have adverse impacts on third-party flood risk. A comparison of the baseline and proposed modelled results for the 1% AEP plus climate change event is shown in Figure 4-5. This demonstrates that there are no adverse impacts on third-party flood risk as a result of the proposed engineering works. In some places, such as north and south-west of the site, a reduction in water levels are predicted.

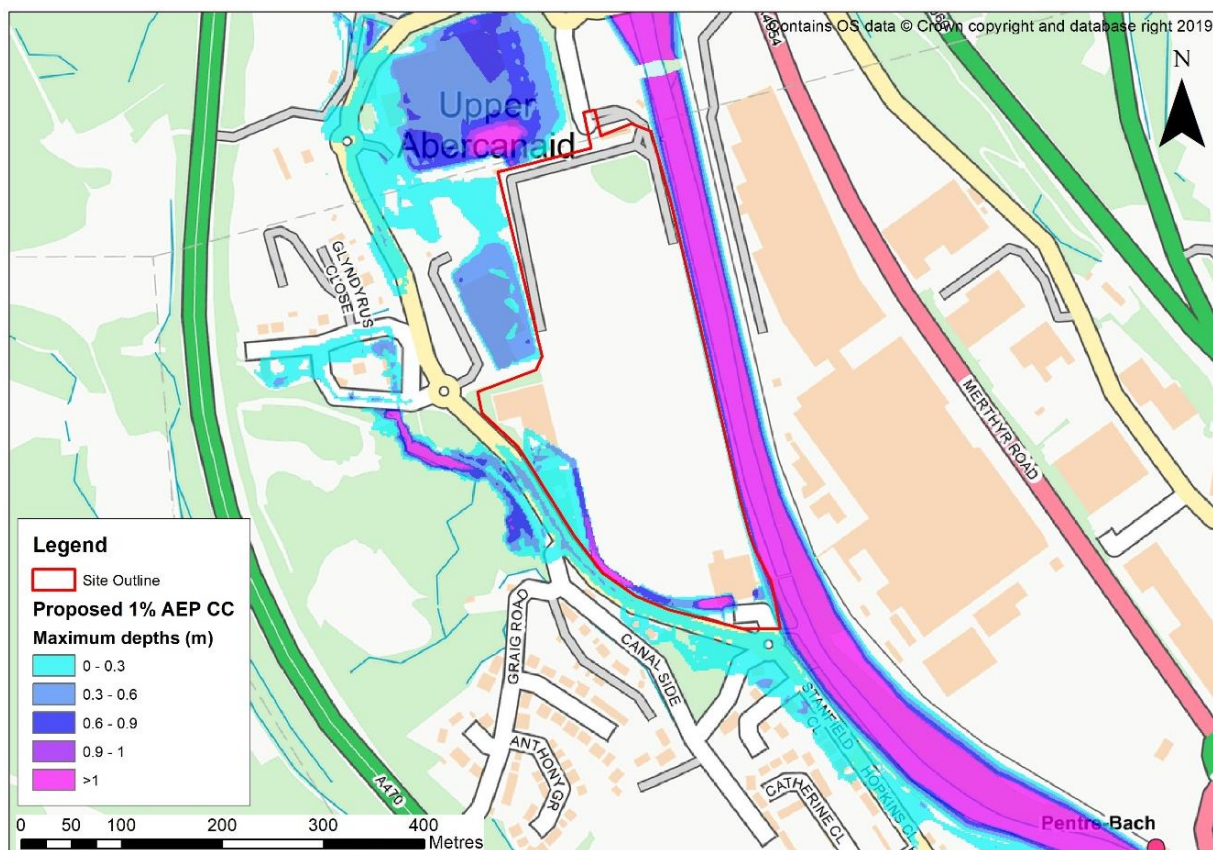


Figure 4-4 Proposed 1% AEP plus climate change maximum depths

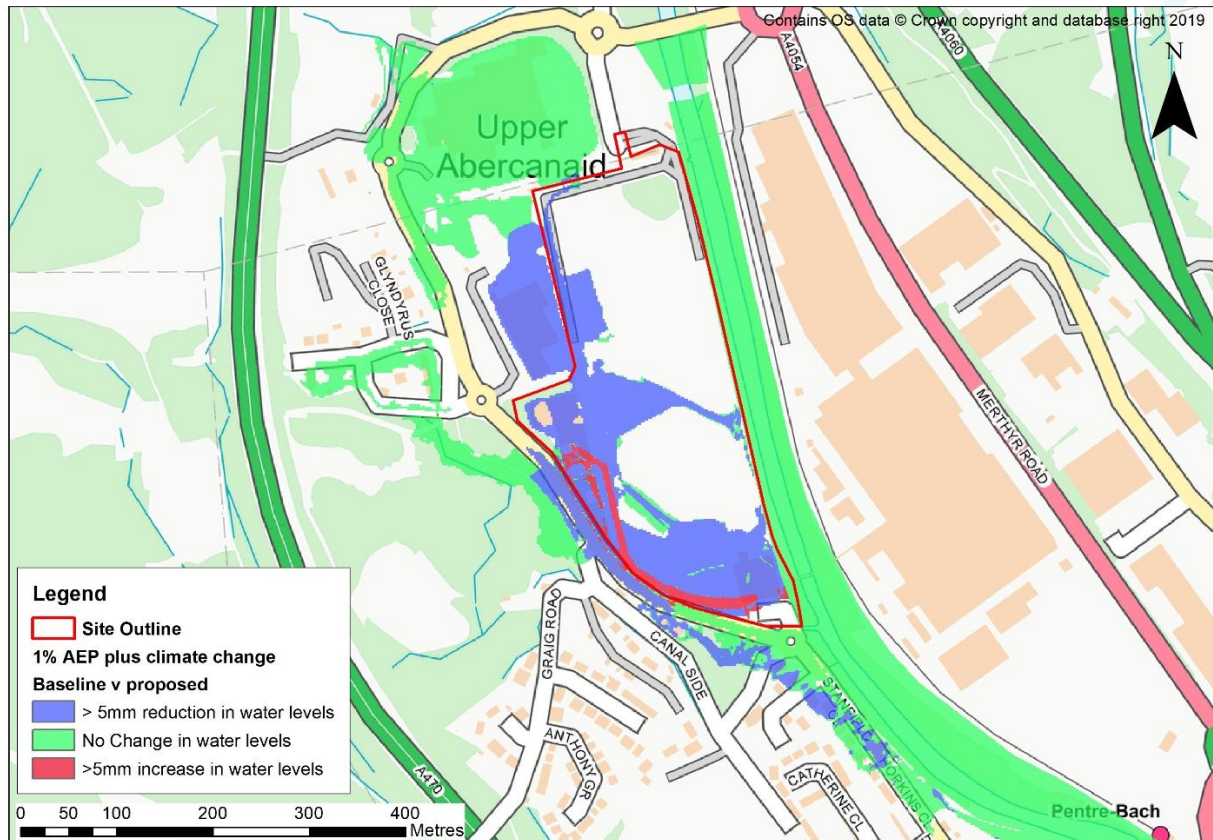


Figure 4-5: Baseline v proposed 1% AEP plus climate change

4.4.2 0.1% AEP

The maximum depths during the 0.1% AEP modelled event for the proposed scenario are shown in Figure 4-6. The majority of the site is flood free during this event. A comparison of the baseline and proposed modelled results for the 0.1% AEP event is shown in Figure 4-7 and demonstrates that there are no adverse impacts on third-party flood risk as a result of the proposed engineering works. In some places, such as north and south-west of the site, a reduction in water levels are predicted.

