SuDS Strategy Report

Borras Park Road, Wrexham

LL12 7TG

Project Reference: SD2407184

SUDS DESIGNS

SUSTAINABLE DRAINAGE DESIGNS

A Division of JMS Group

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Revisions and Additional Material

Document History and Status

Revision	Date	Purpose/Status
-	11.07.2024	First Issue

Document Details

Project Number	SD2407184
Project Director	David Brunning MCIWEM C.WEM
Report Author	Megan Nicholson

Preamble

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1.0 Introduction

1.0.1 SuDS Designs have been appointed to prepare a surface water drainage strategy to support the planning application for the site at Borras Park Road, Wrexham. As part of the proposals, this report will assess the potential impact from alterations to the site drainage, and the surface water characteristics are considered within the scope of the parameters set out in the Sustainable Drainage Statutory Guidance.

1.0.2 This report will also review the requirements set out by Wrexham County Borough Council's local planning guidance.

2.0 Location & Existing Conditions

2.0.1 The site is specifically located at land next to Unit 1 Borras Park Road and equates to an approximate total site area of 0.048ha. The site is considered a brownfield site, and its existing use is a car parking area to the neighboring shops, with soft landscaping to the rear.

2.0.2 To consider the ground conditions in the application site, the British Geological Society database has been reviewed.

