

Ysgol Gyfun Gymraeg Glantaf- Flood Consequences Assessment

Version 2

October 2023

Prepared for:
Curtins



Document Status

Issue date	October 2023
Issued to	Curtins
BIM reference	JKR-JBAU-XX-XX-RP-Z-0001-D3-C02- Ysgol_Gyfun_Gymraeg_Glantaf_Flood_Consequences_Assessment
Revision	Version 2
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1 Introduction

JBA Consulting were commissioned by Curtins Consulting to prepare a Flood Consequences Assessment (FCA) to support a planning application for the construction of a new educational building within the grounds of the Ysgol Gyfun Gymraeg Glantaf. This FCA assesses and demonstrates the suitability of the proposed development and describes the flood mitigation measures recommended to appropriately manage flooding at the site.

1.1 FCA requirements

This FCA follows Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk (TAN15). Where appropriate, the following aspects of flood risk should be addressed in all planning applications over their 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 flood water across the site
- Overland flow routes
- The effect of access and egress and infrastructure, for example, public sewer outfalls, combined sewer outflows, surface water sewers and effluent discharge pipes from wastewater treatment works
- The impact of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain

2 Site description

The proposed development site is located within the grounds of the Ysgol Gyfun Gymraeg Glantaf, Cardiff, as shown in Figure 2-1.

The site is approximately 0.61ha in size and is currently used as sports and play areas. The site is bound to the north and east by school building, to the west by the River Taff and the A4054, to the south by the school all-weather sports pitch.

Vehicular and pedestrian access to the proposed development site is currently available from the main school entrance on Gabalfa Road. An additional pedestrian gate is also present on the A4054 Bridge Road.

Table 2-1 contains further details of the proposed development site.

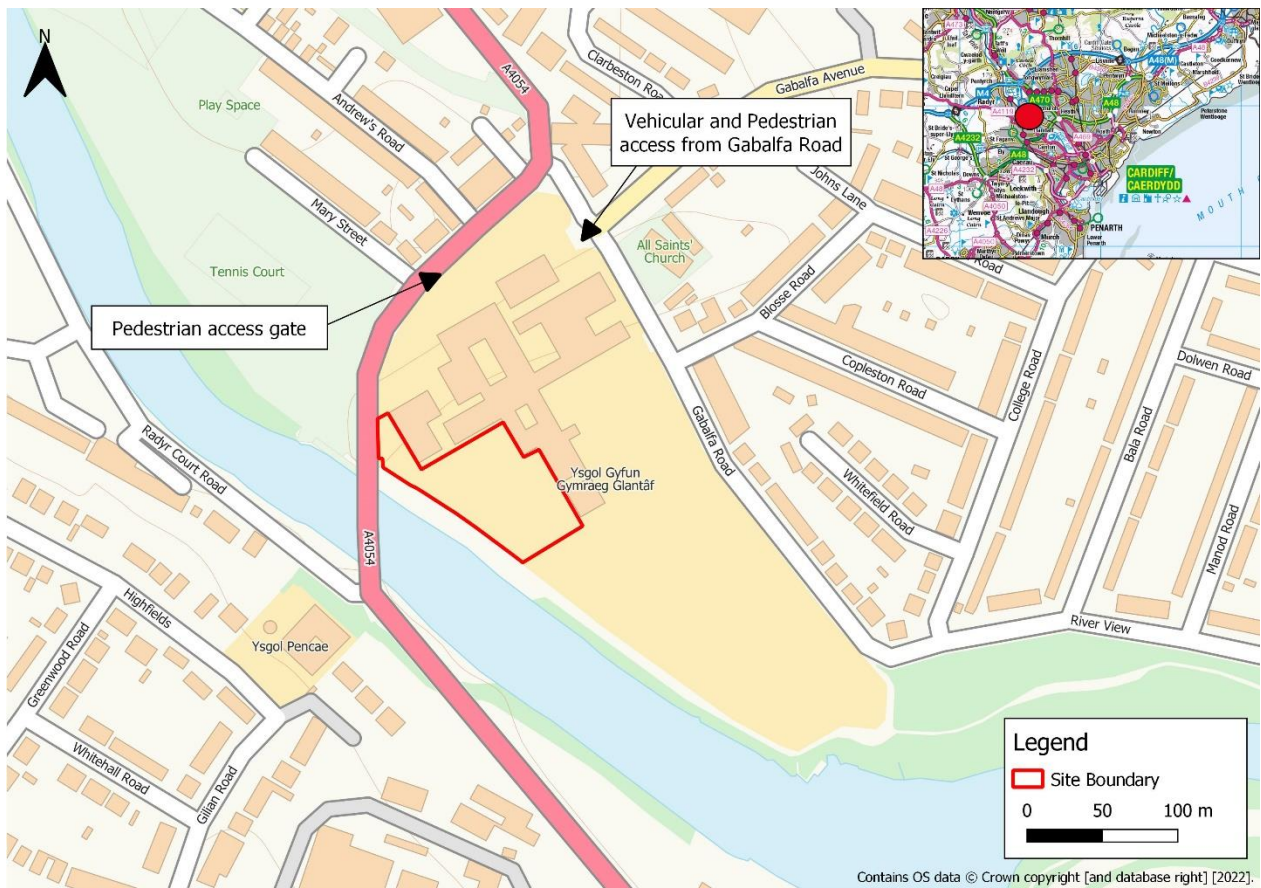


Figure 2-1 Site Location

Table 2-1 Site Summary

Site name	Ysgol Gyfun Gymraeg Glantaf
Site area	0.61ha
Existing land use	Sports and play area
Purpose of development	School extension
OS NGR	ST 14960 78674
Local Planning Authorities	Cardiff Council
Lead Local Flood Authority	Cardiff Council

2.1 Site topography

A topographic survey of the site was undertaken by Azimuth Land Surveys Ltd in April 2022 and is contained in Appendix A. The topographic survey correlates well with Natural Resources Wales (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data, which is therefore presented in Figure 2-2 as an alternative illustration of site topography.

The site is generally flat with the north-western part of the site slightly higher than the rest of the site. Ground levels are highest in the north-eastern corner of the site (approx. 19.43mAOD) from where they slopes towards the centre of the site where ground levels are generally flat with an average of 18.6mAOD.

