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Flood Consequence Assessment

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Checked by **Trefor Hillas**
Approved by **Anthony Guay**
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Ramboll
Twenty3
Brunswick Place
Southampton
SO15 2AQ
United Kingdom

T +44 238 081 7500
<https://uk.ramboll.com/environment-and-health>

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Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

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1. Introduction

1.1 Appointment and Brief

Ramboll UK Limited (Ramboll) has been commissioned by BAM Construction Ltd to undertake a Flood Consequences Assessment (FCA) to support a planning application for the development of a new Nuclear Medicine Unit at Glan Clwyd Hospital, Rhuddlan Road, Bodelwyddan, Rhyl, LL18 5UJ.

1.2 Proposed Development

The Proposed Development is a new Nuclear Medicine Unit comprising a two-storey building with an enclosed plant room on the upper floor. The Proposed Development will include facilities to house two gamma cameras and a static PET CT scanner. The Proposed Development plans are presented in Appendix A at the rear of the report.

1.3 Scope and Objectives

This report considers the risks to the site of various sources of flooding and the consequent risk of flooding to downstream receptors from increased surface water runoff as a result of the Proposed Development. A comparison is made between the current situation and the Proposed Development.

This FCA has been carried out in accordance with Planning Policy Wales (PPW) which provides the policy framework for the effective preparation of local planning authorities' development plans. This is supplemented by 21 topic-based Technical Advice Notes (TANs), and along with TAN15¹ provides technical guidance which supplements the policy set out in PPW in relation to development and flooding.

It is noted that a revised TAN15 was due to be implemented in June 2023 but has recently been postponed. The revised TAN15, once published will be supported by a new Flood Map for Planning, which includes climate change information to show impacts of flood consequences over the next century.

This report provides the following information:

1. A review of the flood risk to the site based upon flood data and flood maps provided by Natural Resources Wales (NRW);
2. An assessment of flood consequences to the Proposed Development from all sources including tidal, fluvial, pluvial, groundwater and infrastructure failure;
3. An assessment of the compatibility of the Proposed Development for its location based on flood risk and its proposed usage;
4. An assessment of the impact of the Proposed Development in terms of surface water runoff;
5. Proposals for measures to mitigate the generation of surface water runoff as a result of the Proposed Development; and,
6. Proposals to mitigate any residual flood risks to the Proposed Development.

¹ Welsh Government, Guidance, Technical advice note (TAN) 15: development, flooding and coastal erosion [online]. Available at: <https://www.gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion>. Accessed June 2023.

1.4 Ramboll and Climate Change

Ramboll UK Ltd is a Partner for Sustainable Change, and as such sustainability is central to our assessments and reporting. We have made specific considerations for climate change throughout this report, to ensure that our planning and design advice is supportive of an approach to ensure robust and sustainable societies.

More information on our company-wide strategy and our commitment to being a Partner for Sustainable Change can be read here: <https://ramboll.com/strategy-2022>.

1.5 General Limitations and Reliance

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions reached in this report are valid only to the extent that the information provided to Ramboll was accurate, complete, and available to Ramboll within the reporting schedule.

The key sources of information used to prepare this report are footnoted within the document. Ramboll is unable to accept liability for the accuracy or otherwise of any information derived from third party sources.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and/or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

Unless stated otherwise, the geological information provided is for general environmental interpretation and should not be used for geotechnical and/or design purposes.

2. Site Description

2.1 Application Site Description

The application site consists of a single parcel in the centre of the Glan Clwyd Hospital campus, approximately 0.3 hectares (ha) in area. Currently it comprises a soft landscaped area of approximately 0.1ha in the south of the site and larger area of approximately 0.2ha in the north of the site that is currently used as a contractor's compound and covered predominantly by tarmacadam and concrete hardstanding.

The Site Location Plan is shown in Figure 2.1.

Figure 2.1: Site Location Plan



2.2 Existing Site Drainage

Within the soft landscaped area, the site drains toward the existing ditch which is culverted at the up and downstream end. The ditch discharges via a 300mm surface water connection to the east of the site before subsequently discharging to a 525mm surface water connection located approximately 10m further downstream. This connection subsequently connects to a 600mm surface water connection located approximately 150m north-east of the site and ultimately to a 900mm private storm water drain located approximately 200m north-east of the site.

The contractor's compound drains toward the north of the site via both known surface water connections of 150mm in diameter, and a series of inferred surface water connections of unknown size. These connections are assumed to drain west and north via further surface water connections until they connect with the existing drainage network serving the wider hospital site. The existing site drainage is shown in the combined drainage plan for the site (RAM-ZZ-XX-M2-C-00001_ExistingDrainage).

2.3 Site Topography

A topographical survey for the site was produced by Layer Surveys Ltd in June 2023. Elevations within the existing ditch range from approximately 9.30m Above Ordnance Datum (AOD) at its westernmost (upstream) point to approximately 8.46m AOD at its easternmost (downstream) point. Across the rest of the soft landscaped area, levels are typically between 10.70 and 11.10m AOD before falling away in the east of the site to approximately 10.40m AOD. Elevations within the contractor's compound range from approximately 10.80m AOD in the south (adjacent to the soft landscaped area) to approximately 9.90m AOD in the north, with a south to north sloping arrangement apparent. The topographical survey is presented in Appendix B at the rear of the report.

2.4 Geological Setting

British Geological Society (BGS) Geology data² indicates that in terms of superficial deposits, the site is underlain by glacial till, described as diamicton (poorly sorted sediment containing a wide range of clast sizes). In terms of bedrock geology, the site is underlain by the Warwickshire Group, described as mudstone, siltstone, and sandstone.

The Contaminated Land and Geotechnical Assessment³ prepared by Ramboll indicates Made Ground (reworked natural material with fragments of brick, wood, and the occasional metal pipe) is present at the site at a thickness of up to 2.60m, above the superficial deposits (glacial till) that are present at a thickness of up to 15.45m. The bedrock geology (Warwickshire Group) was not encountered during the ground investigation.

2.5 Hydrogeological Setting

BGS Hydrogeology data⁴ characterises the Warwickshire Group rock unit that underlies the site as a moderately productive aquifer. The Aquifer Designation Dataset for England and Wales⁵, accessed through the Department for Environment Food and Rural Affairs (DEFRA) MAGIC Maps⁶, categorises the underlying bedrock as a Secondary A aquifer.

The Contaminated Land and Geotechnical Assessment³ states that during the ground investigation, localised groundwater strikes were encountered near the surface within the Made Ground at between 1.80 and 2.40m Below Ground Level (BGL).

2.6 Hydrological Setting

The site is located within the Western Wales River Basin District. An existing ditch is present within the south of the site flowing from west to east and is planned to be culverted as part of the Proposed Development. The nearest watercourses designated as Main Rivers⁷ by NRW are the Bodelwyddan Drain – Faenol Branch, located approximately 200m west of the site, and the Sarn Cut, located approximately 360m north-east of the site. Ordnance Survey (OS) mapping shows

² British Geological Survey (BGS) Geology Viewer [online]. Available at: <https://geologyviewer.bgs.ac.uk>. Accessed June 2023.

³ Glan Clwyd Hospital, Nuclear Medicine Consolidation Project, Contaminated Land and Geotechnical Assessment, NMC-RAM-ZZ-XX-RP-Y-07001, March 2023.

⁴ BGS British Geological Survey, GeoIndex Onshore [online]. Available at: <https://mapapps2.bgs.ac.uk/geoindex/home.html>. Accessed June 2023.

⁵ Aquifer Designation Dataset for England and Wales, British Geological Survey (BGS) [online]. Available at: <https://www.data.gov.uk/dataset/616469ae-3ff2-41f4-901f-6686feb1d5b6/aquifer-designation-dataset-for-england-and-wales>. Accessed June 2023.

⁶ MAGIC [online]. Available at: <https://magic.defra.gov.uk/MagicMap.aspx>. Accessed June 2023.

⁷ Flood Map for Planning [online]. Available at: <https://flood-map-for-planning.naturalresources.wales>. Accessed June 2023.

Bodelwyddan and the surrounding countryside is crossed by several small watercourses and drainage ditches.

The River Clwyd (Afon Clwyd) is located approximately 2.6km north-east of the site, draining to Kinmel Bay approximately 5.2km north of the site. The River Gele is located approximately 2.7km north of the site and is a tributary of the River Clwyd.

