

EXECUTIVE SUMMARY

Item	Assessment	Criteria
1.	Site Classification	BROWNFIELD
2.	Site Area	0.1417 Ha
3.	Greenfield surface water run off rate	1.04 l/s (Q_{BAR}) Demolished Building previously discharged at an unknown rate
4.	Proposed surface water peak flow run off rate	4.0 l/sec For betterment over existing
5.	Existing Greenfield Run off volume	16.177m ³ M100-360 + 45% CCF
6.	Outfall	Discharge to existing sewers adjacent to site boundary.
7.	Flooding assessment	M100-15 to M100-360 + 45% CCF
8.	Storage assessment	M100-15 to M100-360 + 45% CCF
9.	Preliminary Storage assessment	17.0m ³
10.	Storage System	• Pluvial crates • Pipework
11.	Foul water discharge	New connection into existing UU foul sewer located adjacent to site boundary.

1. Introduction

- 1.1. ADS Consult have been appointed to prepare a drainage strategy in support of the proposed residential development off Schwabe Street in Middleton.
- 1.2. The national Grid reference for the site is SD 85282 05599 and the nearest postcode to the site is M24 4TG.
- 1.3. The subject site is a roughly rectangular shaped plot of land, of approximately 0.14 hectares, that lies west of Schwabe Street. The site is currently brownfield and was previously the site of a residence prior to demolition of the existing structure. The site is surrounded by residential properties.

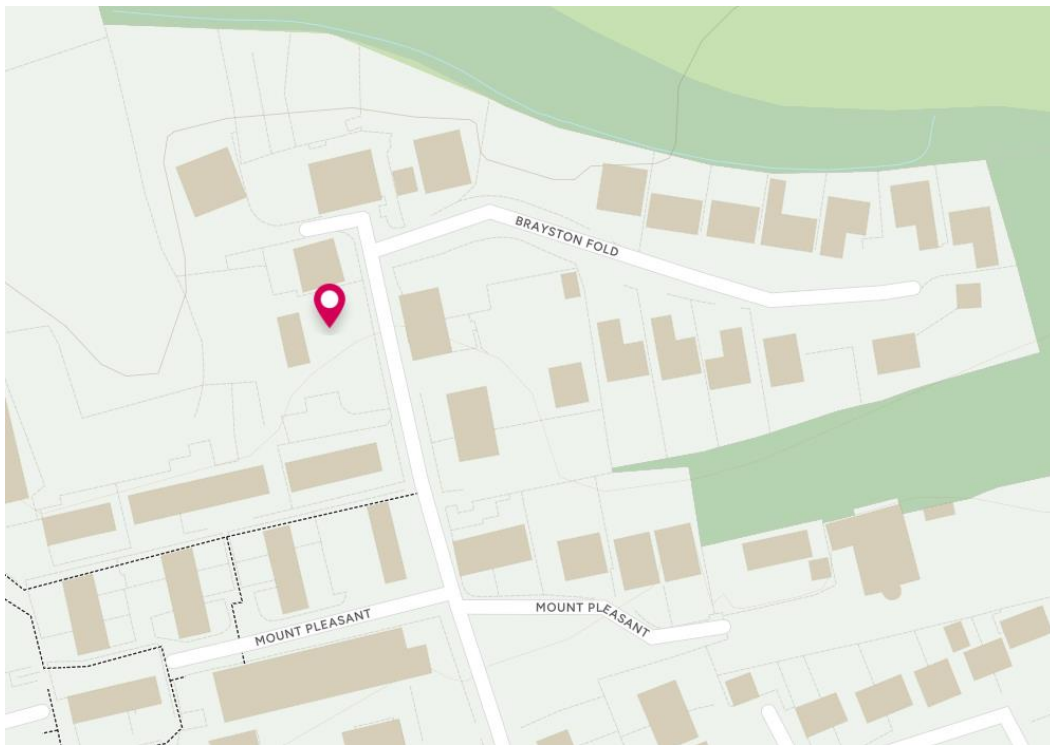


Figure 1: Site Location
Contains OS data © Crown copyright [and database right] [2024]

- 1.4. Prior to demolition, the existing building was assumed to drain directly to the nearby United Utilities (UU) sewer at an uncontrolled rate.
- 1.5. This Drainage Strategy has been prepared on behalf of Lowton Developments ("the Applicant") to support the proposed development consisting of a commercial building. The site plan, 8837-BOW-XX-XX-A-DR-0001 can be found in Appendix A.



2. Proposed Drainage Strategy

2.1. In order to demonstrate the development is of low risk the report should show:

- That it will be feasible to restrict surface water run-off to a rate of 4.0 l/s for all events up to the 1 in 100 year storm (including a 45% allowance for climate change) and set out how this will be achieved.
- How sustainable drainage techniques (SuDS) will be used with any obstacles to their use clearly justified.

2.2. Climate change (CC) will be taken into account by increasing the rainfall intensity by 45% in line with the Environment Agency and NPPF Technical Guidance.