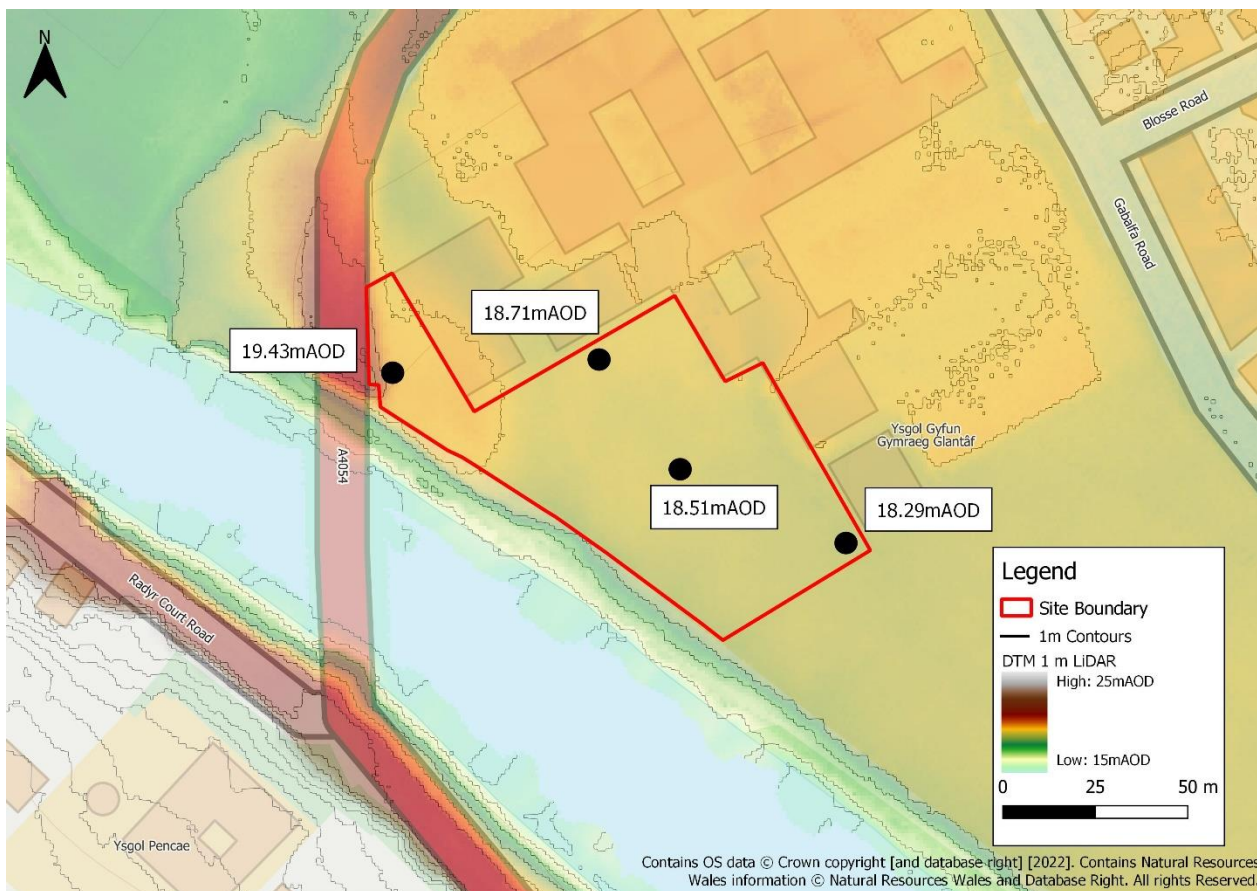


Figure 2-2 LiDAR Topographic data from NRW (1m resolution) with sample points

2.2 Soils and geology

According to the British Geological Survey (BGS) Geology of Britain Viewer, bedrock at the site is described as Mercia Mudstone Group comprised of mudstone. Superficial deposits are classified as Alluvium comprised of clay, silt, sand and gravel.

The Cranfield University Soilscape viewer describes the underlying strata as freely draining floodplain soils.

2.3 Watercourses and Flood Defences

The River Taff, an NRW designated Main River, is located immediately to the west of the proposed development site.

The proposed development site does not benefit from the presence of flood defences.

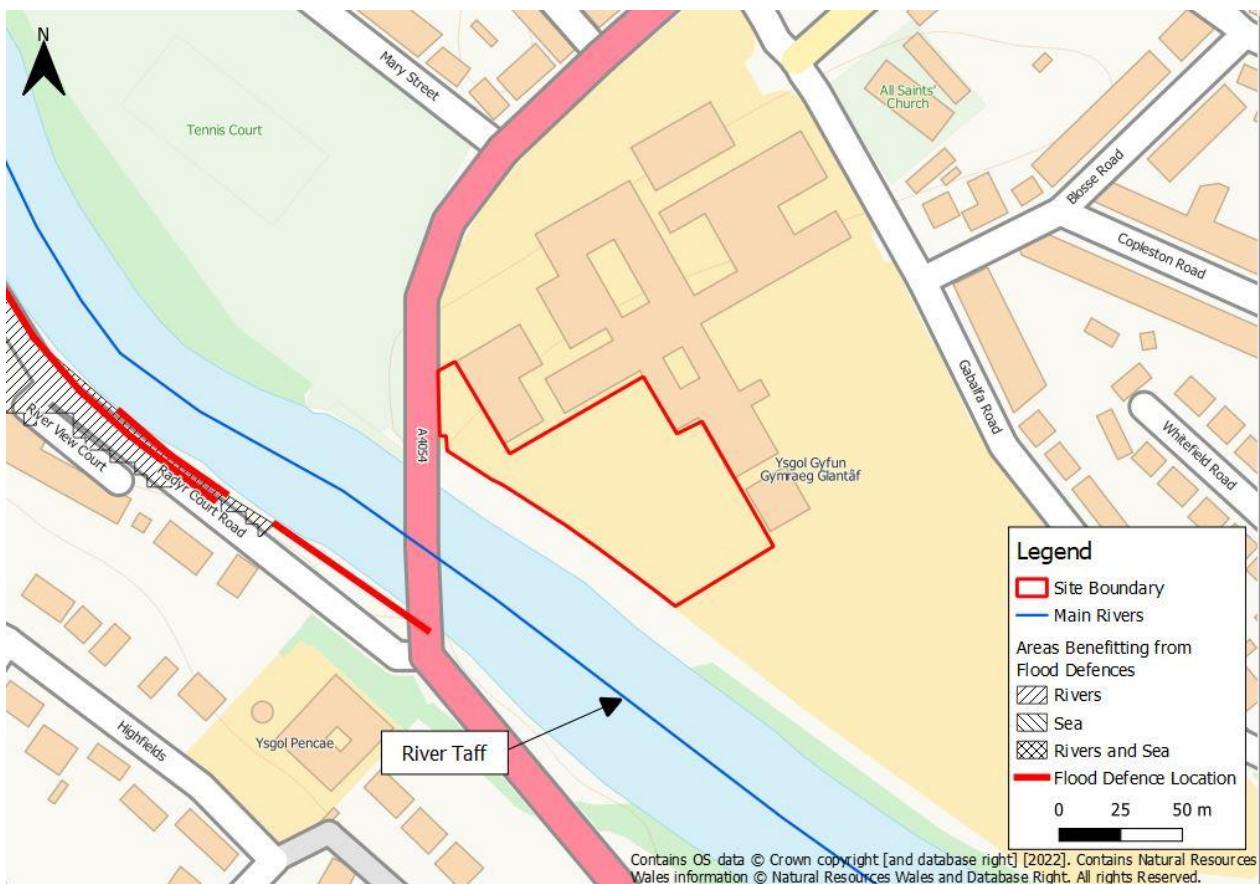


Figure 2-3 Nearby watercourses and flood defences

2.4 Development proposal

Development proposals for the site are for a new building which will provide additional educational facilities for Ysgol Gyfun Gymraeg Glantaf. The building will be linked to the existing school building and will have a finished floor level of 18.7mAOD.

An extract of the proposed development plans is provided in Figure 2-4, with full plans contained in Appendix A.

