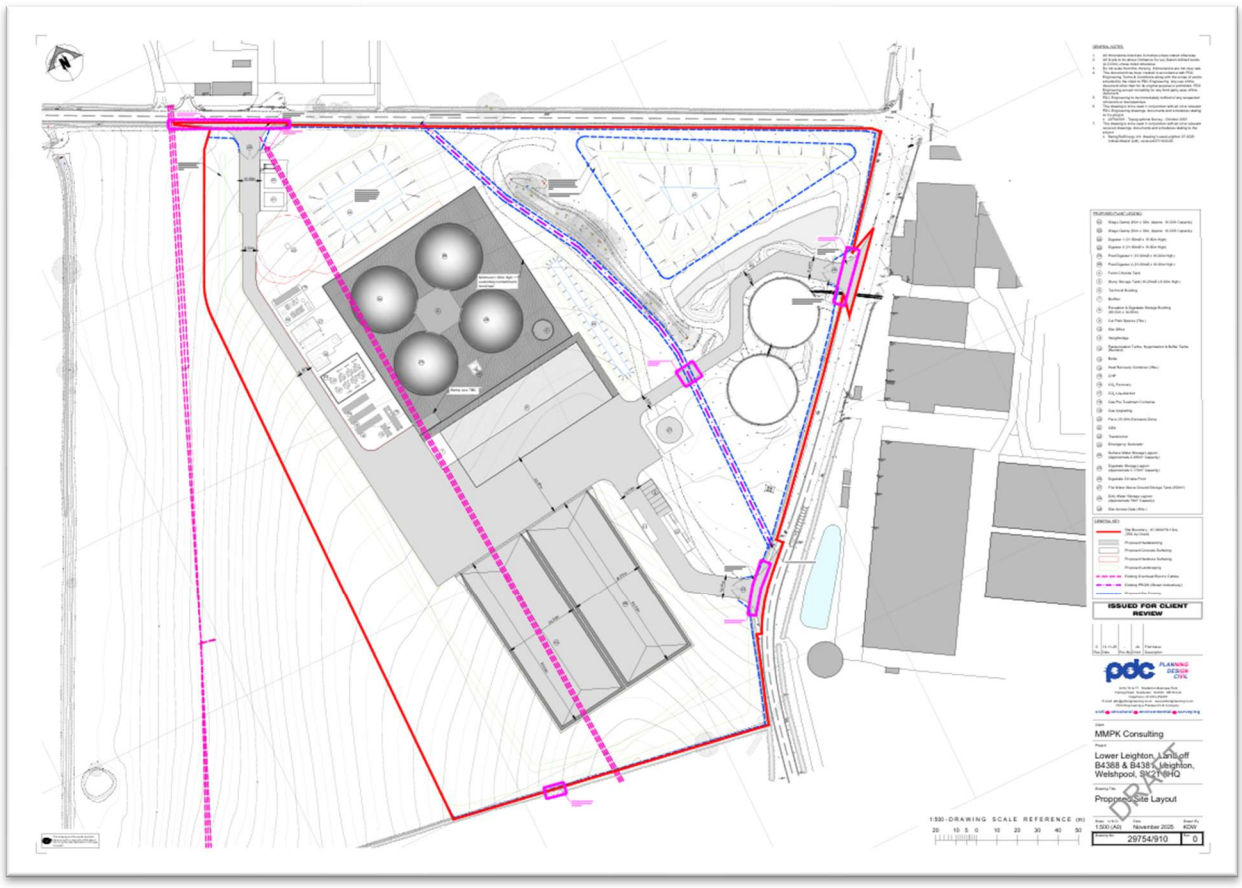

Flood Consequence Assessment and Drainage Strategy for Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH Rev. 2

Contract Ref: FD384

For Roger Parry & Partners

Contents

Quality Assurance Record

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Document Status and Revision History:

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1	30/11/2025	A. Osborne	C. Townsend	C. Townsend	1st Issue
2	03/12/2025	A. Osborne	C. Townsend	C. Townsend	2nd Issue

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1. INTRODUCTION

1.1 Purpose of this Report

Townsend Water Engineering Ltd. has been appointed by Roger Parry & Partners for a Flood Consequence Assessment (FCA) and Drainage Strategy for an AD unit at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH (Grid Ref: 324296 , 306607). This report has been prepared in support of the planning permission for the aforementioned development.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FCA is consistent with the 'Technical Advice Note 15: Flood Risk'.

1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings and respective topographic plan delivered by the client;
- NRW & EA Severn Preliminary Flood Risk Assessment December 2018;
- The NRW online flood maps;
- https://flood-map-for-planning.service.gov.uk/; and
- https://flood-warning-information.service.gov.uk/long-term-flood-risk/.

1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

- National policy contained within the Technical Advice Note 15 (TAN15) dated March 2025, issued by Welsh Assembly.

1.4 Structure of this Report

The Report has been prepared based on the following structure:

- Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and TAN15 vulnerability;
- Section 3 presents the assessment of existing flood risk at the site;
- Section 4 presents the proposed development and findings of flooding;
- Section 5 presents the drainage strategy; and
- Section 6 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

- Appendix A: Topographical Survey;
- Appendix B: Location Plan and
- Appendix C: Drainage Strategy & Calculations.

