

Cardigan Hospital Flood Consequence Assessment

Version 4
December 2023

Prepared for:
Enfys Developments Limited
Archway House
Llanishen
Cardiff
CF14 5DU

www.jbaconsulting.com

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Prepared by	George Williams BSc (Hons) MSc MCIWEM
Reviewed by	Faye Tomalin BSc (Hons) MSc MCIWEM C.WEM
Authorised by	George Baker BEng AIEMA CEnv IEng MCIWEM C.WEM

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Contract

JBA Project Manager	Faye Tomalin BSc (Hons) MSc MCIWEM C.WEM
Address	Kings Chambers, 7-8 High Street, Newport, South Wales, NP20 1FQ
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Abbreviations

AEP	Annual Exceedance Probability
BGS	British Geological Survey
FCA	Flood Consequence Assessment
FMfP	Flood Map For Planning
FRMP	Flood Risk Management Plan
LDP	Local Development Plan
LiDAR	Light Detection And Ranging
NGR	National Grid Reference
NRW	Natural Resources for Wales
OS NGR	Ordnance Survey National Grid Reference
SFCA	Strategic Flood Consequence Assessment

1 Introduction

1.1 Terms of reference

JBA Consulting were appointed by Enfys Developments Ltd, herein after referred to as 'The Client' to prepare a Flood Consequence Assessment (FCA) for a mixed-use residential and commercial development on the former Cardigan Hospital site, Cardigan. This FCA demonstrates the suitability of the proposed development and describes flood mitigation recommendations to manage flood risk at the site.

This FCA (Version 4) is an update to the previously submitted FCA (Version 3) in July 2021. This update reflects proposed changes to the site layout and levels. Additionally, Welsh Government guidance on climate change allowances was updated in September 2021 and has therefore been applied to this updated assessment. Consequently, the FCA considers the flood risk to the updated site proposals and includes a revised assessment of the impact of climate change using current climate change guidance.

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 Risk (TAN-15). Where appropriate, the following aspects of flood risk will be addressed in all planning applications over its expected lifetime in flood risk areas:

- The likely mechanism of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation at the site
- The rate of rise of flood water through the site
- Velocities of floodwater 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 impacts of the development in terms of flood risk on neighbouring properties and elsewhere on the floodplain.

2 Site Description

The proposed development site herein after referred to as 'the site' is located on the former Cardigan Memorial Hospital site, Cardigan, SA43 1DW. The site is bounded by Pont-Y-Cleifion Rd to the north and the A487 to the east. To the west the site is bounded by St Mary's Church with the town of Cardigan located further west. The tidally influenced Afon Teifi marks the southern boundary of the site.

Access to the site is provided at two locations along Pont-y-Cleifion Road, as is shown in Figure 2-1 Proposed development site. The site is 1.03ha in size and currently consists of the former hospital buildings and associated car parking to the central and northern extents of the site. The southern and eastern extents of the site are comprised of landscape areas associated with the former hospital use and a small area of woodland.



Figure 2-1 Proposed development site

Table 2-1 Site summary

Site Name	Cardigan Hospital
Site Area	1.03 ha
Existing Land use	Cardigan and District Memorial Hospital
Purpose of development	Residential apartments and commercial offices
OS NGR	SN 181460
Local Planning Authority	Ceredigion County Council
Lead Local Flood Authority	Ceredigion County Council

2.1 Existing land use

Until recently the site housed the Cardigan & District Memorial Hospital, including a Minor Injury Unit that served the local community until its closure in December 2019, as shown in Figure 2-2

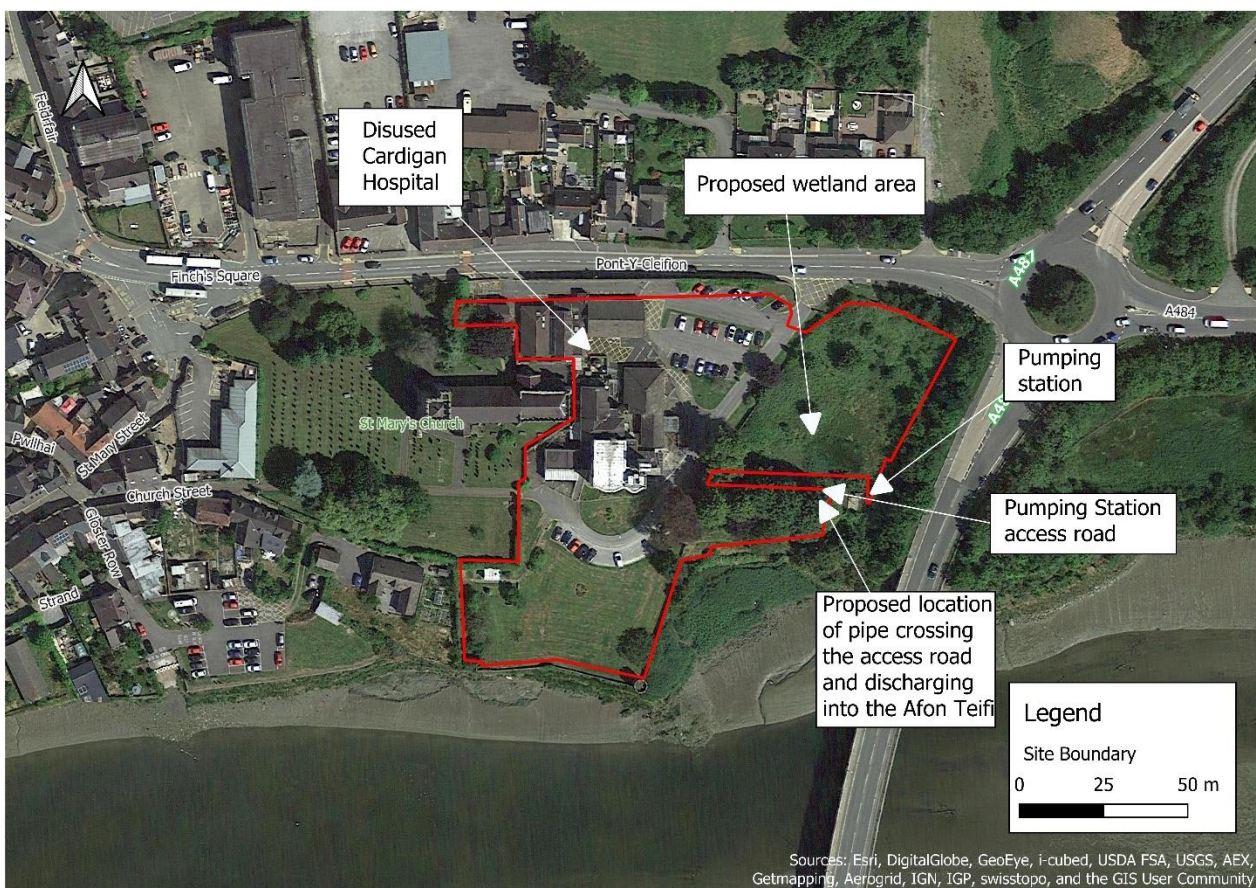


Figure 2-2 Aerial imagery of the site



Figure 2-3 Nash House

The buildings on the site include Nash House, shown in Figure 2-3, originally built in 1792. The building extended to the north, east and west in 1922 to form the Cardigan Memorial hospital. The eastern extent of the site is separated from the main hospital area by a stone wall which surrounds the southern and western borders of the site.

A Dwr Cymru / Wesh Water pumping station is located in the south-east of the site (as shown in Figure 2-4) and can be accessed by a small track to the east of the current hospital buildings. It is understood that this pumping station receives flows from the combined system serving the former Cardigan Hospital. Combined flows from the public sewerage network serving areas of Cardigan to the north are also received by this pumping station. Flows are then pumped westwards towards the wider Cardigan sewer system to the west of the site. A plan of the sewer network is presented in Appendix A.



Figure 2-4 DCWW Pumping station.

2.2 Site topography

John Vincent Surveys Ltd undertook a topographic survey in February 2021 to determine the current site levels. A copy of the survey results is presented in Appendix B. Figure 2-5 shows Natural Resources Wales (NRW) Open Source 1m Light Detection and Ranging (LiDAR) data¹ which provides an alternative illustration of the sites topography. Since the 2021 topographic survey, site clearance works have been undertaken at the site, including demolition of most buildings.

The topographical survey shows that the site generally slopes down from the west to the south-eastern corner.

Ground levels are 6.41mAOD in the north-western corner of the site, around the existing buildings, and slope in an easterly direction towards the car park.

Ground levels around Nash House are between 4.48mAOD and 4.09mAOD. Site levels slope south from Nash House towards the southern boundary of the site where they reach lows of 2.9mAOD.

¹ LiDAR 1m resolution 2020-22 DSM (16bit) | DataMapWales (gov.wales)

The ground levels of the car park are between 4.78mAOD in the northwest to 3.16mAOD along the boundary wall between the main hospital site and wetland area.

The lowest areas on the site are in the wetland and woodland area to the east of the hospital site. In this part of the site, ground levels are highest in the north, and generally fall south towards an area of standing water. Ground levels in this area range from 3.5mAOD in the north-western corner to 2.0mAOD at the pond's edge.

Between the Afon Teifi and the woodland/wetland area is a strip of higher ground running continuous between the A487 and hospital gardens at a minimum level of 3.0mAOD. Behind which is the DCWW pumping station located at a ground level of approximately 2.5mAOD.

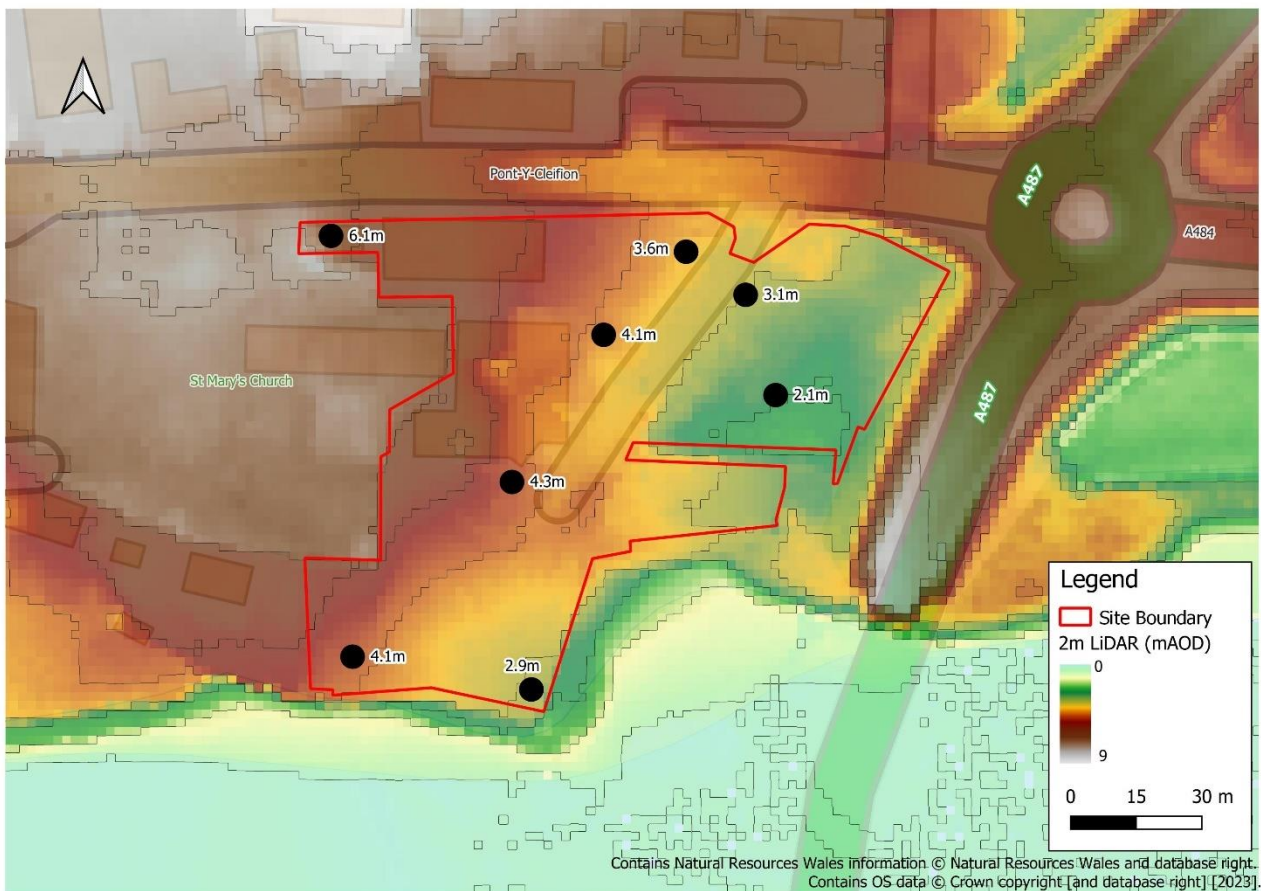


Figure 2-5 LiDAR Topographic data from NRW (1m resolution)

2.3 Soils, geology, and watercourses

Cranfield University Soilscape² has classified the soils as 'Soilscape 18', which can be described as 'slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils with impeded drainage'.

