PLUVIAM ENVIRONMENTAL

Flood Risk Assessment

Alston Dairy
Alston Lane
Preston
PR3 3BN

PN0259-PEL-FRA-01

04.07.25

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Project No: PN0259 Date: July 2025

Revision	Purpose	Date
1.0	First Issue.	04.07.25

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[redacted]

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Director

Checked By:

[redacted]

Rod Green MSc, BSc(Hons), IENG, FCIPHE, MSoPHE
Director

CONTENTS

Appendices

SUMMARY

Site Location	National Grid Reference (NGR) 360190, 435510 and postcode PR3 3BN
Proposed Development	Dairy Extension and Car Park
Vulnerability Classification	Less Vulnerable
Climate Change	Allow 50% increase in rainfall intensity
Flood Zone	Flood Zone 1
Tidal Flooding	**Low and acceptable risk**
Fluvial Flooding	**Low and acceptable risk**
Pluvial Flooding	**Low and acceptable risk**
Groundwater Flooding	**Low and acceptable risk**
Sewer Flooding	**Low and acceptable risk**
Reservoirs, Canal & Artificial Sources	**Low and acceptable risk**
Flooding from the Development	**Low and acceptable risk**
Ground Conditions	Loamy & clayey soils
Surface Water Drainage Proposals	Provision of an appropriate SuDS with a 50% allowance for climate change on the 1in100 year event.
Flood Risk Vulnerability and Flood Zone Compatibility	Site is within Flood Zone 1 therefore **the development is identified as acceptable.**
Sequential & Exception Test	N/A
Additional Mitigation Measures	N/A
Conclusions & Recommendations	The conclusion of the report is **that the scheme should be approved with appropriate conditions** to be addressed as part of a detailed design.

1. INTRODUCTION

James Hall & Co Ltd Ltd has appointed Pluviam Environmental Ltd to provide a Flood Risk Assessment (FRA) for the construction of an extension to Alston Dairy, access road widening and Car Parks for staff. The flood risk is required as the total site area is over 1 ha.

1.1 Flood Risk Aims

The key aims of this flood risk assessment are to:

- Assess the flood risk to the development and to demonstrate the feasibility of designing the development so that the risk of flooding is acceptable.
- Assess the potential impact of the development on flood risk elsewhere and demonstrate that this can be mitigated by using sustainable drainage systems to drain the site.
- Satisfy the requirements of the National Planning Policy.

This assessment has been carried out in accordance with the National Planning Policy Framework (NPPF). The aim of the NPPF is to ensure that flood risk is taken into account at all stages in the planning process and to direct development run-off away from the areas at highest risk. Where new development is necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible to reduce flood risk overall.

Sources

- Ordnance Survey (OS) 1:25,000 and 1:50,000 series mapping
- British Geological Survey (BGS) Geology viewer (BGS website) and Webmap Service
- Cranfield Soil and Agrifood Institute (landis.org.uk website) Soils map
- Environment Agency (EA) Flood risk mapping: data.gov.uk open data sources accessed
- Local Flood Risk Management Strategy for Lancashire 2021-2027
- Central Lancashire Strategic Flood Risk Assessment Level 1 Final Report
- Sustainable Design and Construction - Supplementary Planning Guidance, April 2014.

These documents have been referred to and their guidance incorporated into the development proposals where appropriate.

1.2 Sources of Flooding

The NPPF requires an assessment of flood risk to consider all forms of flooding and lists six forms of flooding that should be considered as part of a flood risk assessment. These forms of flooding are listed below, along with an explanation of each form of flooding.

1.2.1 Flooding From Rivers (Fluvial Flooding)

Watercourses flood when the amount of water in them exceeds the flow capacity of the river channel. Flooding can either develop gradually or rapidly, depending on the characteristics of the catchment. Land use, topography and the development can have a strong influence on flooding from rivers.

1.2.2 Flooding From the Sea (Tidal Flooding)

Flooding to low-lying land from the sea and tidal estuaries is caused by storm surges and high tides. Where tidal defences exist, they can be overtopped or breached during a severe storm, which may be more likely with climate change.

1.2.3 Flooding from Land (Pluvial Flooding)

Intense rainfall, often of short duration, which is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. In developed areas, this flood water can be polluted with domestic sewage where foul sewers surcharge and overflow. Local topography and built form can have a strong influence on the direction and depth of flow. The design of development down to a micro-level can influence or exacerbate this. Overland flow paths should be taken into account in spatial planning for urban developments. Flooding can be exacerbated if development increases the percentage of impervious area.

1.2.4 Flooding from Groundwater

Groundwater flooding can occur from three main sources:

- raised water tables;
- seepage; and
- percolation and groundwater recovery or rebound.

Groundwater flooding occurs when groundwater levels rise above surface levels. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). Chalk is the most extensive source of groundwater flooding.

1.2.5 Flooding from Sewers and Drains

In urban areas, rainwater is frequently drained into sewers. Flooding can occur when sewers are overwhelmed by heavy rainfall or become blocked. Sewer flooding continues until the water drains away.

1.2.6 Flooding from Other Artificial Sources

Non-natural or artificial sources of flooding can include reservoirs, canals and lakes. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

1.3 Flood Zones & Classification

For river and tidal flooding, the https://www.gov.uk/guidance/flood-risk-and-coastal-change website states four different Flood Zones to characterise flood risk (Paragraph: 077 Reference ID: 7-077-20220825). These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences, and are detailed in Table 1.

Table 1 Flood Zones

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The NPPF classifies the vulnerability of developments to flooding into five categories. These categories are detailed in Table 2. Based on the vulnerability of a development, NPPF states within what Flood Zone(s) a development is appropriate. Paragraph: 078 Reference ID: 7-078-20220825.

Table 2 Vulnerability Classification

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

The flood risk vulnerability and Flood Zone 'compatibility' of developments is summarised in Table 3.

Table 3 Development Compatibility (Annex 3: Flood risk vulnerability classification) Updated: 27 March 2012

Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines. • Solar Farms
Highly Vulnerable	• Police stations, Ambulance stations, Fire stations and command centres, telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy

	infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; halls of residence; drinking establishments: nightclubs; and hotels. • Non-residential health care facilities, nurseries and educational establishments. • Landfill and sites used waste management facilities for hazardous waste. • Holiday, short-let caravan and camping sites, **subject to a specific warning and evacuation plan**.
Less Vulnerable	• Police, ambulance and fire stations which are **not** required to be operational during a flooding event. • Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable' and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during a flooding event. • Sewage treatment works (if adequate measures to control pollution and manage sewage flooding events are in place).
Water Compatible Development	• Flood control infrastructure • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing, and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water based recreation (excluding sleeping accommodation) • Lifeguard and coastguard installations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, **subject to specific warning and evacuation plan**.

1.4 The Sequential Test, Exception Test and Sequential Approach

The Sequential Test is a risk-based test that should be applied at all stages of development and aims to steer new development to areas with the lowest probability of flooding (Zone 1). This is applied by the Local Planning Authority by means of a Strategic Flood Risk Assessment (SFRA). The SFRA and the NPPF may require the Exception Test to be applied to certain forms of new development. The test considers the vulnerability of the new development to flood risk and, to be passed, must demonstrate that:

- There are sustainability benefits that outweigh the flood risk; and
- The new development is safe and does not increase flood risk elsewhere.

The Sequential Approach is also a risk-based approach to development. In a development site located in several Flood Zones or with other flood risks, the sequential approach directs the most vulnerable types of development towards the areas of least risk within the site.

1.5 Climate Change

The NPPF makes it a planning requirement to account for climate change in the proposed design. The recommended allowances are summarised below for the Ribble catchment for Peak Rainfall Intensity and Peak River Flow Allowances respectively:

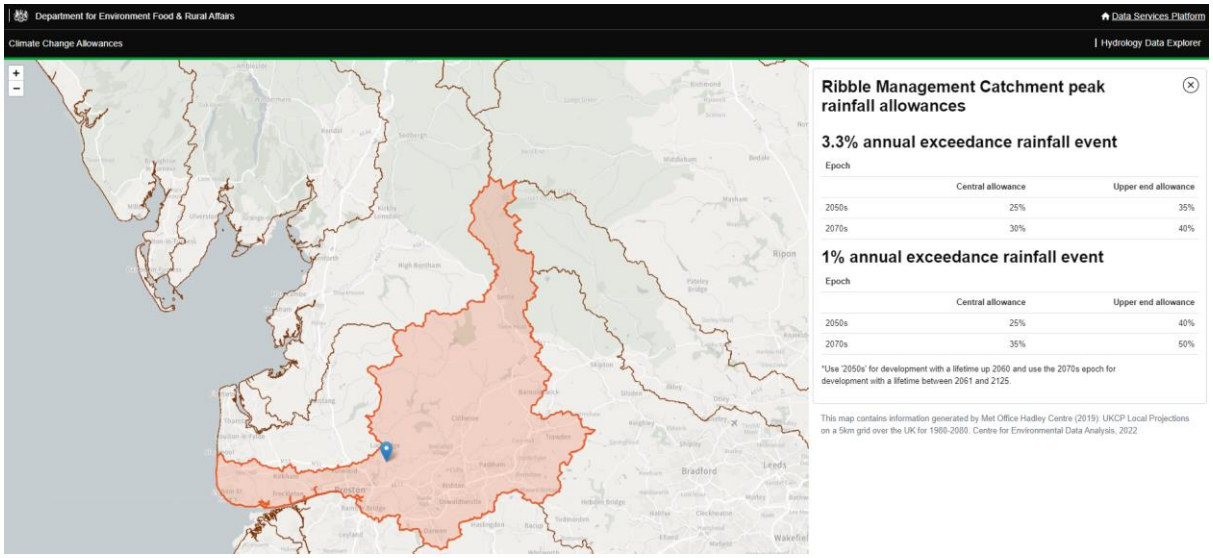


Figure 1. Peak rainfall climate change allowances

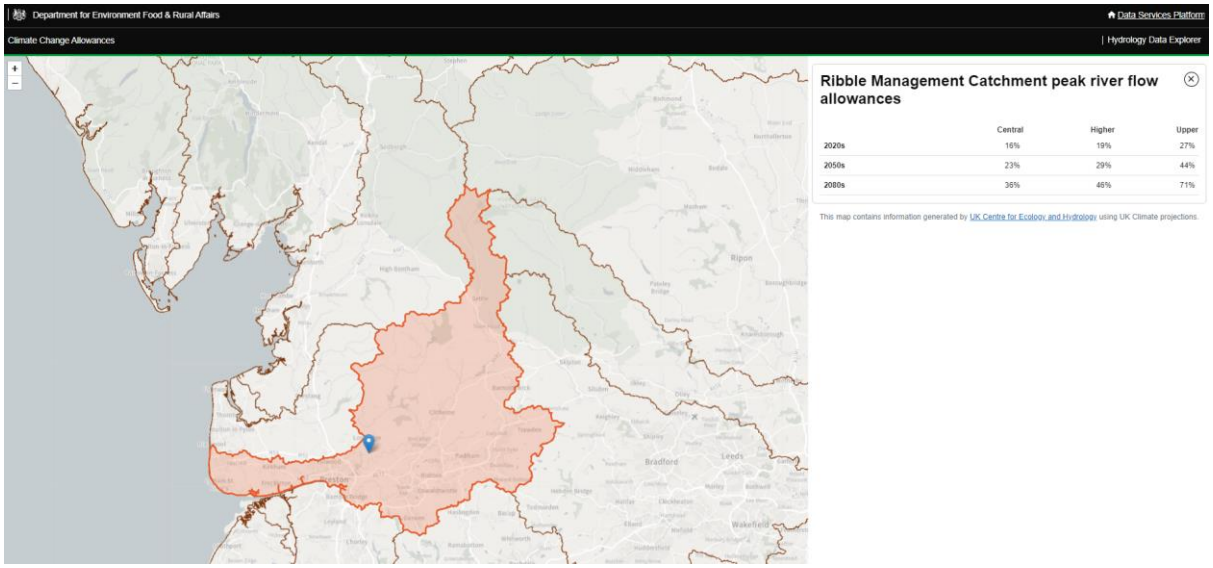


Figure 2. Peak river flow climate change allowances

2. THE SITE AND DEVELOPMENT

2.1 Existing Site

The site is situated approximately 1.7km south of Longridge and 8.5km northeast of Preston. The site is bound by Pinfold Lane to the north, Preston Rd (B6243) to the west, residential houses, and Bolton Fold Farm to the south and a residential house and farmland to the east.

The site falls from North to South. The existing site contains a chill store and dairy along with a site access drive with turning circle.

See Figure 3 for the proposed planning boundary and existing site for context.

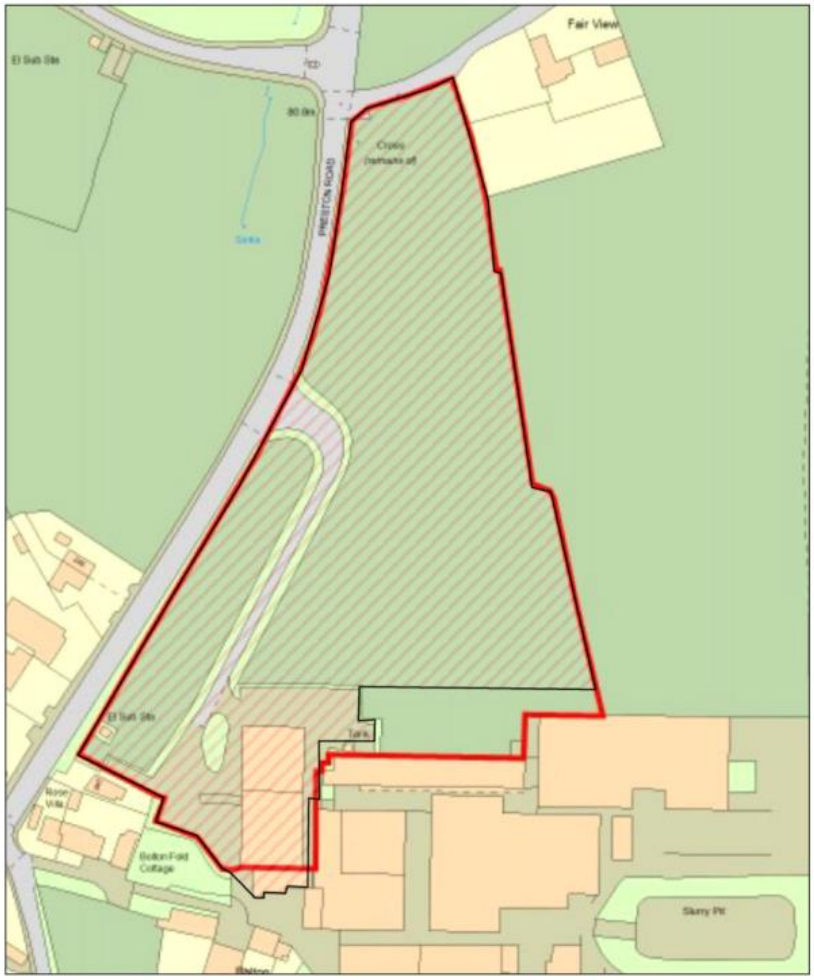


Figure 3. Shows the site boundary.

The architectural drawings can be found in Appendix A.

2.2 Ground Conditions

According to the classifications given by the Cranfield National Soil Resources Institute, the predominant soil type across the site is 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage', Appendix B.

The BGS 1:50,000 Geology map for Garstang (Map Sheet No 067) contained within Appendix C indicates that the site is directly underlain by bedrock of the Warley Wise Grit comprising sandstone and pebbly sandstone; sedimentary bedrock formed approximately 328 to 329 million years ago in the Carboniferous Period.

The BGS Geology map indicates that the superficial deposits underlying the site consists of Devensian Till Deposits comprising clay formed up to 2 million years ago in the Quaternary Period.

A review of available borehole logs on the online interactive BGS mapping tool does not record depth to bedrock within 1km of the site, with boreholes terminated at 5m.

The site has no to very low hazard regarding the potential for ground stability hazards including collapsible ground, compressible ground, ground dissolution, landslide, running sand and shrinking and swelling clays.

There are no BGS Recorded Mineral Sites within 1,000m of the site.

2.3 Hydrogeology

The Envirocheck map in Appendix D shows a culverted water course running across the site from West to East. The watercourse appears to be an open to the northwest prior to being culverted prior to crossing Alston Lane and entering site. Further investigation is currently taking place on site.

2.4 Drainage Infrastructure

Drainage infrastructure on site is currently being surveyed on site and the results of the exercise will be updated within the report. From desktop review, the existing site is served by a foul and surface water drainage system. The foul water drainage system is pumped and passes via a treatment/septic tank. Therefore, it is likely that the existing system discharges to the culverted watercourse or to a local ditch network given the presence of the treatment/septic tank.

2.5 Proposals

The Development consists of:

- An extension to the existing Alston Dairy manufacturing and warehouse facility, including additional parking.
- Widening of access route on site and DDA spaces.

See Appendix A for site plan.

3. FLOOD RISK ASSESSMENT

3.1 Flood Zone Allocation

The Environment Agency (EA) Flood map for planning (Appendix E) indicates that the proposed development site is entirely within in a Zone 1 flood risk area (i.e., there is little or no flood risk).
In accordance with Table 3 of the flood risk vulnerability classification of the technical guidance to the NPPF, the development would be classed as Less Vulnerable. The flood risk vulnerability table (Section 1.3 - Table 2) indicates that if the development is in Flood Zone 1 and is Less Vulnerable then it can be considered as an appropriate site for development.

3.2 Sequential and Exception Test

As the development is located within Flood Zone 1 the Sequential test is not required. The development compatibility table shows that the development does not require the Exception test applying.

3.3 Fluvial & Tidal Flooding

Appendix E indicates that the site is not susceptible to fluvial and/or tidal flooding.

The site is located entirely within Flood Zone 1 for fluvial flooding on the Environment Agency's indicative flood map. Flood Zone 1 is classified as 'low' flood risk, with a 1 in 1000-year or less (<0.1%) annual probability of fluvial flooding. The overall risk of fluvial flooding is therefore 'very low' and mitigation measures are not required.

As the development site is in Flood Zone 1, the risk is considered **low and acceptable**.

3.4 Pluvial Flooding

The Environment Agency's 'Risk of Flooding from Surface Water' map, Appendix F Figure 1, shows that the site predominantly has less than a 1 in 1000 annual probability of surface water flooding ('very low' risk).

There are small local depressions, however, these are depressions are due to dips in the topography. The proposed surface water drainage scheme will collect and attenuate the areas where the localised depressions occur.

Therefore, pluvial flooding is considered **low and acceptable** with no mitigation required.

3.5 Groundwater Flooding

Mapping shows that the site is underlain by loamy-clayey soils that are impeded. The BGS borehole in Appendix C shows that ground water was not present in the first 5m of penetration on an adjacent farm.

There are no known instances of groundwater flooding on-site and no below ground structures are proposed. Whilst no mitigation is proposed it would be prudent to carry out groundwater monitoring prior to construction.

Therefore, the risk of groundwater flooding is considered **low and acceptable** based on historic events and records.

3.6 Flooding from Reservoirs, Canals, and other artificial sources

The Environment Agency Reservoir flood map in Appendix F Figure 2 shows that the site would flood if a reservoir was to fail.

The reservoir in question is:

- Alston No.2 (grid reference SD6050036400)
- Owner: United Utilities PLC
- Lead Local Flood Authority: Lancashire

United Utilities have catchment controllers and supervising engineers that are responsible for the operation, maintenance, inspection and improvements of the reservoir. A rigorous checking, level monitoring and maintenance regime is followed by United Utilities. The effects of a flood/breach may be catastrophic; however, the likelihood is considered to be very low.

Desktop study shows that there are no other artificial sources close to the development which could present a flood risk.

Flood risk from reservoirs, canals and other artificial sources is therefore deemed a **very low risk of failure but a medium high risk to life**.

3.7 Sewer and Drain Flooding

Given the rural surroundings, major sewage and water mains are unlikely to be present adjacent to the site. The United Utilities sewer records show only a foul water network to the West and away from the development, Appendix G.

No further information on sewer and drain flooding within the area could be found during the desktop review, the risk is considered **low and acceptable**.

3.8 Flooding from the Development

Incorporating a Sustainable Urban Drainage System (SUDS) will control runoff associated with the proposed redevelopment. The proposed system will allow interception of overland flow via a series of appropriate SuDS components. An allowance of 50% additional flow for Climate Change has been added to the proposed design calculations. See drainage strategy PN0259-PEL-DS-01 in Appendix H.

The flooding risk as a result of the development is **low and acceptable**.

4. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT TO FLOOD RISK

Development Considerations

In accordance with the NPPF guidance, the development will need to demonstrate that it will:

- Remain operational and safe for users in times of flood;
- Result in no net loss of floodplain storage; and
- Not impede water flows and not increase flood risk elsewhere.

4.1 Safe Access

The NPPF states that the development must provide safe access and egress during a flood event and is not impeded for emergency response vehicles, allowing safe access and egress from the site.

Should the area in which the development is sited be reclassified by the Environment Agency to be within Flood Zones 2 or 3 it is recommended that the facilities management team sign up to the Environment Agency's Flood Line Warnings Direct Service.

Safe access and egress can be gained from Alston Lane as shown in the flood mapping.

4.2 Loss of Floodplain Storage

As the site is located within Flood Zone 1 no loss of active floodplain will occur as a result of the development.

4.3 Sustainable Drainage Strategy

The NPFF and National Standard for Sustainable Drainage requires that surface water arising from a developed site should as far as practicable be managed in a sustainable manner to mimic the surface water flows arising from the site prior to re-development. Opportunities to reduce the surface water run-off and the associated flood risk should be identified and climate change should be considered. Building Regulations (Part H), the NPPF and Environment Agency advice notes require the consideration of sustainable drainage techniques for new developments. Surface water drainage should be considered in accordance with a prescribed hierarchy aimed at minimizing the impact of the development.

Surface water flows should be designed to discharge to:

1. Reuse of water for non-potable uses
2. Infiltration based systems e.g., soakaways / porous pavements etc.
3. Watercourses

4. Surface water sewers

4. Combined water sewers

Due to the clays encountered on site, infiltration as a means of discharge will not be feasible.

Therefore, the proposed drainage system will discharge to the culverted watercourse on site via an existing private connection.

The full drainage strategy can be found in report PN0107-PEL-DS-01 in Appendix H. The proposed system shall discharge at 6.6 l/s during the proposed 1in100+50% climate change storm event.

The following SUDS features can be used on the site:

Table 4 SUDS Checklist

SUDS Feature	Applicability
Pond/Basin	Y
Permeable Paving	Y
Reservoir Paving	Y
Green Roof	N
Blue Roof	N
Infiltration Features	N
Tank Systems (e.g., cellular systems)	Y
Rain garden and/or Swales	Y

Table 4 lists various SUDS features and their applicability for use within the proposed development.

4.4 Maintaining Flow Paths

No flow path crosses the proposed development area.

5. CONCLUSION

This report has considered all potential sources of flooding to the site, including sea, rivers, groundwater, land, existing sewers, artificial sources and the proposed development.

