TECHNICAL NOTE

JBA Project Code	2018s1233
Contract	Land off the A48, Pyle, Bridgend
Client	Geraint John Planning
Date	October 2018
Author	Faye Tomalin / George Baker
Subject	Flood Risk Statement and High-Level Drainage Strategy

1 Introduction

JBA Consulting were commissioned by Geraint John Planning to prepare a high-level flood risk statement and drainage strategy for a proposed development site off the A48 in Pyle, Bridgend. The development site is to be put forward as a candidate site for the revision to the Local Development Plan for Bridgend County Borough Council.

2 The Site

2.1 Site Description

The proposed development site is located to the south of Pyle, East of Bridgend, as shown in Figure 1. The land is split into Areas A, B, C and D due to different landowners across the site area. Areas A, B and D form the area of land currently being promoted as a candidate site. Area C is also likely to form part of the strategic objective through promotion of the land and has therefore also been covered, albeit lightly, within this Technical Note.

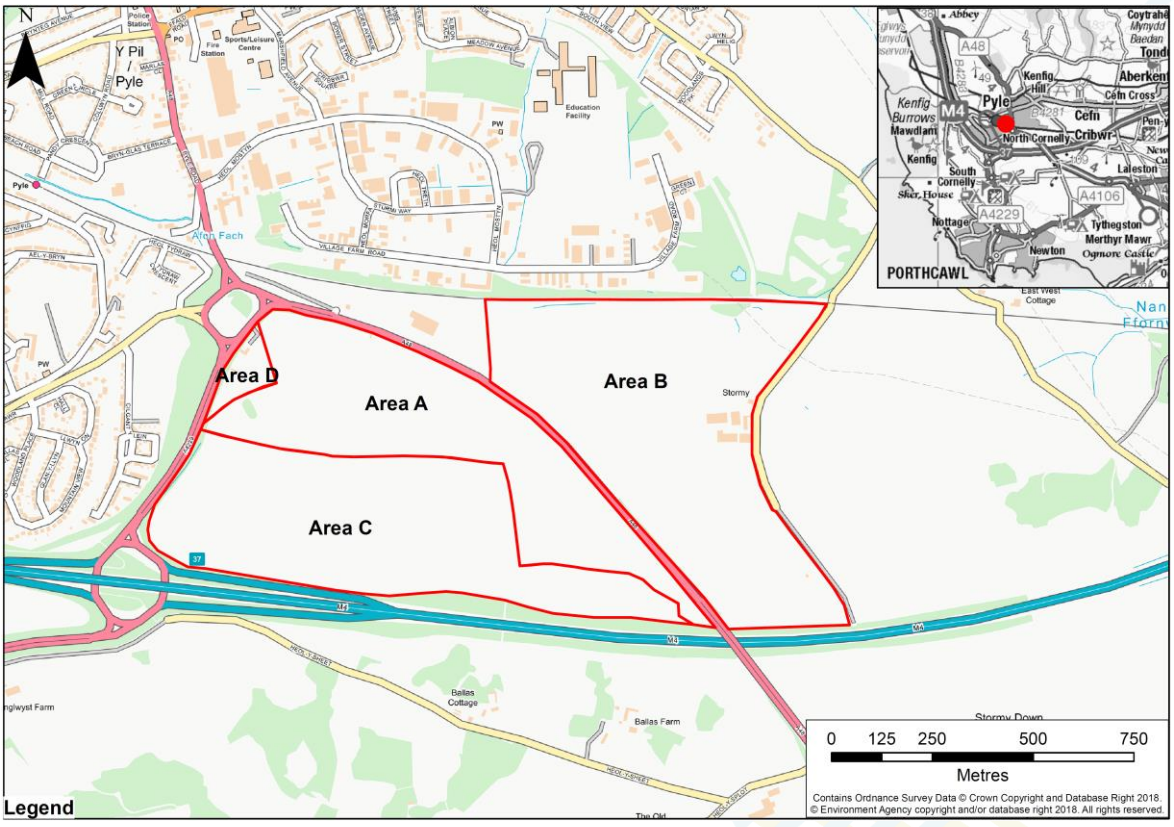

Figure 1 Site Location Plan

The site is bounded to the North and West by residential development. A railway line also forms the Northern boundary of Area B. The A48 runs through the site, separating Areas A and B. The Southern boundary of the candidate site consists of the M4 and further Greenfield agricultural land. The site is also bounded to the East by Greenfield, agricultural land.

The proposed development site is for mixed use commercial and residential development, with a focus on residential development across Areas A and B.

The viability of the site for inclusion within the revised Bridgend County Council Local Development Plan is currently being investigated.

2.2 Site Topography and Existing Land-Use

The proposed site is currently Greenfield in nature, used as agricultural land by the current land owner. Associated farm buildings and infrastructure is located on the Eastern boundary of Area B

The development site is relatively steep, as shown in Figure 2, with ground levels decreasing from the south-eastern corner of the site, towards the northern and western boundaries. Open source 1m LiDAR data, flown in March 2014, indicates that ground levels range from 93.5 mAOD along the southern boundary of Areas A and B, to 44.9m AOD along the Northern boundary of Area B, 46.3 mAOD at the Western boundary of Area D and 43.45mAOD at the Western boundary of Area C.