² LandIS - Land Information System - Soilscape soil types viewer

According to the British Geological Society (BGS) BGS Geology Viewer³ the underlying geology is comprised of the Nantmel Mudstone Formation.

The southern boundary of the site is located along the eastern bank of the Afon Teifi, an NRW Main River, as shown in Figure 2-6. The Afon Teifi is tidally influenced below Llechryd, descending through the steep sided Cilgerran Gorge to Cardigan. West of Cardigan and St Dogmaels, the river broadens into a wide estuary with Poppit Sands on its west bank and Gwbert on its east bank as it enters Cardigan Bay.

An unnamed ordinary watercourse is culverted underneath the site and is assumed to outfall into the Afon Teifi from a 1m diameter tide flap located in the south-eastern corner of the site, ascending to a smaller surface water outfall. An ordinary watercourse refers to those watercourses that are no under the jurisdiction of NRW but are managed by the Lead Local Flood Authority (LLFA)

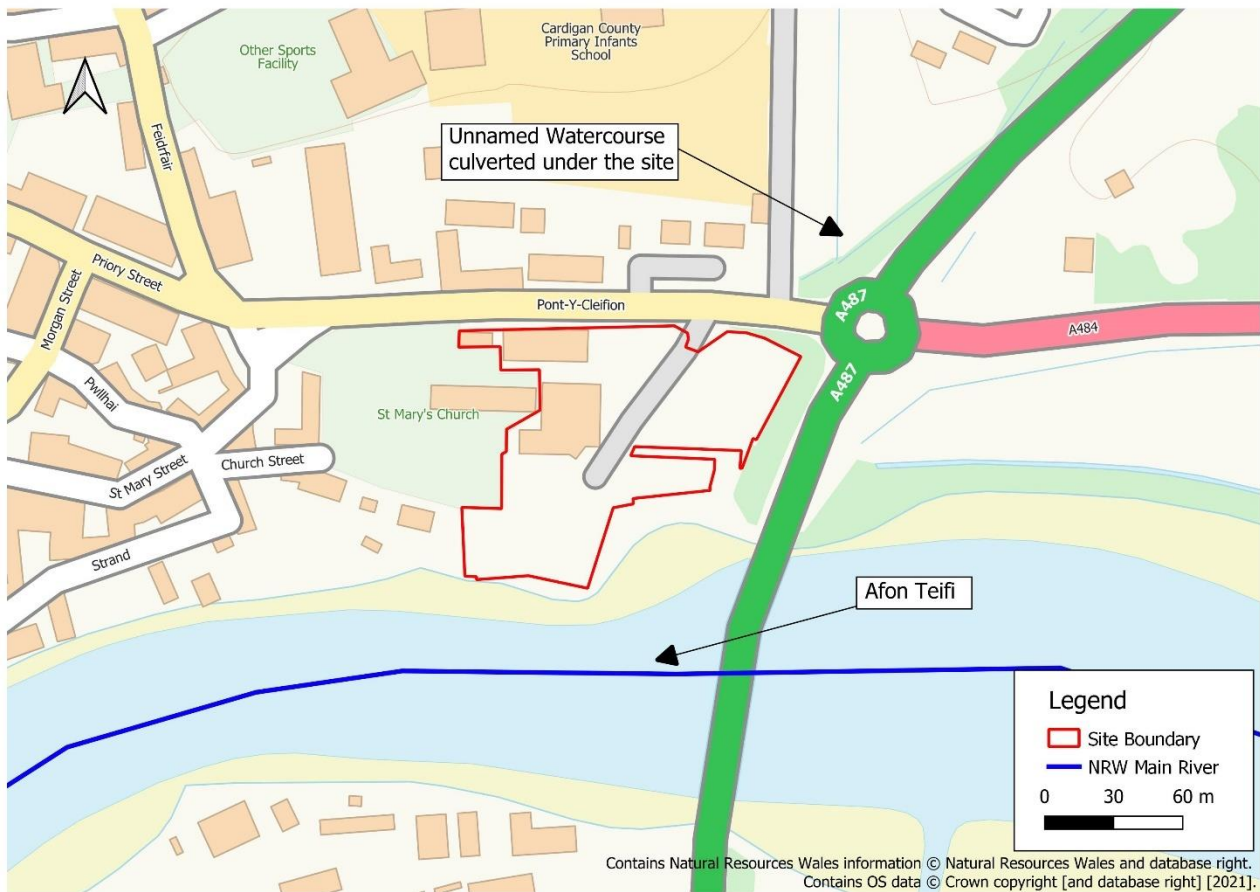


Figure 2-6 NRW Main rivers close to site

³ BGS Geology Viewer (BETA)

2.4 Proposed development

The proposals for the site are to redevelop the site for residential and commercial use. The ground floor design of the proposed development, including the Finished Flood Levels (FFLs) are shown in Figure 2-7 and Appendix C.

The development plan proposes to preserve and repurpose the existing Nash House building due to its heritage value. The building will be used as a café, office space and storage. An extension will be added to the east of the building to provide new offices for Wales and West Housing. To the west of Nash House, a new terrace for the Café will be constructed. The proposals include a sensory garden to the west of Nash House.

To the north-west of the site there are three proposed blocks of residential units (Block A-C). Associated car parking for these residential blocks is also proposed to the south of the residential blocks and north-west of Nash House.

The 'Cambria Building' in the north-east of the site is a proposed storage unit with training facilities. Associated carparking for the 'Cambria Building' will be located to the south of the building. The proposed occupiers of the 'Cambria Building' are Cambria Maintenance Services, a property maintenance subsidiary of Wales and West Housing.

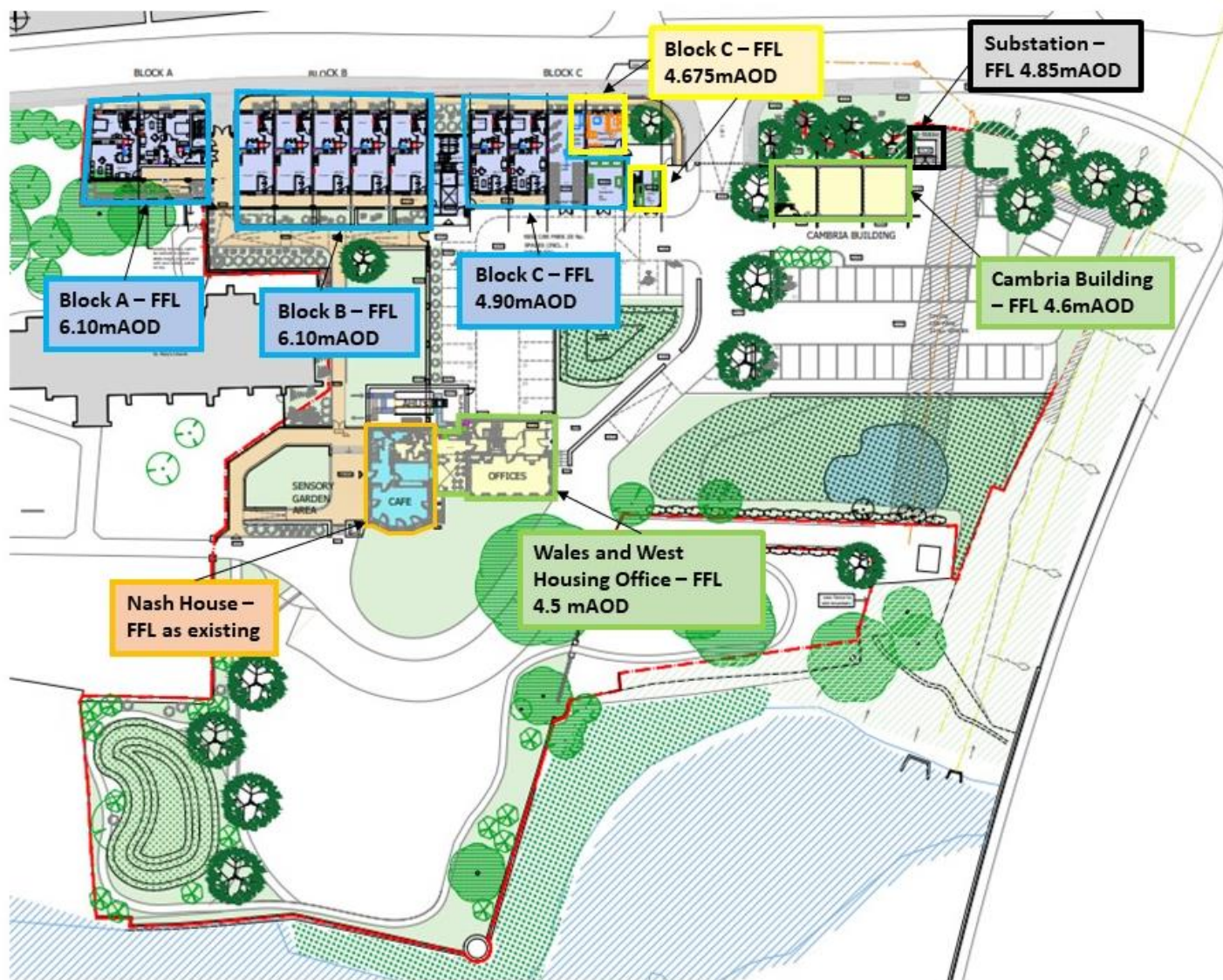


Figure 2-7 Proposed Ground Floor Plan

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 and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing of Future Generations Act 2015.

Technical Advice Note (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. However, Welsh Government subsequently suspended its implementation to undertake further consultation on the proposed changes. It is not currently known when the new TAN-15 will be published and implemented in its final form.

Although the new TAN-15 is not a material consideration, the Welsh Government and NRW advise that some consideration is given to the 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 undertaken.

As a result of the above, both the DAM and FMfP are considered as part of this FCA, although only the policies of the current TAN-15 have been applied to the assessment.

3.2 Vulnerability Classification

TAN-15 assigns one of three flood risk vulnerability classifications to a development, as shown in

Table 3-1 TAN-15 Vulnerability Classifications. The proposed development is for a mixed-use development that includes residential and commercial components. The proposed residential development is classified as '**Highly Vulnerable**' whilst the commercial development is classified as a '**Less vulnerable**' development. As the site was previously a Hospital, the proposed redevelopment of the site will lead to a **reduction** in the vulnerability classification.

Table 3-1 TAN-15 Vulnerability Classifications

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.

3.3 Lifetime of development

The Welsh Government latest technical guidance for climate change states:

"When considering new development proposals, Technical Advice Note 15: Development, Flooding and Coastal Erosion (TAN15) states that it is necessary to take account of the potential impact of climate change over the lifetime of development. A rule of thumb is that residential development has a lifetime of 100 years while a lifetime of 75 years is assumed for all other developments."

