



Ysgol Y Deri 2

Flood Consequence Assessment

For AECOM

Date: 14 September 2022

Doc ref: 17379-HYD-XX-XX-RP-FR-0001

DOCUMENT CONTROL SHEET

Issued by	Hydrock Consultants Limited Over Court Barns Over Lane Almondsbury Bristol BS32 4DF United Kingdom	T +44 (0)1454 619533 F +44 (0)1454 614125 E bristol@hydrock.com www.hydrock.com
Client	AECOM	
Project name	Ysgol Y Deri 2	
Title	Flood Consequence Assessment	
Doc ref	17379-HYD-XX-XX-RP-FR-0001	
Project no.	17379-IOCB / W03	
Status	S2 - for information	
Date	14/09/2022	

Document Production Record		
Issue Number	P02	Name
Prepared by		Luke Whalley BSc (Hons) GradCIWEM
Checked by		Simon Mirams BSc MCIWEM C.WEM CSci
Approved by		David Sullivan BSc CEng MICE

Document Revision Record			
Issue Number	Status	Date	Revision Details
P01	S2	18/12/2020	First Issue
P02	S2	14/09/2022	Final Issue

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

CONTENTS

1.	INTRODUCTION.....	1
2.	SITE INFORMATION.....	2
2.1	Location	2
2.2	Topography.....	3
2.3	Existing Site Use	3
2.4	Proposed Development	3
3.	ASSESSMENT OF FLOOD RISK.....	4
3.1	Fluvial Flooding	4
3.2	Tidal Flooding.....	5
3.3	Surface Water Flooding	5
3.4	Groundwater Flooding.....	6
3.5	Infrastructure Failure Flooding	7
4.	TAN15 REQUIREMENTS	8
4.1	Justifying the Location of the Development	8
4.2	Assessing Flooding Consequences	8
5.	SURFACE WATER MANAGEMENT	9
6.	CONCLUSIONS.....	10
7.	REFERENCES.....	11

Tables

Table 1.	Site Referencing Information	2
----------	------------------------------------	---

Figures

Figure 1.	Site Location Map	2
Figure 2.	NRW Flood Risk from Rivers Map.....	4
Figure 3.	Welsh Assembly Development Advice Map	5
Figure 4.	NRW Surface Water Flood Risk map	6
Figure 5.	BGS Bedrock Geology and Superficial Deposits map.....	7

Appendices

Appendix A	- Site Layout
------------	---------------

1. INTRODUCTION

This report has been prepared by Hydrock Consultants Limited (Hydrock) on behalf of AECOM in support of a Planning Application to be submitted to the Vale of Glamorgan Council for the proposed development of a Primary School off Lavernock Road, Sully, Cardiff.

This Flood Consequence Assessment report has been prepared to address the requirements of Technical Advice Note 15: Development and Flood Risk (TAN15), through:

- Assessing whether the site is likely to be affected by flooding.
- Assessing whether the proposed development is justified in the proposed location
- Presenting any flood risk mitigation measures necessary to ensure that the proposed development and occupant will be safe, whilst ensuring flood risk is not increased elsewhere.

2. SITE INFORMATION

2.1 Location

The site, measuring approximately 2ha, is situated off Lavernock Road in the south of Cardiff, approximately 7.5km from the City centre. The site is bounded by Lavernock Road to the north west, Cosmeston Livery and open fields to the north and east, dense wooded area and open fields to the south and Fort Road and open fields to the west.

The approximate site location is shown in Figure 1, with the address and Ordnance Survey Grid Reference provided in Table 1.

Site Referencing Information	
Site Address	Lavernock Road, Sully, Cardiff CF64 5UY
Grid Reference	ST178688 317844, 168872

Table 1. Site Referencing Information



Figure 1. Site Location Map

Contains OS data © Crown Copyright and database right 2020

2.2 Topography

A site-specific topographical survey is to be carried out but has not been provided at time of writing. Available LiDAR data has therefore been used to provide information on site levels, and this shows a general fall across the site in a north westerly direction towards Lavernock Road. A high point at approximately 23m AOD is found on the south-eastern boundary and a low point at approximately 12.8m AOD in the northern corner of the site.

2.3 Existing Site Use

The site is currently undeveloped open fields laid to grass.

2.4 Proposed Development

A new primary school is being proposed, and a site layout is included in the Planning Application.