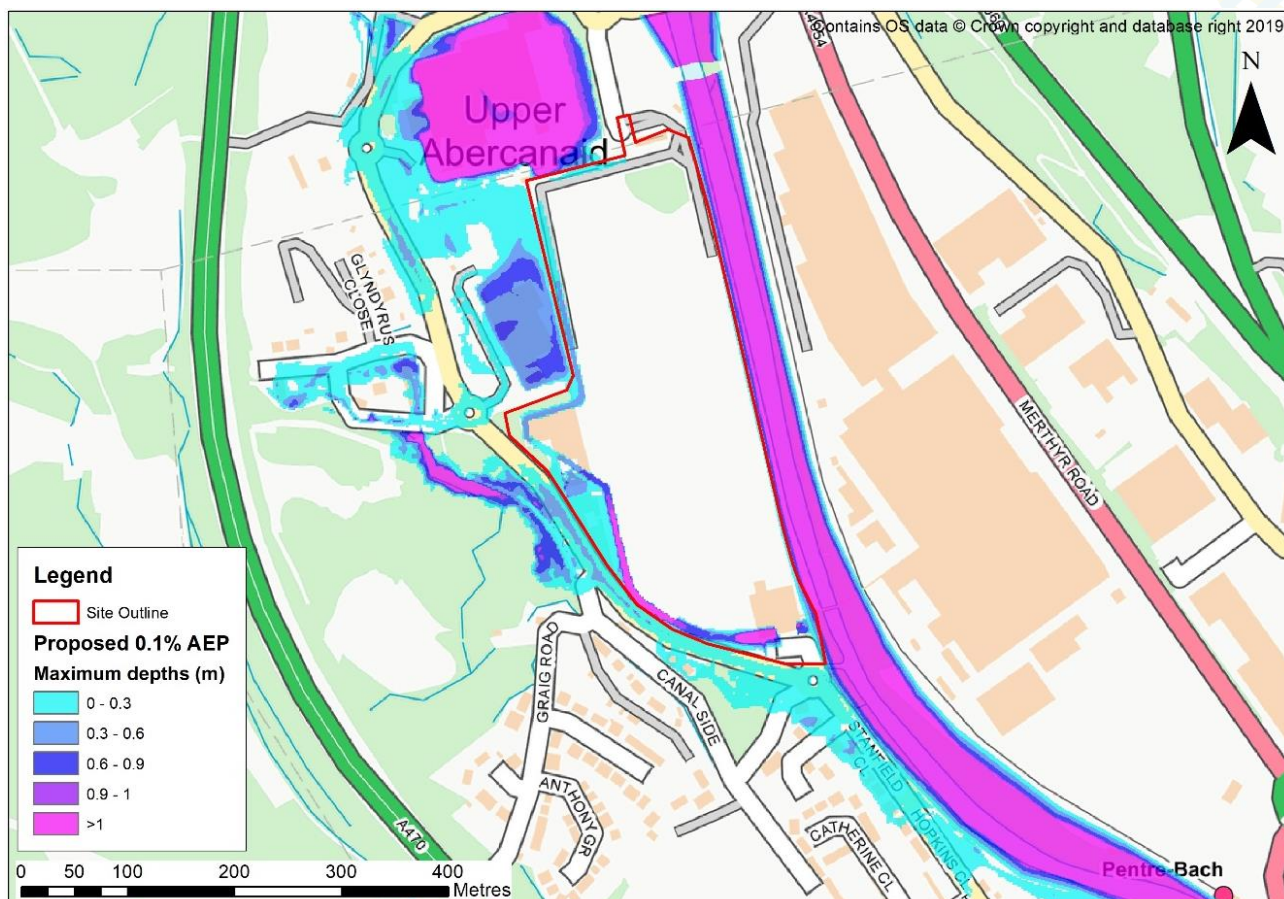


Figure 4-6 Proposed 0.1% AEP Maximum Depths

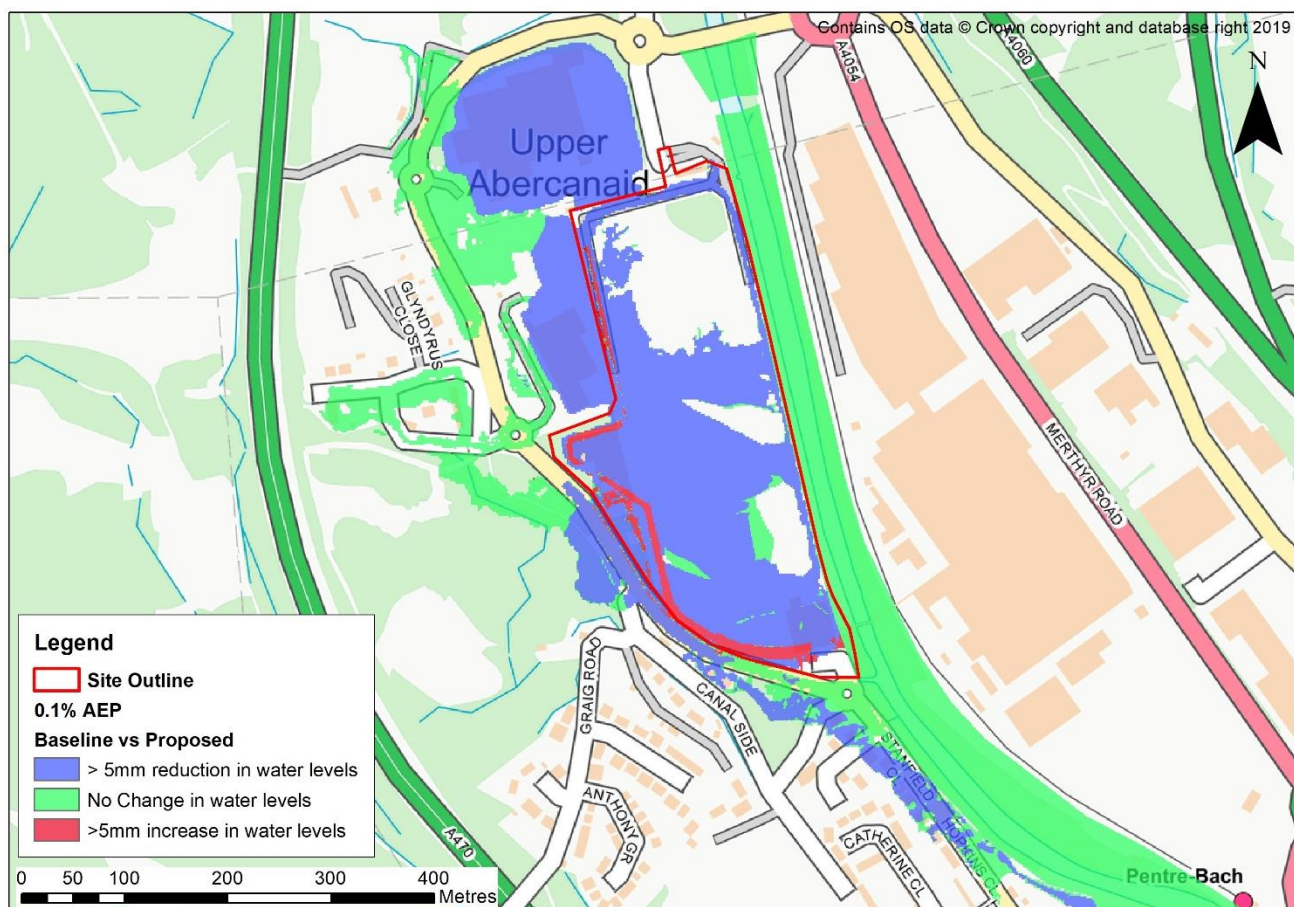


Figure 4-7: Baseline v proposed 0.1% AEP

4.5 Blockage scenarios

The existing culvert on the Nant Canaid is critical in conveying baseflows to the Taff outfall. However, to understand the residual flood risks posed by the failure of this culvert, the impacts of two blockage scenarios (30% and 95%) have been modelled for the 1%, 1% AEP plus climate change and 0.1% AEP events. The proposed model scenario was used for the blockage analysis.

Figure 4-8 to 4-13 demonstrate the maximum flood depths during the modelled blockage scenarios. Although maximum flood depths increase, the flood extents during the blockage scenarios do not change significantly until there is a 95% blockage on the culvert during the 0.1% AEP modelled event. During this scenario depths of <100mm would be present at the Dragon Parc site as shown in Figure 4-13.

