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15th September 2023

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BROOKVALE GROBY, SURFACE WATER DRAINAGE STRATEGY **Brookvale Groby Learning Campus, Ratby Road, Leicester, LE6 0FP**

SCOPE

The purpose of this document is to outline a surface water drainage strategy scheme to support a planning submission for a new education building following demolition of the existing 3no modular buildings to the rear of Brookvale Groby Learning Campus. This report aims to assess the surface water run-off management and the strategies used to achieve the required flow rate, volume, and quality at the outfall. Foul water drainage arising from the new facility will also be evaluated to establish a suitable discharge point for the additional flow. This report should be read in conjunction with the drawings and calculations included within the appendices. The location of the proposed works is displayed enclosed in the red boundary in Figure 1 below.



Figure 1: Proposed Site Location

QUANTIFYING FLOOD RISK

In accordance with Table 1 of the Technical Guidance to National Planning Policy Framework (NPPF) (2019), flood risk can be divided in zones, as described below: -

- Zone 1 Low probability, less than 1 in 1,000 annual probability of flooding from Rivers or Sea. (<0.1%)
- Zone 2 Medium probability, between 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%).
- Zone 3a High probability, between 1 in 20 and 1 in 100 annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%).
- Zone 3b Functional Floodplain, greater than 1 in 20 annual probability of flooding (>5%) or is designed to flood in an extreme (0.1%) flood.

The Gov.UK Flood Map for Planning online resource was consulted and as indicated within Figure 2 below, the development boundary in red lies within Flood Zone 1, therefore not considered at risk of fluvial flooding.

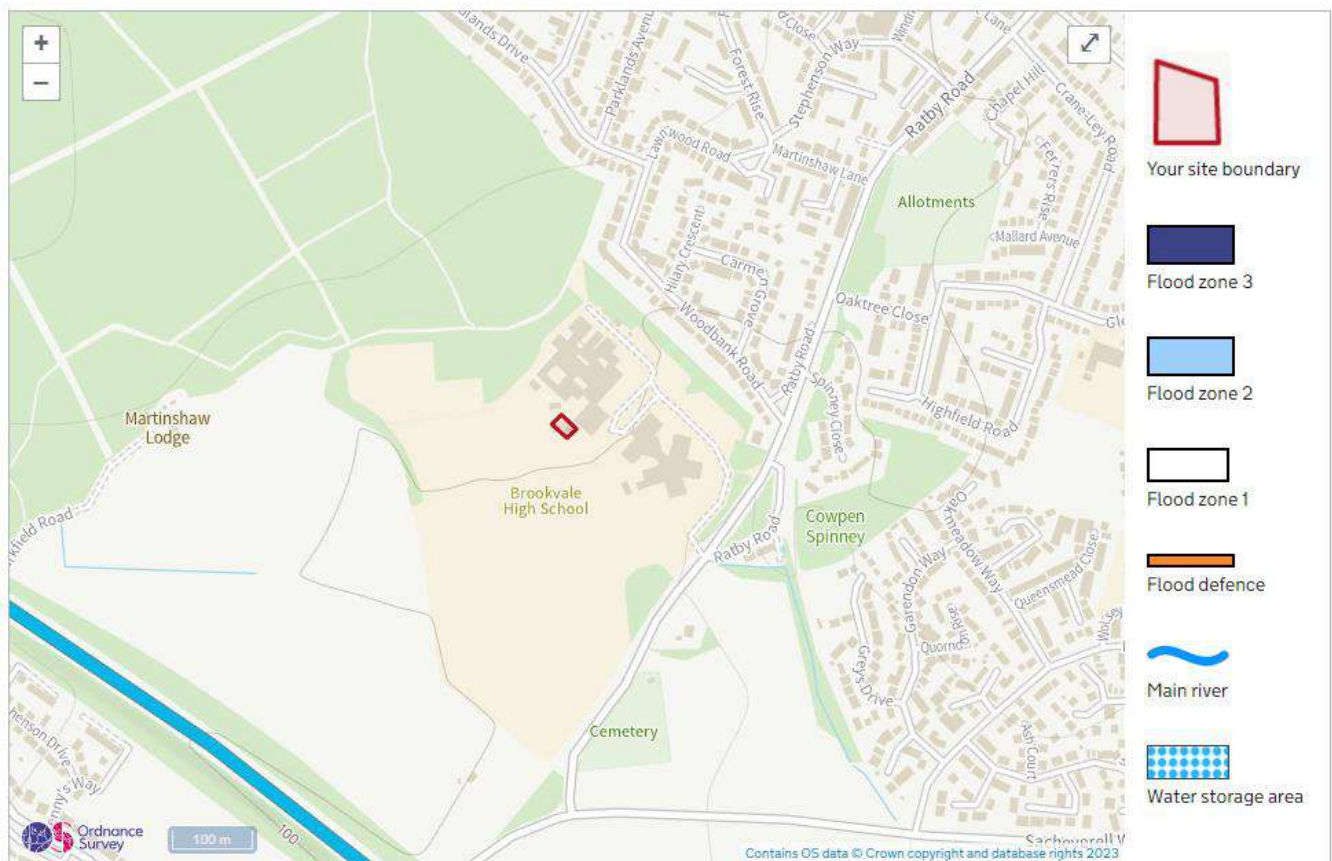


Figure 2: Flood Map for Planning Flood Zone Plan

DISCHARGE METHODS

The Non-statutory technical standards for sustainable drainage systems requires that developments should aim to discharge runoff as high up the following hierarchy of drainage options as reasonably practicable:

- Into the ground (Infiltration)
- To a surface water body
- To a surface water sewer, highway drain or another drainage system
- To a combined sewer

The potential for making use of each discharge option has been considered as follows:

1. Into the Ground (Infiltration)

Figure 3 below has been extracted from the Ground Investigation report undertaken by Georisk Management in August 2023, in which it describes that soakaways are not favourable due to the infiltration results and an alternative drainage solution should be adopted. The full report can be found within the appendices.

Soakaways	Infiltration testing was carried out in TP1 and TP2 in general accordance with BRE:365 (2016). No significant infiltration was recorded over a 5-hour test period in either TP1 and TP2 and; therefore, it was not possible to calculate soil infiltration rates. Based on these test results and in view of the ground conditions encountered, it is considered that surface water from the proposed development would not be effectively discharged by soakaway drainage.
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Figure 3: Georisk Ground Investigation Extract

2. To a Surface Water Body

There are no surface water bodies within reasonable proximity to the site location, therefore removing the possibility to utilise this method.

3. To a Surface Water Sewer

The discharge proposal is to connect into the existing surface water drain serving the existing learning campus adjacent the proposed development via a junction connection. Figure 4 below shows the proposed area extracted from the utilities survey conducted July 2023 by Solum Surveying Ltd on behalf of Ridge and Partners LLP.

