Flood Consequence Assessment

Wild Road Cottage, Duffryn Lane, St Nicholas, Cardiff, CF5 6TA

On Behalf of

Mr & Mrs Walker

Quality Management

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1 Introduction

1.1 Background

This Flood Consequence Assessment (FCA) has been prepared by Hydrogeo at the request of Mr and Mrs Walker, to support a planning application for the proposed development at Wild Rose Cottage, Duffryn Lane, St Nicholas, Cardiff, CF5 6TA.

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.

The report includes a preliminary drainage assessment which presents the options for sustainable surface water management for the development.

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 overall level of flood risk;
- Section 6 justifies the location of the development;
- Section 7 presents a preliminary surface water drainage assessment and
- Section 8 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), the Lead Local Flood Authority (LLFA) 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 Vale of Glamorgan Council

The Vale of Glamorgan Council is the LPA, the LLFA and therefore, has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by the Vale of Glamorgan Council regarding flood risk was consulted to assess the mitigation policies in place.

The Vale of Glamorgan Council Strategic Flood Consequence Assessment (SFCA) and the Vale of Glamorgan Council Preliminary Flood Risk Assessment (PFRA) which cover the site have been reviewed.

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 Vale of Glamorgan Council SFCA and the Vale of Glamorgan Council PFRA have 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 Wild Rose Cottage, Duffryn Lane, St. Nicholas, Cardiff, CF5 6TA (see Appendix 1). The National Grid Reference (NGR) of the site is 309428, 173707. The site is located within a rural setting and is in close proximity to the settlement boundary of St. Nicholas within the administrative boundary of the Vale of Glamorgan Council. The total area of the site measures approximately 1.72 hectares (ha).

3.2 Existing Development

The site currently consists of a three storey residential property together with outbuildings and land. There are a number of existing outbuildings within the southern area of the site, immediately adjacent to the access. This built form comprises a number of redundant buildings and barns that run along and abut the western boundary of the site, as well as remnants of other buildings.

3.3 Proposed Development

The proposal is for the development of mixed holiday accommodation within the current site boundary to include lodges, glamping pods and touring caravan pitches together with landscaping and the creation of an internal road (see Appendix 1).

3.4 Ground Levels

A topographical survey of the site has recently been undertaken (see Appendix 1). The site rises from south to north, site ground levels are between 79.36 and 85.61 metres Above Ordnance Datum (mAOD).

3.5 Catchment Hydrology / Drainage

There are two small watercourses on the site, one of which flows northeast to southwest and the second flows west to east across the site which joins the first watercourse, as shown in Drawing 1. The River Waycock is located approximately 0.90km to the south of the site.

The small watercourses are ephemeral and only flow during storm events such as the recent 2021 storms Arwen and Barra. The existing barn buildings are in poor condition and the gutters discharge to the hardstanding. Three gullies are present on the hardstanding (one is visible in photo 7) and the existing drainage discharges to the watercourse adjacent to the residential property.

When water flows in the small watercourses it discharges off-site via a culvert below the highway, and towards the south. Some surface water runoff from the highway is conveyed into the stream at this location to the southwest of the highway (see photo 2).

3.6 Ground Conditions

The British Geological Survey (BGS) Map indicates that there are no superficial deposits recorded. The bedrock underlying the site consists of Triassic Rocks (undifferentiated) - sandstone and conglomerate, interbedded. Sedimentary bedrock formed approximately

200 to 251 million years ago in the Triassic Period in a local environment previously dominated by rivers.

3.7 Site Visit Photographs

Photographs taken during a site visit by Hydrogeo on the 10th December 2021 have been presented in Figure 3-1 to Figure 3-16 below, along with a brief description. Apart from a small ponded area at the site entrance, the watercourse was dry during the site visit.

The photo locations have been shown on Drawing 1.

Figure 3-1 Looking south along small watercourse

Photo 1 (Figure 3-1) shows the small watercourse leaving the site at the entrance with Dryffin Lane. The watercourse is culverted below the highway.

Figure 3-2 Looking southeast along Duffryn Lane

Photo 2 (Figure 3-2) shows the small watercourse at the south western side of the highway outside the site boundary, joining a highway drainage ditch, and flowing through some woodland to the south.

Figure 3-3 Looking south from Duffryn Lane

Photo 3 (Figure 3-3) shows the small watercourse route to the south through woodland.

Figure 3-4 Looking north along the small watercourse

Photo 4 (Figure 3-4) shows the southern part of the site, including access roadway and culvert for small watercourse.

Figure 3-5 Looking northeast along the small watercourse

Photo 5 (Figure 3-5) shows the formed channel of the small watercourse through the southern part of the site where it is culverted below the access roadway.

Figure 3-6 Looking northeast along the small watercourse

Photo 6 (Figure 3-6) shows the small watercourse route as a more naturally-formed channel past the existing buildings.

Figure 3-7 Looking south near the existing buildings

Photo 7 (Figure 3-7) shows the hardstanding adjacent to the existing buildings; one gulley is visible in the foreground. The gulley is one of three identified by Hydrogeo, and discharges into the small watercourse further to the south. The condition of the sub-surface pipe is not known.

Figure 3-8 Looking northwest at the small watercourse

Photo 8 (Figure 3-8) shows where the second smaller watercourse joins the main small watercourse in the centre of the site.

Figure 3-9 Looking northeast within the site

Photo 9 (Figure 3-9) shows the main area of the site where touring pitches are proposed.

Figure 3-10 Looking northeast along the small watercourse

Photo 10 (Figure 3-10) shows the small watercourse route through the main area of the site.

Figure 3-11 Looking northwest within the site

Photo 11 (Figure 3-11) shows the main area of the site.

Figure 3-12 Looking north at the northern boundary of the site

Photo 12 (Figure 3-12) shows where the watercourse (visible as a small channel) enters the site from woodland to the north.

Figure 3-13 Looking south at the northern boundary of the site

Photo 13 (Figure 3-13) shows the main area of the site.

Figure 3-14 Looking north showing the existing buildings

Photo 14 (Figure 3-14) shows the existing buildings and hardstanding at the southern area of the site.

Figure 3-15 Looking southwest showing the existing buildings

Photo 15 (Figure 3-15Figure 3-15 Looking southwest showing the existing buildings) shows an existing building, including existing guttering/downpipe in poor condition.

Figure 3-16 Looking north showing the existing buildings

Photo 16 (Figure 3-16Figure 3-15 Looking southwest showing the existing buildings) shows an existing building, including existing guttering/downpipe in poor condition.

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 purposes.

Table 4-1 shows 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.

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. Therefore, the design flood event for the site is the 1 in 100 year (+25%) event.