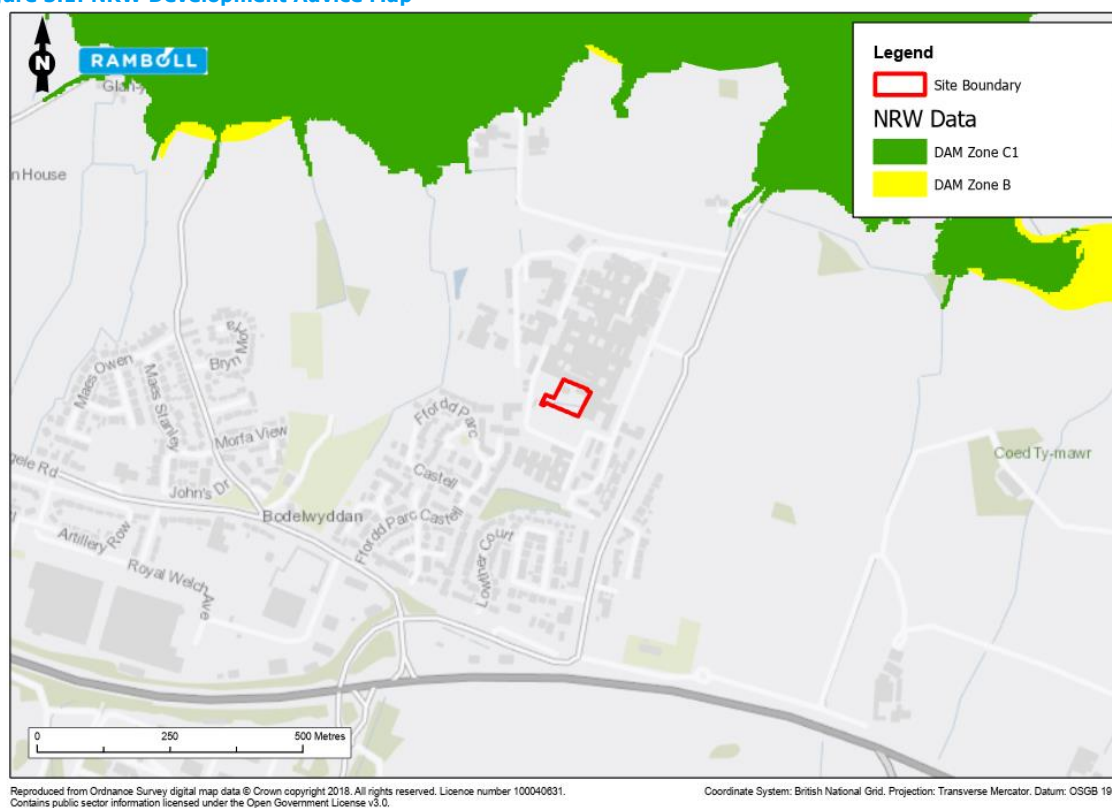
3. Flood Risk Baseline

3.1 Fluvial and Tidal Flood Risk Mapping

Development Advice Map

The NRW Development Advice Map⁸, alongside Planning Policy Wales⁹ and TAN15¹ is the framework used to direct new development in respect of flood risk. The map is intended as a screening tool to understand where further assessment of flooding may be required. The location of the site in relation to Zone C1 (areas served by significant infrastructure, including flood defences) and Zone B (areas known to have flooded in the past) is shown in Figure 3.1.

Figure 3.1: NRW Development Advice Map



The NRW Development Advice Map indicates the site is located within Zone A, land considered to be at little or no risk of fluvial or coastal/tidal flooding. The nearest area of Zone C1 is located approximately 400m north-east of the site. The nearest area of Zone B is located approximately 600m north of the site.

Flood Map for Planning

The Welsh Government is due to implement a revised TAN15 during 2023¹⁰ to be supported by the Flood Map for Planning⁷ which shows how climate change will affect flood risks over the next century. The map shows the potential extent of flooding assuming no defences are present. The

⁸ Natural Resources Wales (NRW) Development Advice Map and National Flood Hazard and Risk Maps Viewer [online]. Available at: <https://maps.cyfoethnaturiolcymru.gov.uk>. Accessed June 2023.

⁹ Welsh Government, Policy and Strategy, Planning Policy Wales [online]. Available at: <https://www.gov.wales/planning-policy-wales>. Accessed June 2023.

¹⁰ Natural Resources Wales, Flood Map for Planning/Development Advice Map, 2023 [online]. Available at: <https://naturalresources.wales/flooding/flood-map-for-planning-development-advice-map/?lang=en>. Accessed June 2023.

Flood Map for Planning is stated to represent the best available information on flood risk and will be used to inform planning advice.

The Flood Map for Planning separates flood risk into river flooding and sea flooding, with each category subdivided into Flood Zones 1, 2 and 3.

Flood Zone 3 displays the extent of flooding from:

- Rivers with a 1% (1 in 100) chance or greater of flooding in any given year, including an allowance for climate change;
- The sea with a 0.5% (1 in 200) chance or greater of flooding in any given year, including an allowance for climate change; and
- Surface water & small watercourses with a 1% (1 in 100) chance or greater of flooding in any given year, including an allowance for climate change.

Flood Zone 2 displays the extent of flooding from:

- Rivers with a 0.1% to 1% (1 in 1,000 to 1 in 100) chance of flooding in any given year, including an allowance for climate change;
- The sea with a 0.1% to 0.5% (1 in 1,000 to 1 in 200) chance of flooding in any given year, including an allowance for climate change; and
- Surface water and small watercourses with a 0.1% to 1% (1 in 1,000 to 1 in 100) chance of flooding in any given year, including an allowance for climate change.

Areas beyond these extents are considered to be in Flood Zone 1, which has less than a 0.1% chance of flooding in any given year.

The location of the site in relation to the Flood Map for Planning flood risk extents is shown in Figures 3.2 and 3.3.

Figure 3.2: Flood Map for Planning River Flood Zones

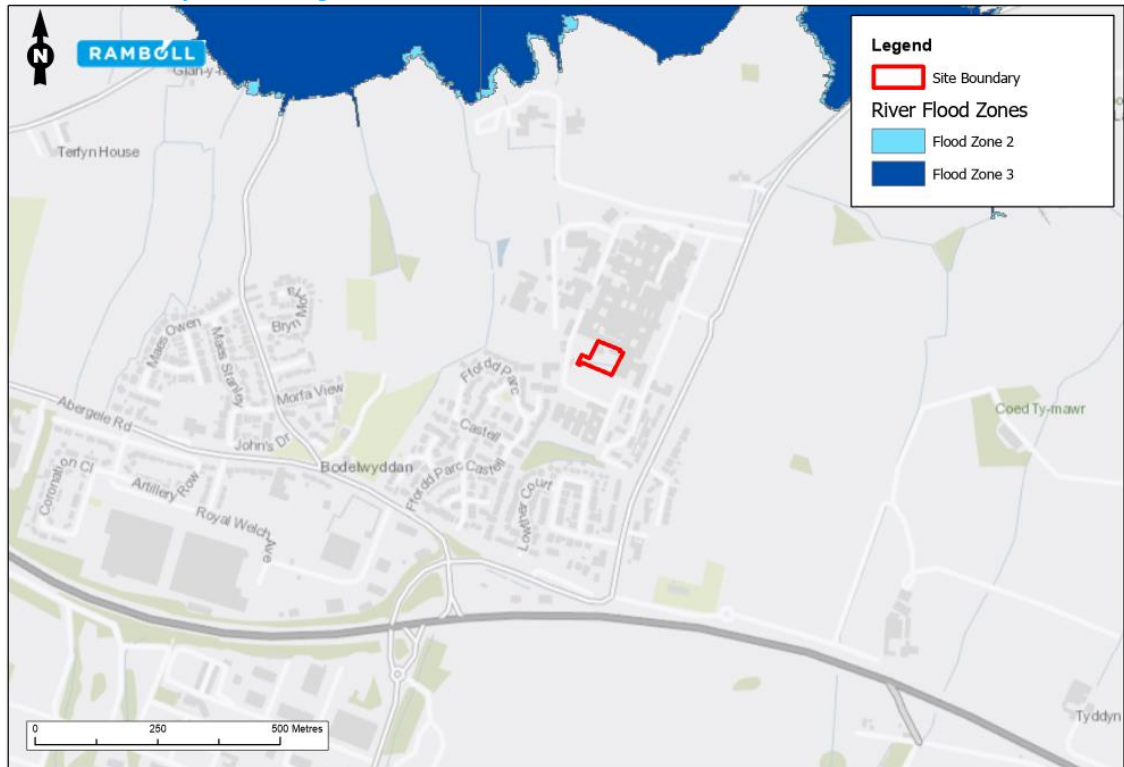
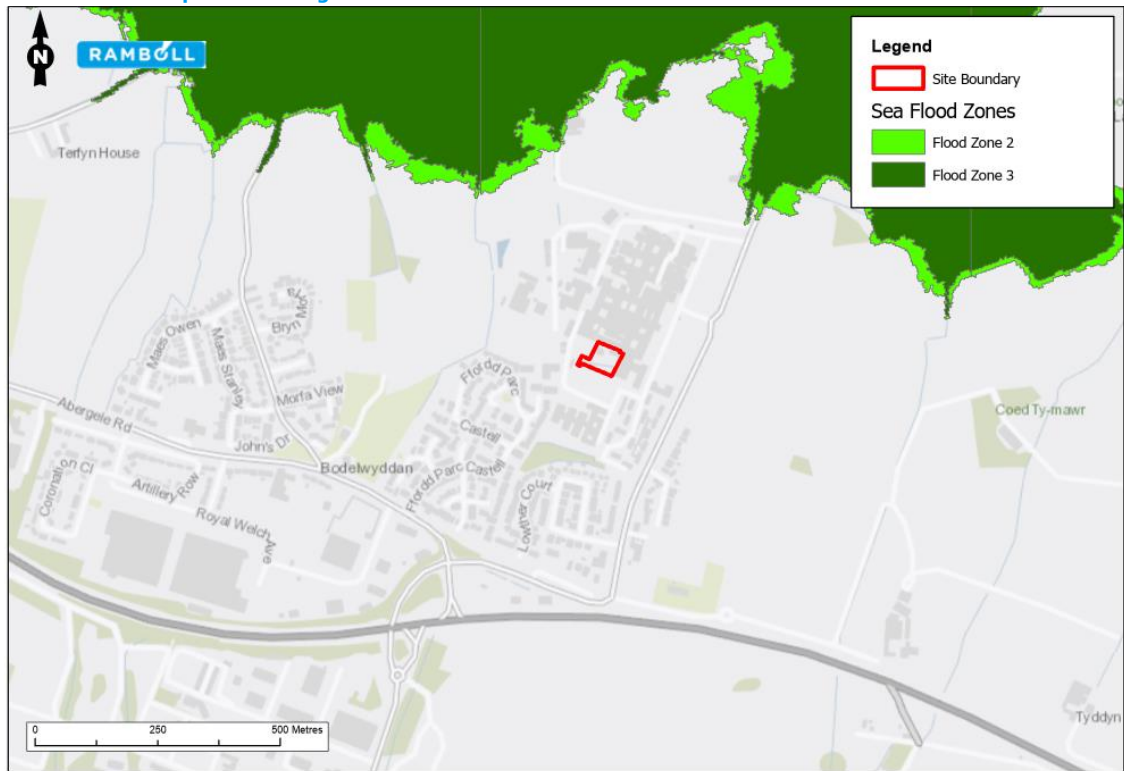


Figure 3.3: Flood Map for Planning Sea Flood Zones



The application site is shown to be located entirely outside Flood Zones 2 and 3 for both river and sea flooding and therefore falls within Flood Zone 1. This is defined by NRW as land with less than a 1 in 1,000 annual probability of flooding from rivers or the sea. The site is located approximately 550m south-east of River Flood Zone 2, approximately 550m south-east of River Flood Zone 3, approximately 360m south-west of Sea Flood Zone 2, and approximately 375m south-west of Sea Flood Zone 3.