There is established precedent that the lifetime of a development for a 'Less Vulnerable Development' can deviate from the above guidance where justified and agreed with the Local Planning Authority. Consequently, it is proposed that the lifetime of the 'Cambria Building' deviates from the standard 75 years, allowing it to be considered against a more realistic lifetime of development. This is recommended for the following reasons:

1. The Cambria Building will be of simple construction, typical of light industrial/storage units. Such buildings typically having design lives less than 50 years.
2. The building must be located close to the site entrance and consequently it would be impractical to raise the building's floor level any further without impacting the required level access into the building. The building will be raised approximately 350mm above the ground level of the entrance.
3. The building, its function, occupants, and users naturally have a high resilience to flooding, which will be enhanced with a robust flood plan and with a flood resilient design (raised electrics etc.).

A breakdown of the proposed lifetime for each part of the development is shown in Table 3-2.

Table 3-2 NRW Development lifetime

Development Type	Lifetime of development
Residential development and associated car parking	100 years
Substation	100 years
New office block, Café, and associated car parking	75 years
Cambria Building	50 years (will be assessed for 75 years)

3.4 Ceredigion County Council's Local Development Plan

In 2007, Ceredigion County Council adopted their Local Development Plan (LDP4) (2007-2022). This LDP provides the basis for decisions on land use planning up to 2022. Despite coming to the end of this period, the LDP remains current due to development of LDP2 being paused since April 2020 due to the COVID-19 pandemic.

The proposed development contributes to the following LDP policies and targets:

Objective 1- “Provide a range of mixed housing to meet urban and rural housing requirements”.

Appendix 3 - Monitoring Framework- “Previously developed (or brownfield) land should, wherever possible, be used in preference to greenfield sites”.

Policy S01: Sustainable Growth- Create “employment opportunities to provide for 4000 jobs across the County in a sustainable manner in line with Policies S02, S03 and S04”.

The proposed development will create residential housing in the local area, support new local employment opportunities, will bring back into use a prominent vacant site.

Development Advice Map Classification

4 Ceredigion County Council (2013) *Ceredigion Local Development Plan 2007-2022*. Retrieved from <http://www.ceredigion.gov.uk/media/6223/ceredigion-local-development-plan-ldp-volume-1-strategy-and-policies-english.pdf>

Table 3-1 shows that the proposed development site is partially located in Zone C2 of the DAM. The DAM is used to trigger different planning actions based on a precautionary assessment of flood risk. Zone C2 describes areas of the floodplain without significant flood defence infrastructure. The area of the site outside of Zone C2 is within Zone A, considered to be at little or no risk of fluvial or tidal flooding, and thus can be developed without the need to consider flood risk further.

Less vulnerable development, within Zone C2 can take place subject to the application of the Justification Test, including the acceptability of consequences.

Highly vulnerable development, such as residential, is not acceptable within DAM Zone C2.

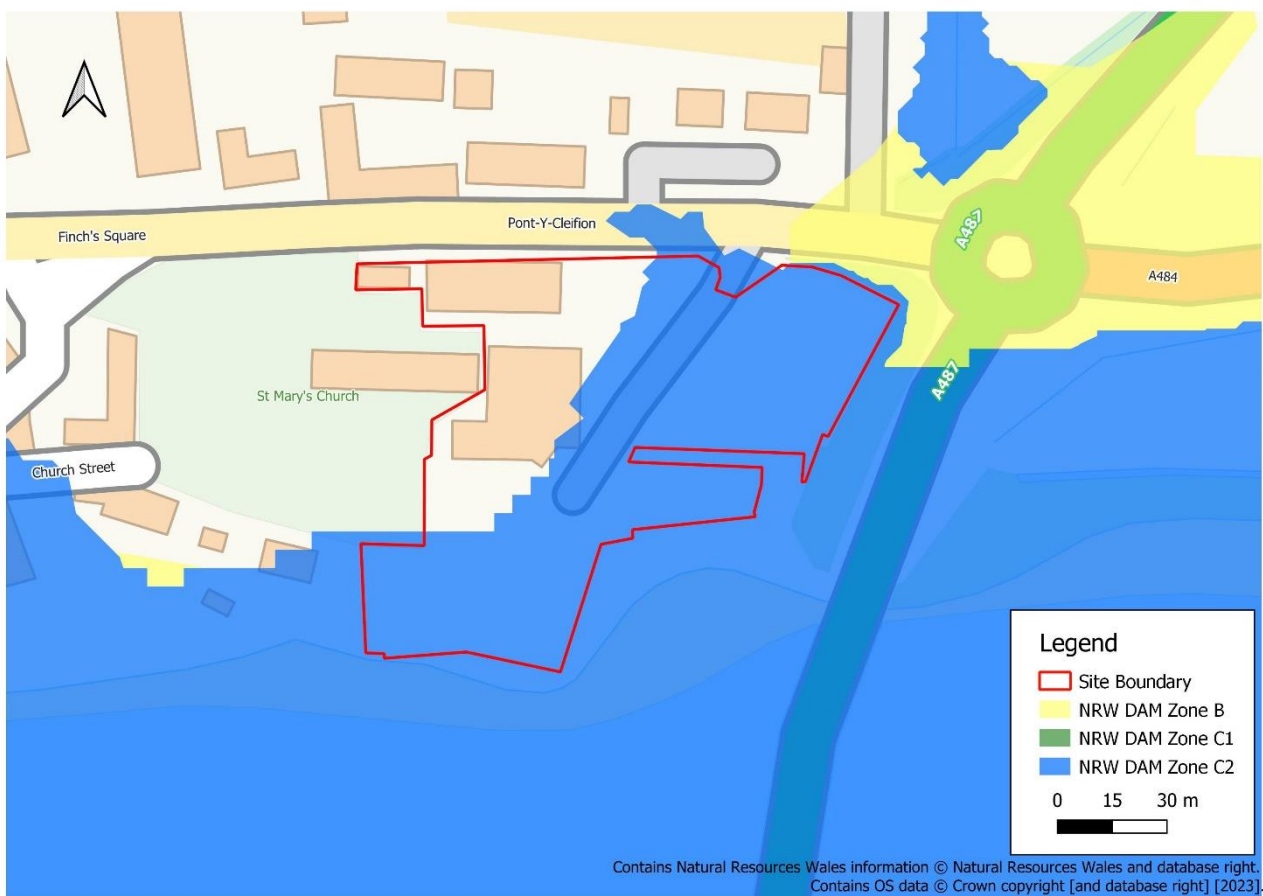


Figure 3-1 Development Advice Map (DAM)

The proposed redevelopment of the site has been carefully planned to ensure that residential development has not been proposed in Zone C2.

3.5 Flood Map for Planning Classification

3.5.1 Flood Map for Planning - Flood Risk from Rivers

According to the FMfP the site is in various Flood Zones as shown in Figure 3-2 FMfP - Flood Risk from Rivers. The north-eastern portion of the site as well as smaller areas along the eastern boundary of the site are located in Flood Zone 3. Areas in Flood Zone 3 have a

greater than 1% (1 in 100) AEP chance of flooding in any given year, with an allowance made for climate change.

An area extending from Pont-Y-Cleifion to the southern extent of the site boundary from north to south and occupying much of the central areas are located within Flood Zone 2. Flood Zone 2 represents an area with a risk of flooding that is less than 1% (1 in 100 year) but greater than or equal to a 0.1% (1 in 1000 year) AEP in any given year, with an allowance made for climate change.

Two small portions of the site, one located in the north-western corner of the site and one running from the central western to the south-western corner of the site are in Flood Zone 1. This is shown as transparent on the map and therefore not displayed graphically.



Figure 3-2 FMfP - Flood Risk from Rivers

3.5.2 Flood Map for Planning - Flood Risk from the Sea

Most of the proposed site is located within Flood Zone 2 and 3 of the FMfP for the sea, as shown in Figure 3-3. Flood Zone 3 represents a greater than 0.5% (1 in 200 year) AEP chance of flooding from tidal sources in any given year. A small portion of the site, mainly located in western extremities of the site boundary are in Flood Zone 1. Flood Zone 1 represents a less than 0.1% (1 in 1000 year) AEP chance of flooding in any given year from tidal sources.

It is worth highlighting that the current FMfP for flood from the sea is based on a 100-year lifetime of development and does not utilise Welsh Government's latest climate change guidance.

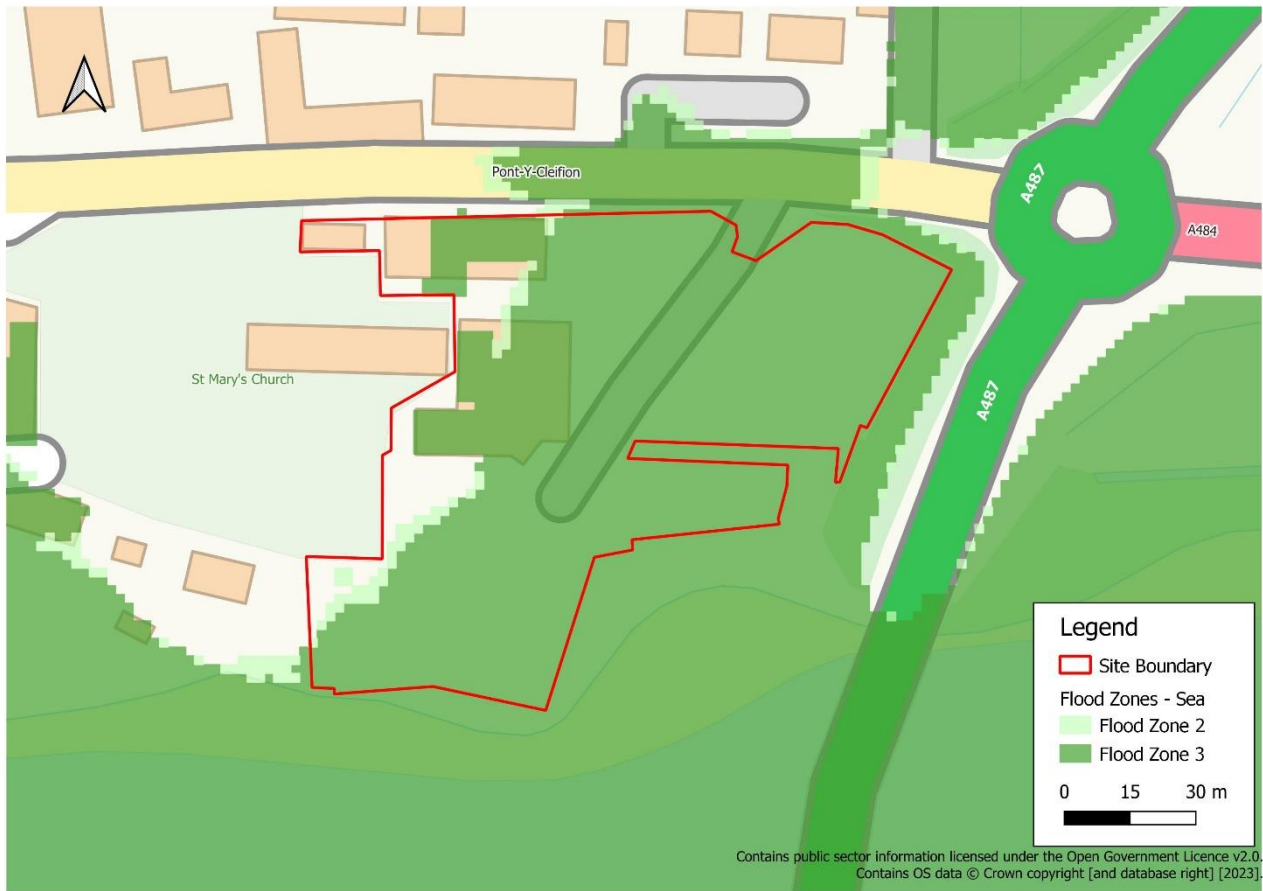


Figure 3-3 FMfP - Flood Risk from the Sea

4 Flood risk Assessment

This section assesses the risk to the site from all sources of flooding, the risk of increased flooding to others, and how flood risk can be managed. Information is taken from publicly available data sources.