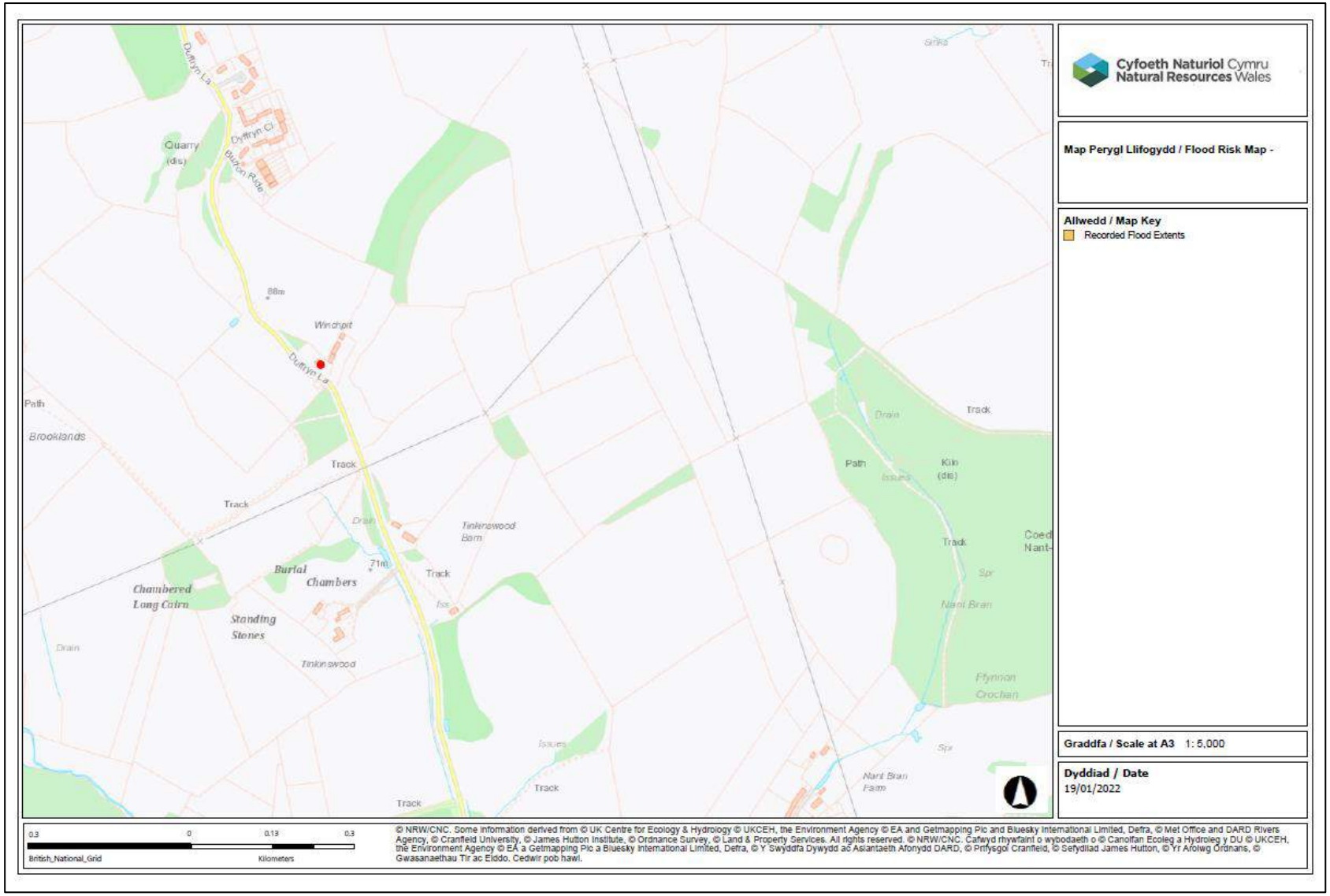
Table 4-1 Peak River Flow Allowances (use 1961 to 1990 baseline)

	Total Potential Change Anticipated by the 2020s	**Total Potential Change Anticipated by the 2050s**	**Total Potential Change Anticipated by the 2080s**
Upper end estimate	25%	40%	70%
Central estimate	10%	20%	25%
Lower end estimate	0%	5%	5%

4.3 Historic Flooding

The Natural Resources Wales records there has been no recoded historic flooding (Figure 4-1). The British Hydrological Society “Chronology of British Hydrological Events” has no information on flooding within the vicinity of the site. Therefore, it has been concluded that the site has not flooded in the recent past.

Figure 4-1 Natural Resources Wales Historic Flood Map



4.4 Existing and Planned Flood Defence Measures

There are formal Natural Resources Wales flood defences which will protect the proposed development from most flood events. Further risk management measures will be used to protect the site from flooding these are discussed in Section 5.0.

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 (Figure 4-2). Used to indicate that justification test is not applicable and no need to consider flood risk further.

Table 4-2 describes the composition and use of the TAN15 zones to control and manage development. Applying the Flood Risk Vulnerability Classification in Figure 2 of TAN15, the proposed development is classified as 'highly vulnerable' and is appropriate at this location.

Figure 4-2 Natural Resources Wales Development Advice Map

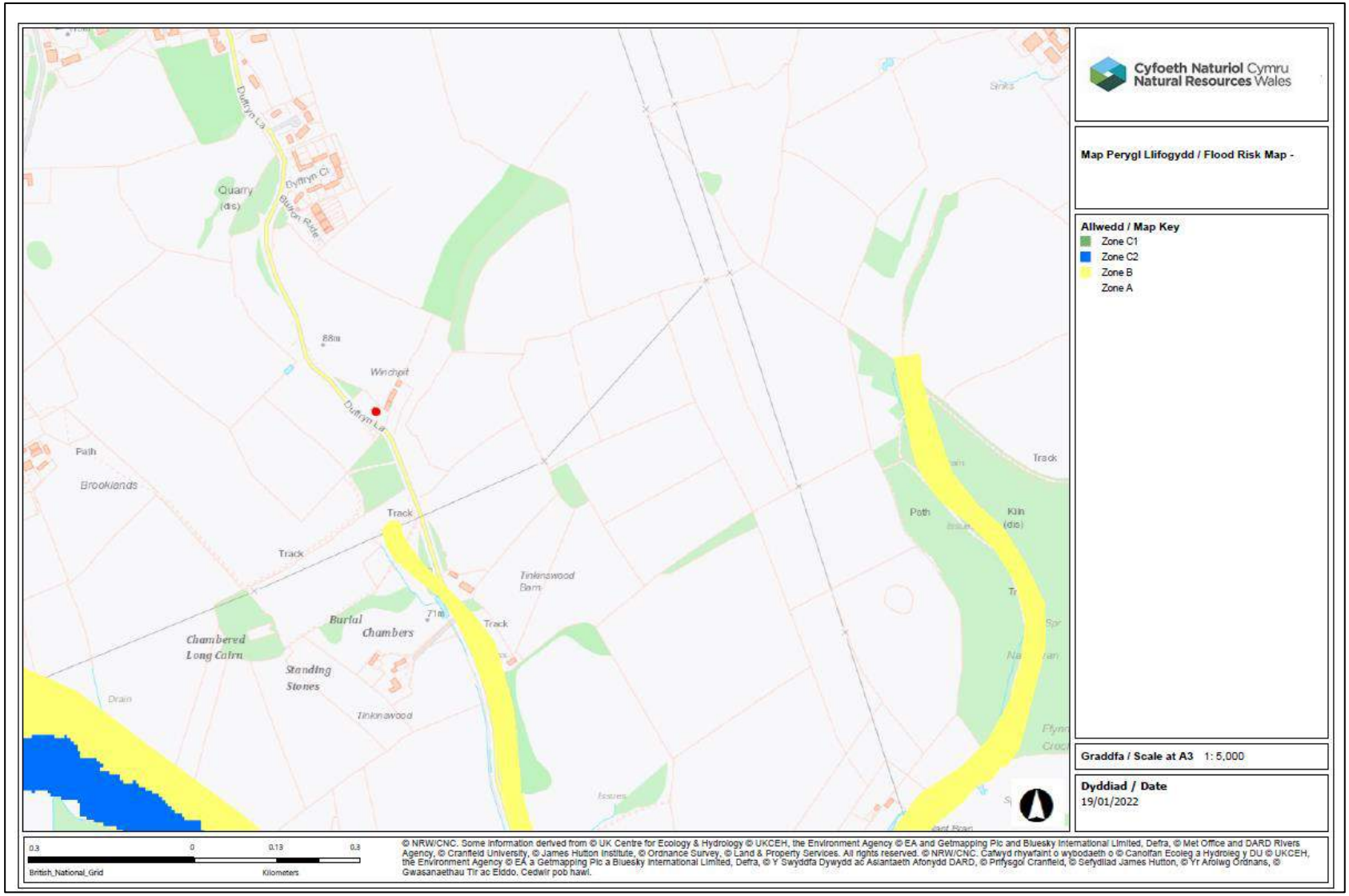


Table 4-2 TAN15 Flood Zones

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.
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 Fluvial (river) Flooding

To assess the fluvial flood risk posed to the site in more detail compared to the generalised, and coarse modelling of the DAMs the Natural Resources Wales Flood Risk Assessment Wales Maps has been used.

Figure 4-3 shows that the site is not at risk of fluvial flooding from a large watercourse. Fluvial flooding could occur if the small watercourses were to overtop their banks during or following an extreme rainfall event therefore, fluvial flooding from the small watercourses poses the principal flood risk to the site. The site is one of the last places in the area to flood and remains flood free when other areas 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. Furthermore, the small watercourses are ephemeral and only flow during storm events such as the recent 2021 storms Arwen and Barra.

