THE OAKS SITE

Operation & Maintenance Manual for SuDS Assets

Wrexham Industrial Estate, Wrexham, LL13 9PW

TOS-BML-XX-XX-RP-C-0501

Tuesday, 20th May 2025

BarnsleyMarshall

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Contents Amendment Record

This report has been issued and amended as follows:

Revision	Description	Issued by	Checked by	Date
P03	Drainage details updated	Indira Withana	A. Mavhunga	2025-05-20
P02	Updated to suit new masterplan	Indira Withana	A. Mavhunga	2025-03-04
P01	First Issue for Planning Approval	Indira Withana	A. Mavhunga	2024-04-29

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APPENDIX A : SUDS DRAINAGE PROPOSALS

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1. Introduction

1.1 Project Background

Barnsley Marshall Ltd was appointed by FI Real Estate Management to provide a Drainage Strategy for the proposed development of an Industrial Unit on 5.80Ha of land off The Oaks Road, Wrexham Industrial Estate, Wrexham, postcode LL13 9PW.

This report provides recommended maintenance regimes for SuDS assets proposed as part of the surface water drainage for the development based on government and local authority guidance with regard to maintenance.

The report is based on currently available and preliminary discussions.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Barnsley Marshall shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Barnsley Marshall.

1.2 Scope of O&M Manual

This manual is intended to give an overview of the operation and maintenance for the range of SuDS features included with the drainage strategy. Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended maintenance regimes and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation of the proposed asset, and thereafter adjusted to suit the site requirements.

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2. Flow Control Units

2.1 Location and Description

The location and details of the flow control unit is indicated on the SuDS Drainage Strategy Layout drawings and construction details, refer to ***Appendix A***. The flow control device is specified as Hydro-brake or similar approved and is a proprietary product; therefore, the manufacturer's recommendations should also be taken into consideration.

2.2 Operation

The Hydro-brake is intended to be the main Surface Water Control Device from the site, limiting the outflow from the development to a maximum of 15.0 l/s for all storm events up to and including the 100-year + 40% CC storm event. When storms exceed the 100-year + 40% CC storm event, the flow control chamber will allow additional outflow from the site via the overflow pipe, and the Hydro-brake will be discharging greater than 15.0 l/s. The flow control chamber and Hydro-brake should be inspected every time after such an excessive storm.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the flow control unit.

Being part of private drainage, whole life cycle maintenance of the Hydro-brake chamber shall be the responsibility of owners of the proposed development – FI Real Estate Management. The responsible officer is Boris Byrne whose details are as below:

- bbyrne@fi-rem.com
- *FI real Estate Management, Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 2.1 gives the recommended maintenance regime for the asset.

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Table 2.1: Recommended Maintenance Regime for Flow Control Chamber and Hydro-brake

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance/inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Six-monthly
	Remove sediment and debris from flow control chambers.	Annually (or as required after heavy rainfall events).
Remedial actions	Repair/rehabilitation of inlets.	As required.

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3. Storage Pond and Swales

3.1 Location and Description

The proposed storage pond and cascading swales are shown on the Drainage Strategy Layout drawing in ***Appendix A***. The grass seeding, flowers, shrubs, and plants within the pond area will be recommended by a Landscape Architect.

3.2 Operation

Work as treatment plants for both dissolved and solid-bound pollutants. The flora (planted grass/lawn/reeds) within the pond/swale absorb the pollutants via photosynthesis and reduce the concentrations in the runoff. Solid-bound pollutants are also retained via sedimentation. The planted flora will require periodic replacement to get rid of the accumulated adsorbed pollutants. The overflow pipe should be periodically cleansed of accumulated grass or debris to keep it fully effective.

3.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the storage pond and swales.

Being part of private drainage, whole life cycle maintenance of the Storage Pond and Swales shall be the responsibility of owners of the proposed development – FI Real Estate Management. The responsible officer is Boris Byrne whose details are as below:

- bbyrne@fi-rem.com
- *FI real Estate Management, Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 3.1 gives the recommended maintenance regime for the asset.

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Table 3.1: Recommended Maintenance Regime for Storage Pond and Swales

Regular Maintenance	
Monthly	• Litter and debris removal • Mulching (where required) • Inspect/check all inlets, outlets, surface and overflow (where required) to ensure that they are in good condition, free from blockages and operating as designed. • Take action where required.
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Pruning and trimming of trees • Inspect and document the presence of wildlife • Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required
As Required	• Repair erosion or other damage by re-mulching or re-seeding • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface (typically every 60-month period) • Remove build-up of sediment, reinstate design levels (typically every 60-month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events.	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order.

4. Permeable Pavements

4.1 Location and Description

The permeable pavements are proposed as the construction make-up for proposed parking bays throughout the site as shown on drainage strategy drawing TOS-BML-XX-XX-DR-C-0700 included in ***Appendix A***.

The permeable pavements have been designed in accordance with CIRIA C697 and BS7533-13. They are designed to mimic the hydrological behaviour of soft landscaping by allowing the water to permeate into a sub-base at the same rate as it would naturally occur thus slowing the flow prior to entering the main surface water drain. The permeable paving is designed to treat and store runoff prior to infiltration into the ground.

4.2 Operation

Permeable pavement underlaid by a drainage blanket (5-20mm sub-base) wrapped in impermeable geo-membrane will allow runoff to undergo cleansing by the sand layer and sub-base before being collected by the proposed Permavoid Diffuser Unit. The permeable pavement shall be System C to BS 7533-13:2009 Figure 4, with an impermeable liner and collection pipe at the base of the sub-base.

4.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the Permeable Pavements.

Being part of private drainage, whole life cycle maintenance of the Permeable Pavements shall be the responsibility of owners of the proposed development – FI Real Estate Management. The responsible officer is Boris Byrne whose details are as below:

- bbyrne@fi-rem.com
- *FI real Estate Management, Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 4.1 gives the recommended maintenance regime for the asset.

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Table 4.1: Recommended Maintenance Regime for Permeable Pavements

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48 hours after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	Annually.
	Monitor inspection chambers.	Annually.
Regular maintenance\inspection	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required and as per landscape architect's specification.
	Removal of weed.	As required.
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

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5. Green Roofs

5.1 Location and Description

The proposed location of a Green Roof is shown on the SuDS Drainage Strategy Layout drawing ***TOS-BML-XX-XX-DR-C-0500 in Appendix A.***

5.2 Operation

A Green Roof is intended to enable Amenity and Diversity to be realised as a SuDS requirement. Green Roofs slow down the hydrological cycle by retaining runoff much longer than a normal roof due to the need for the runoff to seep into the substrate layers before collection by a downpipe at the base of the Green Roof. This also allows the runoff to undergo cleansing by filtration before leaving the site.

5.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the Green Roof.

Access to the roof for maintenance operatives shall be provided, with provisions made to ensure that this does not compromise the privacy of the residents.

Edge protection by way of pedestrian guardrails shall be provided around the Green Roof area to be maintained to safeguard the Health & Safety of maintenance operatives.

Being part of private drainage, whole life cycle maintenance of the Green Roof shall be the responsibility of owners of the proposed development – FI Real Estate Management. The responsible officer is Boris Byrne whose details are as below:

- bbyrne@fi-rem.com
- *FI real Estate Management, Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 5.1 gives the recommended maintenance regime for the asset.

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Table 5.1: Recommended Maintenance Regime for Filter Drains

Regular Maintenance	
Monthly	• During establishment, replace dead grass as required (for 12 months following installation) • Mow grasses (where required) and remove resultant clippings
Six Monthly	• Remove fallen leaves and debris from deciduous plant foliage • Remove nuisance and invasive vegetation, including weeds • Remove debris & litter to prevent clogging of inlet drains and interference with plant growth • Noxious weed treatment (3 times a year)
Annually	• Replace dead grass as required (typically in the Autumn) • Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes, and roof structure for proper operation, integrity of waterproofing and structural stability, take action where required • Inspect soil substrate for evidence of erosion channels and identify any sediment sources, take action where required • Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system, take action where required • Inspect underside of roof for evidence of leakage, take action where required • Inspect and document the presence of wildlife
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events.	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order.

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6. Bio-retention System - Rain Gardens

6.1 Location and Description

The locations of Rain Gardens are shown on the SuDS Drainage Strategy Layout drawing in ***Appendix A***. The grass seeding, flowers, shrubs, and plants within this green area will be recommended by a Landscape Architect.

6.2 Operation

The proposed Rain Gardens will collect runoff from the surrounding hardstanding areas. They will provide physical filtration of any pollutants and provide an increase in water quality.