With reference to the NPPF and the Environment Agency (EA) standing advice on development and flood risk, the proposed site is located within Flood Zone 1 and is considered to be a 'less vulnerable' development. The sequential and exception test can be considered to be passed.

The site is not susceptible to groundwater flooding; however, groundwater levels should be monitored prior to construction.

Appendix A

Architectural Drawings

0 5 10 15 20 25 30 35 40 45 50

LANDSCAPING IS ILLUSTRATIVE ONLY, FOR DETAILS SEE LANDSCAPE PROPOSAL DRAWING BY TBA

KEY

- EXISTING TREE TO BE RETAINED (REFER TO ARBORICULTURAL IMPACT ASSESSMENT)
- PROPOSED TREE PLANTING
- HEDGE PLANTING
- ORNAMENTAL SHRUB PLANTING
- TURF (CLOSE MOWN)
- NATIVE SHRUB PLANTING

remains of cross

EXISTING GRASS

EXISTING GRASS

EXISTING GRASS

EXISTING GRASS

EXISTING GRASS

EXISTING GRASS

EXISTING GRASS

Hedgerow and other vegetation to be trimmed back to highway boundary along full length of works

hedge trimmed back, road side

markers moved

PROPOSED SLAB

PROPOSED PEDESTRIAN REFUGE

Existing 4.1m wide access road, widened to 5.75m

existing fence line

Top of banking

Ground levels to remain as existing

Retaining Wall with metal guarding over

Retaining Wall

4 number 350 dia heavy duty bollards

Top of banking sloping ground level

Grass Banking

Fire escape

77.70

Planned Extension
GIA 2,320 m2 approx

4 DDA Spaces

New access lane

BRUSHED CONCRETE

New hammerhead

Staff Car Park
42 Spaces
+2 EV bays

TARMACADAM

GRASS

OUT

IN

EV

EV

Chill Store

ALSTON DAIRY

Dairy

Bolton Fold Cottage

El Sub Sta

Approximate location of Bus Stop relocation and improvements (Works to be agreed with LCC at detailed design)

FARM

HWL
HARRY WALTERS & LIVESEY Ltd

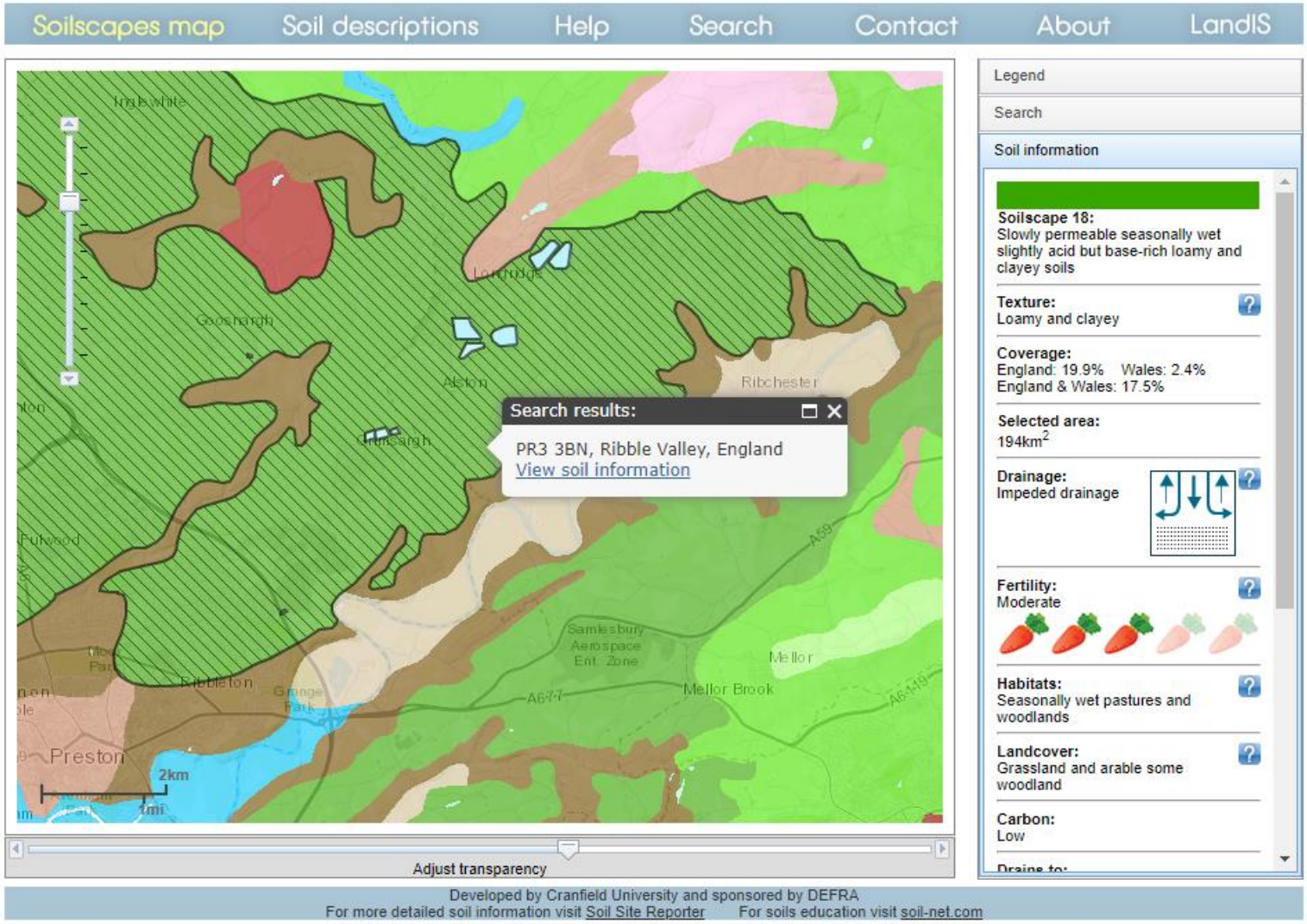
Registered Office • James Hall Spar Distribution Centre Bowland View Fulwood • Preston • Lancashire • PR2 5QT • Company No. 06235823

K.M. McFadyen, Dip. Arch. R.I.B.A.
Tel No: 01772 706696
Email: kevin.mcfadyen@jameshall.co.uk

CLIENT: James Hall & Co		PROJECT NAME: Alston Dairy	
DRAWING NAME: Proposed Site Plan		SCALE: 1:500 @ A1	DRAWN BY: KMc
DATE: Aug 2023	JOB NUMBER: 702	DWG No: PL-05	REV No: R9

Appendix B

Landis Soilscapes Maps



Accessed from Llandis Soilscape website 05.10.23

Appendix C

British Geological Society Map & Borehole

LEONARD FAIRCLOUGH, LIMITED
SITE INVESTIGATION DIVISION
Chapel Street, Adlington, Lancashire PR7 4JP
Telephone: ADLINGTON 264 & 471 Telex: 67510

BOREHOLE LOG SHEET

SD 53 NE 19
[5934 3518]

B.H. No. [redacted] 46 Job No. 74/105

Date 5-5-75

Location HOGHTON TO WHITTINGHAM PIPELINE

Rig 150mm PERCUSSION

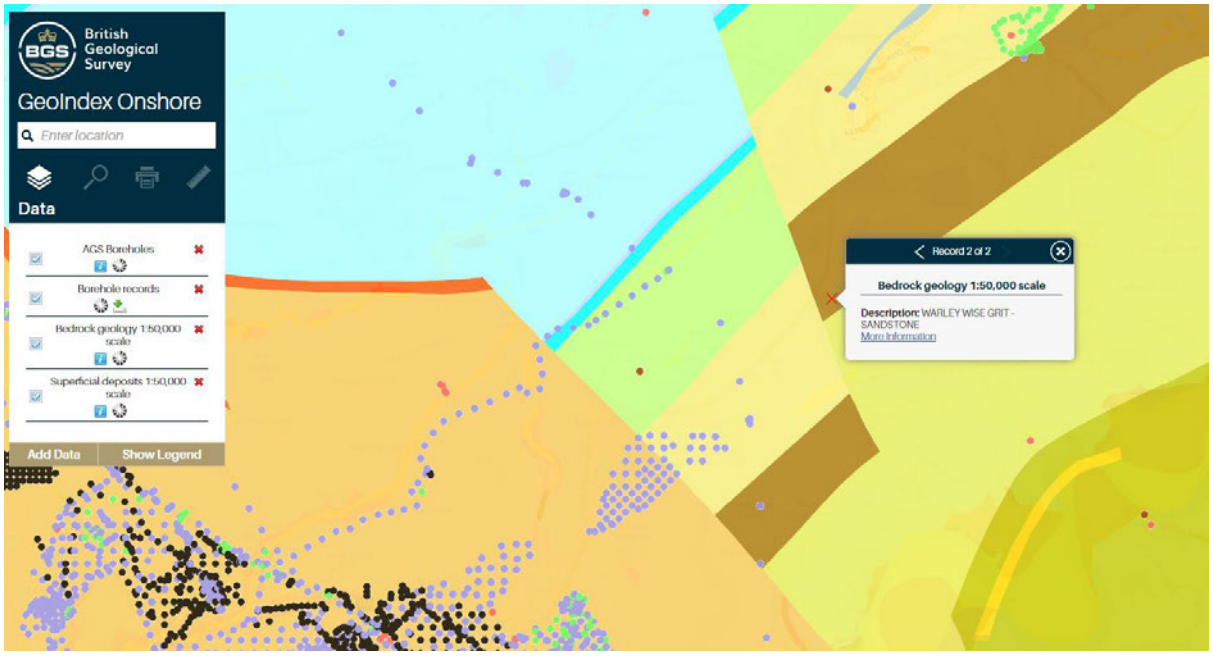
Client PRESTON AND DISTRICT WATER SUPPLY UNIT

Scale 1:50

Description	O.S.D.	Legend	Depth	Thickness	Sample	S.P.T. "N" Value	Water Levels
			0.00				
TOPSOIL			0.15	0.15			
Brown and Grey Sandy CLAY			1.20	1.05	1.00		BOREHOLE DRY
Firm to Stiff Brown Gravelly CLAY			5.00	3.80	2.00 3.00 4.00 5.00		BOREHOLE COMPLETED

Undisturbed Sample □ Disturbed Sample ○ Water Sample △ Standard Penetration Test ×

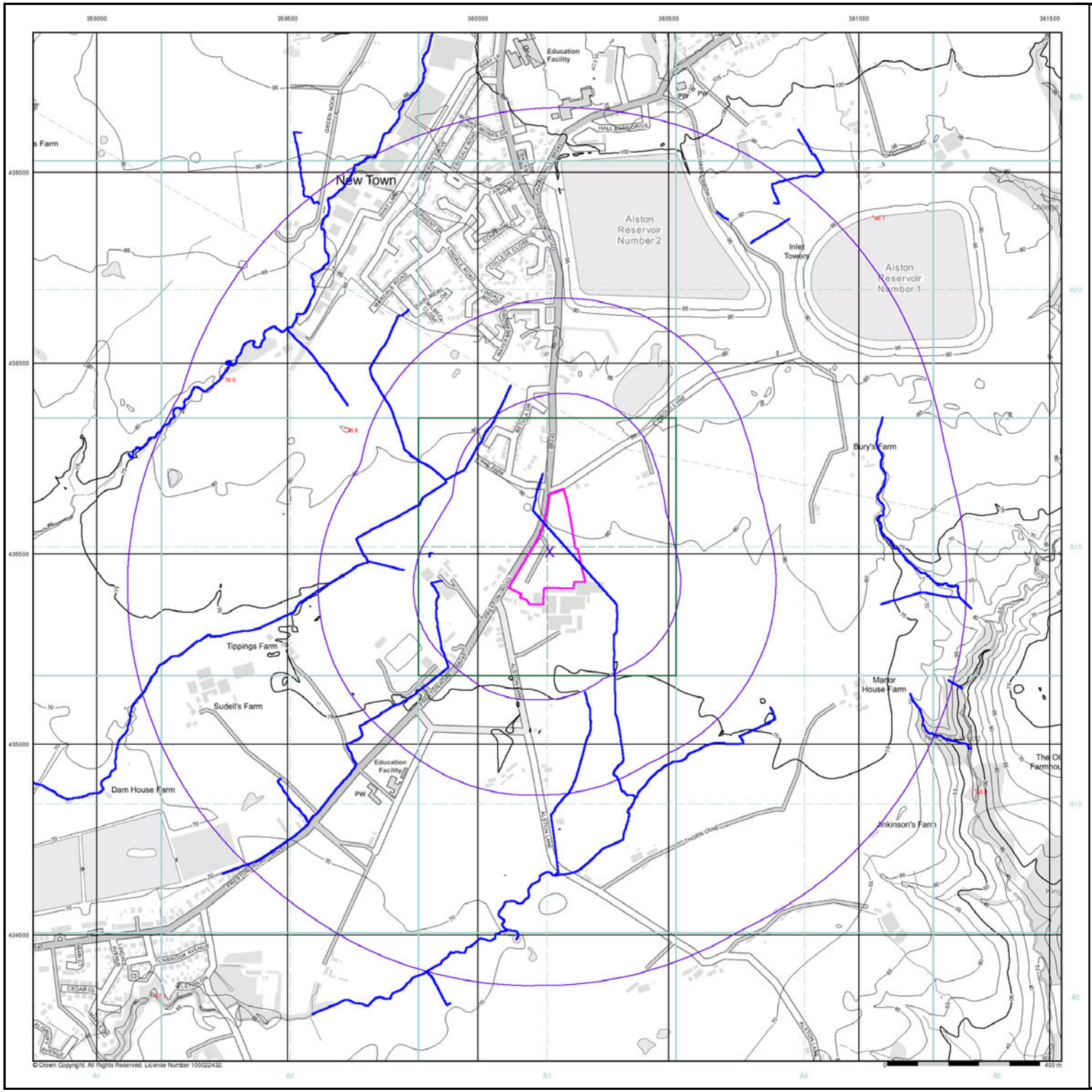
S102



Accessed 08.10.23 from the BGS web viewer

Appendix D

Envirocheck Map



Envirocheck®

LANDMARK INFORMATION GROUP®

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

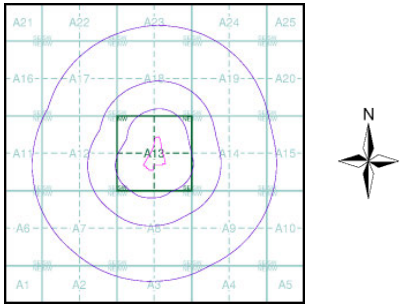
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height 167.3
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	293088206_1_1
Customer Ref:	1269
National Grid Reference:	360190, 435510
Slice:	A
Site Area (Ha):	2.96
Search Buffer (m):	1000

Site Details

Alston Dairy, Alston Lane, PRESTON, PR3 3BN

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix E

Environment Agency Flood Map for Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	**360226/435384**	**4 July 2025 15:34**

Your selected location is in flood zone 1, an area with a low probability of flooding.

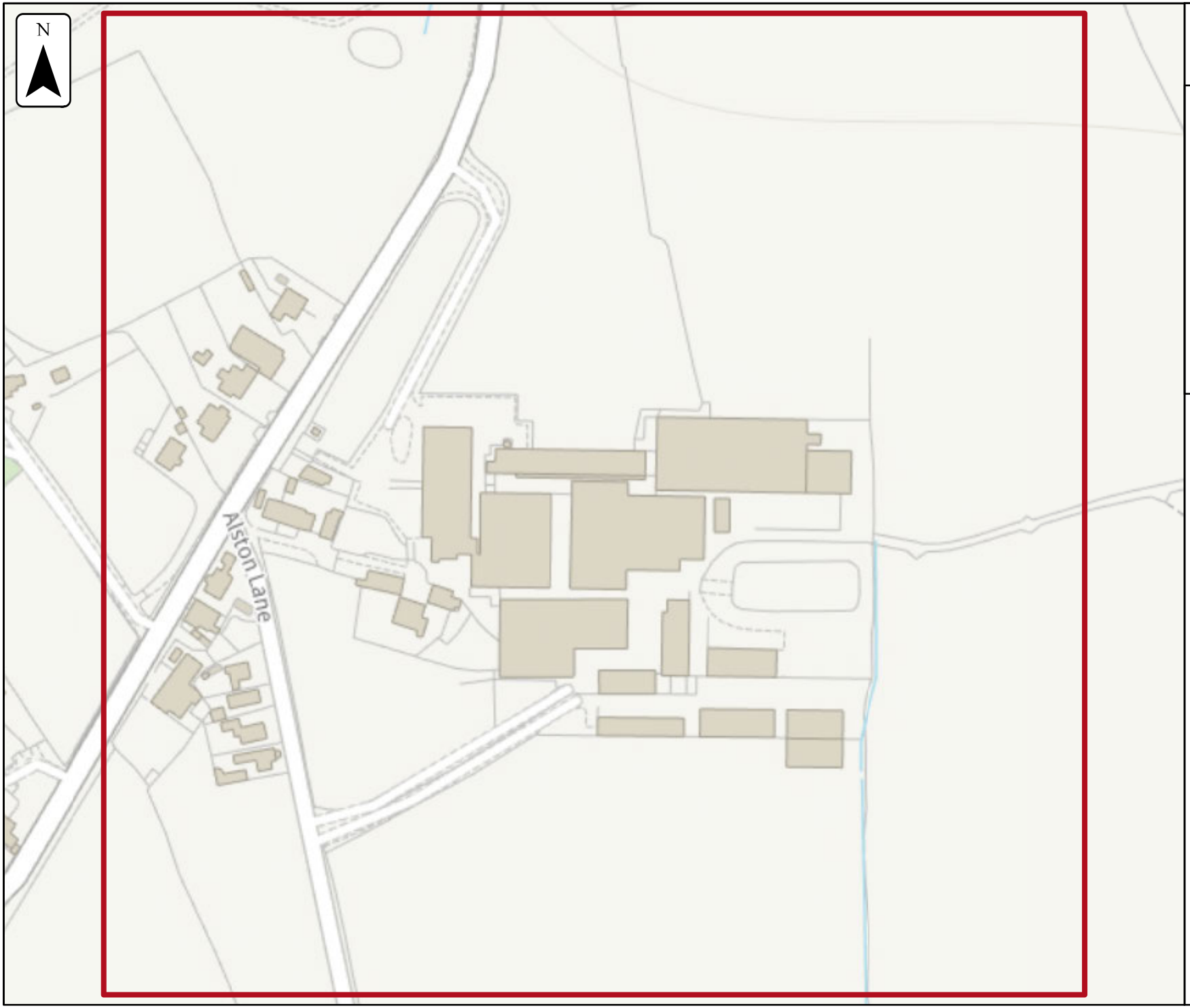
You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
360226/435384