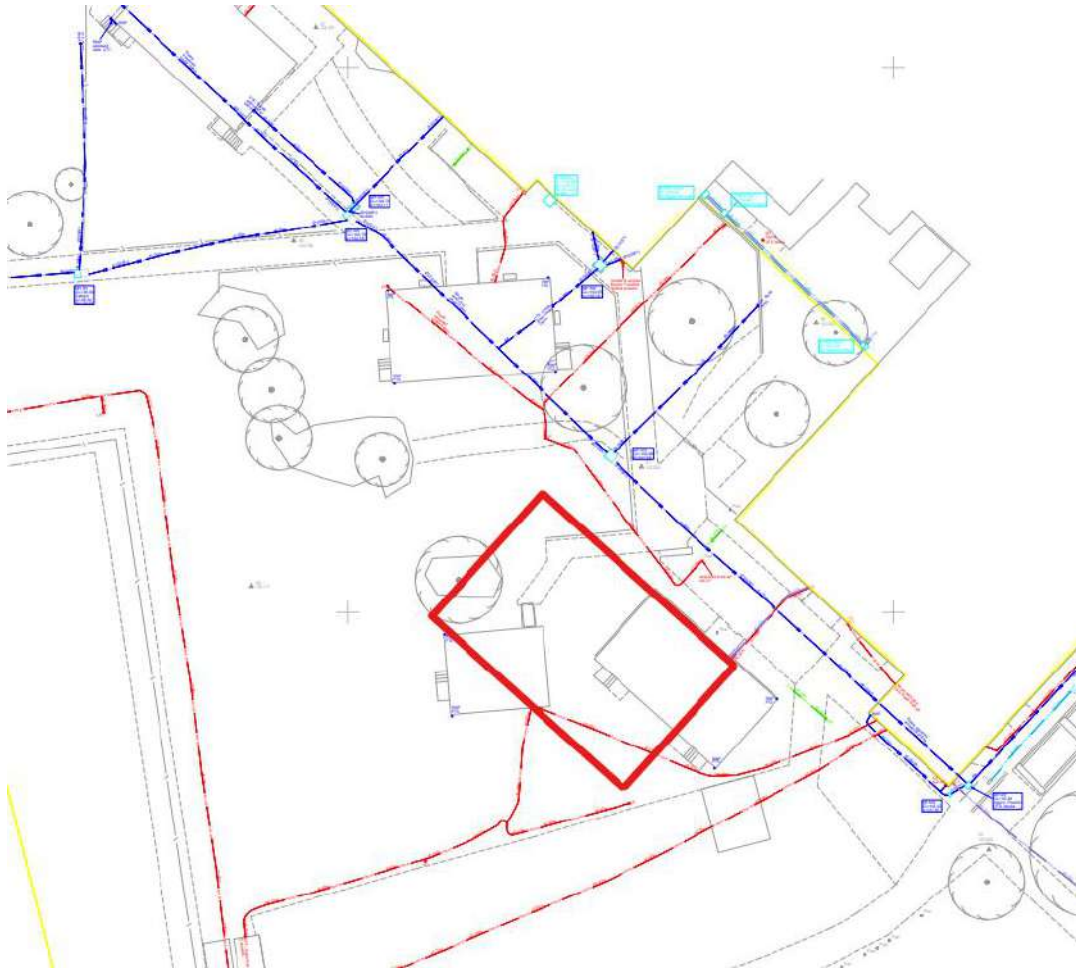


Figure 4: Utilities Survey Extract

4. To a Combined Sewer

Due to a suitable discharge method higher up the hierarchy, this method is not required.

PRELIMINARY SURFACE WATER STORAGE CALCULATIONS



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Variables

FSR Rainfall

Return Period (years)

Region

Map

M5-60 (mm)

Ratio R

Cv (Summer)

Cv (Winter)

Impervious Area (ha)

Maximum Allowable Discharge (l/s)

Infiltration Coefficient (m/hr)

Safety Factor

Climate Change (%)

100

England and Wales

20.000

0.400

0.750

0.840

0.062

2.0

0.00000

2.0

40



Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 22 m³ and 33 m³.

These values are estimates only and should not be used for design purposes.

Figure 5: Storage Estimate MicroDrainage Software Output

An initial preliminary storage calculation was computed using the MicroDrainage Source Control software in order to understand the volume requirements for attenuation.

A median value was calculated between the output results as the most conservative result, equalling an approximate requirement of 30cu.m storage for the 622sq.m proposed impervious area. This storage will be provided via an underground attenuation tank located beneath the soft landscaping to the south-east of the site.

PROPOSED SURFACE WATER DRAINAGE STRATEGY

Figure 6 below indicates the proposed drainage arrangement for the education classroom block development and Figure 7 displays the overland flow routes proposed within the site. The full drawings can be found within the appendices.

The proposal for the collection and conveyance of surface water arising from the roof and footpath is by way of a network of rainwater pipes and linear drains that will connect into a conventional below ground drainage system. This network will be routed to a below ground cellular attenuation tank located beneath soft landscaping to the south-east of the proposed building. The volume for the attenuation tank is sized such that all storms up to and including the 100 year storm +40% allowance for climate change will be catered for. A low flow / inspection pipe will run along the base of the modular cell attenuation tank to concentrate the flow while also providing access for maintenance purposes.

In order to achieve the proposed discharge rate of 2l/s from the new facility, a flow control chamber has been introduced at the outfall of the cellular attenuation tank to restrict the flow. The site has been designed with the intention to connect into the existing surface water drain running parallel to the new building, in a north-west to south-east direction, approximately 6m away from the proposed building.

PROPOSED FOUL WATER DRAINAGE STRATEGY

Foul water will be collected via foul stacks and conveyed towards inspection chambers at the required gradients as part of a traditional below ground drainage system. Due to a lack of existing foul water infrastructure within close proximity to the development, the proposal is such that a foul packaged pumping chamber will be introduced to the north of the building to lift and transport the flow to the available connection approximately 1000m away to the north. Refer to the appendices for the drainage layout indicating this proposal. A S106 application will be required in order to agree the additional foul flow indirectly into the public sewer system, and this will be made at time of construction.