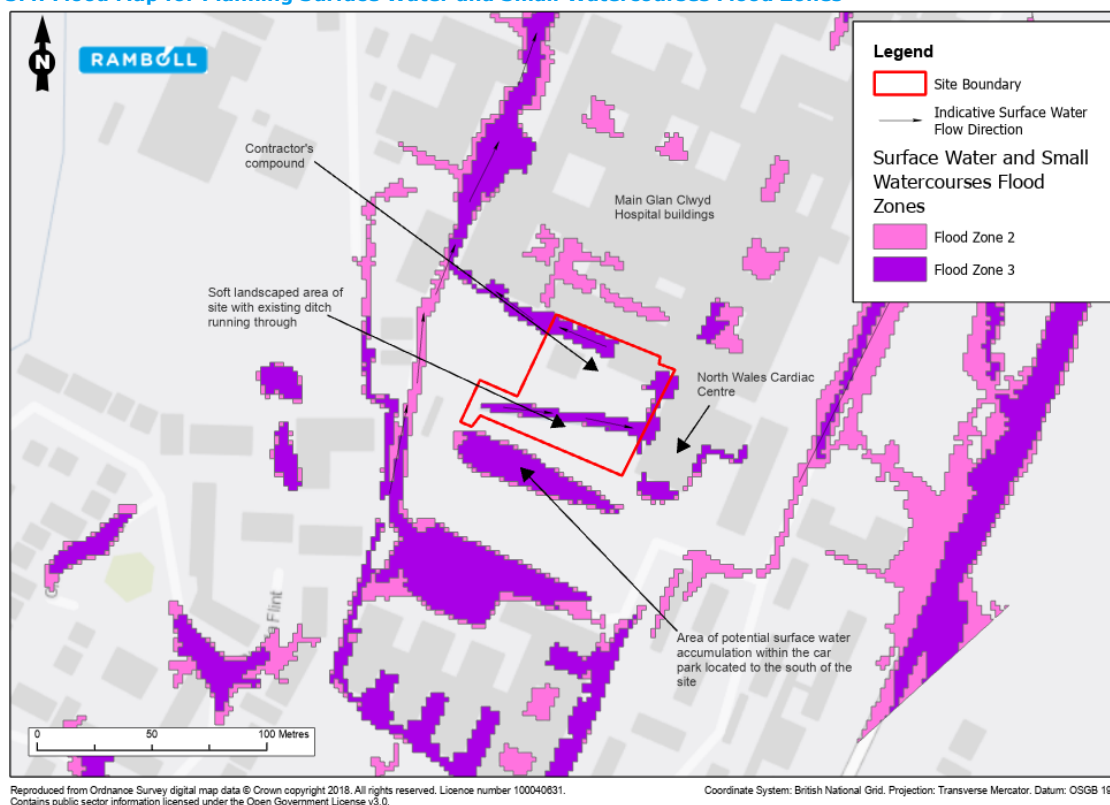
3.2 Surface Water Flood Risk

Within the site a general south to north sloping arrangement is apparent, as detailed in Section 2.3. The topographical low point within the site is within the existing ditch. Outside the site the same general south to north sloping arrangement is apparent from LiDAR data¹¹. In the north of the site, as detailed in Section 2.3, there are further topographical low points present, adjacent to the existing buildings to the north of the site. To the south of the site there is another topographical low point within the existing car park, at approximately 10.3m AOD with adjacent areas to the north and south sitting at approximately 10.6m AOD. These areas of low localised topography are likely to be the immediate areas at most risk from surface water flooding.

The NRW Flood Map for Planning⁷ indicates areas at risk of flooding from surface water and small watercourses in addition to flood risk from rivers or the sea. However, the mapping does not typically consider specific drainage assets such as sewers, drains, or ditches when calculating extents. The location of the site in relation to the mapped surface water flood risk extents is shown in Figure 3.4.

¹¹ Welsh Government, DataMapWales, LiDAR viewer [online]. Available at: <https://datamap.gov.wales/maps/lidar-viewer/>. Accessed July 2023.

Figure 3.4: Flood Map for Planning Surface Water and Small Watercourses Flood Zones



The Surface Water and Small Watercourses mapping indicates that most of the site is located within Flood Zone 1, with localised areas of low topography, adjacent to and within the existing ditch, and in the north of the site, located within Flood Zones 2 and 3.

The risk levels for each Flood Zone are detailed in Section 3.1.

An area of Flood Zone 3 within the north of the site appears to be caused by an overland flow path to the north of the site, with surface water flowing from east to west around an existing building before flowing from south to north through the west of the wider hospital campus.

Given the site topography, it is unlikely there will be extensive overland flow onto the site from neighbouring locations. The main risk to the site is likely to be from heavy rainfall from immediately adjoining impermeable areas accumulating in areas of localised low topography.

Based on a review of the information above, the risk of flooding from surface water flooding is considered to be low, but with localised areas of high risk.

3.3 Groundwater Flood Risk

Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land and/or infrastructure below ground. Groundwater floods may emerge from either point or diffuse locations. They tend to be long in duration developing over weeks or months and prevailing for days or weeks.

As stated in Section 2.5, observed groundwater levels at the site were encountered between 1.80 and 2.40m BGL. Groundsure reporting¹² indicates the site to be at a low risk from groundwater flooding. There remains however the possibility of higher groundwater levels during wetter years and seasons. Any potential groundwater emerging at the surface is likely to flow north around the site to areas of lower topography.

The Western Wales River Basin District Preliminary Flood Risk Assessment Report (PFRA)¹³, states that groundwater flooding in Wales is rare and notes that there have been no recorded events of groundwater flooding within the Western Wales River Basin District since 2011. Furthermore, the risk to the site can be considered low as no basement level is proposed as part of the development.

3.4 Risk from Reservoirs, Canals, and Other Artificial Sources

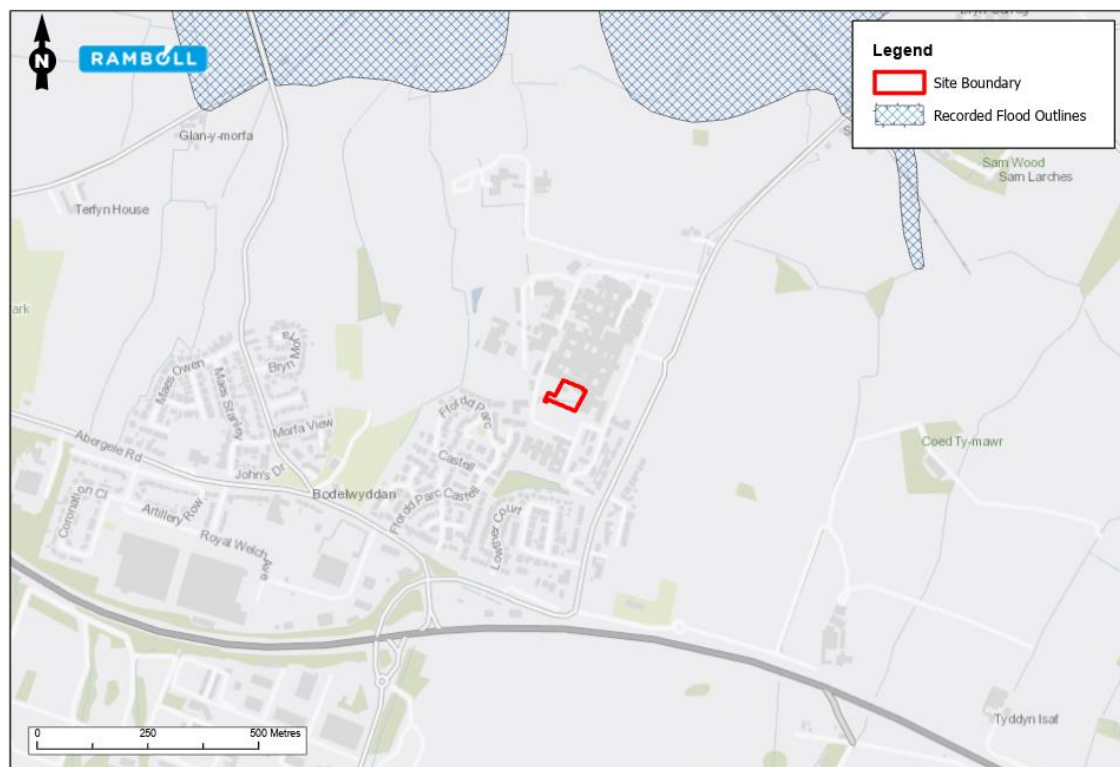
The Flood Map for Planning⁷ does not indicate that the site is at risk from reservoir flooding.

There are no canals or other artificial sources present at or in proximity of the site that are likely to pose a significant flood risk.

