Vale Consultancy

CONSULTING CIVIL & STRUCTURAL ENGINEERS

DRAINAGE STRATEGY REPORT (DSR)

Ysgol Morgan Llwyd,
Cefn Road,
Wrexham,
LL13 9NG

Prepared for: Wernick
Project Ref: 20851_DSR_r01

01656 863 794 | *enquiries@vale-consultancy.co.uk* | http://vale-consultancy.co.uk
29 Bocam Park | Old Field Road | Pencoed | Bridgend | CF35 5LJ

Thornlink Limited T/A Vale Consultancy
Registered Number | 04140053 | VAT Number | 879 7269 45

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01	Cameron Tanti BEng (Hons)	Jack Price BSc (Hons)	31.01.2025	First issue

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1 INTRODUCTION

1.1 Site Location

Vale Consultancy has been instructed by Wernick (the Client) to undertake a drainage strategy report (DSR) for the proposed development at Ysgol Morgan Llwyd, Cefn Road, Wrexham, LL13 9NG.

Refer to **Appendix A** – Existing Site Plans

The proposed development is located approximately 2km north-east of Wrexham city centre. The site is found within the existing school grounds and can be accessed via Cefn Road. Immediately surrounding the development site is Plas Rhosnesni Care.

The proposed development site is undeveloped and is therefore classed as a **'greenfield'** site. The following drainage strategy will cover the hydraulic design criteria of the surface water drainage network only.



Figure 1: *Site Location Satellite Plan*

1.2 Proposed Development

The intention of the proposed project is to construct a single modular unit and associated external works areas to form a new set of classrooms, whilst also incorporating various, raingardens & an attenuation tank into the scheme to provide, amenity & biodiversity across the site.

The total site area is approximately 0.05ha, the whole site is to be developed and as such the development/SAB boundary will also be 0.05ha.

Refer to **Appendix B** – Proposed Plans

1.3 Existing Geology

There was an infiltration test carried out by Gibbs Geotechnical in December 2024. The testing carried out concluded that infiltration was not possible within the site boundary. This is likely due to the presence of clay dominated strata beneath the site.

British Geological Survey records note that the site is listed to have the following:

Superficial deposits: Glaciofluvial Sheet Deposits, Devensian - Sand and gravel. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

Bedrock geology: Salop Formation - Mudstone, sandstone and conglomerate. Sedimentary bedrock formed between 309.5 and 272.3 million years ago during the Carboniferous and Permian periods.

Refer to **Appendix D** – British Geological Survey record.

1.4 Flood Risk

Flood risk has been assessed using the NRW development advice map and detailed view map. The site is located within Zone A of the DAM, so is therefore considered to be at little or no risk of fluvial or tidal/coastal flooding. Furthermore, upon review of the detailed view map the site is outside of all flood zones meaning it has a less than 0.1% chance of flooding from all types including, sea, rivers, reservoirs, surface water and small watercourses. Further flood risk assessment is not considered necessary.

Refer to **Appendix D** – Natural Resource Wales Development Advice Map (DAM) and Flood Risk Assessment Wales Map (FRAWM)

2 SURFACE WATER

2.1 Existing Drainage Systems

As the proposed scheme is situated within an existing school, there is existing drainage apparatus within the site. There is a stormwater chamber to the northwest of site, where we will plan to discharge to. It is envisaged that foul drainage from the site will drain to the existing foul water network via a chamber to the south of the modular building. Refer to the existing site plan in **Appendix A** for the location of the existing drainage system.

2.2 Proposed Drainage Systems

2.2.1 S1: SuDS hierarchy of surface water discharge locations

The following receptors have been considered for surface water runoff on site, in order of SuDS preference. The aim of SuDS Standards is to ensure that the most effective drainage scheme is delivered with the most preferred levels of surface water destination, where the design can move to the next means of discharge only under exception criteria.

1. **Surface water collection for reuse.**
2. **Discharge by infiltration into ground**
3. **Discharge into open surface water body.**
4. **Discharge into surface water sewer, highway drain, or other drainage system.**
5. **Discharge into combined sewer.**

Priority Level 1 - Surface water collected for reuse:

Rainwater harvesting is not proposed due to the practicalities of such a system as well as there being no foreseeable demand for non-potable water within the development proposals throughout its design life. There is also no foreseeable need to harvest water as DCWW has not identified any potential stresses on the mains water supply.

The need for non-potable water is low and the cost for such a system is high therefore it is deemed not feasible.

No solution, move to next Priority Level

Priority Level 2 – Discharge via infiltration:

As explained in section 1.3, multiple infiltration testing has been undertaken by Gibbs Geotechnical. The ground conditions, groundwater and infiltration testing confirm that site is unsuitable for infiltration, please refer to **Appendix C** for the infiltration reports.

No solution, move to next Priority Level

Priority Level 3 – Discharge into open surface water body:

There are no nearby open surface water bodies to the site, with the nearest being approximately 1.25 kilometres away found between Erlas House and Erlas Lane. Therefore discharging into an open surface water body is deemed unviable. Please refer to Appendix D – BGS Records & NRW Maps for the location of the nearest open surface water body.

No solution, move to next Priority Level

Priority Level 4 – Discharge into surface water sewer, highway drain, or other drainage system:

Due to the nature of the site, there are several surface water chambers nearby, where we are proposing to discharge to, given the unviability of discharge at higher priority levels. Though the manholes are not picked up on the DCWW Asset Maps, we can assume that these are owned and maintained privately by the school. Please refer to Appendix A – Existing Site Plans, and Appendix B – Proposed Site Plans for the location of said manholes.

Solution found.

2.2.2 S2: Surface Water Runoff Hydraulic Control

Proposed SuDS drainage system

The proposed surface water drainage system will connect and discharge to an existing stormwater manhole located to the northwest of site.

The proposed SuDS drainage system is relatively simple, the concept is to discharge roof run-off from the proposed modular building through a variety of SuDS features such as a rain gardens, and an attenuation tank. Rain gardens 1 & 2 are located south to the modular building and will receive all flows from the roof at surface level. Any other runoff from the paths, will either flow directly into rain gardens at surface level, or aco drains leading to the rain gardens at surface level. The flows will then leave the rain gardens to the attenuation tank, and then a 20mm orifice which restricts outgoing flows to a rate of 0.5L/Sec.

Refer to **Appendix B** for the proposed surface water drainage layout illustrating how surface water is collected and conveyed towards their discharge location.

Hydraulic Control

The proposed SuDS drainage system will use a combination of SuDs features including bioretention raingardens and an attenuation tank to collect, attenuate and filtrate surface water runoff. Attenuation will be designed such that no flooding will occur for a 1 in 100-year storm event plus 40% climate change and an orifice plate will be installed downstream of the attenuation system to control discharge to the respective outfall location. After calculating the greenfield runoff rate, we found that the QBAR was 0.132 L/S, to achieve this we would have to use an orifice less than 20mm, which would realistically be prone to blocking and need constant maintenance and inspections to prevent flooding.

Therefore, a discharge rate of 0.5L/Sec is proposed in the Q100+40%cc critical event.

For hydraulic design of the drainage network refer to **Appendix E** – Design Calculations.

Interception of runoff

For greenfield sites the majority of rainfall events during the year create no noticeable surface water runoff, the rainwater will normally re-enter the water cycle via evapotranspiration or groundwater recharge.

Whereas impermeable surfaces generate runoff from virtually all rainfall events. Therefore, the development of greenfield sites changes its surface water runoff characteristics and can have a negative impact on the morphology and ecology of receiving watercourses.

By providing interception of runoff through SuDS systems, developed sites can be designed to have zero runoff for most small rainfall events and more closely replicate the surface water characteristics of its former greenfield state.

The proposals will introduce up to 455m^2 of impermeable surfaces to site, as defined by the Application Redline Boundary. Saying this, we are proposing two raingardens to the south of site, to intercept all runoff from the modular unit's roof and the adjacent path.

The remaining 1307m^2 will be covered by soft landscaping and SuDS features.

2.2.3 S3: Water Quality

To assess that the water quality being provided by the proposed SuDS solution is sufficient, the simple index approach as per section 26.7.1 of the CIRIA SuDS Manual 2015 is applied.

To deliver adequate water quality treatment the total SuDS mitigation index must be more than or equal to the pollution hazard index for each contaminant type. The pollution hazard and mitigation indices have been taken from tables 26.2 and 26.3 of the CIRIA SuDS Manual 2015.

Water quality - Simple Index Approach

		Pollution hazard index				Mitigation Index			
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons	SuDS Components for land use	Total Suspended Solids (TSS)	Metals	Hydro-carbons	Mitigation hazard index > Pollution hazard index (for each contaminant type)
Commercial Roof (Modular Building) & Surrounding Pedestrian Hardstanding	Low	0.3	0.2	0.05	Bioretention system (Raingarden),	0.8	0.8	0.8	**Yes**

The proposed design will ensure that surface water runoff will pass through the proposed SuDS feature before discharging to the existing surface water sewer. Surface water will be treated by the SuDS component before discharging via the existing stormwater network. The SuDS component will separate the smaller particles and chemicals from the surface water discharge as it traverses through the feature, providing sufficient water quality treatment to any discharging water.

2.2.4 S4: Amenity

The use of rain gardens has been incorporated to boost the amenity benefits to the site and surrounding area. The design aims to keep surface water as close to the ground surface as possible without over complicating the SuDS solution.

Green spaces are of particular and growing importance within urban and suburban settings. They can help to improve localised air quality, provide habitats for small birds and insect, and help to improve mental well-being for site residents / occupants alike.

The SuDS features and particularly the soft landscaping will improve the visual aesthetics of the site and promote evapotranspiration.

2.2.5 S5: Biodiversity

In urban areas, it is of particular importance to provide biodiversity. As these areas can be generally inhabitable for wildlife. By providing small biodiverse areas across larger urban environments wildlife can start to link areas and create networks, providing habitat as well as improving biodiversity and sustainability.

The use of rain gardens can help to provide a new quality habitat for wildlife, having a positive contribution to biodiversity in the area. The use of planting native species can support local biodiversity by providing habitat and food for invertebrates and birds. A list of plants species suitable to the rain gardens can be incorporated are included on the drainage details drawing.

2.2.6 S6: Operation and Maintenance Requirements

The construction management plan and construction phasing plan will be developed by the appointed contractor, as the SuDS scheme requires coordination with all other elements of the development that will be constructed as part of the scheme, including plot strip / trench fill foundations, plot / boundary walls, foul drainage. We understand that the construction management plan and construction phasing plan can be conditioned to the SAB approval.

To ensure SuDS components continue to operate reliably, regular inspection and maintenance should be carried out. In most cases, appropriate information should be provided by the relevant manufacturer on what has been installed, how it works, when to inspect it and whether maintenance will be required. CIRIA C753 The SuDS Manual also provides information on the operation and maintenance requirements for various SuDS components.

An inspection and maintenance plan has been produced for the site proposals, providing the site owner (s), who is responsible for the maintenance, guidance on the types and frequency of inspections and maintenance work that is required for the proposed SuDS element. It also provides a cost estimate for the inspection and maintenance requirements over the development's lifetime.

Refer to **Appendix F –** Management & Maintenance Plan.

3 CONCLUSIONS

The 0.05ha greenfield site at Ysgol Morgan Llwyd, Cefn Road, Wrexham, LL13 9NG is to be developed such that a singular modular unit is to be constructed. The total site area is approximately 0.05ha, the whole site is to be developed and as such the development/SAB boundary will also be 0.05ha. All surface water incident upon each respective catchment is collected, conveyed and discharged towards the downstream SuDS components as illustrated on the drainage plan which can be found in **Appendix B**. In an exceedance event, surface water runoff will generally flow away from the proposed building & towards the grassed area surrounding the building.

Following the hierarchical approach to discharge location of surface water for new developments as set out in the Statutory Standards for SuDS. The proposed development will provide the site with a new sustainable surface water drainage system that will incorporate multiple SuDS features, providing a solution that will intercept and treat surface water runoff before discharging to the existing stormwater network.

The proposed SuDS features will provide sufficient attenuation storage for all storm events up to and including the critical duration 1 in 100-year storm event plus 40%, before discharging at a controlled rate of 0.5 L/SEC to the existing stormwater network, refer to **Appendix E** – Design Calculations.