6.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the bio-retention areas.

Being part of private drainage, whole life cycle maintenance of the Bio-retention Areas/Rain Gardens shall be the responsibility of owners of the proposed development – FI Real Estate Management. The responsible officer is Boris Byrne whose details are as below:

- bbyrne@fi-rem.com
- *FI real Estate Management, Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 6.1 gives the recommended maintenance regime for the asset.

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Table 6.1: Recommended Maintenance Regime for Bio-Retention Areas

Regular Maintenance	
Monthly	• Litter and debris removal • Mulching (where required) • Inspect/check all inlets, outlets, surface and overflow (where required) to ensure that they are in good condition, free from blockages and operating as designed. • Take action where required.
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Pruning and trimming of trees • Inspect and document the presence of wildlife • Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required
As Required	• Repair erosion or other damage by re-mulching or re-seeding • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface (typically every 60-month period) • Remove build-up of sediment, reinstate design levels (typically every 60-month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events.	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order.

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APPENDICES

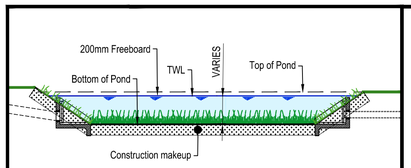
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Appendix A

SuDS Drainage Proposal

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Typical Attenuation Pond

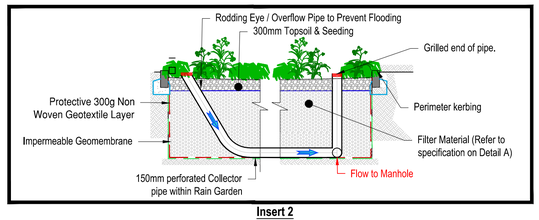


Proposed Attenuation Pond

Required Plan Footprint of Pond	: 2130m²
Depth to base level	: 1.5m
Volume to TWL	: 2143m³
Pond Side Slopes	: 1 in 3

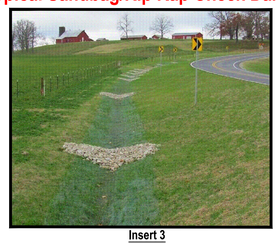
Insert 1
n.t.s

Typical Rain Garden

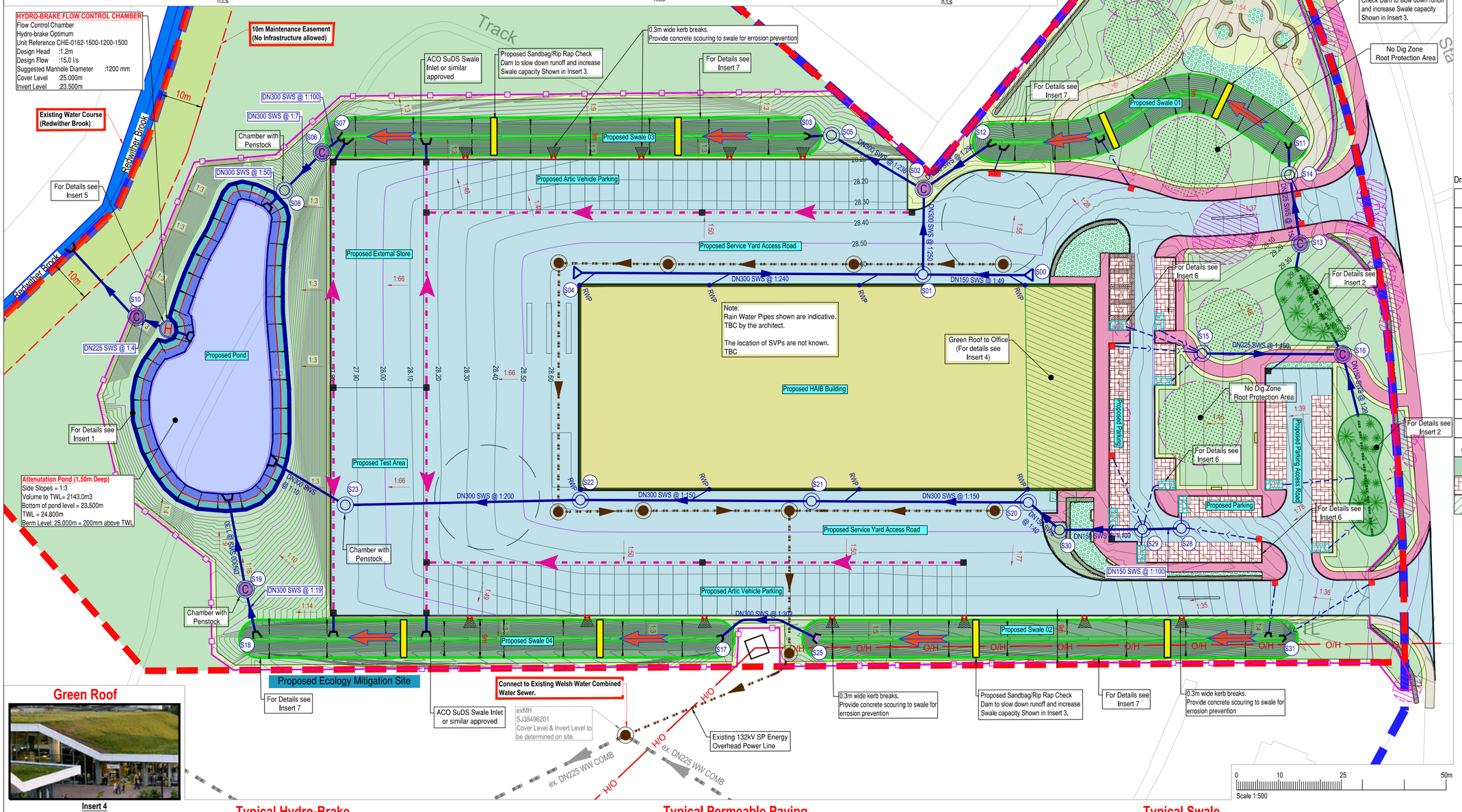


Insert 2
n.t.s

Typical Sandbag/Rip Rap Check Dam



Insert 3
n.t.s

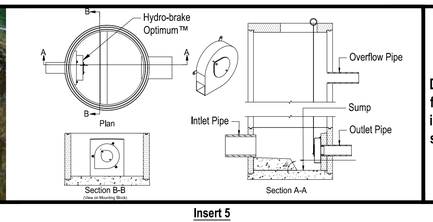


Green Roof

Insert 4
n.t.s

Typical Hydro-Brake

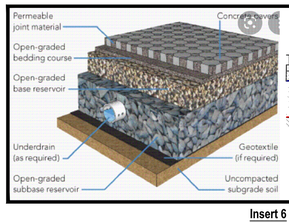


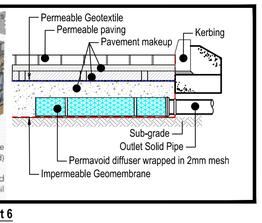


Design flow: 15.0 l/s max. for storms up to and including 100-year+40%CC storm event

Insert 5
n.t.s

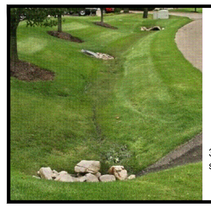
Typical Permeable Paving

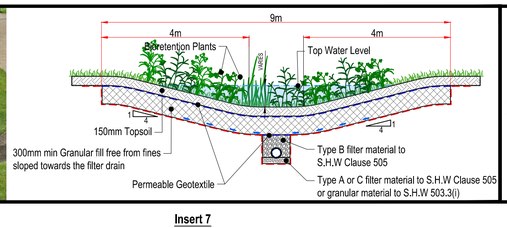




Insert 6
n.t.s

Typical Swale





Allow fo 9m wide Swales

Insert 7
n.t.s

Safety, Health & Environmental Information:

In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,

⚠ INDICATES A RESIDUAL RISK AS A WARNING

ⓘ INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition
Refer to Drawing:

General Notes:

1. Do not scale from this drawing.
2. All dimensions are in millimetres (mm), all levels in metres (m) unless noted otherwise.
3. Discrepancies or omissions are to be reported to the Engineer prior to work commencing.
4. Materials and workmanship are to comply in all respects with current British Standard Specifications, Codes of Practice, and Building Regulations Approved Documents.
5. The copyright of this drawing is vested in the Engineer and must not be copied or reproduced without written consent.
6. The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work commences.
7. This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.

