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Flood Consequence Assessment for Planning

Prepared for:
Laura Thomas

March 2018

Our reference:
87692-Davies-GarbettPI

Location:
No.1 Garbett Place
Crynant
Neath
SA10 8PQ



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Document Issue Record

Project: Flood Consequence Assessment for Planning
Client: Laura Thomas
Location: No. 1 Garbett Place, Crynant, Neath, SA10 8PQ
Application: Construction of a single new dwelling
Our reference: 87692-Davies-GarbettPI
Version: Final v1.0 200318

Lead Consultant: Mrs Emma Jeffery
Authorisation: Mr Edward Bouet

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Southpoint, Old Brighton Road, Gatwick, West Sussex, RH11 0PR
+44 (0) 1293 214 444
www.unda.co.uk

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Key Facts

Flood Risk Posed:

- The site is situated predominantly within Flood Zone B, with only a very small corner of the site within Flood Zone C (as defined by NRW).
- Fluvial risk, originating from the River Dulais.
- Modelled flood levels and flood extents have been requested from the NRW but no reliable fluvial data is available for the area.
- Risk of surface water, groundwater and sewer surcharge flooding would appear to be low.

Flood Risk Management:

- The development will be classified as “highly vulnerable” throughout.
- The applicant has agreed to follow the sequential approach to site layout, and situate the proposed new dwelling entirely outside of the flood zone C2 outline on site.
- Ground floor levels will be raised 600mm above maximum extent of Flood Zone B on site.
- A flood warning and evacuation plan will be implemented post development.
- Flood proofing of the property will be incorporated as appropriate.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

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Introduction

Unda Consulting Limited have been appointed by Laura Thomas (hereinafter referred to as “the applicant”) to undertake a Site Specific Flood Consequence Assessment (FCA) for Planning at Construction of a single new dwelling (hereinafter referred to as “the site”). The FCA has been undertaken in accordance with Technical Advice Note 15 (TAN 15) and the associated technical guidance.

The site appears to be located within Flood Zone B as defined by Natural Resource Wales (NRW) on their Development Advice Map. Under Technical Advice Note 15 (TAN 15), a FCA is required if a proposed development:

- includes building or engineering works in Flood Zone C1, C2 or B;
- includes building or engineering works on land classified as having critical drainage problems;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- site is larger than 1 hectare.

Given that the proposed application site is located within Flood Zone B: (Areas known to have been flooded in the past evidenced by sedimentary deposits.) and includes building work, the applicant is required to submit a FCA under TAN 15. The assessment should demonstrate to the Local Planning Authority (LPA) and NRW how flood risk will be managed now and over the development’s lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FCA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

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Existing Situation

Site Usage:

The site comprises of an existing residential garden / empty plot adjacent to number 2 Garbett Place.



Figure 1: Aerial view of the site and immediate surrounding area (Source: Google Earth)



Figure 2: Street view of the site (Source: Google Earth)

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Topography:

The site is approximately 70m to the east by the River Dulais, 80m to the south of and 115m north of tributaries of the River Dulais.

A topographic site survey undertaken by Mike Williams Surveys in November 2017 shows topographic levels across the site range between approximately 100.02mAOD to 100.87mAOD. The site slopes gently down from east to west (towards Garbett Place) and from south to north.

Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Llynfi Member - Sandstone. Sedimentary Bedrock formed approximately 310 to 315 million years ago in the Carboniferous Period. Local environment previously dominated by rivers.

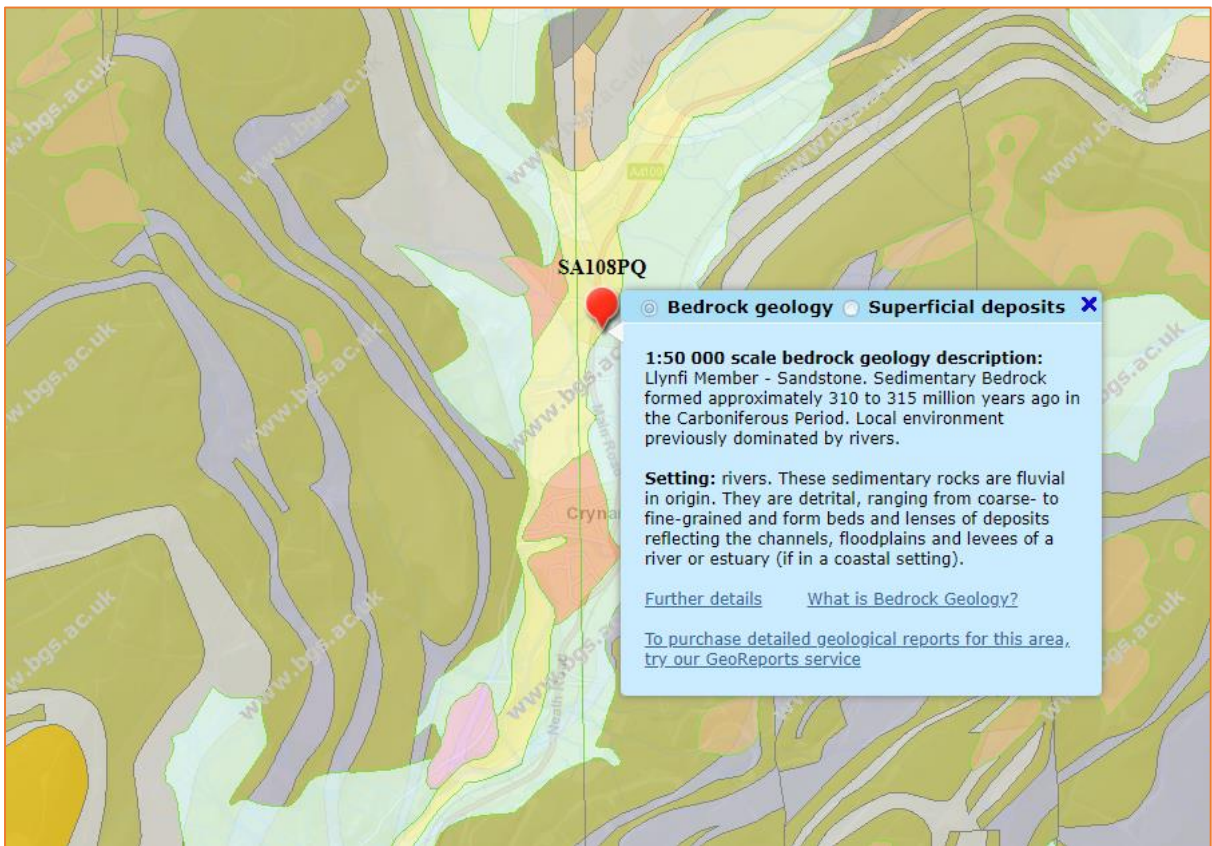


Figure 3: Local geology (Source: BGS)

The soil type on site, taken from the UKSO data, is deep riverine clay, sands and gravels parent material with a clay to sandy loam texture.

