Longley Farm, Longley Lane, Holmfirth, HD9 2JD

Surface Water Drainage Assessment

For Rogers Geotechnical Services Ltd

KRS.0279.034.R.002.A

December 2025

www.krsenviro.com

CONTACT DETAILS

Registered Office:
KRS Environmental Ltd
3 Princes Square
Princes Street
Montgomery
Powys
SY15 6PZ

Tel: 01686 668957
Mob: 07711 257466

Email: emma@krsenvironmental.com
Web: www.krsenviro.com
LinkedIn: uk.linkedin.com/in/emmaserjeant/

Longley Farm, Longley Lane, Holmfirth, HD9 2JD

Project	Surface Water Drainage Assessment
Client	Rogers Geotechnical Services Ltd
Status	Final
Prepared by	Emma Serjeant LL.B, MSc
Reviewed by	Keelan Serjeant BSc (Hons), MSc, MCIWEM
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EXECUTIVE SUMMARY

The purpose of this report is to assess the potential for disposing surface water. This Surface Water Drainage Assessment demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the National Planning Policy Framework (NPPF).

The development should not therefore be precluded on the grounds of flood risk or drainage.

1.0 INTRODUCTION

1.1 Background

This Surface Water Drainage Assessment has been prepared by KRS Enviro at the request of Rogers Geotechnical Services Ltd to support a planning application for the proposed development at Longley Farm, Longley Lane, Holmfirth, HD9 2JD.

It is recognised that developments that are designed without regards to the surface water runoff are likely to result in increased impact on existing off-site service provision and may leads to an increase in flood risk.

1.2 Purpose

This Surface Water Drainage Assessment complies with the principles of SuDS presented in the new Defra non-statutory technical standards for SuDS[1], and the National Planning Policy Framework (NPPF)[2]. A Surface Water Drainage Assessment is presented with reference to the hydrological and hydrogeological context of the development.

The report findings are based upon professional judgement and are summarised below with detailed recommendations provided at the end of the report. The report includes baseline data on flood risk from the Environment Agency, rainfall data from the Flood Estimation Handbook (FEH) and hydrogeological information from the British Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

1.3 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the development site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

A SuDS Strategy for the site proposals has been developed to manage and reduce the flood risk posed by the surface water runoff from the site. An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the development compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same net effect.

[1] Department for Environment, Food and Rural Affairs (2015) Non-statutory technical standards for SUDS (March 2015).
[2] Ministry of Housing, Communities and Local Government (2025). National Planning Policy Framework (NPPF).

1.4 What are SuDS?

A Sustainable Drainage System (SuDS) is designed to replicate, as closely as possible, the natural drainage from the site (before development) to ensure that the flood risk downstream of the site does not increase as a result of the land being developed. SuDS can also significantly improve the quality of water leaving the site and can enhance the amenity and biodiversity that a site has to offer.

There are a range of SuDS options available to provide effective surface water management that intercept and store excess runoff. The standards set out appropriate design criteria based on four main parameters:

1) Runoff Destination (in order of preference)

    a. To ground;
    b. To surface water body;
    c. To road drain or surface water sewer;
    d. To combined sewer

2) Peak flow rate and volume (pre-and post-development)

3) Water Quality (based on potential hazards arising from development and sensitivity of the runoff destination)

4) Function (design; flood risk; operation and maintenance)

These parameters are then used to develop a drainage strategy based on the following six principles;

1) Manage surface runoff at source

2) Manage on the surface

3) Utilise public space and integrate into the drainage design

4) Effective operation and maintenance

5) Account for climate change and changes in impermeable area

6) Affordability

This report aims identify the most practicable runoff destination and drainage parameters for the site and is presented with reference to the hydrological and hydrogeological context of the development.

1.5 Report Structure

This Surface Water Drainage Assessment has the following report structure:

- Section 2 details the location and the existing and proposed development;
- Section 3 details the possible surface water discharge destinations
- Section 4 outlines the surface water peak flow;

- Section 5 outlines the surface water drainage strategy;
- Section 6 details the management and maintenance requirements; and
- Section 7 presents conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located at Longley Farm, Longley Lane, Holmfirth, HD9 2JD (see Figure 1). The National Grid Reference (NGR) of the Site is 414492, 406140.

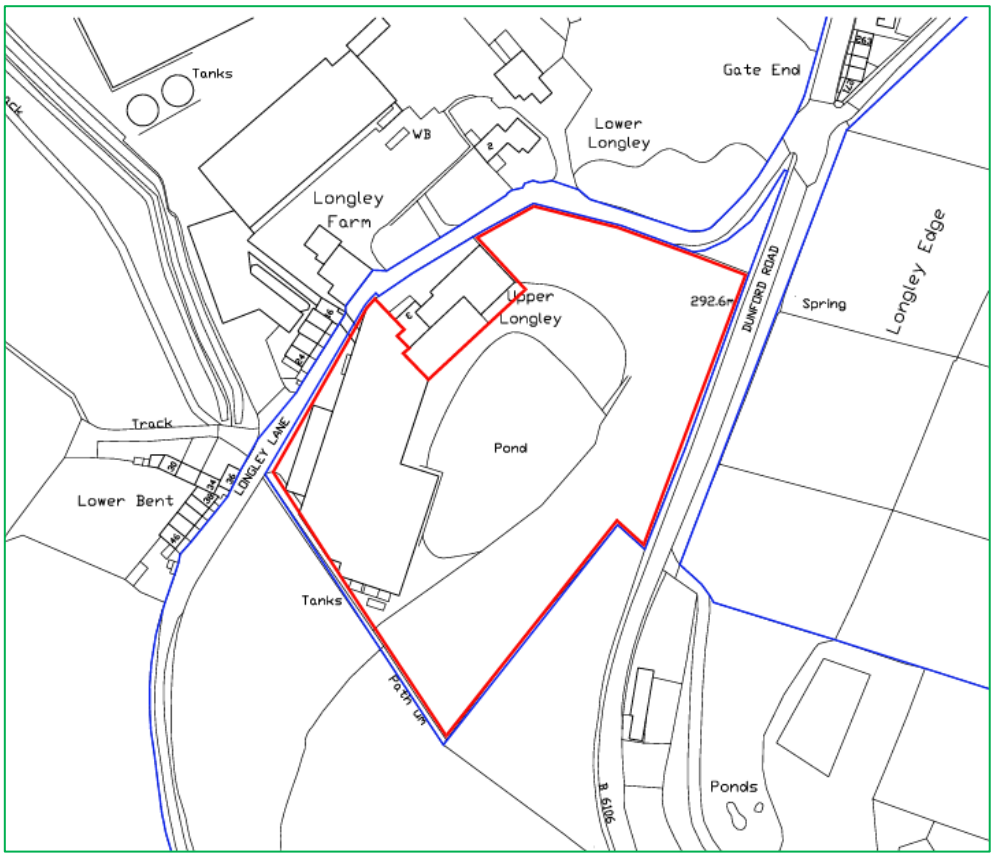


Figure 1 - Site Location

2.2 Existing Development

The Site is comprised of an existing dairy (see Appendix 1).

2.3 Proposed Development

It is understood the proposed development is for the construction of a two-storey extension to the east of the existing dairy, the reroofing of the existing dairy and a new extension together with associated works (see Appendix 1). Further details with regard to the Proposed Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

A topographical survey of the Site has recently been undertaken (see Appendix 2). The Site falls from west to east with a maximum ground level of approximately 300 metres Above

Ordnance Datum (mAOD) on the west of the Site and minimum ground level of approximately 289 on the east of the Site.

2.5 Catchment Hydrology/Drainage

There is a pond located on the Site which has water level of 290.49mAOD and a maximum depth of 1m. Mill Pond is located approximately 470m to the west of the Site and the River Ribble is located approximately 470m to the east of the Site. The Bashaw Whams Reservoir is located approximately 535m to the southeast of the Site and the Holme Styes Reservoir is located approximately 555m to the southwest of the Site. Dean Dike is located approximately 1.10km to the east of the Site.

The existing development discharges surface water runoff into the existing pond located on the Site. The pond outfalls to the north east via a concrete structure.

