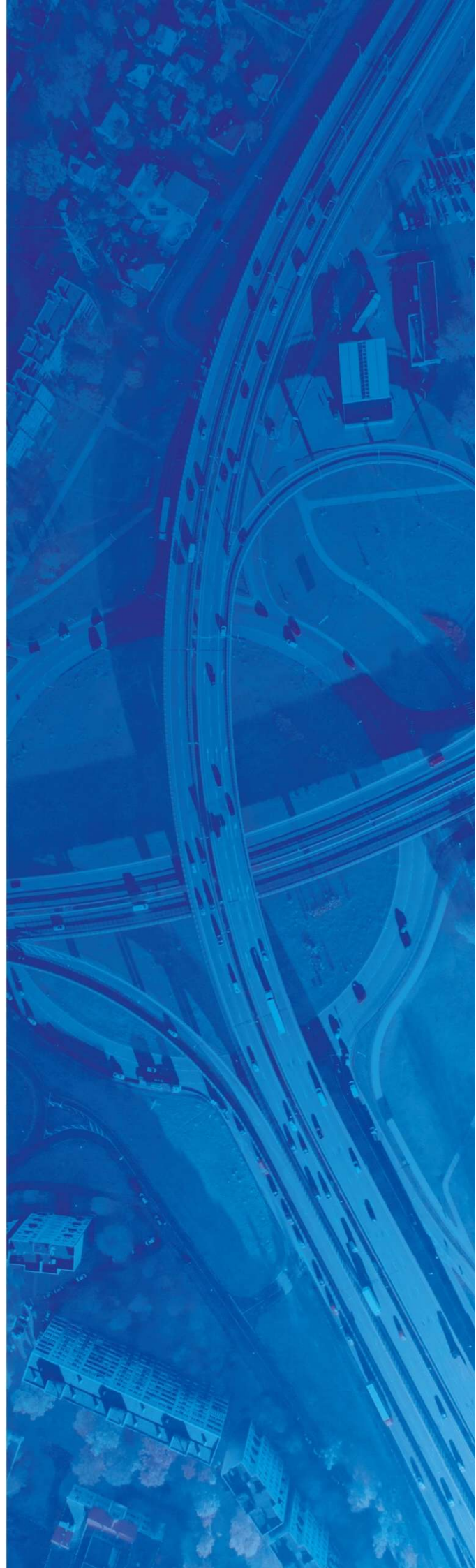




Specialist in Highway,
Drainage & Utility
Infrastructure

Combined Flood Risk Assessment & Drainage Strategy

Petrol Filling Station, Clothall
Road, Baldock (SG7 6PD)



Document Control Sheet

Project Name	Petrol Filling Station, Clothall Road, Baldock (SG7 6PD)
Report Title	Combined Flood Risk Assessment & Drainage Strategy
Client	JP & S Services Ltd
Date of Origin	12/08/2025
Project Number	2-294

Revision	Date	Issued for	Prepared by	Approved by
P1	12/08/2025	Planning	FR	DM

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Appendix G – Surface Water Flooding Information

Appendix H – Groundwater Flooding Information

Appendix I – Reservoir Flooding Information

Appendix J – Artificial Flooding Information

Appendix K – Drainage Strategy Plans

1 Introduction

Civilistix Consulting Engineers has been commissioned by JP & S Services Ltd to prepare a Combined Flood Risk Assessment and Drainage Strategy (FRA & DS) report to support a planning application for the creation of a proposed Petrol Filling Station (PFS).

The site is located at Whitehorse Service Station, Clothall Road, Baldock (SG7 6PD), and occupies a redline boundary area of 0.163ha. The existing site is currently brownfield and is occupied by an existing petrol filling station. A total of 0.159ha within the site redline boundary is currently hardstanding.

Development proposals generate a total impermeable area of 0.148ha when fully constructed. Thus, there is a decrease of 0.011ha in the impermeable area when compared to the existing site scenario.

The purpose of this combined FRA and DS is to demonstrate how this impermeable area can be satisfactorily drained without increasing flood risk onsite and elsewhere. The strategy has been developed in full accordance with National and Local standards as well as best practice documentation.

Specifically, this combined Flood Risk Assessment and Drainage Strategy demonstrates that the proposed development does not lead to an increase in;

- Peak runoff rate of storm water runoff leaving the site.
- Volume of runoff leaving the site.
- Pollution to receiving waters from storm water runoff.
- Flood risk to nearby or neighbouring sites.

2 Existing Site

2.1 Site Location

The site is located at grid reference (525122, 233559) and has a redline boundary area of 0.163ha.

The address of the site is at Whitehorse Service Station, Clothall Road, Baldock (SG7 6PD).

The existing site is currently brownfield and is occupied by an existing petrol filling station

The site is bound by Clothall Road to the North, and private properties to all other directions.

A site location plan is shown in [Appendix A](#).

2.2 Site Hydrology

Based on a Topographical survey undertaken by ASP Surveys, dated December 2024, and satellite/OS mapping, there are no existing watercourses within vicinity of the site.

Based on Anglian Water (AW) asset mapping, there is a 225mm public foul water sewer and a 450mm public surface water sewer within Clothall Road.

It is believed that both existing private surface and foul water sewers discharge into the respective AW public sewers; however, this will need to be confirmed through a comprehensive CCTV survey.

Flow rates during the 1, 30 and 100 year storm events have been calculated (based on the modified rational method) for the existing scenario as shown in [Table 1](#).

Storm Event (Annual Exceedance Probability)	Predicted rainfall Intensity (mm/hr)	Existing Discharge Rate (0.159ha) (l/s)
1 in 1 year	31	14.97 l/s
1 in 30 year	76	36.69 l/s
1 in 100 year	138	66.621 l/s

Table 1 - Existing site runoff rates for the 1,30 and 100 year storm event

AW sewer records and an Existing Drainage General Arrangement Plan are shown in [Appendix B](#).

2.3 Site Topography

A Topographical survey of the site and surrounding area has been prepared by ASP Surveys, dated December 2024, ref. 241212.

The topographical survey indicates the site is generally flat, with levels ranging from approximately 68.90m to 69.30m Above Ordnance Datum (AOD).

The Topographical survey is shown in [Appendix C](#).

2.4 Site Geology

At this time, an intrusive ground investigation has not yet been carried out.

Results from nearby British Geological Survey (BGS) historic boreholes identifies the following;

- Historical borehole TL23SW10 located 340m to the west from the site identified 0.46m of TOPSOIL; 14.93m of medium hard CHALK; and 12.04m of medium hard CHALK. Groundwater was encountered at a depth of 15.85m Below Ground Level (BGL)
- Historical borehole TL23SE10 located 100m to the north from the site identified 10.67m CHALK with no flints; 8.23m of CHALK with flints; and 36.58m CHALK MARL. Groundwater was encountered at a depth of 30.00mBGL.

The BGS Geology Viewer identifies the site as being underlain by the Zig Zag Chalk Formation and the Holywell Nodular Chalk Formation.

British Geology Survey information is provided in [Appendix D](#).

3 Development Proposal

Development proposals are for the creation of a proposed Petrol Filling Station (PFS), including a retail sales building, a jetwash, car wash, 4no. forecourt pumps, 12no. car parking spaces and associated external area.

The site is located at Whitehorse Service Station, Clothall Road, Baldock (SG7 6PD), and occupies a redline boundary area of 0.163ha.

Development proposals generate a total impermeable area of 0.148ha when fully constructed.

Development proposals are provided in **Appendix E**.

4 Flood Risk

4.1 Policy & Best Practice

This proposed Flood Risk Assessment has been primarily prepared in accordance with the following best practice drainage documentation;

- North Hertfordshire District Council Strategic Flood Risk Assessment (SFRA, July 2008).
- Department for Communities and Local Government National Planning Policy Framework, 2012.
- Environment Agency (EA) publications and modelling outputs.
- CIRIA 753, 2015: The SuDS Manual; This document provides current best practice and National guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.

4.2 Fluvial Flooding

Review of EA fluvial flood mapping identifies the development to be within the *very low flooding extents* (Flood Zone 1).

Review of Hertfordshire County Council Flood Risk Management Viewer identifies the development to be within Flood Zone 1.

Fluvial flood maps are shown in **Appendix F**.

It is believed therefore the site is at *very low risk* of fluvial flooding.

4.3 Surface Water Flooding

Review of EA surface water flood mapping and Hertfordshire County Council Flood Risk Management Viewer identifies some areas of the existing development within the medium/high risk extent.

Surface water flood maps are shown in **Appendix G**.

It is believed therefore the existing site is at medium/high risk of surface water flooding.

It is proposed implementation of the SuDS Strategy identified in **Section 5** will sufficiently mitigate surface water flooding.

It is believed therefore the proposed development will be at *low risk* of surface water flooding.

4.4 Groundwater Flooding

At this time, an intrusive ground investigation has not yet been carried out.

Results from nearby British Geological Survey (BGS) historic boreholes identifies the following;

- Historical borehole TL23SW10 located 340m to the west from the site identified 0.46m of TOPSOIL; 14.93m of medium hard CHALK; and 12.04m of medium hard CHALK. Groundwater was encountered at a depth of 15.85m Below Ground Level (BGL)
- Historical borehole TL23SE10 located 100m to the north from the site identified 10.67m CHALK with no flints; 8.23m of CHALK with flints; and 36.58m CHALK MARL. Groundwater was encountered at a depth of 30.00mBGL.

The BGS Geology Viewer identifies the site as being underlain by the Zig Zag Chalk Formation and the Holywell Nodular Chalk Formation.

British Geology Survey information is provided in [Appendix D](#).

Review of Hertfordshire County Council Flood Risk Management Viewer identifies the site outside of the areas susceptible to groundwater flooding and therefore not at risk of groundwater flooding.

Groundwater flood maps are shown in [Appendix H](#).

It is believed therefore the existing site is at *very low risk* of groundwater flooding, based on the deep groundwater levels recorded in nearby BGS boreholes and the Hertfordshire CC mapping review.

4.5 Reservoir Flooding

EA Reservoir Flood mapping identifies the site to be at no risk from reservoir flooding.

Reservoir flood maps are shown in [Appendix I](#).

It is believed therefore the site is at *very low* risk of reservoir flooding.

4.6 Artificial Flooding

Based on Anglian Water (AW) asset mapping, there is a 225mm public foul water sewer and a 450mm public surface water sewer within Clothall Road.

AW sewers records and an Existing Drainage General Arrangement Plan are shown in [Appendix B](#).

Review of North Hertfordshire District Council SFRA Appendix F doesn't identify any historic sewer flooding in the vicinity of the site.

SFRA Appendix F map extract is shown in [Appendix J](#).

The SFRA Appendix F mapping extract suggests that the likelihood of artificial flooding affecting the site is low. Additionally, the SuDS strategy outlined in **Section 5**—including the installation of non-return valves at the demarcation chambers—will provide further protection against potential surcharge from the public sewer network.

It is believed therefore the site will be at low risk of artificial flooding.

4.7 Flood Vulnerability

Technical guidance to the National Planning Policy Framework (NPPF) 2024, divides land use into five classifications as follows;

- Essential infrastructure e.g essential transport infrastructure and utility infrastructure, wind turbines
- Highly vulnerable e.g caravans, mobile homes and park home intended for permanent residential use.
- More vulnerable e.g hospitals, residential institutions, dwelling houses.
- Less vulnerable e.g shops, land and buildings used for agriculture, non-residential institutions, assembly and leisure.
- Water compatible e.g docks, marinas and wharves, amenity open space, sports grounds (and essential facilities such as changing rooms).

The flood risk vulnerability categorisation for the site is “more vulnerable” development. “More vulnerable” development is fully permissible within flood Zone 1.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

Figure 1 – NPPF Flood Risk Vulnerability & Flood Zone Compatibility

4.8 Flood Risk Summary

A summary of the flood risk posed from each flood source before and after development (with the proposed drainage / flood mitigation measures in place) are provided in **Table 2**;

Type of Flooding	Existing Risk Category	Proposed Risk Category
Fluvial flooding	Very Low Risk	Very Low Risk
Surface Water flooding	Medium/High Risk	Low Risk
Groundwater flooding	Very Low Risk	Very Low Risk
Reservoir flooding	Very Low Risk	Very Low Risk
Artificial Flooding	Low Risk	Low Risk

Table 2 – Flood Risk Summary from all sources before and after development

5 Surface Water (SuDS) Drainage Strategy

5.1 Surface Water Discharge Strategy

Part H of the Building Regulations (2010) recommends surface water run-off shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
- A watercourse, or, where that is not reasonably practicable,
- A sewer.

Each disposal option has been reviewed in the context of the site below;

Infiltration Disposal

At this time, an intrusive ground investigation has not yet been carried out.

Results from nearby British Geological Survey (BGS) historic boreholes identifies the following;

- Historical borehole TL23SW10 located 340m to the west from the site identified 0.46m of TOPSOIL; 14.93m of medium hard CHALK; and 12.04m of medium hard CHALK. Groundwater was encountered at a depth of 15.85m Below Ground Level (BGL)
- Historical borehole TL23SE10 located 100m to the north from the site identified 10.67m CHALK with no flints; 8.23m of CHALK with flints; and 36.58m CHALK MARL. Groundwater was encountered at a depth of 30.00mBGL.

The BGS Geology Viewer identifies the site as being underlain by the Zig Zag Chalk Formation and the Holywell Nodular Chalk Formation.

British Geology Survey information is provided in **Appendix D**.

Although infiltration feasibility has not yet been confirmed via BRE 365 testing, due to the nature of the development as a petrol filling station, infiltration is not considered an appropriate surface water disposal method due to contamination risks.

Watercourse Connection

Where infiltration of surface water is not feasible, the next preference within the SuDS hierarchy and the Building Regulations Part H is to form a controlled connection to a watercourse.

Review of the site topographic and OS data confirms the site is not within vicinity of any nearby watercourses or any natural surface water features and therefore a connection to a watercourse is not possible.

Connection to existing sewer

With no alternative method of discharging surface water runoff, it is proposed to discharge surface water to the existing Anglian Water Surface Water sewer at a controlled rate.

5.2 Runoff Rate & Volume

It is proposed all runoff from the proposed development and associated external hardstanding areas (an impermeable area of 0.148ha) is attenuated and discharged at 2.0l/s for all storm events up to and including the critical 100 year plus 40%cc event.

Flow rates during the 1, 30 and 100 year storm events have been calculated for the existing and proposed scenario as shown in **Table 3**.

Storm Event (Annual Exceedance Probability)	Predicted rainfall Intensity (mm/hr)	Existing Discharge Rate (0.159ha) (l/s)	Proposed Discharge Rate (0.148ha) (l/s)
1 in 1 year	31	14.97 l/s	2.00 l/s
1 in 30 year	76	36.69 l/s	2.00 l/s
1 in 100 year	138	66.621 l/s	2.00 l/s

Table 3 - Proposed site runoff rates for the 1,30 and 100 year storm event

It is demonstrated the proposed development provides significant betterment across all critical storm return events when compared to the existing scenario.

5.3 SuDS Strategy

It is proposed the development will drain via a piped network to a geo-cellular storage tank, before releasing flows at 2.0 l/s via gravity to the AW Surface Water sewer within Clothall Road. The attenuation volume provided will be sufficient to accommodate the critical 1 in 100 years plus 40% climate change storm event.

Permeable paving is proposed for the parking areas.

Runoff from the petrol filling forecourt area will be collected via proposed linear drainage channels and directed to a proposed forecourt oil separator and a downstream defender, ensuring the removal of pollutants before release to the rest of the network.

A Drainage Strategy plan and associated calculations are shown in **Appendix K**.

It is recommended detailed design drawings are provided to Anglian Water in due course as part of a S106 application to formally agree the sewerage connection.

5.4 Rainfall Simulation & Climate Change

This drainage strategy uses Flood Estimation Handbook (FEH) rainfall data.

An allowance of +40% for climate change corresponding to the 'upper end' of current legislation on climate change published by the EA has been used.

All attenuation structures have been sized based on the 1 in 100 year critical storm event plus an additional 40% allowance for climate change.

5.5 Surface Water Treatment

The SuDS Manual, 2015 identifies pollution hazard levels of new development based off their proposed land use. In line with the SuDS Manual pollution hazard categorisations, a *high risk* for the proposed development has been adopted (petrol filling station). **Table 4** shows the total suspended solids, metals and hydrocarbons associated with a low pollution categorization (as provided within the SuDS Manual).

	Total Suspended Solids (TSS)	Metals	Hydro-carbons
High pollution hazard index	0.8	0.8	0.9

Table 4: Total suspended solids, and hydrocarbons associated with a low pollution categorization (as provided within the SuDS Manual)

As of the SuDS Manual guidance, conveying run off through different forms of SuDS provides varied mitigation values. On the basis the combined mitigation index value is higher than the initial mitigation values associated with a low pollution risk, the drainage system is deemed to have sufficiently mitigated the pollution hazard posed. In accordance with the SuDS Manual, the combined mitigation index value can be calculated as follow;

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5 \times (\text{mitigation index}_2)$$

Table 5 shows the mitigation indices associated to the proposed SuDS for the petrol filling forecourt area.

	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Forecourt Oil Separator*	0.84	0.63	0.98
Hydro Downstream Defender*	0.5	0.6	0.7
Total SuDS mitigation index	1.09	0.93	1.33

Table 5: Mitigation indices associated to the proposed SuDS

Hydro Downstream Defender & Marsh technical datasheet with forecourt oil separator mitigation indices are shown in **Appendix K**.

It can be confirmed the proposed drainage strategy treats runoff over and above the guidance provided within the SuDS Manual (C753).

5.6 Surface Water Management & Maintenance

For any surface water drainage system to operate as originally designed, it is necessary to ensure that it is adequately maintained to ensure its continued performance throughout its design life.

It is proposed the SuDS features used within this development will be fully maintained and managed by a private management company.

Table 6, 7 and 8 stipulates the proposed maintenance activities and frequencies the private management company would carry out over the lifetime of the development.