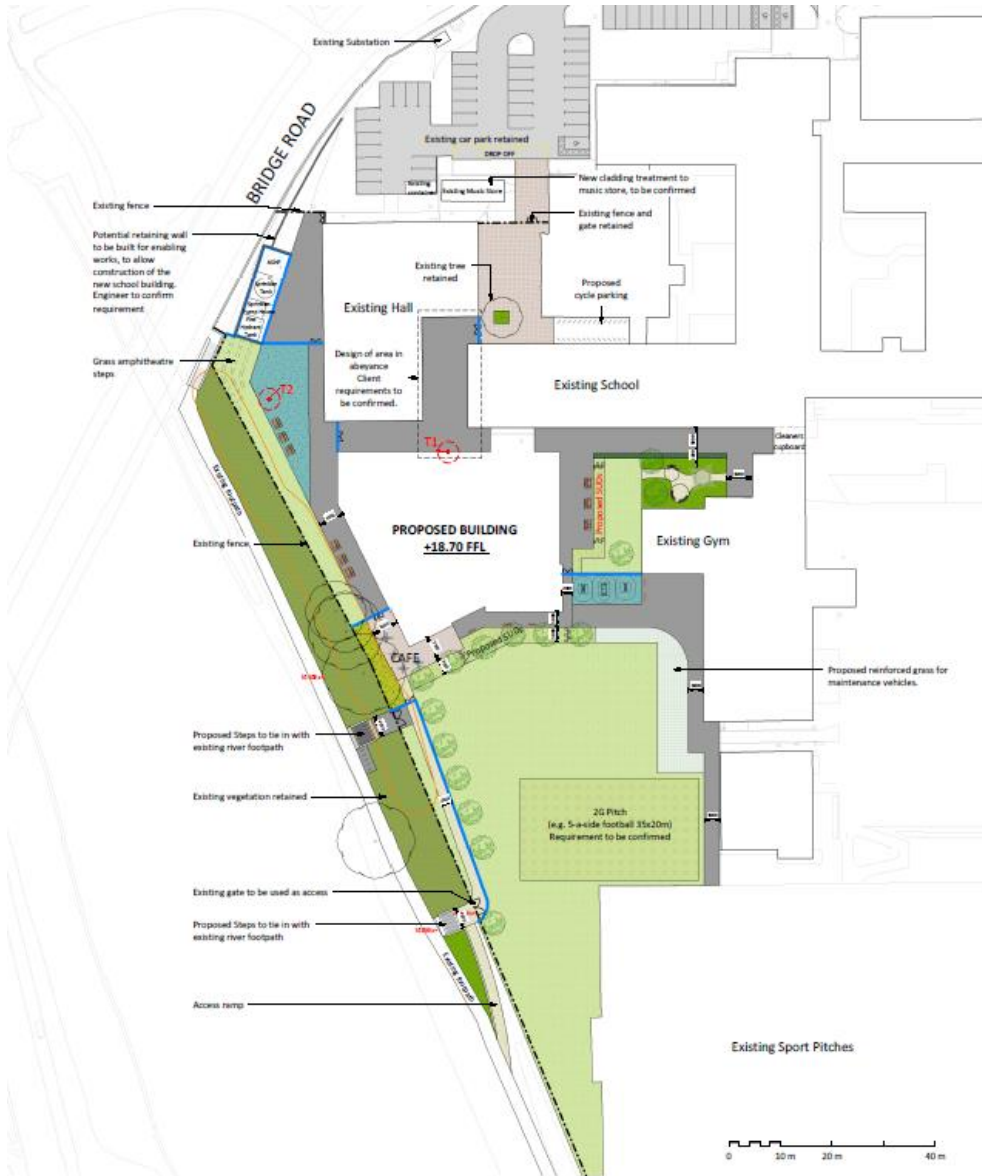


Figure 2-4 Development proposals

3 Planning Policy and Flood Risk

3.1 Planning context

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. These policies have the aim that all development in Wales is sustainable and improves the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

Technical Advice Note 15 (TAN-15), introduced by the Welsh Government in 2004, provides technical guidance relating to development planning and flood risk in Wales. The initial requirements of TAN-15 are to identify the vulnerability classification(s) and flood zones relevant to the proposed development, and to apply this information to the application of the justification tests.

An update for TAN-15 was released in October 2021 and was due to come in force on the 1st December 2021. However, Welsh Government subsequently suspended the implementation of the new TAN-15 until 1st June 2023. Although the new TAN-15 is not a material consideration, Welsh Government and NRW advise that some consideration is given to the draft Flood Map for Planning (FMfP) as best available information. Therefore, where a site is located in a FMfP flood risk zone it is recommended that an FCA is carried out.

As a result of the above, both the DAM and the FMfP are considered as part of this FCA.

3.2 Vulnerability classification

TAN15 assigns one of three flood risk vulnerability classifications to development, as shown in Table 3-1. The proposed development is classed as Highly Vulnerable due to its proposed use as a public building.

Table 3-1 Development categories as defined by TAN15

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 properties (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.

3.3 Development Advice Map classification

The DAM zone classification is used to trigger different planning actions based on a precautionary assessment of flood risk. Figure 3-1 shows that the site is located within Zone B and Zone C1.

Zone B is described as " Areas known to have been flooded in the past evidenced by sedimentary deposits". The Justification Test does not apply to development in Zone B, although as part of a precautionary approach it is advised that site levels should be checked against the extreme (0.1%) flood level.

Zone C1 is described as "areas of the floodplain served by significant infrastructure, including flood defences". Highly vulnerable development is permissible within Zone C1 subject to the application of the Justification Test, including the acceptability of consequences.



Figure 3-1 Development Advice Map

3.4 Flood Map for Planning Classifications

The new TAN15 will replace the DAM with the Flood Map for Planning (FMfP), which shall define the appropriate planning actions under the new TAN15 when it comes into effect in June 2023. Whilst the new TAN15 is not a material consideration until implemented, it does illustrate the current policy thinking of Welsh Government and in some cases the FMfP may constitute best available information. Consequently, information on the FMfP is provide for information only.

3.4.1 Flood Map for Planning – Rivers

As shown in Figure 3-2 the site is located within Flood Zone 2 of the Flood Map for Planning for Rivers. Flood Zone 2 represents areas with a less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change..