2. SPATIAL PLANNING CONSIDERATION

2.1 Location and Background

Figure 1: Site location (Source: Bing Ordanance Survey Map and Figure 2: Aerial View of the site (Source: Google Maps), with location details found in Table 1. The site is located at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH (Grid Ref: 324296, 306607). (Table 1: Site Details).

The planning application is for the erection of a new AD unit. The entire development site is approximately 4.7ha. The existing site is a mix of brownfield and greenfield - the site is currently a field within a farm.

There is a stream running through the site. It discharges into a culvert that runs along the northern boundary and then the culvert leaves the site and then discharge to a watercourse to the west. According to the anecdotal evidence the culvert is 2.3-5m below ground levels.

To the North of the site is the B4381 followed by fields. To the east of the site is Lower Leighton Farm. To the south-east is Leighton School and to the south is a field. To the west is fields and an ordinary

watercourse that is a tributary of the River Severn.

Figure 1 and Figure 2 for the location of the site.

Table 1: Site Details Grid reference details taken from the site https://www.streetmap.co.uk/

Reference	Value
OS X (Eastings)	324296
OS Y (Northings)	306607
Nearest Post Code	SY21 8HH
Nat. Grid	SJ 24293 06624

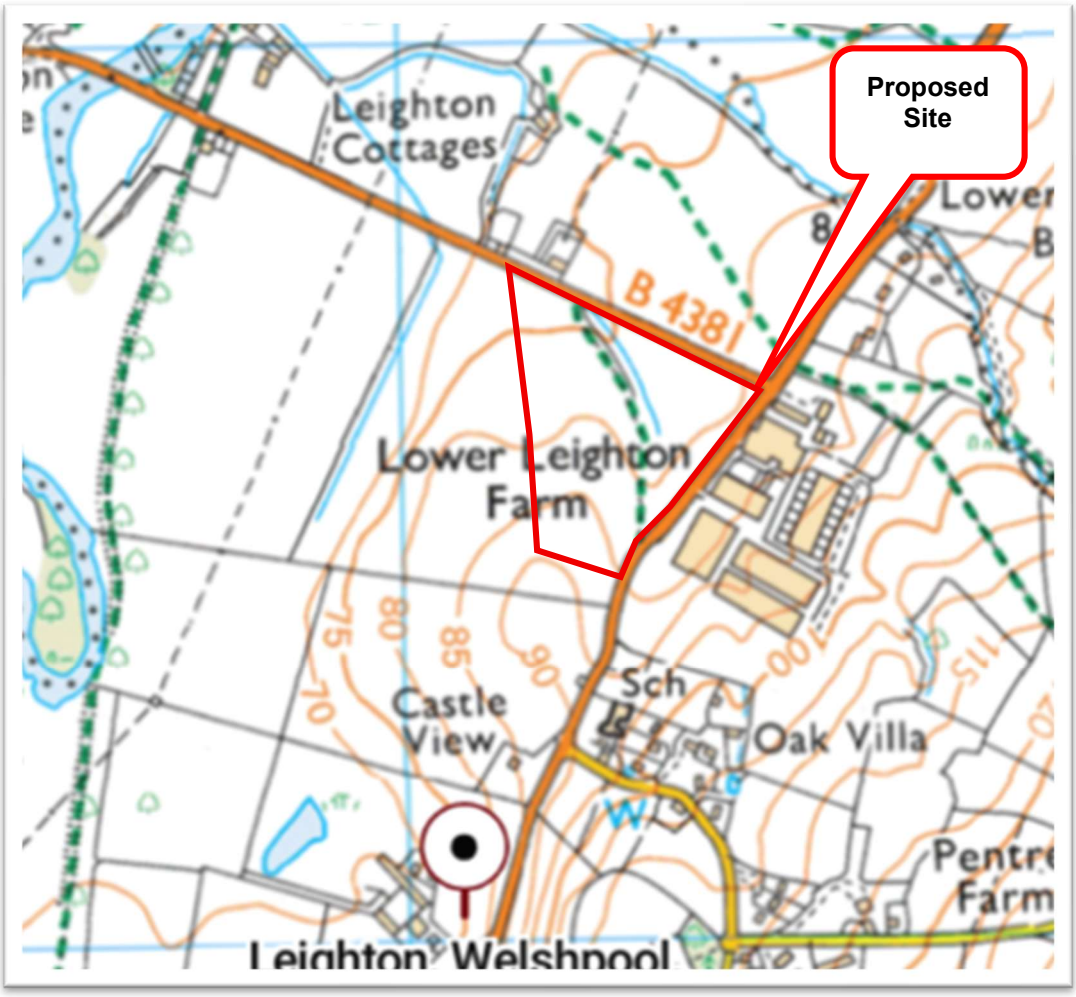


Figure 1: Site location (Source: Bing Ordanance Survey Map)