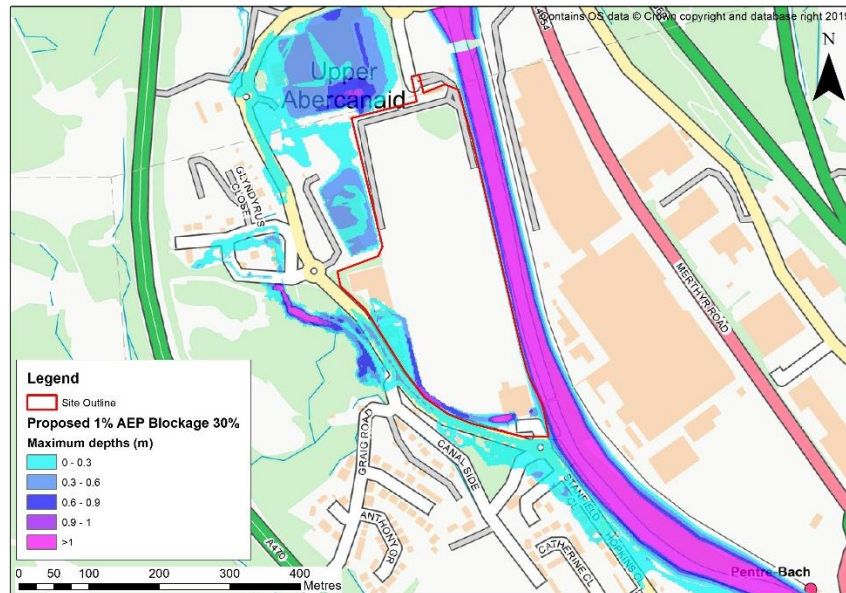


Figure 4-8: 1% AEP - 30% blockage

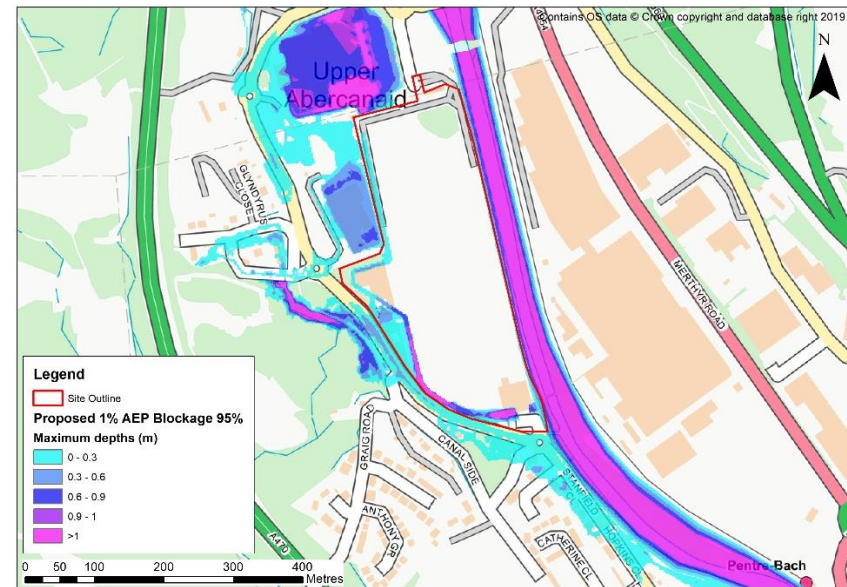


Figure 4-9: 1% AEP - 95% blockage

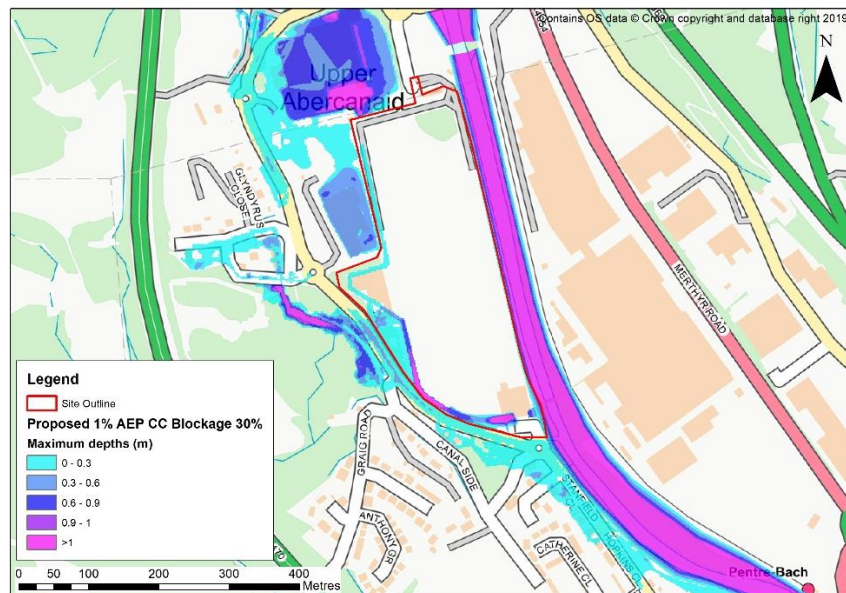


Figure 4-10: 1% AEP plus climate change - 30% blockage

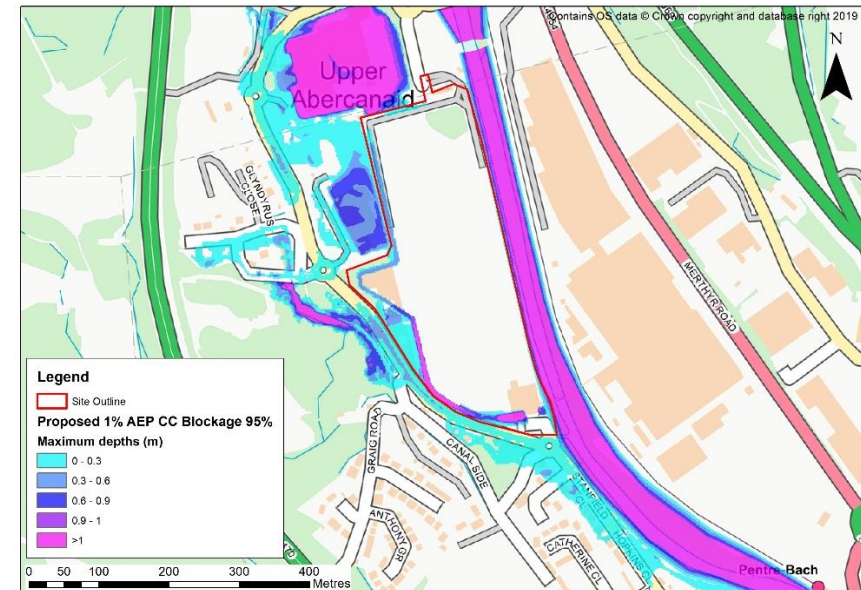


Figure 4-11: 1% AEP plus climate change - 95% blockage

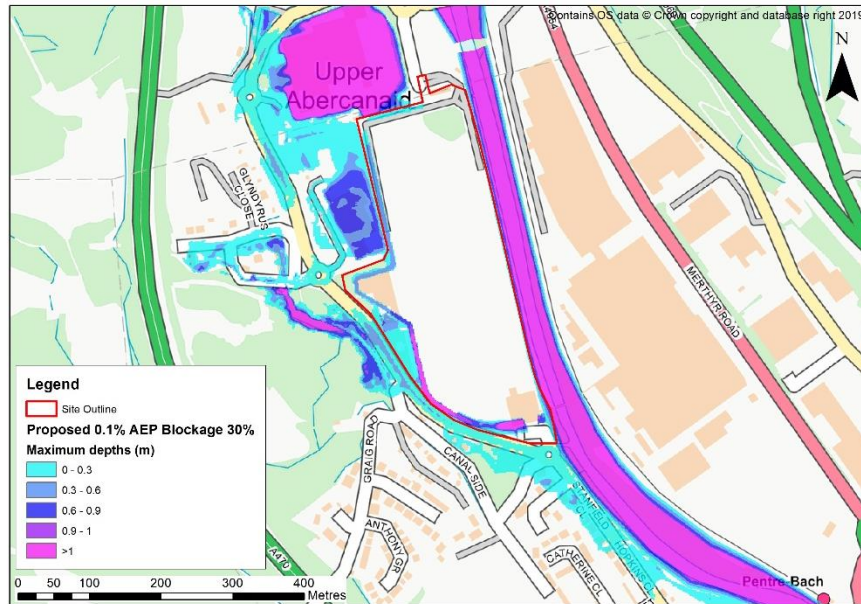


Figure 4-12: 0.1% AEP - 30% blockage

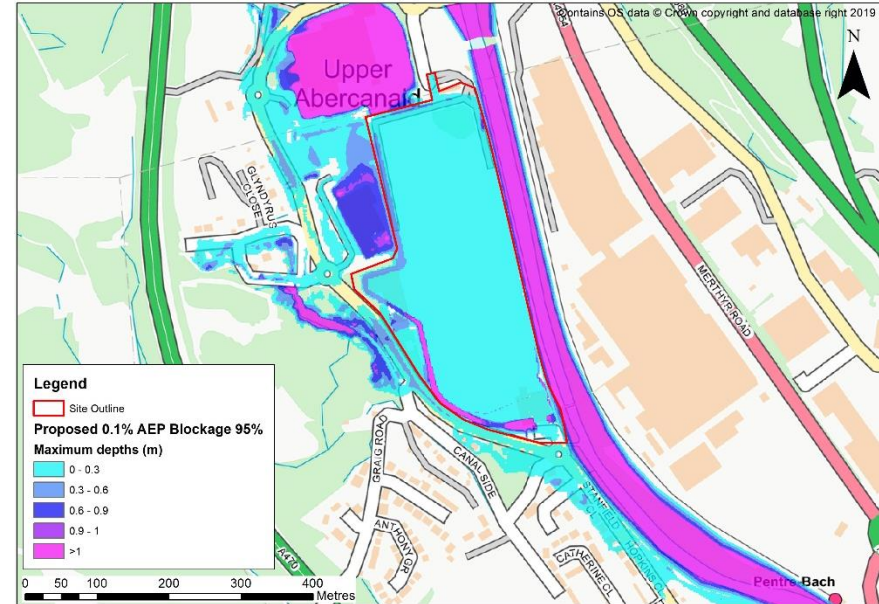


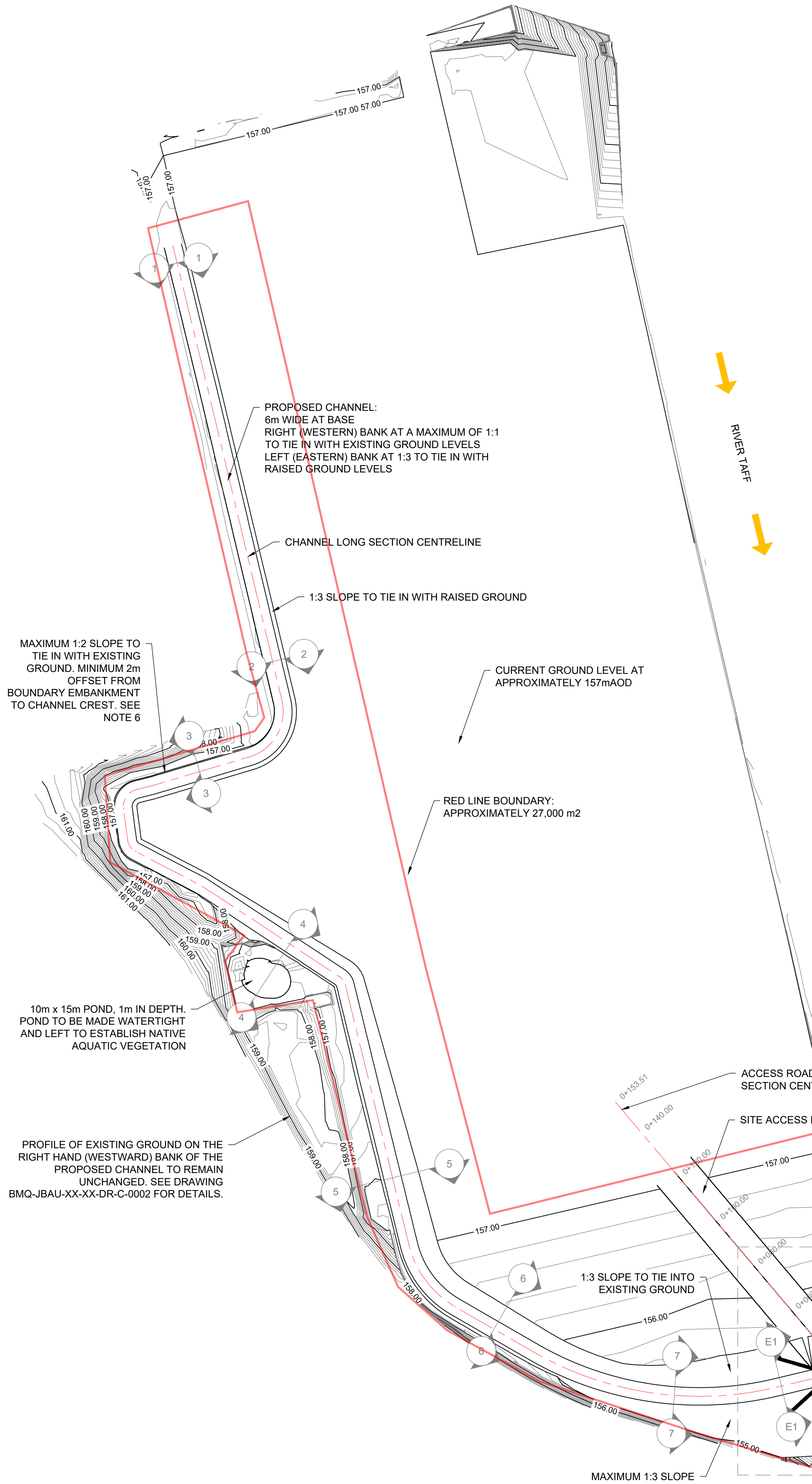
Figure 4-13: 0.1% AEP - 95% blockage

5 Conclusions and Recommendations

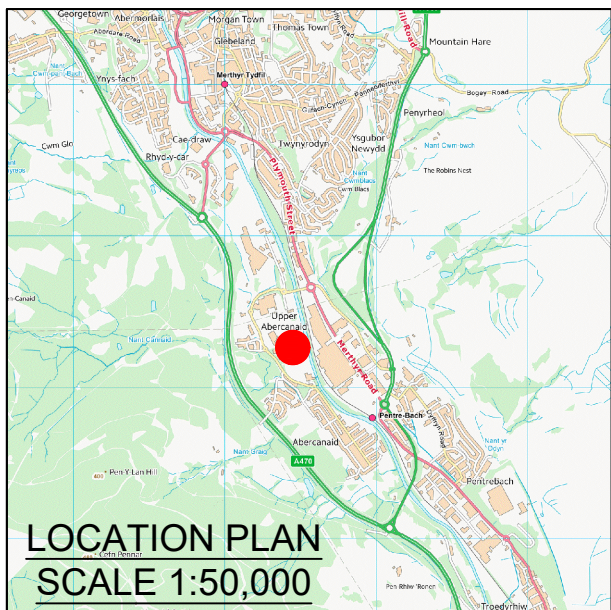
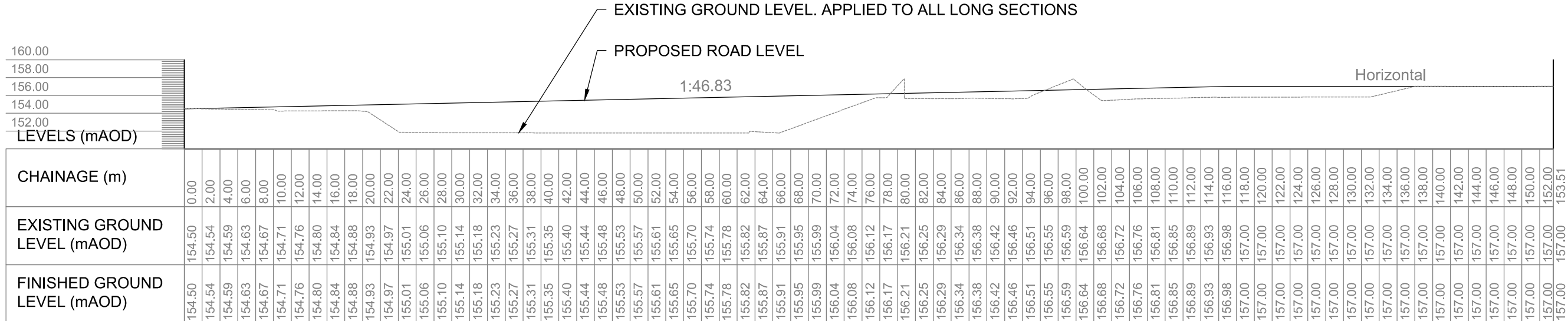
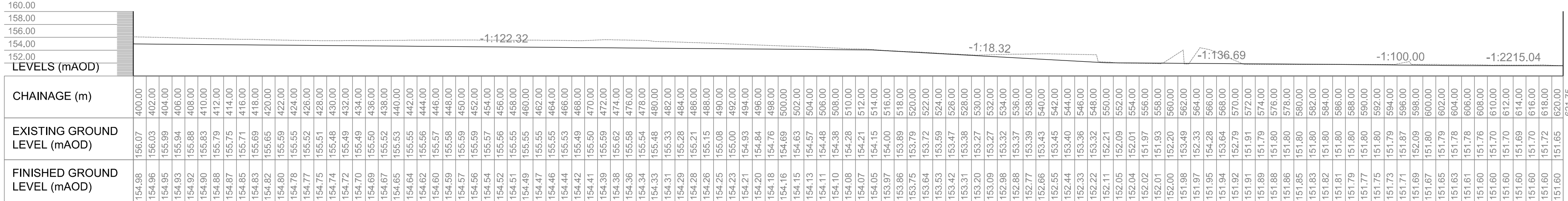
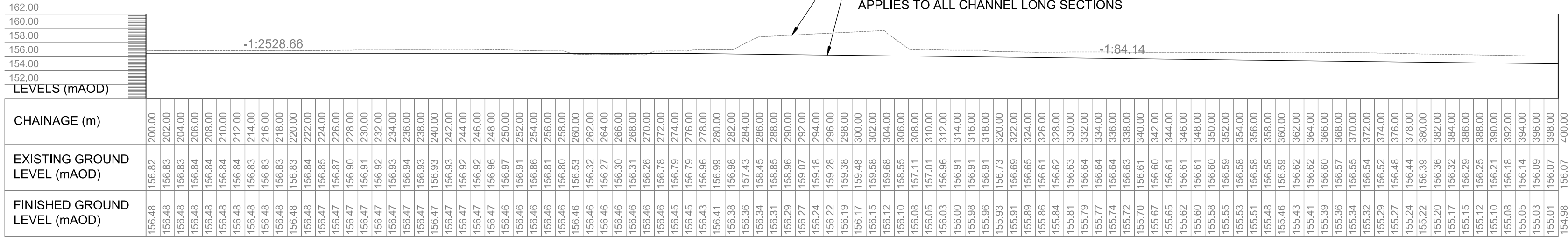
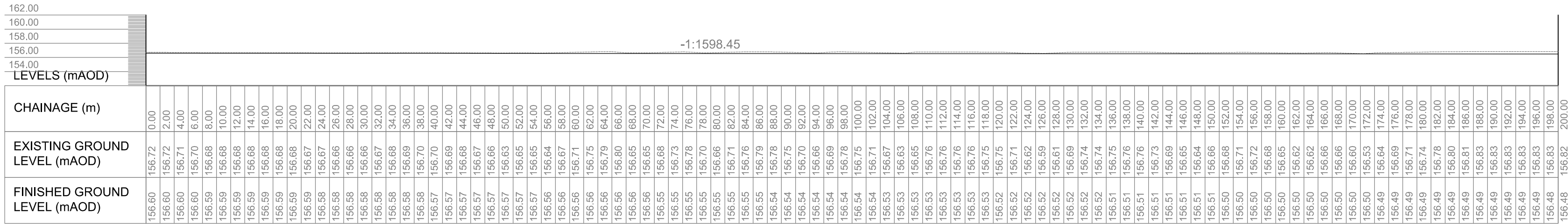
- JBA Consulting were commissioned to prepare a Flood Consequence Assessment (FCA) in support of proposed engineering works as part of a flood mitigation strategy at land at Dragon Parc, Abercanaid. The proposed engineering works aim to facilitate the regeneration of the site in the future.
- The First Replacement Merthyr Tydfil Local Development Plan 2016-2031 places the Dragon Parc site within the *Hoover Strategic Regeneration Area* (Policy SW6). The Hoover Strategic Regeneration Area is a key regeneration site identified to facilitate a major mixed-use development.
- This FCA follows Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk (TAN-15).