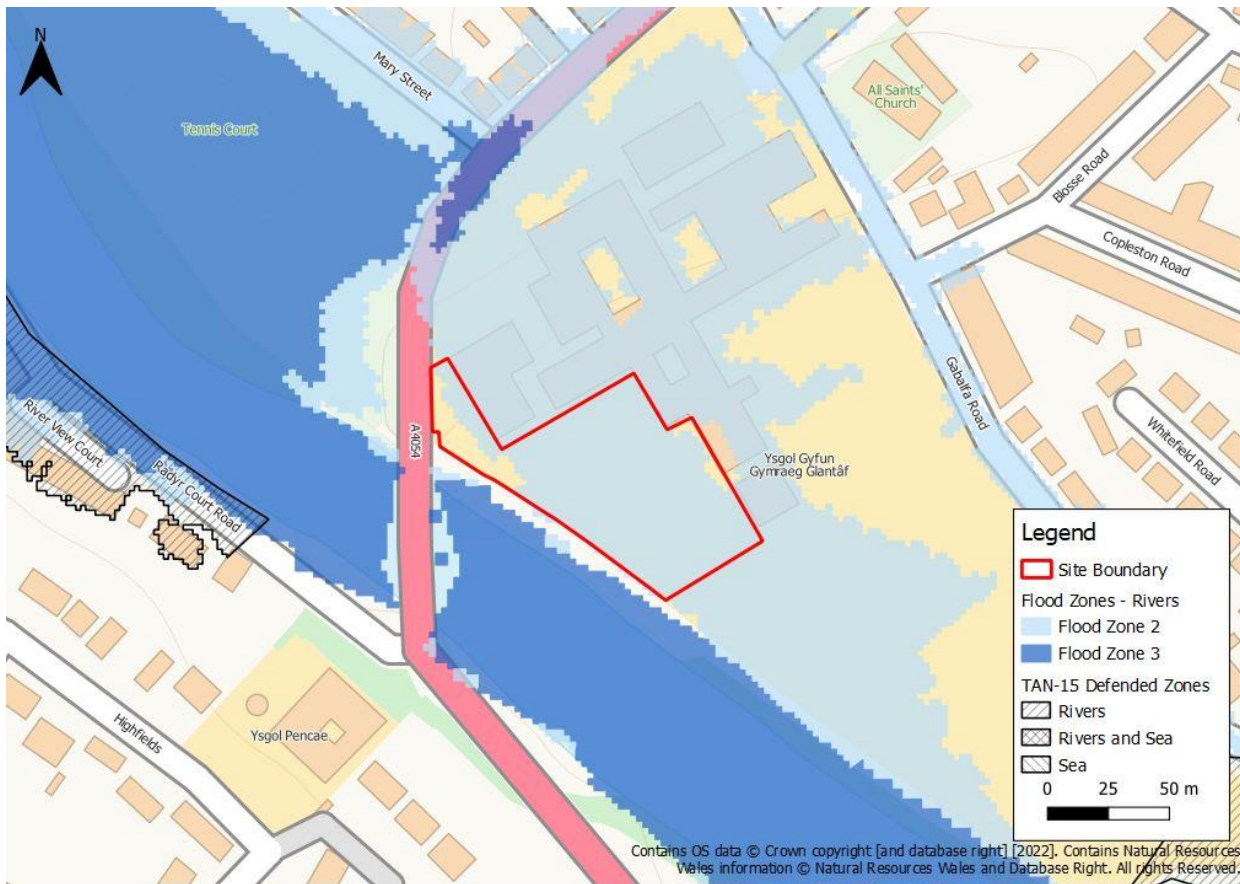


Figure 3-2 Flood Map for Planning - Rivers

3.4.2 Flood Map for Planning – Sea

As shown in Figure 3-3, the site is entirely located within Flood Zone 1 of the Flood Map for Planning for Rivers. Flood Zone 1 represents areas which have less than a 1 in 1000 (0.1%) chance of flooding in a given year, including climate change. Therefore, the site is not a flood risk from the sea, even allowing for climate change.



Figure 3-3 Flood Map for Planning - Sea

3.5 Local Development Plan

The Local Development Plan (LDP) is a land-use document in which the council sets out its land use development over a 15-year period. The current LDP for Cardiff was adopted in 2016 and provides a framework to guide future development and set out where, when, and how much new development can take place within the plan period (2011-2026).

The proposed development contributes to the LDP policy C8: Planning for Schools. This states that "New and improved school facilities will be provided to meet existing and future educational needs".

3.6 Justification Test

Development in Zone C1 is subject to the justification test. TAN-15 states that development will be justified if it can be demonstrated that:

Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or

Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region; and

It concurs with the aims of Planning Policy Wales and meets the definition of previously developed land; and,

The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable.

The proposed development has been assessed against the requirements of the Justification Test, with the results summarised in Table 3-2. All the criteria have been satisfied with regards to the proposed development.

Table 3-2 Justification Test applied to the proposed development

TAN 15 Justification Criteria	Comments	Achieved
Its location is necessary to assist a local authority regeneration initiative or strategy, or contribute to key employment objectives, necessary to sustain an existing settlement or region.	The proposed development is necessary to improve school facilities to meet existing and future educational needs. The proposals therefore align with LDP policy C8.	✓
The site meets the definition of previously developed land (i.e. it is not a Greenfield site) and concurs with the aims of Planning Policy Wales (i.e. the presumption in favour of sustainable development)	The site is part of an established educational site.	✓
The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable.	Detailed flood modelling has been undertaken to demonstrate the acceptability of the proposed development. See sections 4 & 5	✓

4 Flood Risk Assessment

This section assesses the risk to the proposed development site from all sources of flooding, based solely on a desk-based analysis of existing flood risk data.

4.1 Review of existing flood data

The latest available information on flood risk at the site, published by NRW, is summarised in Table 4-1 below.

Table 4-1 Summary of flood risk

Source of Flooding	Onsite Presence	Description
Flood Risk from Rivers	Yes	The site is at low risk of flooding from Rivers.
Flood Risk from the Sea	No	The site is in an area at very low risk of flooding from the Sea.
Flood Risk from Surface Water and Small Watercourses	No	The site is at very low risk of flooding from surface water and small watercourses.
Flood Risk from Groundwater	No	The site is at very low risk of flooding from groundwater.
Flood Risk from Reservoirs	Yes	The site is at low risk of flooding from reservoirs.
Flood Risk from Sewers	No	There is no evidence to suggest that the site is at risk of flooding from sewers.

4.2 Historical flooding

NRW's map of recorded flood extents shows a record of historic flooding on the site, as shown in Figure 4-1. Flooding occurred in December 1960 as a result of the channel capacity being exceeded. The nature of the River Taff and riverside development through Cardiff has changed considerably in the intervening 60 years. Consequently, the historical flood extent may not be a reliable indicator of present flood risk.

Cardiff City Council’s Preliminary Flood Risk Assessment¹, Flood Risk Management Strategy² and Flood Risk Management Plan (FRMP)³ identified no other records of historic flooding at the site.

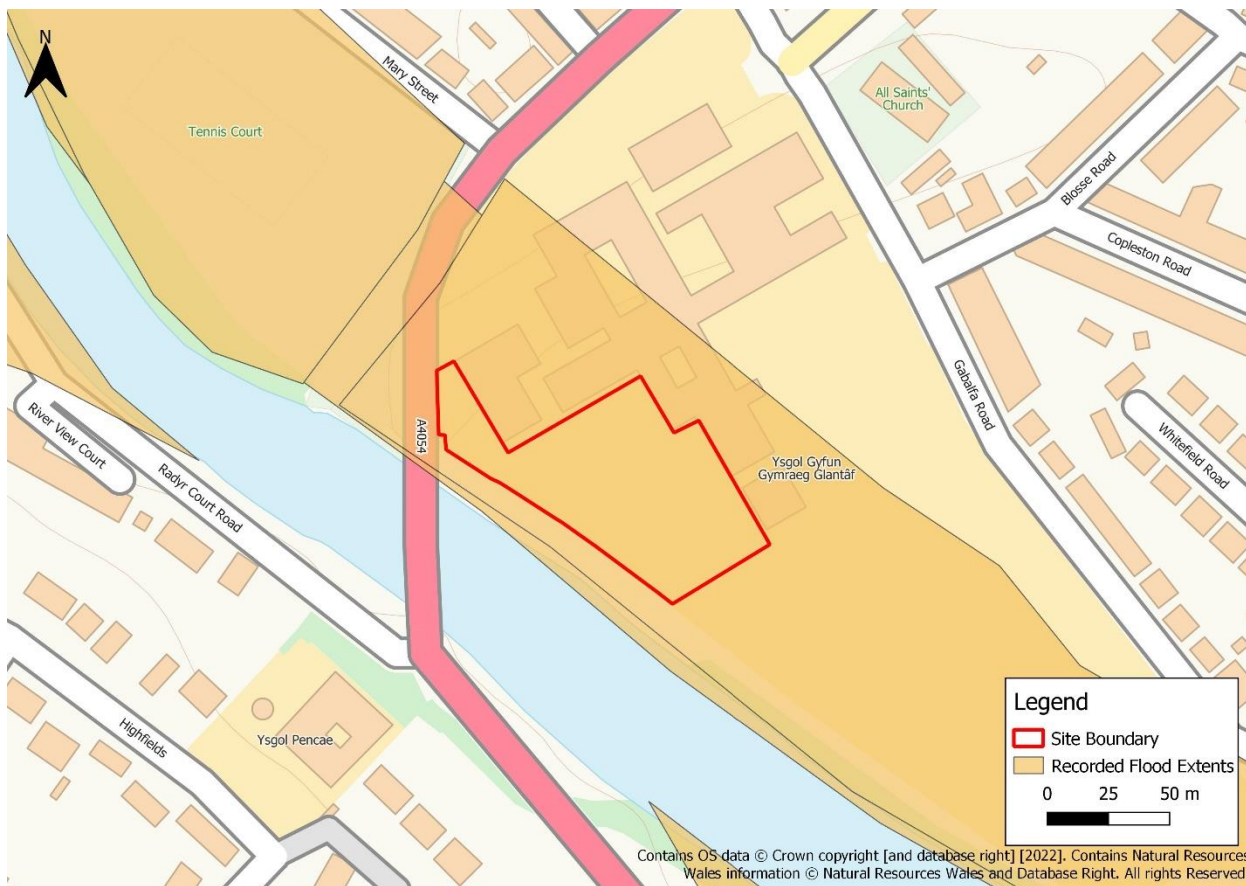


Figure 4-1 Historic Flooding

4.3 Flood Risk from Rivers

NRW’s Flood Risk Assessment Wales (FRAW) Flood Risk from Rivers mapping indicates that the majority of the proposed development site is at **very low risk** of fluvial flooding. This means there is less than a 0.1% AEP chance of fluvial flooding in any given year. This is shown by a transparent layer on the FRAW mapping, as shown in Figure 4-2.