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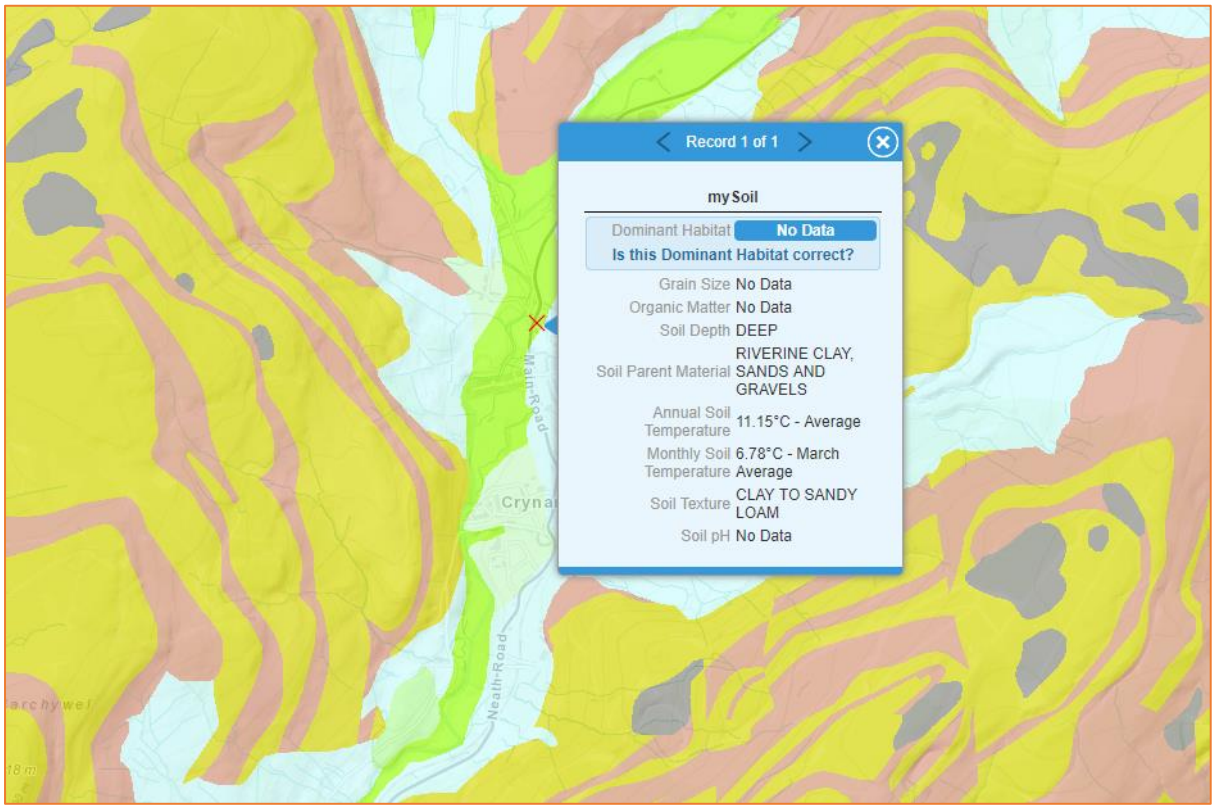


Figure 4: Local soil types (Source: UKSO)

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Proposed Development

The proposed planning application is for the construction of a single new dwelling with garage.

Detailed site plans are provided in the report Appendix.

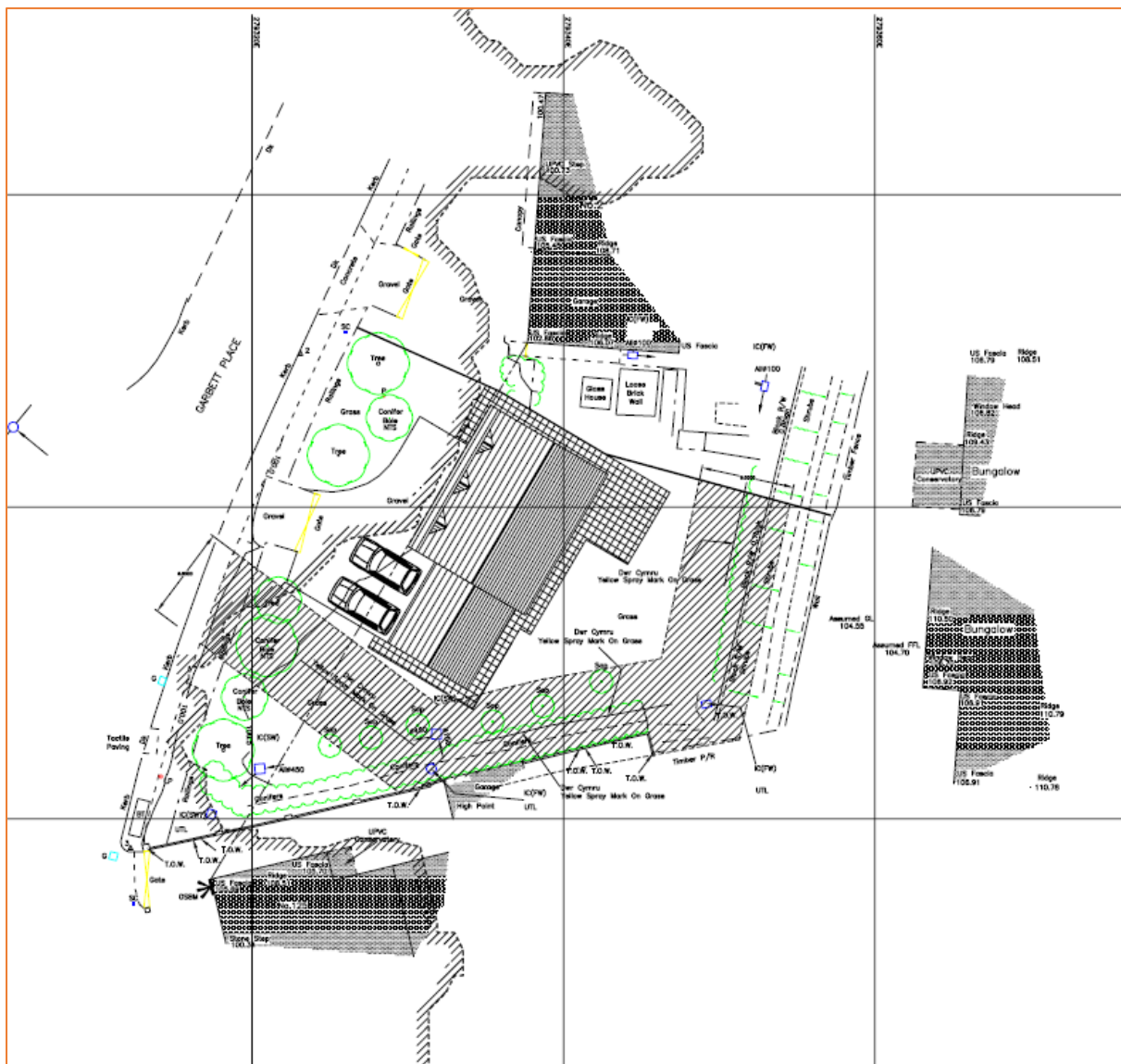


Figure 5: Proposed site layout, showing the proposed house location entirely outside of the Flood Zone C outline on site (hatched) (Source: SGW planning)

Assessment of Flood Risk

Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding. They are shown on the Natural Resource Wales Development Advice Map, available on Natural Resource Wales' web site.

Description of Zone	Zone Name	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 Environment Agency 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.