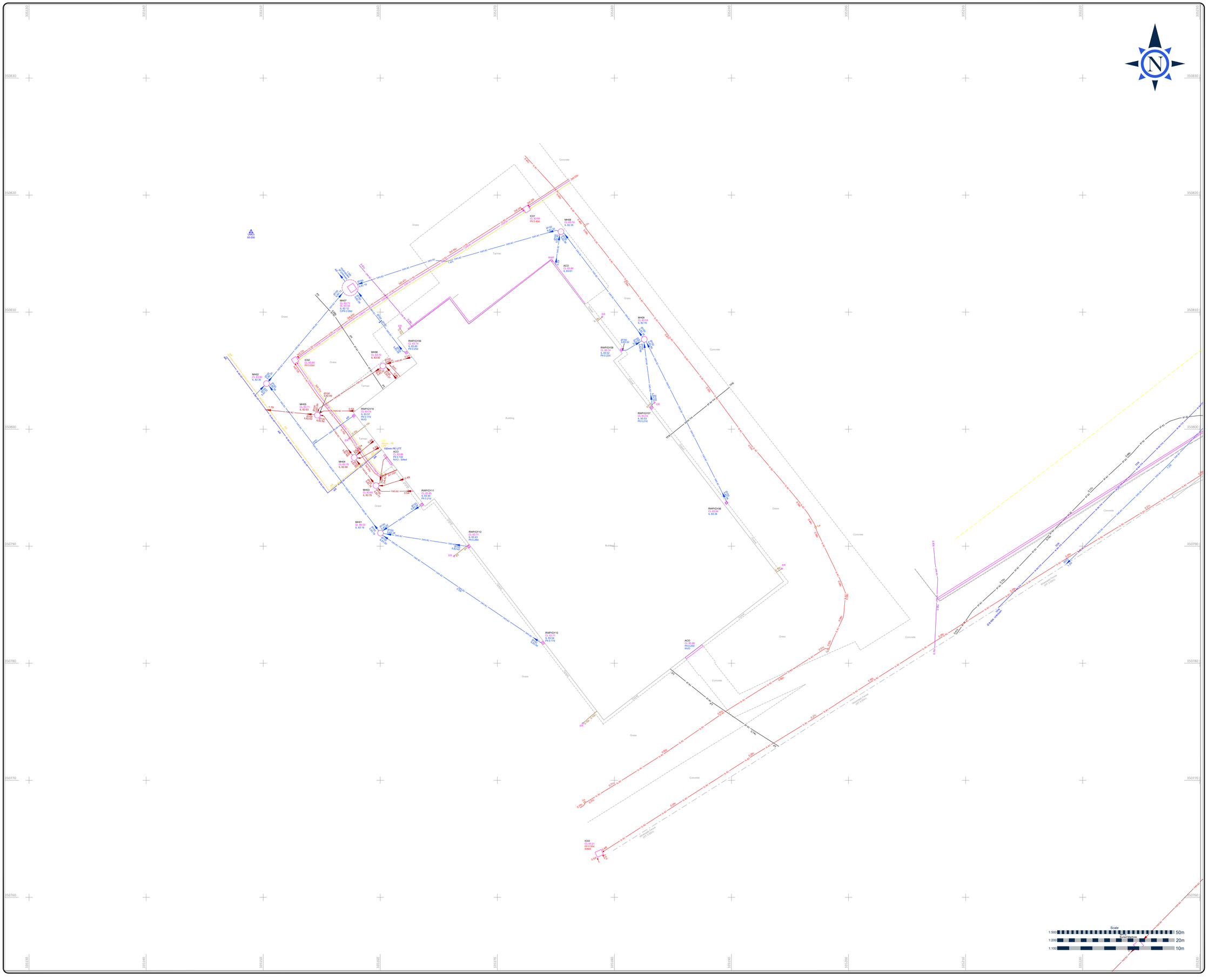
The SuDS components considered suitable for this site are raingardens & an attenuation tank. Surface water will convey from the roof of the modular unit and will either discharge directly into the attenuation tank, or discharge to adjacent raingardens where the water will get treated by a combination of native plant species and stone drainage blankets. The SuDS solution provides improvements to water quality, amenity and biodiversity.

A foul water drainage system is required as part of this development. It is intended to convey foul flows through a piped network to the existing foul water network.

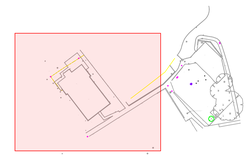
Overall, the proposed surface water drainage system seeks to be a cost effective and easily maintainable sustainable drainage solution. The surface water discharge locations are the most appropriate and preferred method within the sites constraints and the SuDS components incorporated in the design provide suitable surface water management as close to the source as possible and provide water quality, amenity and biodiversity benefits.

APPENDIX A:

Existing Site Plans



Sheet Layout



Legend

AR	Assumed Route	GRun	Gully Run	RS	Road Sign
AV	Air Valve	GR	Gas Riser	RWP	Rain Water Pipe
BH	Borehole	GV	Gas Valve	SA	Soakaway
BLK	Blocked	HOR	Head of Run	SL	Soffit Level
BP	Block Paving	HT	Height	ST	Stop Tap
Bol.	Bollard	IB	Illuminous Bollard	STN	Survey Control Station
BH	Borehole	IC	Inspection Chamber	SV	Stop Valve
CBox	Communication Chamber	KERP	Kerb Entry Dropped	TEL	Telephone Pole
CBox	Control Box	IL	Invert Level	TBM	Temporary Benchmark
CchPt	Catchpit	KO	Kerb Outlet	TFR	Taken From Records
CHE	Chamber Extents	LB	Lighting Bollard	THL	Threshold Level
CL	Cover Level	LC	Lighting Column	TL	Traffic Light
CP	Control Point	LE	Level Edge	TP	Trial Pit
CPB	Concrete Paving Slabs	LP	Lamppost	TP	Telegraph Pole
CR	Cable Riser	MH	Manhole	UIS	Underside
CTV	Cable TV	MKR	Marker	UL	Uplight
DrCham.	Drainage Channel	MTR	Meter	UTF	Unable to Find
DP	Down Pipe	MWall	Masonry Wall	UTL	Unable to Lift
DL	Directly Laid	NOU	Number of Ducts Unknown	UTR	Unable to Rod
DP	Down Pipe	NVI	No Visible Incoming	UTS	Unable to Survey
DR	Duct Riser	NVO	No Visible Outgoing	UTT	Unable to Trace
EJB	Electricity Junction Box	NVP	No Visible Pipe	VP	Vent Pipe
EP	Electricity Pole	OBH	Off Set Hole	VR	Vapour Recovery
EOT	End Of Trace	OSA	Off Survey Area	WFC	Water Filled Chamber
ER	Earth Rod	OSBM	Ordinance Survey Benchmark	WM	Water Meter
FFL	Finished Floor Level	PR	Pipe Riser	WO	Wash Out
FH	Fire Hydrant	PT	Poor Trace	WR	Water Riser
FP	Flag Pole	RE	Rodding Eye	Ø	Diameter
FS	Fire Switch	RWall	Retaining Wall	3SI	3-Stage Interceptor
G	Gully				

Pipeline Material Abbreviations

AC	Asbestos Cement	PVC	Polyvinyl Chloride
CI	Cast Iron	RC	Reinforced Concrete
DI	Ductile Iron	S	Steel
HDPE	High Density Polyethylene	SS	Stainless Steel
MS	Mild Steel	VC	Vitrified Clay
PE	Polyethylene	WI	Wrought Iron

Utility Legend

EHV	Extra High Voltage Electricity	FWS	Foul Drainage
HV	High Voltage Electricity	SWS	Surface Drainage
LV	Low Voltage Electricity	CWS	Combined Drainage
SL	Street Lighting	DWS	Effluent Drainage
TL	Earthing Strip	ACW	Adtlue Line
TS	Traffic Signals	C	Convey Line
CATV	Cable Television	V	Vent Line
CCTV	Closed Circuit Television	F	Fuel Line
COM	Communications	VR	Vapour Recovery
BT	British Telecoms	G	Glycol Line
FO	Fibre Optics	OIL	Oil Pipe
GAS	Gas	HPL	Heating Pipe
HPG	High Pressure Gas	A	Compressed Air
IPG	Intermediate Pressure Gas	O2	Oxygen Supply
LPG	Localised High Pressure Gas	CATV	Alarm Cable
MPG	Medium Pressure Gas	U	Empty Duct
W	Water	M	Multi Service Duct
P	Pipeline	FOAM	Foam Service Pipe
UNK	Unknown Asset	B	Survey Boundary
U_GPR	Unknown GPR		Chamber Extents
			Approx. CE

Utility Location Depth Explanation

The located depth of a service obtained during a survey may be received to 3 different locations;

Center (c); EML Electromagnetic locating provides a depth to the center of the magnetic field received which is also the center of the pipe or cable.

Invert (i); Depths obtained during drainage surveys or using Flexi Trace or Sonde are taken at the invert of a pipe.

Top (t); GPR Ground Penetrating Radar provides depths to the top or crown of a pipe.

0.30c 0.30i 0.30t

The letter following the depth indicates to where the depth has been measured to.

ELECTRO-MAGNETIC DETECTION — APPROX DEPTH TO CENTRE — PIPE OR CABLE (CONDUCTIVE)

SONDE & FLEXI TRACE — APPROX DEPTH TO INVERT — EMPTY DUCT OR DRAINAGE

GROUND PENETRATING RADAR — APPROX DEPTH TO EXTERNAL CROWN — PIPE OR CABLE (NON CONDUCTIVE)

Utility Block Legend

EOT — End of Trace

Capped — Capped Service

TFR — End of Service End of Record

Diameter Change

Junc. — Junction Observed On Drainage CCTV

PAS 128 Quality Level Classifications

Quality Level labeling of located utilities with a classification code allows the user of the information to understand clearly how it was obtained and then apply appropriate confidence and reliance upon it. Project risks relating to underground utilities can then be properly managed.

QL A Information is obtained by visually confirming the utility location, type, position and size. Services can be visually proven by way of Non destructive digging (NDD) using Vacuum Excavation or hand digging techniques to expose the buried service. Once accurately surveyed tolerances for a QL-A classification are: +/- 50mm of given depth and +/- 25mm horizontally.

QL B1 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B1 classification at least two methods must accurately locate and agree on a buried service location. Once accurately surveyed tolerances for a QL-B1 classification are: +/- 15% of given depth and +/- 150mm horizontally.

QL B2 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B2 classification one method must accurately locate a buried service location. Once accurately surveyed tolerances for a QL-B2 classification are: +/- 40% of given depth and +/- 250mm horizontally.

QL B3 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B3 classification one method may indicate a possible position for a service location however due to possible interference or poor results no depth can be achieved. Once accurately surveyed tolerances for a QL-B3 classification are: no given depth and +/- 500mm horizontally.

QL B4- Information is has been unable to be located using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment but is believed to exist until proven otherwise. This type of information could also be associated with assumed routes and Taken from records. There are no design tolerances associated with a B4 quality level and information should be treated with caution.

QL C Information is collected by correlating the survey of visible surface features such as marker plates, manholes or trench scars with existing drawing or record information to enable the approximate position of a utility to be determined. There are no design tolerances associated with a QL-C quality level.

QL D Information is the most basic level of Utility information derived from existing drawing and record information . This method should always be treated as an indication of the presence of a service and should not be used for design.

Drawing Notes

Utility depths and levels shown are in meters.

Pipe sizes and materials which cannot be obtained by visual survey are taken from record drawings or marker plates where available.

Cable routes shown as a single line may actually consist on many cables please refer to annotated configuration details where provided.

Drainage pipe sizes and invert levels have been determined without man entry into chambers. Every effort has been made to correctly obtain this information however accuracy is dependant on the visibility of the service.

For all equipment specifications, site procedures and limitations encountered on this project please see the survey report.

Coordinates and Levels are derived from Ordnance Survey datum OSGB36 through a series of GNSS RTK Observations.

Detection Disclaimer: Electromagnetic locating techniques as well as Ground Penetrating Radar have been utilized in the location of underground services. These results are non-infallible and a NDD non destructive process should be carried out to confirm service identification positions and particularly depths where these are critical. Although all reasonable effort has been made in the locating and mapping of underground services the complete extents of this Utility survey information cannot be guaranteed.

