THE OAKS SITE

SuDS Drainage Strategy

Wrexham Industrial Estate, Wrexham, LL13 9PW

TOS-BML-XX-XX-RP-C-0502

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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 green eco-heritage park and single employment unit with integral offices (for HIAB), new vehicular access, car and HGV parking, servicing and storage, landscaping, heritage and ecology mitigation and ancillary development on 5.86Ha of land off The Oaks Road, Wrexham Industrial Estate, Wrexham, postcode LL13 9PW.

The report provides outline foul and surface water drainage strategy for the proposed development based on Government and local authority guidance with regard to flood risk and sustainable drainage.

The report is based on currently available information 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 Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Planning Policy Wales – Technical Advice Note - 15 (TAN 15) Development and Flood Risk as outlined in the Communities and Local Government Planning Policy Guidance to the Planning Policy Wales and Sustainable Drainage (SuDS) Statutory Guidance - Wales.

The development site is off The Oaks Road in Wrexham Industrial Estate, and approximately 5.86Ha. Following scrutiny of the Natural Resources Wales Flood Maps it has been identified that the existing site lies within an area classified as Flood Zone A in accordance with TAN15 (Flood Zone 1 in accordance with Environment Agency Flood Maps) indicating that the risk of flooding from rivers and sea is low, with an Annual Exceedance Probability of flooding of less than 0.1%, refer to **Figure 1**. The areas around Redwither Brook are shown to be in Zone B and Zone C2 demonstrating a risk of flood. However, the proposed building is located approximately 100m to the North of Redwither Brook with 10m of maintenance easement where no infrastructures allowed, provided along the brook. A Flood Consequences Assessment Report (equivalent to a Flood Risk Assessment Report) is therefore not required as a deliverable for planning submission.

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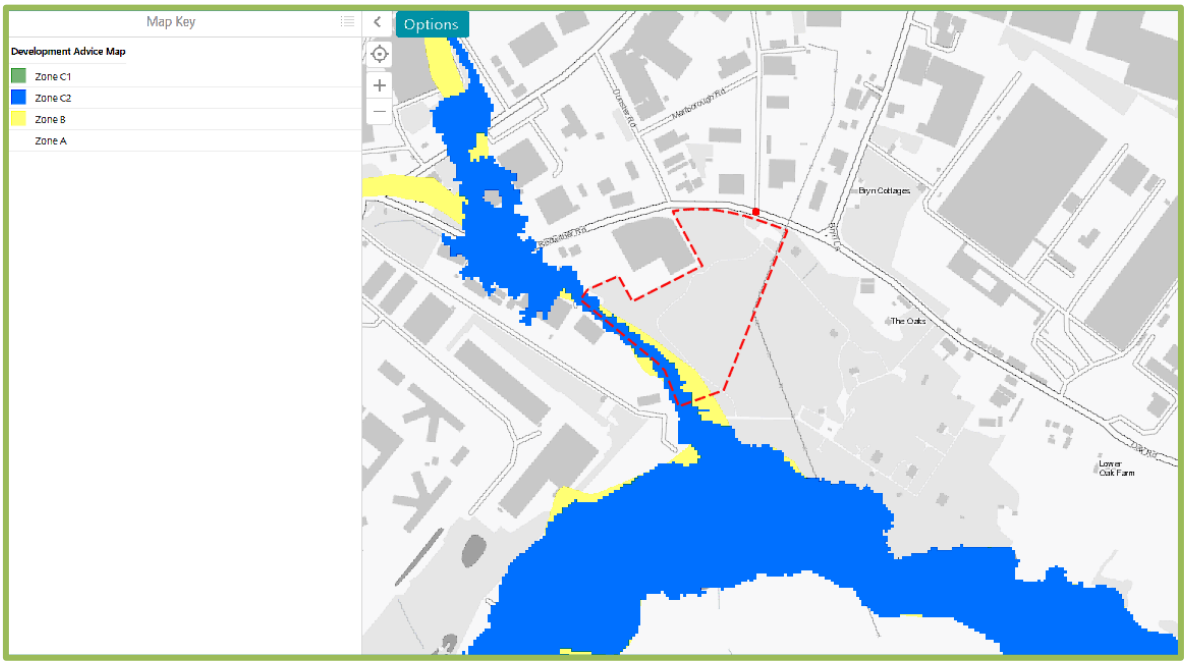


Figure 1: Development Advice Map with Flood Zones

(Source: Natural Resources Wales Flood Maps, Accessed on 2024-04-24, 0900hrs)

In January 2019, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SUDS) a material consideration in the determination of planning applications for new developments of more than 1 dwelling or with construction area greater than 100m^2. The SuDS Drainage Strategy, which is part of this report, has therefore been produced to support the Planning Application in accordance with the Town and Country Planning Order 2019.

The Strategy reviews the following information:

- Natural Resources Wales flood maps for rivers and sea flooding.
- Local Flood Risk Management Strategies
- Sustainable Drainage (SuDS) Statutory Guidance – Wales
- Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems 2018
- Design and Construction Guidance V1 – Oct 2019
- Part H of the Building Regulations: Drainage and waste disposal
- BE EN12056 Part 2 Gravity Drainage Systems Inside Buildings
- Technical Guidance to the National Planning Polity Framework
- CIRIA Report C753 SUDS Manual 2016.
- BS EN 752:2008 Drain and sewer systems outside buildings.
- BS 8582:2013, Code of Practice for surface water management for development sites.

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- BS 8533:2011, Assessing and managing flood risk in development – Code of practice.
- CIRIA C635 Designing for exceedance in urban drainage - good practice
- Flood Estimation Handbook (FEH) /Flood Studies Report (FSR) methods.
- Institute of Hydrology (IH) Reports No. 124.
- Environmental Agency (EA) / Department for Environment, Food and Rural Affairs (DEFRA) recommendations.
- Technical Advice Note (TAN) 15: Development and Flood Risk (2004).
- Floods and Water Management Act 2010
- Flood plan guidance for communities and groups – EA
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities – EA
- Code for Sustainable Homes

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2. Existing Site Details

2.1 Location and Description

The proposed development is located off The Oaks Road, Wrexham Industrial Estate, Wrexham, postcode LL13 9PW. The site is approximately 6.0km east of Wrexham city centre and is located in the South East area of Wrexham Industrial Estate. The site is bounded by Redwither Brook along the south western side of the site, which then flows in a south-easterly direction to join River Clywedog which is approximately 0.5km from the site. The site is surrounded by industrial units to the North Western and North Eastern sides and with the greenfield land to the East. It is bounded by Oak Road to the North, as shown in ***Figure 2.***

For a site location plan refer to ***Appendix A.***



Figure 2: Development Site shown with red border

(Source: Google Maps, Accessed on 2024-04-22, 1000hrs)

2.2 Topography

The site slopes down to the southwest from the northeast corner with levels approximately 30.100mAOD to the northeast corner and 25.200mAOD to the southwest corner, refer to ***Appendix B*** for site topography.

The Ordnance Survey extract from Bing Maps below illustrates that the site slopes from the northeast to the southwest over a distance of approximately 200 meters towards Redwither Brook, with an average gradient of 1 in 40 (see **Figure 3**).

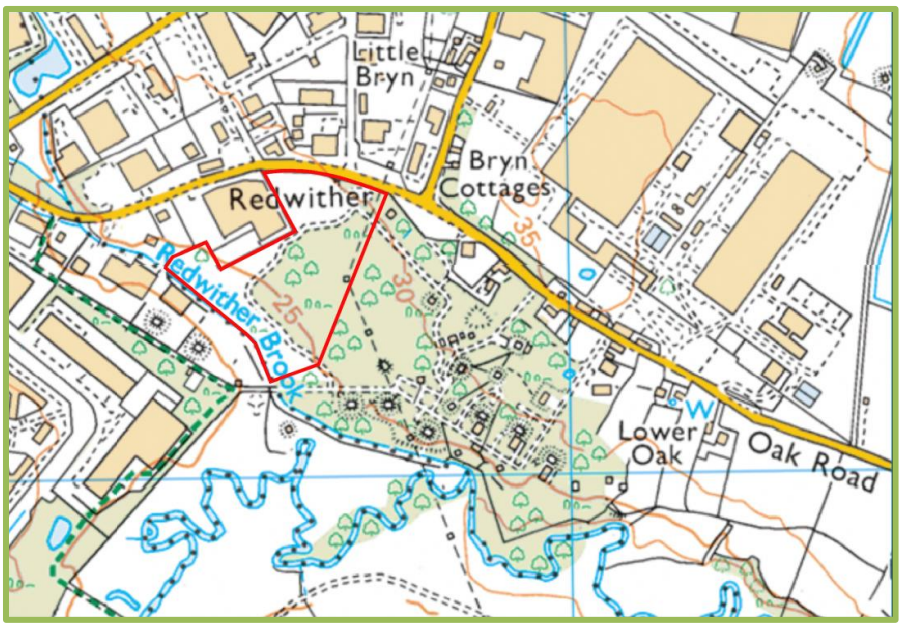


Figure 3: Extract from Ordnance Survey showing formation of existing ground

(Source: Bing Maps, Accessed on 2024-04-23, 1200hrs)

2.3 Existing Watercourses

The site is bounded by existing conveyance ditch/watercourse – Redwither Brook along the south western side of the site, which then flows in a south-easterly direction to join River Clywedog which is approximately 0.5km from the site. (refer to ***Figure 4***).

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Figure 4: Rivers and Ponds within Site Extents

(Source: Google Maps, Accessed on 2024-04-22 1030hrs)

2.4 Existing Public Drainage

There is an existing Welsh Water Combined Water Sewer running from South West to North of the site along the Western border.

Refer to ***Appendix G*** for Site Constraints Drawing.

2.5 Existing Private Drainage

There is no existing private drainage on site. A detailed CCTV & Drainage Survey shall be commissioned to determine whether sewers are on site, and propose remedial works if required to ensure continuity of the sewers during and after construction.

2.6 Site Geology

No Ground Investigation Survey had been carried out at the time this report was compiled. A search on British Geological Survey online showed that there is only one borehole within the site boundary and is listed in ***Table 1***, with their grid references and the ID number used within ***Appendix C***. The borehole location is shown in ***Figure 5***.

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Table 1: Borehole within the site and relevant information

ID	Eastings	Northings	ID within Appendix C
SJ34NE25	338600	349430	S1

A copy of the borehole results is contained in ***Appendix C*** with ID **S1**.

The soil profile from the borehole indicate that the soil is predominantly clay for depths of 18m from the surface and would not support drainage via infiltration. However, due to the dated nature of the boreholes, BRE Digest 365 Soakaway Tests shall be conducted at a number of locations across the site, and if infiltration is found to be possible, the proposed Pond and swales shall be designed as infiltration features, and the controlled outflows to the existing ditch shall be reduced, or if infiltration is good enough, there shall be no outfall from the pond to the existing ditch.

However, a BRE 365 Soakaway Test carried out at Site 1 – Bridgeway Centre located approximately 500m to the East of The Oaks site demonstrated that the soil infiltration at the site is very low and test has been abandoned due to very low infiltration & ground water ingress into the test pit. A copy of soakaway test result is contained in ***Appendix C*** with the ID **S2.**

Hence, The Oaks site is likely to have the same ground formation which would not support drainage via infiltration.



Figure 5: Historic Borehole Locations

(Source: British Geological Survey, Accessed on 2024-04-22, 1130hrs)

3. Drainage Strategy

3.1 Key Principles of SuDS

Figure 6 gives the four key design principles critical for the implementation of SuDS:

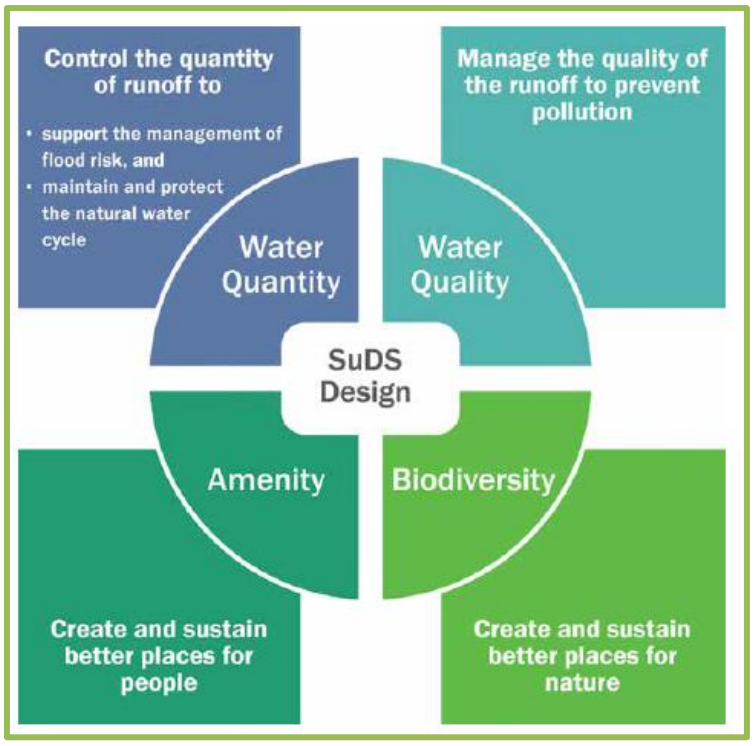


Figure 6: Four Key Principles of SuDS

(Source: CIRIA Report C753 the SuDS Manual)

Quantity Control : Achieved by controlling the quantity of surface water runoff reaching a watercourse, drainage system or sewer. Controlling runoff can aid in mitigating the risk of flooding. The benefits to quantity control include:

- Less surface water entering watercourses, thereby offsetting peak flows and reducing fluvial flood risk.
- Less surface water entering sewers, thereby freeing capacity and reducing flood risk
- Allows for adaption to climate change
- Allows for recharge of underground aquifer

Quality Control : Achieved by improving the quality of surface water reaching a watercourse, drainage system or sewer. The benefits to quality control include:

- Reduces of pollution levels in surface water bodies

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- Protects groundwater resources from contamination
- Enables compliance with the Water Framework Directive

Biodiversity and Amenity Value : Achieved by introducing SuDS that enhance the existing biodiversity of the area and/or add amenity value to the community. The benefits include:

- Contributes to community health & wellbeing by providing green spaces with value in terms of landscape, recreation and walking routes
- Provides opportunities for multifunctional areas
- Provides wildlife habitat and ecological benefits
- Increases property values

These key design principles should be considered in all aspects of SuDS selection and design. All SuDS should aim to achieve ***each of these principles.***

3.2 Discharge Hierarchy

Under the terms of Section H of the Building Regulations 2000, the SUDS Manual 2015 report C753, and the Technical Guidance to the National Planning Policy Framework, the management of runoff should follow the hierarchy in ***Table 2.***

The main findings (refer to ***section 2.6*** of this report) were that drainage via infiltration is not feasible due to the presence of clay soils from the surface to depths greater than 5.0mbgl

Table 2: Surface Water Discharge Hierarchy

Surface Water Discharge Hierarchy	
1	Reuse on site (i.e., rainwater harvesting)
2	Into the ground (infiltration)
3	To a surface water body
4	To a surface water sewer, highway drain, or another drainage system
5	To a combined sewer

(Source: WCC – Flood Risk & Sustainable Drainage – Local guidance for developers, January 2020)

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3.3 Sustainable Drainage Systems Appraisal

A SuDS appraisal was conducted based on the SuDS hierarchy given in ***Table 2***. ***Table 3*** gives the results of the appraisal.

Table 3: Scheme Appraisal of SuDS Drainage Features

SuDS Feature	Is feature suitable for the proposed site?	Comment
Soakaway	NO	Infiltration is not possible due to impermeable soils (Clay soils).
Green/Brown Roofs	YES	As shown on Drainage Plan Layout. To slow down the hydrological cycle by retaining runoff much longer than a normal roof while cleansing by filtration before leaving the site.
Filter Trench/Drain	NO	Swales proposed instead.
Swales with Check Dams	YES	As shown on Drainage Plan Layout. To control the runoff from the site to attenuation pond and treatment before discharging.
Permeable Paving	YES	As shown on Drainage Plan Layout. Proposed within car parking bays – with drainage collection pipes at the bottom. (Permeable Pavement System C has been adopted as per *BS 7533-13:2009*)
Infiltration Basin	NO	Infiltration is not possible due to impermeable soils (Clay soils).
Detention Basin	NO	Spatial constraints and layout make use of Detention Basin unsuitable.
Bioretention System (Rain Garden)	YES	As shown on Drainage Plan Layout. To collect, attenuate and clean the runoff from surrounding hardstanding areas.
Pond	YES	As shown on Drainage Plan Layout. To attenuate and treat runoff before discharging to existing ditch.
Hydro-brake Flow Control Unit	YES	As shown on Drainage Plan Layout. To limit 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.
Storage System: Geo-cellular or Tank	NO	Attenuation and treatment pond proposed instead.

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Based on the selected SuDS features as per ***Table 3***, the main SuDS features associated with the proposed drainage strategy are summarised below:

Permeable Pavement: Permeable pavement underlaid by a drainage blanket (5-20mm sub-base) wrapped in impermeable geomembrane will allow runoff to undergo filtration through the sub-base before being collected by the proposed Permavoid Diffuser Unit. Permeable Pavement is a Pollution Control feature for this SuDS scheme. Any spilt polycyclic aromatic hydrocarbons are filtered through the pavement layers before reaching the collection pipe at the base of the sub-base. Refer to ***Appendix D*** for areas to receive permeable pavement and construction make-up.

Figure 7 gives a section through permeable pavement System C.

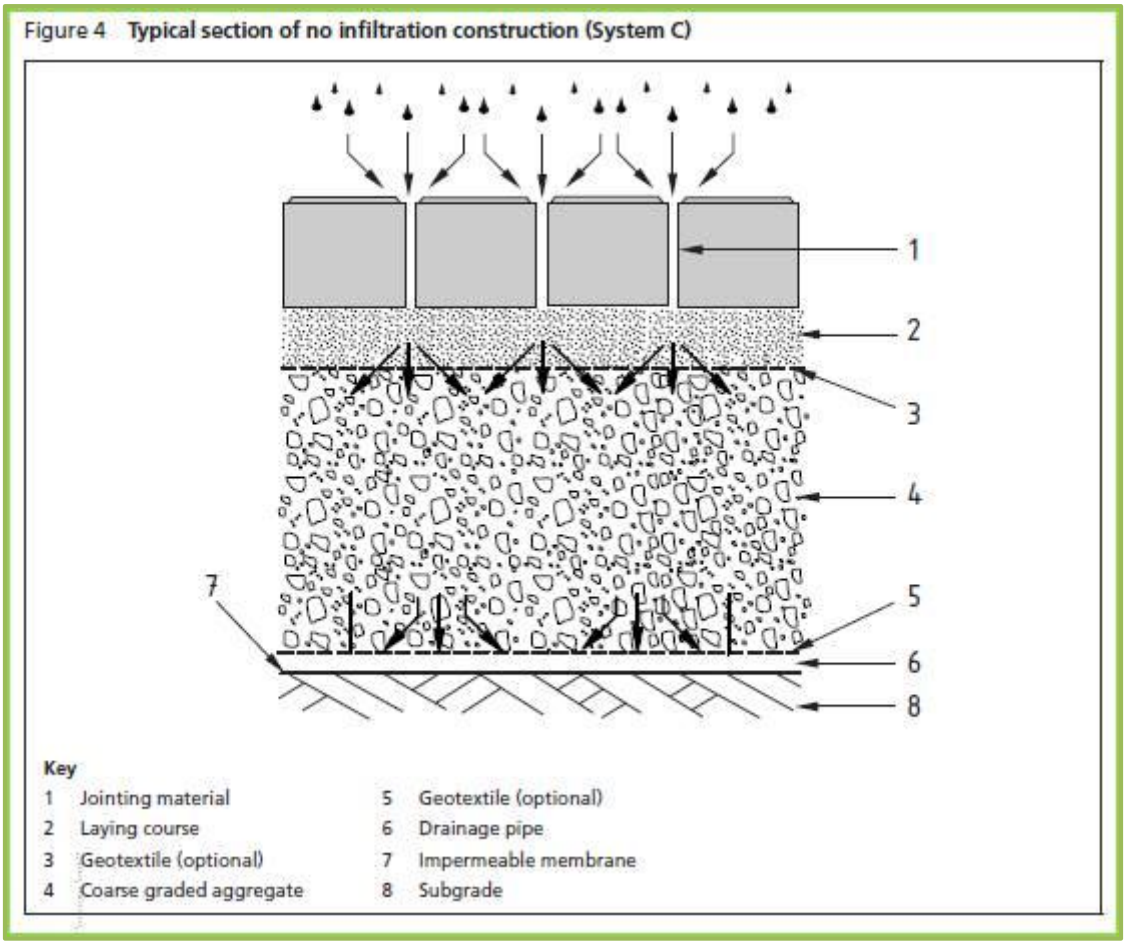


Figure 7: Permeable Pavement System C – for no infiltration

(Source: BS 7533-13:2009 Figure 4)

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Bioretention System-Rain Gardens: The proposed Rain Gardens will collect runoff from surrounding hardstanding areas, as shown in ***Appendix D***, to ensure that runoff is treated by proving physical filtration at the earliest possible stage. Designs will also aim to ensure that the feature looks aesthetically pleasing and can be help to create amenity benefits.

Swales with Check Dams: Provide chemical treatment, and must have reeds and/or special grass (like Perennial Rye) to Landscape Architect's specification. The flora (planted grass/lawn/reeds) within the Swale areas absorb the pollutants via photosynthesis and reduce pollutant concentrations in the runoff. The microbial action of any fauna (bacteria/slugs) within the swale also cause chemical cleansing of the runoff and enhance water quality. The swales also provide physical treatment via adsorption of suspended solids to the flora (grass/lawn/reeds).

Treatment & Attenuation Basin/Pond: The pond has been strategically placed at the lowest point of the site and is the main runoff attenuation feature to provide 2143m^3 of attenuation before discharging to existing Redwither Brook. The pond will also provide runoff cleansing by both physical and microbial processes. An overflow device shall be placed at the pond outlet to prevent flooding of the SuDS feature. Topsoil and seeding with specific species of flora will be in accordance to the Landscape Architect's specification.