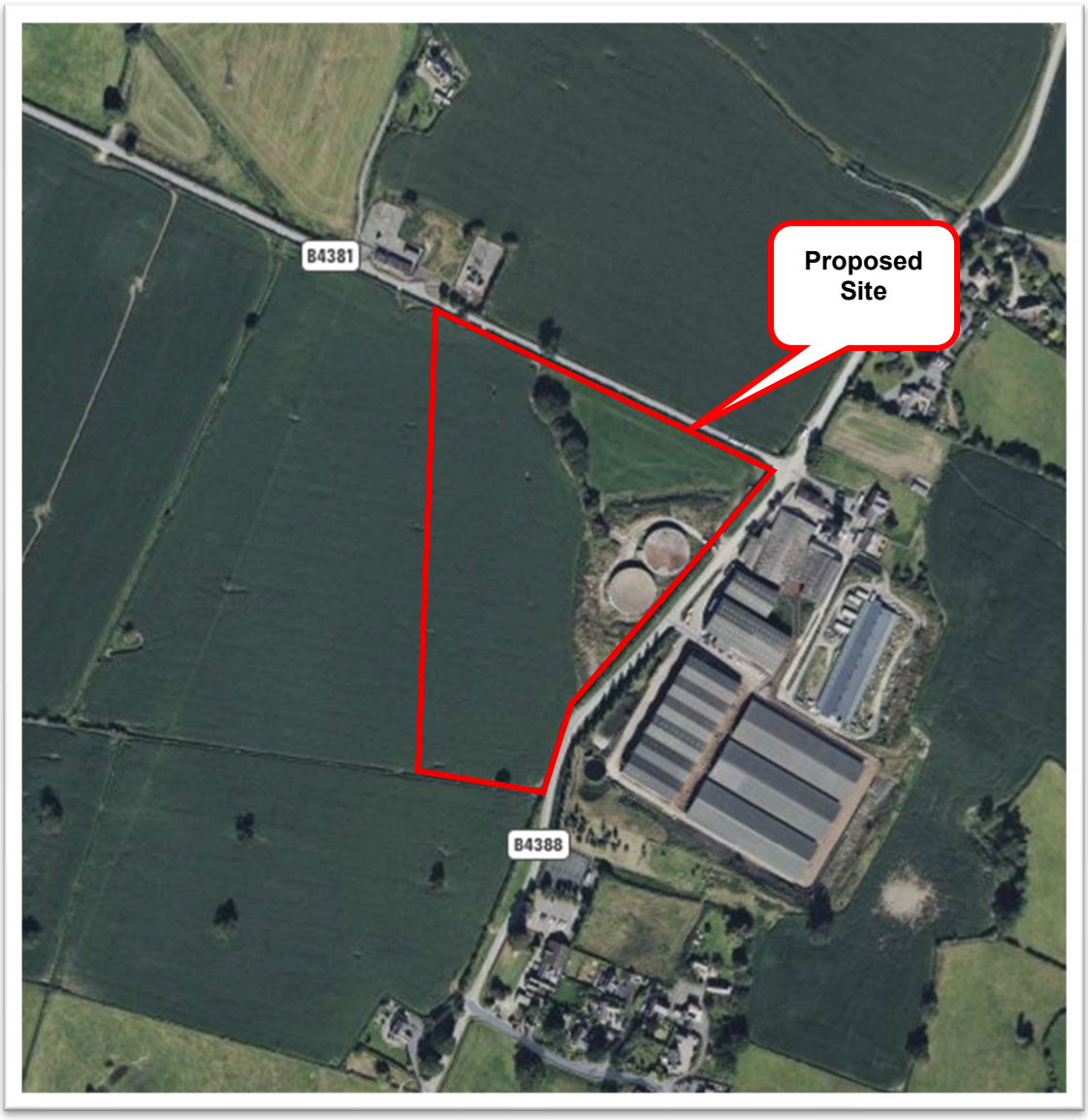


Figure 2: Aerial View of the site (Source: Google Maps)

2.2 Topography

According to OS Maps, there is a high point in the south-east of the site and levels fall from there. There is a watercourse running through the site. The lowest point is the north-west entrance to the site and the levels there are approximately 72.59mAOD. The highest point is at the south-eastern site entrance at approximately 91.41mAOD, please see the layout with the levels indicated on it. Please see Appendix A: Proposed Layout.

Figure 3: Contour Levels on OS Maps

2.3 Geology and Soil

The geology at the site has been obtained from the British Geological Survey (BGS) website. The bedrock beneath the site is described as 'Stone House Shale Formation - Mudstone'. (Figure 4: Bedrock underneath the Site (Source: BGS Bedrock Geology Mapping)). Superficial deposits are described as 'Glaciofluvial Fan Deposits, Devensian'.