3. Existing Site Drainage

- 3.1.** The existing building is assumed to have discharged directly to the existing UU sewer at an uncontrolled rate. The exact positions of the nearest public sewers are to be determined. The topographical survey for the site is shown within Appendix A.
- 3.2.** The Existing Greenfield run off rates for the site are as follows, taken from the IH124 approach

Return period	Peak flow (l/s)
QBar	1.04
1 in 1 year	0.91
1 in 30 year	1.77
1 in 100 year	2.17

4. Consideration of the Sustainable Drainage Systems and Water Quality

4.1. Following the Hierarchy of Sustainable Drainage Systems (SUDS) the following options must be considered

- Soakways for roof run-off and permeable surfacing for roads, drives, car parks and private access roads
- Discharge to local watercourse
- Discharge to local sewer
- Discharge to adjacent land drains and ponds

4.2. The first option to be considered must be infiltration into the ground. Even when there are alternative sewer connections or water courses available, infiltration must be utilised unless it is unfeasible.

4.3. A review of geology maps had been undertaken which identifies the site to be located over ground strata comprising 'Freely draining slightly acid sandy soils'. A copy of the soil mapping is provided as figure 3 below.

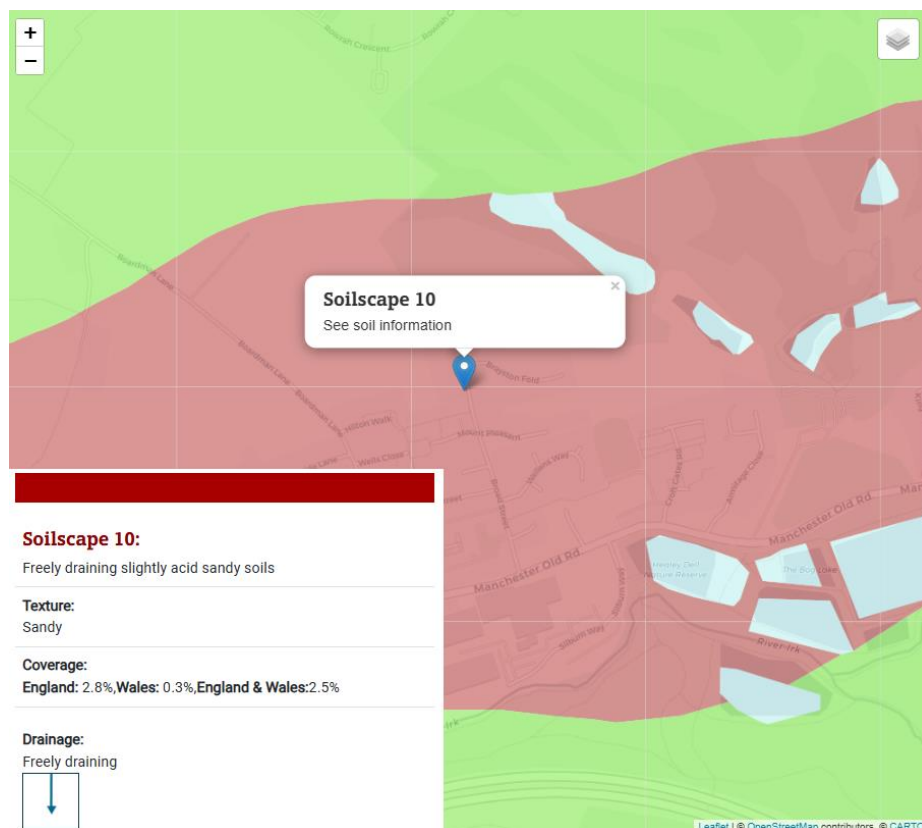


Figure 2: Extract from Soilsapes Mapping Showing Site

- 4.4.** As shown in figure 2, soils are freely draining in this area and therefore infiltration may be a suitable option for this development.
- 4.5.** In terms of soakaway constraints, the site is bordered by a road, and three separate structures are proposed for the site (two dwellings and a garage). Each of these features require an offset of 5m to prevent damage to their substructure. Unfortunately, due to these constraints as well as the presence of existing trees, there is no suitable location for a soakaway within the site boundary.
- 4.6.** The second option to be considered must be discharge to a local watercourse.
- 4.7.** The closest open watercourse to site is located approximately 350m to the northeast but would involve crossing third party land and as such does not constitute a feasible discharge location for this development.
- 4.8.** The third option is to discharge into an existing sewer.
- 4.9.** There are existing UU sewers beneath Schwabe Street that would be a viable discharge point pending approval.
- 4.10.** Based on the information within 4.9, it is our belief that discharging into the existing sewer forms a viable solution for the surface water runoff.
- 4.11.** Current guidance promotes sustainable water management through the use of SuDS. SuDS measures should be used to control the surface water runoff from the proposed development site therefore managing the flood risk to the site and surrounding areas from surface water run off.

A hierarchy of techniques is identified:

- Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- Source Control - control of runoff at or very near its source (such as the use of rainwater harvesting, permeable paving, soakaways and/or green roofs).
- Site Control - management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site, swales and/or infiltration trenches).
- Regional Control - management of runoff from several sites, typically in a detention pond, basins, tanks and/or wetland.



