Land North of Dinas Powys Preliminary Flood Risk Assessment and Drainage Strategy

Version 1

June 2022

www.jbaconsulting.com

Persimmon Home East Wales
Llantrisant Business Park
LLANTRISANT
CF72 8YP

Contents

List of Figures

List of Tables

Abbreviations

FCA	Flood Consequence Assessment
JBA	JBA Consulting
NRW	Natural Resources Wales
SuDS	Sustainable Drainage Systems

1 Introduction

JBA Consulting were commissioned by Persimmon Homes East Wales to undertake a Preliminary Flood Consequence Assessment (FCA) and Conceptual Drainage Statement for the Land North of Dinas Powys. The assessment is to support the submission of the site as a candidate site as part of Vale of Glamorgan Council's ongoing review of a replacement Local Development Plan (LDP).

2 The Site

2.1 Site Description

The proposed development area is split into two land parcels, as shown in Figure 2-1. Both sites are located to the north of the village of Dinas Powys and are being considered for residential development.

Site A is currently greenfield with several farm buildings and an access road located in the centre of the site. The site is bounded by Pen-Y-Turnpike Road to the west, residential buildings to the south, farmland, and the A4055 along the eastern boundary. Several ordinary watercourses are present on the site, as shown in Figure 2-2. These watercourses flow in an easterly direction and are part of the drainage network of the East Brook. The East Brook flows in a southerly direction along the eastern boundary of the site.

Site B is currently greenfield with several farm buildings located in the south eastern part of the site. The site is bounded by farmland to the north and west, residential buildings to the south, and farmland and the A4055 along the eastern boundary. The East Brook flows through the eastern part of the site, with several tributaries flowing through the northern and eastern parts of the site before their confluence with the westerly branch of the East Brook, as shown in Figure 2-2.

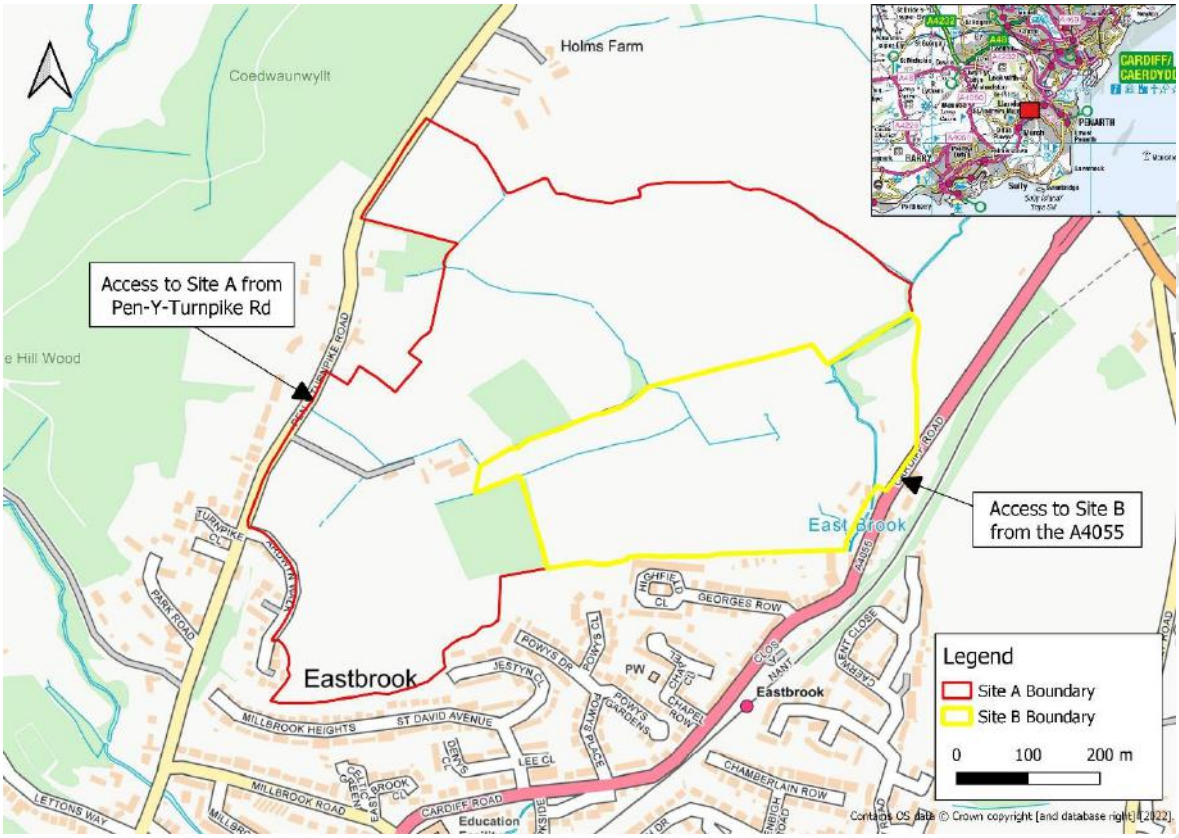


Figure 2-1 Site Location

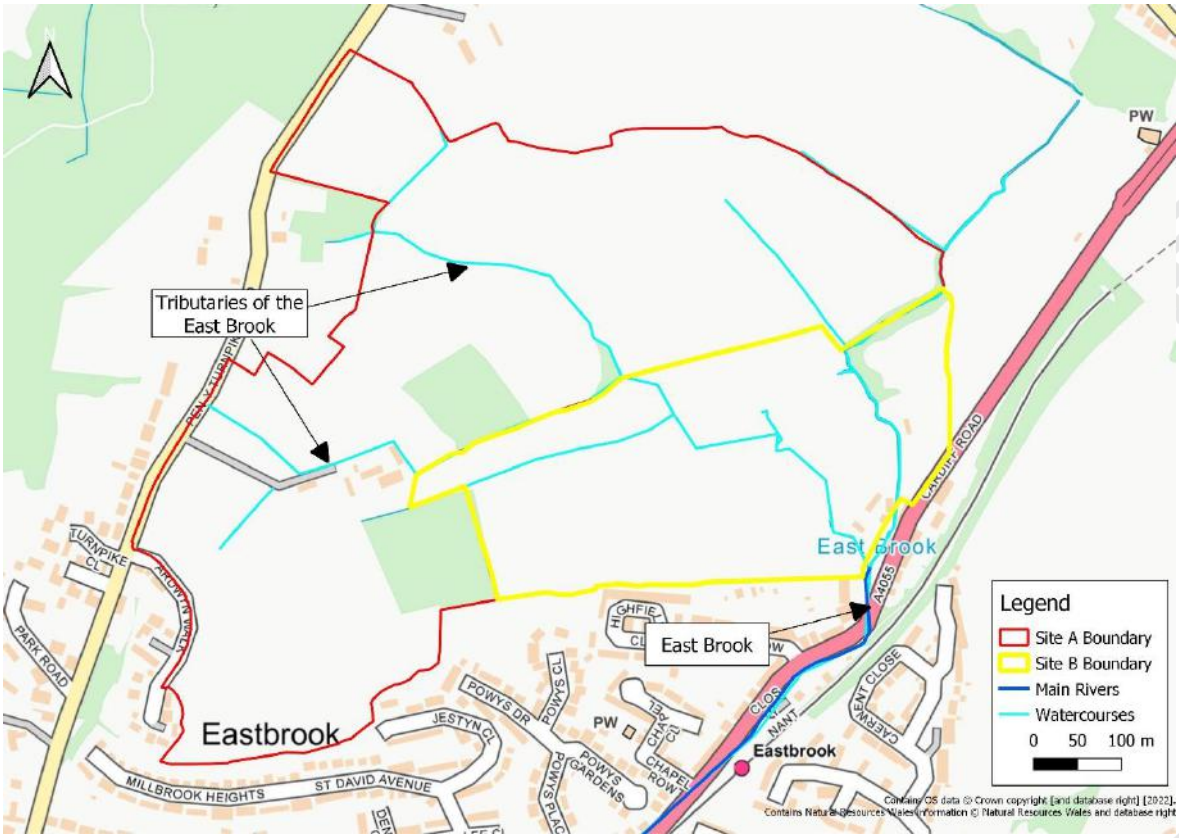


Figure 2-2 Watercourses

2.2 Site Topography

Natural Resources Wales 2m Light Detection and Ranging (LiDAR) data has been used to understand the topography of the proposed development area, as shown in Figure 2-3.

In Site A, the site levels are highest along the north and western boundaries of the site where levels generally fall in an easterly direction. Ground levels are approximately 59.9mAOD at the highest point along the northern boundary of the site and fall to 21.80mAOD in the south east of the site.

In the south western part of the site, ground levels from the hill in this area fall in both a southerly and easterly direction. Ground levels fall from approximately 48.6mAOD to approximately 37.2mAOD along the southern boundary of the site, and to 29.2mAOD along the eastern boundary of the site.

In Site B, the site levels are highest along the western boundary of the site where levels generally fall in an easterly direction. Ground levels are approximately 38.56mAOD at the highest point along the western boundary of the site and fall to 20.8mAOD in the south east of the site along the course of the tributary of the East Brook.

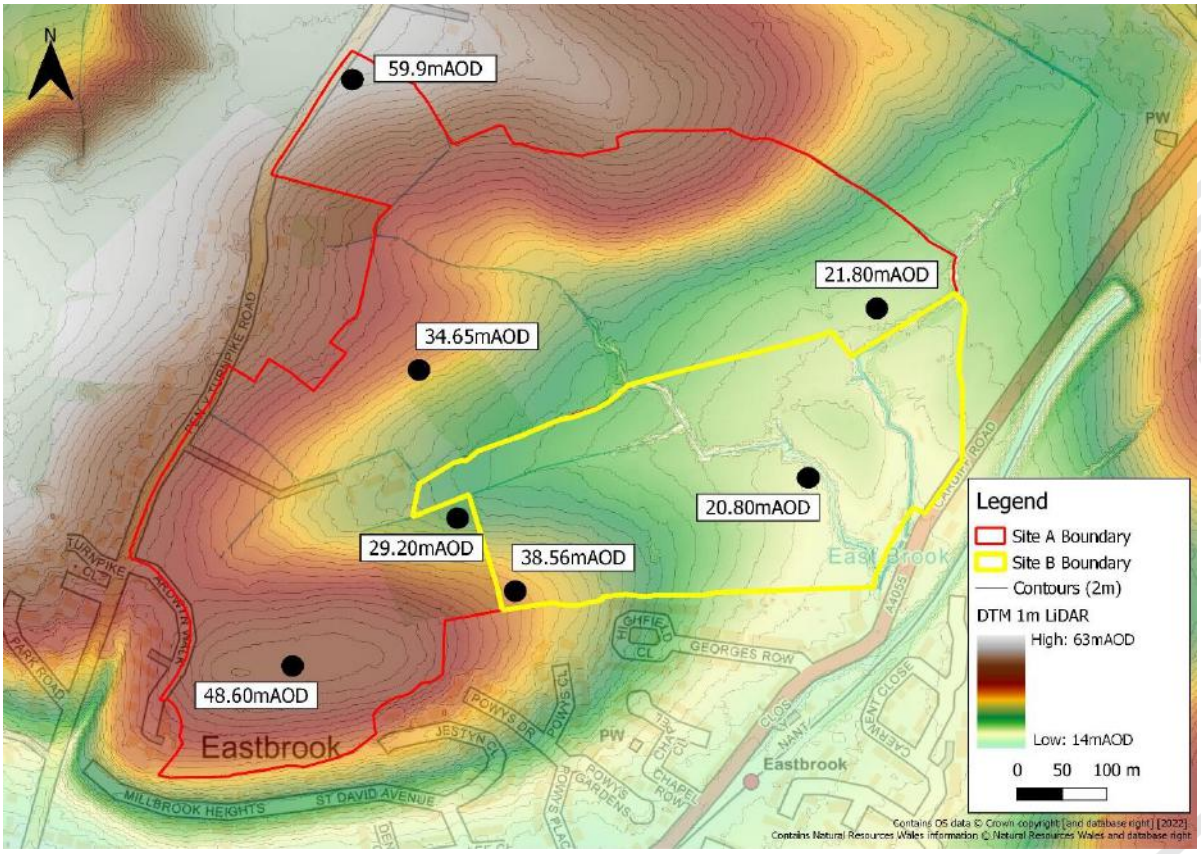


Figure 2-3 2m LIDAR 2m DTM across the development site and surrounding area

3 Planning Policy

3.1 Vale of Glamorgan Council Adopted Local Development Plan (2017)

The Vale of Glamorgan Council Local Development Plan (LDP)[1], adopted in 2017, sets out the council's vision and objectives for the development and use of land in the Vale of Glamorgan, together with the policies and proposals to implement them over a 15-year period to 2036.