Table 1: Flood Zones

The Flood Zones shown on the Natural Resource Wales Development Advice Map do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

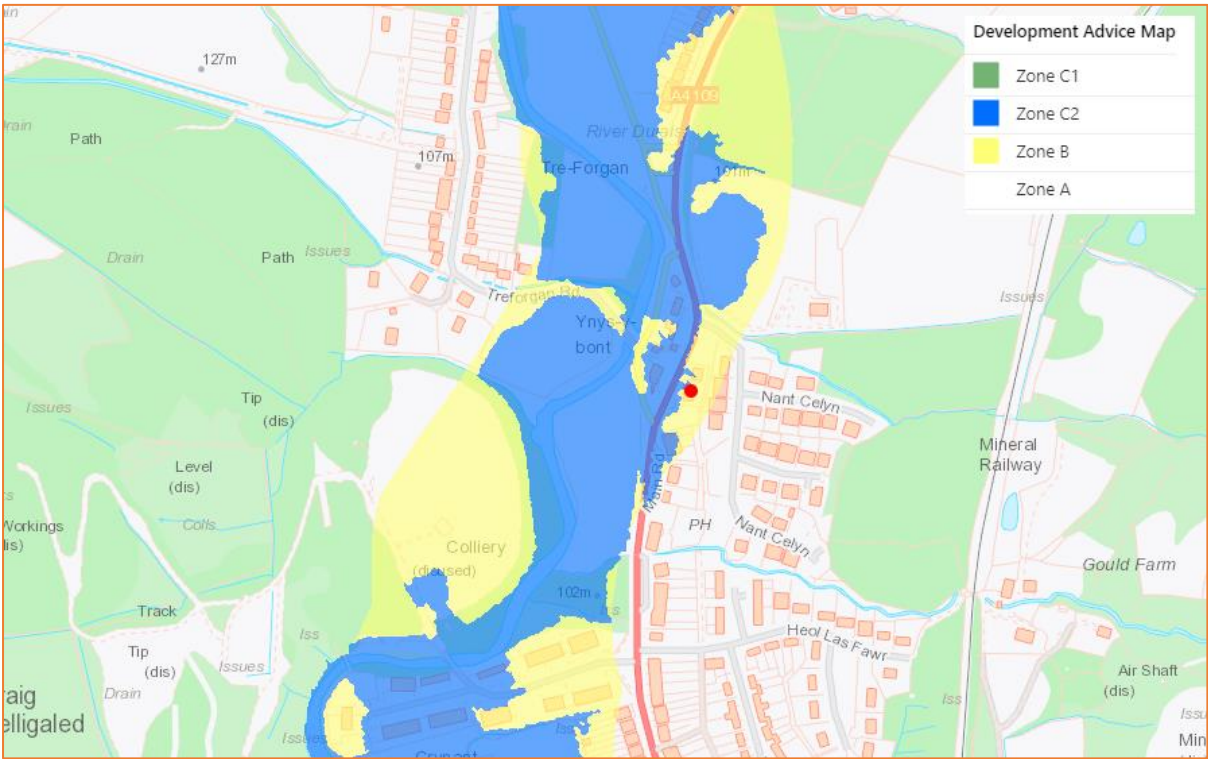


Figure 6: Development Advice Map

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The Flood Zones shown on the Natural Resource Wales Development Advice Map do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

The site is located predominantly within zone B, with a small corner within C2. The proposed dwelling would be entirely within zone B.

The risk would appear to be predominantly fluvial, and originate from the River Dulais.

Fluvial (River Dulais):

The River Dulais (Welsh: Afon Dulais) is a river of Wales which has its source at Mynydd y Drum. It joins the River Neath after flowing over Aberdulais Falls.

Modelled flood levels and extents:

Modelled fluvial flood levels and flood extents have been requested from the NRW as part of a flood data request, however NRW has confirmed that for this area they currently have no reliable data available:

"For this location, currently all we have available for Product 4 would be in channel levels for the Dulais taken from a 1D HECRAS model that was created in 2010. Please note that these levels would not be suitable for use in an FCA.

However, we have new 1D/2D modelling currently being carried out and would expect to have results available from around the end of this financial year."

(Source: Kathleen Banner, External Relations Officer, Natural Resources Wales)

Flood defences:

No formal flood defences have been identified by NRW that offer protection to the site in this location.

Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

No raised flood defences act to defend the site from direct inundation, meaning there is negligible residual risk from beach and overtopping of flood defences.

Historical flood events:

The site does not fall within a historic flood extent recorded by NRW.

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Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA and NRW, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used and considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that NRW do not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The Natural Resources Wales Surface Water Flood Map suggests that the site lies predominantly within areas of “Very Low” risk of flooding from surface water.

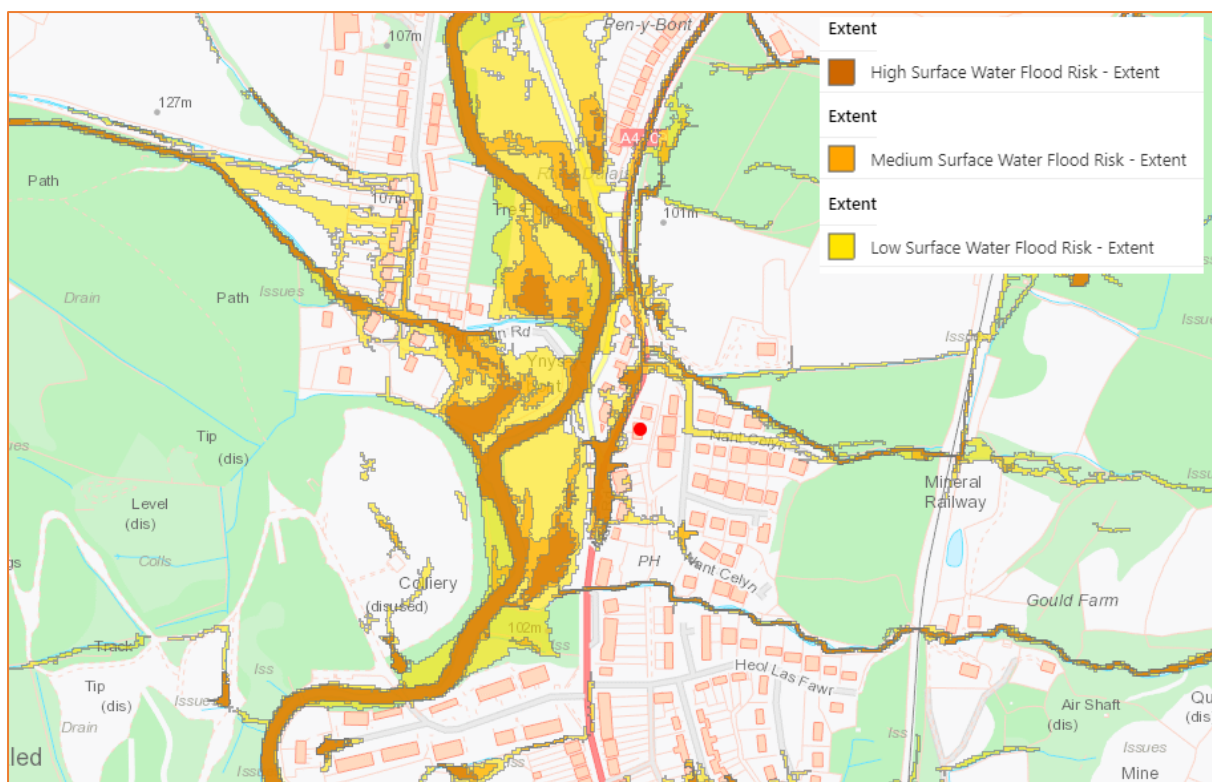


Figure 7: Extract from Natural Resources Wales Surface Water Flood Map (Source: NRW)

Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means

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more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground. No information has been provided to suggest that the site is susceptible to groundwater flooding.

No information has been provided to suggest that the site is susceptible to groundwater flooding.

Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

Other Sources:

The Natural Resources Wales Risk of Flooding from Reservoirs Map suggests that the site lies outside of the "Maximum extent of flooding" from reservoir failure. The Natural Resources Wales also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. These inspections are monitored and enforced by the Natural Resources Wales themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial flooding to occur.