Drainage Key:

DNXXX SWS @ 1:XXX	Proposed Stormwater
	Proposed ACO Channel Drain
	Proposed Foul Sewer
SXX	Proposed Stormwater Manhole
FXX	Proposed Foul Sewer Manhole
SXX	Proposed Stormwater Hydro-brake
SXX	Proposed Ridgistorm Separate Catchpit
	Proposed Road Gully
	Proposed ACO Drain Gully Outlet
	DN150 Gully / RWP Connector
RWP	Proposed Rain Water Pipe
XXX	Proposed Permavoid Diffuser Unit and Connector Dimension: L=708mm x W = 354mm x D = 150m
	Proposed 0.3m wide kerb breaks
ex. DN225 WW COMB	Existing DN225 mm Welsh Water Combined Water Sewer
	Rain Garden
	Permeable Paving
	Green Roof

Rev	By / Chk'd	Date	Description
P02	IW/AM	20/05/2025	Drainage details updated
P01	IW/AM	04/03/2025	Preliminary issue for client comments

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client
FI REAL ESTATE MANAGEMENT

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BarnsleyMarshall

Project
The Oaks Site
Wrexham Industrial Estate

Drawing
Drainage Plan Layout

By	IW/AM	Date	18/02/2025
Drawing No. TOS-BML-XX-XX-DR-C-0500		Revision P02	
BML Job No. 1000-06		Status -	

Drawing Scale at A1: 1:500

CAD Filename: Y:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\Working\DWG\TOS-BML-XX-XX-DR-C-0500 P01 - Drainage Plan Layout.dwg

Stormwater Drainage - Chamber Schedule

Manhole Name	Node Type	Cover Level (m)	MH Depth (m)	Invert Level (m)	Manhole Diam.,L*W (mm)	X Eastings	Y Northings	Cover Loading Class	Remark
S00	Rodding Eye	28.652	1.350	27.302		338575.952	349421.495	E600	Rodding Eye
S01	DCG Type B Chamber	28.650	1.846	26.804	1.350	338566.712	349399.107	E600	New Manhole. Provide a 675mm x 675mm Access Cover.
S02	Rigistorm Separate Catchpit	28.300	1.578	26.722	1.350	338547.887	349407.024	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S03	Althon Inlet Headwall			26.638		338525.673	349386.651		Swale 03 Inlet Headwall
S04	Rodding Eye	28.643	1.500	27.143		338535.709	349323.956	E600	Rodding Eye
S05	DCG Type C Chamber	27.600	0.936	26.664	1.200	338527.727	349391.397	B125	New Manhole. Provide a 675mm x 675mm Access Cover.
S06	Rigistorm Separate Catchpit	27.487	1.439	26.048	1.200	338485.768	349277.305	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S07	Althon Outlet Headwall			26.104		338483.500	349282.437		Swale 03 Outlet Headwall
S08	DCG Type C Chamber	25.000	1.149	23.851	1.200	338491.336	349264.155	B125	New Manhole. Provide a 675mm x 675mm Access Cover.
Flow control manhole	DCG Type B Chamber	25.000	1.500	23.500	1.200	338510.929	349227.418	B125	To be provided by Hydro-International or similar approved. Controls flows to 15.0l/s max for all storm events up to and including 100-year + 40%CC storm event
S10	Rigistorm Separate Catchpit	22.372	1.200	21.172	1.200	338504.747	349220.605	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S11	Althon Inlet Headwall			27.586		338570.362	349491.789		Swale 01 Inlet Headwall
S12	Althon Outlet Headwall			26.789		338543.640	349426.302		Swale 01 Outlet Headwall
S13	Rigistorm Separate Catchpit	29.277	1.529	27.749	1.200	338593.844	349485.327	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S14	DCG Type B Chamber	29.269	1.632	27.637	1.200	338577.602	349489.112	B125	New Manhole. Provide a 675mm x 675mm Access Cover.
S15	DCG Type C Chamber	29.387	1.278	28.110	1.200	338609.259	349453.736	B125	New Manhole. Provide a 675mm x 675mm Access Cover.
S16	Rigistorm Separate Catchpit	30.077	2.191	27.886	1.200	338622.072	349484.749	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S17	Althon Inlet Headwall			27.297		338628.616	349320.840		Swale 04 Inlet Headwall
S18	Althon Outlet Headwall			25.644		338587.344	349219.160		Swale 04 Outlet Headwall
S19	Rigistorm Separate Catchpit	26.107	1.107	25.000	1.200	338575.394	349221.122	B125	New Catchpit. Provide a 675mm x 675mm Access Cover.
S20	DCG Type B Chamber	28.638	1.500	27.138	1.200	338626.553	349401.911	E600	New Manhole. Provide a 675mm x 675mm Access Cover.
S21	DCG Type B Chamber	28.644	1.851	26.793	1.200	338606.801	349354.106	E600	New Manhole. Provide a 675mm x 675mm Access Cover.
S22	DCG Type B Chamber	28.650	2.225	26.426	1.200	338585.749	349303.154	E600	New Manhole. Provide a 675mm x 675mm Access Cover.
S23	DCG Type B Chamber	27.811	1.672	26.139	1.200	338565.318	349249.605	E600	New Manhole. Provide a 675mm x 675mm Access Cover.
S25	Althon Outlet Headwall			27.401		338637.978	349343.734		Swale 02 Outlet Headwall
S28	DCG Type C Chamber	28.900	1.200	27.700	1.200	338646.029	349433.437	D400	New Manhole. Provide a 675mm x 675mm Access Cover.
S29	DCG Type C Chamber	28.700	1.093	27.607	1.200	338642.722	349424.727	D400	New Manhole. Provide a 675mm x 675mm Access Cover.
S30	DCG Type C Chamber	28.640	1.205	27.435	1.200	338636.372	349408.690	B125	New Manhole. Provide a 675mm x 675mm Access Cover.
S31	Start of Swale 02			28.599		338636.372	349408.690		Start of Swale 02

Note
1. DCG means Design & Construction Guidance.