Figure 4-4 shows that the majority of the site is not at risk of fluvial flooding from the small watercourses. However, areas immediately adjacent to the small watercourse, running through the site from the northeast to southwest, are shown to have a low to medium risk of flooding with between a 1 in 1000 (0.1%) to 1 in 30 (3.3%) year chance of flooding. This is shown to result in water depths of less than 150mm with a low hazard rating within areas immediately adjacent to the watercourse, this is due to the rainwater not draining away through the normal drainage systems or not soaking into the ground.

Figure 4-3 Natural Resources Wales Fluvial Flood Map

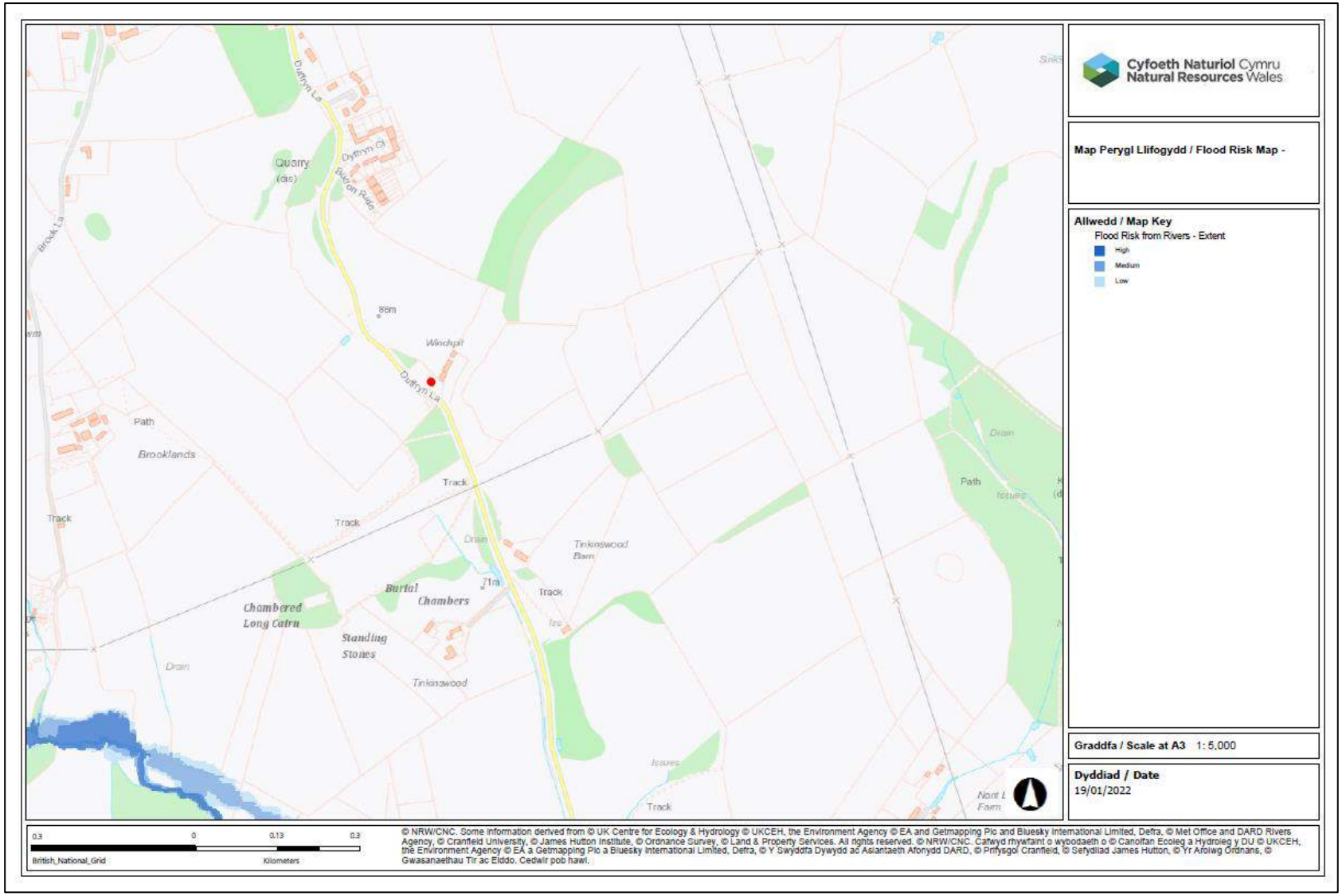
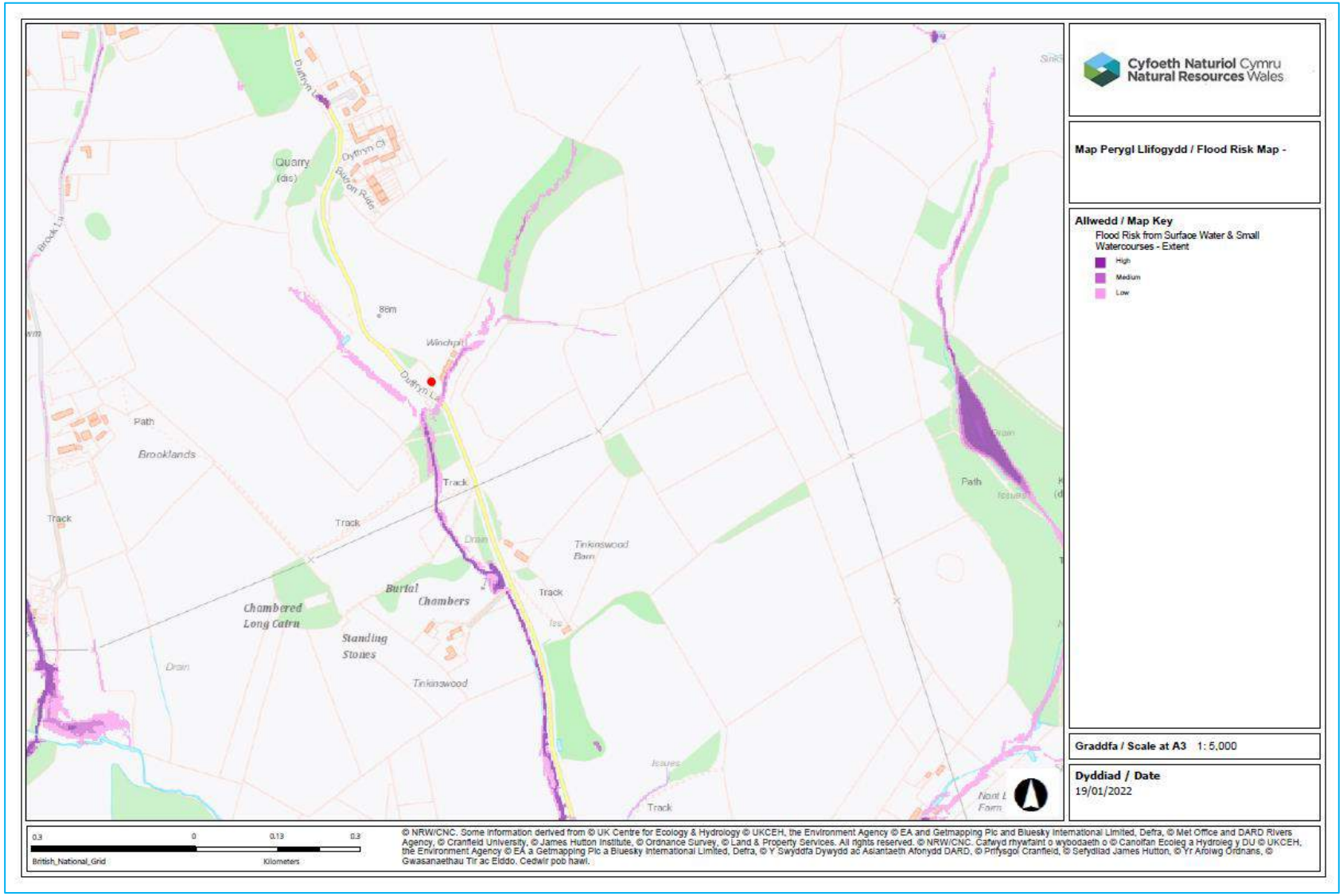


Figure 4-4 Natural Resources Wales Surface Water and Small Watercourse Flood Map



Fluvial flood risk to the site can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow away from the site rather than flowing towards the site. The flooding will only inundate the site, immediately adjacent to the small watercourse, to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site. The availability of debris is very limited due to the upland nature of the site and therefore the probability of debris leading to a hazard is negligible.