Client Logo: EvaBuild

Project Address:
Ysgol Morgan Llwd
Cefn Road
Wrexham
LL13 9NG

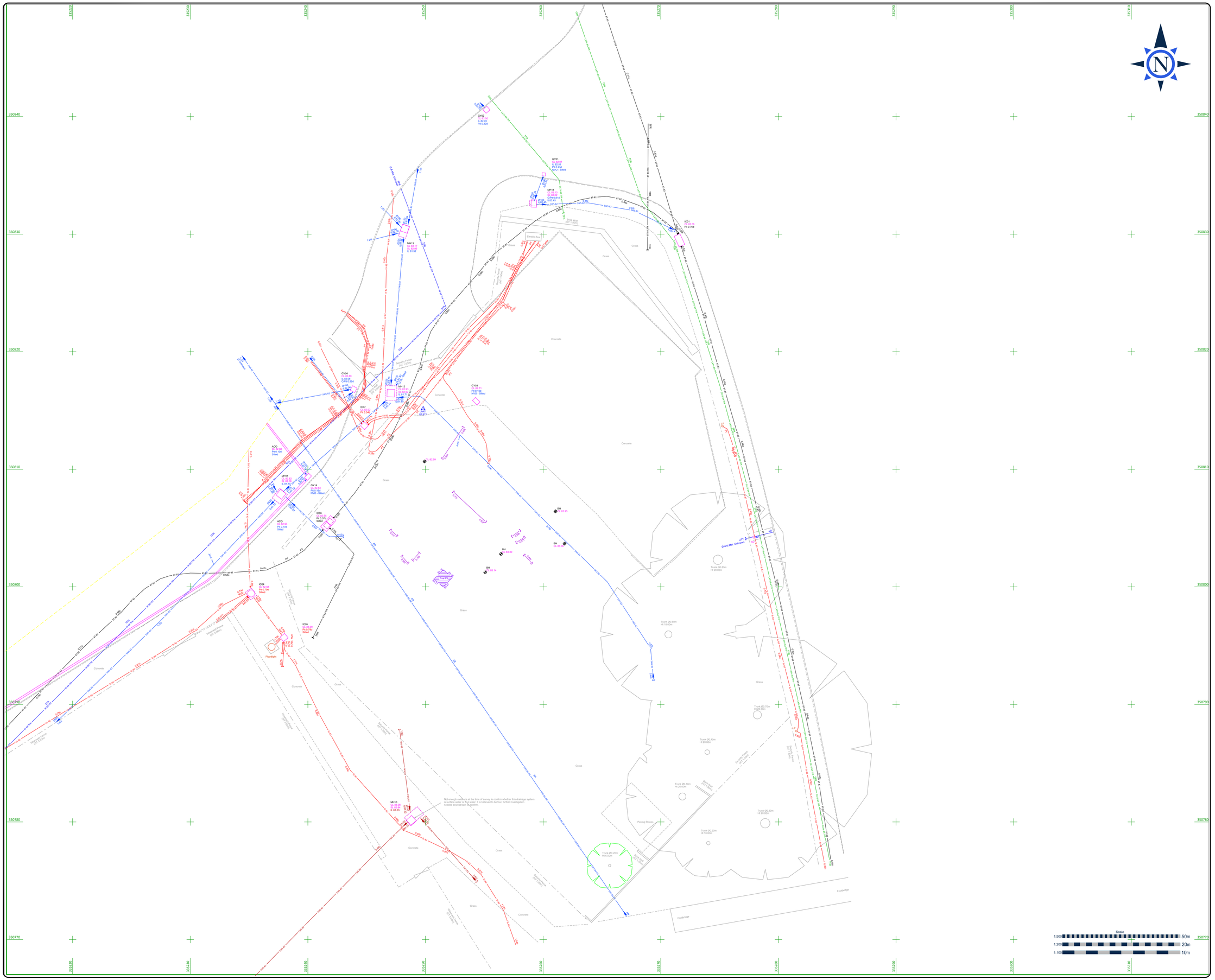
Project Title:
PAS128 QL-B 2D M2 Utility Mapping + Topographic Survey

Surveyor	Drawn	Checked	Survey Date:	Scale:
CD/ER	BB	PL	05/12/2024	1:100 @ A0

Project Number:	Sheet No:	Revision:
UM24-2949-EVA	01 OF 02	0

Revision	Revision Notes	Date

Utility MAPPING
0800 024 UMAP (8627)
www.u-map.co.uk info@u-map.co.uk



Sheet Layout



Legend

AIR	Assumed Route	GRun	Gully Run	RS	Road Sign
AV	Air Valve	GR	Gas Riser	RWP	Rain Water Pipe
BAR	Barrier Line	GV	Gas Valve	SAT	Satellite Dish
BLK	Blocked	HOR	Head of Run	SL	Soffit Level
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CTV	Cable TV	MKR	Marker	UL	Uplight
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EPT	Electricity Pole	OSA	Off Survey Area	WFC	Water Filled Chamber
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FFL	Finished Floor Level	PR	Pipe Riser	WO	Wash Out
FH	Fire Hydrant	PT	Poor Trace	WR	Water Riser
FP	Flag Pole	RE	Rodding Eye	Ø	Diameter
FS	Fire Switch	RWall	Retaining Wall	3SI	3-Stage Interceptor
G	Gully				

Pipeline Material Abbreviations

AC	Asbestos Cement	PVC	Polyvenyl Chloride
CI	Cast Iron	RC	Reinforced Concrete
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MS	Mild Steel	VC	Vitrified Clay
PE	Polyethylene	WI	Wrought Iron

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TL	Earthing Strip	ADS	Adtlive Line
TS	Traffic Signals	O	Offset Fill Line
CATV	Cable Television	V	Vent Line
CCTV	Closed Circuit Television	FUEL	Fuel Line
COM	Communications	VR	Vapour Recovery
BT	British Telecoms	G	Gauge Line
FO	Fibre Optics	OIL	Oil Pipe
GAS	Gas	HTG	Heating Pipe
HPG	High Pressure Gas	A	Compressed Air
IPG	Intermediate Pressure Gas	O2	Oxygen Supply
LHPG	Localised High Pressure Gas	ALARM	Alarm Cable
MPG	Medium Pressure Gas	D	Empty Duct
W	Water	M	Multi Service Duct
P	Pipeline	FOAM	Foam Service Pipe
UNK	Unknown Asset	SURVEY	Survey Boundary
U.GPR	Unknown GPR		Chamber Extents
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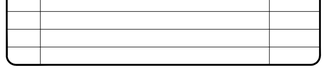
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Utility Block Legend



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Quality Level labeling of located utilities with a classification code allows the user of the information to understand clearly how it was obtained and then apply appropriate confidence and reliance upon it. Project risks relating to underground utilities can then be properly managed.

QL A Information is obtained by visually confirming the utility location, type, position and size. Services can be visually proven by way of Non destructive digging (NDD) using Vacuum Excavation or hand digging techniques to expose the buried service. Once accurately surveyed tolerances for a QL-A classification are: +/- 50mm of given depth and +/- 25mm horizontally.

QL B1 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B1 classification at least two methods must accurately locate and agree on a buried service location. Once accurately surveyed tolerances for a QL-B1 classification are: +/- 15% of given depth and +/- 150mm horizontally.

QL B2 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B2 classification one method must accurately locate a buried service location. Once accurately surveyed tolerances for a QL-B2 classification are: +/- 40% of given depth and +/- 250mm horizontally.

QL B3 Information is obtained using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment. in order to achieve a B3 classification one method may indicate a possible position for a service location however due to possible interference or poor results no depth can be achieved. Once accurately surveyed tolerances for a QL-B3 classification are: no given depth and +/- 500mm horizontally.

QL B4 Information is has been unable to be located using Electromagnetic Pipe & Cable locators EML, Sonde or Flexi trace and Ground Penetrating Radar GPR equipment but is believed to exist until proven otherwise. This type of information could also be associated with incorrect records and Taken from records. There are no design tolerances associated with a B4 quality level and information should be treated with caution.

QL C Information is collected by correlating the survey of visible surface features such as marker plates, manholes or trench scars with existing drawing or record information to enable the approximate position of a utility to be determined. There are no design tolerances associated with a QL-C quality level.

QL D Information is the most basic level of Utility information derived from existing drawing and record information . This method should always be treated as an indication of the presence of a service and should not be used for design.

Drawing Notes

Utility depths and levels shown are in meters.

Pipe sizes and materials which cannot be obtained by visual survey are taken from record drawings or marker plates where available.

Cable routes shown as a single line may actually consist on many cables please refer to annotated configuration details where provided.

Drainage pipe sizes and invert levels have been determined without man entry into chambers. Every effort has been made to correctly obtain this information however accuracy is dependant on the visibility of the service.

For all equipment specifications, site procedures and limitations encountered on this project please see the survey report.

Coordinates and Levels are derived from Ordnance Survey datum OSGB36 through a series of GNSS RTK Observations.

Detection Disclaimer: Electromagnetic locating techniques as well as Ground Penetrating Radar have been utilized in the location of underground services. These results are non infallible and a NDD non destructive process should be carried out to confirm service identification positions and particularly depths where these are critical. Although all reasonable effort has been made in the locating and mapping of underground services the complete extents of this Utility survey information cannot be guaranteed.

Client Logo: EvaBuild

Project Address:
Ysgol Morgan Llwd
Cefn Road
Wrexham
LL13 9NG

Project Title:
PAS128 QL-B 2D M2 Utility Mapping + Topographic Survey

Surveyor	Drawn	Checked	Survey Date:	Scale:
CD/ER	BB	PL	05/12/2024	1:100 @ A0

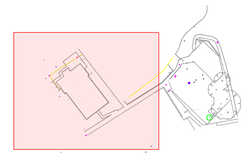
Project Number:	Sheet No:	Revision:
UM24-2949-EVA	02 OF 02	0

Revision	Revision Notes	Date

Scale
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1:100 10m

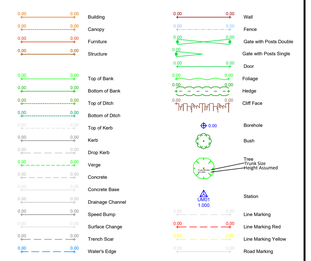
Utility MAPPING
0800 024 UMAP (8627)
www.u-map.co.uk info@u-map.co.uk

Sheet Layout



Legend

AR	Assumed Route	MW	Monitoring Well
AV	Air Valve	NVP	No Visible Pipe
BH	Borehole	OG	Ordnance Grid
BH	Borehole	OSA	OS Survey Area
BTIC	BT Inspection Chamber	OSBM	Ordnance Survey Benchmark
CBox	Control Box	PR	Pipe Riser
CP	Catchpit	PT	Poor Trace
CL	Cover Level	RB	Rodding Eye
Conc	Concrete	RWall	Retaining Wall
CW	Cold Water	RS	Road Sign
CTV	Cable TV	RWP	Rain Water Pipe
DiChan.	Drainage Channel	SA	Soakaway
DP	Down Pipe	SL	Soffit Level
EJB	Electricity Junction Box	ST	Stop Tap
ER	Electric Riser	STN	Survey Control Station
EP	Electricity Pole	SV	Stop Valve
ER	Earth Rod	SVP	Soil Vent Pipe
FFL	Finished Floor Level	TBM	Temporary Benchmark
FH	Fire Hydrant	TFR	Taken From Records
FP	Fence Post	TL	Traffic Island
FS	Fire Switch	TL	Traffic Light
G	Gully	TP	Telegraph Pole
GrRun	Gully Run	U/S	Underside
GV	Gas Valve	UL	Uplight
HH	Hand Hole	UNF	Unable to Find
IB	Illuminated Bollard	UTL	Unable to Lift
IC	Inspection Chamber	UTR	Unable to Rod
IGP	Illuminated Guidepost	UTS	Unable to Survey
IL	Invert Level	UTT	Unable to Trace
KL	Kerb Level	V	Valve
LB	Lighting Bollard	VR	Vapour Recovery
LC	Lighting Column	WFC	Water Filled Chamber
LP	Lamppost	WM	Water Meter
MH	Manhole	WO	Wash Out
MKR	Marker	WR	Water Riser
MTR	Meter	Ø	Diameter



Station Table

SURVEY STATIONS

Name	Easting	Northing	Height
UM01	335249.793	350815.155	82.971
UM03	335148.962	350816.864	83.030
UM02	335160.939	350751.843	83.239

Drawing Notes

Utility depths and levels shown are in meters.

Pipe sizes and materials which cannot be obtained by visual survey are taken from record drawings or marker plates where available.

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Drainage pipe sizes and invert levels have been determined without man entry into chambers. Every effort has been made to correctly obtain this information however accuracy is dependant on the visibility of the service.

Coordinates and Levels are derived from Ordnance Survey datum OSGB36 through a series of GNSS RTK Observations.