There do not appear to be any further artificial (man-made) sources of flood risk (such as raised canals) in the vicinity of the site.

Flood Risk Management Measures

Vulnerability to flooding:

TAN15 classifies property usage by vulnerability to flooding.

Post development, the development will be classified as “highly vulnerable” throughout, as the application is for the construction of a residential property.

Particular flooding consequences may not be acceptable for particular types of development. For example, allowing residential development in areas which are subject to high risks of flooding can result in a traumatic impact on people's lives. The precautionary framework identifies the vulnerability of different land uses to flooding, and for this purpose, development has been subdivided into three categories:

Development category	Types
Emergency services	hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood
Highly vulnerable development	all residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites
Less vulnerable development	general industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites

Table 2: Vulnerability to flooding categories

The Emergency Services category describes facilities which need to be operational and accessible at all times. Highly vulnerable development describes development where the ability of occupants to decide on whether they wish to accept the risks to life and property associated with flooding, or be able to manage the consequences of such a risk, is limited. It also includes those industrial uses where there would be an attendant risk to the public and the water environment should the site be inundated. Less vulnerable development describes development where the ability of occupants to decide on whether they wish to accept such risks is greater than that in the highly vulnerable category. The vulnerability attributed to a mixed use proposal will be defined by the most vulnerable use.

There are uses which are considered to be exceptions to the general rule, and have not been classified above, because they are required in a fluvial, tidal or coastal location by virtue of their nature. These include boatyards, marinas, essential works required at mooring basins, and development associated with canals.

Physical Design Measures:

In accordance with section A1.14 of TAN15 there is a frequency threshold of flooding below which flooding of development should not be allowed. The following table, taken from TAN15, provides indicative guidance as to what the frequency threshold could be for different types of development in terms of annual probability of occurrence:

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Type of development	Threshold frequency	
	Fluvial	Tidal
Residential	1%	0.5%
Commercial / retail	1%	0.5%
Industrial	1%	0.5%
Emergency services	0.1%	0.1%
General infrastructure	1%	0.5%

Table 3: TAN15 Flood frequency thresholds

Detailed fluvial modelled flood data relevant to the site was not available from NRW, however the applicant has agreed to follow the sequential approach to site layout, and situate the proposed new dwelling entirely outside of the flood zone C2 outline on site.

Flood zone C2 is defined by the 1:1000 year flood extent, and while modelled flood levels are not available from NRW, the proposed house is located entirely outside of flood zone C (and therefore outside of the NRW 1:1000 year extent used to define this).

In the absence of modelled flood data a precautionary approach is applied, where topographic levels along the edge of the Flood Zone C2 extent are used to inform finished floor levels. Flood zone C2 is defined by the 1:1000 year flood extent. Topographic levels along the edge of the Flood Zone C2 extent vary between 100.16mAOD and 100.23mAOD based on the topographic survey.

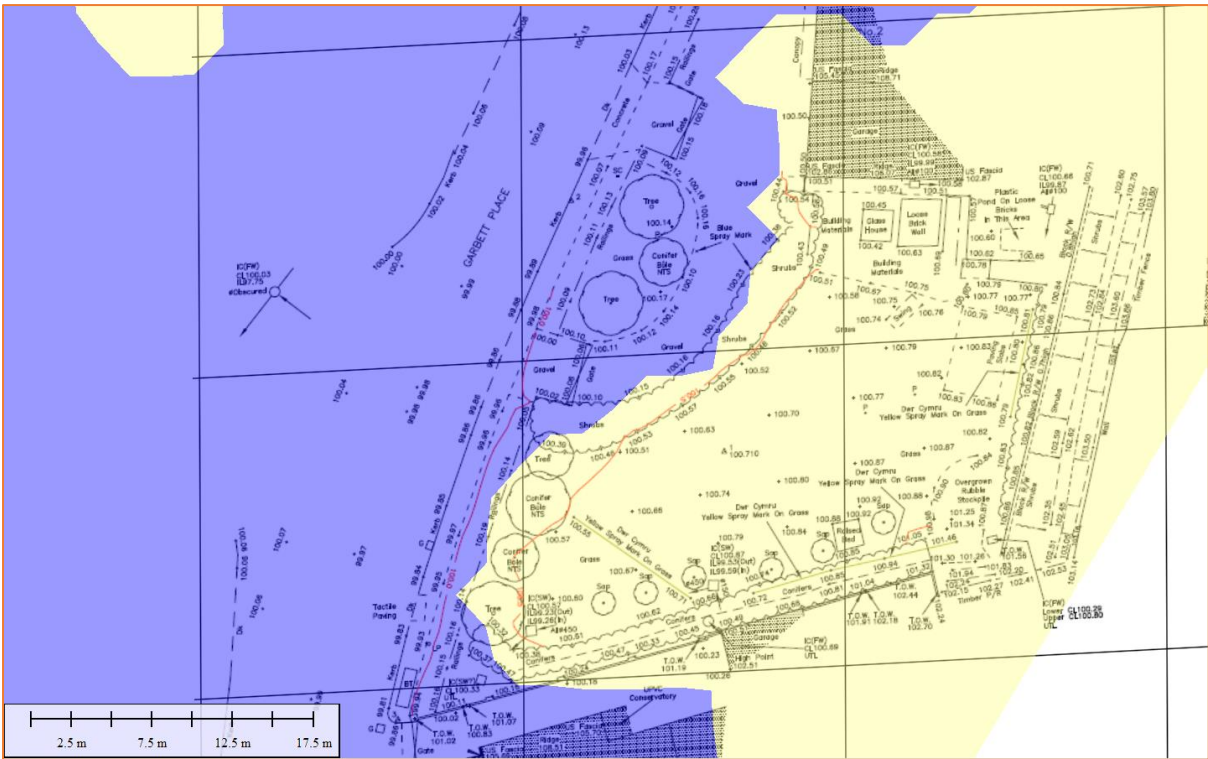


Figure 8: NRW Zone C1 and B (blue and yellow respectively) mapped onto the topographic survey (Source: NRW, Mike Williams Surveys)

As such, the applicant has agreed that finished ground floor levels will be raised 600mm above this level of 100.23mAOD as a precautionary measure (a finished floor level of 100.83mAOD).

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the proposed property, in consultation with the Local Authority building control department. These measures can include the following:

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- Solid concrete ground floor slab, with waterproof membrane;
- Waterproof screed used on floors;
- Closed-cell foam used in wall cavities;
- Waterproof ground floor internal render;
- External walls rendered resistant to flooding to first floor level;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor;
- Electrical incomer and meter situated at first floor level or above;
- Boilers, control and water storage / immersion installed at first floor level or above;
- Gas meter installed at first floor level or above;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Built-in furniture units of solid, water resistant material;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid hardwood construction with wood faces treated to resist water penetration.

Safe Escape:

TAN 15 requires a route of safe escape for all residents and uses to be provided from new residential properties in Flood Zone C. The site is situated predominantly within Flood Zone B, with only a very small corner of the site within Flood Zone C.

Type of development	Maximum depth of flooding (mm)	Maximum rate of rise of floodwaters (m/hr)	Maximum speed of inundation of flood risk area (hrs)	Maximum velocity of floodwaters (metres/sec)
	Property Access			Property Access
Residential (habitable rooms)	600 600	0.1	4	0.15 0.3
Commercial & Retail	600 600	0.3	2	0.15 0.3
Industrial	1000 1000	0.3	2	0.3 0.45
Emergency Services	450 600	0.1	4	0.15 0.3
General Infrastructure	600 600	0.3	2	0.3 0.3

Table 4: TAN15 table A1.15

Table A1.15 shoes the threshold frequency beyond which proposed development would be expected to flood under extreme conditions (1:1000 year event). For new residential development a maximum flood depth of 600mm would be allowance at the property and for the site access.