- The 78ha brownfield site is currently vacant, following the demolition of a former factory. Elevations across the site vary from 153m AOD to 160m AOD and generally slope down towards the south-east corner. Outside the eastern site boundary, the bank steeply drops by ~6m into the Afon Taff channel.
- The proposed site is located within Zone C2 as categorised by NRW's Development Advice Map (DAM). Zone C2 is defined as "areas of floodplain without significant flood defence infrastructure". The proposed engineering works do not fall into any of the three vulnerability categorisations outlined in TAN-15.
- TAN-15 is more commonly applied towards proposed **property** developments. Whereas, the aim of the proposed engineering works covered by this FCA are to provide flood mitigation to enable the site to be developed in the future. The proposed works are considered to be Water Compatible Development and as such the proposals are not subject to the application of the Justification Test but are required to meet the Acceptability Criteria contained within TAN-15.
- A review of existing flood data demonstrates that the flood risk from the Afon Taff at the Dragon Parc site is considered to be low as the site is raised well above the extreme Afon Taff flood levels.
- To the west of the site a small 'Ordinary Watercourse', the Nant Canaid, enters a culverted system which approximately follows the site's western boundary to discharge into the Afon Taff to the south of the site. When the Nant Canaid channel and culvert inlet capacity is exceeded the Dragon Parc is at risk of flooding.
- A 1D-2D model of the Nant Canaid and Afon Taff has been accepted by NRW and was used to determine the current flood risk posed by this 'Ordinary Watercourse'.
- The baseline hydraulic modelling demonstrates that when the channel and culvert capacity of the Nant Canaid is exceeded, the flood water travels across the site in a south-easterly directly, before discharging into the Afon Taff at multiple locations. Maximum modelled depths on the Dragon Parc site, in both the 1% AEP plus climate change and 0.1% AEP events, are generally <300mm.
- The proposed engineering works covered by this FCA have been designed to mitigate against the flood risk posed by the Nant Canaid. The proposed engineering works will improve the future development potential of the site.
- The proposed flood mitigation works consist of site re-profiling, the development of a dry 6m wide swale along the western boundary and a pair of new pre-cast box culverts at the southern end of the site to convey water from the swale into a new outfall structure which will discharge at a single point into the Afon Taff.
- The proposed engineering works were incorporated within the 1D-2D hydraulic model to develop a proposed model scenario.