It is generally accepted that the implementation of SUDS as opposed to conventional drainage systems, provides several benefits by:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream.
- reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources
- reducing potable water demand through rainwater harvesting;
- improving amenity through the provision of public open spaces and wildlife habitat
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

The most appropriate attenuation system will need to satisfy three main characteristics, firstly, provide the required volume of storage, secondly, minimise the loss of developable land and thirdly, where possible provide local amenity. The application of the SuDS Manual requires that the runoff from sites is not only restricted to meet the pre-development runoff characteristics but also that SuDS systems are utilised to improve the quality of the runoff prior to outfall to watercourses. The SuDS Manual and Environment Agency guidance applies a sustainability hierarchy to the various types of SuDS systems, this is summarised in Table A below.

Table A - Sustainability Hierarchy

Most Sustainable	SuDS Technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife
	Green / Living roofs /	X	X	X
	Basins and ponds			
	- Constructed wetlands			
	- Balancing ponds	X	X	X
	Filter strips and swales	X	X	X
	Infiltration Devices	X	X	X
	Permeable Surfaces and			
	Filter Drains			
	- Gravelled areas	X	X	
Least Sustainable	Tanked systems			
	- Over-sized pipes/tanks	X		
	- Cellular storage			

Systems at the top of the hierarchy provide a combination of attenuation, treatment and ecology and are deemed the most sustainable options. There are always specific scenarios where systems are more suitable than others and at this stage it is not possible to guide the development towards a particular strategy.

The usual approach is to consider the 'SUDS train' where each of the above options are considered in turn until a suitable solution is found. Thus, source control techniques such as soakaways, rainwater harvesting and/or infiltration trenches, if suitable on a site, are considered preferable to permeable conveyance and passive treatment systems such as tanks or ponds. The various options are considered in outlined in Table B below

Table B - SuDS Techniques

SuDS Technique	Comments	Suitability for Development
Green / Living Roofs / Living Wall	A green roof is a multi-layered system that covers the top of a building with soil and vegetation and which can provide a degree of rainstorm attenuation and a reduction in site runoff. Can be used to reduce the volume and rate of runoff so that other SuDS techniques in the scheme can be significantly reduced in size.	Not compatible with proposed development.
Basins / Ponds	Provides storage of runoff and flow attenuation. Vegetated surfaces can be used to support the prevention of runoff from the site for small rainfall events (interception) and improve water quality associated with the removal of sediment and buoyant materials.	The site is constrained, with no suitable space for a basin or pond.
Filter Strips / Swales	Good removal of urban pollutants, reduces runoff rates and volumes.	The site is constrained with a large change in level across the site meaning no suitable space for the use of a swale.
Infiltration Devices (e.g. soakaways)	Reduces total runoff volume from the development.	Soakaways are not suitable due to space restrictions.
Permeable Surfaces and Filter Drains	Permeable surfaces together with their associated substructures are an efficient means of intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium.	Potential for permeable surfaces may be used for access areas.
Tanked systems	Ideal for sites with insufficient space for basins etc., provide a volume of below ground storage with a high void ratio.	Potential to be installed under access.
Flow reduction	Manages and reduces the flood risk to the local surface water sewers and watercourses.	A hydrobrake unit can be installed downstream of the attenuation tank to control flows to the proposed runoff rates.

5. Proposed Drainage Design

- 5.1.** Preliminary calculations have been undertaken at this stage to model and analyse the potential storage requirements for the site. The peak flow for the 1 in 100 yr +45% CC will be restricted to 4.0 l/s via a flow control unit, before discharging into the existing UU sewer – subject to agreement.
- 5.2.** Storage is to be provided by a below ground cellular tank located beneath the garage access.
- 5.3.** Peak run of volumes will not exceed 50% of the predevelopment brownfield runoff values.
- 5.4.** The connections and flow rates are subject to agreement with UU during the planning process.
- 5.5.** Foul water runs will discharge to the UU sewer subject to agreement during the planning process.
- 5.6.** Storage will be provided up to and including the 1 in 100 year storm event plus an allowance of 45% increase for climate change.



6. Summary

- The development involves the demolition of an existing residence and the construction of two replacement dwellings.
- Surface water run-off from the proposed development will be discharged to the existing UU sewer subject to consent.
- Storage for the impermeable areas will be provided up to and including the 1 in 100 year + 45% climate change event within the site boundary. The attenuation will be in the form of a pluvial crate system.
- The drainage proposals will be designed in accordance with the techniques set out within the SUDS manual.

7. Conclusion

The strategy outlined above shows a viable sustainable drainage solution is achievable within the constraints of the site. Detailed design of the system following a successful planning application can be delivered to meet the NPPF, Environment Agency, Local Authority and United Utilities requirements.

Report Prepared By: S. T. Johnston.

