



Flood Consequence Assessment

Cefn Farm, Rhydargaeau, Carmarthenshire, SA32 7DS

On Behalf of

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Quality Management

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Appendix 1

Proposed Site Layout

1 Introduction

1.1 Background

This Flood Consequence Assessment (FCA) has been prepared by Hydrogeo at the request of Kevin Thomas, to support a planning application for the proposed development at Cefn Farm, Rhydargaeau, Carmarthenshire, SA32 7DS. A separate Drainage Strategy has been undertaken by others.

This FCA has been carried out in accordance with guidance contained in Technical Advice Note 15 Development and Flood Risk (TAN15)¹ and associated Development Advice Maps. This FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 Technical Advice Note 15 (TAN15)

One of the key aims of TAN15 is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall.

A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FCA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate; and
- satisfy the justification test, including the acceptability of consequences.

1.3 Report Structure

This FCA has the following report structure:

- Section 2 details the sources of information that have been consulted;
- Section 3 describes the location area and the existing and proposed development;
- Section 4 outlines the flood risk to the existing and proposed development;

- Section 5 outlines the mitigation measures used to reduce the flood risk;
- Section 6 justifies the location of the development; and
- Section 7 presents a summary and conclusions.

2 Sources of Information

2.1 Discussion with Regulators

Consultation and discussions with the relevant regulators have been undertaken during this FCA including Natural Resources Wales, the Local Planning Authority (LPA) and the Sewerage Undertakers.

2.1.1 Natural Resources Wales

The Flood and Water Management Act 2010 gives Natural Resources Wales a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. The Natural Resources Wales is the statutory consultee with regards to flood risk and planning.

Natural Resources Wales Flood Risk Standing Advice and TAN15 have been consulted and reviewed during this FCA. This has confirmed the level of FCA required and that a surface water drainage assessment is to be undertaken. Information regarding the current flood risk at the application site and local flood defences has been obtained from Natural Resources Wales.

2.1.2 Carmarthenshire County Council

Carmarthenshire County Council is the LPA, and the Sustainable Drainage Approval Body (SAB) and therefore, has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by the Carmarthenshire County Council regarding flood risk was consulted to assess the mitigation policies in place.

The Carmarthenshire County Council Strategic Flood Consequence Assessment (SFCA) which covers the site have been reviewed. Separate approval will be required from the SAB relating to the management surface water runoff from the proposed development.

2.1.3 Welsh Water/Dŵr Cymru

Welsh Water/Dŵr Cymru is responsible for the disposal of waste water and supply of clean water for this area. Information with regards to sewer and water main flooding contained within the Carmarthenshire County Council SFCA has been consulted as part of this FCA. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

3 Location & Development Description

3.1 Site Location

The site is located at Cefn Farm, Rhydargaeau, Carmarthenshire, SA32 7DS (see Figure 3-1). The National Grid Reference (NGR) of the site is 244148, 227195. The proposed development site comprises a parcel of land, being the third phase, of an active residential site set off the north-eastern extremity of “Dan-y-Dderwen”, which itself adjoins onto the eastern flank of the A485 road within the centre of the village of Rhydargaeau. The site area is 1.18 hectares (ha).



Figure 3-1 Site Location

3.2 Existing Development

The site was historically used as a farmland which comprised open grazing pasture. Today, the site remains currently unused land. The Cefn Farm site has undergone extensive recent works under applications ref. W/37215, and W/38215 that comprise the existing surrounding developments at the site. For ease of reference, these have been split up into Phase 1 and Phase 2 below. These developments and works are adjacent to and border the proposed development site to its south and west boundaries.

3.3 Proposed Development

The proposals are for the construction of 17 dwellings, extension of the estate road and associated works (see Appendix 1). This proposal relates to Phase 3 of the development (plots 22 – 38) and will consist of a mix of detached, semi-detached, and terraced units. 3 affordable units are to be provided as part of the proposals (units 35, 36 and 37). Each dwelling will benefit from access and off-street parking.

3.4 Ground Levels

The site falls from south to north with a maximum ground level of 143.10 metres Above Ordnance Datum (mAOD) and a minimum ground level of 136.63mAOD.

3.5 Catchment Hydrology/Drainage

A drainage ditch is located to the west of the site, running south parallel to the A485 and a pond is located approximately 100m to the south of the site. Existing Welsh Water/Dŵr Cymru public foul and surface water sewers are located on, and within the vicinity of the site.

3.6 Ground Conditions

The British Geological Survey (BGS) Map indicates that the superficial deposits consist of Till, Devensian (welsh Ice) - diamicton. Superficial deposits formed up to 2 million years ago in the Quaternary Period. The bedrock underlying the site consists of the Allt Formation - mudstone, silty. Sedimentary Bbedrock formed approximately 444 to 449 million years ago in the Ordovician Period.

4 Flood Risk

4.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

4.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within TAN15 recommends that the effects of climate change are incorporated into FCA. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the CL-03-16 - Climate change allowances for Planning purposes¹.

The 9th of January 2014 Welsh Government letter to all Chief Planning Officers (CPO) in Wales and CL-03-16 - Climate change allowances for Planning purposes clarifies and refers to the Natural Resources Wales recommendations that the lifetime of development for residential development is 100 years, and for other development it is considered to be 75 years.

Table 4-1 show the peak river flow allowances for this river basin district. There is reasonable level of certainty that the future impacts of climate change will lie somewhere between the central and upper allowances. Therefore, the design fluvial flood event for the site is the 1 in 100 year (+30%) event.

Table 4-1 Peak River Flow Allowances (use 1961 to 1990 baseline)

River Basin District	Allowance Category	Total Potential Change Anticipated by the 2020s	Total Potential Change Anticipated by the 2050s	Total Potential Change Anticipated by the 2080s
West Wales	Upper end estimate	25%	40%	75%
	Central estimate	15%	25%	30%
	Lower end estimate	5%	10%	15%

¹ <https://gov.wales/climate-change-allowances-and-flood-consequence-assessments>

Projections of relative mean sea level rise for each epoch (period of time) is provided for the Welsh coastline in Table 4-2. These projections are consistent with the latest global predictions for sea level rise. The design tidal event for the site is the 1 in 200 year in 2122 event.

Table 4-2 Sea Level Rise by 2100 and 2120

Local Authority Area	Allowance (percentile)	Mean Sea Level Rise (m) by 2100*	Mean Sea Level Rise (m) by 2120*
Carmarthenshire	70th	0.83	0.99
	95 th	1.09	1.03

* (UKCP18 baseline 1981-2000)

4.3 Historic Flooding

The Natural Resources Wales and Carmarthenshire County Council records show that the site has not historically flooded. The British Hydrological Society “Chronology of British Hydrological Event²” has no information on flooding within the vicinity of the site. No other historical records of flooding for the site have been recorded. Therefore, it has been concluded that the site has not historically flooded.

4.4 Existing and Planned Flood Defence Measures

There are no formal flood defences within this area.

4.5 Development Advice Map

The Development Advice Map (DAM) which accompanies TAN15 shows that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding (see Figure 4-1). Used to indicate that justification test is not applicable and no need to consider flood risk further. Table 4-3 describes the composition and use of the DAM zones to control and manage development.