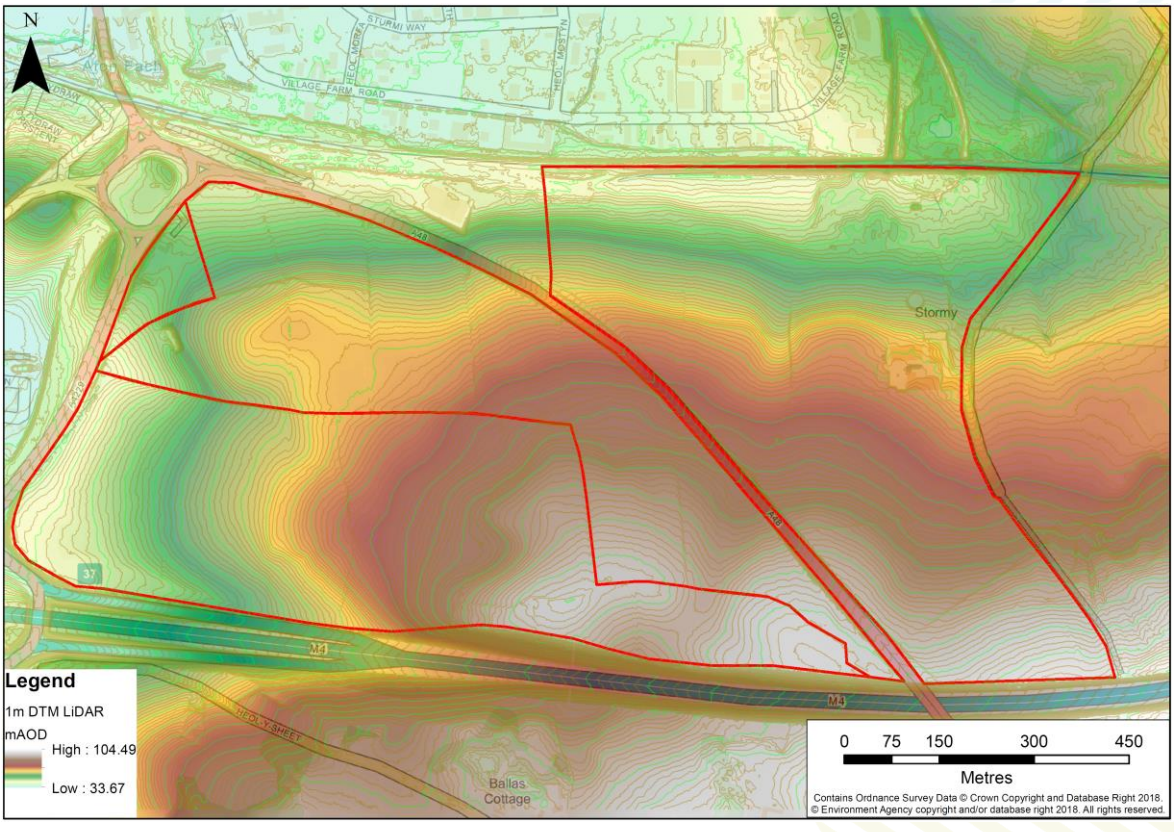

Figure 2 1m DTM LiDAR across the proposed development site

An ordinary watercourse flows in a westerly direction along the Northern boundary of Area B. The watercourse is culverted beneath the railway line where it forms the River Fach, a designated main river. The River Fach continues to flow in a westerly direction towards its confluence with the River Kenfig approximately 2.5km West of the site. Mapping also identifies that there is a small watercourse along the Western boundary of Area C, flowing in a southerly direction.

3 Planning Policy

TAN-15 was introduced in 2004 by the Welsh Assembly Government. Its technical guidance relating to development planning and flood risk uses a sequential characterisation of risk based on Welsh Government's Development and Flood Risk Advice Maps (DAM).

TAN-15 assigns one of three flood risk vulnerabilities to development. These are: emergency services, highly vulnerable development, and less vulnerable development. Emergency services incorporates all development which needs to be operational and accessible at all times, for example hospitals and buildings used to provide emergency shelter during floods. Highly vulnerable development includes all residential properties and a select list of industrial development (including power stations) and waste disposal sites, with less vulnerable development comprising all other types of development.