Stormwater Drainage - Pipe Schedule

Pipe PN	From	To	Pipe Length (m)	Pipe Diameter (mm)	Upstream MH Cover Level (mm)	Upstream MH Invert Level (mm)	Downstream MH Cover Level (mm)	Downstream MH Invert Level (mm)	Upstream MH Easting X	Upstream MH Northing Y	Downstream MH Easting X	Downstream MH Northing Y
P2.000	S00	S01	24.220	150	28.652	27.302	28.650	26.804	338575.952	349421.495	338566.712	349399.107
P1.001	S01	S02	20.423	300	28.650	26.804	28.300	26.722	338566.712	349399.107	338547.887	349407.024
P1.000	S04	S01	81.294	300	28.643	27.143	28.650	26.804	338535.709	349323.956	338566.712	349399.107
P1.002	S02	S05	25.507	300	28.300	26.772	27.600	26.664	338547.887	349407.024	338527.727	349391.397
P1.003	S05	S03	5.172	300	27.600	26.664	27.650	26.638	338527.727	349391.397	338525.673	349386.651
P1.005	S07	S06	5.611	300	27.116	26.104	27.487	26.048	338483.500	349282.437	338485.768	349277.305
P1.006	S06	S08	14.280	300	27.487	26.048	25.000	23.851	338485.768	349277.305	338491.336	349264.155
P1.007	S08	Pond	5.540	300	25.000	23.851	25.000	23.740	338491.336	349264.155	338494.120	349259.366
P10.001	Flow control manhole	S10	9.199	225	25.000	23.500	22.372	21.172	338510.929	349227.418	338504.747	349220.605
P10.000	Pond	Flow control manhole	6.887	300	25.000	23.500	25.000	23.500	338515.438	349232.624	338510.929	349227.418
Swale 03	S03	S07							338525.673	349386.651	338483.500	349282.437
Swale 01	S11	S12							338570.362	349491.789	338543.640	349426.302
P3.007	S12	S02	19.740	300	27.789	26.789	28.300	26.722	338543.640	349426.302	338547.887	349407.024
P3.003	Rain Garden 2	S13	5.949	225	29.327	27.800	29.277	27.749	338598.855	349482.120	338593.844	349485.327
P3.004	S13	S14	16.677	225	29.277	27.749	29.269	27.637	338593.844	349485.327	338577.602	349489.112
P3.005	S14	S11	7.719	225	29.269	27.637	29.297	27.586	338577.602	349489.112	338570.362	349491.789
P3.001	Rain Garden 1	S16	16.159	150	29.906	28.700	30.077	27.886	338638.075	349482.511	338622.072	349484.749
P3.002	S16	Rain Garden 2	7.148	225	30.077	27.886	29.327	27.800	338622.072	349484.749	338614.972	349483.923
P5.001	S15	S16	33.556	225	29.387	28.110	30.077	27.886	338609.259	349453.736	338622.072	349484.749
P5.000	Porous Paving	S15	12.438	150	29.253	28.692	29.387	28.110	338599.839	349445.613	338609.259	349453.736
P6.000	Porous Paving (1)	S15	22.450	150	28.895	28.334	29.387	28.110	338595.645	349435.885	338609.259	349453.736
P3.000	Porous Paving (2)	Rain Garden 1	8.767	150	29.851	29.325	29.906	28.700	338663.661	349464.233	338660.801	349472.521
P4.000	Porous Paving (3)	Rain Garden 1	17.783	150	29.848	29.223	29.906	28.700	338645.504	349459.711	338650.524	349476.770
P7.000	Porous Paving (4)	S15	9.039	150	29.253	28.642	29.387	28.110	338608.226	349444.756	338609.259	349453.736
Swale 04	S17	S18							338628.616	349320.840	338587.344	349219.160
P7.003	S18	S19	12.110	300	26.644	25.644	26.107	25.000	338587.344	349219.160	338575.394	349221.122
P7.004	S19	Pond	24.394	300	26.107	25.000	25.000	24.187	338575.394	349221.122	338551.485	349225.964
P8.003	S20	S21	51.725	300	28.638	27.138	28.644	26.793	338626.553	349401.911	338606.801	349354.106
P8.004	S21	S22	55.130	300	28.644	26.793	28.650	26.426	338606.801	349354.106	338585.749	349303.154
P8.005	S22	S23	57.314	300	28.650	26.426	27.811	26.139	338585.749	349303.154	338565.318	349249.605
P8.006	S23	Pond	21.000	300	27.811	26.139	25.000	24.039	338565.318	349249.605	338548.178	349237.472
Swale 02	S31	S25							338679.305	349445.417	338637.978	349343.734
P8.000	S28	S29	9.317	150	28.900	27.700	28.700	27.607	338646.029	349433.437	338642.722	349424.727
P8.001	S29	S30	17.249	150	28.700	27.607	28.640	27.435	338642.722	349424.727	338636.372	349408.690
P8.002	S30	S20	11.931	150	28.640	27.435	28.638	27.138	338636.372	349408.690	338626.553	349401.911
P9.001	Porous Paving (6)	S28	3.316	150	28.806	28.250	28.900	27.700	338649.314	349432.985	338646.029	349433.437
P9.002	Porous Paving (5)	S28	3.912	150	29.107	28.550	28.900	27.700	338642.404	349434.908	338646.029	349433.437
P9.003	Porous Paving (8)	S29	10.283	150	29.109	28.550	28.700	27.607	338634.973	349431.486	338642.722	349424.727
P9.004	Porous Paving (7)	S29	4.432	150	28.925	28.330	28.700	27.607	338638.297	349424.478	338642.722	349424.727
P7.001	S25	S17	31.392	300	28.401	27.401	28.297	27.297	338637.978	349343.734	338628.616	349320.840

Safety, Health & Environmental Information:

In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,

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ⓘ INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition

Refer to Drawing:

General Notes:

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2. All dimensions are in millimetres (mm), all levels in metres (m) unless noted otherwise.
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Note:
1. For Drainage Plan Layout refer to drawing: TOS-BML-XX-XX-DR-C-0500
2. For External Surfaces refer to drawing: TOS-BML-XX-XX-DR-C-0700
3. For Drainage Details refer to drawings: TOS-BML-XX-XX-DR-C-0505 to 0508

Rev	By / Chk'd	Date	Description
P01	IW/AM	20/05/2025	Preliminary issue for client comments

PRELIMINARY DRAWING
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Client

FI REAL ESTATE MANAGEMENT

BarnsleyMarshall Limited
4&5 Prior Whard
Harris Business Park, Hanbury Rd
Stoke Prior, Bromsgrove
B604FG
Tel: 01905 330550
Email: design@barnsleymarshall.co.uk
Web: www.barnsleymarshall.co.uk

BarnsleyMarshall

Project

The Oaks Site
Wrexham Industrial Estate

Drawing

Stormwater Chamber & Pipe Schedules

By IW/AM Date 20/05/2025

Drawing No. (Project - Originator - Volume - Level - Type - Role - Number)
TOS-BML-XX-XX-DR-C-0502

Revision
P01

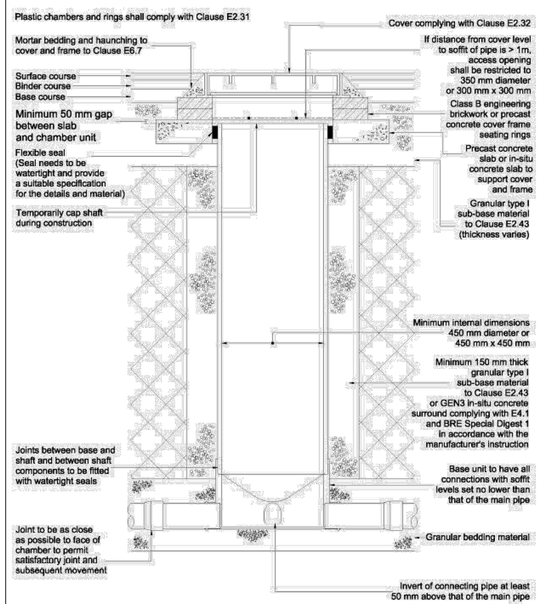
BML Job No.
1000-06

Status
-

Drawing Scale at A1: 1:500

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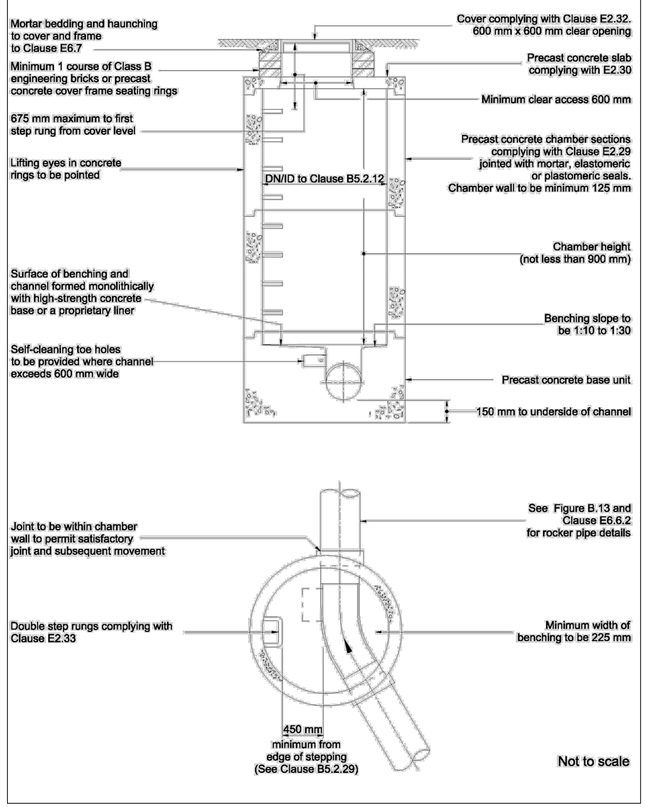
Figure B 18
Typical inspection chamber detail – Type D
Depth from cover level to soffit of pipe up to 3 m
Flexible material construction for use in areas subject to vehicle loading



Note: Where the access chamber is in the highway (including any footway), the highway authority can have specific requirements.

Chamber Type D Polypropylene Inspection Chamber (PPIC),
with Concrete surround or 150mm thick Type 1 Sub-Base material, no shaft
(For use in areas subject to heavy vehicle loading)
Scale: n.t.s
(Inspection Chamber Details from Design and Construction Guidance)

Figure B 9
Typical manhole detail – Type B
Depth from cover level to soffit of pipe 1.5 m to 3 m
Rigid material construction without concrete surround



Chamber Type B (Option 1)
Thick walled manhole, no concrete surround, no shaft
Scale: n.t.s
(Manhole Details from Design and Construction Guidance)

Note:

1) All manhole covers to be 675mm x 675mm.

2) Precast concrete manhole rings will not be cut under any circumstances.

Safety, Health & Environmental Information:

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Refer to Drawing: MGPS-BML-XX-XX-DR-C-2700

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7. This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.

