AUSTIN PARTNERSHIP
CONSULTING ENGINEERS

Project Title:
ST.BARUCS CHURCH

Project No:
20.4764

Client:
Newydd HA

Date:
APRIL 2021

Version:
v1.0

Status:
APPROVAL

SURFACE WATER DRAINAGE STRATEGY

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DATE ISSUED: **April 2021**

JOB NUMBER: **20.4764**

REPORT NUMBER: **0001**

VERSION: **v1.0**

STATUS: **Approval**

CLIENT: **Newydd Housing Association**

SITE NAME: **ST.BARUCS CHURCH**

SURFACE WATER DRAINAGE STRATEGY

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Revision Record

Ver.	Date Checked	Description	Prepared
1	16.04.2021		

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DRAWINGS	TITLE.	SCALE.
2118-015	(CFW) Site Plan	1:100 @ A1
TBC	() Detailed Soft Landscape Proposals	1:200 @ A2
20.4764	(Austin Partnership) *All drawings shown on accompanying drawing register.*	Varies

GENERAL SUPPORTING DOCUMENTS

- Planning Policy Wales Technical Advice Note 15 (TAN) (2004)
- Welsh Government Statutory Standards for Sustainable Drainage Systems (2018)
- Welsh Government Sustainable Drainage SuDS Statutory Guidance (2019)
- CIRIA SuDS Manual C753 (2015)

EXECUTIVE SUMMARY

Austin Partnership have been commissioned by Newydd Housing Association to produce a Surface Water Drainage Strategy to accompany the SAB (SuDS Approving Body) application. Table 1 summarises the details of the development, flood risk to the site and proposed drainage strategy.

Table 1: Site Summary	
Site Location	The site is located at Church of Saint Baruc, Phyllis Street, Barry Island, Barry, Vale of Glamorgan.
Proposed Development	The proposed development is to construct Flats on the former Saint Barucs Church .
Surface Water Drainage Strategy	It is proposed to utilise Sustainable Drainage Systems to manage surface water runoff from the proposed development in line with current best practice. The development will utilise the rain water in sud planters as no room on site for rain gardens or soakaways . The site is shown as being outside of any Flood Risk Area, and NRW maps are included in Appendix B.

EXISTING SITE CONDTIONS AND DEVELOPMENT PROPOSALS

1.1 The Site and Surrounding Area

1.1.1 The site is located in the Barry Island in Barry. The National Grid Reference of the centre of the site is ST116669, Easting 311609, Northing 166993 and the nearest postcode is CF62 5UX.

1.1.2 The site is based on the former Saint Baruc church at Phyllis Street, Barry Island, Barry, Vale of Glamorgan, A Site Location Plan is presented in Figure 1 below.

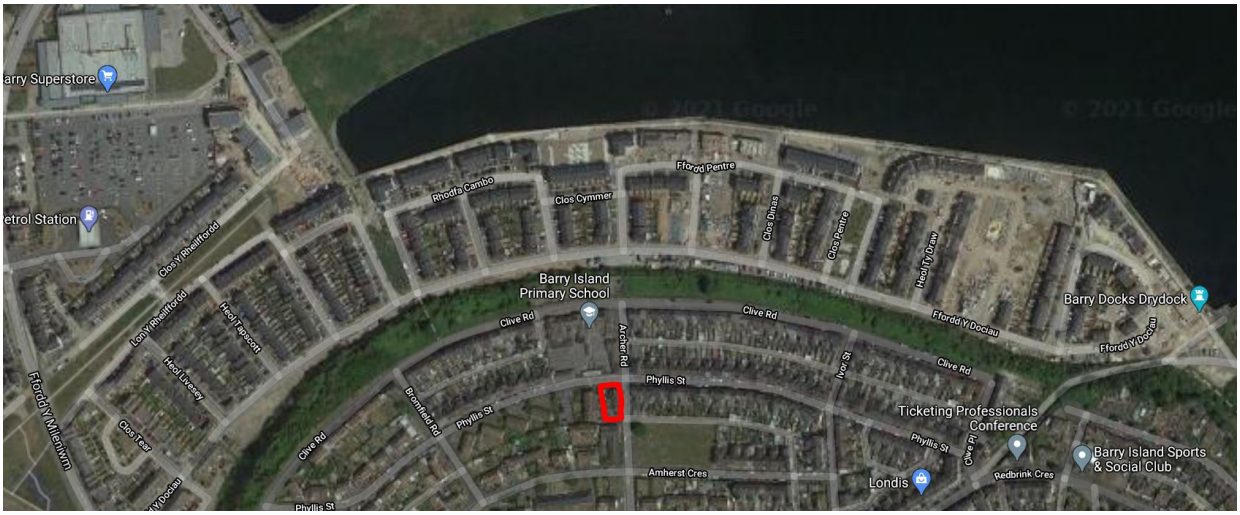


Figure 1 – Site Location Plan

1.2 Development Proposals

1.2.1 It is proposed that a former St Baruc's Church adjacent to Archer Road and Phyllis Street, Barry is to be developed into residential accommodation.