² <http://www.dundee.ac.uk/geography/cbhe/>

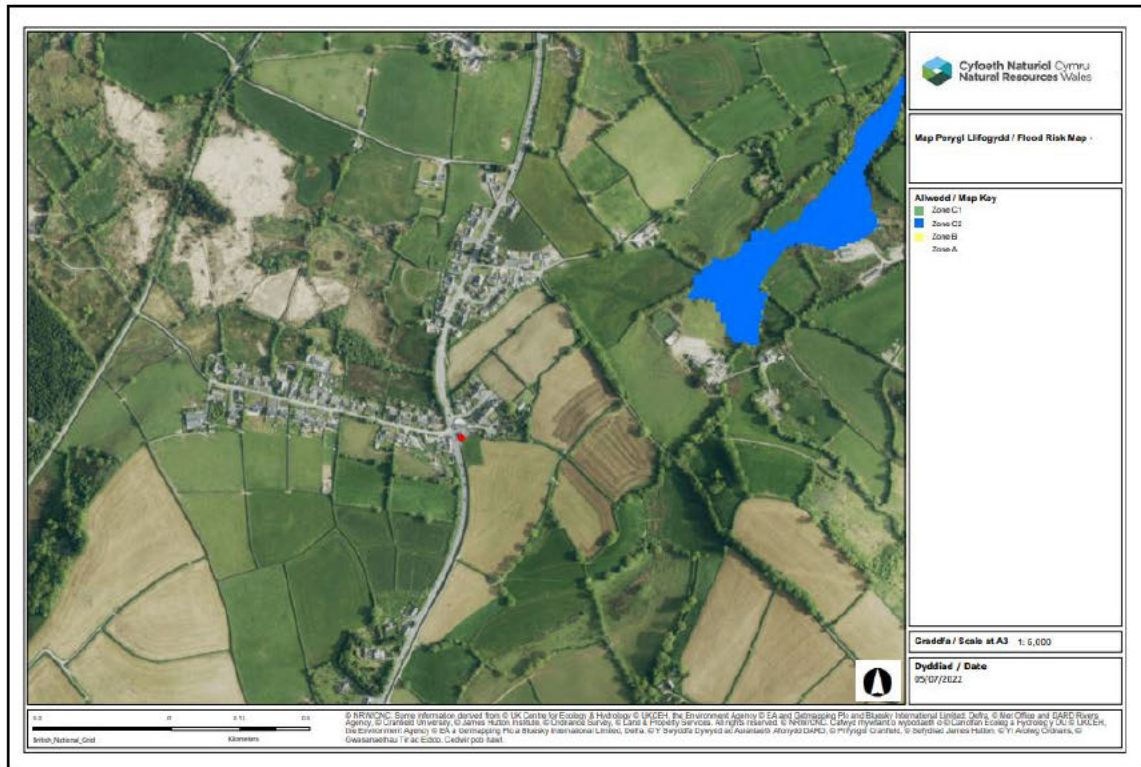


Figure 4-1 Development Advice Map

Table 4-3 Development Advice Map Zones

Description of Zone	Zone	Use within the Precautionary Framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Natural Resources Wales extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.

Description of Zone	Zone	Use within the Precautionary Framework
Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

4.6 Flood Map for Planning

The Flood Map for Planning (FMfP) shows that the site is located within Flood Zone 1 for flooding from rivers, within Flood Zone 1 for flooding from the sea. The north east of the site is located within Flood Zones 2 and 3 for flooding from surface water and small watercourses (see Figure 4-2). Table 4-4 provides details of the FMfP Flood Zones. The proposed development is appropriate for this location.

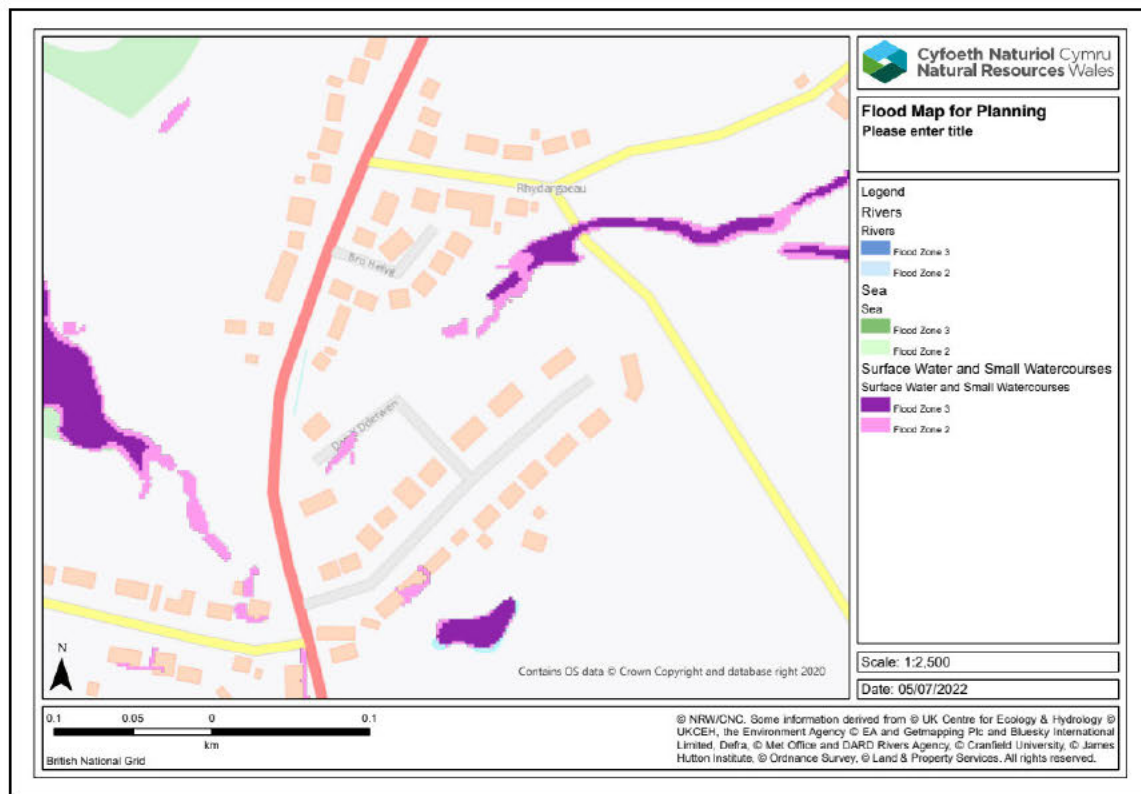


Figure 4-2 Flood Map for Planning

Table 4-4 FMfP Flood Zones

Flood Zone	Explanation
Rivers - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Rivers - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Sea - Flood Zone 2	Areas with 0.1% to 0.5% (1 in 1000 to 1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.
Sea - Flood Zone 3	Areas with more than 0.5% (1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.
Surface Water and Small Watercourses - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.
Surface Water and Small Watercourses - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

4.7 Flood Risk Vulnerability

Applying the Flood Risk Vulnerability Classification in Figure 2 of TAN15, the proposed development is classified as being 'highly vulnerable', 'highly vulnerable' uses are appropriate at this location.

4.8 Fluvial (river) Flooding

The site is not located within the vicinity of fluvial flooding sources and the risk of fluvial flooding is considered to be **not significant**.

4.9 Tidal (coastal) Flooding

The site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be **not significant**.

4.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).

Given the nature of the soils in the area and the lack of historical data on groundwater flooding within this area there is a very low risk of groundwater flooding. Also no below surface infrastructure and buildings are located or are proposed for the site. Therefore, the risk of flooding from groundwater flooding is considered to be **not significant**.

4.11 Surface Water (pluvial) Flooding

Surface water flooding tends to occur sporadically in both location and time such surface water. The site is not situated on and adjacent to areas of permeability and areas with geology which may result in surface water flooding.