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EvaBuild

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Project Number:	Sheet No.:	Revision:
UM24-2949-EVA	01 OF 02	0

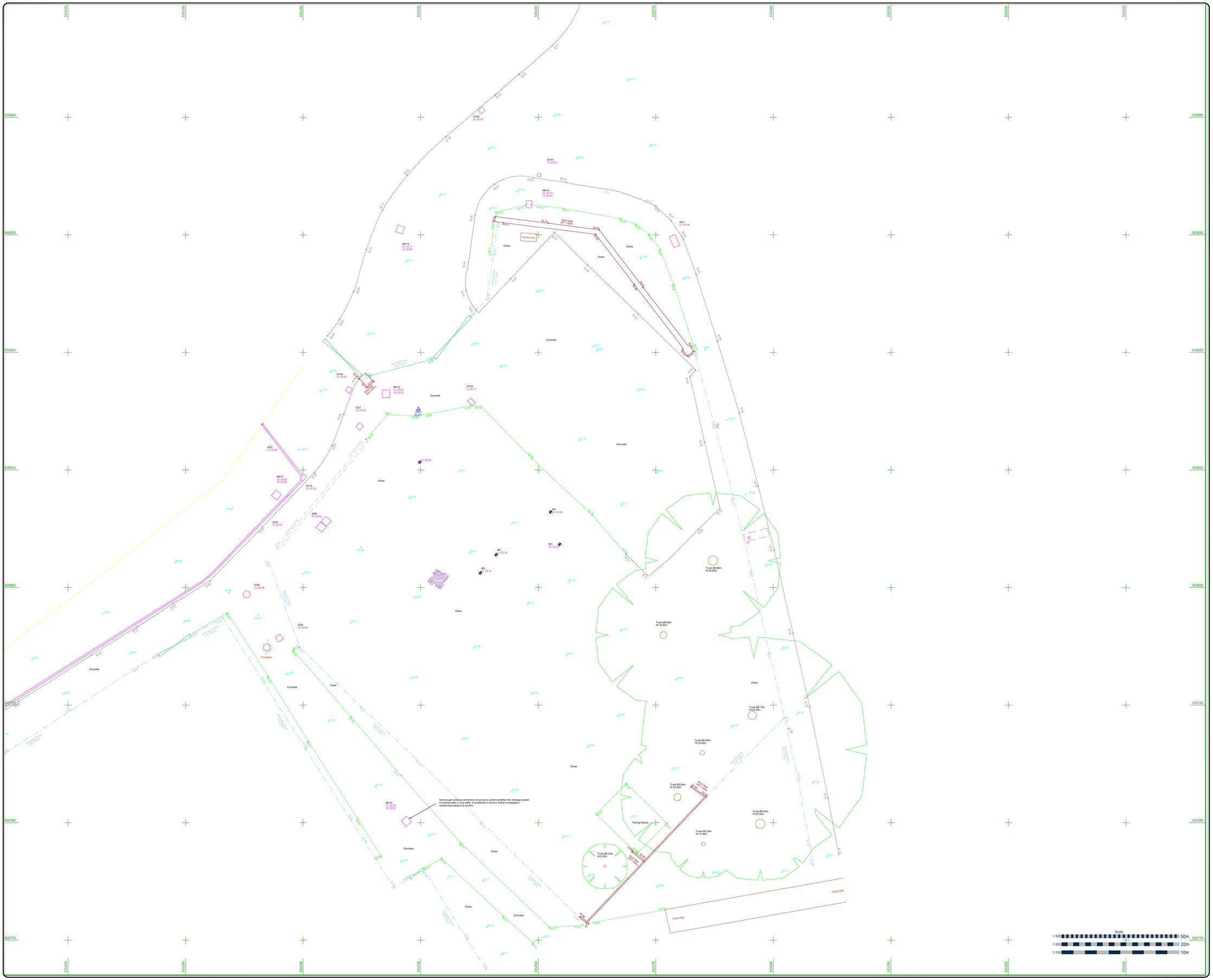
Revision	Revision Notes	Date

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Scale
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1:200 20m
1:100 10m
Bunker Machine

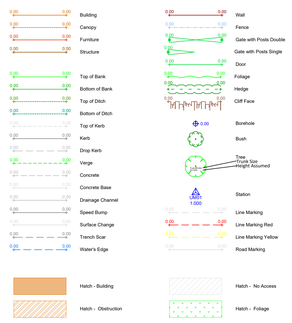


Sheet Layout



Legend

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Project Title:
PAS128 QL-B 2D M2 Utility Mapping + Topographic Survey

Surveyor	Drawn	Checked	Survey Date:	Scale:
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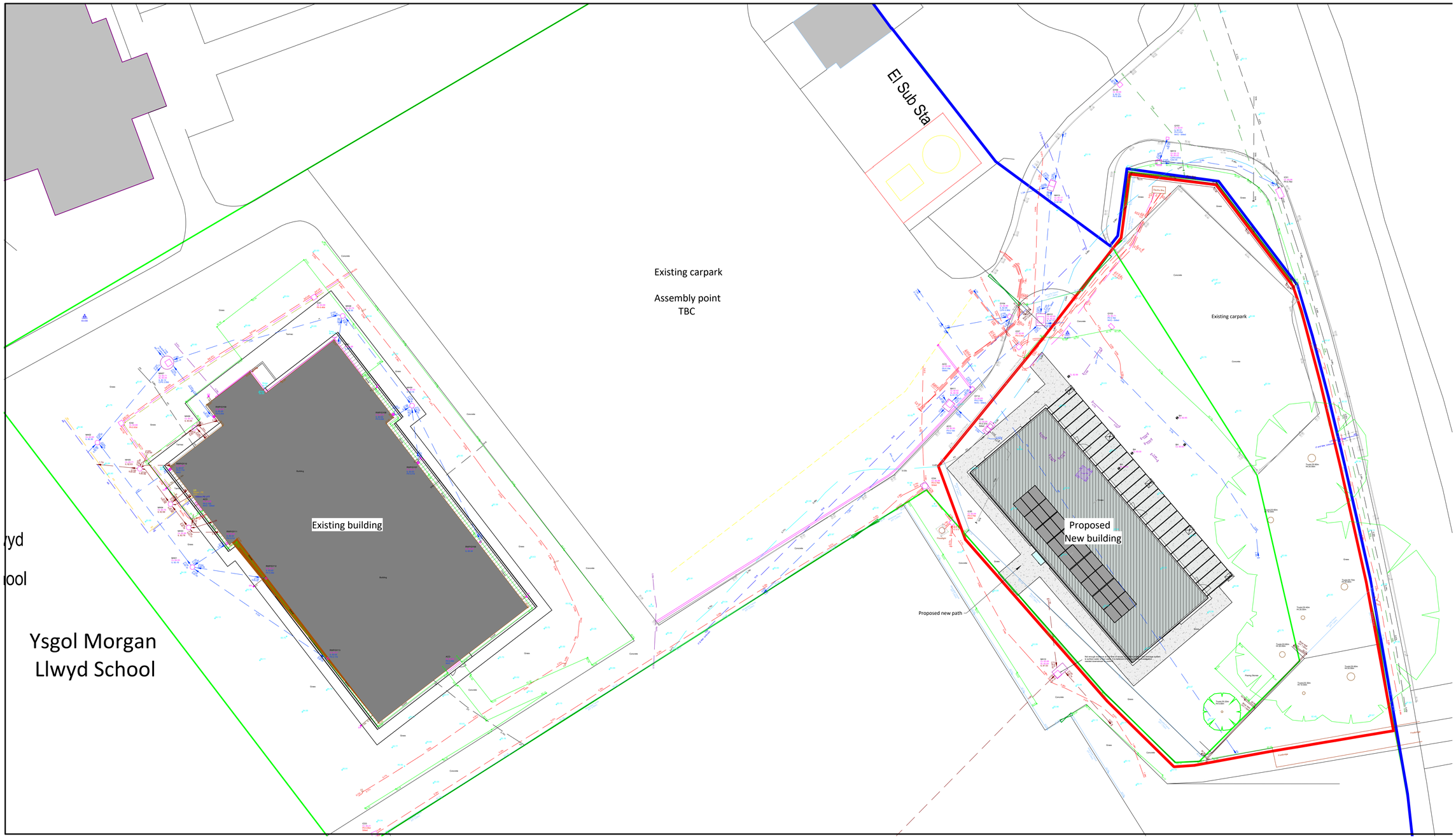
Project Number:	Sheet No:	Revision:
UM24-2949-EVA	01 OF 02	0

Revision	Revision Notes	Date

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APPENDIX B:

Proposed Site Plans



1 Site plan
1 : 200

0 4m 12m 20m

N

Wernick GROUP

Part of the Wernick Group of Companies.
WB 527B

Number	Revision Description	Date	Issued	Checked
P01	First issue	16-Jan-2025	SL	KA

SUITABILITY:

WORK IN PROGRESS:
S0 - Initial Stage or WIP
PUBLISHED (CONTRACTUAL):
Approved & Accepted
A0 to **A7** and STAGES **0** to **7**

SHARED (NON-CONTRACTUAL):
S1 - For coordination
S2 - For information
S3 - For review and comment
S4 - For stage approval

• Do not scale from this drawing. • Check all dimensions on site. • Report any discrepancies and omissions to WB Technical Services. • This drawing is based on photocopied/scanned information liable to distortion in scale. • These drawings are copyright, project specific and confidential and no part is to be used or copied in any way without the express prior consent of Wernick Buildings.

NOTES:

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION PURPOSES UNTIL "APPROVED FOR CONSTRUCTION" STAMP IS APPLIED. The areas shown are approximate only and have been measured off preliminary drawings as the likely areas at the current stage of design using the started option from the code of Measuring Practice, 4th edition. RISCS/ISVA These may be affected by future design development and construction tolerances, or the result of surveys for existing buildings. Take account of these factors before planning any financial or property developemnt purpose or strategy and seek confirmation of latest areas before decision making.

Wernick BUILDINGS
Kenfig Industrial Estate, Port Talbot, SA13 2 PE
Tel: 01656 747 340 **Website:** wernick.co.uk

CLIENT:	Wrexham Borough Council
PROJECT:	Ysgol Morgan Llwyd - 3 No. classroom
	Cefn Road, LL13 9NG Wrexham
DRAWING TITLE:	Proposed site plan

DRAWN:	CHECKED:	APPROVED:	SCALE:
SL	KA	KN	1 : 200@ A1
FIRST ISSUE:	CONTRACT NO:	SUITABILITY:	REVISION:
16-Jan-25	12117	S0	P01

12117 - WB - 02 - B1 - DR - AA - 0203

APPENDIX C:

Ground Investigation Reports

Infiltration Testing For:

Ysgol Morgan Llwd,
Cefn Road,
Wrexham,
LL13 9NG

Prepared for: EvaBuild

REF: Ysgol Morgan Llwd #684

DATE: 16.12.2024

GibbsGeoTechnical

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

GibbsGeoTechnical

Document Control

Project	**Ysgol Morgan Llwd**
Client	**EvaBuild**
Ref:	**Ysgol Morgan Llwd #684**

Document Checking:

Prepared By: **Oliver Gibbs** **Signed:** 

Issue	Date	Status
01	**16/12/2024**	**Written and submitted**
02		
03		

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

GibbsGeoTechnical

Contents

1 Introduction 3
1.1 Brief 3
1.2 Site Investigations 3
2 Site findings 4
2.1 Method of testing 4
2.2 British Geological Records 4
2.3 Trial pit soil conditions 4
3 Results 5
4 Conclusions 8
APPENDIX A: Site Test Plans 9
APPENDIX B: Site Photos 10
APPENDIX C: BGS Records 13

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

1 Introduction

1.1 Brief

Gibbs Geotechnical has been instructed by EvaBuild (the Client) to undertake 1 soil infiltration test to BRE365 standard at Ysgol Morgan Llwd, Cefn Road, Wrexham, LL13 9NG.

National Grid Reference: SJ352507 – Easting 335258, Northing 350798

Latitude, Longitude: 53.050507 , -2.9672742



Figure 1 - Site location

One BRE365 infiltration test has been proposed to determine the local geology and permeation rates on site. This BRE365 test pit will be 0.5x1.0x0.5m minimum and tested a maximum of 3 times or as many as possible in the timeframe allowed. Refer to **Appendix A** – Site Test Plans

1.2 Site Investigations

The tests were performed by Gabriel Usher (of Gibbs Geotechnical) on the 5th of December 2024. Refer to **Appendix B** – Site photos

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

2 Site findings

The following tests were performed to the best of the ability of those involved, subject to site constraints and weather conditions. The test pit was successfully excavated to 1.0m depth, shown in the location on **Appendix A**, whereupon it started to self-fill to a depth of 0.07m over a 15 minute time period. It was subsequently excavated to a depth of 1.5m where it self-filled to a depth of 0.08m after 17 minutes, and after filling with water to a depth of 1.32m drained away slowly – results shown below.

2.1 British Geological Records

Local searches from the British Geological Survey (BGS) online records show the site to have the following superficial soils and bedrock:

Bedrock: Salop Formation - Mudstone, sandstone and conglomerate. Sedimentary bedrock formed between 309.5 and 272.3 million years ago during the Carboniferous and Permian periods.