3. ASSESSMENT OF FLOOD RISK

3.1 Fluvial Flooding

The closest watercourse to the site is the Sully Brook which is approximately 90m to the north and flows in a westerly direction.

Natural Resources Wales (NRW) Flood Risk mapping (Figure 2) shows the site to be at 'very low' risk of flooding from rivers with no designated flood risk areas impacting on the site.



Figure 2. NRW Flood Risk from Rivers Map

Contains OS data © Crown Copyright and database right 2020

The Welsh Assembly Development Advice Map (Figure 3) shows the site to be completely within Zone A (considered to be at little or no risk of fluvial or coastal/tidal flooding).

Whilst the potential effects of climate change could increase frequency, depth and extent of flooding from Sully Brook, given the >2m elevation difference between the bank levels of the watercourse and the existing lowest site levels (as taken from LiDAR data), any increase in flood risk is considered unlikely to be of a magnitude which might result in on-site fluvial flooding

Based on the above, it can be concluded that the risk of fluvial flooding at the site is 'low'.

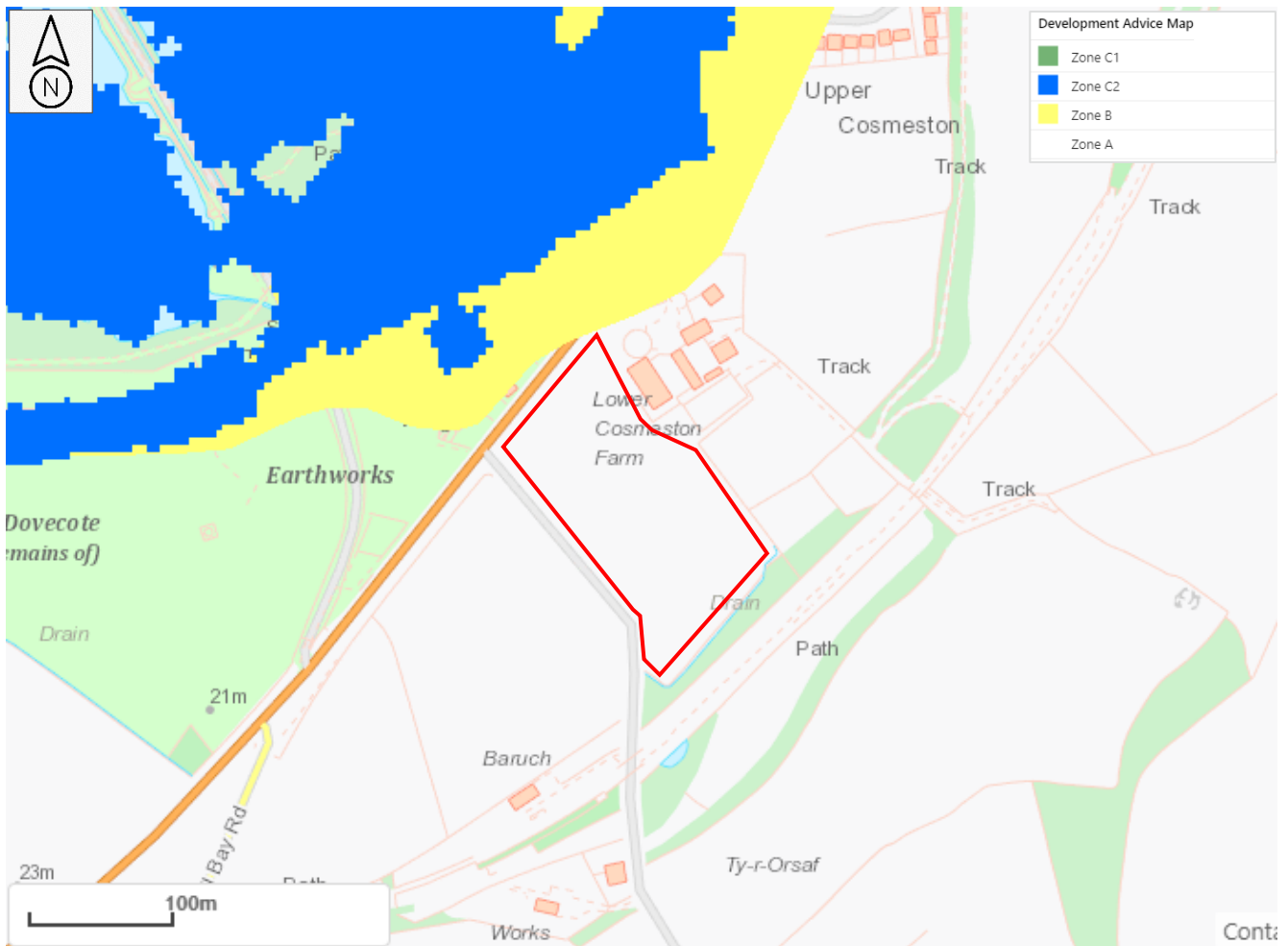


Figure 3. Welsh Assembly Development Advice Map

Contains OS data © Crown Copyright and database right 2020

3.2 Tidal Flooding

NRW Flood Risk from the Sea (See Ref B - Section 6) mapping shows the topography of the surrounding area to limit flood risk to the coast line approximately 650m to the east at its closest point. As such the risk of tidal flooding at the site is concluded to be 'negligible'.

3.3 Surface Water Flooding

Surface water flooding occurs as the result of an inability of intense rainfall to infiltrate to ground. This often happens when the maximum soil infiltration rate or storage capacity is reached. Flows generated by such events either enter existing land drainage features or follow the general topography which can concentrate flows and lead to localised ponding/flooding.

NRW Surface Water Flood Risk Mapping (Figure 4) shows the majority of the site as being at 'very low' risk of flooding from surface water, however the road from which access to the site is provided (Lavernock Road) is shown to be at 'medium' and 'high' risk.

Based on the existing topography surrounding the site, any surface water run-off generated will likely be directed overland as shallow 'sheet-flow', following the prevailing topography to flow north away from site, utilising the road as a preferential flow route (i.e. not directed into the site).