2.0.3 Superficial Deposits:

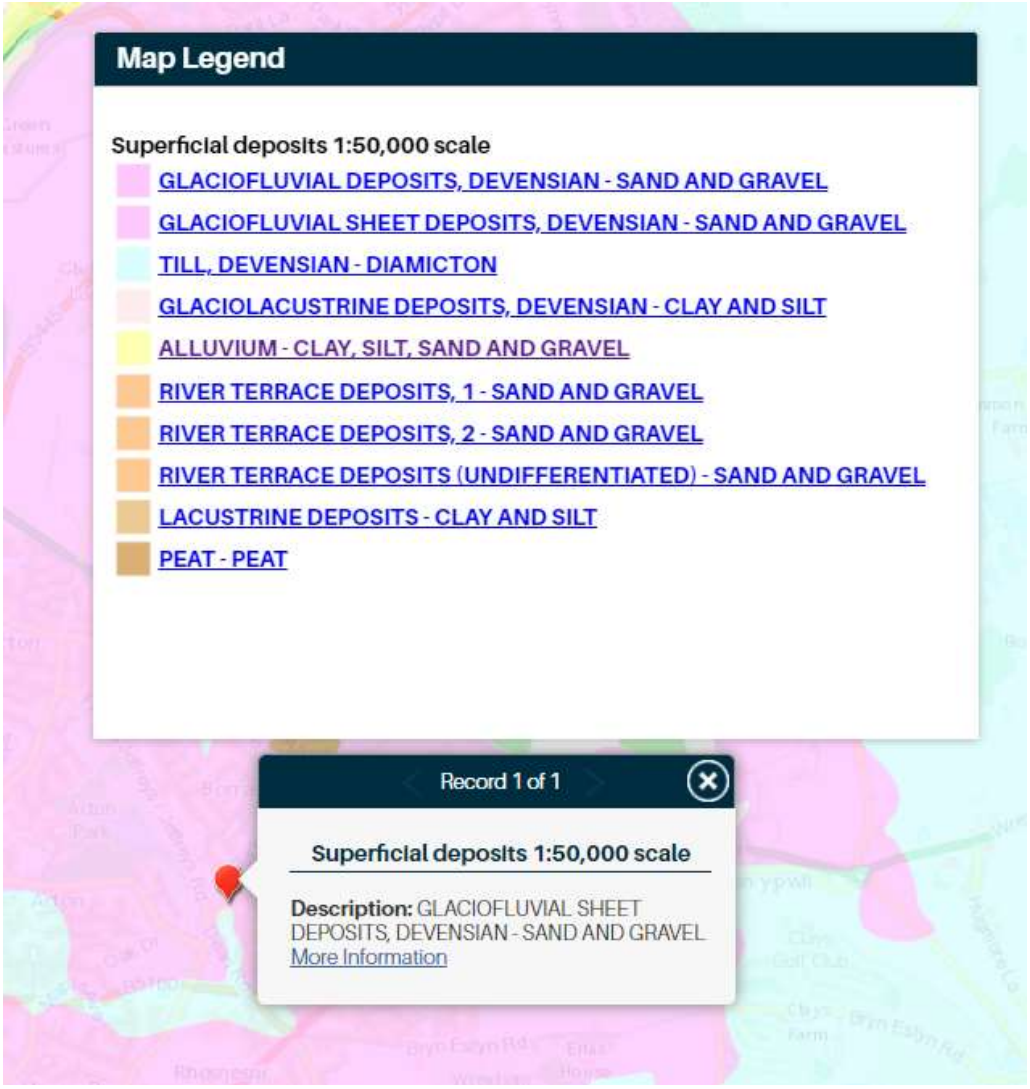


Figure 1: Extent of Superficial Geology

2.0.4 Bedrock Geology:

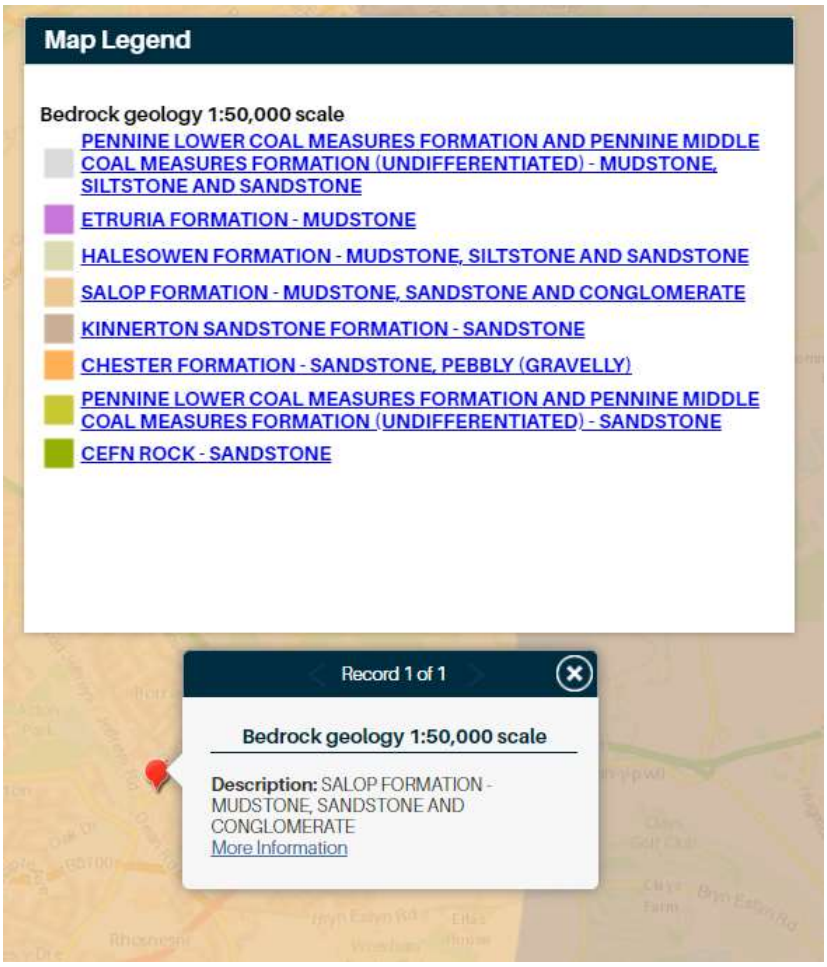


Figure 2: Extent of BGS Bedrock Geology

2.0.5 BGS mapping shows the site to be located above Salop Formation of mudstone, sandstone and conglomerate. Superficial deposits are shown in **Figure 1** above and shows the site is on Glaciofluvial Sheet.

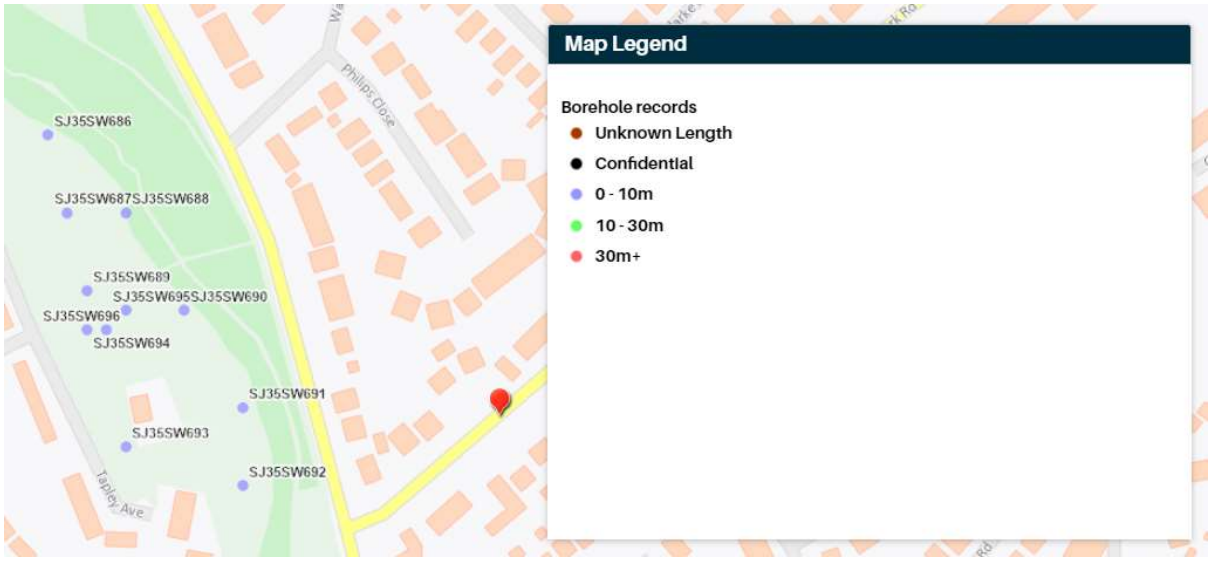
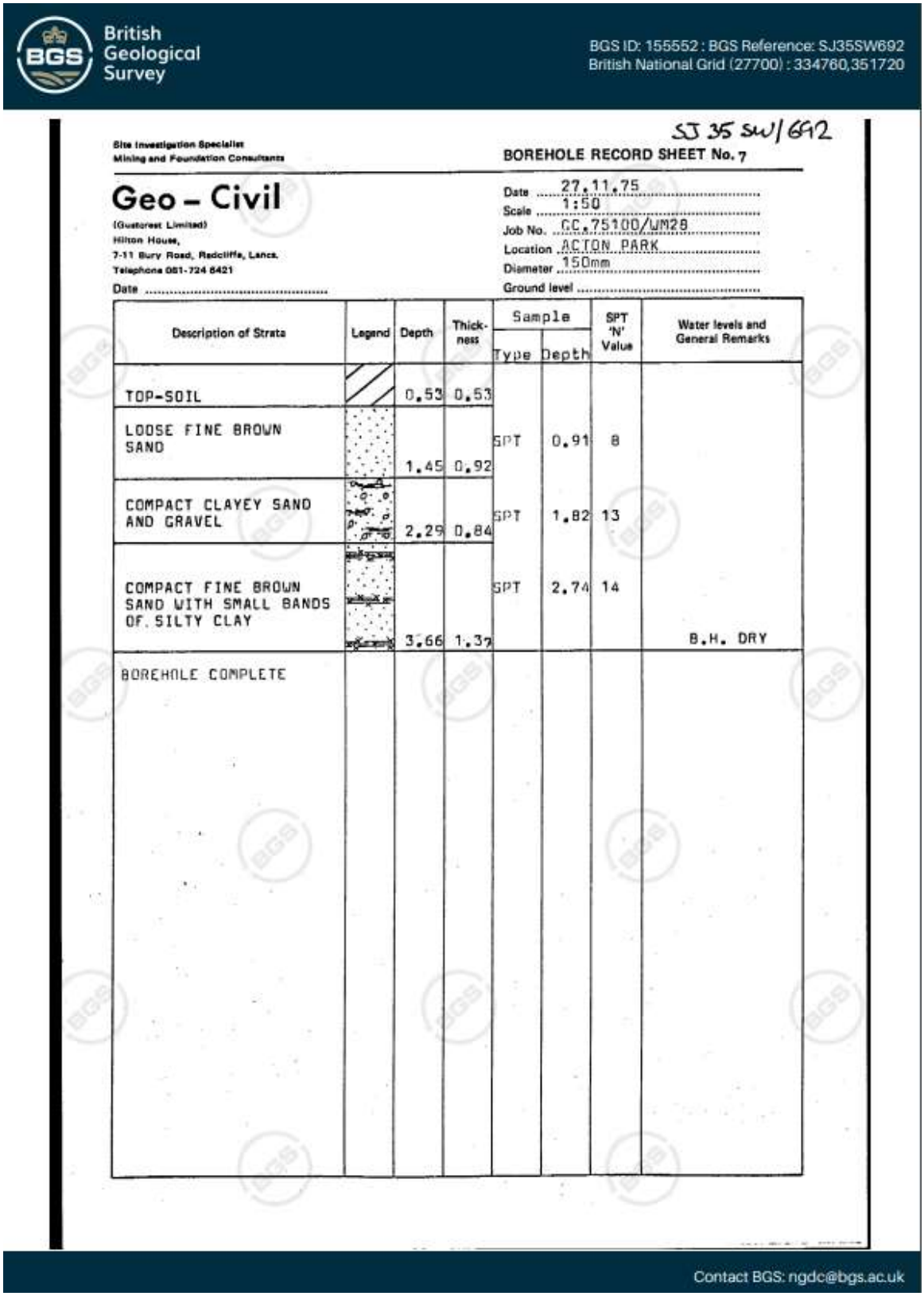


Figure 3: Local Borehole information.