3.5 Historical Flooding

According to the Flood Map for Planning⁷, there are no records of flooding at the site. The nearest recorded flooding event was the St. Asaph to R. Gele event in 1964, the extent of which is located approximately 650m north of the site. Recorded flood extents are presented in Figure 3.5.

Figure 3.5: Recorded Flood Extents



¹² Groundsure Location Intelligence, Glan Clwyd Hospital, Rhuddlan Road, Bodelwyddan, Rhyl, LL18 5UJ, RMBL-9335428, 03/02/2023.

¹³ Natural Resources Wales, Western Wales River Basin District, Preliminary Flood Risk Assessment Report, December 2018 [online]. Available at: <https://cdn.naturalresources.wales/media/687969/pfra-report-western-wales.pdf>. Accessed July 2023.

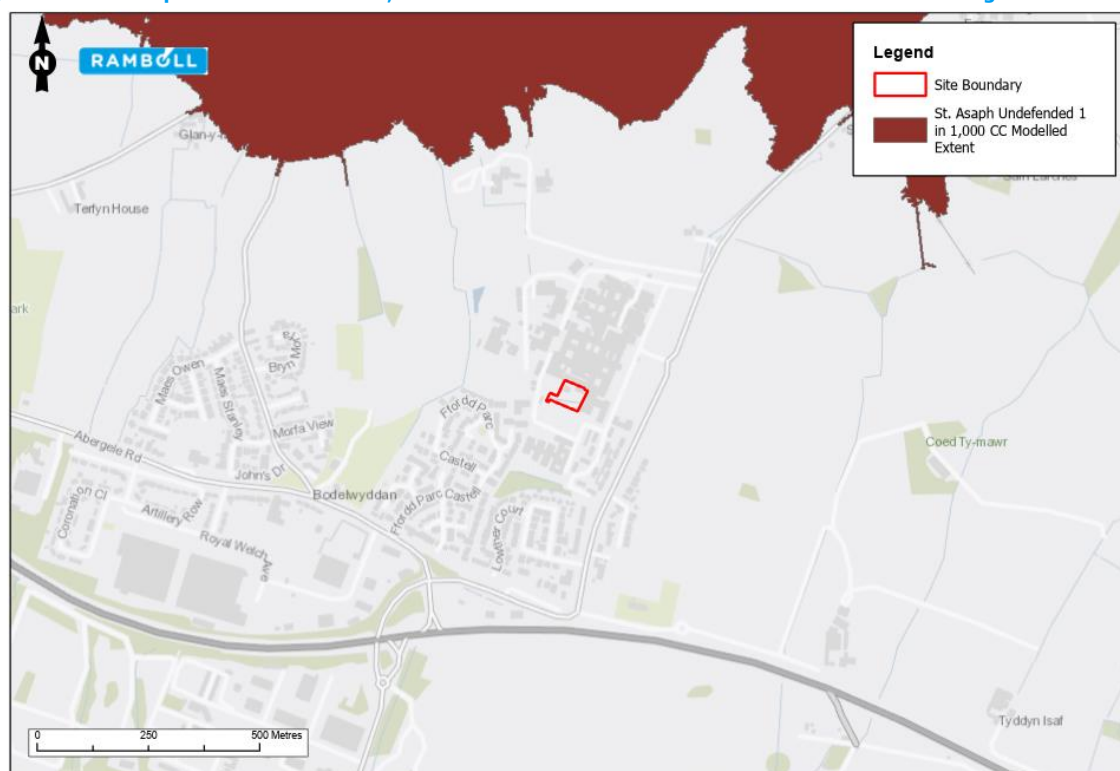
4. Hydraulic Modelling

As part of a detailed study of flood risk, NRW flood modelling reports and flood model outputs relevant to the site were requested and have been reviewed. The hydraulic model was used to inform the new Flood Map for Planning which is to be updated in 2023. The Flood Map for Planning therefore incorporates the results of these models, but they have been represented separately here to provide a more detailed assessment into the fluvial and tidal sources that could cause flooding to the site.

4.1 St. Asaph

The model for St. Asaph was most recently updated in 2020. The undefended 1 in 1,000 year event with an allowance for climate change, which is the most extreme flood scenario modelled, is shown in Figure 4.1. Based on the updated modelling outputs, it is observed that the modelled 1 in 1,000 year flood extents with an allowance for climate change do not reach Bodelwyddan or the site.

Figure 4.1: St. Asaph Undefended 1 in 1,000 modelled extent with an allowance for climate change



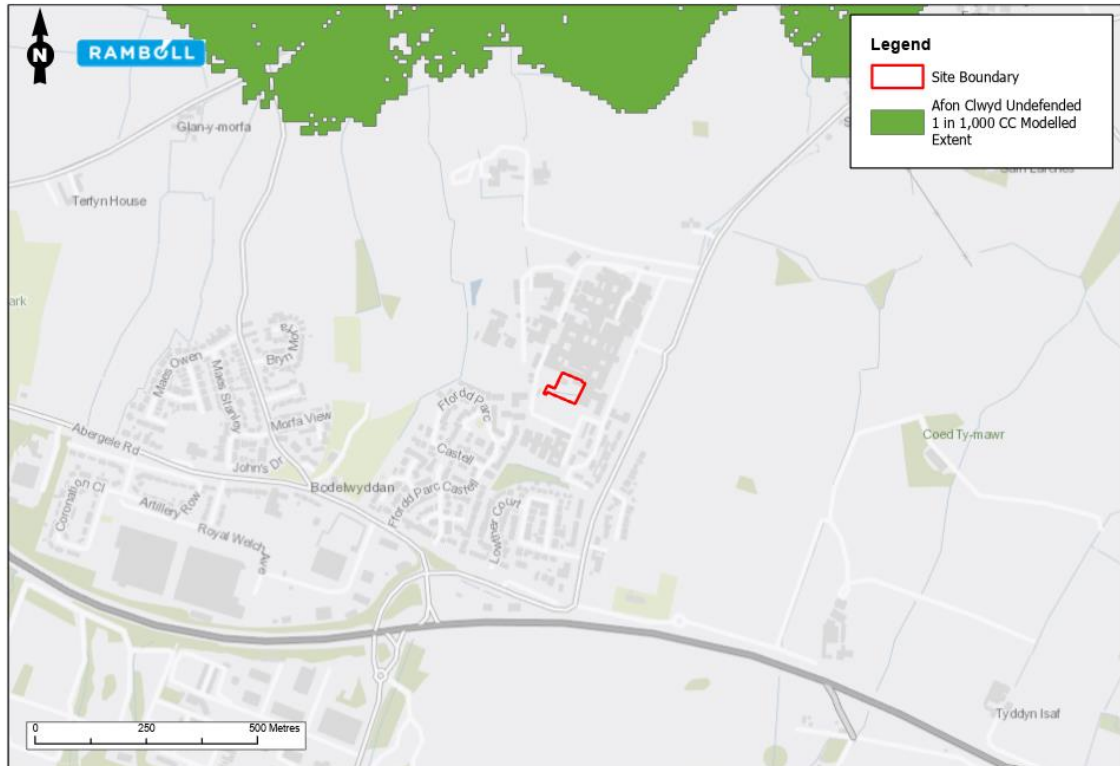
Reproduced from Ordnance Survey digital map data © Crown copyright 2018. All rights reserved. Licence number: 100040631. Contains public sector information licensed under the Open Government License v3.0.

Coordinate System: British National Grid. Projection: Transverse Mercator. Datum: OSGB 1936.

4.2 Afon Clwyd

The model for the Afon Clwyd was most recently updated in 2020. The undefended 1 in 1,000 year event with an allowance for climate change, which is the most extreme flood scenario modelled, is shown in Figure 4.2. Based on the updated modelling outputs, it is observed that the modelled 1 in 1,000 year flood extents with an allowance for climate change do not reach Bodelwyddan or the site.

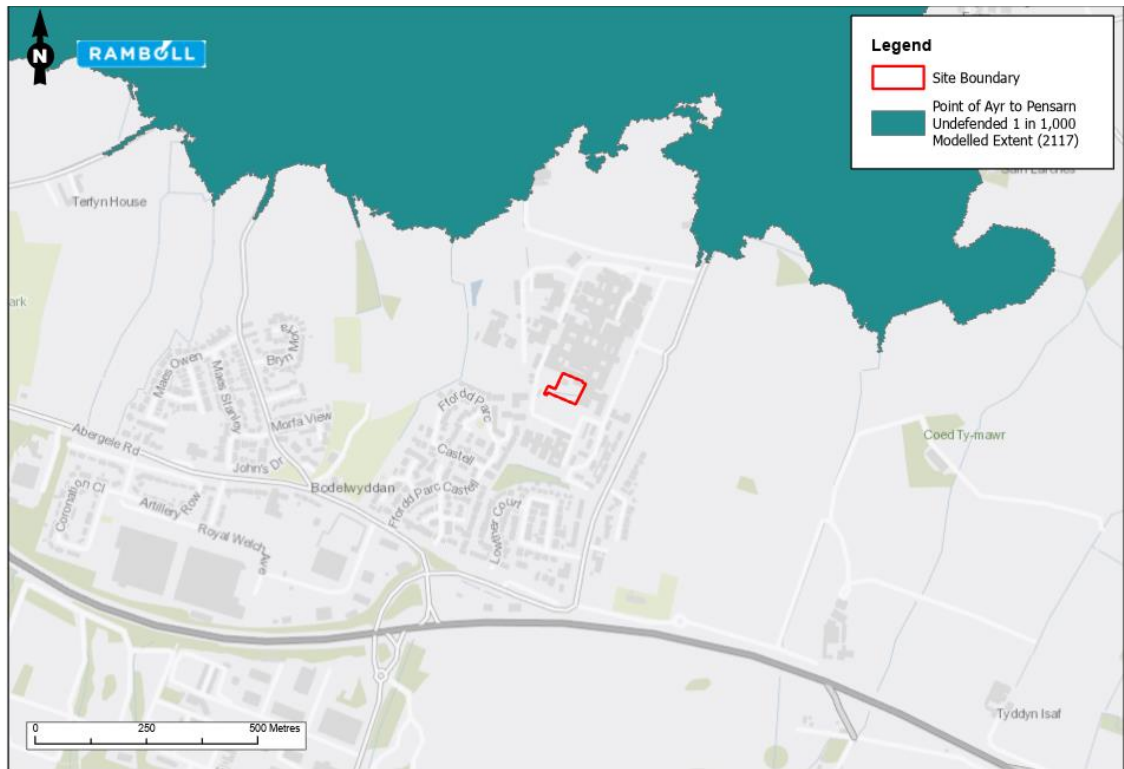
Figure 4.2: Afon Clwyd Undefended 1 in 1,000 modelled extent with an allowance for climate change



4.3 Point of Ayr to Pensarn

The Point of Ayr to Pensarn model is dated to 2018. The undefended 1 in 1,000 year 2117 scenario is the most extreme flood scenario modelled and is shown in Figure 4.3. Based on the outputs it is observed that the modelled extent of this scenario does not reach the site.