The typical rainfall profile for this region, is a low intensity, long duration event commensurate with frontal weather systems. The speed of inundation and rate of floodwater rise would be low.

Given the small scale and nature of the proposed development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding poses a low flood risk to the site.

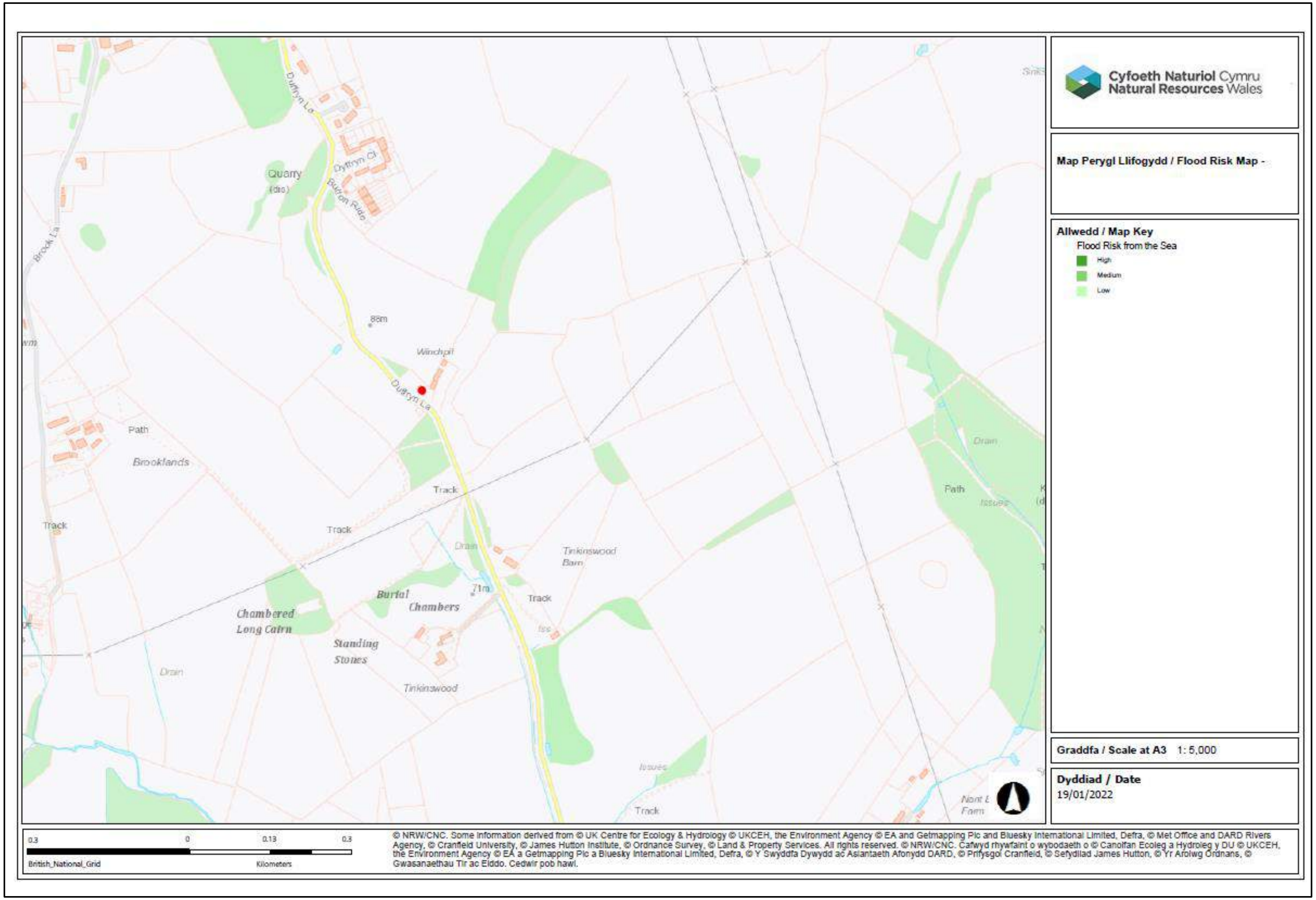
Therefore, the risk of fluvial flooding is considered to be of **low significance**.

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).

4.7 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** (Figure 4-5).

Figure 4-5 Natural Resources Wales Tidal Flood Map


Cyfoeth Naturiol Cymru
Natural Resources Wales
Map Perygl Llifogydd / Flood Risk Map -
Allwedd / Map Key
Flood Risk from the Sea
High
Medium
Low
Graddfa / Scale at A3 1: 5,000
Dyddiad / Date
19/01/2022
Quarry
Brooklands
Path
Track
Winchpit
Burial
Chambers
Chambered
Long Cairn
Standing
Stones
Tinkinswood
Tinkinswood
Barn
Drain
71m
88m
British_National_Grid
Kilometers
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4.8 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**.

4.9 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.

Figure 4-4 shows that the majority of the site is not at risk of fluvial flooding from the small watercourses. However, area immediately adjacent to the small watercourse running northeast to southwest through the site, are shown to have a low to medium risk of flooding with between a 1 in 1000 (0.1%) to 1 in 30 (3.3%) year chance of flooding. This is shown to result in water depths of less than 150mm with a low hazard rating within areas immediately adjacent to the small watercourse, this is due to the rainwater not draining away through the normal drainage systems or not soaking into the ground.

Given the small scale and nature of the proposed development and the size and location of the surface water flooding sources it has been concluded that surface water flooding is considered to be of **low significance**.

The risk of surface water flooding will be further managed and mitigated by using a number of risk management measures to manage and reduce the overall flood risk at the site (see Section 5).

4.10 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.

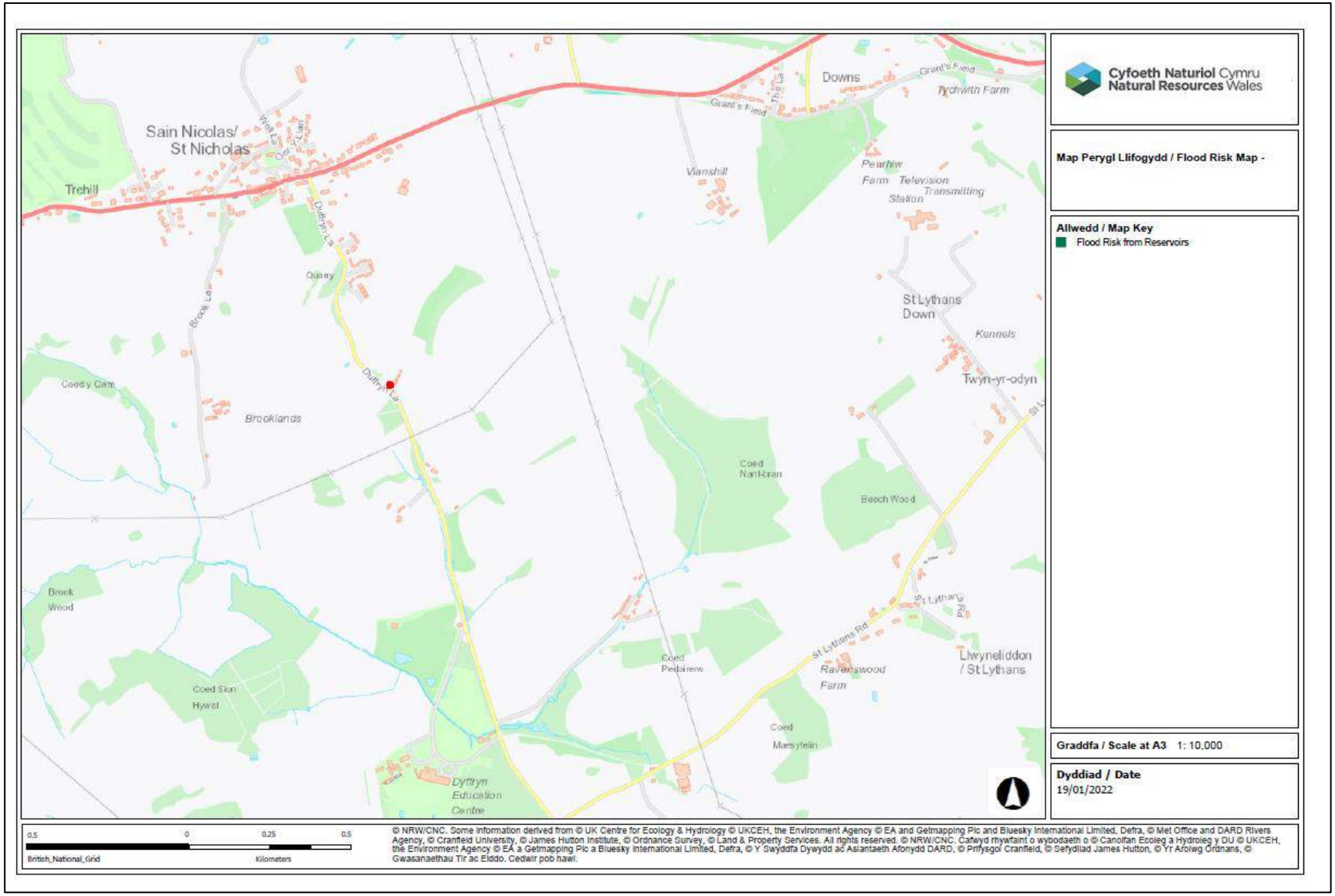
The risk of flooding from sewer flooding is considered to be **not significant**.