The LDP sets out the spatial strategy and strategic policies, which have been developed to implement the plan's key objectives. Detailed development management policies are also set out, grouped by the plan's themes, against which all development proposals in the Vale of Glamorgan will be assessed and provides the basis for the rational and consistent consideration of planning applications and appeals.

The LDP contains Development Management Policies MD7 Environmental Protection and Objective 2 of the Local Development Plan. Policy MD7 states that development will be expected to avoid areas of unnecessary flood risk and meet the requirements of TAN-15. Objective 2 of the Local Plan states that one of the ways the county will mitigate against the effects of climate change is to avoid development in areas that are susceptible to flooding. It goes on to acknowledge that this development policy will make developments demonstrate that there will not be an impact on people or the natural environment.

3.2 Planning Context

Planning Policy Wales (PPW) sets out the core planning policies required by the Welsh Government. These policies have the aim that all development in Wales is sustainable and improve the social, economic, environmental, and cultural wellbeing of Wales as set out in the Wellbeing and Future Generations Act 2015. PPW uses a series of Technical Advice Notes to provide more guidance on areas of planning and development in Wales. TAN-15 was introduced in 2004 by the Welsh Assembly Government and provides technical guidance relating to development planning and flood risk in Wales.

An update for TAN-15 was released in October 2021 and was due to come in force on the 1st December 2021. However, Welsh Government have since suspended the implementation of the new TAN-15 until 1st June 2023. Although the new TAN-15 is not a material consideration, Welsh Government and NRW advise that some consideration is given to the draft Flood Map for Planning (FMfP) as best available information. Any future planning application for the proposed development site shall be made under the updated requirements for TAN-15. As a result, the new FMfP has been consulted as part of this preliminary assessment.

3.3 Extant TAN-15

3.3.1 Vulnerability classification

TAN-15 assigns one of three flood risk vulnerability classifications to developments, as shown in Table 3-1. The proposed development sites are being considered for residential use; therefore, they are classified as a 'highly vulnerable development' by TAN-15.

[1] Monmouthshire County Council Local Development Plan (2014)https://www.monmouthshire.gov.uk/app/uploads/2017/05/Adopted-Local-Development-Plan-with-PDF-tags.pdf

Table 3-1 Development categories defined by TAN-15

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

3.3.2 Development Advice Map classification

The DAM is used to trigger different planning actions based on a precautionary assessment of flood risk. Figure 3-1 shows the DAM Zones for both Site A and Site B.

Site A is entirely located within Zone A.

Site B is also predominantly located in Zone A with the exception of an area along the East Brook which is located in Zone C2.

Zone A is considered to be at little or no risk of fluvial or coastal/tidal flooding and highly vulnerable and less vulnerable uses are considered acceptable in this area.

DAM Zone C2 is defined as 'areas of floodplain without significant flood defence infrastructure and is used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences.' The developer will ensure that no development takes place within the DAM C2 Zone. Site B's partial location in DAM Zone C2 triggers the need for an FCA to meet the requirements of the Justification Test and acceptability of flood consequences.

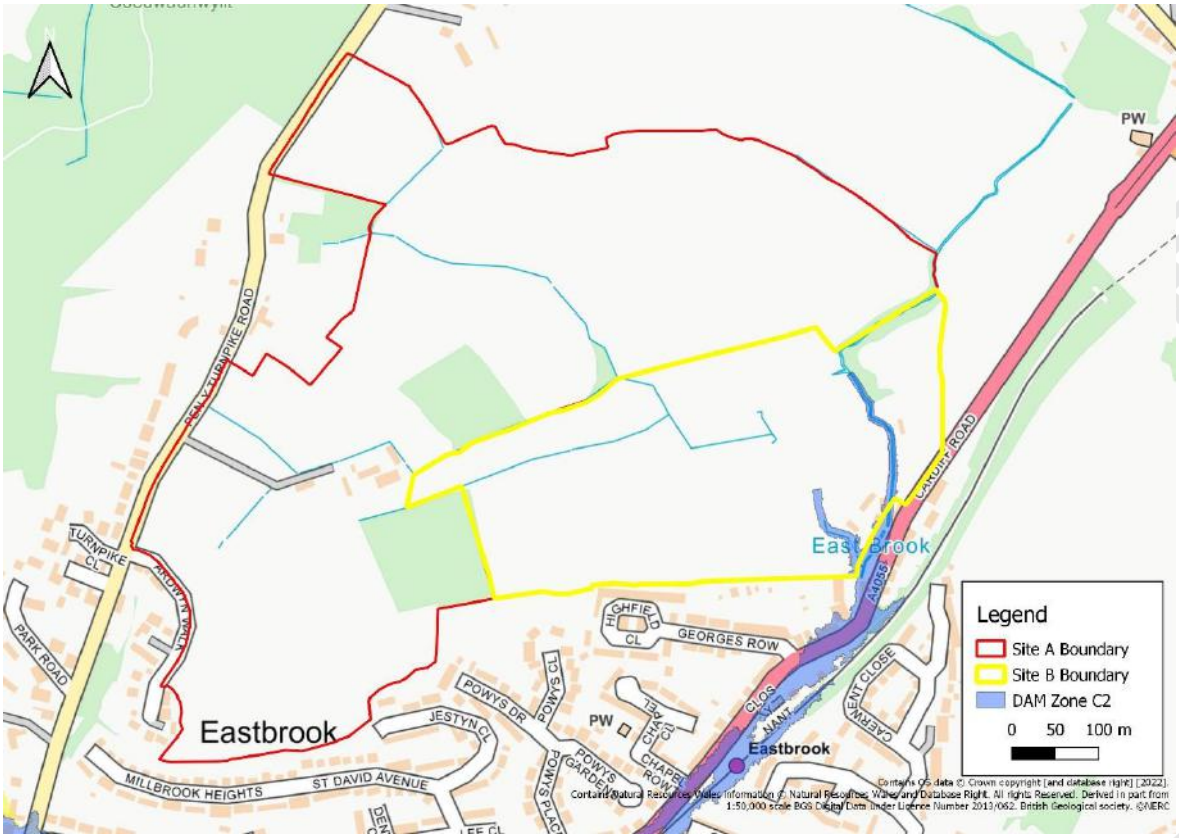


Figure 3-1 Development Advice Map

3.4 Updated TAN-15 (Expected Release June 2023)

3.4.1 Vulnerability Classification

TAN-15 assigns one of three flood risk vulnerability classifications to a development, as shown in Table 3-2. The proposed development is classed as residential development. Consequently, the development is classified as **Highly Vulnerable**.

Table 3-2 Development categories defined by the updated TAN-15

Development category	Types
Highly vulnerable development	**All residential premises** (including hotels, Gypsy and Traveller sites and caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries. Especially vulnerable industrial development (e.g. power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites. Emergency services, including: ambulance stations, fire stations, police stations, command centres, emergency depots. Buildings used to provide emergency shelter in time of flood.
Less vulnerable	General industrial, employment, commercial and retail

development	development. Transport and utilities infrastructure. Car parks. Mineral extraction sites and associated processing facilities (excluding waste disposal sites). Public buildings including libraries, community centres and leisure centres (excluding those identified as emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities (excluding hydro generation).
Water compatible development	Boatyards, marinas and essential works required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

3.4.2 Flood Map for Planning Classifications

The FMFP is used to trigger different planning actions based on a precautionary assessment of flood risk.

Flood Map for Planning – Rivers

As shown in Figure 3-2, Site A is located almost entirely within Flood Zone 1. Flood Zone 1 represents areas which have less than a 1 in 1000 (0.1%) chance of flooding in a given year, including climate change. A small area along the eastern boundary of the site along the East Brook is located within Flood Zone 2, which represents areas which have less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.

Site B is also predominantly located within Flood Zone 1. A small area along the tributaries of the East Brook and the East Brook is located within Flood Zone 2 and Flood Zone 3. Flood Zone 3 represents areas which have a greater than a 1 in 100 (1%) chance of flooding in a given year, including climate change and Flood Zone 2 represents areas which have up to 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.

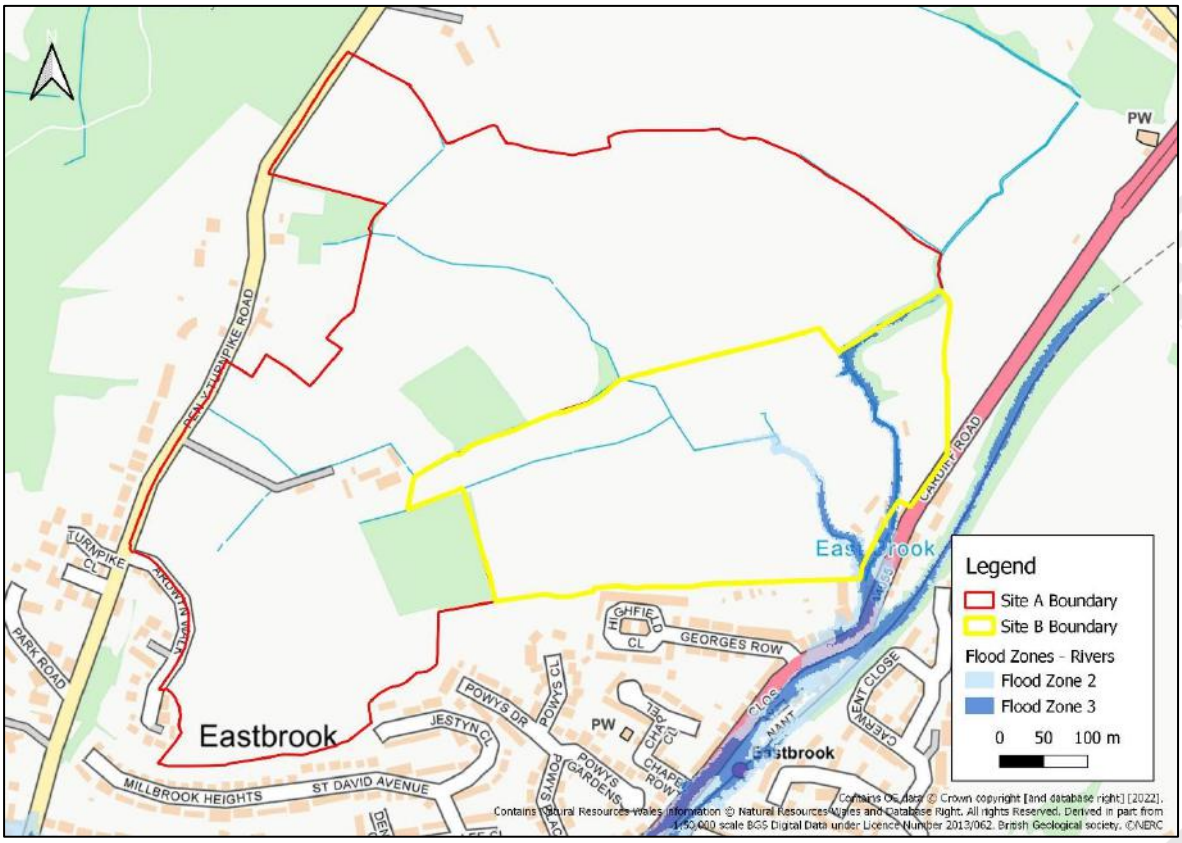


Figure 3-2 Flood Map for Planning – Rivers.

Flood Map for Planning - Sea

Sites A and B are located in Flood Zone 1 of the Flood Map for Planning for Sea. This is shown as a transparent layer on the FMFP mapping and therefore no figure has been provided.