1.2.2 The total site area is 0.019ha (199m²).

1.2.3 The Proposed Site Plan drawing, 2118-015 has been developed by project architects, CFW.

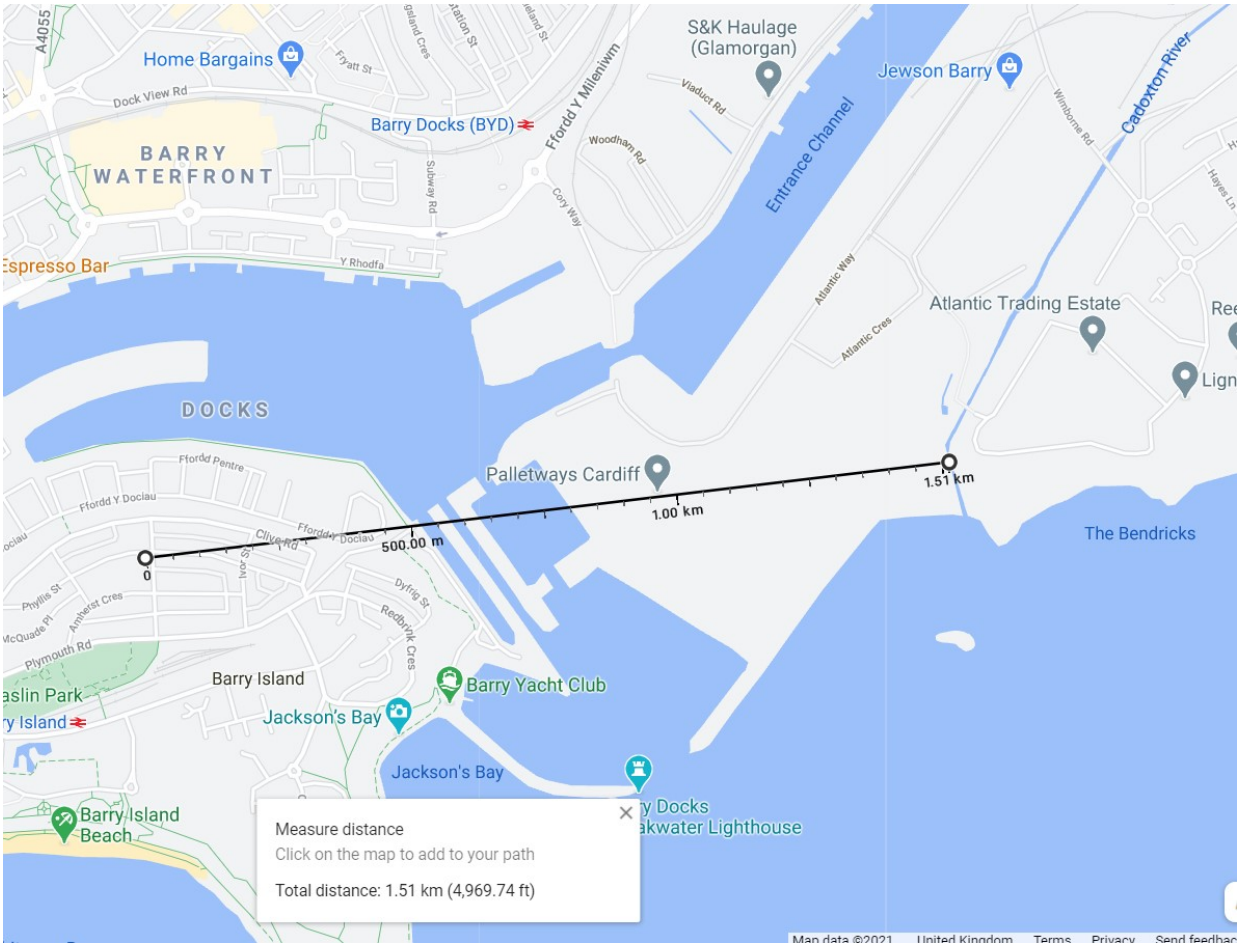
1.2.4 A planning application for the proposed development has been submitted under Planning Ref No. 1978/00608/RES

1.3 Existing Topography

1.3.1 A topographical survey drawing reference 21372 was carried out by Zenith Land Surveys Ltd and shows that the site is gradually sloping South to North with a central level of approx. 19.080m A.O.D. This is shown on CFW drawing 2118-001, which should be read in conjunction with this document.