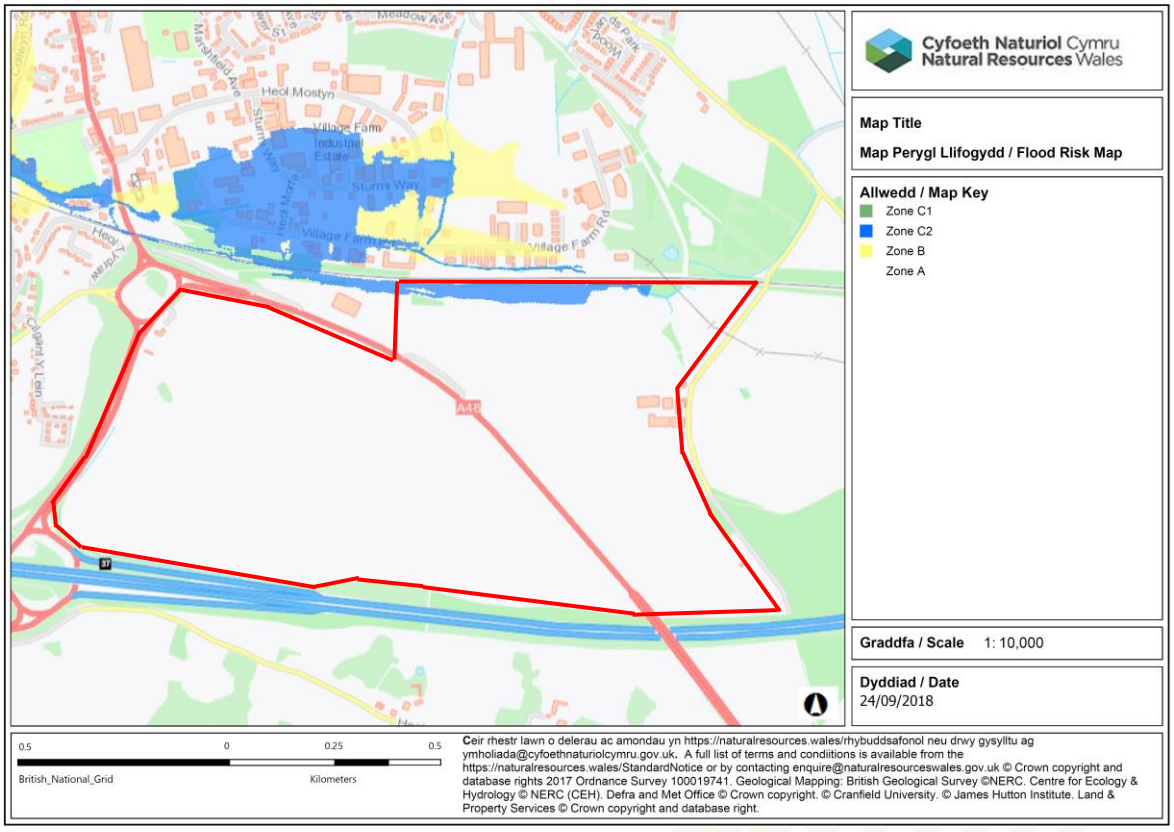

Figure 3 Welsh Government Development Advice Map

The DAM map in Figure 3 shows that the majority of this site lies within Flood Zone A, with a small area along the northern boundary of Area B lying within Flood Zone C2. TAN-15 defines Zone C2 as "areas of the floodplain without significant flood defence infrastructure" and is used to indicate that "only less vulnerable development should be considered subject to application of the Justification Test and acceptability of the consequences".

A strategic approach to planning and development site layout should be taken to locate all highly vulnerable development away from areas of DAM Zone C2, where appropriate, to meet the requirements set out in TAN-15.

4 Assessment of Flood Risk

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

Table 1 High-level Assessment of Flood Risk

Source of Flooding	Onsite Presence	Description
Tidal	×	The site is not at risk of tidal flooding
Fluvial	✓	The site is partially located within Flood Zone 3 and 2, and DAM Zone C2 due to fluvial flood risk.
Surface Water	✓	The site has a low to medium risk of surface water flooding
Reservoirs	×	The site has a very low risk of flooding from reservoirs
Groundwater	×	The site has a low risk of flooding from groundwater
Canals	×	The site is not at risk of flooding from canals
Sewers	×	The site is at a very low risk of flooding from sewers

4.1 Tidal Flood Risk

The site is not at risk of tidal flooding.

4.2 Fluvial Flood Risk

The Northern boundary of Area B lies within Flood Zones 2 and 3, as shown in Figure 4.

Flood Zone 3 indicates that the site has a risk of flooding in the 1% AEP event or greater.

Flood Zone 2 indicates that the site has a risk of flooding between the 0.1% AEP event and the 1% AEP event.

The majority the site does not lie within these flood zones and therefore the overall fluvial flood risk to the site is considered to be low. It is advised that all development is concentrated away from the Northern Boundary of Area B and is therefore solely located within Flood Zone 1.