Superficial soils Glaciofluvial Sheet Deposits, Devensian - Sand and gravel. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

Refer to **Appendix C** for BGS records http://mapapps.bgs.ac.uk/geologyofbritain3d/

2.2 Trial pit soil conditions

Soils encountered were logged at the following approximate depths:

Pit 1

Topsoil:	*0-0.2m*	*- Lightly grassed loam*
Superficial soils:	*0.2-1.5m*	*- Sand/gravel/clay*

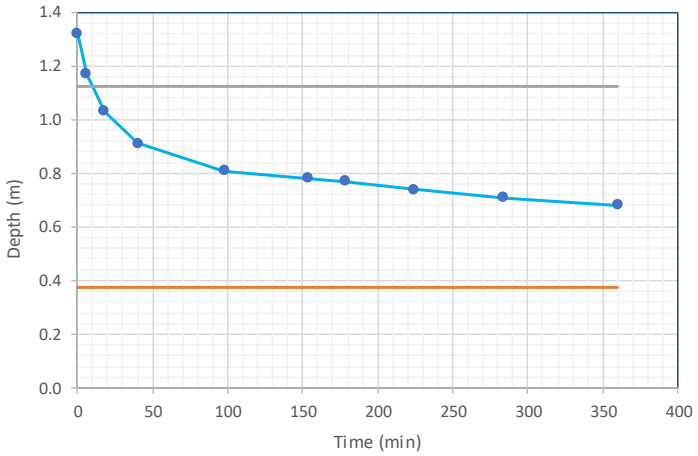
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Cartref Dawel | Upper Gellifelen
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T +44 7975688433
E info@gibbsgeotechnical.co.uk

Results

Soakaway Test Results - BRE 365 Digest standards				Site:	Ysgol Morgan Llwd
				Client:	EvaBuild
Trial Pit	**1**		**Date:**	05/12/2024	
			Performed by:	Gabriel Usher (of Gibbs Geotechnical)	
Dimensions	(m)		**Weather:**	Sunny	
Width	1		**Topsoil:**	Lightly grassed loam	
Length	0.5		**Superficial soil:**	Sand/gravel/clay	
Effective depth	1.5		**Comments:**		
Total depth of hole	1.5				

Test No.	Time (min)	Depth (m)			
1	0	1.32	**time 75% =**	10	
	6	1.17	**time 25% =**	N/A	
	18	1.03	**Area =**	0.5	
	40	0.91	**Vp 75% =**	1.125	
	98	0.81	**Vp 25% =**	0.375	
	154	0.78			
	178	0.77			
	224	0.74			
	284	0.71			
	360	0.68			
			Vp75-25 =	0.375	m
			As50 =	2.75	m²
			tp75-25 =	N/A	s
			f =	**N/A**	**m/s**



3 Conclusions

The tests which could be performed in the timeframe allowed found infiltration results of:

Test Pit 1: N/A – test pit did not drain to 25% in the 6 hour timeframe allowed.

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

GibbsGeoTechnical

APPENDIX A: Site Test Plans



Figure 1- Test pit locations

GIBBS GEOTECHNICAL
Cartref Dawel | Upper Gellifelen
Llanelly Hill |Abergavenny | NP7 0NU

T +44 7975688433
E info@gibbsgeotechnical.co.uk

APPENDIX B: Site Photos



Figure 2 - Test pit 1 during excavation – self-fill evident at 1.0m BGL



Figure 3 – Test pit 1 after subsequent excavation to 1.5m BGL, self-filling evident



Figure 4 - Test pit after filling and during monitoring



Figure 5 - Test pit remediation

(More pictures available upon request)

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T +44 7975688433
E info@gibbsgeotechnical.co.uk

APPENDIX C: BGS Records

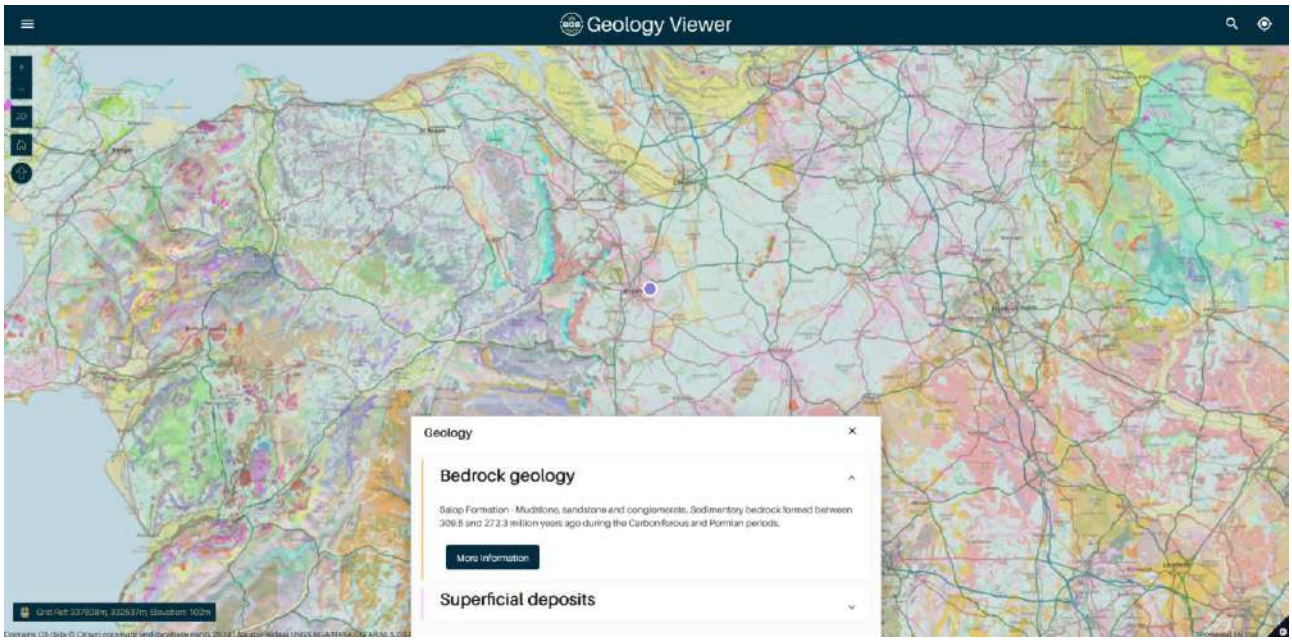


Figure 6 - Royal Geological survey records of the site

APPENDIX D:

British Geological Survey Records, Natural Resource Wales Development Advice Map (DAM) and Flood Risk Assessment Wales Map (FRAWM)

Geology

Bedrock geology

Salop Formation - Mudstone, sandstone and conglomerate. Sedimentary bedrock formed between 309.5 and 272.3 million years ago during the Carboniferous and Permian periods.

More Information

Superficial deposits

Legend

Development Advice Map Zone C1

Zone C1

Development Advice Map Zone C2

Zone C2

Development Advice Map Zone B

Zone B

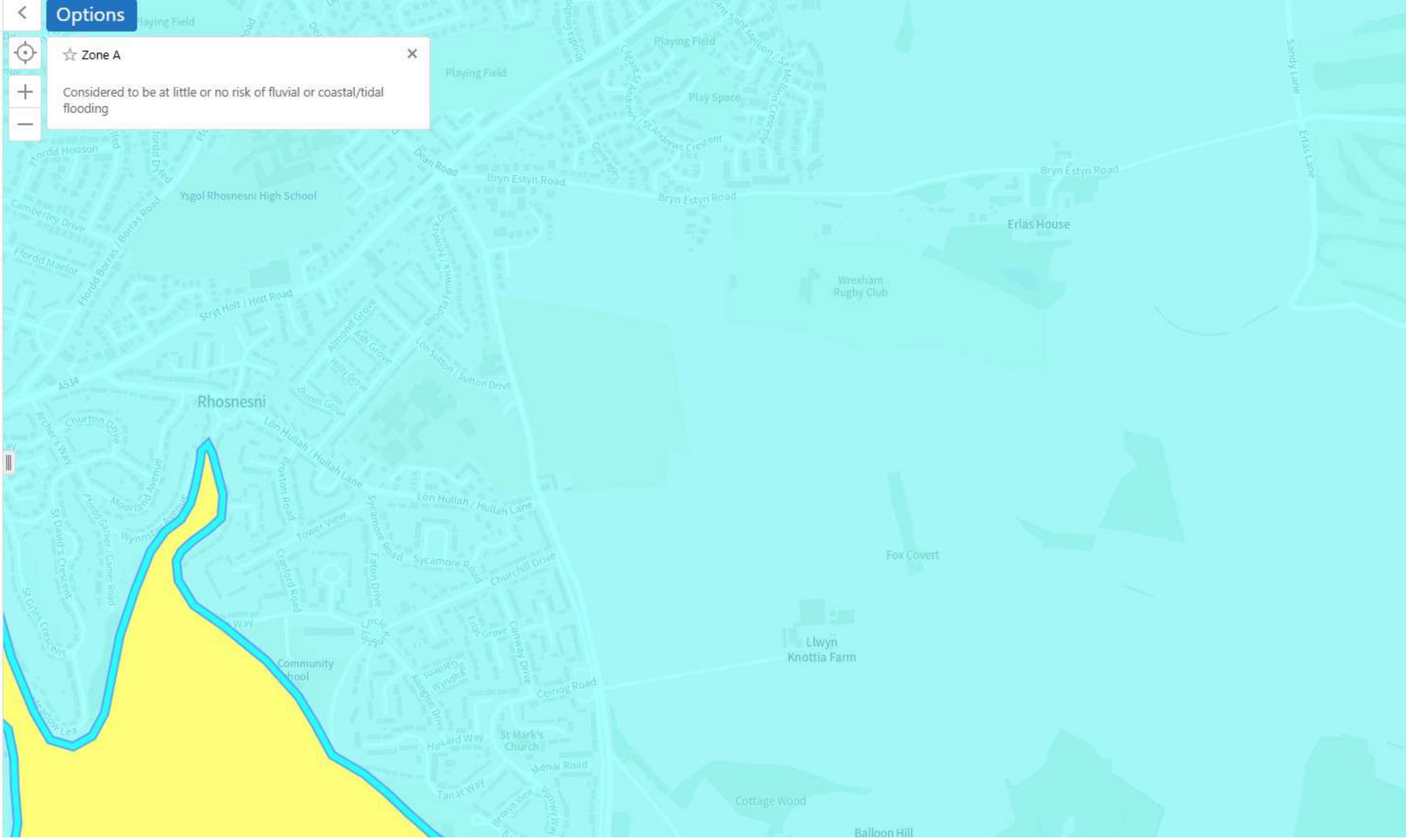
Development Advice Map Zone A

Zone A

Options

☆ Zone A

Considered to be at little or no risk of fluvial or coastal/tidal flooding



APPENDIX E :

Design Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 655 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	82.058	0.158	0.0	0.3	0.3	13.5	O K
30 min Summer	82.111	0.211	0.0	0.4	0.4	18.0	O K
60 min Summer	82.168	0.268	0.0	0.4	0.4	22.9	O K
120 min Summer	82.212	0.312	0.0	0.5	0.5	26.7	O K
180 min Summer	82.232	0.332	0.0	0.5	0.5	28.4	O K
240 min Summer	82.243	0.343	0.0	0.5	0.5	29.3	O K
360 min Summer	82.251	0.351	0.0	0.5	0.5	30.0	O K
480 min Summer	82.250	0.350	0.0	0.5	0.5	29.9	O K
600 min Summer	82.247	0.347	0.0	0.5	0.5	29.7	O K
720 min Summer	82.244	0.344	0.0	0.5	0.5	29.4	O K
960 min Summer	82.234	0.334	0.0	0.5	0.5	28.6	O K
1440 min Summer	82.213	0.313	0.0	0.5	0.5	26.8	O K
2160 min Summer	82.181	0.281	0.0	0.4	0.4	24.0	O K
2880 min Summer	82.153	0.253	0.0	0.4	0.4	21.6	O K
4320 min Summer	82.109	0.209	0.0	0.4	0.4	17.9	O K
5760 min Summer	82.078	0.178	0.0	0.3	0.3	15.3	O K
7200 min Summer	82.059	0.159	0.0	0.3	0.3	13.6	O K
8640 min Summer	82.045	0.145	0.0	0.3	0.3	12.4	O K
10080 min Summer	82.036	0.136	0.0	0.3	0.3	11.7	O K
15 min Winter	82.077	0.177	0.0	0.3	0.3	15.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	158.615	0.0	12.9	19
30 min Summer	107.079	0.0	17.3	34
60 min Summer	69.155	0.0	23.5	64
120 min Summer	41.597	0.0	28.3	122
180 min Summer	30.503	0.0	31.2	182
240 min Summer	24.376	0.0	33.2	242
360 min Summer	17.698	0.0	36.1	360
480 min Summer	14.039	0.0	38.2	440
600 min Summer	11.699	0.0	39.7	496
720 min Summer	10.061	0.0	41.0	556
960 min Summer	7.905	0.0	42.8	684
1440 min Summer	5.591	0.0	44.9	954
2160 min Summer	3.929	0.0	48.6	1364
2880 min Summer	3.058	0.0	50.4	1760
4320 min Summer	2.148	0.0	53.0	2548
5760 min Summer	1.685	0.0	55.7	3288
7200 min Summer	1.424	0.0	58.8	4040
8640 min Summer	1.258	0.0	62.3	4760
10080 min Summer	1.149	0.0	66.3	5544
15 min Winter	158.615	0.0	14.5	19