1.4 Proximity to Watercourses

1.4.1 The nearest watercourse to the site is the Cadoxton River which is located approximately 1.51km east from the site boundary shown in image from Google below. Besides the site is near the coast with The Barry Docks to the north and Barry Island beach to the south and Jakson Bay the East all being closer to the site than Cadoxton River.



1.5 Existing Sewers

1.5.1 The surrounding area is built up residential area that is served by significant infrastructure. The closest sewer to the site are both North and East of the site on Phyllis Street and Archer Road respectively. Refer to the DCWW sewer map in Appendix A.

1.6 Utilities

1.6.1 The utility search results are shown in Appendix A. Services locations will have to be checked prior to works starting on site.

1.7 Geology and Ground Conditions

1.7.1 Information has been obtained from the British Geological Survey website shows no Superficial Geology in the area. Bedrock geology. St Mary's Well Bay Member - Limestone and mudstone, interbedded. Sedimentary bedrock.

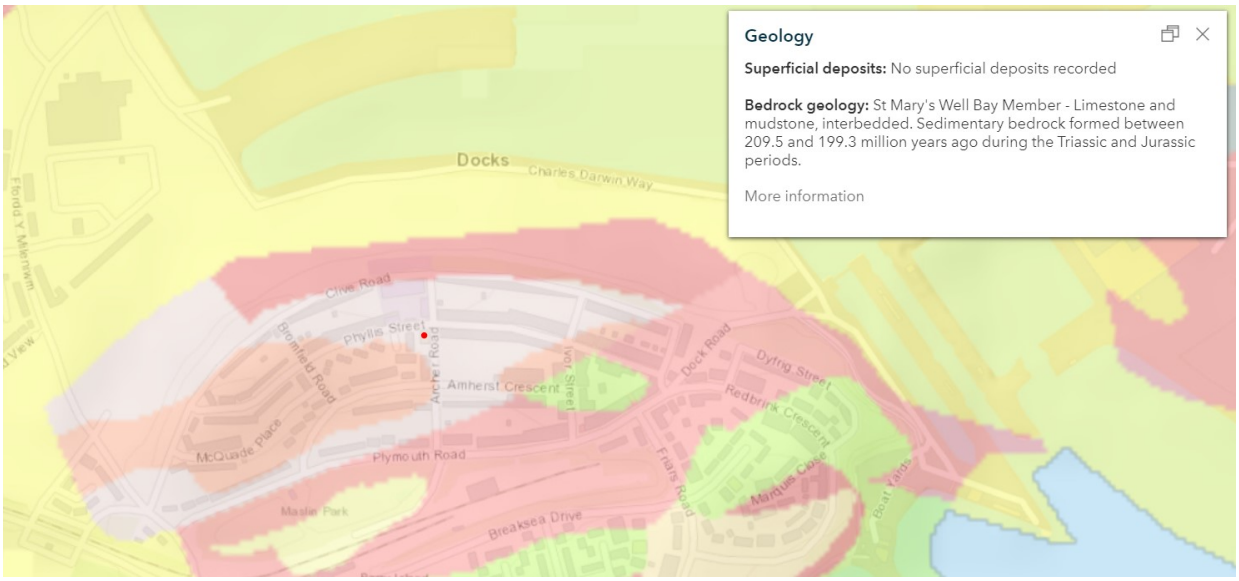


Figure 2 – Superficial Geology, Bedrock Geology

1.7.2 The Geotechnical and Geo-Environmental Site Investigation Report reference 010321-16393-01 carried out by Terra Firma (Wales) Ltd in March 2021. This document should be read in conjunction with this document.

Table 2: Summary of Ground Conditions (SI report details?)		
Depth (m)	**Thickness (m)**	**Stratum**
0.0 - 0.1	0.1	Concrete Flag
0.1 - 0.2	0.1	Loose yellowish brown **SAND (MADE GROUND)**
0.2 - 0.35	0.15	Loose greyish brown slightly sandy fine and medium angular **GRAVEL** of limestone **(MADE GROUND)**
0.35 - 0.4	0.05	Loose black ashy **SAND (MADE GROUND)**
0.4 - 1.1	0.7	Firm dark greyish brown yellow mottled slightly sandy silty gravelly **CLAY**.
1.1 - 1.2	0.1	Firm to stiff yellowish brown **CLAY**
1.2 - >2.0	-	Firm to stiff yellowish brown grey mottled very gravelly **CLAY**.

1.7.3 There was no infiltration testing carried out in the Geotechnical report. But from the window samples that was undertaken it indicates that the ground is made up of clay making infiltration unlikely.