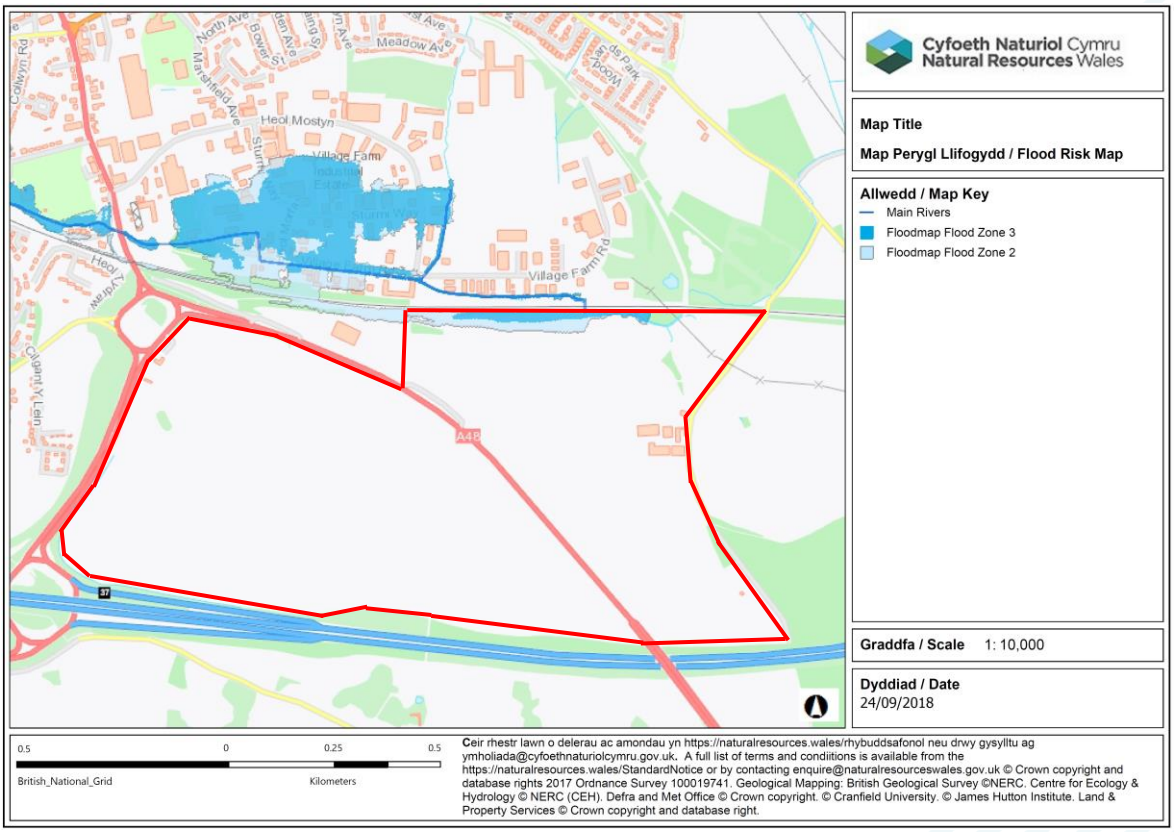

Figure 4 NRW Flood Risk Mapping

4.3 Surface Water Flood Risk

Figure 5 shows the NRW flood map for surface water. This indicates that there is a low to very low risk of flooding across the proposed development site. There is a medium risk of surface water flooding to the North-Eastern corner and along the Northern boundary of Area B. the overall surface water flood risk to the site is considered to be low to medium.

The two surface water flow paths shown on NRW flood map for surface water are in the approximate locations of two flow paths identified on a site visit carried out in September 2018.

Additionally, there is a surface water flow path along the Northern and Western boundaries of Area C.

For such a large site the level of surface water flood risk is very low with small, isolated and well defined areas of flood risk that should be easily manageable within a masterplanning process.

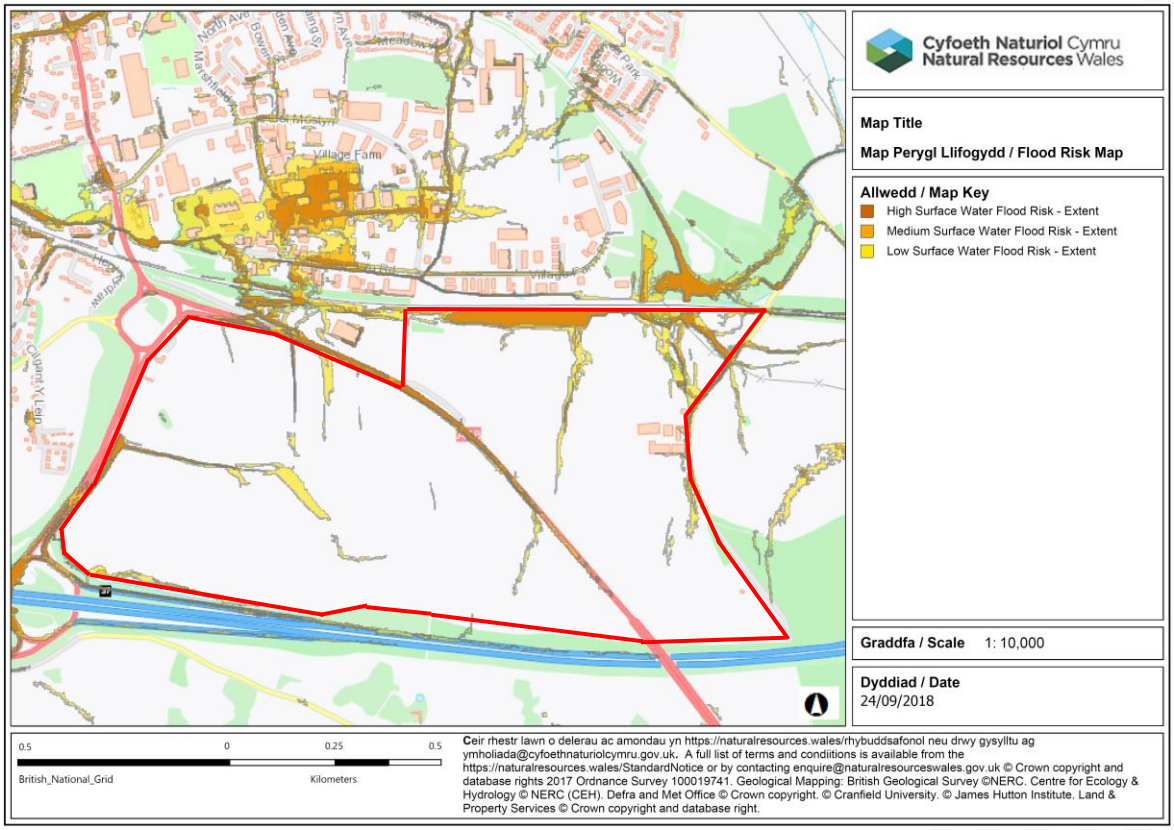

Figure 5 NRW Flood Map for Surface Water

4.4 Risk of Flooding from Reservoirs

NRW flood risk maps indicate that the site is not at risk of flooding as a result of reservoir failure.