Flow Control Device: Runoff from the development shall be controlled to maximum 15.0 l/s for all storm events up to and including the 100-year + 40% CC storm event by a Hydro-brake Outflow Control placed at the pond outlet, details of which are shown in ***Appendix E.***

The controlled flow is discharged into existing Redwither Brook located at the south western edge of the site.

Green Roof: *The Proposed* 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.

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3.4 Stormwater Drainage Strategy

The proposed development has a plan area of 5.86Ha, with approximately 3.65ha being impermeable, and 2.15ha being reserved for an ecological zone. The IH124 method was used to estimate the greenfield runoff rates from the site since the site is less than 200Ha. *Because the site is also less than 50ha, the ICP SUDS tool in Micro-drainage Source Control module was used to calculate the greenfield runoff rates*. The tool uses the IH124 approach to calculate the greenfield runoff for 50ha, then linearly interpolate to get the flows for smaller catchments. The 1-year, 30-year, and 100-year Greenfield runoff rates were found to be 15.6 l/s, 36.7 l/s, and 48.2 l/s respectively, refer to ***Appendix E*.**

Qbar is 18.7 l/s for both rural and urban.

It is recommended that, to prevent increased flows post-development and offer an improvement to existing downstream flash flooding, runoff from the development shall be controlled to 15.0 l/s maximum for all storm events up to and including the 100-year + 40% CC storm event. It is to be noted that, the runoff rate is limited to 15.0 l/s which is less than calculated 1-year Greenfield Runoff Rate of the site, refer to ***Appendix E*** for drainage calculations.

Figure 8 gives a summary of the proposed SuDS Drainage Strategy.

The SuDS Approval Body shall be consulted and fully briefed on the proposed drainage strategy so they can provide a formal Discharge Consent to the existing ditches before construction begins.

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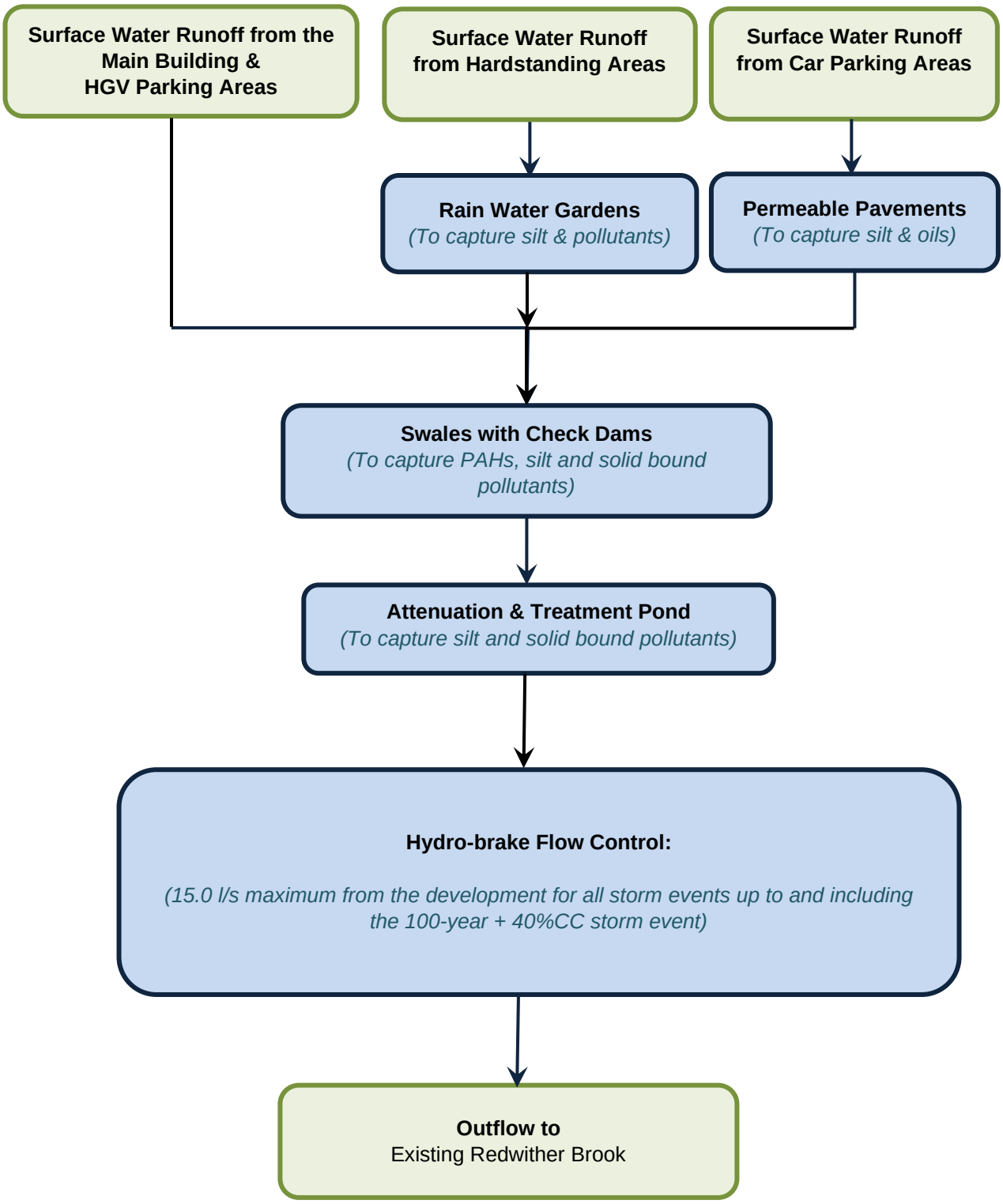


Figure 8: SuDS Drainage Strategy Summary

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3.5 Pollution Control and Water Quality

The following pollution control devices have been proposed:

- ***Permeable Pavement Areas:***
  Treat pollutants from Parking Bays

  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.

  Permeable Pavement is the primary Pollution Control feature for this SuDS scheme. Any spilled Polycyclic Aromatic Hydrocarbons (PAHs) are filtered through the pavement layers before reaching the sub-grade. Refer to ***Appendix D*** for areas to receive permeable pavement and construction make-up.

- ***Pond/Swales:***
  Treat effluent from whole site
  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. The reeds also provide physical treatment via adsorption of suspended soils to the flora (grass/lawn/reeds). Refer to ***Appendix D*** for swale details.

- ***Rain Water Gardens:***
  Capture silt & pollutants
  Rain Gardens have been strategically placed to capture silt and pollutants before the runoff reaches the swales and hence provide an increase in water quality.

- ***Green Roof:***
  Capture pollutants
  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.

CIRIA report C753, The SuDS Manual, says on page 567 ‘To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).’

Table 4 shows Table 26.2 of the SuDS Manual, which gives the pollution hazard indices for various land uses.

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Table 4: Pollution hazard indices for different land use classifications

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Table 5 shows Table 26.3 of the SuDS Manual, which gives indicative SuDS mitigation indices for discharges to surface waters.

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Table 5: Indicative SuDS mitigation indices for discharges to surface waters

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices[1] TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yujj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Table 6 gives a summary analysis of the adequacy of the proposed SuDS drainage in addressing pollution control and water quality.

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, where:

Total SuDS mitigation index = mitigation $\mathbf{index_{(1)}}$ + $\mathbf{0.5 * mitigation\ index_{(2)}}$

Where mitigation $index_{(n)}$ = mitigation index for component n

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations.

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Table 6: Mitigation versus hazard indices for proposed layouts

SuDS Drainage Layout	SuDS device/Land Use	TSS	Metals	Hydro-carbons	Remark
Green Roof, Swales & Pond	Green Roof, Swales & Pond	**1.4**	**1.5**	**1.5**	**OK**, SuDS elements provides sufficient treatment.
	Roof + Yard Areas	0.9	0.8	0.8	
Permeable Paving, Swales, Pond	Permeable Paving	**1.3**	**1.4**	**1.4**	**OK**, SuDS elements provides sufficient treatment.
	Parking Bays	0.5	0.4	0.4	
Bioretention System, Swales & Pond	Rain Water Gardens, Swales & Pond	**1.4**	**1.5**	**1.5**	**OK**, SuDS elements provides sufficient treatment.
	Surrounding hardstanding areas	0.6	0.6	0.8	

3.6 Spillage Management

The probability of an oil spillage on this site is higher within the HGV Parking Areas, refer to proposed Masterplan. Should any accidental oil spillage take place, the oil from the HGVs Parking Area flows into the proposed swales designed around the proposed building. Two chambers with penstocks are located at the downstream end of the two swales before discharging runoff to the attenuation/treatment pond. Further the runoff from the car parking area is directed to the pond via a separate drainage run and a chamber with penstock has been proposed at the downstream location prior to discharging into the pond. These chambers will be sealed by lowering the penstocks, thus restricting the spillage to the pond. The oil can then be sucked up and the swale/hardstanding areas cleansed before opening the penstocks. Use of the swales and penstock chambers absolves the need for a Bypass Oil Interceptor.

Moreover, any minor spills within the Cars Parking Bays will be treated by the Permeable Pavement as the runoff filters through the layers to the collection pipe at the bottom of the sub-base.

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3.7 Exceedance Flows

Exceedance flows are those flows generated by flooding of part or all of the drainage scheme due to storm events in excess of the design storm event [100-year + 40% CC storm event].

Exceedance flood water will find its way to existing ditch running along South Western to South Eastern edges of the site.

Refer to ***Appendix F*** for Flood Flow Analysis Plan Layout.

3.8 Foul Drainage

Foul drainage from the proposed building shall be taken by a new private gravity sewer system across the site and then discharged into the existing Welsh Water Combined Water Sewer running close to the eastern boundary of site flowing from northeast to southeast direction.

Proposed foul drainage is shown on drainage plan layouts in ***Appendix D.***

The pre-planning enquiry response received from Welsh Water confirmed that there is sufficient capacity within the foul network to accommodate foul water arising from the development. A Section 106 WIA agreement will be raised at the detailed design stage to gain the approval from Welsh Water (refer to Welsh Water correspondences in ***Appendix H***).

3.9 Maintenance and Operation

A SuDS Operation and Maintenance Manual has been produced and issued as a separate document from this report. The Manual shall be revised post-construction to suit recorded drainage (which should be in accordance with details approved at planning stage) and added to the Health and Safety File.

Please refer to report ***TOS-BML-XX-XX-RP-C-0501*** SuDS Operation and Maintenance Manual for details of Owner and Maintainer of the assets, and recommended maintenance regime for the drainage assets.

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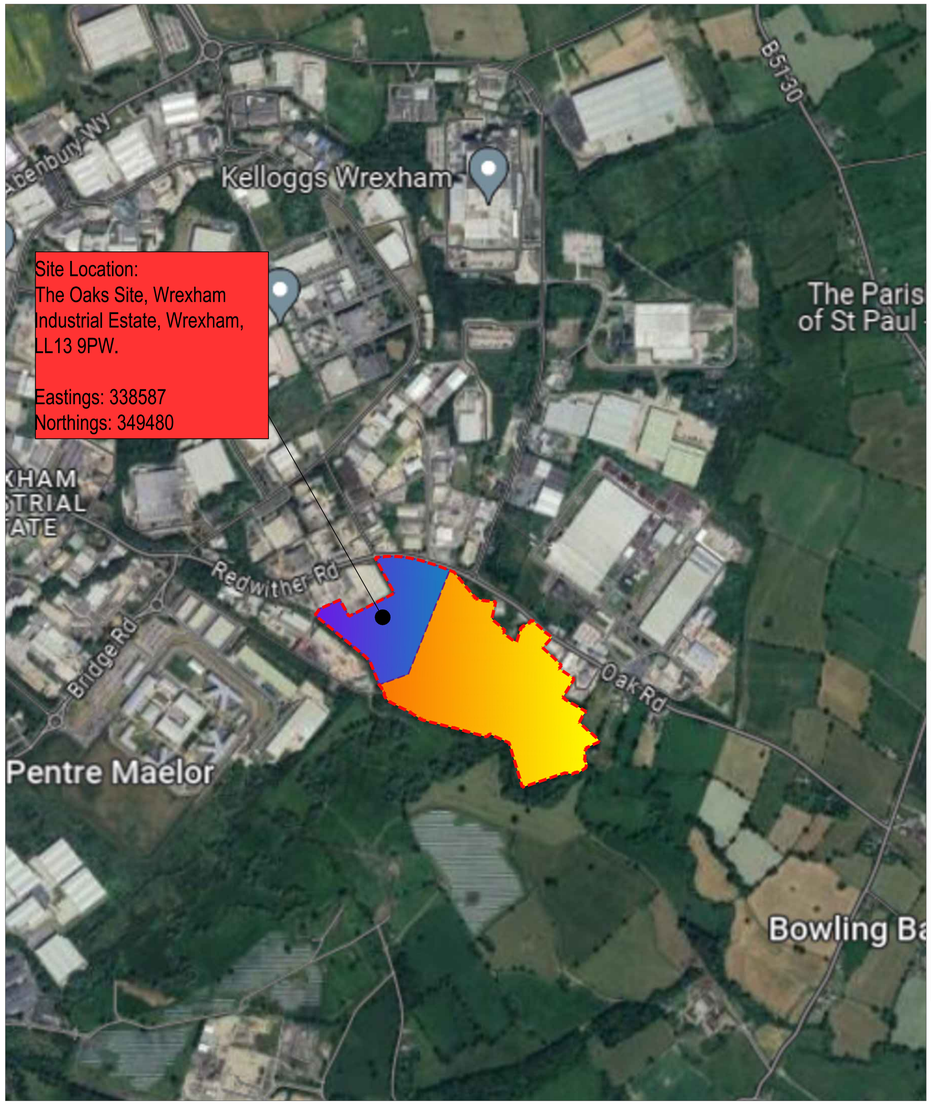
APPENDICES

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Appendix A

Site Location Plan and Masterplan

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KEY:

Scheme Location

Site Extents not covered by proposed works

Site (Private Ownership) Boundary

N
W E
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.

Rev	By / Chk'd	Date	Description
P01	IW/AM	06/03/2024	First Issue for Construction

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client
FI REAL ESTATE MANAGEMENT

BarnsleyMarshall Limited
4&5 Prior Wharf
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
Scheme Location

By ?? Date 00/00/0000

Drawing No. TOS-BML-XX-XX-DR-C-0100
Revision P01
BML Job No. 1000-06
Status -
Drawing Scale at A1: -
CAD Filename: Y:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\Drawings\C - Site Location Plan\Working\DWG\TOS-BML-XX-XX-DR-C-0100 P01 - Site Location Plan.dwg

Appendix B

Site Topography

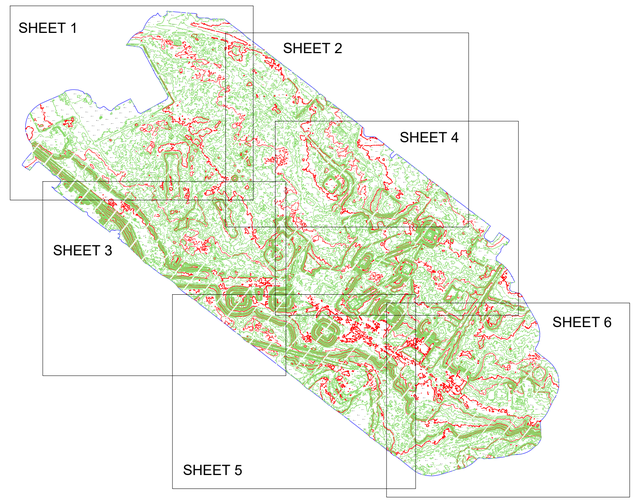
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0 25 50 Meters

SHEET KEY nts



REV:	DESCRIPTION:	BY:	DATE:

STATUS: INFORMATION ONLY

FI CONSTRUCTION

CLIENT: FI Construction Limited
Botany Brow
Chorley
Lancashire, PR69AF

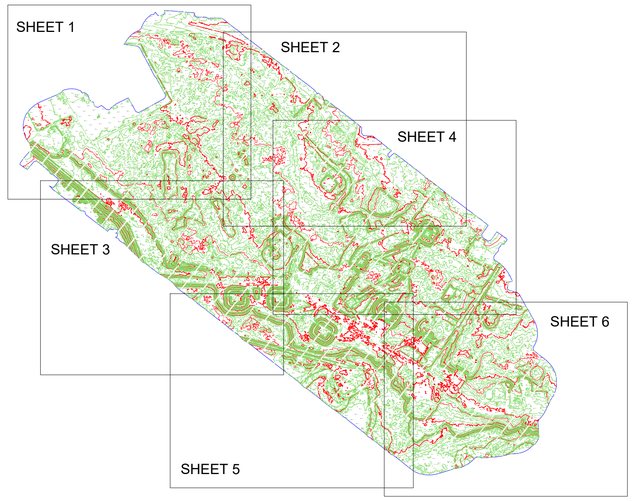
SITE: THE OAKES

TITLE: AS-BUILT DRONE SURVEY 21.02.2025
SHEET 6 of 6

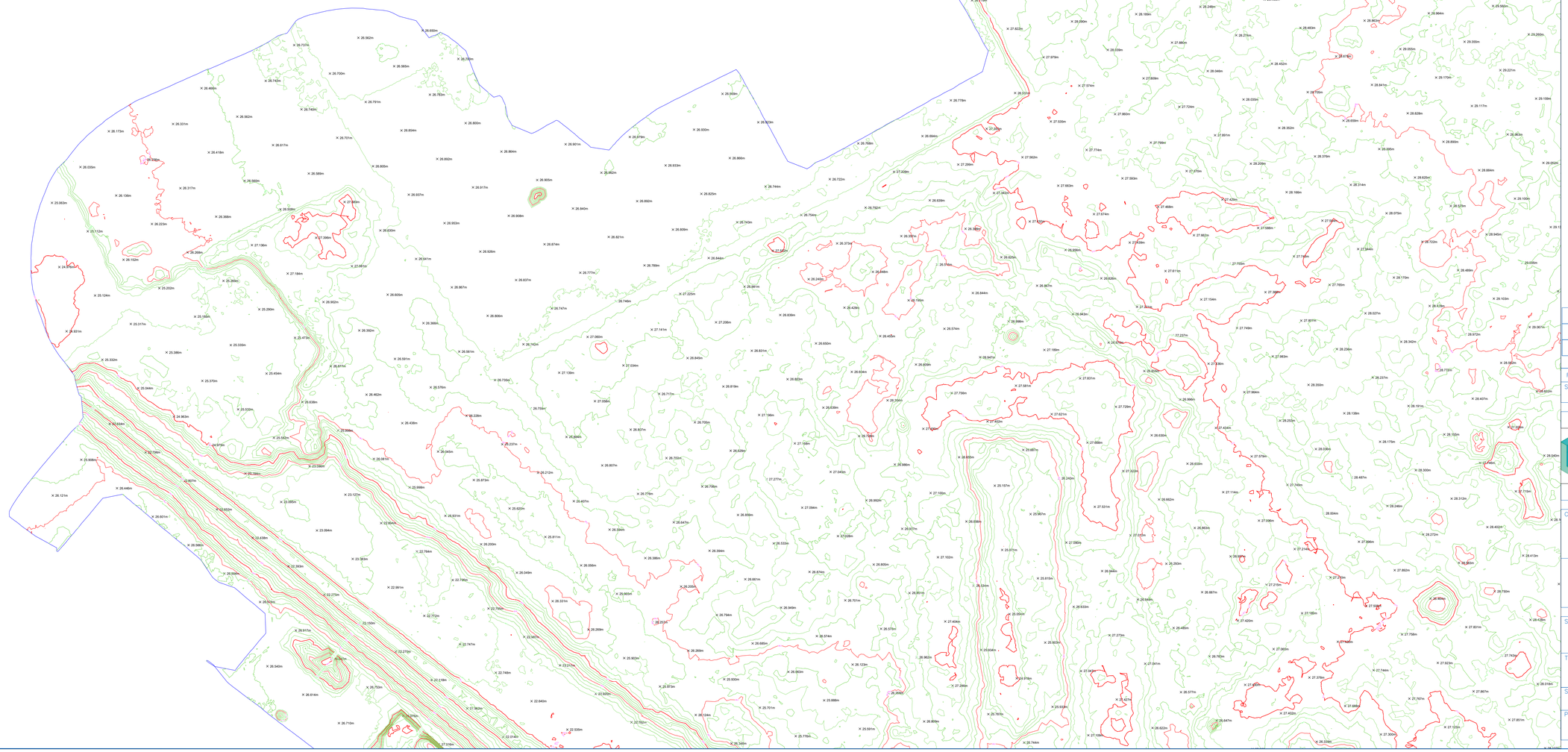
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PROJECT NO:	DRAWING NO:	REVISION:
00301	C4D/00301/105	

SHEET KEY nts



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STATUS: INFORMATION ONLY

FI CONSTRUCTION

CLIENT: FI Construction Limited
Botany Brow
Chorley
Lancashire, PR69AF

SITE: THE OAKES

TITLE: AS-BUILT DRONE SURVEY 21.02.2025
SHEET 1 of 6

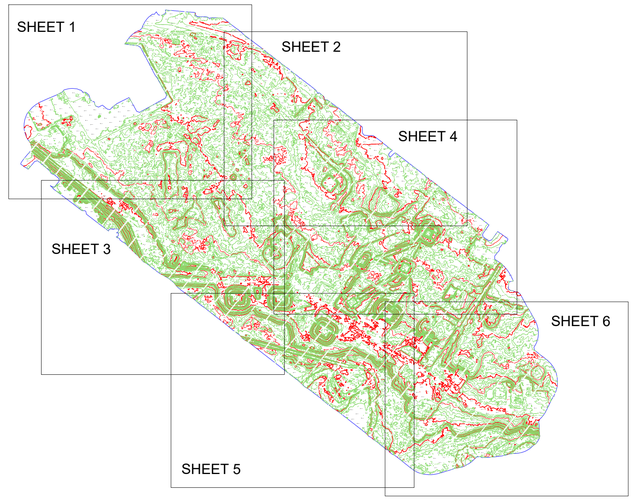
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1:500	25/02/2025	CD	TD