The majority of the site is located within Flood Zone 1 and has a chance of flooding of less than 1 in 1000 (0.1%) years, including the effects of climate change (see Figure 4-2). However, the north east of the site is located within Flood Zones 2 and 3 for flooding from surface water and small watercourses. Flood Zone 2 has a 1 in 100 (1%) to 1 in 1000 (0.1%) year chance of flooding in a given year, including the effects of climate change. Flood Zone 3 has greater than a 1 in 100 (1%) year chance of flooding in a given year, including the effects of climate change. Figure 4-3 shows that units 24 and 25 are located within Flood Zone 2 and units 26 to 28 are located within Flood Zone 3.

The surface water flooding on the site is associated with a dry valley, where ground levels are lower, between 136.63 to 139.46mAOD, that runs through the north east of the site from west to east and then to the east of the site. On the Natural Resources Wales National Flood Hazard maps the flow direction is shown to be the east. The dry valley runs into a watercourse approximately 150m to the east of the site, which ultimately discharges into the Nant Corrwg.

During the high, medium and low risk events the majority of water depths are shown to be 0.15m to 0.30 with a small area of ponding of 0.30 to 0.90m (see Figures 4-4 to 4-6). The velocities are shown to be less than 1.00m/s with the majority of the hazard rating being low. There is a small area shown to be at a 'danger for some' which is associated with an area of deeper water. Based on a maximum water depth of 0.90m and ground level of 136.63 to 139.46mAOD the water level is likely to be 137.53 to 140.36mAOD.

The rate of surface water runoff from this area will not be high or of a large volume. Any surface water flows generated within this area are very low with flows a maximum of 1.00m/s during the 1 in 1000 year event. This would result in very low water depths, water velocities and therefore low flood risk to the site. This will be reduced post development due to the attenuation capacity that a new drainage system will provide. Information with regards to the new drainage system will be provided by others. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**.