1.8 Hydrogeology

Source Protection Zones

1.8.1 Groundwater provides a third of drinking water in England and Wales, and maintains the flow in many of our rivers. The EA have defined Source Protection Zones (SPZ's) for 2000 groundwater sources such as springs, boreholes and wells used for the public drinking supply. These zones show the risk of contamination from any activities that might cause pollution in the area – the closer the activity the greater the risk. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which occasionally applies to a groundwater source.

1.8.2 Reviewing the mapping show on the Lle website, the site is not within a SPZ, nor in a zone of SSSI or SPA.

Aquifers

1.8.3 Aquifers are underground layers of water-bearing permeable rock or drift deposits from which groundwater can be extracted. Aquifer designations reflect their importance in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the BGS, which is updated regularly to reflect ongoing improvements.

1.8.4 The site investigation report carried out by Terra Firma (Wales) Ltd refers to the underlying rock group being a secondary aquifer. Further expanded information is given in the report and this should be read in conjunction with this document.

2 PROPOSED SURFACE WATER DRAINAGE STRATEGY

2.1 Background

2.1.1 The Flood and Water Management Act 2010 (Schedule 3), which came into effect in Wales on 7 January 2019, requires new developments to include Sustainable Drainage Systems (SuDS) features that comply with national standards.

2.1.2 From 7 January 2019, new developments of more than one dwelling or where the area covered by construction work equals or exceeds 100 square metres require approval before construction can commence from the SuDS Approval Body (SAB). Adoption and management arrangements, including a funding mechanism for maintenance of SuDS infrastructure and all drainage elements are to be agreed by the SAB as part of this approval. This will ensure that SuDS infrastructure is properly maintained and functions effectively for its design life.

2.1.3 For every new development, the Welsh Ministers expect SABs to seek an overall reduction in, or significant attenuation of, surface water volumes reaching public sewers and combined systems as part of the aim of 'Ensuring the stability and durability of drainage systems' in a sustainable way.

2.1.4 All new drainage systems will be designed with consideration for PPW, Non- Statutory Technical Standards for Sustainable Drainage Systems, Building Regulations – Approved Document H (Drainage and Waste Disposal), and the latest version of Sewers for Adoption.

2.2 Sustainable Drainage (SuDS) Statutory Guidance

2.2.1 The Welsh Government statutory standards for SuDS contains a set

of principles which must be applied in the design of any surface water drainage scheme in order to obtain approval from the SAB Body. There are 6 SuDS standards, Standard S1 is a Hierarchy Standard which gives criteria for prioritising the choice of runoff destination, while S2 to S6 are Fixed Standards. The fixed standards state the minimum design criteria, how
SuDS should be built, maintained and operated.

2.2.2 S1 - Runoff destination:

- The runoff destination should be prioritised as follows: collect for use; infiltrated to ground; discharge to a surface water body; discharge to a surface water sewer, highway drain, or another drainage system; discharged to a combined sewer

2.2.3 S2 - Hydraulic control:

- Surface water should be managed to prevent, so far as possible, any discharge from the site for the majority of rainfall events of less than 5mm.

- The surface water runoff rate for the 1 in 1-year return period event (or agreed equivalent) should be controlled to help mitigate the negative impacts of the development runoff on the morphology and associated ecology of the receiving surface water bodies.

- The surface water runoff (rate and volume) for the 1% (1 in 100 year) return period event (or agreed equivalent) should be controlled to help mitigate negative impacts of the development on flood risk in the receiving water body.

- The surface water runoff for events up to the 1% (1 in 100 year) return period (or agreed equivalent) should be managed to protect people and property on and adjacent to the site from flooding from the drainage system.

- The risks (both on site and off site) associated with the surface water runoff for events greater than the 1% (1 in 100 year) return period should be considered. Where the consequences are excessive in terms of social disruption, damage or risk to life, mitigating proposals should be developed to reduce these impacts.

- Drainage design proposals should be examined for the likelihood and consequences of any potential failure scenarios (e.g. structural failure or blockage), and the associated flood risks managed where possible.

2.2.4 S3 – Water quality:

- Treatment for surface water runoff should be provided to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers.

2.2.5 S4 – Amenity:

- The design of the surface water management system should maximise amenity benefits.

2.2.6 S5 – Biodiversity:

- The design of the surface water management system should maximise biodiversity benefits.

2.2.7 S6 - Construction, operation and maintenance:

- All elements of the surface water drainage system should be designed so that they can be constructed easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).

- All elements of the surface water drainage system should be designed to ensure maintenance and operation can be undertaken (by the relevant responsible body) easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).

- The surface water drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance.

2.2.8 The statutory SuDS Standards encourage SuDS techniques such as wetlands, swales, ponds and vegetated systems which can help increase access to green spaces and provide community facilities to bring people together.