PROJECT NO:	DRAWING NO:	REVISION:
00301	C4D/00301/100	

0 25 50

Meters

SHEET KEY nts



N

Notes:

1. Where this drawing has been issued in electronic .dwg format it has been done so in good faith. gwscivils do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to gwscivils. The electronic .dwg file should not be assumed to be to scale and should not be used for 'overlaying', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information. gwscivils take no responsibility for this information, which should be checked against the originators paper drawing(s).
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Chorley
Lancashire, PR69AF

SITE: THE OAKES

TITLE: AS-BUILT DRONE SURVEY 21.02.2025
SHEET 2 of 6

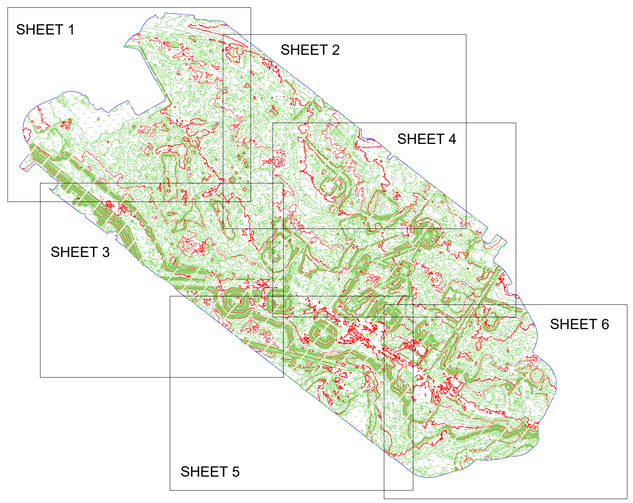
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0 25 50 Meters

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SITE: THE OAKES

TITLE: AS-BUILT DRONE SURVEY 21.02.2025
SHEET 3 of 6

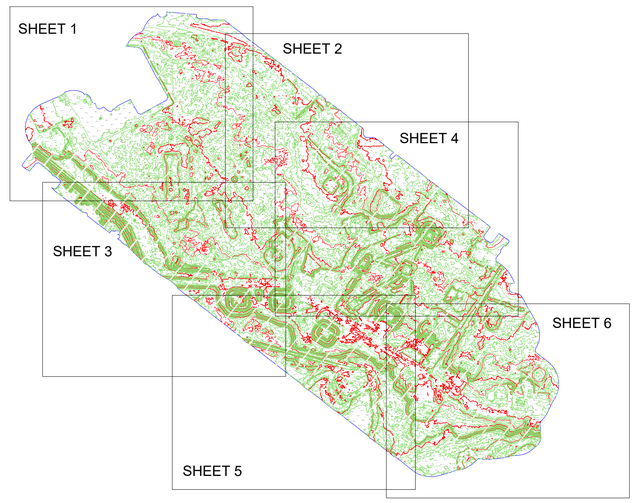
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PROJECT NO:	DRAWING NO:	REVISION:
00301	C4D/00301/102	

0 25 50
Meters

N

SHEET KEY nts



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STATUS:	INFORMATION ONLY		

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SITE: THE OAKES

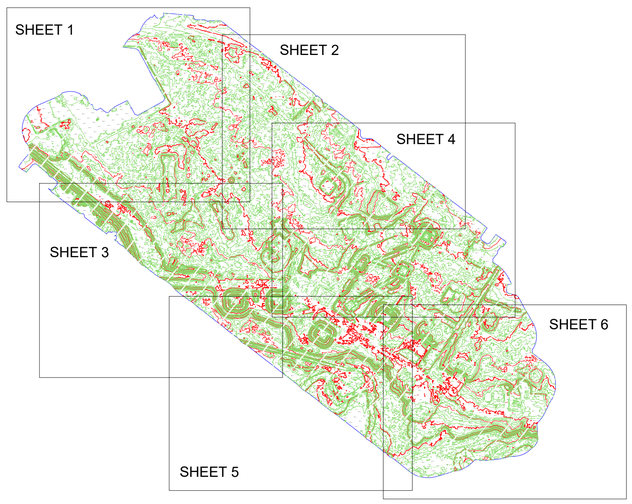
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SHEET 4 of 6

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SHEET KEY nts



0 25 50 Meters

REV:	DESCRIPTION:	BY:	DATE:
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SITE: THE OAKES

TITLE: AS-BUILT DRONE SURVEY 21.02.2025
SHEET 5 of 6

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:500	25/02/2025	CD	TD
PROJECT NO:	DRAWING NO:		REVISION:
00301	C4D/00301/104		

Appendix C

Site Geology

S1

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British Geological Survey

SJ 34 NE 25 **3860 4943** **Redwither, Abenbury** **Block C**

Surface level +28.8 m
Water not encountered
Shell and auger 152 mm diameter
September 1977

Waste 18.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Made ground	1.0	1.0
Boulder Clay	Clay, silty, dark brown, soft to 6 m stiff below; scattered stones	17.0+	18.0

British Geological Survey

BGS ID: 153131 : BGS Reference: SJ34NE25
British National Grid (27700) : 338600,349430

Institute of Geological Sciences
IMAU Sand and Gravel Borehole Log Form

SJ 34 NE/25

SJ 34 NE 25	3860 4943	REDWITHER ABENBURY	

Surface level	+28·8 m
Water not struck	
Shell and auger 152 mm diameter	
September 1977	

Waste	18·0+	

LOG

Geological Classification	Lithology	Thickness m	Thickness ft	Depth m	Depth ft
	Made ground	1·0		1·0	
Boulder clay	Clay, soft, becoming stiff at 6m, dark brown, rare stones, silty.	17·0+		18·0	

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 153131 : BGS Reference: SJ34NE25
British National Grid (27700) : 338600,349430

...strial Minerals Assessment Unit

BOREHOLE RECORD SHEET

Registration Number

6 in.quarter sheet | Accn. No. | Suffix

SJ34NE | | 25 | |

Temp No. SJ 34 NE 7

Borehole diam. 152 mm

Water struck N/S

Remarks:

Classification	Thickness (m)	Lithology
~~Overburden~~ Waste	18·0	MADE GROUND

Lithostrat. Code	Description	Thickn (m)	Depth to base(m)	Sample No.
SOIL	MADE GROUND — SOFT MOIST CLAY	1·0	1·0	
GLLD	SILTY CLAY. GREY/BROWN. VERY SOFT. NO PEBBLES OR LAMINATIONS	5·0	6·0	
GLLD	CLAY BROWN V. STIFF. ~~NO~~ LAMS. NO PEBBLES. LAKE CLAY. HOMOGENEOUS. TORVISOE VEINING PRESENT	2·0	8·0	WSSG 7·0
GLLD	CLAY BECOMING STIFFER WITH GREEN SILTY LAMS OCCASIONAL BUNTER SSTN PEBBLE.	4·0	12·0	
GLLD	CLAY BECOMING SOFTER AND SILTIER DARK CHOCOLATE BROWN. NO LAMS. OR PEBBLES	6·0	18·0	
	T.D. 18m 14/9/71			

Contact BGS: ngdc@bgs.ac.uk

Appendix C

Site Geology

S2

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SP ASSOCIATES
SOAKAWAY TEST

1 Market Place, Warwick, CV34 4SA
Tel: 01926 494271

Site: Bridgeway Centre, Wrexham Industrial Estate
Job No: S1802
Test Date: 12/01/2023 Report date: 19/01/2023
Test Method: BRE 365 (2015)

Trial Pit Number: ST2
Depth: 1.8m, Length 1.0m Width 0.4m

Start Water Depth for Analysis – Datum (mbgl): **0.96**
75% Effective Depth (mbgl): - Elapsed Time (Mins):
50% Effective Depth (mbgl): -
25% Effective Depth (mbgl): - Elapsed Time (Mins):
Base of Soakage Zone (mbgl): **1.8**

Volume outflow between 75% and 25% effective depth (m3):
Mean surface area of outflow (m 2):
Time for outflow between 75% and 25% effective depth (mins):

Elapsed Time (minutes)	Water Depth (m below datum)	Elapsed Time (minutes)	Water Depth (m below datum)
0	0.96	90	0.94
1	0.96	100	0.94
2	0.96	110	0.94
3	0.96	120	0.93
4	0.96	130	0.93
5	0.96	140	0.93
6	0.96	150	0.93
7	0.96	160	0.93
8	0.96	170	0.93
9	0.96	180	0.92
10	0.96	190	0.92
15	0.96	200	0.92
20	0.96	210	0.92
25	0.95	220	0.91
30	0.95	230	0.91
40	0.95	240	0.91
50	0.95	250	-
60	0.95	260	-
70	0.94	270	-
80	0.94	280	-

Soil Infiltration Rate (m/s): Test abandoned due to very low rate of infiltration and groundwater ingress into test pit.

SP ASSOCIATES
SOAKAWAY TEST

1 Market Place, Warwick, CV34 4SA
Tel: 01926 494271

Site: Bridgeway Centre, Wrexham Industrial Estate
Job No: S1802
Test Date: 18/11/2022 Report date: 15/11/22
Test Method: BRE 365 (2007)

Trial Pit Number: ST1
Depth: 1.7m, Length 1.1m Width 0.4m

Start Water Depth for Analysis – Datum (mbgl): **0.98**
75% Effective Depth (mbgl): -
50% Effective Depth (mbgl): -
25% Effective Depth (mbgl): -
Base of Soakage Zone (mbgl): **1.7**

Elapsed Time (Mins):
Elapsed Time (Mins):

Volume outflow between 75% and 25% effective depth (m3):
Mean surface area of outflow (m 2):
Time for outflow between 75% and 25% effective depth (mins):

Elapsed Time (minutes)	Water Depth (m below datum)	Elapsed Time (minutes)	Water Depth (m below datum)
0	0.98	90	0.98
1	0.98	100	0.98
2	0.98	110	0.98
3	0.98	120	0.97
4	0.98	130	0.97
5	0.98	140	0.97
6	0.98	150	0.97
7	0.98	160	0.96
8	0.98	170	0.96
9	0.98	180	0.96
10	0.98	190	0.96
15	0.98	200	0.95
20	0.98	210	0.95
25	0.98	220	0.95
30	0.98	230	0.95
40	0.98	240	0.95
50	0.98	250	-
60	0.98	260	-
70	0.98	270	-
80	0.98	280	-

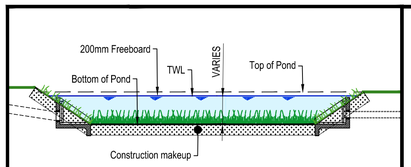
Soil Infiltration Rate (m/s): Test abandoned due to very low rate of infiltration and groundwater ingress into test pit.

Appendix D

Drainage Strategy Drawings

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Typical Attenuation Pond

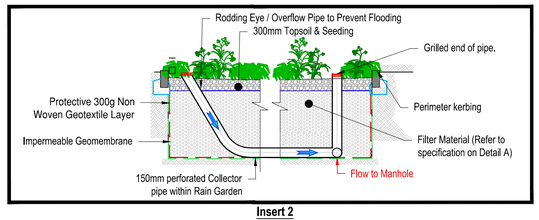


Proposed Attenuation Pond

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

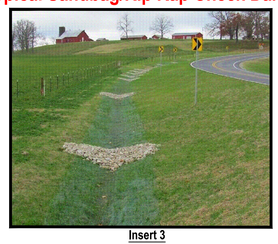
Insert 1
n.t.s

Typical Rain Garden

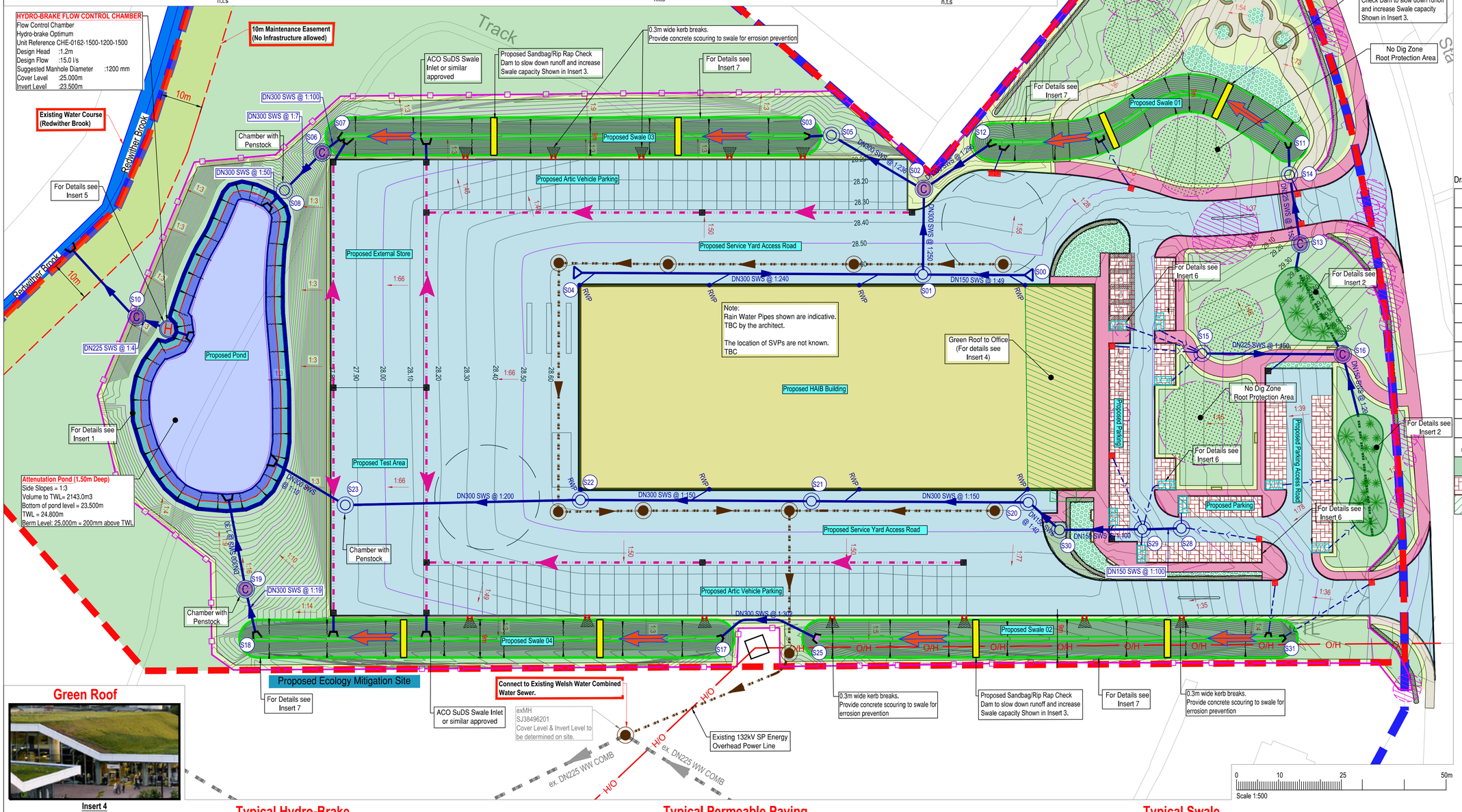


Insert 2
n.t.s

Typical Sandbag/Rip Rap Check Dam



Insert 3
n.t.s

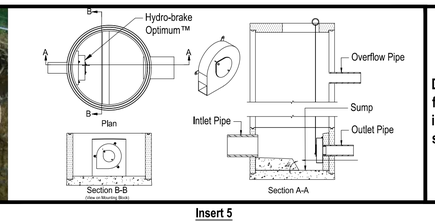


Green Roof

Insert 4
n.t.s

Typical Hydro-Brake

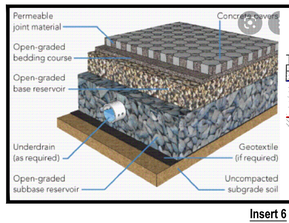


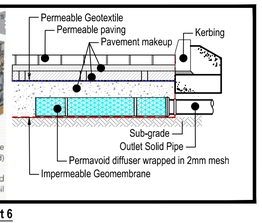


Design flow: 15.0 l/s max. for storms up to and including 100-year+40%CC storm event

Insert 5
n.t.s

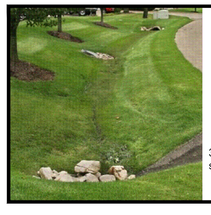
Typical Permeable Paving

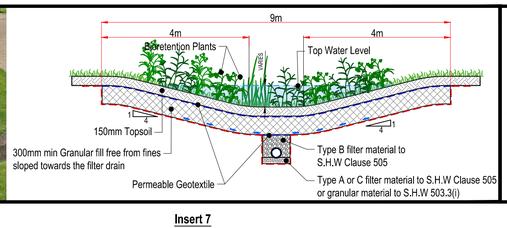




Insert 6
n.t.s

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
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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,

⚠ 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:

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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
This drawing is not to be used for construction

Client

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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

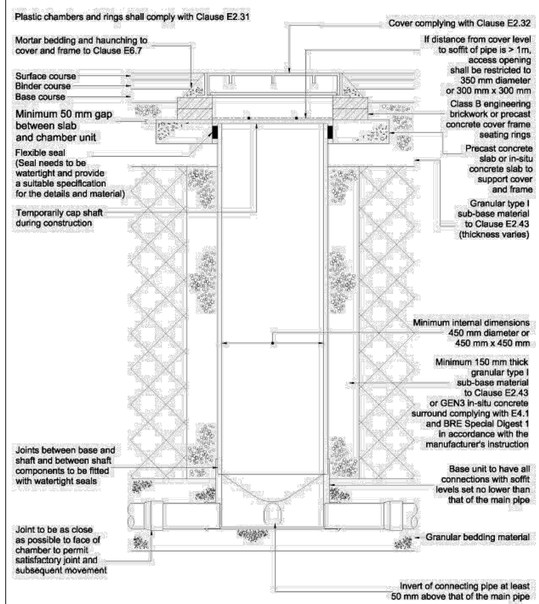
BML Job No.
1000-06

Status
-

Drawing Scale at A1: 1:500

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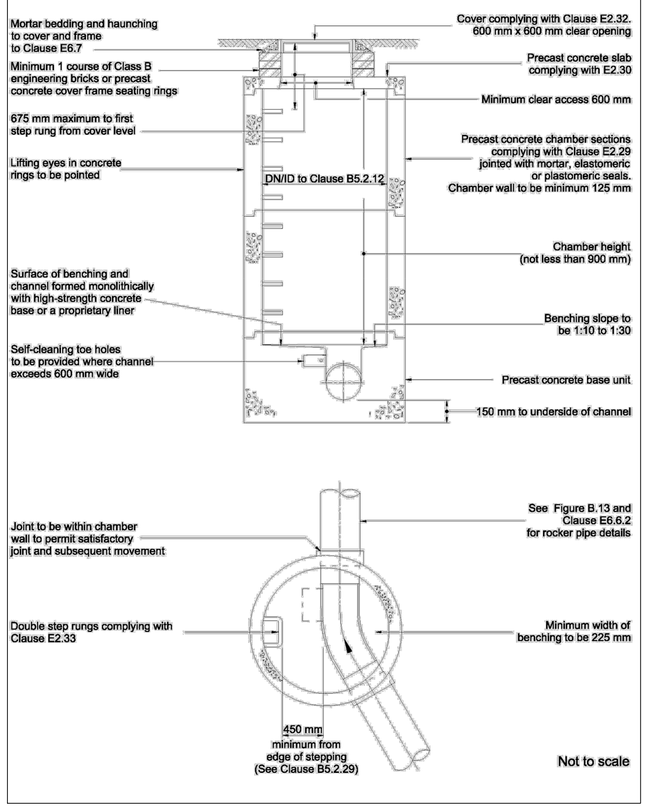
Figure B 18
Typical inspection chamber detail – Type D
Depth from cover level to soffit of pipe up to 3 m
Flexible material construction for use in areas subject to vehicle loading



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:

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

8. Details and locations of existing services are based on the Topographical Survey and Utility Records received from Third Parties and Service Providers respectively, and should be considered indicative and approximate only. The existing services shown on Series 2700 drawings may not be exhaustive. The Contractor shall use Trial Pits and other approved methods to accurately locate and verify the positions and depths of all existing services before commencement of works on site.

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

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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

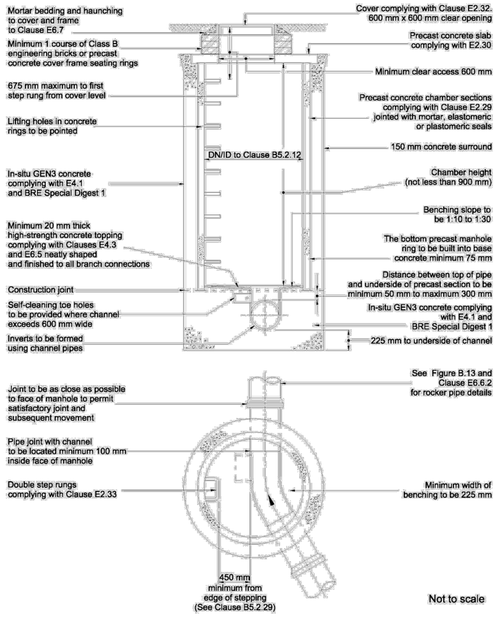
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Drawing Scale at A1: As Shown

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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

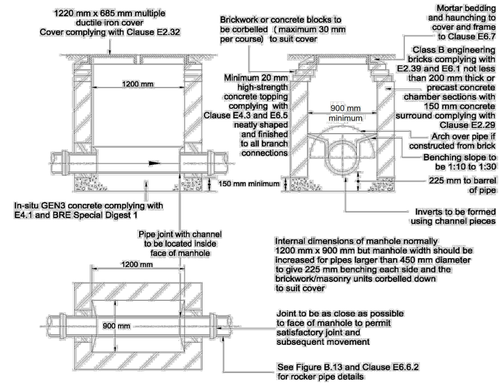


Not to scale

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



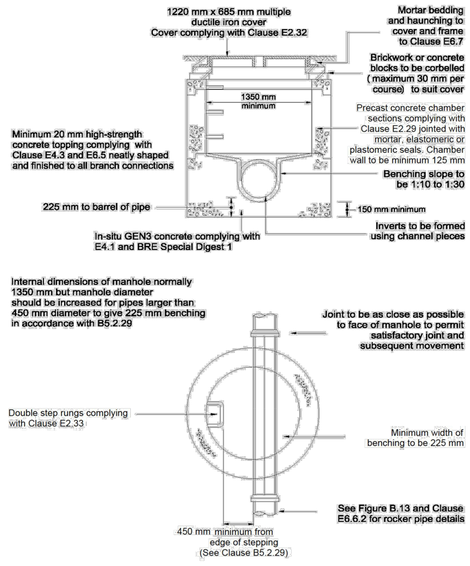
Note: The use of precast concrete chamber units to E2.29 with 150 mm GEN3 in-situ concrete complying with E4.1 and BRE Special Digest 1 in place of brickwork construction is permitted.