Flood Map for Planning – Surface Water and Small Watercourses

As shown in Figure 3-2, Site A is located almost entirely within Flood Zone 1. Flood Zone 1 represents areas which have less than a 1 in 1000 (0.1%) chance of flooding in a given year, including climate change. Areas of Flood Zone 2 and Flood Zone 3 are located along the course of the tributaries of the East Brook. Flood Zone 2 represents areas which have less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change. Flood Zone 3 represents areas which have a greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.

Site B is also predominantly located within Flood Zone 1. A small area along the tributaries of the East Brook and the East Brook watercourse in the eastern part of the site is located within Flood Zone 2 and Flood Zone 3.

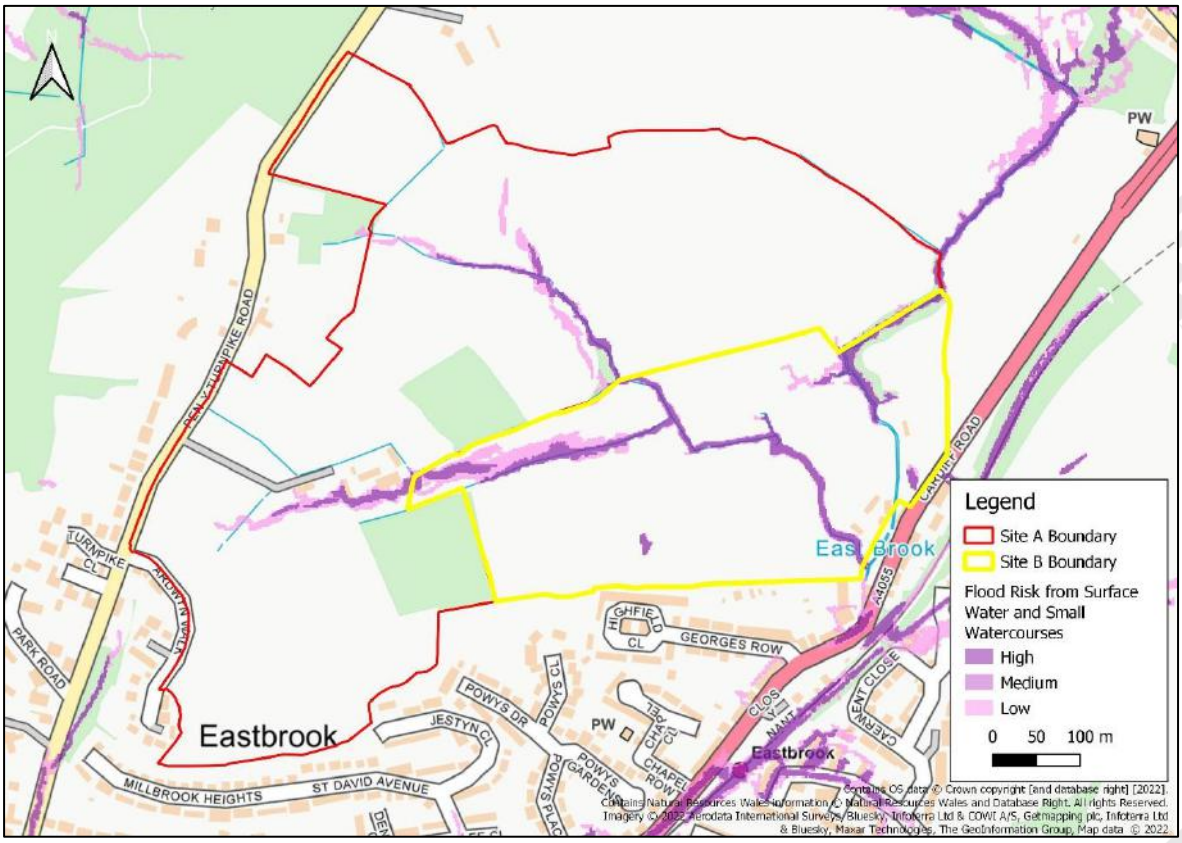


Figure 3-3 Flood Map for Planning - Surface Water and Small Watercourses

4 Assessment of Flood Risk

A review of the existing data on flood risk from all sources has been undertaken based on publicly available data and is summarised in the table below.

Table 4-1 Summary of flood risk

Source of Flooding	Onsite Presence	Description
Flood Risk from Rivers	✓	Site A is at low risk of fluvial flooding. Site B is at high to low risk of flooding.
Flood Risk from the Sea	×	Both Site A and Site B are at very low risk of tidal flooding.
Flood Risk from Surface Water and Small Watercourses	✓	Both Site A and Site B are predominantly at very low risk of surface water and small watercourse flooding with a small, localised areas of the site at high risk of flooding.
Flood Risk from Groundwater	×	Both sites are at low risk of flooding from groundwater.
Flood Risk from Reservoirs	×	Both sites are not at risk of flooding from reservoirs
Flood Risk from Sewers	×	Both sites are at low risk of flooding from sewers.

4.1 Flood History & Flood Risk Management Proposals

It should be recognised that Dinas Powys has a significant history of flooding caused by peak flood flows exceeding the capacity of the East Brook and the Cadoxton River. Development has taken place in close proximity to the watercourses and there is little remaining floodplain in the village to naturally store and convey floodwater in flood events. Internal property flooding was reported in 1903, 1913, 1948, 1986, 1998, 1999, 2008 and most recently in March 2020. External flooding was also reported in 1965, 1968, 1976, 1995, 2007, 2012 and 2013.

Given the extensive history of flooding in Dinas Powys, it shall be essential that development upstream of the village does nothing to exacerbate the issues. Ideally development should contribute to a betterment of downstream flood risk situation.

In 2020 NRW published an Outline Business Case (OBC) to management flood risk in Dinas Powys[2]. This concluded "*The upstream flood storage option [on the Cadoxton River] is the most viable option, but has a marginal economic case, may have several significant potential impacts, and lacks broad community support, so to pursue this option would be very challenging. No other option manages the flood risk for most homes and businesses in Dinas Powys whilst following government project appraisal guidance, particularly providing value for money. Therefore, the Outline Business Case has recommended the Business As Usual option, where we continue with our current approach to managing flood risk in the village.*"

As a result of this conclusion, NRW are now further investigating the viability of Natural Flood Management (NFM) measures in the upstream catchment to alleviate flooding. One of the

[2] https://cncdev.net/about-us/our-projects/flood-scheme-projects/dinas-powys-flood-scheme/project-outcome/?lang=en

options is to utilise the naturally oversized channels on the East Brook to store flood water to reduce peak flood flows downstream in Dinas Powys. Previous work during OBC identified that such works would:

- Cost an estimated £852,000 and would provide an economic benefit of £1.5 million.
- Benefit 31 homes and four businesses, protecting them up to a 1% (1 in 100) chance flood event.
- Improve water quality and potentially improve habitats.

4.2 Flood Risk from Rivers

NRW's Flood Risk Assessment Wales (FRAW) map for Flood Risk from Rivers shows the risk posed the proposed development area as shown in Figure 4-1.

Site A is located within a **very low risk** area for flooding from rivers. Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).

Site B is predominantly located within a **very low risk** area for flooding from rivers. A small part of the site along the course of the East Brook and its tributaries has a high to low risk of fluvial flooding. High risk indicates that the site will have a chance of flooding of greater than 1 in 30 (3.3%) and Low risk indicates that each year, the site has a chance of flooding of between 1 in 1000 (0.1% AEP) and 1 in 100 (1% AEP).

No residential development should be located within the area of flood risk identified in NRW FRAW Flood Risk from Rivers map.

The naturally oversized channels on the East Brook through the candidate site, mentioned in Section 4.1, significantly contribute to the very low flood risk in the area.

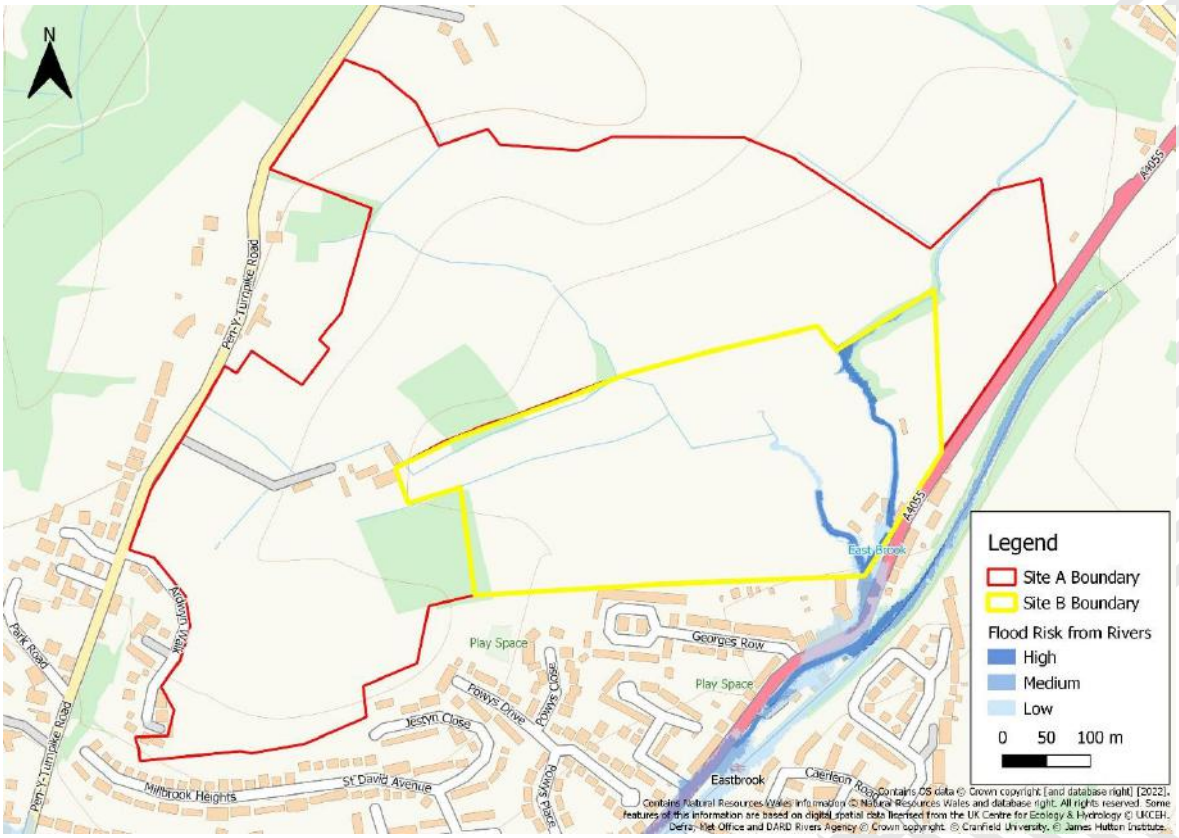


Figure 4-1 FRAW - Flood Risk from Rivers

4.3 Flood Risk from the Sea

The NRW FRAW Flood Risk from the Sea map illustrates that the proposed development area is at very low risk of tidal flooding, shown as a transparent layer on the FRAW mapping.

4.4 Flood Risk from Surface Water and Small Watercourses

The NRW FRAW Surface Water and Small Watercourses map shows the risk posed the proposed development area as shown in Figure 4-2.

Site A is predominantly located within a **very low risk** area for flooding from rivers. Very low means that each year, this area has a chance of flooding of less than 1 in 1000 (0.1%). A small part of the site along the tributaries of the East Brook has a high to low risk of surface water and small watercourse flooding. High risk indicates that the site will have a chance of flooding of greater than 1 in 30 (3.3%) and Low risk indicates that each year, the site has a chance of flooding of between 1 in 1000 (0.1% AEP) and 1 in 100 (1% AEP).

Site B is also predominantly located within a **very low risk** area for flooding from rivers. A small part of the site along the course of the East Brook and tributaries has a high to low risk of fluvial flooding. High risk indicates that the site will have a chance of flooding of greater than 1 in 30 (3.3%) and Low risk indicates that each year, the site has a chance of flooding of between 1 in 1000 (0.1% AEP) and 1 in 100 (1% AEP).

Areas shown at risk of flooding from surface water and small watercourse flooding are located within topographic depressions and valleys on the site and should be easily manageable within the master planning process and through the use of SuDS features. It is recommended that essential infrastructure associated with housing development should avoid areas at risk of flooding.