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NOTE:

1. For Drainage Plan Layout refer to drawing, TOS-BML-XX-XX-DR-C-0500.

2. For Drainage Details refer to drawings, TOS-BML-XX-XX-DR-C-0505 to 0508.

3. For Flood Flow Analysis refer to drawing, TOS-BML-XX-XX-DR-C-0520.

4. For External Surfaces refer to drawing, TOS-BML-XX-XX-DR-C-0700.

Rev	By / Chk'd	Date	Description
P01	IW/AM	04/03/2025	Preliminary issue for client comments

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

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BarnsleyMarshall

Project

The Oaks Site
Wrexham Industrial Estate

Drawing

Drainage Details 01

By IW/AM Date 18/02/2025

Drawing No. TOS-BML-XX-XX-DR-C-0505

Revision P01

BML Job No. 1000-06

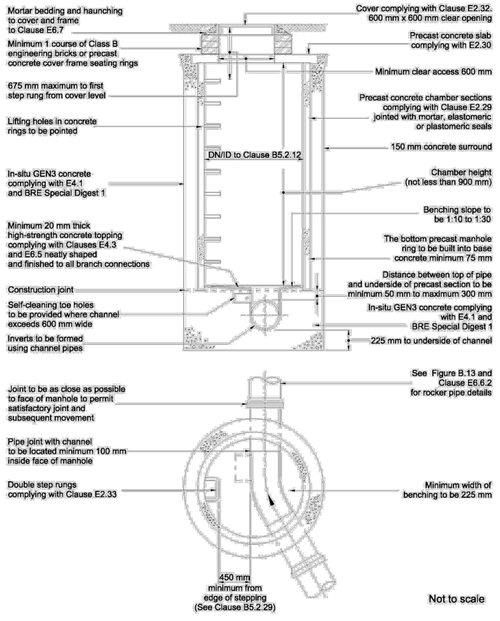
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25 May 2021

Figure B 10
Typical manhole detail – Type B
Depth from cover level to soffit of pipe 1.5 m to 3 m
Alternative rigid material construction with concrete surround

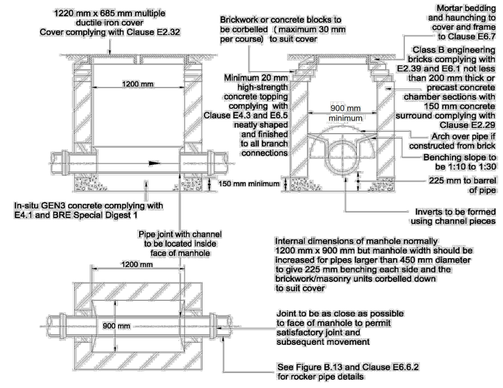


Not to scale

Chamber Type B (Option 2)
Thin walled manhole, with 150mm concrete surround, no shaft
Scale: n.t.s

(Manhole Details from Design and Construction Guidance)

Figure B 14
Typical manhole detail – Type C
Depth from cover level to soffit of pipe less than 1.5 m
Maximum pipe size 450 mm diameter
Rigid material construction



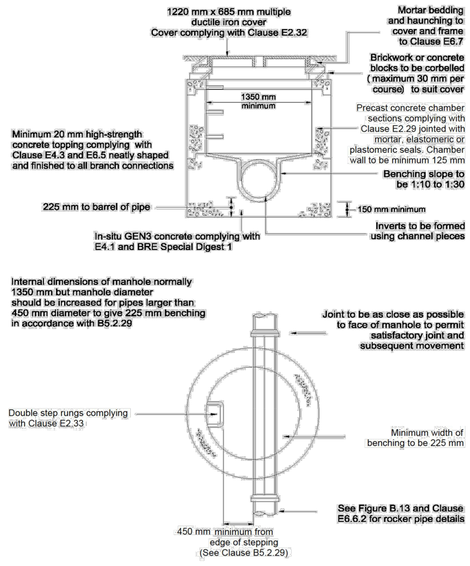
Note: The use of precast concrete chamber units to E2.29 with 150 mm GEN3 in-situ concrete complying with E4.1 and BRE Special Digest 1 in place of brickwork construction is permitted.

Not to scale

Chamber Type C (Option 1)
Brickwork thick walled manhole, min. 200mm thick, no shaft /
Thin walled manhole with 150mm concrete surround, no shaft
Scale: n.t.s

(Manhole Details from Design and Construction Guidance)

Figure B 15
Typical manhole detail – Type C
Depth from cover level to soffit of pipe less than 1.5 m
Maximum pipe size 450 mm diameter
Rigid material construction



Note: The use of precast concrete chamber units to E2.29 with 150 mm GEN3 in-situ concrete complying with E4.1 and BRE Special Digest 1 in place of brickwork construction is permitted.

Chamber Type C (Option 2)
Thick walled manhole, no concrete surround, no shaft
Scale: n.t.s

(Manhole Details from Design and Construction Guidance)

Note:

1) All manhole covers to be 675mm x 675mm.
2) Precast concrete manhole rings will not be cut under any circumstances.

Safety, Health & Environmental Information:
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NOTE:

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2. For Drainage Details refer to drawings, TOS-BML-XX-XX-DR-C-0505 to 0508.
3. For Flood Flow Analysis refer to drawing, TOS-BML-XX-XX-DR-C-0520.
4. For External Surfaces refer to drawing, TOS-BML-XX-XX-DR-C-0700.

P01	IW/AM	04/03/2025	Preliminary issue for client comments
Rev	By / Chk'd	Date	Description

PRELIMINARY DRAWING
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Client
FI REAL ESTATE MANAGEMENT

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WR3 8SG

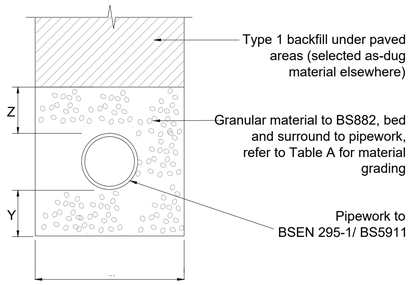
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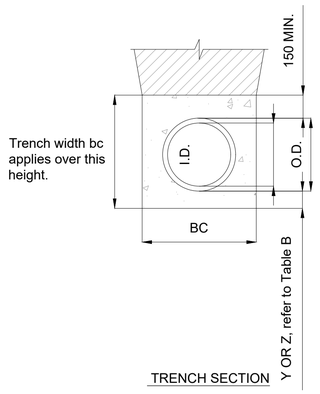
Project
The Oaks Site
Wrexham Industrial Estate

Drawing
Drainage Details 02

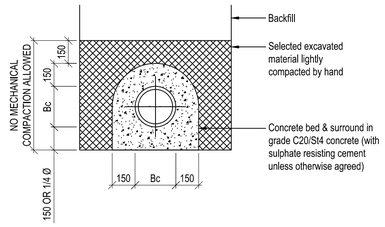
By IW/AM	Date 18/02/2025
Drawing No. TOS-BML-XX-XX-DR-C-0506	Revision P01
BML Job No. 1000-06	Status -
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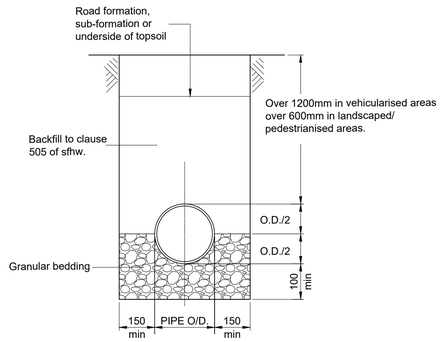
CLASS S PIPE BEDDING DETAIL
(FOR ALL PIPES WITH MORE THAN 1.2M COVER IN VEHICULAR AREAS OR MORE THAN 300MM COVER IN SOFT AREAS)



TRENCH SECTION



Class 'Z' Bedding



Class B Bedding
(Bedding factor 1.9)

Bedding beneath and at the sides of the pipe to be well compacted the first 300mm of fill above the crown of the pipe is to be lightly tamped by hand. Mechanical compaction may be used only above this level. Geotextiles may be used where directed or approved by the engineer to contain bedding material in certain soils e.g. running sand in very wet conditions, where directed or approved by the engineer a temporary land drain may be laid within the granular bed.

Note:

1) All manhole covers to be 675mm x 675mm.