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Detailed flood hazard mapping and modelled flood levels for the site were not available at the time of writing, however it should be noted that the site is situated predominantly within Flood Zone B, with only a very small corner of the site within Flood Zone C.

Flood Alert/Warnings:

NRW is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The applicant has agreed to implement a flood warning and evacuation plan post development, and subscribe to the NRW's flood warning service.

The site is in a NRW Flood Alert Area. The NRW issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free NRW Floodline Warnings Direct service at <https://www.fws.environment-agency.gov.uk/app/olr/home?style=NRW&lang=en> to receive flood warnings by phone, text or email.

Flood Warning:

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 5: Flood Warnings

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Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the Farmhouse and the proposed properties prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

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Off-Site Impacts

Floodplain storage:

TAN15 requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

Surface Water Drainage Strategy:

The development will utilise Sustainable Urban Drainage (SuDs) design in accordance with the TAN15 for Planning Applications hierarchy as follows:

1. Store rainwater for later use;
2. Infiltration techniques;
3. Attenuate rainwater by storing in tanks for gradual release;
4. Discharge rainwater direct into watercourse;
5. Discharge rainwater into surface water sewer;
6. Discharge rainwater into a combined sewer;
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local stream.

Due to the scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

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Conclusion

Unda Consulting Limited have been appointed by Laura Thomas to undertake a Site Specific Flood Consequence Assessment (FCA) for Planning at No. 1 Garbett Place, Crynant, Neath, SA10 8PQ. The FCA has been undertaken in accordance with Technical Advice Note 15 (TAN 15) and the associated technical guidance.

The proposed planning application is for construction of a single new dwelling.

Post development, the development will be classified as “highly vulnerable” throughout.

The site is situated predominantly within Flood Zone B, with only a very small corner of the site within Flood Zone C.

Detailed fluvial modelled flood data relevant to the site was not available from NRW, however the applicant has agreed to follow the sequential approach to site layout, and situate the proposed new dwelling entirely outside of the flood zone C2 outline on site.

Flood zone C is defined by the 1:1000 year flood extent, and while modelled flood levels are not available from NRW, the proposed house is located entirely outside of flood zone C (and therefore outside of the NRW 1:1000 year extent used to define this).

The applicant has agreed that finished ground floor levels will be raised 600mm above the inferred 1:1000 year flood level of 100.23mAOD as a precautionary measure (a finished floor level of 100.83mAOD). The risk would appear to be predominantly fluvial, and originate from the River Dulais.

Modelled flood levels and flood extents have been requested from the NRW as part of a flood data request, however NRW has confirmed that for this area they currently have no reliable data available.

The Natural Resources Wales Surface Water Flood Map suggests that the site lies predominantly within areas of “Very Low risk of flooding from surface water.

The risk of flooding posed to the site by groundwater, sewer surcharge and reservoir flooding would appear to be low.

- The site is situated predominantly within Flood Zone B, with only a very small corner of the site within Flood Zone C (as defined by NRW).
- The development will be classified as “highly vulnerable” throughout.
- Modelled flood levels and flood extents have been requested from the NRW but no reliable fluvial data is available for the area.
- The applicant has agreed to follow the sequential approach to site layout, and situate the proposed new dwelling entirely outside of the flood zone C2 outline on site.
- Risk of surface water, groundwater and sewer surcharge flooding would appear to be low.
- Ground floor levels will be raised 600mm above maximum extent of Flood Zone B on site.
- A flood warning and evacuation plan will be implemented post development.
- Flood proofing of the properties will be incorporated as appropriate.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