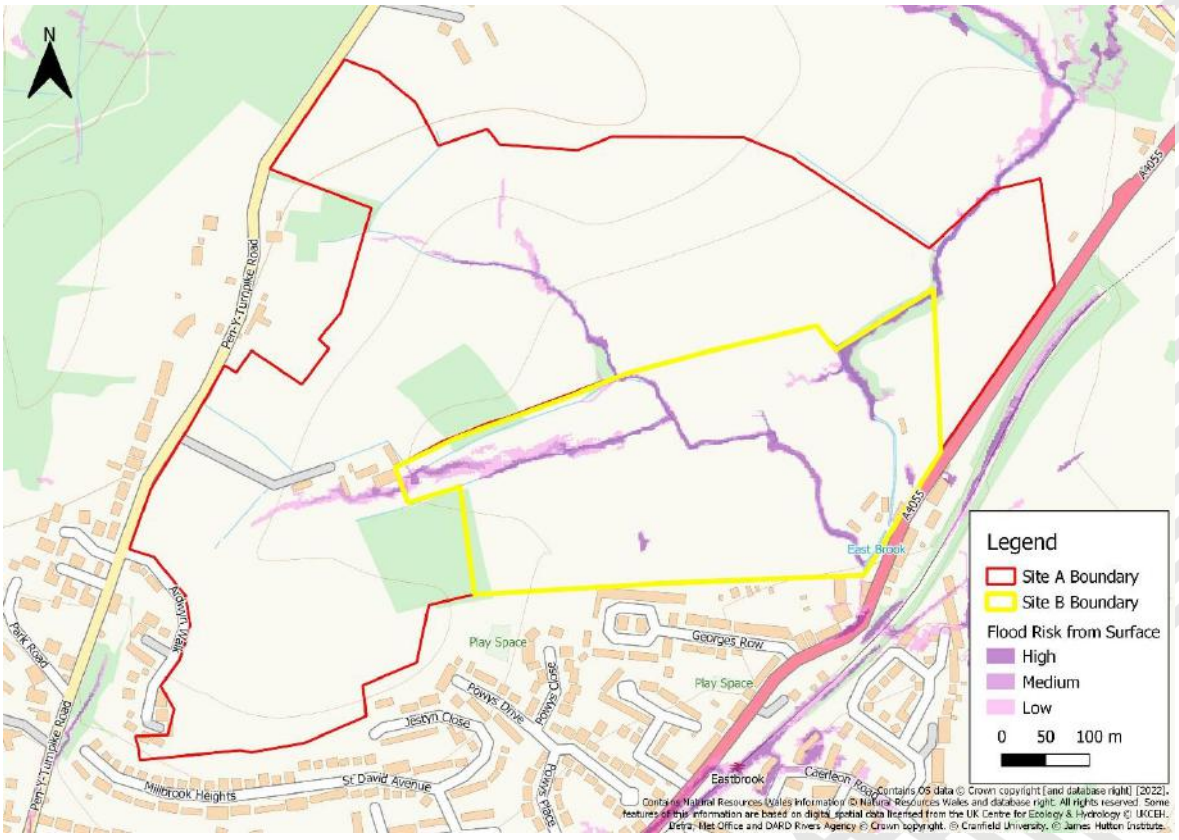


Figure 4-2 FRAW – Flood risk from surface water and small watercourses

4.5 Flood Risk from Groundwater

Groundwater flooding is caused by unusually high groundwater levels. It occurs as excess water emerges at the ground surface or within manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and can result in damage to property. This risk of groundwater flooding depends on the nature of the geological strata underlying the site and the local topography.

The British Geological Survey 1:50,000 scale Geology of Britain Viewer[3] indicates the Bedrock and Superficial Deposits underlay the site.

Site A is largely underlain by the Mercia Mudstone Group consisting of Mudstone Sedimentary Bedrock. The western and southern parts of the site is underlain by Blue Anchor Formation consisting of Mudstone. No superficial deposits overlay the bedrock.

Site B is also predominantly underlain by Mercia Mudstone Group consisting of Mudstone Sedimentary Bedrock. A small part of the south west of the site is underlain by Blue Anchor Formation consisting of Mudstone. No superficial deposits overlay the bedrock.

Mudstone is generally considered to be reasonably impermeable and is unlikely to support groundwater and result in groundwater flooding. Furthermore, the site is not identified as an area where groundwater has occurred previously. It can therefore be concluded that the risk of flooding from groundwater to the site is **low**.

4.6 Flood Risk from Reservoirs

The NRW FRAW Flood Risk from Reservoirs map illustrates that both sites are at very low risk of reservoir flooding, shown as a transparent layer on the FRAW mapping.

4.7 Flood Risk Management Recommendations

The flood risk throughout the candidate site is generally very low. If plans are progressed, it is recommended that more detailed flood modelling is undertaken to confirm this. Although, due to the naturally oversized channels throughout site it is unlikely that flood risks will increase with a more detailed assessment.

The NRW OBC recognised the opportunity using the East Brook catchment and specifically the naturally oversized channels to reduce flood risk downstream in Dinas Powys where flooding is a regular issue. Nature-based solutions such as Natural Flood Management techniques (NFM) can be used to retain water and attenuate flows that can otherwise contribute to flooding. Installation of temporary detention features such as leaky dams and large woody debris in watercourses across a catchment can mitigate flood risk and improve the capability of the watercourse to manage more extreme events. NFM techniques could deployed within the area to contribute to the mitigation of flooding downstream of the proposed development site in Dinas Powys.

[3] Geology of Britain Viewer: http://mapapps.bgs.ac.uk/geologyofbritain/home.html?

5 Existing Surface water drainage regime

5.1 Soils, geology and existing drainage routes

The British Geological Survey 1:50,000 scale Geology of Britain Viewer[4] indicates that the proposed development area is largely underlain by the Mercia Mudstone Group consisting of Mudstone Sedimentary Bedrock and by Blue Anchor Formation consisting of Mudstone. These are not overlain by any superficial deposits.

Cranfield University Soilscapes[5] has highlighted two soil types across both sites. The soils across the majority of the sites are described as 'slightly acid loamy and clayey soils with impeded drainage'. Based on the ground conditions described, it is considered likely that the site primarily drains via overland flow to the watercourse network.

It is unlikely that infiltration will be viable at either site due to the geology; however it is recommended that infiltration testing is undertaken to inform any future outline and detailed drainage strategy for the site.

5.2 Greenfield runoff rates

Table 2.41 of the SuDS Manual[6] indicates that the FEH methods (FEH statistical and ReFH) should be the preferred methods for calculating peak runoff rates.

The UK SuDS tool has been used to calculate Greenfield runoff rates for both Sites A and B together (44.07ha) using the FEH Statistical Method, as seen in Appendix A. Catchment descriptors were extracted from the FEH Webservice. The calculated greenfield runoff rates are shown in Table 5-1.

Table 5-1 Calculated greenfield runoff rates

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
1	10.0	442.1
QBAR	11.4	502.4
30	20.3	894.3
100	24.8	1095.3

5.3 Allowance for Climate Change

The Welsh Government has produced Adapting to Climate Change guidance[7] which contains updated representative climate changes allowances for Wales for peak flows. The guidance contains indicative sensitivity ranges for peak rainfall intensity. As both sites are proposed to include residential uses, the assumed lifetime of development at the site is 100 years, and as such the 2070-2115 estimate should be used. The recommended climate change factor for small catchments using the Central estimate for the 2070-2115 epoch is 20%.

5.4 Greenfield runoff volumes

Greenfield runoff volumes were calculated for a six-hour storm event for the sites using the FSSR16 method as shown in Equation 1 below.

---

4 British Geological Society Geology of Britain Viewer: https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/
5 Cranfield University Soilscapes: http://www.landis.org.uk/soilscapes/

6 The SuDS Manual (C753), CIRIA 2015. https://www.ciria.org.

7 Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales: https://gov.wales/sites/default/files/publications/2019-06/adapting-to-climate-change-guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales.pdf

Runoff volume = Site Area x Rainfall Depth x Percentage Runoff

Equation 1: FSSR16 method for calculating Greenfield runoff volumes

Percentage runoff was calculated using the FSSR16 methodology which accounts for soil type, catchment wetness and storm intensity. The rainfall depths for a six-hour 100-year storm event were extracted from the FEH Web Service and are summarised in

Table 5-2 and Appendix A with the calculated Greenfield runoff volumes.

Table 5-2 Greenfield rainfall depths and runoff volumes

Return Period	6-hour rainfall runoff depth (mm)	Site runoff volume (m3)
100	69.7	14490
100 plus climate change (20%)	83.6	17388

6 Surface water management approach

6.1 Sustainable drainage systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of Greenfield surface water drainage by allowing water to flow along natural flow routes and also aims to reduce the runoff rates and volumes during storm events, whilst providing water treatment benefits. SuDS also have the advantage of providing Blue and Green Infrastructure and ecology and recreational benefits when designed and maintained properly.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirement for all new developments to incorporate the four pillars of SuDS design, shown in Figure 6-1.

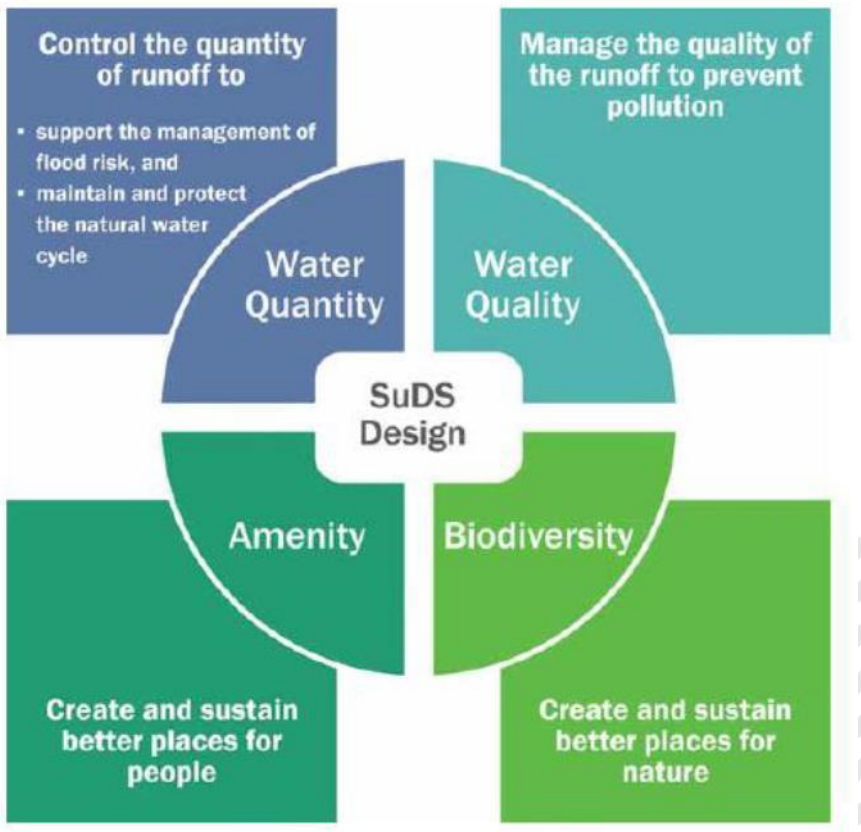


Figure 6-1 Four pillars of SUDS Design (CIRIA, 2015)

6.2 Design criteria

The following national guidance documents and design standards have been considered when developing this outline surface water drainage strategy:

- C753 The SuDS Manual (Ciria, 2015)
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems (Welsh Government, 2018)
- Planning Policy Wales – Edition 11, February 2021
- The Building Regulations 2010 Part H: Drainage and Waste Disposal
- Sewers for Adoption 7th Edition

The Vale of Glamorgan Council does not have any specific guidance related to SuDS. Should guidance be developed during the outline or detailed drainage design this should be consulted.

6.3 S1 Surface water runoff destination

The statutory standards for SUDS in Wales address the use of surface water by the development and where it should be discharged. It has developed a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

- Priority Level 1: Surface water runoff is collected for reuse
- Priority Level 2: Surface water runoff is infiltrated to ground
- Priority Level 3: Surface water runoff is discharged to a surface water body
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
- Priority Level 5: Surface water runoff is discharged to the combined sewer

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

Priority Level 1 - Water for re-use

The potential for surface water re-use within any residential development within the site may be limited and would not provide a means for disposal of surface water from the entire site area. Where practical, water butts should be provided at residential properties to promote water re-use. However, water butts should not be included in any storage calculations for the site. Surface water reuse could be explored for the school proposed as part of the site development.