2.0.6 Local borehole information has also been reviewed and **Figure 3** above shows the site in relation to the closest borehole of SJ35SW692. The borehole information in **Figure 4** shows topsoil over a band of brown sand which overlies a band of clayey sand and gravel. Beneath this is a layer of fine brown sand with small bands of silty clay where the borehole record terminates.



British Geological Survey

BGS ID: 155552 : BGS Reference: SJ35SW692
British National Grid (27700) : 334760,351720

SJ 35 SW/692

Site Investigation Specialist
Mining and Foundation Consultants

BOREHOLE RECORD SHEET No. 7

Geo – Civil

(Gustoreet Limited)
Hilton House,
7-11 Bury Road, Radcliffe, Lancs.
Telephone 061-724 8421

Date .....

Date 27.11.75
Scale 1:50
Job No. GC.75100/WM28
Location ACTON PARK
Diameter 150mm
Ground level .....

Description of Strata	Legend	Depth	Thick-ness	Sample Type	Sample Depth	SPT 'N' Value	Water levels and General Remarks
TOP-SOIL		0.53	0.53				
LOOSE FINE BROWN SAND		1.45	0.92	SPT	0.91	8	
COMPACT CLAYEY SAND AND GRAVEL		2.29	0.84	SPT	1.82	13	
COMPACT FINE BROWN SAND WITH SMALL BANDS OF SILTY CLAY		3.66	1.37	SPT	2.74	14	B.H. DRY
BOREHOLE COMPLETE							

Contact BGS: ngdc@bgs.ac.uk

Figure 4: Borehole SJ35SW692

2.1 Site Topography

2.1.1 A topographical survey information is available and shows a gentle slope with levels highest in the South-East of the site, falling in a North-West Direction

2.2 Site Proposals

2.2.1 The development proposals include construction of 1 new dwelling with associated driveway and rear garden.

2.3 Existing Drainage Regime

2.3.1 The existing site can be described as a brownfield site and the surface water is currently considered to outfall to soft landscaping areas and the highway.

2.3.2 Given the existing site conditions and drainage regime, a site peak runoff rate for the existing development area can be calculated as shown in the table below. The existing total impermeable area is taken as approximately 0.023ha. The Modified Rational Method is used to consider the average existing runoff as set out below:

Q(l/s) = Cv x Cr x 2.78 x I (mm/hr) x A (ha)

Where:

A = 0.023

Cv = 0.75

Cr = 1.3

I = 43.05

Q = 2.68 l/s

	1:1 Year Storm Event	1:30 Year Storm Event	1:100 Year Storm Event
Existing Peak Runoff Rate (l/s)	2.68	6.52	8.56
Peak Rainfall Intensity (mm/hr)	43.05	104.64	137.337

3.0 SuDS Considerations

3.0.1 Consideration of SuDS are a planning requirement for new developments. SuDS are designed to replicate the natural course of drainage as closely as possible with a view to reducing the impact of flooding, removing pollutants at source, and combining water management with green space.

Developments should utilise SuDS where possible and ensure that surface water run-off is managed as close to its source as possible in line with the following hierarchy:

1. Into ground (infiltration).
2. To a surface water body.
3. To a surface water sewer.
4. To a combined sewer.

3.0.2 Sustainable Drainage Systems should be included in the design to manage surface water flood risk. SuDS should be inspired by natural drainage processes and manage water as close to its source as possible whilst offering pollution control and landscape benefits.

3.0.3 For this development the criteria is set out by Wrexham County Borough Council and reference is made to the local planning guidance notes. National guidance is also considered. The Sustainable Drainage Statutory Guidance states that all new developments of more than 1 dwelling house or where the construction area is 100 square meters or more, will require sustainable drainage systems (SuDS) for surface water. The SuDS must be designed and built in accordance with Statutory SuDS Standards

SuDS Incorporation

3.1.1 The below figure, taken from the SuDS Manual, C753, CIRIA, 2015 Document lists a variety of SuDS component options which may be applied to development proposals.

3.1.2 There is reasonable possibility that site ground conditions will facilitate the use of infiltration as a method of surface water disposal.

Component Type	Description	Design Criteria							
		Collection Mechanism	Water Quantity (Chapter 3)			Water Quality (Chapter 4)	Amenity (Chapter 5)	Biodiversity (Chapter 6)	Further Information (Chapter Ref)
			Peak Runoff Rate	Runoff Volumes					
				Events (Interceptions)	Large Events				
Rainwater Harvesting Systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●		11
Green roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●	12
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●	13
Proprietary treatment systems	Subsurface structures design to provide treatment to runoff	P				●			14
Filter strips	Grass strips hat promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○	15
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○	16
Swales	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	L	●	●	●	●	●	●	17
Bioretention systems	Trees with soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	●	●	●	●	●	●	18
Trees	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	P	●	●		●	●	●	19
Pervious pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	●	○	○	20
Attenuation storage tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration-controlled release or use	P	●						21
Detention basins	Vegetated depressions that store and treat runoff	P	●	●		●	●	●	22
Ponds and wetlands	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in an attenuation zone above the pool	P	●			●	●	●	23

P-Point L-Lateral S-Surface

● – likely valuable contribution to delivery of design criterion

○ - some potential contribution to delivery of design criterion, if specifically included in the design

Figure 5: CIRIA Table 7.1 SuDS Components

3.1.3 The proposed site layout offers the opportunity to apply a range of SuDS measures in accordance with the table above. Proposals are as follows:

- **Soakaway**– Located in the front driveway, offering natural treatment of surface water and preventing surface water disposable to local infrastructure.
- **Rainwater Harvesting Systems –** Offering benefits in terms of water quantity and amenity. Proposals are to re-use water for garden irrigation.

3.1.4 By use of the above, the development proposals aim to drain most impermeable areas via SuDS measures. The rear patio area is to drain to the soft landscaped area of the garden to ensure safe exceedance flow routes.