Simon Johnston

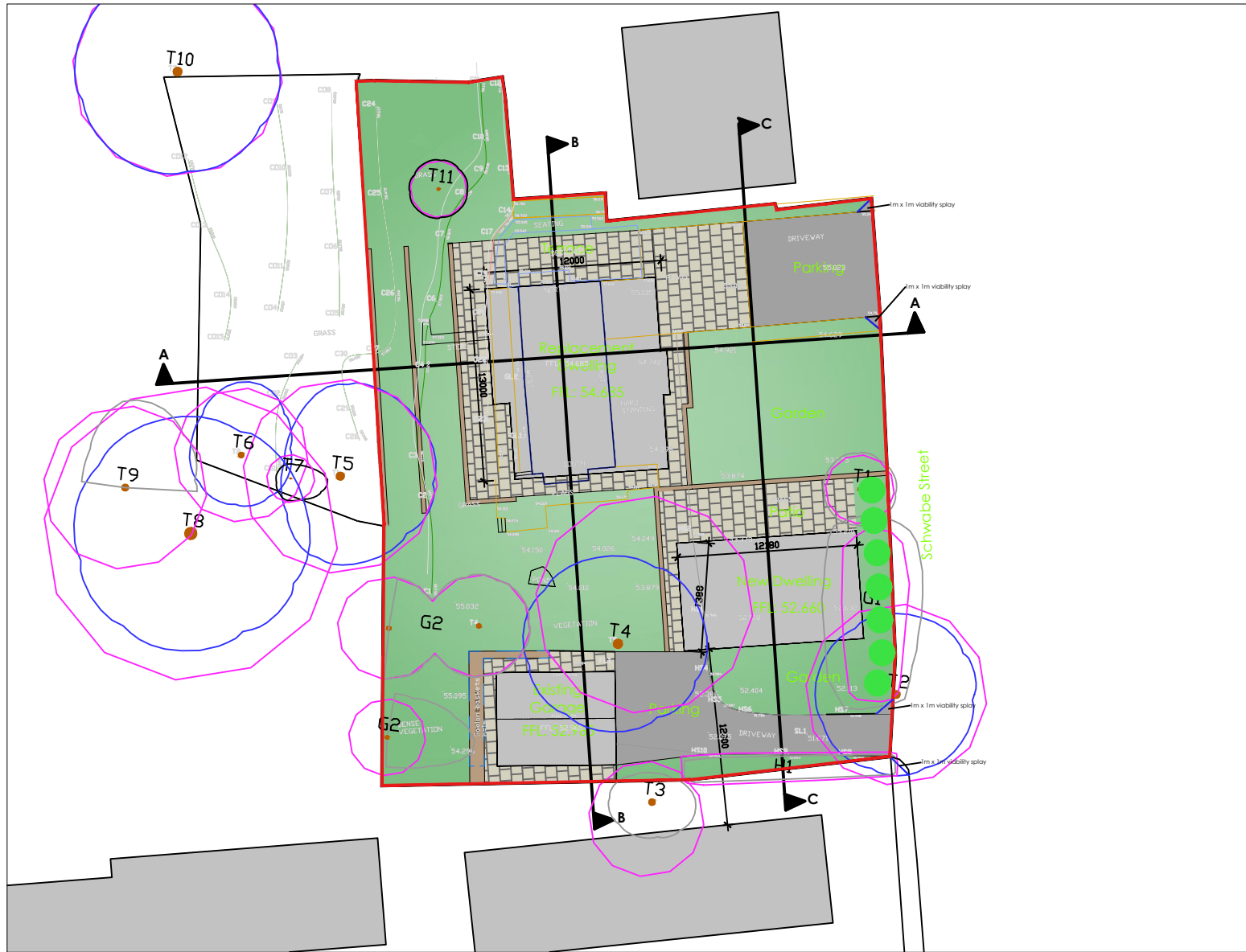
Report Reviewed By: A. E. Bristow.

Andrew Bristow

For and on behalf of
ADS Consult.