Priority Level 2- Infiltration

Given the underlying soil conditions and geology in the area it is unlikely that runoff from the development site can be infiltrated to the ground. It is recommended that infiltration testing is undertaken prior to any outline or detailed design to determine the best means of surface water disposal from the site. Should infiltration be viable across the site, this should be the preferred means of surface water disposal in line with the drainage hierarchy.

Priority Level 3- Discharge to a surface water body

Should infiltration not be viable across the site then opportunities to discharge surface water to a watercourse should be explored. The site should aim to discharge to the tributaries of the East Brook, where surface water would naturally drain under gravity. It is envisaged that the majority of the proposed development site shall dispose of surface water via the watercourse network; however, a small area in the south-western corner of Site A would be unable to drain to a watercourse as a result of local ground levels and site topography. As a result, Priority Levels 4 and 5 shall need to be considered.

Priority Level 4- Discharge to a surface water sewer, highway drain or another drainage system

A public surface water sewers is located in Ardwyn Walk, to the south west of Site A. As a result of local land levels, any connection to this public sewer would require a pumped connection. The principles of SuDS, listed within the Statutory Standards for SuDS in Wales, state that surface water drainage schemes should avoid the need for pumping where possible. As a result, it is unlikely that a pumped connection to the public surface water system would be permissible. Therefore, this priority level has been discounted.

Priority Level 5- Discharge to a combined sewer

A public combined sewer is located in the south western part of Site A draining towards Millbrook Heights. It is therefore proposed to drain surface water from this area of the site, where a connection to a local watercourse is not viable, to the public combined sewer.

6.4 S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rate

There are typically three design storm events which should be considered when designing the SuDS system for managing flows and volumes:

- 1 in 1-year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted.
- 1 in 30-year storm event, where surface water flooding of the site is not permitted at this frequency.
- 1 in 100-year storm event with allowances for future climate change, where runoff should be managed within the extents of the development site, ensuring that it cannot affect people or properties either within the development or surrounding developments.

6.4.1 Interception of rainfall

When rainfall takes place on Greenfield sites there is, for the majority of rainfall events, no runoff from a site due to evapotranspiration or groundwater recharge. Therefore, interception mechanisms are based on runoff volume reduction using evapotranspiration and infiltration processes. A simplified approach to interception can be used based on assumed compliance of various drainage components. Table G2.1 of the statutory standards for SuDS in Wales lists the interception drainage components which have assumed compliance.

At outline and detailed design stage, further consideration shall be required on the use of SuDS to provide sufficient interception of rainfall across the site.

6.4.2 Discharge Limits and Attenuation Volume

It is proposed to discharge surface water from the proposed development site at the Greenfield runoff rate. Greenfield runoff rates have been calculated in Section 5.2. The Specific Runoff for the site is 11.4 l/s/ha.

Currently, the final impermeable surfaced proportion of the proposed development sites is unknown and so the exact required attenuation volume cannot be calculated. Attenuation should be considered at all stages of master planning and site design to facilitate the implementation of SuDS across the site through Blue-Green Corridors and source control techniques wherever possible.

6.5 S3: Water Quality

The surface water drainage system should provide a sufficient level of water quality treatment to prevent pollution of receiving waterbodies. During the water treatment design event (5mm rainfall across the entire site) no runoff should leave the site. This is usually achieved through source control techniques such as permeable pavements and rain gardens.

Table 4.3 of the SuDS Manual advocates the use of the "simple index approach" to determine an appropriate level of pollution mitigation for development sites. This splits pollution into three contaminant types (Total Suspended Solids, Metals and Hydrocarbons) and assigns a "pollution hazard index" to each type. Different SuDS features are then assigned a "SuDS Mitigation Index" and sufficient treatment is deemed to be provided if the "SuDS Mitigation Index" is equal to or greater than the "pollution hazard index" for each pollutant type. When more than one SuDS component is required a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

The proposed development is for residential use with low traffic roads. Low traffic roads have a 'low' pollution hazard level. The "pollution hazard indices" for a low pollution hazard site is given in Table 6-1.

Table 6-1 Pollution hazard indices for the site

Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Low	0.5	0.4	0.4

6.6 S4: Amenity Value

The design of the surface water management system should maximise amenity benefits across the site. SuDS components can enhance the provision of high-quality, attractive public space which can help to provide health and well-being benefits, improve liveability and contribute to improving the climate resilience of new developments.

The aim of Standard 4 is to ensure that wherever possible and having regard to the need to prioritise infiltration drainage, the SuDS scheme makes the best contribution towards maximising benefits for amenity.

Across both sites, there are opportunities to enhance the existing green corridors alongside watercourse corridors, creating a pleasant place to live and promoting the well-being of residents across the site. The introduction of SuDS assets along highways of the proposed development can provide linkages, providing open and accessible areas, whilst also assisting in the climate resilience of the development, promoting carbon sequestration. Large areas of public open space are proposed across the site, including within the school. Opportunities to include SuDS assets within this area should be explored to increase the multifunctional benefits of SuDS assets. SuDS within the school site also have the potential to increase hands-on learning, providing amenity benefits.

6.7 S5: Biodiversity

The surface water drainage system should seek to enhance existing habitats within the sites and complement neighbouring habitats. The ecological potential of the SuDS system can be maximised by utilising local planting and locating SuDS adjacent to existing features. The strategy should create a range of habitats and provide varied water depths within the SuDS features which should be sustained by ensuring that an effective management regime is implemented. Rain gardens located around the areas of residential development could also provide additional habitats and help connect the development to the river landscape.

Across the development sites, SuDS features will contribute to the creation of a diverse, self-sustaining and resilient ecosystem. The existing watercourses on the sites could be enhanced to include ponds which would provide a variety of habitats and enhance biodiversity by creating a space for native planting.

The woodland areas in both Site A and Site B could be used as a wet woodland, a priority habitat for Wales, enhancing the existing ecosystem and providing a more diverse habitat. It is recommended that the SuDS scheme is designed in conjunction with the project ecologists and landscape architects.

6.8 S6: Design for Construction, Maintenance and Structural Integrity

The national SuDS standards state that components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under

anticipated loading conditions over the design life of the development considering the requirement for reasonable levels of maintenance.

6.8.1 Health and Safety

The surface water drainage systems should be designed so that it minimises health and safety risk to the site occupants. SuDS are sometimes perceived as unsafe features with fears of drowning and overturning cars, but with correct design, these risks can be mitigated. A CDM Designers Risk Assessment should be undertaken demonstrating that any proposed surface water drainage system is fit for purpose, with risks designed out of the proposal, or mitigated wherever necessary.

6.8.2 Adoption and Maintenance

Schedule 3 of the Flood and Water Management Act was implemented in Wales on the 7th January 2019. Under this legislation, SuDS that serve multiple properties must be approved and adopted by the SuDS Approval Body (SAB) – a function performed by the Lead Local Flood Authority at the Vale of Glamorgan Council.

During detailed design phase, a detailed maintenance plan should be developed to demonstrate the maintenance required to ensure the proposed drainage systems function to optimal capacity in perpetuity.

6.9 Site opportunities and constraints

The proposed development site provides many opportunities and constraints for the management of surface water via the use of SuDS. A range of SuDS components should be used within the development sites in an interconnected system designed to manage, treat and make best use of surface water runoff. A central design concept for SuDS is the SuDS management train. This describes the use of a sequence of components that collectively provide the necessary processes to control the frequency of runoff, the flow rates and the volumes of runoff, and to reduce concentrations of contaminants to acceptable levels.

Both proposed development sites provide many opportunities and constraints for the disposal of surface water via the use of SuDS. These are detailed below and shown in Appendix B.

Given the underlying soil conditions and geology in the area there is unlikely to be the potential for the development site to infiltrate to the ground. It is recommended that infiltration testing is undertaken prior to any further design of the proposed SuDS system to determine the best means of surface water disposal from the site. Should infiltration be viable across the site, this should be the preferred means of surface water disposal in line with the drainage hierarchy. The development site is crossed by a number of watercourses, and it is therefore proposed to discharge of surface water to these watercourses. The south western part of Site A will be required to drain into the DCWW combined sewer system due to the topography of this area. The site shall be drained at greenfield runoff rates.

The topography of the site results in a series of small valleys, falling in a primarily easterly direction, along the route of the watercourses crossing the site. As a result, an assessment of likely surface water flow paths has been undertaken to determine sub-catchments across the site, as shown in Appendix C. The number of sub-catchments across the sites, along with the watercourses crossing the site, result in a number of outfalls being required with regional attenuation areas located in or adjacent to existing green corridors. This provides opportunities to increase the provision of green spaces across the site and enhance and create habitat links.

The topography of the site is generally steep and conveyance/storage features may require control measures, such as check-dams, to slow reduce velocities and minimise erosion to SuDS assets. Additionally, the potential for the site to receive sheeting overland flows from higher land should also be considered. The northern boundary of Site A has the potential to receive sheeting overland flows and the provision of SuDS assets at this location should be

explored to intercept and manage these flows. SuDS assets at this location have the potential to enhance the existing green corridor of the site, aiding habitat connectivity.

The current conceptual site layout contains a number of open spaces which have the potential for the siting of SuDS assets. SuDS can be multifunctional and opportunities for creating areas of open space within SuDS assets should be explored. Low flow channels can be utilised to attenuate smaller rainfall events leaving usable and functional open spaces, which only store flows from larger rainfall events. Playing fields and school play areas are optimal locations for such features, and the provision of LAPs and LEAPs in smaller attenuation areas should also be considered. The conceptual layout also contains a primary school to the centre of the proposed development site. SuDS can be used across the school site for the attenuation and treatment of surface water, along with amenity benefits through the use of SuDS for educational tools for the site.

Indicative locations and sizes for detention basins in Site A and Site B are provided in Appendix B. These basins indicate the low points of each catchment where surface water could be stored and discharged into the nearby watercourse. The inclusion of basins and additional surface water conveyance and storage SuDS features maximises the amenity and biodiversity benefits of the site, whilst providing storage and treatment of surface water to manage water quality.

Further consideration should also be given to the potential for habitat creation on the site through the use of SuDS. There are opportunities to create areas of wet woodland, a priority habitat for Wales, in areas of existing woodland on the site where surface water is attenuated in these areas. Project team ecologists and landscape architects should be consulted to determine whether this is a viable solution for the site. The tributaries of the East Brook could also be enhanced to include ponds to attenuate surface water. The inclusion of ponds along the tributaries of the East Brook could maximise the habitat potential of this area.

Further SuDS features should be considered at outline design stage in order to increase amenity and biodiversity across both Site A and Site B. Consideration should be given to plot scale rain gardens for each dwelling, and tree-lined highways to enhance the biodiversity and amenity benefits of the scheme, as well as providing additional attenuation storage and water quality treatment. The SuDS scheme should take a holistic approach across Sites A and B with the possibility of shared attenuation areas explored.

The proposed site layout and SuDS scheme shall need to take into account existing features of the site, including DCWW assets. The site is crossed by the following features:

- An 18 inch strategic watermain crosses Site A and Site B from the northern boundary of Site A to the western boundary of Site B. A 7m easement from the centreline is required around this watermain. No SuDS assets shall be permitted within the easement zone.
- A public 1450mm rising combined sewer is located in the eastern boundary of Site B. A combined sewer is also located in the south-western corner of Site A. A 14m easement from the centreline of the pipe is required around these public combined sewers. No SuDS assets shall be permitted within the easement zone.
- A number of tributaries to the East Brook cross the development sites. No development should be placed within 8m of the watercourses, though SuDS assets are likely to be permitted to be located within this buffer zone.

6.10 Summary of SuDS viability on site

Given the design criteria above, and the opportunities and constraints across the site, consideration has been given to various SuDS components and their viability for use across the proposed development site. Table 7-3 provides a summary of the SuDS component and their viability, along with indication of the additional benefits they can provide, such as amenity, biodiversity and water quality benefits. This demonstrates that there are a wide range of SuDS options that could potentially be deployed at the site. Such SuDS options would be deployed in combination to form a SuDS 'management train' to achieve the multiple requirements and objectives of the SuDS standards.