4.11 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no reservoirs located within the vicinity of the site. The Natural Resources Wales Reservoir map shows that the site is not at risk of reservoir flooding (Figure 4-6). There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the site.

The risk of flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.

Figure 4-6 Natural Resources Wales Reservoir Flood Map



4.12 Effect of the Development on Flood Risk

Ground levels within the site will not change considerably as part of the proposed development. The design of the site ensures that the performance of the floodplain and the flood hydrograph will remain unaltered and flood risk will not be worsened and replaces the storage lost due to the development at the same level as it is lost. This ensures that the storage is filled at the same time during a flood event as it does under existing conditions.

Two small sections of pipe are proposed for the small watercourses to allow the access road to be constructed. The proposed sections of pipe will be required to be designed to support the new road construction and the requisite vehicular loadings in accordance with the highways specification.

The proposed culverts will match the existing channel in slope, width and height to reduce the impact on water levels within the watercourse and therefore the flood risk posed to the site and offsite locations. By maintaining the same profile the conditions will be as existing and therefore will accommodate any increase in water flows.

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. There will be a gain in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed.

4.13 Summary of Site Specific Flood Risk Assessment

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4-3.

Table 4-3 Risk Posed by Flooding Sources

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

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 proposed development is classified as 'highly vulnerable' and is appropriate at this location.

The site is unlikely to flood except in extreme conditions the principal flood risk posed to the site is from the small watercourse, running through the site from the northeast to southwest. Areas immediately adjacent to the small watercourse are shown to have a low to medium risk of flooding with between a 1 in 1000 (0.1%) to 1 in 30 (3.3%) year chance of flooding. This is due to the rainwater not draining away through the normal drainage systems or not soaking into the ground and may result in water depths of less than 150mm with a low hazard rating within areas immediately adjacent to the small watercourse.

Given the small scale and nature of the proposed development and the size and location of the flooding sources it has been concluded that fluvial and surface water flooding poses a low flood risk to the site.

Therefore, the risk of fluvial and surface water is considered to be of **low significance**.

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. There will be a gain in flood storage capacity, as overall there will be more cut than fill during the construction phase. The conveyance routes (flow paths) will not be blocked or obstructed.

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).

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 existing buildings which are to be converted will have a finished floor level set as a minimum at existing finished floor levels. The proposed lodges, glamping pods and touring caravan pitches will be set at a minimum of 300mm above the existing ground levels.

A combination of resistance (proofing) and resilience measures will be included to provide further protection; this is discussed below.

5.3 Flood Resilience and Resistance

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

To make the structures/buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials.

To improve the structures/buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level.

5.4 Safe Access and Egress Route

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.

In the event of a flood warning, vital belongings, including waterproof clothing, necessary medication and essentials for infants and children will be collected. It should be ensured that all occupiers and visitors to the site are accounted for, and then exit the site using the site entrance and head to the north on Duffryn Lane.

In the event of flooding, vital belongings, including waterproof clothing, necessary medication and essentials for infants and children will be collected. It should be ensured that all occupiers and visitors to the site are accounted for, and then exit the site using the route shown in Drawing 2. Therefore, safe access and egress from the site will be possible as per TAN15 and Natural Resources Wales guidance.

5.5 Flooding Consequences

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 required criteria a site / development must fulfil are:

i) 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

ii) 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

iii) it concurs with the aims of PPW and meets the definition of previously developed land; and,

iv) 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 found to be acceptable.

The proposed development has been assessed against the requirements of the Justification Test.

The 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 4-2). Used to indicate that justification test is not applicable and no need to consider flood risk further. Furthermore, the proposed development plans would assist a local authority strategy for this area by providing and maintain tourism uses and employment opportunities. The site is currently occupied by buildings and is therefore, defined as previously developed land.

The potential consequences of a flooding event for the particular type of development have been considered within this FCA. This FCA details the potential consequences of flooding from all sources taking into account the proposed development type has been considered and has been found to be acceptable. The development proposals should be considered by the LPA to satisfy the Justification Test as set out in TAN15.

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 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 (Figure 4-3 and Figure 4-5). Used to indicate that justification test is not applicable and no need to consider flood risk further.

The Council's objectives are to sustain and enhance the vitality and viability of the region, and to ensure a wide range of tourist accommodation to which people have easy access by a range of transport therefore, improving the overall quality of life. This is underpinned by the quality of the physical environment, social well-being and economic and environmental improvements. The Council seeks to grant permission for developments that add to the vitality and viability of the region.

An assessment of the flood consequences to the site in an extreme flood has been undertaken as per the indicative guidelines as given within Table A1.14 and A1.15 of TAN15. 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 development proposals should therefore be considered by the LPA to satisfy the Acceptability Criteria as set out in TAN15.

7 Surface Water Drainage Assessment

7.1 Introduction

As the area of the proposed development at the site exceeds 100m^2 the site will need to comply with the principles of Sustainable Drainage Systems (SuDS), as presented in the 'Statutory Standards for Sustainable Drainage Systems – Designing, constructing, operating and maintaining surface water drainage systems' (2018).

This section of the report provides an overview of the elements which need to be taken into account for an application to the Vale of Glamorgan SuDS Approving Body (SAB).

The six standards that need to be met for a SAB application are as follows:

- S1 – Surface water runoff destination
- S2 – Surface water runoff hydraulic control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Designing drainage for construction, operation, maintenance and structural integrity

A summary of these standards and how SuDS could be integrated into the proposed development has been provided in the sections below.

7.2 Surface Water Destination

The management of surface water runoff from developments should be prioritised as to the choice of discharge destination. The priority hierarchy is listed below:

1) Collect for re-use;
2) Infiltrate to ground;
3) Discharge to a surface water body;
4) Discharge to a surface water sewer/highway drain; and
5) Discharge to a combined sewer.

Following an appraisal of whether re-use is a viable solution, it is likely that infiltration testing would be required at the site in order to determine the suitability of infiltration SuDS components. These components can include soakaways (granular or geocellular) and/or infiltration from permeable surfaces such as permeable paving. Soakaway testing to BRE Digest 365 'Soakaway Design' (2016) would involve the excavation of a number of trial pits to varying depth across the site, and the use of water to fill the pits for repeat testing.

If infiltration is shown not to be viable, then discharge to the existing surface watercourse running through the site is the next most likely option.

7.3 Surface Water Hydraulic Control

If discharging to a surface watercourse the runoff should be restricted to the greenfield runoff rate in order to most closely mimic the natural undeveloped condition of the site, which provides flood protection for land and property downstream.

The restriction of the rate of runoff from the site will necessitate the temporary storage of water; this may take the form of detention basins, ponds and sub-surface storage crates. Consideration should be given at an early stage in the site layout design to the land-take required for SuDS components. The conveyance of water under gravity is preferable, therefore attenuation features may be best placed at the southern area of the site adjacent to the entrance.