1 Cardiff Council (2017) Preliminary Flood Risk Assessment. Retrieved from- <https://www.cardiff.gov.uk/ENG/resident/Community-safety/Flood-and-Coastal-Erosion-Risk-Management/Flood-Risk-Management-Plan/Preliminary-Assessment/Pages/default.aspx>

2 Cardiff Council (2014) Local Flood Risk Management Strategy. Retrieved from- <https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/Documents/Flood/Local%20Flood%20Risk%20Management%20Strategy.pdf>

3 Cardiff Council (2015) Cardiff Flood Risk Management Plan . Retrieved from- <https://www.cardiff.gov.uk/ENG/resident/Community-safety/Flood-and-Coastal-Erosion-Risk-Management/Documents/Cardiff%20Flood%20Risk%20Management%20Plan.pdf>

A small part of the proposed development site is shown to be at **low risk** of fluvial flooding. This means this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).

In accordance with FRAW, the proposed development site does not benefit from any fluvial flood defences.

To better understand the risk of flooding posed by fluvial flooding sources and the implications of climate change on the flood risk to the proposed development, further assessment using detailed flood modelling data was undertaken and is discussed in Section 5.

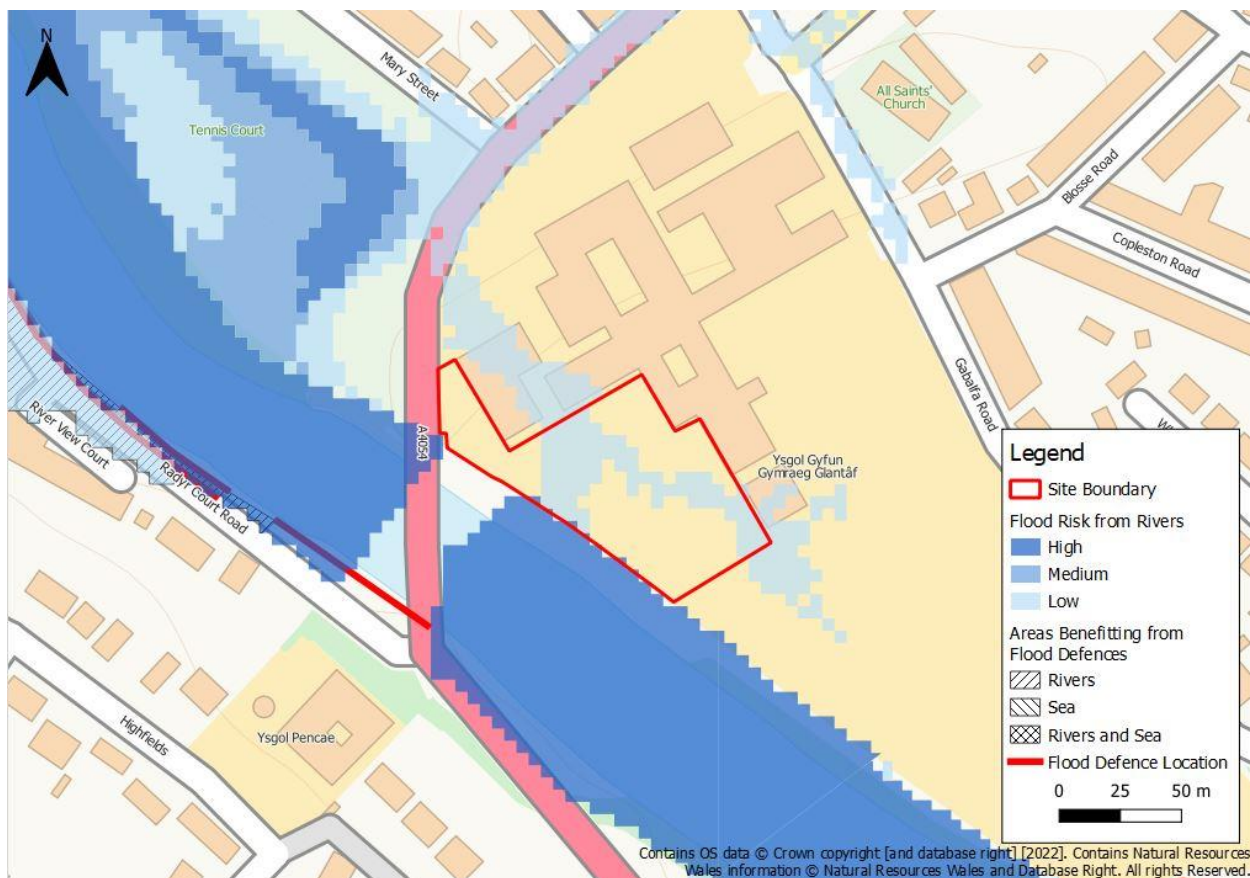


Figure 4-2 FRAW map – Risk of flooding from Rivers

4.4 Flood Risk from the Sea

NRW's FRAW Flood Risk from the Sea mapping indicates that the proposed development site is at **very low** risk of tidal flooding. This means there is less than a 0.1% AEP chance of tidal flooding in any given year, as shown in Figure 4-3.



Figure 4-3 FRAW map – Risk of flooding from the Sea

4.5 Flood Risk from Surface Water and Small Watercourses

The NRW FRAW Flood Risk from Surface Water and Small Watercourse map indicates that the site is at **very low risk** of surface water flooding. This means there is less than a 0.1% AEP chance of surface water flooding in any given year. This is shown by a transparent layer on the FRAW mapping, as shown in Figure 4-4.



Figure 4-4 FRAW map – Risk of flooding from Surface Water and Small Watercourses

4.6 Flood Risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels, and it occurs as excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, sometimes lasting for weeks or months, and can damage property. This risk of groundwater flooding depends on the nature of the site's geological strata and the local topography.

Cardiff City Flood Risk Management Plan⁴ states that 'there is no information on historic groundwater flooding which suggests that the risk of groundwater flooding is low in Cardiff'. It can therefore be concluded that the risk of groundwater flooding at the site is **low**.

4

<https://www.cardiff.gov.uk/ENG/resident/Community-safety/Flood-and-Coastal-Erosion-Risk-Management/Documents/Cardiff%20Flood%20Risk%20Management%20Plan.pdf>

4.7 Flood Risk from Reservoirs

As shown in Figure 4-5, NRW flood risk mapping indicates the site is at risk of flooding due to reservoir failure from the Beacons, Cantref, Pontsticill (Taf Fechan), Llwyn-On reservoirs. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly, and essential safety work is carried out. The regulatory nature of reservoir management means that the probability of a failure at a statutory reservoir is very low.

The Beacons, Cantref reservoirs are 42km and 40km north of the site respectively and the Pontsticill (Taf Fechan) and Llwyn-On reservoirs are 34km and 35km north; this should provide substantial warning time if a failure should occur. It is therefore concluded, given the probability and consequences of such an event, that the risk at the proposed development site as a result of reservoir failure is **low**.