Table 6-2 Viability of SuDS Techniques on site

SuDS Component	Site Viability	Amenity Benefits	Biodiversity Benefits	Water Quality Benefits	Comments
Rainwater harvesting	×/✓	✓	×	×	Unlikely to establish the yield: use ratio required, however may be viable for any proposed school site
Infiltration systems and soakaways	×	✓	✓	✓	Desktop study suggests that infiltration shall not be viable across the site, however soakaway testing is required to confirm this
Filter strips	✓	✓	✓	✓	Opportunities for inclusion within Green Corridors
Filter drains	✓	×	×	✓	Beneficial for use within a treatment train
Swales	✓	✓	✓	✓	Consideration to be given to conveying surface water to basins.
Bioretention systems and rain gardens	✓	✓	✓	✓	Beneficial for use within treatment trains and for implementation of SuDS at source - e.g. along highways
Pervious Pavements	✓	✓	×	✓	Beneficial for use within treatment trains and for implementation of SuDS at source

Attenuation Storage Tanks	×	×	×	×	Above ground SuDS should be considered prior to the use of below ground storage
Detention Basins	✓	✓	✓	✓	Opportunities for habitat creation and inclusion within areas of public open space
Pond and Wetlands	✓	✓	✓	✓	Opportunities to enhance biodiversity and habitat creation in public open space and existing woodland.

7 Foul Drainage

7.1 Building Regulations 2010: Part H: Drainage and Waste Disposal

Part H of the Building Regulations 2010 state that foul drainage should be connected to the foul or combined sewer wherever this is reasonably practicable.

A DCWW enquiry has been submitted to determine whether there is capacity within the public network to receive flows from the proposed development site. Their response has been included in Appendix D.

7.2 DCWW Developer Enquiry Response

Foul Water

DCWW have stated that it is unlikely that sufficient capacity exists within the public sewerage system to accommodate foul water flows generated by the proposed development sites. DCWW have advised that that a hydraulic modelling assessment is undertaken which will examine the impact of the introduction of flows from the proposed development upon the performance of the existing network. It shall also consider, where required, the solutions and points of communication to ensure that the sites can be accommodated within the system.

DCWW do not envisage any problems with the Wastewater Treatment Works (WwTW) for the treatment of domestic discharges from this site.

A public combined sewer is located in the eastern part of Site B and the south-western corner of Site A. DCWW require access to their apparatus at all times and therefore no part of any building or SuDS asset will be permitted within the protection zone of the public sewers, measured 14 metres either side of the centreline. The locations of these sewers are shown in Figure 8-1.

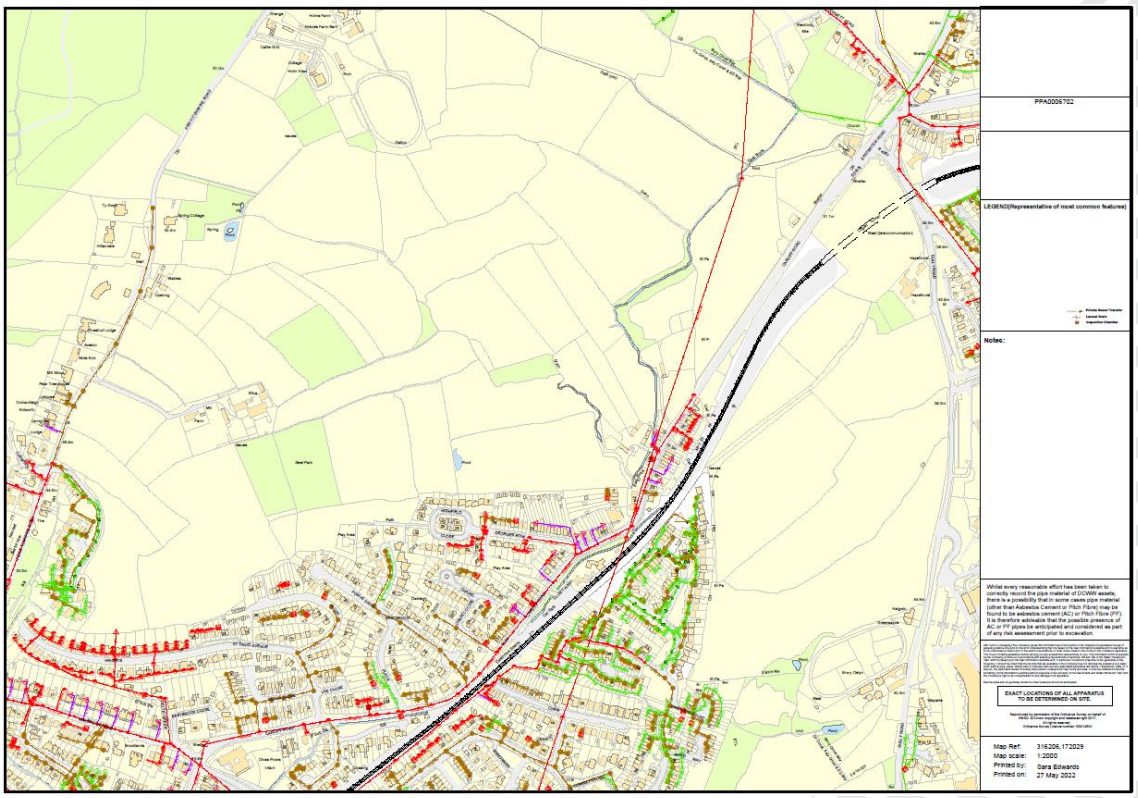


Figure 7-1 DCWW Sewer Map

Potable Water Supply

DCWW have stated that the proposed development is in an area where there are water supply problems for which there are no improvements planned within their current Capital Investment Programme AMP7 (years 2020 to 2025). DCWW have advised that that a hydraulic modelling assessment should be undertaken to establish what would be required to serve the site with an adequate water supply.

In addition, DCWW have advised that both Sites A and B are crossed from north to south by a trunk watermain. As the statutory undertaker, DCWW has statutory powers to access their apparatus at all times and therefore require a 7-meter easement from the centreline of these water mains. The locations of the trunk watermain is shown in Figure 8-2.

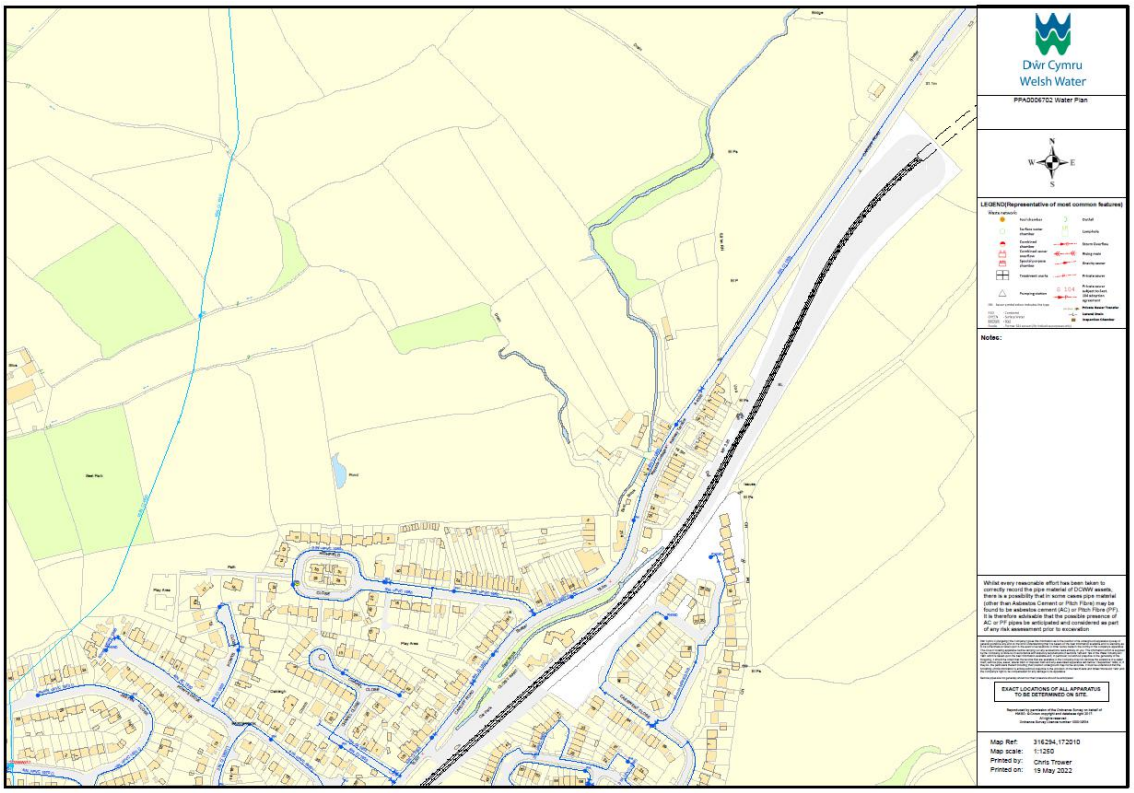


Figure 7-2 DCWW Water Supply Map

8 Conclusions and Recommendations

- JBA Consulting was commissioned by Persimmon Homes East Wales to undertake an assessment of flood risk and drainage for two parcels of land at the land north of Dinas Powys.
- The two land parcels are to be put forward as candidate sites for the revision to the Local Development Plan for the Vale of Glamorgan Council.

8.1 Flood Risk

- The vast majority of the Site A is in Flood Zone A where there is very little to no risk of fluvial and tidal flooding. Parts of the eastern edge of Site A are located within Flood Zone C2. A small area to the east of Site B is also located in Zone C2. The rest of the site is in Zone A where there is very little risk of flooding. All built development will be directed away from any areas of Zone C2.
- A significant update to TAN15 is due to come into effect June 2023. Consequently, the new TAN15 has been considered in this assessment and the Flood Map for Planning reviewed. There are very limit differences between the Development Advice Map and the Flood Map for Planning (rivers and sea) for the Sites A and B. All built development will be directed away from any areas of Flood Zones 2 and 3 (river and sea).
- The flood risk throughout the candidate site is generally very low. If plans are progressed, it is recommended that more detailed flood modelling is undertaken to confirm this. Although, due to the naturally oversized channels throughout site it is unlikely that flood risks will increase with a more detailed assessment.
- Previous studies by NRW have recognised the opportunity using the East Brook catchment and specifically the naturally oversized channels to reduce flood risk downstream in Dinas Powys where flooding is a regular issue. Nature-based solutions such as Natural Flood Management techniques (NFM) can be used to retain water and attenuate flows that can otherwise contribute to flooding. Installation of temporary detention features such as leaky dams and large woody debris in watercourses across a catchment can mitigate flood risk and improve the capability of the watercourse to manage more extreme events. NFM techniques could deployed within the area to contribute to the mitigation of flooding downstream of the proposed development site in Dinas Powys.
- Site A is not at risk of tidal, fluvial, groundwater or reservoir flooding. A small part of the Site B is at risk of fluvial flooding from the East Brook and its tributary. A small part of both Site A and Site B are at risk of surface water and small watercourse flooding from a flow path of surface water and the overtopping of the banks of the tributaries of the East Brook.

8.2 Drainage

- The soil type beneath the sites are described as impeded drainage. The underlying geology is comprised of Mudstone. As a result, the site is likely to have impeded infiltration and surface water is unlikely to be able to be discharged via infiltration. However, infiltration testing will be required and is advised to be completed prior to outline design.
- Given the underlying soil conditions and geology in the area there is unlikely to be the potential for the development site to infiltrate to the ground. It is recommended that infiltration testing is undertaken prior to any further design of the proposed SuDS system to determine the best means of surface water disposal from the site. Should infiltration be viable across the site, this should be the preferred means of surface water disposal in line with the drainage hierarchy. The

development site is crossed by a number of watercourses, and it is therefore proposed to discharge of surface water to these watercourses.