All proprietary systems such as the oil interceptor and downstream defender would be maintained as of manufacturer instruction

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Visual inspection and removal of debris / silt. If any siltation or debris is observed, it will be removed by hosing down, manual cleaning (subject to sufficient risk assessment taking place)	Visual inspection to be carried out once every month or after a substantial storm event.
Occasional Maintenance	Remove debris and hose down as a matter of course including clearing of sump chamber	Every 6 months
Remedial Work	Operation of flow control including testing as required. If operation is compromised in any way, flow control to be replaced.	As required

Table 6: Operation and Maintenance Requirements for Flow Control Device

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify 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 risk to performance)	Monthly
	For system 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, outlets, 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

Table 7: Operation and Maintenance Requirements for Geo-cellular Tank

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 8: Operation and Maintenance Requirements for Pervious Pavements

6 Proposed Foul Water Drainage

In accordance with Building Regulations Part H1 the preferred priority order of foul water disposal is:

H1. (1) An adequate system of drainage shall be provided to carry foul water from appliances within the building to one of the following, listed in order of priority:

- a) a public sewer; or, where that is not reasonably practicable,
- b) a private sewer communicating with a public sewer; or,
- c) where that is not reasonably practicable, either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system; or,
- d) where that is not reasonably practicable, a cesspool.

The total foul water flow rate from the retail sales building can be calculated based on guidance given within Design and Construction Guidance. A discharge rate of 0.6 l/s/ha has been assumed:

- Dry Weather Flow (DWF) = $0.6 \text{ l/s/ha} \times 0.029\text{ha} = 0.0174 \text{ l/s}$
- Foul Water Peak = $6 \times \text{DWF} = 6 \times 0.0174 \text{ l/s} = 0.10 \text{ l/s}$.

Runoff from the car washing facilities will be collected and directed to a proposed wash-down and silt separator, ensuring the removal of pollutants before release to the rest of the network.

The total foul water flow rate from the jet wash and car wash areas can be calculated based on typical manufacturer data. A discharge rate of 0.42 l/s and 0.25 l/s for the jet wash and car wash areas respectively have been assumed;

- Dry Weather Flow (DWF) = $0.42 \text{ l/s} + 0.25 \text{ l/s} = 0.67 \text{ l/s}$
- Foul Water Peak = $4 \times \text{DWF} = 4 \times 0.67 \text{ l/s} = 2.68 \text{ l/s}$.

Thus, a total foul water peak flow rate of 2.78 l/s is estimated for the proposed development.

It is recommended detailed design drawings are provided to AW in due course as part of a S106 application to formally agree the sewerage connection and a trade effluent consent.

A Drainage Strategy plan and associated documentation are shown in **Appendix K**.

7 Conclusion

Civilistix Consulting Engineers has been commissioned by JP & S Services Ltd to prepare a Combined Flood Risk Assessment and Drainage Strategy (FRA & DS) report to support a planning application for the creation of a proposed Petrol Filling Station (PFS).

The site is located at Whitehorse Service Station, Clothall Road, Baldock (SG7 6PD), and occupies a redline boundary area of 0.163ha. The existing site is currently brownfield and is occupied by an existing petrol filling station. A total of 0.159ha within the site redline boundary is currently hardstanding.

Development proposals generate a total impermeable area of 0.148ha when fully constructed. Thus, there is a decrease of 0.011ha in the impermeable area when compared to the existing site scenario.

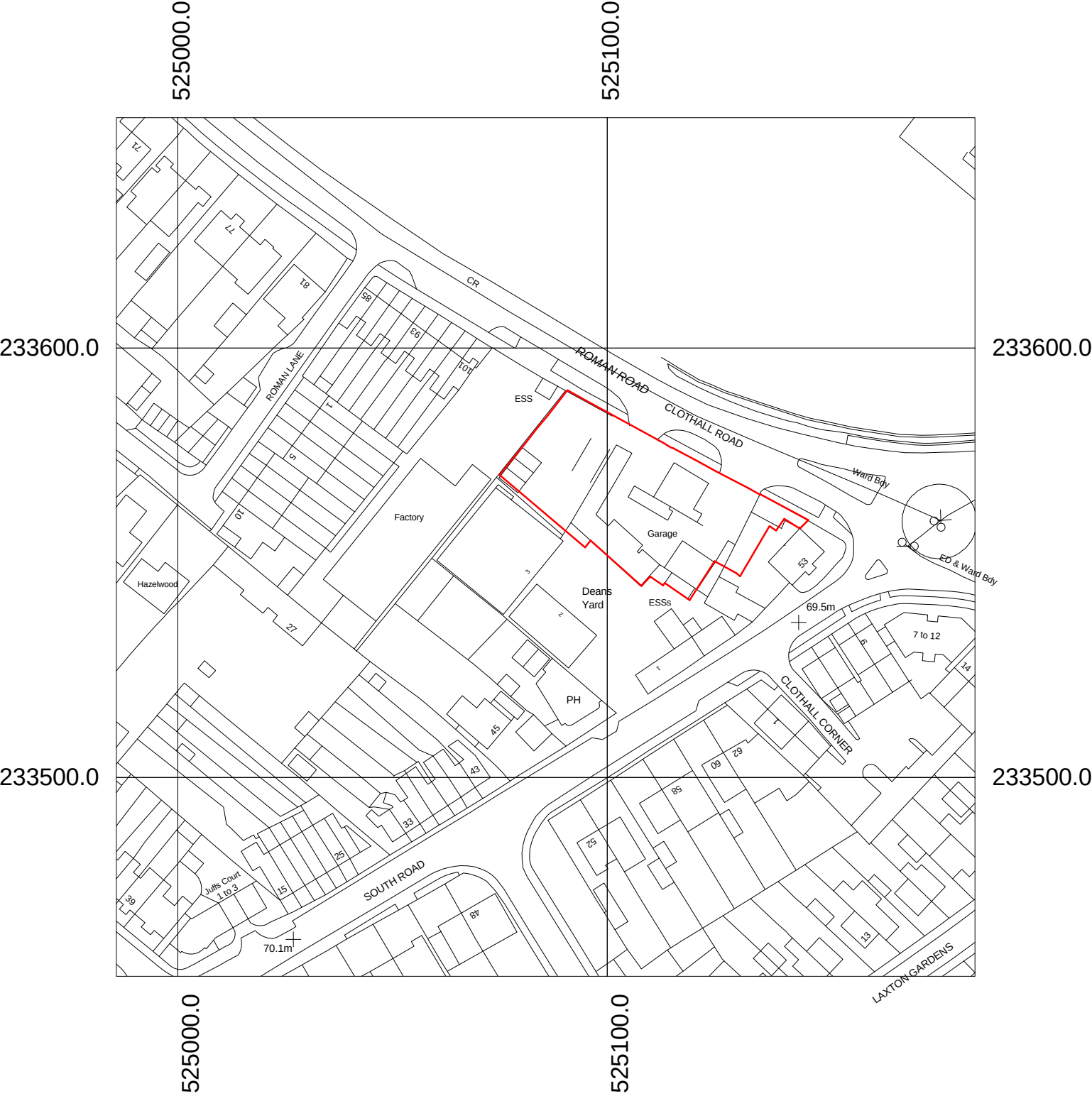
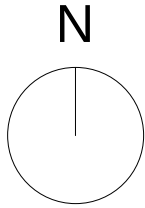
A summary of the flood risk posed from each flood source before and after development (including with the implemented proposed mitigation measures) are provided below;

Type of Flooding	Existing Risk Category	Proposed Risk Category
Fluvial flooding	Very Low Risk	Very Low Risk
Surface Water flooding	Medium/High Risk	Low Risk
Groundwater flooding	Very Low Risk	Very Low Risk
Reservoir flooding	Very Low Risk	Very Low Risk
Artificial Flooding	Low Risk	Low Risk

This report makes the following key conclusions;

- Although infiltration feasibility has not yet been confirmed via BRE 365 testing, due to the nature of the development as a petrol filling station, infiltration is not considered an appropriate surface water disposal method due to contamination risks. Review of the site topographic and OS data confirms the site is not within vicinity of any nearby watercourses or any natural surface water features and therefore a connection to a watercourse is not possible.
- It is proposed the development will drain via a piped network to a geo-cellular storage tank, before releasing flows at 2.0 l/s via gravity to the AW Surface Water sewer within Clothall Road. The attenuation volume provided will be sufficient to accommodate the critical 1 in 100 years plus 40% climate change storm event.
- Permeable paving is proposed for the parking areas.
- Runoff from the petrol filling forecourt area will be collected via proposed linear drainage channels and directed to a proposed forecourt oil separator and a downstream defender, ensuring the removal of pollutants before release to the rest of the network.
- It is demonstrated the proposed development provides significant betterment across all critical storm return events when compared to the existing scenario.
- It is proposed all foul water flows from development will be directed via gravity into a new demarcation chamber, before discharging into the existing AW Foul Water sewer within Clothall Road. Runoff from the car washing facilities will be collected and directed to a proposed wash-down and silt unit, ensuring the removal of pollutants before release to the rest of the network.

Appendix A – Site Location Plan



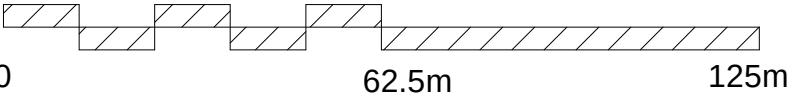
Site Location Plan (PFS)

1 : 1250

Red line denotes approximate application boundary

"Ordnance Survey MasterMap Data purchased under 12 month license from
Stanfords (OS Partner license 100035409) 08/07/2024, Order license reference
CC-00021003

SCALE : 1 to 1250



Note: This maybe a reduced sized print, check scales below

P1	Planning Submission	EF	02.06.2025	IMAS
Revision	Description	Drawn	Date	Checked

Client's Name

JP&S Servicess Ltd

Job Title

Clothall Road, Baldock

Drawing Title

Site Location Plan (PFS)

Scale

As indicated @A3

Job No

1209

Drawing No

104

Status

PLANNING SUBMISSION

Rev

P1

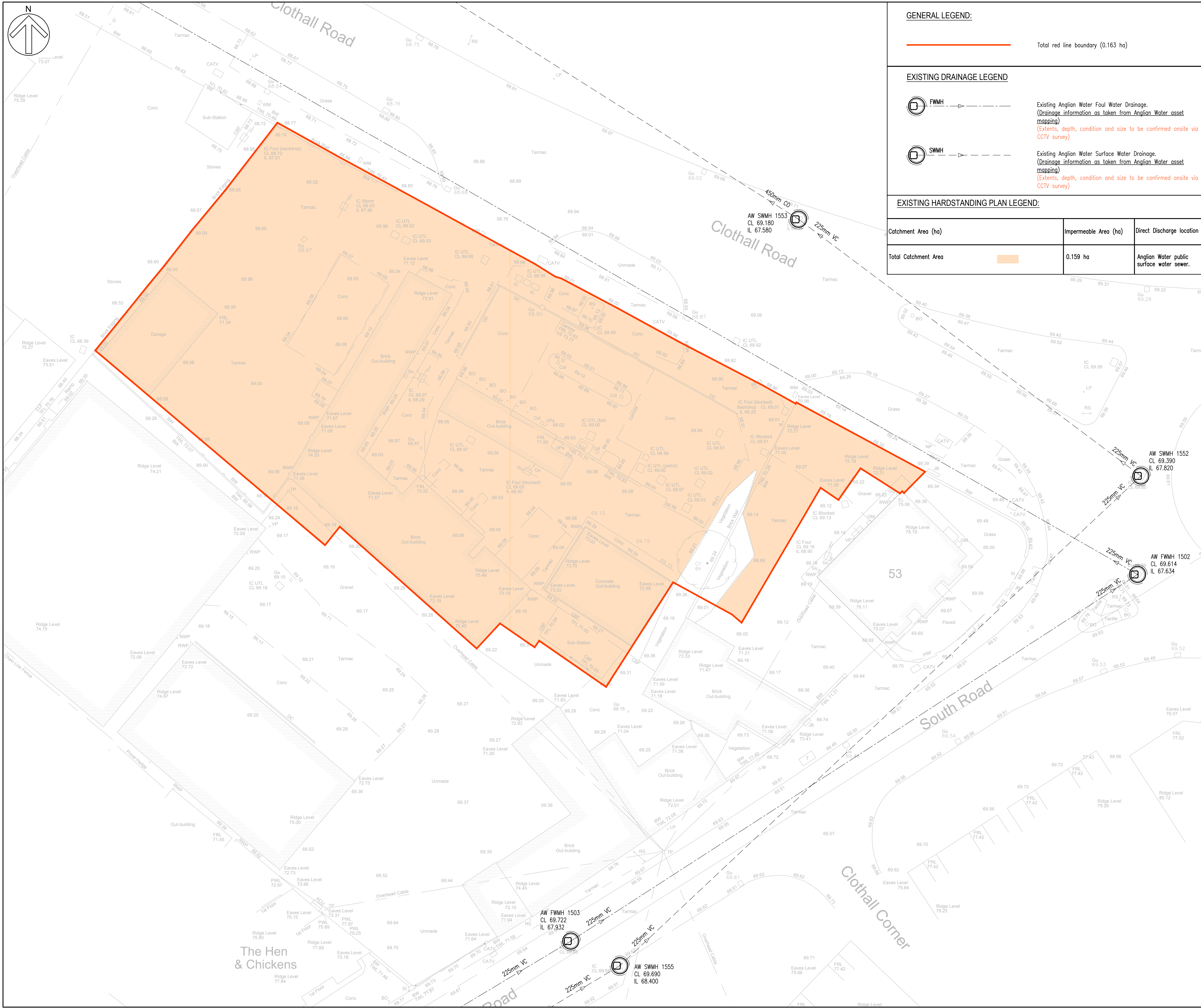
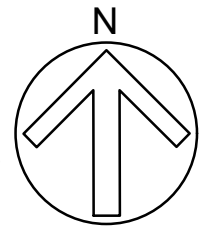


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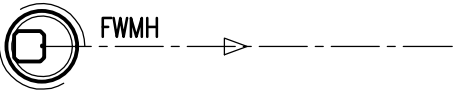
Appendix B – Existing Site Drainage Regime



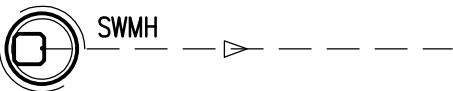
GENERAL LEGEND:

 Total red line boundary (0.163 ha)

EXISTING DRAINAGE LEGEND



Existing Anglian Water Foul Water Drainage.
(Drainage information as taken from Anglian Water asset mapping)
(Extents, depth, condition and size to be confirmed onsite via CCTV survey)



Existing Anglian Water Surface Water Drainage.
(Drainage information as taken from Anglian Water asset mapping)
(Extents, depth, condition and size to be confirmed onsite via CCTV survey)

EXISTING HARDSTANDING PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
	0.159 ha	Anglian Water public surface water sewer.

DO NOT SCALE

GENERAL

- The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
- All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
- Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
- All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
- This drawing should not be used for setting out
- All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

P1	12-08-2025	KH	PLANNING ISSUE	FR	DM
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD

DRAWING STATUS:	FOR PLANNING
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Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civistix.com
www.civistix.com

CLIENT:	JP & S Services Ltd
---------	---------------------

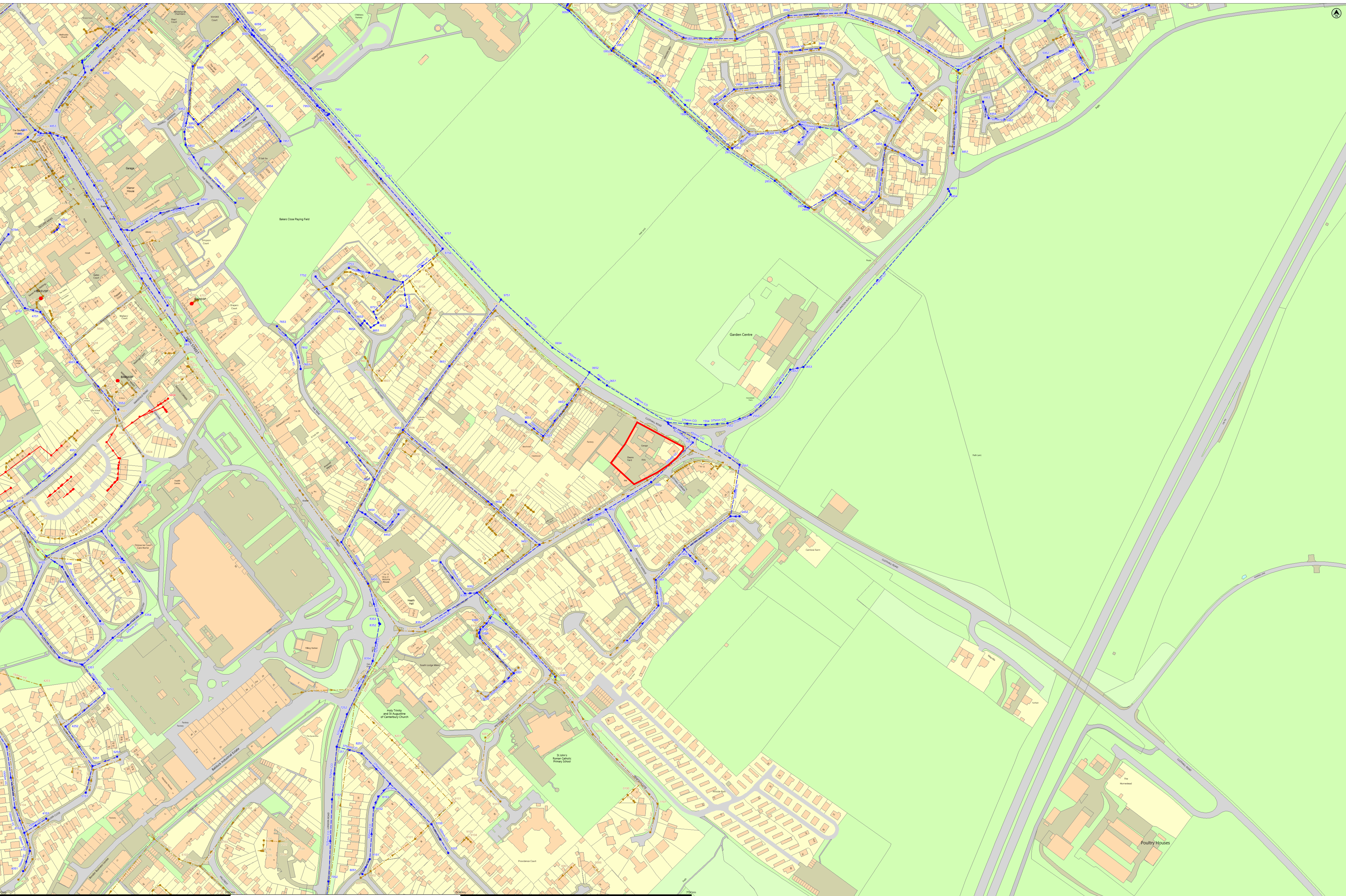
ARCHITECT:	MS4 Architects LTD
------------	--------------------