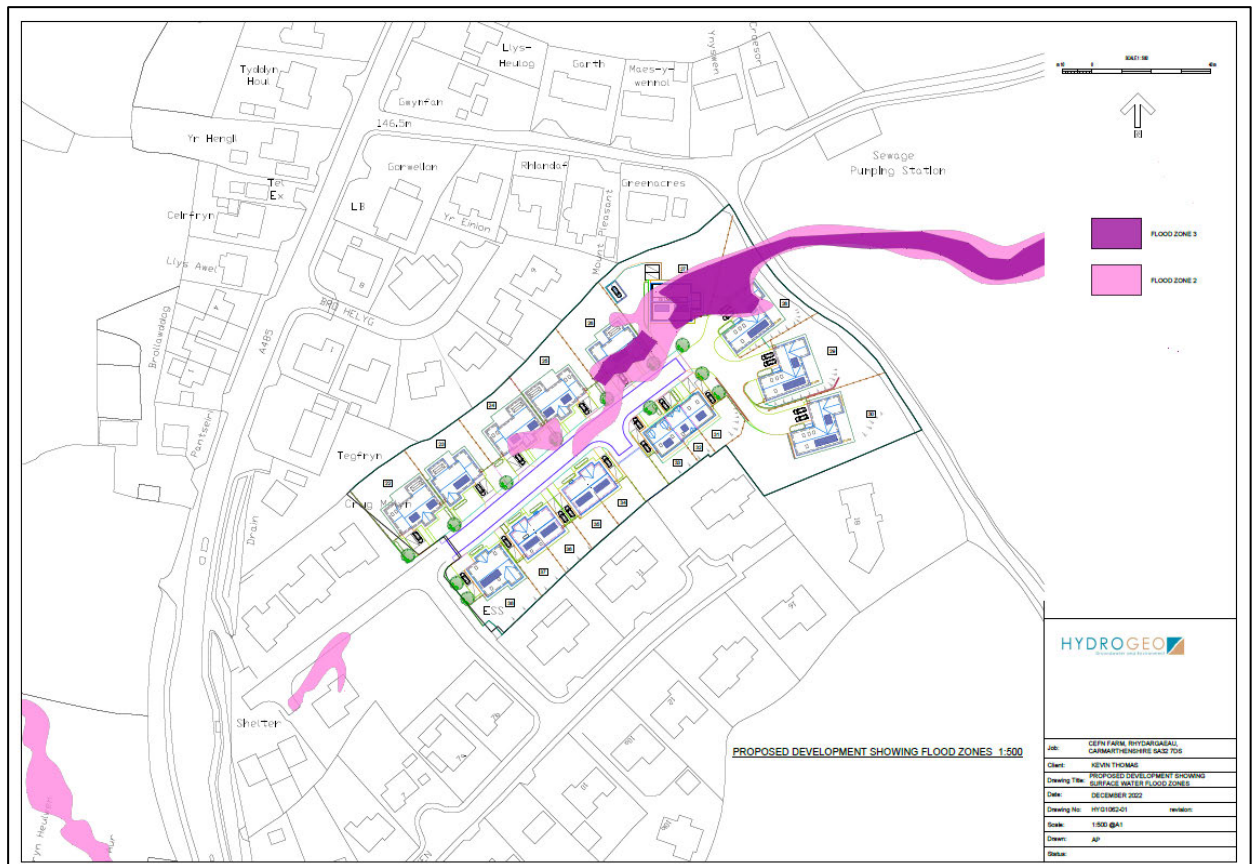


Figure 4-3 Surface Water FMfP and the Proposed Development

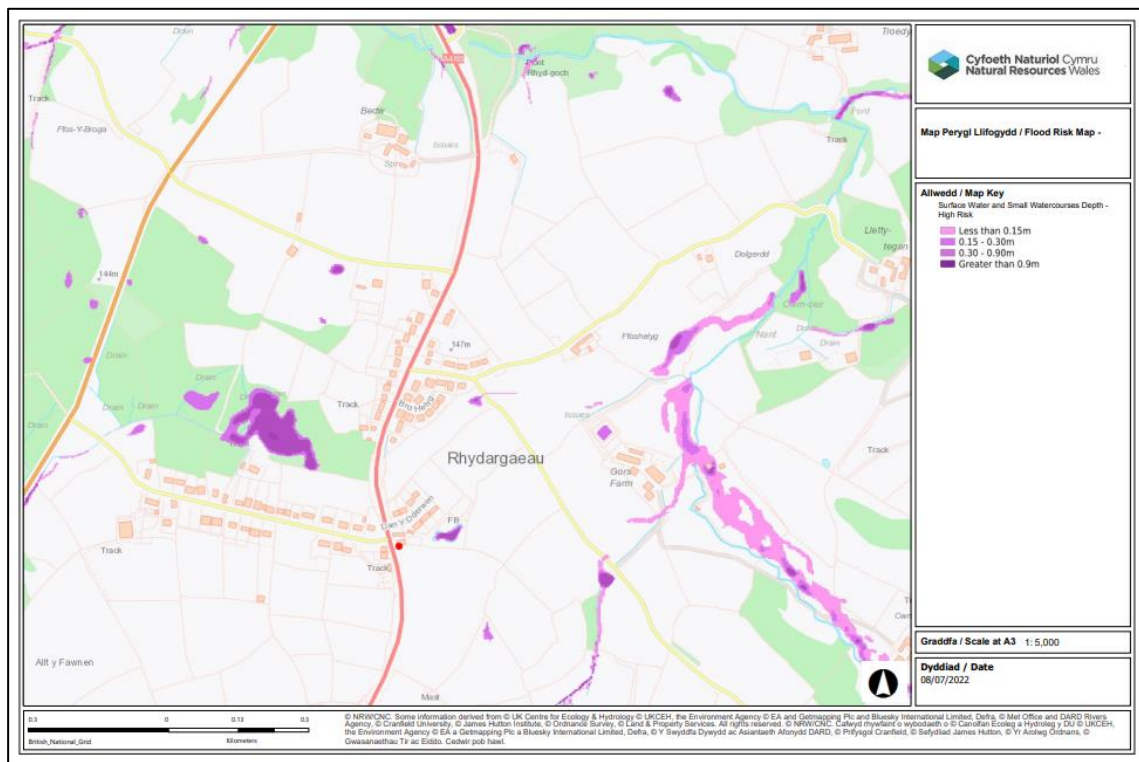


Figure 4-4 Natural Resources Wales Nation Flood Hazard – Water Depth: High Risk

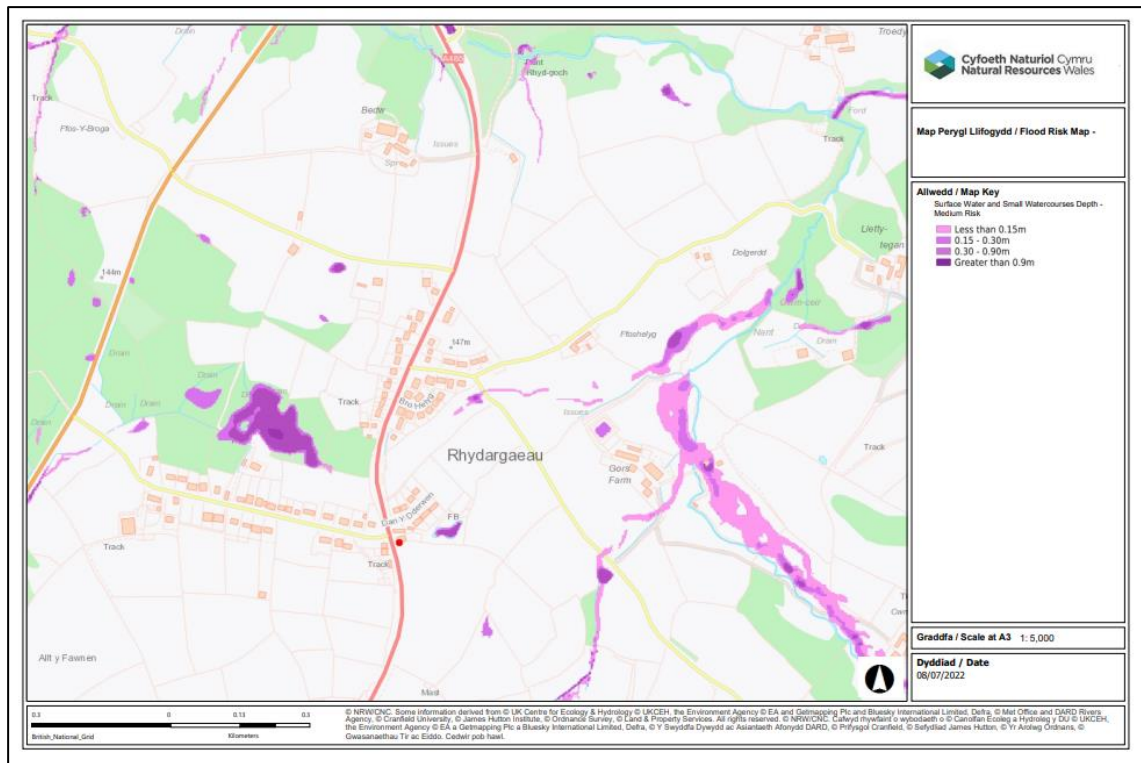


Figure 4-5 Natural Resources Wales Nation Flood Hazard – Water Depth: Medium Risk

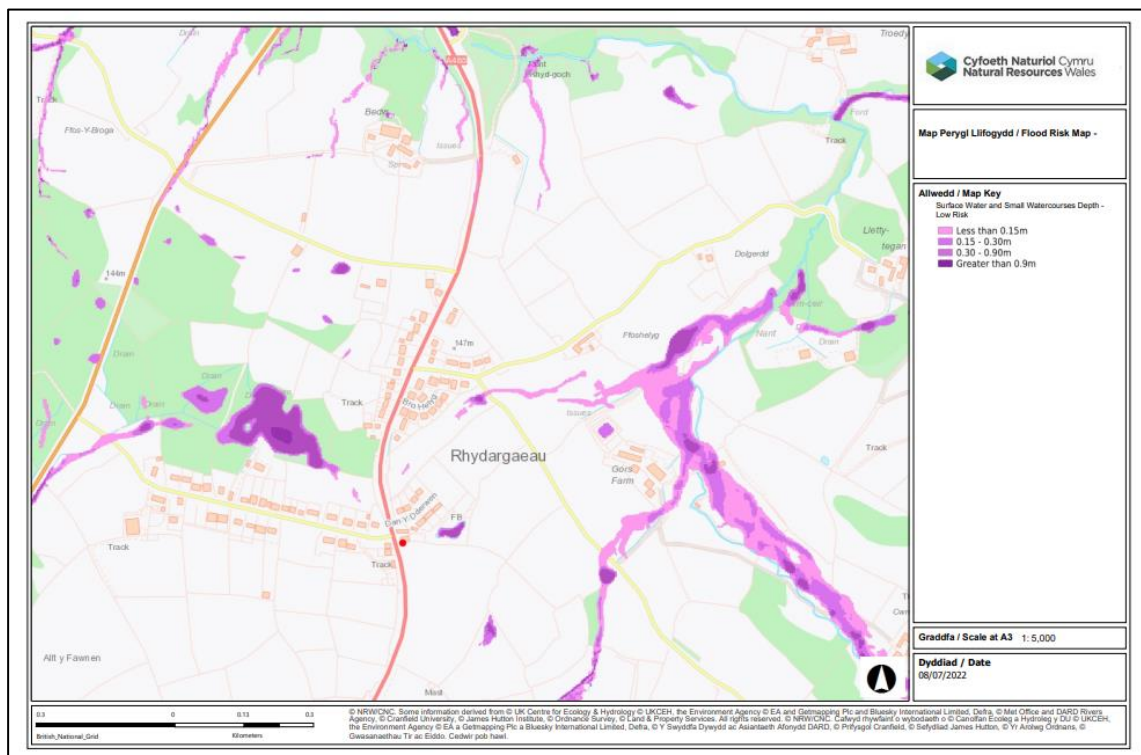


Figure 4-6 Natural Resources Wales Nation Flood Hazard – Water Depth: Low Risk

4.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

Any existing sewers located within the vicinity of the will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years.

The provision of adequate level difference between the ground levels and the invert levels of sewers would reduce the annual probability from this source to 1 in 100 years or less. The risk of flooding from sewer flooding is considered to be **not significant**.

4.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

The Natural Resources Wales Reservoir flood map shows that the site is not at risk of reservoir flooding (see Figure 4-7). The risk of flooding from flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.