Figure 4.3: Point of Ayr to Pensarn Undefended 1 in 1,000 modelled extent (2117)



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Coordinate System: British National Grid, Projection: Transverse Mercator, Datum: OSGB 1936.

5. Assessment of Flood Risk

5.1 Flood Risk Vulnerability

The vulnerability of land uses is defined under TAN15¹ in Table 5.1:

Table 5.1: TAN15 Development Vulnerability Categories

Development Category	Types
Highly vulnerable development	<p>All residential premises (including hotels, Gypsy and Traveller sites and caravan parks and camping sites).</p> <p>Schools and childcare establishments, colleges, and universities.</p> <p>Hospitals and GP surgeries.</p> <p>Especially vulnerable industrial development (e.g., power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites.</p> <p>Emergency services, including ambulance stations, fire stations, police stations, command centres, emergency depots.</p> <p>Buildings used to provide emergency shelter in time of flood.</p>
Less vulnerable development	<p>General industrial, employment, commercial and retail development.</p> <p>Transport and utilities infrastructure.</p> <p>Car parks.</p> <p>Mineral extraction sites and associated processing facilities (excluding waste disposal sites).</p> <p>Public buildings including libraries, community centres and leisure centres (excluding those identified as emergency shelters).</p> <p>Places of worship.</p> <p>Cemeteries.</p> <p>Equipped play areas.</p> <p>Renewable energy generation facilities (excluding hydro generation).</p>
Water compatible development	<p>Boatyards, marinas, and essential works required at mooring basins.</p> <p>Development associated with canals.</p> <p>Flood defences and management infrastructure.</p> <p>Open spaces (excluding equipped play areas).</p>

	Hydro renewable energy generation.
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Based on the TAN15 land use vulnerability categories, the proposed development is considered part of the 'Highly vulnerable development' category.

TAN15¹⁴ sets out that:

"The general approach of PPW, supported by the TAN, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is, in order of preference, to:

- *Direct new development away from those areas which are at high risk of flooding.*
- *Where development has to be considered in high risk areas (Zone C), only those developments which can be justified on the basis of the tests outlined in Section 6 and Section 7 [of TAN15] are located within such areas".*

5.2 Justification Test

Section 6 of TAN15¹⁴ sets out the Justification Test is necessary to determine if the location of a proposed development can be justified given any identified flood risks and states the following:

"New development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less of an issue. In Zone C the tests outlined in Sections 6 and 7 will be applied, recognising, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted. All other new development should only be permitted within Zones C1 and C2 if determined by the planning authority to be justified in that location. Development, including transport infrastructure, will only be justified if it can be demonstrated that:

1. *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,*
2. *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,*
3. *It concurs with the aims of PPW and meets the definition of previously developed land; and,*
4. *The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 [of TAN15] found to be acceptable".*

The proposed development is situated entirely within Zone A, and thereby passes the Justification Test.

5.3 Consequence Test

Section 7 of TAN15¹⁴ sets out that *"whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed down to a level*

¹⁴ Welsh Assembly Government, Planning Policy Wales, Technical Advice Note, 15: Development and Flood Risk [online]. Available at: <https://www.gov.wales/sites/default/files/publications/2018-09/tan15-development-flood-risk.pdf>. Accessed July 2023.

which is acceptable for the nature/type of development being proposed, including its effects on existing development”.

“Where development is justified, the assessment can be used to establish whether suitable mitigation measures can be incorporated within the design to ensure that development is as safe as possible and there is:

- *Minimal risk to life;*
- *Minimal disruption to people living and working in the area;*
- *Minimal potential damage to property;*
- *Minimal impact of the proposed development on flood risk generally; and,*
- *Minimal disruption to natural heritage”.*

Based on an assessment of flood risk mapping and modelling, the Proposed Development has no potential to interact with floodwaters in extreme tidal or fluvial events. The Proposed Development would also have no impact on flood conveyance or effect flood risk elsewhere for this reason. The consequences of tidal and fluvial flooding of the Proposed Development are, therefore, at a level which is acceptable for the nature of the Proposed Development, with no significant effects on existing development anticipated. Mitigation of surface water flooding and groundwater flooding are discussed below.

5.4 Flood Mitigation Measures

Fluvial and Tidal Flooding

The site has not been identified as being at risk from fluvial or tidal flooding, therefore no mitigation against this type of flooding is proposed.

Surface Water Management

The increase in impermeable area resulting from development over existing permeable surfaces will increase the surface water discharge generated at the site. Furthermore, there are existing areas of surface water flood risk present at the site. To mitigate this risk a proposed drainage strategy has been prepared by Ramboll and is presented in Appendix C at the rear of the report.

The surface water strategy is summarised as follows:

- The existing ditch is proposed to be culverted and built over, with an allowance made for a new chamber to provide permanent access;
- Where possible, roof rainwater pipes are to be routed to the southern building elevation;
- A surface water attenuation tank is proposed to be located to the south of the new Nuclear Medicine Unit. The tank is proposed to allow for a drained area of 1,375m², a storage volume of approximately 105m³, and a tank area of approximately 120m². The tank is assumed to be 0.9m deep;
- A flow control chamber is proposed to be located to the east of this attenuation tank with discharge restricted to greenfield rates of approximately 2.0l/s. The chamber will connect to the attenuation tank;

- The tank is proposed to sit above a pervious surface with subbase attenuation. A further proposed location for a pervious surface is in the north-west of the site to the south of another proposed surface water attenuation tank;
- Another flow control chamber is proposed to be located in the north of the site with discharge restricted to greenfield rates of approximately 3.0l/s. This chamber will connect to the second proposed surface water attenuation tank described above;
- The second attenuation tank is proposed to allow for a drained area of 1,125m², a storage volume of approximately 55m³, and a tank area of approximately 60m². The tank is assumed to be 0.9m deep; and
- An existing gabion basket retaining wall currently serving the ambulance parking area is to remain protected from surcharge during and after the proposed works. It is acknowledged the wall may require strengthening to suit final load requirements.

Further to the above the following mitigation measures are recommended:

- Engineering of external gradients – external gradients should be designed so any surface water falling on the site is directed away from building entrances; or
- Use of linear drains at building entrances – where it is not possible to engineer external gradients to direct water away from building entrances, linear interceptor drains should be used instead.

Groundwater Flood Risk Management

In the unlikely event there is groundwater emerging at the surface, it is considered unlikely this would lead to flooding of the Proposed Development.

As shown in Figure 3.4, there are no existing overland flow routes leading onto the site. Any groundwater emerging outside the site is therefore considered unlikely to pose a significant risk.

Within the external areas of the site any emerging groundwater would be managed by the proposed surface water drainage strategy detailed above. Internal areas are not considered to be at a significant risk from groundwater given no basement level is proposed as part of the development.