3.1.5 In accordance with Table 26.2 of CIRIA Report C753, the pollution hazard level can be classified as 'very low' and 'low'. Using table 26.3 of the same document, the mitigation indices values for permeable surfacing exceed the pollution hazard values taken from the previous table. This ensures that proposals offer enough pollution risk mitigation.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
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	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	High	0.8	0.8	0.9

Figure 6: Extract from Table 26.2 CIRIA SuDS Manual Pollution hazard indices for different land use classifications

3.1.6 The above proposals ensure that an 'at source' SuDS measure is applied, and betterment is provided in terms of surface water runoff velocity and quality. Pollution indices from different land types can be found per as per table 26.15 CIRIA SuDS Manual 2015, below.

Land use surface type (Lust)	Impermeability (IMP_{Rf})	Total suspended solids pollution index (PI_{TSS})	Organic pollution index (PI_{Org})	Hydrocarbon pollution index (PI_{PAD})	Metals Pollution index (PI)
Roofs					
• Industrial / Commercial	1.0	0.3	0.3-0.4	0.2	0.4-0.8
• Residential	0.9	0.4-0.5	0.6-0.7	0.1	0.2-0.5
Highways					
• Motorways	0.8-0.9	0.9	0.7	0.9	0.8
• Major arterial highways	0.7-0.8	0.8	0.7	0.8	0.8
• Urban distributor roads	0.6-0.7	0.7-0.8	0.5	0.8	0.7
• Residential Street	0.4-0.6	0.4	0.6	0.6	0.6
• Pavements	0.5-0.6	0.4	0.6	0.3	0.3
Car Parks / Hardstanding					
• Industrial/Commercial	0.6-0.8	0.6-0.7	0.6-0.7	0.7	0.4-0.5
• Driveways (Residential)	0.5	0.5	0.6	0.4	0.3
Open Areas					
• Gardens (All types)	0.1	0.3	0.2-0.3	0	0.01
• Parks/Golf Courses	0.2	0.2-0.3	0.2	0	0.02
• Grassed Areas (including verges, all types)	0.1	0.2-0.3	0.2-0.3	0.05	0.05
Note					
1 Pollution index values are based on reported land use type EMC distributions and impact potential thresholds from House et al (1991), Luker and Montague (1994), Butler and Clark (1995), D'Arcy et al (2000), Mitchell (2005) and Moy et al (2003)					

Figure 7: Impermeability and pollution indices for different land use types

3.2 Climate Change

3.2.1 The appended drainage calculation allows for a 1:100-year storm plus 40% climate change, this has been sourced from the document 'Flood Consequences Assessments: Climate change allowances

Applies across all of Wales	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

Figure 8: Climate change allowances for peak rainfall in Wales

4.0 Surface Water Strategy

The surface water strategy is based upon the SuDS implementation as outlined above along with the hierarchy for surface water disposal as follows:

A. Store rainwater for later use:

Rainwater harvesting via a water butt planter unit proposed for garden irrigation purposes.

B. Use infiltration techniques

A soakaway is proposed to provide infiltration through the ground as the method of surface water disposal.

C. Attenuate rainwater in ponds or open water features for gradual release:

Not applicable.

D. Attenuate rainwater by storing in tanks or sealed water features for gradual release:

Not applicable.

E. Direct rainwater direct to the watercourse:

Not applicable.

F. Discharge rainwater to a surface water sewer/drain

Not applicable.

G. Discharge rainwater to combined sewer:

Not applicable.

H. Discharge rainwater to foul sewer:

Not applicable.

4.1 Designing for Exceedance

4.1.0 Consideration should be given to external levels to ensure they are set above overland flood risk levels, and low points are created to direct water away from the building footprints during exceedance events. Please see appended drawing for exceedance flow directions.

4.1.1 CIRIA document C635 *Designing for exceedance in urban drainage – good practice* states that "at present there are no guidelines on the return period of event (extreme event) that should be used for design exceedance". However, Section 3.4 also states that "it is suggested that return periods of 1 in 30, to 1 in 100 or 1 in 200-year events would form a suitable framework for most applications".

4.1.2 In accordance with the above, the drainage network has been modelled using a 1 in 100-year event.

5.0 Building and Detailed Design

5.1 Pollution, Water Quality, and Control Measures

5.1.0 Consideration for surface water needs to be taken during the construction process, and how it is managed including flood risk and pollution control.

5.1.1 On completion of the permanent drainage system the network will be relied upon to control pollution and water quality for the remainder of the construction works.

5.1.2 Wheel and plant washing will take place at the temporary entrance to minimise the pollutants being transferred to, or from site, and is also located to minimise the risk of pollutants entering the permeable surfacing and other drainage elements.

5.1.3 Pollution incident potential involving plant and machinery can be contained by simple measures:

- Use of drip trays
- Emergency spill kits
- Regular maintenance/checks of plant and machinery including checks for wear, oil leaks and immediate decommissioning when faults occur.
- Procedures for refuelling areas, with spillage kits

6.0 Surface Water Drainage Maintenance Schedules

6.0.1 This section of the report gives guidance on the maintenance of the drainage system and outlines the responsible party as the freeholder.

6.0.2 The design life of the development is likely to exceed the design life of each of the SuDS components listed above. During the routine inspections of any drainage components, it may become apparent that they have reached the end of their functional lifetime. In the interest of sustainability, repairs should be the first-choice solution where practicable. If this is not the case, then it will be necessary for the property owners to undertake complete replacement of the component in question.

6.1 Rainwater Pipes, and Chambers

Table 1 - Rainwater Pipes, and Chambers: System storage operation and maintenance requirements

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspection of silt trap chamber and removal of debris when necessary	Quarterly or as required following monitoring

Remedial Actions	Check for blockages in manholes and pipes. Rodding and jetting of pipes to be carried out. CCTV survey can be carried out to inspect condition of pipework	Quarterly or as required following monitoring
Monitoring	Inspect collection apparatus for debris and litter. Remove where necessary to prevent blockages in the system.	Monthly or after periods of heavy rainfall

6.2 Soakaway

Table 2 - System storage operation and maintenance requirements (soakaway)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube.	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually
	Check soakaway to ensure emptying is occurring	Annually

7.0 Conclusions

7.0.1 Local geology suggests compliant material for use of infiltration as a surface water disposal method, therefore proposals are to discharge surface water runoff to a soakaway.

7.0.2 A series of SuDS components are proposed throughout the development including permeable paving. The SuDS measures implemented to ensure that contributions are made towards peak flow, runoff volume, water quality, amenity and biodiversity.