- SuDS features on the site could include swales, basins, rain gardens and other cross contour features which could convey surface water into these drainage features.
- Greenfield runoff rate at the site have been calculated as 11.4 l/s/ha
- The drainage system should work to provide multiple amenity and biodiversity benefits and ensure water quality is not adversely affected as a result of the development.

Appendices

A Greenfield Runoff Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	
Site name:	Dinas Powys- Site B
Site location:	Dinas Powys

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.44040° N
Longitude:	3.20585° W
Reference:	3158935895
Date:	May 27 2022 13:38

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 44.07

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.323
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.08

Hydrological characteristics	Default	Edited
SAAR (mm):	959	1018
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):		502.43
1 in 1 year (l/s):		442.13
1 in 30 years (l/s):		894.32
1 in 100 year (l/s):		1095.29
1 in 200 years (l/s):		1235.97

B Opportunities and Constraints

N

The steep topography and potential for sheeting overland flow to enter the development site will need to be managed through the use of SuDS.

7 meter easement required from the centreline of the water main crossing the site.

Space should be made within the proposed development layout for SuDS features. These features should include plot scale SuDS such as rain gardens, and conveyance features such as swales.

No development should be placed within 8m of a watercourse to ensure maintenance can still take place.

The connectivity of these watercourses should be ascertained to determine suitability for development in this location.

The pond feature in the south of the site should be retained and could be used to attenuate flow and enhance biodiversity.

14 meter easement from the centre line of the combined sewer.

14 meter easement from the centre line of the combined sewer.

The proposed masterplan suggests this area to be utilised for SuDS. This is unlikely to be a suitable option as a consequence of site constraints

PARK LAND

WOODS

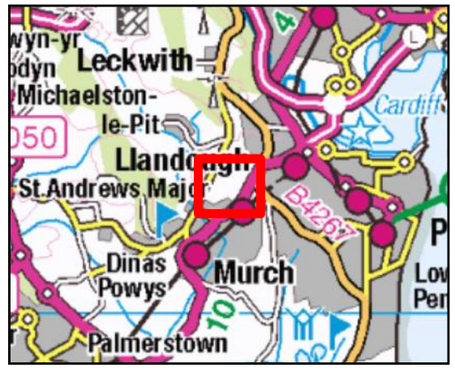
PLAYING FIELDS

PRIMARY SCHOOL

0 100 200 400 Metres

Original @ A3

KEYPLAN



KEY

- Site boundary-A
- Site boundary-B

DCWW Assets

- Combined
- Foul
- Surface Water
- WW Water main
- DCWW14m easement for sewer infrastructure
- DCWW 7m easement for water main infrastructure

Watercourses

- Watercourses
- 8m watercourse buffer

JBA consulting

LAND NORTH OF DINAS POWYS

FLOOD RISK AND DRAINAGE CONSTRAINTS

N

The existing watercourses on the site will be retained with SuDS features conveying water into these watercourses at QBar rate of 11.40 l/s/ha

Check dams should be utilised where appropriate to slow and retain flow as a result of steep topography

Green corridors located along the boundaries of development will intercept sheeting overland flows from higher ground

Playing fields could be multifunctional with low flow channels to create usable spaces which are designed to flood in larger rainfall events

Ponds located along the tributaries of the East Brook can be enhanced to store surface water runoff from the proposed development. These ponds provide a method of retaining surface water as well as a natural method of flood management which could help reduce flood risk to Dinas Powys.

PARK LAND

PARK LAND

WOODS

WOODS

Existing woodland will be retained and could be enhanced to provide a wet woodland habitat subject to ecological requriements and engagement with design team ecologists.

Basins and elongated swales used across the site to store and treat surface water prior to discharging into the East Brook. Opportunities to provide amenity and biodiversity benefits through these assets.

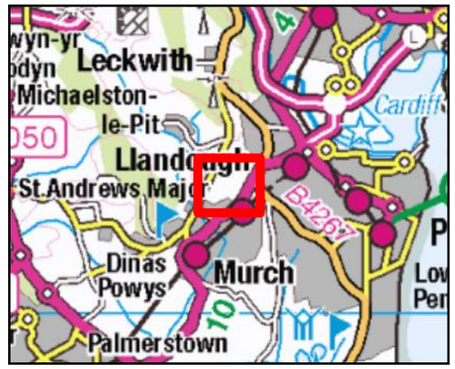
Green corridors located along the boundaries of the development will intercept sheeting overland flows from flowing into the existing, neighbouring properties.

Consideration should be given to plot scale SuDS features as source control assets such as rain gardens. SuDS for conveyance could also be used to enhance the street scene of the site.

Catchment to discharge into DCWW combined sewer at rate of 11.40 l/s/ha due to the topography of this area. No SuDS to be placed within the sewer easement area.

0 50 100 200 Metres
Original @ A3

KEYPLAN



KEY

- Site boundary-A
- Site boundary-B
- Flow Direction Arrows
- Watercourses
- Site sub-catchments
- DCWW Sewer 14m buffer

SuDS Features

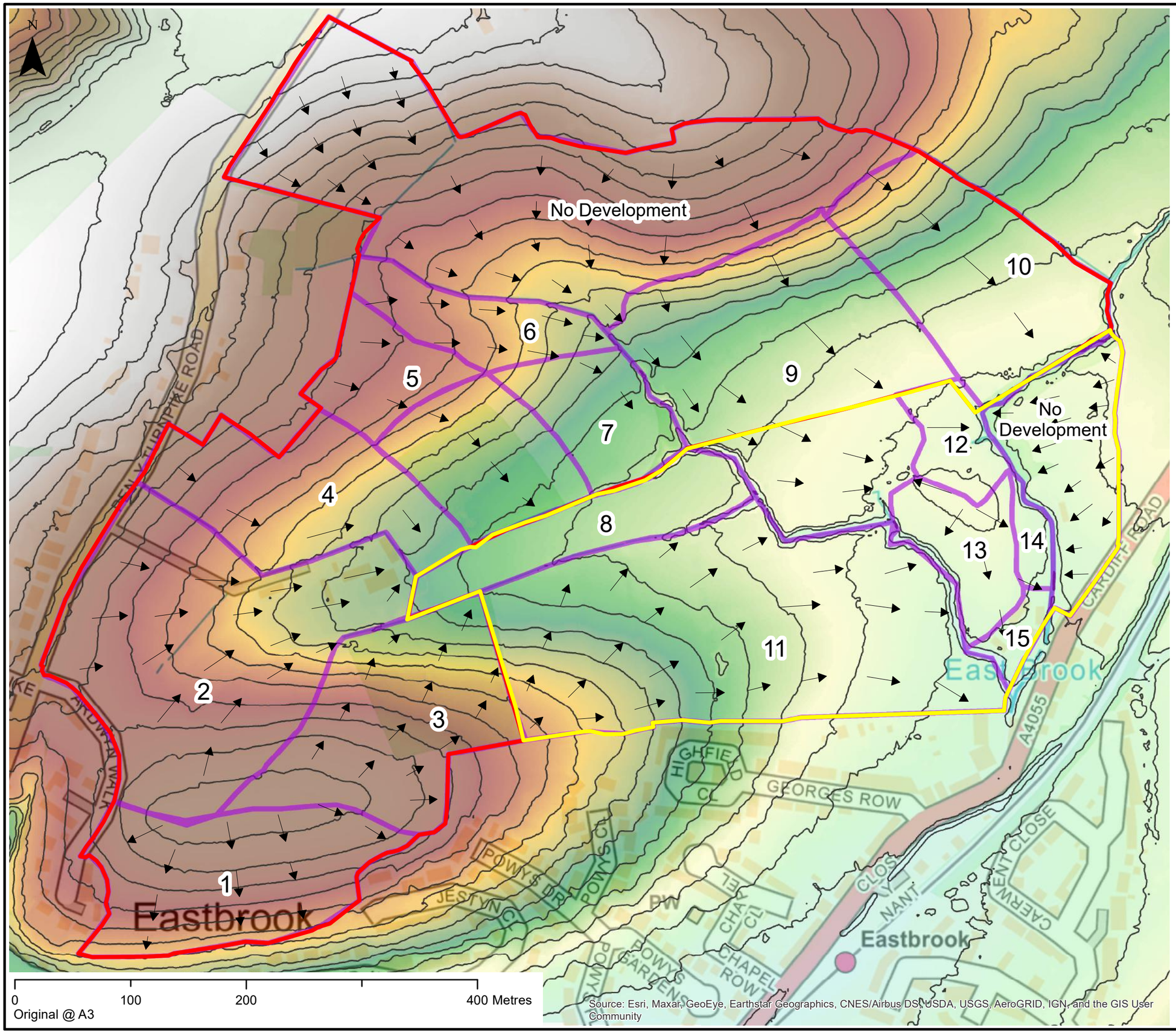
- Green Corridor
- Pipe
- SuDS Footprint
- Wet Woodland Potential
- Pond
- Basin

JBA consulting

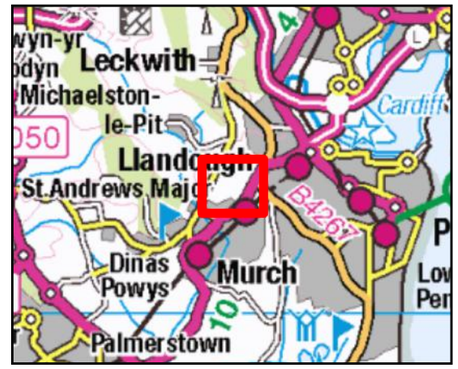
LAND NORTH OF DINAS POWYS

SURFACE WATER DRAINAGE OPPORTUNITIES

C Flow routes and development drainage sub catchments



KEYPLAN



KEY

- Site boundary-A
- Site boundary-B
- Flow Direction Arrows
- 2m Contours

2m LiDAR

- High : 63
- Low : 14

- Site sub-catchments

JBA consulting

Land north of Dinas Powys
Preliminary Flood Consequence Assessment & Drainage Strategy

Flow direction and development site sub-catchments

D Welsh Water Developer Enquiry

Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

Gwasanaethau Datblygu
Blwch Post 3146
Caerdydd
CF30 0EH

Ffôn: +44 (0)800 917 2652
Ffacs: +44 (0)2920 740472
E.bost: developer.services@dwrcymru.com

JBA Consulting
8 Kings Court
High Street
Newport
NP20 1FQ

Date: 19/05/2022
Our Ref: PPA0006702

Dear Ms Booth

Grid Ref: 316236 172029
Site Address: Cardiff Road, Dinas Powys
Development: Residential

Firstly, we note that the proposal relates to a residential development of 2180 units on Cardiff Road, Dinas Powys and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage system, we offer the following comments as part of our appraisal of this development.

Please note, notwithstanding the following assessment, we would advise there is also a mandatory requirement to undertake pre-application consultation with all 'Specialist Consultees', including Dwr Cymru Welsh Water as the statutory water and sewerage undertaker, in accordance with Schedule 4 of Town & Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016. As a major development, amounting to more than 10 units, you will be statutorily required to consult Welsh Water and a substantive response will be issued within 28 days from the date of the notice as per the requirements of Article 2E.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a combined public sewerage system which drains to Cog Moors Wastewater Treatment Works (WwTW).

This site is crossed by a public sewer with the approximate position being marked on the attached Statutory Public Sewer Record. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. No part of any building will be permitted within the protection zone of the public sewer measured 14 metres either side of the centreline. Our strong recommendation is that your site layout takes into account the location of the assets crossing the site and should be referred to in any master-planning exercises or site layout plans submitted as part of any subsequent planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Vale of Glamorgan Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note. In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded it is unlikely that sufficient capacity exists to accommodate your development without causing detriment to the existing services we provide to our customers, or in regard to the protection of the environment. There are no planned reinforcement works within Dwr Cymru Welsh Water's Capital Investment Programme and therefore, at this stage, we are unable to provide you with a point of adequacy on the network.

In light of the above our recommendation is that you instruct us to undertake a Hydraulic Modelling Assessment (HMA) which is at the developer's expense and will examine the impact of the introduction of flows from your development upon the performance of the existing network and consider. Where required and appropriate, the HMA will then identify solutions and points of communication to ensure that your site can be accommodated within the system. For the developer to obtain a quotation for the HMA, we will require a fee of £250 + VAT. Please note that we will seek to control the outcomes of the HMA via appropriate planning conditions.