6. Conclusion

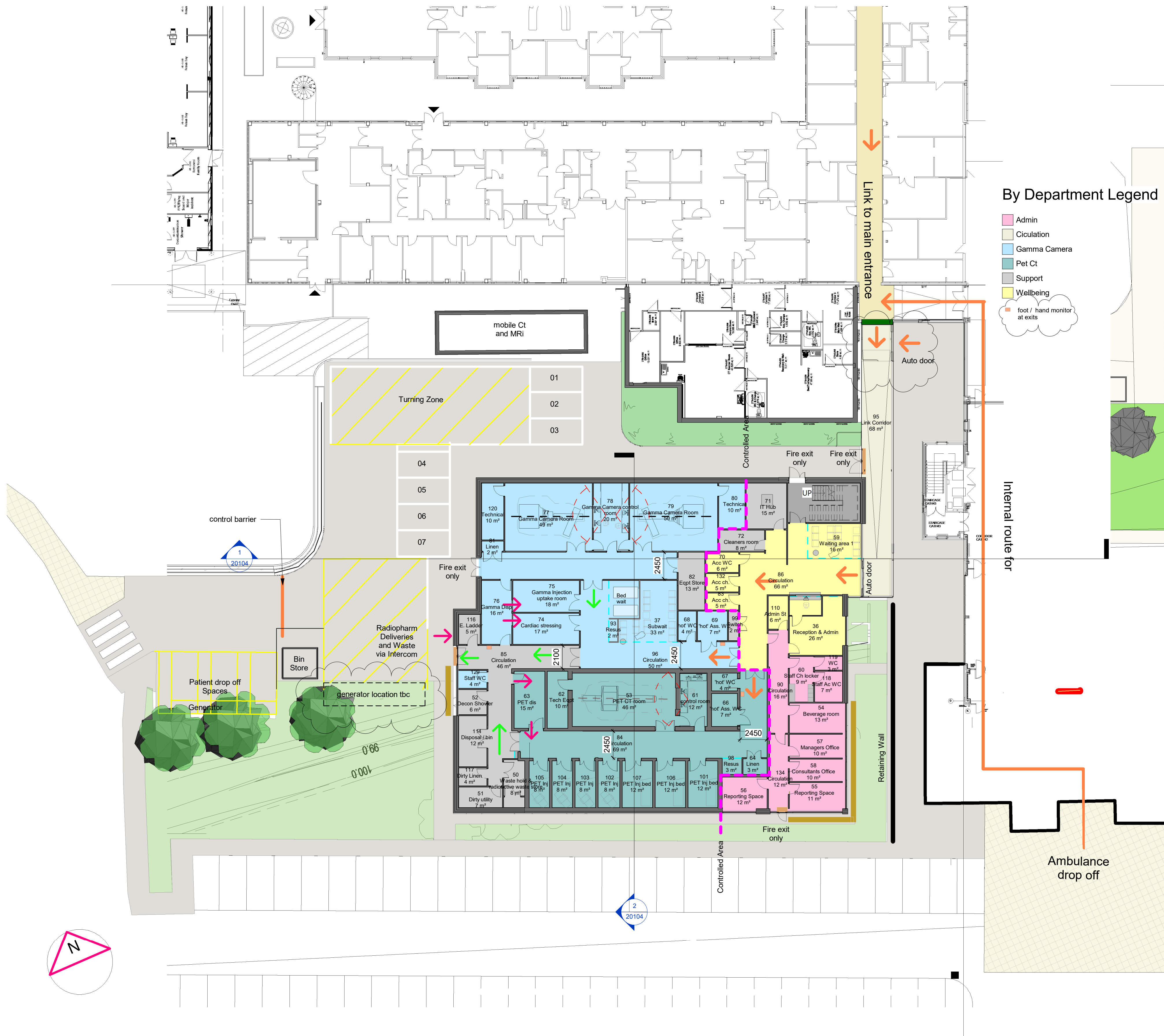
Based on the findings of this Flood Consequences Assessment and in consideration of the recommendations made, it is concluded that flood risk is appropriately managed within the development proposals over the lifetime of the development, taking climate change into account and fittingly for the vulnerability of proposed users.

The Proposed Development is located entirely within TAN15 Zone A (Flood Zone 1). It is considered that the overall risk of flooding to the development is low, which is acceptable for the nature/type of development proposed.

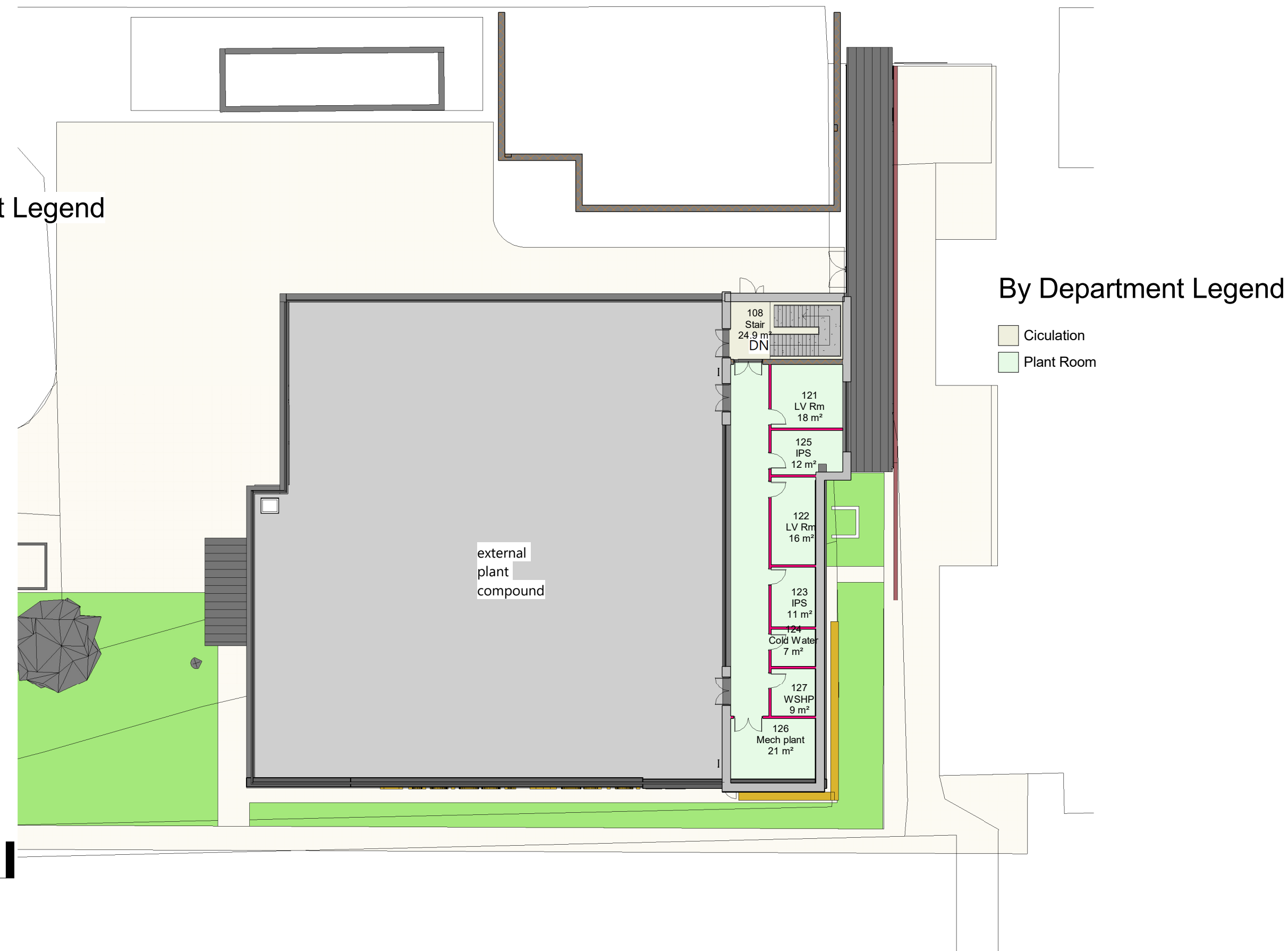
No further assessment is deemed necessary.

Appendix A

Proposed Development Plans



1 Ground Floor Plan
1 : 200



2 Plant room Plan
1 : 250

This drawing must not be scaled.
Figured dimensions and levels to be used.
Any inaccuracies must be notified to the architect.
Detail drawings and large scale drawings take
precedence over smaller drawings.

Rev:
P07 Changing rooms moved, beverage bay door moved, Pet CT tech room reduced, bin
store and generator moved following MEP and Civils feedback
P08 Site arrangement amended following MEP and civils feedback
P09 Automatic doors moved, generator location shown as TBC, escape doors added
back to stari and link, hand & foot monitoring locations indicated

Chk'd:

28-04-23
02-04-23
03-05-23

STATUS

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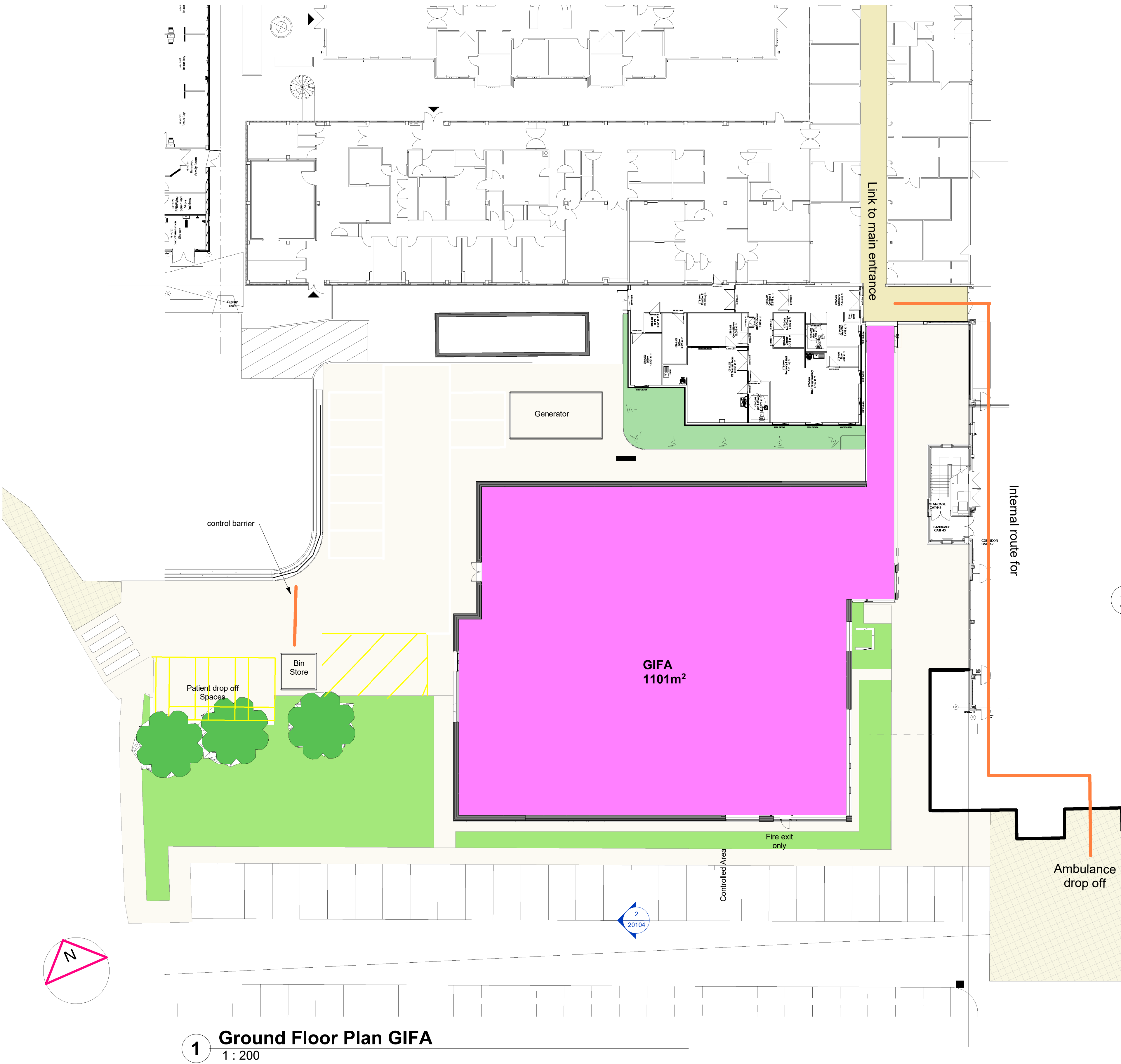
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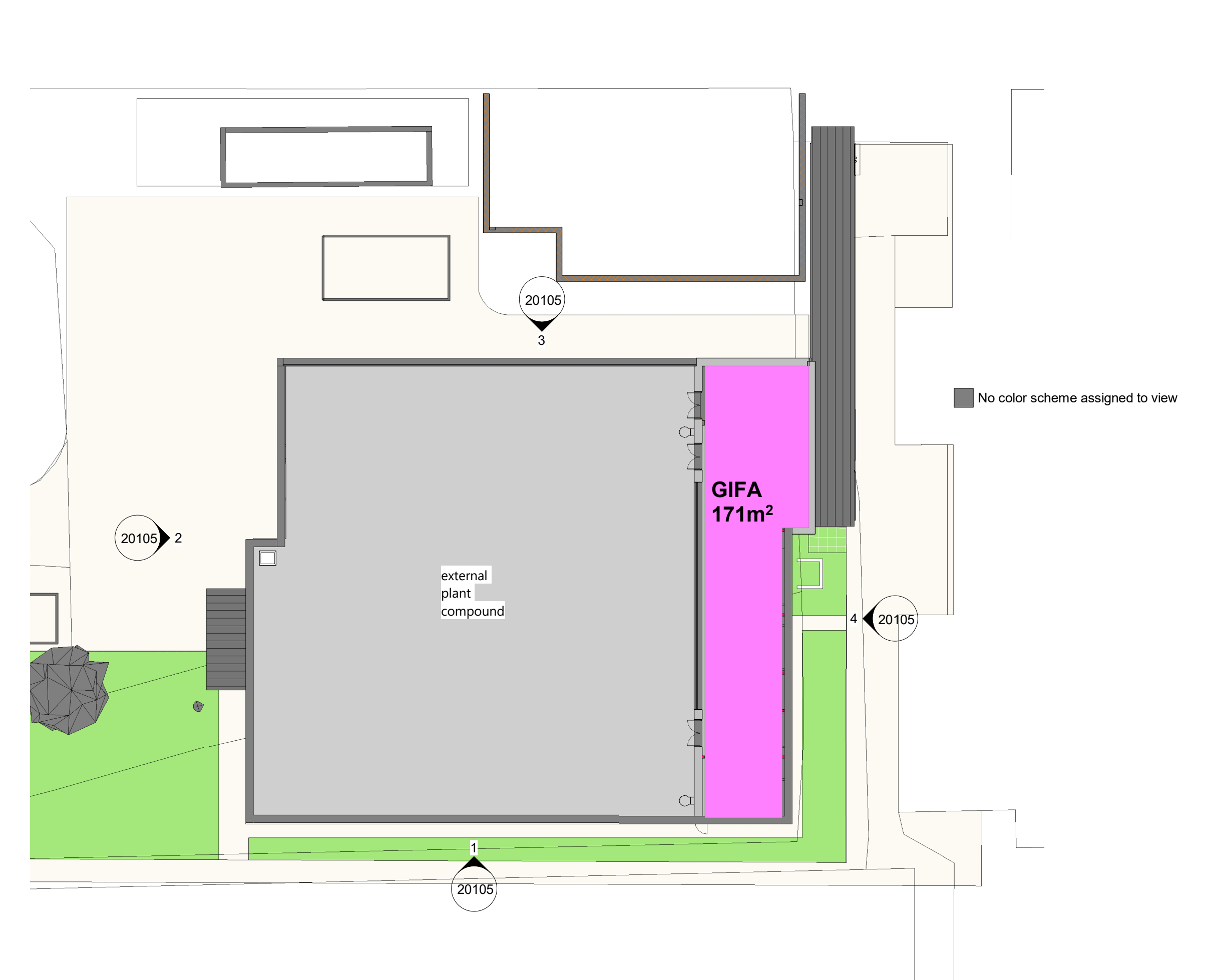
PDA Job No: 22045	REV P09
NMC - PDA - ZZ - 00-DR- A - 20100	
UPRN	ORIGINATOR
VOLUME	LEVEL
TYPE	ROLE
CLASS	NUMBER

Contract: Nuclear Medicine
Ysbyty Glan Clwyd
Title: GA Ground Floor Plan

Scale: As indicated
Date: 11/03/23
Drawn: RD
Checked: RD



1 Ground Floor Plan GIFA
1 : 200



2 Plant room Plan GIFA
1 : 250

As drawn GIFA

Ground Floor - 1101m²
First Floor (plant) - 171m²

Total : 1272m²

This drawing must not be scaled.
Figured dimensions and levels to be used.
Any inaccuracies must be notified to the architect.
Detail drawings and large scale drawings take precedence over smaller drawings.

Rev: P02
Following gleeds email from 21-04-23 *Gamma tech rooms made smaller,
*staff toilet and changing moved
*additional staff toilet shown for controlled area,
*linen stores moved in gamma area,
*store accessed from gamma area
*staff beverage area moved,
*hot cleaners omitted,
*disposal increased in size
*circulation space omitted
*reception desk area reduced
*circulation reduced in reception area
P03
Changing rooms moved, beverage bay door moved, Pet CT tech room reduced, bin store and generator moved following MEP and Civils feedback

25-04-23

Chk'd:

28-04-23

STATUS

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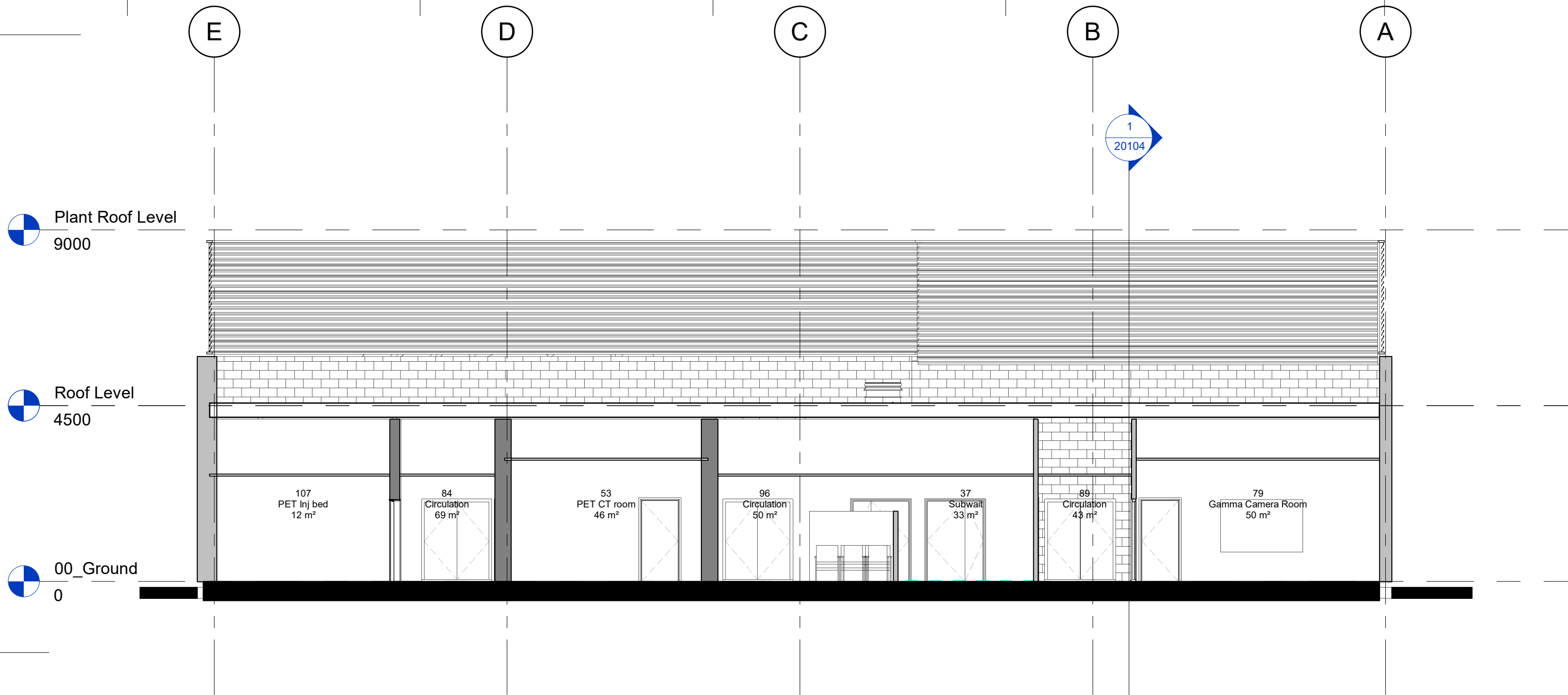
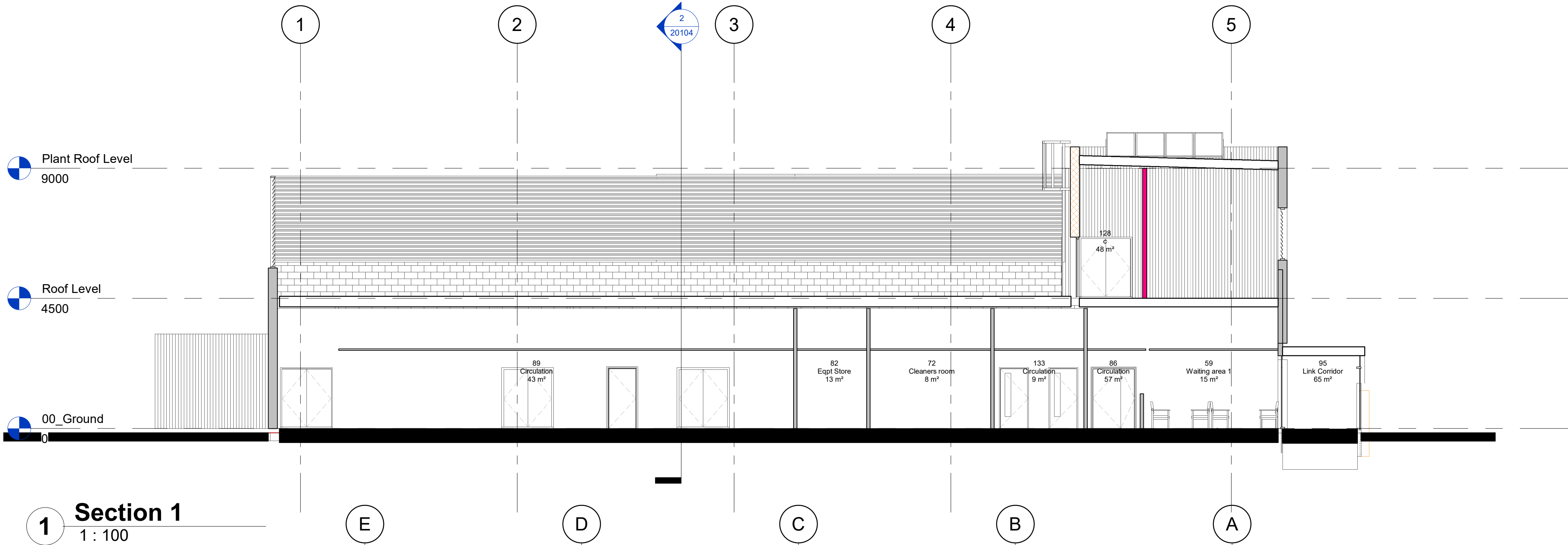
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PDA Job No: 22045							
NMC - PDA - ZZ - 00 - DR- A - 20103		REV P03					
UPRN	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	CLASS	NUMBER