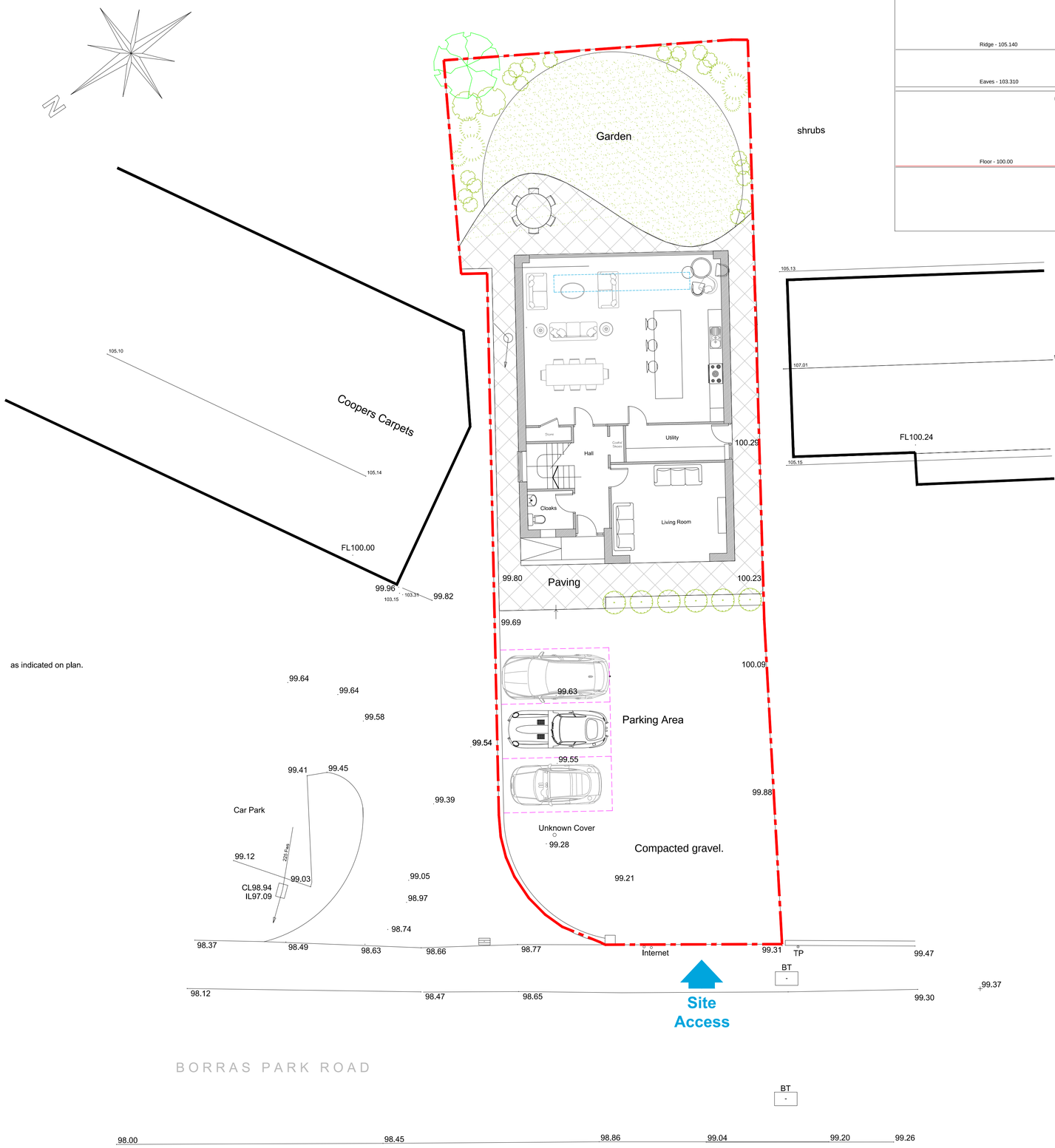
7.0.3 The drainage strategy is designed to limit the surface water runoff from the proposed development to an appropriate discharge rate. The proposed peak runoff rate offers significant reduction in flows, decreasing potential for surface water flooding downstream.

8.0 Appendices

8.1 Architect layout Plan



Proposed Site Section
Scale 1:100



PROPOSED SITE PLAN
Scale 1:100

cad CULLIS•ARCHITECTURAL•DESIGN
partner LABC
25 Sunningdale Close
Wresham
North Wales
LL13 9QU
T 01978 264376
M 07791 480768
E ajones540@btinternet.com

Client: Mr. & Mrs. Kumas.

Drawing Title: Proposed Site Plan.

Job Title: New Dwelling to Borras Road, Wxm, Adjacent to Coopers Carpets.

Date:	Scale:	Rev:	Drg.No:
March 2020	1:100 at A1		PD186/04

8.2 Proposed Drainage Calculations

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

Half Drain Time : 860 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	97.643	0.243	0.2	7.5	O K
30 min Summer	97.729	0.329	0.2	10.2	O K
60 min Summer	97.823	0.423	0.2	13.1	O K
120 min Summer	97.919	0.519	0.2	16.0	O K
180 min Summer	97.970	0.570	0.2	17.6	O K
240 min Summer	98.000	0.600	0.2	18.5	O K
360 min Summer	98.033	0.633	0.2	19.5	O K
480 min Summer	98.048	0.648	0.2	20.0	O K
600 min Summer	98.052	0.652	0.2	20.1	O K
720 min Summer	98.051	0.651	0.2	20.1	O K
960 min Summer	98.046	0.646	0.2	19.9	O K
1440 min Summer	98.027	0.627	0.2	19.3	O K
2160 min Summer	97.991	0.591	0.2	18.3	O K
2880 min Summer	97.955	0.555	0.2	17.1	O K
4320 min Summer	97.885	0.485	0.2	15.0	O K
5760 min Summer	97.820	0.420	0.2	13.0	O K
7200 min Summer	97.762	0.362	0.2	11.2	O K
8640 min Summer	97.711	0.311	0.2	9.6	O K
10080 min Summer	97.666	0.266	0.2	8.2	O K
15 min Winter	97.672	0.272	0.2	8.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	114.068	0.0	26
30 min Summer	77.827	0.0	41
60 min Summer	50.812	0.0	70
120 min Summer	32.076	0.0	128
180 min Summer	24.146	0.0	188
240 min Summer	19.594	0.0	246
360 min Summer	14.506	0.0	364
480 min Summer	11.720	0.0	482
600 min Summer	9.925	0.0	600
720 min Summer	8.658	0.0	662
960 min Summer	6.974	0.0	778
1440 min Summer	5.129	0.0	1038
2160 min Summer	3.764	0.0	1452
2880 min Summer	3.017	0.0	1856
4320 min Summer	2.204	0.0	2684
5760 min Summer	1.762	0.0	3464
7200 min Summer	1.481	0.0	4248
8640 min Summer	1.286	0.0	5008
10080 min Summer	1.142	0.0	5744
15 min Winter	114.068	0.0	26