2.3 Discharge Hierarchy

2.3.1 In accordance with Building Regulations and the Welsh Government Sustainable Drainage Systems Standards for Wales the preferred hierarchy for disposal of surface water is:
Reuse: Infiltration: Watercourse: Surface Water Sewer: Combined Sewer

2.3.2 Percolation testing was carried out and indicated that the site has a very low rate of infiltration and therefore infiltration is not a viable option. The extracts from engineers TerraFirma, Geotechnical & Geo-Environmental Report are included in Appendix C of this report.

2.4 Infiltration Rates

2.4.1 Due to poor infiltration rates as highlighted in 1.7.3. Surface Water from the new development will not be able to be disposed of via infiltration.

2.5 Catchments

The proposed impermeable areas for the proposed development are less than the existing buildings roof area. With the proposed roof area being 135m² and the existing roof area being 155m². Meaning lower flow rates going into the Existing combined sewer. The roof area is divided into areas that discharge via individual downpipe locations that pass through SuD planters before discharging into the proposed surface water system.

2.6 Surface Water Drainage Strategy

2.6.1 CIRIA report C753 'The SuDS Manual' outlines the various types of SuDS, their benefits and limitations and design considerations associated with each. Not all SuDS features/methods are feasible or appropriate for all developments due to factors such as ground conditions, available space and site levels, which will influence the different methods adopted as part of a particular development. Given the nature of the site and existing ground conditions the following surface water drainage strategy is proposed.

2.6.2 Surface water runoff from the roof of the proposed building will be conveyed via downpipes to low level SuD planters which will provide treatment, as well as amenity and biodiversity to the development.

2.6.3 The proposed drainage strategy is outlined on drawing 20.4764-01.

2.7 Attenuation Requirements

2.7.1 There is no room on site to add attenuation but because the proposed runoff is less than the existing site and there no record of flooding in the surrounding area attenuation would not be needed. Causeway Flow software has been used to design the surface water. Storm events and durations have been calculated up to and including a 1 in 100 year event plus 40% increase for climate change and 10% urban creep. These are shown in the Drainage

Calculations document, which should be read in conjunction with the document.

2.8 Piped System

2.8.1 In accordance with Sewers for Adoption (7th Edition), the piped system has been designed to accommodate runoff during storm events up to the 1 in 30-year event. Adoptable piped sewer systems will be designed in accordance with Sewers for Adoption (7th Edition) with any private drainage systems designed in accordance with Building Regulations – Approved Document H.

2.8.2 To provide a self-cleansing regime within surface gravity sewers all pipes have been designed with a nominal diameter of 150mm and laid to a gradient no flatter than 1:150 and diameter of 100mm and laid to a gradient no flatter than 1:80 in accordance with Sewers for Adoption (7th Edition).

2.9 Exceedance Flows

2.9.1 The surface water drainage system has been designed to minimise the risk of flooding to properties in the event of exceedance of the system capacity during storm events in excess of the design storm, which in this case is the 1 in 100 year + 40% climate change event. In addition, the SuD planters bioretention facilities have been designed with a minimum freeboard of 50mm to reduce surface water exceedance.

2.9.2 It is anticipated that during extreme flood events the space available in the granular growing material and the freeboard in the bioretention areas will provide additional attenuation storage.

3 WATER QUALITY TREATMENT AND POLLUTION PREVENTION

3.1 Water Quality

3.1.1 The surface water drainage system which will incorporate SuDS will ensure that a sufficient level of water quality treatment is provided to ensure that the proposed development does not have any adverse impact on of the receiving network.

3.1. The first 5mm of rainfall is known as the ‘first flush’ and generally has a higher pollutant load than subsequent runoff. This flow will be contained within the Site, through provision of the SuDS techniques like SuD Planters.

3.1.3 According to CIRIA C753, runoff from the proposed building is

considered to present a 'low' source of runoff pollution and the simple index approach should be used. The pollution hazard index is outlined table below.

Table: Pollution Hazard Index (After Table 26.2 CIRIA C753)				
Land use	**Pollution Hazard**	**Total Suspended Solids (TSS)**	**Metals**	**Hydrocarbons**
Roof	Low	0.3	0.2	0.05

3.1.4 The mitigation indices have been applied to the roof and maintenance access areas to demonstrate that the pollution hazard has been addressed as outlined in Table below.

Table : Mitigation Indices (After Table 26.3 CIRIA C753)				
Land Use	**SuDS Feature**	**TSS**	**Metals**	**Hydrocarbons**
Roof	Bioretention (SuD planter)	0.8	0.8	0.8
	Total	**0.8**	**0.8**	**0.8**
	Pollution Hazard Addressed			

3.2 Sediment Control

3.2.1 During a rainfall event, runoff normally builds up rapidly to a peak and then diminishes. Because the amount of sediment conveyed in runoff is dependent upon the velocity and volume of that runoff, sediment tends to be deposited as runoff rates decrease. By effectively controlling erosion the supply of sediment can be significantly reduced, but sediment trapping and management will still be required for residual loadings.