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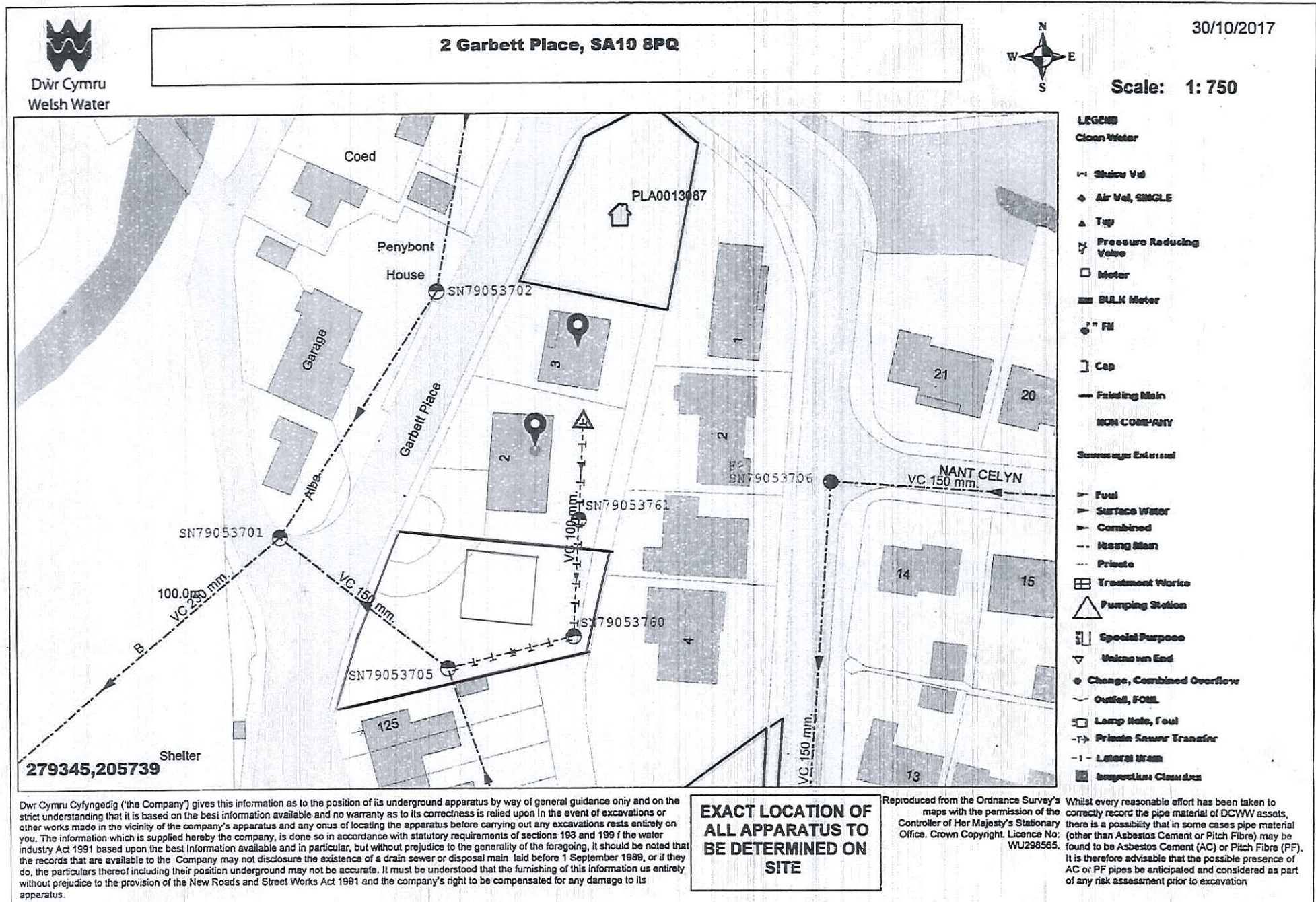
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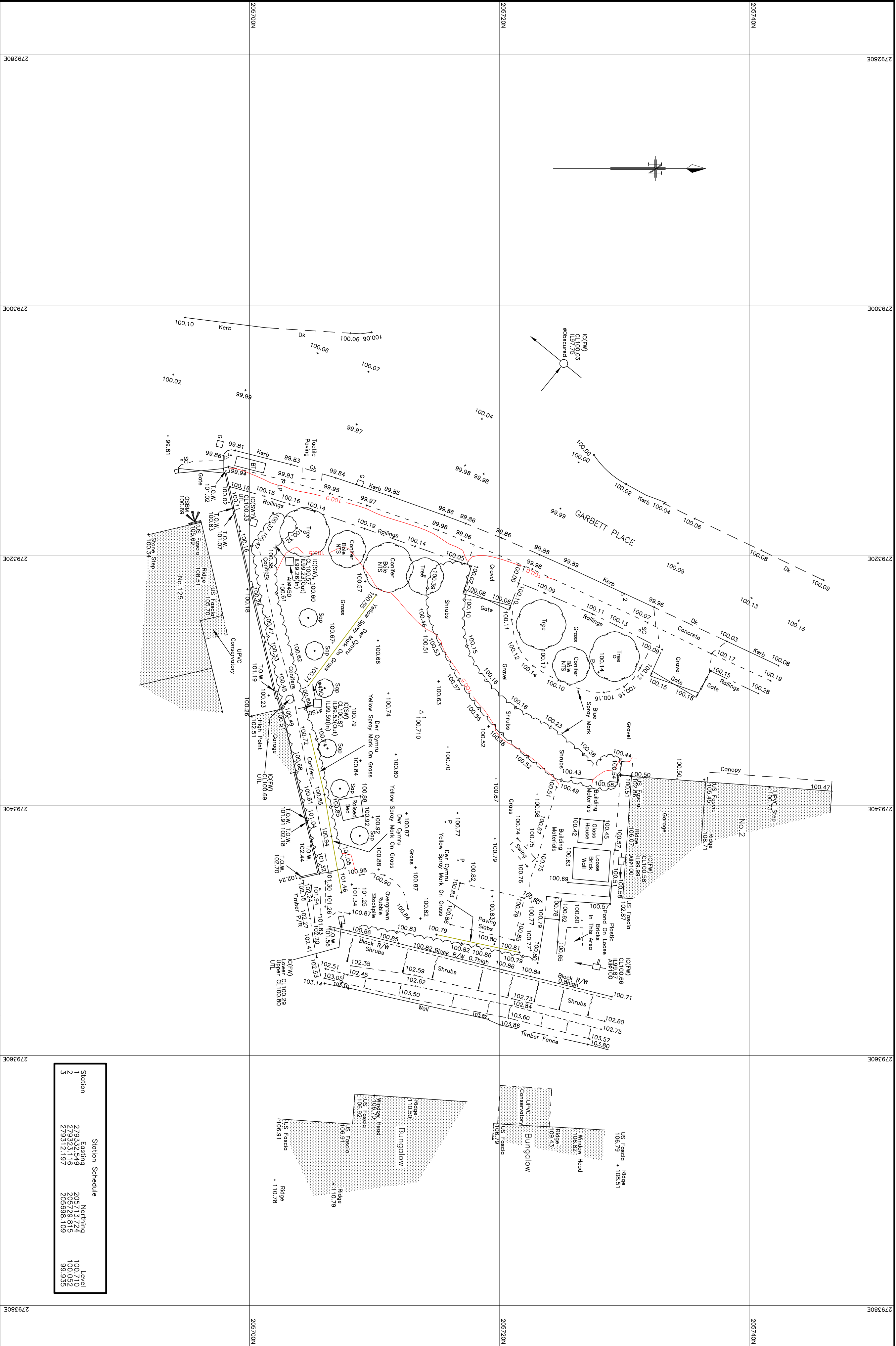


Appendix

Page 21:	Site location plan (1 page);
Page 22:	Topographic site survey (1 page);
Page 23:	Proposed site plan (1 page).

Superseded





MIKE WILLIAMS SURVEYS
LAND & ENGINEERING SURVEYORS
Rothwell Business Centre
Rothwell Park
Sunderland, SA1 9BH
Tel: 07889 203065
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LINE TYPES
Buildings
Electricity Poles
Electricity Cables
Top of banks
Bottom of banks
Hedges
Surface Change