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	97.770	0.370	0.2	11.4	O K
60 min Winter	97.876	0.476	0.2	14.7	O K
120 min Winter	97.986	0.586	0.2	18.1	O K
180 min Winter	98.046	0.646	0.2	19.9	O K
240 min Winter	98.082	0.682	0.2	21.1	O K
360 min Winter	98.123	0.723	0.2	22.3	O K
480 min Winter	98.144	0.744	0.2	23.0	O K
600 min Winter	98.154	0.754	0.2	23.3	O K
720 min Winter	98.157	0.757	0.2	23.4	O K
960 min Winter	98.149	0.749	0.2	23.1	O K
1440 min Winter	98.124	0.724	0.2	22.4	O K
2160 min Winter	98.074	0.674	0.2	20.8	O K
2880 min Winter	98.019	0.619	0.2	19.1	O K
4320 min Winter	97.913	0.513	0.2	15.8	O K
5760 min Winter	97.817	0.417	0.2	12.9	O K
7200 min Winter	97.733	0.333	0.2	10.3	O K
8640 min Winter	97.661	0.261	0.2	8.1	O K
10080 min Winter	97.600	0.200	0.2	6.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	77.827	0.0	40
60 min Winter	50.812	0.0	70
120 min Winter	32.076	0.0	126
180 min Winter	24.146	0.0	184
240 min Winter	19.594	0.0	242
360 min Winter	14.506	0.0	356
480 min Winter	11.720	0.0	470
600 min Winter	9.925	0.0	582
720 min Winter	8.658	0.0	690
960 min Winter	6.974	0.0	888
1440 min Winter	5.129	0.0	1106
2160 min Winter	3.764	0.0	1568
2880 min Winter	3.017	0.0	2020
4320 min Winter	2.204	0.0	2896
5760 min Winter	1.762	0.0	3696
7200 min Winter	1.481	0.0	4472
8640 min Winter	1.286	0.0	5200
10080 min Winter	1.142	0.0	5952

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.322	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.036

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.012	4	8	0.012	8	12	0.012

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Model Details

Storage is Online Cover Level (m) 99.200

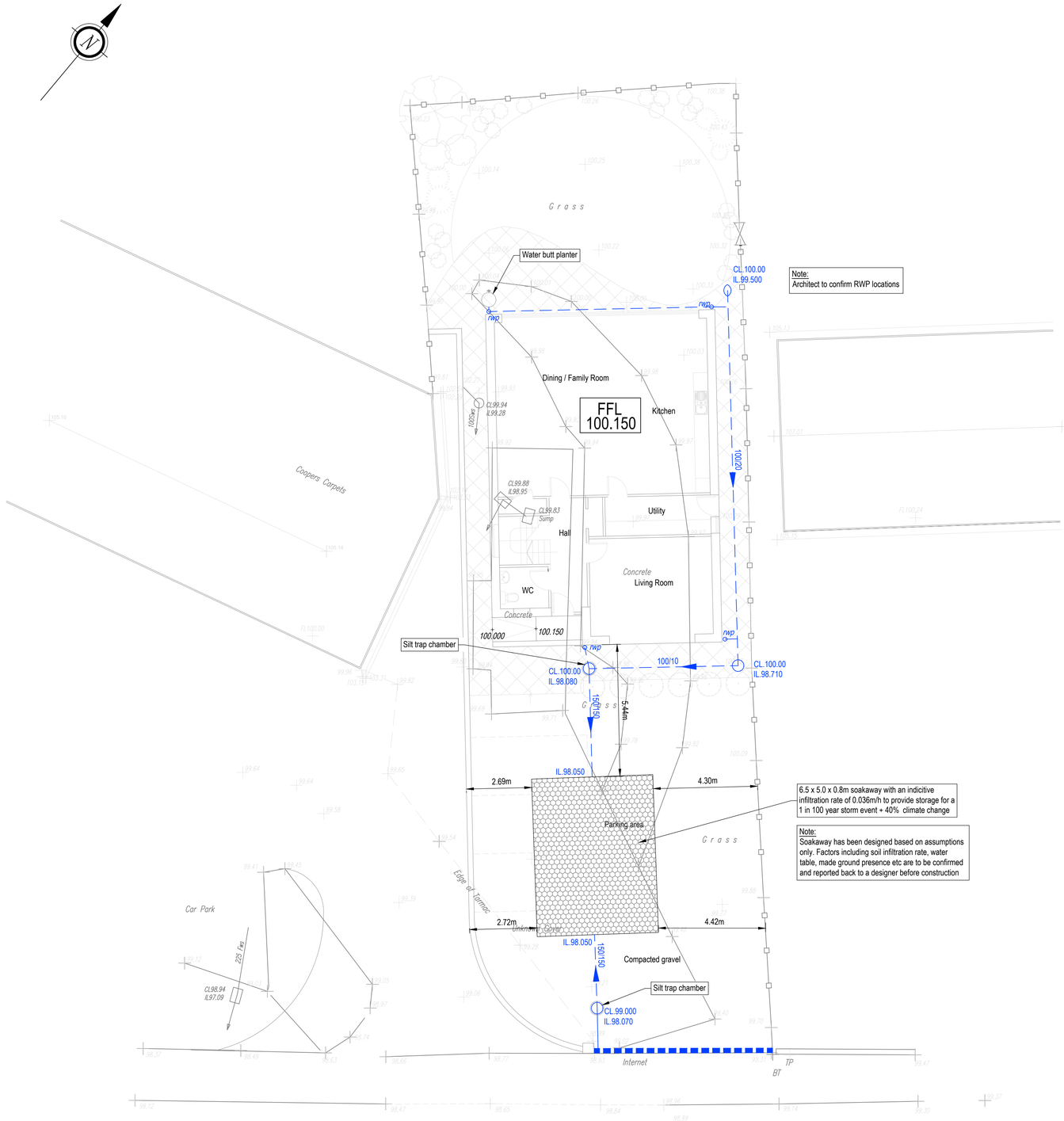
Cellular Storage Structure

Invert Level (m) 97.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	32.5	32.5	0.900	0.0	51.9
0.800	32.5	50.7			

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8.3 Proposed Drainage Layout and Details



Borras Park Road

Note:
Architect to confirm RWP locations

6.5 x 5.0 x 0.8m soakaway with an indicitive infiltration rate of 0.036m/h to provide storage for a 1 in 100 year storm event + 40% climate change

Note:
Soakaway has been designed based on assumptions only. Factors including soil infiltration rate, water table, made ground presence etc are to be confirmed and reported back to a designer before construction

General Notes:

1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
3. All work is to be to the satisfaction of the engineer and local authority building control.
4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
5. All workmanship and materials are to be to current British Standards.
6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
8. All highway works are to be in accordance with the local authorities design guide and specification.
9. Prior to the occupation of the first dwelling, street nameplates shall be erected in accordance with the highway authority and to the wording agreed with the planning authority.
10. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.
11. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.
12. All road markings and signs are to be in accordance with `the traffic signs regulations and directions' 2016.
13. All sewer works are to be in accordance with the Sewerage Sector Guidance.
14. All private connections to adoptable sewers should be a minimum of 100mm diameter (foul) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

Soakaways

1. The proposed soakaways have been designed based on an assumed infiltration rate typical of the ground conditions encountered.
2. The proposed soakaways have been designed for a 1 in 100 year storm plus 40% climate change.
3. The proposed soakaways must be located at least 5m away from any building or structure.