4.5 Risk of Flooding from Groundwater

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

The area lies within a mixed geological setting. Part of the site lies within the Penarth Group formation, the Blue Anchor formation and the Mercia Mudstone Group providing a bedrock of Sandstone and Mudstone. Some areas of bedrock are overlain by Devensian Till superficial deposits, whilst other areas have no superficial deposits. Cranfield University Soilscapes viewer indicates that there are also varied soil types across the site. The Northern areas of Areas A and B consist of slowly permeable seasonally wet soils with impeded drainage, whilst the southern areas of these sites, along with Areas C and D are freely draining slightly acid loamy soils.

Geo-environmental plans produced by Integral Geotechnique indicate that there is a risk of groundwater flooding to the northern area of Area B due to the

naturally high groundwater levels and soft ground conditions, also experienced on site in September 2018.

Given the geology and soil type of the site the risk of groundwater flooding is considered to be low.

5 Existing Surface Water Regime

5.1 Existing Discharge Location

The proposed site is underlain by bedrock which is predominantly sandstone and mudstone. Cranfield University Soilscapes[1] indicate the soils are slowly permeable and seasonally wet to the northern areas of Areas A and B, whilst the southern portion of Area A are freely draining.

A visit to the site indicated that ground conditions along the northern area of Area B are extremely wet, with evident surface water overland flow routes, indicative of slow infiltration rates. A watercourse and a ditch are also located along the northern boundary of Area B. Based on this information, it is considered that the drainage of Area B occurs as if the site were a low-permeability Greenfield site, with drainage occurring primarily through evapo-transpiration losses, slow infiltration into underlying soils and run-off towards the drainage ditch and watercourse at the northern boundary.

There are no indicative drainage discharge points across Areas A and D, and it is therefore assumed that surface water infiltrates into the ground across this area.

Greenfield runoff rates and volumes have been calculated, which will form a key design criterion for the development of surface water drainage systems across the sites.

5.2 Greenfield Runoff Rates

Table 24.1 of Ciria C753 The SuDS Manual[2] indicates that the FEH methods (FEH Statistical and REFH) should be the preferred methods for calculating peak Greenfield Runoff Rates. This is supported by Natural Resources Wales GN008 Flood Estimation: Technical Guidance and Environment Agency research by Faulkner et al which concluded that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods such as IH124 and ADA 345 where possible.

The UKSUDS tool was used to calculate peak Greenfield runoff rates for the Areas A, B and D. The area of the development is 66.3 hectares. Catchment descriptors were extracted from the FEH CD_ROM (version 3). The calculated Greenfield runoff rates are shown in Table 2 below and the UKSUDS calculation record is found in Appendix A.

Table 2 Greenfield Peak Runoff Rates

Return Period	Specific Runoff (l/s/ha)	Peak Runoff Rate (l/s)
1	10	660
QBAR	11	750
30	20	1335
100	25	1635

[1] Cranfield University Soilscapes available at: http://www.landis.org.uk/soilscapes/ [Accessed 16/10/2018]
[2] Woods Ballard et al (2015) *Ciria C753 The SuDS Manual* London:ciria

5.3 Greenfield Runoff Volumes

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

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 CD_ROM (version 3) and are summarised in Table 3 with the calculated Greenfield runoff volumes.

Table 3 Greenfield Runoff Volume

Return Period	6 hour rainfall runoff depth (mm)	Site runoff volume (m^3)
100	70.9	18,318
100 plus climate change (30%)	92.19	25,158

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 aim to reduce the runoff rates and volumes during storm events, whilst providing water treatment benefits. SuDS also have the advantage of providing effective Blue and Green Infrastructure and ecology and recreational benefits when designed and maintained properly.

6.2 Design Criteria

The following national guidance documents and design standards have been considered when developing this high-level drainage strategy:

- Planning Policy Wales - Edition 9, November 2016
- The Building Regulations 2000 Part H: Drainage and Waste Disposal
- C753 The SuDS Manual (CIRIA, 2015)
- Rainfall runoff for developments Report - SCO3219 (Environment Agency, 2013)
- Recommended Non-Statutory Standards for Sustainable Drainage (SuDS) in Wales

6.2.1 Discharge Hierarchy

The non-statutory standards for SuDS in Wales addresses the use of surface water by a development and where it shall be discharged. It contains a discharge 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 other drainage system
- Priority Level 5: Surface water runoff is discharged to a combined sewer.

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances.

6.2.2 Runoff Quantity

The proposed surface water drainage system should aim to replicate Greenfield runoff rates and volumes, in line with the non-statutory standards for sustainable drainage (SuDS) in Wales.

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

- 1 in 30 year storm event, where all surface water flows are to be attenuated on site, with no flooding permitted across the development site.

- 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 either within the development or surrounding developments.

6.2.3 Allowance for Climate Change

Welsh Government has produced guidance for extreme rainfall climate change factors[3] and the recommended factors for the West Wales River Basin District are shown in Table 4. As the proposed development for the site is residential, the assumed lifetime of the development is 100 years, and as such the 2080 estimate has been used. Guidance states that the central estimate should be assessed as the design value of the drainage strategy.

Table 4 Climate Change Allowances - West Wales River Basin

	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper End Estimate	25%	40%	75%
Central Estimate	15%	25%	30%

6.2.4 Runoff 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 green roofs, rainwater harvesting, permeable pavements and soakaways. In line with CIRIA 753 The SuDS Manual, runoff from roofs and low traffic roads, such as those proposed, is considered to present a very low hazard for runoff pollution.