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:
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:

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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.

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

PRELIMINARY DRAWING
This drawing is not to be used for construction

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Worcester
WR3 8SG

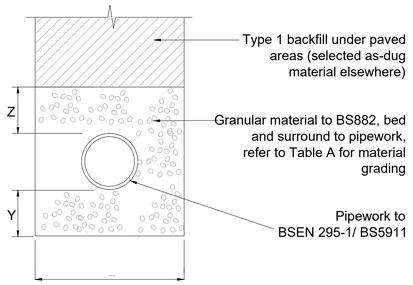
Tel: 01905 330550
Email: design@barnsleymarshall.co.uk
Web: www.barnsleymarshall.co.uk

BarnsleyMarshall

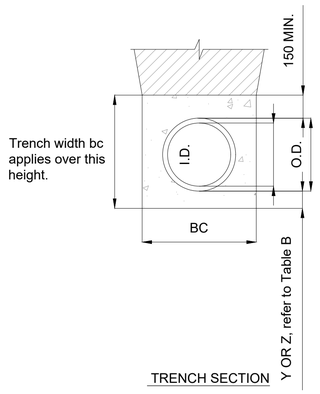
Project
The Oaks Site
Wrexham Industrial Estate

Drawing
Drainage Details 02

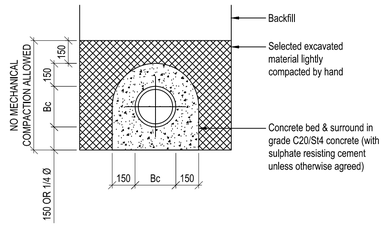
By IW/AM	Date 18/02/2025
Drawing No. TOS-BML-XX-XX-DR-C-0506	Revision P01
BML Job No. 1000-06	Status -
Drawing Scale at A1: As Shown	
CAD Filename: T:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\5-Innovation - Working\DWG\TOS-BML-XX-XX-DR-C-0505 - 0510 P01 - Drainage Details 1 to 5.dwg	



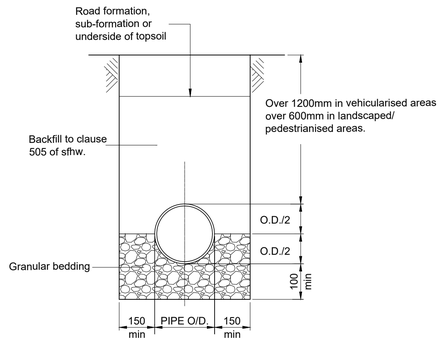
CLASS S PIPE BEDDING DETAIL
(FOR ALL PIPES WITH MORE THAN 1.2M COVER IN VEHICULAR AREAS OR MORE THAN 300MM COVER IN SOFT AREAS)



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.

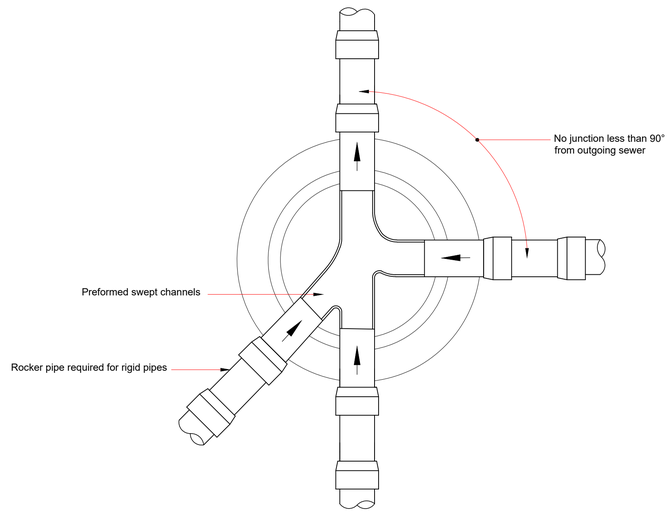
2) Precast concrete manhole rings will not be cut under any circumstances.

	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

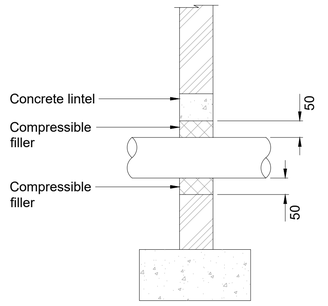
Rigid pipes built into manhole should have a flexible joint as close as feasible to the external face of the structure and the length of the next rocker pipe should be as shown.

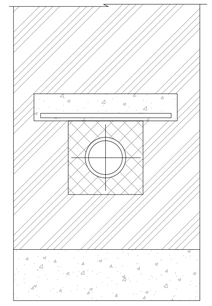
Nominal diameter (mm)	Maximum effective length (m)
150 - 600	0.6
601 - 750	1.00
over 750	1.25

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

Arrangement of pipe junctions within manholes

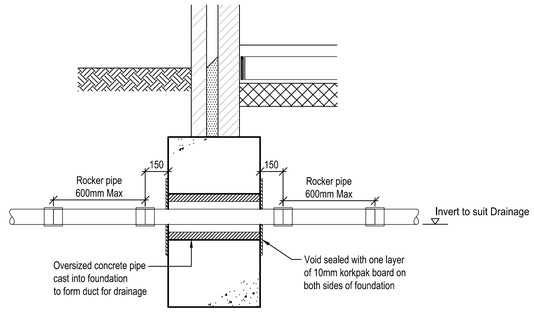
Granular Pipe Bedding Details for Rigid Pipes





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:

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:

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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

FI REAL ESTATE MANAGEMENT

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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

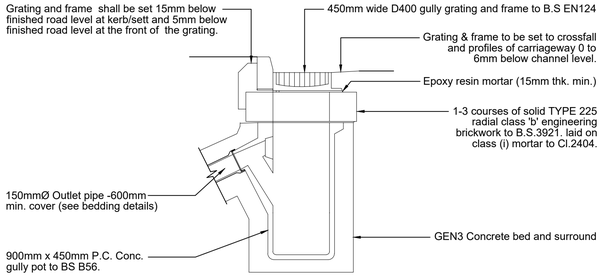
Revision P01

BML Job No. 1000-06

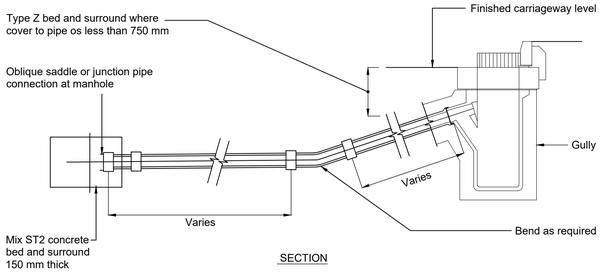
Status -

Drawing Scale at A1: As Shown

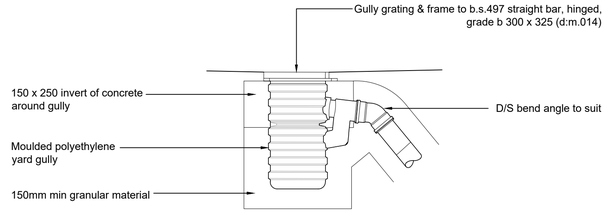
CAD Filename: T:\Project\1000.06 The Oaks Site, Wrexham Ind Est\04-Innovation - Working\DWG\TOS-BML-XX-XX-DR-C-0505 - 0510.PR7 - Drainage Details 1 to 5.dwg



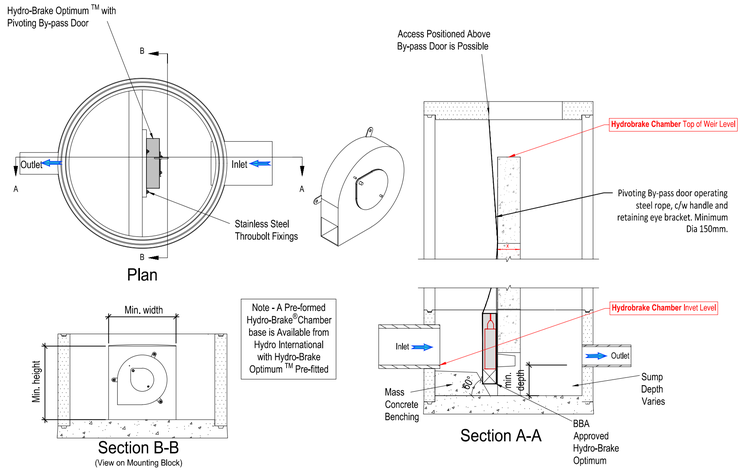
ROAD GULLY DETAIL



SECTION

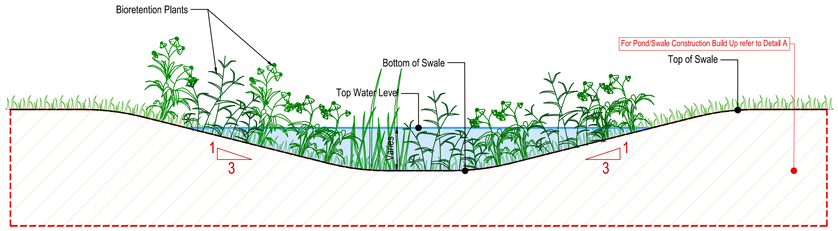


GULLY DETAIL - NON-KERBED AREAS



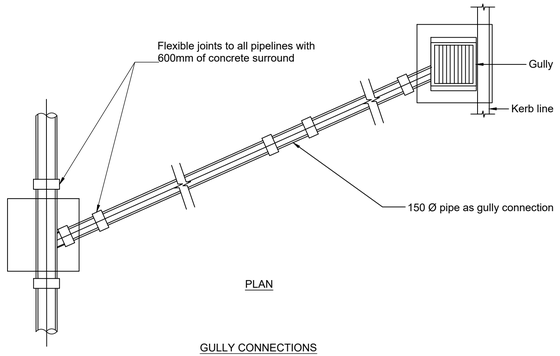
Hydrobrake Chamber Detail With Overflow Pipe

Scale 1:20



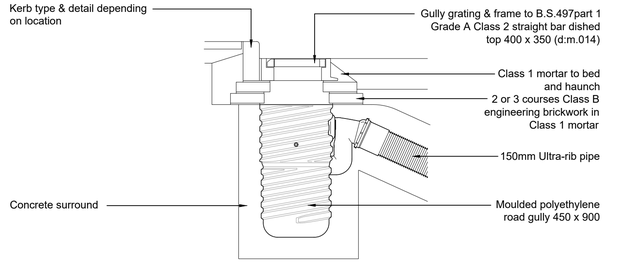
Swale - Cross Section

Scale 1:20

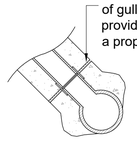


PLAN

GULLY CONNECTIONS



GULLY DETAIL - KERBED AREAS



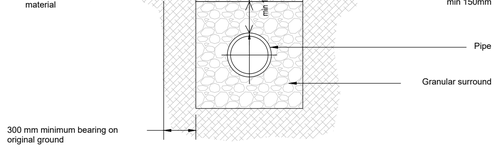
Gully connection to be 150mm dia pipe, bends as required, with 150mm GEN3 concrete surround. Concrete surround to be provided for full length of gully connection. Flexible joints (Flexcell or similar approved) to be provided at each joint. Where connection is to an existing gully connection, a proprietary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

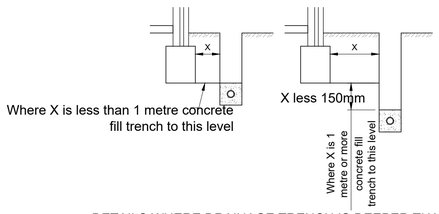
Where the existing sewer is greater than 300mm, a saddle connection may be used.

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

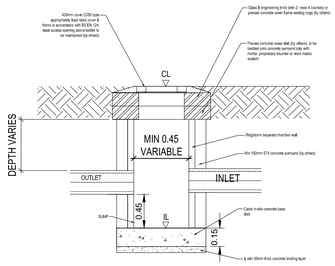
SADDLE CONNECTION TO EXISTING SEWER



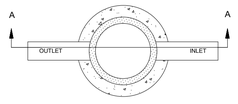
PROTECTION OF PIPES LAID AT SHALLOW DEPTHS



DETAILS WHERE DRAINAGE TRENCH IS DEEPER THAN FOUNDATIONS



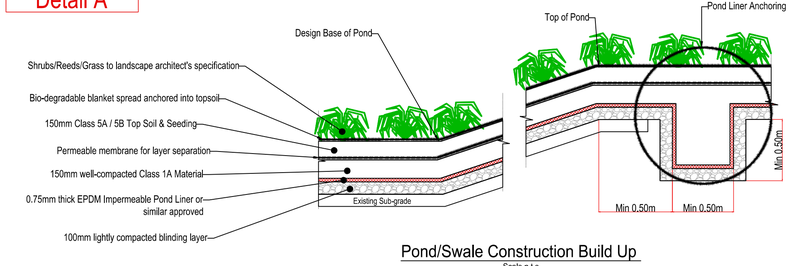
SECTION A-A



PLAN

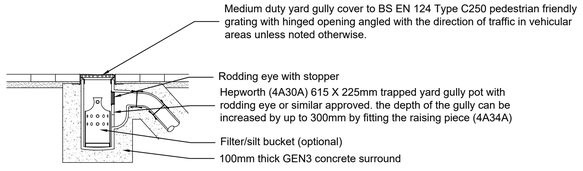
Ridgistorm Separate Catchpit

Detail A



Pond/Swale Construction Build Up

Scale n.t.s



YARD GULLY

Safety, Health & Environmental Information:

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INDICATES A RESIDUAL RISK FOR INFORMATION

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Construction/Maintenance/Cleaning/Demolition

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

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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

FI REAL ESTATE MANAGEMENT

BarnsleyMarshall Limited
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Email: design@barnsleymarshall.co.uk
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:

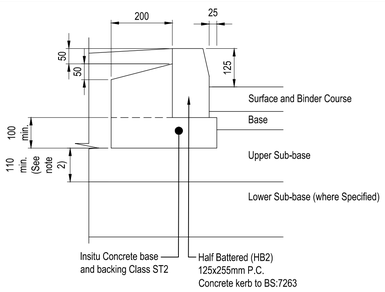
1. Contractor is to ensure a minimum CBR of 5% at the top of sub-grade/base of capping layer

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

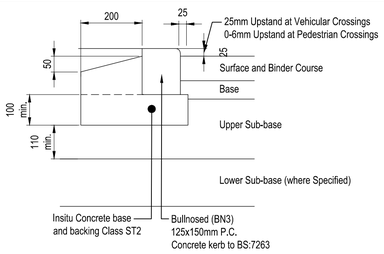
Notes:

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.



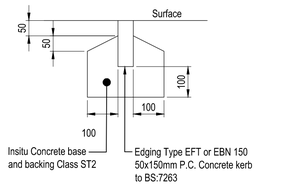
Full height HB2 Kerb & Base Detail

Scale 1:10



Dropped BN3 Kerb & Base Detail

Scale 1:10



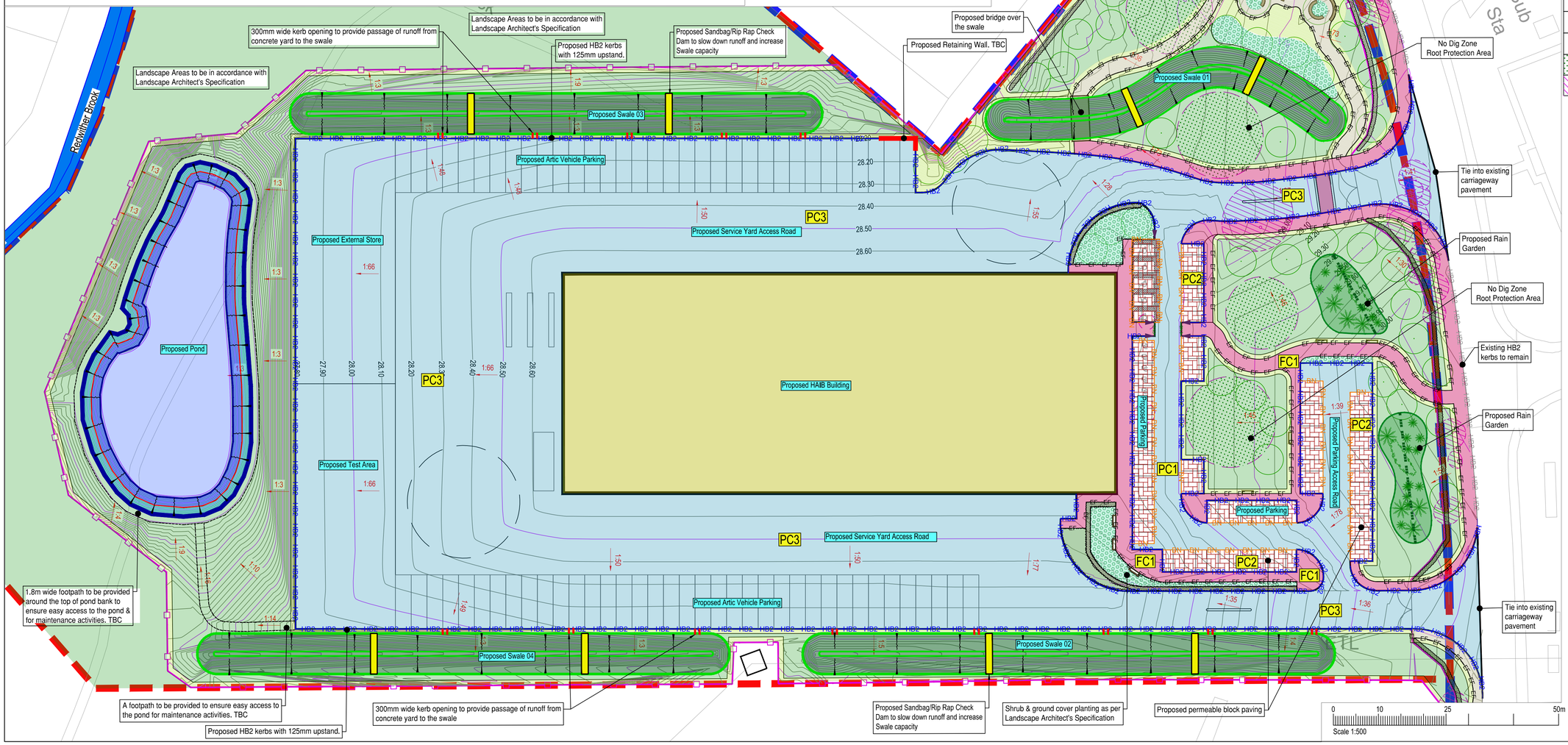
Edging EFT Kerb & Base Detail

Scale 1:10

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

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



Safety, Health & Environmental Information:

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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

FI REAL ESTATE MANAGEMENT

BarnsleyMarshall Limited
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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

Appendix E

Hydraulic Calculations

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ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 800 Urban 0.000
Area (ha) 3.650 Soil 0.450 Region Number Region 4

Results l/s

QBAR Rural 18.7
QBAR Urban 18.7

Q100 years 48.2

Q1 year 15.6
Q30 years 36.7
Q100 years 48.2

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Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Barnsley Marshall		



Catchment Area

Type : Catchment Area

Area (ha)	0.038

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.098

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.087

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.076

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (4)

Type : Catchment Area

Area (ha)	0.038

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (5)

Type : Catchment Area

Area (ha)	0.104

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.203

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (7)

Type : Catchment Area

Area (ha)	0.124

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (8)

Type : Catchment Area

Area (ha)	0.091

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (9)

Type : Catchment Area

Area (ha)	0.175

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (10)

Type : Catchment Area

Area (ha)	0.006

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (11)

Type : Catchment Area

Area (ha)	0.012

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
The Oaks Wrexham	03/04/2025		
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Catchment Area (12)

Type : Catchment Area

Area (ha)	0.009

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (13)

Type : Catchment Area

Area (ha)	0.009

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (14)

Type : Catchment Area

Area (ha)	0.022

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (16)

Type : Catchment Area

Area (ha)	0.032

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (17)

Type : Catchment Area

Area (ha)	0.005

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (15)

Type : Catchment Area

Area (ha)	0.223

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Barnsley Marshall		



Catchment Area (18)

Type : Catchment Area

Area (ha)	0.075

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (19)

Type : Catchment Area

Area (ha)	0.325

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (20)

Type : Catchment Area

Area (ha)	0.193

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Barnsley Marshall		



Catchment Area (21)

Type : Catchment Area

Area (ha)	0.079

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (22)

Type : Catchment Area

Area (ha)	0.155

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (23)

Type : Catchment Area

Area (ha)	0.01

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (24)

Type : Catchment Area

Area (ha)	0.03

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (25)

Type : Catchment Area

Area (ha)	0.054

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (26)

Type : Catchment Area

Area (ha)	0.004

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (27)