2.6 Ground Conditions

The British Geological Survey (BGS) map[3] shows that the bedrock deposits underneath the majority of the Site consists of the Huddersfield White Rock – sandstone, an area to the east of the pond consists of the Marsden Formation – mudstone and siltstone and the southeast of the Site consists of the Rossendale Formation – mudstone and siltstone. There are no superficial deposits present.

Information from the National Soil Resources Institute[4] details the Site area as being situated on slowly permeable wet very acid upland soils with a peaty surface with impeded drainage.

2.7 Source Protection Zone

The Site is not located within a Source Protection Zone (SPZ). SPZ's have been defined by the Environment Agency around major public water supplies with the intent to show the risk of contamination from any activities that might cause pollution in the area. Three zones are defined: SPZ 1 is the Inner Zone (highest risk); SPZ 2 is the Outer Zone (average risk); and SPZ 3 is the Total Catchment (least risk).

[3] https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.14476159.932338379.1655890995-1831306757.1655472887
[4] http://www.landis.org.uk/soilscapes/

3.0 SURFACE WATER RUNOFF DESTINATION

3.1 Opportunities for Runoff of Surface Water

Possible receptors for runoff generated onsite have been assessed in line with the prioritisation set onsite out in the Defra non-statutory technical standards for SuDS. There are four possible options to discharge the surface water. The Runoff Destination is (in order of preference):

a) To ground;

b) To surface water body;

c) To road drain or surface water sewer;

d) To combined sewer

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local runoff profile by using systems that can either attenuate runoff and reduce peak flow rates or positively impact on the existing surface water runoff.

3.2 Discharge to Ground

The BGS soils data for this Site indicates the underlying soils have very significant constraints for the use infiltration SuDS. Therefore, it has been concluded that the use of infiltration SuDS techniques such as soakaways will not be a viable option and will not provide a suitable option for discharge of surface water runoff from the Site.

3.3 Discharge to surface Water Body

In the event that discharge of surface water to the ground is not possible, the next option is discharge to a surface water body. The existing development discharges surface water runoff into the existing pond located on the Site. The pond outfalls to the north east via a concrete structure. It is deemed sustainable to re-use this existing discharge location. Therefore, discharge of surface water runoff to a surface water body will be possible and this is the preferred option for the discharge of surface water runoff from the Site.

3.4 Discharge to Road Drain or Surface Water Sewer

This option is not required.

3.5 Discharge to a Combined Sewer

This option is not required.

4.0 SURFACE WATER PEAK FLOW

4.1 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into assessments. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance[5].

Table 1 shows the anticipated changes in extreme rainfall intensity. The proposals will take into account a 45% increase in rainfall intensity due to climate change. In accordance with the Environment Agency climate change guidance a rainfall intensity uplift of +45% (Upper End) has been applied.

This uplift is appropriate for the design horizon for non-residential development and is consistent with Defra's requirement to design SuDS for the lifetime of the development. The use of the Upper End uplift represents a precautionary, policy-compliant approach.

Table 1 - Peak Rainfall Intensity Allowance

Allowance Category	2050s	2070s
Upper End	+40%	+45%
Central	+25%	+30%

4.2 Surface Water Runoff Rates

An estimation of surface water runoff is required to permit effective site surface water management and prevent any increase in flood risk to off-site receptors. In accordance with The SuDS Manual, the Greenfield runoff from the Site has been calculated using the Institute of Hydrology (IoH124) method. Table 2 shows the IoH124 method Greenfield runoff rates calculated for the impermeable area of 4,360m^2. The mean annual maximum flow rate from a Greenfield site (QBAR: approximately a 2.30 year return period) has been calculated to be 6.30 litres/second (l/s) (see Appendix 3).

Table 2 - IoH124 method Greenfield Runoff Rates

Rainfall Event	Runoff Rate (l/s)
1	5.40
QBAR (rural)	6.30
30	11.10
100	13.20

The method used for calculating the runoff complies with the NPPF, as well as the Defra non-statutory technical standards for SuDS and assumes that the excess runoff associated with the proposed development (plus an allowance for future climate change) will need to be managed by the proposed SuDS scheme.

[5] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances

5.0 SURFACE WATER DRAINAGE SYSTEMS

5.1 SuDS Strategy

One of the aims of the NPPF is to provide not only flood risk mitigation but also to maximise additional gains such as improvements in runoff quality and provision of amenity and biodiversity. Systems incorporating these features are often termed SuDS and it is the requirement of NPPF that these are considered as the primary means of collection, control and disposal for storm water as close to source as possible.

The objective of this SuDS Strategy is to ensure that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the Site. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the Site.
- No increase in flooding to people or property off-site as a result of the development.
- No surface water flooding of the Site.
- The proposals take into account a 45% increase in rainfall intensity due to climate change.

In line with adopting a 'management train' it is recommended that water is managed as close to source as possible. This will reduce the size and cost of infrastructure further downstream and also shares the maintenance burden more equitably. The proposed SuDS Strategy will take the form of:

- Semi-permeable surfaces - crushed stone
- Surface water attenuation storage within the existing pond on Site.
- Runoff rates will be restricted to 5.00l/s before discharge off the Site to a watercourse.

The principle applied in the design of storage is to limit the discharge rate of surface water runoff from the developed Site for events of similar frequency of occurrence to the same peak rate of runoff as that which takes place from a greenfield site prior to development.

The SuDS Strategy design for the Site is shown in Appendix 4. The SuDS Strategy will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this Site. The adoption of a SuDS Strategy for the Site represents an enhancement from the current conditions as the current surface water runoff from the Site is uncontrolled, untreated, unmanaged and unmitigated. In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.

The QBAR runoff rate has been calculated to be 6.30l/s. To provide betterment a value of 5.00l/s has been used as the limiting discharge rate before discharge off the Site. Appendix 5 shows the volume of storage required for the proposed development estimated within the for the 1 in 100 year event, with a 45% allowance for climate change (increase in peak rainfall) with 5.00l/s used as the limiting discharge rate before discharge to the watercourse adjacent to the Site. At this stage, it is proposed that the existing pond within the Site will be used to provide

the required effective storage volume of 920m^3. The 920m^3 of attenuation storage is provided entirely above the existing permanent pond water level with an adequate freeboard on top of this.

This additional storage volume will be contained within the existing pond over and above the current permanent pond level. Additional storage would be provided within the manholes, pipes and drainage gullies which will provide betterment over and above the 1 in 100 year (+45%) event.

5.2 Water Quality

In accordance with CIRIA SuDS Manual C753, the proposed SuDS features provide the required water quality treatment for the development. The existing pond provides sedimentation and pollutant removal suitable for roof and hardstanding runoff, satisfying the Mitigation Index requirements for Total Suspended Solids, Metals and Hydrocarbons. No additional proprietary treatment devices are required.

5.3 Designing for Local Drainage System Failure/Exceedance Events

When considering residual risk, it is necessary to make predictions as to the impacts of a storm event that exceeds the design event, or the impact of a failure of the local drainage system. The SuDS Strategy applies a safe and sustainable approach to discharging rainfall runoff from the Site and this reduces the risk of flooding however, it is not possible to completely remove the risk.

As part of the SuDS Strategy it must be demonstrated that the flooding of property would not occur in the event of local drainage system failure and/or design exceedance. It is not economically viable or sustainable to build a drainage system that can accommodate the most extreme events. Consequently, the capacity of the drainage system may be exceeded on rare occasions, with excess water flowing above ground. However, this is considered unlikely in the immediate future due to the 45% allowance for climate change used in the calculations.

The design of the Proposed Development provides an opportunity to manage this local drainage system failure/exceedance flow and ensure that indiscriminate flooding of property does not occur. There will not be an extensive sewerage network on the Proposed Development and therefore it is very unlikely that a catastrophic failure would occur. An exceedance or blockage event of the sewers would not affect the proposed buildings/structures because the finished levels will be raised above surrounding ground levels, ensuring any exceedance flooding would not affect the buildings/structures.