Figure 4-5 FRAW map – Risk of flooding from Reservoirs

4.8 Flood Risk from Sewers

Cardiff's Flood Risk Management Plan suggests there is no evidence of historic sewer flooding at the site. The FRMP concluded that flooding from sewers does not have significant consequences at a strategic scale, so it can be concluded that the risk of sewer flooding at the site is **low**.

5 Detailed Assessment of Fluvial Flood Risk

5.1 Hydraulic modelling availability

Detailed fluvial flood risk modelling data for Cardiff has been used to inform a more detailed assessment of fluvial flood risk. This data is taken from the recently updated NRW Lower Taff model (2022).

The Lower Taff model (2022) was prepared by Arup on behalf of NRW. It represents a major and comprehensive update of the previous Lower Taff model. The model was updated and calibrated in response to the Storm Dennis, which caused significant flooding in the area in February 2020. The model provides detailed model results for the study area based on best available methods, software, science and following current climate change guidance.

5.2 Detailed model results

Presented below are the baseline results from the Lower Taff model, for the 1% AEP plus climate change and the 0.1% AEP design events, as required by TAN15.

5.2.1 1% AEP plus Climate Change

Figure 5-1 shows the predicted 1% AEP plus 25% climate change event fluvial flood depths. During this event the proposed development site is flood free.

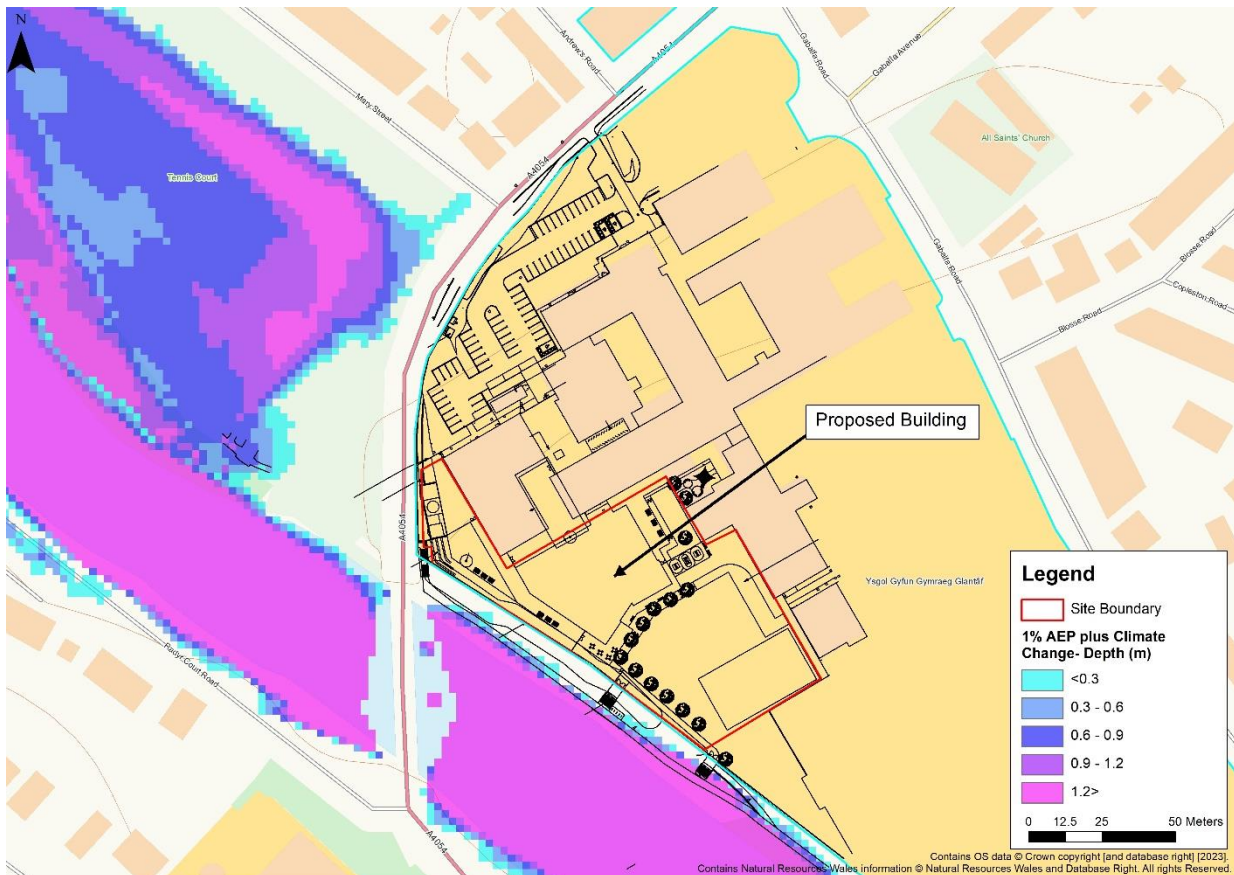


Figure 5-1 Baseline- 1% AEP plus climate change event

5.2.2 0.1% AEP event

Figure 5-2 shows the predicted 0.1% AEP event fluvial flood depths. During this flood event, flood water overtops the banks of the River Taff into the park to the north of the proposed development, before flowing south through the A4054 onto the wider school site and towards the proposed building.

In this event flood depths across the site reach an average of 0.02m with a localised maximum flood depth of 0.11m. The maximum flood level across the site is 18.68mAOD. To reach the site of the proposed building, flood water must first pass through the existing school building to the north, which has a threshold level of 18.94mAOD. Whilst this flooding through the building is possible within the hydraulic model, given the depths of flooding onsite and the level of the building, in reality flooding of the area proposed for the new building is unlikely to occur.

As stated in Section 2.4, the proposed building will have a finished floor level of 18.70mAOD. Therefore the building is predicted to be flood free in this event.