Contract: Nuclear Medicine
Ysbyty Glan Clwyd
Title: As Drawn GIFA

Scale: As indicated
Date: 11/03/23
Drawn: RD
Checked: RD



1 0 1 2 3 4 5

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A2

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Rev:

P01
P02

Plant room amended following co-ordination meeting
Following gleeds email from 21-04-23 •Gamma tech rooms made smaller,
•staff toilet and changing moved
•additional staff toilet shown for controlled area,
•linen stores moved in gamma area
•store accessed from gamma area
•staff beverage area moved,
•hot cleaners omitted,
•disposal increased in size
•circulation space omitted
•reception desk area reduced
•circulation reduced in reception area

14-04-23
25-04-23

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Ysbyty Glan Clwyd
Title: GA Sections

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PDA Job No:
22045

NMC - PDA - ZZ - 00 - DR- A - 20104

UPRN ORIGINATOR VOLUME LEVEL TYPE ROLE CLASS NUMBER

REV

P02

Scale: 1 : 100
Date: 11/03/23
Drawn: RD
Checked: RD

C:\Users\rhodri.davies\Documents\22045-PDA-ZA-ZZ-03-A-001_rhodridavies.rvt



1 Elevation 1 - a Cladding option 01 - Coloured perforated
1 : 200



2 Elevation 1 - a Cladding option 02 - Brick Detail
1 : 200

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Rev:

Chk'd:

A1

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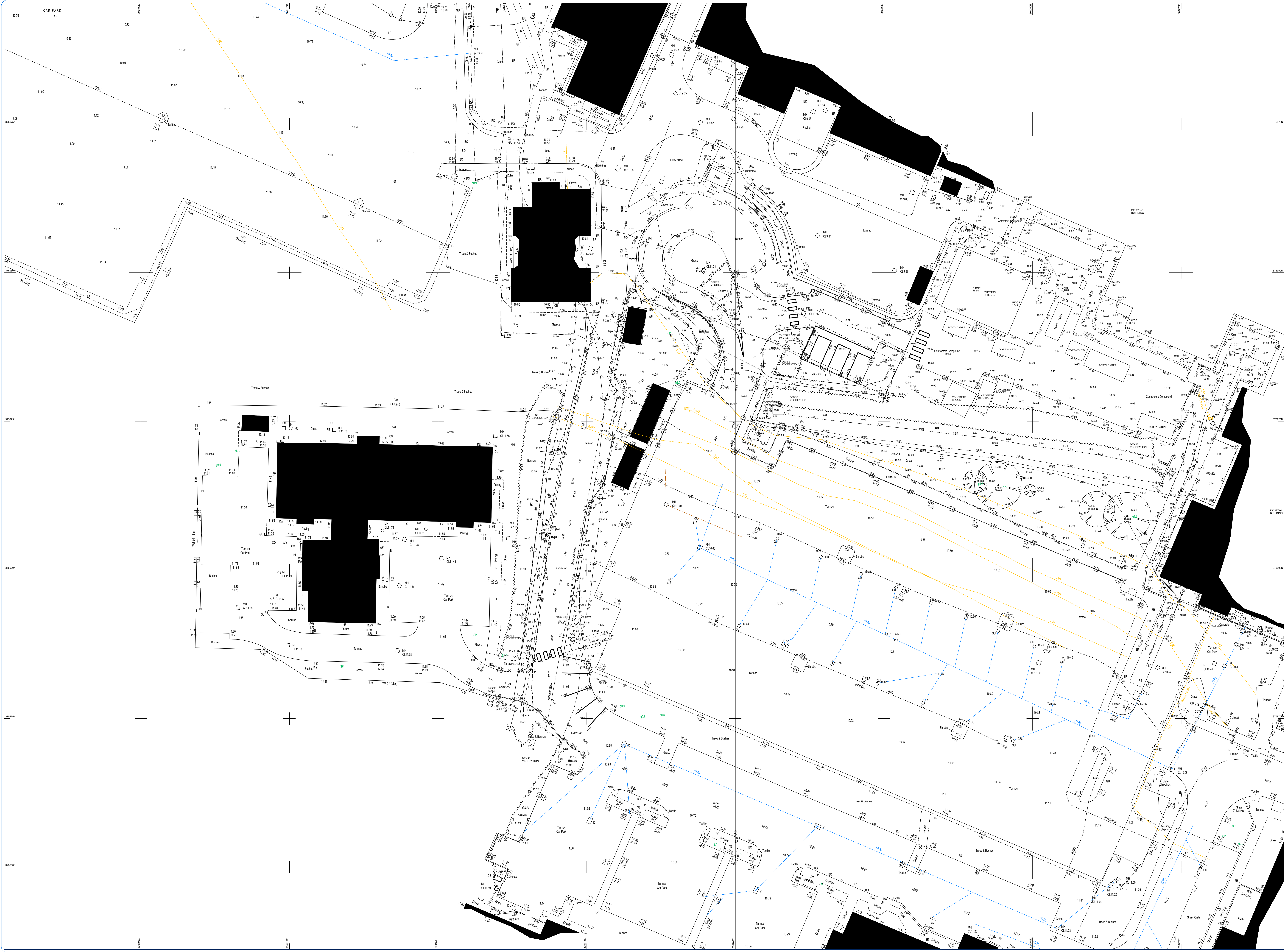
PDA Job No: 22045							
NMC - PDA - ZZ - ZZ- D - A - 20106							REV
UPRN	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE	CLASS	NUMBER

Contract: Nuclear Medicine
Ysbyty Glan Clwyd
Title: Elevations Cladding Options

Scale: 1 : 200
Date: 14/04/22
Drawn: RD
Checked: Checker

Appendix B

Topographical Survey



Layer Surveys Ltd. 2023

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PLAN GRID NORTH

NOTES

PLEASE NOTE: This drawing is a preliminary design and is not to be used for construction purposes. It is intended to provide a visual representation of the proposed development and to illustrate the layout of the site. It is not a final design and is subject to change without notice. The client is responsible for ensuring that the design meets all relevant planning and regulatory requirements. The design is based on the information provided by the client and is not intended to be a guarantee of performance or results. The design is not intended to be a substitute for professional advice and should not be used as such. The design is not intended to be a substitute for professional advice and should not be used as such. The design is not intended to be a substitute for professional advice and should not be used as such.

LEGEND

DECLARATION

SHEET 1

SHEET 2

SHEET 3

SHEET 4

SHEET 5

Client

BAM Construction

Project Title

Cam Camwell Hospital
Rhuddlan Road
Rhyl, LL18 3JL

Drawing Ref.

1771

Surveyed

AJL/M

Checked

Layer Surveys

Scale

1:200

Date

June 20

Drawn

11

No.

02

Size

A0

Rev

AD

Appendix C

Proposed Drainage Strategy