Type : Catchment Area

Area (ha)	0.018

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Junctions Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S00	Manhole	338575.952	349421.495	28.652	1.350	27.302	Circular	1.200
S01	Manhole	338566.712	349399.107	28.650	1.846	26.804	Circular	1.350
S02	Manhole	338547.887	349407.024	28.300	1.578	26.722	Circular	1.350
S03	Manhole	338525.673	349386.651	27.650	1.012	26.638	Circular	1.350
S04	Manhole	338535.709	349323.956	28.643	1.500	27.143	Circular	1.200
S05	Manhole	338527.727	349391.397	27.600	0.936	26.664	Circular	1.200
S06	Manhole	338485.768	349277.305	27.487	1.439	26.048	Circular	1.200
S07	Manhole	338483.500	349282.437	27.116	1.012	26.104	Circular	1.200
S08	Manhole	338491.336	349264.155	25.000	1.149	23.851	Circular	1.200
Flow control manhole	Manhole	338510.929	349227.418	25.000	1.500	23.500	Circular	1.200
S10	Manhole	338504.747	349220.605	22.372	1.200	21.172	Circular	1.200
S11	Manhole	338570.362	349491.789	29.297	1.711	27.586	Circular	1.200
S12	Manhole	338543.640	349426.302	27.789	1.000	26.789	Circular	1.200
S13	Manhole	338593.844	349485.327	29.277	1.529	27.749	Circular	1.200
S14	Manhole	338577.602	349489.112	29.269	1.632	27.637	Circular	1.200
S15	Manhole	338609.259	349453.736	29.387	1.278	28.110	Circular	1.200
S16	Manhole	338622.072	349484.749	30.077	2.191	27.886	Circular	1.200
S17	Manhole	338628.616	349320.840	28.297	1.000	27.297	Circular	1.200
S18	Manhole	338587.344	349219.160	26.644	1.000	25.644	Circular	1.200
S19	Manhole	338575.394	349221.122	26.107	1.107	25.000	Circular	1.200
S20	Manhole	338626.553	349401.911	28.638	1.500	27.138	Circular	1.200
S22	Manhole	338585.749	349303.154	28.650	2.225	26.426	Circular	1.200
S21	Manhole	338606.801	349354.106	28.644	1.851	26.793	Circular	1.200
S23	Manhole	338565.318	349249.605	27.811	1.672	26.139	Circular	1.200
S31	Manhole	338679.305	349445.417	29.599	1.000	28.599	Circular	1.200
S25	Manhole	338637.978	349343.734	28.401	1.000	27.401	Circular	1.200
S28	Manhole	338646.029	349433.437	28.900	1.200	27.700	Circular	1.200
S29	Manhole	338642.722	349424.727	28.700	1.093	27.607	Circular	1.200
S30	Manhole	338636.372	349408.690	28.640	1.205	27.435	Circular	1.200

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Junctions Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Lock
S00	None
S01	None
S02	None
S03	None
S04	None
S05	None
S06	None
S07	None
S08	None
Flow control manhole	None
S10	None
S11	None
S12	None
S13	None
S14	None
S15	None
S16	None
S17	None
S18	None
S19	None
S20	None
S22	None
S21	None
S23	None
S31	None
S25	None
S28	None
S29	None
S30	None

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Junctions Storm Phase: Phase	Company Address: Barnsley Marshall		

Inlets

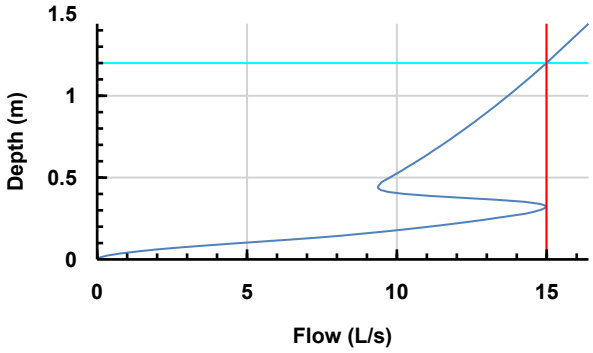
Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
S00	Inlet	Catchment Area	(None)	No Restriction
S01	Inlet	P2.000	(None)	No Restriction
	Inlet (1)	P1.000	(None)	No Restriction
	Inlet (2)	Catchment Area (1)	(None)	No Restriction
S02	Inlet	P1.001	(None)	No Restriction
	Inlet (1)	P3.007	(None)	No Restriction
S03	Inlet	P1.003	(None)	No Restriction
	Inlet (1)	Catchment Area (4)	(None)	No Restriction
	Inlet (4)	Catchment Area (5)	(None)	No Restriction
	Inlet (5)	Catchment Area (6)	(None)	No Restriction
	Inlet (6)	Catchment Area (8)	(None)	No Restriction
	Inlet (7)	Catchment Area (7)	(None)	No Restriction
S04	Inlet	Catchment Area (2)	(None)	No Restriction
	Inlet (1)	Catchment Area (3)	(None)	No Restriction
S05	Inlet	P1.002	(None)	No Restriction
S06	Inlet	P1.005	(None)	No Restriction
S07	Inlet (1)	P1.004	(None)	No Restriction
S08	Inlet	P1.006	(None)	No Restriction
Flow control manhole	Inlet	P10.000	(None)	No Restriction
S10	Inlet	P10.001	(None)	No Restriction
S11	Inlet	Catchment Area (9)	(None)	No Restriction
	Inlet (1)	P3.005 Catchment Area (10)	(None)	No Restriction
S12	Inlet (1)	P3.006	(None)	No Restriction
S13	Inlet	P3.003	(None)	No Restriction
S14	Inlet	P3.004	(None)	No Restriction
S15	Inlet	P5.000	(None)	No Restriction
	Inlet (1)	P6.000	(None)	No Restriction
	Inlet (2)	P7.000	(None)	No Restriction
S16	Inlet	P3.001	(None)	No Restriction
	Inlet (1)	P5.001	(None)	No Restriction
S17	Inlet	Catchment Area (21)	(None)	No Restriction
	Inlet (1)	Catchment Area (19)	(None)	No Restriction
	Inlet (2)	Catchment Area (20)	(None)	No Restriction
	Inlet (5)	P7.001	(None)	No Restriction
S18	Inlet	P7.002	(None)	No Restriction
S19	Inlet	P7.003	(None)	No Restriction
S20	Inlet	Catchment Area (15)	(None)	No Restriction
	Inlet (1)	P8.002	(None)	No Restriction
S22	Inlet	Catchment Area (18)	(None)	No Restriction
	Inlet (1)	P8.004	(None)	No Restriction
S21	Inlet	P8.003	(None)	No Restriction
S23	Inlet	P8.005	(None)	No Restriction
S31	Inlet	Catchment Area (22)	(None)	No Restriction
S25	Inlet (1)	P7.000 (1)	(None)	No Restriction
S28	Inlet	P9.001	(None)	No Restriction
	Inlet (1)	P9.002	(None)	No Restriction
S29	Inlet	P8.000	(None)	No Restriction
	Inlet (1)	P9.003	(None)	No Restriction
	Inlet (2)	P9.004	(None)	No Restriction
S30	Inlet	P8.001	(None)	No Restriction

Project:	Date:		
The Oaks Wrexham	03/04/2025		
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	NS		
Report Details: Type: Junctions Storm Phase: Phase	Company Address: Barnsley Marshall		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S00	Outlet	P2.000	Free Discharge
S01	Outlet	P1.001	Free Discharge
S02	Outlet	P1.002	Free Discharge
S03	Outlet	P1.004	Free Discharge
S04	Outlet	P1.000	Free Discharge
S05	Outlet	P1.003	Free Discharge
S06	Outlet	P1.006	Free Discharge
S07	Outlet	P1.005	Free Discharge
S08	Outlet	P1.007	Free Discharge
Flow control manhole	Outlet	P10.001	Hydro-Brake®

Invert Level (m)	23.500
Design Depth (m)	1.200
Design Flow (L/s)	15.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0162-1500-1200-1500



S11	Outlet	P3.006	Free Discharge
S12	Outlet	P3.007	Free Discharge
S13	Outlet	P3.004	Free Discharge
S14	Outlet	P3.005	Free Discharge
S15	Outlet	P5.001	Free Discharge
S16	Outlet	P3.002	Free Discharge
S17	Outlet	P7.002	Free Discharge
S18	Outlet	P7.003	Free Discharge
S19	Outlet	P7.004	Free Discharge
S20	Outlet	P8.003	Free Discharge
S22	Outlet	P8.005	Free Discharge
S21	Outlet	P8.004	Free Discharge
S23	Outlet	P8.006	Free Discharge
S31	Outlet	P7.000 (1)	Free Discharge
S25	Outlet	P7.001	Free Discharge
S28	Outlet	P8.000	Free Discharge
S29	Outlet	P8.001	Free Discharge
S30	Outlet	P8.002	Free Discharge

Pond Type : Pond

Dimensions

Exceedance Level (m)	25.000
Depth (m)	1.500
Base Level (m)	23.500
Freeboard (mm)	200
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.735
Total Volume (m³)	2142.952

Depth (m)	Area (m²)	Volume (m³)
0.000	1312.00	0.000
1.500	2130.00	2556.847

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	P1.007
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	P7.004
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	P8.006
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P10.000
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	78.769
Friction Scheme	Manning's n
n	0.03



Rain Garden 2

Type : Soakaway

Dimensions

Exceedance Level (m)	29.327
Depth (m)	1.527
Base Level (m)	27.800
Freeboard (mm)	0
Soakaway Shape	Rectangular
Diameter / Width (m)	9.028
Length (m)	21.619
Porosity (%)	30
Ineffective Storage Depth (m)	0.000
Number of Soakaways	1
Total Volume (m³)	89.437

Inlets

Inlet

Incoming Item(s)	P3.002
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P3.003
Outlet Type	Free Discharge



Rain Garden 1

Type : Soakaway

Dimensions

Exceedance Level (m)	29.906
Depth (m)	1.206
Base Level (m)	28.700
Freeboard (mm)	0
Soakaway Shape	Rectangular
Diameter / Width (m)	7.728
Length (m)	29.114
Porosity (%)	30
Ineffective Storage Depth (m)	0.000
Number of Soakaways	1
Total Volume (m³)	81.373

Inlets

Inlet

Incoming Item(s)	P3.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Incoming Item(s)	P4.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P3.001
Outlet Type	Free Discharge



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.142
Depth (m)	0.450
Base Level (m)	28.692
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.005
Long. Slope (1:X)	45.00
Width (m)	17.473
Total Volume (m³)	9.707

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (12)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P5.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.784
Depth (m)	0.450
Base Level (m)	28.334
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	4.996
Long. Slope (1:X)	45.00
Width (m)	18.384
Total Volume (m³)	10.194

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (13)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P6.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.725
Depth (m)	0.400
Base Level (m)	29.325
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.006
Long. Slope (1:X)	40.00
Width (m)	43.964
Total Volume (m³)	21.129

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (14)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (16)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P3.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (3)

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.723
Depth (m)	0.500
Base Level (m)	29.223
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	4.988
Long. Slope (1:X)	40.00
Width (m)	28.946
Total Volume (m³)	18.193

Inlets

Outlets

Outlet

Outgoing Connection	P4.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (4)

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.142
Depth (m)	0.500
Base Level (m)	28.642
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.008
Long. Slope (1:X)	45.00
Width (m)	10.000
Total Volume (m³)	6.310

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (17)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P7.000
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (5)

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.000
Depth (m)	0.450
Base Level (m)	28.550
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.026
Long. Slope (1:X)	47.00
Width (m)	19.932
Total Volume (m³)	11.119

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (23)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P9.002
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (6)

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.700
Depth (m)	0.450
Base Level (m)	28.250
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.005
Long. Slope (1:X)	47.00
Width (m)	29.768
Total Volume (m³)	16.539

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (24)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (27)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P9.001
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (7)

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.780
Depth (m)	0.450
Base Level (m)	28.330
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	6.680
Long. Slope (1:X)	46.00
Width (m)	47.334
Total Volume (m³)	35.097

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (25)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P9.004
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0



Porous Paving (8)

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.000
Depth (m)	0.450
Base Level (m)	28.550
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	5.005
Long. Slope (1:X)	46.00
Width (m)	7.533
Total Volume (m³)	4.185

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (26)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P9.003
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Connections Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter /	Height (mm)	Side Slope (1:X)
P2.000	24.220	Pipe	48.629		0.6	150		
P1.001	20.423	Pipe	250.000		0.6	300		
P1.000	81.294	Pipe	240.000		0.6	300		
P1.002	25.507	Pipe	235.688		0.6	300		
P1.003	5.172	Pipe	200.657		0.6	300		
P1.005	5.611	Pipe	100.000		0.6	300		
P1.006	14.280	Pipe	6.500		0.6	300		
P1.007	5.540	Pipe	50.000		0.6	300		
P10.001	9.199	Pipe	3.952		0.6	225		
P10.000	6.887	Pipe	0.000		0.6	300		
P1.004	112.424	Trapezoidal Channel	210.531	0.025		500	1012	3.00
P3.006	70.729	Trapezoidal Channel	88.754		0.6	500	1711	3.00
P3.007	19.740	Pipe	295.995		0.6	300		
P3.003	5.949	Pipe	115.639		0.6	225		
P3.004	16.677	Pipe	150.000		0.6	225		
P3.005	7.719	Pipe	150.000		0.6	225		
P3.001	16.159	Pipe	19.851		0.6	150		
P3.002	7.148	Pipe	83.111		0.6	225		
P5.001	33.556	Pipe	149.907		0.6	225		
P5.000	12.438	Pipe	21.366		0.6	150		
P6.000	22.450	Pipe	100.000		0.6	150		
P3.000	8.767	Pipe	14.018		0.6	150		
P4.000	17.783	Pipe	33.978		0.6	150		
P7.000	9.039	Pipe	16.986		0.6	150		
P7.002	109.737	Trapezoidal Channel	66.387		0.6	500	1000	3.00
P7.003	12.110	Pipe	18.805		0.6	300		
P7.004	24.394	Pipe	30.000		0.6	300		
P8.003	51.725	Pipe	150.000		0.6	300		
P8.004	55.130	Pipe	150.000		0.6	300		
P8.005	57.314	Pipe	199.955		0.6	300		
P8.006	21.000	Pipe	10.000		0.6	300		
P7.000 (1)	109.761	Trapezoidal Channel	91.620		0.6	500	1000	3.00
P8.000	9.317	Pipe	100.000		0.6	150		
P8.001	17.249	Pipe	100.115		0.6	150		
P8.002	11.931	Pipe	40.235		0.6	150		
P9.001	3.316	Pipe	6.029		0.6	150		
P9.002	3.912	Pipe	4.603		0.6	150		
P9.003	10.283	Pipe	10.903		0.6	150		
P9.004	4.432	Pipe	6.129		0.6	150		
P7.001	31.392	Pipe	301.847		0.6	300		

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Connections Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Curved	Upstream Cover Level (m)	Upstream	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)
P2.000	☐	28.652	27.302	28.650	26.804		None	
P1.001	☐	28.650	26.804	28.300	26.722		All	
P1.000	☐	28.643	27.143	28.650	26.804		None	
P1.002	☐	28.300	26.772	27.600	26.664		All	
P1.003	☐	27.600	26.664	27.650	26.638		All	
P1.005	☐	27.116	26.104	27.487	26.048		None	
P1.006	☐	27.487	26.048	25.000	23.851		None	
P1.007	☐	25.000	23.851	25.000	23.740		All	
P10.001	☐	25.000	23.500	22.372	21.172		None	16.4
P10.000	☐	25.000	23.500	25.000	23.500		None	
P1.004	☐	27.650	26.638	27.116	26.104		None	
P3.006	☐	29.297	27.586	27.789	26.789		None	
P3.007	☐	27.789	26.789	28.300	26.722		None	
P3.003	☐	29.327	27.800	29.277	27.749		None	
P3.004	☐	29.277	27.749	29.269	27.637		None	
P3.005	☐	29.269	27.637	29.297	27.586		None	
P3.001	☐	29.906	28.700	30.077	27.886		None	
P3.002	☐	30.077	27.886	29.327	27.800		None	
P5.001	☐	29.387	28.110	30.077	27.886		None	
P5.000	☐	29.253	28.692	29.387	28.110		None	
P6.000	☐	28.895	28.334	29.387	28.110		None	
P3.000	☐	29.851	29.325	29.906	28.700		None	
P4.000	☐	29.848	29.223	29.906	28.700		None	
P7.000	☐	29.253	28.642	29.387	28.110		None	
P7.002	☐	28.297	27.297	26.644	25.644		None	
P7.003	☐	26.644	25.644	26.107	25.000		None	
P7.004	☐	26.107	25.000	25.000	24.187		All	
P8.003	☐	28.638	27.138	28.644	26.793		None	
P8.004	☐	28.644	26.793	28.650	26.426		None	
P8.005	☐	28.650	26.426	27.811	26.139		None	
P8.006	☐	27.811	26.139	25.000	24.039		All	
P7.000 (1)	☐	29.599	28.599	28.401	27.401		All	
P8.000	☐	28.900	27.700	28.700	27.607		None	
P8.001	☐	28.700	27.607	28.640	27.435		None	
P8.002	☐	28.640	27.435	28.638	27.138		None	
P9.001	☐	28.806	28.250	28.900	27.700		None	
P9.002	☐	29.107	28.550	28.900	27.700		None	
P9.003	☐	29.109	28.550	28.700	27.607		None	
P9.004	☐	28.925	28.330	28.700	27.607		None	
P7.001	☑	28.401	27.401	28.297	27.297		None	

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Connections Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Culvert Type	Culvert Entrance
P2.000	(None)	(None)
P1.001	(None)	(None)
P1.000	(None)	(None)
P1.002	(None)	(None)
P1.003	(None)	(None)
P1.005	(None)	(None)
P1.006	(None)	(None)
P1.007	(None)	(None)
P10.001	(None)	(None)
P10.000	(None)	(None)
P1.004		
P3.006		
P3.007	(None)	(None)
P3.003	(None)	(None)
P3.004	(None)	(None)
P3.005	(None)	(None)
P3.001	(None)	(None)
P3.002	(None)	(None)
P5.001	(None)	(None)
P5.000	(None)	(None)
P6.000	(None)	(None)
P3.000	(None)	(None)
P4.000	(None)	(None)
P7.000	(None)	(None)
P7.002		
P7.003	(None)	(None)
P7.004	(None)	(None)
P8.003	(None)	(None)
P8.004	(None)	(None)
P8.005	(None)	(None)
P8.006	(None)	(None)
P7.000 (1)		
P8.000	(None)	(None)
P8.001	(None)	(None)
P8.002	(None)	(None)
P9.001	(None)	(None)
P9.002	(None)	(None)
P9.003	(None)	(None)
P9.004	(None)	(None)
P7.001	(None)	(None)