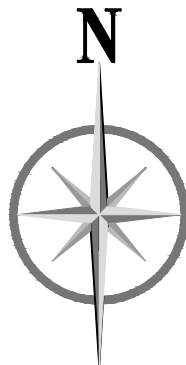
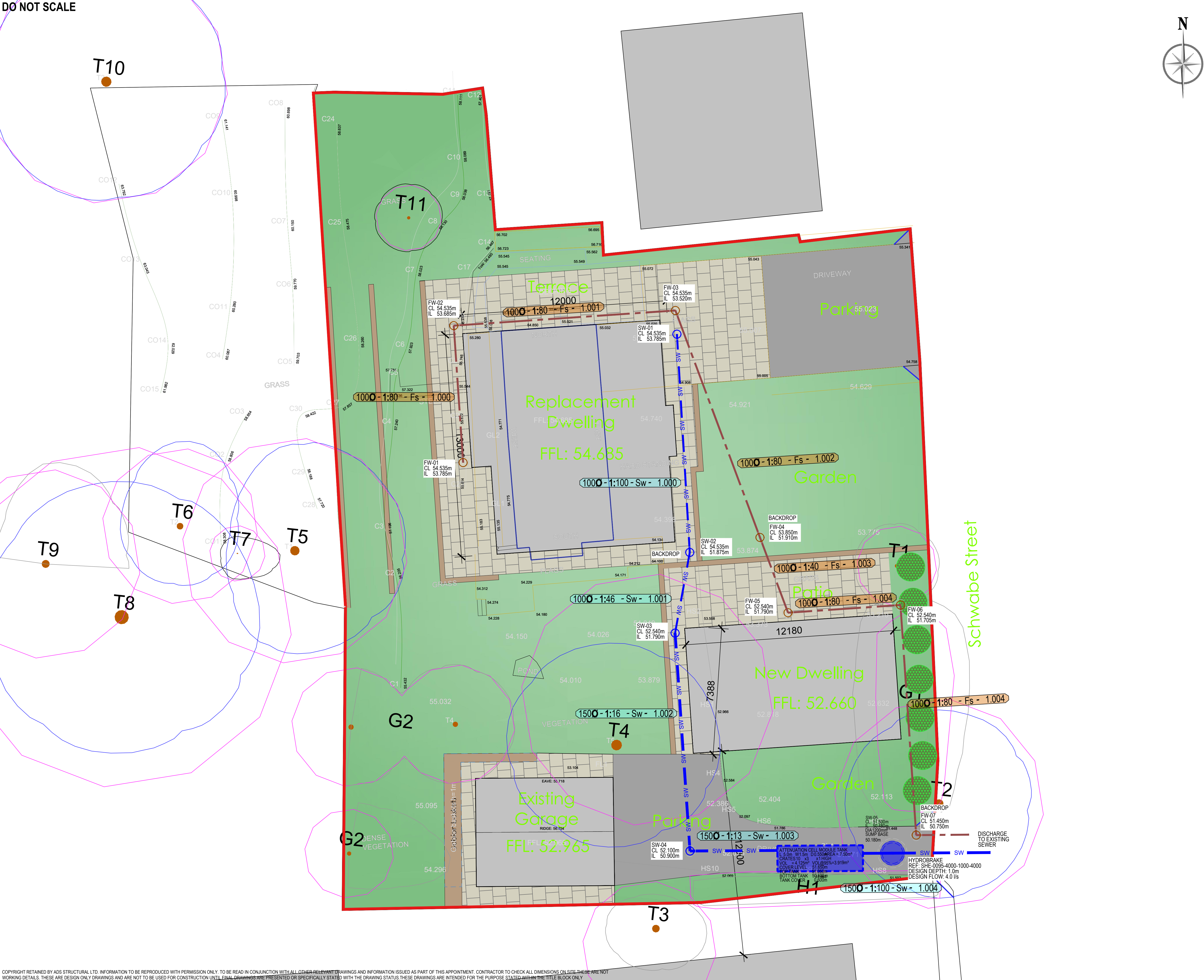
APPENDIX A
PROPOSED SITE PLAN AND TOPOGRAPHICAL SURVEY





APPENDIX B SCHEMATIC DRAINAGE LAYOUT

DO NOT SCALE



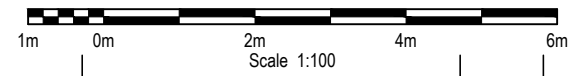
NOTES

- CDM REGULATIONS 2015**
- IN LINE WITH THE ABOVE REGULATIONS WE ARE OBLIGED TO INFORM THE CONTRACTORS OF THE RISKS THAT MAY BE ENCOUNTERED IN THE CONSTRUCTION OF THESE WORKS. ALL DESIGN WORK HAS BEEN CARRIED OUT WITH HEALTH & SAFETY ASPECTS GIVEN FULL CONSIDERATION. WHEREVER POSSIBLE RISKS HAVE BEEN ELIMINATED FROM THE DESIGN. HOWEVER DUE TO THE VERY NATURE OF THIS TYPE OF WORK IT IS NOT POSSIBLE TO REMOVE ALL RISKS FROM THE DESIGN. WE WOULD ALSO RESPECTFULLY REMIND THE CONTRACTOR OF HIS OBLIGATIONS TO TAKE ALL REASONABLE STEPS ENSURING THAT ONLY COMPETENT WORKERS WHO HAVE A VALID SAFETY POLICY ARE EMPLOYED.
- THEY SHOULD ALSO PROVIDE SATISFACTORY RESPONSES AT TENDER STAGE AS TO THE MANNER IN WHICH THEY DEAL WITH THE ELEMENTS OF RISK INVOLVED IN THIS TYPE OF WORK AND IN PARTICULAR THOSE HIGHLIGHTED BY ADS STRUCTURAL LIMITED BELOW.
1. SUPPORT/ TREATMENT FOR ALL EXCAVATION WORK.
 2. GUARDING TO EDGES OF EXCAVATIONS TO PREVENT PEOPLE, MATERIALS AND VEHICLES FALLING INTO EXCAVATIONS.
 3. GUARDING OF EXCAVATIONS OUTSIDE WORKING HOURS TO PREVENT UNAUTHORISED ACCESS.
 4. UNDERMINING TO ADJACENT ROADS OR STRUCTURES.
 5. CONFINED SPACE OPERATIONS.
 6. DEALING WITH EXISTING SERVICES.
 7. TRAFFIC MANAGEMENT ON EXISTING HIGHWAYS.
 8. PROCEDURE TO BE FOLLOWED IN EVENT OF AN ACCIDENT OR EMERGENCY.
 9. METHOD OF WORKING WHERE CONTAMINATED GROUND IS PRESENT ON SITE.
 10. CONFIRMATION WILL BE REQUIRED THAT ALL OPERATIVES ARE ADEQUATELY TRAINED AND COPIES OF RELEVANT CERTIFICATES TO BE SUPPLIED.
 11. THE CONTRACTOR IS RESPONSIBLE FOR THE OVERALL STABILITY OF THE STRUCTURE FROM THE COMMENCEMENT OF WORKS INCLUDING THE DESIGN AND PROVISION OF ALL NECESSARY TEMPORARY WORKS.
- THE ABOVE LIST IS BY NO MEANS EXHAUSTIVE BUT IT DOES HIGHLIGHT OPERATIONS THAT PRESENT A RISK TO CONTRACTORS AND THE GENERAL PUBLIC.