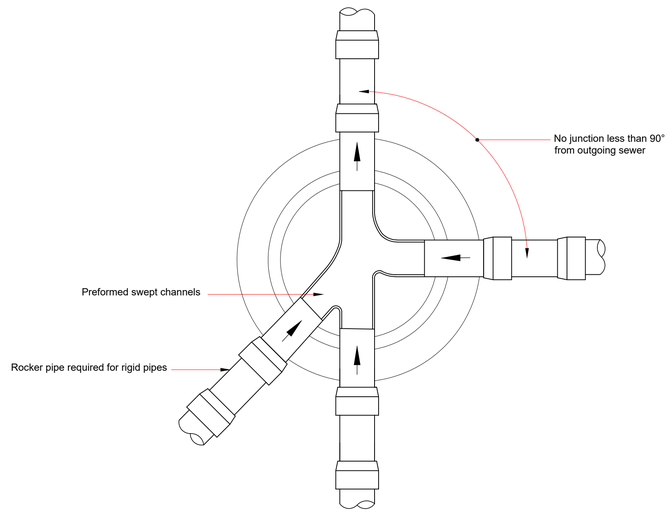
2) Precast concrete manhole rings will not be cut under any circumstances.

	Aggregate size.	
Pipe dia. (mm)	Graded (mm)	Single sized (mm)
100	-	10
150	14 - 5	10 OR 14
225 - 300	14 - 5 OR 20 - 5	10,14 OR 20
375 - 525	14 - 5 OR 20 - 5	10,14 OR 20
EXCEEDING 525	14 - 5 OR 20 - 5 OR 40 - 5	10,14,20 OR 40

TABLE A
GRANULAR PIPE BEDDING MATERIAL TYPE 'S'

PIPE DIA.(MM)	WIDTH BC		Y		Z
	MAX.	MIN.	Y1 (UNIFORM SOIL)	Y2 (ROCK) *	MIN.
100	550	450	100	200	100
150	600	490	100	200	100
225	700	580	150	200	100
300	750	680	150	200	100
375	1050	950	150	200	100
450	1150	1030	150	200	150
525	1200	1120	150	200	150
600	1350	1240	150	200	150
675	1450	1330	150	200	225
750	1500	1400	150	200	225
825	1600	1490	150	225	225
900	2100	1900	150	225	225
975	2150	1950	175	250	300
1050	2250	2050	175	275	300
1200	2500	2250	200	300	300
OVER 1200	O.D. + 1000	O.D. + 800	I.D./6	I.D./4	400

TABLE B
TRENCH WIDTHS AND OTHER DIMENSIONS



Sectional Plan

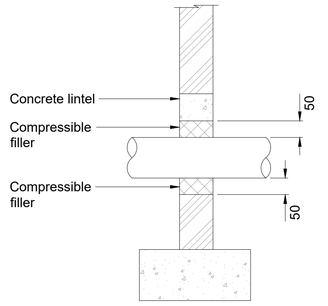
Rigid pipes built into manhole should have a flexible joint as close as feasible to the external face of the structure and the length of the next rocker pipe should be as shown.

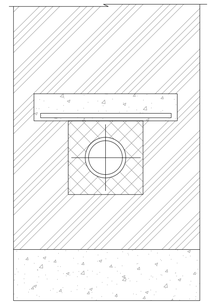
Nominal diameter (mm)	Maximum effective length (m)
150 - 600	0.6
601 - 750	1.00
over 750	1.25

All pipes entering the bottom of the manhole to have soffits level.

Arrangement of pipe junctions within manholes

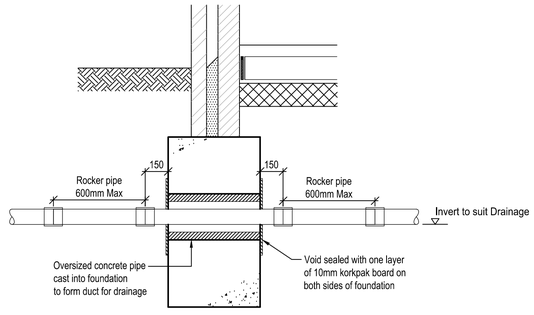
Granular Pipe Bedding Details for Rigid Pipes





Not to scale, dimensions in millimetres
(all dimensions are minimum sizes)

Protection of pipes penetrating Single Leaf Boundary alls
n.t.s



Detail For Drainage Though Foundation
Scale 1:20

Safety, Health & Environmental Information:

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NOTE:

1. For Drainage Plan Layout refer to drawing, TOS-BML-XX-XX-DR-C-0500.

2. For Drainage Details refer to drawings, TOS-BML-XX-XX-DR-C-0505 to 0508.

3. For Flood Flow Analysis refer to drawing, TOS-BML-XX-XX-DR-C-0520.

4. For External Surfaces refer to drawing, TOS-BML-XX-XX-DR-C-0700.

Rev	By / Chk'd	Date	Description
P01	IW/AM	04/03/2025	Preliminary issue for client comments

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

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BarnsleyMarshall

Project

The Oaks Site
Wrexham Industrial Estate

Drawing

Drainage Details 03

By IW/AM Date 18/02/2025

Drawing No. TOS-BML-XX-XX-DR-C-0507

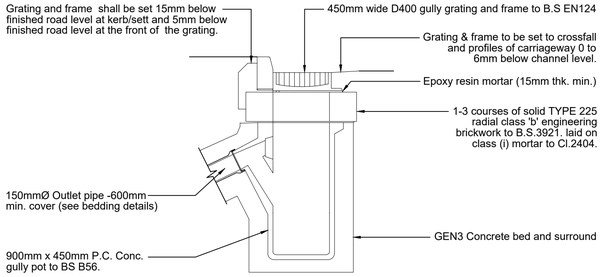
Revision P01

BML Job No. 1000-06

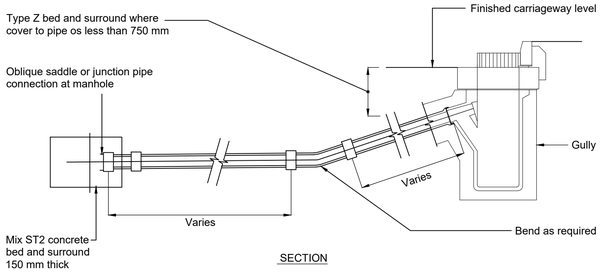
Status -

Drawing Scale at A1: As Shown

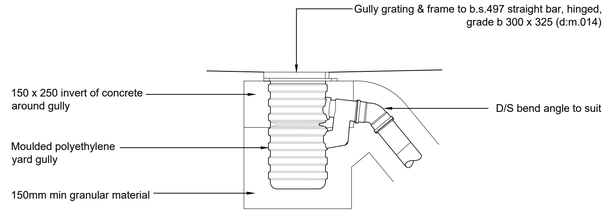
CAD Filename: T:\Project\1000.06 The Oaks Site, Wrexham Ind Est\04-Innovation - Working\DWG\TOS-BML-XX-XX-DR-C-0505 - 0510.PR7 - Drainage Details 1 to 5.dwg



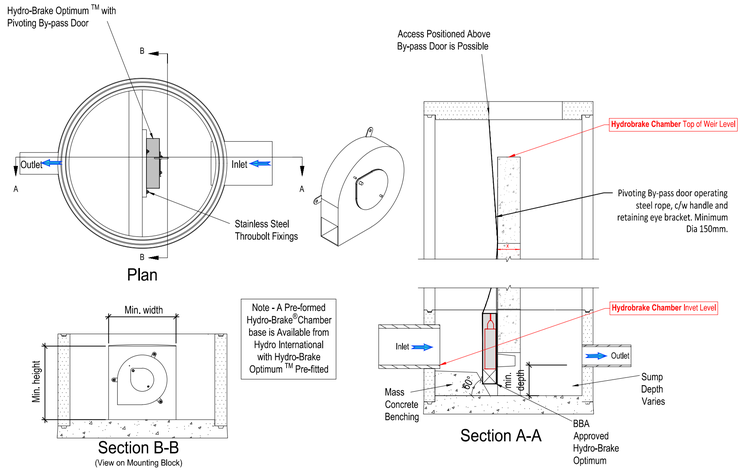
ROAD GULLY DETAIL



SECTION

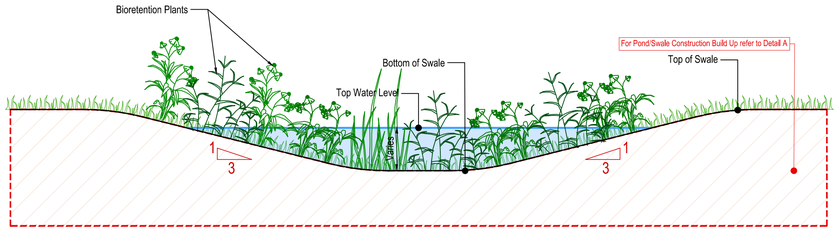


GULLY DETAIL - NON-KERBED AREAS



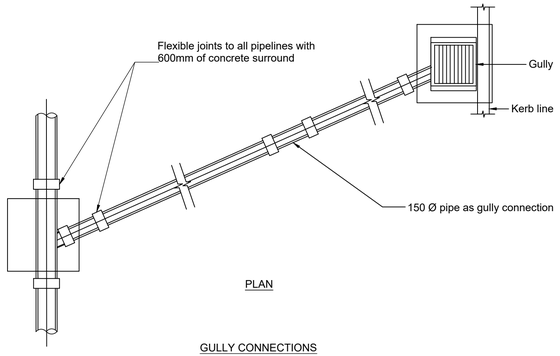
Hydrobrake Chamber Detail With Overflow Pipe