The land-take of the SuDS features is largely determined by the volume of water requiring attenuation, this mainly stems from the total size of impermeable areas. Whilst some impermeable surfaces are unavoidable, such as roofs, it is strongly advised to limit the amount of impermeable surfaces such as tarmac or concrete roadways or patios etc. These surfaces can easily be substituted for permeable solutions such as permeable paving, permeable tarmac, granular surfacing, and Grasscrete etc.

Depending on the results of shallow infiltration testing, permeable surfaces may be able to discharge their surface water to ground through the subbase, rather than contribute to a larger attenuation feature, such as a basin, at the lowest part of the site.

7.4 Water Quality

Sufficient treatment must be provided by the various SuDS features through which surface water runoff will pass. Depending on the surface the level and type of contamination in the runoff will vary, but may include hydrocarbons from vehicle movements etc. SuDS features which provide the good mitigation for contamination include vegetated surface feature such as rain gardens, swales, ponds and detention basins. Permeable surfacing also provides a good level of contamination mitigation.

7.5 Amenity and Biodiversity

It is a requirement that SuDS enhance the amenity and biodiversity value of a site. Typically this can be achieved by planted surface features such as rain gardens, swales, ponds and detention basins. These can form part of the landscaping for the site for the benefit of wildlife, and site end users.

7.6 Construction and Maintenance Requirements

The surface water drainage should be designed with ease of construction and performance in mind; typically this would involve as many surface features as possible (limiting traditional sub-surface structures), and construction of the features at the end of the building phase.

The drainage system needs to be easily maintained throughout its lifetime. Surface conveyance and attenuation features are significantly easier to maintain than sub-surface features. Silting up or a blockage can be easily observed and rectified in surface features, whereas they might only be detected following failure of the system in sub-surface pipes and chambers, and might require jetting to clear.

7.7 Potential SuDS Options

The potential SuDS options, routes and features which may be applied at the site have been listed below.

It should be noted that this does not constitute a drainage strategy for submission to the Vale of Glamorgan SAB; the features described are to facilitate land-take and materials planning at an early stage of the design. In turn, this should reduce the likelihood of delays and layout changes at later stages.

Camping and Touring Pitches

- Permeable surfacing such as gravel; treatment, interception and infiltration to ground via the subbase (assuming suitable ground conditions are proven)

Internal Road and Other Parking Areas

- Permeable surfacing such as gravel (with reinforced grid), permeable paving, permeable tarmac, or Grasscrete; treatment, interception and infiltration to ground via the subbase (assuming suitable ground conditions are proven)

Roofs and Other Impermeable Areas

- Conveyance of surface water runoff via surface water feature; swale to convey water under gravity to the south of the site.
- Traditional sub-surface features such as gullies, chambers and pipes may be needed, particularly to cross the existing watercourse to get to an attenuation feature.

Attenuation Feature

- Geocellular soakaway crates to allow infiltration to ground at suitable areas of the site.
- If infiltration is not viable then a vegetated detention basin or pond at the southern part of site to provide storage for the water generated following a 1 in 100 year rainfall event, this option has significant biodiversity and amenity benefits to meet the standards.
- Flow restriction device between the basin/pond and the existing watercourse limiting the discharge to the greenfield runoff rate.

8 Summary and Conclusions

8.1 Introduction

This report presents an FCA in accordance with TAN15 for the proposed development of Wild Rose Cottage, Duffryn Lane, St Nicholas, Cardiff, CF5 6TA.

8.2 Flood Risk

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 proposed development is classified as 'highly vulnerable' and is appropriate at this location.

The site is unlikely to flood except in extreme conditions the principal flood risk posed to the site is from the small watercourse, running through the site from the northeast to southwest. Areas immediately adjacent to the small watercourse are shown to have a low to medium risk of flooding with between a 1 in 1000 (0.1%) to 1 in 30 (3.3%) year chance of flooding. This is due to the rainwater not draining away through the normal drainage systems or not soaking into the ground and may result in water depths of less than 150mm with a low hazard rating within areas immediately adjacent to the small watercourse.

Given the small scale and nature of the proposed development and the size and location of the flooding sources it has been concluded that fluvial and surface water flooding poses a low flood risk to the site.

Therefore, the risk of fluvial and surface water is considered to be of **low significance**.

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. There will be a gain in flood storage capacity, as overall there will be more cut than fill during the construction phase. The conveyance routes (flow paths) will not be blocked or obstructed.

8.3 Risk Management

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

Finished Floor Levels

The existing buildings which are to be converted will have a finished floor level set as a minimum at existing finished floor levels. The proposed lodges, glamping pods and touring caravan pitches will be set at a minimum of 300mm above the existing ground levels. A combination of resistance (proofing) and resilience measures will be included to provide further protection; this is discussed below.

Flood Resilience and Resistance

To make the structures/buildings more resistant to seepage the following measures will be incorporated. Sealant will be used around external doors and windows. All external doors and windows will be constructed from durable materials.

To improve the structures/buildings resilience to flooding the following measures will be incorporated. All electrical wiring, switches, sockets, socket outlets, electrical, and gas meters etc. will be located a minimum of 450mm above the finished floor level.

Safe Access and Egress Route

In the event of a flood warning, vital belongings, including waterproof clothing, necessary medication and essentials for infants and children will be collected. It should be ensured that all occupiers and visitors to the site are accounted for, and then exit the site using the site entrance and head to the north on Duffryn Lane. Therefore, safe access and egress from the site will be possible as per TAN15 and Natural Resources Wales guidance.

8.4 Justifying the Location of the Development

The site is compliant with the indicative consequences of flooding as set out in A1.14 and A1.15 of TAN15. 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 development proposals should therefore be considered by the LPA to satisfy the Justification Test and the Acceptability Criteria as set out in TAN15.

8.5 Surface Water Drainage

A summary of the requirements for managing the surface water runoff from the proposed development has been formulated.

Based on the proposed site layout (Appendix 1) possible SuDS features could include either discharge to ground at a soakaway (if ground conditions allow), or attenuation storage at a detention basin/pond. These SuDS features could be positioned at the lowest part of the site, adjacent to the entrance, and in the case of a basin or pond would include a restricted discharge to the existing watercourse.

Surface water from the developed areas of the site could be conveyed to the main SuDS feature(s) by a mixture of surface and sub-surface features, such as a swale and traditional pipes/gullies etc.

Where possible the use of permeable surfacing should be encouraged to provide infiltration (where ground conditions are suitable), interception and treatment of surface water runoff. The increased use of permeable surfacing is likely to reduce the scale of down-stream SuDS features, and therefore reduce land-take at the site.

8.6 Conclusion

In conclusion, a mixed holiday accommodation site 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.