- The model results from the proposed scenario demonstrate that the engineering works would prevent the site flooding during the 1% AEP plus climate change and 0.1% AEP events.
- TAN-15 indicates that any new development should not have adverse impacts on third-party flood risk. A comparison of the baseline and proposed modelled results demonstrate that there are no adverse impacts on third-party flood risk as a result of the proposed engineering works. In some places, such as north and south-west of the site, a reduction in water levels are predicted.
- The existing culvert on the Nant Canaid is critical in conveying baseflows to the Taff outfall. However, to understand the residual flood risks posed by the failure of this culvert, a number of blockage scenarios have been modelled. Blockages of 30% and 95% were modelled a range of events. The flood extents during the blockage scenarios do not change significantly until there is a 95% blockage on the culvert during the 0.1% AEP modelled event. During this scenario depths of <100mm would be present at the Dragon Parc site, whereas the site is modelled to be flood-free during all other residual risk simulations.
- Flood risk from groundwater, surface water, sewers and as a result of reservoir failure are considered to be low. Future development of the site should adopt a sustainable drainage strategy to manage surface water flows.
- The proposed engineering works comply with the requirements of TAN-15, do not result in adverse impacts to third-party flood risk and will enable the future development of this brownfield site identified within the LDP as an important regeneration area.

Appendix A: Proposed engineering works



PLAN
1:1000



• Falls from height • Lifting • Excavation • Ground conditions • Working in / near water • Existing services • Flood risk	• Public / Plant interface • River channel access • Falls from height	• Habitat loss • Invasive non-native species • Pollution of a watercourse • Contaminated land
Construction Risks	Public Risks	Environmental Risks
In addition to the hazards/risks normally associated with the types of work detailed on this drawing take note of the above. It is assumed that all works detailed on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.		
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX		

- GENERAL NOTES:
- Do not scale from this drawing. All dimensions to be checked / verified on site.
 - All levels shown with respect to meters Above Ordnance Datum (mAOD).
 - Ground contours were generated based on the topographic survey carried out by Azimuth Land Surveys Ltd (2015), subject to the proposed engineering works.
 - This drawing is not for construction issue.
 - Existing services not shown.
 - Final channel layout to depend on ground conditions, to be confirmed via Ground Investigation.

Drawing to be read in conjunction with:-
BMQ-JBAU-XX-XX-DR-C-0002-Sections
BMQ-JBAU-XX-XX-DR-C-0010-Road_GA
BMQ-JBAU-XX-XX-DR-C-0011-Road_Section
BMQ-JBAU-XX-XX-DR-C-0020-Outfall

P02		Comments	2nd Issue							
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P01		Comments	1st Issue							
Rev.:	Date	17/10/19	Drawn	BH	Designed	JK	Checked	GB	Approved	AT
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Project

Land at Dragon Parc, Merthyr

Title

General Arrangement Plan and Long Sections

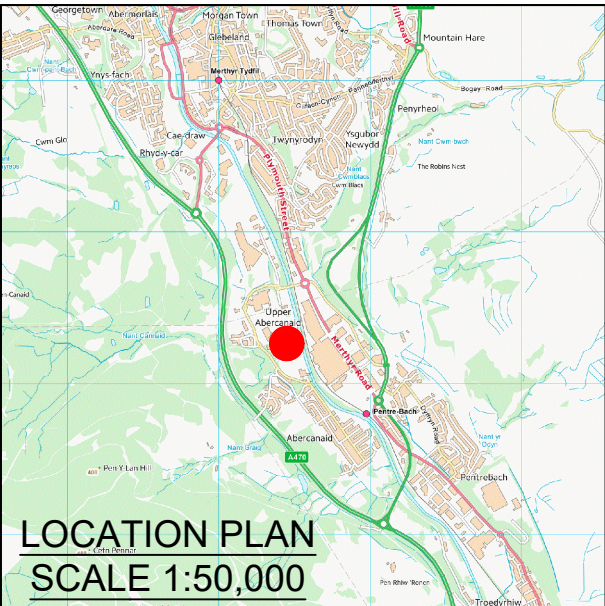
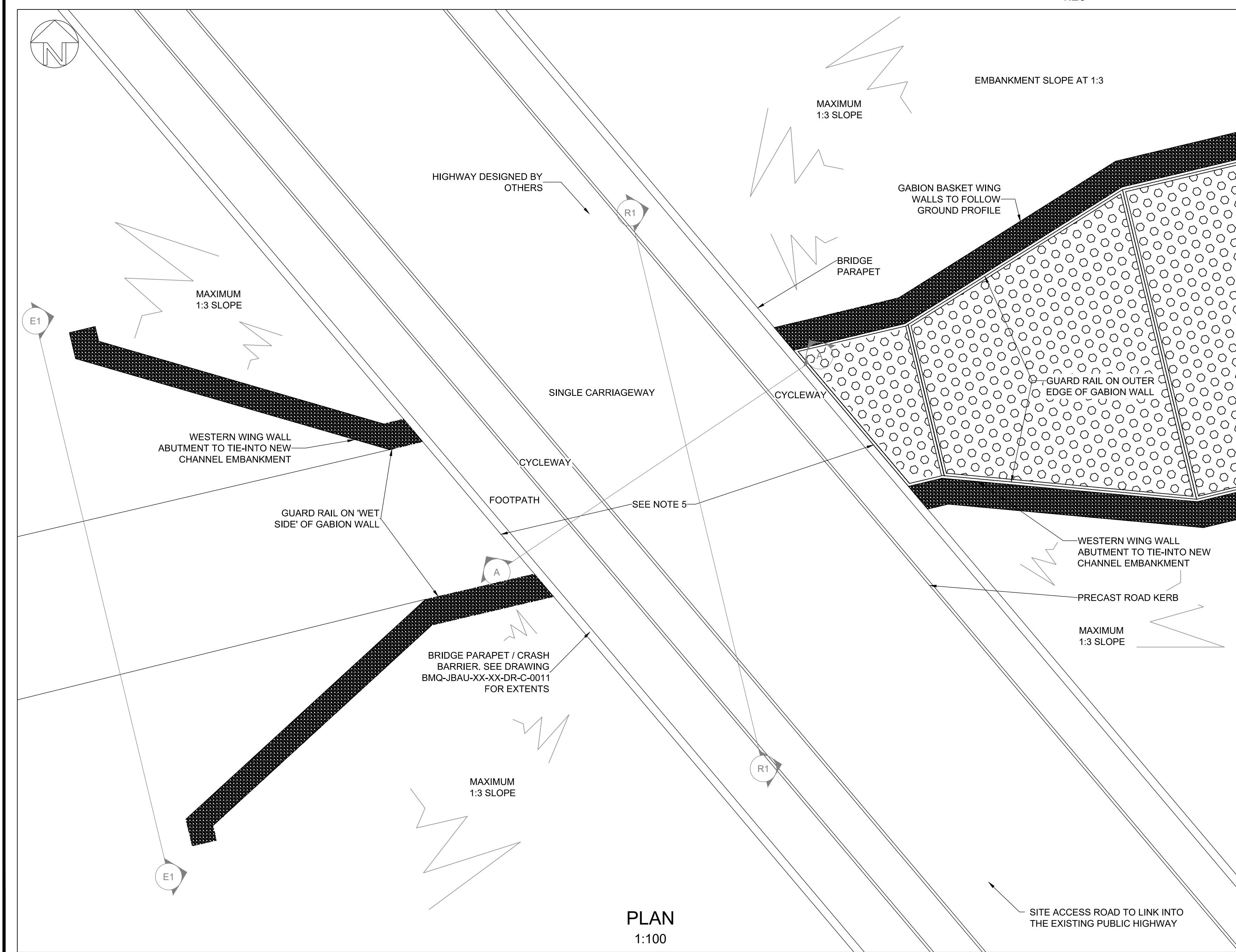
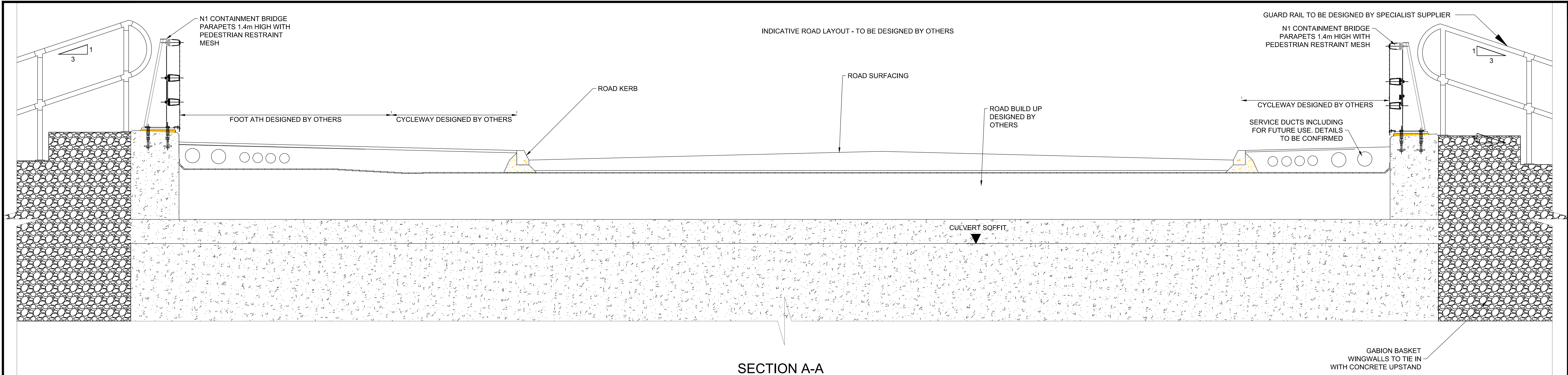
Client