Scale
1:2,500

Created
4 Jul 2025 15:34

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Appendix F

Environment Agency Flood Maps

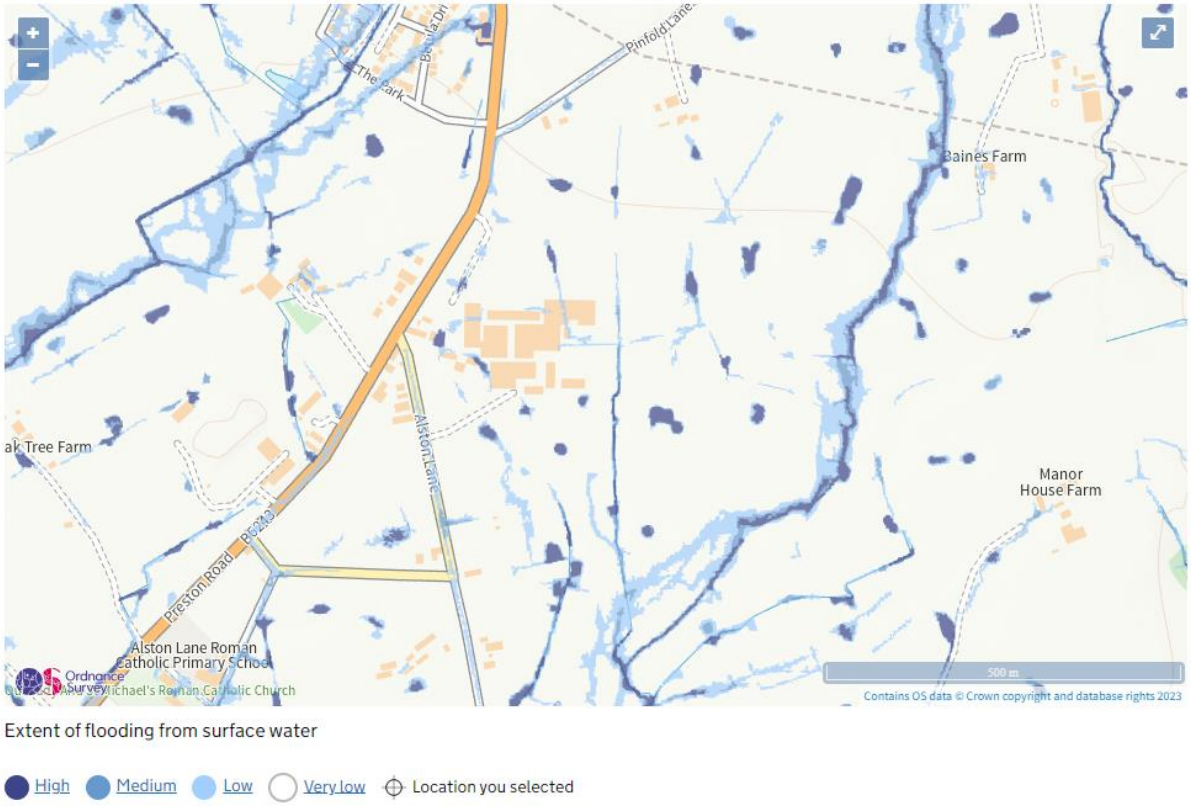


Figure 1. Surface water flood risk

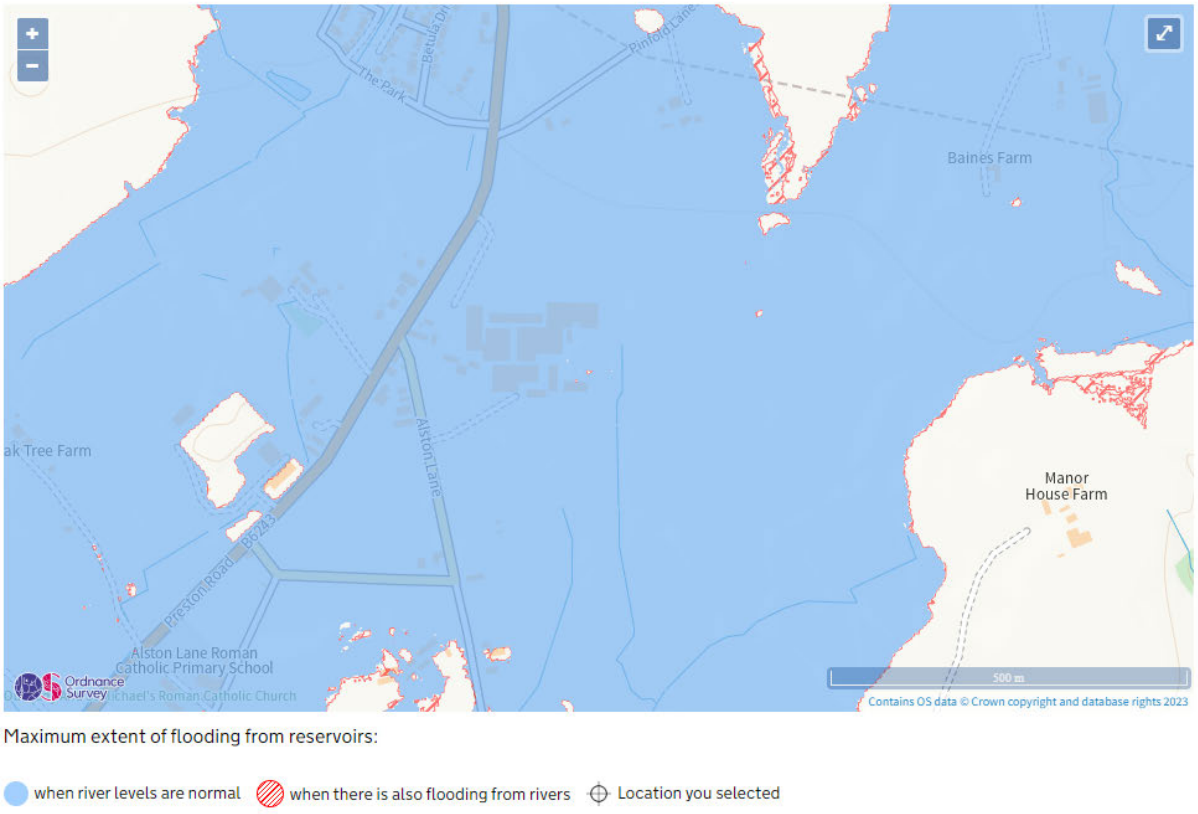
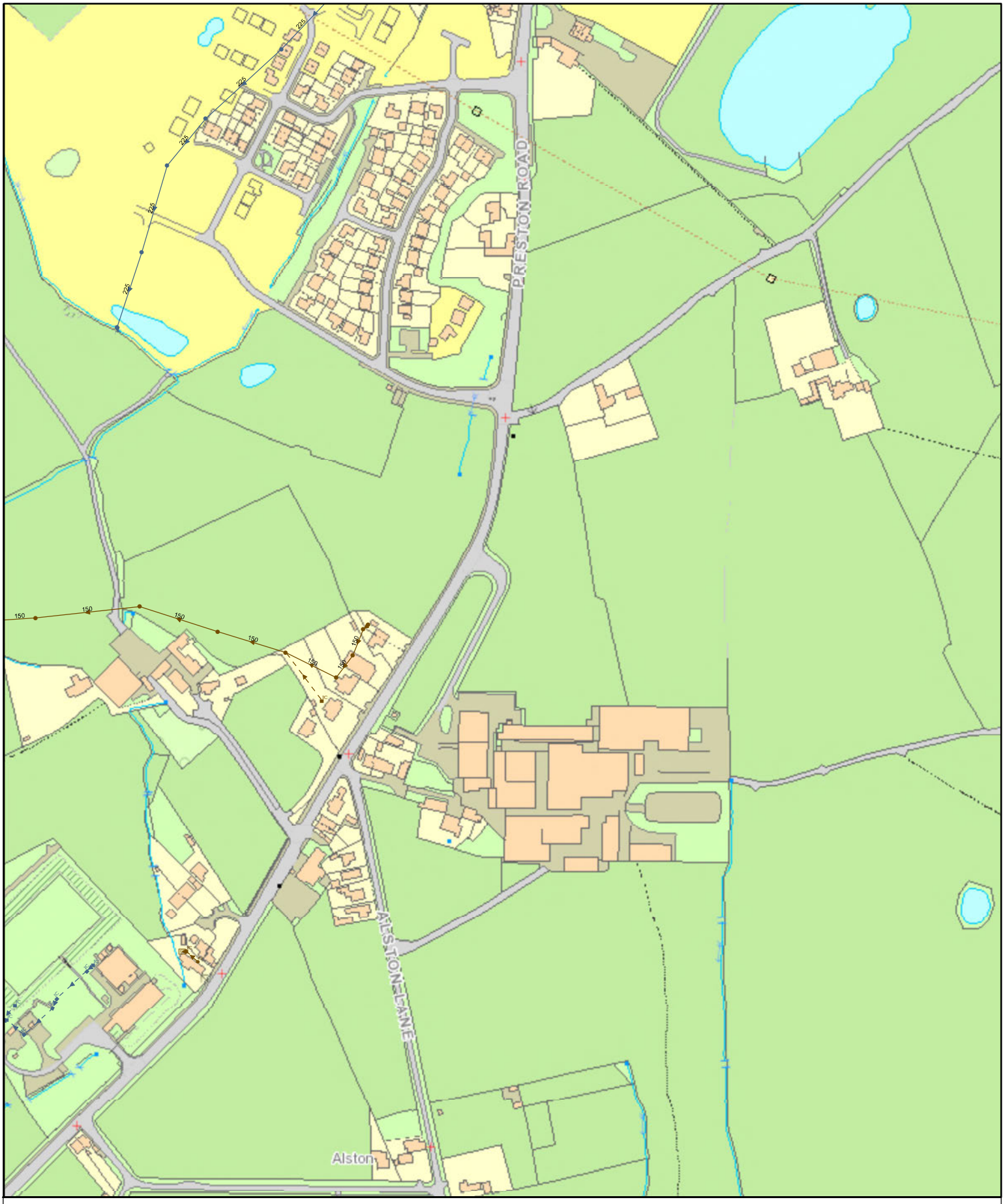


Figure 2. Maximum extent of flooding from reservoir

Appendix G

United Utilities Sewer Records



Date: 25/03/2022

Extract from Map of Public Sewers

Printed By:
Property Searches

Land and surrounding area Pinfold Lane & Preston Road Longridge PR

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

Appendix H

PN0259-PEL-DS-01 Drainage Strategy

PLUVIAM ENVIRONMENTAL

Drainage Strategy Report

Alston Dairy
Alston Lane
Preston
PR3 3BN

PN0259-PEL-DS-01

04.07.25

This document prepared by Pluviam Environmental Limited (PEL), its contents and any supporting information relating to this document should not be used for any purpose other than that for which it was prepared and provided. Should the document be forwarded to other parties for information, the whole of the report and any supporting information should be so copied, but no professional liability or warranty shall be extended to other parties by PEL in this connection without the explicit written agreement thereto by PEL.

Project No: PN0259 Date: July 2025

Revision	Purpose	Date
1.0	First Issue.	04.07.25

Produced By:

[redacted]

John Roberts CSSW
Director

[redacted]

Rod Green MSc, BSc(Hons), IENG, FCIPHE, MSoPHE
Director

CONTENTS

Appendices

1. INTRODUCTION

The following proposal outlines the foul and storm water drainage management system proposed for the Alston Dairy development. The site is located at National Grid Reference (NGR) 360190, 435510 and postcode PR3 3BN.

The site is situated approximately 1.7km south of Longridge and 8.5km northeast of Preston. The site is bound by Pinfold Lane to the north, Preston Rd (B6243) to the west, residential houses and Bolton Fold Farm to the south and a residential house and farmland to the east.

This planning application seeks planning permission for the construction of a dairy extension with an associated car park and delivery area.

Staff parking is to be extended with a dedicated staff car park and the internal driveway from Preston Road is to be widened.

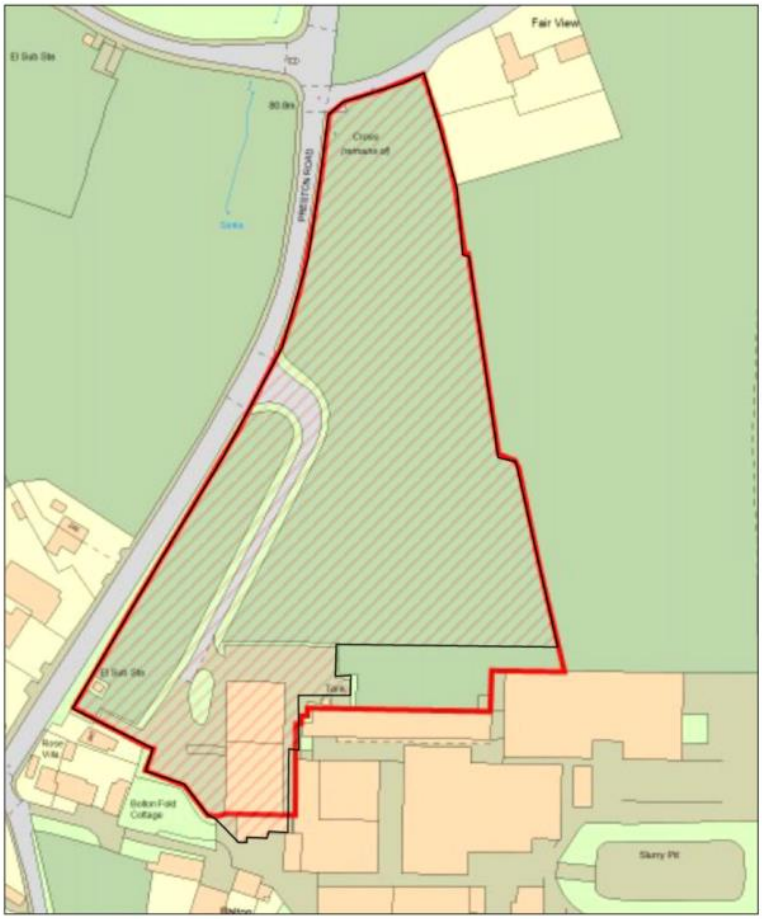


Figure 1.1. Site Location and Planning Boundary

2. DRAINAGE DESIGN PROPOSALS

Ground Conditions

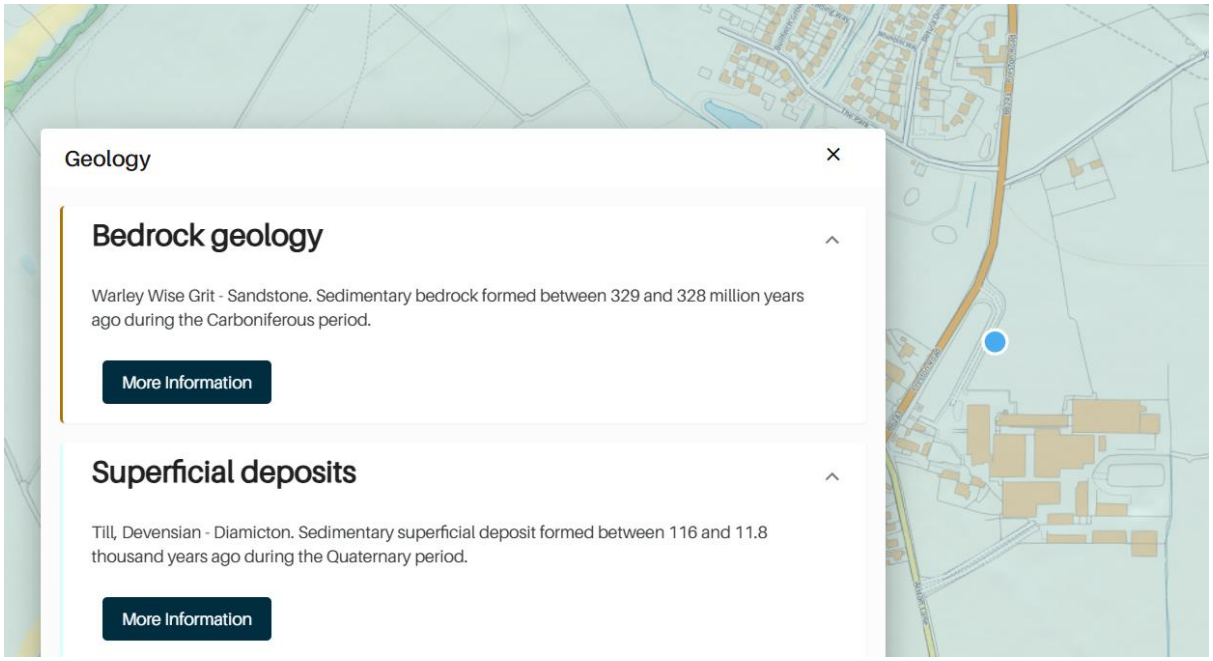


Figure 2.1 bedrock map (left) and superficial deposits map (right) with the location of the site outlined in blue.

The British Geological Society GeoIndex indicates that the site bedrock is Warley Wise Grit- Sandstone Formation. The superficial deposits are Till, Devensian Deposits – clay, and silt.

According to the classifications determined by the National Soil Resources Institute (Figure 2.2), the primary soil type on the site is 'loamy and clayey soils with naturally impeded drainage'.

Borehole results can be found in Appendix A, which agree with the NSRI description and characteristics.

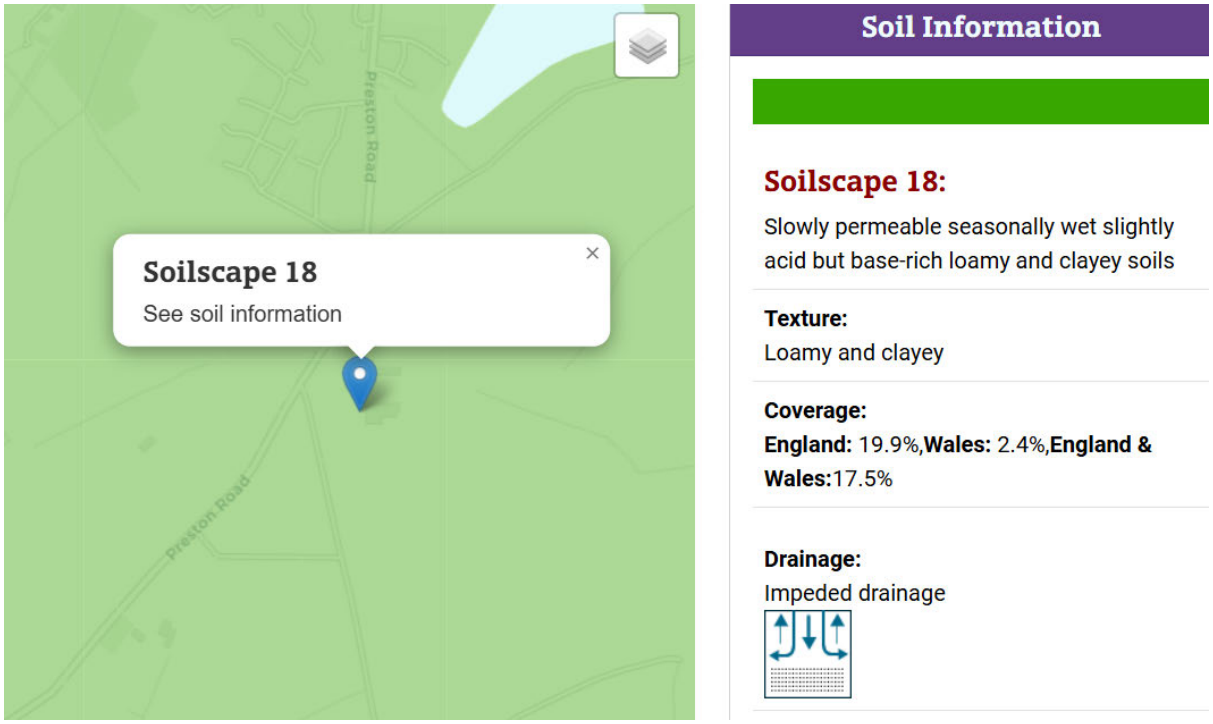


Figure 2.2 LandIS Soilscapes map

Drainage Strategy Design Parameters

The drainage strategy is developed in line with the following documents:

National Planning Policy Framework (NPPF) requires that new developments should not increase flood risk both on the Site and in the area surrounding it. Therefore, surface water runoff should not exceed the peak volumes already generated on the Site and betterment should be provided where possible.

Environment Agency Climate Change Guidance provides peak rainfall intensity allowances to be applied during drainage design for each Management Catchment, using the upper end 2070s epoch allowances for surface water in developments with lifetimes beyond 2100. Refer to section **Error! Reference source not found.**.

DEFRA National Standards for Sustainable Drainage Systems provide statutory guidance on the peak flow and volume from a development as well as managing flood risk within the development. Notably relevant standards include:

1. Runoff destinations – Discharge must follow a clearly defined hierarchy, with evidence needed to justify use of lower priority routes. Rainwater reuse and infiltration are prioritised.
2. Interception of everyday rainfall – Requires that the first 5mm of most rainfall events (80% in summer, 50% in winter) is retained on site through source control measures.

3. Extreme rainfall and flood risk – Addresses 1:1 and 1:100 AEP events, urban creep, exceedance routes, and climate change allowances.
4. Water quality protection – Requires robust risk assessment and SuDS trains tailored to land use pollution risks.
5. Amenity benefits – SuDS should be multifunctional and enhance landscape character, health, education, and placemaking.
6. Biodiversity enhancement – Drainage systems must contribute to habitat creation, BNG, and LNRS goals.
7. Design for construction, operation and maintenance – Emphasises whole-life design, access, inspection, and resilience.

The updated discharge hierarchy notes the priority routes:

1. Collected for non-potable use;
2. Into the ground (infiltration);
3. To a surface water body;
4. To a surface water sewer, highway drain, or another drainage system; and
5. To a combined sewer.

Additionally, Pluviam Environmental Ltd has reviewed the information provided and considered an approach based on previous experience of similar sites and current SuDS guidance provided in:

- Sustainable Design and Construction - Supplementary Planning Guidance, April 2014.
- CIRIA report C753 (2016); The SUDS manual
- CIRIA Report C724 (2013) Creating water sensitive places-scoping the potential for water sensitive urban design in the UK.
- BS 8582:2013, Code of practice for surface water management for development sites

Discharge Review

Water Reuse – non-potable

Passive irrigation shall be used to utilise the incoming water to irrigate the raingardens. A rainfall depth far above the first 5mm will be captured within the 4 no. raingardens and vegetated swale sides. This will be utilised for irrigation of the planting and lost via evapotranspiration or captured within the void and held in surface tension.

Discharge via infiltration

Where possible, infiltration should be incorporated into the final design of the drainage. Infiltration should be the second consideration for drainage outfall.

However, boreholes adjacent to site show clay from surface level down to at least 5m below ground level. Therefore, it is unlikely that infiltration will be feasible. Soilscapes notes impeded drainage and poor infiltration.

See Appendix A for borehole logs.

Discharge via a watercourse

Discharge shall be to the surface water culvert via an existing private connection. Investigation (dye testing) by Sleater Watson has shown that the culvert connects to the River Ribble via the Tun Brook. A private manhole and connection exists on site. The culvert is wholly within the client's (site owner) land and connection will be made on the clients site.

See existing drainage investigations in Appendix B.

Surface water and combined sewers

The United Utilities sewer record is available in Appendix C. There are no public sewers close to site which do not involve crossing third party land for connection. Therefore, no drainage will go to the public assets.

Engineering Challenges

The key engineering challenges for this site from a drainage design perspective are:

- Managing the 100 year storm event with 50% added to peak flows for climate change;
- Treatment of surface water runoff;
- Attenuation and discharge into the local combined sewer at 6.9 l/s, greenfield runoff rate.

Stormwater Calculation Inputs

The SuDS system is designed to store and attenuate below ground a 100yr return period storm event plus an additional 50% for climate change (see Figure 2.3 below).

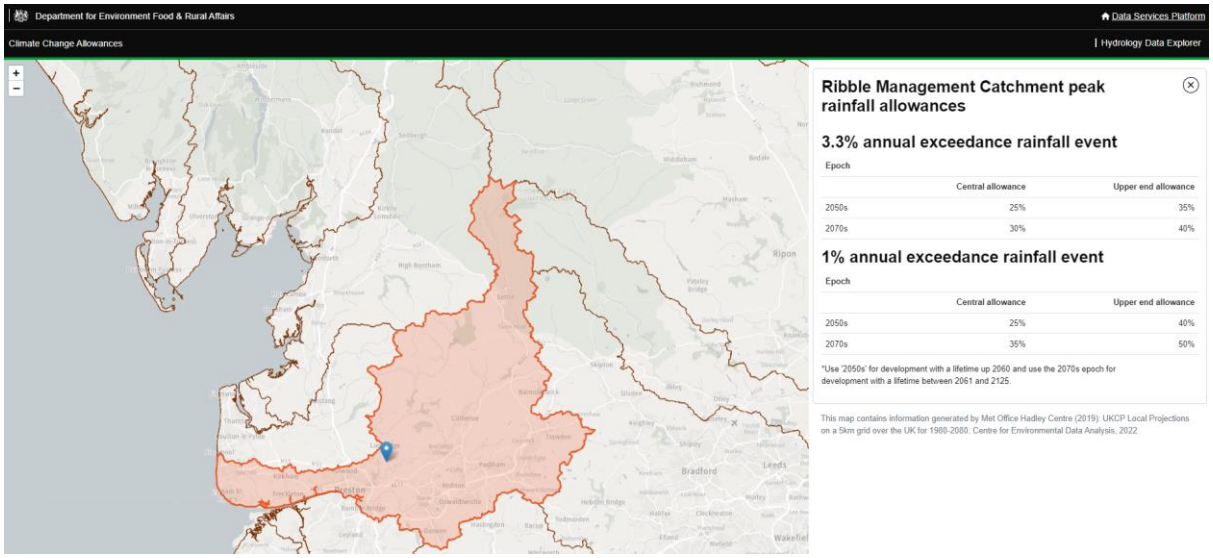


Figure 2.3 DEFRA climate change allowances for rainfall

Location:	Alston, Preston
FEH Data 2022	
Existing impermeable catchment area:	0.1 ha (existing road)
Proposed impermeable Catchment area:	0.565 ha
Storm Event:	100 years
Climate Change Factor:	50% Upper End
Greenfield Flow Rate QBar:	6.9 l/s (Appendix D)
Proposed design 1in100 + 50% storm event flow rate:	6.6 l/s

Urban creep is set at 0% as the whole of the development is agricultural in nature.

Contributing Areas

The site has been divided into 16 drainage areas, as shown in Figure .4 **Error! Reference source not found.** lists the area in m^2 and outgoing connections for each drainage area. All contributing areas have a PIMP of 0.90 with 1 set for both summer and winter (Cv).