6.2.5 Ecology

The surface water drainage system should seek to enhance habitats within the site and complement neighbouring habitats. The ecological potential of the SuDS system can be maximised by utilising local planting, locating SuDS adjacent to existing features and utilising the known surface water flow paths across the site. 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.

6.2.6 Health and Safety

The surface water drainage system should be designed so that it minimises health and safety risks to the site occupants. SuDS are sometimes perceived as unsafe structures with fears of drowning and overturning cars, but with correct design, these risks can be mitigated. The risk of drowning in SuDS features, such as attenuation ponds, can be overcome by ensuring that deep waterbodies have dense planting along the edges to initially discourage people from entering them,

[3] Welsh Government Climate Change Allowances for Planning Purposes: https://gov.wales/docs/desh/publications/160831guidance-for-flood-consequence-assessments-climate-change-allowances-en.pdf [Accessed 18/10/2018]

and shallow sloped banks to allow people to easily climb out them should they enter the pond.

6.2.7 Adoption and Maintenance

Schedule 3 of the Flood and Water Management Act 2010 is to be enacted on the 7th January 2019 in Wales. This means that any planning application for any development of more than one home or >100m^2 of impermeable area shall be required to implement SuDS techniques to dispose of surface water. Furthermore, SuDS must be approved and adopted by the SuDS Approval Body (SAB) - a function performed by the Lead Local Flood Authority.

6.3 Site Opportunities and Constraints

The proposed development site provides many opportunities and constraints for the disposal of surface water via the use of SuDS. Figure 6 shows the locations of these opportunities and constraints.

The location of the A48 between Areas A and B, and topographical constraints pose a challenge to developing a single site-wide drainage strategy, as these features distinctly separate the two areas. Consequently, it is likely to be necessary to develop two separate systems for the areas of land North and South of the A48. Despite this, an overarching surface water drainage masterplan should be designed for Areas A, B and D, with the possibility of the inclusion of Site C should it be developed at a later stage.

A site visit has been undertaken to further understand the topographical constraints for surface water drainage design across Areas A and B. Images from the site visit can be seen in Table 5 and locations referenced in Figure 6**.**

The area of land towards the northern boundary of Area B was extremely wet underfoot following relatively dry antecedent conditions, indicating that surface water flows towards the bottom of the site, and the watercourse at the northern boundary. Areas of standing water were also evident in this area. An overland surface water flow route and man-made channel were evident, flowing from south to north from the current Stormy Farm buildings. A marshy area/pond was also located along this flow path, possibly fed by a spring. Further indicative surface water flow paths were also seen across this area of land. A drainage ditch was also located along the northern boundary of Area B, to receive surface water flows and discharge them into the watercourse to the north of the site.

Area A has little evidence of natural flow paths across the site, with no obvious drainage ditches crossing or bordering the site.

Table 5 Images from Site Visit

	
Picture 1: Manmade channel north of Stormy Farm	Picture 2: Marshy area/Pond along overland flow route of Area B
	
Picture 3: Area of standing water within overland flow route on Area B	Picture 4: Further evidence of overland flow routes across Area B

Picture 5: Ditch along the northern border of Area B

Picture 6: Northern boundary of Area A

Picture 7: Land falling towards the north-west of Area A

Picture 8: Land falling to the north of Area A

Adequate consideration should be given to the existing surface water flow paths across the site, by incorporating water sensitive design into the masterplan for the development. These areas have the potential to be used to create green corridors across the site, providing both amenity and biodiversity enhancements. There is the potential for the use of SuDS at the Northern boundary of Area B to also provide ecological enhancements and habitat linkage between the site and Frog Pond Wood Nature Reserve north of the site.

There is also the potential to incorporate across site storage and attenuation features and swales across the site to slow down the rate of runoff across the site. These features will also enhance habitat potential and increase amenity space. Potential areas for attenuation have been shown in Figure 6, however these have been included for indicative purposes only and should be considered further at outline or detailed design stage.

It is envisaged that the yield: use ratio will not be sufficient to enable surface water to be drained solely by rainwater harvesting. No infiltration testing has been carried out on this site at this time, however given known soil and geological conditions across the site, it is considered that infiltration will not be viable across Area B, however there will be potential to infiltrate surface water across Areas A and D. Infiltration testing should be conducted to determine whether and where soakaways will be viable across the site.