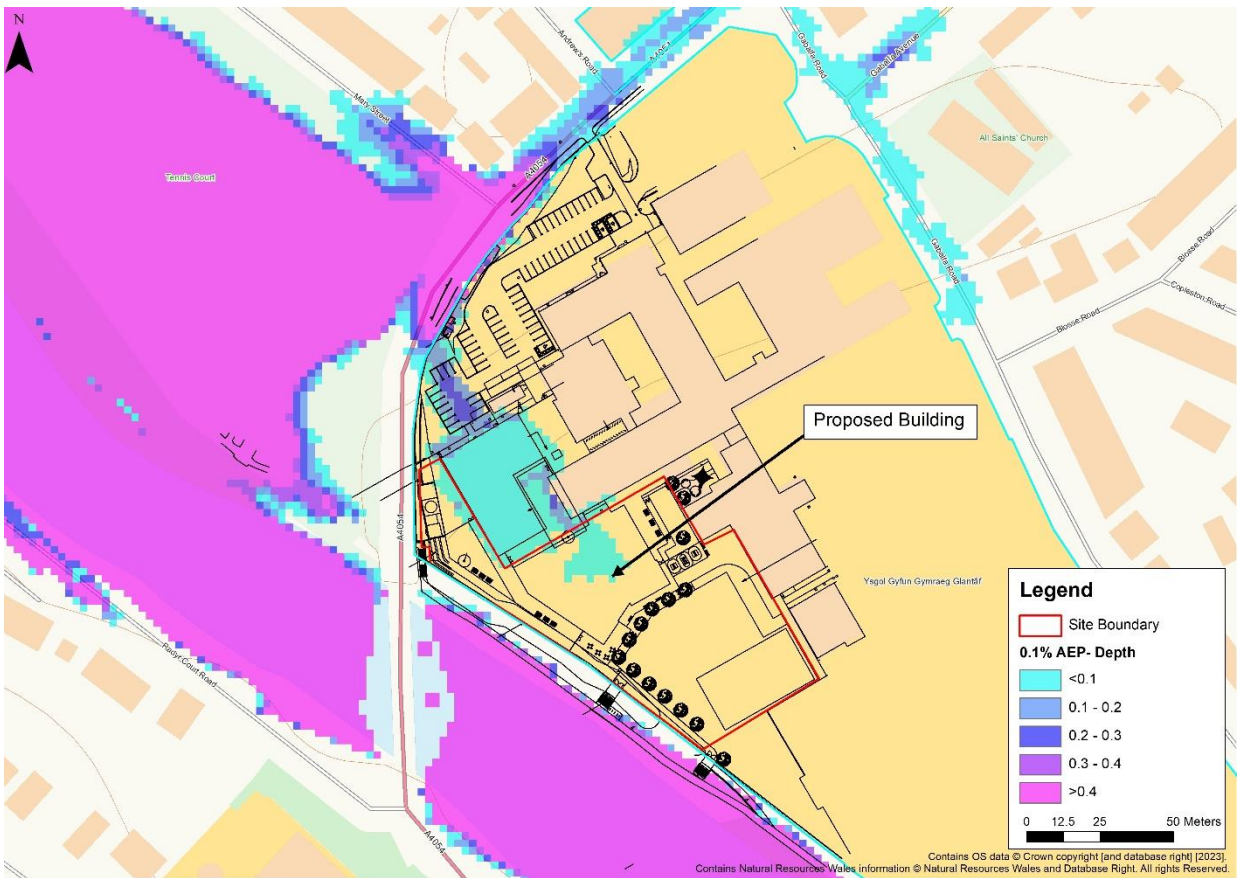


Figure 5-2 Baseline- 0.1% AEP event

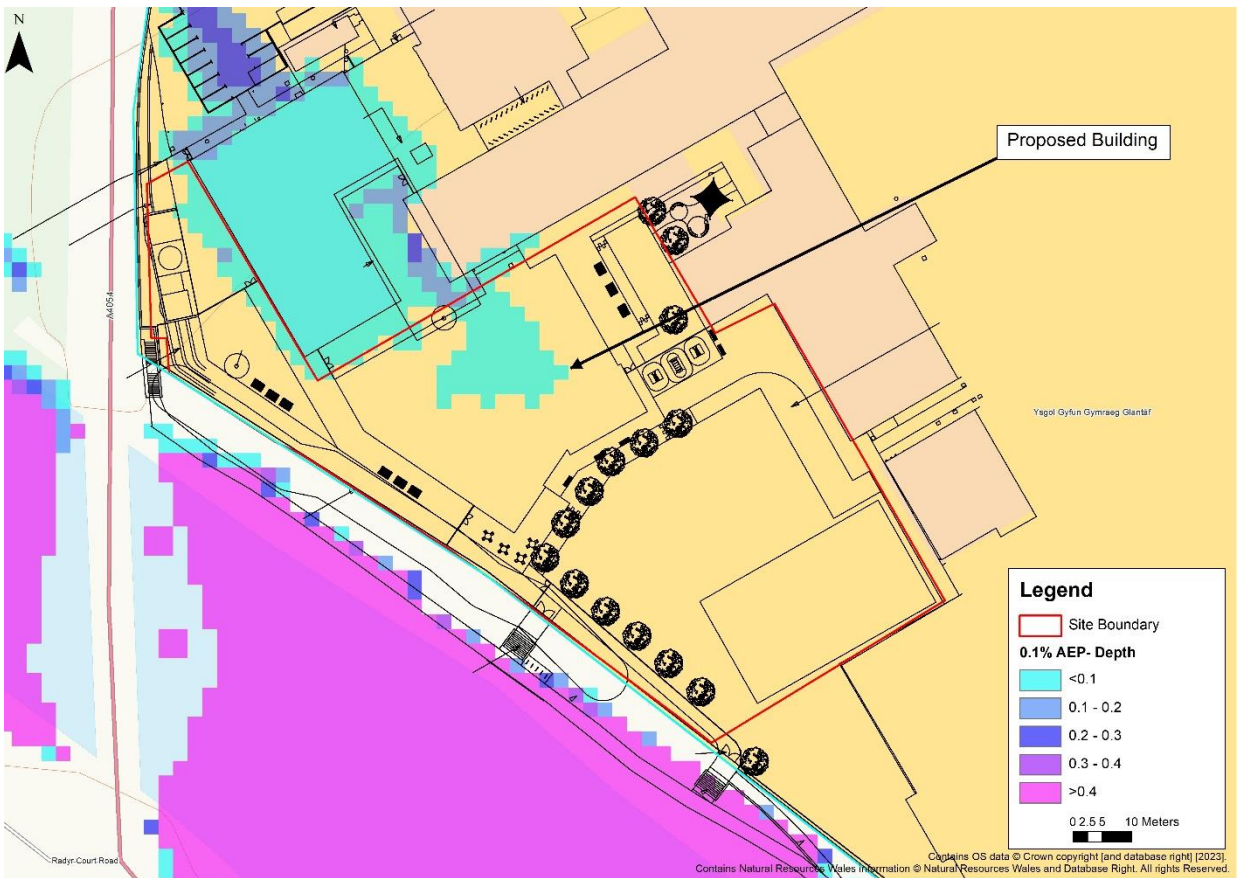


Figure 5-3 Baseline- 0.1% AEP event at the proposed development site

6 Acceptability of consequences

Table 6-1 assesses the proposed development against the acceptability requirements required to be met for the development zone.