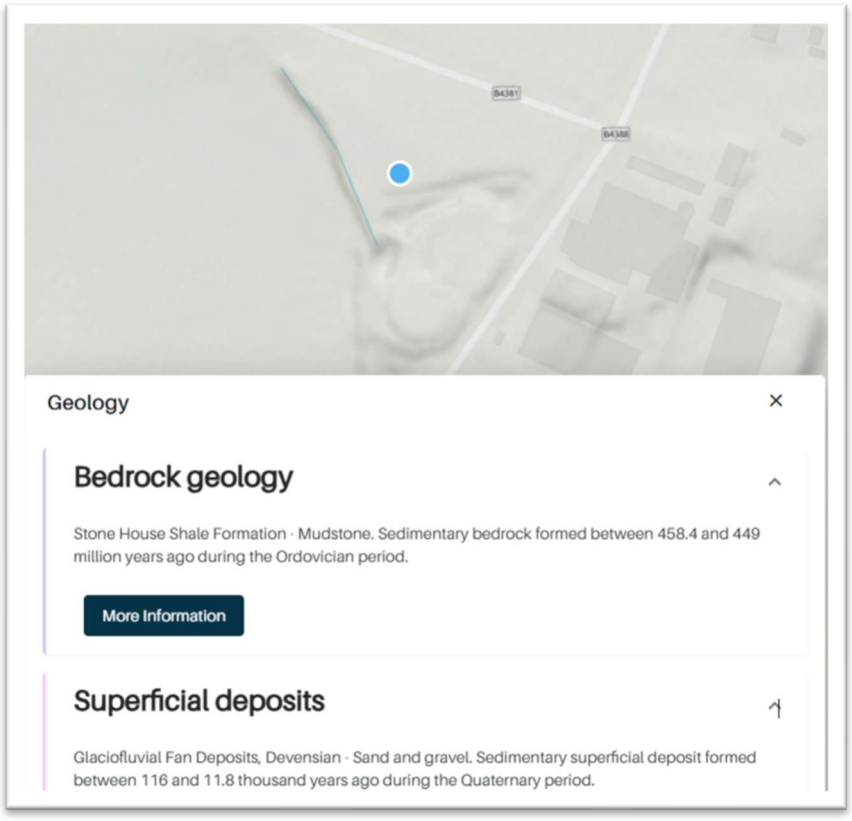


Figure 4: Bedrock underneath the Site (Source: BGS Bedrock Geology Mapping)

Soilscapes Viewer describes the soil conditions at the site as Soilscapes 18 - 'Slowly permeable seasonally wet acid loamy and clayey soils' with impeded drainage. Please see Figure 5 below.

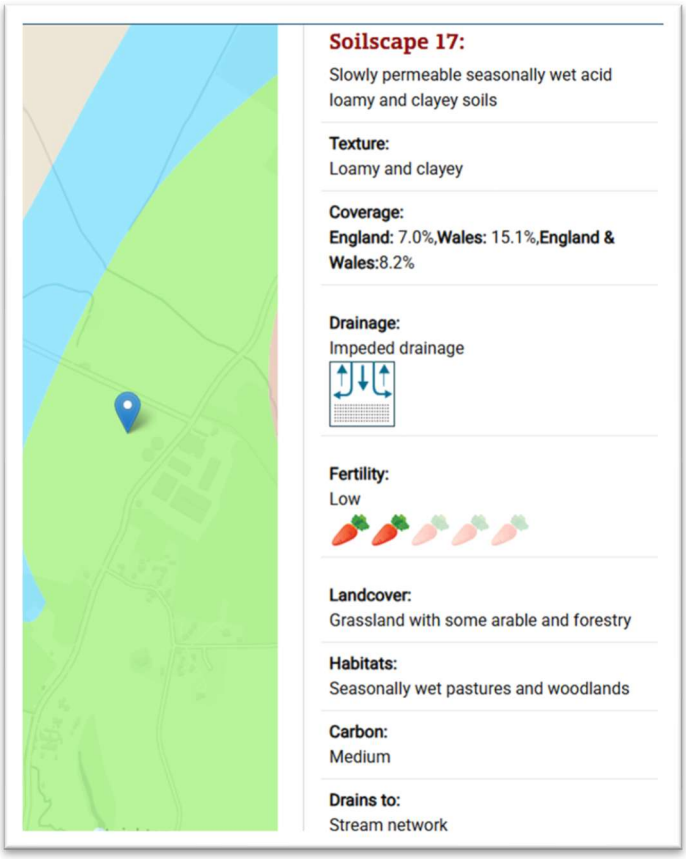


Figure 5: Soilscapes 10

Soilscapes data indicates that the site is unlikely to be suitable for infiltration, and the sites vicinity to the river and watercourses makes it likely that groundwater is too high within the site for infiltration to work successfully.

2.4 Flood Zone

2.4.1 Fluvial

The existing site is within Flood Zone 1 for rivers and seas, please see Figure 6. Flood Zone 1 is an area at low risk of fluvial flooding (Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year). This suggests the site is at low risk of fluvial flooding.