Drainage Key

Private Surface Water

- Surface Water Manhole Text: CL.00.00 / IL.00.00
- Surface Water Pipe Diameter / Gradient: 100/10
- Inspection chamber 480mm Ø >600mm Depth
- Silt Trap Chamber
- Channel Drain
- Soakaway
- Waterbutt Planter

External works

- Proposed Level: 00.000
- Existing Level: 00.000
- Finished Floor Level: FFL 00.000

Scale 1:100
4m 3m 2m 1m 0m 2m 4m

Issue	Notes	Drawn	Approved	Date
P1	Preliminary Issue	AH	MN	11.07.2024

SUDS DESIGNS
SUSTAINABLE DRAINAGE DESIGNS

Issuing Office:
JMS East Anglia (Ipswich): Unit 27, Brightwell Barns
Brightwell, Suffolk, United Kingdom, IP10 0BJ, Tel: 01473 487047

Project
Borras Park Road
Wrexham LL12 7TF

Drawing Title
SuDS Designs
Drainage Layout

Project No.	Drawing No.	Issue
SD2407184	201	P1

STRATEGY

Original Sheet Size: A1

Private Drainage Notes:

1. Inspection chamber covers and frames as follows:-

Brickwork and pre-cast concrete:

i) Private drives accepting vehicle traffic: BS EN124 class D400, 600mm clear opening, solid top cover and frame.
ii) Footpaths, verges and gardens: BS EN124 class B125, 600mm clear opening, solid top cover and frame.

Polypropylene:

iii) Areas accepting vehicle traffic: Class B
iv) Soft landscaped areas: Class C

2. Mortar haunching to inspection chamber and frames.

3. i) For use with brick inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 150mm grade C25P in-situ concrete (reinforced with A393 mesh to BS 4483) cover slab.
Other locations inaccessible to vehicles; light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 100mm grade C25P in-situ concrete (reinforced with A193 mesh to BS 4483) cover slab.
ii) For use with precast concrete inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections.
Other locations inaccessible to vehicles: light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections.

4. With precast or brick inspection chambers, cover slabs with a clear opening of 600x600mm are required. Offset to suit chosen face for step rungs.

5. 215mm thick walls in Class B engineering bricks to BS 3921 layered in English bond with frogs up. Inner faces to be plumb and in true alignment. Brick course to be level. Flush jointing to brickwork inner faces and precast concrete chamber sections to BS 5911.

6. All step rungs to BS 1247

i) General purpose pattern (with 230mm tail) to be built into chamber wall of brick inspection chambers.

ii) Precast concrete manhole pattern "let in" to chamber wall of precast inspection chambers. All step rungs to be horizontally and vertically staggered as shown on section x-x. Step rungs are not required to either type of inspection chamber where depth to soffit is less than 750mm.

7. Mass concrete infill.

8. Benching to rise vertically from edges of channel to a height not less than pipe (full section) soffit level. Steel float smooth hard surface with cement mortar 1:1 mix, 25mm thick.

9. 50mm min. thick mortar bed to half round channels.

10. 150mm min. thick mass concrete base slab (grade C20P) to precast, uPVC and brick types of inspection chamber.

11. 75mm thick lean mix concrete blinding.

12. Minimum of 2, and maximum of 4 courses of 215mm thick engineering bricks (Class B) to underside of cover & frame, built off cover slab, may be required to facilitate road or drive construction.

13. A brick relieving arch shall be turned over all pipes where they pass through the walls of a brick inspection chamber.

14. Pipes entering inspection chambers shall have a flexible joint within 150mm of the outer face of the brickwork or concrete surround.

15. Channel junctions within brick or precast concrete inspection chambers to be half round channel sections.

16. Backfill material to be as detailed above for normal pipe bedding.

17. Following the flexible joint from either a precast or brick inspection chamber (note 14 above) a `rocker' pipe of 600mm length shall be installed.

18. Precast concrete inspection chambers may (if chosen for use) have a purpose made base units.

19. Where precast concrete inspection chambers are constructed wholly above the water table, joints are to be sealed with mortar. In waterlogged ground or where the water table is above the base slab, joints are to be water tight using a mastic sealant or rubber rings of a type suitable to the chamber units.

Private Drainage Notes:

1. Formation of trench beds and inspection chambers

i) Excavate immediately before laying beds and pipes or base slabs for inspection chambers.

ii) Remove all mud, rock projections, boulders and hard spots and replace with well compacted selected fill. Localised soft spots are to be hardened by tamping in granular bedding material.

iii) If oil contamination is found adjacent to trench, the trench profile is to be cut back by 150mm from the face of bedding material and replaced with crushed concrete.

2. Concrete and mortar

i) The concrete used to surround pipes and in the construction of gullies and inspection chambers is to be grade C20P (unless noted otherwise) and mixed using SRPC unless directed otherwise by the engineer or local authority. Sulphate resisting cement is to be used for in-situ or precast concrete and mortars to foul drains.

3. Covers and frames

All inspection chamber cover and frames are to be laid to have the top surface in alignment with both the longitudinal and transverse gradients of adjacent roads, drives, footways and verges. They are otherwise to be laid level. All cover levels as shown on the drainage layout/longsection are approximate. Actual cover levels are to be determined on site from the position in the road, drive, footpath or otherwise.