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S00	28.652 27.302	Diameter / Length: 1.200					Manhole
E:338575.952 N:349421.495	1.350		{a} P2.000	Pipe	27.302	Diam/Width:150	Not Applicable
S01	28.650 26.804	Diameter / Length: 1.350	{1} P2.000 {2} P1.000	Pipe Pipe	26.804 26.804	Diam/Width:150 Diam/Width:300	Manhole
E:338566.712 N:349399.107	1.846		{a} P1.001	Pipe	26.804	Diam/Width:300	Not Applicable
S02	28.300 26.722	Diameter / Length: 1.350	{1} P1.001 {2} P3.007	Pipe Pipe	26.722 26.722	Diam/Width:300 Diam/Width:300	Manhole
E:338547.887 N:349407.024	1.578		{a} P1.002	Pipe	26.772	Diam/Width:300	Not Applicable
S03	27.650 26.638	Diameter / Length: 1.350	{1} P1.003	Pipe	26.638	Diam/Width:300	Manhole
E:338525.673 N:349386.651	1.012		{a} P1.004	Trapezoidal Channel	26.638	Diam/Width:500 Height:1012	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S04	28.643 27.143	Diameter / Length: 1.200					Manhole
E:338535.709 N:349323.956	1.500		{a} P1.000	Pipe	27.143	Diam/Width:300	Not Applicable
S05	27.600 26.664	Diameter / Length: 1.200	{1} P1.002	Pipe	26.664	Diam/Width:300	Manhole
E:338527.727 N:349391.397	0.936		{a} P1.003	Pipe	26.664	Diam/Width:300	Not Applicable
S06	27.487 26.048	Diameter / Length: 1.200	{1} P1.005	Pipe	26.048	Diam/Width:300	Manhole
E:338485.768 N:349277.305	1.439		{a} P1.006	Pipe	26.048	Diam/Width:300	Not Applicable
S07	27.116 26.104	Diameter / Length: 1.200	{1} P1.004	Trapezoidal Channel	26.104	Diam/Width:500 Height:1012	Manhole
E:338483.500 N:349282.437	1.012		{a} P1.005	Pipe	26.104	Diam/Width:300	Not Applicable
S08	25.000 23.851	Diameter / Length: 1.200	{1} P1.006	Pipe	23.851	Diam/Width:300	Manhole
E:338491.336 N:349264.155	1.149		{a} P1.007	Pipe	23.851	Diam/Width:300	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Flow control manhole	25.000 23.500	Diameter / Length: 1.200	{1} P10.000	Pipe	23.500	Diam/Width:300	Manhole
E:338510.929 N:349227.418	1.500		{a} P10.001	Pipe	23.500	Diam/Width:225	Not Applicable
S10	22.372 21.172	Diameter / Length: 1.200	{1} P10.001	Pipe	21.172	Diam/Width:225	Manhole
E:338504.747 N:349220.605	1.200						Not Applicable
S11	29.297 27.586	Diameter / Length: 1.200	{1} P3.005	Pipe	27.586	Diam/Width:225	Manhole
E:338570.362 N:349491.789	1.711		{a} P3.006	Trapezoidal Channel	27.586	Diam/Width:500 Height:1711	Not Applicable
S12	27.789 26.789	Diameter / Length: 1.200	{1} P3.006	Trapezoidal Channel	26.789	Diam/Width:500 Height:1711	Manhole
E:338543.640 N:349426.302	1.000		{a} P3.007	Pipe	26.789	Diam/Width:300	Not Applicable
S13	29.277 27.749	Diameter / Length: 1.200	{1} P3.003	Pipe	27.749	Diam/Width:225	Manhole
E:338593.844 N:349485.327	1.529		{a} P3.004	Pipe	27.749	Diam/Width:225	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S14	29.269 27.637	Diameter / Length: 1.200	{1} P3.004	Pipe	27.637	Diam/Width:225	Manhole
E:338577.602 N:349489.112	1.632		{a} P3.005	Pipe	27.637	Diam/Width:225	Not Applicable
S15	29.387 28.110	Diameter / Length: 1.200	{1} P5.000 {2} P6.000 {3} P7.000	Pipe Pipe Pipe	28.110 28.110 28.110	Diam/Width:150 Diam/Width:150 Diam/Width:150	Manhole
E:338609.259 N:349453.736	1.278		{a} P5.001	Pipe	28.110	Diam/Width:225	Not Applicable
S16	30.077 27.886	Diameter / Length: 1.200	{1} P3.001 {2} P5.001	Pipe Pipe	27.886 27.886	Diam/Width:150 Diam/Width:225	Manhole
E:338622.072 N:349484.749	2.191		{a} P3.002	Pipe	27.886	Diam/Width:225	Not Applicable
S17	28.297 27.297	Diameter / Length: 1.200	{1} P7.001	Pipe	27.297	Diam/Width:300	Manhole
E:338628.616 N:349320.840	1.000		{a} P7.002	Trapezoidal Channel	27.297	Diam/Width:500 Height:1000	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S18	26.644 25.644	Diameter / Length: 1.200	{1} P7.002	Trapezoidal Channel	25.644	Diam/Width:500 Height:1000	Manhole
E:338587.344 N:349219.160	1.000		{a} P7.003	Pipe	25.644	Diam/Width:300	Not Applicable
S19	26.107 25.000	Diameter / Length: 1.200	{1} P7.003	Pipe	25.000	Diam/Width:300	Manhole
E:338575.394 N:349221.122	1.107		{a} P7.004	Pipe	25.000	Diam/Width:300	Not Applicable
S20	28.638 27.138	Diameter / Length: 1.200	{1} P8.002	Pipe	27.138	Diam/Width:150	Manhole
E:338626.553 N:349401.911	1.500		{a} P8.003	Pipe	27.138	Diam/Width:300	Not Applicable
S22	28.650 26.426	Diameter / Length: 1.200	{1} P8.004	Pipe	26.426	Diam/Width:300	Manhole
E:338585.749 N:349303.154	2.225		{a} P8.005	Pipe	26.426	Diam/Width:300	Not Applicable
S21	28.644 26.793	Diameter / Length: 1.200	{1} P8.003	Pipe	26.793	Diam/Width:300	Manhole
E:338606.801 N:349354.106	1.851		{a} P8.004	Pipe	26.793	Diam/Width:300	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S23	27.811 26.139	Diameter / Length: 1.200	{1} P8.005	Pipe	26.139	Diam/Width:300	Manhole
E:338565.318 N:349249.605	1.672		{a} P8.006	Pipe	26.139	Diam/Width:300	Not Applicable
S31	29.599 28.599	Diameter / Length: 1.200					Manhole
E:338679.305 N:349445.417	1.000		{a} P7.000 (1)	Trapezoidal Channel	28.599	Diam/Width:500 Height:1000	Not Applicable
S25	28.401 27.401	Diameter / Length: 1.200	{1} P7.000 (1)	Trapezoidal Channel	27.401	Diam/Width:500 Height:1000	Manhole
E:338637.978 N:349343.734	1.000		{a} P7.001	Pipe	27.401	Diam/Width:300	Not Applicable
S28	28.900 27.700	Diameter / Length: 1.200	{1} P9.001 {2} P9.002	Pipe Pipe	27.700 27.700	Diam/Width:150 Diam/Width:150	Manhole
E:338646.029 N:349433.437	1.200		{a} P8.000	Pipe	27.700	Diam/Width:150	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Barnsley Marshall		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S29	28.700 27.607	Diameter / Length: 1.200	{1} P8.000	Pipe	27.607	Diam/Width:150	Manhole
E:338642.722 N:349424.727	1.093		{2} P9.003	Pipe	27.607	Diam/Width:150	
			{3} P9.004	Pipe	27.607	Diam/Width:150	
			{a} P8.001	Pipe	27.607	Diam/Width:150	Not Applicable
S30	28.640 27.435	Diameter / Length: 1.200	{1} P8.001	Pipe	27.435	Diam/Width:150	Manhole
E:338636.372 N:349408.690	1.205		{a} P8.002	Pipe	27.435	Diam/Width:150	Not Applicable

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address: Barnsley Marshall		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FSR

Type: FSR

Return Period (years)	1.0
Region	England And Wales
M5-60 (mm)	18.0
Ratio R	0.322

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	250.00
Max. Slope (1:X)	20.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Manhole Options

Apply Offset	☐

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Project:	Date:		
The Oaks Wrexham	03/04/2025		
	Designed by:	Checked by:	Approved By:
	NS		
Report Title:	Company Address:		
Rainfall Analysis Criteria	Barnsley Marshall		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	10
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	18.0
Ratio R	0.322
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	40.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 1 years: +0 %: 15 mins: Summer	0.04	4.7	2.044
Catchment Area (1)	FSR: 1 years: +0 %: 15 mins: Summer	0.10	12.0	5.216
Catchment Area (2)	FSR: 1 years: +0 %: 15 mins: Summer	0.09	10.7	4.645
Catchment Area (3)	FSR: 1 years: +0 %: 15 mins: Summer	0.08	9.3	4.023
Catchment Area (4)	FSR: 1 years: +0 %: 15 mins: Summer	0.04	4.6	2.000
Catchment Area (5)	FSR: 1 years: +0 %: 15 mins: Summer	0.10	12.8	5.541
Catchment Area (6)	FSR: 1 years: +0 %: 15 mins: Summer	0.20	24.9	10.808
Catchment Area (7)	FSR: 1 years: +0 %: 15 mins: Summer	0.12	15.3	6.611
Catchment Area (8)	FSR: 1 years: +0 %: 15 mins: Summer	0.09	11.1	4.818
Catchment Area (9)	FSR: 1 years: +0 %: 15 mins: Summer	0.17	21.4	9.277
Catchment Area (10)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	0.7	0.314
Catchment Area (11)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.4	0.616
Catchment Area (12)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.1	0.466
Catchment Area (13)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.1	0.487

Catchment Area (14)	FSR: 1 years: +0 %: 15 mins: Summer	0.02	2.7	1.169
Catchment Area (16)	FSR: 1 years: +0 %: 15 mins: Summer	0.03	3.9	1.695
Catchment Area (17)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	0.6	0.269
Catchment Area (15)	FSR: 1 years: +0 %: 15 mins: Summer	0.22	27.4	11.878
Catchment Area (18)	FSR: 1 years: +0 %: 15 mins: Summer	0.08	9.2	3.999
Catchment Area (19)	FSR: 1 years: +0 %: 15 mins: Summer	0.32	39.8	17.249
Catchment Area (20)	FSR: 1 years: +0 %: 15 mins: Summer	0.19	23.7	10.270
Catchment Area (21)	FSR: 1 years: +0 %: 15 mins: Summer	0.08	9.7	4.205
Catchment Area (22)	FSR: 1 years: +0 %: 15 mins: Summer	0.16	19.1	8.252
Catchment Area (23)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.2	0.529
Catchment Area (24)	FSR: 1 years: +0 %: 15 mins: Summer	0.03	3.6	1.569
Catchment Area (25)	FSR: 1 years: +0 %: 15 mins: Summer	0.05	6.6	2.842
Catchment Area (26)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.5	0.197
Catchment Area (27)	FSR: 1 years: +0 %: 15 mins: Summer	0.02	2.2	0.956

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Summer	0.04	16.2	7.006
Catchment Area (1)	FSR: 30 years: +40 %: 15 mins: Summer	0.10	41.3	17.873
Catchment Area (2)	FSR: 30 years: +40 %: 15 mins: Summer	0.09	36.7	15.904
Catchment Area (3)	FSR: 30 years: +40 %: 15 mins: Summer	0.08	31.8	13.779
Catchment Area (4)	FSR: 30 years: +40 %: 15 mins: Summer	0.04	15.8	6.848
Catchment Area (5)	FSR: 30 years: +40 %: 15 mins: Summer	0.10	43.8	18.981
Catchment Area (6)	FSR: 30 years: +40 %: 15 mins: Summer	0.20	85.5	37.021
Catchment Area (7)	FSR: 30 years: +40 %: 15 mins: Summer	0.12	52.3	22.647
Catchment Area (8)	FSR: 30 years: +40 %: 15 mins: Summer	0.09	38.1	16.508
Catchment Area (9)	FSR: 30 years: +40 %: 15 mins: Summer	0.17	73.4	31.790
Catchment Area (10)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	2.5	1.086
Catchment Area (11)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	4.9	2.104
Catchment Area (12)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	3.7	1.592
Catchment Area (13)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	3.9	1.673

Catchment Area (14)	FSR: 30 years: +40 %: 15 mins: Summer	0.02	9.2	4.007
Catchment Area (16)	FSR: 30 years: +40 %: 15 mins: Summer	0.03	13.4	5.803
Catchment Area (17)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	2.1	0.913
Catchment Area (15)	FSR: 30 years: +40 %: 15 mins: Summer	0.22	93.9	40.682
Catchment Area (18)	FSR: 30 years: +40 %: 15 mins: Summer	0.08	31.6	13.695
Catchment Area (19)	FSR: 30 years: +40 %: 15 mins: Summer	0.32	136.4	59.094
Catchment Area (20)	FSR: 30 years: +40 %: 15 mins: Summer	0.19	81.2	35.184
Catchment Area (21)	FSR: 30 years: +40 %: 15 mins: Summer	0.08	33.3	14.410
Catchment Area (22)	FSR: 30 years: +40 %: 15 mins: Summer	0.16	65.3	28.276
Catchment Area (23)	FSR: 30 years: +40 %: 15 mins: Summer	0.01	4.2	1.826
Catchment Area (24)	FSR: 30 years: +40 %: 15 mins: Summer	0.03	12.4	5.375
Catchment Area (25)	FSR: 30 years: +40 %: 15 mins: Summer	0.05	22.5	9.742
Catchment Area (26)	FSR: 30 years: +40 %: 15 mins: Summer	0.00	1.6	0.685
Catchment Area (27)	FSR: 30 years: +40 %: 15 mins: Summer	0.02	7.6	3.286

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Summer	0.04	20.9	9.041
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Summer	0.10	53.2	23.062
Catchment Area (2)	FSR: 100 years: +40 %: 15 mins: Summer	0.09	47.4	20.524
Catchment Area (3)	FSR: 100 years: +40 %: 15 mins: Summer	0.08	41.0	17.780
Catchment Area (4)	FSR: 100 years: +40 %: 15 mins: Summer	0.04	20.4	8.832
Catchment Area (5)	FSR: 100 years: +40 %: 15 mins: Summer	0.10	56.5	24.497
Catchment Area (6)	FSR: 100 years: +40 %: 15 mins: Summer	0.20	110.2	47.780
Catchment Area (7)	FSR: 100 years: +40 %: 15 mins: Summer	0.12	67.4	29.230
Catchment Area (8)	FSR: 100 years: +40 %: 15 mins: Summer	0.09	49.1	21.303
Catchment Area (9)	FSR: 100 years: +40 %: 15 mins: Summer	0.17	94.7	41.028
Catchment Area (10)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	3.2	1.402
Catchment Area (11)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	6.3	2.711
Catchment Area (12)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	4.7	2.052
Catchment Area (13)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	5.0	2.160

Catchment Area (14)	FSR: 100 years: +40 %: 15 mins: Summer	0.02	11.9	5.168
Catchment Area (16)	FSR: 100 years: +40 %: 15 mins: Summer	0.03	17.3	7.490
Catchment Area (17)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	2.7	1.174
Catchment Area (15)	FSR: 100 years: +40 %: 15 mins: Summer	0.22	121.1	52.508
Catchment Area (18)	FSR: 100 years: +40 %: 15 mins: Summer	0.08	40.8	17.678
Catchment Area (19)	FSR: 100 years: +40 %: 15 mins: Summer	0.32	175.9	76.265
Catchment Area (20)	FSR: 100 years: +40 %: 15 mins: Summer	0.19	104.8	45.411
Catchment Area (21)	FSR: 100 years: +40 %: 15 mins: Summer	0.08	42.9	18.595
Catchment Area (22)	FSR: 100 years: +40 %: 15 mins: Summer	0.16	84.2	36.492
Catchment Area (23)	FSR: 100 years: +40 %: 15 mins: Summer	0.01	5.4	2.355
Catchment Area (24)	FSR: 100 years: +40 %: 15 mins: Summer	0.03	16.0	6.935
Catchment Area (25)	FSR: 100 years: +40 %: 15 mins: Summer	0.05	29.0	12.576
Catchment Area (26)	FSR: 100 years: +40 %: 15 mins: Summer	0.00	2.0	0.884
Catchment Area (27)	FSR: 100 years: +40 %: 15 mins: Summer	0.02	9.8	4.233

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total	Status
S00	FSR: 1 years: +0 %: 15 mins: Summer	28.652	27.302	27.343	0.041	4.7	0.047	0.000	4.6	2.049	OK
S01	FSR: 1 years: +0 %: 15 mins: Summer	28.650	26.804	26.951	0.147	34.5	0.210	0.000	27.9	15.837	OK
S02	FSR: 1 years: +0 %: 30 mins: Summer	28.300	26.722	26.930	0.208	35.4	0.297	0.000	34.5	34.935	OK
S03	FSR: 1 years: +0 %: 30 mins: Summer	27.650	26.638	26.782	0.144	80.5	0.207	0.000	77.6	74.949	OK
S04	FSR: 1 years: +0 %: 15 mins: Summer	28.643	27.143	27.244	0.102	20.0	0.115	0.000	17.9	8.713	OK
S05	FSR: 1 years: +0 %: 15 mins: Summer	27.600	26.664	26.815	0.152	33.8	0.172	0.000	34.9	24.290	OK
S06	FSR: 1 years: +0 %: 15 mins: Summer	27.487	26.048	26.131	0.084	75.3	0.095	0.000	75.5	50.796	OK
S07	FSR: 1 years: +0 %: 15 mins: Summer	27.116	26.104	26.286	0.182	72.2	0.205	0.000	75.3	50.855	OK
S08	FSR: 1 years: +0 %: 15 mins: Summer	25.000	23.851	24.029	0.178	75.5	0.202	0.000	76.0	50.654	OK
Flow control manhole	FSR: 1 years: +0 %: 960 mins: Summer	25.000	23.500	23.742	0.242	11.5	0.273	0.000	11.5	499.474	Surcharged
S10	FSR: 1 years: +0 %: 960 mins: Summer	22.372	21.172	21.204	0.032	11.5	0.000	0.000	11.5	499.462	OK
S11	FSR: 1 years: +0 %: 15 mins: Summer	29.297	27.586	27.621	0.035	22.1	0.039	0.000	20.5	9.745	OK
S12	FSR: 1 years: +0 %: 15 mins: Summer	27.789	26.789	26.939	0.150	20.5	0.169	0.000	15.5	9.088	OK
S13	FSR: 1 years: +0 %: 120 mins: Summer	29.277	27.749	27.785	0.036	2.4	0.041	0.000	2.3	8.587	OK
S14	FSR: 1 years: +0 %: 120 mins: Summer	29.269	27.637	27.676	0.038	2.3	0.043	0.000	2.3	8.568	OK
S15	FSR: 1 years: +0 %: 60 mins: Summer	29.387	28.110	28.132	0.022	0.9	0.025	0.000	0.9	2.077	OK
S16	FSR: 1 years: +0 %: 120 mins: Summer	30.077	27.886	27.921	0.035	2.8	0.040	0.000	2.8	9.026	OK
S17	FSR: 1 years: +0 %: 15 mins: Summer	28.297	27.297	27.365	0.068	78.7	0.077	0.000	71.8	38.777	OK
S18	FSR: 1 years: +0 %: 30 mins: Summer	26.644	25.644	25.748	0.104	59.1	0.117	0.000	57.9	52.885	OK

S19	FSR: 1 years: +0 %: 30 mins: Summer	26.107	25.000	25.115	0.115	57.9	0.131	0.000	57.6	52.844	OK
S20	FSR: 1 years: +0 %: 15 mins: Summer	28.638	27.138	27.252	0.114	27.4	0.129	0.000	25.8	14.344	OK
S22	FSR: 1 years: +0 %: 15 mins: Summer	28.650	26.426	26.560	0.134	32.1	0.152	0.000	27.2	17.660	OK
S21	FSR: 1 years: +0 %: 15 mins: Summer	28.644	26.793	26.896	0.103	25.8	0.116	0.000	22.9	14.028	OK
S23	FSR: 1 years: +0 %: 15 mins: Summer	27.811	26.139	26.195	0.056	27.2	0.063	0.000	25.6	17.531	OK
S31	FSR: 1 years: +0 %: 15 mins: Summer	29.599	28.599	28.632	0.033	19.1	0.037	0.000	16.7	8.352	OK
S25	FSR: 1 years: +0 %: 15 mins: Summer	28.401	27.401	27.485	0.084	16.7	0.095	0.000	10.4	7.100	OK
S28	FSR: 1 years: +0 %: 60 mins: Summer	28.900	27.700	27.739	0.039	2.5	0.044	0.000	2.5	5.279	OK
S29	FSR: 1 years: +0 %: 60 mins: Summer	28.700	27.607	27.660	0.053	4.3	0.060	0.000	4.3	10.326	OK
S30	FSR: 1 years: +0 %: 60 mins: Summer	28.640	27.435	27.474	0.040	4.3	0.045	0.000	4.3	10.299	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total	Status
S00	FSR: 30 years: +40 %: 15 mins: Winter	28.652	27.302	27.410	0.108	15.2	0.122	0.000	12.5	6.984	OK
S01	FSR: 30 years: +40 %: 15 mins: Summer	28.650	26.804	27.339	0.535	107.3	0.765	0.000	98.9	53.943	Surcharged
S02	FSR: 30 years: +40 %: 15 mins: Summer	28.300	26.722	27.199	0.477	98.9	0.683	0.000	97.4	90.055	Surcharged
S03	FSR: 30 years: +40 %: 15 mins: Summer	27.650	26.638	26.902	0.264	310.4	0.377	0.000	273.2	189.192	OK
S04	FSR: 30 years: +40 %: 15 mins: Summer	28.643	27.143	27.611	0.468	68.5	0.530	0.000	54.2	29.460	Surcharged
S05	FSR: 30 years: +40 %: 15 mins: Summer	27.600	26.664	26.969	0.305	97.4	0.345	0.000	98.2	86.121	Surcharged
S06	FSR: 30 years: +40 %: 15 mins: Winter	27.487	26.048	26.187	0.140	195.6	0.158	0.000	195.6	180.154	OK
S07	FSR: 30 years: +40 %: 15 mins: Winter	27.116	26.104	26.543	0.439	260.6	0.497	0.000	195.6	180.283	Surcharged
S08	FSR: 30 years: +40 %: 15 mins: Winter	25.000	23.851	24.389	0.538	195.6	0.608	0.000	195.6	179.808	Surcharged
Flow control manhole	FSR: 30 years: +40 %: 1440 mins: Summer	25.000	23.500	24.278	0.778	21.5	0.880	0.000	15.0	1644.243	Surcharged
S10	FSR: 30 years: +40 %: 1440 mins: Summer	22.372	21.172	21.208	0.036	15.0	0.000	0.000	15.0	1644.204	OK
S11	FSR: 30 years: +40 %: 15 mins: Summer	29.297	27.586	27.655	0.069	75.9	0.078	0.000	70.7	36.772	OK
S12	FSR: 30 years: +40 %: 30 mins: Summer	27.789	26.789	27.225	0.436	51.4	0.493	0.000	54.0	56.575	Surcharged
S13	FSR: 30 years: +40 %: 60 mins: Summer	29.277	27.749	27.830	0.081	10.8	0.092	0.000	10.8	22.440	OK
S14	FSR: 30 years: +40 %: 60 mins: Summer	29.269	27.637	27.716	0.079	10.8	0.089	0.000	10.9	22.385	OK
S15	FSR: 30 years: +40 %: 60 mins: Summer	29.387	28.110	28.154	0.044	3.6	0.050	0.000	3.6	7.188	OK
S16	FSR: 30 years: +40 %: 60 mins: Summer	30.077	27.886	27.964	0.078	12.5	0.088	0.000	12.3	23.609	OK
S17	FSR: 30 years: +40 %: 15 mins: Summer	28.297	27.297	27.431	0.134	277.6	0.151	0.000	259.6	136.137	OK
S18	FSR: 30 years: +40 %: 30 mins: Summer	26.644	25.644	25.897	0.253	209.2	0.286	0.000	195.6	183.984	OK
S19	FSR: 30 years: +40 %: 30 mins: Summer	26.107	25.000	25.337	0.337	195.6	0.381	0.000	193.1	183.967	Surcharged