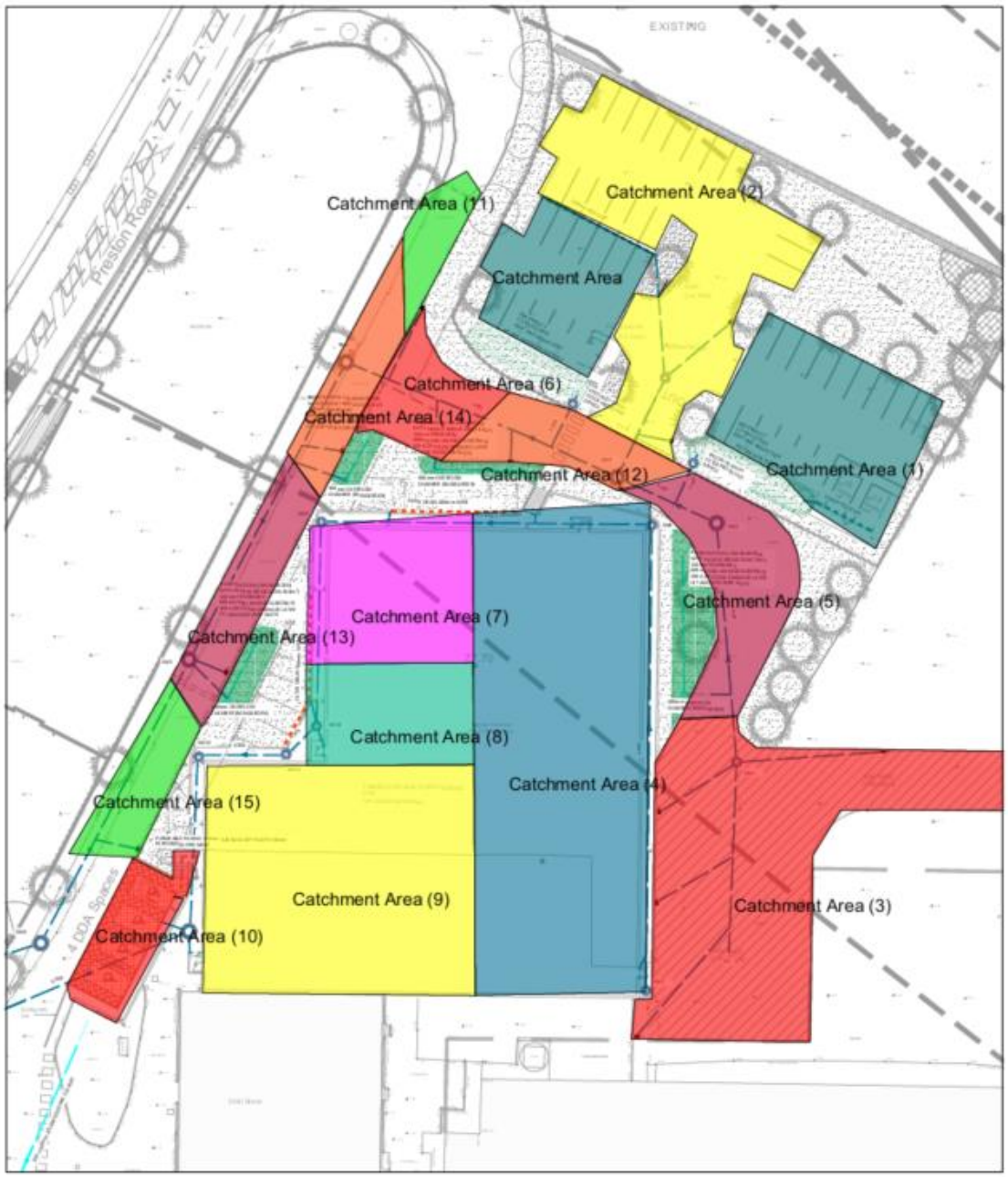


Figure 2.4 Contributing drainage areas

Table 2.1 (below) Contributing drainage areas

Name	Outgoing Item	Area
Catchment Area	Dry Swale 1	0.025
Catchment Area (1)	Dry Swale 2	0.04
Catchment Area (2)	SW3	0.063
Catchment Area (3)	SW1	0.084
Catchment Area (4)	SW8	0.103
Catchment Area (5)	Bioretention 1	0.026
Catchment Area (6)	SW4	0.014
Catchment Area (7)	SW9	0.027
Catchment Area (8)	SW10	0.02
Catchment Area (9)	SW13	0.082

Catchment Area (10)	Porous Paving	0.014
Catchment Area (11)	SW4	0.008
Catchment Area (12)	Bioretention 2	0.015
Catchment Area (13)	Bioretention 4	0.017
Catchment Area (14)	Bioretention 3	0.014
Catchment Area (15)	SW6	0.013
Total		0.565

The total impermeable (and actively drained) area on the site is 5,640 m^2.

Attenuation

To prevent flooding on the site in a 1 % AEP + 50 % climate change storm, the storage areas need the following capacity:

Table 2.2 Attenuation volumes

Name / location	Required volume (m^3)	Indicative dimensions and porosity
Tank (cellular)	333	20.5m x 10m 1.6m deep (97% void)
Dry Swale 1	7.5	46 sq.m and 400mm deep with 100% void
Dry Swale 2	5.6	46 sq.m and 400mm deep with 100% void
Permeable Paving	6.7	300 mm deep, 30% void 4/20 stone
Bioretention 1 (Raingarden) with passive irrigation	11.1	150mm freeboard (100% void), 600mm substrate (25% void) and 200mm 4/20 stone (30% void)
Bioretention 2 (Raingarden) with passive irrigation	5.2	150mm freeboard (100% void), 600mm substrate (25% void) and 200mm 4/20 stone (30% void)
Bioretention 3 (Raingarden) with passive irrigation	4.5	150mm freeboard (100% void), 600mm substrate (25% void) and 200mm 4/20 stone (30% void)
Bioretention 4 (Raingarden) with passive irrigation	6.2	150mm freeboard (100% void), 600mm substrate (25% void) and 200mm 4/20 stone (30% void)

Pollution Removal

As per the CIRIA Simple Index approach, a delivery yard/car park is medium risk and needs mitigation indices that meet 0.8, 0.6 and 0.9 for total suspended solids (TSS), metals and

hydrocarbons respectively. This is met with a Bypass separator (SuDS also included but not considered in calculation). The calculations are shown in Appendix E using the CIRIA SIA tool.

High Flow and Exceedance Events

As per non-statutory technical standard S8, flooding is permitted on site in events exceeding 3.3 % AEP + climate change, so long as it does not flood buildings or critical infrastructure in a 1 % AEP + climate change event. For events in excess of 1 % AEP + climate change, S9 states that flows should be managed in exceedance routes that minimise the risks to people and property.

The InfoDrainage modelling presented in **Error! Reference source not found.** predicts that in the 1 % AEP + 50 % storm event, 0 m^3 of flooding would occur.

Flooding beyond the extreme design storm event would follow the following pathway:

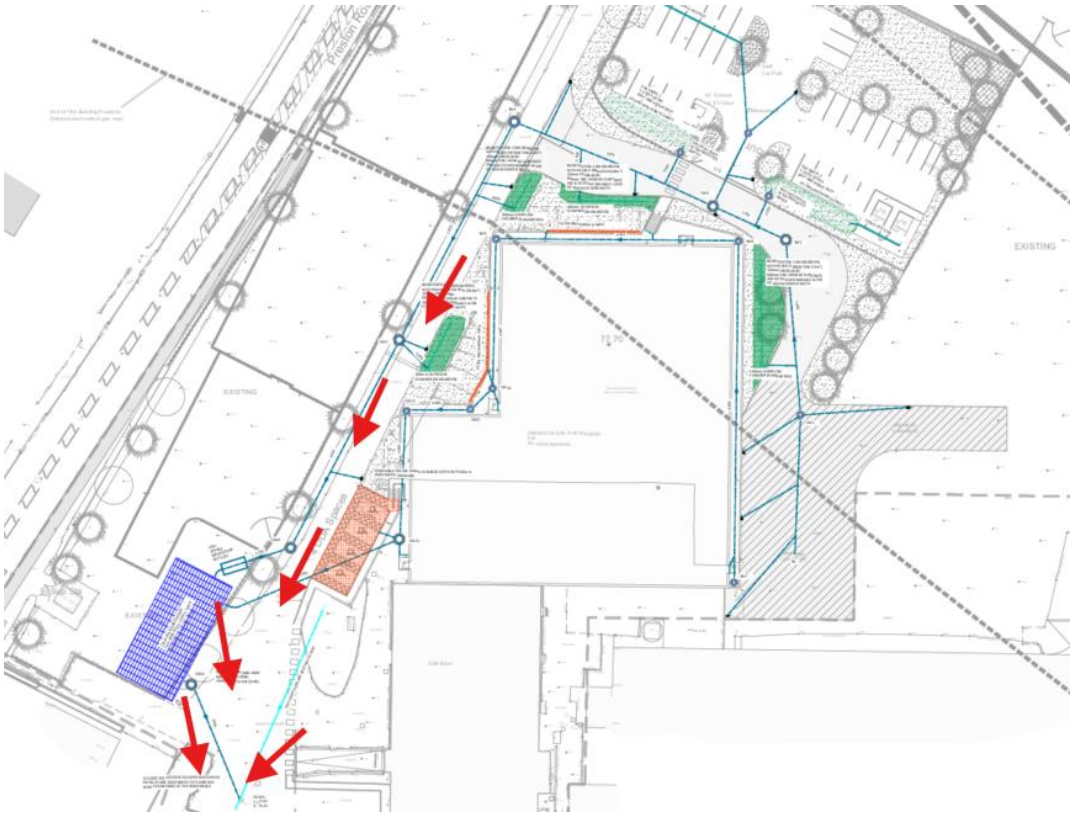


Figure 2.5 Exceedance routing

Integration with the landscape

Naturally planted swales and native species raingardens have been suggested by Pluviam Environmental to provide, biodiversity, amenity and treatment of any runoff passing through the devices.

3. OVERVIEW OF DRAINAGE PROPOSALS

Outline Design

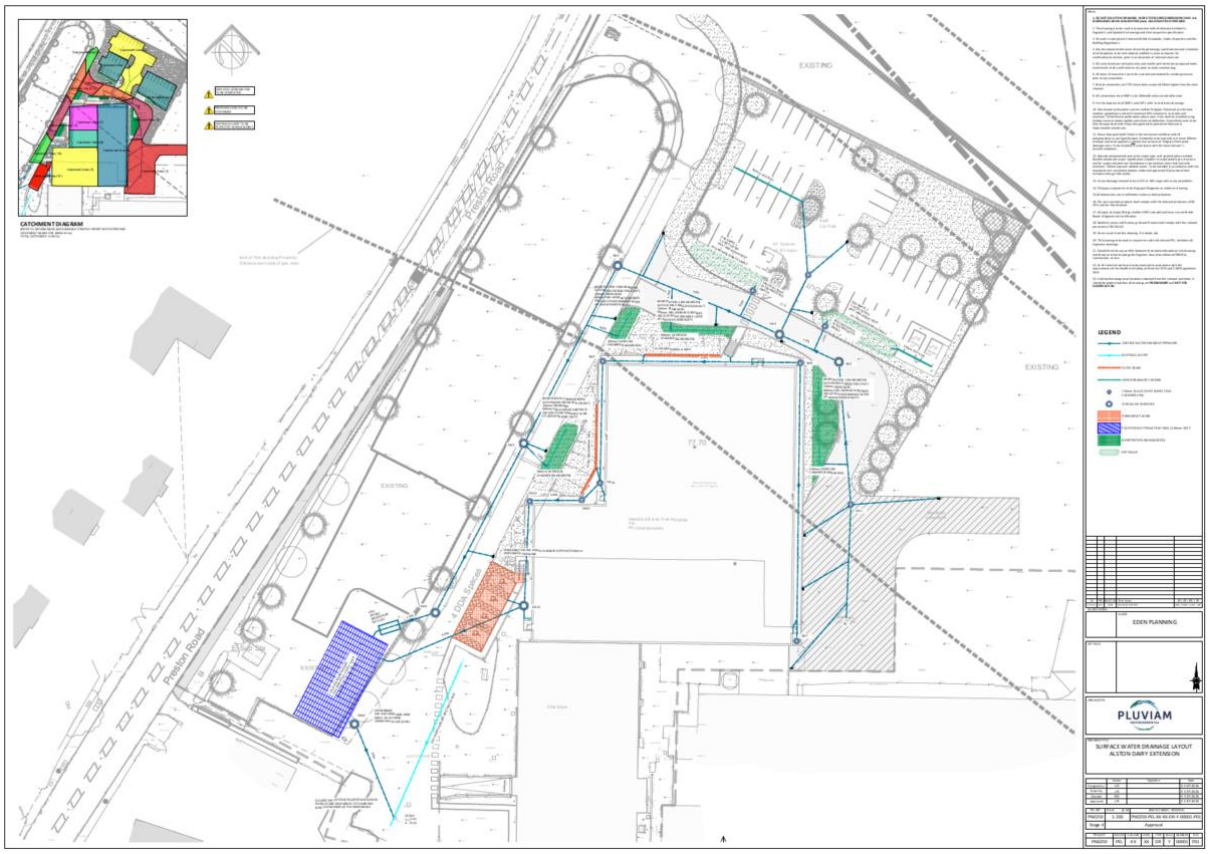


Figure 3.1 Outline drainage design and details (available full size in Appendix G)

The drainage design is based on achieving source control and treatment of the run-off from the proposed development.

The proposed drainage shall discharge to the existing onsite private connection to the culverted watercourse.

The hardstanding areas shall be collected primarily within raingardens and swales and supplemented with conventional gullies and channels where required. The hardstanding areas will pass through bypass separators for treatment prior to discharging into a geocellular attenuation tank. A small area adjacent to the proposed extension providing disabled spaces shall be collected within permeable paving (which will also provide treatment).

The building roofs shall discharge to respective network geocellular attenuation tanks via silt trap manholes.

The geocellular attenuation tank and Hydrobrake device are provided to limit the flows to Greenfield runoff rate. The Greenfield runoff rate 6.9 l/s. However, 6.6 l/s will be utilised as the design flow rate

during the 1in100+50% climate change storm event. The outline surface water calculations completed in InfoDrainage can be found in Appendix F.

Please refer to: PEL outline layout drawing PN0259-PEL-XX-XX-DR-Y-0001, Appendix G, for the proposed surface water drainage layout and PN0259-PEL-XX-XX-DR-Y-0002 for the proposed details.

4. MAINTENANCE

Management Responsibilities

The management, operation and maintenance of the soft SuDS features will be undertaken by Alston Diary. The dairy operation has a robust maintenance regime currently in place. However, specific tasks based on the proposed design are note below. This document will be provided to the diary at handover.

Managing SuDS

The SuDS has been designed for easy maintenance and comprises:

- Regular care – litter collection, manage vegetation growth and checking inlets where water enters the raingardens/tree pits. Inspection after major storm events for signs of blockage and debris.
- Occasional tasks – checking the inlets, catchpits and pipework and removing any silt/debris that builds up in the SuDS feature.
- Remedial Work – repairing damage where necessary, manage vegetation growth all in accordance with the current CIRIA SUDS Manual.

Routine maintenance

The following routine maintenance procedures are recommended:

• Remove silt/debris from back inlet gullies and yard gullies as required.

• Remove silt/debris from inspection chambers as required.

• Remove silt/debris from linear drainage channels as required.

• Remove siltation from attenuation tank via low flow high volume pressure jetting.

• Records of inspections and maintenance undertaken should be kept by the client.

Management of maintenance to be undertaken by Alston Dairy.

Separators should follow the maintenance and management plan specified by the supplier. They are specialist units which require the manufacturers guidance to be adhered to.

Maintenance activities comprise:

General Requirements
• Regular maintenance • Occasional tasks • Remedial work
General Litter - collect all litter or other debris and remove it from site at each visit. Landscaping and mowing.

- Avoid use of weed-killers and pesticides to prevent chemical pollution
- Avoid de-icing agents wherever possible
- Protect all below ground drainage through careful selection and placement of hard and soft landscaping.

Specific Maintenance

Raingardens and Swales	
Regular maintenance	**Frequency**
Inspect and identify any areas that are not operating correctly. If required take remedial action. Remove debris from the catchment surface (where it may cause risks to performance) Remove sediment from pre-treatment inlet structures and inspection chambers. Maintain vegetation and prune any dead vegetation. Remove invasive plants and weeds regularly.	Monthly for three months then annually Monthly Annually or as necessary Annually or as necessary
Occasional maintenance	**Frequency**
Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary or every three months
Remedial work	**Frequency**
Repair physical damage if necessary.	As required

Geocellular Tank	
Regular maintenance	**Frequency**
Inspect and identify any areas that are not operating correctly. If required take remedial action. Remove debris from the catchment surface (where it may cause risks to performance)	Monthly for 3 mths then annually Monthly Annually or as required

Remove sediment from pre-treatment inlet structures and inspection chambers. Maintain vegetation (grass, hedges and trees) to designed limits within the vicinity of below ground drainage pipes and tanks to avoid damage to system. Remove nuisance plants.	Monthly or as required
Remedial work	**Frequency**
Repair physical damage if necessary	As required
Monitoring	**Frequency**
Inspect all inlets, outlets and vents to ensure that they are in good condition and operating as designed Survey inside of tank and pipe runs for sediment build up and remove if necessary	Annually Every 5 years or as require

Chambers and Channels	
Regular maintenance	**Frequency**
Inlet Structures Inspect rainwater down pipes, channel drains, silt traps, inspection chambers and road gullies, removing obstructions and silt as necessary. Check there is no physical damage Strim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly Monthly
Inspection Chambers and below ground control chambers Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually

Undertake inspection after leaf fall in autumn	
Occasional maintenance	**Frequency**
Check topsoil levels are 20mm above edges of chambers to avoid mower damage	As necessary
Remedial work	**Frequency**
Repair physical damage if necessary	As required

Waste Management

- **Litter** shall be disposed of offsite at an appropriate recycling facility.
- **Grass cuttings** shall be composted.
- **Sediment** arising from clearing silt traps, pipes, inspection chambers shall be disposed of according to EA guidance.

Any variance to the above shall follow the guidance of the CIRIA SuDS manual.

Spillage – Emergency Action

Spillages of oil or other COSHH substances should be removed where possible using soak mats as recommended by the Environment Agency.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or closely woven fabric).

Contact The Environment Agency immediately.

5. CONCLUSION

The proposed SuDS design meets the requirements of the CIRIA SuDS Manual C753.

The system is designed to collect, treat, and attenuate the rainwater runoff from the new impermeable areas and discharge into the existing surface water culvert.

The proposed surface water drainage system combines existing conventional drainage principles and products along with source control techniques and components.

Appendix A

Site Investigation – Borehole Extracts

LEONARD FAIRCLOUGH, LIMITED
SITE INVESTIGATION DIVISION
Chapel Street, Adlington, Lancashire PR7 4JP
Telephone: ADLINGTON 264 & 471 Telex: 67510

BOREHOLE LOG SHEET

SD 53 NE 19
[5934 3518]

B.H. No. [redacted] 46 Job No. 74/105

Date 5-5-75

Location HOGHTON TO WHITTINGHAM PIPELINE

Rig 150mm PERCUSSION

Client PRESTON AND DISTRICT WATER SUPPLY UNIT

Scale 1:50

Description	O.S.D.	Legend	Depth	Thickness	Sample	S.P.T. "N" Value	Water Levels
			0.00				
TOPSOIL			0.15	0.15			
Brown and Grey Sandy CLAY			1.20	1.05	1.00		BOREHOLE DRY
Firm to Stiff Brown Gravelly CLAY			5.00	3.80	2.00 3.00 4.00 5.00		BOREHOLE COMPLETED

Undisturbed Sample □ Disturbed Sample ○ Water Sample △ Standard Penetration Test ×

S102

Appendix B

Existing Drainage Investigation

Outlook

RE: Alston Dairy

From [redacted]
Date
To

Hi Nicole,

The survey was carried out, due to the very dry weather the dye took a very long time to move downstream but we found the dye in Tun Brook which discharges into the River Ribble.

Regards

Michael Billington

For and on behalf of

SleaterWatson
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Telephone [redacted]
Address: 26 West Cliff, Preston, Lancashire, PR1 8HU.
Website: www.sleaterwatson.co.uk
Follow us on LinkedIn

Fro [redacted]
Ser
To:
Subject: RE: Alston Dairy

Good morning,

@Michael Billington did the survey happen as planned?