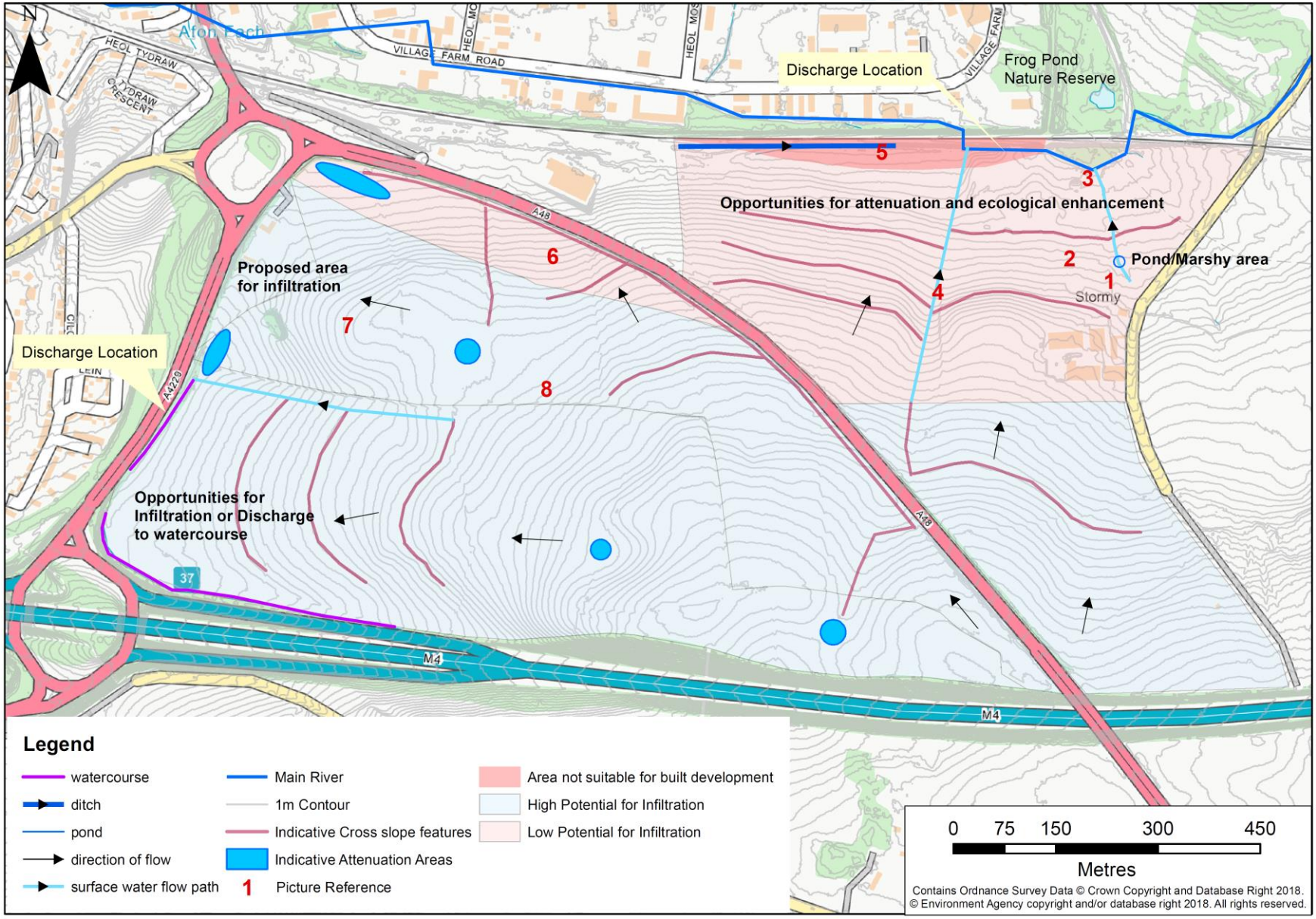

Figure 6 Opportunities and Constraints Plan

6.4 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 6 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 Viability of SuDS Components on Site

SuDS Component	Site Viability	Amenity Benefits	Biodiversity Benefits	Water Quality Benefits	Comments
Rainwater harvesting	×	✓			Unlikely to establish the yield: use ratio required
Green roofs	✓	✓	✓	✓	Structural and maintenance requirements of these on dwellings to be considered. May be more viable for commercial areas
Infiltration systems and soakaways	✓	✓	✓	✓	Across site soakaway testing required to establish infiltration rates - may not be viable in northern areas of the site
Filter strips	✓			✓	Opportunities for inclusion within Green Corridors and adjacent to watercourses across the site
Filter drains	✓			✓	Beneficial for use within a treatment train if water is to discharge to a watercourse for Area B to provide water quality benefits
Swales	✓	✓	✓	✓	Consideration to be given to steep site topography and swale gradient requirements. Existing overland flow paths should be retained
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 links at the Northern boundary of Area B

7 Foul Water Management Approach

7.1 Building Regulations 2010 Part H: Drainage and Waste Disposal

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

Utility searches, provided by Cornerstone Projects Ltd in October 2018, indicate that there are no foul sewers which cross the proposed development site. There are, however, existing foul sewers within the residential area to the West of the development site which should be investigated further to determine whether a connection to this system is viable.

7.2 Dŵr Cymru Welsh Water Developer Enquiry

A pre-planning consultation request has been submitted to Dŵr Cymru Welsh Water (DCWW) to determine if there is sufficient capacity within the existing foul water network to receive foul flows from the development of Areas A and B.

At this preliminary stage it has been assumed that Areas A and B will be designated for residential use. As an outline masterplan of the number of dwellings across these areas is yet to be devised, an approximation of the number of dwellings across the area has been calculated based on the current requirement of the Bridgend County Council Local Development Plan for new developments to provide a housing density of at least 35 dwellings per hectare. It has been assumed that all 25 Ha of Area A will be utilised, with 20 Ha of Area B. The pre-planning consultation request therefore approximated 1575 dwellings across Areas A and B. This represents an absolute maximum number of dwellings for the purposes of the pre-planning consultation request and is not a reliable estimation of actual housing numbers.

The DCWW response to this enquiry, contained in Appendix C, states that it is unlikely that sufficient capacity exists to accommodate the development without causing a detriment to existing services, and they are unable to provide a point of adequacy on the existing network at this stage. Given the potential size of the development and the nature of the initial enquiry, the response from DCWW is unsurprising and it is inevitable that some infrastructure improvements will be required.

The DCWW response also stated that no problems are envisaged with the Waste Water Treatment Works for the treatment of foul flows from the proposed site.

DCWW recommends that a Hydraulic Modelling Assessment is undertaken to examine the existing network and to consider the impact of the introduction of

flows from the proposed development. Where required, the assessment will identify solutions and points of communication to ensure the site can be accommodated in the system.