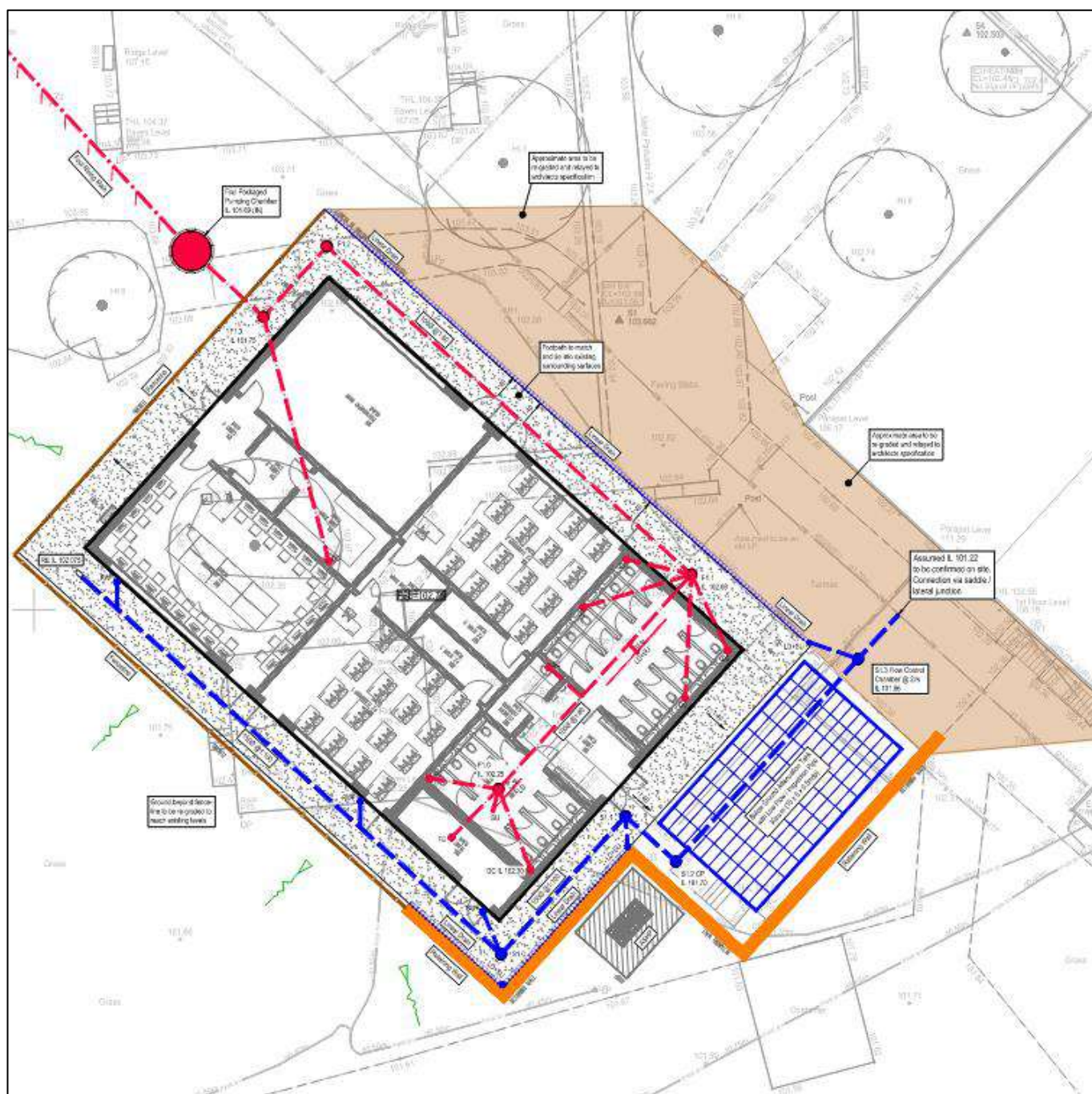


Figure 6: Proposed Drainage Layout

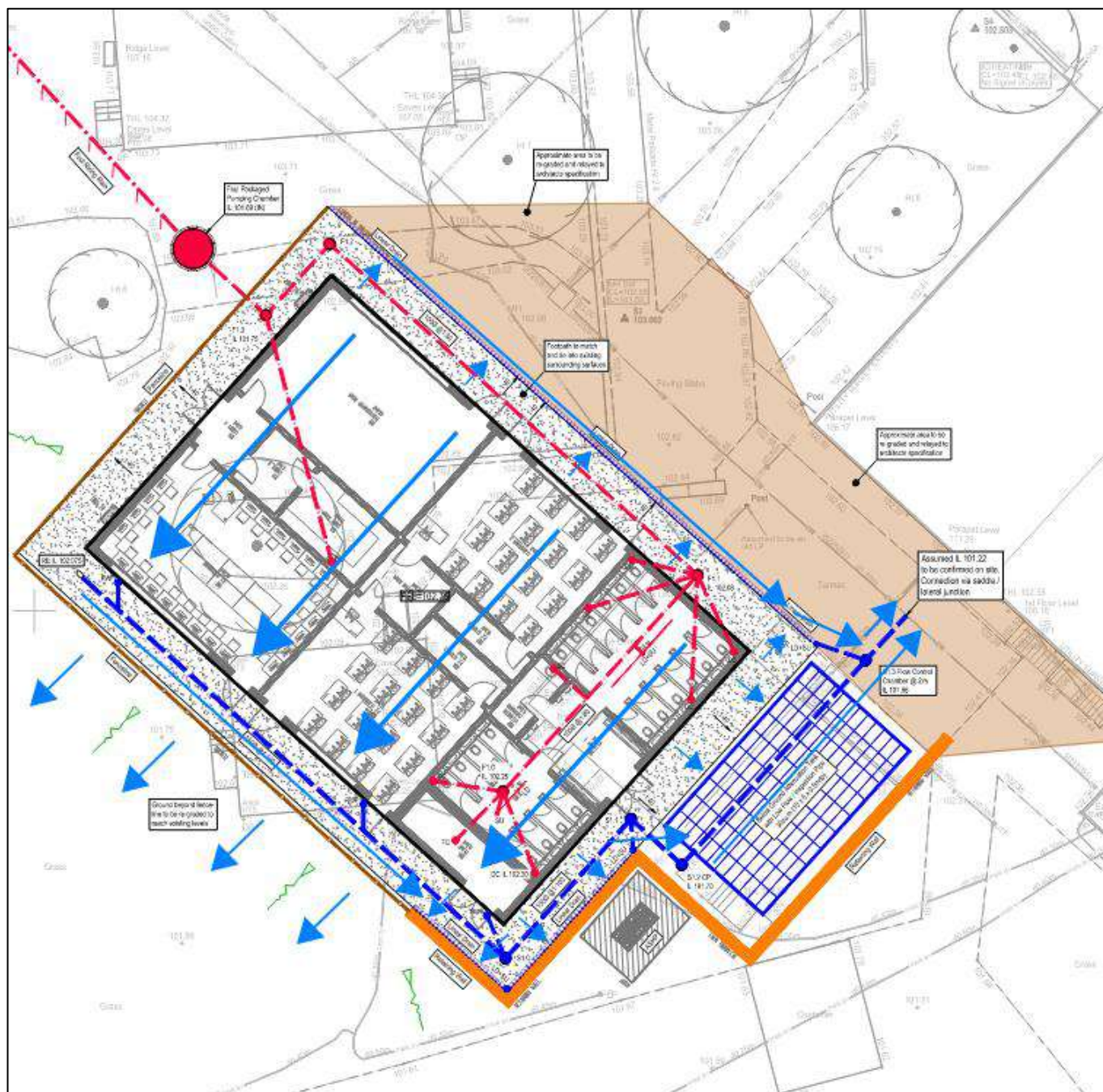


Figure 7: Proposed Overland Flow Routing

MICRODRAINAGE CALCULATIONS AND RESULTS

A preliminary strategic drainage network has been modelled and simulated in Microdrainage software. Simulations for the 1-year, 30-year, and 100-year +40% climate change return period events were run for the below surface water network, and the results display:

- No surcharge in the 1 year event
- No flooding in the 30 year event
- No flooding in the 100 year +40% event

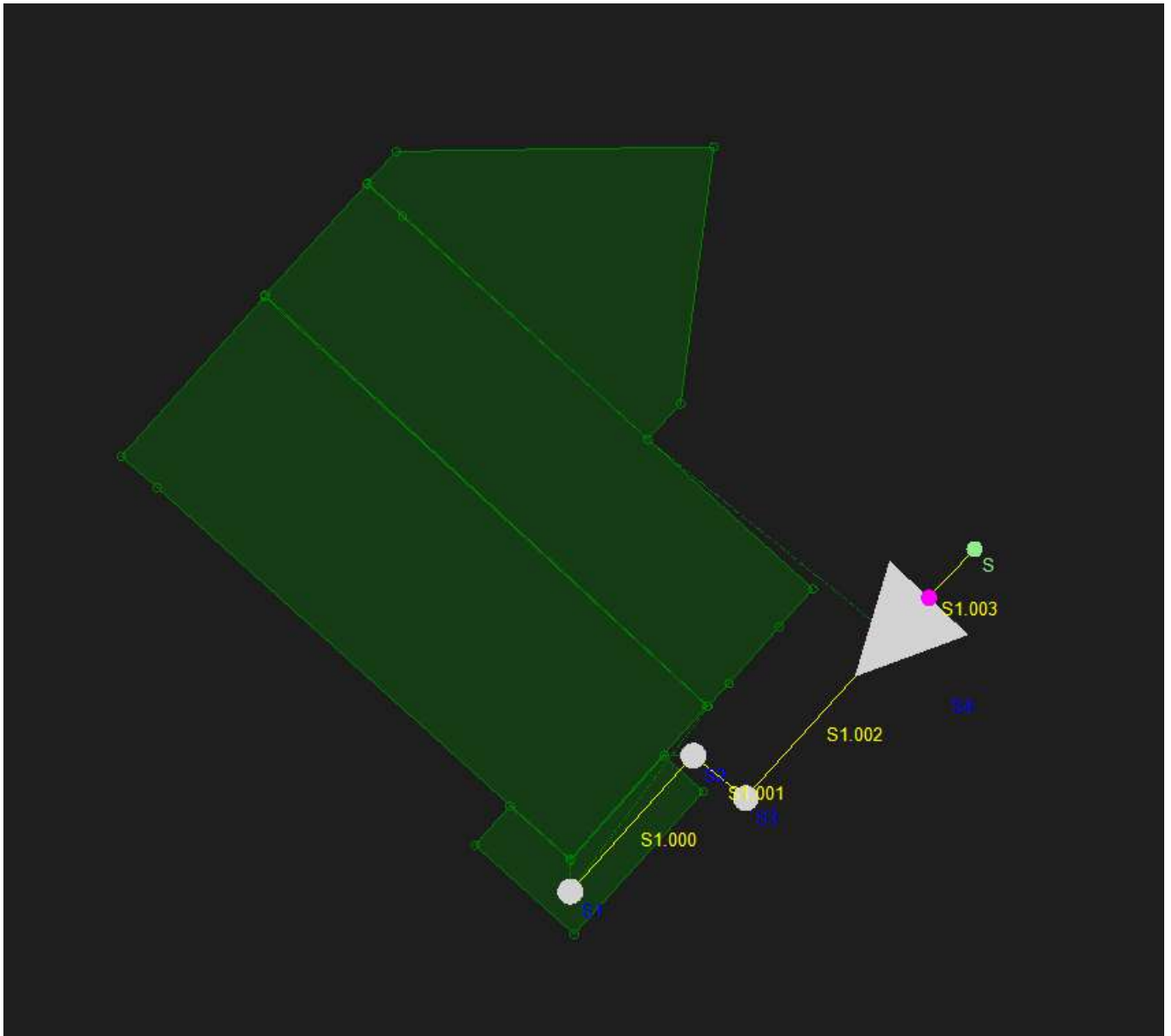
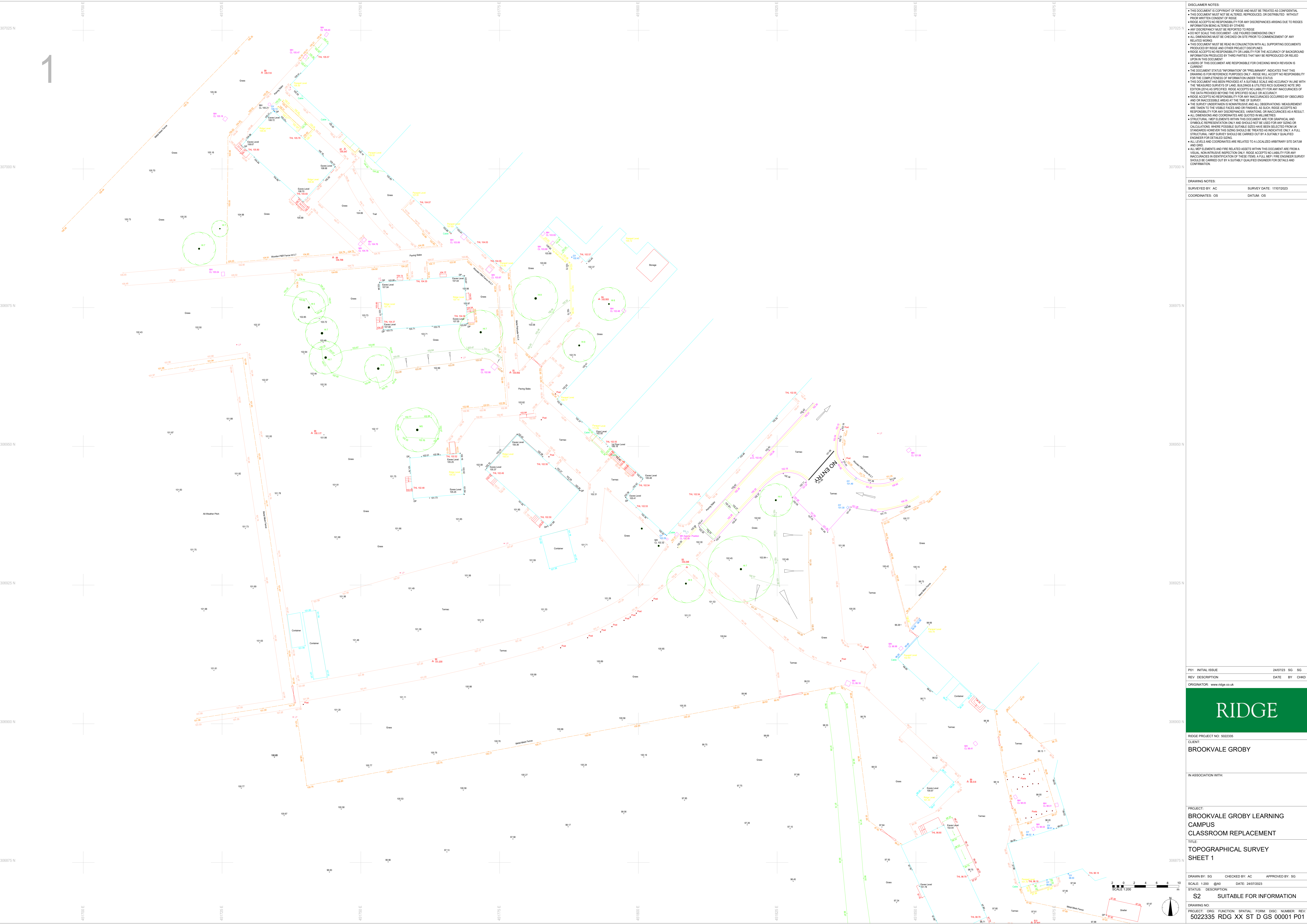