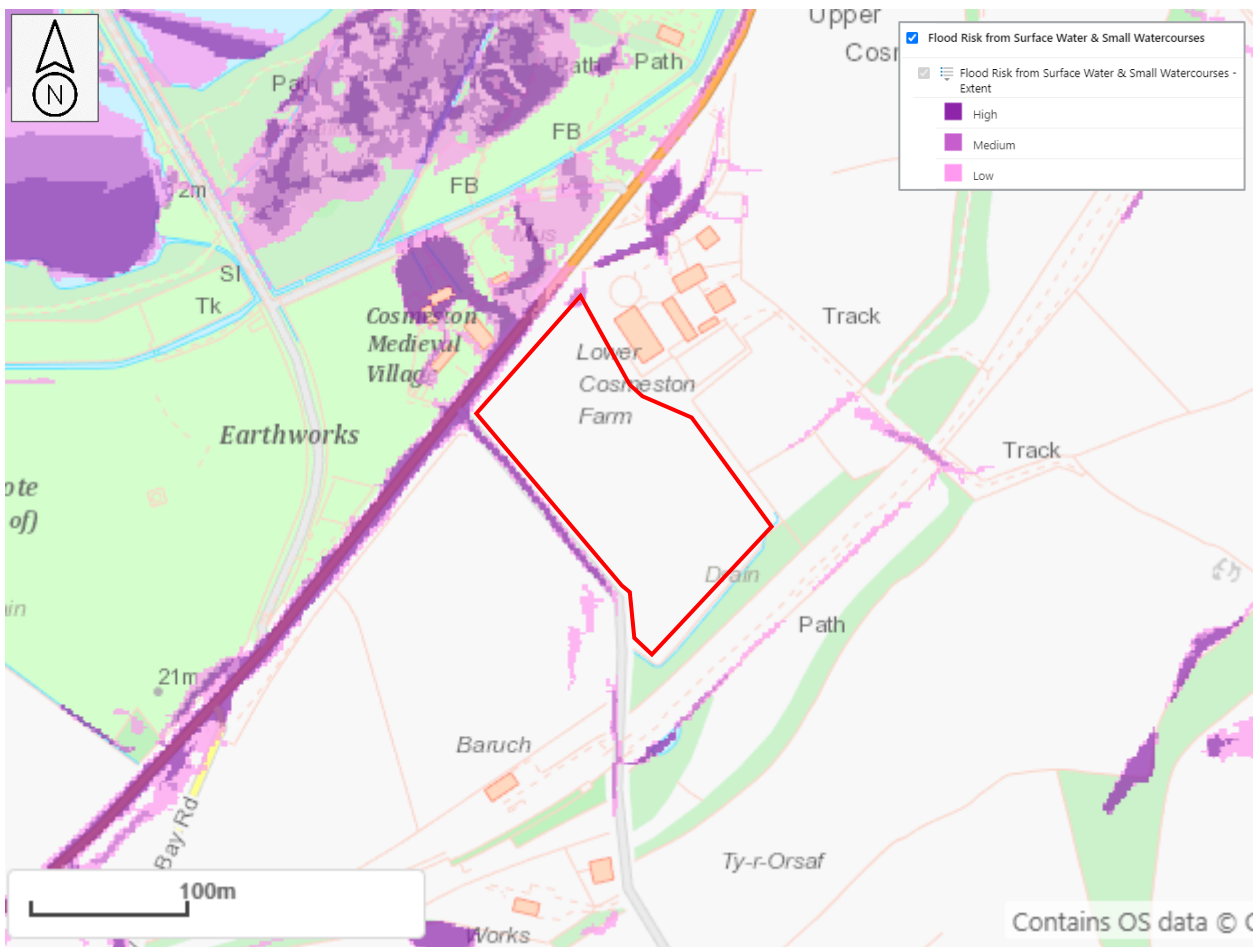


Figure 4. NRW Surface Water Flood Risk map

Contains OS data © Crown Copyright and database right 2020

Whilst the potential effects of climate change could increase the frequency, depth and extent of on-site surface water flooding, given the sloping topography of the site, any increase in flood risk is considered unlikely to be of a magnitude which would result in a significant increase in the risk of on-site surface water flooding, as any surface water run-off will likely continue to be directed overland as shallow 'sheet-flow' with the prevailing topography and away from the site.

On the basis of the above, the site is concluded to be at 'low' risk of surface water flooding.

3.4 Groundwater Flooding

British Geological Survey (BGS) mapping (Figure 5) shows the majority of the site to be underlain by St Mary's Well Bay Member (Limestone and Mudstone) with an area parallel with the south east border underlain by Lavernock Shales Member (Mudstone). Areas north of the site are underlain by superficial deposits of Alluvium.

The generally low permeability of the local geology is unlikely to be conducive to groundwater emergence. Furthermore, the topographically elevated position of the site means that any sub-surface groundwater flows are likely to be directed downhill and away from the site, preferentially emerging within the surrounding lower-lying land (i.e. near the Sully Brook channel, north of Lavernock Road).

Whilst a geological boundary is present towards the southern limit of the site, The Vale of Glamorgan Local Flood Risk Management Strategy (Capita, 2013 - Ref A) (LFRMS) showed the site to be in an area

with <25% susceptibility to groundwater flooding. In addition, the Vale of Glamorgan LFRMS reported no areas of localised groundwater flooding at the specified site or immediately surrounding areas.

Given that the determination of groundwater flood risk in this instance is driven by geological and topographical factors, both of which will be unaffected by the potential effects of climate change, the risk of groundwater flooding posed to the site is considered unlikely to increase as a result of climate change.

Based on the above, the site is concluded as being at 'low' risk from groundwater flooding.