Drawings

Drawing 1

Photo location plan

HYDROGEO
Groundwater and Environment

HYG996 Wild Rose Cottage

DRAWING 1

Photo location plan

KEY

- Site boundary
- Stream (ephemeral)
- Culvert
- Photo location

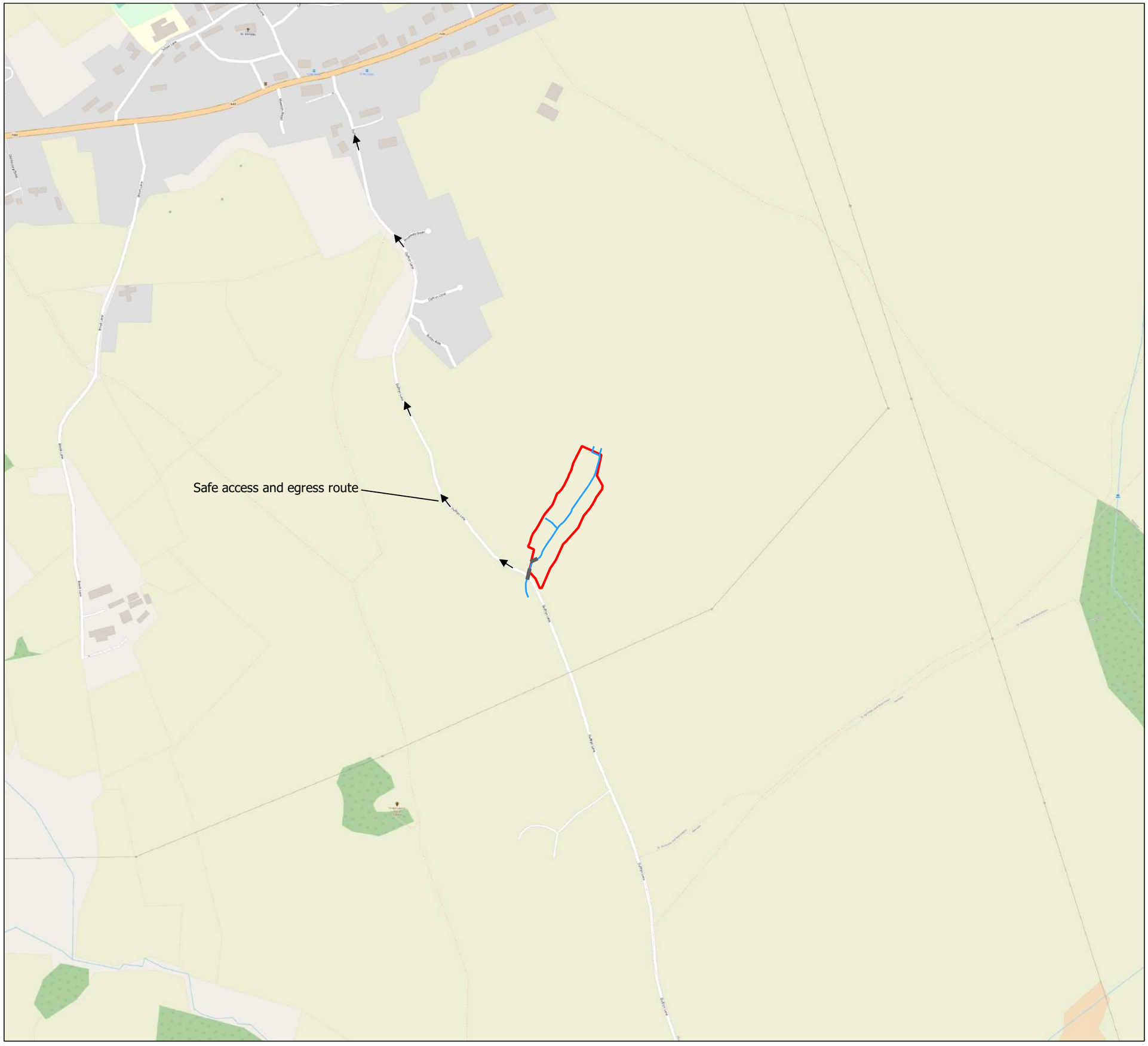
10 0 10 20 30 m

N

Date	By	Paper	Scale	Rev
12 2021	TP	A3	1:750	1

Drawing 2

Safe access and egress route



HYDROGEO
Groundwater and Environment

HYG996 Wild Rose Cottage

DRAWING 2

Safe access and egress route

KEY

Site boundary

Stream (ephemeral)