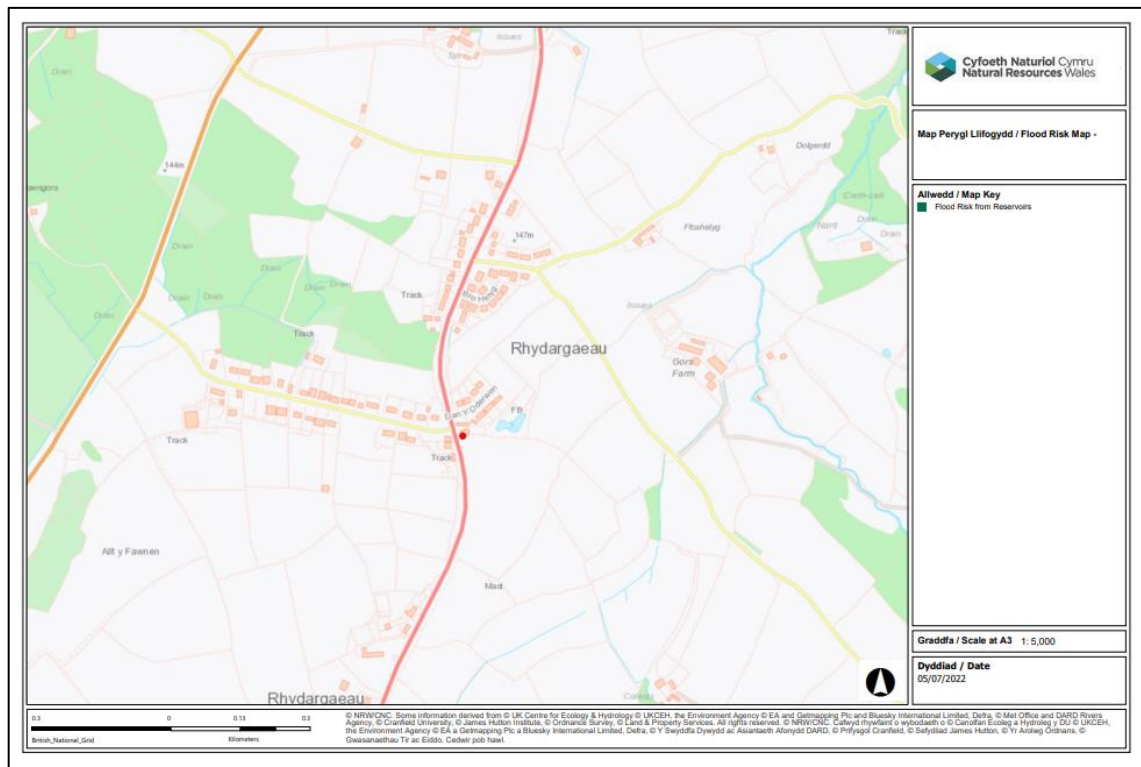


Figure 4-7 Natural Resources Wales Reservoir Flood Map

4.14 Effect of the Development on Flood Risk

The rate of surface water runoff from this area will not be high or of a large volume. Any surface water flows generated within this area are very low with flows a maximum of 1.00m/s during the 1 in 1000 year event. This would result in very low water depths, water velocities and therefore low flood risk to the site. Any displaced surface water would be very minor, would be incepted by the proposed internal highways and contained within the internal highways of the site rather than being displaced off the site. The surface water would then drain into the proposed surface water drainage system.

The impact of the proposed development will be mitigated post development due to the attenuation capacity that a new drainage system will provide and the permeable landscaped areas. The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.

4.15 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4-5.

The site is unlikely to flood except in extreme conditions. The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal), the primary flood risk posed to the site is from surface water flooding.

The DAM shows that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no need to consider flood risk further. The FMfP shows that the site is located within Flood Zone 1 for flooding from rivers and sea.

For surface water flooding, the majority of the site is located within Flood Zone 1 and has a chance of flooding of less than 1 in 1000 (0.1%) years, including the effects of climate change. However, the north east of the site is located within Flood Zones 2 and 3 for flooding from surface water and small watercourses. This location has a greater than 1 in 100 (1%) to 1 in 1000 (0.1%) year chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. Units 24 and 25 are located within Flood Zone 2 and units 26 to 28 are located within Flood Zone 3.

The surface water flooding on the site is associated with a dry valley, where ground levels are lower, between 136.63 to 139.46m AOD, that runs through the north east of the site from west to east and then to the east of the site. Based on a maximum water depth of 0.90m and ground level of 136.63 to 139.46m AOD the water level is likely to be 137.53 to 140.36m AOD.

The rate of surface water runoff from this area will not be high or of a large volume. Any surface water flows generated within this area are very low with flows a maximum of 1.00m/s during the 1 in 1000 year event. This would result in very low water depths, water velocities and therefore low flood risk to the site. This will be reduced post development due to the attenuation capacity that a new drainage system will provide. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**. The proposed development is classified as being 'highly vulnerable', 'highly vulnerable' uses are appropriate at this location.

The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.

The risk of flooding will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the site (see Section 5.0).

Table 4-5 Risk Posed by Flooding Sources.

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial (river) Flooding	No	None Reported	Not significant
Tidal (coastal) Flooding	No	None Reported	Not significant
Groundwater Flooding	No	None Reported	Not significant
Surface Water (pluvial) Flooding	Yes	Dry Valley	Low
Sewer Flooding	No	None Reported	Not significant
Flooding from Artificial Drainage Systems/Infrastructure Failure	No	None Reported	Not significant

5 Risk Management

5.1 Introduction

In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

A number of techniques and mitigation strategies to manage and reduce the overall flood risk in the area will be used. This will ensure the development will be safe 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.

5.2 Finished Floor Levels

The finished floor level of the houses will be between 140 and 142mAOD which provides a more than adequate freeboard above the surface water flood levels of 137.53 to 140.36mAOD, as shown in Table 5-1. It is also proposed that flood protection measures are employed within the buildings design to reduce the overall risk to the occupants. A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

Table 5-1 Freeboards.

Plot No.	Finished Floor Level (mAOD)	Water Level (mAOD)	Freeboard (m)
22 to 23	142.00	140.36	1.64
24 to 25	141.50	140.36	1.14
26	140.50	139.41	1.09
27 to 29	140.00	137.53	2.47
30 to 33	141.00	137.53	3.47
34 to 35	140.50	139.41	1.09
36 to 37	141.00	140.36	0.64
38	141.50	140.36	1.14

5.3 Flood Resistance Measures

Flood risk can be mitigated through the design of the building. Flood resistance measures are measures that help resist floodwaters entering a property (airbrick covers are an example of a flood resistance measure). Flood resistant measures will be used, including:

- The walls of the building will be thick.
- Sealant will be used around external doors and windows.
- All external doors and windows will be constructed from hard wearing materials.
- No airbricks or airbrick flood covers will be used

These factors will prevent water entering the properties and make the properties more resistant to seepage.

5.4 Flood Resilience Measures

Flood resilience measures are designed in such a way as to reduce the cost and time required to reinstate the property should it be flooded (tiled floors are an example of a flood resilience measure).

The buildings will be constructed in such a way that although floodwater may enter the building, elements that are damaged by floodwater can be easily repaired or replaced. This is a form of flood resilience. They are suitable as no other measure is practicable. Robust materials and finishes will be used, including:

- all electrics wiring, switches, sockets, socket outlets etc. will be located a minimum of 450mm above the finished floor level.

5.5 Safe Access and Egress

Access routes should be such that occupants can safely access and exit their properties in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

The site is one of the last places in the area to flood and remains flood free when other areas close by are flooded. The site is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free for the vast majority of flood events during the lifetime of the proposed development.

Safe access and egress routes, including emergency access can be maintained for vehicles and/or by foot. Figure 4-6 shows that the anticipated flood depths during the surface water 1 in 100 year event (medium risk) on the internal access road will be less than 0.15m. Figure 5-1 shows that the hazard rating will be low during the surface water 1 in 100 year event (medium risk) on the internal access road.

The likelihood of a rapid water level rise and possible rapid inundation of the site posing a risk to life is considered to be minimal. The site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

The site access and A4068 - Heol Gwys road is one of the last places in the area to flood and remains flood free when other areas are flooded. The site access is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free during the vast majority of flood events during the lifetime of the proposed development.