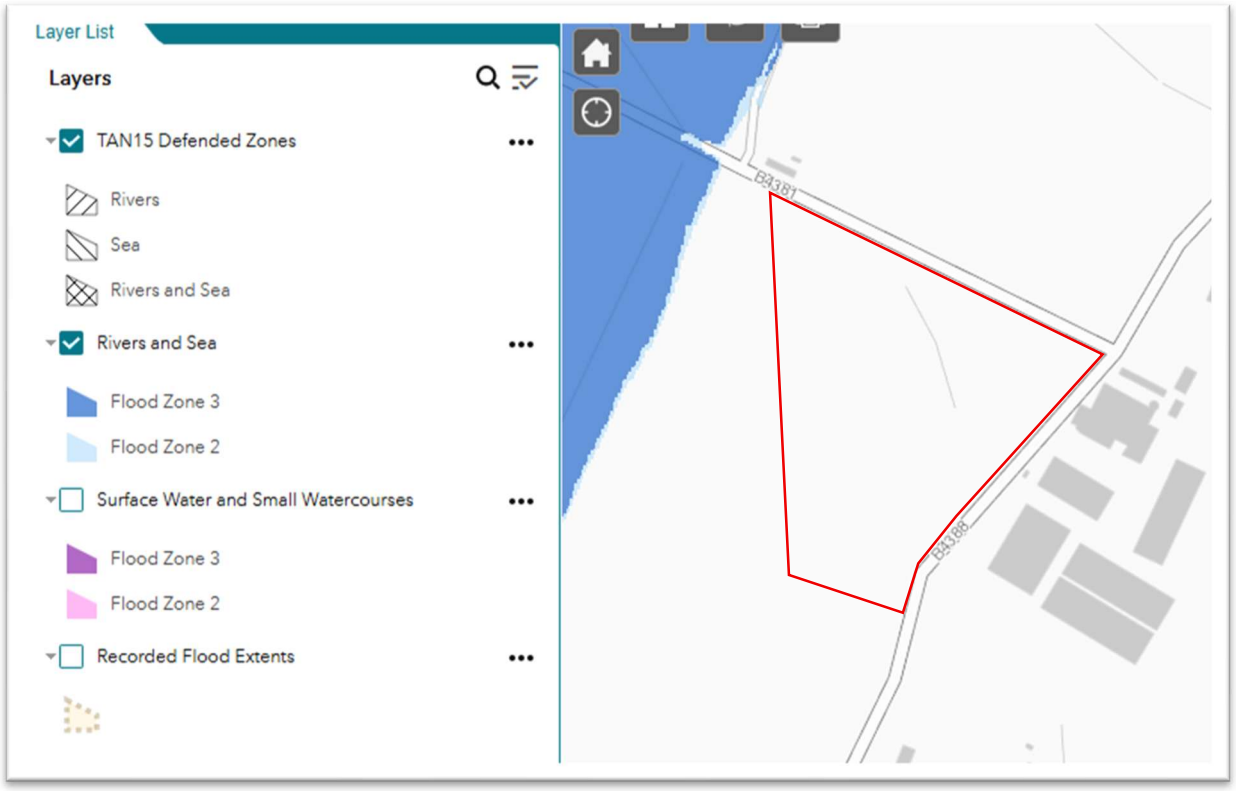


Figure 6: Flood Map for Planning (Source: Natural Resources Wales)

2.4.2 Surface Water

The majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water running through the site, following the path of the stream, that is within Flood Zone 2 (less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change) and Flood Zone 3 (a greater than 1 in 100 (1%) chance of flooding in a given year, including climate change).

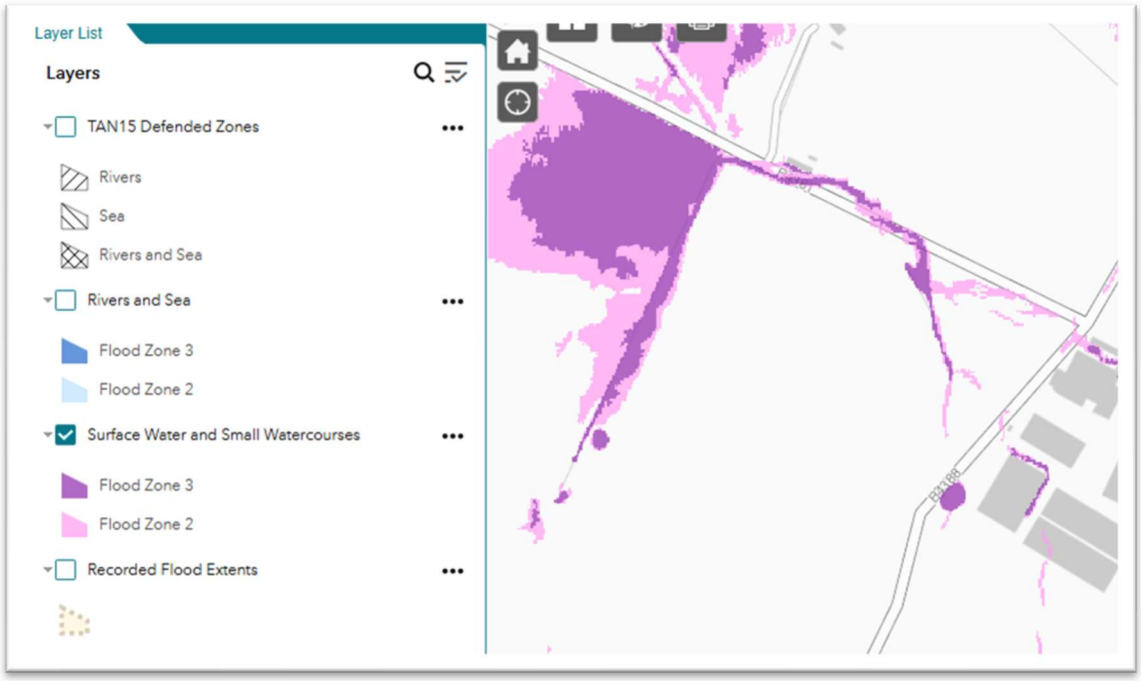


Figure 7: Flood Map for Planning: Surface Water Risk (NRW)

2.5 TAN15 Vulnerability

The development will be classed as ‘Less Vulnerable’ under the TAN15 vulnerability classification (Table 2).