Figure 8: MicroDrainage Strategic Network

Refer to the appendices for the full Microdrainage output calculations.

APPENDICES

APPENDIX A – TOPOGRAPHICAL SURVEY



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P01 INITIAL ISSUE	24/07/23	SG	SG
REV DESCRIPTION	DATE	BY	CHKD
ORIGINATOR: www.ridge.co.uk			

RIDGE

RIDGE PROJECT NO: 5022335

CLIENT:
BROOKVALE GROBY

IN ASSOCIATION WITH:

PROJECT:
BROOKVALE GROBY LEARNING CAMPUS
CLASSROOM REPLACEMENT

TITLE:
TOPOGRAPHICAL SURVEY SHEET 1

DRAWN BY: SG
SCALE: 1:200 @A0
STATUS: DESCRIPTION

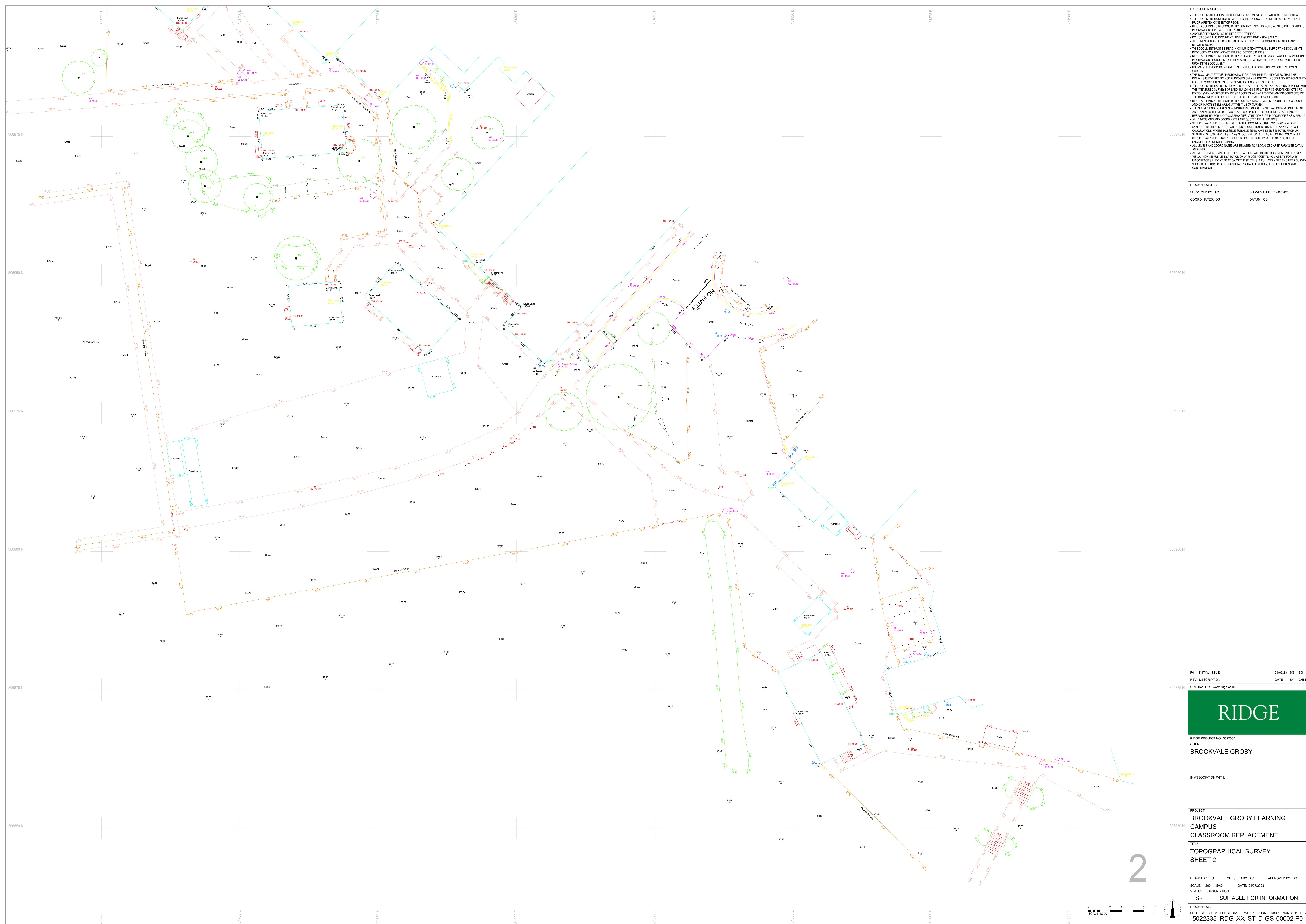
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APPROVED BY: SG
DATE: 24/07/2023

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PD1 INITIAL ISSUE	24/07/23	SG	SG
REV DESCRIPTION	DATE	BY	CHKD

ORIGINATOR: www.ridge.co.uk

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RIDGE PROJECT NO: 5022335

CLIENT:
BROOKVALE GROBY

IN ASSOCIATION WITH:

PROJECT:
BROOKVALE GROBY LEARNING CAMPUS
CLASSROOM REPLACEMENT

TITLE:
TOPOGRAPHICAL SURVEY
SHEET 2

DRAWN BY: SG	CHECKED BY: AC	APPROVED BY: SG
SCALE: 1:200 @A0	DATE: 24/07/2023	
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APPENDIX B – GROUND INVESTIGATION EXECUTIVE SUMMARY

georisk

MANAGEMENT



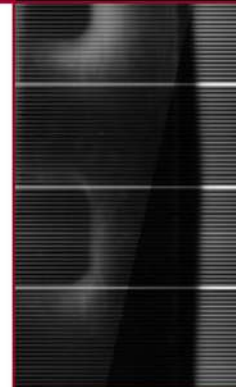
GROUND INVESTIGATION

**BROOKVALE LEARNING CAMPUS
RATBY ROAD, GROBY
LEICESTER, LE6 0FP**

Report No: 23195/1
Date: August 2023

Prepared for

BROOKVALE GROBY LEARNING TRUST



Innovative Land Development Solutions

EXECUTIVE SUMMARY

GROUND INVESTIGATION

BROOKVALE LEARNING CAMPUS RATBY ROAD, GROBY LEICESTER, LE6 0FP

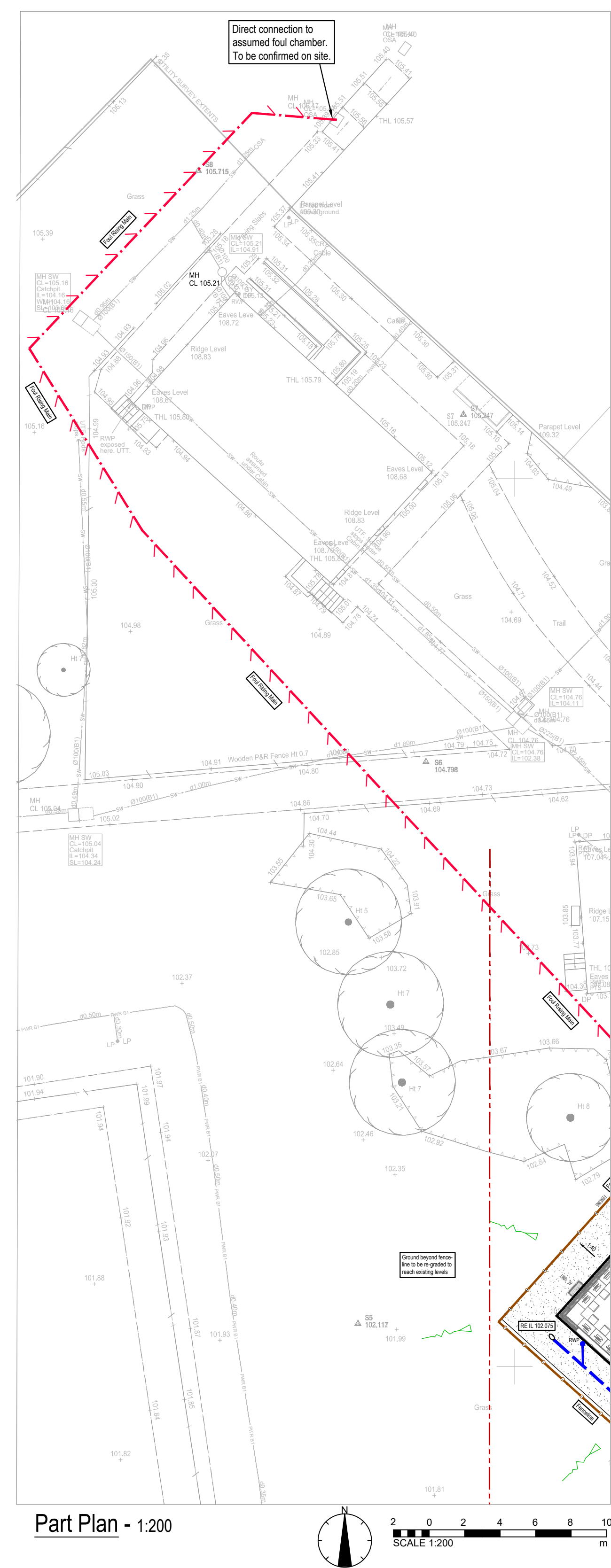
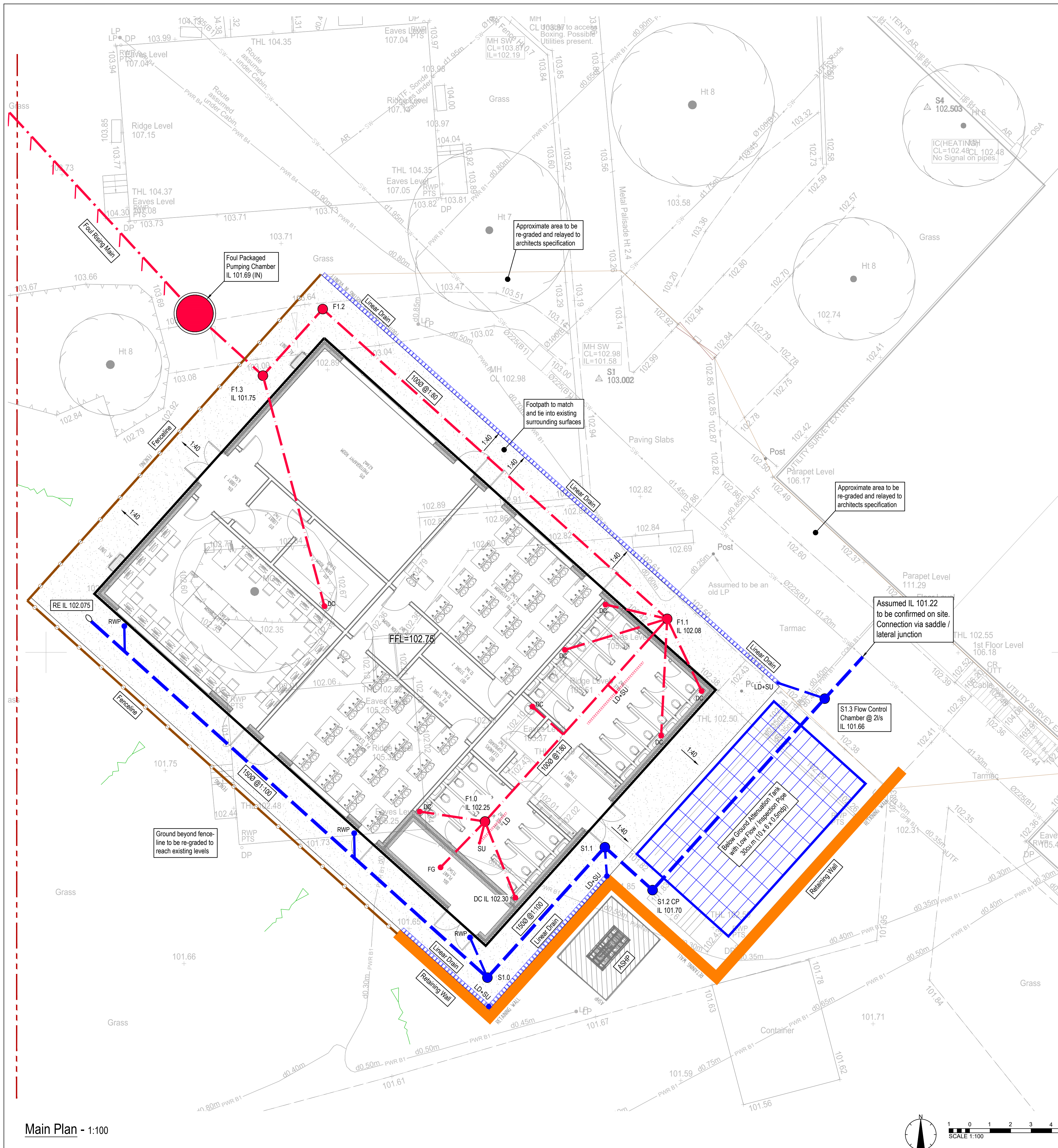
Georisk Management Limited has been commissioned to carry out a ground investigation at the above site which is to be developed with construction of a new single-storey teaching unit and toilet block.

Phase II	Comments
Ground Conditions	Topsoil was encountered across the study area to depths of between 0.2 and 0.3 m begl and typically comprised dark brown sandy gravelly clay. Made Ground was encountered beneath the topsoil in WS1 from 0.25 to 0.3 m begl and comprised brown and grey clayey sandy gravel of sandstone. The Thrussington Member was encountered beneath the topsoil and/or Made Ground to a maximum penetrated depth of 4.0 m begl. These deposits typically comprised firm, firm to stiff and stiff brown and grey sandy gravelly clay and loose and medium dense brown and grey clayey/silty locally gravelly sand.
Contamination	No visual/olfactory evidence of potential significant contamination was recorded during the fieldwork.
Groundwater	During the fieldwork, groundwater was encountered in the Thrussington Member in TP1 and WS1 at depths of 2.9 m and 3.0 m begl respectively. Subsequent monitoring of a standpipe installed in WS2 has recorded 'dry' conditions throughout the monitoring period.
Soil-Gas	No methane has been recorded during the monitoring programme. Steady state carbon dioxide levels ranged from 1.4 to 2.2 % by volume (% v/v) during the monitoring programme. A maximum positive gas flow of 0.1 l/hr has been recorded and ambient atmospheric pressures ranged from 1001 to 1010 mb.
Environmental Assessment	Comments
Soil Contamination	All test results for the potential contaminants of concern are below the relevant assessment criteria (S4UL/C4SL/SSV).
Risk Evaluation: Human Health	No remedial action in respect of risk to human health is considered necessary for the proposed development at the site. Site-won topsoil should be retained in soft-landscaped areas to act as a suitable growing medium.
Risk Evaluation: Soil-Gas	Gas protection not considered necessary for the proposed development.
Statutory Consultation	If required to satisfy planning and/or land quality conditions, this report should be submitted to the Local Authority and/or warranty provider for approval before any construction work starts on site.
Geotechnical Assessment	Comments
Foundations	This investigation has identified topsoil and nominal localised Made Ground to depths of between 0.2 and 0.3 m begl overlying the Thrussington Member that generally comprised firm, firm to stiff and stiff clay and loose and medium dense sand. Groundwater was encountered locally at depths of 2.9 and 3.0 m begl during the fieldwork and the groundwater monitoring installation has remained 'dry' during the monitoring programme. On this basis, it is considered that the use of traditional spread footings bearing onto competent natural soil should be viable for the proposed development; however, due consideration should be given to the volume change potential of the near-surface material and the localised loose nature of the Thrussington Member. Geotechnical testing of the near-surface soils indicates they should be classified as shrinkable soil of medium volume change potential and; therefore, a minimum founding depth of 0.9 m begl would need to be adopted in accordance with NHBC Standards ensuring at least 300 mm penetration into competent material is achieved. Foundations should also be extended through loose granular Thrussington Member, such as recorded to 1.3 m begl in WS2.