4.1 Review of existing flood risk data

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

Table 4-1 Summary of flood risk

Sources of Flooding	Onsite Presence	Description
Flood Risk from Rivers	✓	Portions of the site are at ' low ' risk of fluvial flooding, whilst others are at ' very low ' risk
Flood Risk from the Sea	✓	Portions of the site are at ' high ' risk of flooding from tidal sources. Some areas are at ' low ' risk.
Flood Risk from Surface Water and Small Watercourses	✓	North-eastern portion to central eastern portion at ' high ' risk of flooding from surface water or small watercourses.
Flood Risk from Groundwater	✗	The site was assessed to have a very low risk of groundwater flooding
Flood Risk from Reservoirs	✗	The site was assessed to have a very low risk of flooding from reservoirs or artificial sources.
Flood Risk from Sewers	✓	The site was assessed to have a medium risk of sewer flooding. This is because of previously recorded sewer flood events and the presence of a combined sewer traversing the southern area of the site.

4.2 Historical Flooding

NRW's map of recorded flood extents does not show any evidence of historic flooding at the site. No further records of historic flooding were identified at the site in the Mid Wales - Strategic Flood Consequences Assessment (SFCA)⁵.

⁵ <https://www.ceredigion.gov.uk/media/13336/202211-01-mid-wales-strategic-flood-consequences-assessment-stage-1-eng.pdf>

4.3 Flood Risk from Rivers

According to the NRW Flood Risk Assessment Wales (FRAW) map the site is at low risk of fluvial flooding from the tidally influenced Afon Teifi, as seen in Figure 4-1 FRAW - Flood risk from rivers. This represents a between 0.1% (1 in 1000 year) AEP and 1% (1 in 100 year) AEP chance of flooding in any given year from fluvial sources. This site has been assessed to be at greater risk from flooding from the sea and therefore, a more detailed assessment of tidal risk has been conducted. Knowing that the tidal risk can be managed at this site will also mean that the fluvial risk will be adequately managed.



Figure 4-1 FRAW - Flood risk from rivers

4.4 Flood Risk from the Sea

NRW's FRAW mapping indicates that the site is in an area at high to low Flood Risk from the Sea, due to the tidally influenced Afon Teifi, as shown in Figure 4-2. This means that the site has a chance of tidal flooding of between 0.1% (1 in 1000year) AEP and 3.3% (1 in 30 year) AEP in any given year.

In the high-risk flood event (3.3% AEP), flood water is present in the eastern and southern parts of the site. Flood water is predominantly confined to the wetland and woodland area in the eastern part of the site, however, a small part flows onto the existing access road from the hospital where ground levels (according to the Digital Elevation Model) are lower than

those of the surrounding area. Flood water is also present in the south-eastern corner of the site in the landscaping area to the south of the hospital buildings.

In the medium flood risk scenario (between 0.5% AEP (1 in 200 year) and 3.3% AEP (1 in 30 year)), the extent of flooding increases significantly. Under this scenario the existing hospital building as well as the existing car park and access road in the east of the site are impacted. The extent of flooding in the landscaped area in the south of the site also increase.

In the low-risk scenario (between 0.1% (1 in 1000 year) AEP and 0.5% (1 in 200 year) AEP) the extent of flooding has not significantly increased from the high and medium risk scenarios. Under this scenario the current car park and the south of the site are impacted.

The site does not benefit from any flood defences.



Figure 4-2 FRAW- Flood risk from the sea

To better understand the risk associated with tidal flooding, further assessment of the risk has been undertaken to calculate extreme sea levels at Cardigan now and for the future. This work has been based on the current guidance⁶, and the best available data⁷. These calculations are based on estimates of extreme sea levels on the open coast. It is

6 Flood Consequences Assessments: Climate change (gov.wales)

7 Coastal flood boundary conditions for the UK: update 2018 (publishing.service.gov.uk)

considered suitable and precautionary to apply these tidal levels at Cardigan, as the hydraulic constrictions at Poppit Sands and Castle Street Bridge are likely to attenuate and not amplify tidal levels as they propagate upstream (i.e. no tidal prism effects). The predicted levels are shown in Table 4-2.

Table 4-2 Predicted Maximum Sea Level (mAOD)

Epoch (year)	0.5% AEP (1 in 200) event	0.1% AEP (1 in 1000) event
2023 - Present day	3.66	3.81
2073 - 50 yrs	4.06	4.21
2098 - 75 yrs	4.34	4.49
2123 - 100 yrs	4.65	4.80

4.5 Flood Risk from Surface Water and Small Water Courses

Surface water flooding occurs when rain falling on saturated or impermeable ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can also originate from surcharging blocked sewers or drains. Depending on the return period, sewer flooding can also occur from the overloading of sewers due to their capacity being exceeded by large amounts of surface water. This typically occurs in events exceeding the 1 in 30 year (3.3% AEP). Overland flow can therefore pose a risk to both the development site and surrounding land. Overland flows may originate from the site itself or adjoining land at a higher elevation from which flow migrates onto the development area.

The NRW FRAW map indicating the risk of flooding from surface water and small watercourses shows that most of the site has a very low risk of flooding from surface water and small watercourses, as shown in Figure 4-3.

According to NRW's National Flood Hazard mapping, flood depths are predicted to be a maximum of 1.2m in the site's wetland and woodland area, with flood depths across most of the site, less than 0.7m in this most extreme flood event. As noted in section, 2.2 site levels fall from northwest to the south-east of the site, towards the wetland and woodland area where site levels are the lowest. Due to the topography of the site, surface water from the site and the surrounding area flows into this area and ponds, unable to drain into the Afon Teifi due to the 3.0mAOD embankment along the riverbank.

The unnamed culverted watercourse noted in Section 2.3 has not been included in the broadscale modelling that the FRAW map is based upon. Consequently, without this 1m culvert the watercourse is unable to drain to the Afon Teifi, leading to a significant overestimation of flood risk.

Notwithstanding the likely overestimation of surface water and small watercourse flood risk, any flooding of the site will be controlled by the level at which water can drain into the Afon Teifi. This is control by the embankment along the Afon Teifi which has a level of approximately 3.0mAOD. Therefore, flood levels from this source of risk are unlikely to exceed this level in any event.

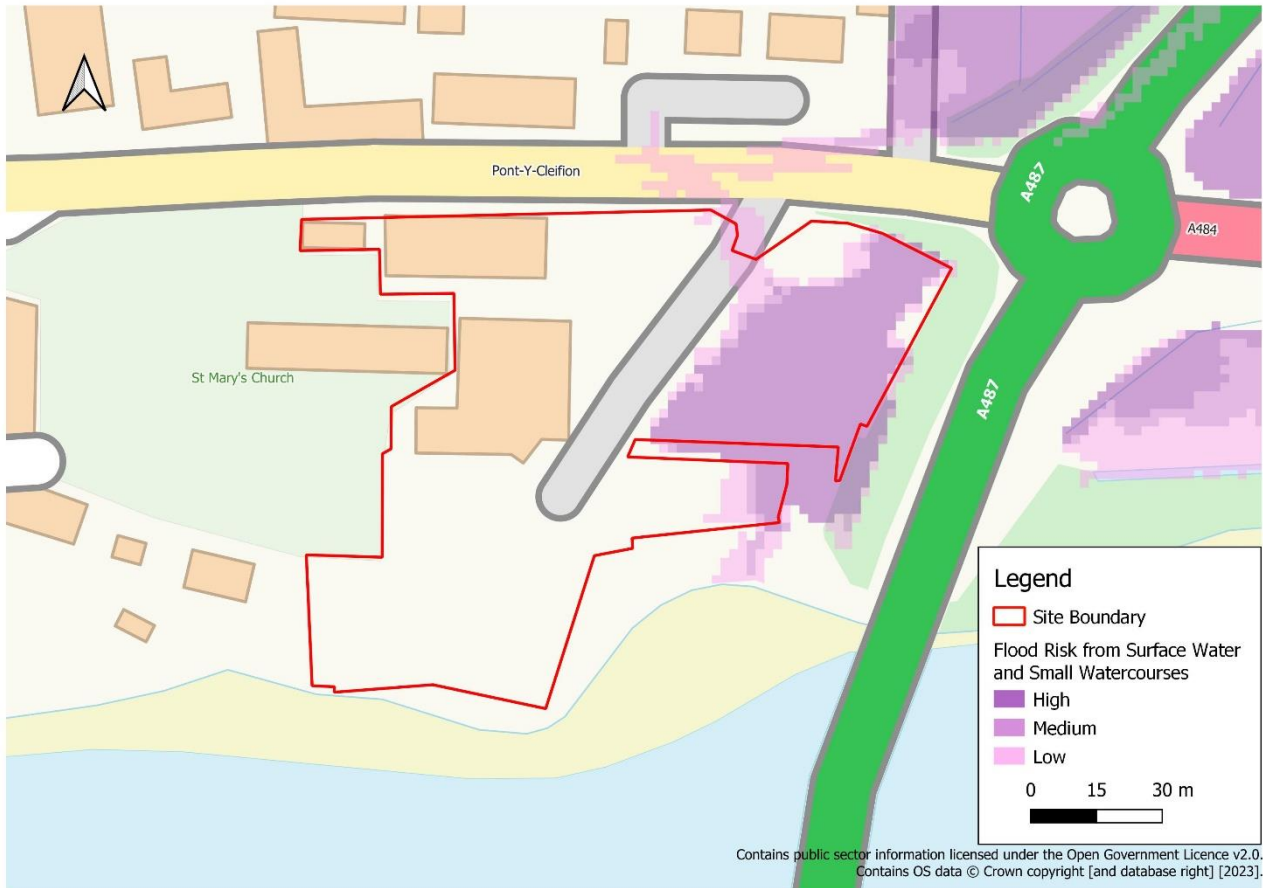


Figure 4-3 FRAW- Risk from surface water and small watercourses

4.6 Flood risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels and is closely linked to the underlying strata. Ground water flooding occurs when excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than other forms of flooding, lasting for weeks or months and can result in considerable damage to properties.

The Mid Wales SFCA states that groundwater levels in Cardigan are the closest to the surface and are predominantly at least 0.5m from the surface. The SFCA also states that some areas of Cardigan have groundwater levels between 0.025m and 0.5m below ground level, this would represent a risk of groundwater flooding. However, after reviewing the BGS borehole records, recorded groundwater levels near the site are at approximately 4.0m-6.5m below ground level and would not pose a risk at the proposed site.

Additionally, given the proposed sites proximity to the Afon Teifi, groundwater levels are likely to be in continuity with the average river levels.

It has therefore been assessed that the risk of groundwater flooding at the site is **very low**.

4.7 Flood Risk from Reservoirs

NRW flood maps indicate that the proposed development site is not at risk of flooding due to reservoir failure. It can, therefore, be assessed that the risk of flooding from reservoir failure is **very low**.

4.8 Flood Risk from Sewage

The Mid Wales SFCA - Flood Risk Review tabulates sewer flood incidents by electoral ward. This data was provided by Dwr Cymru / Welsh Water, who keep records on incidents of sewer flooding.

Dwr Cymru / Welsh Water (DCWW) are responsible for the sewer infrastructure and records of sewer flood incidents across Ceredigion. Within the Mid Wales SFCA- Flood Risk Review the number of sewer flood incidents within Ceredigion is presented. This data shows that there have been 41 incidents of sewer flooding within Cardigan. This is the highest number of incidents across the whole of the Ceredigion study area and relates to well know issues in the area. Major investment works were completed by Welsh Water in 2021 to reduce incidents of sewer flooding in the area. This is believed to have resolved the issues in the area. There are no reports of the Site experiencing sewer flooding.

As mentioned in Section 2.1 a DCWW combined sewers runs westwards through the southern extent of the site from the pumping station located near the south-east extent of the site. Combined sewers are most at risk from flooding as they can become overwhelmed during intense rainfall events.