However, in the absence of known solutions to accommodate your site we will not be able to support your development through the planning process. We therefore recommend that the HMA is undertaken in advance of a planning application being submitted, in order to avoid any subsequent delays. Further information on Hydraulic Modelling Assessments as well as any implications on the planning process is provided in the attached Advice & Guidance note.

Alternatively, given that the site is located in the vicinity of a combined sewer, the developer may wish to investigate and explore any opportunities to remove surface water flows from the existing public sewerage system which may provide sufficient compensation for the foul flows generated by the proposed development. Should the developer wish to explore this option, we recommend that any scheme/strategy is provided, preferably in advance of a planning application being submitted, in order for us to assess whether suitable as a solution to accommodate foul flows from the proposed development into the public sewerage system.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

Foul Water Drainage – Sewage Treatment

No problems are envisaged with the Wastewater Treatment Works for the treatment of domestic discharges from this site.

Potable Water Supply

The proposed development is in an area where there are water supply problems for which there are no improvements planned within our current Capital Investment Programme AMP7 (years 2020 to 2025). In order to establish what would be required to serve the site with an adequate water supply, it will be necessary for the developer to fund the undertaking of a hydraulic modelling assessment on the water supply network. For the developer to obtain a quotation for the hydraulic modelling assessment, we will require a fee of £250 + VAT.

The proposed development is crossed by a trunk watermain, the approximate position being shown on the attached plan. Dwr Cymru Welsh Water as Statutory Undertaker has statutory powers to access our apparatus at all times. I enclose our Conditions for Development near Watermain(s). It may be possible for this watermain to be diverted under Section 185 of the Water Industry Act 1991, the cost of which will be re-charged to the developer. The developer must consult Dwr Cymru Welsh Water before any development commences on site.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Planning Liaison Manager
Developer Services

***Please Note** that demands upon the water and sewerage systems change continually; consequently, the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter*

PPA0006702

CONDITIONS FOR DEVELOPMENT NEAR WATER MAINS

Location: Dinas Powys
Date: 19.05.22

The development of the site with our water main located as shown on the attached plan will involve certain conditions which must be strictly adhered to. These are:-

1. No structure is to be sited within a minimum distance of **7m** from the centre line of the mains. The pipeline must therefore be located and marked up accurately at an early stage so that the Developer or others understand clearly the limits to which they are confined with respect to the Company's apparatus. Arrangements can be made for Company staff to trace and peg out such water mains on request of the Developer.

2. Adequate precautions are to be taken to ensure the protection of the water main during the course of site development.

3. If heavy earthmoving machinery is to be employed, then the routes to be used in moving plant around the site should be clearly indicated. Suitable ramps or other protection will need to be provided to protect the water main from heavy plant.

4. The water main is to be kept free from all temporary buildings, building material and spoil heaps etc.

5. The existing ground cover on the water main should not be increased or decreased.

6. All chambers, covers, marker posts etc. are to be preserved in their present position.

7. Access to the Company's apparatus must be maintained at all times for inspection and maintenance purposes and must not be restricted in any way as a result of the development.

8. No work is to be carried out before this Company has approved the final plans and sections.

These are general conditions only and where appropriate, will be applied in conjunction with specific terms and conditions provided with our quotation and other associated documentation relating to this development.

Dŵr Cymru
Welsh Water

PPA0006702

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

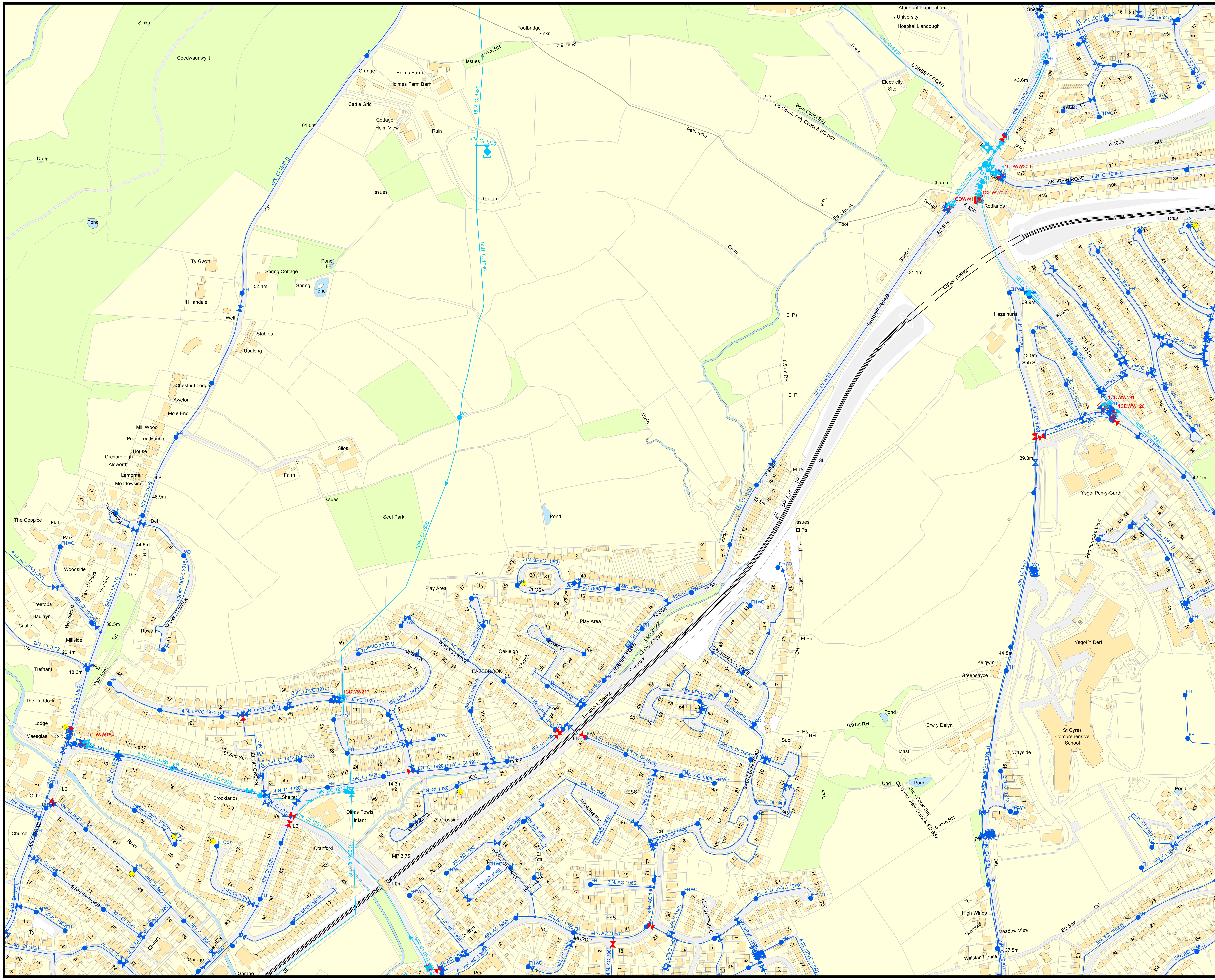
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

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

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	316206,172029
Map scale:	1:2000
Printed by:	Sara Edwards
Printed on:	27 May 2022



PPA0006702

N
W E
S

LEGEND

Clean network:

- Sluice valve
- Pressure reducing valve
- Meter
- Bulk meter
- Hydrant
- Cap end
- Air valve
- Stop tap
- Water Treatment Works
- Water Pumping Station
- Existing main
- Non-operational main
- Raw Water

NB: Water main symbol colour indicates the type.

LIGHT BLUE - Trunk
DARK BLUE - Distribution
YELLOW - Raw Water

Notes:

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

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

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

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	316249,171977
Map scale:	1:2500
Printed by:	Sara Edwards
Printed on:	27 May 2022

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

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

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

N

The steep topography and potential for sheeting overland flow to enter the development site will need to be managed through the use of SuDS.

7 meter easement required from the centreline of the water main crossing the site.

Space should be made within the proposed development layout for SuDS features. These features should include plot scale SuDS such as rain gardens, and conveyance features such as swales.

No development should be placed within 8m of a watercourse to ensure maintenance can still take place.

The connectivity of these watercourses should be ascertained to determine suitability for development in this location.

The pond feature in the south of the site should be retained and could be used to attenuate flow and enhance biodiversity.

14 meter easement from the centre line of the combined sewer.

14 meter easement from the centre line of the combined sewer.

The proposed masterplan suggests this area to be utilised for SuDS. This is unlikely to be a suitable option as a consequence of site constraints

PARK LAND

PARK LAND

PARK LAND

PRIMARY SCHOOL

WOODS

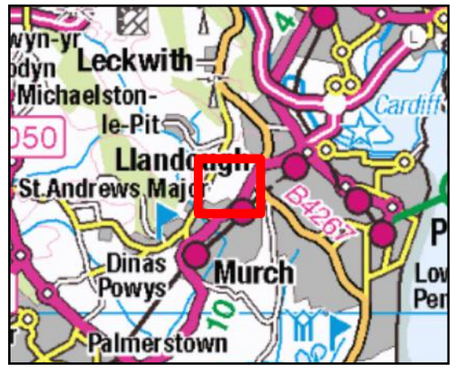
WOODS

PLAYING FIELDS

0 100 200 400 Metres

Original @ A3

KEYPLAN



KEY

- Site boundary-A
- Site boundary-B

DCWW Assets

- Combined
- Foul
- Surface Water
- WW Water main
- DCWW14m easement for sewer infrastructure
- DCWW 7m easement for water main infrastructure

Watercourses

- Watercourses
- 8m watercourse buffer

JBA consulting

LAND NORTH OF DINAS POWYS

FLOOD RISK AND DRAINAGE CONSTRAINTS

N

The existing watercourses on the site will be retained with SuDS features conveying water into these watercourses at QBar rate of 11.40 l/s/ha

Check dams should be utilised where appropriate to slow and retain flow as a result of steep topography

Green corridors located along the boundaries of development will intercept sheeting overland flows from higher ground

Playing fields could be multifunctional with low flow channels to create usable spaces which are designed to flood in larger rainfall events

Ponds located along the tributaries of the East Brook can be enhanced to store surface water runoff from the proposed development. These ponds provide a method of retaining surface water as well as a natural method of flood management which could help reduce flood risk to Dinas Powys.

PARK LAND

PARK LAND

WOODS

WOODS

CAR PARK

SCHOOL FIELDS

Seel Park

Existing woodland will be retained and could be enhanced to provide a wet woodland habitat subject to ecological requriements and engagement with design team ecologists.

Basins and elongated swales used across the site to store and treat surface water prior to discharging into the East Brook. Opportunities to provide amenity and biodiversity benefits through these assets.

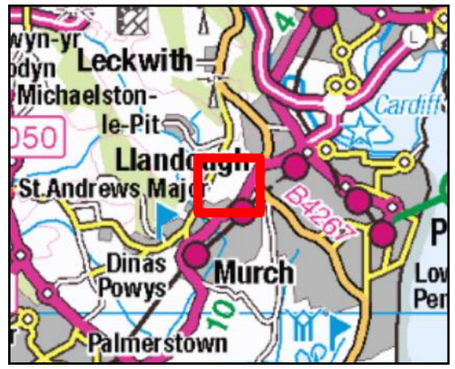
Green corridors located along the boundaries of the development will intercept sheeting overland flows from flowing into the existing, neighbouring properties.

Consideration should be given to plot scale SuDS features as source control assets such as rain gardens. SuDS for conveyance could also be used to enhance the street scene of the site.

Catchment to discharge into DCWW combined sewer at rate of 11.40 l/s/ha due to the topography of this area. No SuDS to be placed within the sewer easement area.

0 50 100 200 Metres
Original @ A3

KEYPLAN



KEY

- Site boundary-A
- Site boundary-B
- Flow Direction Arrows
- Watercourses
- Site sub-catchments

WW Sewer Network

- Combined
- Foul
- Surface Water
- DCWW Sewer 14m buffer

SuDS Features

- Green Corridor
- Pipe
- Wet Woodland Potential
- Pond
- Basin

JBA consulting

LAND NORTH OF DINAS POWYS

SURFACE WATER DRAINAGE OPPORTUNITIES