3.2.2 Sediment control devices that are located close to the runoff surface allow sediment build-up to occur gradually in dry features and at shallow depths, facilitating the breakdown and degradation of the organic particulates and straightforward, cost effective sediment removal. Sediment trapping provides important removal of a range of contaminants that are absorbed onto sediment surfaces and upstream sediment controls protect downstream

features from damage or poor performance due to sediment build-up either on the surface or within the subsurface media or soils.

3.2.3 A number of sediment control features will be implemented as part of the SuDS strategy for the site. The SuD planters bioretention facilities will aid sediment control. Catchpits will provide sediment

control within the surface water drainage system.

3.3 Accidental Spills

3.3.1 Given the nature of the site being residential the risk of accidental spills is low and will be immediately visible and can be isolated and dealt with rapidly.

4 AMENITY AND BIODIVERSITY

4.1 Visual Impact and Amenity

4.1.1 Vegetated bioretention areas can be used as a striking visual feature within a development and can contribute to visual character. The surface water drainage system aims to have a neutral or positive visual impact on the development and will enhance the sites amenity value wherever possible.

4.1.2 Species chosen include a mixture of evergreen, structural and colourful plants to maintain year-round interest.

4.2 Ecology and Biodiversity

4.2.1 The incorporation of bioretention facility to managed surface water runoff from the project will aim to enhance existing habitats and provide quality habitats conditions for wildlife within the urban area wherever possible.

4.2.2 Species chosen include a mixture of evergreen, structural and colourful plants to maintain a lengthened flowering season for wildlife value.

4.2.3 All plant species chosen either native or of known value to pollinators. All plants non-toxic and suitable for seasonally dry or waterlogged soil conditions.

5 CONSTRUCTION, OPERATION AND MAINTENANCE

5.1.1 As part of the planning application approval process and SAB approval, the Local Planning Authorities and Lead Local Flood Authority must satisfy themselves that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

5.1.2 Maintenance schedules for the bio-retention areas can be found in the SuDS Maintenance Schedule, which should be read with this document. Where the need for jetting arises, a machine can be parked on the emergency access route and the piped network can be jetted using a long hose.

5.1.3 Maintenance schedules for the Catchpits, Manholes and pipes are included in SuDS Maintenance Schedule.

5.1.4 It is recommended that the SuDs scheme is offered to the Vale of Glamorgan Council or Welsh Water for adoption. If this is not feasible; the developer must appoint a SuDs management company prior to the first occupancy on the site.

5.1.5 The following maintenance regime should be implemented for all on site private drainage structures/ sewers.

- Gutters, rainwater pipes, outlets and gullies should be inspected and thoroughly cleaned once a year
- All manholes should be inspected once a year and where necessary cleaned out at the same time. Any defects to the brickwork, benching or cover/ frame should be made good. Attention should be made to the confined spaces regulation 1997 and the provisions contained within there for access to confined spaces. Details for entering manholes are contained in the above legislation
- All catchpit manholes should be inspected and cleaned out yearly.
- Flow control (orifice plate) should be maintained as the supplies recommendations and should be inspected after prolonged rainfall periods or after any extreme storm event

6 CONCLUSIONS

6.1.1 The proposed development is at St Baruc Church.

6.1.2 To ensure that the development does not have any adverse offsite impacts and does not increases flood risk elsewhere surface water runoff will be sustainably managed and disposed of using SuDS techniques.

6.1.3 Infiltration testing has not been carried out. But the window samples that where undertaken found out that the ground is made up of clay so the ground would be insufficient for infiltration at the site. This means that drainage by infiltration is not a viable option.