S20	FSR: 30 years: +40 %: 15 mins: Summer	28.638	27.138	27.406	0.268	95.4	0.303	0.000	88.8	53.309	OK
S22	FSR: 30 years: +40 %: 15 mins: Summer	28.650	26.426	26.802	0.376	107.7	0.426	0.000	95.3	65.783	Surcharged
S21	FSR: 30 years: +40 %: 15 mins: Winter	28.644	26.793	27.009	0.216	84.4	0.244	0.000	77.4	52.789	OK
S23	FSR: 30 years: +40 %: 30 mins: Summer	27.811	26.139	26.252	0.113	94.5	0.127	0.000	94.1	97.038	OK
S31	FSR: 30 years: +40 %: 15 mins: Summer	29.599	28.599	28.665	0.066	65.3	0.075	0.000	59.6	28.721	OK
S25	FSR: 30 years: +40 %: 30 mins: Summer	28.401	27.401	27.572	0.171	44.3	0.194	0.000	39.8	37.554	OK
S28	FSR: 30 years: +40 %: 60 mins: Summer	28.900	27.700	27.806	0.106	10.6	0.119	0.000	10.6	18.137	OK
S29	FSR: 30 years: +40 %: 60 mins: Summer	28.700	27.607	27.775	0.168	19.2	0.190	0.000	19.2	35.722	Surcharged
S30	FSR: 30 years: +40 %: 60 mins: Summer	28.640	27.435	27.533	0.098	19.2	0.111	0.000	19.0	35.696	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total	Status
S00	FSR: 100 years: +40 %: 15 mins: Summer	28.652	27.302	27.847	0.545	20.9	0.616	0.000	14.6	9.002	Surcharged
S01	FSR: 100 years: +40 %: 15 mins: Summer	28.650	26.804	27.670	0.866	148.4	1.240	0.000	141.7	69.239	Surcharged
S02	FSR: 100 years: +40 %: 30 mins: Summer	28.300	26.722	27.344	0.622	110.9	0.890	0.000	110.0	173.405	Surcharged
S03	FSR: 100 years: +40 %: 15 mins: Summer	27.650	26.638	26.931	0.293	396.2	0.420	0.000	344.7	246.130	OK
S04	FSR: 100 years: +40 %: 15 mins: Summer	28.643	27.143	28.135	0.993	88.4	1.123	0.000	80.6	37.978	Surcharged
S05	FSR: 100 years: +40 %: 30 mins: Summer	27.600	26.664	27.040	0.376	110.0	0.425	0.000	109.7	170.161	Surcharged
S06	FSR: 100 years: +40 %: 120 mins: Summer	27.487	26.048	26.186	0.139	193.3	0.157	0.000	193.2	589.030	OK
S07	FSR: 100 years: +40 %: 120 mins: Summer	27.116	26.104	26.698	0.594	234.7	0.671	0.000	193.3	589.046	Surcharged
S08	FSR: 100 years: +40 %: 60 mins: Winter	25.000	23.851	24.405	0.554	192.1	0.627	0.000	193.0	461.997	Surcharged
Flow control manhole	FSR: 100 years: +40 %: 960 mins: Winter	25.000	23.500	24.496	0.996	15.0	1.127	0.000	15.0	1226.176	Surcharged
S10	FSR: 100 years: +40 %: 960 mins: Winter	22.372	21.172	21.208	0.036	15.0	0.000	0.000	15.0	1226.139	OK
S11	FSR: 100 years: +40 %: 15 mins: Summer	29.297	27.586	27.666	0.080	97.9	0.090	0.000	91.4	49.150	OK
S12	FSR: 100 years: +40 %: 15 mins: Summer	27.789	26.789	27.388	0.599	136.2	0.677	0.000	74.7	52.724	Surcharged
S13	FSR: 100 years: +40 %: 60 mins: Summer	29.277	27.749	27.848	0.100	15.7	0.113	0.000	15.6	30.003	OK
S14	FSR: 100 years: +40 %: 60 mins: Summer	29.269	27.637	27.732	0.095	15.6	0.107	0.000	15.6	29.952	OK
S15	FSR: 100 years: +40 %: 60 mins: Summer	29.387	28.110	28.161	0.052	5.0	0.058	0.000	5.0	9.452	OK
S16	FSR: 100 years: +40 %: 60 mins: Summer	30.077	27.886	27.981	0.095	18.0	0.107	0.000	17.8	31.225	OK
S17	FSR: 100 years: +40 %: 15 mins: Summer	28.297	27.297	27.450	0.153	359.1	0.173	0.000	336.9	177.255	OK
S18	FSR: 100 years: +40 %: 15 mins: Summer	26.644	25.644	26.102	0.458	336.9	0.518	0.000	203.5	173.803	Surcharged

S19	FSR: 100 years: +40 %: 15 mins: Summer	26.107	25.000	25.509	0.509	203.5	0.576	0.000	203.8	173.725	Surcharged
S20	FSR: 100 years: +40 %: 15 mins: Summer	28.638	27.138	27.825	0.687	121.1	0.777	0.000	93.8	71.316	Surcharged
S22	FSR: 100 years: +40 %: 30 mins: Summer	28.650	26.426	27.093	0.668	118.5	0.755	0.000	117.0	127.625	Surcharged
S21	FSR: 100 years: +40 %: 30 mins: Summer	28.644	26.793	27.497	0.704	92.3	0.796	0.000	90.6	103.925	Surcharged
S23	FSR: 100 years: +40 %: 30 mins: Summer	27.811	26.139	26.267	0.128	117.0	0.144	0.000	116.5	127.477	OK
S31	FSR: 100 years: +40 %: 15 mins: Summer	29.599	28.599	28.675	0.076	84.2	0.086	0.000	77.3	37.080	OK
S25	FSR: 100 years: +40 %: 30 mins: Summer	28.401	27.401	27.602	0.201	57.7	0.227	0.000	52.2	49.155	OK
S28	FSR: 100 years: +40 %: 15 mins: Summer	28.900	27.700	28.277	0.577	16.8	0.653	0.000	17.2	10.618	Surcharged
S29	FSR: 100 years: +40 %: 30 mins: Summer	28.700	27.607	28.186	0.580	28.3	0.656	0.000	28.8	32.820	Surcharged
S30	FSR: 100 years: +40 %: 30 mins: Summer	28.640	27.435	27.953	0.519	28.8	0.587	0.000	29.6	32.733	Surcharged

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Total Lost	Max. Outflow (L/s)	Total Discharge	Percentage Available (%)	Status
Pond	FSR: 1 years: +0 %: 960 mins: Summer	23.743	23.743	0.243	0.243	37.7	333.635	0.000	0.000	11.5	499.556	84.431	OK
Rain Garden 2	FSR: 1 years: +0 %: 120 mins: Summer	27.835	27.835	0.035	0.035	2.8	2.074	0.000	0.000	2.4	8.600	97.681	OK
Rain Garden 1	FSR: 1 years: +0 %: 120 mins: Summer	28.722	28.722	0.022	0.022	2.2	1.518	0.000	0.000	1.9	6.286	98.135	OK
Porous Paving	FSR: 1 years: +0 %: 60 mins: Summer	28.832	28.702	0.029	0.010	0.7	0.505	0.000	0.000	0.3	0.806	94.800	OK
Porous Paving (1)	FSR: 1 years: +0 %: 60 mins: Summer	28.473	28.349	0.028	0.015	0.7	0.568	0.000	0.000	0.3	0.820	94.428	OK
Porous Paving (2)	FSR: 1 years: +0 %: 60 mins: Summer	29.511	29.351	0.060	0.025	4.0	2.834	0.000	0.000	2.5	4.948	86.586	OK
Porous Paving (3)	FSR: 1 years: +0 %: 15 mins: Summer	29.348	29.223	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
Porous Paving (4)	FSR: 1 years: +0 %: 60 mins: Summer	28.783	28.649	0.029	0.007	0.4	0.274	0.000	0.000	0.2	0.457	95.651	OK
Porous Paving (5)	FSR: 1 years: +0 %: 60 mins: Summer	28.686	28.557	0.030	0.007	0.8	0.545	0.000	0.000	0.4	0.915	95.096	OK
Porous Paving (6)	FSR: 1 years: +0 %: 60 mins: Summer	28.441	28.268	0.084	0.018	3.6	2.280	0.000	0.000	2.2	4.376	86.214	OK
Porous Paving (7)	FSR: 1 years: +0 %: 60 mins: Summer	28.530	28.346	0.055	0.016	4.0	3.328	0.000	0.000	1.8	4.734	90.519	OK
Porous Paving (8)	FSR: 1 years: +0 %: 60 mins: Summer	28.689	28.555	0.030	0.005	0.3	0.198	0.000	0.000	0.1	0.344	95.266	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Total Lost	Max. Outflow (L/s)	Total Discharge	Percentage Available (%)	Status
Pond	FSR: 30 years: +40 %: 960 mins: Summer	24.280	24.280	0.780	0.780	110.6	1176.995	0.000	0.000	22.0	1076.312	45.076	OK
Rain Garden 2	FSR: 30 years: +40 %: 60 mins: Summer	27.881	27.881	0.081	0.081	12.3	4.747	0.000	0.000	10.8	22.481	94.693	OK
Rain Garden 1	FSR: 30 years: +40 %: 60 mins: Summer	28.748	28.748	0.048	0.048	10.3	3.249	0.000	0.000	8.9	16.458	96.008	OK
Porous Paving	FSR: 30 years: +40 %: 60 mins: Summer	28.891	28.712	0.087	0.020	2.2	1.405	0.000	0.000	1.4	2.752	85.531	OK
Porous Paving (1)	FSR: 30 years: +40 %: 60 mins: Summer	28.531	28.363	0.086	0.029	2.3	1.582	0.000	0.000	1.4	2.878	84.486	OK
Porous Paving (2)	FSR: 30 years: +40 %: 30 mins: Summer	29.622	29.376	0.172	0.051	15.3	7.267	0.000	0.000	10.5	12.368	65.607	OK
Porous Paving (3)	FSR: 30 years: +40 %: 15 mins: Summer	29.348	29.223	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
Porous Paving (4)	FSR: 30 years: +40 %: 60 mins: Summer	28.842	28.656	0.089	0.014	1.3	0.770	0.000	0.000	0.8	1.577	87.796	OK
Porous Paving (5)	FSR: 30 years: +40 %: 60 mins: Summer	28.747	28.563	0.090	0.013	2.6	1.548	0.000	0.000	1.6	3.136	86.081	OK
Porous Paving (6)	FSR: 30 years: +40 %: 30 mins: Summer	28.578	28.285	0.222	0.035	13.5	5.729	0.000	0.000	9.0	10.944	65.363	OK
Porous Paving (7)	FSR: 30 years: +40 %: 60 mins: Summer	28.639	28.362	0.164	0.032	13.7	9.305	0.000	0.000	8.0	16.448	73.488	OK
Porous Paving (8)	FSR: 30 years: +40 %: 60 mins: Summer	28.749	28.560	0.090	0.010	1.0	0.566	0.000	0.000	0.6	1.183	86.487	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Total Lost	Max. Outflow (L/s)	Total Discharge	Percentage Available (%)	Status
Pond	FSR: 100 years: +40 %: 960 mins: Winter	24.498	24.498	0.998	0.998	91.8	1562.679	0.000	0.000	15.0	1227.114	27.078	OK
Rain Garden 2	FSR: 100 years: +40 %: 60 mins: Summer	27.901	27.901	0.101	0.101	17.8	5.933	0.000	0.000	15.7	30.046	93.367	OK
Rain Garden 1	FSR: 100 years: +40 %: 60 mins: Summer	28.759	28.759	0.059	0.059	13.9	3.966	0.000	0.000	13.0	21.813	95.127	OK
Porous Paving	FSR: 100 years: +40 %: 60 mins: Summer	28.913	28.715	0.109	0.023	2.9	1.735	0.000	0.000	1.9	3.623	82.126	OK
Porous Paving (1)	FSR: 100 years: +40 %: 60 mins: Summer	28.553	28.368	0.108	0.034	3.1	1.953	0.000	0.000	2.0	3.780	80.841	OK
Porous Paving (2)	FSR: 100 years: +40 %: 30 mins: Summer	29.665	29.385	0.214	0.059	20.0	8.989	0.000	0.000	14.1	16.313	57.458	OK
Porous Paving (3)	FSR: 100 years: +40 %: 15 mins: Summer	29.348	29.223	0.000	0.000	0.0	0.000	0.000	0.000	0.0	0.000	100.000	OK
Porous Paving (4)	FSR: 100 years: +40 %: 60 mins: Summer	28.864	28.658	0.111	0.016	1.7	0.952	0.000	0.000	1.1	2.072	84.916	OK
Porous Paving (5)	FSR: 100 years: +40 %: 60 mins: Summer	28.769	28.566	0.112	0.016	3.4	1.923	0.000	0.000	2.2	4.136	82.710	OK
Porous Paving (6)	FSR: 100 years: +40 %: 30 mins: Summer	28.629	28.311	0.273	0.061	17.6	6.989	0.000	0.000	14.5	14.434	57.744	OK
Porous Paving (7)	FSR: 100 years: +40 %: 60 mins: Summer	28.679	28.368	0.204	0.038	18.0	11.504	0.000	0.000	11.2	21.721	67.223	OK
Porous Paving (8)	FSR: 100 years: +40 %: 60 mins: Summer	28.770	28.562	0.112	0.012	1.3	0.701	0.000	0.000	0.8	1.552	83.239	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
P2.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S00	S01	28.652	27.343	0.094	2.049	0.4	0.18	4.6	OK
P1.001	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S01	S02	28.650	26.951	0.169	15.837	0.7	0.4	27.9	OK
P1.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S04	S01	28.643	27.244	0.124	8.713	0.6	0.25	17.9	OK
P1.002	FSR: 1 years: +0 %: 30 mins: Summer	Pipe	S02	S05	28.300	26.930	0.159	34.919	0.9	0.48	34.5	OK
P1.003	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S05	S03	27.600	26.815	0.151	24.202	1.1	0.45	34.9	OK
P1.005	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S07	S06	27.116	26.286	0.133	50.855	2.5	0.68	75.3	OK
P1.006	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S06	S08	27.487	26.131	0.131	50.796	2.5	0.17	75.5	OK
P1.007	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S08	Pond	25.000	24.029	0.162	50.654	1.9	0.48	76.0	OK
P10.001	FSR: 1 years: +0 %: 960 mins: Summer	Pipe	Flow control manhole	S10	25.000	23.742	0.032	499.462	3.3	0.04	11.5	Surcharged
P10.000	FSR: 1 years: +0 %: 960 mins: Summer	Pipe	Pond	Flow control	25.000	23.743	0.242	499.556	0.2	0.22	11.5	OK
P1.004	FSR: 1 years: +0 %: 30 mins: Summer	Trapezoidal Channel	S03	S07	27.650	26.782	0.159	74.909	0.5	0.01	77.6	OK
P3.006	FSR: 1 years: +0 %: 15 mins: Summer	Trapezoidal Channel	S11	S12	29.297	27.621	0.084	9.745	0.5	0	20.5	OK
P3.007	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S12	S02	27.789	26.939	0.177	8.970	0.4	0.24	15.5	OK
P3.003	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	Rain Garden 2	S13	29.327	27.835	0.036	8.600	0.6	0.05	2.4	OK

P3.004	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	S13	S14	29.277	27.785	0.037	8.587	0.5	0.06	2.3	OK
P3.005	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	S14	S11	29.269	27.676	0.026	8.568	0.9	0.06	2.3	OK
P3.001	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	Rain Garden 1	S16	29.906	28.722	0.029	6.286	0.8	0.05	1.9	OK
P3.002	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	S16	Rain Garden 2	30.077	27.921	0.034	9.026	0.9	0.05	2.8	OK
P5.001	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	S15	S16	29.387	28.132	0.029	2.077	0.3	0.02	0.9	OK
P5.000	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving	S15	29.253	28.711	0.016	0.806	0.3	0.01	0.3	OK
P6.000	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (1)	S15	28.895	28.355	0.018	0.820	0.3	0.02	0.3	OK
P3.000	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (2)	Rain Garden 1	29.851	29.368	0.022	4.948	1.8	0.05	2.5	OK
P4.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	Porous Paving (3)	Rain Garden 1	29.848	29.223	0.008	0.000	0.0	0	0.0	OK
P7.000	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (4)	S15	29.253	28.660	0.015	0.457	0.2	0	0.2	OK
P7.002	FSR: 1 years: +0 %: 15 mins: Summer	Trapezoidal Channel	S17	S18	28.297	27.365	0.086	38.777	1.1	0	71.8	OK
P7.003	FSR: 1 years: +0 %: 30 mins: Summer	Pipe	S18	S19	26.644	25.748	0.110	52.885	2.5	0.22	57.9	OK
P7.004	FSR: 1 years: +0 %: 30 mins: Summer	Pipe	S19	Pond	26.107	25.115	0.112	52.844	2.4	0.28	57.6	OK
P8.003	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S20	S21	28.638	27.252	0.109	14.344	1.1	0.28	25.8	OK
P8.004	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S21	S22	28.644	26.896	0.118	14.028	0.9	0.25	22.9	OK
P8.005	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S22	S23	28.650	26.560	0.095	17.660	1.4	0.35	27.2	OK
P8.006	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S23	Pond	27.811	26.195	0.055	17.531	2.9	0.07	25.6	OK

P7.000 (1)	FSR: 1 years: +0 %: 15 mins: Summer	Trapezoidal Channel	S31	S25	29.599	28.632	0.051	8.352	0.6	0	16.7	OK
P8.000	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	S28	S29	28.900	27.739	0.046	5.279	0.6	0.14	2.5	OK
P8.001	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	S29	S30	28.700	27.660	0.046	10.326	0.9	0.24	4.3	OK
P8.002	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	S30	S20	28.640	27.474	0.063	10.299	0.8	0.15	4.3	OK
P9.001	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (6)	S28	28.806	28.301	0.029	4.376	0.9	0.03	2.2	OK
P9.002	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (5)	S28	29.107	28.568	0.023	0.915	0.2	0	0.4	OK
P9.003	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (8)	S29	29.109	28.568	0.029	0.344	0.1	0	0.1	OK
P9.004	FSR: 1 years: +0 %: 60 mins: Summer	Pipe	Porous Paving (7)	S29	28.925	28.365	0.035	4.734	0.6	0.02	1.8	OK
P7.001	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S25	S17	28.401	27.485	0.064	7.100	0.9	0.16	10.4	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstrea	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
P2.000	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	S00	S01	28.652	27.410	0.150	6.984	0.7	0.49	12.5	OK
P1.001	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S01	S02	28.650	27.339	0.300	53.943	1.4	1.41	98.9	Surcharged
P1.000	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S04	S01	28.643	27.611	0.300	29.460	0.8	0.76	54.2	Surcharged
P1.002	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S02	S05	28.300	27.199	0.300	86.305	1.4	1.35	97.4	Surcharged
P1.003	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S05	S03	27.600	26.969	0.281	85.926	1.6	1.26	98.2	Surcharged
P1.005	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	S07	S06	27.116	26.543	0.289	180.283	2.8	1.76	195.6	Surcharged
P1.006	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	S06	S08	27.487	26.187	0.300	180.154	2.8	0.45	195.6	OK
P1.007	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	S08	Pond	25.000	24.389	0.300	179.808	2.8	1.24	195.6	Surcharged
P10.001	FSR: 30 years: +40 %: 1440 mins: Summer	Pipe	Flow control manhole	S10	25.000	24.278	0.037	1644.204	3.5	0.06	15.0	Surcharged
P10.000	FSR: 30 years: +40 %: 960 mins: Summer	Pipe	Pond	Flow control	25.000	24.280	0.300	1076.312	0.3	0.41	22.0	Surcharged
P1.004	FSR: 30 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S03	S07	27.650	26.902	0.337	188.997	0.7	0.04	273.2	OK
P3.006	FSR: 30 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S11	S12	29.297	27.655	0.252	36.725	0.5	0	70.7	OK
P3.007	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	S12	S02	27.789	27.225	0.300	56.241	0.8	0.84	54.0	Surcharged
P3.003	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Rain Garden 2	S13	29.327	27.881	0.081	22.481	0.8	0.22	10.8	OK

P3.004	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S13	S14	29.277	27.830	0.080	22.440	0.9	0.26	10.8	OK
P3.005	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S14	S11	29.269	27.716	0.056	22.381	1.4	0.26	10.9	OK
P3.001	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Rain Garden 1	S16	29.906	28.748	0.063	16.458	1.3	0.22	8.9	OK
P3.002	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S16	Rain Garden 2	30.077	27.964	0.079	23.609	1.4	0.22	12.3	OK
P5.001	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S15	S16	29.387	28.154	0.060	7.188	0.4	0.08	3.6	OK
P5.000	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving	S15	29.253	28.746	0.032	2.752	0.5	0.04	1.4	OK
P6.000	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (1)	S15	28.895	28.392	0.036	2.878	0.4	0.08	1.4	OK
P3.000	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	Porous Paving (2)	Rain Garden 1	29.851	29.436	0.048	12.368	2.6	0.22	10.5	OK
P4.000	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	Porous Paving (3)	Rain Garden 1	29.848	29.223	0.021	0.000	0.0	0	0.0	OK
P7.000	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (4)	S15	29.253	28.693	0.029	1.577	0.3	0.02	0.8	OK
P7.002	FSR: 30 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S17	S18	28.297	27.431	0.187	136.137	1.3	0.01	259.6	OK
P7.003	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	S18	S19	26.644	25.897	0.295	183.984	2.9	0.76	195.6	OK
P7.004	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	S19	Pond	26.107	25.337	0.284	183.967	2.9	0.95	193.1	Surcharged
P8.003	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S20	S21	28.638	27.406	0.248	53.309	1.4	0.98	88.8	OK
P8.004	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	S21	S22	28.644	27.009	0.279	52.789	1.1	0.85	77.4	OK
P8.005	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	S22	S23	28.650	26.802	0.244	65.783	1.8	1.22	95.3	Surcharged
P8.006	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	S23	Pond	27.811	26.252	0.109	97.038	4.1	0.27	94.1	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

P7.000 (1)	FSR: 30 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S31	S25	29.599	28.665	0.106	28.721	0.7	0	59.6	OK
P8.000	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S28	S29	28.900	27.806	0.137	18.137	0.8	0.6	10.6	OK
P8.001	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S29	S30	28.700	27.775	0.133	35.722	1.3	1.08	19.2	Surcharged
P8.002	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	S30	S20	28.640	27.533	0.147	35.696	1.2	0.67	19.0	OK
P9.001	FSR: 30 years: +40 %: 15 mins: Summer	Pipe	Porous Paving (6)	S28	28.806	28.374	0.063	6.682	1.3	0.12	9.0	OK
P9.002	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (5)	S28	29.107	28.601	0.059	3.136	0.3	0.02	1.6	OK
P9.003	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (8)	S29	29.109	28.600	0.089	1.183	0.1	0.01	0.6	OK
P9.004	FSR: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (7)	S29	28.925	28.428	0.100	16.448	0.8	0.11	8.0	OK
P7.001	FSR: 30 years: +40 %: 30 mins: Summer	Pipe	S25	S17	28.401	27.572	0.145	37.554	1.3	0.63	39.8	OK