Table 6-1 TAN-15 Acceptability Criteria

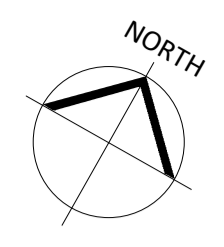
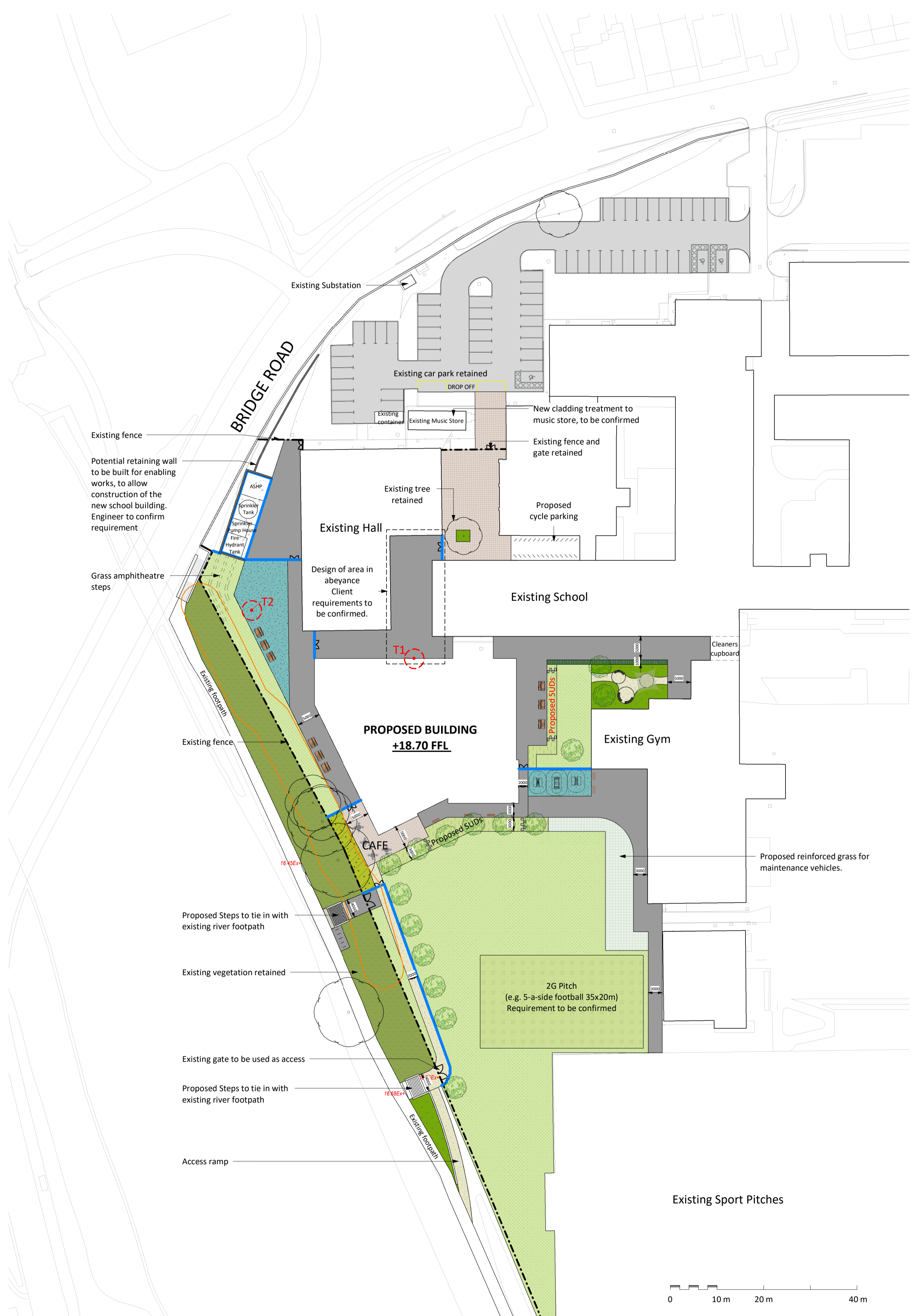
TAN15 Justification Criteria	Comments	Achieved?
Developer is required to demonstrate that the site is designed to be flood free for the lifetime [Ref: TAN15 A1.5] of development for a 1 in 100 (1%) chance (fluvial) flood event including an allowance for climate change in accordance with TAN15 table A1.14.	The proposed building is flood free in the 1% AEP plus climate change event.	Yes
The development should be designed so that in an extreme (1 in 1000) event there would be less than 600mm of water on access roads and within the property.	The proposed building is predicted not to flood in the 0.1% AEP event.	Yes
No flooding elsewhere.	Due to the modest development proposals and the extremely shallow flood depths on the building footprint, the proposed shall not effect flooding outside of the school site. If any floodwater displacement were to occur these effects would be very small and confined to the immediate surroundings within the school site.	Yes
Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any given year).	There are no formal flood defences which protect the proposed development site.	N/A
The developer must ensure that future	The council and future site managers should be made aware of flood risk. It is	Yes

TAN15 Justification Criteria	Comments	Achieved?
occupiers of development are aware of the flooding risks and consequences.	recommended that the school prepare and maintain an emergency flood plan.	
Effective flood warnings are provided at the site.	The site is included in the “River Taff at Radyr Court Road, Cardiff” Flood Warning Area and the “River Taff” Flood Alert Area. It is recommended that the school sign up for the NRW flood warning service.	Yes
Escape/evacuation routes are shown by the developer to be operational under all conditions.	There is no change to existing escape/evacuation routes from the current scenario at the site. These routes experience little or no flooding.	Yes
The development is designed by the developer to allow the occupier of the facility for rapid movement of goods/possessions to areas away from flood waters.	Flooding of the new building is not predicted.	N/A
Development is designed to minimise structural damage during a flood event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of a flood.	Flooding of the new building is not predicted.	N/A

7 Conclusions

- JBA Consulting were commissioned by Curtins Consulting to prepare a Flood Consequences Assessment (FCA) to support a planning application for the construction of a new educational building within the grounds of the Ysgol Gyfun Gymraeg Glantaf, Cardiff.
- The proposed development will have a 'highly vulnerable' development vulnerability classification, according to Technical Advice Note 15: Development and Flood Risk (TAN15).
- The proposed development lies within Zone B and Zone C1 of the Natural Resources Wales (NRW) Development Advice Map (DAM). Zone C1 denotes areas of the floodplain that are served by significant infrastructure, including flood defences.
- Highly vulnerable development can take place within Zone C1 subject to the application of the Justification Test, including acceptability of consequences.
- NRW's Flood Risk Assessment Wales maps shows the site has a low risk of fluvial, groundwater and reservoir flooding.
- The site has a very low risk of flooding from tidal and surface water and small watercourses flood risk sources.
- Recent flood modelling of the Lower Taff (2022) provides detailed model outputs for the site. The site remains flood free during a 1% AEP event and is predicted to experience minimal flooding during the 0.1% AEP design event.
- The proposed building is predicted to remain flood free during a 0.1% AEP event. In this design event, flood modelling shows a maximum flood level of 18.68mAOD in comparison to the proposed finished floor level of 18.7mAOD.
- This FCA has demonstrated that all aspects of the Justification Tests, including the acceptability criteria, set out in TAN15 have been satisfied. Consequently, we conclude that on the grounds of flood risk, the proposed development broadly meets the requirement set out in TAN15 and the aims of Planning Policy Wales.

A Topographic Survey



LEGEND

Site Boundary

SOFT LANDSCAPE
Refer to Soft Landscape Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-9020

- Existing trees to be retained
RPA in orange
- Existing tree to be removed as part of development.
Tree no. T1 and T2 - Refer to Arboricultural Report by ArbTS Ltd for details.
- Proposed trees
- Existing Planting retained
- Proposed hedge planting
- Proposed ornamental shrub planting
- Proposed rain garden / SuDS
- Grass
- Wildflower

HARD LANDSCAPE
Refer to Hard Landscape Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-9030

- Proposed asphalt surface to pedestrian areas
- Proposed asphalt surface to vehicular areas
- Proposed resin bound paving 01
- Proposed resin bound paving 02
- Proposed paving
- Proposed reinforced grass for maintenance access
- Proposed concrete slab to service area
- Proposed wetpour
- Stepping stone
- 2G sport pitch

FURNITURE
Refer to Furniture Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-????

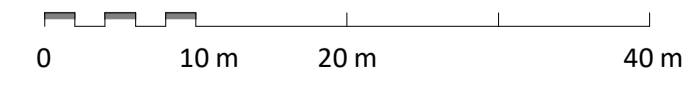
- Benches
- Curved benches
- Tables and benches
- Canopy
- Outdoor gym equipment
- Cafe style tables and seating
- Sheffield cycle stands

FENCING
Refer to Fencing and Site Security Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-9040

- Existing Boundary Fence (to be retained)
Repairs and making good as required.
- Proposed Fencing

NOTE:

- For levels and drainage information refer to engineers plans and details.
- All roof rain water run-off to discharge via green roof system or rain gardens.
- All other landscaping borders are purely ornamental with no dual drainage function.



SO	PL01	24/08/23	First Draft for Team Co-ordination
STATUS	REV	DATE	DESCRIPTION
			REVISED BY
			CLIENT
			AECOM
			CHECKED BY
			CS
			ORIGINATOR NO
			155452

CONSULTANT
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PROJECT
Ysgol Glantaf SRB
Bridge Road, Cardiff CF14 2JL

DRAWING TITLE
Landscape GA Plan

STATUS CODE	SCALE
SO : Work in progress (Initial Status)	1 : 500@A1
DRAWING USAGE:	
PROJECT - ORIGINATOR - VOLUME - LEVEL - TYPE - ROLE - CLASS - NUMBER	STATUS - REVISION
GSRB-STL-XX-XX-DR-L-09001	SO_PL01

B Proposed Development Plans

Offices at

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