Any exceedance flows will follow the existing topography and will be directed towards the existing pond. Overland exceedance routing has been assessed using site topography. Exceedance flows will continue to follow the natural gradient from west to east and will be directed towards permeable areas and the existing pond, and away from buildings and off-site receptors. The Proposed Development therefore does not increase residual flood risk to either the Site or neighbouring land. It is not considered that there is an increased risk to the Site or properties located adjacent to the Site.

Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the structures and through contouring of the hardstanding areas. When considering the impacts of a storm event that exceeds the design event, there is safety factor, even under the design event conditions. Consequently, if this event were to be exceeded there is additional capacity with the system to accommodate this (i.e. within the

manholes, pipes etc.). If this freeboard was to be exceeded the consequences would be similar, if not less than for the local drainage system failure. Consequently, the impact of an exceedance event is not considered to represent any significant flood hazard.

The above manages and mitigates the flood risk from surface water runoff to the adjacent premises and Site infrastructure from surface water runoff generated by the Proposed Development.

5.4 Compliance with Defra Non-Statutory SuDS Technical Standards

The proposed drainage design meets the requirements of the Defra Technical Standards for SuDS:

- S2/S4: Peak discharge rates are restricted to 5.00l/s, which is below the calculated Greenfield QBAR rate (6.30l/s).
- S6: Runoff volume will not increase compared to pre-development conditions, with attenuation provided within the existing pond.
- S8: The design incorporates a 1 in 100 year (+45%), ensuring rainfall intensity increases due to climate change are fully accounted for.
- S9 (Water Quality): The existing pond provides primary water-quality treatment in accordance with CIRIA C753, achieving the required Mitigation Indices for roof runoff and external yard areas.

6.0 MANAGEMENT AND MAINTENANCE PLAN

6.1 Operation and Maintenance Requirements

The following maintenance schedules are based on The SuDS Manual, for standard maintenance regimes. In order for any surface water drainage system to operate as originally intended, it is necessary to ensure that it is adequately maintained throughout its lifetime. Therefore, over the lifetime of a development there is strong possibility that the system could either fail or its performance be reduced if it is not correctly maintained. This is even more important when SuDS form part of the SuDS Strategy compared to traditional piped networks.

The surface water drainage scheme will be regularly maintained. The key maintenance requirements are regular inspection of silt traps, manholes, pipework and pre-treatment devices, with removal of sediment and debris as required.

Regular inspection and maintenance is required to ensure the effective long-term operation of below ground systems. Maintenance responsibility for the system will be placed with the owner of the Site who will employ responsible organisations when required. Specific maintenance needs of the system will be monitored, and maintenance schedules adjusted to suit requirements.

Preventative measures will be taken rather than corrective measures. Preventative maintenance ensures both the condition monitoring and life-extending tasks are carried out at scheduled regular intervals, ensuring failure and regular repair of the system is avoided.

Inlet structures and Inspection Chambers

Inlet structures such as rainwater downpipes, road gullies and channel drains. They should be free from obstruction at all times to allow free flow through the system. Inspection chambers and rodding eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary. Table 3 provides details of the maintenance requirements.

Table 3 - Inlet Structures and Inspection Chambers

Regular Maintenance	Frequency
Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt, as necessary. Check there is no physical damage.	Monthly
Strim vegetation 1m minimum surrounding structures and keep area free from silt and debris.	Monthly
Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Removed debris and silt.	Annually
Occasional Tasks	**Frequency**
Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As required
Remedial Work	**Frequency**
Repair physical damage if necessary.	As required

Below Ground Drainage Pipes

Below ground drainage pipes convey water to the SuDS system. They should be free from obstruction at all times to allow free flow. Table 4 provides details of the maintenance requirements.

Table 4 - Below Ground Drainage Pipes

Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within vicinity of below ground drainage pipes and tanks to avoid damage to system.	Annually or as required
Occasional Tasks	**Frequency**
Inspect all inlets, outlets, and vents to ensure that they are in good condition and operating as designed.	Annually
Remedial Work	**Frequency**
Repair physical damage if necessary.	As required
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

Attenuation Pond

Ponds are designed to provide attenuation and storage of surface water. Table 5 provides details of the maintenance requirements.

Table 5 - Attenuation Pond

Regular Maintenance	Frequency
Remove litter and debris	Monthly (or as required)
Grass cutting – meadow grass	Half yearly (spring, before nesting season, and autumn)
Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
Inspect water body for signs of poor water quality	Monthly (May – October)
Inspect silt accumulatio rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build up has occurred, to inform management and disposal options	Half yearly
Check any mechanical devices, e.g. penstocks	Half yearly

Hand cut submerged and emergent aquatic plants (at minimum of 0.10m above pond base; include max 25% of pond surface)	Annually
Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
Tidy all dead growth (scrub clearance) before start of growing season	Annually
Remove sediment from forebay	1–5 years, or as required
Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional Maintenance	**Frequency**
Remove sediment from the main body of ponds when pool volume is reduced by 20%	>25 years (usually)
Remedial Work	**Frequency**
Repair of erosion or other damage	As required
Aerate pond when signs of eutrophication are detected	As required
Realignment of damage	As required
Repair / rehabilitation of inlets, outlets and overflows	As required

Sediments excavated from pond that receive runoff from roof / driveway areas are generally not toxic or hazardous material and can be safely disposed of by either land application or landfilling. However, consultation should take place with the environmental regulator to confirm appropriate protocols.

It will be acceptable to distribute the sediment on site if there is an appropriate safe and acceptable location to do so. If ponds are to be drawn down, care should be taken to prevent downstream discharge of sediments and anoxic water.

It should be ensured that in the first five years, while vegetation is establishing, certain plant growth is controlled, such as invasive plants, particularly Common Bulrush (Typha latifolia). As it is not desirable for all new ponds to be bulrush dominated. After this period, ponds can usually be allowed to develop naturally, recognising that, unless the margins are occasionally managed, they are likely to become dominated by trees and shrubs.

Eutrophication of SuDS ponds can occur during the summer months. Eutrophication is best alleviated by controlling the nutrient source or providing a continuous baseflow to the pond. Unless eutrophication is severe, aeration can be used as a stop-gap measure to save aquatic animal species and reduce risks to receiving waters. However, the addition of barley straw bales, dredging or rendering the nutrients inactive by chemical means can also be successful.

Flow Control Device

A flow control device controls the flow of water leaving the Site. Table 6 provides details of the maintenance requirements.

Table 6 - Flow Control Device

General Requirements	Frequency
Inspect and identify any areas that are not operating correctly and clear out any debris from chamber	Monthly for first 3 months then every 6 months
Occasional Tasks	**Frequency**

Inspect all inlets, outlets, and vents to ensure that they are in good condition and operating as designed	Annually
Remedial Work	**Frequency**
Repair physical damage if necessary	As Required