Therefore, it can be assessed that sewer flood risk at the site is **medium**. This recognises the historical prevalence of sewer flooding in the wider area and the Welsh Water assets on the site.

5 Flood Risk Management

Tidal flooding has been identified as the most significant source of flood risk at the site. It is recognised that the risk of flooding constrains development on the site. Therefore, to manage the risk of flooding to the proposed development, the site design has carefully been developed using a sequential approach to locate the most vulnerable parts of the development to the areas at lowest risk of flooding. The design of the site, the raising of the finished floor levels, and the proportionate raising and sloping of other areas will manage the risk of flooding appropriately. Part of the wetland area (to the southeast of the site) and the landscaping area to the south of Nash House are not being developed as a result of the risk of flooding, and all residential development has been located outside of the DAM Zone C2.

In the following section, an assessment of the risk to tidal flooding to each component of the proposed development has been undertaken.

5.1 Residential development

Three apartment blocks are proposed in the western extent of the site. Block A, B and C are located along the site's northern boundary. Finished Floor Levels (FFLs) will be 6.10mAOD for Blocks A and B, whilst the western half of Block B will be set at 4.9mAOD with the electrical switch room and office bin store having FFLs of 4.65mAOD.

Associated residential car parking spaces have been provided to the south of the residential blocks. The car parking spaces will have a minimum level of 4.65mAOD, although generally higher.

5.1.1 Flood risk for the lifetime of the development

The lifetime of development for the residential development is 100 years. The predicted flood level for the 0.5% (1 in 200 year) AEP event in the 2123 epoch is 4.65mAOD and 4.80mAOD for the 0.1 AEP (1 in 1000 year) event.

Given that the FFL for all residential development block is higher than both the 0.5% and 0.1% AEP flood levels they are not expected to flood during the lifetime of the development. The associated residential car parking has a minimum level of 4.65mAOD, which is at the level of the 0.5% event and lower than the 0.1% AEP flood level.

Predicted water levels for the 2123 epoch indicate that the car parking spaces will not flood during the 0.5% (1 in 200 year) AEP event but will flood to a shallow depth of up to 150mm in the 0.1% AEP event. Consequently, the proposed residential development and associated parking comply with the acceptability criteria of A1.14 and A1.15 of TAN-15.

A summary of flood depth and levels are included in

Table 5-1 Flood depth and levels for residential

Table 5-1 Flood depth and levels for residential development

Flood Risk Scenario	Predicted flood level (mAOD)	Flood depths on the site
0.5% 2023	3.66	Flood Free
0.1% 2023	3.81	Flood Free
0.5% 2123	4.65	Flood Free
0.1% 2123	4.80	Dwellings - Flood Free Car Parking Spaces - flood depths of up to 150mm

5.2 Café and Wales and West Housing offices

The existing Nash House building is proposed to be renovated for use as a café and office space. Development in this part of the site will also include a new office block which will extend to the east of Nash House. The lower ground floor of Nash House will accommodate office space, with the café located on the upper ground floor, and further office space located on the first floor. A café terrace will also replace the existing west extension to Nash House.

The lower ground floor of Nash House is already established at 3.61mAOD. However, through careful design the lowest point of entrance (i.e. windowsill, threshold on access steps) shall be maintained at a level of 4.50mAOD. The upper ground floor of Nash House is established at 6.27mAOD. The new café terrace will have a finished floor level of 6.30m AOD.

The new Wales and West office building, that extends to the east of Nash House, will have a ground floor FFL of 4.5mAOD.

5.2.1 Flood risk for the lifetime of the development

The lifetime of development for an office and café is 75 years. Consequently, flood levels have been predicted for the 2098 epoch. The predicted flood level for the 0.5% AEP 2098 epoch is 4.34mAOD, and for the 0.1% AEP 2098 epoch is 4.49mAOD.

During the 0.5% AEP 2098 epoch event all areas of office and café space are predicted to be flood free, satisfying the requirements of TAN15 A1.14.

During the 0.1% AEP 2098 epoch event most areas of the office space are flood free with the exception of the lower ground floor levels.

The existing lower ground floor level of Nash House is predicted to flood to a depth of 880mm. Although, such flooding is slightly over the recommended and indicative guidance of TAN15 A1.15 it should be acknowledge that this is the refurbishment of an existing building of historical value and all practical measures have been taken to minimise the risk of flooding to this relatively small space.

As the surrounding threshold levels are to be set to 4.50mAOD, flood water would have to breach these areas before flooding the entrance to the lower ground floor of Nash House. Therefore, flood depths of 880mm represent a 'worst-case scenario'.

A summary of the flood levels and depth are presented in Table 5-2 Flood levels and depth for Nash House and Office buildings below.

Table 5-2 Flood levels and depth for Nash House and Office buildings

Flood Risk Scenario	Predicted flood level (mAOD)	Flood depths on the site
0.5% 2023	3.66	All areas flood free
0.1% 2023	3.81	All areas flood free
0.5% 2098	4.34	All areas flood free
0.1% 2098	4.49	Lower ground floor of Nash House - 880mm

5.3 Cambria Building

The Cambria building is proposed to be sited in the northeastern corner of the site, to the north of the proposed car park. The building will be used for staff training and storage only. The building has a proposed finished floor level of 4.60m AOD.

5.3.1 Flood risk for the lifetime of the development

The development lifetime for the Cambria Building is anticipated to be 50 years. However, the Cambria building will be assessed against the 75-year lifetime of development to align with the current TAN-15 guidance for a non-residential property.

Flood levels have been predicted for the 2098 epoch. The predicted flood level for the 0.5% AEP 2098 epoch is 4.34mAOD, and for the 0.1% AEP 2098 epoch is 4.49mAOD.

During both the 0.5% AEP 2098 epoch event and the 0.1% AEP 2098 epoch event the Cambria Building will remain flood free. This satisfies the requirements of TAN15 A1.14.

5.4 Substation

The electric substation is proposed to be situated in the northeastern part of the site, to the east of the Cambria Building. The substation will have a proposed finished level of 4.85mAOD.

5.4.1 Flood risk for the lifetime of the development

The development lifetime of the substation is 100 years as it shall be serving the residential development. The predicted flood level for the 0.5% (1 in 200 year) AEP event in the 2123 epoch is 4.65mAOD and 4.80mAOD for the 0.1 AEP (1 in 1000 year) event.

The predicted flood level for the 0.5% AEP and the 0.1% AEP 2123 epoch indicates that the substation will remain flood-free during these scenarios. Thus, satisfying the requirements of TAN15 A1.14 and A1.15.

5.5 Commercial Car park

The commercial car park located to the south and east of the Cambria Building is to only be utilised by Wales and West Housing staff. Proposed ground levels vary across the car park from a low of 3.9mAOD in the eastern extent to a high of 4.5mAOD to the west areas of the car park.

5.5.1 Flood risk for the lifetime of the development

As the car park will only be used by Wales and West Housing staff the lifetime of the development is 75 years (2098). The predicted flood level for the 0.5% AEP 2098 epoch is 4.34mAOD, and for the 0.1% AEP 2098 epoch is 4.49mAOD.

Predicted water levels for the 2096 epoch indicate that some parts of the car park will flood in both design events. Maximum depths will range from 350mm during the 0.5% AEP event and 500mm for the 0.1% AEP 2098 epoch event.

Despite some flooding at the site, predicted flood levels are less than the indicative and recommended thresholds (600mm) of A1.14 and A1.15 presented in TAN-15 (2024) or Figure 7 of the December 2021 update of TAN-15.

Additionally given the sites former use the vulnerability classification of the site has considerable reduced.

Therefore, given the above justification its concluded that the proposed car parking area meets the objectives of the acceptability criteria of TAN-15.

A summary of flood depth and levels are included in Table 5-3.

Table 5-3 Flood depth and levels for Commercial Car Parks

Flood Risk Scenario	Predicted flood level (mAOD)	Flood depths on the site
0.5% 2023	3.66	Flood Free
0.1% 2023	3.81	Flood Free
0.5% 2098	4.34	Eastern areas of the site could have flood depths of up to 350mm

Flood Risk Scenario	Predicted flood level (mAOD)	Flood depths on the site
0.1% 2098	4.49	Eastern areas of the car park could have flood depths of up to 500mm

5.6 Access

Most residents are expected to be car free and for them, access and egress to the site will be through the primary pedestrian access between blocks A and B. This entrance provides access to all residential blocks and the café at a minimum level of 4.90mAOD, although generally the level will be quite a lot higher than this.

Pedestrian access to the Wales and West office block has a minimum ground level of 4.50mAOD. Pedestrians access to the Cambria Building has a minimum ground level of 4.60mAOD

The access road from the residential areas to Pont-Y-Cleifion road will be raised to between 4.50 - 4.675mAOD. For the Cambria Building and car park entrance the minimum ground level shall be 4.50mAOD.

It should also be acknowledged that the entrance of the site coincides with a low point on Pont Y Cleifion road of 3.75mAOD, an existing and unchangeable constraint. By raising ground levels between Pont Y Cleifion road and the river, tidal flood water will not be able to reach the road until a water level of 4.00mAOD is reached. Consequently, the proposed development will provide wider benefit in reducing the flood risk to this key road into Cardigan.

5.6.1 Flood risk for the lifetime of the development

Pedestrian access for all residential blocks and the café remains flood free for the lifetime of the development and provides safe and secure dry access across Pont-Y-Cleifion road and high ground.

Vehicular access for residents is constrained by the need to join Pont-Y-Cleifion at its lowest point. When looking at the 2123 epoch flood depths of up to 300mm are predicted on the site access for the 0.1% AEP event. These depths do not exceed the recommended and indicative thresholds of TAN-15 A1.15, although resident should be advised not to enter flood water.

For the 75-year lifetime of development of the Cambria Building the access will be flood free for both the 0.5% AEP and the 0.1% AEP event.

Pedestrian access to the Wales and West office building will be flood free for both the 0.5% AEP and the 0.1% AEP event over its 75 lifetime.

Vehicular access to the Wales and West office is not normally required and instead staff would only drive to the car park. Potential flooding of the car park is cover in Section 5.5.

5.7 Potential for third party impacts

TAN-15 section 7.3 requires that new developments should ensure 'minimal impact on the proposed development on flood risk generally'. TAN-15 provides little guidance on how off-site impacts should be assessed and evaluated. However, NRW have published guidance on 'Modelling for Flood Consequence Assessments'⁸ which provides guidance on the measurable limits of flood models and assessment of off-site impacts. NRW guidance is that an increase greater than 5mm is the measurable limit for the purposes of an FCA.

The proposals have the theoretical potential to increase flood risk to others, as the proposed ground raising to manage on-site flood risk will displace floodwater from the floodplain. In total it is estimated that the proposed development will displace a total of 3,319m³.

The risk of flooding to Cardigan comes from extreme high tides caused by the combination of astronomical high tides and storm surges. Typically, tidal flooding is insensitive to the loss of floodplain storage given the effectively infinite volume of the sea. However, where the tide is more tightly confined as in an estuary or tidal river, some impact on flood risk is at least theoretically possible.

To evaluate the potential impact of the proposals on water levels through Cardigan, an analysis of flood volumes has been completed. This analysis adopted the following approach:

- Calculation of volume of displacement caused by the development. These calculations have been undertaken and provided by the designers on the project.
- Tidal projection modelling of the area from Poppit Sands to Rosehill Marsh. This modelling was undertaken using the extreme sea level predictions contained in Table 4-2. The output of the tidal projection modelling is a maximum flood depth grid.
- Inspect the maximum flood depth grid for defined regions to calculate the total volume of floodwater within those regions. Also, calculate the plan area of flooding in those regions.
- Compare volume of displacement with volume of floodwater.
- Calculate the potential increase in water level within a region as a result of the proposed development and the associated displacement.