Access routes should be such that occupants can safely access and exit their buildings in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood. A safe access and egress route, including emergency access, has been identified by foot/vehicles via the site access and then the A4068 - Heol Gwys road to the north and/or the south of the site. Therefore, safe access and egress from the site will be possible in accordance with TAN15 and Natural Resources Wales guidance.

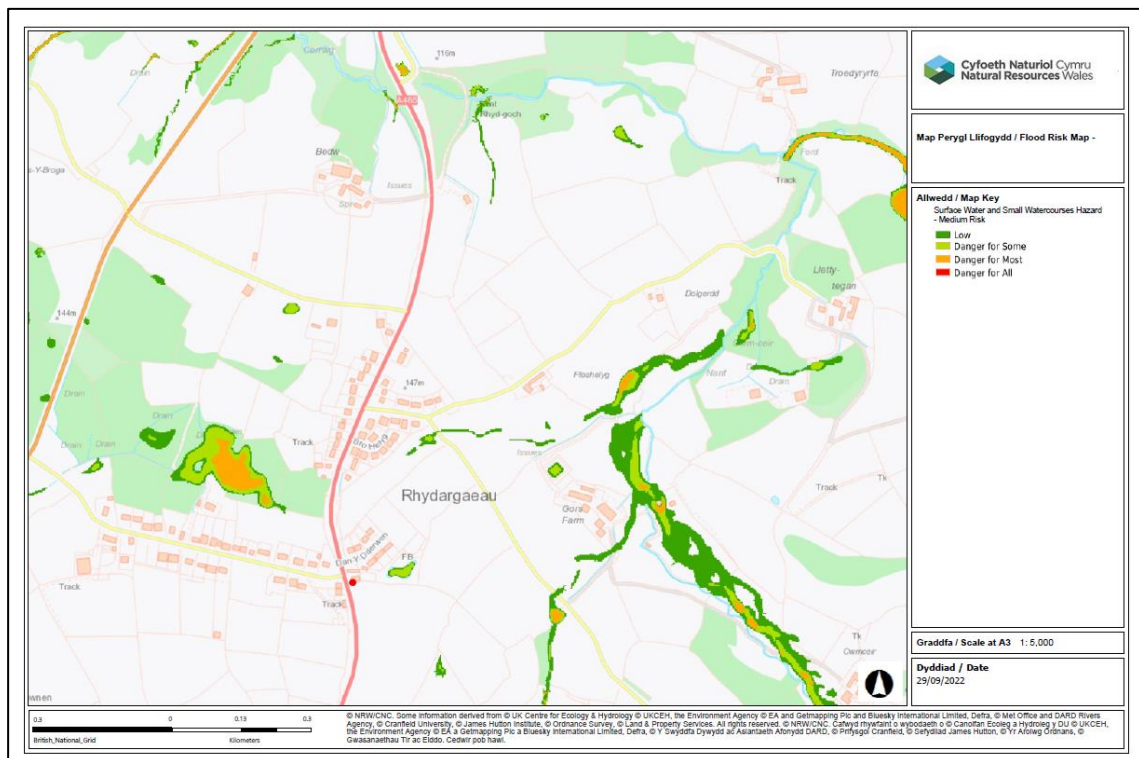


Figure 5-1 Natural Resources Wales Surface Water 1 in 100 Year Hazard Rating

5.6 Residual Risk

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. As such, the residual risk is considered to be acceptable for the lifetime of the development.

6 Justifying the Location of the Development

6.1 Justification Test

The Justification Test sets out the details required to justify siting a new development in an area believed to be at risk of flooding and is defined in Section 6 of TAN15. The advice with regards to the Justification Test within TAN15 is specific to river and sea flooding. The site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no need to consider flood risk further. The FMfP shows that the site is located within Flood Zone 1 for flooding from rivers and sea. The development proposals should therefore be considered by the LPA to satisfy the Justification Test.

6.2 Assessment of Acceptability Criteria

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. The advice with regards to the Assessment of Flood Consequences within TAN15 is specific to river and sea flooding.

There is an indicative frequency threshold of flooding below which flooding of developed may not be allowed (see Table A1.14 of TAN15) and indicative flood consequences during an extreme flood (see Table A1.15 of TAN15).

The site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no need to consider flood risk further. It is considered that the proposed development has been elevated as far as is practicable, accounting the for site constraints an further mitigation measures will be used to manage the surface water flood risk.

The consequences of flooding can be acceptably managed for the lifetime of the development recognising the small scale proposal on the edge of floodplain. The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. Therefore, the site is compliant with A1.14 and A1.15 of TAN15.

7 Summary and Conclusions

7.1 Introduction

This report presents an FCA in accordance with TAN15 for the proposed development at Cefn Farm, Rhydargaeau, Carmarthenshire, SA32 7DS.

7.2 Flood Risk

The site is unlikely to flood except in extreme conditions. The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal), the primary flood risk posed to the site is

The DAM shows that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no need to consider flood risk further. The FMfP shows that the site is located within Flood Zone 1 for flooding from rivers and sea.

For surface water flooding, the majority of the site is located within Flood Zone 1 and has a chance of flooding of less than 1 in 1000 (0.1%) years, including the effects of climate change. However, the north east of the site is located within Flood Zones 2 and 3 for flooding from surface water and small watercourses. This location has a greater than 1 in 100 (1%) to 1 in 1000 (0.1%) year chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

The surface water flooding on the site is associated with a dry valley, where ground levels are lower, between 136.63 to 139.46mAOD, that runs through the north east of the site from west to east and then to the east of the site. Based on a maximum water depth of 0.90m and ground level of 136.63 to 139.46mAOD the water levels is likely to be 137.53 to 140.36mAOD. Units 24 and 25 are located within Flood Zone 2 and units 26 to 28 are located within Flood Zone 3.

The rate of surface water runoff from this area will not be high or of a large volume. Any surface water flows generated within this area are very low with flows a maximum of 1.00m/s during the 1 in 1000 year event. This would result in very low water depths, water velocities and therefore low flood risk to the site. This will be reduced post development due to the attenuation capacity that a new drainage system will provide. Therefore, the risk of flooding from surface water flooding is considered to be of **low significance**. The proposed development is classified as being 'highly vulnerable', 'highly vulnerable' uses are appropriate at this location.

The proposed development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. The site proposals have been shown to be in accordance with A1.12 of TAN15.

The risk of flooding will be further managed and mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the site.

7.3 Risk Management

The flood risk at the site will be reduced by the following risk management measures:

Finished Floor Levels: The finished floor level of the houses will be between 140 and 142mAOD which provides a more than adequate freeboard above the surface water flood levels of 137.53 to 140.36mAOD. It is also proposed that flood protection measures are employed within the buildings design to reduce the overall risk to the occupants. A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

Flood Resistance Measures: Flood resistant measures will be used, including:

- The walls of the building will be thick.
- Sealant will be used around external doors and windows.
- All external doors and windows will be constructed from hard wearing materials.
- No airbricks or airbrick flood covers will be used

These factors will prevent water entering the properties and make the properties more resistant to seepage.

Flood Resilience Measures: Robust materials and finishes will be used, including:

- all electrics wiring, switches, sockets, socket outlets etc. will be located a minimum of 450mm above the finished floor level.

Safe Access and Egress: Safe access and egress routes, including emergency access can be maintained for vehicles and/or by foot. The likelihood of a rapid water level rise and possible rapid inundation of the site posing a risk to life is considered to be minimal. The site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2.

The site access and A4068 - Heol Gwys road is one of the last places in the area to flood and remains flood free when other areas are flooded. The site access is at such a ground level that it would only flood in the most extreme flood events; the site will remain flood free during the vast majority of flood events during the lifetime of the proposed development.