DCWW were unable to comment on the adequacy of the water supply for the site due to the potential development size. It will therefore be necessary for the developer of the site to fund a Hydraulic Modelling Assessment on the water supply network.

8 Conclusion

- JBA Consulting were commissioned by Geraint John Planning Ltd to prepare a Flood Risk Statement and High-Level Drainage Strategy for foul and surface water for a proposed candidate site to the revision of the Local Development Plan by Bridgend County Borough Council
- The site is split into Areas A, B, C and D due to different land ownership across the site. Areas A, B and D are currently being put forward as a candidate site for the proposed revision to the Bridgend County Borough Council Local Development Plan.
- The proposed development site is currently Greenfield, agricultural land and is 66.3 Ha in size. The site generally falls towards the North and Western boundaries of the site.
- The Northern boundary of Area B is located in DAM Zone C2. It is advised that the proposed development is located away from this small area of land and confined solely to areas of DAM Zone A; 'Areas a little or no risk of flooding'.
- The site has a low to medium risk of flooding due to surface water, and it is therefore proposed that existing surface water flow routes are retained where possible and incorporated within the surface water drainage strategy.
- There is a negligible risk of flooding to the site from all other sources of flooding.
- The soils on the site are varied, with the Northern parts of Areas A and B comprised of slowly permeable seasonally wet soils with impeded drainage, and the southern parts of the site comprised of freely draining soils.
- Areas A and C have no known surface water infrastructure and are assumed to drain via infiltration across the site.
- Area B has a drainage ditch and watercourse located at the Northern border, however the rest of Area B has no known surface water infrastructure. It is therefore assumed to drain as a low-permeability greenfield site, with drainage occurring primarily through evapo-transpiration losses, slow infiltration into the underlying soils and runoff towards the watercourse and drainage ditch located along the Northern boundary.
- Estimated Greenfield runoff rates have been calculated as 24.65 l/s/ha for the 1 in 100 year event
- The surface water drainage system should reduce post-development run-off rates and volumes as close to Greenfield runoff rates as possible, in line with the non-statutory standards for sustainable drainage systems (SuDS) in Wales. The drainage strategy should provide multiple benefits and ensure water quality downstream is not adversely affected as a result of the proposed development.
- It is anticipated that the proposed SuDS system will require approval and adoption by the SuDS Approval Body (SAB).
- A review of possible SuDS components for the sites, along with their considerations have been included within this Technical Note.
- A DCWW developer enquiry has been submitted to determine if there is sufficient capacity within the Welsh Water network to receive the envisaged

foul flows from the proposed development. This initial capacity enquiry advised that the waste water treatment plant has sufficient capacity, but that additional hydraulic modelling will be required to advise on foul and water supply network capacity and potential connections points. Given the maximum potential size of the development, local infrastructure improvements to the DCWW network are likely to be required.

Appendix A - UK SUDS TOOL OUTPUTS

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	faye tomalin
Site name:	Land Adj to A48
Site location:	Pyle, Bridgend

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	51.52084° N
Longitude:	3.67737° W

Reference:	6447744
Date:	2018-10-11T14:52:01

Methodology	FEH Statistical

Site characteristics

Total site area (ha)	66.3

Methodology

Qmed estimation method	Calculate from BFI and SAAR
BFI and SPR estimation method	Specify BFI manually
HOST class	N/A
BFI / BFIHOST	0.438
Qmed (l/s)	NaN
Qbar / Qmed Conversion Factor	1.08

Hydrological characteristics

	Default	Edited
SAAR (mm)	1174	1219
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	NaN	749.79
1 in 1 year (l/s)	NaN	659.81
1 in 30 years (l/s)	NaN	1334.62
1 in 100 years (l/s)	NaN	1634.53

Appendix B – DCWW Developer Enquiry Response

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
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E.bost: developer.services@dwrcymru.com

Miss Faye Tomalin
JBA Consulting
Kings Chambers 8 High Str
8 High Street
Newport
Gwent
NP20 1FQ

Date: 15/10/2018
Our Ref: PPA0003458

Dear Miss Tomalin

Grid Ref: 283691 181453
Site Address: Land adj to A48, Stormy Farm, Pyle, Bridgend
Development: 1,575 No. Residential Units

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

SEWERAGE

We have considered the impact of the foul flows generated by the proposed development upon the local public sewerage system and concluded that 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. Accordingly, we are unable at this stage 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 of the local public sewerage network. This Assessment will examine the existing network and consider the impact of the introduction of flows from your development upon its performance. Where required and appropriate, the Assessment will then identify solutions and points of communication to ensure that your site can be accommodated within the system.

Please note that we will seek to control the outcomes of the Hydraulic Modelling Assessment via appropriate planning conditions. However in the absence of known solutions to accommodate your site we not be able to support your development through the planning process. We therefore recommend that the Assessment is undertaken in advance of the 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.

Turning to surface water flows, and in respect of the 'Non-statutory standards for sustainable drainage (SuDS) in Wales', you are required to explore and fully exhaust all technical 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 watercourses in liaison with the Land Drainage Authority and/or Natural Resources Wales. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note. In addition, no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Furthermore, 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.

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.

SEWAGE TREATMENT

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

WATER SUPPLY

Due to the size of the development, 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.

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,

Owain George
Planning Liaison Manager
Developer Services

Encs. Sewer plan
Water plan
Pre-planning advice

***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.*