The method above was applied to two inspection regions. The first covers the entire area between Poppit Sands to Rosehill Marsh. The second area covered a smaller area of floodplain upstream of the site. The smaller area was chosen as the hydraulics of floodplain storage loss are most likely to affect water levels in this area, due to the way that tidal flooding will surge upstream. Both areas are shown in Figure 5-1.

8 Modelling for FCA's

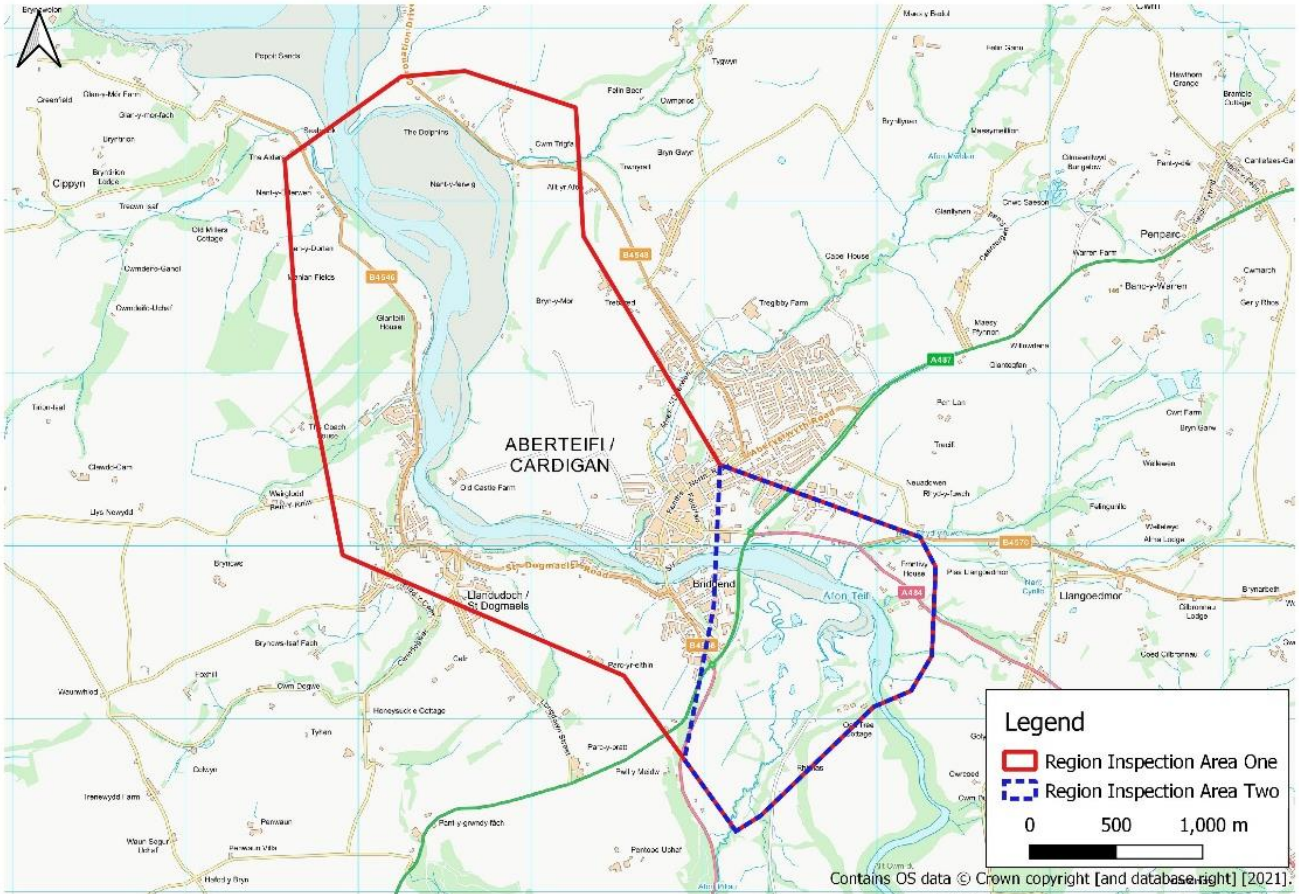


Figure 5-1: Flood volume inspection regions

Table 5-4 Flood Volume Analysis shows the results of the flood volume analysis. This shows that across the larger Poppit Sands to Rosehill Marsh area the potential increase in water level is approximately 0.51mm. Across the smaller Rosehill Marsh area the increase is slightly greater with a maximum increase of 2.3mm.

It is worth noting that the greatest increases have been calculated for the present-day events when the site is not wholly flooded and therefore not all on-site displacement would occur. The analysis also does not consider the temporal effects that would spread the displacement effects across several hours of the tidal cycle. These figures are therefore conservative in nature, although they clearly show that any displacement effects will be well below the measurable limit advised by NRW and shall have no impact upon the flood risk to others.

Table 5-4 Flood Volume Analysis

		Poppit Sands to Rosehill Marsh (larger area)			Rosehill Marsh (Smaller area)		
Epoch	Event	Flood volume (m ³)	Area (m ²)	Increase in water levels (mm)	Flood volume (m ³)	Area (m ²)	Increase in water levels (mm)
2023	0.5% AEP	6,549,011	2,304,080	0.507	1,449,188	760,660	2.290
	0.1% AEP	6,896,615	2,331,240	0.481	2,243,263	840,148	1.480
2123	0.5% AEP	8,918,003	2,474,140	0.372	1,564,206	772,940	2.122
	0.1% AEP	9,290,655	2,494,684	0.357	2,370,026	850,076	1.400

5.8 Summary

Tidal flooding across the site is predicted to be extensive and could affect a significant part of the site. Consequently, in recognising this the redevelopment of the site has been careful considered and a sequential approach applied to the design of the site to protect the most vulnerable site users whilst recognising the challenges of preserving a historical building, connect to the existing highway and maintaining access to DCWW's pumping station. The approach adopted lowers the vulnerability classification of the development and the flood risk across the site in a sensitive, sustainable, and positive way. Most importantly, the residential blocks are predicted to remain flood free for the lifetime of the development up to and including the most extreme 0.1% AEP event.

The proposed flood mitigation measures will have no impact on flooding elsewhere.

6 Emergency planning and flood risk mitigation

6.1 Flood warning

NRW flood warnings for tidal surge events are typically provided 24hrs in advance of a flood event. Flood warnings give notice that “flooding is expected” and “immediate action is required”. A lower grade Flood Alert is used to prepare for possible flooding and is usually issued with a greater lead time of up to two days.

Water levels in Cardigan are closely monitored by NRW using their water level gauge ‘Teifi at Cardigan Quay’ 490m downstream of the site. This gauge provides real-time monitoring and informs NRW flood warnings and flood alerts. The real-time data is publicly available through NRW’s website.

The site is covered by the ‘Tidal area at Cardigan’ flood warning area and the ‘Lower Teifi/Teifi Isaf’ and the ‘Ceredigion coast between Clarach and Cardigan’ flood alert areas. It is recommended that the residential and commercial occupants of the site sign up for these flood warnings. The flood warnings and flood alerts will provide sufficient time for flood preparations to be made.

Given how flood risk has been managed by the design proposals (Section 5), flood preparations will largely consist of moving staff and residents’ cars offsite to parking areas not susceptible to tidal flooding. There is no expectation that residents would need to evacuate the site as internal flooding of residential areas is not predicted and dry pedestrian access will be maintained.

6.2 Flood emergency plan

A Flood Emergency Plan should be prepared before occupation of the site. The plan should give consideration for effective flood warning, evacuation, and access/egress routes in the event of flooding for the lifetime of the development. As landowner, management company and occupier, Wales and West Housing are in a unique position to keep the Flood Emergency Plan up to date and communicate the plan to all staff and residents as necessary. Wales and West Housing will be custodians of the Flood Emergency Plan. This approach can also acknowledge that for many years the flood risk will be very low, only becoming significant over time due to the effects of climate change.

6.3 Management of car parks

Wales and West Housing will manage access to the car parks. If a flood alert or flood warning is triggered, Wales and West Housing will coordinate the evacuation and closure of the car park with their staff and residents if necessary.

6.4 Flood resilient design

During the 2098 epoch 0.1% AEP event only the lower ground floor of the Nash House is expected to experience some flooding. Therefore, it is recommended that Flood Resilience

Measures such as raised electrical sockets, tiled floors and water resilient plaster are considered in the building design (where appropriate). Installation of these measures will enable the development to recover more quickly from a flood event and in a cost-effective manner.

7 Acceptability of Acceptability Criteria

TAN-15 states that for a development to be considered within Zone C2, the proposed development must meet the requirements set out within the justification Test including the Acceptability Criteria. An assessment of the acceptability criteria is summarised in Table 7-1 below. These criteria must be satisfied for the proposed development to comply with TAN-15.

Table 7-1 TAN-15 Acceptability Criteria

TAN-15 Acceptability Criteria	Comments	Assessment
Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e., that flood with a probability of occurrence of 0.1%)	N/A - There are currently no flood defences which benefit the site.	✓
The cost of future maintenance for all new/approved flood mitigation measures, including defences must be accepted by the developer and agreed with NRW.	No flood defences are required for the development. Passive mitigation measures are proposed to raise the site above projected the 0.5% AEP sea level for the lifetime of the development.	✓
The developer must ensure that future occupiers of development are aware of the flooding risks and consequences	A Flood Emergency Plan will be prepared before occupation of the site. (ref. Section 6.2)	✓
Effective flood warnings are provided at the site	The site is covered by the 'Tidal area at Cardigan' flood warning area and the 'Lower Teifi/Teifi Isaf' and the 'Ceredigion coast between Clarach and Cardigan' flood alert areas. NRW provide 24-hour lead times for flood warnings, and 1-2 days for flood alerts. The site is therefore served by effective flood warnings providing sufficient time for flood preparations to be made. (ref Section 6.1)	✓
Escape/evacuation routes are shown by the developer to be operational under all conditions	Flood risk can be safely and appropriately managed with the flood warning service provided by NRW,	✓

TAN-15 Acceptability Criteria	Comments	Assessment
	<p>which provides substantial lead times to implement flood preparations.</p> <p>Dry pedestrian access is provided in all events, recognising that most residents will be car free.</p>	
<p>Flood emergency plans and procedures produced by the developer must be in place</p>	<p>As the landowner, management company and occupier, Wales and West Housing are in a unique position to keep the Flood Emergency Plan up to date and communicate the plan to all staff and residents as necessary. Wales and West Housing will be custodians of the Flood Emergency Plan. (ref Section 6.2)</p>	<p>✓</p>
<p>The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from the floodwaters</p>	<p>All residential areas of the site are predicted to be flood free during all design events. Flood resilience measures should be considered to the office building and cafe to ensure goods can be safely stored during in the event of flooding. Appropriate actions in the event of a flood alert should be documented within a Flood Emergency Plan.</p>	<p>✓</p>
<p>Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood</p>	<p>The lower ground floor Nash House is at risk of flooding during exceedance events over its lifetime (75years).</p> <p>Flood resilience measures have been recommended and should be considered in the detailed design of the development.</p>	<p>✓</p>
<p>No flooding elsewhere</p>	<p>The risk of flooding to the site is tidal. Given the effectively infinite volume of the sea, any displacement caused by ground raising will have no impact on flood risk elsewhere. See analysis in Section 5.7.</p>	<p>✓</p>

TAN-15 Acceptability Criteria	Comments	Assessment
<p>The development should be designed to be flood-free during the 0.5% tidal flood</p>	<p>The proposed finished floor levels of all residential and commercial buildings on the site have been set to be flood free in the 0.5% AEP event over their respective development lifetimes. (ref Section 5)</p>	<p>✓</p>
<p>The development should be designed so that in an extreme (1 in 1000 chance) event there would be less than 600mm of water on access roads and within the property</p>	<p>The proposed finished floor levels of all residential buildings on the site have been set to be flood free in the 0.1% AEP event over the lifetime of the development.</p> <p>All proposed commercial buildings with the exception of the lower ground floor of Nash House are expected to be flood free during the 0.1% AEP event during their lifetime (75 years). Worst case scenario flood depths at the lower ground floor of Nash House could reach depths in excess of the 600mm required.</p> <p>However, it should be considered that this is a refurbishment of an existing building with historical value and effort has been made to reduce the level of risk as much as possible for this small area of the site.</p>	<p>✓</p>