- GENERAL NOTES**
1. THIS DRAWING IS TO BE READ IN CONNECTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
 2. DO NOT SCALE FROM THIS DRAWING. ALL SETTING OUT DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO COMMENCEMENT OF ANY BUILDING WORKS & FABRICATION OF MATERIALS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER.
 3. ALL WORKMANSHIP AND MATERIALS ARE TO COMPLY WITH THE CURRENT BUILDING REGULATIONS, BRITISH STANDARDS AND CODES OF PRACTICE. ALL MATERIALS SHALL BE FIXED OR APPLIED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. THE CONTRACTOR IS TO TAKE INTO ACCOUNT EVERYTHING DEEMED NECESSARY FOR THE PROPER EXECUTION OF THE WORKS WHETHER INDICATED ON THE DRAWINGS OR NOT TO THE COMPLETE SATISFACTION OF THE LOCAL AUTHORITY.
 4. FOR FINAL SETTING OUT INFORMATION RELATING TO WALL POSITIONS REFER TO ARCHITECTS DRAWINGS.
- DRAINAGE NOTES**
1. ALL DRAINAGE WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH ADS STRUCTURAL LTD DESIGN SPECIFICATIONS. ANY DEVIATIONS WILL NEED TO BE APPROVED BY THE DESIGN ENGINEER PRIOR TO WORKS.
 2. THE CONTRACTORS ARE TO CONFIRM FIRST ALL DIMENSIONS AND LEVELS PRIOR TO THE COMMENCEMENT OF ANY WORK. DISCREPANCIES MUST BE HIGHLIGHTED WITH THE DESIGN ENGINEER WHO IS TO ASSESS THE POTENTIAL IMPACT PRIOR TO FURTHER WORKS.
 3. ALL DRAINAGE IS TO CONFORM TO THE ASSOCIATED STANDARDS OF BOTH BS EN 7534 CODE OF PRACTICE FOR BUILDING DRAINAGE AND TO SEWERS FOR ADOPTION WHERE APPROPRIATE.
 4. THE CONTRACTOR IS TO PROVIDE PROTECTION TO ALL NEW AND EXISTING SERVICE PIPEWORK DURING THE CONSTRUCTION PHASE. A STATEMENT OF PROPOSED MEASURES TO BE PROVIDED TO THE DESIGN ENGINEER PRIOR TO THE COMMENCEMENT OF WORKS.
 5. ALL PIPES WITHIN TRAFFICKED AREAS TO HAVE A MINIMUM OF 900mm COVER UNLESS OTHERWISE STATED. WHERE THESE DO NOT CONFORM TO THIS STANDARD A MINIMUM OF 150mm SURROUND CONCRETE USING C20/20 AS PROTECTION. FLEXIBILITY OF PIPES EITHER SIDE OF THE PROTECTION MUST BE UTILISED.
 6. PIPE TRENCHES ARE TO HAVE ALL SOFT SPOTS FILLED WITH APPROVED GRANULAR FILL. HARD SPOTS ARE TO BE BROKEN DOWN. THE CONTRACTOR TO ENSURE ALL TRENCHES OFFER ADEQUATE PROTECTION FOR SAFE WORKING.
 7. TRENCHES ARE TO BE BACKFILLED WITH EITHER GRANULAR FILL OR TYPE 'B' SELECTED MATERIAL FROM EXISTING SITE. ANY TRENCH WITHIN 1M OF A LOAD BEARING STRUCTURE TO BE BACKFILLED WITH CONCRETE UP TO THE UNDERSIDE OF THE STRUCTURE.
 8. ALL ACCESS COVERS MUST CONFORM TO BS EN 124 PART 1.
 9. RWP'S DISCHARGING TO A COMBINED SEWER MUST BE INSTALLED WITH TRAPPED BACK INLET GULLY.
 10. ALL COVER LEVELS ARE APPROXIMATE AND ARE TO BE SET IN ACCORDANCE TO FINISHED LEVELS.