for

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Project Reference:	2019s0875	Scale:	As Shown @ A1		
Drawing Number:	BMQ-JBAU-XX-XX-DR-C-0001	Status:	S3	Revision:	P02
				Sheet Size:	A1



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- Falls from height - Lifting - Excavation - Ground conditions - Working in / near water - Existing services - Flood risk	- Public / Plant interface - River channel access - Falls from height	- Habitat loss - Invasive non-native species - Pollution of a watercourse - Contaminated land
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GENERAL NOTES:						
1.	Do not scale from this drawing. All dimensions to be checked / verified on site.					
2.	All levels shown with respect to meters Above Ordnance Datum (mAOD).					
3.	Ground contours were generated based on the topographic survey carried out by Azimuth Land Surveys Ltd (2015), subject to the proposed engineering works.					
4.	This drawing is not for construction issue.					
5.	Culvert entrance and exit to align with the site access road parapet. Access road alignment indicative; to be designed by others.					
Drawing to be read in conjunction with:- BMQ-JBAU-XX-XX-DR-C-0001-Channel_Plan BMQ-JBAU-XX-XX-DR-C-0002-Sections BMQ-JBAU-XX-XX-DR-C-0011-Road_Section BMQ-JBAU-XX-XX-DR-C-0020-Outfall						
Rev.:	Date	Drawn	Designed	Checked	Approved	
P01						
Rev.:	Date	17/10/19	Drawn	BH	Designed	JK
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Project

Land at Dragon Parc, Merthyr

Title

Road Plan, Sections and Details

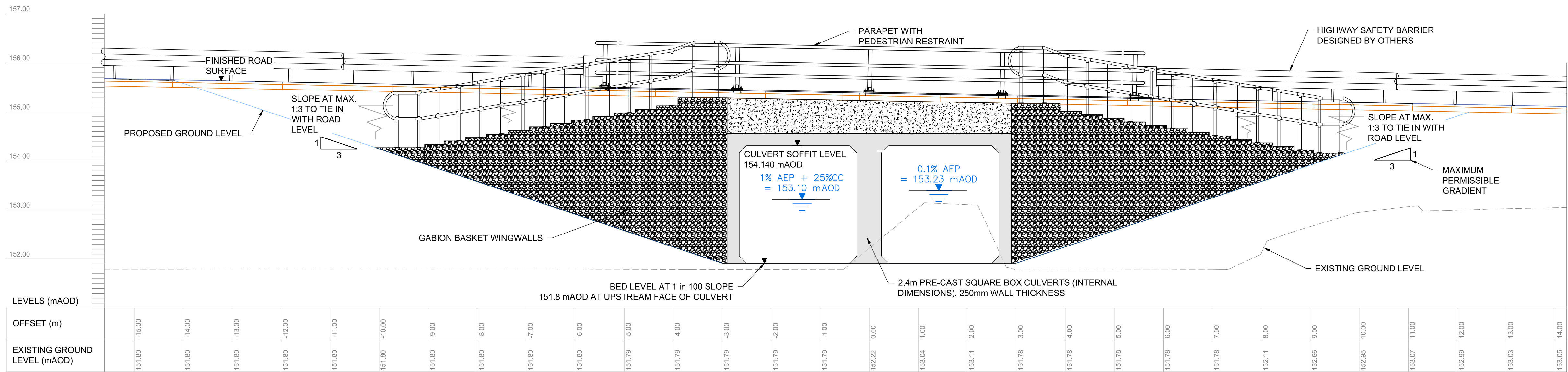
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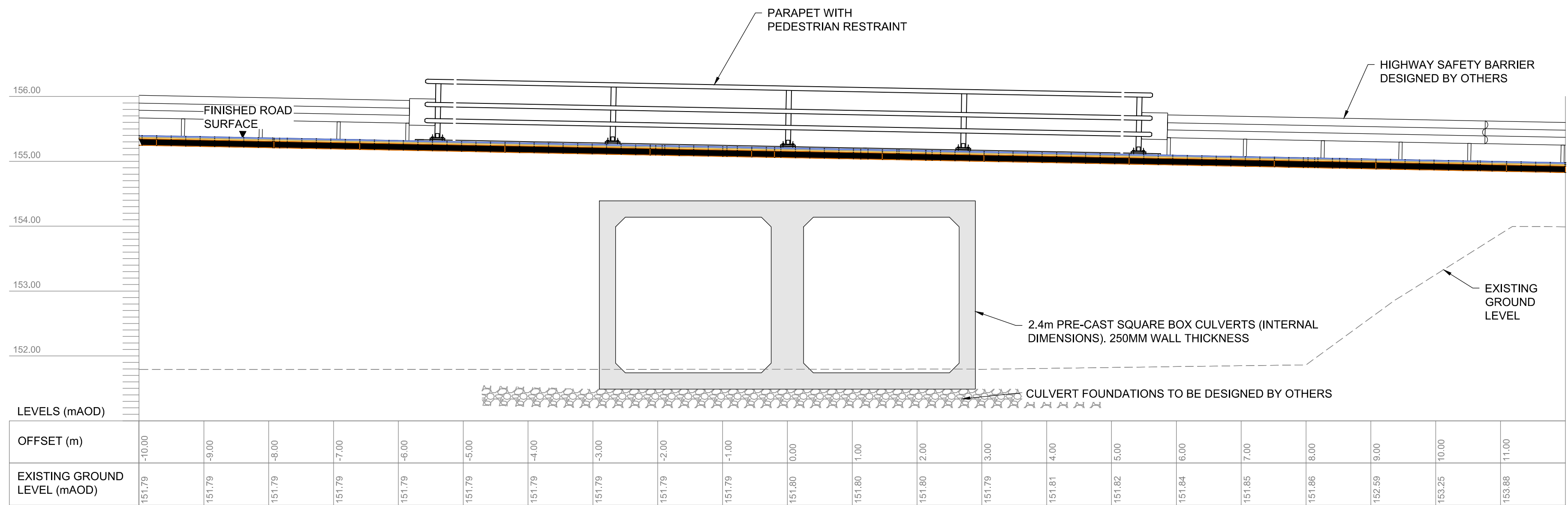
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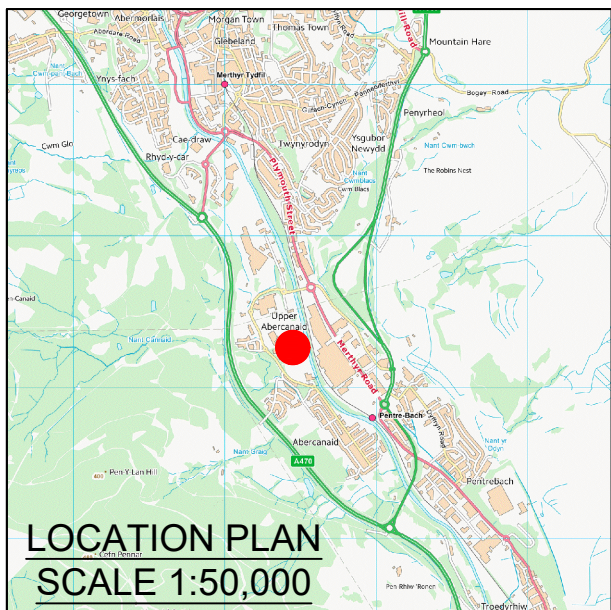
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Project Reference:	2019s0875		Scale:	As Shown @ A1				
Drawing Number:	BMQ-JBAU-XX-XX-DR-C-0010		Status:	S3	Revision:	P01	Sheet Size:	A1



ELEVATION E1-E1
CH: 571.29
1:50



SECTIONAL ELEVATION R1-R1
CH: 592.78
1:50



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 - This drawing is not for construction issue.