PROJECT:	Petrol Filling Station, Clothall Road, Baldock (SG7 6PD)
----------	--

DRAWING TITLE:	Existing Drainage General Arrangement Plan
----------------	--

SCALE @ A1:	CHECKED / APPROVED BY:	DATE:
1:150	FR/DM	August 2025

PROJECT No:	DRAWING No:	REV:
2-294	C-001	P1



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- | | |
|----------------------|---|
| Foul Sewer | — |
| Surface Sewer | — |
| Combined Sewer | — |
| Final Effluent | — |
| Rising Main | — |
| Private Sewer | — |
| Decommissioned Sewer | — |
- | | |
|---------|---|
| Outfall | — |
| Inlet | — |
| Manhole | ● |
- | | |
|--------------------------------|---|
| Public Sewage Treatment Works | ☐ |
| Public Pumping Station | ☐ |
| Decommissioned Pumping Station | ● |
- | | |
|--------------------|---|
| 2.294 - Deans Yard | ● |
|--------------------|---|

enquiries@cwsl.co.uk
2.294 - Deans Yard



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Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert	Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert	Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert	Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert	Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
5604	524586	233608	C	-	-	-	5502	524541	233578	F	69.2	67.73	1.47	0952	525077	233985	S	69.979	66.919	3.06	7252	524790	233265	S	73.92	71.13	2.79							
0000	525061	233074	F	-	-	-	5503	524548	233574	F	69.58	67.57	2.01	0953	525079	233988	S	-	-	-														
0001	525028	233094	F	-	-	-	5504	524569	233545	F	70.14	67.9	2.24	1058	525107	234028	S	72.398	68.478	3.92	7451	524794	233452	S	69.97	67.77	2.2							
0002	525032	234034	F	71.125	67.425	3.7	5600	524519	233687	F	-	-	-	1351	525128	233687	S	71.7	70.2	1.5	7551	524790	233560	S	70.1	68.81	1.29							
0003	525034	234029	F	70.861	65.571	5.29	5601	524593	233657	F	-	-	-	1451	525125	233411	S	71.051	69.581	1.47	7651	524740	233640	S	69.56	68.17	1.39							
0005	525078	234014	F	71.167	69.767	1.4	5605	524529	233618	F	-	-	-	1452	525156	233444	S	70.3	69.25	1.05	7653	524714	233686	S	69.08	67.65	1.43							
0100	525095	233177	F	-	-	-	5606	524532	233610	F	-	-	-	1453	525108	233431	S	70.578	69.598	0.98														
0200	525016	233390	F	-	-	-	5607	524526	233622	F	-	-	-	1507	525146	233651	S	69.709	68.109	1.6														
0201	525035	233278	F	-	-	-	5610	524562	233614	F	-	-	-	1552	525155	233560	S	69.39	67.82	1.57														
0202	525057	233243	F	-	-	-	5612	524557	233610	F	-	-	-	1553	525138	233582	S	69.18	67.58	1.6														
0301	525017	233307	F	74.138	72.438	1.7	5613	524552	233625	F	-	-	-	1554	525179	233579	S	69.577	67.967	1.61														
0302	525091	233345	F	72.649	70.859	1.79	5614	524540	233614	F	-	-	-	1555	525120	233517	S	69.69	68.4	1.29														
0303	525012	233312	F	74.004	72.422	1.582	5615	524522	233617	F	-	-	-	1562	525124	233951	S	69.486	67.175	2.31														
0304	525009	233354	F	74	72.472	1.528	5616	524535	233610	F	-	-	-	1563	525157	233926	S	69.37	67.55	1.42														
0305	525076	233330	F	-	-	-	5618	524512	233662	F	-	-	-	1564	525157	233918	S	68.94	67.31	1.63														
0401	525010	233453	F	70.332	69.122	1.21	5702	524566	233724	F	65.04	63.11	1.93	1955	525155	233999	S	71.601	68.851	2.75														
0402	525064	233488	F	70.012	68.252	1.76	5703	524558	233773	F	64.25	62.52	1.73	1956	525189	233927	S	69.448	68.368	1.08														
0404	525062	233454	F	-	-	-	5704	524569	233733	F	-	-	-	1957	525127	233955	S	-	-	-														
0405	525056	233451	F	-	-	-	5705	524579	233779	F	-	-	-	2052	525209	234023	S	73.329	69.609	3.72														
0501	525025	233594	F	68.498	67.038	1.46	5706	524586	233779	F	-	-	-	2451	525206	233480	S	69.852	68.792	1.06														
0502	525003	233565	F	68.798	67.418	1.38	5901	524515	233815	F	63.69	61.58	2.11	2452	525216	233404	S	69.972	69.052	0.92														
0601	525039	233623	F	68.162	66.362	1.8	5901	525052	233988	F	73.801	72.051	1.75	2551	525216	233536	S	69.93	68.29	1.64														
0602	525043	233618	F	68.247	66.587	1.66	5902	524538	233987	F	60.71	59.44	1.27	2552	525203	233981	S	69.683	68.143	1.54														
0603	525034	233605	F	68.349	66.739	1.61	5902	525579	233993	F	72.994	70.944	2.05	2553	525228	233590	S	69.873	68.483	1.39														
0901	525079	233985	F	70	66.01	3.99	5903	525596	233963	F	73.104	71.324	1.78	2651	525249	233609	S	70.216	68.886	1.33														
1005	525107	234025	F	72.327	68.007	4.32	5904	525538	233943	F	74.405	72.825	1.58	2652	525271	233639	S	70.513	69.053	1.46														
1100	525108	233190	F	-	-	-	5905	525549	233936	F	74.343	72.973	1.37	2853	525265	233642	S	70.571	69.231	1.34														
1101	525127	233168	F	-	-	-	5906	525564	234000	F	-	-	-	2852	525208	233879	S	69.107	67.907	1.2														
1102	525119	233137	F	-	-	-	5907	525556	233997	F	-	-	-	2853	525203	233878	S	69.095	67.945	1.15														
1103	525101	233171	F	-	-	-	5925	524513	233924	F	-	-	-	2854	525254	233844	S	69.347	68.387	0.96														
1301	525126	233384	F	71.679	69.869	1.81	5926	524506	233956	F	-	-	-	2854	525286	233816	S	70.149	68.689	1.46														
1401	525123	233412	F	71.079	69.279	1.8	6002	524566	233077	F	76.82	75.22	1.6	2855	525291	233814	S	70.175	68.795	1.38														
1402	525157	233448	F	-	-	-	6103	525557	234005	F	69.043	68.313	1.15	2856	525227	233894	S	69.481	68.231	1.25														

Appendix C – Topographical Survey



Note:

For safety reasons all underground drainage details are by visual inspection only.

Drainage must be verified on site before the commencement of any works.

All tree information is indicative and if required should be verified by a specialist .

Surveyed boundary features are not necessarily legal boundaries

Abbreviations:

BE	Bare Earth	OSF	Open Board Fence
BO	Bollard	O/H	Overhead
BP	Brick Paving	OHC	Overhead Cable
BRW	Brick Retaining Wall	P	Post
BS	Bus Stop	PCF	Post & Chain Fence
BW	Brick Wall	PWL	Parapet Wall Level
CATV	Cable TV	PRF	Post & Rail Fence
CBF	Close Board Fence	PWF	Post & Wire Fence
CL	Cover Level	RE	Rodding Eye
CWF	Chicken Wire Fence	RG	Road Gully
Conc	Concrete	RL	Ridge Level
CPS	Concrete Paving Slabs	RNP	Road Name Plate
CY	Cypress	RS	Road Sign
Dk	Drop Kerb	RW	Retaining Wall
DTL	Door Theshold	RWP	Rain Water Pipe
E	Electricity	SB	Silver Birch
EL	Eaves Level	SP	Sign Post
EP	Electricity Pole	SC	Stop Cock
ER	Earthing Rod	SPF	Stock Proof Fence
FH	Fire Hydrant	FRL	Flat Roof Level
FRL	Flat Roof Level	SRW	Stone Retaining Wall
G	Gas	St	Stump
GP	Gate Post	SV	Stop Valve
Gu	Gully	SW	Stone Wall
h	Height (metres)	Syc	Sycamore
IL	Invert Level	T	Telephone
IR	Iron Railing	TFL	Top of Fence Level
IRF	Iron Railing Fence	TWL	Top of Wall Level
JB	Junction Box	U	Unidentified
LB	Letter Box	UTL	Unable to Lift
LP	Lamp Post	V	Vent
Mkr	Marker	VP	Vent Pipe
IC	Inspection Cover	W	Water
MPF	Metal Palisade Fence		

Benchmark Details:

Survey Grid set to Ordnance Survey Grid via RTK network.

All Levels related to Ordnance Survey Datum via RTK network.

Drawing Title:

Topographical Survey

Job Title:

Deans Yard
South Road
Baldock
Hertfordshire

Scale: 1/200 Size: A1 Date: Dec 2024

Appendix D – Ground Investigation Information



MAP LAYERS

☐ Superficial Geology

☒ Bedrock Geology

About this layer:

Bedrock geology is a term used for the main mass of rocks forming the Earth that are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.



Info



Opacity



Legend

☐ Combined Geology

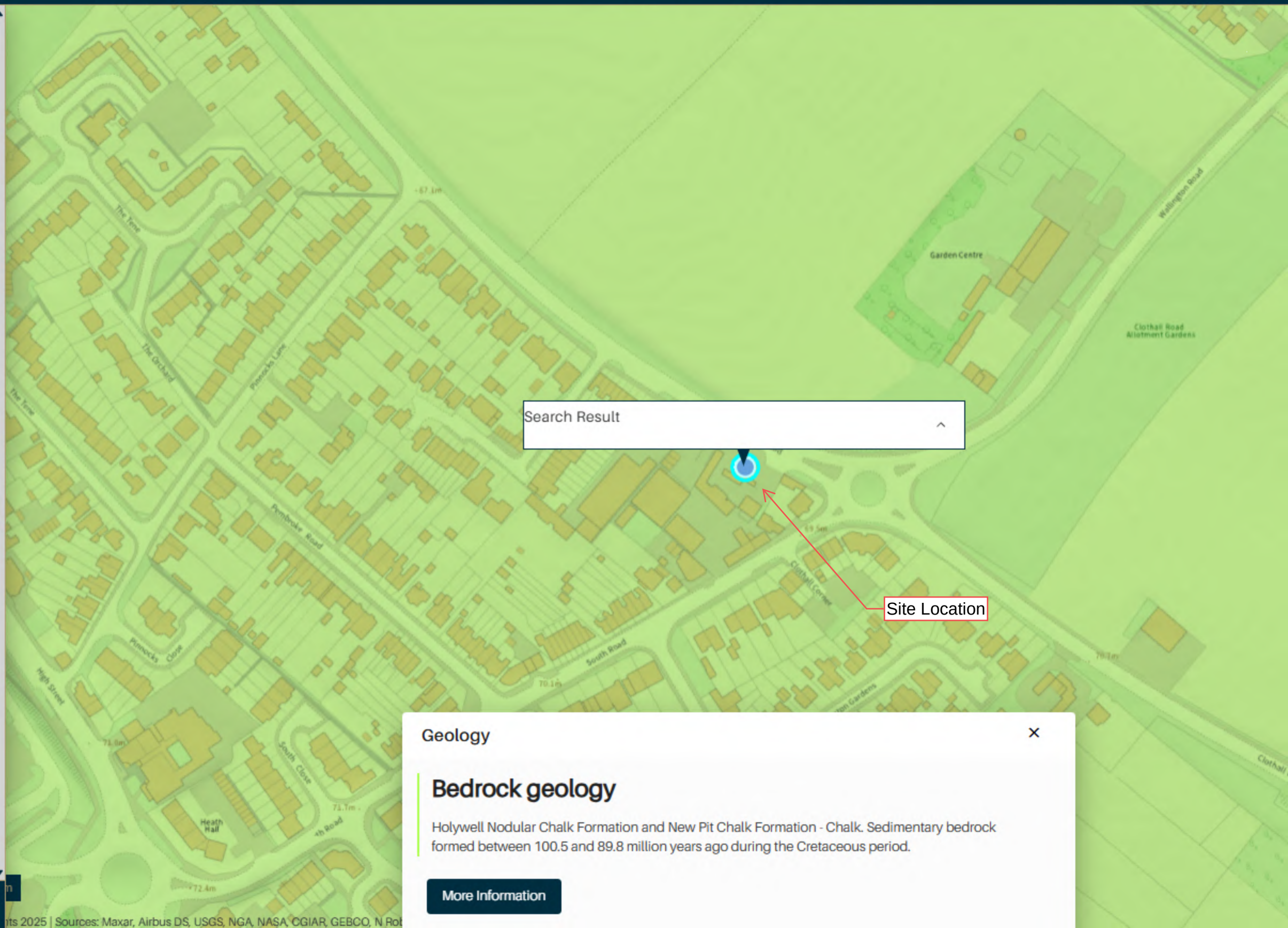
OPTIONS

Select Basemap

Settings

Contact BGS

More data? Try BGS GeoIndex



Search Result

Site Location

Geology



Bedrock geology

Holywell Nodular Chalk Formation and New Pit Chalk Formation - Chalk. Sedimentary bedrock formed between 100.5 and 89.8 million years ago during the Cretaceous period.

[More Information](#)



British
Geological
Survey

GeoIndex Onshore

Whitehorse Service Station,



Data



Borehole records



Add Data

Show Legend

TL23SW11

TL23SW10

Mercia Rd

West Close

TL23SE10

Clothall
Road Allotment
Gardens

Wallington Rd

Clothall Rd

South Rd

Pembroke Rd

Pinnocks Close

Roman La

Pinnocks La

The Orchard

The Tene

Site Location

A507

Location: 524768, 234015

221/231 Homeland, Wallington Road, Baldock

TL 23 SE 10
2522.3365

Surface +230. Bore 12 in. Water struck at +200. R.W.L. +192; Ell. Jan. 1935.
Drawdown 3. Yield 12,000 g.p.h. June 1943. R.W.L. +186½. P.W.L. +184. Yield 10,000 g.p.h.
Aug. 1948. R.W.L. +192. P.W.L. +188. Yield 10,000 g.p.h. Sept. 1954. R.W.L. +189. P.W.L. +185.
Yield 12,000 g.p.h. Oct. 1958. R.W.L. +189. P.W.L. +187. Yield 10,000 g.p.h. Electric pump.
Oct. 1963. Pumped only in summer.

MCK) LCK)	...	...	182	182	
GEOLOGICAL CLASSIFICATION	NATURE OF STRATA		THICKNESS ft.	DEPTH ft.	
Middle chalk	{	Chalk, with no flints	35'	35'	
Lower chalk		Chalk with flints			
182'		Chalk Marl.		182'	

pp. h. P. Thomas
March 1968.



221/231 Homeland, Wallington Road, Baldock

TL ~~2231~~ 336
2522 TL 23/30

Surface +230. Bore 12 in. Water struck at +200. R.W.L. +192. Ell, Jan. 1935.

Drawdown 3. Yield 12,000 g.p.h. June 1943. R.W.L. +186½. P.W.L. +184. Yield 10,000 g.p.h.

Aug. 1948. R.W.L. +192. P.W.L. +188. Yield 10,000 g.p.h. Sept. 1954. R.W.L. +189. P.W.L. +185.

Yield 12,000 g.p.h. Oct. 1958. R.W.L. +189. P.W.L. +187. Yield 10,000 g.p.h. Electric pump.

Oct. 1963. Pumped only in summer.

MCK)

...

...

182

182

LCK)

GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

THICKNESS
ft.

DEPTH
ft.

Middle chalk
Lower chalk
182'

{ Chalk with no flints
Chalk with flints
Chalk Marl.

35'

35'

182'

P.P. H.P. Thomas
March 1968.



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etc.

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PUMPS
for all duties and
GENERAL
PUMPING
MACHINERY

STEEL
WATER TOWERS

"ELSEX" WATER
SOFTENERS

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Geological Survey & Museum
Exhibition Road
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London S.W.7.

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CHAS. J. ELL & SONS

(PARTNERS: H. W. ELL, S. C. ELL)

Victoria Well Works

LEAGRAVE

LUTON

Contractors

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Rotary or Percussion
Process

DEEP WELLS

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for

WORKS, TOWNS
VILLAGES, etc.

AIR LIFT PLANTS

SUBJECT Baldock - Herts. **7NE-E**

Home land,

Jan 10th 1935

*strictly this is in
wallington parish*

Dear Sir

We have just completed the Borehole for Mr Hart at the
above who is a Nurseryman.

The Site is about 200 Yards up the Wallington Road.

Chalk with no Flints	to	35	feet
Chalk with Flints	to	62	feet
Chalk Marl	to	182	feet

We have just reached the Gault at 171 feet.

Diameter of Borehole 12" Rest Water Level 38 feet.

The pumping test is being carried out next week when we
hope to raise 10000 Gallons per hour.

Yours Faithfully

Per Pro Chas J Ell & Sons

*900 yds. E.S.E. of St. Mary's Ch. Surface c. 230 ft. on chalk subsoil.
Well situated at back of dwelling house. When pumping 12,000 galls. per
hour, water will fall a yard in half a minute, then stay at that
stage. When boring water struck at 30 ft.*

*the rest of the day
pumping all the time.*

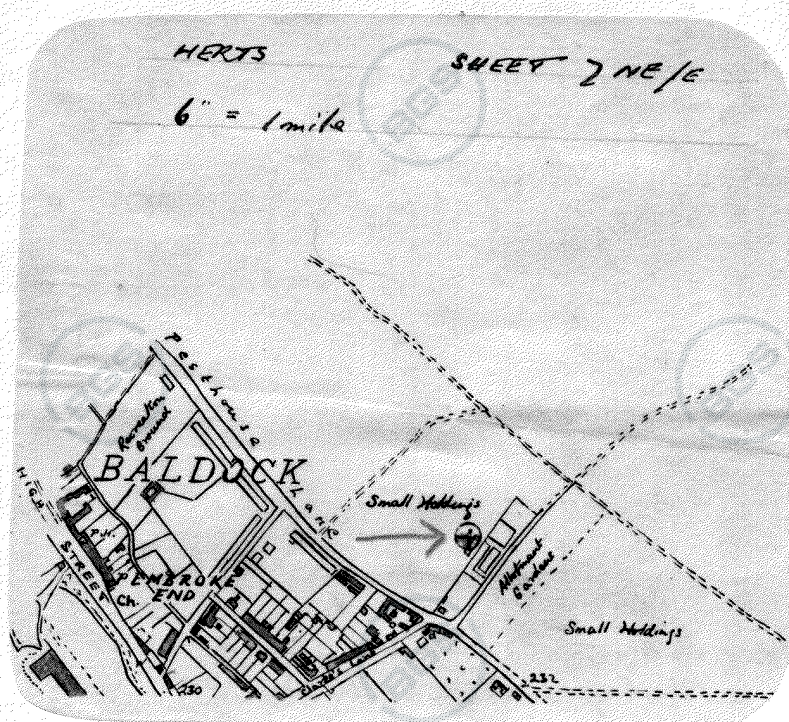
def + site (see over) from St. Hart, Esq., in letter dated 9.6.43

Visited and site amended. Supplies nursery; electric pump.

used in summer only; abstraction not known to lady of the house

OD + 230. A.S. 29/9/60.