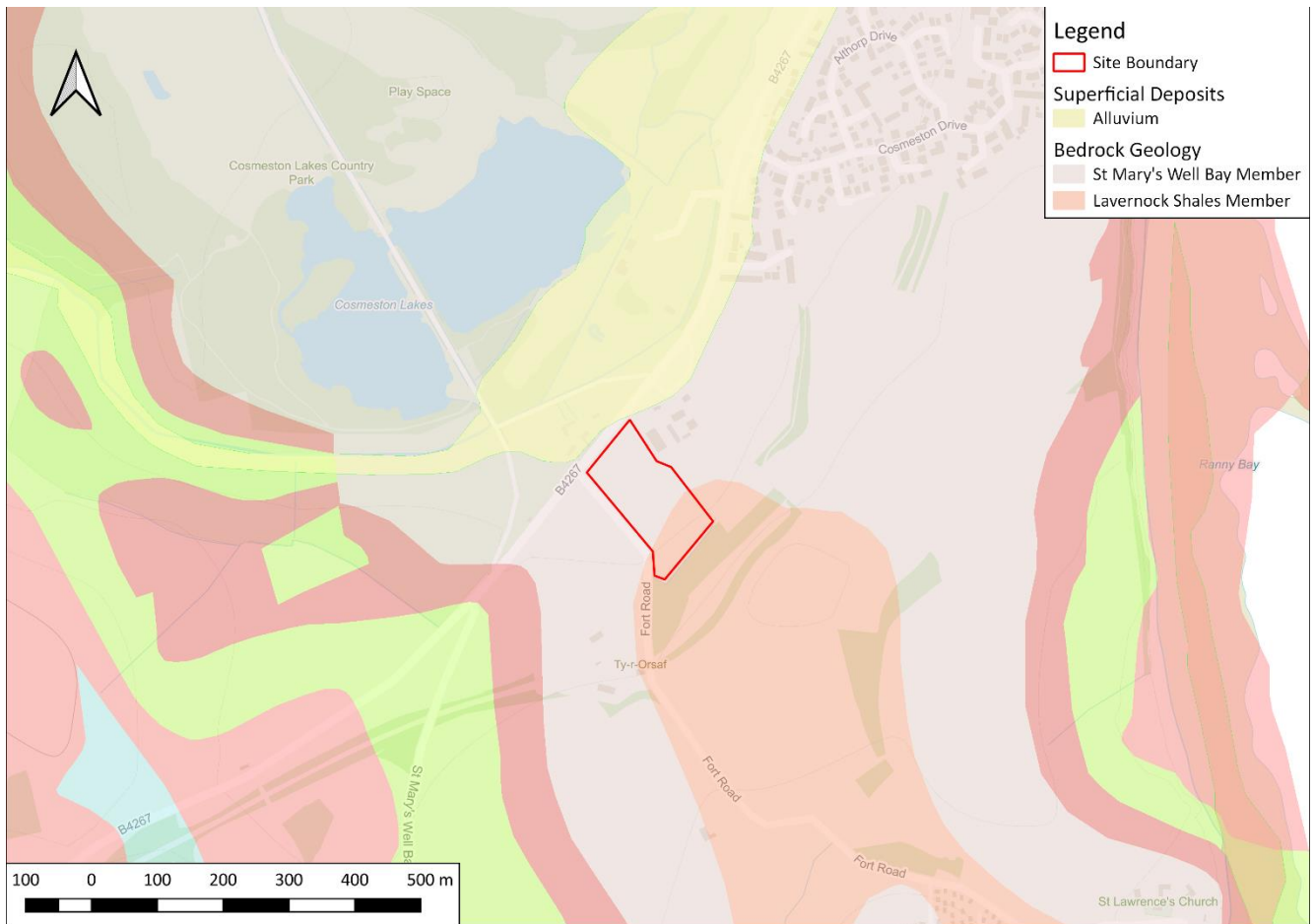


Figure 5. BGS Bedrock Geology and Superficial Deposits map

Contains OS data © Crown copyright (2020) and British Geological Survey data under [OGLv3](#)

3.5 Infrastructure Failure Flooding

Sewer networks are considered as being confined to surrounding road networks with limited public systems serving the wider area due to its undeveloped nature. As with the assessment of surface water flooding, if the sewer network were to fail / surcharge any flows will likely drain to the lower lying area to the north of the site, and the site is therefore concluded to be at 'low' risk of sewer flooding.

The NRW Flood Risk from Reservoirs map (See Ref B - Section 6) shows there to be 'negligible' risk of infrastructure failure flooding from any sources within the immediate vicinity or uphill of the site.

On this basis, the site is concluded to be at 'low' risk of infrastructure failure flooding.

4. TAN15 REQUIREMENTS

4.1 Justifying the Location of the Development

It has been demonstrated that the entirety of the proposed site is located in Zone A (considered to have little or no risk of fluvial or tidal/coastal flooding) and is at 'low' or 'negligible' risk of flooding from all other potential sources.

Figure 1 of TAN 15 states that Zone A is "Used to indicate that [a] justification test is not applicable and [there is] no need to consider flood risk further".

Accordingly, the application of the Justification Test is concluded to not be required in this instance.