8 Conclusion

- JBA Consulting were commissioned by Enfys Developments Ltd to produce a Flood Consequence Assessment (FCA) in support of a planning application to convert the former Cardigan hospital into a mixed-use residential and commercial development. This FCA is an update to the previously submitted Version 3 in June 2021.
- The site is located at the former Cardigan Memorial Hospital, Cardigan. The site comprises the old hospital buildings, associated car parking, landscaping, and woodland.
- The development proposals for the site are to redevelop the site for residential and commercial use. Three residential apartment blocks will be provided as part of the development, a new office for Wales and West Housing, and a café. Plans also include a car park to the east of the site, along with a training and storage unit (the Cambria Building).
- A significant part of the site falls within Zone C2 of NRW's DAM Map. Zone C2 is described as "areas of the floodplain without significant flood defence infrastructure". Less vulnerable development within this zone is acceptable subject to satisfying the Justification Test requirements, including a demonstration of the acceptability of the flood consequences. Residential development is not permitted in Zone C2 and therefore all such development is outside of this zone.
- As a hospital presently occupies the site, the proposed development shall decrease the existing vulnerability classification of Emergency Services to Highly Vulnerable and Less Vulnerable.
- The site is indicated to be at high risk of flooding from the sea (tidal flooding), according to NRW's FRAW maps and within Flood Zone 3 for the NRW FMfP maps.
- The site is shown to be at low risk of Flooding from Rivers (fluvial flooding) and within Flood Zone 1 of the FMfP.
- NRW's FRAW maps predict a high risk of surface water and small watercourses flooding is some low-lying portions of the site. This is replicated in the NRW FMfP maps with this area being in Flood zone 3. Although, this is believed to be an overestimation of the risk given the simplification of the modelling.
- Flood risk from sewers was assessed to be 'medium' given Cardigans history of sewer flooding but considered recent sewer improvements works.
- Flood risk from reservoirs, groundwater is assessed to be very low.
- In order to assess tidal flood risk to the site, extreme sea-level estimates have been calculated and used to assess flood risk for a range of events and climate change

epochs. This have been updated following the update guidance provided by the Welsh Government in 2022.

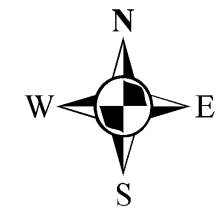
- TAN-15 states that it is necessary to consider the impact of climate change over the lifetime of development. Tidal projection modelling was therefore completed for the 75-year and 100-year development lifetimes for the different development types on the site.
- The proposed development has been designed using a sequential approach that has endeavoured to allocate the most vulnerable parts of the development to the lowest risk areas. All finished floor levels have also been set above the 0.5% plus climate change flood levels, with residential blocks raised above the 0.1% AEP plus climate change level.
- NRW provide 24-hour lead times for flood warnings and 1-2 days for flood alerts. The site is therefore served by effective flood warnings providing sufficient time for flood preparations to be made. A Flood Emergency Plan will be prepared before occupation of the site to set out the required actions of occupants on receipt of a flood warning. As landowner, management company and occupier, Wales and West Housing are in a unique position to keep the Flood Emergency Plan up to date and communicate the plan to all staff and residents as necessary. Wales and West Housing will be custodians of the Flood Emergency Plan.
- Tidal flooding across the site is predicted to be extensive and could affect a significant part of the site. Consequently, in recognising this the redevelopment of the site has been carefully considered and a sequential approach applied to the design of the site to protect the most vulnerable site users whilst recognising the challenges of preserving a historical building, connect to the existing highway and maintaining access to DCWW's pumping station. The approach adopted lowers the vulnerability classification of the development and the flood risk across the site in a sensitive, sustainable, and positive way. Most importantly, the residential blocks are predicted to remain flood free for the lifetime of the development up to and including the most extreme 0.1% AEP event.
- By following the recommendations of this assessment, the proposed development satisfies the Justification Test requirements, including managing flood risk in line with the acceptability criteria. It is therefore considered that the development meets the principles and requirements set out in TAN-15 and the aims of Planning Policy Wales

A DCWW Sewer Network



Dŵr Cymru
Welsh Water

Old Cardigan Memorial Hospital



LEGEND(Representative of most common features)

- Waste network:**
- Foul chamber
 - Surface water chamber
 - Combined chamber
 - Combined sewer overflow
 - Special purpose chamber
 - Treatment works
 - Pumping station
 - NB: Sewer symbol colour indicates the type.
 - RED - Combined
 - GREEN - Surface Water
 - BROWN - Foul
 - Purple - Former S24 sewers (for indicative purposes only)
 - Outfall
 - Lamphole
 - Storm Overflow
 - Rising main
 - Gravity sewer
 - Private sewer
 - Private sewer subject to Sect. 104 adoption agreement
 - Private Sewer Transfer
 - Lateral Drain
 - Inspection Chamber

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation.

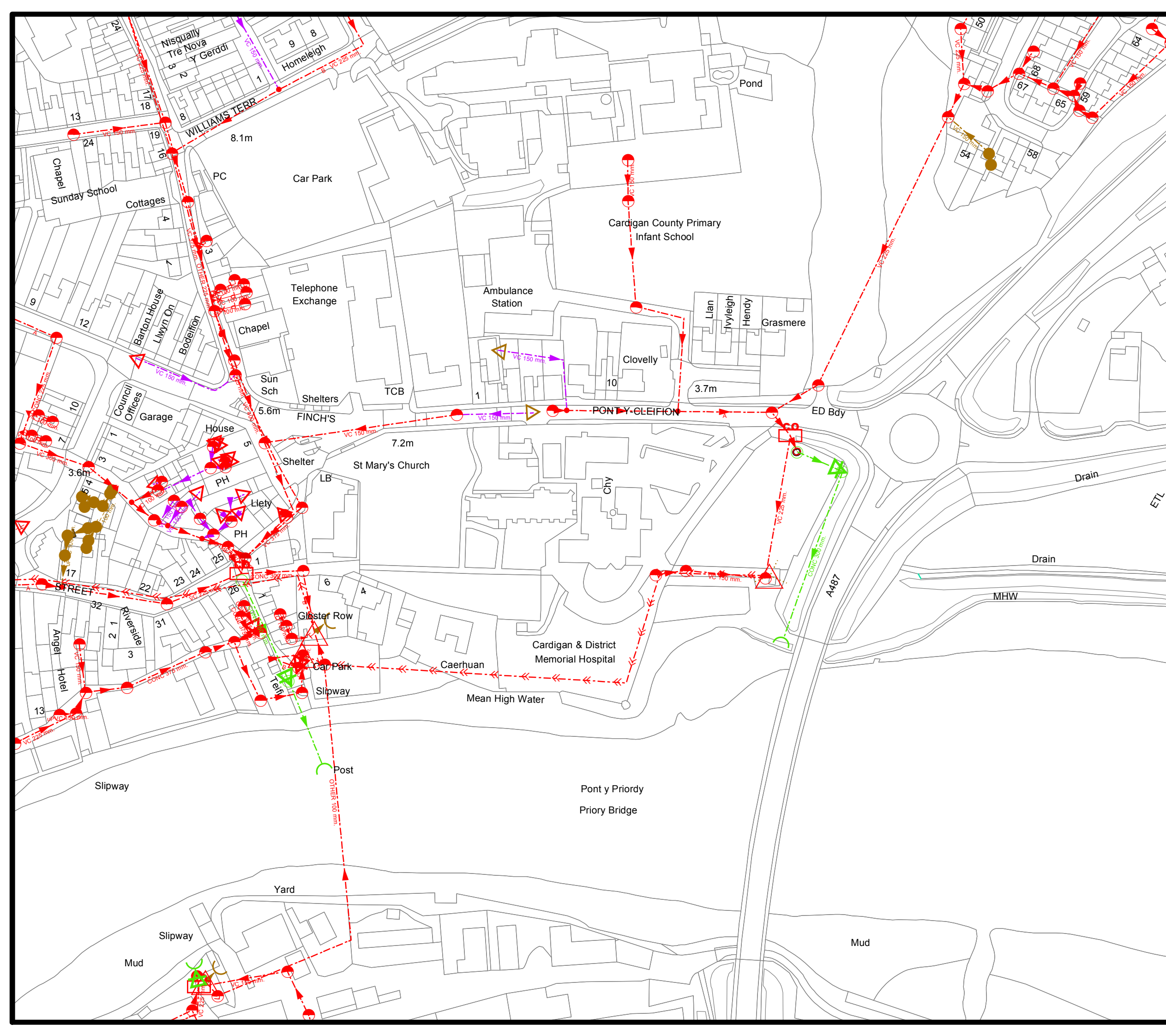
Dŵr Cymru Cyfyngedig ("the Company") gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

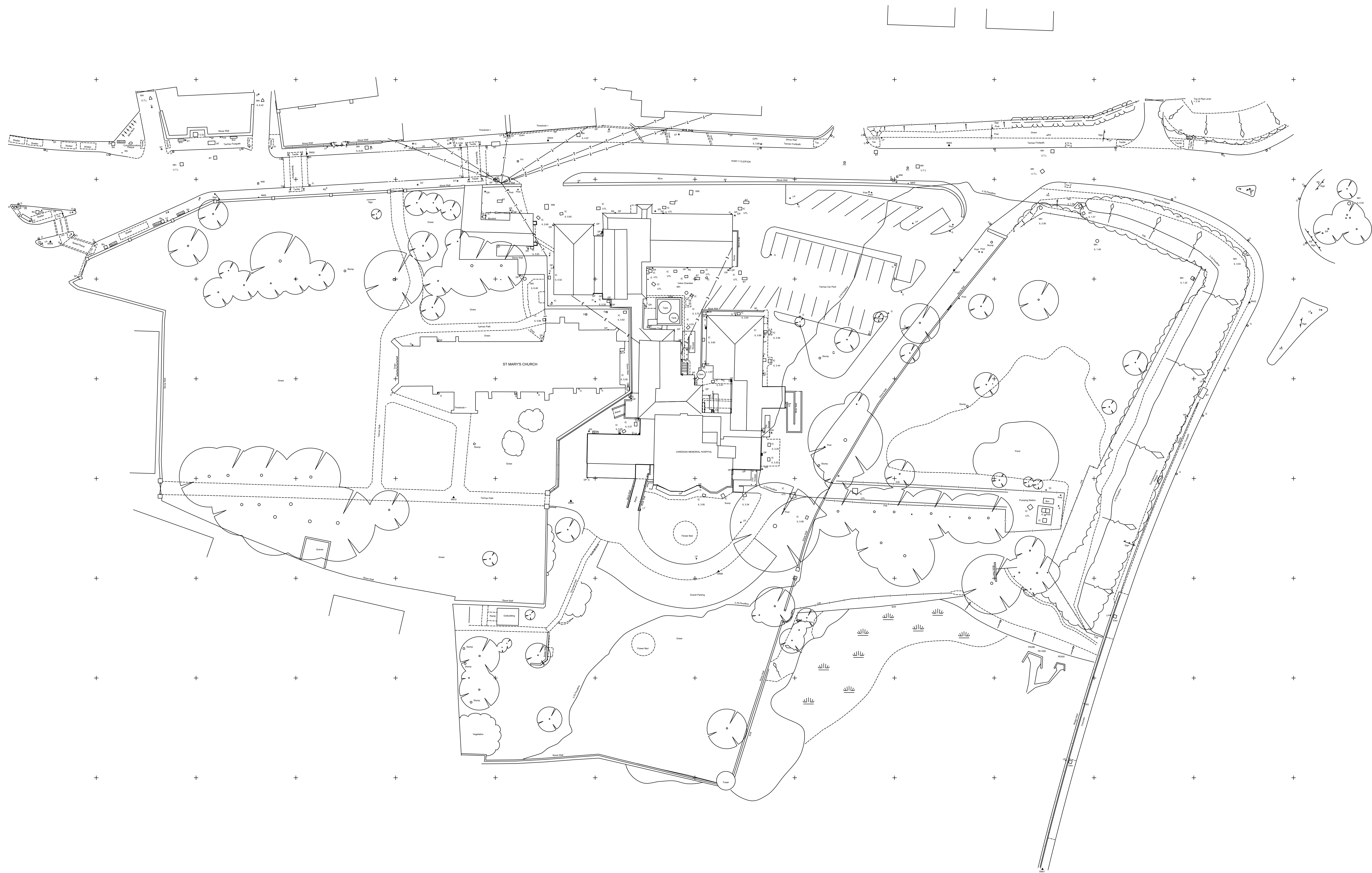
EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 218134,246040
Map scale: 1:1500
Printed by: Emma John
Printed on: 18 Dec 2020