Kind regards

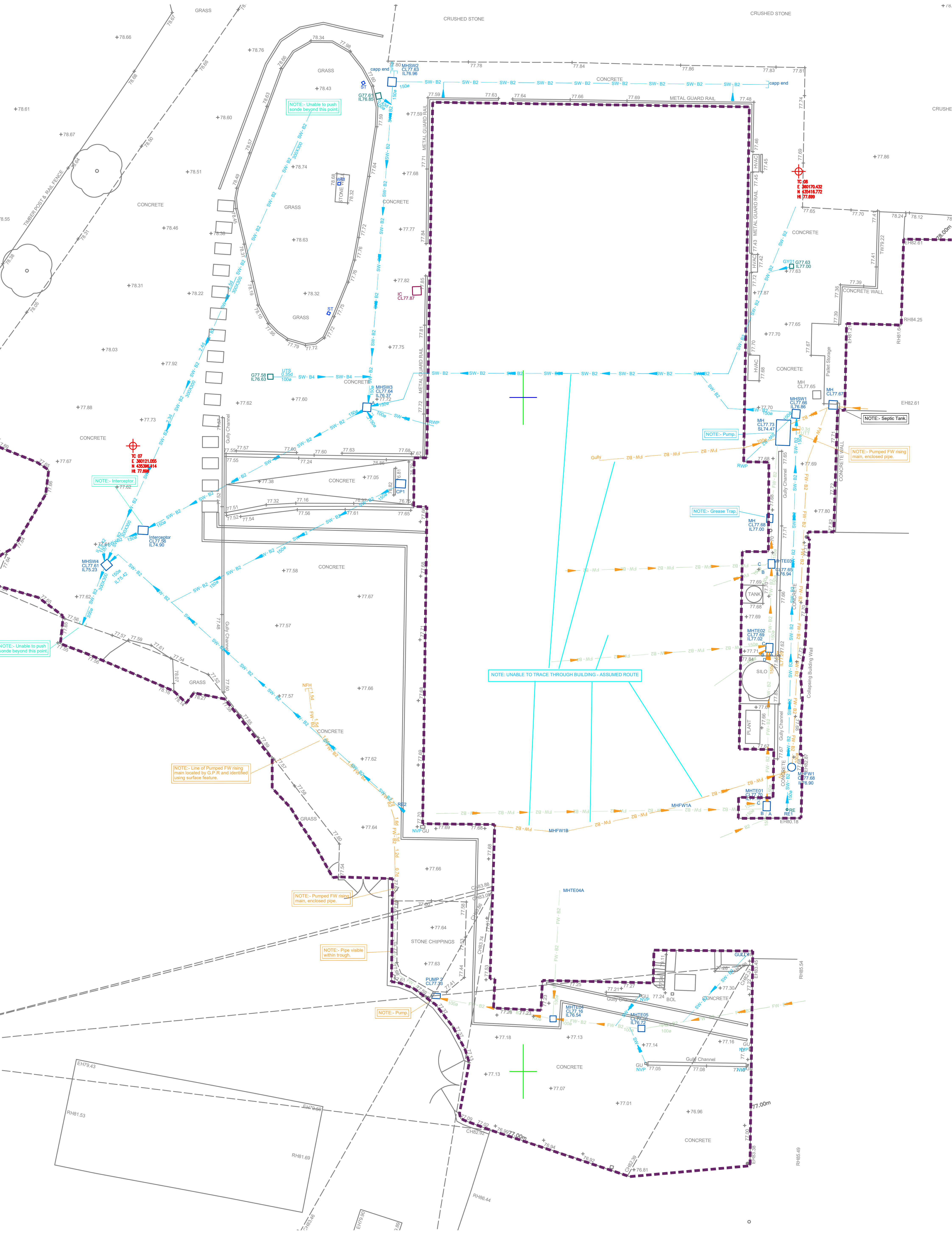
Nicole Roe
Director
[redacted]
E: nicole@edenplanning.co.uk
1 Market Street . Altrincham . WA14 1QE
edenplanning.co.uk

EDEN

View our work: Track Record

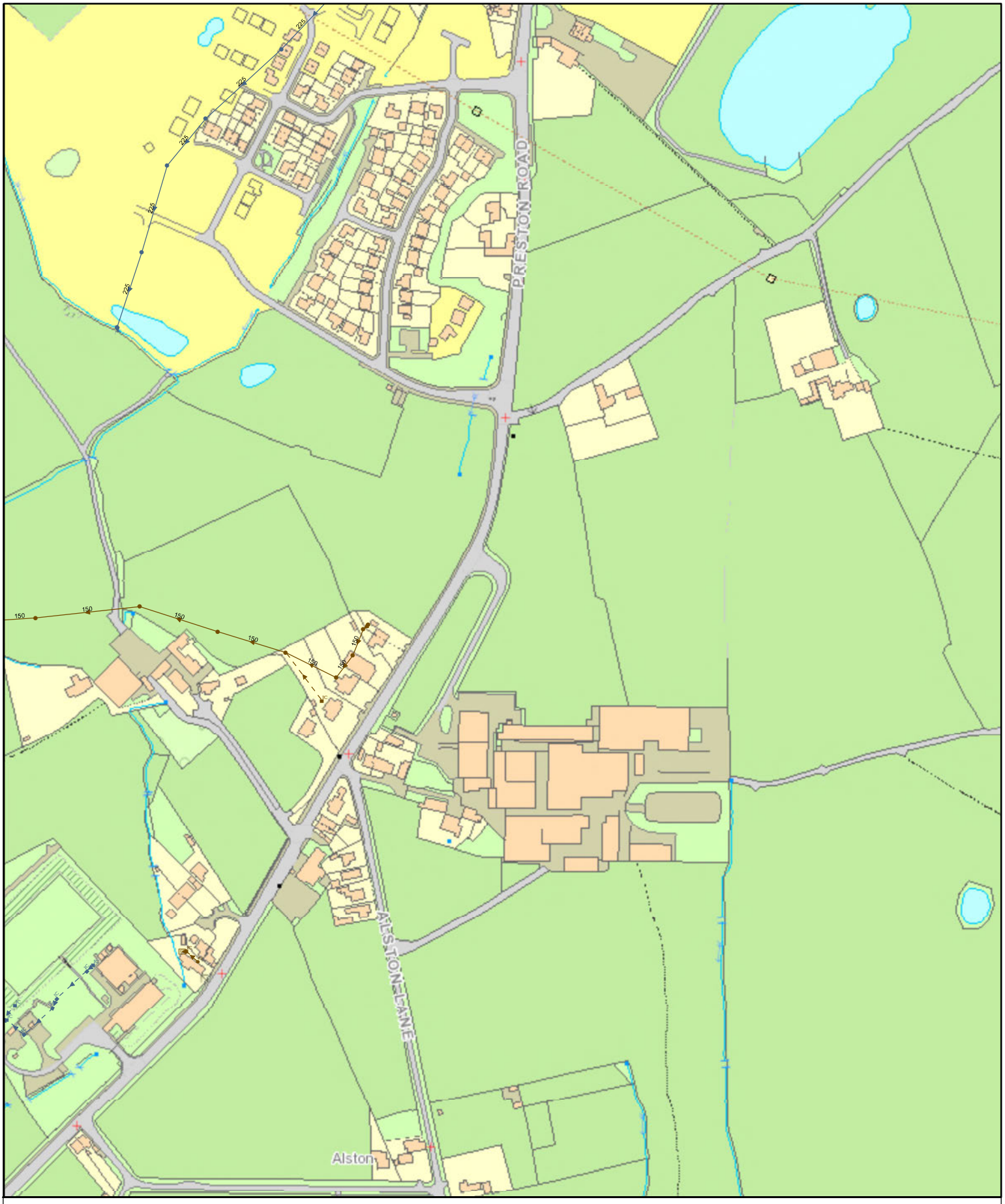
Fro [redacted]
Se
To
Su

Thank you for letting us know. @'John Roberts' how long do you envisage needing after this?


GRASS
CRUSHED STONE
CRUSHED STONE
TIMBER POST & RAIL FENCE
CONCRETE
GRASS
STONE WALL
NOTE:- Unable to push sonde beyond this point.
capp end
MHSW2 CL77.63 IL76.96
G77.61 IL76.85
METAL GUARD RAIL
HVAC
TC 08 E 360170.432 N 435416.772 Ht 77.699
GY01 G77.63 IL77.00
CONCRETE WALL
Pallet Storage
IC CL77.87
G77.58 IL76.63
UTS 0.35d 100ø
MHSW3 CL77.64 IL76.37
RWP
MH CL77.65
MH CL77.67
MHSW1 CL77.66 IL76.86
NOTE:- Septic Tank.
MH CL77.73 SL74.47
NOTE:- Pump.
NOTE:- Pumped FW rising main, enclosed pipe.
Gully
TC 07 E 360121.055 N 435398.414 Ht 77.696
NOTE:- Interceptor.
Interceptor CL77.56 IL74.90
MHSW4 CL77.61 IL75.23
Gully Channel
CP1
NOTE:- Grease Trap.
MH CL77.68 IL77.00
MHTE03 CL77.65 IL76.94
TANK
MHTE02 CL77.69 IL77.02
SILO
PLANT
Collapsing Building Wall
NOTE: UNABLE TO TRACE THROUGH BUILDING - ASSUMED ROUTE
NFH
NOTE:- Line of Pumped FW rising main located by G.P.R and identified using surface feature.
RE2
MHFW1 CL77.68 IL76.90
MHTE01 CL77.70
RE1
MHFW1A
MHFW1B
NVP GU
NOTE:- Pumped FW rising main, enclosed pipe.
STONE CHIPPINGS
NOTE:- Pipe visible within trough.
PUMP 2 CL77.33
NOTE:- Pump.
MHTE04A
MHTE04 CL77.16 IL76.54
MHTE05 CL77.16 IL76.72
GULLY
BOL
77.00m
78.00m
EH79.43
RH81.53
EH79.50
RH81.69
RH86.44
RH85.54
RH85.49
EH83.45
EH83.38
EH82.61
RH84.25
EH80.18

Appendix C

United Utilities Sewer Record Map



Date: 25/03/2022

Extract from Map of Public Sewers

Printed By:
Property Searches

Land and surrounding area Pinfold Lane & Preston Road Longridge PR

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

Appendix D

GFFR Calculation

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

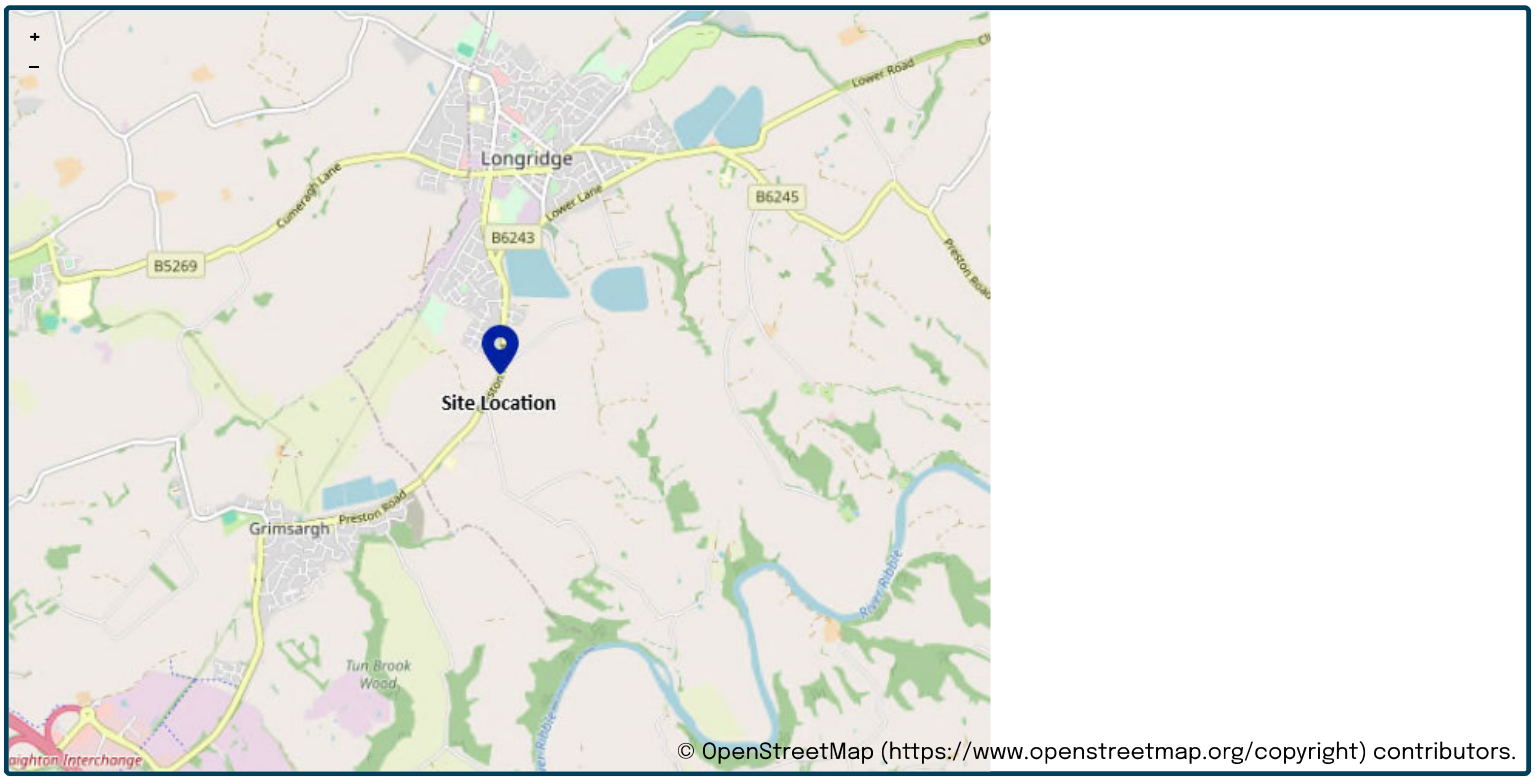
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	02/07/2025
Calculated by	John Roberts
Reference	AlstonD
Model version	2.0.1

Location

Site name	Alston
Site location	Alston



Site easting	360158
Site northing	435418

Site details

Total site area (ha)	.564 ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value
SAAR (mm)	1094 mm		1094
BFIHOST	.351		
QMed-QBar conversion	1.075		1.075
QMed (l/s)	6.41 l/s		
QBar (FEH statistical) (l/s)	6.9 l/s		

Growth curve factors

	My value		Map value
Hydrological region	10		10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	FEH statistical
Flow rate 1 year (l/s)	6 l/s
Flow rate 2 year (l/s)	6.4 l/s
Flow rate 10 years (l/s)	9.5 l/s
Flow rate 30 years (l/s)	11.7 l/s
Flow rate 100 years (l/s)	14.3 l/s
Flow rate 200 years (l/s)	16.3 l/s

Appendix E

CIRIA SIA Tool - Pollution

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Standard commercial yard or delivery area	This classification is not appropriate for haulage yards, lorry parks, waste management areas, or chemical storage/handling zones			
Pollution Hazard Level	Medium				
Pollution Hazard Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
SuDS components proposed					
Component 1	Petrol interceptor (from SPEL) - Bypass	Detailed assessment of performance of designed component in reducing inflow concentrations of each pollutant type required as evidence of adopted indices. Enter indices approved by the environmental regulator in appropriate 'User Defined Indices' row below			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.8				
Metals	0.6				
Hydrocarbons	0.9				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.8	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.6				
Hydrocarbons	0.9				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

Appendix F

InfoDrainage Model Results

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Inflows Storm Phase: Phase	Pluviam Environmental		

Catchment Area

Type : Catchment Area

Area (ha)	0.025

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (1)

Type : Catchment Area

Area (ha)	0.04

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (2)

Type : Catchment Area

Area (ha)	0.063

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (3)

Type : Catchment Area

Area (ha)	0.084

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Inflows Storm Phase: Phase	Pluviam Environmental		

Catchment Area (4)

Type : Catchment Area

Area (ha)	0.103

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (5)

Type : Catchment Area

Area (ha)	0.026

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.014

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (7)

Type : Catchment Area

Area (ha)	0.027

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (8) Type : Catchment Area

Area (ha)	0.02

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (9) Type : Catchment Area

Area (ha)	0.082

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (10) Type : Catchment Area

Area (ha)	0.014

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (11) Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (12) Type : Catchment Area

Area (ha)	0.015

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (13) Type : Catchment Area

Area (ha)	0.017

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (14) Type : Catchment Area

Area (ha)	0.014

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	90

Catchment Area (15) Type : Catchment Area

Area (ha)	0.013

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	0.9

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Junctions Storm Phase: Phase	Pluviam Environmental		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SW8	Manhole	1915.827	-747.865	79.200	1.871	77.329	Circular	1.200
SW9	Manhole	1877.389	-747.689	78.913	1.755	77.158	Circular	1.200
SW10	Manhole	1876.840	-771.367	78.619	1.625	76.995	Circular	1.200
SW11	Manhole	1873.297	-774.611	78.478	1.525	76.953	Circular	1.200
SW12	Manhole	1863.265	-775.022	78.508	1.717	76.791	Circular	1.200
SW13	Manhole	1862.852	-795.561	77.950	1.251	76.699	Circular	1.200
SW1	Manhole	1925.683	-775.687	78.681	0.925	77.756	Circular	1.200
SW2	Manhole	1923.333	-747.785	79.235	1.604	77.632	Circular	1.200
SW3	Manhole	1911.975	-742.428	79.219	1.755	77.464	Circular	1.200
SW4	Manhole	1880.542	-729.045	79.021	1.709	77.312	Circular	1.200
SW5	Manhole	1860.318	-767.803	78.584	1.584	77.000	Circular	1.350
SW6	Manhole	1844.941	-796.822	78.714	1.859	76.854	Circular	1.350
SW14	Manhole	1843.328	-820.963	77.930	2.654	75.277	Circular	1.350
SW7	Manhole	1915.402	-802.482	78.566	0.850	77.716	Circular	1.200

Name	Lock
SW8	None
SW9	None
SW10	None
SW11	None
SW12	None
SW13	None
SW1	None
SW2	None
SW3	None
SW4	None
SW5	None
SW6	None
SW14	None
SW7	None

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Junctions Storm Phase: Phase	Pluviam Environmental		

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW8	Inlet	Catchment Area (4)	(None)	No Restriction
	Inlet (1)	4.000	(None)	No Restriction
SW9	Inlet	Catchment Area (7) 4.001	(None)	No Restriction
SW10	Inlet	Catchment Area (8) 4.002	(None)	No Restriction
SW11	Inlet	4.003	(None)	No Restriction
SW12	Inlet	4.004	(None)	No Restriction
SW13	Inlet	Catchment Area (9) 4.005	(None)	No Restriction
SW1	Inlet	Catchment Area (3)	(None)	No Restriction
SW2	Inlet	1.000 2.000	(None)	No Restriction
	Inlet (1)	No Delay	(None)	No Restriction
SW3	Inlet	Catchment Area (2) 1.001 3.000	(None)	No Restriction
	Inlet (2)	5.000	(None)	No Restriction
SW4	Inlet	Catchment Area (6) 1.002	(None)	No Restriction
	Inlet (1)	Catchment Area (11)	(None)	No Restriction
	Inlet (2)	6.000	(None)	No Restriction
SW5	Inlet	1.003	(None)	No Restriction
	Inlet (2)	7.000	(None)	No Restriction
SW6	Inlet	1.004 Catchment Area (15)	(None)	No Restriction
SW14	Inlet	1.006	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SW8	Outlet	4.001	Free Discharge
SW9	Outlet	4.002	Free Discharge
SW10	Outlet	4.003	Free Discharge
SW11	Outlet	4.004	Free Discharge
SW12	Outlet	4.005	Free Discharge
SW13	Outlet	4.006	Free Discharge
SW1	Outlet	1.000	Free Discharge
SW2	Outlet	1.001	Free Discharge
SW3	Outlet	1.002	Free Discharge
SW4	Outlet	1.003	Free Discharge
SW5	Outlet	1.004	Free Discharge
SW6	Outlet	1.005	Free Discharge
SW7	Outlet	4.000	Free Discharge

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Bioretention 1

Type : Bioretention

Ponding Area

Exceedance Level (m)	78.829
Depth (m)	0.150
Base Level (m)	78.679
Top Area (m²)	79.41
Side Slope (1:X)	2.00
Base Area (m²)	64.83
Freeboard (mm)	150
Porosity (%)	100
Length (m)	24.298
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	5.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	13.748

Filter Area

Base Level (m)	77.879

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	25	0.3	Soil Type
	Storage	200	30	5.0	

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	53.932
Top Perimeter (m)	55.132

Bioretention 2

Type : Bioretention

Ponding Area

Exceedance Level (m)	79.021
Depth (m)	0.150
Base Level (m)	78.871
Top Area (m²)	28.00
Side Slope (1:X)	2.00
Base Area (m²)	18.004
Freeboard (mm)	150
Porosity (%)	100
Length (m)	16.660
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	5.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	3.872

Filter Area

Base Level (m)	78.071

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	25	0.3	Soil Type
	Storage	200	30	5.0	

Inlets

Inlet

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

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Outlets

Outlet

Outgoing Connection	5.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	35.481
Top Perimeter (m)	36.681

Bioretention 3

Type : Bioretention

Ponding Area

Exceedance Level (m)	78.942
Depth (m)	0.150
Base Level (m)	78.792
Top Area (m²)	20.93
Side Slope (1:X)	2.00
Base Area (m²)	16.27
Freeboard (mm)	150
Porosity (%)	100
Length (m)	7.763
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	5.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	3.459

Filter Area

Base Level (m)	77.992

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	25	0.3	Soil Type
	Storage	200	30	5.0	

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Inlets

Inlet

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

Outlets

Outlet

Outgoing Connection	6.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	19.718
Top Perimeter (m)	20.918

Bioretention 4

Type : Bioretention

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Ponding Area

Exceedance Level (m)	78.518
Depth (m)	0.150
Base Level (m)	78.368
Top Area (m²)	37.08
Side Slope (1:X)	2.00
Base Area (m²)	29.33
Freeboard (mm)	150
Porosity (%)	100
Length (m)	12.910
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	5.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	6.230

Filter Area

Base Level (m)	77.568

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	100
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	600	25	0.3	Soil Type
	Storage	200	30	5.0	

Inlets

Inlet

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

Outlets

Outlet

Outgoing Connection	7.000
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	30.364
Top Perimeter (m)	31.564

Tank

Type : Tank

Dimensions

Exceedance Level (m)	77.885
Depth (m)	2.485
Base Level (m)	75.400
Freeboard (mm)	900
Initial Depth (m)	0.000
Porosity (%)	97
Average Slope (1:X)	0.00
Total Volume (m³)	322.830

Depth (m)	Area (m²)	Volume (m³)
0.000	210.00	0.000
1.680	210.00	342.216

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.005
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	4.006 No Delay (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

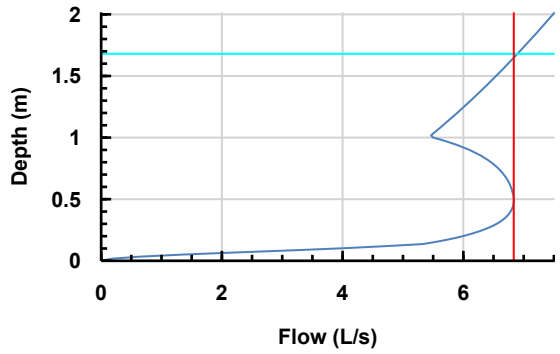
Outlets

Outlet

Outgoing Connection	1.006
Outlet Type	Hydro-Brake®

Invert Level (m)	75.400
Design Depth (m)	1.680
Design Flow (L/s)	6.9
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☑

Unit Reference	SHE-0113-6900-1680-6900



Advanced

Perimeter	Circular
Length (m)	6.031

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	78.187
Depth (m)	0.500
Base Level (m)	77.687
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	100.0
Porosity (%)	30
Length (m)	6.642
Long. Slope (1:X)	1000.00
Width (m)	16.605
Total Volume (m³)	12.242

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (10)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (1)
Outlet Type	Orifice

Diameter (m)	0.060
Coefficient of Discharge	0.600
Invert Level (m)	77.687

Advanced

Conductivity (m/hr)	5.0

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Dry Swale 1

Type : Swale

Swale

Exceedance Level (m)	78.955
Depth (m)	0.400
Base Level (m)	78.555
Top Width (m)	2.871
Side Slope (1:X)	3.00
Base Width (m)	0.471
Freeboard (mm)	400
Length (m)	16.027
Long. Slope (1:X)	1000.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	0.000

Inlets

Inlet

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

Outlets

Outlet

Outgoing Connection	3.000
Outlet Type	Orifice

Diameter (m)	0.050
Coefficient of Discharge	0.600
Invert Level (m)	78.555

Advanced

Swale

Porosity (%)	100

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Stormwater Controls Storm Phase: Phase	Pluviam Environmental		

Dry Swale 2

Type : Swale

Swale

Exceedance Level (m)	79.253
Depth (m)	0.400
Base Level (m)	78.853
Top Width (m)	2.903
Side Slope (1:X)	3.00
Base Width (m)	0.503
Freeboard (mm)	400
Length (m)	16.230
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	5.0
Friction Scheme	Manning's n
n	0.03
Total Volume (m³)	0.000

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	2.000
Outlet Type	Orifice

Diameter (m)	0.100
Coefficient of Discharge	0.600
Invert Level (m)	78.853

Advanced

Swale

Porosity (%)	100

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Connections Storm Phase: Phase	Pluviam Environmental		