2



DATA

Bank

LOG FOR BOREHOLE No. 61 B Fig. 81a

Location No. 4168 BALDOCK BY-PASS

Sheet 1 of 2

Carried out for Hertfordshire County Council

Date : 23/26.4.63 NGR 2784.3374

TL 23 SW 10

Equipment:- Mobile Boring Rig.

Hole diameter: 8 and 6 inch.

Description	Reduced Level	Legend	Sample	Depth	Thickness	Standard Penetration test	qs
Ground Level (Ft. above N.D.) Brown, slightly sandy silty TOPSOIL	235.2 71.68m 233.7		1	0' 0"	1' 6"		21
			2	1' 6"			26
			3				29
			4		6' 6"		24
			5		1'	58	28
			6				28
			7		11' 6"	43	26
			8		1'		27
			9		16' 6"	45	25
			10		1'		21
			11		21' 6"	47	23
			12		1'		24
			13		25' 6"	56	20
			14		29' 0"	42	26
			15		1'		22
			16		39' 0"	65	20
			17		43' 6"	70	21
			18		48' 6"	63	21

Medium hard, hard in places,
generally white but greyish in
places, CHALK, with traces of
joints, easily softened and
shattered.

Scale : 1 in. = 5 ft.

- Disturbed Sample
- Tube or Core
- Sample (length in hole)
- Bulk Sample
- Initial penetration only
- Δ Water Sample

SOIL MECHANICS LTD., 65, OLD CHURCH ST., S.W.3.



CONTINUATION LOG FOR BOREHOLE No. 61 B

Fig. 81b
Sheet 2 of 2

LOC.	Description	Reduced Level	Legend	Sample	Depth	Thickness	Standard Penetration test		No.
							Depth and penetration	No. of blows	
	TL 23 SW/10	184.7			50' 6" 15.39m				
				● 19			53' 6" 6"	70°	17
				● 20			58' 6" 2"	70°	18
	Hard, wet greyish - white CHALK, with joints, very easily softened and shattered.			● 21			63' 6" 3"	70°	18
				● 22		39' 6" penetrated	68' 6" 6"	70°	26
				● 23			75' 6" 3"	58	26
				● 24			80' 6" 6"	80	25
				● 25			85' 0" 6"	75°	24
				▲ 27					
		145.2		● 26	90' 0" 27.43m		89' 6" 6"	75°	23
	Water first observed at 52' rose to 50' 6"			END OF BOREHOLE					

LOG FOR BOREHOLE No. 62 B Fig.82a

Location No. 4168 BALDOCK BY-PASS

Sheet 1 of 2

Carried out for Hertfordshire County Council

Date : 27/30.4.63 NG-R 2784.3374

TL 23 SW 10

Equipment:- Mobile Boring Rig.

Hole diameter:- 8 and 6 inch

Description	Reduced Level	Legend	Sample	Depth	Thickness	Standard Penetration Test	#
Ground Level (Ft. above N.D.)	72.01m			0' 0"	1' 0"	Depth and penetration	
Brown, slightly sandy, silty TOPSOIL	236.3		1	1' 0"			20
	235.3		2	0.30m			23
Weak			3				30
			4		6' 6"	50	31
			5		1'		27
			6				31
			7		11' 6"	44	29
			8		1'		25
Medium hard, greyish white CHALK with joints, softened in some areas, easily shattered and softened.	222.5		9		16' 6"	70	24
	Form		10		1'		25
			11		51' 6"	21' 6"	74
			12		1'		21
			13		28' 0"	60	20
			14		6"		
			15		34' 0"	60	23
			16		3"		
					38' 6"	70	19
					6"		
					45' 0"	60	24
					3"		

Scale : 1 in. = 5 ft.

● Disturbed Sample

○ Bulk Sample

▼

— Tube or Core

— Sample (length to scale)

* Initial penetration only

Δ Water Sample

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No. NOT PLUM

TL123SW110

CONTINUATION LOG FOR BOREHOLE No. 62 B FIG. 82b.
Sheet 2 of 2

LOC.

Description	Reduced Level	Legend	Sample	Depth	Thickness	Standard Penetration test		#
						Depth and penetration	No. of blows/10'	
TL 23 SW/10 								



NOTE: Report all errors and omissions to the Architect. All dimensions to be checked on site before fabrication.

Contractors must verify all dimensions on site before setting out, commencing work, or making any shop drawings.

- All dimensions must be checked on site
- All setting out to be checked on site
- All levels must be checked on site and their datum confirmed
- This drawing must be read in conjunction with the relevant specification clauses
- This drawing must not be used for land transfer purposes

- GENERAL NOTES:**
- Existing tree to be removed
 - Application boundary
 - Existing buildings to be demolished
 - Scheduled Monument (Ref: 1016305)
 - Proposed forecourt canopy (4.5m clearance beneath)
 - Sub-Station
 - Below ground electric cables (to Groundsure property search (Ref: Q/JP&S/001929))
- Notes: Base plan references ASP Surveys
Topographical Survey data indicated magenta

P3	Planning Submission	EF	02.06.2025	MAS
P2	Pre-Application Submission	MAS	12.03.2025	MAS
P1	Information Issue	MAS	11.09.2024	MAS
Revision	Description	Drawn	Date	Checked

Client's Name
JP&S Serviss Ltd

Job Title
Clothall Road, Baldock

Drawing Title
**Proposed Site Plan
PETROL FILLING STATION**

Scale
As indicated @A1

Job No
1209

Drawing No
102

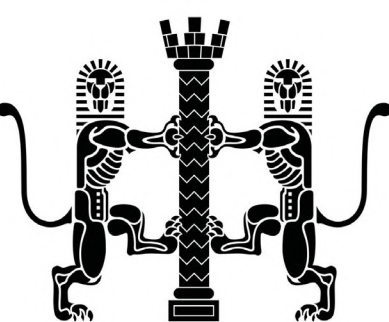
Status
PLANNING SUBMISSION

Rev
P3



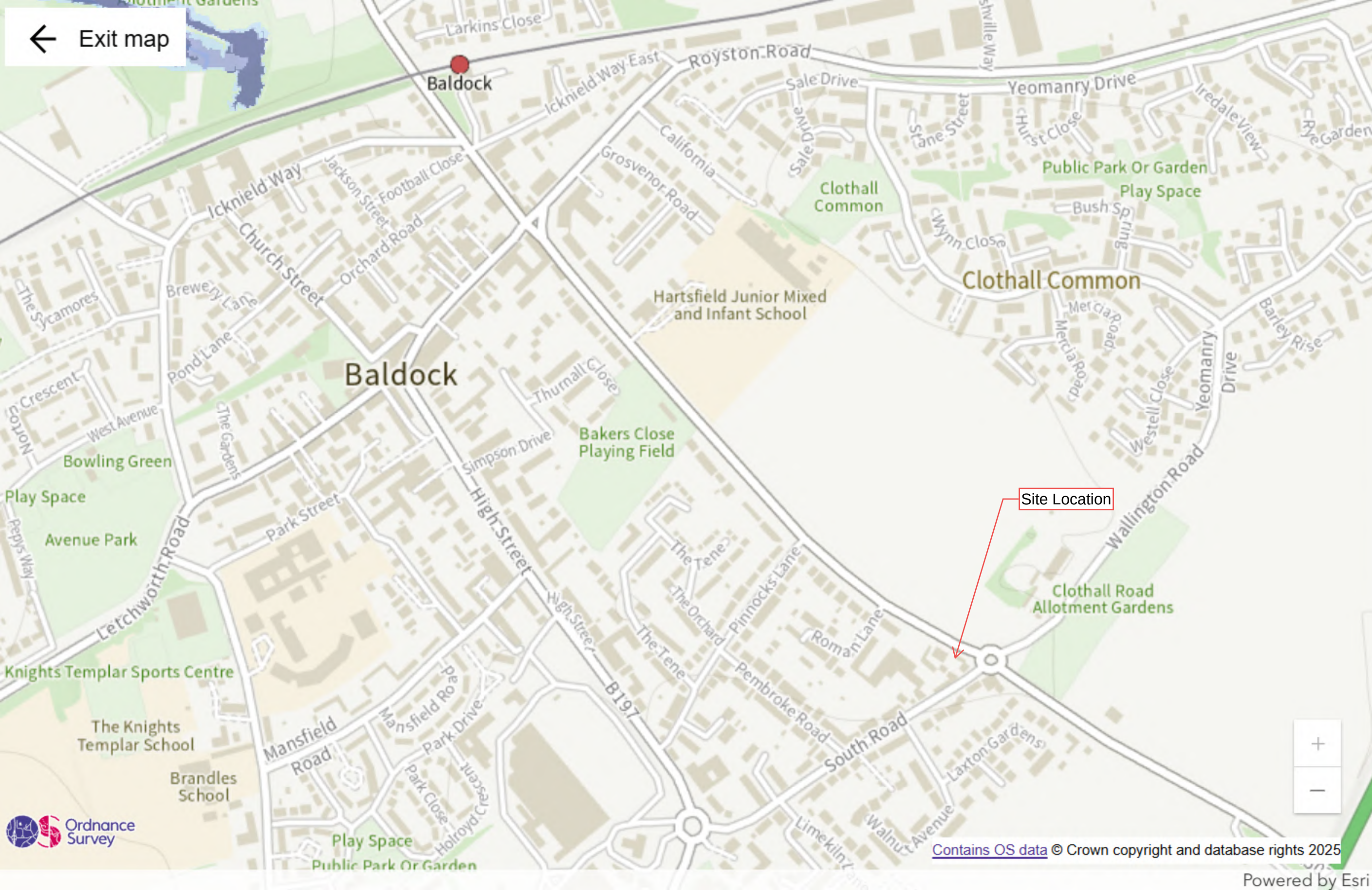
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Farnborough
Hampshire
GU14 7NA

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MJ +44 (0)777 208 3303
EJ mike@ms4architects.co.uk



Appendix F – Fluvial Flooding Information

← Exit map



Rivers and sea map

Yearly chance of flooding

● Flood area (extent)

High chance

Medium chance

Low chance

Very low chance

Yearly chance of flooding between 2036 and 2069

○ Flood area (extent)

Map details

☒ Show flooding

☐ Selected address

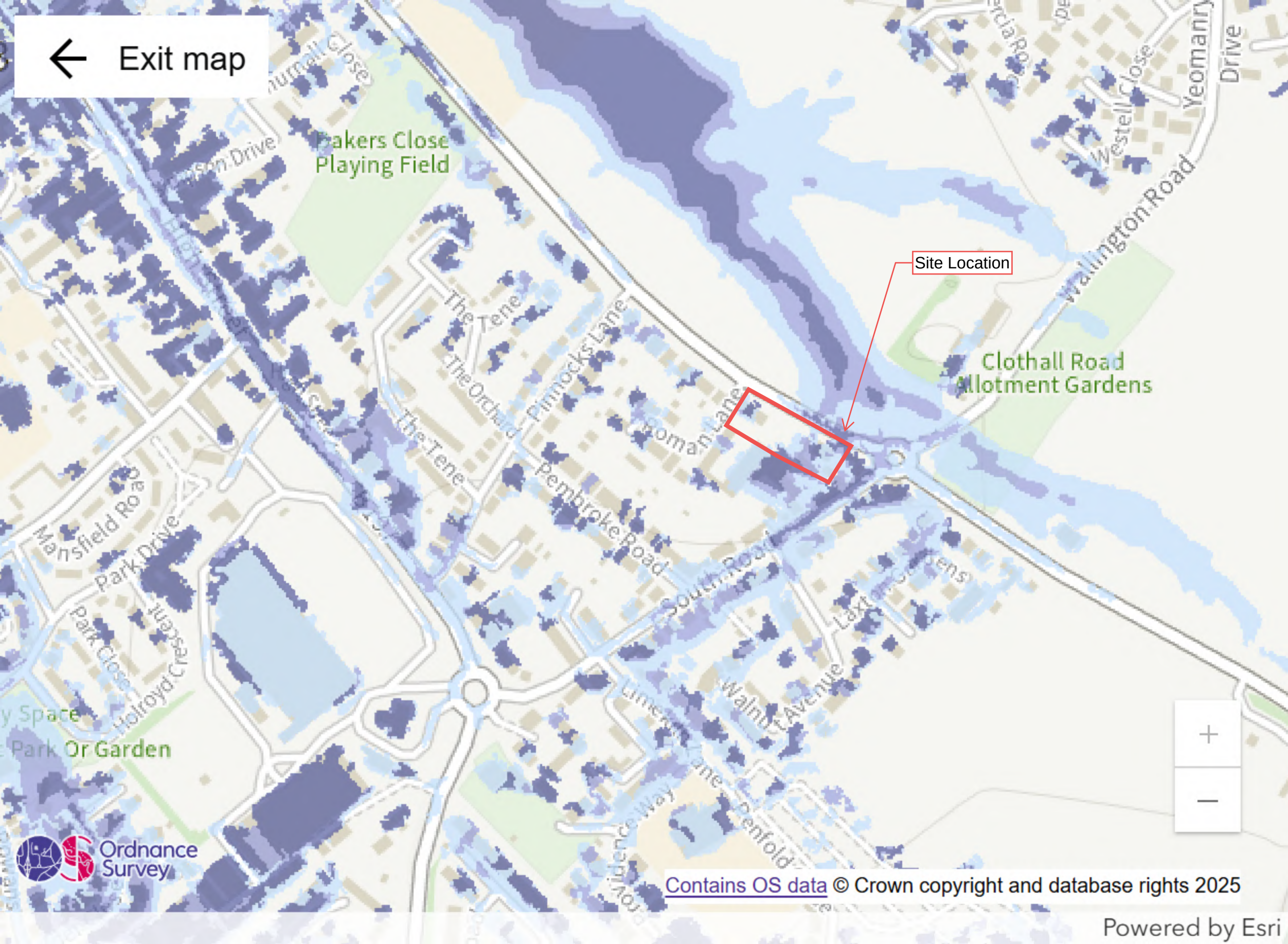


Legend

- EA Flood Zone 3
- EA Flood Zone 2

Appendix G – Surface Water Flooding Information

← Exit map



Surface water map

- High chance
- Medium chance
- Low chance

Yearly chance of flooding
between 2040 and 2060

○ Flood area (extent)

Map details

- ☒ Show flooding
- ☐ Selected address



SG7 6PD



Buscar resultados de SG7 6PD



Leyenda



Surface Water and Groundwater Flooding

Risk of Flooding from Surface Water

Max Extent

Risk of Flooding from Surface Water map (1 in 30yr)



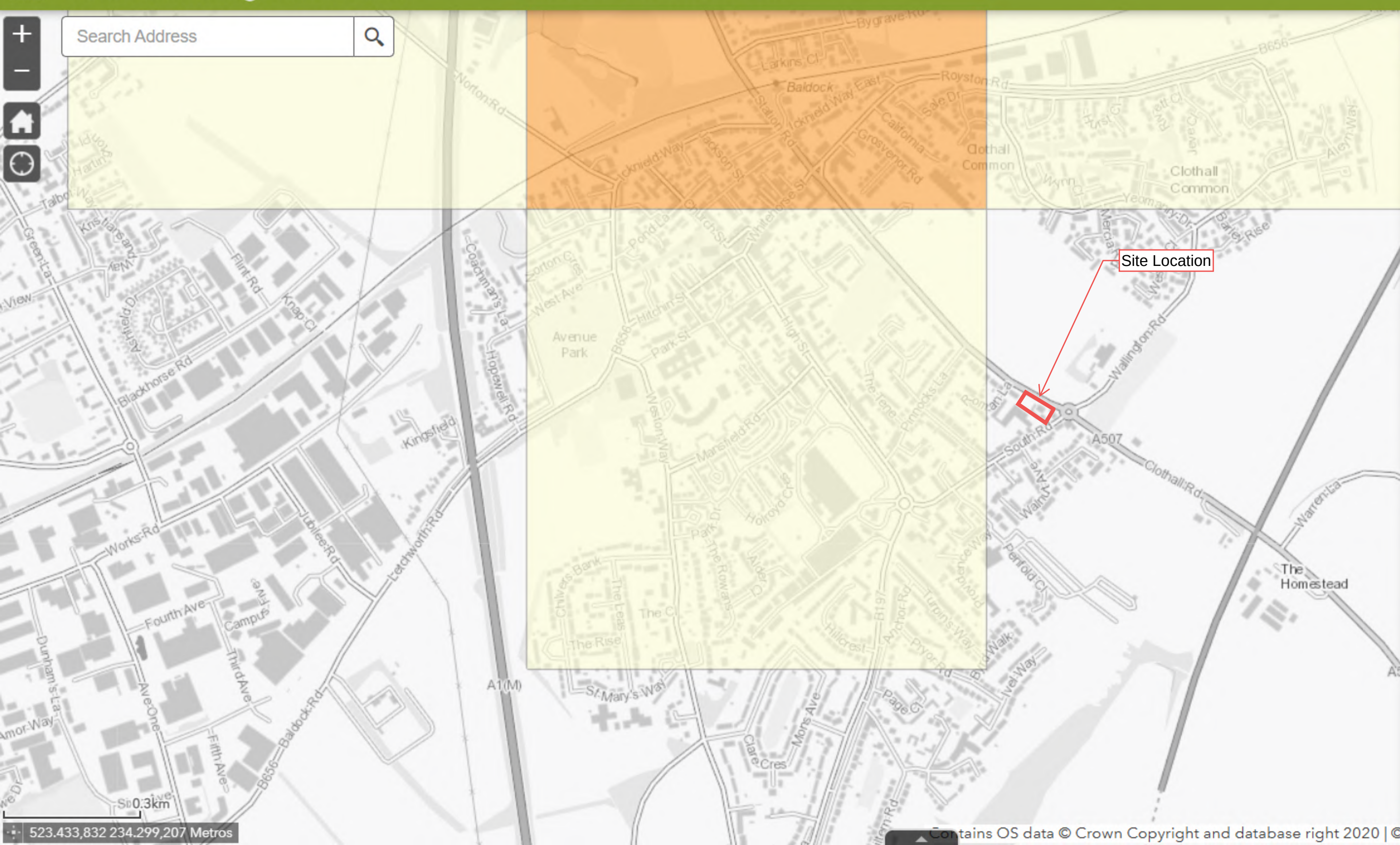
Risk of Flooding from Surface Water map (1 in 100yr)