Access routes should be such that occupants can safely access and exit their buildings in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood. A safe access and egress route, including emergency access, has been identified by foot/vehicles via the site access and then the A4068 - Heol Gwys road to the north and/or the south of the site. Therefore, safe access and egress from the site will be possible in accordance with TAN15 and Natural Resources Wales guidance.

7.4 Justifying the Location of the Development

The development proposals should be considered by the LPA to satisfy the Justification Test and the Acceptability Criteria as set out in TAN15.

7.5 Conclusion

In conclusion, the proposed development would be expected to remain dry in all but the most extreme conditions. The proposed development will provide betterment compared to the existing situation.

Providing the recommendations made in this FCA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable, and the development would be in accordance with the requirements of TAN15.

This FCA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of TAN15. The development should not therefore be precluded on the grounds of flood risk.

Appendices

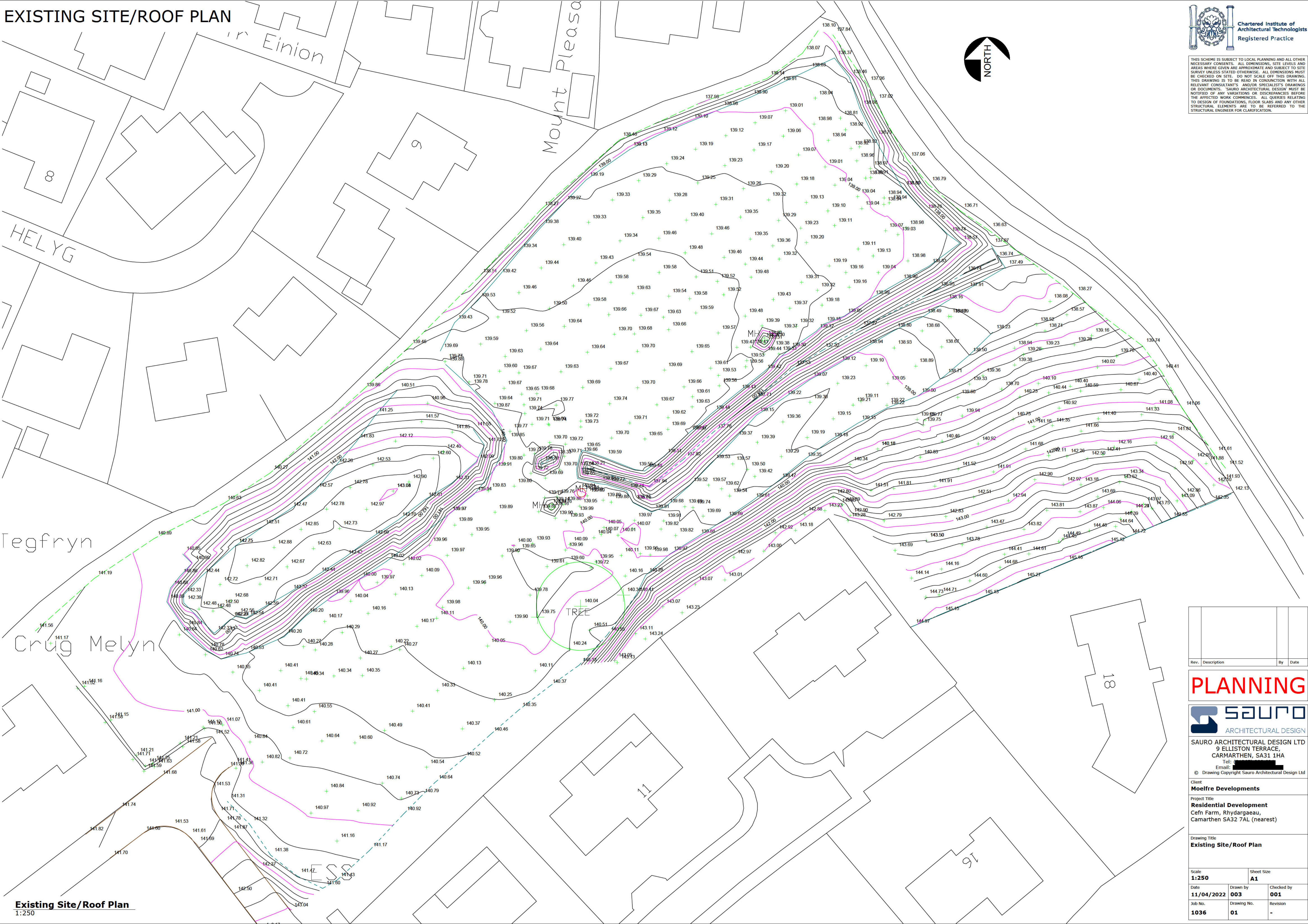
Appendix 1

Site Plans

EXISTING SITE/ROOF PLAN



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Existing Site/Roof Plan
1:250

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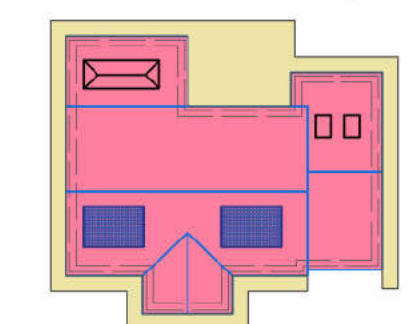
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Moelfre Developments
Project Title:
Residential Development
Cefn Farm, Rhydargaeau,
Carmarthen SA32 7AL (nearest)

Drawing Title:
Existing Site/Roof Plan

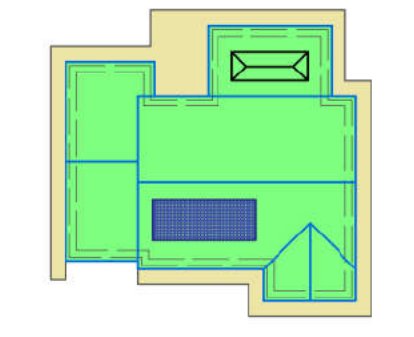
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Job No. 1036	Drawing No. 01	Revision -

PROPOSED SITE/ROOF PLAN

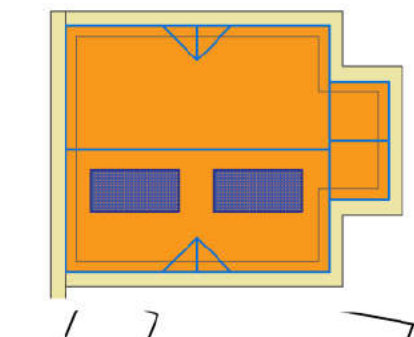
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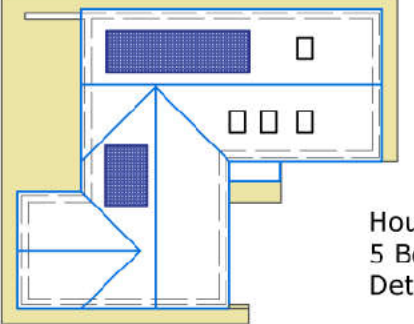
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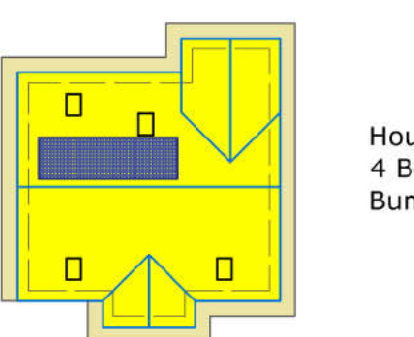
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4 Bedroom
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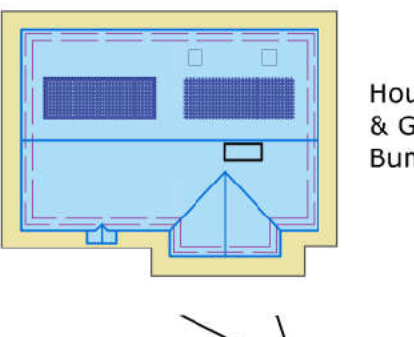
House Type C
5 Bedroom
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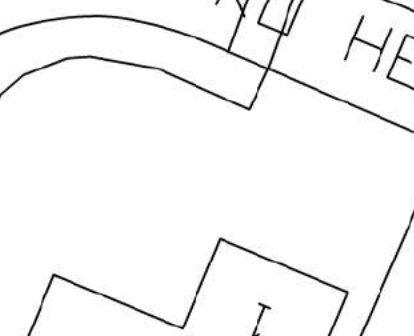
House Type D1/D2
5 Bedroom
Detached