Scale 1:20



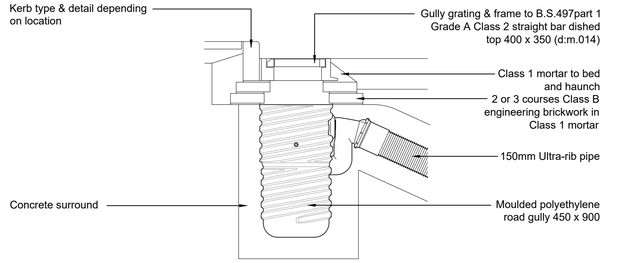
Swale - Cross Section

Scale 1:20

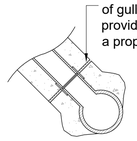


PLAN

GULLY CONNECTIONS



GULLY DETAIL - KERBED AREAS



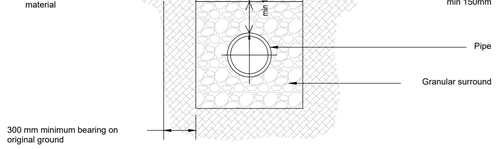
Gully connection to be 150mm dia pipe, bends as required, with 150mm GEN3 concrete surround. Concrete surround to be provided for full length of gully connection. Flexible joints (Flexcell or similar approved) to be provided at each joint. Where connection is to an existing gully connection, a proprietary connector shall be used.

When connecting to an existing sewer, where the diameter is less than 300mm, preformed junctions should be utilised with proprietary couplings as appropriate.

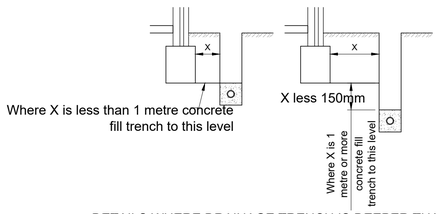
Where the existing sewer is greater than 300mm, a saddle connection may be used.

For new sewer construction, preformed junctions shall be incorporated on the new pipe run.

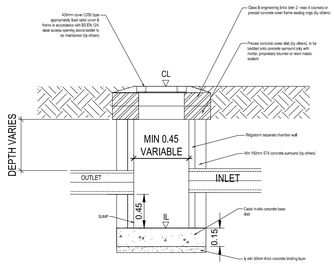
SADDLE CONNECTION TO EXISTING SEWER



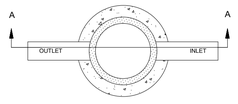
PROTECTION OF PIPES LAID AT SHALLOW DEPTHS



DETAILS WHERE DRAINAGE TRENCH IS DEEPER THAN FOUNDATIONS



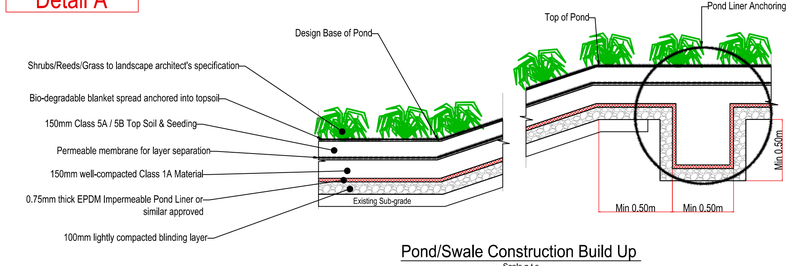
SECTION A-A



PLAN

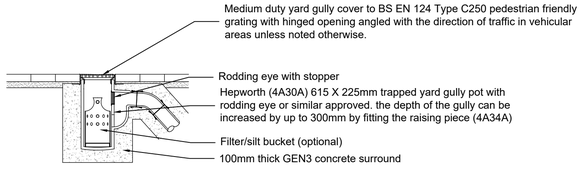
Ridgistorm Separate Catchpit

Detail A



Pond/Swale Construction Build Up

Scale n.t.s



YARD GULLY

Safety, Health & Environmental Information:

In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,

INDICATES A RESIDUAL RISK AS A WARNING

INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition

Refer to Drawing: MGPS-BML-XX-XX-DR-C-2700

General Notes:

1. Do not scale from this drawing.

2. All dimensions are in meters (m), all levels in metres (m) unless noted otherwise.

3. Discrepancies or omissions are to be reported to the Engineer prior to work commencing.

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NOTE:

1. For Drainage Plan Layout refer to drawing, TOS-BML-XX-XX-DR-C-0500.

2. For Drainage Details refer to drawings, TOS-BML-XX-XX-DR-C-0505 to 0508.

3. For Flood Flow Analysis refer to drawing, TOS-BML-XX-XX-DR-C-0520.

4. For External Surfaces refer to drawing, TOS-BML-XX-XX-DR-C-0700.

Rev	By / Chk'd	Date	Description
P01	IW/AM	04/03/2025	Preliminary issue for client comments

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

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Web: www.barnsleymarshall.co.uk

BarnsleyMarshall

Project

The Oaks Site
Wrexham Industrial Estate

Drawing

Drainage Details 04

By	IW/AM
Date	18/02/2025
Drawing No.	TOS-BML-XX-XX-DR-C-0508
Revision	P01
BML Job No.	1000-06
Status	-
Drawing Scale at A1:	As Shown
CAD Filename:	Y:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\0-Formation - Working\DWG\TOS-BML-XX-XX-DR-C-0508 - (B10) P01 - Drainage Details 1 to 5.dwg

Table 1: Pavement Construction Chart

Pavement Construction Type	Surface Course	Binder Course	Base Layer (Bituminous)	Base Layer (HBM)	Sub-base/Capping Layer (Foundation Class 2)
Parking Access Road PC1	40mm AC6 dense surf 160/220 to BS EN 13108-1 and BSI PD 6691 Annex B	60mm AC20 dense bin 100/150 to BS EN 13108-1 and BSI PD 6691 Annex B	80mm AC32 dense base 100/150 to BS EN13108-1 and BSI PD 6691 Annex B	75mm Type 1 sub base to DfT SHW Clause 803	Minimum 200mm in-situ Lime-Stabilised Sub-Base - Non-frost susceptible. The contractor shall achieve a CBR of, at least, 30% at the top of this layer.
Permeable Paving (Parking Bays) PC2	80mm Permable Concrete Block Paviours to Architect specification.	50mm Sand Layer Class II to BS7533 Part 3 2005+A1:2009 or similar approved on non-woven permeable geotextile membrane	--	325mm Type 3 Sub-Base to DfT SHW Clause on non-woven permeable geotextile membrane	Minimum 200mm in-situ Lime-Stabilised Sub-Base - Non-frost susceptible. The contractor shall achieve a CBR of, at least, 30% at the top of this layer.
Service Yard Access Road PC3	190mm thick slab grade PAV2 (air entrained to 5.5%), including 1 layer of A252 mesh in bottom with 40mm cover. To have brushed finish			75mm thick Type 1 sub base well compacted, sub grade to be proof rolled	Minimum 200mm in-situ Lime-Stabilised Sub-Base - Non-frost susceptible. The contractor shall achieve a CBR of, at least, 30% at the top of this layer.

Notes:

1. Contractor to check insitu CBR at time of construction and adjust pavement foundation as per Table 3.
2. Contractor is to ensure a minimum CBR of 5% at the top of sub-grade/base of capping layer.
3. Contractor to check that the existing subgrade is not frost-susceptible. If found to be frost-susceptible, contractor to ensure all material within 450mm depth from the pavement surface is non frost-susceptible by adding a capping layer below the sub-base.