6.1.4 To replicate pre-developed conditions, SUDS features will be used in

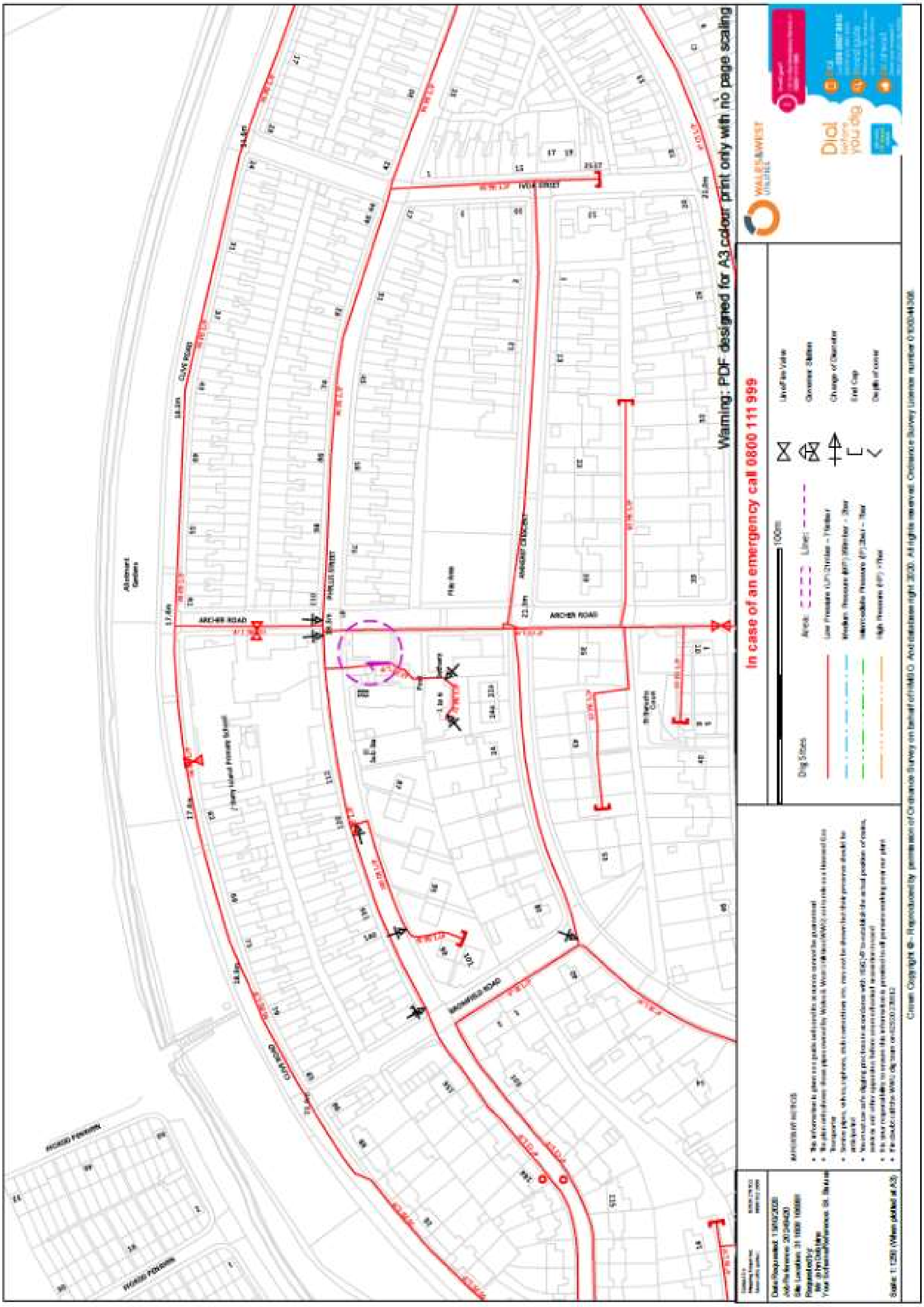
the form of SUD planters to bioretention the surface water before entering the existing storm sewer. As there is no room on site for soakaways, raingardens, permeable paving.

6.1.5 In conclusion, it has been demonstrated that the proposals within this report are compliant the SAB requirements. It is therefore considered that on implementation of this strategy, the development will can be suitably drained for the development lifetime.

APPENDIX A
Utilities


Dŵr Cymru
Welsh Water
St Barucs Church, Barry
N
E
W
S
LEGEND(Representative of most common features)
Notes:
EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.
Map Ref: 311610,166994
Map scale: 1:1250
Printed by: Akwasi Asamoah
Printed on: 03 Nov 2020
IVOR STREET
CLIVE ROAD
AMHERST CRESCENT
BROMFIELD ROAD
CLARE ROAD
Gardens
Play Area
Church
Bethany
Archer Court
Ysgol Gynradd Ynys Y Barri
TCB
21.0m
18.8m
15.8m


WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales
IMPORTANT NOTICES
Overhead Lds
Underground Cable
Pole Mounted Transformer
Ground Mounted Transformer
Plans generated by DigSAFE Pro (tm) software provided by Linesearchbeforeyoudig


Warning: PDF designed for A3 colour print only with no page scaling
In case of an emergency call 0800 111 999
ARCHER ROAD
IVOR STREET
WALES & WEST UTILITIES

APPENDIX B
NRW Map extract

Extract from NRW Development Advice Map. Site shown by blue dot centrally in image.