ABBREVIATIONS
AV - Air Valve
BB - Boundary Beacon
BL - Bench Level
BR - Boundary Ridge
BU - Boundary Upright
BT - Boundary Trough
CA - Cover Level
CB - Cover Box
CC - Corrugated Fence
CD - Down Pipe
CE - Eaves Level
CF - Electrically Safe
CH - Chimney Head
CI - Cover Inlet
CL - Cover Level
CM - Cover Manhole
CP - Cover Pipe
CR - Cover Ridge
CS - Cover Step
CT - Cover Trough
CU - Cover Upright
CV - Cover Valve
DA - Down Pipe
DB - Down Box
DC - Down Cover
DE - Down Eaves
DF - Down Floor
DG - Down Gutter
DH - Down Hole
DI - Down Inlet
DJ - Down Junction
DK - Down Kerb
DL - Down Level
DM - Down Manhole
DN - Down Niche
DO - Down Outlet
DP - Down Pipe
DQ - Down Ridge
DR - Down Ridge
DS - Down Step
DT - Down Trough
DU - Down Upright
DV - Down Valve
EA - Eaves Level
EB - Eaves Box
EC - Eaves Cover
ED - Eaves Down
EE - Eaves Eaves
EF - Eaves Floor
EG - Eaves Gutter
EH - Eaves Hole
EI - Eaves Inlet
EJ - Eaves Junction
EK - Eaves Kerb
EL - Eaves Level
EM - Eaves Manhole
EN - Eaves Niche
EO - Eaves Outlet
EP - Eaves Pipe
EQ - Eaves Ridge
ER - Eaves Ridge
ES - Eaves Step
ET - Eaves Trough
EU - Eaves Upright
EV - Eaves Valve
FA - Floor Level
FB - Floor Box
FC - Floor Cover
FD - Floor Down
FE - Floor Eaves
FG - Floor Gutter
FH - Floor Hole
FI - Floor Inlet
FJ - Floor Junction
FK - Floor Kerb
FL - Floor Level
FM - Floor Manhole
FN - Floor Niche
FO - Floor Outlet
FP - Floor Pipe
FQ - Floor Ridge
FR - Floor Ridge
FS - Floor Step
FT - Floor Trough
FU - Floor Upright
FV - Floor Valve
GA - Gutter Level
GB - Gutter Box
GC - Gutter Cover
GD - Gutter Down
GE - Gutter Eaves
GF - Gutter Floor
GG - Gutter Gutter
GH - Gutter Hole
GI - Gutter Inlet
GJ - Gutter Junction
GK - Gutter Kerb
GL - Gutter Level
GM - Gutter Manhole
GN - Gutter Niche
GO - Gutter Outlet
GP - Gutter Pipe
GQ - Gutter Ridge
GR - Gutter Ridge
GS - Gutter Step
GT - Gutter Trough
GU - Gutter Upright
GV - Gutter Valve
HA - Head Level
HB - Head Box
HC - Head Cover
HD - Head Down
HE - Head Eaves
HF - Head Floor
HG - Head Gutter
HH - Head Hole
HI - Head Inlet
HJ - Head Junction
HK - Head Kerb
HL - Head Level
HM - Head Manhole
HN - Head Niche
HO - Head Outlet
HP - Head Pipe
HQ - Head Ridge
HR - Head Ridge
HS - Head Step
HT - Head Trough
HU - Head Upright
HV - Head Valve
IA - Inlet Level
IB - Inlet Box
IC - Inlet Cover
ID - Inlet Down
IE - Inlet Eaves
IF - Inlet Floor
IG - Inlet Gutter
IH - Inlet Hole
II - Inlet Inlet
IJ - Inlet Junction
IK - Inlet Kerb
IL - Inlet Level
IM - Inlet Manhole
IN - Inlet Niche
IO - Inlet Outlet
IP - Inlet Pipe
IQ - Inlet Ridge
IR - Inlet Ridge
IS - Inlet Step
IT - Inlet Trough
IU - Inlet Upright
IV - Inlet Valve
JA - Junction Level
JB - Junction Box
JC - Junction Cover
JD - Junction Down
JE - Junction Eaves
JF - Junction Floor
JG - Junction Gutter
JH - Junction Hole
JI - Junction Inlet
IJ - Junction Junction
JK - Junction Kerb
JL - Junction Level
JM - Junction Manhole
JN - Junction Niche
JO - Junction Outlet
JP - Junction Pipe
JQ - Junction Ridge
JR - Junction Ridge
JS - Junction Step
JT - Junction Trough
JU - Junction Upright
JV - Junction Valve
KA - Kerb Level
KB - Kerb Box
KC - Kerb Cover
KD - Kerb Down
KE - Kerb Eaves
KF - Kerb Floor
KG - Kerb Gutter
KH - Kerb Hole
KI - Kerb Inlet
KJ - Kerb Junction
KK - Kerb Kerb
KL - Kerb Level
KM - Kerb Manhole
KN - Kerb Niche
KO - Kerb Outlet
KP - Kerb Pipe
KQ - Kerb Ridge
KR - Kerb Ridge
KS - Kerb Step
KT - Kerb Trough
KU - Kerb Upright
KV - Kerb Valve
LA - Level Level
LB - Level Box
LC - Level Cover
LD - Level Down
LE - Level Eaves
LF - Level Floor
LG - Level Gutter
LH - Level Hole
LI - Level Inlet
LJ - Level Junction
LK - Level Kerb
LL - Level Level
LM - Level Manhole
LN - Level Niche
LO - Level Outlet
LP - Level Pipe
LQ - Level Ridge
LR - Level Ridge
LS - Level Step
LT - Level Trough
LU - Level Upright
LV - Level Valve
MA - Manhole Level
MB - Manhole Box
MC - Manhole Cover
MD - Manhole Down
ME - Manhole Eaves
MF - Manhole Floor
MG - Manhole Gutter
MH - Manhole Hole
MI - Manhole Inlet
MJ - Manhole Junction
MK - Manhole Kerb
ML - Manhole Level
MM - Manhole Manhole
MN - Manhole Niche
MO - Manhole Outlet
MP - Manhole Pipe
MQ - Manhole Ridge
MR - Manhole Ridge
MS - Manhole Step
MT - Manhole Trough
MU - Manhole Upright
MV - Manhole Valve
NA - Niche Level
NB - Niche Box
NC - Niche Cover
ND - Niche Down
NE - Niche Eaves
NF - Niche Floor
NG - Niche Gutter
NH - Niche Hole
NI - Niche Inlet
NJ - Niche Junction
NK - Niche Kerb
NL - Niche Level
NM - Niche Manhole
NN - Niche Niche
NO - Niche Outlet
NP - Niche Pipe
NQ - Niche Ridge
NR - Niche Ridge
NS - Niche Step
NT - Niche Trough
NU - Niche Upright
NV - Niche Valve
OA - Outlet Level
OB - Outlet Box
OC - Outlet Cover
OD - Outlet Down
OE - Outlet Eaves
OF - Outlet Floor
OG - Outlet Gutter
OH - Outlet Hole
OI - Outlet Inlet
OJ - Outlet Junction
OK - Outlet Kerb
OL - Outlet Level
OM - Outlet Manhole
ON - Outlet Niche
OO - Outlet Outlet
OP - Outlet Pipe
OQ - Outlet Ridge
OR - Outlet Ridge
OS - Outlet Step
OT - Outlet Trough
OU - Outlet Upright
OV - Outlet Valve
PA - Pipe Level
PB - Pipe Box
PC - Pipe Cover
PD - Pipe Down
PE - Pipe Eaves
PF - Pipe Floor
PG - Pipe Gutter
PH - Pipe Hole
PI - Pipe Inlet
PJ - Pipe Junction
PK - Pipe Kerb
PL - Pipe Level
PM - Pipe Manhole
PN - Pipe Niche
PO - Pipe Outlet
PP - Pipe Pipe
PQ - Pipe Ridge
PR - Pipe Ridge
PS - Pipe Step
PT - Pipe Trough
PU - Pipe Upright
PV - Pipe Valve
RA - Ridge Level
RB - Ridge Box
RC - Ridge Cover
RD - Ridge Down
RE - Ridge Eaves
RF - Ridge Floor
RG - Ridge Gutter
RH - Ridge Hole
RI - Ridge Inlet
RJ - Ridge Junction
RK - Ridge Kerb
RL - Ridge Level
RM - Ridge Manhole
RN - Ridge Niche
RO - Ridge Outlet
RP - Ridge Pipe
RQ - Ridge Ridge
RR - Ridge Ridge
RS - Ridge Step
RT - Ridge Trough
RU - Ridge Upright
RV - Ridge Valve
SA - Step Level
SB - Step Box
SC - Step Cover
SD - Step Down
SE - Step Eaves
SF - Step Floor
SG - Step Gutter
SH - Step Hole
SI - Step Inlet
SJ - Step Junction
SK - Step Kerb
SL - Step Level
SM - Step Manhole
SN - Step Niche
SO - Step Outlet
SP - Step Pipe
SQ - Step Ridge
SR - Step Ridge
SS - Step Step
ST - Step Trough
SU - Step Upright
SV - Step Valve
TA - Trough Level
TB - Trough Box
TC - Trough Cover
TD - Trough Down
TE - Trough Eaves
TF - Trough Floor
TG - Trough Gutter
TH - Trough Hole
TI - Trough Inlet
TJ - Trough Junction
TK - Trough Kerb
TL - Trough Level
TM - Trough Manhole
TN - Trough Niche
TO - Trough Outlet
TP - Trough Pipe
TQ - Trough Ridge
TR - Trough Ridge
TS - Trough Step
TT - Trough Trough
TU - Trough Upright
TV - Trough Valve
UA - Upright Level
UB - Upright Box
UC - Upright Cover
UD - Upright Down
UE - Upright Eaves
UF - Upright Floor
UG - Upright Gutter
UH - Upright Hole
UI - Upright Inlet
UJ - Upright Junction
UK - Upright Kerb
UL - Upright Level
UM - Upright Manhole
UN - Upright Niche
UO - Upright Outlet
UP - Upright Pipe
UQ - Upright Ridge
UR - Upright Ridge
US - Upright Step
UT - Upright Trough
UU - Upright Upright
UV - Upright Valve
VA - Valve Level
VB - Valve Box
VC - Valve Cover
VD - Valve Down
VE - Valve Eaves
VF - Valve Floor
VG - Valve Gutter
VH - Valve Hole
VI - Valve Inlet
VJ - Valve Junction
VK - Valve Kerb
VL - Valve Level
VM - Valve Manhole
VN - Valve Niche
VO - Valve Outlet
VP - Valve Pipe
VQ - Valve Ridge
VR - Valve Ridge
VS - Valve Step
VT - Valve Trough
VU - Valve Upright
VV - Valve Valve
WA - Wall Level
WB - Wall Box
WC - Wall Cover
WD - Wall Down
WE - Wall Eaves
WF - Wall Floor
WG - Wall Gutter
WH - Wall Hole
WI - Wall Inlet
WJ - Wall Junction
WK - Wall Kerb
WL - Wall Level
WM - Wall Manhole
WN - Wall Niche
WO - Wall Outlet
WP - Wall Pipe
WQ - Wall Ridge
WR - Wall Ridge
WS - Wall Step
WT - Wall Trough
WU - Wall Upright
WV - Wall Valve
XA - X Level
XB - X Box
XC - X Cover
XD - X Down
XE - X Eaves
XF - X Floor
XG - X Gutter
XH - X Hole
XI - X Inlet
XJ - X Junction
XK - X Kerb
XL - X Level
XM - X Manhole
XN - X Niche
XO - X Outlet
XP - X Pipe
XQ - X Ridge
XR - X Ridge
XS - X Step
XT - X Trough
XU - X Upright
XV - X Valve
YA - Y Level
YB - Y Box
YC - Y Cover
YD - Y Down
YE - Y Eaves
YF - Y Floor
YG - Y Gutter
YH - Y Hole
YI - Y Inlet
YJ - Y Junction
YK - Y Kerb
YL - Y Level
YM - Y Manhole
YN - Y Niche
YO - Y Outlet
YP - Y Pipe
YQ - Y Ridge
YR - Y Ridge
YS - Y Step
YT - Y Trough
YU - Y Upright
YV - Y Valve
ZA - Z Level
ZB - Z Box
ZC - Z Cover
ZD - Z Down
ZE - Z Eaves
ZF - Z Floor
ZG - Z Gutter
ZH - Z Hole
ZI - Z Inlet
ZJ - Z Junction
ZK - Z Kerb
ZL - Z Level
ZM - Z Manhole
ZN - Z Niche
ZO - Z Outlet
ZP - Z Pipe
ZQ - Z Ridge
ZR - Z Ridge
ZS - Z Step
ZT - Z Trough
ZU - Z Upright
ZV - Z Valve