4.2 Assessing Flooding Consequences

4.2.1 Flood Resistance and Resilience

In line with TAN15, it is recommended that the finished floor level of the proposed building is 'flood free' in the 1 in 100 year +25% 'design' flood. This is considered as being achieved as the location of the building is entirely within the 'low risk' zone. Where practicable, it is recommended that FFLs be set 150mm above immediately surrounding ground levels to mitigate against any residual flood risk and to adopt a 'design for exceedance' approach.

4.2.2 Flood Warning and Evacuation

Access to the site is off Fort Road, on the eastern boundary of the site. The site is in an area of 'low' risk from fluvial flooding, however the NRW Surface Water Flood Risk map (Figure 4) indicates Lavernock Road and the northern parts of Fort Road to be at 'high' risk.

Following comments received from the Lead Local Flood Authority, it is understood that the *"LLFA is currently investigating extensive highway flooding along Lavernock Road that occurred on 23rd December 2020. The evidence collated to date indicates that surface water flows overwhelmed the capacity of the existing highway drainage network during an estimated 1 in 20 year storm event. This resulted in significant disruption to traffic flows along Lavernock Rd and vehicles driving through flood waters. Similar highway flooding was also observed during Storm Jorge in February 2020"*. This therefore confirms the risk of surface water flooding along the main site access route however, also confirms actions are being taken to investigate and address the issue which is likely as a result of drainage related issues. Following the investigation, it is likely that any such measures to reduce the known risk will be put in place by the local Highway Authority and the LLFA and therefore would address any potential access and egress issues for the proposed development.

4.2.3 Floodplain Storage

On the basis that the site has been demonstrated to be at 'low' risk of flooding, and therefore outside a functioning floodplain, the proposed development is not considered to increase flood risk within the catchment through a loss of floodplain storage, and accordingly no further mitigation measures are required in this respect.

5. SURFACE WATER MANAGEMENT

A comprehensive Drainage Strategy, presented separately, has been prepared to ensure surface water will be appropriately managed, and this should be consulted in relation to the proposed means of surface water management at the site.

6. CONCLUSIONS

This Flood Consequence Assessment (FCA) report has been prepared by Hydrock on behalf of AECOM in support of a planning application for the proposed Primary School off Lavernock Road, Sully.

The site is shown to be within a 'low' risk area / Zone A.

Site-specific analysis has identified potential fluvial, surface water, groundwater and infrastructure failure flood risks.

Owing to the proposed building being within the 'low' risk Zone it considered that the finished floor level of the proposed building is 'flood free' in the 1 in 100 year +25% 'design' flood. However, it is recommended that, where practicable, a further 150mm 'freeboard' be provided above immediately surrounding ground levels to mitigate against any residual flood risk .

A comprehensive Drainage Strategy, presented separately, has also been prepared to ensure surface water will be appropriately managed.

This report therefore demonstrates that, in respect of flood risk, the proposed scheme:

- Is justified in the location proposed.
- Will be adequately flood resistant and resilient.
- Will offer a means of flood warning and evacuation.
- Will not increase flood risk elsewhere through the loss of floodplain storage.
- Will put in place measures to ensure surface water is appropriately managed.

As such, the Application is concluded to meet the flood risk requirements of TAN15.

Hydrock Consultants Limited

7. REFERENCES

References			
	Author	Date	Description
A	Capita	December 2013	Vale of Glamorgan Council Local Flood Risk Management Strategy (https://www.valeofglamorgan.gov.uk/Documents/_Committee%20Reports/Cabinet/2014/14-04-28/VoGC-LFRMS----Vol-1-Main-Report.PDF)
B	NRW	2020	NRW Long Term Flood Risk Maps (https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default&layerTheme=)

Appendix A - Site Layout



- Porous block paving to car park
- Pedestrian Resin Bound Gravel
- Feature Flag Paving
- Porous Macadam Colour: To be confirmed To MUGA
- Vehicle grade macadam
- Playground Safety Rubber Mat Play equipment to be provided by school. MEWP access must be retained with any new proposed play equipment. Colour: To be confirmed
- Artificial pitch Artificial grass
- Concrete Base To bin store and sprinkler tank. Note that bin store will have a central gully. With bin store with capacity for 10no. 660L bins
- Retaining wall with guardrail Indicative only. Extent to be confirmed