APPENDIX C
Geotechnical report extracts

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

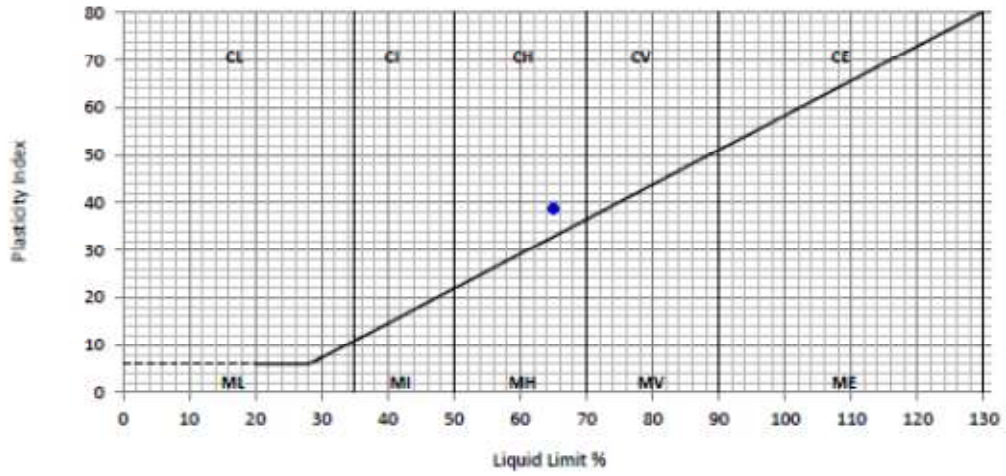
Project No:	D21106	**Client:**	Terra Firma
Project Name:	St Barrucs Church	**Address:**	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	23423		

Site Ref / Hole ID:	WS01	**Depth (m):**	1.10 - 1.20
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Greenish grey slightly gravelly CLAY
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	15 February 2021	**Date Tested:**	17 February 2021

Test Results

Liquid Limit	65	%
Plastic Limit	26	%
Plasticity Index	39	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	5	%



Remarks:

QA Ref. BS1377 - 2 Rev. 2.0	Apex Testing Solutions Sturrel Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 748782 Fax: 01656 749096	7771	Approver: L Davis L Davis, Quality Manager	Date: 18/02/2021	Fig. ATT

TEST REPORT
LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX
BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

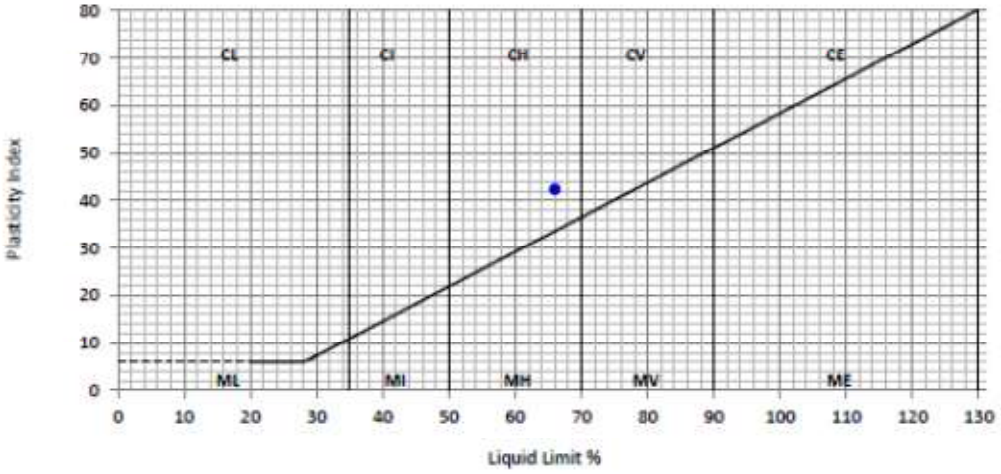
Project No:	D21106	**Client:**	Terra Firma
Project Name:	St Barrucs Church	**Address:**	Deryn Court 5 Wharfdale Road Cardiff CF23 7HA
ATS Sample No:	23424		

Site Ref / Hole ID:	WS02	**Depth (m):**	0.80 - 0.90
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brownish grey CLAY
Location in Works:	N/A	**Material Source:**	Unknown
Date Sampled:	Unknown	**Material Supplier:**	Unknown
Sampled By:	Client	**Specification:**	BS1377
Date Received:	15 February 2021	**Date Tested:**	16 February 2021

Test Results

Liquid Limit	66	%
Plastic Limit	24	%
Plasticity Index	42	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	0	%



Remarks:

QA Ref.					
BS1377 - 2 Rev. 2.0	Apex Testing Solutions Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: L Davis	Date: 18/02/2021	Fig. ATT
			L Davis, Quality Manager		

....end