Risk of Flooding from Surface Water map (1 in 1000yr)



Appendix H – Groundwater Flooding Information



Legend

Surface Water and Groundwater Flooding

Risk of Flooding from Groundwater

Areas Susceptible to Groundwater Flooding

- $\geq 75\%$
- $\geq 50\% < 75\%$
- $\geq 25\% < 50\%$
- $< 25\%$

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Appendix I – Reservoir Flooding Information

← Exit map

📖 Surface water

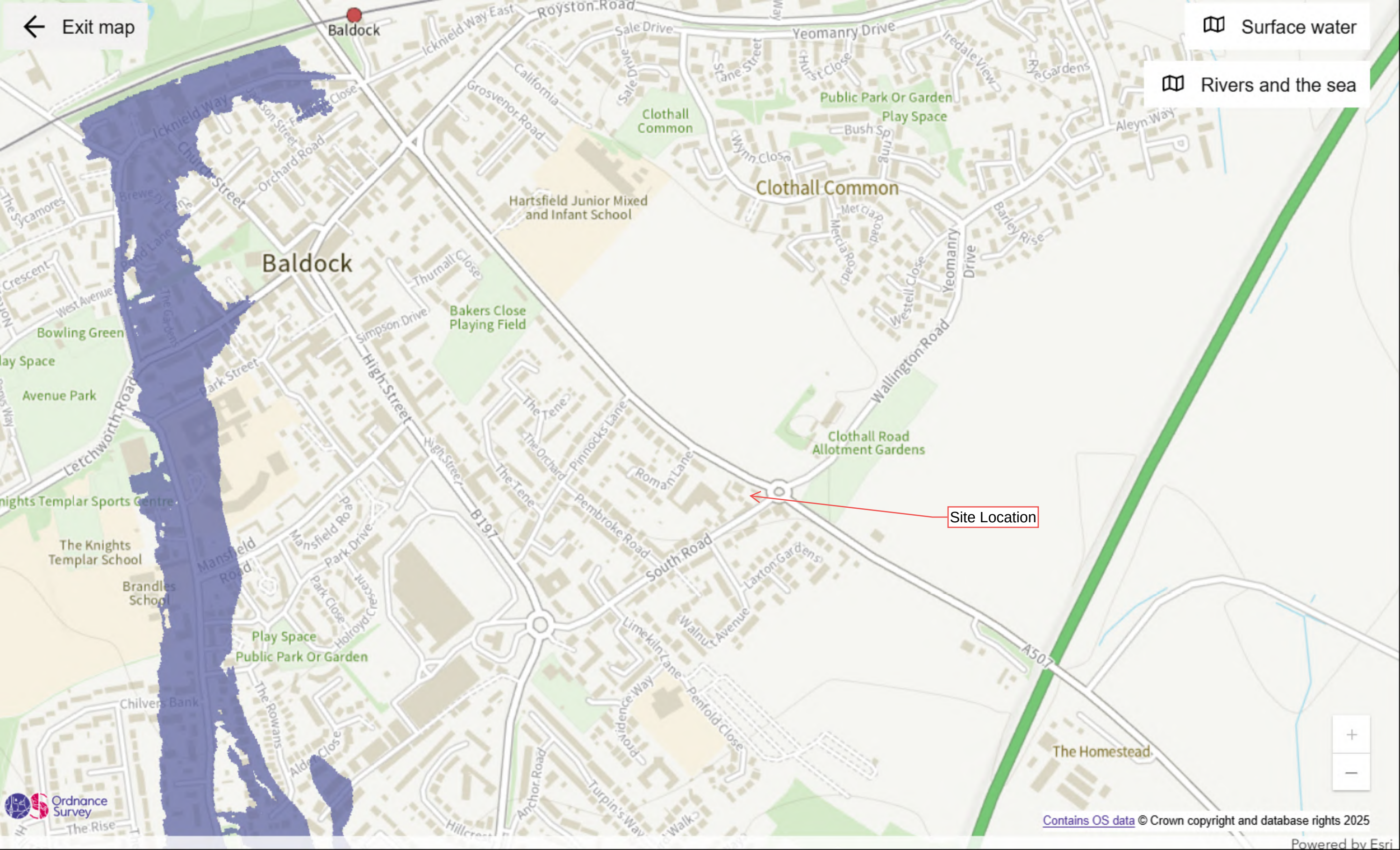
📖 Rivers and the sea

Reservoirs map

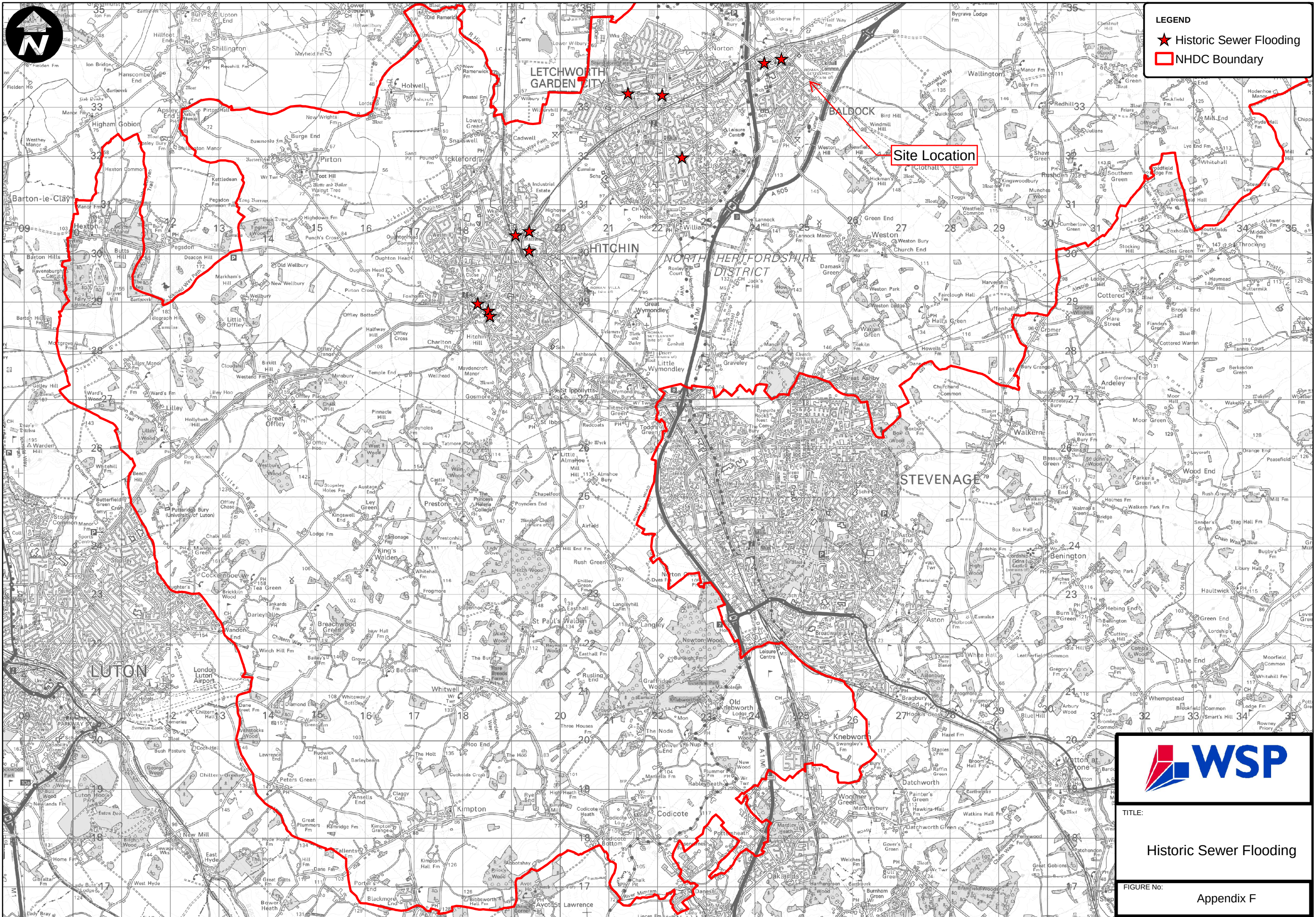
- Extent
 - When river levels are normal
 - When there is also flooding from rivers

Map details

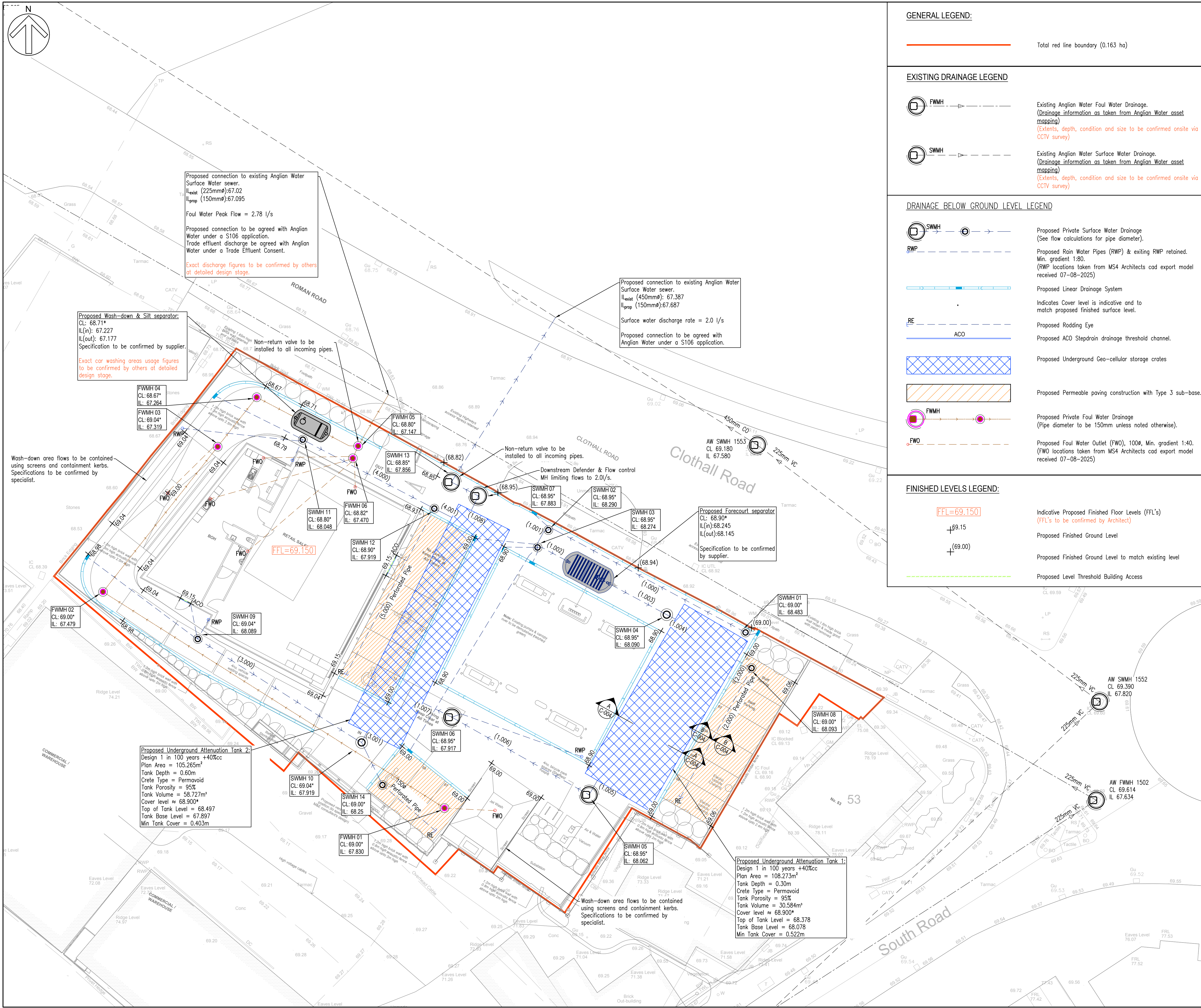
☒ Show flooding



Appendix J – Artificial Flooding Information



Appendix I – Drainage Strategy Plans



GENERAL LEGEND:

Total red line boundary (0.163 ha)

EXISTING DRAINAGE LEGEND

FWMH Existing Anglian Water Foul Water Drainage.
(Drainage information as taken from Anglian Water asset mapping)
(Extents, depth, condition and size to be confirmed onsite via CCTV survey)

SWMH Existing Anglian Water Surface Water Drainage.
(Drainage information as taken from Anglian Water asset mapping)
(Extents, depth, condition and size to be confirmed onsite via CCTV survey)

DRAINAGE BELOW GROUND LEVEL LEGEND

SWMH Proposed Private Surface Water Drainage
(See flow calculations for pipe diameter).

RWP Proposed Rain Water Pipes (RWP) & exiting RWP retained.
Min. gradient 1:80.
(RWP locations taken from MS4 Architects cad export model received 07-08-2025)

RE Proposed Linear Drainage System
Indicates Cover level is indicative and to match proposed finished surface level.

ACO Proposed Rodding Eye
Proposed ACO Stepdrain drainage threshold channel.

FWMH Proposed Underground Geo-cellular storage crates

FWO Proposed Permeable paving construction with Type 3 sub-base.

FWMH Proposed Private Foul Water Drainage
(Pipe diameter to be 150mm unless noted otherwise).

FWO Proposed Foul Water Outlet (FWO), 100Ø, Min. gradient 1:40.
(FWO locations taken from MS4 Architects cad export model received 07-08-2025)

FINISHED LEVELS LEGEND:

FFL=69.150 Indicative Proposed Finished Floor Levels (FFL's)
(FFL's to be confirmed by Architect)

+69.15 Proposed Finished Ground Level

+ (69.00) Proposed Finished Ground Level to match existing level

--- Proposed Level Threshold Building Access

DO NOT SCALE

GENERAL

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- The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
- All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
- The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
- Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
- This drawing should not be used for setting out
- All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

P1	12-08-2025	KH	PLANNING ISSUE	FR	DM
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD

DRAWING STATUS: FOR PLANNING

Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civistix.com
www.civistix.com

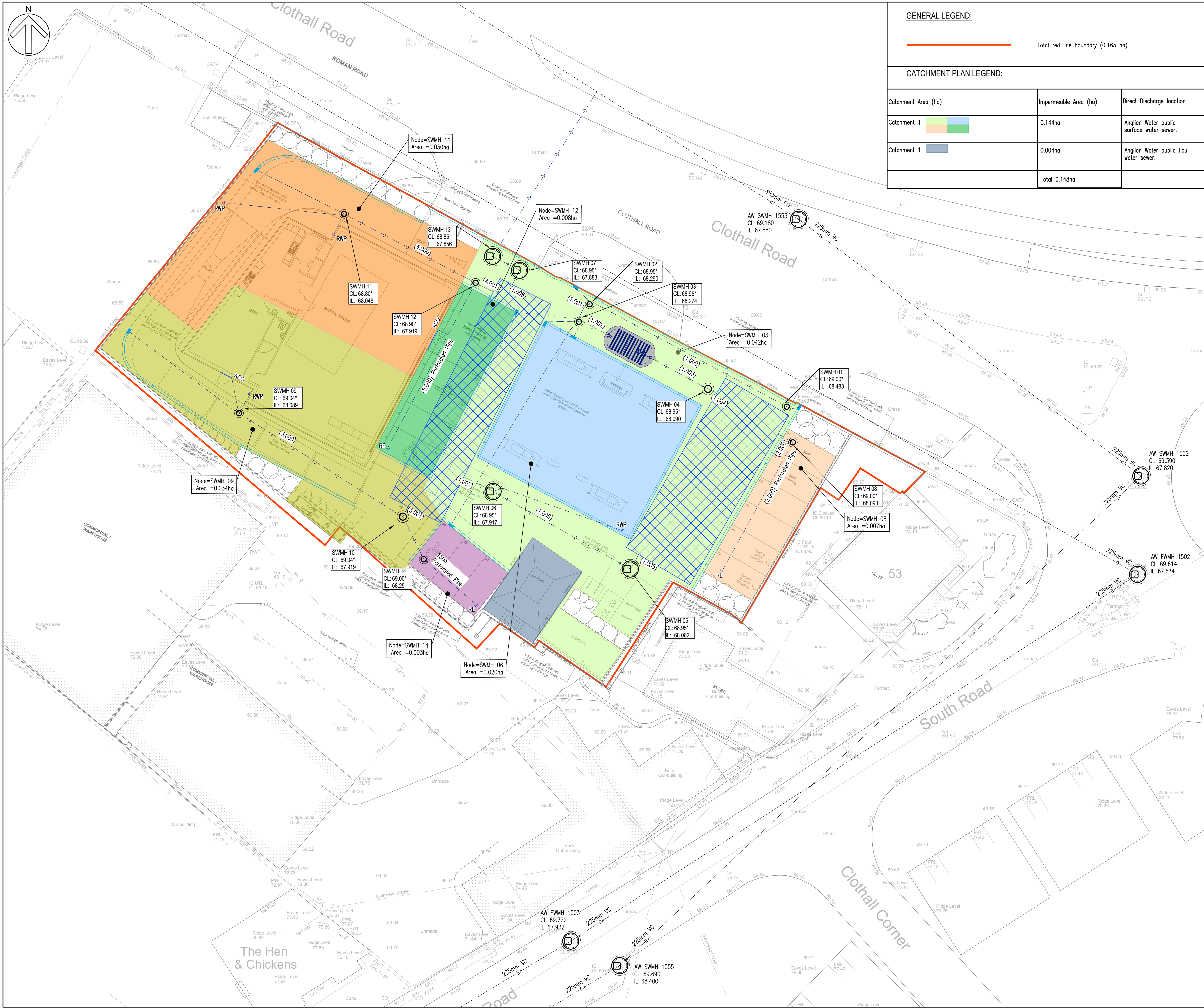
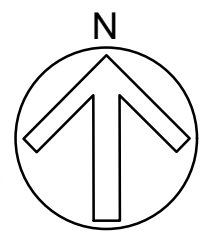
CLIENT: JP & S Services Ltd