7.0 SUMMARY AND CONCLUSIONS

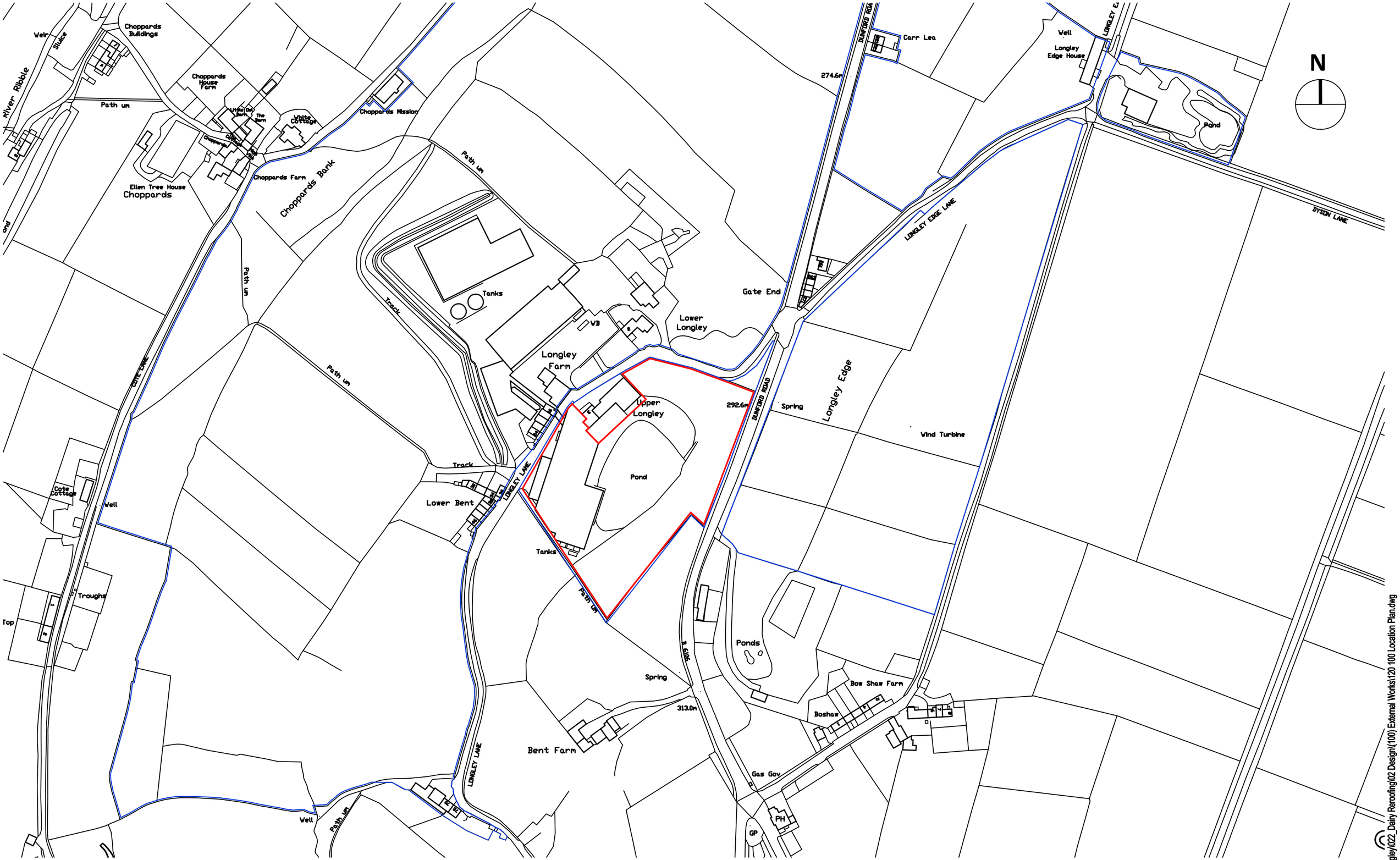
7.1 Conclusion

This Surface Water Drainage Assessment demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The Proposed Development will considerably reduce the flood risk posed to the Site and to off-site locations due to the adoption of a SuDS Strategy.

The SuDS strategy delivers measurable betterment compared to the existing uncontrolled runoff regime by reducing peak discharge rates to below Greenfield levels and provides significant attenuation within the existing on-site pond. The Proposed Development should not therefore be precluded on the grounds of flood risk or drainage. The SuDS Strategy satisfies the NPPF by ensuring no increase in flood risk on- or off-site

APPENDICES

APPENDIX 1 – Proposed Site Layout



Construction staff and operatives must ensure the principal contractor has provided thorough and accurate information on all health and safety aspects relating to the designs identified on this drawing including the review of:

- Designers/contractors risk assessments
- Method statements
- Permit to work
- Pre construction information

The designers note that the following health and safety risks relating to this drawing have not been eliminated during the design process:

	revision	date	by	chk
A	Blue Line Boundary corrected	22.08.25		

holmearchitecture
17a Chapelgate · Scholes · Holmfirth · HD9 1SX
matt@holmearchitecture.com | www.holmearchitecture.com | 07975977532

All dimensions to be verified on site, and the Architect informed of any discrepancy.
All drawings and specifications should be read in conjunction with the H&S Plan

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LONGLEY FARM
Cottage Cheese Extension and Dairy Reroofing

LOCATION PLAN

project number	drawing number	revision
120	**100**	**A**

cad reference: D:\02 Projects\Longley\022_Dairy Reroofing\02 Design\(100) External Works\120 100 Location Plan.dwg

N

Silos

Silos

Silos

Trapezoidal metal cladding roof

Existing trapezoidal metal cladding roof

Existing stepped parapet wall

6° falls

Silos

Silos

Gutter and step in roof

Insulated aluminium standing seam roof cladding with photo voltaic panels. 84 panels drawn

6° falls

12852

32847

Roof vents to be used in building natural ventilation system

Lower Roof

3917

8492

Step in roof

Insulated aluminium standing seam roof cladding with photo voltaic panels. 23 panels drawn.

6° falls

6° falls

19658

6° falls

13217

Insulated aluminium standing seam roof cladding with photo voltaic panels. 108 panels drawn

Step in roof

Extensive green roof comprising Sedum Blanket on membrane lined insulated cladding

14016

2° falls

23701

32386

Handrail

Extensive green roof comprising Sedum Blanket on membrane lined insulated cladding

POND

6° falls

25496

12997

29518

Proposed Step in roof

4° falls

18321

25494

2979

2110

5005

Insulated aluminium standing seam roof cladding with photo voltaic panels. 176 panels drawn

Extensive green roof comprising Sedum Blanket on membrane lined insulated cladding

Existing cementitious roof cladding to be replaced with insulated standing seam roof cladding in the same plane

9920

5559

4635

13895

1880

Existing cementitious roof cladding to be replaced with insulated standing seam roof cladding in the same plane

4103

3580

Existing Stone tiled pitched roof to cottage

Existing workshop roof

SCALE BAR

0m 2 4 6 8 10m

Construction staff and operatives must ensure the principal contractor has provided thorough and accurate information on all health and safety aspects relating to the designs identified on this drawing including the review of:

- Designers/contractors risk assessments
- Method statements
- Permit to work
- Pre construction information

The designers note that the following health and safety risks relating to this drawing have not been eliminated during the design process:

ref	residual risk

	revision	date	by	chk
A	Issued for planning	29.08.25		

All dimensions to be verified on site and the Architect informed of any discrepancy. All drawings and specifications shall be read in conjunction with the Health and Safety Plan; all conflicts should be reported to the CDM Coordinator.

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DO NOT SCALE FROM THIS DRAWING

☐ preliminary ☐ comment ☐ construction
☐ planning ☐ tender ☐ record

holmearchitecture
17a Chapelgate · Scholes · Holmfirth · HD9 1SX
tel: 07975977532
mail@holmearchitecture.com
www.holmearchitecture.com