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	82.137	0.237	0.0	0.4	0.4	20.2	O K
60 min Winter	82.201	0.301	0.0	0.5	0.5	25.7	O K
120 min Winter	82.251	0.351	0.0	0.5	0.5	30.0	O K
180 min Winter	82.275	0.375	0.0	0.5	0.5	32.0	O K
240 min Winter	82.288	0.388	0.0	0.5	0.5	33.2	O K
360 min Winter	82.300	0.400	0.0	0.5	0.5	34.2	O K
480 min Winter	82.300	0.400	0.0	0.5	0.5	34.2	O K
600 min Winter	82.295	0.395	0.0	0.5	0.5	33.8	O K
720 min Winter	82.289	0.389	0.0	0.5	0.5	33.3	O K
960 min Winter	82.277	0.377	0.0	0.5	0.5	32.3	O K
1440 min Winter	82.248	0.348	0.0	0.5	0.5	29.8	O K
2160 min Winter	82.204	0.304	0.0	0.5	0.5	26.0	O K
2880 min Winter	82.166	0.266	0.0	0.4	0.4	22.7	O K
4320 min Winter	82.107	0.207	0.0	0.4	0.4	17.7	O K
5760 min Winter	82.068	0.168	0.0	0.3	0.3	14.3	O K
7200 min Winter	82.042	0.142	0.0	0.3	0.3	12.2	O K
8640 min Winter	82.025	0.125	0.0	0.3	0.3	10.7	O K
10080 min Winter	82.013	0.113	0.0	0.3	0.3	9.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	107.079	0.0	19.3	33
60 min Winter	69.155	0.0	26.4	62
120 min Winter	41.597	0.0	31.7	120
180 min Winter	30.503	0.0	34.9	178
240 min Winter	24.376	0.0	37.2	236
360 min Winter	17.698	0.0	40.5	350
480 min Winter	14.039	0.0	42.8	458
600 min Winter	11.699	0.0	44.5	558
720 min Winter	10.061	0.0	45.9	578
960 min Winter	7.905	0.0	47.8	730
1440 min Winter	5.591	0.0	50.0	1036
2160 min Winter	3.929	0.0	54.5	1472
2880 min Winter	3.058	0.0	56.5	1900
4320 min Winter	2.148	0.0	59.3	2684
5760 min Winter	1.685	0.0	62.4	3456
7200 min Winter	1.424	0.0	65.9	4184
8640 min Winter	1.258	0.0	69.8	4936
10080 min Winter	1.149	0.0	74.3	5656

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 335232 350839 SJ 35232 50839
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.046

Time (mins) From:	To:	Area (ha)
0	4	0.046

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Model Details

Storage is Online Cover Level (m) 82.900

Cellular Storage Structure

Invert Level (m) 81.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	90.0	0.0	2.600	0.0	0.0
0.200	90.0	0.0	2.800	0.0	0.0
0.400	90.0	0.0	3.000	0.0	0.0
0.401	0.0	0.0	3.200	0.0	0.0
0.800	0.0	0.0	3.400	0.0	0.0
1.000	0.0	0.0	3.600	0.0	0.0
1.200	0.0	0.0	3.800	0.0	0.0
1.400	0.0	0.0	4.000	0.0	0.0
1.600	0.0	0.0	4.200	0.0	0.0
1.800	0.0	0.0	4.400	0.0	0.0
2.000	0.0	0.0	4.600	0.0	0.0
2.200	0.0	0.0	4.800	0.0	0.0
2.400	0.0	0.0	5.000	0.0	0.0

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 81.900

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Cameron Tanti
Site name:	Ysgol Morgan Llwyd
Site location:	Wrexham

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:	53.05073° N
Longitude:	2.96723° W
Reference:	1717825814
Date:	Jan 24 2025 11:37

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from dominant HOST

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	10
SPR/SPRHOST:	0.1	0.35

Hydrological characteristics

	Default	Edited
SAAR (mm):	720	720
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):	0.17	2.63
1 in 1 year (l/s):	0.15	2.32
1 in 30 years (l/s):	0.31	4.68
1 in 100 year (l/s):	0.38	5.74
1 in 200 years (l/s):	0.43	6.47

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX F :

Management & Maintenance Plan

Vale Consultancy

CONSULTING CIVIL & STRUCTURAL ENGINEERS

MANAGEMENT & MAINTENANCE PLAN

Ysgol Morgan Llwyd,
Cefn Road,
Wrexham,
LL13 9NG

Prepared for: Wernick
Project Ref: 20851_MP_r01

01656 863 794 | *enquiries@vale-consultancy.co.uk* | http://vale-consultancy.co.uk
29 Bocam Park | Old Field Road | Pencoed | Bridgend | CF35 5LJ

Thornlink Limited T/A Vale Consultancy
Registered Number | 04140053 | VAT Number | 879 7269 45

DOCUMENT CONTROL

Project:	Ysgol Morgan Llwyd
Client:	Wernick
Vale Consultancy Ref:	20851_MP_r01

Issue	Prepared by	Approved by	Date	Status
01	Cameron Tanti (BEng) Hons	Jack Price BSc (Hons)	28.01.2025	First Issue

CONTENTS

1 INTRODUCTION 3
2 MANAGEMENT RESPONSIBILITIES 3
3 MANAGEMENT OBJECTIVES 3
4 INSPECTION AND MAINTENANCE ACCESS 4
5 MAINTENANCE VISITS OR INSPECTIONS 4
6 GENERAL 4
9 TRADITIONAL DRAINAGE 6
10 SUMMARY OF INSPECTION AND MAINTENANCE FOR SUDS 6
11 LIFETIME MANAGEMENT AND MAINTENANCE COSTS FOR SUDS 8

1 INTRODUCTION

1.1. This SuDS Management and Maintenance Plan has been prepared by Vale Consultancy in support of a SuDS scheme for the proposed development at Ysgol Morgan Llwyd, Cefn Road, Wrexham, LL13 9NG.

1.2. The proposed project consists of a single modular unit to provide classrooms and surrounding pedestrian hardstanding, whilst also incorporating various raingardens & an attenuation tank into the scheme to provide amenities & biodiversity across the site.

1.3. The scheme incorporates a sustainable drainage system for surface water runoff, which consists of raingardens and an attenuation tank.

1.4. The method for disposal of surface water runoff is discharge into the existing stormwater network found to the northwest of site.

1.5. The purpose of this document is to set out the overall management and maintenance objectives for the proposed SuDS components and to describe the long-term maintenance required to allow the system to continue operating as is intended.

1.6. All references to SuDS components are based on the SAB submission drawings:

- ***20851_100_r01 – Site Location Plan***
- ***20851_500_r01 – Proposed Drainage Layout***
- ***20851_503_r01 – Proposed Floor Exceedance Flows***
- ***20851_504_r01 – Proposed Drainage Details***

2 MANAGEMENT RESPONSIBILITIES

2.1. The current site owner(s) shall be responsible for the implementation of the Management and Maintenance Plan. If deemed necessary, all maintenance operations shall be undertaken by suitable and qualified contractors appointed by the site owner.

2.2. All inspections and maintenance work must be recorded. This allows for future assessment of the maintenance activities and their response to the system. It can also provide protection against legal claims should the system be exceeded in a storm event leading to flooding elsewhere.

3 MANAGEMENT OBJECTIVES

3.1. The site shall be managed and maintained as an attractive, tidy, and safe finish to all landscape elements.

3.2. The proposed planting shall enhance the biodiversity and nature conservation interests.

3.3. The Site Owner(s) shall ensure establishment and long-term health of all landscape elements for the benefit of the tenants and visual amenity of the area.

3.4. Best Health & Safety practices shall always be used.

3.5. To monitor standards and make amendments where required, it is expected that the Site Owner will review the management work (with reference to this document) at least quarterly for the first year and annually thereafter.

4 INSPECTION AND MAINTENANCE ACCESS

4.1. Access to the site(s) for inspection and maintenance can be gained via the proposed junction accessed off Cefn Road, Wrexham which can be accessed via the A5156/1534, after following Stryt Holt.

4.2. Maintenance vehicles can park in the car park areas for maintenance of the various SuDS features as required.

5 MAINTENANCE VISITS OR INSPECTIONS

5.1. The Site Owner or appointed maintenance contractor shall carry out a minimum of 12 maintenance visits or inspections per year to check drainage SuDS components. Visits shall be monthly. Additional visits may be needed to deal with extreme weather conditions or specific horticultural requirements.

6 GENERAL

6.1. All materials and workmanship are to be to the highest possible standards and shall be in accordance with relevant British Standards, good horticultural and arboricultural practices, and the landscape specification.

6.2. The Site Owner shall employ suitably qualified staff for all work and when using sprays and mechanical equipment. All equipment shall be kept in a sound condition, fit for use and purpose.

6.3. The Site Owner and their appointed contractors shall comply with all relevant Health and Safety regulations and good working practices.

6.4. The Site Owner shall take care when work is beside any structure or paved area and will, at their own cost, be responsible for making any damage caused good.

6.5. Weeds, pruning's, leaves, rubbish and other arisings shall be removed from site for composting, where possible. No material shall be left on site, and the area shall be left in a neat and tidy condition after each visit.

7 LITTER COLLECTION

7.1. All hard surfacing shall be swept as necessary, and all rubbish removed from site.

7.2. Litter picking/clearance shall take place during each maintenance visit and all waste shall be removed from site.

7.3. During autumn maintenance visits all fallen leaves shall be collected and removed from site.

8 ORNAMENTAL PLANTING

Specific objectives:

- To ensure early establishment and healthy growth
- To maintain a dense canopy cover
- To maintain year-round appearance and visual interest

Maintenance Operations:

8.1. All shrub beds in the raingardens shall be maintained substantially free of weeds. Work shall be done either manually or with appropriate selective weed killer in accordance with manufacturer's recommendations. If weed killer is used the dead weeds shall be removed at the next maintenance visit. Care must be taken to avoid damage to adjacent planting and grass and replaced immediately if affected by weed killer.

8.2. Once established, shrubs shall be selectively thinned or reduced in height as appropriate by removal or pruning to allow room for growth and avoid overcrowding/overshadowing and create a natural form rather than cube or cloud shapes. Care shall be taken to avoid over pruning and so creating obvious gaps in the shrub beds.

8.3. Ground cover plants shall be clipped or pruned, if necessary, to give a neat and tidy finish and contained within the planting bed. Work to remove dead vegetation shall be carried out during the winter months.

8.4. Pruning of herbaceous planting:

In spring cut stems close to the 'crown' or 'dormant' top of the plant, avoiding the removal of new shoots.

- Tidy up the base of the plant, removing dead foliage and debris.
- Remove all material from site.
- If necessary, apply a 50mm layer of fine horticultural mulch. This will help moisture retention in the soil, contribute to weed suppression and allow delicate stems to grow.
- Leave dried flower head over winter for relevant species e.g. ornamental grasses.

8.5. Fertilising:

- One application, just before or at the time of spring growth.
- A balanced fertiliser is required, one high in Phosphorus (which encourages blooming as well as strong roots and disease resistance). Fertilisers high in nitrogen should not be used as nitrogen promotes excess foliage at the expense of flowers and roots which can result in weak stems

9 TRADITIONAL DRAINAGE

9.1. A bi-monthly site inspection should be carried out, checking for any areas that are not operating correctly and collecting/removing litter and debris.

9.2. All rainwater pipes, channel drains, gullies and inspection chambers should be inspected biannually, typically spring and autumn.

9.3. Any excessive sediment built-up in rainwater pipes, channel drains, gullies or inspection chambers causing blockage or poor performance shall be cleared and cleaned as required.