Project: The Oaks Wrexham	Date: 03/04/2025		
	Designed by: NS	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Barnsley Marshall		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
P2.000	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S00	S01	28.652	27.847	0.150	9.002	0.8	0.57	14.6	Surcharged
P1.001	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S01	S02	28.650	27.670	0.300	69.239	2.0	2.02	141.7	Surcharged
P1.000	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S04	S01	28.643	28.135	0.300	37.978	1.1	1.13	80.6	Surcharged
P1.002	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S02	S05	28.300	27.344	0.300	170.239	1.6	1.53	110.0	Surcharged
P1.003	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S05	S03	27.600	27.040	0.300	170.008	1.6	1.4	109.7	Surcharged
P1.005	FSR: 100 years: +40 %: 120 mins: Summer	Pipe	S07	S06	27.116	26.698	0.300	589.046	2.8	1.74	193.3	Surcharged
P1.006	FSR: 100 years: +40 %: 120 mins: Summer	Pipe	S06	S08	27.487	26.186	0.300	589.030	2.7	0.44	193.2	OK
P1.007	FSR: 100 years: +40 %: 60 mins: Winter	Pipe	S08	Pond	25.000	24.405	0.300	461.997	2.7	1.22	193.0	Surcharged
P10.001	FSR: 100 years: +40 %: 960 mins: Winter	Pipe	Flow control manhole	S10	25.000	24.496	0.037	1226.139	3.5	0.06	15.0	Surcharged
P10.000	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	Pond	Flow control	25.000	24.484	0.300	1790.252	0.3	0.41	21.9	Surcharged
P1.004	FSR: 100 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S03	S07	27.650	26.931	0.434	245.900	0.7	0.05	344.7	OK
P3.006	FSR: 100 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S11	S12	29.297	27.666	0.322	49.075	0.5	0	91.4	OK
P3.007	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S12	S02	27.789	27.388	0.300	43.947	1.1	1.16	74.7	Surcharged
P3.003	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Rain Garden 2	S13	29.327	27.901	0.101	30.046	0.9	0.32	15.7	OK

P3.004	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	S13	S14	29.277	27.848	0.097	30.003	0.9	0.37	15.6	OK
P3.005	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	S14	S11	29.269	27.732	0.069	29.940	1.5	0.37	15.6	OK
P3.001	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Rain Garden 1	S16	29.906	28.759	0.077	21.813	1.4	0.32	13.0	OK
P3.002	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	S16	Rain Garden 2	30.077	27.981	0.098	31.225	1.4	0.31	17.8	OK
P5.001	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	S15	S16	29.387	28.161	0.073	9.452	0.4	0.12	5.0	OK
P5.000	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving	S15	29.253	28.758	0.037	3.623	0.6	0.05	1.9	OK
P6.000	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (1)	S15	28.895	28.405	0.043	3.780	0.5	0.11	2.0	OK
P3.000	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	Porous Paving (2)	Rain Garden 1	29.851	29.462	0.058	16.313	2.7	0.29	14.1	OK
P4.000	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	Porous Paving (3)	Rain Garden 1	29.848	29.223	0.026	0.000	0.0	0	0.0	OK
P7.000	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (4)	S15	29.253	28.705	0.034	2.072	0.4	0.03	1.1	OK
P7.002	FSR: 100 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S17	S18	28.297	27.450	0.277	177.255	1.3	0.02	336.9	OK
P7.003	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S18	S19	26.644	26.102	0.300	173.803	2.9	0.79	203.5	Surcharged
P7.004	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S19	Pond	26.107	25.509	0.300	173.725	3.1	1	203.8	Surcharged
P8.003	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S20	S21	28.638	27.825	0.300	69.887	1.3	1.04	93.8	Surcharged
P8.004	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S21	S22	28.644	27.497	0.300	103.925	1.3	1	90.6	Surcharged
P8.005	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S22	S23	28.650	27.093	0.300	127.625	1.7	1.49	117.0	Surcharged
P8.006	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S23	Pond	27.811	26.267	0.123	127.477	4.3	0.33	116.5	OK

P7.000 (1)	FSR: 100 years: +40 %: 15 mins: Summer	Trapezoidal Channel	S31	S25	29.599	28.675	0.125	37.080	0.7	0	77.3	OK
P8.000	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S28	S29	28.900	28.277	0.150	10.476	1.0	0.97	17.2	Surch arged
P8.001	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S29	S30	28.700	28.186	0.150	32.820	1.6	1.62	28.8	Surch arged
P8.002	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S30	S20	28.640	27.953	0.150	32.733	1.7	1.05	29.6	Surch arged
P9.001	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	Porous Paving (6)	S28	28.806	28.406	0.150	8.995	1.3	0.21	15.0	Surch arged
P9.002	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (5)	S28	29.107	28.614	0.150	4.136	0.4	0.03	2.2	OK
P9.003	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (8)	S29	29.109	28.612	0.150	1.552	0.1	0.02	0.8	OK
P9.004	FSR: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving (7)	S29	28.925	28.451	0.150	21.721	0.9	0.15	11.2	OK
P7.001	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S25	S17	28.401	27.602	0.167	49.155	1.4	0.82	52.2	OK

Appendix F

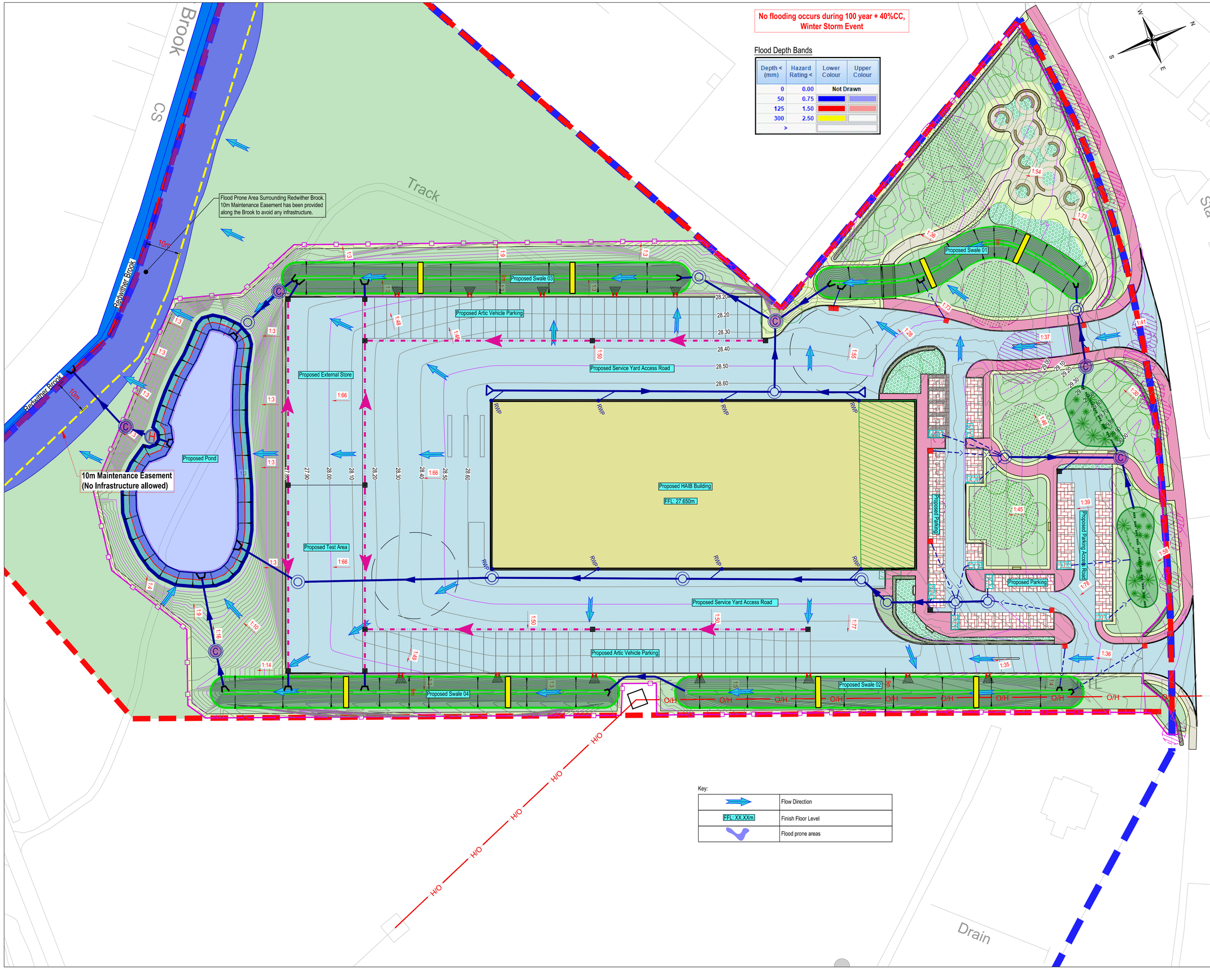
Flood Flow Analysis

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No flooding occurs during 100 year + 40%CC, Winter Storm Event

Flood Depth Bands

Depth < (mm)	Hazard Rating <	Lower Colour	Upper Colour
0	0.00	Not Drawn	
50	0.75		
125	1.50		
300	2.50		
>			



Key:

	Flow Direction
FFL: XX.XXm	Finish Floor Level
	Flood prone areas

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.

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
4. For Stormwater Chamber & Pipe Schedules refer to drawing: TOS-BML-XX-XX-DR-C-0502

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

Flood Flow Analysis

By IW/AM Date 18/02/2025

Drawing No. TOS-BML-XX-XX-DR-C-0520 (Prefix: TOS; Originator: BML; Volume: XX; Level: XX; Type: DR; Role: C; Number: 0520)

Revision P02

BML Job No. 1000-06

Status -

Drawing Scale at A1: -

CAD Filename: Y:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\Information - Working\DWG\TOS-BML-XX-XX-DR-C-0520 P01 - Flood Flow Analysis.dwg

Appendix G

Site Constraints

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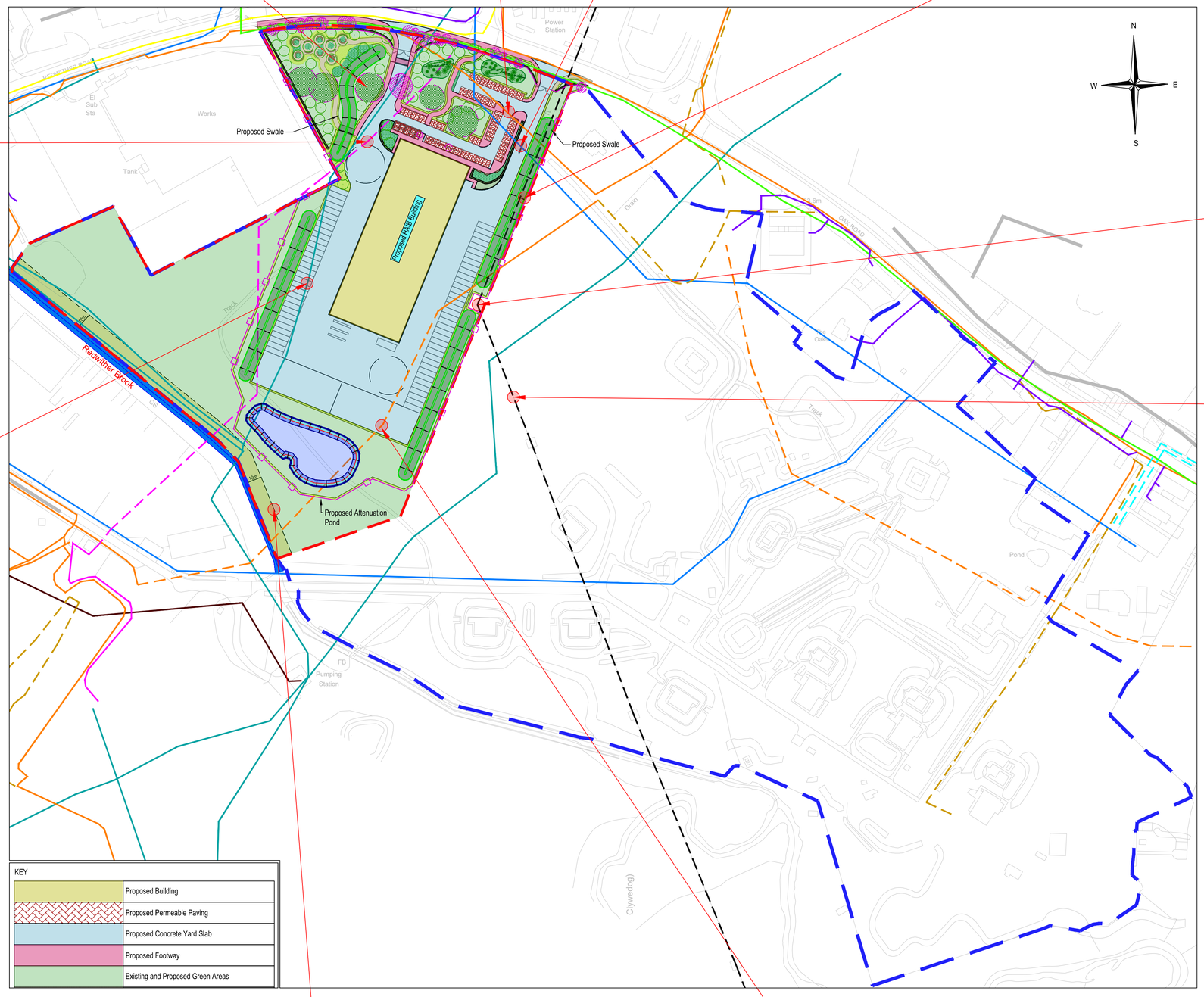
Existing Oak Trees/Root Protection Area
Deep construction to be avoided within Root Protection Zone.
Ideally Main Access Road to be re-aligned to avoid Root Protection Zone or permission required to cut down some trees.

High Voltage Underground Power Line
Detailed utility survey to be conducted.
Utility to be deepened or diverted depending on site conditions.

Existing Dee-Valley Public Water Mains
Detailed utility survey to be conducted.
Utility to be deepened or diverted depending on site conditions.

Application Boundary
Application boundary to be extended to include 9m wide swales.

Existing 33kV Power Line
Vertical clearance to be checked and confirmed.



Electric Pylon
Consultation to be required with SP Energy to confirm the required clearance.

Existing Welsh Water Combined Water Sewer
Detailed utility survey to be conducted.
CCTV survey required to determine the invert levels.
Assume needs to be diverted and easement agreed/provided.

Existing 132kV Power Line
Consultation to be required with SP Energy to confirm the required clearance.

KEY

	Proposed Building
	Proposed Permeable Paving
	Proposed Concrete Yard Slab
	Proposed Footway
	Existing and Proposed Green Areas

Redwither Brook
No infrastructure to be constructed 10m within the river boundary.

High Voltage Overhead Power Line
Detailed utility survey to be conducted.
Vertical clearance to be checked and utility to be possibly diverted.

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. The copyright of this drawing is vested in the Engineer and must not be copied or reproduced without written consent.
5. This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.

	Dee Valley Public Water Mains
	Welsh Water Combined
	Welsh Water Foul
SP Energy Overhead Line Voltage	
	132 kV
	33 kV
	High Voltage
SP Energy In Use - Underground Voltage	
	132 kV
	33 kV
	High Voltage
	Low Voltage
SP Energy Out Of Use - Underground Voltage	
	High Voltage
	Dee Valley Private Water Mains
	Fibre Optic Cable
	Root Protection Area (No Dig Zone)
	Trees to be removed

Rev	By / Chk'd	Date	Description
P02	IW/AM	20/05/2025	Masterplan updated
P01	IW/AM	04/03/2025	First Issue for Construction

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client
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Project
The Oaks Site
Wrexham Industrial Estate

Drawing
Site Constraints

By ?? Date 00/00/0000

Drawing No. TOS-BML-XX-XX-DR-C-0101
Revision P02

BML Job No. 1000-06
Status -

Drawing Scale at A1: Nts

CAD Filename: Y:\Projects\1000-06 The Oaks Site, Wrexham Ind Est\Information - Working\DWG\TOS-BML-XX-XX-DR-C-0101 P01 - Site Constraints.dwg

Appendix H

Welsh Water Correspondences

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Dŵr Cymru
Welsh Water

Developer Services
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Cardiff
CF30 0EH

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Fax: +44 (0)2920 740472
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Caerdydd
CF30 0EH

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E.bost: developer.services@dwrcymru.com

Miss Indira Withana
Barnsley Marshall Limited
4 & 5 Prior Wharf
Harris Business Park Stoke Prior
Stoke Prior
West Midlands
B60 4FG

Date: 03/05/2024
Our Ref: PPA0008697

Dear Miss Withan,

Grid Ref: 338721 349232
Site Address: The Oaks Site Wrexham Industrial Estate Wrexham
Development: Discharging foul sewage into an existing Welsh Water public combined sewer passing near the proposed building from 140 employees

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

APPRAISAL

Firstly, we note that the proposal relates to a 140 staff industrial unit at the Oaks site and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a predominantly combined public sewerage system which drains to Five Fords Wastewater Treatment Works (WwTW).

glas
Glas Cymru Cyfyngedig

Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in Welsh and English

Dŵr Cymru Cyf, a limited company registered in Wales no 2366777. Registered office: Pentwyn Road, Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn Nelson, Treharris, Morgannwg Ganol CF46 6LY.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales. It is therefore recommended that the developer consult with Wrexham County Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the combined sewer between manholes SJ38497301 and SJ38496201 located within the site boundary. Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

Foul Water Drainage – Sewage Treatment

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site. If the development will give rise to a new discharge (or alter an existing discharge) of trade effluent, directly or indirectly to the public sewerage system, then a Discharge Consent under Section 118 of the Water Industry Act 1991 is required from Welsh Water. Please note that the issuing of a Discharge Consent is independent of the planning process and a consent may be refused although planning permission is granted.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

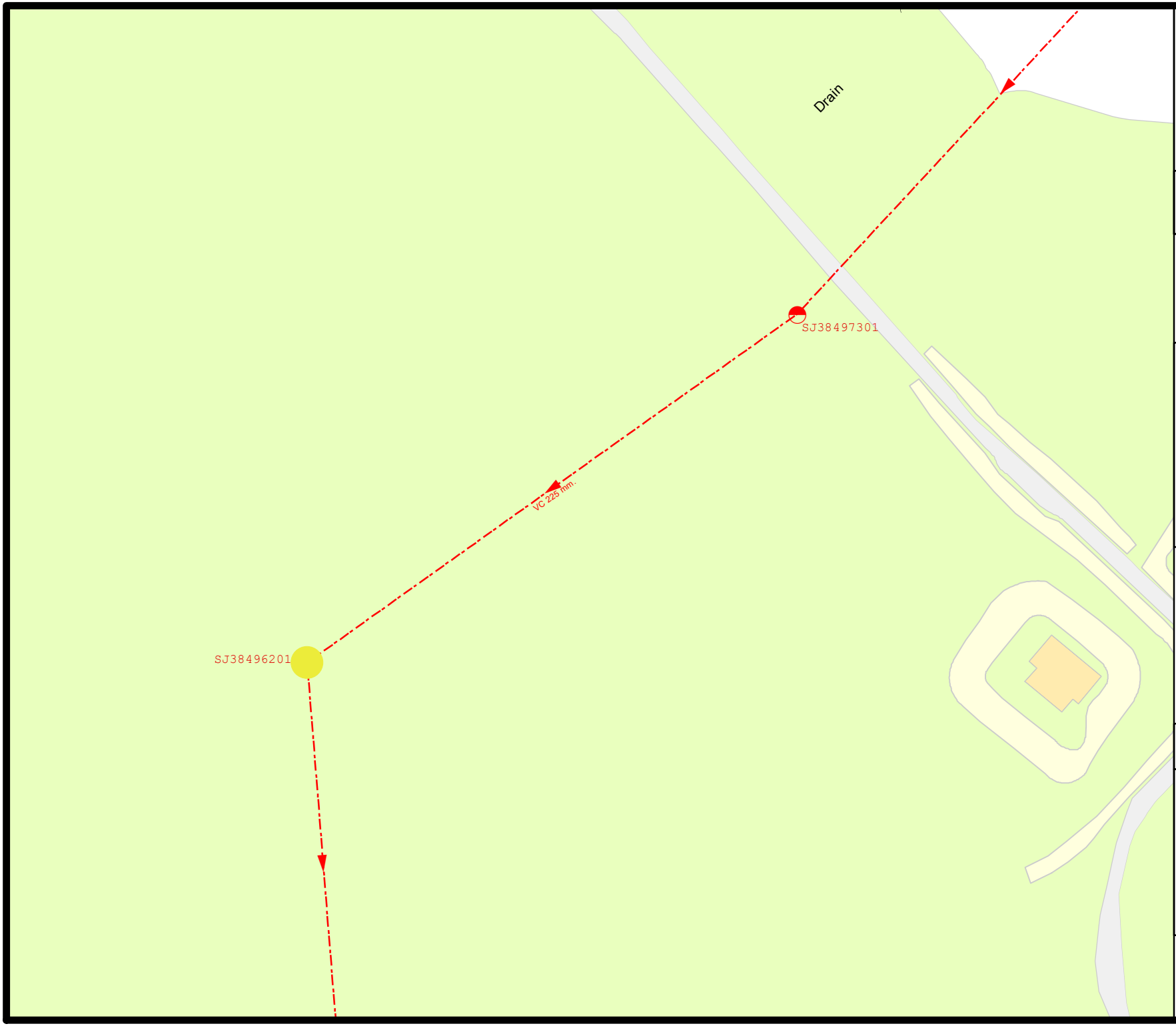
Yours faithfully,



Owain George
Planning Liaison Manager
Developer Services

<u>Please Note</u> that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.

ENC. SEWER PLAN
PRE PLANNING NOTES



Dŵr Cymru
Welsh Water

PPA0008697 Sewer plan

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref:	338691,349320
Map scale:	1:900
Printed by:	Stacey Harris
Printed on:	07 May 2024

Dŵr Cymru
Welsh Water

PPA0008697 Sewer plan

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow (CO)
- Special purpose chamber (SPC)
- Treatment works
- Pumping station
- Outfall
- Lamphole (LH)
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement (S 104)
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
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