Geotechnical Assessment	Comments
Foundations (continued)	There are trees on site and foundations near trees may need to be deepened and heave protection measures adopted in accordance with NHBC Standards Chapter 4.2 'Building Near Trees'. These aspects should be considered further at the detailed design stage and a detailed tree/hedgerow survey will be required to assist with foundation design. Where foundations depths exceed 2.5 m due to tree influence, NHBC require a design by an Engineer to demonstrate that potential heave uplift forces can be resisted by the foundation and usually this entails the use of a piled foundation. Foundations should also be deepened through any ground disturbed during site clearance works and where constructed adjacent to any deep drains or sewers. For strip/trench fill foundations placed in competent soil either firm to stiff clay or medium dense sand, an allowable bearing pressure of 125 kN/m² is considered appropriate for foundation design purposes with total settlements not anticipated to exceed 25 mm. If variable sand/clay materials are encountered at foundation level, it is recommended that mesh reinforcement be incorporated into foundation construction to accommodate any potential differential settlement. Care should be taken to limit the exposure of any excavation prepared to receive concrete, which may cause deterioration and a reduction in bearing capacity. Foundation excavations should be inspected by qualified personnel and if any soft or loose materials are encountered at formation level, foundations would need to be deepened and infilled with lean mix concrete.
Floor Slabs	As the ground conditions comprise clay/shrinkable soil and there are trees close to the proposed development, it is recommended that a suspended floor slab design is adopted for the proposed development.
Pavement Design	For preliminary design purposes, a long-term equilibrium CBR value of 2 to 3 % should be assumed for the near-surface Thrussington Member at the site (based on average construction conditions). The proposed formation should be proof rolled and caution must be exercised to ensure that any soft/loose areas identified within the formation are excavated and filled with suitably compacted granular fill. Once levels have been finalised, in situ CBR tests should be undertaken to allow detailed design of road formations to be made.
Buried Concrete	A Design Sulphate Class of DS-1 and an ACEC class of AC-2z apply at the site.
Dewatering	Based on the findings of this investigation, significant groundwater ingress is unlikely in shallow temporary excavations; however, any localised seepage/ingress should be controlled by sump pumping.
Excavations	Conventional mechanical excavation should be readily achievable through the near-surface soil to depths of at least 4 m begl. Shallow excavations should remain stable in the short-term; however, instability may occur in excavations left open for extended periods of time. Support should be provided in any excavations requiring man entry. Care should be taken to limit the exposure of any excavation prepared to receive concrete, which may cause deterioration and a reduction in bearing capacity. Foundation excavations should be inspected by qualified personnel and any soft or very loose materials that are encountered should be removed and replaced with compacted granular fill or lean mix concrete.
Soakaways	Infiltration testing was carried out in TP1 and TP2 in general accordance with BRE:365 (2016). No significant infiltration was recorded over a 5-hour test period in either TP1 and TP2 and; therefore, it was not possible to calculate soil infiltration rates. Based on these test results and in view of the ground conditions encountered, it is considered that surface water from the proposed development would not be effectively discharged by soakaway drainage.
Additional Work	Comments
Various	If required to satisfy planning and/or land quality conditions, this report should be submitted to the Local Authority and/or warranty provider for approval before any construction work starts on site.

The above summary is intended for reference purposes only and specific details should be obtained by reading the entire report.

APPENDIX C – PROPOSED BELOW GROUND DRAINAGE LAYOUT



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KEY

-
- Existing Foul Water Sewer
- Proposed Foul Water Sewer
- Proposed Foul Water Sewer and Manhole
- Proposed Drainage Connection refer to Architects drawing for latest SVP/SS locations
- Proposed Foul Gully
- Proposed Foul Linear Drain (ACO or Similar) with Sump
- Existing Surface Water Sewer
- Proposed Surface Water Sewer
- Proposed Surface Water Sewer and Manhole
- Proposed Surface Water Linear Drain (ACO or Similar) with Sump Unit
- Proposed Road Gully
- Proposed Rodding Eye
- Proposed Rain Water Pipe refer to Architects drawing for latest locations
- Proposed Finished Floor Level
- Proposed Surface Re-grading to Existing

P03	Updated for Planning	15.09.2023	MM	RG
P02	Updated for Planning	29.08.2023	MM	RG
P01	Issued for Planning	25.08.2023	MM	RG
REV	DESCRIPTION	DATE	BY	CHKD

ORIGINATOR:

RIDGE

2 CRANBROOK WAY
SOLIHULL BUSINESS PARK
SOLIHULL, B90 4GT

TEL: 0121 713 8000

WWW.RIDGE.CO.UK

CLIENT:

Brookvale Groby School

IN ASSOCIATION WITH:

PROJECT:
**Brookvale Groby Learning Campus
 Classroom Replacement**

TITLE:

Below Ground Drainage Layout

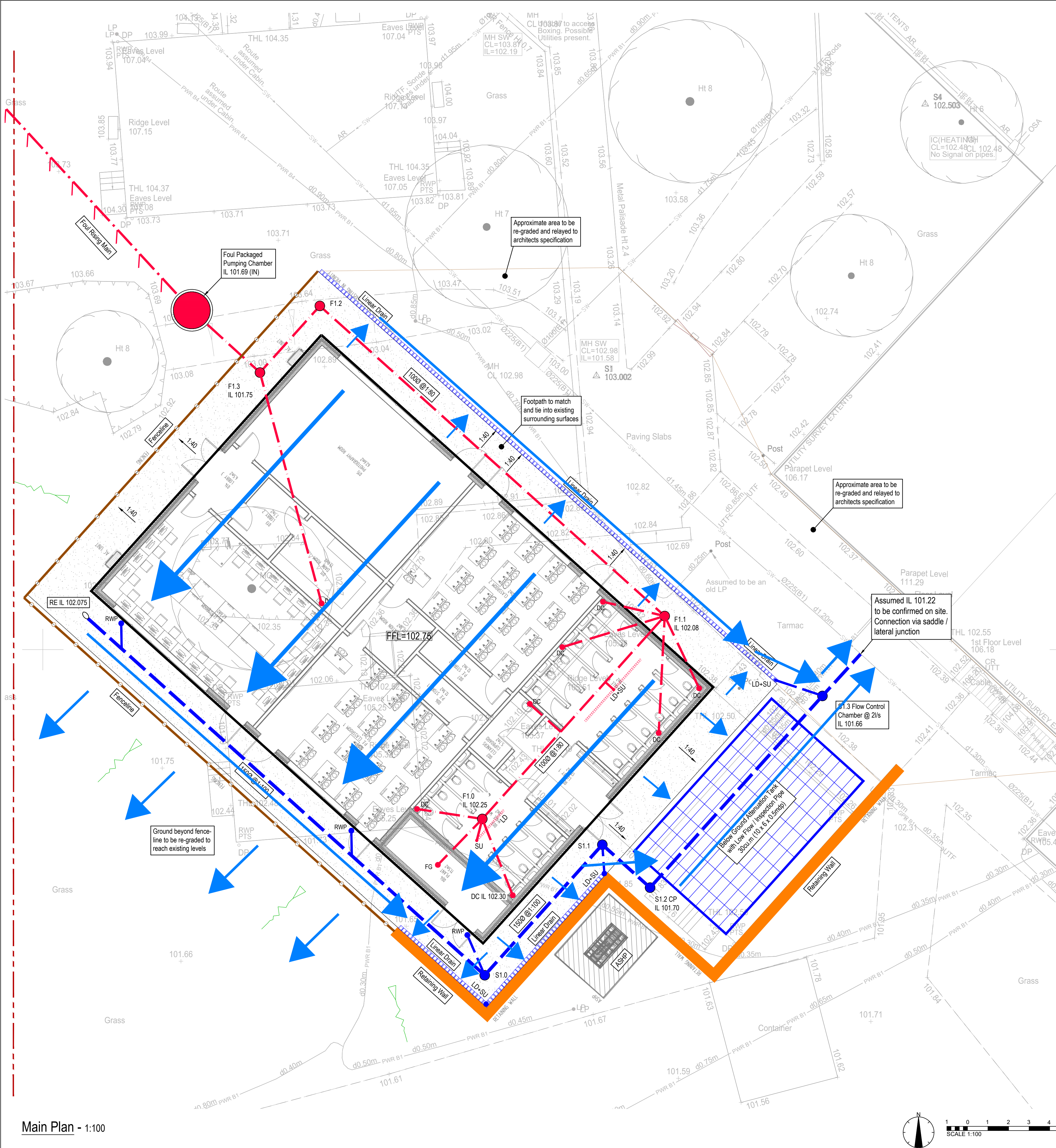
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MM	RG		STATUS ISSUE:		