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream	Upstream Invert Level (m)
4.001	38.438	Pipe	225.000		0.6	225	79.200	77.329
4.002	23.685	Pipe	145.000		0.6	225	78.913	77.158
4.003	4.804	Pipe	115.000		0.6	225	78.619	76.995
4.004	10.040	Pipe	115.000		0.6	225	78.478	76.953
4.005	20.544	Pipe	225.000		0.6	300	78.508	76.791
1.000	28.001	Pipe	225.000		0.6	225	78.681	77.756
1.001	12.558	Pipe	74.739		0.6	225	79.235	77.632
1.002	34.164	Pipe	225.000		0.6	300	79.219	77.464
1.003	43.718	Pipe	140.430		0.6	300	79.021	77.312
1.004	32.841	Pipe	225.000		0.6	375	78.584	77.000
1.005	5.243	Pipe	3.605		0.6	375	78.714	76.854
2.000	5.623	No Delay						
3.000	10.919	No Delay						
1.006	18.486	Pipe	150.000		0.6	150	78.651	75.400
4.006	23.923	Pipe	225.000		0.6	300	77.950	76.699
4.000	54.619	Pipe	150.000		0.6	150	78.566	77.716
No Delay	13.911	No Delay						
No Delay (1)	15.978	No Delay						
5.000	9.899	No Delay						
6.000	11.237	No Delay						
7.000	8.092	No Delay						

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
4.001	78.913	77.158		None		(None)	(None)
4.002	78.619	76.995		None		(None)	(None)
4.003	78.478	76.953		None		(None)	(None)
4.004	78.508	76.866		None		(None)	(None)
4.005	77.950	76.699		None		(None)	(None)
1.000	79.235	77.632		None		(None)	(None)
1.001	79.219	77.464		None		(None)	(None)
1.002	79.021	77.312		None		(None)	(None)
1.003	78.584	77.000		None		(None)	(None)
1.004	78.714	76.854		None		(None)	(None)
1.005	78.674	75.400		None		(None)	(None)
2.000							
3.000							
1.006	77.930	75.277		All	6.7	(None)	(None)
4.006	78.648	76.593		Levels		(None)	(None)
4.000	79.200	77.352		None		(None)	(None)
No Delay							
No Delay (1)							
5.000							
6.000							
7.000							

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Manhole Schedule Storm Phase: Phase	Pluviam Environmental		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW8	79.200 77.329	Diameter / Length: 1.200	{1} 4.000	Pipe	77.352	Diam/Width:150	Manhole
E:1915.827 N:-747.865	1.871		{a} 4.001	Pipe	77.329	Diam/Width:225	Not Applicable
SW9	78.913 77.158	Diameter / Length: 1.200	{1} 4.001	Pipe	77.158	Diam/Width:225	Manhole
E:1877.389 N:-747.689	1.755		{a} 4.002	Pipe	77.158	Diam/Width:225	Not Applicable
SW10	78.619 76.995	Diameter / Length: 1.200	{1} 4.002	Pipe	76.995	Diam/Width:225	Manhole
E:1876.840 N:-771.367	1.625		{a} 4.003	Pipe	76.995	Diam/Width:225	Not Applicable
SW11	78.478 76.953	Diameter / Length: 1.200	{1} 4.003	Pipe	76.953	Diam/Width:225	Manhole
E:1873.297 N:-774.611	1.525		{a} 4.004	Pipe	76.953	Diam/Width:225	Not Applicable
SW12	78.508 76.791	Diameter / Length: 1.200	{1} 4.004	Pipe	76.866	Diam/Width:225	Manhole
E:1863.265 N:-775.022	1.717		{a} 4.005	Pipe	76.791	Diam/Width:300	Not Applicable
SW13	77.950 76.699	Diameter / Length: 1.200	{1} 4.005	Pipe	76.699	Diam/Width:300	Manhole
E:1862.852 N:-795.561	1.251		{a} 4.006	Pipe	76.699	Diam/Width:300	Not Applicable

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Manhole Schedule Storm Phase: Phase	Pluviam Environmental		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW1	78.681 77.756	Diameter / Length: 1.200					Manhole
E:1925.683 N:-775.687	0.925		{a} 1.000	Pipe	77.756	Diam/Width:225	Not Applicable
SW2	79.235 77.632	Diameter / Length: 1.200	{1} 1.000 {2} 2.000 {3} No Delay	Pipe No Delay No Delay	77.632 Not Applicable Not Applicable	Diam/Width:225 Not Applicable Not Applicable	Manhole
E:1923.333 N:-747.785	1.604		{a} 1.001	Pipe	77.632	Diam/Width:225	Not Applicable
SW3	79.219 77.464	Diameter / Length: 1.200	{1} 1.001 {2} 3.000 {3} 5.000	Pipe No Delay No Delay	77.464 Not Applicable Not Applicable	Diam/Width:225 Not Applicable Not Applicable	Manhole
E:1911.975 N:-742.428	1.755		{a} 1.002	Pipe	77.464	Diam/Width:300	Not Applicable
SW4	79.021 77.312	Diameter / Length: 1.200	{1} 1.002 {2} 6.000	Pipe No Delay	77.312 Not Applicable	Diam/Width:300 Not Applicable	Manhole
E:1880.542 N:-729.045	1.709		{a} 1.003	Pipe	77.312	Diam/Width:300	Not Applicable

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address: Pluviam Environmental		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW5	78.584 77.000	Diameter / Length: 1.350	{1} 1.003 {2} 7.000	Pipe No Delay	77.000 Not Applicable	Diam/Width:300 Not Applicable	Manhole
E:1860.318 N:-767.803	1.584		{a} 1.004	Pipe	77.000	Diam/Width:375	Not Applicable
SW6	78.714 76.854	Diameter / Length: 1.350	{1} 1.004	Pipe	76.854	Diam/Width:375	Manhole
E:1844.941 N:-796.822	1.859		{a} 1.005	Pipe	76.854	Diam/Width:375	Not Applicable
SW14	77.930 75.277	Diameter / Length: 1.350	{1} 1.006	Pipe	75.277	Diam/Width:150	Manhole
E:1843.328 N:-820.963	2.654						Not Applicable
SW7	78.566 77.716	Diameter / Length: 1.200					Manhole
E:1915.402 N:-802.482	0.850		{a} 4.000	Pipe	77.716	Diam/Width:150	Not Applicable

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Inflow Summary Storm Phase: Phase	Pluviam Environmental		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Dry Swale 1		Time of Concentration	0.025	90.0	0	90.0	0.023
Catchment Area (1)	Dry Swale 2		Time of Concentration	0.040	90.0	0	90.0	0.036
Catchment Area (2)	SW3		Time of Concentration	0.063	90.0	0	90.0	0.057
Catchment Area (3)	SW1		Time of Concentration	0.084	90.0	0	90.0	0.076
Catchment Area (4)	SW8		Time of Concentration	0.103	90.0	0	90.0	0.092
Catchment Area (5)	Bioretention 1		Time of Concentration	0.026	90.0	0	90.0	0.023
Catchment Area (6)	SW4		Time of Concentration	0.014	90.0	0	90.0	0.012
Catchment Area (7)	SW9		Time of Concentration	0.027	90.0	0	90.0	0.024
Catchment Area (8)	SW10		Time of Concentration	0.020	90.0	0	90.0	0.018
Catchment Area (9)	SW13		Time of Concentration	0.082	90.0	0	90.0	0.073
Catchment Area (10)	Porous Paving		Time of Concentration	0.014	90.0	0	90.0	0.012
Catchment Area (11)	SW4		Time of Concentration	0.008	90.0	0	90.0	0.007
Catchment Area (12)	Bioretention 2		Time of Concentration	0.015	90.0	0	90.0	0.014
Catchment Area (13)	Bioretention 4		Time of Concentration	0.017	100.0	0	100.0	0.017
Catchment Area (14)	Bioretention 3		Time of Concentration	0.014	90.0	0	90.0	0.013
Catchment Area (15)	SW6		Time of Concentration	0.013	0.9	0	0.9	0.000
TOTAL		**0.0**		**0.563**				**0.496**

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Network Design Criteria Storm Phase: Phase	Pluviam Environmental		

Flow Options

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

FEH

Type: FEH

Site Location	GB 360163 435444 SD 60163 35444
Return Period (years)	30.0
Rainfall Version	2022

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	0.700
Min. Slope (1:X)	225.00
Max. Slope (1:X)	40.00
Min. Backdrop (m)	0.300
Max. Backdrop (m)	2.000
Min. Velocity (m/s)	0.75
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

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

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

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Network Design Criteria Storm Phase: Phase	Pluviam Environmental		

Manhole Options

Apply Offset	☐

Manhole Size Library

Default

Diameter / Width

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

Additional Sizing

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

Depth

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

Access

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

Benching Requirements

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

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Outfall Details Storm Phase: Phase	Pluviam Environmental		

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
SW14	Free Discharge			

Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Title:	Company Address:		
Rainfall Analysis Criteria	Pluviam Environmental		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
SW8	FEH: 2 years: +0 %: 15 mins: Summer	79.200	77.329	77.439	0.110	17.1	0.124	0.000	15.4	7.430	OK
SW9	FEH: 2 years: +0 %: 15 mins: Summer	78.913	77.158	77.267	0.109	19.8	0.123	0.000	18.2	9.336	OK
SW10	FEH: 2 years: +0 %: 15 mins: Summer	78.619	76.995	77.113	0.118	21.4	0.134	0.000	20.3	10.738	OK
SW11	FEH: 2 years: +0 %: 15 mins: Summer	78.478	76.953	77.062	0.109	20.3	0.123	0.000	19.4	10.722	OK
SW12	FEH: 2 years: +0 %: 15 mins: Summer	78.508	76.791	76.897	0.107	19.4	0.121	0.000	18.4	10.696	OK
SW13	FEH: 2 years: +0 %: 15 mins: Summer	77.950	76.699	76.839	0.139	32.1	0.158	0.000	28.6	16.569	OK
SW1	FEH: 2 years: +0 %: 15 mins: Summer	78.681	77.756	77.858	0.102	14.1	0.115	0.000	13.4	6.107	OK
SW2	FEH: 2 years: +0 %: 15 mins: Summer	79.235	77.632	77.719	0.087	17.6	0.099	0.000	16.7	8.945	OK
SW3	FEH: 2 years: +0 %: 15 mins: Summer	79.219	77.464	77.595	0.131	28.3	0.148	0.000	26.6	15.203	OK
SW4	FEH: 2 years: +0 %: 15 mins: Summer	79.021	77.312	77.428	0.116	30.2	0.131	0.000	27.4	16.906	OK
SW5	FEH: 2 years: +0 %: 15 mins: Summer	78.584	77.000	77.117	0.116	27.4	0.166	0.000	24.4	16.784	OK
SW6	FEH: 2 years: +0 %: 15 mins: Summer	78.714	76.854	76.896	0.042	24.4	0.060	0.000	24.0	16.763	OK
SW14	FEH: 2 years: +0 %: 15 mins: Summer	77.930	75.277	75.328	0.051	3.6	0.000	0.000	3.6	3.453	OK
SW7	FEH: 2 years: +0 %: 15 mins: Summer	78.566	77.716	77.716	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
SW8	FEH: 30 years: +0 %: 15 mins: Summer	79.200	77.329	77.521	0.192	36.9	0.217	0.000	33.3	15.990	OK
SW9	FEH: 30 years: +0 %: 15 mins: Summer	78.913	77.158	77.350	0.192	42.9	0.217	0.000	38.9	20.137	OK
SW10	FEH: 30 years: +0 %: 15 mins: Summer	78.619	76.995	77.212	0.217	45.9	0.245	0.000	43.9	23.170	OK
SW11	FEH: 30 years: +0 %: 15 mins: Summer	78.478	76.953	77.139	0.186	43.9	0.211	0.000	42.2	23.153	OK
SW12	FEH: 30 years: +0 %: 15 mins: Summer	78.508	76.791	76.976	0.186	42.2	0.210	0.000	40.2	23.122	OK
SW13	FEH: 30 years: +0 %: 15 mins: Summer	77.950	76.699	76.934	0.235	69.6	0.265	0.000	63.7	35.821	OK
SW1	FEH: 30 years: +0 %: 15 mins: Summer	78.681	77.756	77.924	0.168	30.3	0.190	0.000	28.8	13.156	OK
SW2	FEH: 30 years: +0 %: 15 mins: Summer	79.235	77.632	77.770	0.138	35.6	0.156	0.000	34.1	19.635	OK
SW3	FEH: 30 years: +0 %: 15 mins: Summer	79.219	77.464	77.673	0.210	58.4	0.237	0.000	55.5	32.715	OK
SW4	FEH: 30 years: +0 %: 15 mins: Summer	79.021	77.312	77.496	0.185	63.2	0.209	0.000	58.6	36.736	OK
SW5	FEH: 30 years: +0 %: 15 mins: Summer	78.584	77.000	77.174	0.174	58.6	0.248	0.000	54.5	37.129	OK
SW6	FEH: 30 years: +0 %: 15 mins: Summer	78.714	76.854	76.914	0.060	54.6	0.086	0.000	54.0	37.090	OK
SW14	FEH: 30 years: +0 %: 15 mins: Summer	77.930	75.277	75.345	0.068	6.2	0.000	0.000	6.2	6.807	OK
SW7	FEH: 30 years: +0 %: 15 mins: Summer	78.566	77.716	77.716	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
SW8	FEH: 30 years: +40 %: 15 mins: Summer	79.200	77.329	77.885	0.557	51.6	0.629	0.000	42.0	22.930	Surcharged
SW9	FEH: 30 years: +40 %: 15 mins: Summer	78.913	77.158	77.611	0.453	55.4	0.512	0.000	50.4	28.210	Surcharged
SW10	FEH: 30 years: +40 %: 15 mins: Summer	78.619	76.995	77.343	0.348	60.3	0.394	0.000	56.7	32.468	Surcharged
SW11	FEH: 30 years: +40 %: 15 mins: Summer	78.478	76.953	77.237	0.284	56.7	0.321	0.000	54.0	32.449	Surcharged
SW12	FEH: 30 years: +40 %: 15 mins: Summer	78.508	76.791	77.049	0.258	54.0	0.292	0.000	48.8	32.431	OK
SW13	FEH: 30 years: +40 %: 15 mins: Summer	77.950	76.699	77.010	0.310	89.9	0.351	0.000	83.6	50.212	Surcharged
SW1	FEH: 30 years: +40 %: 15 mins: Summer	78.681	77.756	78.004	0.248	42.4	0.280	0.000	39.3	18.389	Surcharged
SW2	FEH: 30 years: +40 %: 15 mins: Summer	79.235	77.632	77.833	0.202	47.2	0.228	0.000	41.7	27.740	OK
SW3	FEH: 30 years: +40 %: 15 mins: Summer	79.219	77.464	77.731	0.268	75.3	0.303	0.000	73.3	45.163	OK
SW4	FEH: 30 years: +40 %: 15 mins: Summer	79.021	77.312	77.543	0.231	84.3	0.261	0.000	79.6	50.483	OK
SW5	FEH: 30 years: +40 %: 15 mins: Summer	78.584	77.000	77.206	0.206	79.6	0.294	0.000	75.3	50.944	OK
SW6	FEH: 30 years: +40 %: 15 mins: Summer	78.714	76.854	76.925	0.071	75.4	0.101	0.000	74.7	50.901	OK
SW14	FEH: 30 years: +40 %: 15 mins: Summer	77.930	75.277	75.347	0.070	6.6	0.000	0.000	6.6	7.641	OK
SW7	FEH: 30 years: +40 %: 15 mins: Summer	78.566	77.716	77.744	0.028	5.3	0.032	0.000	0.6	0.625	OK

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
SW8	FEH: 100 years: +0 %: 15 mins: Summer	79.200	77.329	77.694	0.365	46.2	0.413	0.000	36.4	20.241	Surcharged
SW9	FEH: 100 years: +0 %: 15 mins: Summer	78.913	77.158	77.467	0.309	48.5	0.349	0.000	43.8	25.246	Surcharged
SW10	FEH: 100 years: +0 %: 15 mins: Summer	78.619	76.995	77.268	0.273	52.6	0.309	0.000	51.1	29.053	Surcharged
SW11	FEH: 100 years: +0 %: 15 mins: Summer	78.478	76.953	77.181	0.228	51.1	0.258	0.000	48.3	29.034	Surcharged
SW12	FEH: 100 years: +0 %: 15 mins: Summer	78.508	76.791	77.012	0.222	48.3	0.251	0.000	45.5	29.008	OK
SW13	FEH: 100 years: +0 %: 15 mins: Summer	77.950	76.699	76.977	0.278	82.3	0.314	0.000	77.2	44.925	OK
SW1	FEH: 100 years: +0 %: 15 mins: Summer	78.681	77.756	77.964	0.208	38.0	0.235	0.000	35.9	16.479	OK
SW2	FEH: 100 years: +0 %: 15 mins: Summer	79.235	77.632	77.798	0.166	43.4	0.188	0.000	41.0	24.786	OK
SW3	FEH: 100 years: +0 %: 15 mins: Summer	79.219	77.464	77.712	0.248	71.2	0.281	0.000	67.9	40.638	OK
SW4	FEH: 100 years: +0 %: 15 mins: Summer	79.021	77.312	77.526	0.214	77.6	0.243	0.000	72.4	45.480	OK
SW5	FEH: 100 years: +0 %: 15 mins: Summer	78.584	77.000	77.195	0.195	72.4	0.279	0.000	68.0	45.955	OK
SW6	FEH: 100 years: +0 %: 15 mins: Summer	78.714	76.854	76.921	0.067	68.0	0.096	0.000	67.3	45.913	OK
SW14	FEH: 100 years: +0 %: 15 mins: Summer	77.930	75.277	75.346	0.070	6.5	0.000	0.000	6.5	7.400	OK
SW7	FEH: 100 years: +0 %: 15 mins: Summer	78.566	77.716	77.728	0.012	0.0	0.014	0.000	0.2	0.247	OK

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
SW8	FEH: 100 years: +50 %: 15 mins: Summer	79.200	77.329	78.377	1.048	69.3	1.186	0.000	49.3	31.683	Surcharged
SW9	FEH: 100 years: +50 %: 15 mins: Summer	78.913	77.158	78.004	0.846	67.3	0.957	0.000	59.9	37.901	Surcharged
SW10	FEH: 100 years: +50 %: 15 mins: Summer	78.619	76.995	77.641	0.646	73.2	0.731	0.000	68.2	43.623	Surcharged
SW11	FEH: 100 years: +50 %: 15 mins: Summer	78.478	76.953	77.488	0.535	68.2	0.605	0.000	64.2	43.604	Surcharged
SW12	FEH: 100 years: +50 %: 15 mins: Summer	78.508	76.791	77.270	0.479	64.2	0.542	0.000	61.3	43.600	Surcharged
SW13	FEH: 100 years: +50 %: 15 mins: Summer	77.950	76.699	77.185	0.486	116.5	0.549	0.000	113.4	67.482	Surcharged
SW1	FEH: 100 years: +50 %: 15 mins: Summer	78.681	77.756	78.416	0.660	56.9	0.747	0.000	50.4	24.671	Flood Risk
SW2	FEH: 100 years: +50 %: 15 mins: Summer	79.235	77.632	78.110	0.478	59.5	0.541	0.000	54.9	37.129	Surcharged
SW3	FEH: 100 years: +50 %: 15 mins: Summer	79.219	77.464	77.921	0.458	99.6	0.518	0.000	94.8	59.560	Surcharged
SW4	FEH: 100 years: +50 %: 15 mins: Summer	79.021	77.312	77.634	0.322	109.5	0.364	0.000	98.8	66.389	Surcharged
SW5	FEH: 100 years: +50 %: 15 mins: Summer	78.584	77.000	77.233	0.233	98.9	0.333	0.000	94.5	66.719	OK
SW6	FEH: 100 years: +50 %: 15 mins: Summer	78.714	76.854	76.934	0.080	94.6	0.114	0.000	93.9	66.668	OK
SW14	FEH: 100 years: +50 %: 15 mins: Summer	77.930	75.277	75.347	0.071	6.6	0.000	0.000	6.6	8.101	OK
SW7	FEH: 100 years: +50 %: 15 mins: Summer	78.566	77.716	78.215	0.499	10.0	0.565	0.000	9.2	1.757	Surcharged

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Stormwater Control	Storm Event	Max. US Depth (m)	Max. DS	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Dry Swale 1	FEH: 2 years: +0 %: 30 mins: Summer	0.085	0.101	2.8	1.121	0.000	1.4	2.406	0.000	Flood Risk
Dry Swale 2	FEH: 2 years: +0 %: 30 mins: Summer	0.034	0.094	4.5	0.711	0.000	4.3	3.861	0.000	Flood Risk
Bioretention 1	FEH: 2 years: +0 %: 480 mins: Summer	0.200	0.200	1.0	5.312	0.000	0.5	5.011	61.365	OK
Porous Paving	FEH: 2 years: +0 %: 240 mins: Summer	0.095	0.046	0.8	2.044	0.000	0.2	1.587	83.307	OK
Tank	FEH: 2 years: +0 %: 480 mins: Summer	0.382	0.382	20.4	77.711	0.000	6.4	148.417	75.928	OK
Bioretention 2	FEH: 2 years: +0 %: 120 mins: Summer	0.243	0.201	1.2	1.625	0.000	0.7	1.904	58.027	OK
Bioretention 3	FEH: 2 years: +0 %: 120 mins: Summer	0.201	0.201	1.2	1.390	0.000	0.8	1.803	59.809	OK
Bioretention 4	FEH: 2 years: +0 %: 240 mins: Summer	0.200	0.200	1.1	2.573	0.000	0.7	3.272	58.705	OK

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Stormwater Control	Storm Event	Max. US Depth (m)	Max. DS	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Dry Swale 1	FEH: 30 years: +0 %: 60 mins: Summer	0.183	0.199	5.6	3.191	0.000	2.2	6.990	0.000	Flood Risk
Dry Swale 2	FEH: 30 years: +0 %: 15 mins: Summer	0.094	0.176	14.3	2.056	0.000	7.4	6.176	0.000	Flood Risk
Bioretention 1	FEH: 30 years: +0 %: 60 mins: Summer	0.321	0.209	5.7	6.667	0.000	1.1	2.547	51.506	OK
Porous Paving	FEH: 30 years: +0 %: 120 mins: Summer	0.141	0.082	2.2	3.363	0.000	0.4	2.197	72.533	OK
Tank	FEH: 30 years: +0 %: 960 mins: Summer	0.661	0.661	21.1	134.691	0.000	6.6	313.407	58.278	OK
Bioretention 2	FEH: 30 years: +0 %: 15 mins: Winter	0.494	0.495	5.1	2.362	0.000	1.0	0.831	39.014	OK
Bioretention 3	FEH: 30 years: +0 %: 15 mins: Winter	0.512	0.512	4.8	2.157	0.000	1.1	0.945	37.654	OK
Bioretention 4	FEH: 30 years: +0 %: 30 mins: Summer	0.472	0.397	4.7	3.772	0.000	1.2	1.883	39.460	OK