J&E DICKINSON
Longley Lane Holmfirth HD9 2JD

drawn by	checked by	date	scale @ A0
MC	MC	22.08.25	1:100

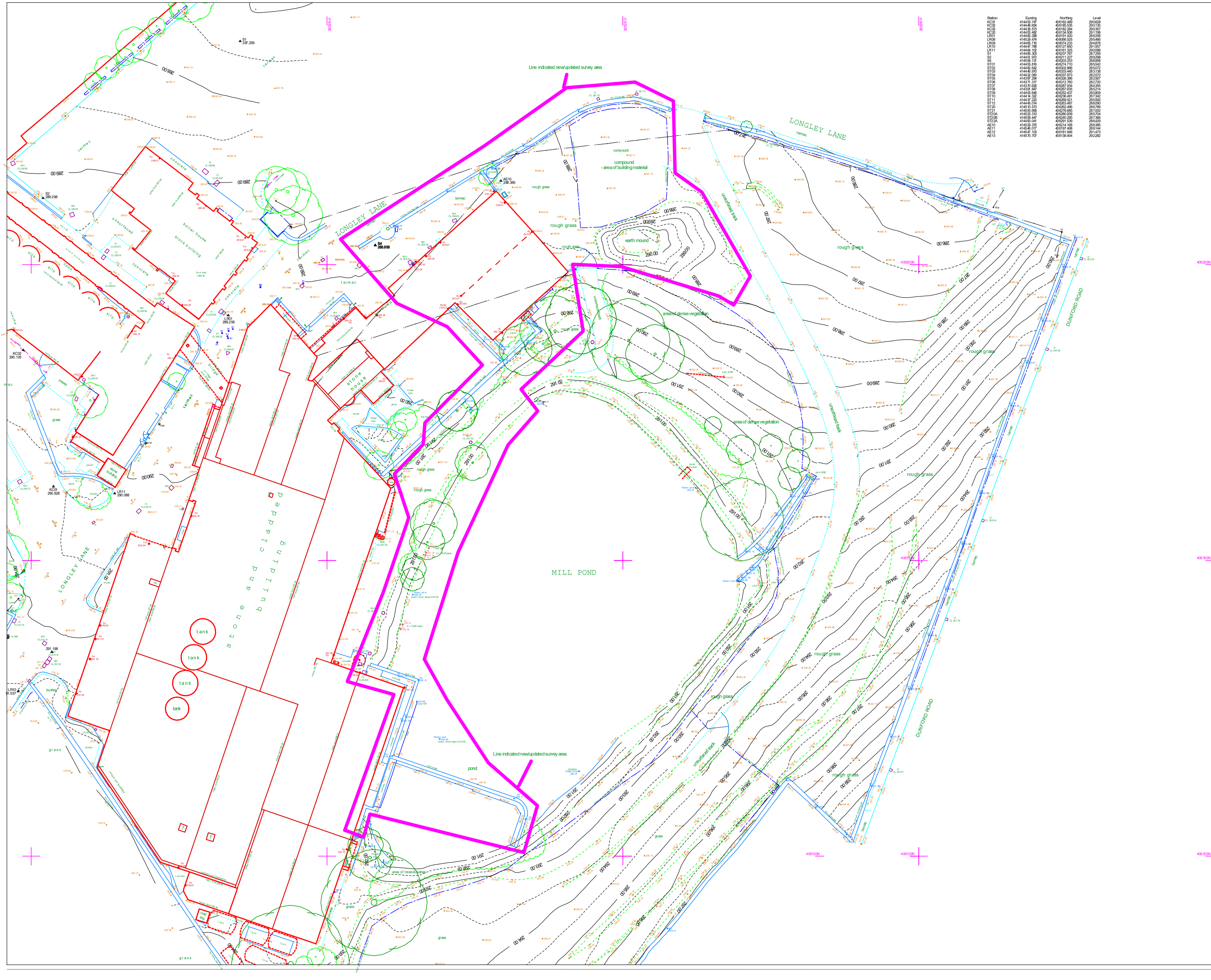
Cottage Cheese Extension and Dairy Reroofing

PROPOSED DAIRY ROOF PLAN

project number	drawing number	revision
120	222	A

cad reference: D:\02 Projects\Longley\022 Dairy Reroofing\02 Design\(200) Plans\120_222 Proposed Dairy Roof Plan.dwg

APPENDIX 2 – Topographical Survey



Station	Easting	Northing	Level
KC01	414493.747	406162.489	290828
KC02	414468.634	406185.535	290135
KC03	414436.573	406182.284	290357
LR01	414448.288	406158.600	289258
LR01	414448.288	406191.400	289258
LR08	414529.476	406066.525	295466
LR09	414448.716	406074.233	294878
LR10	414447.788	406127.890	291557
LR11	414496.102	406161.325	290088
S1	414486.303	406237.767	287259
S2	414491.972	406211.227	289298
S4	414508.138	406203.253	288958
ST01	414493.816	406274.710	285542
ST02	414482.642	406302.866	285072
ST03	414446.593	406333.440	283138
ST04	414422.060	406337.973	282572
ST05	414397.256	406326.386	282360
ST06	414371.317	406312.760	282720
ST07	414351.547	406287.635	283214
ST08	414349.647	406267.635	284214
ST09	414465.646	406252.437	285809
ST10	414414.322	406236.491	287342
ST11	414437.220	406269.521	285592
ST12	414446.014	406263.487	286090
ST20	414510.573	406262.496	286789
ST21	414501.699	406278.685	287002
ST20A	414523.313	406280.839	285704
ST20B	414509.447	406240.285	287366
ST22A	414493.041	406291.539	286429
AE10	414529.375	406214.169	288385
AE11	414546.017	406197.498	289144
AE12	414547.103	406181.846	291473
AE13	414570.707	406138.404	292282

B	BOLLARD	OSA	OUTSIDE SURVEY AREA
BH	BOREHOLE	P	POST / POLE
BT	BRITISH TELECOM CHAMBER	RL	RIDGE LEVEL
CATV	CABLE TV	RS	ROD/SIGHT
CP	CABLE PIT	WMP	RAINWATER PIPE
CL	COVER LEVEL	S	STAY
CR	CABLE RISER	SC	STOP COCK
CS	TREE CROWN SPREAD	SD	TREE STEM DIAMETER
DP	DOWN PIPE	SP	SIGN POST
EL	EAVE S LEVEL	ST	STOP TAP
EP	ELECTRICITY POLE	SV	STOP VALVE
ER	EARTH ROD	SVP	SOIL VENT PIPE
FH	FIRE HYDRANT	TC	TRAFFIC CONTROL
FL	FLOOR LEVEL or FENCE LEVEL	TCB	TRAFFIC CABLE BOX
GL	GROUND LEVEL	TD	TAKEN FROM RECORDS
G	GULLY	TH	THRESHOLD LEVEL
GPR	TRACED BY G.P.R.	TL	TRAFFIC LIGHTS
GV	GAS VALVE	TP	TELEGRAPH POLE
IC	INSPECTION CHAMBER	UTOA	UNABLE TO GAIN ACCESS
IL	INVERT LEVEL	UTL	UNABLE TO LOCATE
JB	JUNCTION BOX	UTR	UNABLE TO RAISE
LB	LIGHT BOLLARD	UTS	UNABLE TO SURVEY
LB	LITTLE BALL or LETTER BOX	UTT	UNABLE TO TRACE
LP	LAMP POST	WL	WATER LEVEL or WALL LEVEL
MH	MANHOLE	VP	VENT PIPE
MI	MISCELLANEOUS	WM	WATER METER
NL	NOT LOCATED	WO	WASH OUT VALVE
		WP	WATER PIPE

b	BEAM HEIGHT
c	CILL HEIGHT
ch	CEILING HEIGHT
dh	DOOR HEIGHT
eh	EAVES HEIGHT
FL(2)	FLOOR LEVEL
110.24	BEAM/OVERHEAD LEVEL
h	HEAD HEIGHT
p	PURLIN HEIGHT
r	RIDGE BOX RO/SHEIGHT
w	SPRING POINT
	STEPS / S TAIRS UP

All services to be field verified.

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constructionline

SURVEY NOTES:

The survey is fitted to the previous topographic survey 3481CT.

Due to the scale factor any setting out or design works should strictly use the control co-ordinates as shown on the drawing.

If manhole invert levels / basic drainage information is shown on this drawing, these have been surveyed from above ground.

If any drainage issues are noticed or design are advise that a full drainage is carried out to verify any drainage information shown on the drawing.

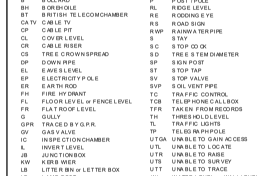
SURVEY REVISIONS:

PREVIOUS DWG NO.	1904AT, 2424CT, 2426CT, 2628CT, 2631AB , 3481CT & 6193CM
REVISION NO.	No 9
REVISION SURVEY DATE:	Oct 2010, Oct 2012, Apr 2013, Oct 2013, May 2015, Sep 2024, May 2025

REVISION NOTES:

6193CM-R2 - Survey extended to the West of the Mill Pond. New Pond wall surveyed.
6193CM-R1 - Survey extended to the East of the Mill Pond.
6193CM - The survey area next to the pond and adjacent to the building has extended and updated. Area has been highlighted in the drawing.
1904AT - was the survey around the boiler house.
2424CT - was the survey of the delivery yard.
2426CT - was the survey around the dispatch fridge.
2631AB - is an extension to enlarge parts the southern factory building including elevations.
3481CT - survey extended to include the weigh bridge area to the North of Longley Lane.
- shed behind weighbridge surveyed internally
- main production area surveyed internally and office extensions fitted in.