4. Pipes to as follows:

Pipe dia. (mm)	Type	Remark
100 Internal (110 NOM. dia.)	uPVC	BS EN 1401
150 Internal (160 NOM. dia.)	uPVC	BS EN 1401

5. The contractor/devloper is to ensure that all of the works comply with the following:

i) BS 8301: 1985 (code of practice for building drainage)

ii) The Building Regulations: Approved Document H 2002

iii) NHBC Technical requirements

iv) BRE Digest No. 363

6. The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions.

7. All uPVC items as specified on this drawing are to comply with BS EN 1401.

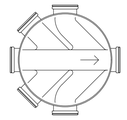
8. Mortar
Mortar shall be mixed only as and when required, the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

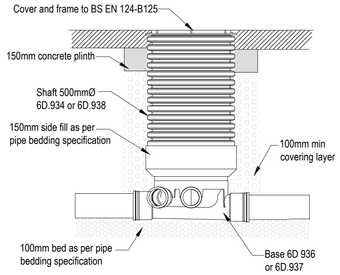
Alternative Nominal Mixes by Volume		
Cement:Lime:Sand	Cement:Sand	Cement:Sand with plasticiser
1 : ¼ : 3	1 : 3	1 : 2½ to 3

9. Ready-mixed lime: Sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4721 and to be of category 1.12 and designation (i) respectively.

10. All mortar shall be conveyed fresh to the works as required for use. Mortar which has begun to set or which has been site-mixed for a period of more than 1 hour shall not be used. Plasticising and set retarding mortar admixtures shall comply with BS 4887: part 1 and 2, respectively and shall be supplied with instructions for use.

11. Crushed natural stone and shall comply in all respects with BS 1200.

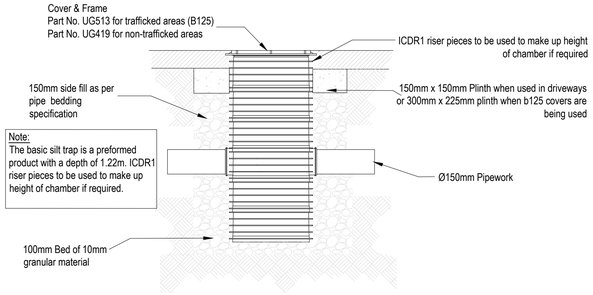




Polypropylene Shallow Inspection Chamber Ø450mm (Light Loading B125)

Scale 1:20

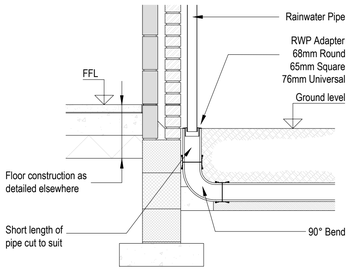
Note:
3m maximum depth. Up to Ø150mm pipework for 450mm shaft, or up to 300mm pipework on 500mm shaft. B125 maximum Loading, suitable for car parks and private drives



Polypipe Civils Basic Silt Trap

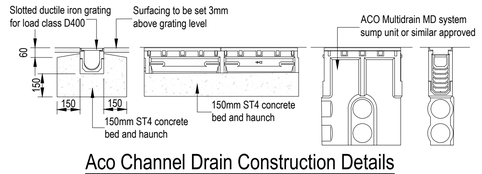
For 150mmØ Pipework

Scale 1:20



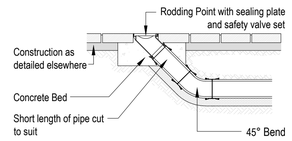
External RWP Connection

Scale 1:20



Aco Channel Drain Construction Details

Scale 1:20



Rodding Point

Scale 1:20

Minimum Dimensions for Access Fittings and Inspection Chambers

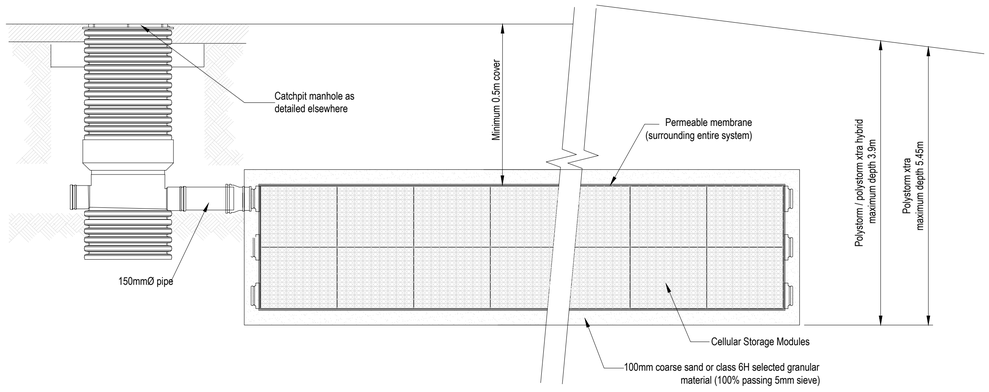
Type	Depth to invert from cover level (m)	Internal dimensions		Cover dimensions	
		Length (mm) x width (mm)	Circular dia. (mm)	Length (mm) x width (mm)	Circular dia. (mm)
Rodding eye		As drain but 100 min.			Same size as pipework.1
Access fitting Small 150 dia. 150x100 Large 225x100	0.6 or less, except where situated in a chamber	150x100 225x100	150 225	150x100.1 225x100.1	Same size as access fitting
Inspection chamber shallow Deep	0.6 or less 1.2 or less >1.2	225x100 450x450 450x450	190.2 450 450	- MIN. 430x430 MAX 300x300.3	190.1 430 access restricted to max 350.3

NOTES
1. The clear opening may be reduced by 20mm in order to provide proper support for the cover and frame.
2. Drains up to 150mm.
3. A larger clear opening cover may be used in conjunction with a restricted access. the size is restricted for health and safety reasons to deter entry.

Materials for Below Ground Drainage

Material	British Standard
1. Rigid pipes:	
Vitrified clay	BS 65, BS EN 295
Concrete	BS 5911
Grey iron	BS 437
Ductile iron	BS EN 598
2. Flexible pipes:	
UPVC	BS EN 1401*
PP	BS EN 1852*
Structure walled Plastic pipes	BS EN 13476

*Application area code "UD" should normally be specified
Note
Some of these materials may not be suitable for conveying trade effluent.



Private Crate Infiltration System - Typical Section 150mmØ Pipe

Scale 1:20

Scale
As Shown

Issue	Notes	Drawn	Approved	Date
P1	Preliminary Issue	AH	MN	11.07.2024

SUDS DESIGNS
SUSTAINABLE DRAINAGE DESIGNS

Issuing Office:
JMS East Anglia (Ipswich): Unit 27, Brightwell Barns
Brightwell, Suffolk, United Kingdom, IP10 0BJ, Tel: 01473 487047

Project
Borras Park Road
Wrexham LL12 7TF

Drawing Title
SuDS Designs
Drainage Construction Details

Project No.	Drawing No.	Issue
SD2407184	202	P1

STRATEGY

Questions?

Contact us.

www.sudsdesigns.co.uk

SUDS DESIGNS

SUSTAINABLE DRAINAGE DESIGNS

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