STATUS: PLANNING

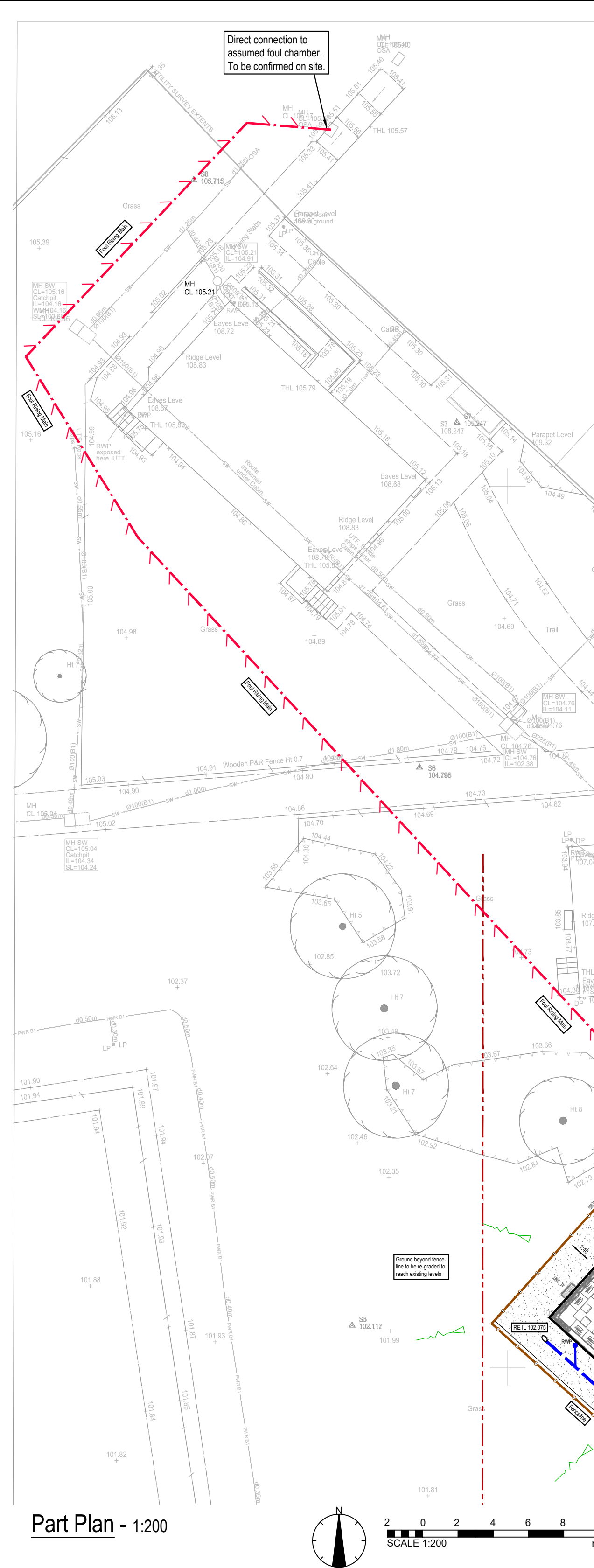
****UNLESS ISSUED FOR CONSTRUCTION - WORKS AT CLIENT/CONTRACTORS RISK****

ISO 19650							
STATUS: S2 - Suitable for Information							
PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:	REV:
5022335	RDG	XX	ST	PL	C	0500	P03

APPENDIX D – OVERLAND FLOW ROUTING PLAN



Main Plan - 1:100



Part Plan - 1:200

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- KEY**
- Existing Foul Water Sewer
 - Proposed Foul Water Sewer
 - Proposed Foul Water Sewer and Manhole
 - Proposed Drainage Connection refer to Architects drawing for latest SVP/SS locations
 - Proposed Foul Gully
 - Proposed Foul Linear Drain (ACO or Similar) with Sump
 - Existing Surface Water Sewer
 - Proposed Surface Water Sewer
 - Proposed Surface Water Sewer and Manhole
 - Proposed Surface Water Linear Drain (ACO or Similar) with Sump Unit
 - Proposed Road Gully
 - Proposed Rodding Eye
 - Proposed Rain Water Pipe refer to Architects drawing for latest locations
 - Proposed Finished Floor Level
 - Proposed Surface Re-grading to Existing

P03	Updated for Planning	15.09.2023	MM	RG
P02	Updated for Planning	29.08.2023	MM	RG
P01	Issued for Planning	25.08.2023	MM	RG
REV	DESCRIPTION	DATE	BY	CHKD

ORIGINATOR:

2 CRANBROOK WAY
SOLIHULL BUSINESS PARK
SOLIHULL, B90 4GT

TEL: 0121 713 8000
WWW.RIDGE.CO.UK

CLIENT:

Brookvale Groby School

IN ASSOCIATION WITH:

PROJECT:

Brookvale Groby Learning Campus
Classroom Replacement

TITLE:

Below Ground Drainage Layout

ENG/TECH:	CSE:	ICSE:	SCALE:	As Shown	@	A1
MM	RG		STATUS ISSUE:			
STATUS:						
UNLESS ISSUED FOR CONSTRUCTION - WORKS AT CLIENT/CONTRACTORS RISK						
ISO 19650						
STATUS:						
PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:
5022335	RDG	XX	ST	PL	C	0500
						REV:
						P03

APPENDIX E – MICRODRAINAGE CALCULATIONS

Ridge and Partners LLP		Page 1								
The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block									
Date 15/09/2023 15:44 File SW Network.MDX	Designed by MM Checked by RG									
Innovyze	Network 2020.1									
<u>Time Area Diagram for Storm</u> <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.064</td><td>4-8</td><td>0.012</td></tr></tbody></table> Total Area Contributing (ha) = 0.076 Total Pipe Volume (m³) = 0.425			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.064	4-8	0.012
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.064	4-8	0.012							
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Brookvale Groby Learning Campus New Education Block

Designed by MM
Checked by RG



Network 2020.1

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	8.452	0.090	93.9	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit
S1.001	3.106	0.031	100.2	0.032	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.002	10.024	0.042	238.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S1.003	5.579	0.437	12.8	0.012	0.00	0.0	0.600	o	100	Pipe/Conduit

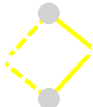
Network Results Table

PN	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	101.820	0.032	0.0	1.04	18.3
S1.001	101.730	0.064	0.0	1.00	17.7
S1.002	101.699	0.064	0.0	0.65	11.4
S1.003	101.657	0.076	0.0	2.17	17.1

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The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block	
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Innovyze	Network 2020.1	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	102.700	0.880	Open Manhole	1200	S1.000	101.820	150				
S2	102.700	0.970	Open Manhole	1200	S1.001	101.730	150	S1.000	101.730	150	
S3	102.700	1.001	Open Manhole	1200	S1.002	101.699	150	S1.001	101.699	150	
S4	102.700	1.043	Open Manhole	1200	S1.003	101.657	100	S1.002	101.657	150	
S	102.400	1.180	Open Manhole	0		OUTFALL		S1.003	101.220	100	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	451771.412	306934.198	451771.412	306934.198	Required	
S2	451777.089	306940.460	451777.089	306940.460	Required	
S3	451779.504	306938.507	451779.504	306938.507	Required	

Brookvale Groby Learning Campus New Education Block

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Network 2020.1

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S4	451786.240	306945.931	451786.240	306945.931	Required	
S	451790.059	306949.997			No Entry	