- SOFT LANDSCAPE**
- Existing Hedge To be protected and retained. Areas that are removed are to be translocated to a suitable location within the site as advised by ecologist.
 - Area allocated for translocated hedge species Area allocated along Lavernock Road
 - Existing Tree Retained
 - Proposed Trees
 - Proposed Shrub Planting
 - Proposed Rain Gardens Ornamental Shrub Planting
 - Proposed Grass General amenity mix. Existing grass to be made good where necessary with this mix too.
 - Proposed Meadow Mix For ecological benefit.
 - Proposed Planting to Raised Beds in Horticulture Area To be planted by school students
 - Proposed Bulbs Planting Mix
 - Proposed Swale Planting Included for SUDS for S278, sized for interception requirements.
 - Proposed Native Scrub
 - Proposed Scrub Planting Area between proposed boundary fence and retained woodland to be allowed to scrubs naturally with bramble.

- SITE FURNITURE**
- Fixed Seating With back & arm rest
 - Pergola Timber pergola
 - Cycle Shelter with green roof. Cycle and scooter storage underneath.
 - Raised Planters Timber planters. A number to have wheelchair accessible design.
 - Storage shed A large metal shed, with security features to keep all playground equipment locked away safely
 - Thermoplastic playground markings A range of playground linemarkings in various colours to be provided across all play areas. Indicative graphics indicated only.
 - Canopy / shelter Anticlimb design

Notes
 Check all dimensions on site. Do not scale from this drawing.
 Report any discrepancies and omissions to HLM Architects.
 This Drawing is Copyright ©

Soft Landscaping Strategy

- Designed to connect the proposed school with the surrounding context, creating a cohesive landscape character within the site, which will aid the biodiversity of the site and define a range of external spaces for all
- Planting provides seasonal and sensory diversity with chosen species providing visual interest, through form, colour, texture and movement.
- We will review the use of planting to subdivide areas of surfacing. Existing trees and hedgerow will be retained as much as possible with further enhancements proposed to enhance wildlife such as birds, bees and insects
- Soft landscaping will provide the school with opportunities to play, explore, and study as well as further enhance the biodiversity of the site, the areas will include:
 - Areas to socialise and dine
 - Place for relaxation and calm with seating and shelter from the elements
 - Habitat areas created using natural materials such as logs, boulders and landform
 - A safe, accessible, and stimulating environment with fencing where appropriate with a high-quality attention to design and material choice
- Please note that the detailed soft landscape planning strategy is shown on drawings:
 - Proposed Shrub Planting
 - Proposed Rain Gardens
 - Proposed Grass
 - Proposed Meadow Mix
 - Proposed Planting to Raised Beds in Horticulture Area
 - Proposed Bulbs Planting Mix
 - Proposed Swale Planting
 - Proposed Native Scrub
 - Proposed Scrub Planting

Rev.	Description	Date	By	CHK
P12	ISSUED FOR PLANNING	06.10.22	SL	IB
P11	ISSUED FOR STAGE 4	01.09.2022	SL	IB
P10	ISSUED FOR COMMENT	28.07.22	SL	IB
P09	Electric vehicle and car-share labels added.	12.05.2022	AMS	IB
P08	ISSUED FOR STAGE 3 COMMENTS	05.04.2022	SL	IB
P07	ISSUED FOR PLANNING	24.03.2022	SL	IB
P06	ISSUED FOR STAGE 3 REPORT	10.03.2022	IB	HLM
P05	Updated with new road layout and FFL +15.800	03.03.2022	IB	HLM
P04	Issued for Client engagement meeting	10.02.2022	IB	HLM
P03	Issued for Stage 2 Report	13.01.2022	SL	IB
P02	Tender Submission	21.10.2021	AMS	GW
P01	Preliminary Issue for Comment	07.10.2021	AMS	GW

Revisions
 Project: 15-1077-01
 Ysgol Y Deri - Primary School
 Client: Vale of Glamorgan Council
 Title: Proposed Site Layout - Facing Fort Road

Drawing No. YYDE-HLM-00-00-DR-L-00005 P12
 Scale @ A1 1:500
 Date 06.10.22
 Drawn SL
 Checked IB

HLM Architects
 © HLM Architects Suite 104 The Creative Quarter Morgan Arcade The Hayes Cardiff CF10 1AF
 www.hlmarchitects.com T. +44 (0) 29 2039 6070 F. +44 (0) 29 2039 6080 cardiff@hlmarchitects.com