- LEGEND**
- MANHOLE
 - INSPECTION CHAMBER
 - ROAD GULLY
 - RAIN WATER PIPE
 - SLOT DRAIN
 - ACO CHANNEL DRAIN
 - BACKDROP PIPE
 - SURFACE WATER PIPE
 - FOUL WATER PIPE
 - COMBINED SEWER
 - EXISTING SURFACE WATER
 - EXISTING FOUL WATER
 - FLOW DIRECTION
 - CONCRETE SURROUND PIPES
 - EXISTING CULVERT

- MODULAR CELL ATTENUATION TANK**
1. INSTALLATION OF TANK UNITS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION AND CONSTRUCTION GUIDE.
 2. TANKS ARE TO BE FULLY ENCAPSULATED WITH 1mm THICK IMPERMEABLE MEMBRANE. UNITS ARE TO BE SECURED TOGETHER FOLLOWING MANUFACTURERS INSTALLATION SPECIFICATIONS.
 3. VENTILATION PIPES ARE TO BE INSTALLED WHERE POSSIBLE WITHIN SOFT LANDSCAPED AREAS AND ARE TO BE SITUATED AWAY FROM BUILDINGS. NUMBERS AND LOCAL ARE TO BE AGREED.
 4. TANK ACCESS POINTS TO BE INSTALLED IN ACCORDANCE TO THE INSTALLATION GUIDE. NUMBERS AND LOCATIONS TO BE AGREED.
 5. IF LEVELS ALARMS ARE REQUIRED THEN DUCTING MUST BE PROVIDED AS WELL AS CONCRETE PLINTH IF CONTROL UNIT TO BE INSTALLED.



P1	21.08.24	FIRST ISSUE	SJ	SH	ADS
REV	DATE	REVISION DETAILS	DRN	CHK	APP

CLIENT
LOWTON DEVELOPMENTS

PROJECT:
**RESIDENTIAL DEVELOPMENT
SCHWABE ST, MIDDLETON**

DRAWING TITLE:
DRAINAGE STRATEGY

DRAWING STATUS:
PRELIMINARY



107 Mere Grange
Business Park, Leaside, St
Helens, WA9 5GG
Tel: 0151 541 4000
info@adsstructural.co.uk

SCALE	PROJECT - ORIGINATOR - ZONE - LEVEL - TYPE - ROLE - NUMBER	REV
1:100	XXXX-ADS-XX-00-DR-C-500	P1



APPENDIX C

SUDS MANAGEMENT AND MAINTENANCE

ADS Consult Ltd

**Sustainable Drainage System (SuDS) Management
Strategy**

for

Mount Cottage, Middleton

Document No.:	XXXX-ADS-XX-XX-RP-C-501
Title:	Sustainable Drainage System (SuDS) Management Strategy
Client:	Lowton Developments
Date:	August 2024

CONTENTS

1	INTRODUCTION.....	3
2	MAINTENANCE RESPONSIBILITIES	3
3	MAINTENANCE REGIME.....	4
3.1	Storage Tanks.....	4
3.2	Flow Controls	6
3.3	Manholes.....	7
3.4	Pipes	7
	APPENDIX A INSPECTION CHECKLIST	8

This management strategy has been prepared by ADS Consult Limited on behalf of Lowton Developments, for the development at Mount Cottage in Middleton.

The SUDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of one hundred years plus climate change of 40%. This is required so that the development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to the underlying strata via the following features:

- Storage Tank.
- Flow Control
- Pipes
- Manholes

This document outlines the long-term maintenance of the proposed surface water system and will make reference to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, 'The SUDS Manual', 2015
- CIRIA Report C625, 'Model Agreements for Sustainable Water Management Systems', 2004.
- CIRIA Report C768, 'Guidance on the Construction of SuDS', 2017; and

2.0

MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the Development, the drainage responsibilities will be as following:

- Site - Management and maintenance of the drainage system will be undertaken by the site owners.

3.0 MAINTENANCE REGIME

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the owner.

3.1 Storage Tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Inspect inlets, outlets, and overflows for blockages, and clear if required.	Monthly
	Inspect inlets, outlets, and overflows for evidence of physical damage.	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Maintenance of pump plant	As per the supplier maintenance agreement schedule
Occasional Maintenance	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair/rehabilitation of inlets, outlets, and overflows	As required

3.3 Manholes

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Inspect inlets, outlets, and overflows for blockages, and clear if required.	Monthly
	Inspect inlets, outlets, and overflows for evidence of physical damage.	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), the annually or as required
	Check any penstocks and other mechanical devices	Annually
Occasional Maintenance	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair/rehabilitation of inlets, outlets, and overflows	As required

3.4 Pipes

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect inlets, outlets, and overflows for evidence of poor operation.	Monthly
	Inspect inlets and facility surface for silt accumulation.	Monthly (for first year), the annually or as required
Occasional Maintenance	Rod through poorly performing pipes	As required
	If continued poor performance jet and CCTV survey poorly performing runs.	As required
Remedial actions	Repair / rehabilitation	As required

APPENDIX A

INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g., biodiversity, wildlife, and visual aspects)	

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channeling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying construction or ground (e.g., under drained swale or infiltration basin)?								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Does permeable or porous surfacing require sweeping to remove silt?								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc.)? (check against approved planting regime)								
Does any part of the system require weeding, pruning, or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g., wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity, and visual aspects?								