Figure 4- Development vulnerability categories

Vulnerability category	Types
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites, caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries. Especially vulnerable industrial development (e.g. power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites. Emergency services, including: ambulance stations, fire stations, police stations, command centres, emergency depots. Buildings used to provide emergency shelter in time of flood.
Less vulnerable development	General industrial, employment, commercial and retail development. Transport and utilities infrastructure. Car parks. Mineral extraction sites and associated processing facilities (excluding waste disposal sites). Public buildings including libraries, community centres and leisure centres (excluding those identified as in Highly Vulnerable category and emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities (excluding hydro generation).
Water compatible development	Boatyards, marinas and essential works required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

As the site is ‘Less Vulnerable’ and in Fluvial Flood Zone 1 and mostly within a Surface Water Flood Zone 1, the development is acceptable as long as there is no development placed in the Surface Water Flood Zone 2 and 3 areas, and development is appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events.

2.6 Climate Change Allowances for Peak River Flow

Table 3 indicates the anticipated increase in peak river flows for the 3 river basin districts that cover Wales. The allowances present the current national representation of how climate change could impact peak flow. This data will be updated once revised data is made available through UKCP18.

The allowances are based on percentage increases of change from a 1961-1990 baseline and are provided for the:

- 10th percentile (lower end estimate)
- 50th percentile (change factor/central estimate)
- 90th percentile (upper end estimate)

The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels. If a figure other than the central estimate is used, applicants will be expected to provide full justification within the FCA.

The climate change used in this area is 25% for the river Severn central estimate total potential change anticipated by the 2080's.

Table 1: peak river flow allowances by river basin district (using 1961 to 1990 baseline[1])

	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Severn			
Upper end estimate	25%	40%	70%
Change factor /central estimate	10%	20%	25%
Lower end estimate	0%	5%	5%
West Wales			
Upper end estimate	25%	40%	75%
Change factor /central estimate	15%	25%	30%
Lower end estimate	5%	10%	15%
Dee			
Upper end estimate	20%	30%	45%
Change factor /central estimate	10%	15%	20%
Lower end estimate	5%	5%	5%

Table 3: Flood Consequence Assessment of Table 1: Peak River Flow allowances by River Basin District (using 1961 to 1990 Baseline)

2.7 Climate Change Allowances for Rainfall Intensity

Table 4 shows the anticipated changes in peak rainfall intensity for use in small catchments. Both the central and upper estimates should be assessed to understand the range of impact. As a minimum, development proposals should be assessed against the central estimate to inform design levels. Where the assessment indicates a significant flood risk for the upper estimate (e.g. depths, velocity), the flood consequences assessment will need to indicate the mitigation measures required to protect people and property.

Rainfall allowances should also be applied when considering surface water flooding and drainage assessments. Drainage systems should be designed to ensure there is no increase in site run-off when assessed against the upper estimate.

The climate change used in this area is 40% for the upper estimate total potential change anticipated for 2080s (2070-2115).

Table 4: Climate Change Allowance for Rainfall Intensity (compared to a 1961-90 baseline) :

Applies across all of Wales	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

3. FLOOD HAZARD FOR EXISTING SITE

3.1 Source of Flood Risk

Flood sources and their possibilities described below.

3.1.1 Flood Risk from Fluvial Sources

The proposed development is situated within Fluvial Flood Zone 1, an area at low risk of fluvial flooding.

3.1.1.1 River Severn Fluvial Flooding

3.1.1.2 Historic Flooding

With regard to historic flooding, there is one recorded instance of flooding in February 2002, to the west of the site. However, this event did not flood the proposed site. Please see Figure 8.