Drawing to be read in conjunction with:-
BMQ-JBAU-XX-XX-DR-C-0001-Channel_Plan
BMQ-JBAU-XX-XX-DR-C-0002-Sections
BMQ-JBAU-XX-XX-DR-C-0010-Road_GA
BMQ-JBAU-XX-XX-DR-C-0020-Outfall

	Comments									
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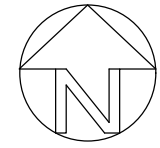
Project Land at Dragon Parc, Merthyr

Title Road Sections

Client for
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BMQ-JBAU-XX-XX-DR-C-0011			S3	P01	A1



STEEP GRADIENT DUE TO GROUND RAISING IN PROXIMITY OF THE RIVER BANK. DESIGN OF STABILISATION WORKS BY OTHERS

TOP OF BANK

RIGHT HAND BANK OF RIVER TAFF. TOPOGRAPHY UNKNOWN AND TO BE CONFIRMED VIA SURVEY

EMBANKMENT SLOPE AT 1:3

GABION BASKET CHANNEL WALLS TO FOLLOW GROUND PROFILE

BRIDGE PARAPET

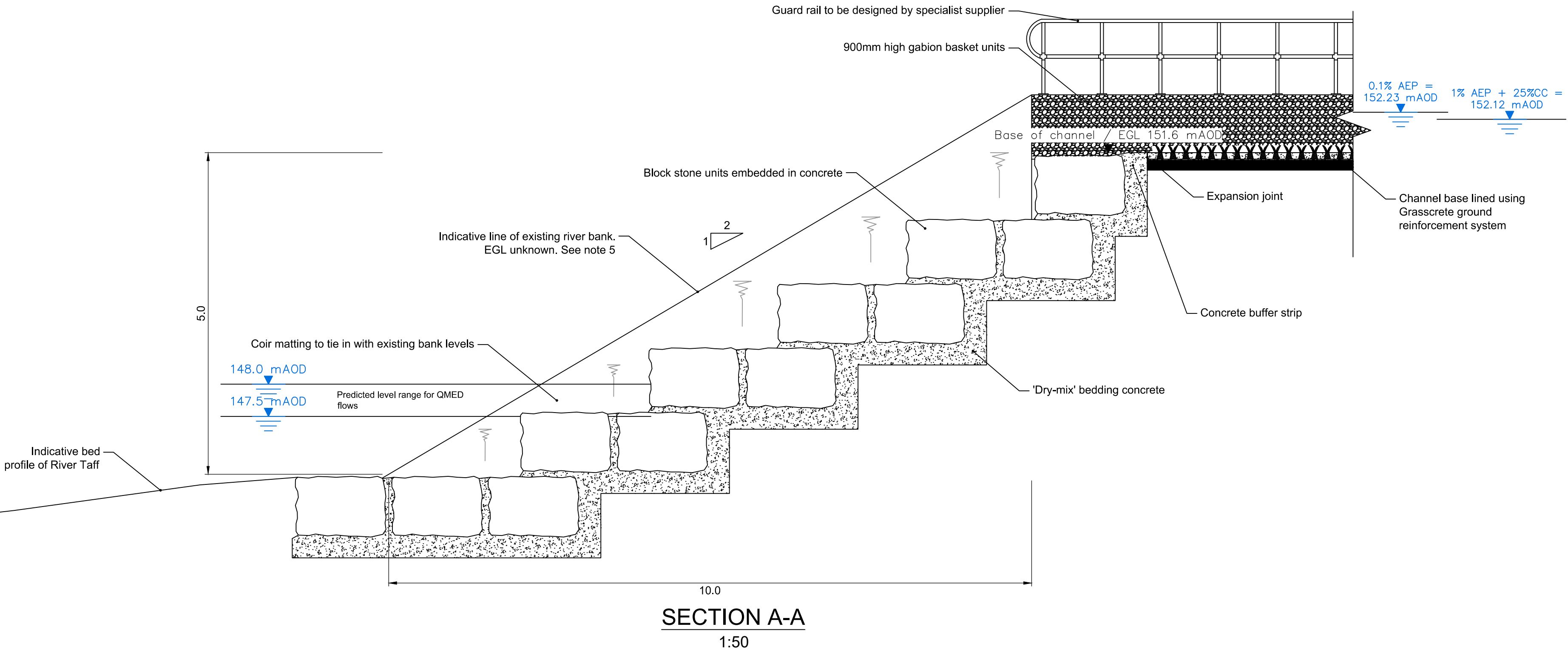
GUARD RAIL ON OUTER EDGE OF GABION WALL

WESTERN WING WALL ABUTMENT TO TIE-INTO NEW CHANNEL EMBANKMENT

PRECAST ROAD KERB

STEEP GRADIENT DUE TO GROUND RAISING IN PROXIMITY OF THE RIVER BANK. DESIGN OF STABILISATION WORKS BY OTHERS

PLAN
1:100



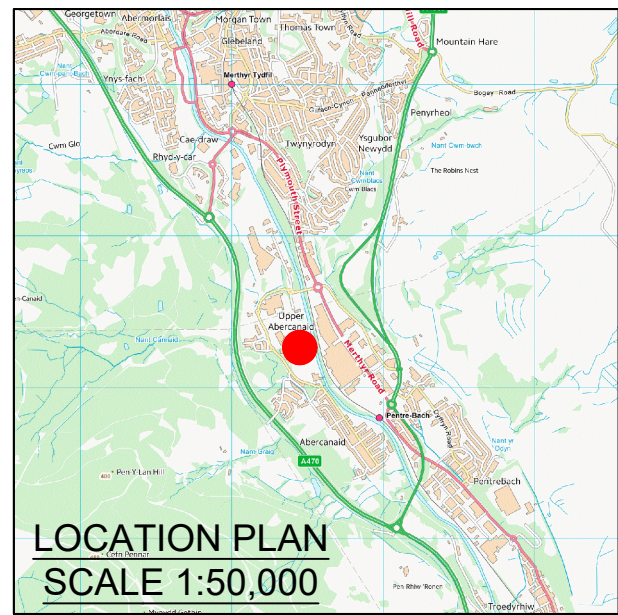
SECTION A-A
1:50

STEPPED BLOCKSTONE CASCADE / OUTFALL

COIR MATTING

900mm HIGH GABION BASKETS FORMING CHANNEL WALLS

BASE OF CHANNEL LINED USING GRASSCRETE REINFORCEMENT SYSTEM



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 - Ground contours were generated based on the topographic survey carried out by Azimuth Land Surveys Ltd (2015), subject to the proposed engineering works.
 - This drawing is not for construction issue.
 - The existing bank profile of the River Taff is unknown at the outfall location. The design shown is based on a 1 in 2 slope from the top of bank. This has been interpolated from survey data provided by Maltby Land Surveys (2017).

Drawing to be read in conjunction with:-
BMQ-JBAU-XX-XX-DR-C-0001-Channel_Plan
BMQ-JBAU-XX-XX-DR-C-0002-Sections
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BMQ-JBAU-XX-XX-DR-C-0011-Road_Section

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Project

Land at Dragon Parc, Merthyr

Title

Outfall Plan and Long Sections

Client

for

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