ARCHITECT: MS4 Architects LTD

PROJECT: Petrol Filling Station, Clothall Road, Baldock (SG7 6PD)

DRAWING TITLE: Proposed Private Drainage GA Plan

SCALE @ A1: 1:150	CHECKED / APPROVED BY: FR/DM	DATE: August 2025
PROJECT No: 2-294	DRAWING No: C-002	REV: P1



GENERAL LEGEND:

Total red line boundary (0.163 ha)

CATCHMENT PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
Catchment 1	0.144ha	Anglian Water public surface water sewer.
Catchment 1	0.004ha	Anglian Water public Foul water sewer.
Total 0.148ha		

DO NOT SCALE

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P1	12-08-2025	KH	PLANNING ISSUE	FR	DM
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD

DRAWING STATUS:	FOR PLANNING
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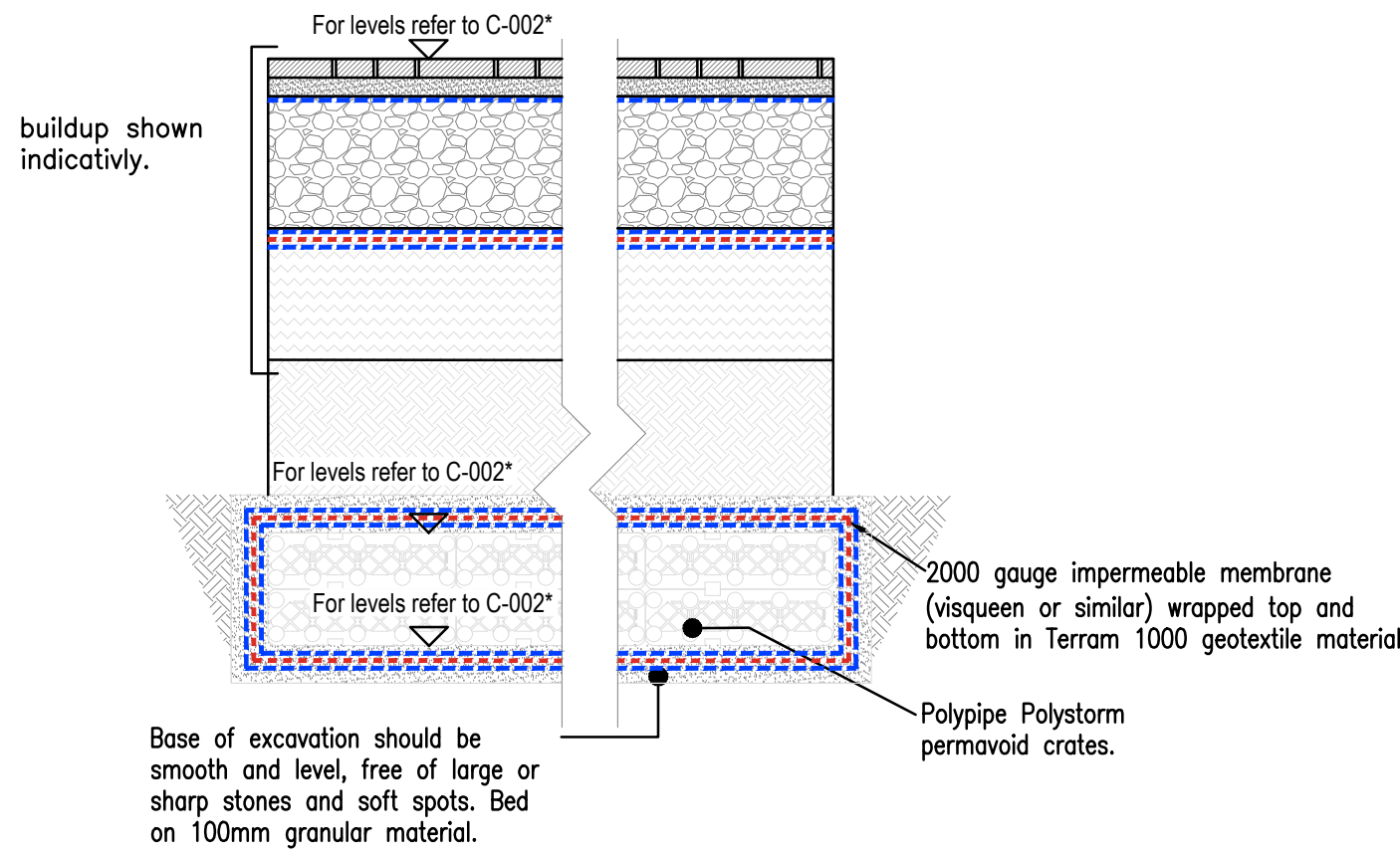
Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civistix.com
www.civistix.com

CLIENT:	JP & S Services Ltd
ARCHITECT:	MS4 Architects LTD
PROJECT:	Petrol Filling Station, Clothall Road, Baldock (SG7 6PD)

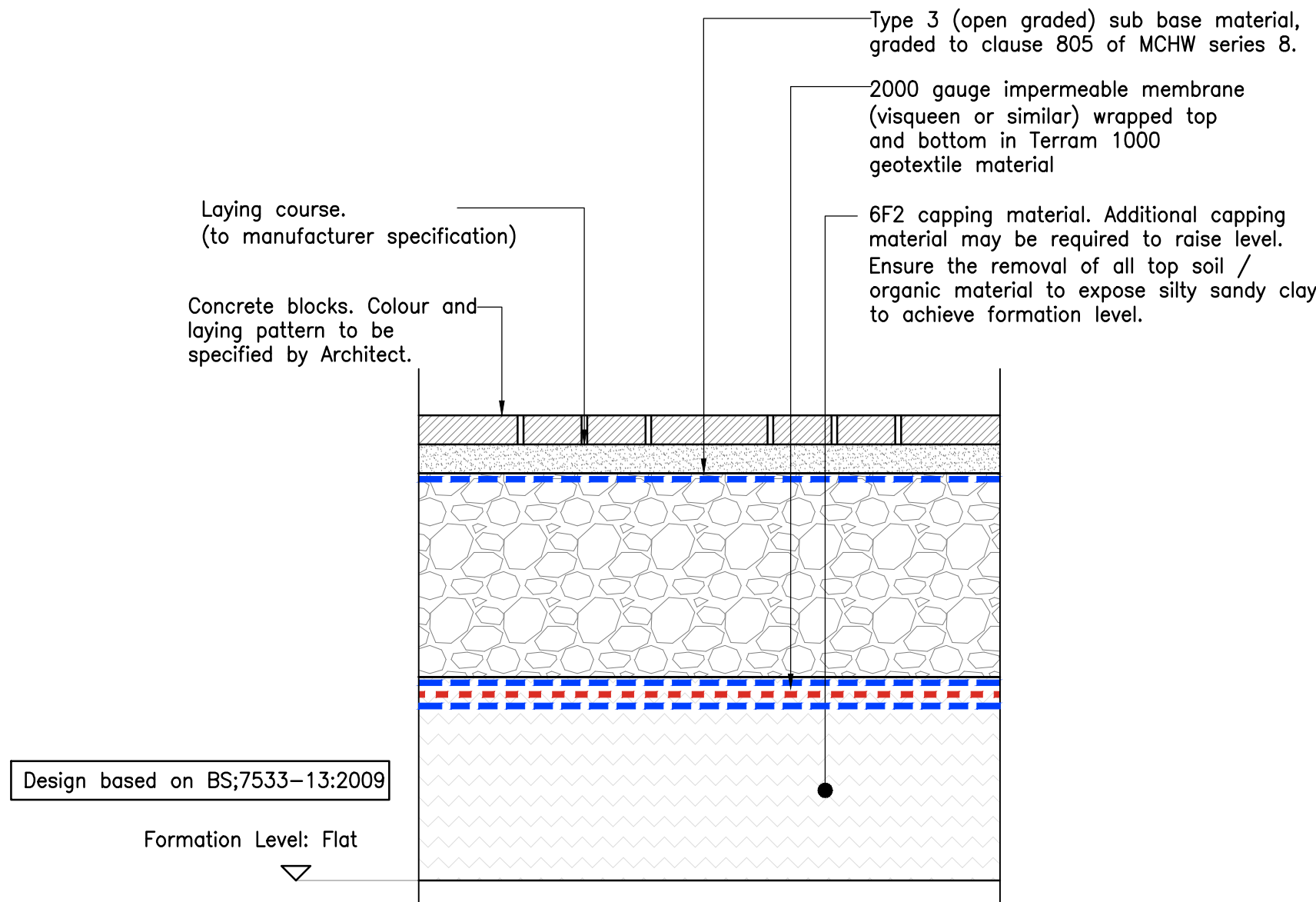
DRAWING TITLE:

Proposed Surface Water Catchment Plan

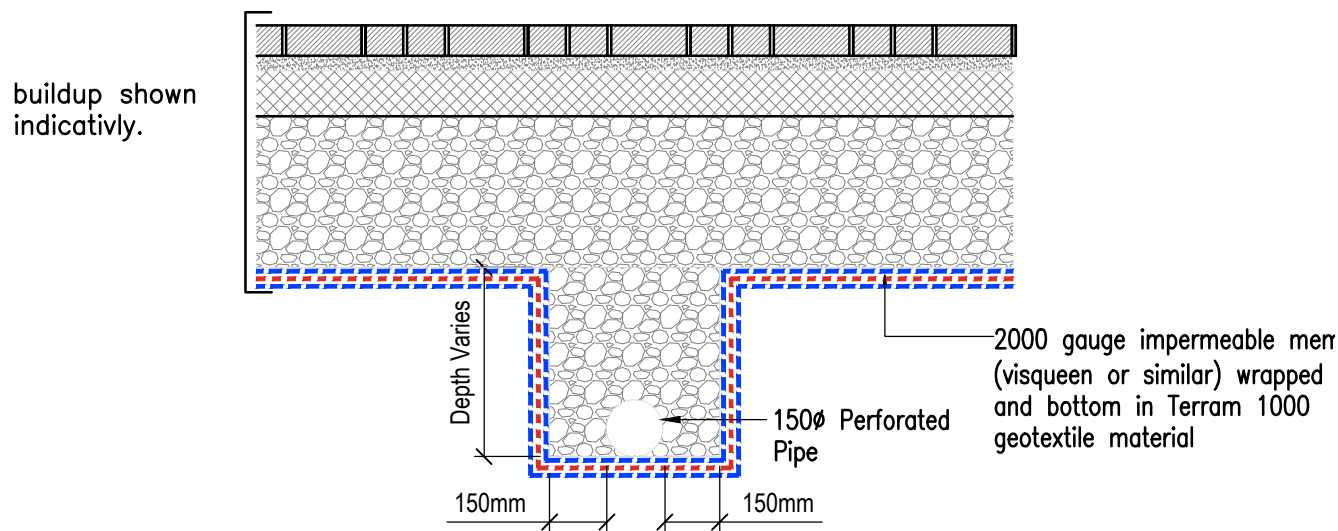
SCALE @ A1:	1:150	CHECKED / APPROVED BY: FR/DM	DATE: August 2025
PROJECT No:	2-294	DRAWING No: C-003	REV: P1



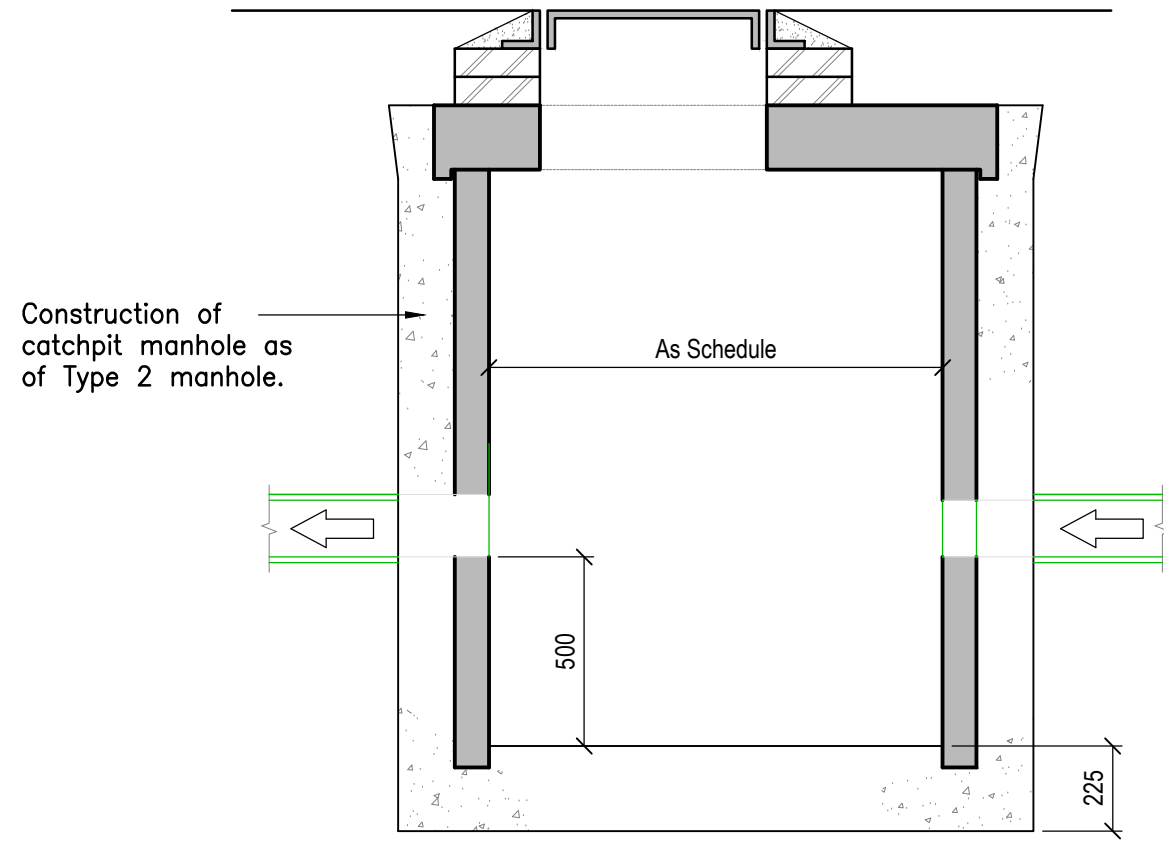
Section A-A - Typical Geo-Cellular Lined Tank Detail
(1:20)



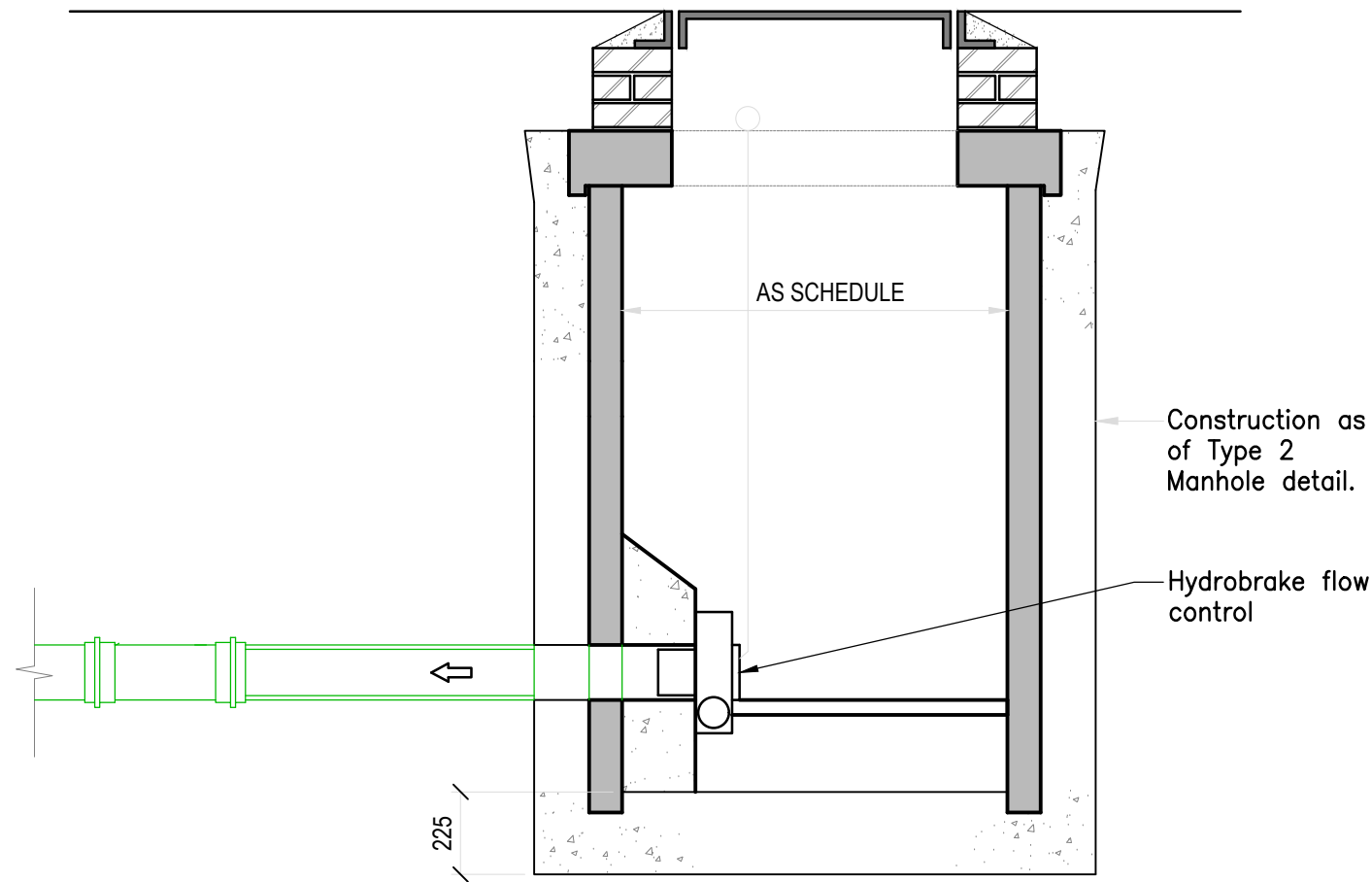
Proposed Lined Permeable Block Construction Detail
(System C - Tanked permeable paving)
(1:10)