Table 2: Footway Construction Chart

Pavement Construction Type	Surface Course	Binder Course	Base Layer (Bituminous)	Base Layer (HBM)	Sub-base/Capping Layer (Foundation Class 2)
Footway Pavement FC1	25mm AC6 Dense Surf 100/150 to BS EN 13108-1	50mm AC20 Dense BIN 100/150 to BS EN 13108-1	--	75mm thick Type 1 sub base well compacted, sub grade to be proof rolled	Minimum 200mm in-situ Lime-Stabilised Sub-Base - Non-frost susceptible. The contractor shall achieve a CBR of, at least, 30% at the top of this layer.

Notes:

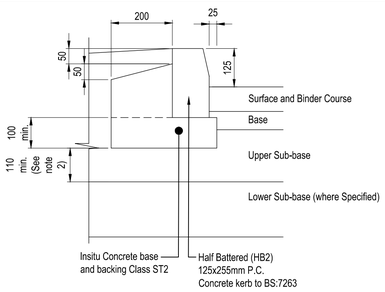
1. Contractor is to ensure a minimum CBR of 5% at the top of sub-grade/base of capping layer

Table 3: Class 2 Pavement Foundation Options

In-situ CBR	Type 1 sub base to DfT SHW Clause 803
7% - 20%	100
5% - 7%	150
3% - 5%	250
2% - 3%	325
< 2%	Consult Engineer for Advice

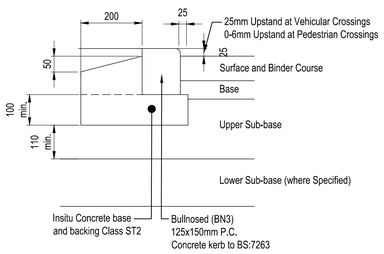
Notes:

1. Minimum thickness of sub-base may be considered for reduction when using proprietary geogrid, provided they can be adequately justified and designed by an Engineer in accordance with technical requirement R5.
2. Specialists advice should be sort to improve the subgrade.



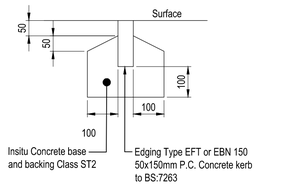
Full height HB2 Kerb & Base Detail

Scale 1:10



Dropped BN3 Kerb & Base Detail

Scale 1:10



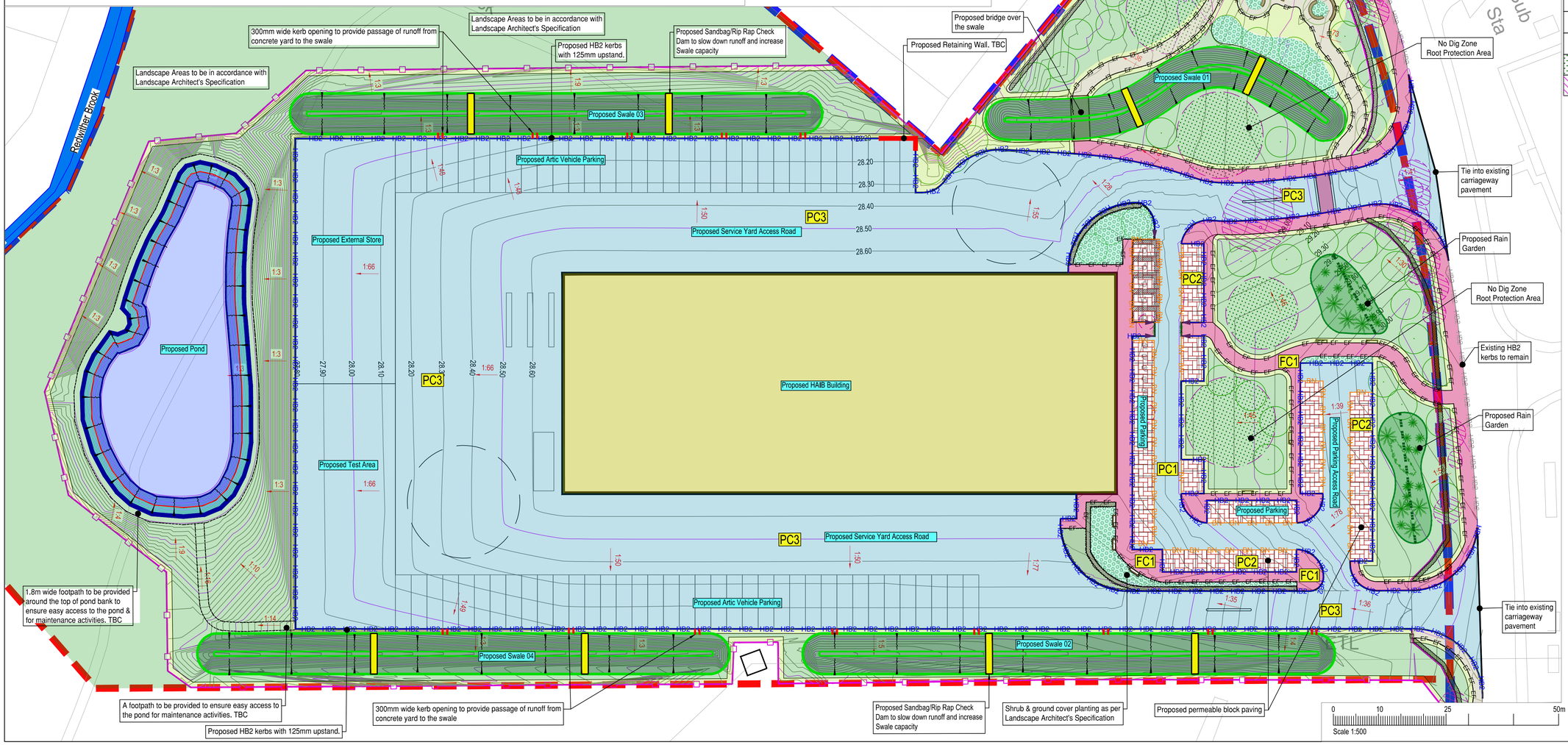
Edging EFT Kerb & Base Detail

Scale 1:10

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Note:
This drawing is to be read in conjunction with Landscape Architect's Drawing Ref: **311/LAND/L/102-P01**



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INDICATES A RESIDUAL RISK AS A WARNING

INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition

Refer to Drawing:

KEY

	Proposed Building
	Proposed Permeable Paving
	Proposed Concrete Yard Slab
	Proposed Footway
	Existing and Proposed Green Areas
	Proposed hogging/heritage gravel path to picnic area(refer to Landscape Architect layout for details)
	Proposed native grass mix (refer to Landscape Architect layout for details)
	Proposed ornamental shrub & herbaceous planting (refer to Landscape Architect layout for details)
	Proposed native mixed species hedging (refer to Landscape Architect layout for details)
	Proposed native species shrub planting (refer to Landscape Architect layout for details)
	Proposed bench seating (refer to Landscape Architect layout for details)
–HB2–HB2–HB2–	Proposed HB2 kerbs with 125mm upstand
—BN—BN—BN—	Proposed BN kerbs with 25mm upstand
–BN3–BN3–BN3–	Proposed BN3 Kerbs with 0-6mm upstand
► ◄	Proposed dropped kerbs
—EF—EF—EF—EF—	Proposed EF Kerbs
–HB2–HB2–HB2–	Existing Kerbing to remain
	Root Protection Area (No Dig Zone)
	Trees to be removed

Note:

1. For Drainage Plan Layout refer to drawing: TOS-BML-XX-XX-DR-C-0500
2. For Stormwater Chamber & Pipe Schedule refer to drawing: TOS-BML-XX-XX-DR-C-0502
3. For Drainage Details refer to drawings: TOS-BML-XX-XX-DR-C-0505 to 0508

Rev	By / Chk'd	Date	Description
P02	IW/AM	20/05/2025	Drainage details updated
P01	IW/AM	18/02/2025	First Issue for Construction

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

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BarnsleyMarshall

Project

The Oaks Site
Wrexham Industrial Estate

Drawing

Drainage Plan Layout

By IW/AM Date 18/02/2025

Drawing No. TOS-BML-XX-XX-DR-C-0500

Revision P02

BML Job No. 1000-06

Status -

Drawing Scale at A1: 1:500

CAD Filename: Y:\Project 1000-06 The Oaks Site Wrexham Ind Est\Working\DWG\TOS-BML-XX-XX-DR-C-0700 P01 - External Surfaces.dwg