Ridge and Partners LLP		Page 7																							
The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block																								
Date 15/09/2023 15:44 File SW Network.MDX	Designed by MM Checked by RG																								
Innovyze	Network 2020.1																								
<u>Simulation Criteria for Storm</u> <table><tr><td>Volumetric Runoff Coeff 0.750</td><td>Manhole Headloss Coeff (Global) 0.500</td><td>Inlet Coeffiecient 0.800</td></tr><tr><td>Areal Reduction Factor 1.000</td><td>Foul Sewage per hectare (l/s) 0.000</td><td>Flow per Person per Day (l/per/day) 0.000</td></tr><tr><td>Hot Start (mins) 0</td><td>Additional Flow - % of Total Flow 0.000</td><td>Run Time (mins) 60</td></tr><tr><td>Hot Start Level (mm) 0</td><td>MADD Factor * 10m³/ha Storage 2.000</td><td>Output Interval (mins) 1</td></tr></table> Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FSR</td><td>M5-60 (mm) 20.000</td><td>Cv (Summer) 0.750</td></tr><tr><td>Return Period (years)</td><td>1</td><td>Ratio R 0.400</td><td>Cv (Winter) 0.840</td></tr><tr><td colspan="3">Region England and Wales Profile Type Summer Storm</td><td>Duration (mins) 30</td></tr></table>			Volumetric Runoff Coeff 0.750	Manhole Headloss Coeff (Global) 0.500	Inlet Coeffiecient 0.800	Areal Reduction Factor 1.000	Foul Sewage per hectare (l/s) 0.000	Flow per Person per Day (l/per/day) 0.000	Hot Start (mins) 0	Additional Flow - % of Total Flow 0.000	Run Time (mins) 60	Hot Start Level (mm) 0	MADD Factor * 10m³/ha Storage 2.000	Output Interval (mins) 1	Rainfall Model	FSR	M5-60 (mm) 20.000	Cv (Summer) 0.750	Return Period (years)	1	Ratio R 0.400	Cv (Winter) 0.840	Region England and Wales Profile Type Summer Storm		
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Ridge and Partners LLP		Page 9																		
The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block																			
Date 15/09/2023 15:44 File SW Network.MDX	Designed by MM Checked by RG																			
Innovyze Network 2020.1																				
Storage Structures for Storm Cellular Storage Manhole: S4, DS/PN: S1.003 Invert Level (m) 101.600 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>60.0</td><td>0.0</td><td>0.500</td><td>60.0</td><td>0.0</td><td>0.501</td><td>0.0</td><td>0.0</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	60.0	0.0	0.500	60.0	0.0	0.501	0.0	0.0
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)												
0.000	60.0	0.0	0.500	60.0	0.0	0.501	0.0	0.0												
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The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block	
Date 15/09/2023 15:44 File SW Network.MDX	Designed by MM Checked by RG	
Innovyze	Network 2020.1	
<u>1 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm</u>		
<u>Simulation Criteria</u>		
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000		
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0		
<u>Synthetic Rainfall Details</u>		
Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840		
Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF Analysis Timestep Fine DVD Status OFF		
Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40		
WARNING: Half Drain Time has not been calculated as the structure is too full.		
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The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block	
Date 15/09/2023 15:44 File SW Network.MDX	Designed by MM Checked by RG	
Innovyze	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm

								Water	Surcharged	Flooded				Half Drain	Pipe	
US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status

US/MH	Level
PN	Name Exceeded

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The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR	Brookvale Groby Learning Campus New Education Block	
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Innovyze	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm

PN	US/MH		Return Period	Climate Change	First (X) First (Y) First (Z) Overflow				Water	Surcharged	Flooded	Half Drain	
	Name	Storm			Surcharge	Flood	Overflow	Act.	Level	Depth	Volume	Flow / Overflow	Time
									(m)	(m)	(m³)	Cap. (l/s)	(mins)
S1.000	S1	15 Summer	1	+0%	30/15 Summer				101.873	-0.097	0.000	0.26	
S1.001	S2	15 Summer	1	+0%	30/15 Summer				101.824	-0.056	0.000	0.70	
S1.002	S3	15 Summer	1	+0%	30/15 Summer				101.798	-0.051	0.000	0.77	
S1.003	S4	15 Summer	1	+0%	30/15 Summer				101.675	-0.082	0.000	0.01	

PN	US/MH	Pipe Flow	Level
	Name	(l/s)	Status Exceeded
S1.000	S1	4.2	OK
S1.001	S2	7.8	OK
S1.002	S3	7.8	OK
S1.003	S4	0.1	OK

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The Cowyards Blenheim Park, Oxford Road Woodstock OX20 1QR					Brookvale Groby Learning Campus New Education Block																																																																																	
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<u>30 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm</u>																																																																																						
<u>Simulation Criteria</u>																																																																																						
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000																																																																																						
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800																																																																																						
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Climate Change (%) 0, 0, 40																																																																																						
<table><tr><th colspan="2"></th><th>US/MH</th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Water</th><th>Surcharged</th><th>Flooded</th><th colspan="2"></th><th>Half Drain</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>Level</th><th>Depth</th><th>Volume</th><th>Flow /</th><th>Overflow</th><th>Time</th></tr><tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>(m)</th><th>(m)</th><th>(m³)</th><th>Cap.</th><th>(l/s)</th><th>(mins)</th></tr><tr><td>S1.000</td><td>S1 15 Summer</td><td></td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>102.081</td><td>0.111</td><td>0.000</td><td>0.63</td><td></td><td></td></tr><tr><td>S1.001</td><td>S2 15 Summer</td><td></td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>102.047</td><td>0.167</td><td>0.000</td><td>1.75</td><td></td><td></td></tr></table>														US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	Surcharged	Flooded			Half Drain	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	Depth	Volume	Flow /	Overflow	Time										(m)	(m)	(m³)	Cap.	(l/s)	(mins)	S1.000	S1 15 Summer		30	+0%	30/15 Summer				102.081	0.111	0.000	0.63			S1.001	S2 15 Summer		30	+0%	30/15 Summer				102.047	0.167	0.000	1.75		
		US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	Surcharged	Flooded			Half Drain																																																																								
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<u>30 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm</u>																									
<table><thead><tr><th rowspan="2">PN</th><th colspan="2">Pipe</th><th rowspan="2">Status</th><th rowspan="2">Level Exceeded</th><th rowspan="2"></th></tr><tr><th>US/MH Name</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>S1.000</td><td>S1</td><td>10.1</td><td>SURCHARGED</td><td></td><td></td></tr><tr><td>S1.001</td><td>S2</td><td>19.3</td><td>SURCHARGED</td><td></td><td></td></tr></tbody></table>						PN	Pipe		Status	Level Exceeded		US/MH Name	Flow (l/s)	S1.000	S1	10.1	SURCHARGED			S1.001	S2	19.3	SURCHARGED		
PN	Pipe		Status	Level Exceeded																					
	US/MH Name	Flow (l/s)																							
S1.000	S1	10.1	SURCHARGED																						
S1.001	S2	19.3	SURCHARGED																						
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100 year Return Period Summary of Critical Results by Maximum Flood Volume (Rank 1) for Storm

									Water	Surcharged	Flooded	Half Drain		
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)
S1.002	S3	15 Summer	100	+40%	30/15 Summer				102.210	0.361	0.000	3.10		
S1.003	S4	15 Summer	100	+40%	30/15 Summer				101.901	0.144	0.000	0.13		85

PN	US/MH Name	Pipe Flow (1/s)	Status	Level Exceeded
S1.002	S3	31.6	SURCHARGED	
S1.003	S4	2.0	SURCHARGED	

APPENDIX F – MAINTENANCE SCHEDULE

Surface Water / SuDS / Foul Water - Maintenance Schedule – 1 Page

Site Name: Brookvale Groby Learning Campus New Education Block
Person responsible for inspections and maintenance: Premises Maintenance Manager TBC

SuDS/SW Element	Inspections/maintenance item and action taken	Frequency (Months or as specified)	Date Undertaken dd/mm/yy	Next scheduled inspection	Initials
General Site Maintenance A	Regular Maintenance: • Visual inspection of car park patios and service yard surfaces • Sweep car park surfaces • Clearance of gutters and downpipes and leaf guards if applicable • Root trimming	3 6 12 12			
Channels and Gullies B	Regular Maintenance: • Remove litter as required • Inspect channels • Remove silt and oil from channels and gully traps. Recommend this is done after 1 year of operation then every 2 years thereafter or as required if heavily silting is observed during inspection	1 6 24			
Silt Chambers / Catch pits C	Regular Maintenance: • Inspect chambers for silt build up and remove silt and debris if discovered	12			
Non-Permeable Paved surfaces E	Routine maintenance: • Remove debris and litter from the surface • Cut back vegetation to surrounding landscaping • Manual brushing	As required Routine landscaping maintenance 1			