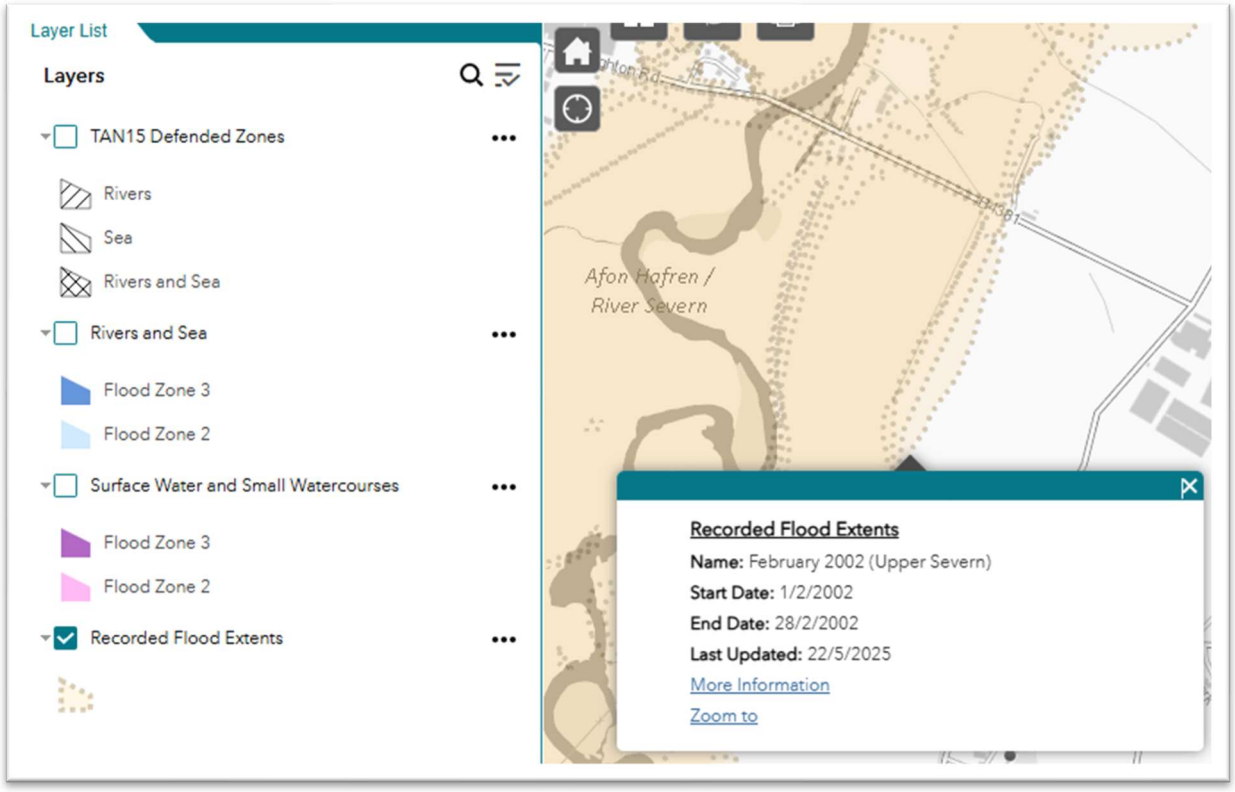


Figure 8: Recorded Flood Extents (Flood Map for Planning)

3.1.1.3 Access and Egress Outside of the Redline Boundary

In the event of any flooding the site would be dry, if the site needed to be evacuated, people could escape to the east of the site.

3.1.2 Surface Water

The NRW surface flood extents have been obtained from the NRW open dataset. The majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water running through the site, following the path of the stream, that is within Flood Zone 2 (less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change) and Flood Zone 3 (a greater than 1 in 100 (1%) chance of flooding in a given year, including climate change). Please see

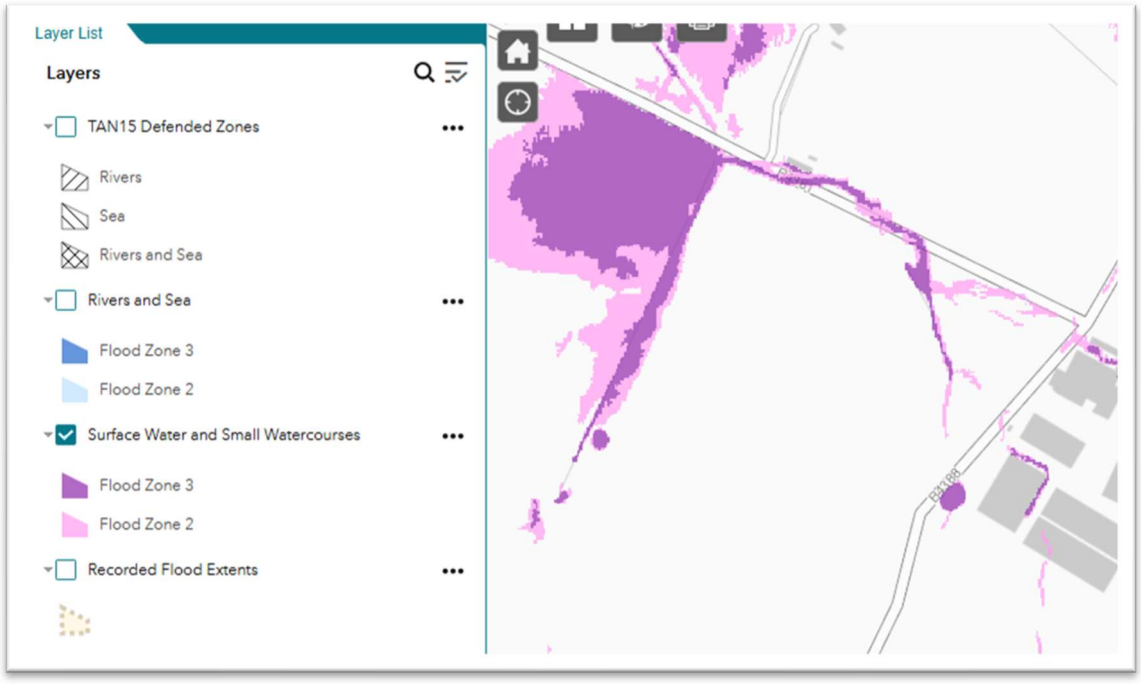


Figure 7.

No buildings will be placed in the Surface Water Flood Zone 2 and 3 areas, the only development will be the pond in the north-west of the site. However, this is a pond and can get wet as it is a water body.

Development will be appropriately set back from the surface water Flood Zone 2 and 3 areas, to allow for extreme flood events.