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
Other observations								
Information appended (e.g., photos)								
Continue as current Increase maintenance. Decrease maintenance								
Proposed date for next inspection								



APPENDIX D DRAINAGE MODELLING

Surface Water Drainage Model: Residential Development Schwabe St Middleton		Date: 21/08/2024	
		Designed by: SJ	Checked by: SH
		Approved By: ADS	
Report Details: Type: Inflows Summary Storm Phase: Phase		ADS Consult: 107 Mere Grange Business Park St Helens WA9 5GG	



Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
NEW DWELLING ROOF AREA	FSR: 100 years: +45 %: 15 mins: Winter	0.01	3.9	1.782
REPLACEMENT DWELLING ROOF AREA	FSR: 100 years: +45 %: 15 mins: Winter	0.01	6.3	2.910
GARAGE ROOF AREA	FSR: 100 years: +45 %: 15 mins: Winter	0.01	2.2	1.017
PARKING AREA 1	FSR: 100 years: +45 %: 15 mins: Winter	0.01	2.6	1.197
PARKING AREA 2	FSR: 100 years: +45 %: 15 mins: Winter	0.01	3.4	1.548

Surface Water Drainage Model: Residential Development Schwabe St Middleton	Date: 21/08/2024		
	Designed by: SJ	Checked by: SH	Approved By: ADS
Report Details: Type: Junctions Summary Storm Phase: Phase	ADS Consult: 107 Mere Grange Business Park St Helens WA9 5GG		



Critical Storm Per Item: Rank By: Max. Depth

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 Discharge Volume (m³)	Status
SW-01	FSR: 100 years: +45 %: 15 mins: Winter	54.53 5	53.78 5	53.873	0.088	6.3	0.025	0.000	6.0	2.908	OK
SW-02	FSR: 100 years: +45 %: 15 mins: Winter	54.53 5	51.87 5	51.962	0.087	8.5	0.025	0.000	8.3	4.103	OK
SW-03	FSR: 100 years: +45 %: 15 mins: Winter	52.54 0	51.79 0	51.845	0.055	12.2	0.015	0.000	12.1	5.880	OK
SW-04	FSR: 100 years: +45 %: 30 mins: Winter	52.10 0	50.90 0	51.508	0.608	12.7	0.172	0.000	12.2	11.682	Surcharged
OUTFALL	FSR: 100 years: +45 %: 60 mins: Winter	51.50 0	50.42 5	50.473	0.048	4.0	0.000	0.000	4.0	15.483	OK
SW-05	FSR: 100 years: +45 %: 60 mins: Winter	51.50 0	50.48 0	51.500	1.020	5.0	1.418	0.265	4.0	15.487	Flood

Surface Water Drainage Model: Residential Development Schwabe St Middleton		Date: 21/08/2024			
		Designed by: SJ	Checked by: SH		Approved By: ADS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADS Consult: 107 Mere Grange Business Park St Helens WA9 5GG			



Critical Storm Per Item: Rank By: Max. Resident Volume

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 Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 100 years: +45 %: 30 mins: Winter	51.503	51.503	1.003	1.003	12.2	4.398	0.000	0.000	8.5	11.238	3.556	OK

Surface Water Drainage Model: Residential Development Schwabe St Middleton		Date: 21/08/2024	
Report Details: Type: Connections Summary Storm Phase: Phase		Designed by: SJ	Checked by: SH
		Approved By: ADS	
		ADS Consult: 107 Mere Grange Business Park St Helens WA9 5GG	



Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S-1.000	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	SW-01	SW-02	54.535	53.873	0.083	2.908	0.9	0.98	6.0	OK
S-1.001	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	SW-02	SW-03	54.535	51.962	0.071	4.103	1.4	0.93	8.3	OK
S-1.002	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	SW-03	SW-04	52.540	51.845	0.150	5.880	1.9	0.27	12.1	OK
S-1.003	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	SW-04	Cellular Storage	52.100	51.244	0.150	8.432	1.1	0.35	17.5	Surcharged
S-1.004	FSR: 100 years: +45 %: 30 mins: Winter	Pipe	Cellular Storage	SW-05	51.650	51.503	0.150	11.237	0.5	0.49	8.5	Surcharged
S-1.005	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	SW-05	OUTFALL	51.500	51.500	0.050	15.483	0.8	0.23	4.0	Flood

Surface Water Drainage Model: Residential Development Schwabe St Middleton	Date: 21/08/2024		
	Designed by: SJ	Checked by: SH	Approved By: ADS
Report Details: Type: Phase Management Storm Phase: Phase	ADS Consult: 107 Mere Grange Business Park St Helens WA9 5GG		



Phase
FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
OUTFALL			4.0	15.483
TOTAL	10.0	15.498	4.0	15.483

Graphs