LAYOUT VIEWS



CT SURVEYS
UNIT 5
HILLINGDEN COURT
LEEDS
LS14 6FG
TEL : 0113 232 00 435
MOB : 07949 59754
EMAIL : MAIL@CT-SURVEYS.COM
WEBSITE : WWW.CT-SURVEYS.COM

CLIENT:

Holme Architecture

PROJECT TITLE:

Longley Farm. Longley Lane, Holmfirth

DRAWING NUMBER:

6193CM-R2

SCALE:	1:200 @A0	SURVEY DATE:	June 2010
LEVEL DATUM:	OSGB by GPS	GRID DATUM:	OSGB fixed at LR11
BENCH MARK USED:	Nail at LR11 surveyed by GPS	BM VALUE:	290.088m
		SHEET NUMBER:	1 of 1

APPENDIX 3 – IoH124 Method Greenfield Runoff Rates

ICP SUDS Mean Annual Flood

Input

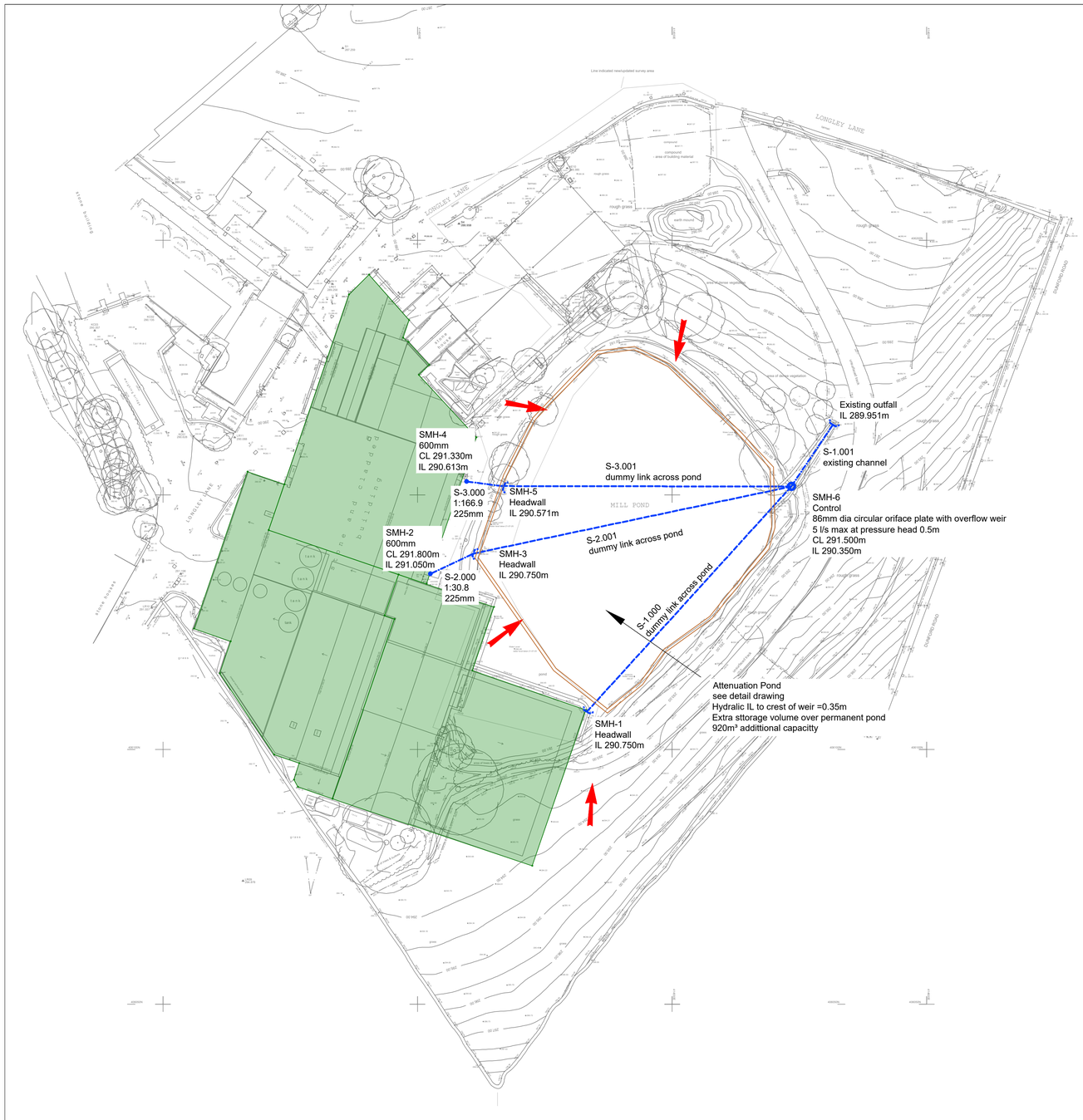
Return Period (years)	100	Soil	0.500
Area (ha)	0.436	Urban	0.000
SAAR (mm)	1600	Region Number	Region 3

Results l/s

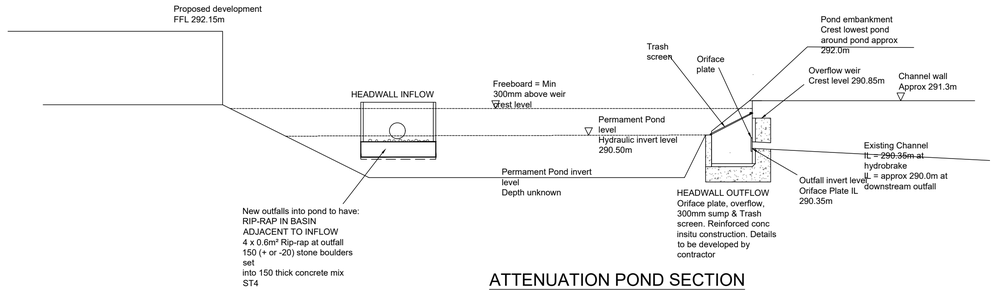
QBAR Rural	6.3
QBAR Urban	6.3
Q100 years	13.2
Q1 year	5.4
Q30 years	11.1
Q100 years	13.2

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APPENDIX 4 – SuDS Design



SURFACE WATER DRAINAGE PLAN 1:500



ATTENUATION POND SECTION
nts

KEY

- PROPOSED SURFACE WATER PIPE
- DUMMY LINK ACROSS POND
- HYDROBRAKE
- DRAINAGE CATCHMENT -100% IMPERMEABLE
- EXCEEDANCE FLOOD FLOW PATHS

N

SCALE 1 : 500

m 10 0 40 m

NOTES:

1) All works and materials to conform to standards in latest edition of Sewers for Adoption or any relevant design guides by the overseeing Local Authorities
2) All covers and gratings to be class C in Highway, Class B where in access or can be class A where away from access and any vehicle paths
3) Outfall to be headwall at watercourse (see details)

Rev.	Date:	Notes:	By:
A	11.12.25	SW DRAINAGE UPDATED	AP

KRS ENVIRONMENTAL
TEL: 01484 437420 MOBILE: 07857264376
3 PRINCES SQUARE PRINCES STREET
MONTGOMERY POWYS SY15 6PZ

Job:	LONGLEY FARM
Client:	Rogers Geotechnical Services
Drawing Title:	Proposed Surface Water Drainage
Date:	November 2025
Drawing No:	KRS.0279.031.001 revision: A
Scale:	AS NOTED@A1
Drawn:	AP
Status:	DRAFT

APPENDIX 5 – Microdrainage Calculations

Date 08/12/2025 15:06
File Longley Farm_SW-revA.MDX
Micro Drainage

Designed by ss
Checked by
Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes SLS-1 Manhole Sizes 600mm +