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

Stormwater Control	Storm Event	Max. US Depth (m)	Max. DS	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Dry Swale 1	FEH: 30	0.243	0.259	7.8	4.920	0.000	2.5	9.774	0.000	Flood Risk
Dry Swale 2	FEH: 30	0.155	0.237	20.0	3.533	0.000	9.0	8.641	0.000	Flood Risk
Bioretention 1	FEH: 30	0.675	0.211	5.8	9.525	0.000	1.3	7.890	30.719	OK
Porous Paving	FEH: 30	0.197	0.116	3.1	4.749	0.000	0.5	3.151	61.205	OK
Tank	FEH: 30	1.204	1.204	46.7	245.347	0.000	6.6	299.919	24.001	OK
Bioretention 2	FEH: 30	0.836	0.853	4.7	4.535	0.000	1.2	4.904	-17.099	Flood Risk
Bioretention 3	FEH: 30	0.828	0.836	3.5	3.823	0.000	1.3	4.802	-10.532	Flood Risk
Bioretention 4	FEH: 30	0.807	0.660	6.0	5.907	0.000	1.4	5.417	5.190	Flood Risk

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Stormwater Control	Storm Event	Max. US Depth (m)	Max. DS	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Dry Swale 1	FEH: 100 years: +0 %: 60 mins: Summer	0.225	0.241	7.2	4.368	0.000	2.4	8.940	0.000	Flood Risk
Dry Swale 2	FEH: 100 years: +0 %: 15 mins: Summer	0.134	0.216	17.9	2.970	0.000	8.5	7.743	0.000	Flood Risk
Bioretention 1	FEH: 100 years: +0 %: 60 mins: Winter	0.481	0.214	5.9	8.287	0.000	1.3	4.047	39.723	OK
Porous Paving	FEH: 100 years: +0 %: 60 mins: Summer	0.149	0.103	4.0	4.018	0.000	0.5	1.908	67.179	OK
Tank	FEH: 100 years: +0 %: 1440 mins: Winter	0.656	0.656	12.5	133.655	0.000	6.6	426.515	58.599	OK
Bioretention 2	FEH: 100 years: +0 %: 60 mins: Summer	0.816	0.832	4.3	4.094	0.000	1.2	4.442	-5.730	Flood Risk
Bioretention 3	FEH: 100 years: +0 %: 60 mins: Winter	0.809	0.813	3.2	3.415	0.000	1.3	4.327	1.262	Flood Risk
Bioretention 4	FEH: 100 years: +0 %: 60 mins: Summer	0.807	0.531	5.5	5.353	0.000	1.2	4.938	14.083	Flood Risk

Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Pluviam Environmental		

FEH: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Outflow

Stormwater Control	Storm Event	Max. US Depth (m)	Max. DS	Max. Inflow (L/s)	Max. Resident	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Dry Swale 1	FEH: 100	0.315	0.331	10.7	7.461	0.000	2.9	13.269	0.000	Flood Risk
Dry Swale 2	FEH: 100	0.222	0.304	18.5	5.569	0.000	10.5	16.025	0.000	Flood Risk
Bioretention 1	FEH: 100	0.806	0.352	5.0	12.610	0.000	1.5	16.476	8.275	Flood Risk
Porous Paving	FEH: 100	0.224	0.158	6.0	6.136	0.000	0.6	2.824	49.877	OK
Tank	FEH: 100	1.506	1.506	28.4	306.722	0.000	6.6	642.374	4.989	OK
Bioretention 2	FEH: 100	0.914	0.931	5.2	6.346	0.000	1.3	6.063	-63.864	Flood Risk
Bioretention 3	FEH: 100	0.902	0.910	4.3	5.193	0.000	1.3	8.334	-50.111	Flood Risk
Bioretention 4	FEH: 100	0.854	0.866	4.2	7.892	0.000	1.4	10.874	-26.673	Flood Risk

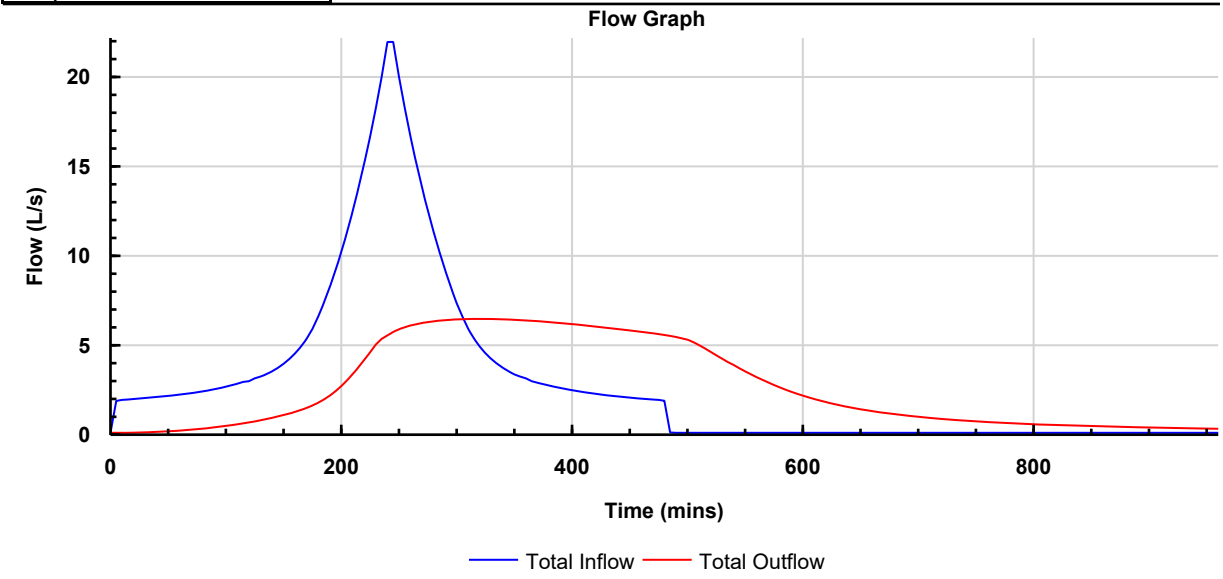
Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Phase Management Storm Phase: Phase	Pluviam Environmental		

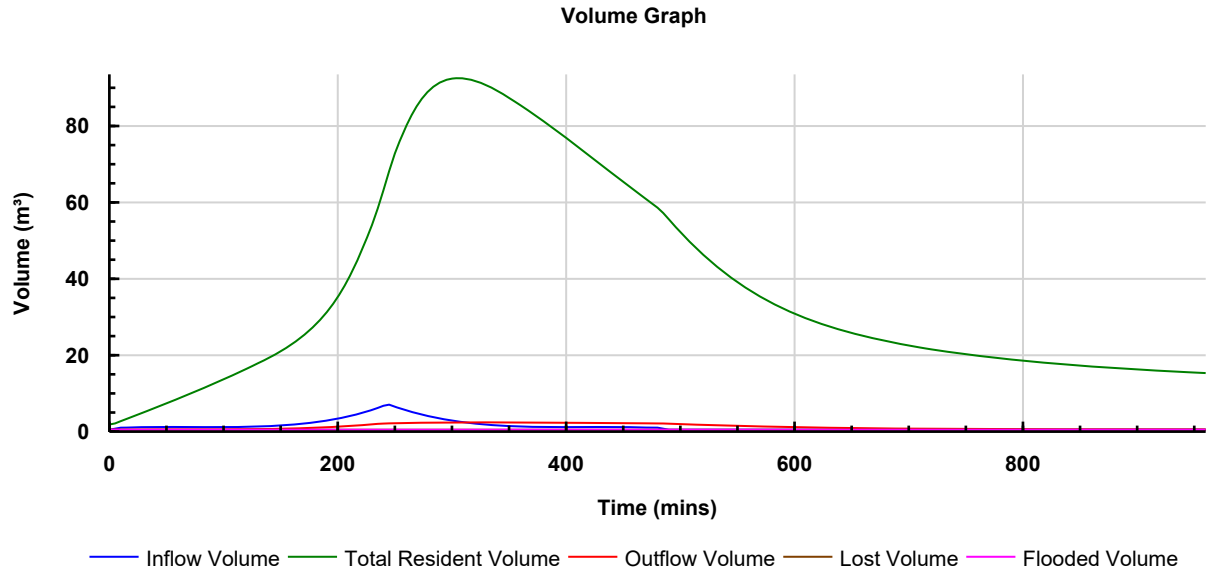
Phase
FEH: 2 years: Increase Rainfall (%): +0: 480 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
SW14			6.4	148.403
TOTAL	22.0	161.876	6.4	148.403

Graphs





Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Phase Management Storm Phase: Phase	Pluviam Environmental		

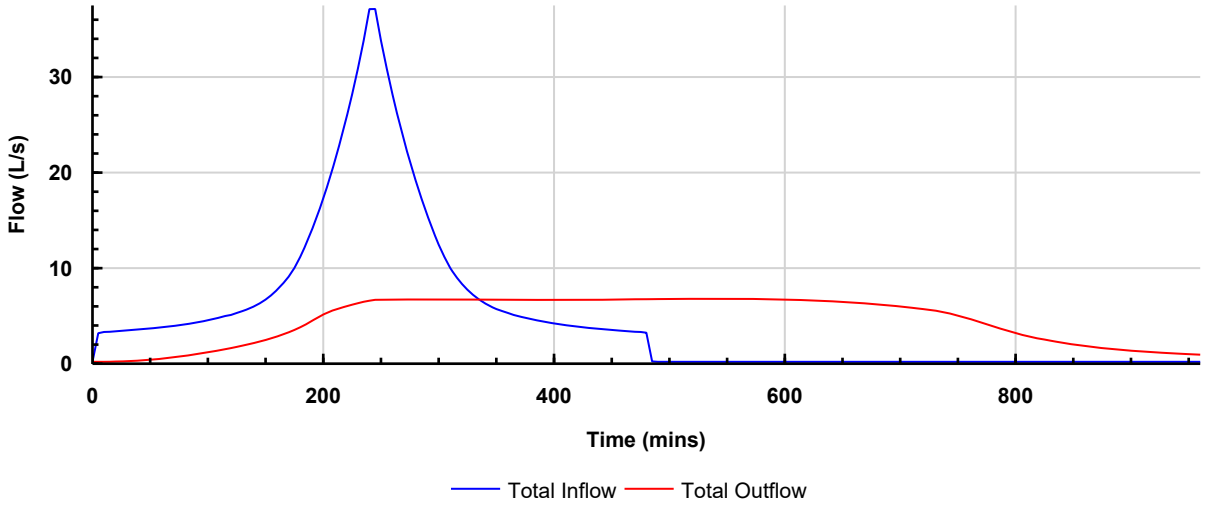
Phase
FEH: 30 years: Increase Rainfall (%): +0: 480 mins: Summer

Tables

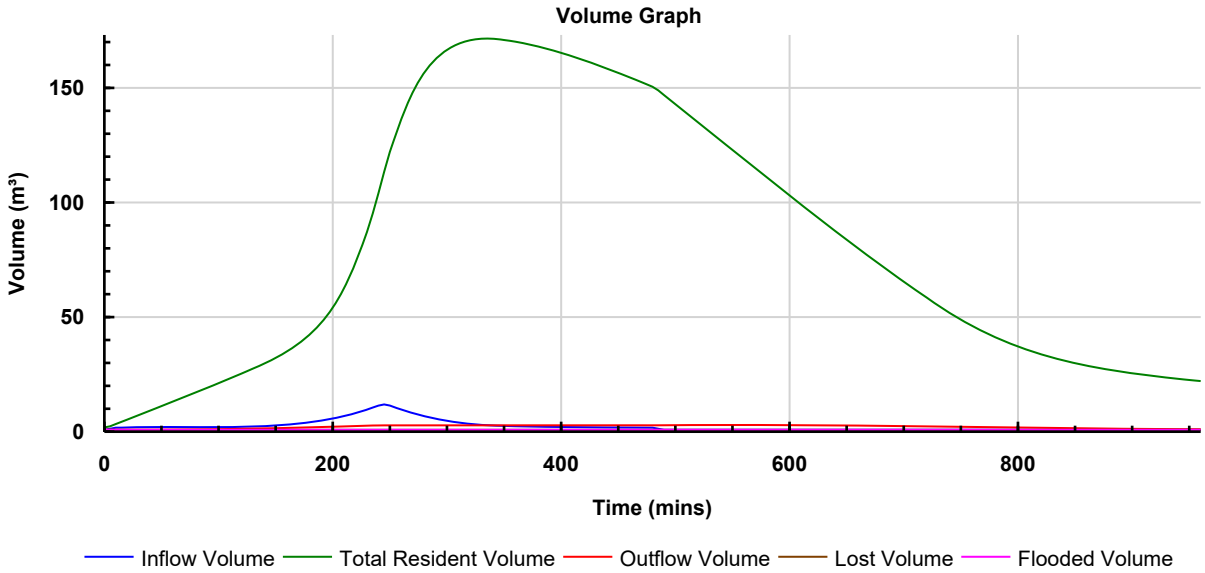
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
SW14			6.6	253.485
TOTAL	37.1	273.719	6.6	253.485

Graphs

Flow Graph



Volume Graph



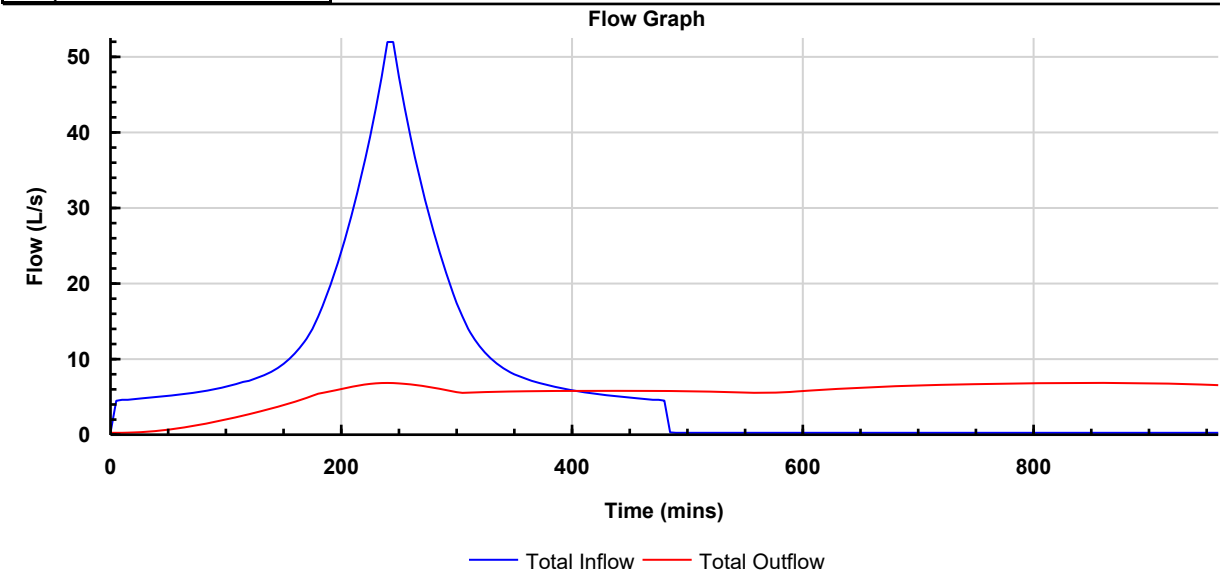
Project: Alston Dairy	Date: 02/07/2025		
	Designed by: JR	Checked by: RG	Approved By: RG
Report Details: Type: Phase Management Storm Phase: Phase	Company Address: Pluviam Environmental		

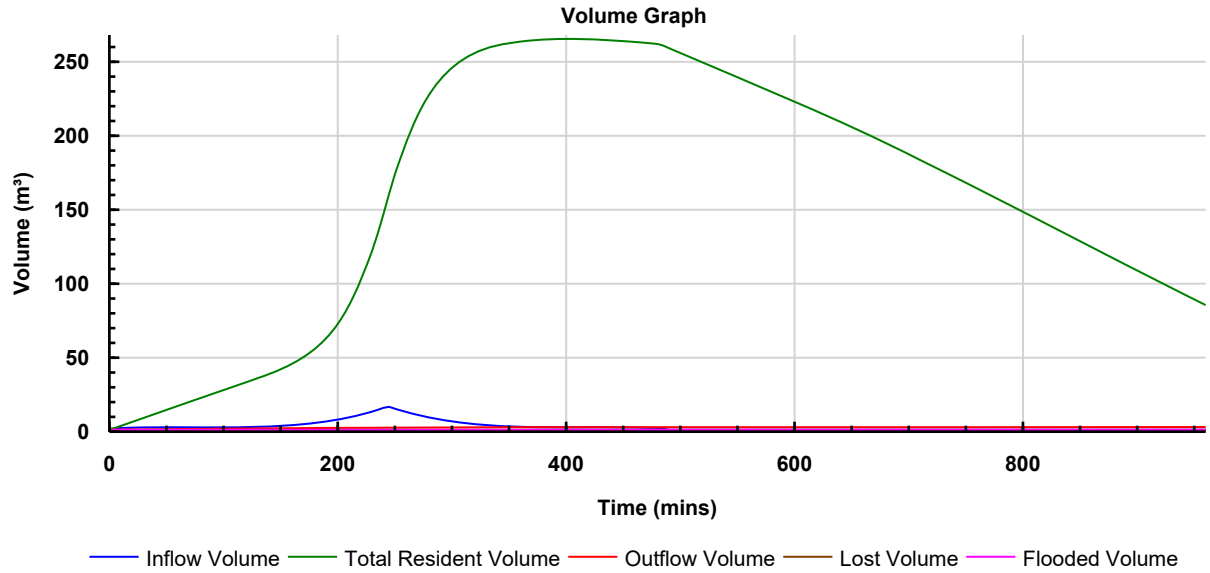
Phase
FEH: 30 years: Increase Rainfall (%): +40: 480 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
SW14			6.6	299.827
TOTAL	52.0	383.203	6.6	299.827

Graphs





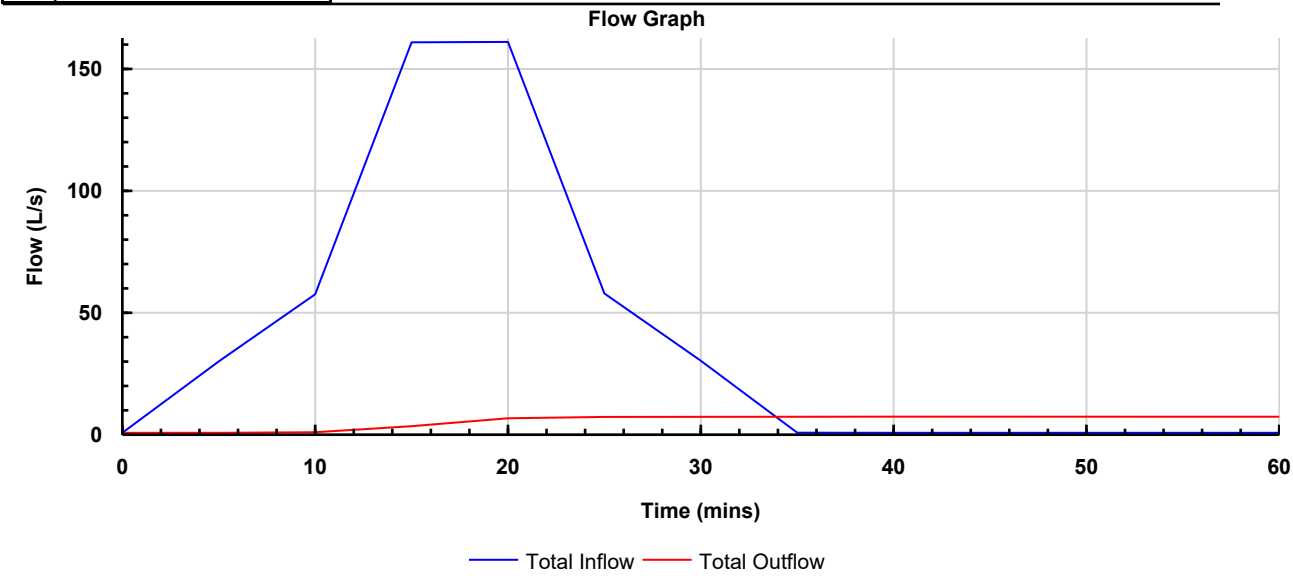
Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Phase Management Storm Phase: Phase	Pluviam Environmental		

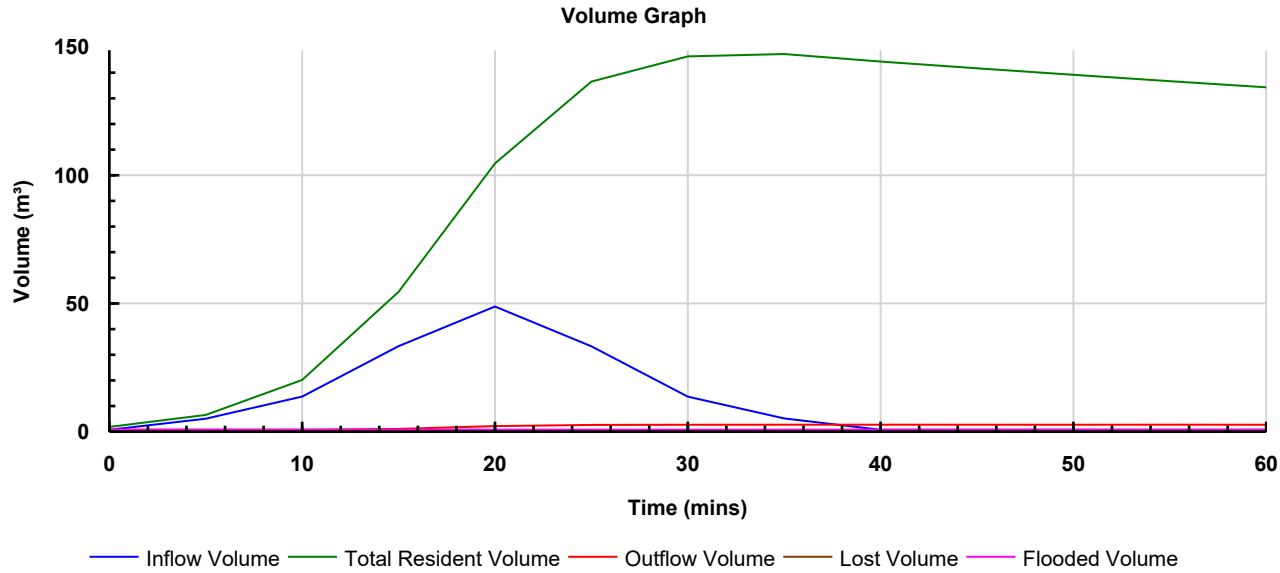
Phase
FEH: 100 years: Increase Rainfall (%): +0: 30 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
SW14			6.6	17.622
TOTAL	161.1	148.635	6.6	17.622