Section B-B - Typical Sub-Formation Drainage Arrangement
(1:20)



Typical Catchpit Detail - Type 2 (1:20)
(Max depth from cover level to soffit of pipe of 3.0m)
Manhole construction shall comply with Sewers for Adoption 7th Edition



Control Chamber with Emergency Overflow Detail (1:20)
(Max depth from cover level to soffit of pipe of 3.0m)
Manhole construction shall comply with Sewers for Adoption 7th Edition

DO NOT SCALE

GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
8. This drawing should not be used for setting out
9. All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

P1	12-08-2025	KH	PLANNING ISSUE	FR	DM
REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD

DRAWING STATUS: FOR PLANNING



Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: JP & S Services Ltd

ARCHITECT: MS4 Architects LTD

PROJECT: Petrol Filling Station, Clothall Road, Baldock (SG7 6PD)

DRAWING TITLE: Proposed Private Drainage Construction Details

SCALE @ A1: AS SHOWN	CHECKED / APPROVED BY: FR/DM	DATE: August 2025
PROJECT No: 2-294	DRAWING No: C-004	REV: P1

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SWMH 01		4.00	69.000	450	525134.859	233565.580	0.517
SWMH 02			68.950	450	525117.771	233574.458	0.660
SWMH 03	0.042	4.00	68.950	450	525116.767	233573.185	0.676
SWMH 04			68.950	600	525128.026	233567.124	0.860
SWMH 05			68.950	1200	525121.299	233551.507	0.888
SWMH 06	0.020	4.00	68.950	1200	525109.408	233558.236	1.033
SWMH 07			68.950	1200	525111.708	233577.407	1.067
SWMH 08	0.007	4.00	69.000	450	525135.380	233562.488	0.907
SWMH 09	0.034	4.00	69.040	450	525087.482	233565.216	0.951
SWMH 10			69.040	600	525101.456	233555.776	1.121
SWMH 11	0.030	4.00	68.800	450	525096.493	233582.289	0.752
SWMH 12	0.008	4.00	68.900	450	525107.891	233576.315	0.981
SWMH 14	0.003	4.00	69.000	450	525103.393	233552.357	1.040
ATT TANK1			68.900	1	525129.100	233566.546	0.822
ATT TANK2			68.900	1	525106.881	233559.493	1.003
Forecourt			68.900	1	525119.314	233571.814	0.755

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SWMH 01	SWMH 02	19.257	0.600	68.483	68.290	0.193	99.8	150	4.32	50.0
1.001	SWMH 02	SWMH 03	1.621	0.600	68.290	68.274	0.016	101.3	150	4.35	50.0
1.002	SWMH 03	Forecourt	2.893	0.600	68.274	68.245	0.029	99.8	150	4.39	50.0
1.003	Forecourt	SWMH 04	5.547	0.600	68.145	68.090	0.055	100.9	150	4.49	50.0
1.004	SWMH 04	ATT TANK1	1.220	0.600	68.090	68.078	0.012	101.7	150	4.51	50.0
1.005	ATT TANK1	SWMH 05	1.594	0.600	68.078	68.062	0.016	99.6	150	4.53	50.0
1.006	SWMH 05	SWMH 06	14.513	0.600	68.062	67.917	0.145	100.1	150	4.77	50.0
1.007	SWMH 06	ATT TANK2	1.974	0.600	67.917	67.897	0.020	98.7	150	4.81	50.0
1.008	ATT TANK2	SWMH 07	1.394	0.600	67.897	67.883	0.014	99.6	150	4.83	50.0
2.000	SWMH 08	ATT TANK1	1.470	0.600	68.093	68.078	0.015	98.0	150	4.02	50.0
3.000	SWMH 09	SWMH 10	16.952	0.600	68.089	67.919	0.170	99.7	150	4.28	50.0
3.001	SWMH 10	ATT TANK2	2.223	0.600	67.919	67.897	0.022	101.0	150	4.32	50.0
4.000	SWMH 11	SWMH 12	12.869	0.600	68.048	67.919	0.129	99.8	150	4.21	50.0
4.001	SWMH 12	ATT TANK2	2.161	0.600	67.919	67.897	0.022	98.2	150	4.25	50.0
5.000	SWMH 14	SWMH 10	3.930	0.600	67.960	67.919	0.041	95.8	150	4.06	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	3000	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	40	0	0
100	40	0	0

Node SWMH 07 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	67.883	Product Number	CTL-SHE-0073-2000-0599-2000
Design Depth (m)	0.599	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node ATT TANK1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	68.078	Depth (m)	0.300
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	488	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	6.372	Number Required	1
Porosity	0.94	Pit Length (m)	16.992		

Node ATT TANK2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	67.897	Depth (m)	0.600
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	476	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.956	Number Required	1
Porosity	0.94	Pit Length (m)	21.240		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SWMH 01	1	68.483	0.000	0.0	0.0000	0.0000	OK
15 minute summer	SWMH 02	10	68.333	0.043	0.5	0.0068	0.0000	OK
15 minute summer	SWMH 03	10	68.333	0.059	4.7	0.0093	0.0000	OK
15 minute winter	SWMH 04	9	68.231	0.141	5.1	0.0399	0.0000	OK
180 minute summer	SWMH 05	108	68.089	0.027	1.3	0.0310	0.0000	OK
240 minute summer	SWMH 06	160	67.985	0.068	1.8	0.0772	0.0000	OK
240 minute summer	SWMH 07	160	67.985	0.102	1.9	0.1149	0.0000	OK
15 minute summer	SWMH 08	9	68.122	0.029	0.8	0.0046	0.0000	OK
15 minute summer	SWMH 09	10	68.136	0.047	3.8	0.0075	0.0000	OK
240 minute summer	SWMH 10	160	67.985	0.066	1.5	0.0187	0.0000	OK
15 minute summer	SWMH 11	10	68.092	0.044	3.3	0.0070	0.0000	OK
240 minute summer	SWMH 12	160	67.985	0.066	1.5	0.0105	0.0000	OK
240 minute summer	SWMH 14	160	67.985	0.025	0.1	0.0040	0.0000	OK
180 minute summer	ATT TANK1	108	68.108	0.030	2.3	3.0713	0.0000	OK
240 minute summer	ATT TANK2	160	67.985	0.088	4.6	8.7166	0.0000	OK
15 minute summer	Forecourt	9	68.234	0.089	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SWMH 01	1.000	SWMH 02	0.0	0.000	0.000	0.0396	21.6
15 minute summer	SWMH 02	1.001	SWMH 03	-0.5	-0.153	-0.030	0.0085	
15 minute summer	SWMH 03	1.002	Forecourt	4.7	0.788	0.262	0.0171	
15 minute winter	SWMH 04	1.004	ATT TANK1	6.4	1.210	0.365	0.0106	
180 minute summer	SWMH 05	1.006	SWMH 06	1.3	0.365	0.073	0.0664	
240 minute summer	SWMH 06	1.007	ATT TANK2	1.8	0.584	0.099	0.0183	
240 minute summer	SWMH 07	Hydro-Brake®		1.9				
15 minute summer	SWMH 08	2.000	ATT TANK1	0.9	0.825	0.049	0.0019	
15 minute summer	SWMH 09	3.000	SWMH 10	3.8	0.700	0.213	0.0920	
240 minute summer	SWMH 10	3.001	ATT TANK2	1.4	0.471	0.082	0.0203	
15 minute summer	SWMH 11	4.000	SWMH 12	3.3	0.634	0.185	0.0699	
240 minute summer	SWMH 12	4.001	ATT TANK2	1.5	0.506	0.082	0.0197	
240 minute summer	SWMH 14	5.000	SWMH 10	0.1	0.098	0.006	0.0185	
180 minute summer	ATT TANK1	1.005	SWMH 05	1.3	0.549	0.073	0.0038	
240 minute summer	ATT TANK2	1.008	SWMH 07	1.9	0.231	0.107	0.0163	
15 minute summer	Forecourt	1.003	SWMH 04	6.0	0.632	0.341	0.0774	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SWMH 01	11	68.593	0.110	2.4	0.0175	0.0000	OK
15 minute summer	SWMH 02	11	68.589	0.299	4.3	0.0475	0.0000	SURCHARGED
15 minute summer	SWMH 03	11	68.588	0.314	29.9	0.0499	0.0000	SURCHARGED
240 minute winter	SWMH 04	236	68.337	0.247	4.9	0.0700	0.0000	SURCHARGED
240 minute winter	SWMH 05	232	68.337	0.275	3.6	0.3111	0.0000	SURCHARGED
240 minute winter	SWMH 06	232	68.337	0.420	5.6	0.4748	0.0000	SURCHARGED
240 minute winter	SWMH 07	232	68.336	0.453	2.1	0.5126	0.0000	OK
240 minute winter	SWMH 08	232	68.337	0.244	0.8	0.0388	0.0000	SURCHARGED
15 minute summer	SWMH 09	10	68.478	0.389	24.2	0.0618	0.0000	SURCHARGED
240 minute winter	SWMH 10	232	68.337	0.418	4.1	0.1182	0.0000	SURCHARGED
15 minute summer	SWMH 11	10	68.356	0.308	21.3	0.0490	0.0000	SURCHARGED
240 minute winter	SWMH 12	232	68.337	0.418	4.3	0.0664	0.0000	SURCHARGED
240 minute winter	SWMH 14	232	68.337	0.377	0.3	0.0599	0.0000	SURCHARGED
240 minute winter	ATT TANK1	232	68.337	0.259	7.2	26.3670	0.0000	SURCHARGED
240 minute winter	ATT TANK2	232	68.337	0.440	12.5	43.5055	0.0000	SURCHARGED
15 minute summer	Forecourt	11	68.464	0.319	26.2	0.0000	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SWMH 01	1.000	SWMH 02	3.6	0.264	0.203	0.3027	
15 minute summer	SWMH 02	1.001	SWMH 03	6.4	0.366	0.365	0.0285	
15 minute summer	SWMH 03	1.002	Forecourt	26.2	1.490	1.475	0.0509	
240 minute winter	SWMH 04	1.004	ATT TANK1	4.8	0.872	0.274	0.0215	
240 minute winter	SWMH 05	1.006	SWMH 06	3.6	0.352	0.204	0.2555	
240 minute winter	SWMH 06	1.007	ATT TANK2	5.4	0.713	0.304	0.0348	
240 minute winter	SWMH 07	Hydro-Brake®		2.0				95.8
240 minute winter	SWMH 08	2.000	ATT TANK1	0.8	0.550	0.043	0.0259	
15 minute summer	SWMH 09	3.000	SWMH 10	23.2	1.316	1.303	0.2984	
240 minute winter	SWMH 10	3.001	ATT TANK2	4.0	0.749	0.226	0.0391	
15 minute summer	SWMH 11	4.000	SWMH 12	20.6	1.170	1.159	0.2266	
240 minute winter	SWMH 12	4.001	ATT TANK2	4.2	0.860	0.237	0.0380	
240 minute winter	SWMH 14	5.000	SWMH 10	0.2	0.108	0.014	0.0692	
240 minute winter	ATT TANK1	1.005	SWMH 05	3.6	0.724	0.204	0.0281	
240 minute winter	ATT TANK2	1.008	SWMH 07	2.1	0.286	0.119	0.0245	
15 minute summer	Forecourt	1.003	SWMH 04	26.4	1.501	1.495	0.0977	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SWMH 01	11	68.797	0.314	6.4	0.0499	0.0000	FLOOD RISK
15 minute summer	SWMH 02	11	68.798	0.508	8.7	0.0808	0.0000	FLOOD RISK
15 minute summer	SWMH 03	11	68.798	0.524	37.8	0.0833	0.0000	FLOOD RISK
240 minute winter	SWMH 04	228	68.489	0.399	6.0	0.1130	0.0000	SURCHARGED
240 minute winter	SWMH 05	236	68.487	0.425	3.7	0.4804	0.0000	SURCHARGED
240 minute winter	SWMH 06	232	68.487	0.570	5.7	0.6442	0.0000	SURCHARGED
240 minute winter	SWMH 07	236	68.486	0.603	2.1	0.6821	0.0000	OK
240 minute winter	SWMH 08	232	68.488	0.395	1.0	0.0628	0.0000	SURCHARGED
15 minute summer	SWMH 09	10	68.754	0.665	30.6	0.1057	0.0000	FLOOD RISK
240 minute winter	SWMH 10	236	68.487	0.568	5.1	0.1606	0.0000	SURCHARGED
15 minute summer	SWMH 11	10	68.570	0.522	27.0	0.0829	0.0000	FLOOD RISK
240 minute winter	SWMH 12	236	68.487	0.568	5.4	0.0903	0.0000	SURCHARGED
240 minute winter	SWMH 14	236	68.487	0.527	0.4	0.0837	0.0000	SURCHARGED

240 minute winter	ATT TANK1	236	68.487	0.409	9.0	30.5840	0.0000	SURCHARGED
240 minute winter	ATT TANK2	236	68.487	0.590	13.1	58.3445	0.0000	SURCHARGED

15 minute summer	Forecourt	11	68.611	0.466	32.2	0.0000	0.0000	FLOOD RISK
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Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SWMH 01	1.000	SWMH 02	-6.4	-0.381	-0.359	0.3390	
15 minute summer	SWMH 02	1.001	SWMH 03	8.7	0.496	0.495	0.0285	
15 minute summer	SWMH 03	1.002	Forecourt	32.2	1.830	1.813	0.0509	
240 minute winter	SWMH 04	1.004	ATT TANK1	5.9	1.036	0.335	0.0215	
240 minute winter	SWMH 05	1.006	SWMH 06	3.5	0.357	0.199	0.2555	
240 minute winter	SWMH 06	1.007	ATT TANK2	5.6	0.624	0.312	0.0348	
240 minute winter	SWMH 07	Hydro-Brake®		2.0				118.8
240 minute winter	SWMH 08	2.000	ATT TANK1	0.9	0.539	0.051	0.0259	
15 minute summer	SWMH 09	3.000	SWMH 10	29.0	1.648	1.632	0.2984	
240 minute winter	SWMH 10	3.001	ATT TANK2	5.0	0.788	0.285	0.0391	
15 minute summer	SWMH 11	4.000	SWMH 12	26.0	1.476	1.462	0.2266	
240 minute winter	SWMH 12	4.001	ATT TANK2	5.3	0.814	0.297	0.0380	
240 minute winter	SWMH 14	5.000	SWMH 10	0.3	0.097	0.018	0.0692	
240 minute winter	ATT TANK1	1.005	SWMH 05	3.7	0.720	0.207	0.0281	
240 minute winter	ATT TANK2	1.008	SWMH 07	2.1	0.299	0.119	0.0245	
15 minute summer	Forecourt	1.003	SWMH 04	32.3	1.835	1.827	0.0977	

Downstream Defender® Advanced Hydrodynamic Vortex Separator

The Downstream Defender® is an advanced hydrodynamic vortex separator for the effective and reliable removal of fine particles, oils and other floatable debris from surface water runoff.

Its innovative design delivers high efficiency across a wide range of flows in a much smaller footprint than conventional or other swirl-type devices and it is the perfect choice for any catchment likely to convey high quantities of contamination.

1. Access for removal of floatables and sediments.
2. Inlet pipe.
3. Inlet chute.
4. Centre shaft.
5. Dip plate.
6. Centre cone.
7. Benching skirt.
8. Floatables and oil storage.
9. Isolated sediment storage zone.
10. Outlet pipe.

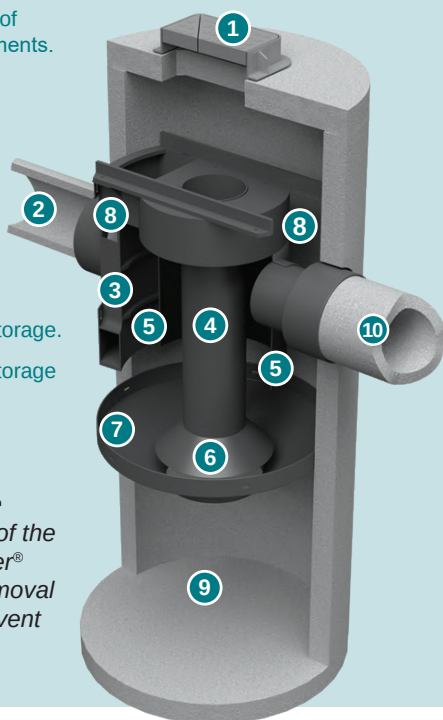


Figure 1 - The unique internal components of the Downstream Defender® enhance pollutant removal performance and prevent wash out.

Unique Flow Modifying Components

The Downstream Defender® consists of a choice of concrete or HDPE chamber with unique flow modifying internal components. It is these internal components that differentiate the Downstream Defender® from catchpits, sedimentation basins or sedimentation sumps. They facilitate advanced hydrodynamic vortex separation by reducing turbulence, lengthening the flow path to increase chamber residence time and introducing shear planes.

The internal components also ensure that the pollutant storage zones are isolated and protected from high flows that could cause pollutant re-entrainment or wash out.

Compared to devices that have poorly designed internal components, the Downstream Defender® captures and retains more of the annual pollutant load.

Watch a short video showing the Downstream Defender® components and operation at:

<http://www.hydro-int.com/en-gb/products/downstream-defender-0>



Repeatable, reliable performance

The Downstream Defender® delivers high removal of pollutants through advanced, hydrodynamic separation across a wide range of flows. The device has a proven track record of tackling an assortment of pollutants including:

Sediment (or Total Suspended Solids)



The Downstream Defender® is a highly effective sediment/TSS removal device. It can be sized in a number of ways to suit the application and level of protection required (see Table 1).

Gross Pollutants



100% removal of floatable debris, such as food wrappers, Styrofoam cups and drinks cartons

Liquid Hydrocarbons



Effective spill containment device that meets the BS EN 858-1:2002 Class I and Class II effluent targets at low flow rates. Note these systems are not considered oil separators according to the BS EN 858-1 and must not be used in applications where full certification is required.

Sediment Bound Hydrocarbons (including Polycyclic Aromatic Hydrocarbons - PAHs)



PAHs have low solubility in water and are readily adsorbed onto sediment particles. Effective removal of sediment particles will also ensure the removal of many PAHs.

Sediment Bound Heavy Metals and Nutrients



As an efficient device for removal of fine sediment, the Downstream Defender® is also effective for the removal of sediment bound pollutants.



No Risk of Pollutant Wash Out

The Downstream Defender® has been specially designed to isolate the pollutant storage zones and is proven to prevent pollutant wash out.