Culvert

50 0 50 100 150 200 m

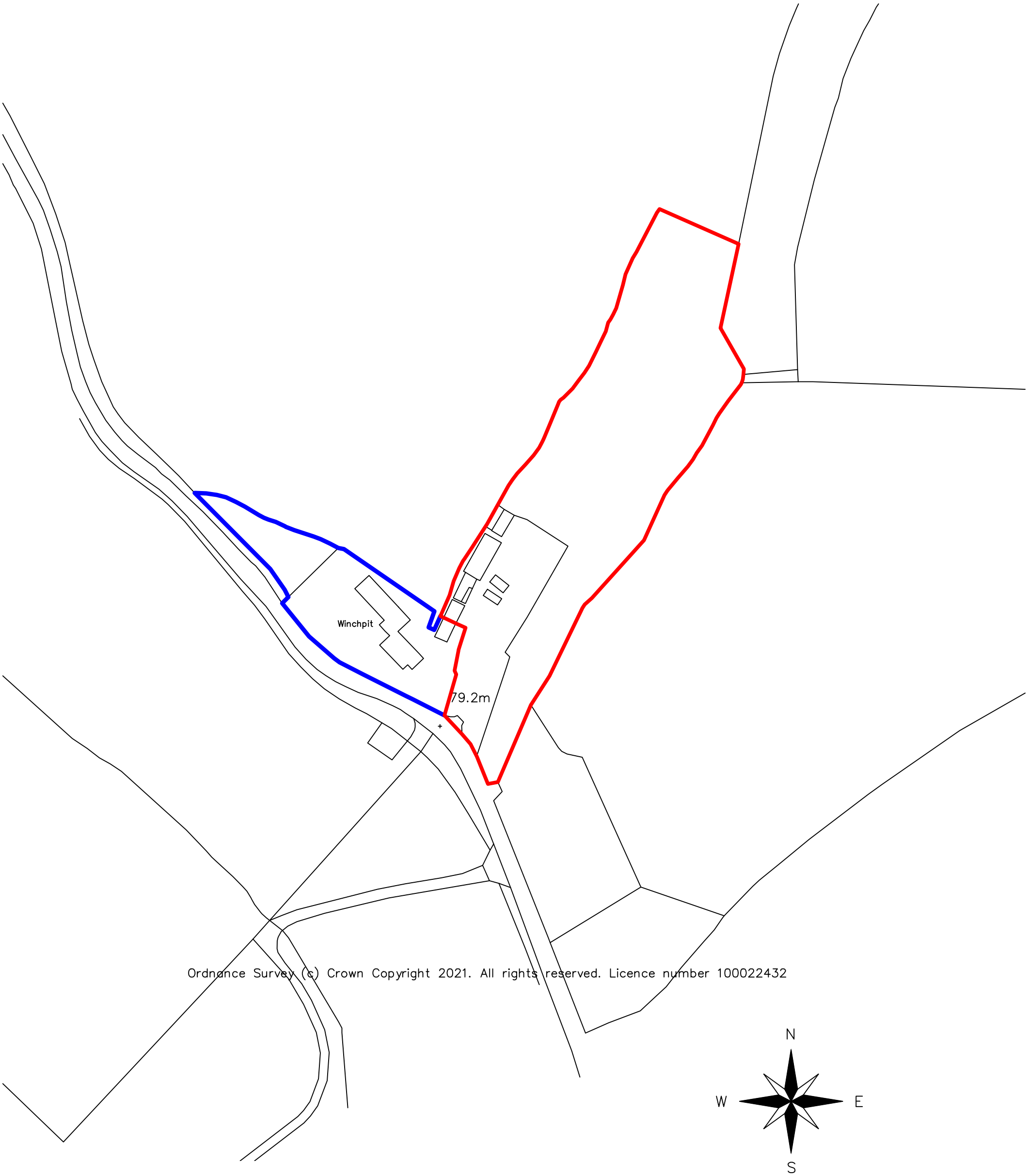
N

Date	By	Paper	Scale	Rev
01 2022	TP	A3	1:5,000	1

Appendices

Appendix 1

Existing site layout, topographical survey, and proposed site layout



Project:
Land at Wild Rose Cottage
Dyffryn Lane
St Nicholas
CF5 6TA

Dwg. Title:
Location Plan

Client:
Mr & Mrs Walker

Scale: 1/1250 @A3

Drawing No: 01

Drawn By: CTS

Checked By: N/A

Date: 06/21

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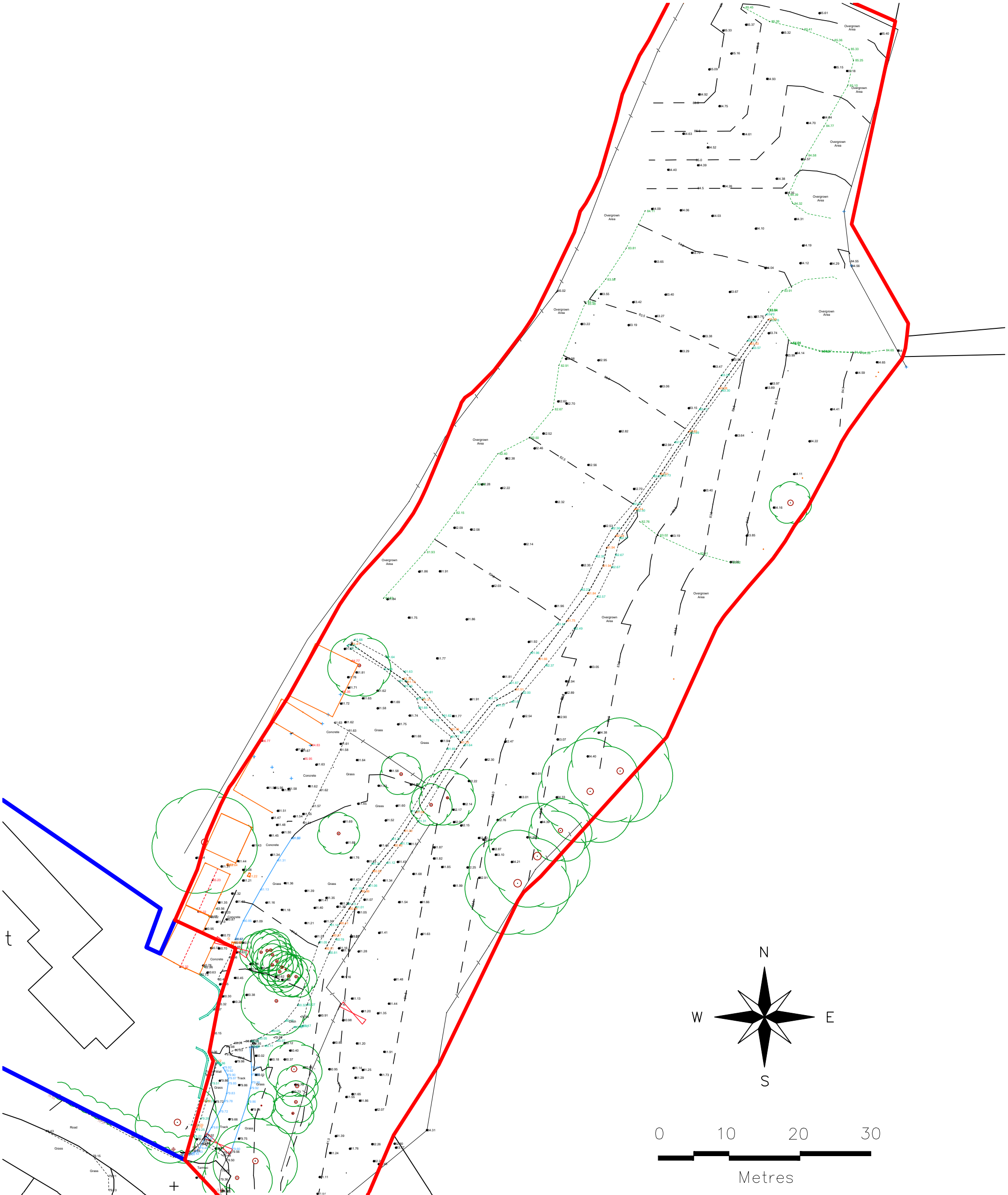

Project:
Land at Wild Rose Cottage
Dyffryn Lane
St Nicholas
CF5 6TA

Dwg. Title:
Existing Block Plan

Client:
Mr & Mrs Walker

Scale: 1/500 @A3

Drawing No: 02

Drawn By: CTS

Checked By: N/A

Date: 06/21

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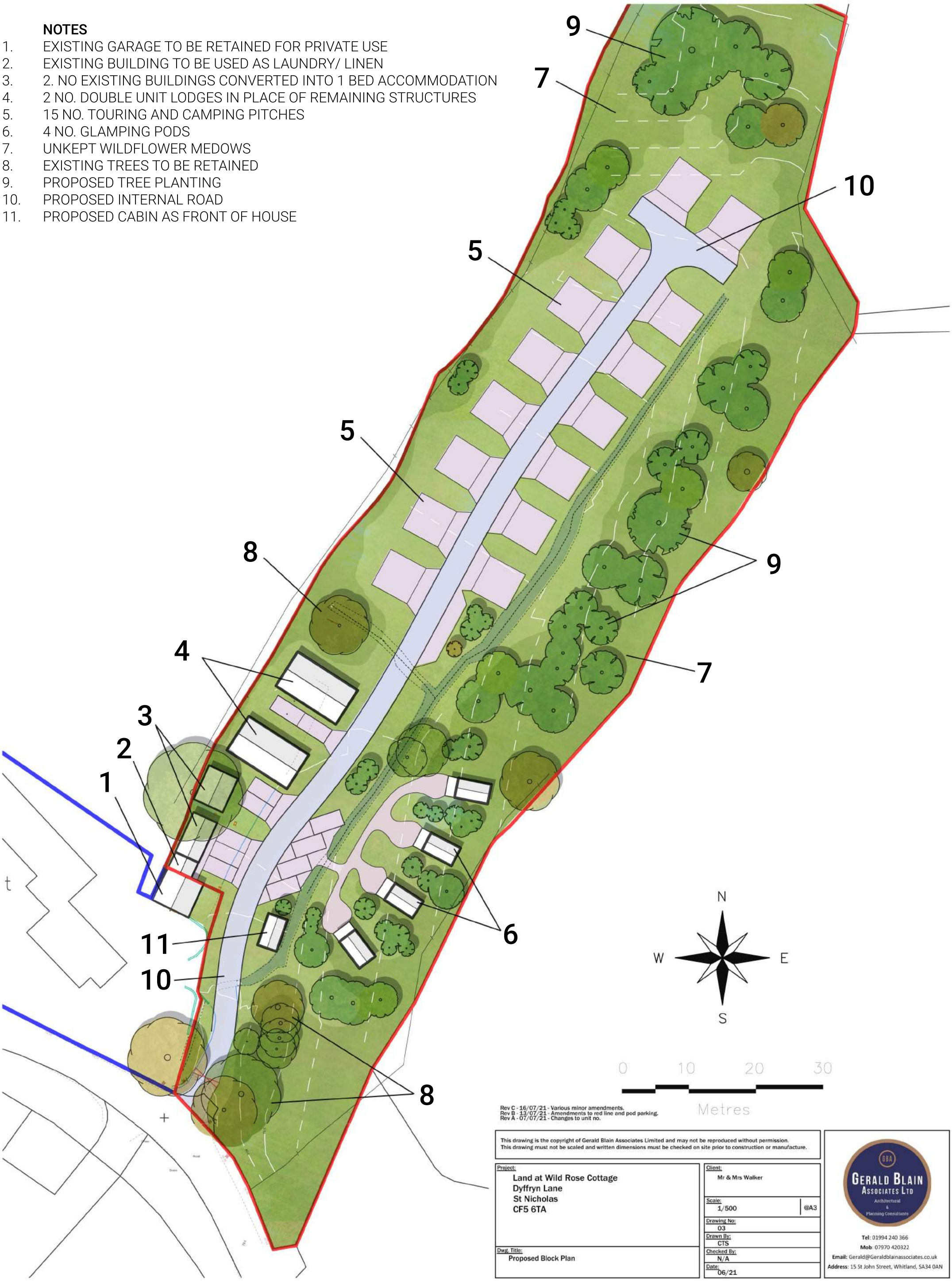
NOTES

1. EXISTING GARAGE TO BE RETAINED FOR PRIVATE USE
2. EXISTING BUILDING TO BE USED AS LAUNDRY/ LINEN
3. 2. NO EXISTING BUILDINGS CONVERTED INTO 1 BED ACCOMMODATION
4. 2 NO. DOUBLE UNIT LODGES IN PLACE OF REMAINING STRUCTURES
5. 15 NO. TOURING AND CAMPING PITCHES
6. 4 NO. GLAMPING PODS
7. UNKEPT WILDFLOWER MEDOWS
8. EXISTING TREES TO BE RETAINED
9. PROPOSED TREE PLANTING
10. PROPOSED INTERNAL ROAD
11. PROPOSED CABIN AS FRONT OF HOUSE



Rev C - 16/07/21 - Various minor amendments.
Rev B - 13/07/21 - Amendments to red line and pod parking.
Rev A - 07/07/21 - Changes to unit no.

Project:
Land at Wild Rose Cottage
Dyffryn Lane
St Nicholas
CF5 6TA

Client:
Mr & Mrs Walker

Scale: 1/500 @A3

Drawing No: 03

Drawn By: CTS

Checked By: N/A

Date: 06/21

Dwg. Title:
Proposed Block Plan

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