Graphs





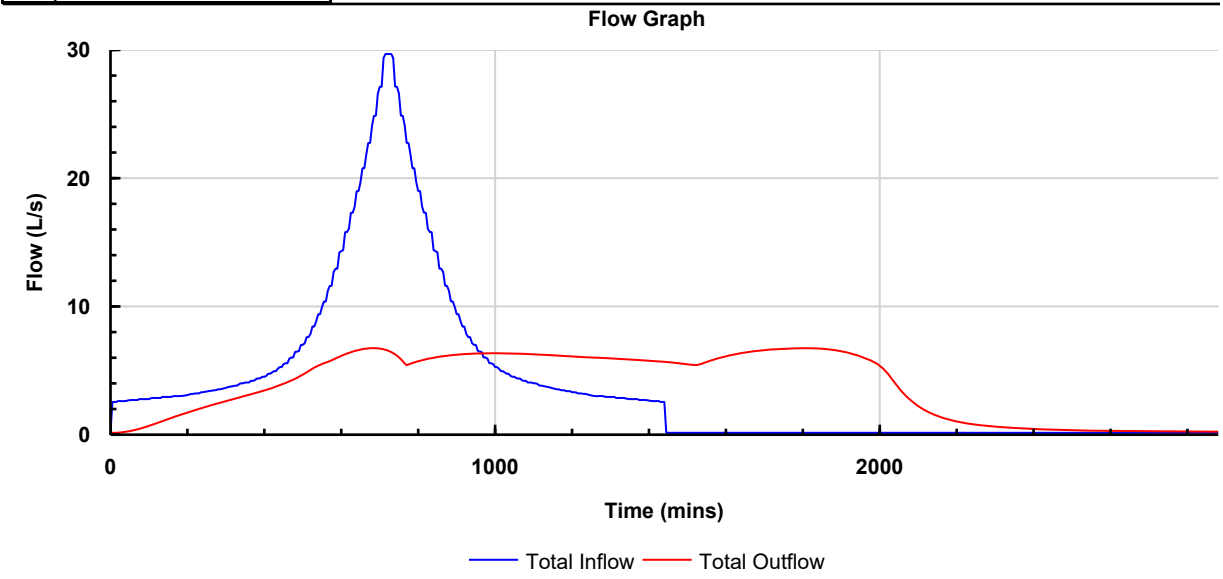
Project:	Date:		
Alston Dairy	02/07/2025		
	Designed by:	Checked by:	Approved By:
	JR	RG	RG
Report Details:	Company Address:		
Type: Phase Management Storm Phase: Phase	Pluviam Environmental		

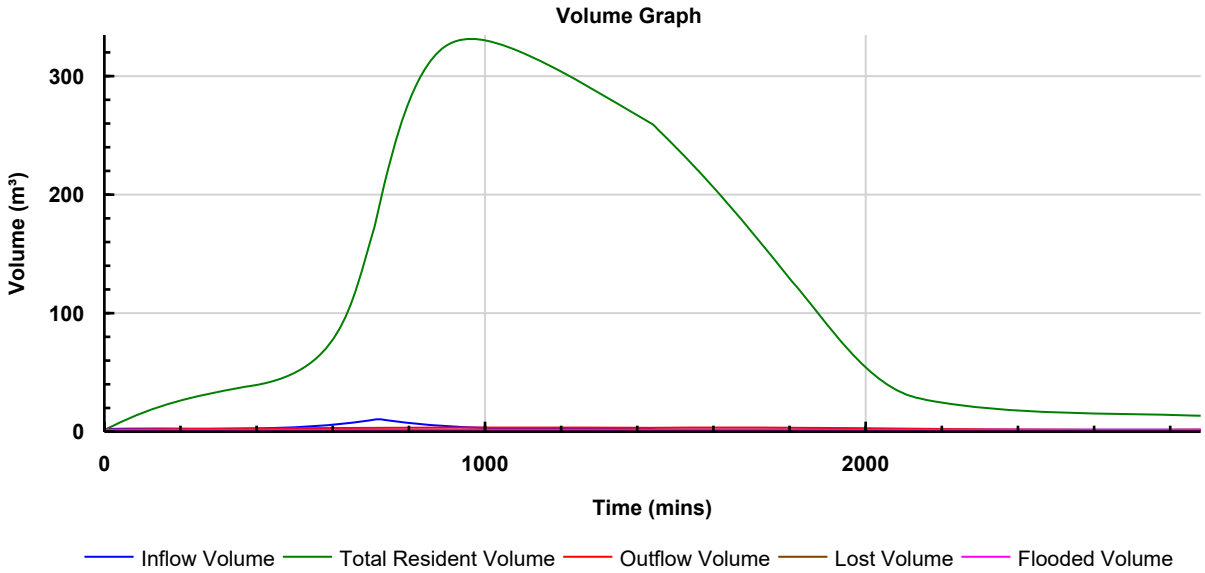
Phase
FEH: 100 years: Increase Rainfall (%): +50: 1440 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
SW14			6.6	642.365
TOTAL	29.7	654.087	6.6	642.365

Graphs





Appendix G

Proposed Outline Drainage Layout and Details

Notes.

1. DO NOT SCALE THIS DRAWING. WORK TO FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE.

2. This drawing is to be read in conjunction with all relevant Architect's, Engineer's and Specialist's drawings and their respective specification.

3. All work to comply with relevant British Standards, Codes of practice and the Building Regulations.

4. Any discrepancies between all working drawings, specifications and schedules of all disciplines to be immediately notified to main contractor for clarification/correction prior to construction of relevant structure.

5. All cover levels are indicative only and shall match Architects proposed levels. Invert levels to be confirmed on site prior to work commencing.

6. All areas of excavation are to be scanned and marked for existing services prior to any excavation.

7. Branch connections to PPIC's have been assumed 50mm higher than the main channel.

8. All connections from RWP to be 160mmØ unless noted otherwise.

9. For the location of all RWP's and SVP's refer to Architects drawings.

10. Stormwater attenuation system shall be Polypipe-Polystorm pre-formed modular geocellular units with minimum 94% volumetric void ratio and minimum 52% effective perforated surface area. Units shall be installed using locking ties to maintain rigidity and minimise deflection. Geocellular units to be fully encapsulated with Heavy duty geotextile protection fleece and impermeable membrane.

11. Heavy duty geotextile fleece to be non-woven needle-punched polypropylene as per Specification. Geotextile to be laid with minimum 300mm overlaps and to be applied to all external surfaces of Polypipe-Permavoid drainage units. To be installed in accordance with the manufacturer's recommendations.

12. Waterproof geomembrane to be single layer cold applied robust welded flexible membrane as per Specification suitable for waterproofing to structure and for water containment. Membrane to be nominal 1mm thick laid with minimum 150mm laps and welded seams. To be installed in accordance with the manufacturer's recommendations under and approved CQA protocol that includes testing of the welds.

13. Linear drainage channel to be ACO S or MD range with sump assemblies.

14. Oil bypass separators to be Kingspan Klargester as noted on drawing.

15.All dimensions are in millimeters unless noted otherwise.

16. Pre-cast concrete products shall comply with the relevant provisions of BS 5911 and be 'Kite Marked'.

17. All pipes and pipe fittings shall be HDPE twinwall and have current British Board of Agreement Certification.

18. Manhole covers and frames, grids and frames shall comply with the relevant provisions of BS EN 124.

19. Do not scale from this drawing. If in doubt ask.

20. This drawing to be read in conjunction with all relevant PEL, Architects & Engineers drawings.

21. Should there be any conflict between the details indicated on this drawing and those on other drawings the Engineer should be informed PRIOR to construction on site.

22. At all times the works are to be executed in accordance with the requirements of the Health And Safety at Work Act 1974 and CDM Regulations 2015.

23. Until technical approval has been obtained from the relevant Authority, It should be understood that all drawings are **PRELIMINARY** and **NOT FOR CONSTRUCTION**.

LEGEND

- SURFACE WATER DRAINAGE PIPEWORK
- EXISTING CULVERT
- FILTER DRAIN
- LINEAR DRAINAGE CHANNEL
- 750mm DIA CATCHPIT INSPECTION CHAMBER (SW)
- 1200 dia SW MANHOLE
- PERMEABLE PAVING
- POLYSTORM ATTENUATION TANK 1200mm DEEP
- BIORETENTION (RAINGARDEN)
- DRY SWALE

STATUS	REV	DATE	REVISION HISTORY	DSG | DRW | CHK | APP
S3	P01	04.07.25	First issue	JR | JR | RG | JR

ALL REVISIONS

CLIENT

EDEN PLANNING

KEY PLAN

ORIGINATOR

PLUVIAM ENVIRONMENTAL

DRAWING TITLE

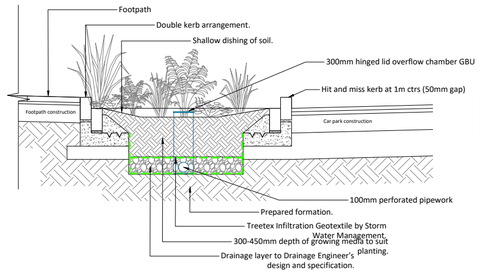
SURFACE WATER DRAINAGE LAYOUT
ALSTON DAIRY EXTENSION

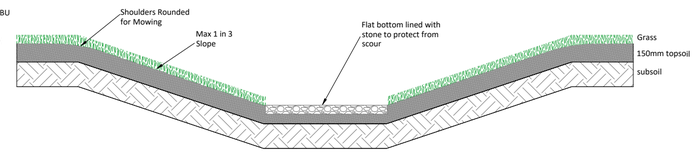
	Name	Signature	Date
Designed by	JR		01/07/2025
Drawn by	JR		01/07/2025
Checked	RG		01/07/2025
Approved	JR		01/07/2025

PEL REF	SCALE @ A0	BIM FILE NAME - REVISION
PN0259	1:200	PN0259-PEL-XX-XX-DR-Y-00001-P01
Stage 4	Approval	

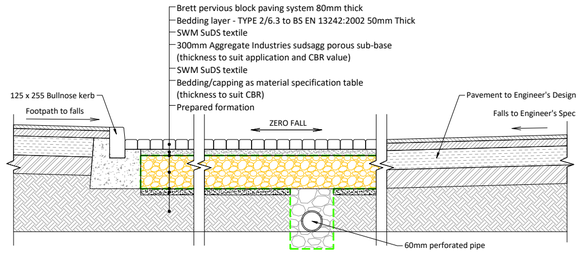
PROJECT	ISSUER	VOLUME	LEVEL	TYPE	ROLE	NUMBER	REV
PN0259	PEL	XX	XX	DR	Y	00001	P01

TYPICAL DETAILS FOR BIORETENTION (RAIN GARDEN)





CROSS SECTION THROUGH SWALE



TYPICAL SECTION THROUGH PERVIOUS PAVEMENT WITH OPEN GRADED SUB-BASE AND COLLECTOR DRAIN

Table of aggregat sizes for pipe bedding

For rigid pipe materials only

Pipe diameter	Alternative aggregate sizes		Aggregate material
	Single size	Graded	
100Ø	10mm	Not suitable	Natural aggregate
150Ø	10mm or 14mm	14mm - 5	To BS 882
225Ø - 450Ø	10mm or 14mm or 20mm	14mm - 5 or 20mm - 5	Either crushed or as dug
500Ø and above	14mm or 20mm	14mm - 5 or 20mm - 5 or 40 - 5	Must be crushed stone

Table 1
Capping layer & sub base thickness

Granular sub base type 1
Thickness to depend on in-situ CBR

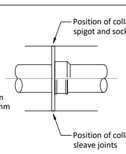
CBR (%)	Sub-base thickness
< 2%	610mm
2%	420mm
2.5%	370mm
3%	310mm
4%	300mm (Minimum)

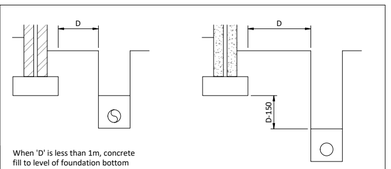
Pipe bedding details

Class A bedding shall be used on all pipelines with less than 1.2m depth to soffit in adoptable highways and other vehicular areas, and all other areas where depth to soffit is less than 0.9m

Flexible joint to pipe bedding

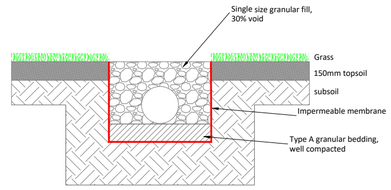
Flexibility maintained in pipeline at every joint by break in bed formed by collar of bitumen impregnated insulating board.
1 No 18mm thick for pipes DN100mm - 400mm
2 No 18mm thick for pipes DN 450mm - 1200mm



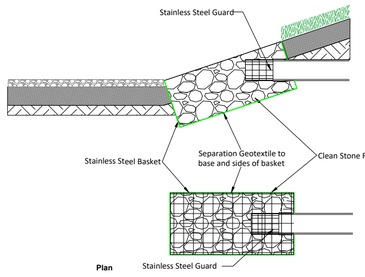


Pipes near buildings

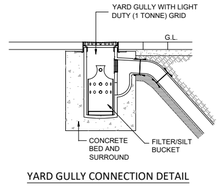
Trenches within 1m of load bearing walls should be filled with concrete at least to the level of the underside of the foundation. Where the distance is more than 1m from the wall, the concrete fill should be to a level below the underside of the foundation equal to the distance from the wall to the nearside of the trench, less 150mm.



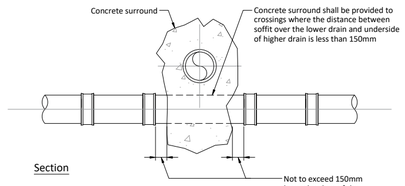
CROSS SECTION THROUGH FILTER DRAIN (1:10)

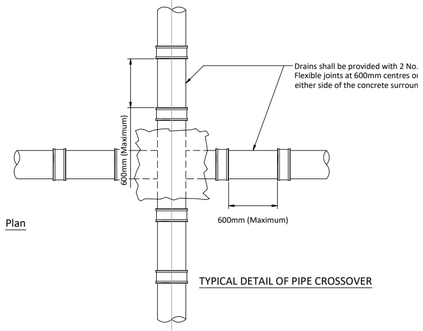


BASKETTED DIFFUSER OUTLET DETAIL - SWALE



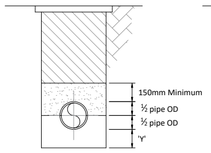
YARD GULLY CONNECTION DETAIL



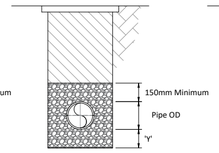


TYPICAL DETAIL OF PIPE CROSSOVER

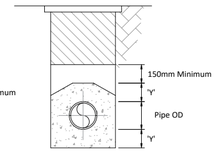
Class B
180° Granular bed
Fb 1.9 Concrete pipes
Fb 2.5 Clay pipes

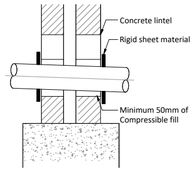


Class S
360° Granular bed
Fb 2.2 Concrete pipes
Fb 2.5 Clay pipes

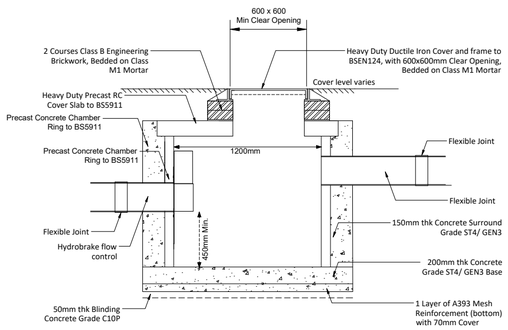


Class S
360° Plain concrete surround
Fb 4.5 (CPDA)

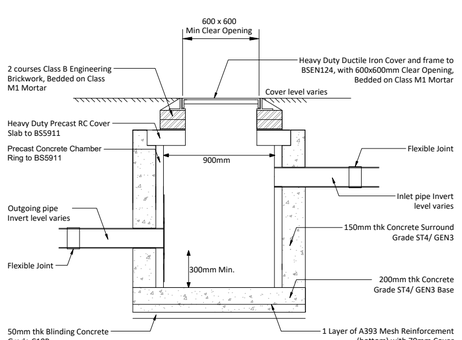




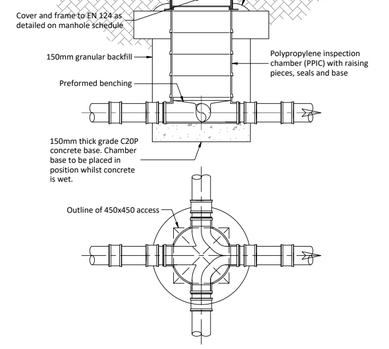
DRAIN PENETRATING THROUGH WALLS



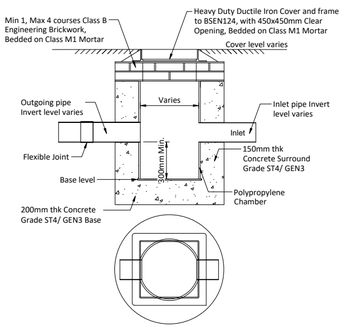
TYPICAL 1200mm FLOW CONTROL CATCHPIT



900Ø CATCHPIT INSPECTION CHAMBER (750Ø Similar)
SUMP REQUIRED ON SURFACE WATER NETWORK ONLY



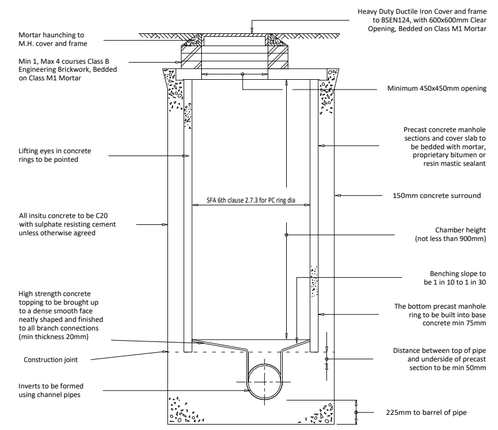
DETAIL OF 500mm/600mm POLYPROPYLENE INSPECTION CHAMBER MAXIMUM DEPTH TO SOFFIT 1.20m MANHOLE TYPE A

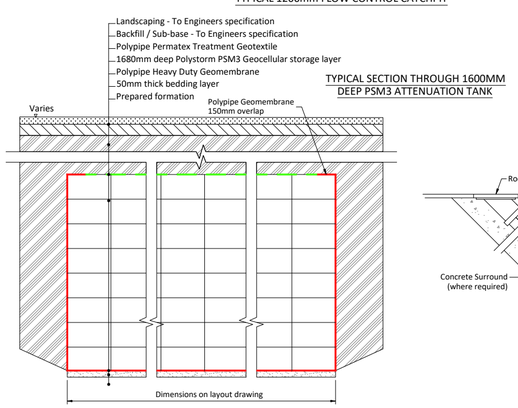


POLYPROPYLENE CATCHPIT INSPECTION CHAMBER

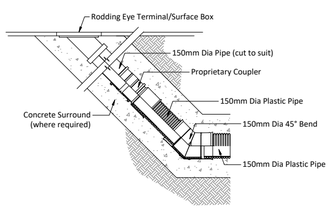
TYPICAL MANHOLE DETAIL - TYPE B

Max depth from cover level to soffit of pipe 3.0m
Steps or otherwise to be fitted as required by Undertaker's policy

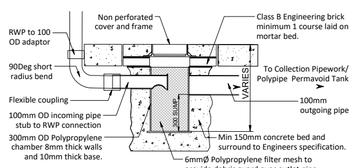




TYPICAL SECTION THROUGH 1600MM DEEP PSM3 ATTENUATION TANK



TYPICAL RODDING EYE DETAIL



TYPICAL 300mmØ RWP BACK INLET GULLY

Notes.

1. DO NOT SCALE THIS DRAWING. WORK TO FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE.

2. This drawing is to be read in conjunction with all relevant Architect's, Engineer's and Specialist's drawings and their respective specification.

3. All work to comply with relevant British Standards, Codes of practice and the Building Regulations.

4. Any discrepancies between all working drawings, specifications and schedules of all disciplines to be immediately notified to main contractor for clarification/correction prior to construction of relevant structure.

5. All cover levels are indicative only and shall match Architects proposed levels. Invert levels to be confirmed on site prior to work commencing.

6. All areas of excavation are to be scanned and marked for existing services prior to any excavation.

7. Branch connections to PPIC's have been assumed 50mm higher than the main channel.

8. All connections from RWP to be 160mmØ unless noted otherwise.

9. For the location of all RWP's and SVP's refer to Architects drawings.

10. Stormwater attenuation system shall be Polypipe-Polystorm pre-formed modular geocellular units with minimum 94% volumetric void ratio and minimum 52% effective perforated surface area. Units shall be installed using locking ties to maintain rigidity and minimise deflection. Geocellular units to be fully encapsulated with Heavy duty geotextile protection fleece and impermeable membrane.

11. Heavy duty geotextile fleece to be non-woven needle-punched polypropylene as per Specification. Geotextile to be laid with minimum 300mm overlaps and to be applied to all external surfaces of Polypipe-Permavoid drainage units. To be installed in accordance with the manufacturer's recommendations.

12. Waterproof geomembrane to be single layer cold applied robust welded flexible membrane as per Specification suitable for waterproofing to structure and for water containment. Membrane to be nominal 1mm thick laid with minimum 150mm laps and welded seams. To be installed in accordance with the manufacturer's recommendations under and approved CQA protocol that includes testing of the welds.

13. Linear drainage channel to be ACO S or MD range with sump assemblies.

14. Oil bypass separators to be Kingspan Klargester as noted on drawing.

15.All dimensions are in millimeters unless noted otherwise.

16. Pre-cast concrete products shall comply with the relevant provisions of BS 5911 and be 'Kite Marked'.

17. All pipes and pipe fittings shall be HDPE twinwall and have current British Board of Agreement Certification.

18. Manhole covers and frames, grids and frames shall comply with the relevant provisions of BS EN 124.

19. Do not scale from this drawing. If in doubt ask.

20. This drawing to be read in conjunction with all relevant PEL, Architects & Engineers drawings.

21. Should there be any conflict between the details indicated on this drawing and those on other drawings the Engineer should be informed PRIOR to construction on site.

22. At all times the works are to be executed in accordance with the requirements of the Health And Safety at Work Act 1974 and CDM Regulations 2015.

23. Until technical approval has been obtained from the relevant Authority, It should be understood that all drawings are **PRELIMINARY** and **NOT FOR CONSTRUCTION**.

STATUS	REV	DATE	REVISION HISTORY	DSG | DRW | CHK | APP
S3	P01	04.07.25	First issue	JR | JR | RG | JR

ALL REVISIONS

CLIENT

EDEN PLANNING

KEY PLAN

ORIGINATOR

PLUVIAM ENVIRONMENTAL

DRAWING TITLE

SURFACE WATER DRAINAGE DETAILS
ALSTON DAIRY EXTENSION

	Name	Signature	Date
Designed by	JR		01/07/2025
Drawn by	JR		01/07/2025
Checked	RG		01/07/2025
Approved	JR		01/07/2025

PEL REF	SCALE @ A1	BIM FILE NAME - REVISION
PN0259	1:25	PN0259-PEL-XX-XX-DR-Y-00002-P01
Stage 4	Approval	

PROJECT	ISSUER	VOLUME	LEVEL	TYPE	ROLE	NUMBER	REV
PN0259		XX	XX	DR	Y	00002	P01