NOTES
1. Local authority grid used.
2. North arrow indicates approximate North.
3. All levels relate to OSBM Value 100.00m.
4. Contour interval 0.50m.

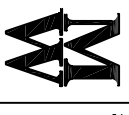
CLIENT
Bath Jones
541 Burnley Road
Clydach
Sunderland
SA6 5JU

SHEET DIAGRAM
One Sheet Only

SCALE
1:200 at A2
DATE
November 2017

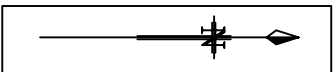
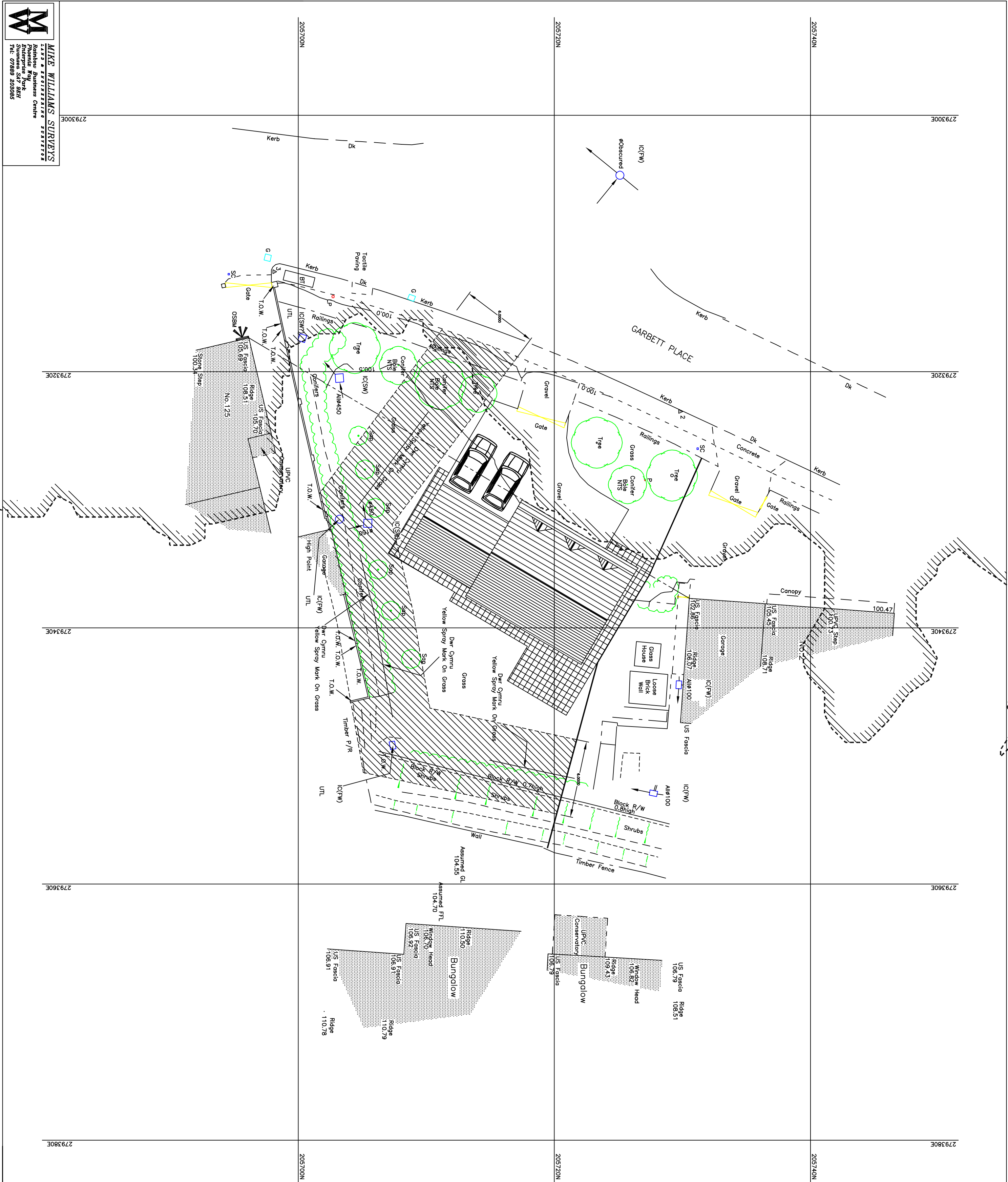
Plot at 2, Garbett Place, Crynant, SA10 8PQ.

Superseded



MIKE WILLIAMS SURVEYS
LAND & ENGINEERING SURVEYOR

Rainbow Business Centre
Phoenix Way
Enterprise Park
Swansea, SA7 9EH
Tel: 07889 203085



Rev	Description	Date	Initial

1 GARBETT PLACE, CRYNANT, NEATH

Title: PROPOSED SITE LAYOUT

Date: _____ Drawn: _____

1.200 @ A2

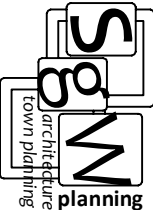
ISSUE:

SCALES(S).

DRAFT

18/748/3*
Dwg. NO.
Revisiul.

Garbett_Place_S11E.dwg



58 Walter Road, Swansea. SA1 5PZ - Tel: 01792 648380

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Dimensions where shown should be read and not scaled.

Dimensions where shown should be confirmed on site.

Any discrepancies should be notified as soon as possible.

A2

②