9.4. Geo-cellular attenuation tanks require little to no maintenance. They should however be inspected after every major storm event. For traditional drainage systems it is recommended that a slit trap is incorporated into the pipework at the inlet to the tank. However, in SuDS applications silt and debris are usually removed by upstream SuDS components so there is less need for a silt trap.

9.5. Flow control devices provide customised water quantity management for surface water across a wide range of flows and for a variety of applications. The flow control has no moving parts and no power requirements and provides reliable, low maintenance, engineered flood management. The two most common flow control devices are vortex and orifice plate flow controls. This scheme will incorporate orifice flow controls only and maintenance requirements are as detailed in section 9.

10 SUMMARY OF INSPECTION AND MAINTENANCE FOR SUDS

10.1. The following briefly summarises the frequency and type of inspections and maintenance required for the SuDS components and drainage system used in this scheme:

10.2. General

Operation and maintenance requirements for traditional drainage components		
Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Inspection of traditional drainage including rainwater pipes, channel drains, gullies and inspection chambers (as applicable).	Bi-annually
	Remove litter or build-up of foliage	Bi-annually (or as required)
Occasional maintenance	Clear channel drains and gullies of silt build up	Every 5 years (or as required)
Remedial Actions	Jet/vac inspection chambers and below ground pipework when blocked or performance is affected due to partial blockages	Every 20 years (or as required)

10.3. Orifice Plate

Operation and maintenance requirements for vortex flow control		
Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Inspection of flow control device including litter and debris removal	Routine maintenance should be undertaken on completion of drainage works and then annually thereafter
	Check emergency drain down (if fitted) is in good working order	
	Check and clean orifice screening device and replace if damaged	
	Check component fixings are secure	
Occasional maintenance	De-silting / sediment removal	As required upon inspection
Remedial Actions	Damage repair	As required upon inspection

10.4. Bioretention areas (Raingardens)

Operation and maintenance requirements for Bioretention Raingardens		
Maintenance schedule	**Required action**	**Typical frequency**
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

10.5. Attenuation Tank

Operation and maintenance requirements for Bioretention Raingardens		
Maintenance schedule	**Required action**	**Typical frequency**
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where id may cause risk to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediments from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment buildup and remove in necessary	Every 5 years or as requires

11 LIFETIME MANAGEMENT AND MAINTENANCE COSTS FOR SUDS

11.1. Lifetime management and maintenance costs have been broken down for each SuDS drainage system. Costs are based on a 60-year design life.

11.2. The costs associated with the management and maintenance of the SuDS system over the 60-year design life of the scheme has been estimated based on the inspection and maintenance activities in section 10, as follows:

11.3. General

- General monthly inspection by the site owner (incl. litter removal) – no cost as is incorporated in general site maintenance undertaken by site owner.
- Biannual check of traditional drainage - no cost as is incorporated in general site maintenance undertaken by site owner.
- Annual check of flow control chamber - no cost as is incorporated in general site maintenance undertaken by site owner.

11.4. Bioretention areas (Raingardens)

- Annual inspection - no cost as is incorporated in general site maintenance undertaken by site owner.
- Annual pruning/fertilising - no cost as is incorporated in general site maintenance undertaken by site owner.
- Plant replacement over 60 years, assuming 10% of plants need to be replaced each year with Meadowmat SuDS & Slopes seed mix (10%area of 79 m^2 = 8 m^2) @ £2 / m2 / year - £960

11.5. Attenuation Tank

- Annual Inspection (quarterly in first year) £30 x 4 = £120 (first year) + £30 x 59 yr = £1770. Total = £1890.
- Annual trimming of roots = £100 x 60 yr = £6,000

11.6. The total sum of management and maintenance costs for the proposed SuDS over a 60-year design life - **£8850 or circa £150 a year.**

APPENDIX G:

Proposed Drainage Drawings

Sheet ACAD - A1 rev. C

N

0 1000 2000 3000 4000 5000 mm

SCALE 1:100

FLOW CONTROL REF	COVER LEVEL (m)	INVERT LEVEL (m)	ORIFICE SIZE (mm)	FLOW RATE (l/s)
MHSW06	83.000	81.900	20	0.5

PROPOSED PLANTING SCHEDULE

YELLOW FLAG IRIS (IRIS PSEUDOCORUS)

PENDULOUS SEDGE (CAREX PENDULA)

PURPLE LOOSESTRIFE (LYTHRUM SALICARIA)

WATER MINT (MENTHA AQUATIC)

HEMP AGRIMONY (EUPATORIUM CANNABINUM)

RAGGED ROBIN (LYCHNIS FLOS-CUCULI)

MARSJ WOUNDWORT (STACHYS PALUSTRIS)

SOFT RUSH (JUNCUS EFFUSU)

ROYAL FERN (OSMUNDA REGALIS)

BUGLE (AJUGA REPTANS)

CHIVES (ALLIUM SCHOENOPRASUM)

EXISTING SURFACE WATER SEWER AS INDICATED BY CCTV REPORT (REF: UM24-2949-EVA). ANY REPAIRS/DESILTING REQUIRED AS RECOMMENDED WITH CCTV REPORT TO BE CARRIED OUT PRIOR TO NEW CONNECTION BEING MADE.

EXSWMH01
CL:82.820
IL:81.740

Existing carpark

MHSW06 (FC)
CL:83.000
IL:81.900

1500 @ 2.94

15.000

1500 @ 1.20

+83.150

RWP

DEPTH OF CRATES = 0.4M
REFER TO 20851_501_R01
FOR FURTHER DETAILS

MHSW05
CL:83.150
IL:81.950

6.000

1500 @ 1.15

FURTHER INVESTIGATION REQUIRED TO CONFIRM THAT EXISTING SURFACE WATER SEWER IN LOCATION OF PROPOSED ATTENUATION TANK IS REDUNDANT. IF NOT REDUNDANT, EXISTING SURFACE WATER SEWER TO BE DIVERTED AROUND PROPOSED CRATE ACCORDINGLY.

MHSW07
CL:83.100
IL:82.400

1500 @ 1.20

MHSW04
CL:83.100
IL:82.055

MHSW01
CL:83.100
IL:82.400

1500 @ 1.46

FFL 83.300 (TBC)

MHFW01
CL:83.150
IL:82.200

1000 @ 1.50

MHFW02
CL:83.200
IL:82.115

MHSW02
CL:83.150
IL:82.340

1000 @ 1.40

MHFW03
CL:83.150
IL:82.185

MHFW04
CL:83.010
IL:81.740

Proposed new path

1000 @ 1.13

1500 @ 1.44

1500 @ 1.00

CCTV REPORT (REF: UM24-2949-EVA) INDICATED THIS AS AN EXISTING FOUL WATER SEWER, HOWEVER FURTHER INVESTIGATION HAS BEEN ADVISED TO CONFIRM THIS.

1000 @ 1.39

EXFWMH01
CL:83.080
IL:81.530

MHSW03
CL:83.100
IL:82.230

DRAINAGE LEGEND

- 1000 @ 1:40 / 1500 @ 1:150 — PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- RWP — PROPOSED RAINWATER PIPE
- FLOW CONTROL CHAMBER
- ACO DRAINAGE CHANNEL (SO / RA) — PROPOSED ACO MD100 DRAINAGE CHANNEL
- GEO-CELLULAR TANK 1 IN 100 YEAR EVENT WITH ACCESS POINTS
- +11.300 — PROPOSED SPOT LEVEL
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE
- RAINGARDEN WITH PERFORATED PIPE UNDERDRAIN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THE DRAWING. USE FIGURED DIMENSIONS ONLY.
4. ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE ENGINEER.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SUBCONTRACTORS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
6. EXISTING SERVICES HAVE NOT BEEN SHOWN BUT ARE PRESENT - THE CONTRACTOR IS TO LIAISE WITH ALL STATUTORY AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY WORKS.
7. ANY WORKS COMMENCING ON SITE PRIOR TO PLANNING, HIGHWAY & DRAINAGE APPROVALS BEING GRANTED IS UNDERTAKEN IS AT THE DEVELOPER'S OWN RISK
8. TOPOGRAPHICAL SURVEY INFORMATION TAKEN FROM UTILITY MAPPING DRG NO. UM24-2949-EVA DATED DECEMBER 2024.

PRELIMINARY

rev.	drawn	chkd.	apprvd.	date	description
01	CT	JP	PG	27.01.25	PRELIMINARY ISSUE

Client
WERNICK

Project
YSGOL MORGAN LLWYD

Title
PROPOSED DRAINAGE LAYOUT

Vale Consultancy
CONSULTING CIVIL & STRUCTURAL ENGINEERS
29 Bocam Park, Old Field Road, Pencoed, Bridgend CF35 5LJ.
Phone: 01656 863794 Email: enquiries@vale-consultancy.co.uk

date	drawn	checked		approved	
JAN 2025	CT	JP	27.01.25	PG	27.01.25

scale @ A1	project no.
1:100	20851

status	drg. no.	rev.
P	20851_500	01

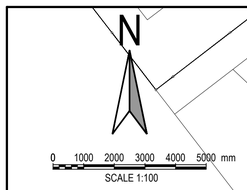
DRAWING STATUS
A - Approval, AB - As-Built, C - Construction, D - Draft, P - Preliminary, T - Tender

ORIGINAL DRAWING SIZE 841 x 594

10 0 10 20 50 100mm NATURAL SCALE

A1

Sheet ACAD - A1 rev. C



Existing carpark

Proposed new path

LEGEND

CATCHMENT AREA A = 455m²

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
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PRELIMINARY

rev.	drawn	chkd.	approd.	date	description
01	CT	JP	PG	24.01.25	PRELIMINARY ISSUE

Client
WERNICK

Project
YSGOL MORGAN LLWYD

Title
PROPOSED HARDPAVED AREAS

29 Bocam Park, Old Field Road, Pencoed, Bridgend CF35 5LJ.
Phone: 01656 863794 Email: enquiries@vale-consultancy.co.uk

date	drawn	checked		approved	
JAN 2025	CT	JP	24.01.25	PG	24.01.25

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1:100	20851

status	drg. no.	rev.
P	20851_502	R01

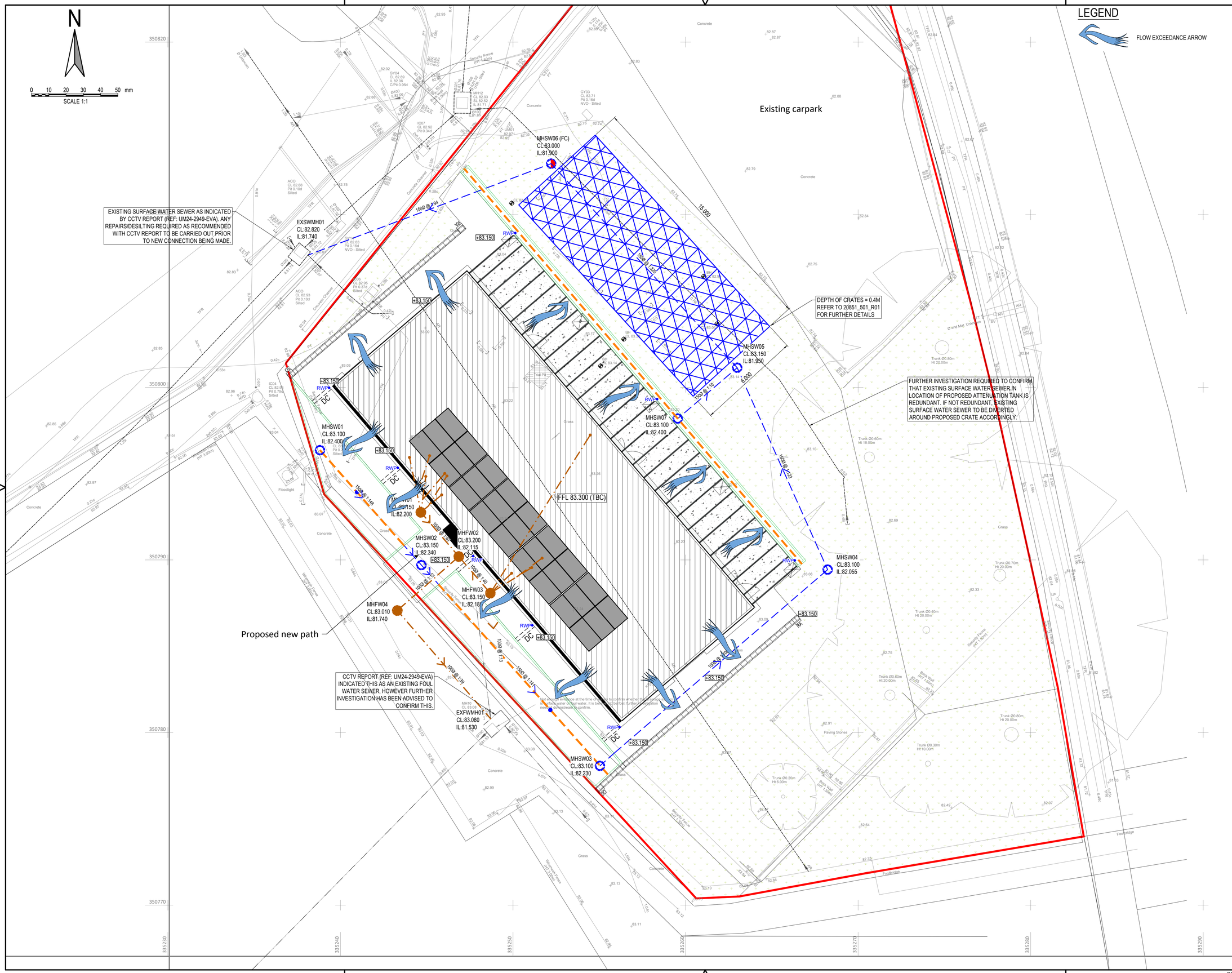
DRAWING STATUS
A - Approval, AB - As-Built, C - Construction, D - Draft, P - Preliminary, T - Tender