The Simple Index Approach (SIA)

The Simple Index Approach outlined in CIRIA C753 The SuDS Manual is a water quality design method for sites with a low to medium risk pollution hazard level. Sites with a high risk pollution hazard level should consider a more precautionary approach.

The approach assigns pollution hazard indices to the given land use for three pollutant groups, total suspended solids (TSS), metals and hydrocarbons. SuDS components are then selected until their combined pollution mitigation index score is greater than the pollution hazard index for each pollutant group.

Downstream Defender® SuDS Mitigation Indices		
Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.5	0.4	0.8
Notes: (a) All mitigation indices supplied by Hydro International Ltd are independently verified and calculated using the methods laid out in the British Water How To Guide: Applying the CIRIA SuDS Manual Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Performance declarations are available on request or on the British Water website.		

Table 1 - SuDS Mitigation Indices for Downstream Defender®.

Sizing

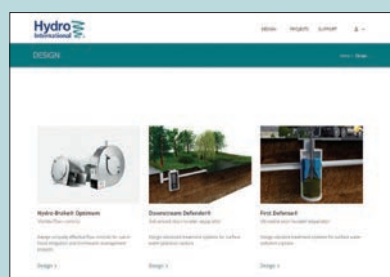
The Downstream Defender® can be sized for different treatment goals and objectives. For design purposes, the selected model's Treatment Flow Rate should be greater than or equal to the site's Water Quality Flow Rate.

The hydraulic capacity of the selected model should be considered with respect to the peak discharge flow rate from the site.

If there is no treatment objective, just betterment, do not use a treatment flow rate and only compare the hydraulic capacity to the peak discharge flow rate.

Model Diameter (m)	Treatment Flow Rate - Fine (a)(b) (l/s)	Hydraulic Capacity (c) (l/s)	Minimum Oil Storage Capacity (l)	Minimum Sediment Storage Capacity (d) (m³)	Maximum Headloss at Treatment Flow Rate (mm)
1.2	30	120	283	0.39	150
1.8	69	270	1356	0.73	225
2.55	138	542	2535	2.89	300
3.0	190	750	4693	3.10	375
Notes: (a) Treatment Flow Rate - Fine is based on an annualised removal efficiency of >50% of all particles up to 1000 microns with a mass-median particle size (D50) of 75 microns and a specific gravity of 2.65. The test procedure is WRc approved and in line with the British Water Code of Practice. (b) Alternative sizing based on different sediment grades available on request. (c) Maximum flow rate that can pass through the chamber with a maximum headloss of 500mm. (d) Additional sediment storage capacity can be provided to extend maintenance intervals if required.					

Table 2 - Downstream Defender® design information.



Design a Downstream Defender® with our Online Design Tool

Our online design tool now enables you to design your own Downstream Defender® or First Defense® stormwater treatment separators as well as Hydro-Brake® Optimum.

The tool also allows you to save project designs and submit them to our expert technical team for a free design review.

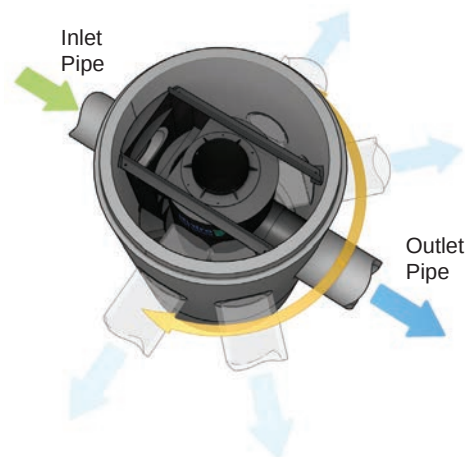
hydro-int.design

Setting out

The Downstream Defender® can accommodate a change in pipe direction to suit site specific requirements. Combined with the high rate internal bypass, this helps to avoid the need for additional manholes on site. Head loss across the chamber is kept to a minimum (see Table 2). The inlet and outlet pipes should be sized in accordance with Table 3 (opposite), and a minimum of 90 degrees between inlet and outlet is required.

Inlet and outlet pipe connections are at the same invert level.

Additional manhole sections can be provided to extend the chamber to meet site cover and invert levels or provide additional pollutant storage where required.



Dimensions and weights

General arrangement drawings of all units are available for download from:

<http://www.hydro-int.com/en-gb/products/downstream-defender-0>

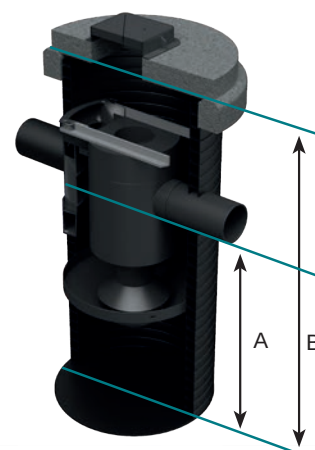
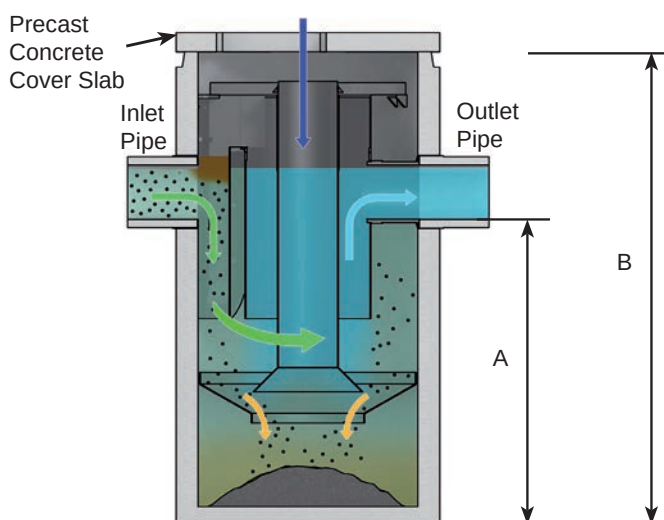
Model	Material	Chamber Diameter - Internal (mm)	Chamber Diameter - External (mm)	Inlet and Outlet ID (mm)	Depth to invert (m) (A) ⁽¹⁾	Chamber Depth (m) (B) ⁽²⁾	Maximum Component Lift Weight (kg)
PQL1320.1000	Concrete	1200	1460	300	1.916	2.830	2200
PQL1320.1030	Concrete	1800	2160	450	2.495	4.029	5450
PQL1320.1060	Concrete	2550	2850	600	2.95	4.95	8700
PQL1320.1090	Concrete	3000	3350	750	3.12	5.20	12100
PQL1320.1020	HDPE Single Wall	1188	1200	300	1.55	2.3	140
PQL1320.1051	HDPE Single Wall	1776	1812	500	2.11	3.41	460
PQL1320.1081	HDPE Single Wall	2530	2570	600	2.94	4.8	900
PQL1320.1111	HDPE Single Wall	2974	3000	800	3.13	5.3	1300
PQL1320.1025	HDPE Twin Wall	1200	1300	300	1.56	2.22	400
PQL1320.1055	HDPE Twin Wall	1800	2200	560	2.467	3.75	1100

Notes:

1) Minimum depth to invert shown. Depth to invert can be increased if required.

2) Minimum chamber depth shown. Additional sediment storage capacity or increased depth to invert can be provided if required.

Table 3 - Downstream Defender® unit types, dimensions and weights.



Easy to install

The Downstream Defender® is delivered to site as a near finished manhole with internal components already installed. Installation is therefore similar to any other manhole installation on site. Full installation guidelines are available.

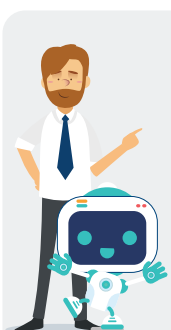
We can provide structural concrete systems for simple plug-and-play installation or choice of lightweight single and twin wall plastic chambers.

Simple, safe and cost-effective maintenance

Maintenance is carried out from the surface, using a standard vacuum tanker and personnel are not required to enter the device.

With a large capacity to store sediments and oils (see Table 2), and with a proven ability to prevent wash out, maintenance intervals can be years rather than months - depending on site conditions. The unit can also be fitted with a [Hydro-Logic® Smart Monitoring](#) system to alert the site operator when maintenance is required and provide peace of mind that the unit is operating normally at other times.

Additional pollutant storage can be built into the chamber to extend maintenance intervals if required.



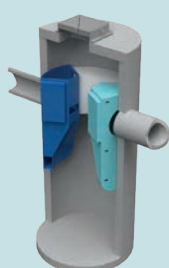
Make it Smart

Add Hydro-Logic® Smart Monitoring and your Downstream Defender® will let you know when it needs maintenance

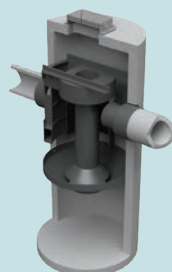
Get monitoring maintenance alerts from your Downstream Defender®
Save time and money by only visiting your Downstream Defender® when it actually needs emptying.

Our full range of surface water treatment devices

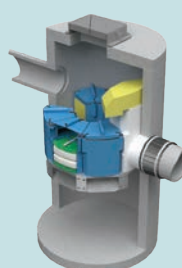
The Downstream Defender® is one of a range of surface water treatment devices. Each device delivers proven, measurable and repeatable surface water treatment performance. Each can be used independently to meet the specific needs of a site or combined to provide higher levels of treatment. They can be used alongside natural SuDS features to protect, enable or enhance them.



First Defense®
Vortex Separator



Downstream Defender®
Advanced Hydrodynamic
Vortex Separator



Up-Flo™ Filter
Fluidised Bed Up Flow
Filtration System



Hydro Biofilter™
Biofiltration System

Patent: www.hydro-int.com/patents

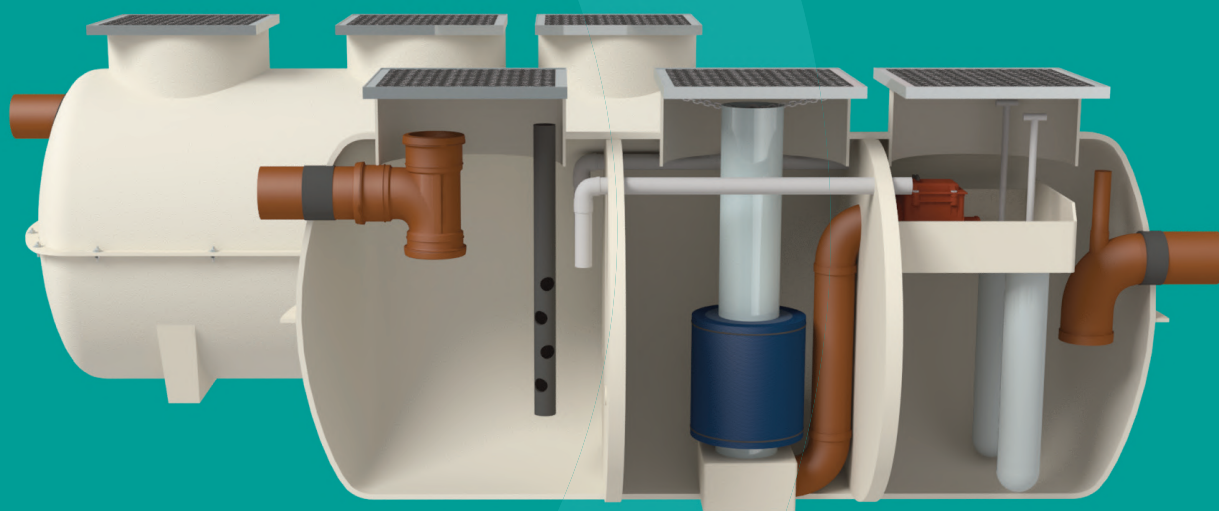
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Downstream Defender® Design Data P/0222

OIL SEPARATORS

ENGINEERED FOR EN 858 COMPLIANCE
AND SUDS SAFE COMPATIBILITY



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1 Oil separators

Separation by flotation and settlement

Oil separators are designed to prevent oil and other hydrocarbons from entering the drainage system. They separate oil from water, and safely retain the oil until it is removed.

Oil cannot be treated easily and will therefore cause severe pollution if allowed to enter mains sewers or drainage fields. Statutory controls enforce strict regulations on the discharge of such pollutants.

Separators should be used in such applications as petrol stations, industrial yards and garages; or virtually any site where a risk of oil contamination exists.

Discharge requirements for oil separators may vary in different areas of the country and it is therefore essential to consult the appropriate environmental controlling authority prior to specifying an oil separator. If the discharge is to a public sewer then local Building Control, the Water Authorities and water companies should also be contacted.

Note: For larger sites, more than one type of oil separator may be required.

Separator types and principles of operation

Separators are classed in two categories based on performance under standard test conditions.

Class 1 separators are designed to achieve a discharge concentration of less than 5mg/litre of oil. These separators are required for discharges to surface water drains and the water environment.

Class 2 separators are designed to achieve a discharge concentration of less than 100mg/litre of oil under standard test conditions. They are suitable for dealing with discharges where there is a lower quality requirement, such as discharges to the foul sewer.

Both classes can be produced as 'full retention', 'bypass' or 'forecourt' separators as explained below.

Bypass separators

Bypass separators treat all flows from rainfall events of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows higher than 6.5mm/hr are designed to bypass the separator.

These separators are used in a 'low risk' environment where there is no requirement to provide full treatment for the flow; for example, a car park where the risk of a significant spillage is small.

Full retention separators

Full retention separators treat the full flow that is delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.

These separators are used where there may be a 'high risk' of a significant fuel spillage, such as vehicle workshops

Forecourt separators

Forecourt separators are a type of full retention separator; however, they are specifically designed to store the maximum spillage likely to occur on a petrol station forecourt.

These separators are manufactured to a specific size to retain the potential spillage from a single compartment of a road tanker – currently up to 7,600 litres in the UK.

Wash-down separators and silt traps

It is a legal requirement to install a silt trap or wash-down separator on commercial sites, such as vehicle wash bays, where there is an environmental risk of contamination from dirt, brake dust, traffic film residue, cleaning agents, oil, etc.

2 BS EN 858-1 standards in summary

BS EN 858-1 standards pertain to separator systems used for separating hydrocarbons of mineral origin from wastewater. These systems, known as oil separators, are specifically designed to separate light liquids like oil and petrol. They work by leveraging the difference in density between water and light liquids, causing the lighter phase to rise and be collected from the water surface. Furthermore, coalescence separators offer an effective method where fine oil droplets adhere to a specialised filter insert, gradually forming an oil film. Once a certain thickness is reached, the oil film detaches, coalesces into larger drops, and rises through the water for separation.

Class	Max. permissible content of residual oil (mh/l)	Separator Technology
1 – Discharge to surface water	5	Coalescer
2 – Discharge to foul sewer	100	Gravity

Marsh Industries' range of Hydroil and Marator oil separators are compliant with the above targets.

Environmental concerns surrounding current standards

Current EN standard

The European Standard, BS EN 858 parts 1&2, was introduced in 2002 to normalise design and regulate testing of products across Europe. This standard settled on a two-tier quality level – class 1 and class 2.

Class 1 – designed to achieve a discharge concentration of less than 5mg/ltr of oil in the discharge

Class 2 – designed to achieve a discharge concentration of less than 100mg/ltr of oil in the discharge

Once testing is complete and approval achieved, manufacturers are free to bring their products to market.

The effects of current standards

A good starting point for any product is to set out relevant standards and levels of quality, both in product build and product performance. However, since the introduction of BS EN 858 in 2002, product development in gravity oil/liquid separation has remained static.

Manufacturers are only required to meet the testing standards to sell product. There has been no natural drive to improve product performance.

The current class 1 standard of less than 5mg/ltr of light liquid is only determined by test conditions. Our experience in this field tells us that this standard is rarely met once a product is installed.

The reality of current standards

With the current level of 5mg/ltr for a Class 1 discharge we ask; are Class 1 separators the very best that manufacturers can offer?

Studies have shown that most hydrocarbon pollutants entering the water system stems from urban developments. The table below shows the toxic effects of contaminants on humans and aquatic life.

Contaminant	Potential effect on humans	Recommended criteria	
		Drinking water	Aquatic life
Lead	Nephritis	50 mg/litre	0.01 LC50
Zinc	Metallic taste	5 mg/litre	0.01 LC50
Copper	Liver damage	1 mg/litre	0.01 LC50

(Source: Krenkel and Novotny, 1980)

Leaving aside the toxic effects of contaminants on human and aquatic life, when a hydrocarbon molecule spreads to one molecule thick and given enough surface area to spread, five litres of oil would be more than enough to contaminate five football pitches.

In addition, most hydrocarbon molecules are attached to silt particles; where Stokes law proves that these particles will sink rather than float as conventional separators require.

When mixed with other elements in real life scenarios, such as glycol, standard gravity separators become less efficient at contaminant removal.

In our view, the current testing standards covering products within the gravity separator market are outmoded and failing to protect the environment as they should. They do not reflect or address any 'real-life' scenario where hydrocarbon pollution is prevalent.

The solution

The solution to alleviate any environmental concerns is the Marsh:Marator, owing to its outstanding effluent treatment and discharge quality.

3 SuDS Safe in summary

"SuDS Safe" refers to the concept of Sustainable Drainage Systems (SuDS) that are designed and implemented to effectively manage and mitigate the impact of surface water runoff in a sustainable and environmentally responsible manner.

SuDS aim to mimic natural water management processes by allowing rainwater to be absorbed, filtered, and stored naturally, rather than quickly channelled away through conventional drainage systems. A development or area that is "SuDS Safe" ensures that its drainage infrastructure follows these principles, helping prevent flooding, reducing pollution, and supporting the overall health of the local ecosystem.

4 Mitigation indices

As the world focuses on green and environmentally friendly solutions, Marsh has examined how effective their separators are when incorporating them into sustainable drainage schemes.

Marsh:Hydroil range

The company tested the Hydroil separator range for total suspended solids and metal mitigation indices in line with industry-approved procedures at PIA, the notified test house in Aachen, Germany. With the same approach being applied to the first 10% of flow to enter their Bypass separators. This is in addition to an existing test procedure, whereby the Hydroil has already achieved EN858-1 certification for light liquid separators.

Combining these two test sets together and applying the simple index approach to proprietary/manufactured EN858 devices, the Hydroil separator range can achieve the following mitigation indices:

Total Suspended Solids (TSS)	0.84
Metals	0.63
Hydrocarbons	0.98

These results provide user confidence that the testing of this range is beyond reproach and cements the products as the complete surface water treatment solution for SuDS schemes.