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	19.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	0.600
Ratio R	0.343	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	59.735	0.075	800.0	0.160	5.00	0.0		0.045	3 \=/	600	1:3 Swale	
2.000	9.253	0.300	30.8	0.138	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	63.943	0.080	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	43.06	10.82	290.750	0.160	0.0	0.0	0.0	0.17	27.0	24.9
2.000	50.00	5.08	291.050	0.138	0.0	0.0	0.0	1.82	32.1	24.9
2.001	42.06	11.31	290.750	0.138	0.0	0.0	0.0	0.17	27.0	24.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	7.011	0.042	168.2	0.139	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	56.834	0.071	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.001	14.635	0.324	45.2	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.002	8.726	0.700	12.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	5.12	290.505	0.139	0.0	0.0	0.0	1.01	40.0	25.0
3.001	43.41	10.65	290.463	0.139	0.0	0.0	0.0	0.17	27.0	25.0
1.001	41.42	11.65	290.392	0.436	0.0	0.0	0.0	0.72	113.4	65.2
1.002	41.34	11.69	289.993	0.436	0.0	0.0	0.0	3.73	148.2	65.2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	291.500	0.750	Junction		1.000	290.750	600				
2	291.800	0.750	Open Manhole	450	2.000	291.050	150				
3	291.500	0.750	Open Manhole	1000	2.001	290.750	600	2.000	290.750	150	
4	291.330	0.825	Open Manhole	600	3.000	290.505	225				
5	291.440	0.977	Open Manhole	1000	3.001	290.463	600	3.000	290.463	225	
6	291.500	1.108	Junction		1.001	290.392	600	1.000	290.675	600	283
								2.001	290.670	600	278
								3.001	290.392	600	
7	290.700	0.707	Open Manhole	1000	1.002	289.993	225	1.001	290.068	600	
dummy	290.000	0.707	Open Manhole	1000		OUTFALL		1.002	289.293	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	414533.248	406107.417			No Entry	
2	414502.504	406134.489	414502.504	406134.489	Required	
3	414510.801	406138.587	414510.801	406138.587	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
4	414509.605	406152.633	414509.605	406152.633	Required	
5	414516.560	406151.746	414516.560	406151.746	Required	
6	414573.395	406151.650			No Entry	
7	414581.572	406163.787	414581.572	406163.787	Required	
dummy	414580.641	406172.464			No Entry	



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	3 \=/	600	1	291.500	290.750	0.600	Junction	
2.000	o	150	2	291.800	291.050	0.600	Open Manhole	450
2.001	3 \=/	600	3	291.500	290.750	0.600	Open Manhole	1000
3.000	o	225	4	291.330	290.505	0.600	Open Manhole	600
3.001	3 \=/	600	5	291.440	290.463	0.827	Open Manhole	1000
1.001	3 \=/	600	6	291.500	290.392	0.958	Junction	
1.002	o	225	7	290.700	289.993	0.482	Open Manhole	1000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	59.735	800.0	6	291.500	290.675	0.675	Junction	
2.000	9.253	30.8	3	291.500	290.750	0.600	Open Manhole	1000
2.001	63.943	800.0	6	291.500	290.670	0.680	Junction	
3.000	7.011	168.2	5	291.440	290.463	0.752	Open Manhole	1000
3.001	56.834	800.0	6	291.500	290.392	0.958	Junction	
1.001	14.635	45.2	7	290.700	290.068	0.482	Open Manhole	1000
1.002	8.726	12.5	dummy	290.000	289.293	0.482	Open Manhole	1000

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.160	0.160	0.160
2.000	User	-	100	0.138	0.138	0.138
2.001	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.139	0.139	0.139
3.001	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.436	0.436	0.436

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	M5-60 (mm) 19.000	Cv (Summer)	1.000
Return Period (years)		2	Ratio R 0.343	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

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Online Controls for Storm

Orifice Manhole: 6, DS/PN: 1.001, Volume (m³): 457.6

Diameter (m) 0.086 Discharge Coefficient 0.600 Invert Level (m) 290.392

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Offline Controls for Storm

Weir Manhole: 6, DS/PN: 1.001, Loop to PN: 1.002

Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 290.892

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Storage Structures for Storm

Tank or Pond Manhole: 6, DS/PN: 1.001

Invert Level (m) 290.392

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2564.0	0.500	2687.0

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 0.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.343 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1
Climate Change (%)	25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	15 Summer	1	+25%					290.912	-0.588	0.000	0.03			31.6	OK
2.000	2	15 Summer	1	+25%					291.187	-0.013	0.000	0.96			27.1	OK
2.001	3	15 Summer	1	+25%					290.902	-0.598	0.000	0.03			27.4	OK
3.000	4	15 Summer	1	+25%					290.676	-0.054	0.000	0.92			27.5	OK
3.001	5	15 Summer	1	+25%					290.611	-0.830	0.000	0.02			27.4	OK
1.001	6	4320 Summer	1	+25%				0	290.452	-1.048	0.000	0.00	0.0		1.5	OK
1.002	7	4320 Summer	1	+25%					290.007	-0.212	0.000	0.01			1.5	OK

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Level Exceeded
1.000	1	
2.000	2	
2.001	3	
3.000	4	
3.001	5	
1.001	6	
1.002	7	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes SLS-1 Manhole Sizes 600mm +

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	19.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	0.600
Ratio R	0.343	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	59.735	0.075	800.0	0.160	5.00	0.0		0.045	3 \=/	600	1:3 Swale	
2.000	9.253	0.300	30.8	0.138	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	63.943	0.080	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	43.06	10.82	290.750	0.160	0.0	0.0	0.0	0.17	27.0	24.9
2.000	50.00	5.08	291.050	0.138	0.0	0.0	0.0	1.82	32.1	24.9
2.001	42.06	11.31	290.750	0.138	0.0	0.0	0.0	0.17	27.0	24.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	7.011	0.042	168.2	0.139	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	56.834	0.071	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.001	14.635	0.324	45.2	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.002	8.726	0.700	12.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	5.12	290.505	0.139	0.0	0.0	0.0	1.01	40.0	25.0
3.001	43.41	10.65	290.463	0.139	0.0	0.0	0.0	0.17	27.0	25.0
1.001	41.42	11.65	290.392	0.436	0.0	0.0	0.0	0.72	113.4	65.2
1.002	41.34	11.69	289.993	0.436	0.0	0.0	0.0	3.73	148.2	65.2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	291.500	0.750	Junction		1.000	290.750	600				
2	291.800	0.750	Open Manhole	450	2.000	291.050	150				
3	291.500	0.750	Open Manhole	1000	2.001	290.750	600	2.000	290.750	150	
4	291.330	0.825	Open Manhole	600	3.000	290.505	225				
5	291.440	0.977	Open Manhole	1000	3.001	290.463	600	3.000	290.463	225	
6	291.500	1.108	Junction		1.001	290.392	600	1.000	290.675	600	283
								2.001	290.670	600	278
								3.001	290.392	600	
7	290.700	0.707	Open Manhole	1000	1.002	289.993	225	1.001	290.068	600	
dummy	290.000	0.707	Open Manhole	1000		OUTFALL		1.002	289.293	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	414533.248	406107.417			No Entry	
2	414502.504	406134.489	414502.504	406134.489	Required	
3	414510.801	406138.587	414510.801	406138.587	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
4	414509.605	406152.633	414509.605	406152.633	Required	
5	414516.560	406151.746	414516.560	406151.746	Required	
6	414573.395	406151.650			No Entry	
7	414581.572	406163.787	414581.572	406163.787	Required	
dummy	414580.641	406172.464			No Entry	



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	3 \=/	600	1	291.500	290.750	0.600	Junction	
2.000	o	150	2	291.800	291.050	0.600	Open Manhole	450
2.001	3 \=/	600	3	291.500	290.750	0.600	Open Manhole	1000
3.000	o	225	4	291.330	290.505	0.600	Open Manhole	600
3.001	3 \=/	600	5	291.440	290.463	0.827	Open Manhole	1000
1.001	3 \=/	600	6	291.500	290.392	0.958	Junction	
1.002	o	225	7	290.700	289.993	0.482	Open Manhole	1000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	59.735	800.0	6	291.500	290.675	0.675	Junction	
2.000	9.253	30.8	3	291.500	290.750	0.600	Open Manhole	1000
2.001	63.943	800.0	6	291.500	290.670	0.680	Junction	
3.000	7.011	168.2	5	291.440	290.463	0.752	Open Manhole	1000
3.001	56.834	800.0	6	291.500	290.392	0.958	Junction	
1.001	14.635	45.2	7	290.700	290.068	0.482	Open Manhole	1000
1.002	8.726	12.5	dummy	290.000	289.293	0.482	Open Manhole	1000