House Type E
4 Bedroom
Bungalow



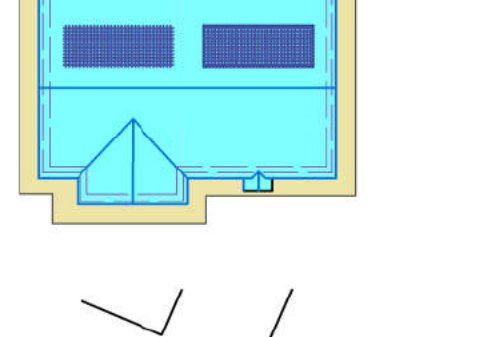
House Type F
2 Bedroom
Bungalow



House Type F & G
2 Bedroom
Bungalow



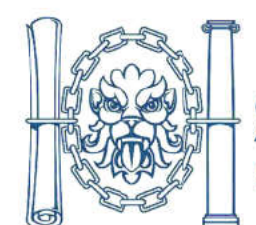
House Type H, I & J
H - 4 Bedroom
I - 2 Bedroom
J - 3 Bedroom



House Type F
& G 2 Bedroom
Bungalow



Proposed Site/Roof Plan
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General Notes:

- Refer to engineer's drawing for site drainage plan

A	Minor amendment on plot 36 & 37	006	25/7/22
Rev.	Description	By	Date

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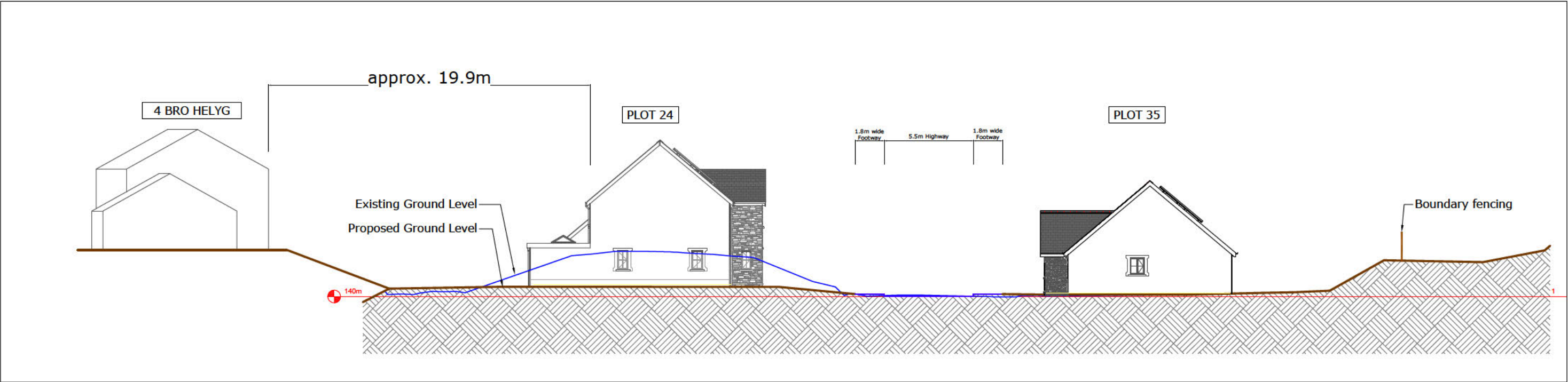
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Project Title
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Drawing Title
Proposed Site/Roof Plan

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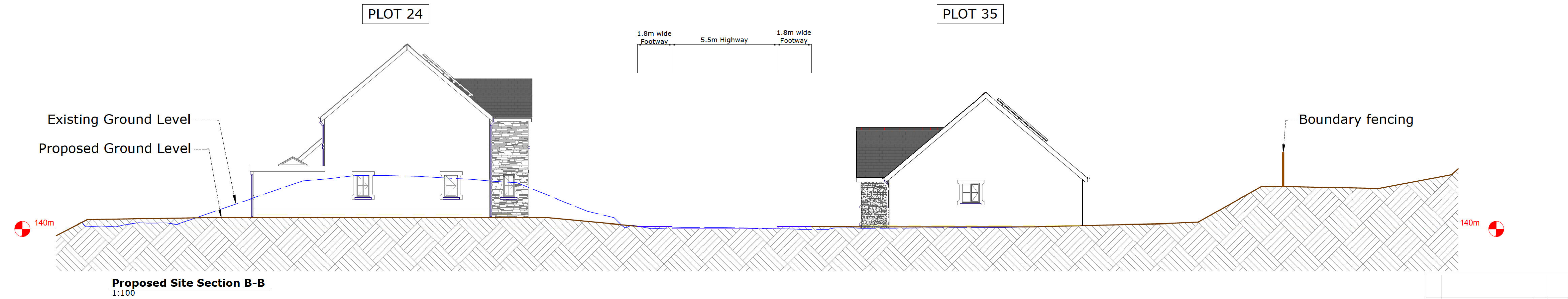
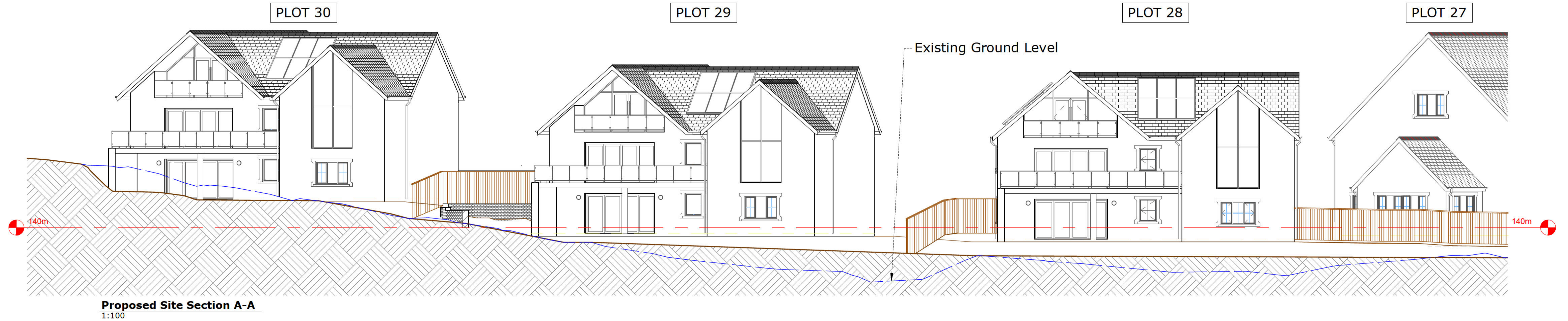


Section B-B [Prelim]

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PROPOSED SITE SECTIONS

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Project Title:
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Cefn Farm, Rhydargaeau,
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Drawing Title:
Proposed Site Sections

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