ORIGINAL DRAWING SIZE 841 x 594

10 0 10 20 50 100mm NATURAL SCALE

A1

Sheet ACAD - A1 rev. C



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
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PRELIMINARY

rev.	drawn	chkd.	approvd.	date	description
01	CT	JP	PG	28.01.25	PRELIMINARY ISSUE

Client
WERNICK

Project
YSGOL MORGAN LLWYD

Title
PROPOSED FLOOD EXCEEDANCE FLOWS

Vale Consultancy
CONSULTING CIVIL & STRUCTURAL ENGINEERS
29 Bocam Park, Old Field Road, Pencoed, Bridgend CF35 5LJ.
Phone: 01656 863794 Email: enquiries@vale-consultancy.co.uk

date	drawn	checked		approved	
JAN 2025	CT	JP	28.01.25	PG	28.01.25

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1:100	20851

status	drg. no.	rev.
P	20851_503	01

DRAWING STATUS
A - Approval, AB - As-Built, C - Construction, D - Draft, P - Preliminary, T - Tender

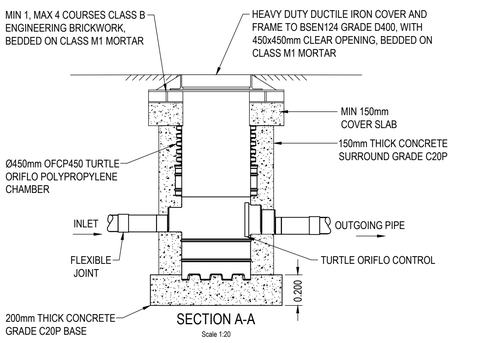
ORIGINAL DRAWING SIZE 841 x 594

10 0 10 20 50 100mm NATURAL SCALE

A1

PLAN ON ORIFICE FLOW CONTROL

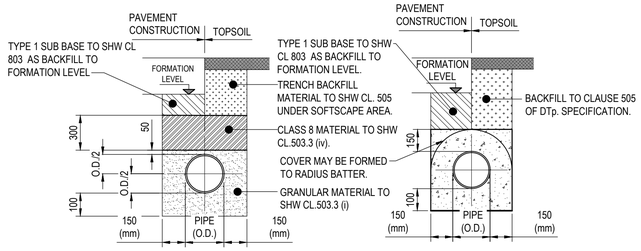
Scale 1:20



SECTION A-A

Scale 1:20

FLOW CONTROL REF	COVER LEVEL (m)	INVERT LEVEL (m)	ORIFICE SIZE (mm)	FLOW RATE (l/s)
MHS06	83.000	81.900	20	0.5



TYPE S BEDDING

GRANULAR BED AND SURROUND UNDER ROAD
(BEDDING FACTION = 2.2)
SCALE 1:20

TYPE Z BEDDING

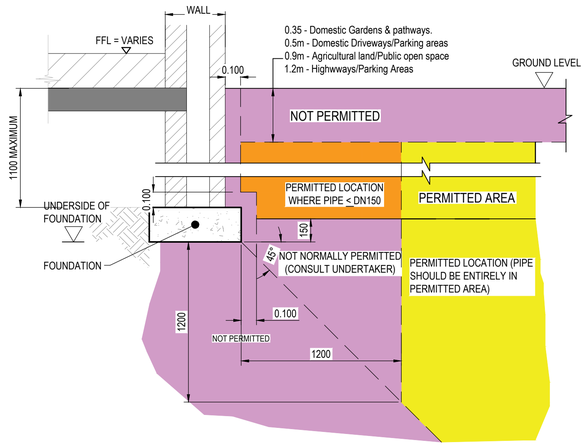
CONCRETE BED AND SURROUND
(BEDDING FACTION = 2.6)
SCALE 1:20

NOTES:
1. REFER TO SHW TABLE 5/3 AND SHW TABLE 6/1
2. BEDDING BENEATH AND AT SIDES OF THE PIPE TO BE WELL COMPACTED IN ACCORDANCE WITH CL 505.
3. CONCRETE CRADLES AND ARCHES MAY BE EXTENDED TO THE SIDES OF THE TRENCH.
4. GEOTEXTILES MAY BE USED WHERE DIRECTED OR APPROVED BY THE ENGINEER TO CONTAIN BEDDING MATERIAL IN CERTAIN SOILS EG. RUNNING SAND.
5. IN VERY WET CONDITIONS, WHERE DIRECTED OR APPROVED BY THE ENGINEER A TEMPORARY LAND DRAIN MAY BE LAID WITHIN THE GRANULAR BED.

NOTES: (TYPE Z ONLY)
6. WHERE PIPES WITH FLEXIBLE JOINTS ARE USED, THE CONCRETE PROTECTION IS TO BE INTERRUPTED OVER ITS FULL CROSS SECTION AT INTERVALS NOT EXCEEDING 5 METRES (OR AS DIRECTED BY THE ENGINEER) BY A SHAPED FORMER OF BITUMEN IMPREGNATED COMPRESSIBLE FILLER. THESE INTERRUPTIONS SHALL COINCIDE WITH PIPE JOINTS. SEE DIMENSIONS FOR PIPE BEDDING TABLE FOR THICKNESS OF COMPRESSIBLE FILLER.
7. CONCRETE TO BE GRADE GEN 3. WHERE FLEXIBLE PIPES ARE USED. CARE MUST BE TAKEN
8. TO PREVENT THE PIPES FROM FLOATING.

BEDDING DETAILS

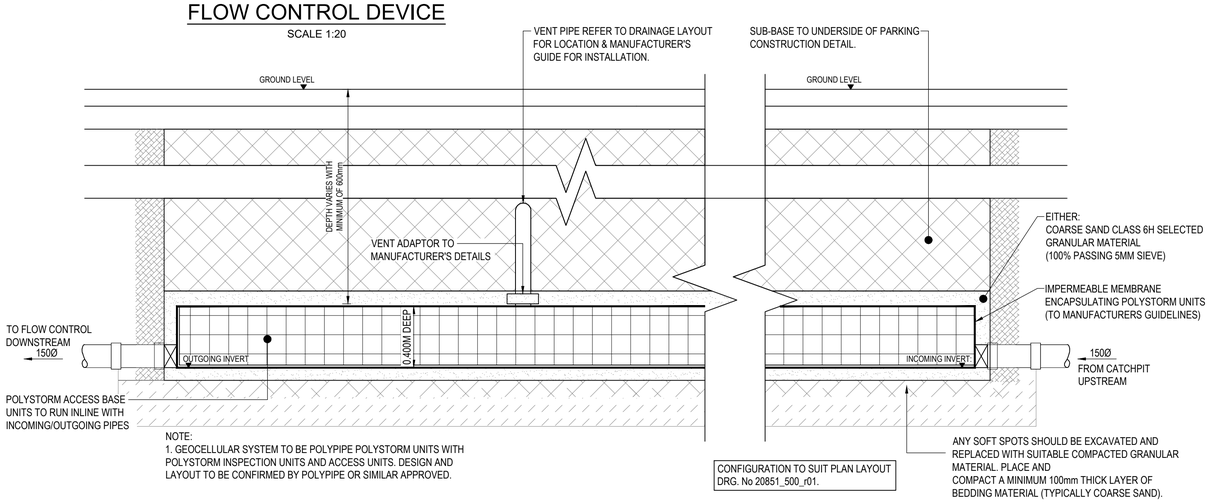
SCALE 1:20



TYPICAL DRAINAGE DETAIL IN CLOSE PROXIMITY OF FOUNDATIONS (DETAIL IN ACCORDANCE WITH SFA FIGURE B1)

Ø450MM TURTLE ORIFLO CATCHPIT INSPECTION CHAMBER INCORPORATING FLOW CONTROL DEVICE

SCALE 1:20



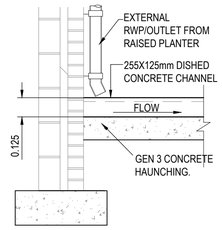
NOTE:
1. GEOCELLULAR SYSTEM TO BE POLYPIPE POLYSTORM UNITS WITH POLYSTORM INSPECTION UNITS AND ACCESS UNITS. DESIGN AND LAYOUT TO BE CONFIRMED BY POLYPIPE OR SIMILAR APPROVED.

ATTENUATION DETAIL

SCALE: NTS

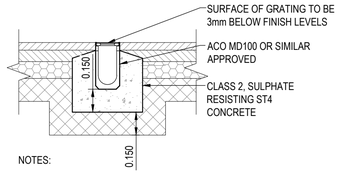
TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3

(REFER TO FIG. B.16 OF SEWERS FOR ADOPTION 7th ED)
(DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m)
(FLEXIBLE MATERIAL DETAIL)



RWP CONNECTION DETAIL TO DISHED CHANNEL

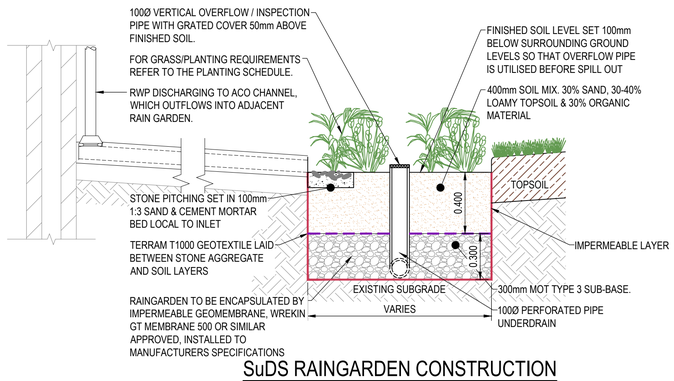
SCALE 1:20



NOTES:
1. DRAINAGE CHANNELS TO BE ACO MD100 OR SIMILAR APPROVED
2. FOUNDATION FOR CHANNELS TO BE LAID ON A ROLLED SUB-BASE OF 150mm MINIMUM THICKNESS.
3. GRATING LOAD CLASSIFICATION TO BE D400

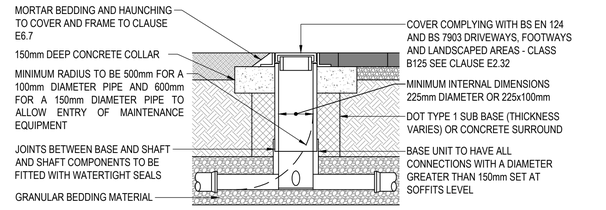
DRAINAGE CHANNEL DETAIL WITHIN TARMAC CONSTRUCTION

N.T.S.



SuDS RAINGARDEN CONSTRUCTION DETAIL - RG1 & 2

SCALE 1:20



TYPICAL INSPECTION CHAMBER DETAIL - TYPE 4A WITHIN PAVED AREAS

(REFER TO FIG. B.21 OF SEWERS FOR ADOPTION 7th ED) - SITED IN DRIVEWAYS/PAVED AREAS
(FLEXIBLE MATERIAL DETAIL)
SCALE 1:20

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Client
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Project
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Title
PROPOSED DRAINAGE DETAILS

Vale Consultancy
CONSULTING CIVIL & STRUCTURAL ENGINEERS
29 Bocam Park, Old Field Road, Pencoed, Bridgend CF35 5LJ.
Phone: 01656 863794 Email: enquiries@vale-consultancy.co.uk

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