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.160	0.160	0.160
2.000	User	-	100	0.138	0.138	0.138
2.001	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.139	0.139	0.139
3.001	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.436	0.436	0.436

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	M5-60 (mm) 19.000	Cv (Summer)	1.000
Return Period (years)		2	Ratio R 0.343	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

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Online Controls for Storm

Orifice Manhole: 6, DS/PN: 1.001, Volume (m³): 457.6

Diameter (m) 0.086 Discharge Coefficient 0.600 Invert Level (m) 290.392

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Offline Controls for Storm

Weir Manhole: 6, DS/PN: 1.001, Loop to PN: 1.002

Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 290.892

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 | Manhole Headloss Coeff (Global) 0.500 | MADD Factor * 10m³/ha Storage 0.000
Hot Start (mins) 0 | Foul Sewage per hectare (l/s) 0.000 | Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 | Additional Flow - % of Total Flow 0.000 | Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 | Number of Offline Controls 1 | Number of Time/Area Diagrams 0
Number of Online Controls 1 | Number of Storage Structures 1 | Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR | M5-60 (mm) 19.000 | Cv (Summer) 1.000
Region England and Wales | Ratio R 0.343 | Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 | DTS Status ON | Inertia Status OFF
Analysis Timestep Fine | DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 30
Climate Change (%) 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.000	1	15 Summer	30	+45%					291.020	-0.480	0.000	0.10			89.9
2.000	2	15 Summer	30	+45%	30/15 Summer	30/15 Summer			291.807	0.607	6.512	1.69			48.0
2.001	3	15 Summer	30	+45%					290.948	-0.552	0.000	0.05			48.0
3.000	4	15 Summer	30	+45%	30/15 Summer				291.032	0.302	0.000	2.61			78.1
3.001	5	15 Summer	30	+45%					290.715	-0.726	0.000	0.05			77.9
1.001	6	2160 Summer	30	+45%				0	290.511	-0.990	0.000	0.00	0.0		4.1
1.002	7	2160 Summer	30	+45%					290.021	-0.198	0.000	0.04			4.1

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
1.000	1	OK	
2.000	2	FLOOD	5
2.001	3	OK	
3.000	4	FLOOD RISK	
3.001	5	OK	
1.001	6	OK	
1.002	7	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes SLS-1 Manhole Sizes 600mm +

FSR Rainfall Model - England and Wales

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	19.000	Volumetric Runoff Coeff.	1.000	Min Design Depth for Optimisation (m)	0.600
Ratio R	0.343	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	59.735	0.075	800.0	0.160	5.00	0.0		0.045	3 \=/	600	1:3 Swale	
2.000	9.253	0.300	30.8	0.138	5.00	0.0	0.600		o	150	Pipe/Conduit	
2.001	63.943	0.080	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	43.06	10.82	290.750	0.160	0.0	0.0	0.0	0.17	27.0	24.9
2.000	50.00	5.08	291.050	0.138	0.0	0.0	0.0	1.82	32.1	24.9
2.001	42.06	11.31	290.750	0.138	0.0	0.0	0.0	0.17	27.0	24.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	7.011	0.042	168.2	0.139	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	56.834	0.071	800.0	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.001	14.635	0.324	45.2	0.000	0.00	0.0		0.045	3 \=/	600	1:3 Swale	
1.002	8.726	0.700	12.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	50.00	5.12	290.505	0.139	0.0	0.0	0.0	1.01	40.0	25.0
3.001	43.41	10.65	290.463	0.139	0.0	0.0	0.0	0.17	27.0	25.0
1.001	41.42	11.65	290.392	0.436	0.0	0.0	0.0	0.72	113.4	65.2
1.002	41.34	11.69	289.993	0.436	0.0	0.0	0.0	3.73	148.2	65.2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	291.500	0.750	Junction		1.000	290.750	600				
2	291.800	0.750	Open Manhole	450	2.000	291.050	150				
3	291.500	0.750	Open Manhole	1000	2.001	290.750	600	2.000	290.750	150	
4	291.330	0.825	Open Manhole	600	3.000	290.505	225				
5	291.440	0.977	Open Manhole	1000	3.001	290.463	600	3.000	290.463	225	
6	291.500	1.108	Junction		1.001	290.392	600	1.000	290.675	600	283
								2.001	290.670	600	278
								3.001	290.392	600	
7	290.700	0.707	Open Manhole	1000	1.002	289.993	225	1.001	290.068	600	
dummy	290.000	0.707	Open Manhole	1000		OUTFALL		1.002	289.293	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	414533.248	406107.417			No Entry	
2	414502.504	406134.489	414502.504	406134.489	Required	
3	414510.801	406138.587	414510.801	406138.587	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
4	414509.605	406152.633	414509.605	406152.633	Required	
5	414516.560	406151.746	414516.560	406151.746	Required	
6	414573.395	406151.650			No Entry	
7	414581.572	406163.787	414581.572	406163.787	Required	
dummy	414580.641	406172.464			No Entry	



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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	3 \=/	600	1	291.500	290.750	0.600	Junction	
2.000	o	150	2	291.800	291.050	0.600	Open Manhole	450
2.001	3 \=/	600	3	291.500	290.750	0.600	Open Manhole	1000
3.000	o	225	4	291.330	290.505	0.600	Open Manhole	600
3.001	3 \=/	600	5	291.440	290.463	0.827	Open Manhole	1000
1.001	3 \=/	600	6	291.500	290.392	0.958	Junction	
1.002	o	225	7	290.700	289.993	0.482	Open Manhole	1000

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	59.735	800.0	6	291.500	290.675	0.675	Junction	
2.000	9.253	30.8	3	291.500	290.750	0.600	Open Manhole	1000
2.001	63.943	800.0	6	291.500	290.670	0.680	Junction	
3.000	7.011	168.2	5	291.440	290.463	0.752	Open Manhole	1000
3.001	56.834	800.0	6	291.500	290.392	0.958	Junction	
1.001	14.635	45.2	7	290.700	290.068	0.482	Open Manhole	1000
1.002	8.726	12.5	dummy	290.000	289.293	0.482	Open Manhole	1000

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.160	0.160	0.160
2.000	User	-	100	0.138	0.138	0.138
2.001	-	-	100	0.000	0.000	0.000
3.000	User	-	100	0.139	0.139	0.139
3.001	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.436	0.436	0.436

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	M5-60 (mm) 19.000	Cv (Summer)	1.000
Return Period (years)		2	Ratio R 0.343	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

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Online Controls for Storm

Orifice Manhole: 6, DS/PN: 1.001, Volume (m³): 457.6

Diameter (m) 0.086 Discharge Coefficient 0.600 Invert Level (m) 290.392

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Offline Controls for Storm

Weir Manhole: 6, DS/PN: 1.001, Loop to PN: 1.002

Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 290.892

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Storage Structures for Storm

Tank or Pond Manhole: 6, DS/PN: 1.001

Invert Level (m) 290.392

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2564.0	0.500	2687.0

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 0.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 1.000
Region England and Wales Ratio R 0.343 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.000	1	15 Summer	100	+45%					291.056	-0.444	0.000	0.13			116.4
2.000	2	15 Summer	100	+45%	100/15 Summer	100/15 Summer			291.813	0.613	12.805	1.70			48.2
2.001	3	15 Summer	100	+45%					290.948	-0.552	0.000	0.05			48.2
3.000	4	15 Summer	100	+45%	100/15 Summer				291.282	0.552	0.000	3.37			100.9
3.001	5	15 Summer	100	+45%					290.751	-0.689	0.000	0.06			100.9
1.001	6	1440 Summer	100	+45%				0	290.539	-0.961	0.000	0.00	0.0		5.0
1.002	7	1440 Summer	100	+45%					290.023	-0.195	0.000	0.04			5.0

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Status	Level Exceeded
1.000	1	OK	
2.000	2	FLOOD	6
2.001	3	OK	
3.000	4	FLOOD RISK	
3.001	5	OK	
1.001	6	OK	
1.002	7	OK	

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01686 668957 • info@krsenviro.com • www.krsenviro.com