B Topographic Survey



NO.	DESCRIPTION	DATE	BY	CHECKED
1	ISSUED FOR TENDERS	2021/05/10	JV	JV
2	REVISED TO INCLUDE ARCHITECTURAL DETAILS	2021/05/15	JV	JV
3	REVISED TO INCLUDE STRUCTURAL DETAILS	2021/05/20	JV	JV
4	REVISED TO INCLUDE ELECTRICAL DETAILS	2021/05/25	JV	JV
5	REVISED TO INCLUDE MECHANICAL DETAILS	2021/06/01	JV	JV
6	REVISED TO INCLUDE PLUMBING DETAILS	2021/06/05	JV	JV
7	REVISED TO INCLUDE SANITARY DETAILS	2021/06/10	JV	JV
8	REVISED TO INCLUDE FLOORING DETAILS	2021/06/15	JV	JV
9	REVISED TO INCLUDE PAINTING DETAILS	2021/06/20	JV	JV
10	REVISED TO INCLUDE GLAZING DETAILS	2021/06/25	JV	JV
11	REVISED TO INCLUDE JOINERY DETAILS	2021/07/01	JV	JV
12	REVISED TO INCLUDE ROOFING DETAILS	2021/07/05	JV	JV
13	REVISED TO INCLUDE EXTERIOR FINISHES	2021/07/10	JV	JV
14	REVISED TO INCLUDE INTERIOR FINISHES	2021/07/15	JV	JV
15	REVISED TO INCLUDE LANDSCAPING DETAILS	2021/07/20	JV	JV
16	REVISED TO INCLUDE SITEWORK DETAILS	2021/07/25	JV	JV
17	REVISED TO INCLUDE UTILITY DETAILS	2021/08/01	JV	JV
18	REVISED TO INCLUDE SECURITY DETAILS	2021/08/05	JV	JV
19	REVISED TO INCLUDE FURNITURE DETAILS	2021/08/10	JV	JV
20	REVISED TO INCLUDE LIGHTING DETAILS	2021/08/15	JV	JV
21	REVISED TO INCLUDE SIGNAGE DETAILS	2021/08/20	JV	JV
22	REVISED TO INCLUDE AUDIO VISUAL DETAILS	2021/08/25	JV	JV
23	REVISED TO INCLUDE SPECIAL REQUIREMENTS	2021/09/01	JV	JV
24	REVISED TO INCLUDE COMPLIANCE DETAILS	2021/09/05	JV	JV
25	REVISED TO INCLUDE FINAL CHECKS	2021/09/10	JV	JV

NO.	DESCRIPTION	DATE	BY	INITIALS
1	ISSUED FOR TENDERS	2021/05/10	JV	JV
2	REVISED TO INCLUDE ARCHITECTURAL DETAILS	2021/05/15	JV	JV
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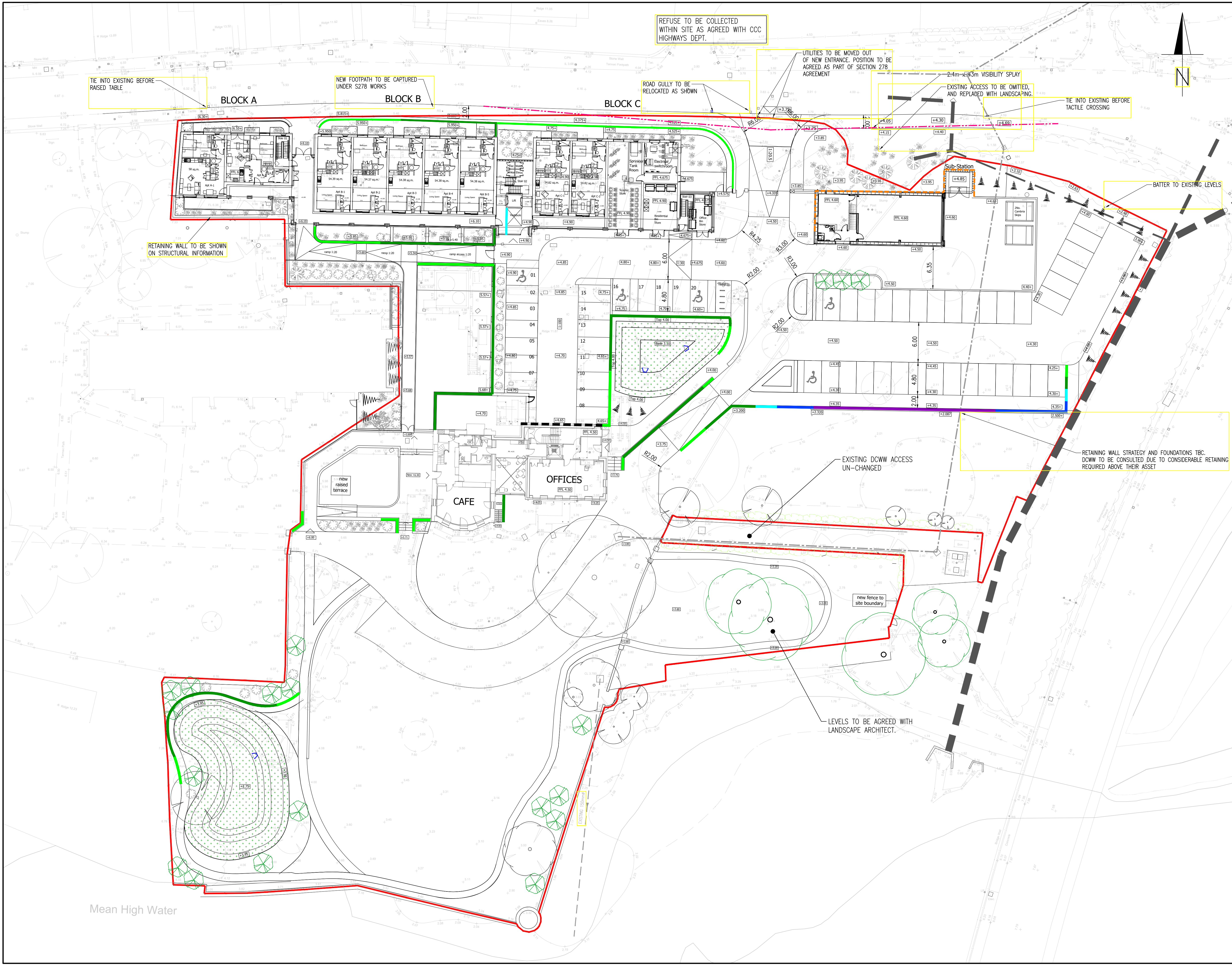
SURVEY BY
JOHN VINCENT SURVEYS LTD
 NIBERIAN HOUSE
 MONASTERY ROAD
 NEATH ABBEY BUSINESS PARK
 NEATH SA10 7DR
 TEL: (01792) 812468
 DATE: MAY 2021

DRAWING NO. 01010/21
CARDIGAN & DISTRICT
MEMORIAL HOSPITAL
ROOF PLAN LAYOUT

ENFYS DEVELOPMENTS LTD
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 LLANISHEN
 CF14 5DU

SCALE 1:200 @ UNDEFINED
 LEVELS RELATED TO ORDNANCE SURVEY G.P.S. DATUM

C Proposed Site Engineering Layout



GENERAL NOTES

- DO NOT SCALE THIS DRAWING.
- CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER.
- ANY DISCREPANCY TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SUBCONTRACTORS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.

HEIGHTS OF RETAINING WALL

0.0 - 0.5m
0.5 - 1.0m
1.0 - 1.5m
1.5 - 2.0m
2.0 - 2.5m
UNDERBUILD
TANKING
MAX GRADIENT 1 IN 2

- HIGHWAY NOTES**
- ALL TRAFFIC SIGNS & ROAD MARKINGS SHALL BE IN ACCORDANCE WITH THE 'TRAFFIC SIGNS REGULATIONS & GENERAL DIRECTIONS' 2016.
 - ROAD MARKINGS SHALL BE OF THERMOPLASTIC MATERIAL AND MAY BE SCREED OR SPRAY APPLIED.
 - ROAD MARKINGS SHALL HAVE A SKID RESISTANCE LEVEL OF NOT LESS THAN 55 SRV AS SPECIFIED IN BS EN 1436:2007 (TABLE 3 CLASS 53).
 - ALL ROAD MARKINGS SHALL BE REFLECTORIZED BY THE INCORPORATION OF SOLID GLASS BEADS WITHIN THE MIXTURE AND THE APPLICATION OF SURFACE APPLIED GLASS BEADS UNLESS OTHERWISE INDICATED.
 - ALL NEW ROAD MARKINGS TO BE TIE INTO EXISTING.
 - EXISTING/REDUNDANT ROAD MARKINGS AFFECTED BY THE PROPOSALS BUT NOT REMOVED UNDER SURFACING OPERATIONS SHALL BE REMOVED PRESSURE WASHED. ALL TRAFFIC SIGN LOCATIONS TO BE AGREED ON SITE PRIOR TO INSTALLATION TO ENSURE CONFLICT WITH OTHER ITEMS IS AVOIDED.
 - WHERE POSSIBLE ALL POSTS TO BE LOCATED AT THE BACK OF FOOTWAY UNLESS SHOWN OTHERWISE. A MINIMUM FOOTWAY WIDTH OF 1.2M IS TO BE MAINTAINED.
 - NO PART OF THE SIGN ASSEMBLY OR BOLLARD TO BE WITHIN 450MM OF THE EDGE OF THE CARRIAGEWAY.
 - ALL BILINGUAL SIGNS TO HAVE WELSH ABOVE ENGLISH UNLESS SPECIFICALLY SPECIFIED.

Rev	Detail	By	Date
PO8	SUBSTATION LEVEL REVISED	DF	12.12.23
PO7	DRAWING REVISED TO SHOW NEW DRAIN LOCATION	DF	04.10.22
PO6	NOTE RE WALL IN ABYSSANCE ADDED.	DF	03.05.22
PO5	RETAINING WALLS UPDATED	DF	29.04.22
PO4	DRAWINGS REVISED FOR STAGE 4	DF	11.03.22
PO3	RETAINING WALLS AMENDED	CH	14.09.21
PO2	RETAINING WALLS PLAN ADDED TO DRAWINGS	CH	07.09.21

Revisions

Reinforcement schedules nos.

CB3 CONSULT
Structural & Civil Engineering Consultants

First Floor
7 St James Crescent
Swansea
SA1 6DP

Telephone +44 1792 473 182
e-mail admin@cb3consult.co.uk
web www.cb3consult.co.uk

Tai Wales & West Housing

Project
PROPOSED RE-DEVELOPMENT CARDIGAN HOSPITAL CARDIGAN

Drawing Title
ENGINEERING LAYOUT

Drawing No.
CB3-00-ZZ-DR-C-001

Project No. Issue Status
C1753 S2

Scale: 1:250 Date: 26.08.21 Revision
Drawn: DF Checked: DF Sheet Size: A1 P08

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Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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Jeremy Benn
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3246693

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