Therefore, flood risk from surface water is believed to be low at the site.

3.1.3 Flood Risk from Reservoir /Canals / Other Artificial Sources

There is no flood risk from reservoirs to the site, please see Figure 9.

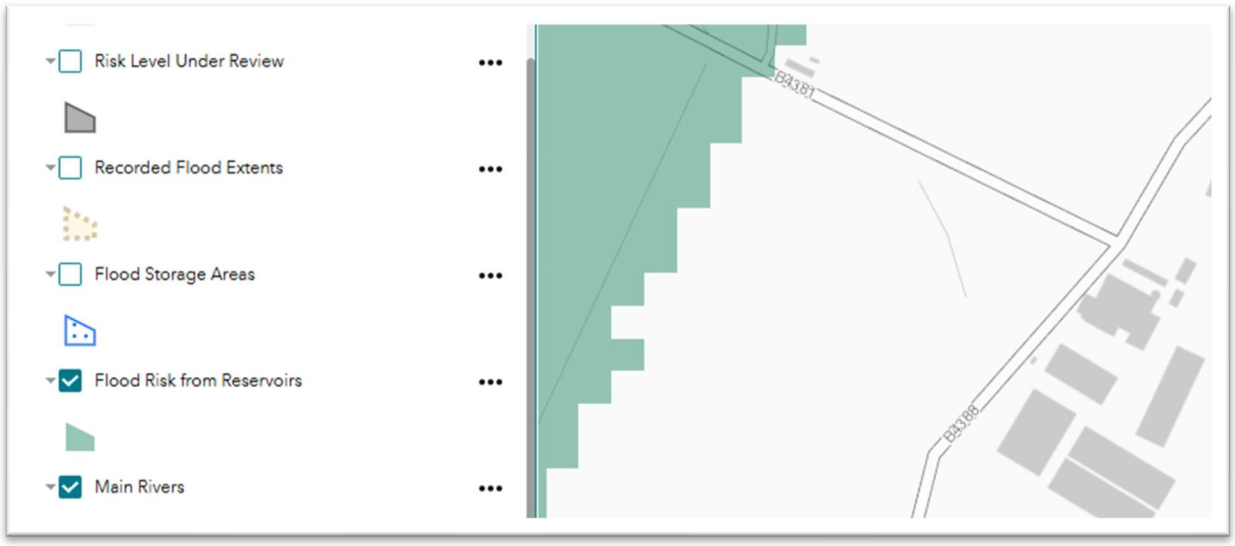
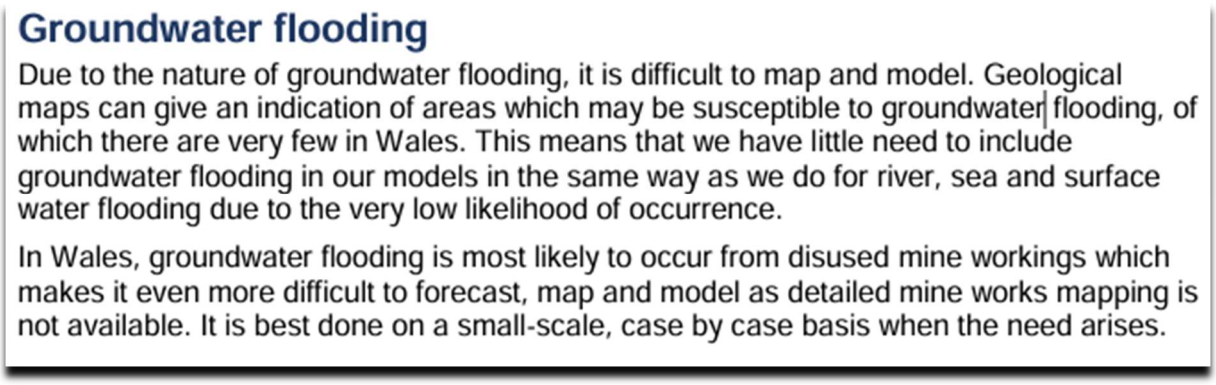


Figure 9: Reservoir Flood Risk Map (Source: NRW)

There is no flood risk from canals or other artificial sources, as there are no canals or artificial sources within the vicinity of the site.

3.1.4 Flood Risk from Groundwater

According to the NRW & EA Severn Preliminary Flood Risk Assessment December 2018, there is a very low likelihood of groundwater flooding in Wales. Please see Figure 10.



Groundwater flooding

Due to the nature of groundwater flooding, it is difficult to map and model. Geological maps can give an indication of areas which may be susceptible to groundwater flooding, of which there are very few in Wales. This means that we have little need to include groundwater flooding in our models in the same way as we do for river, sea and surface water flooding due to the very low likelihood of occurrence.

In Wales, groundwater flooding is most likely to occur from disused mine workings which makes it even more difficult to forecast, map and model as detailed mine works mapping is not available. It is best done on a small-scale, case by case basis when the need arises.

Figure 10: NRW & EA Severn Preliminary Flood Risk Assessment December 2018

Furthermore, BGS maps describes Groundwater Vulnerability Wales: Bedrock Geology & Superficial Deposits as ‘ Low vulnerability, Secondary aquifer’. Please see Figure 11.

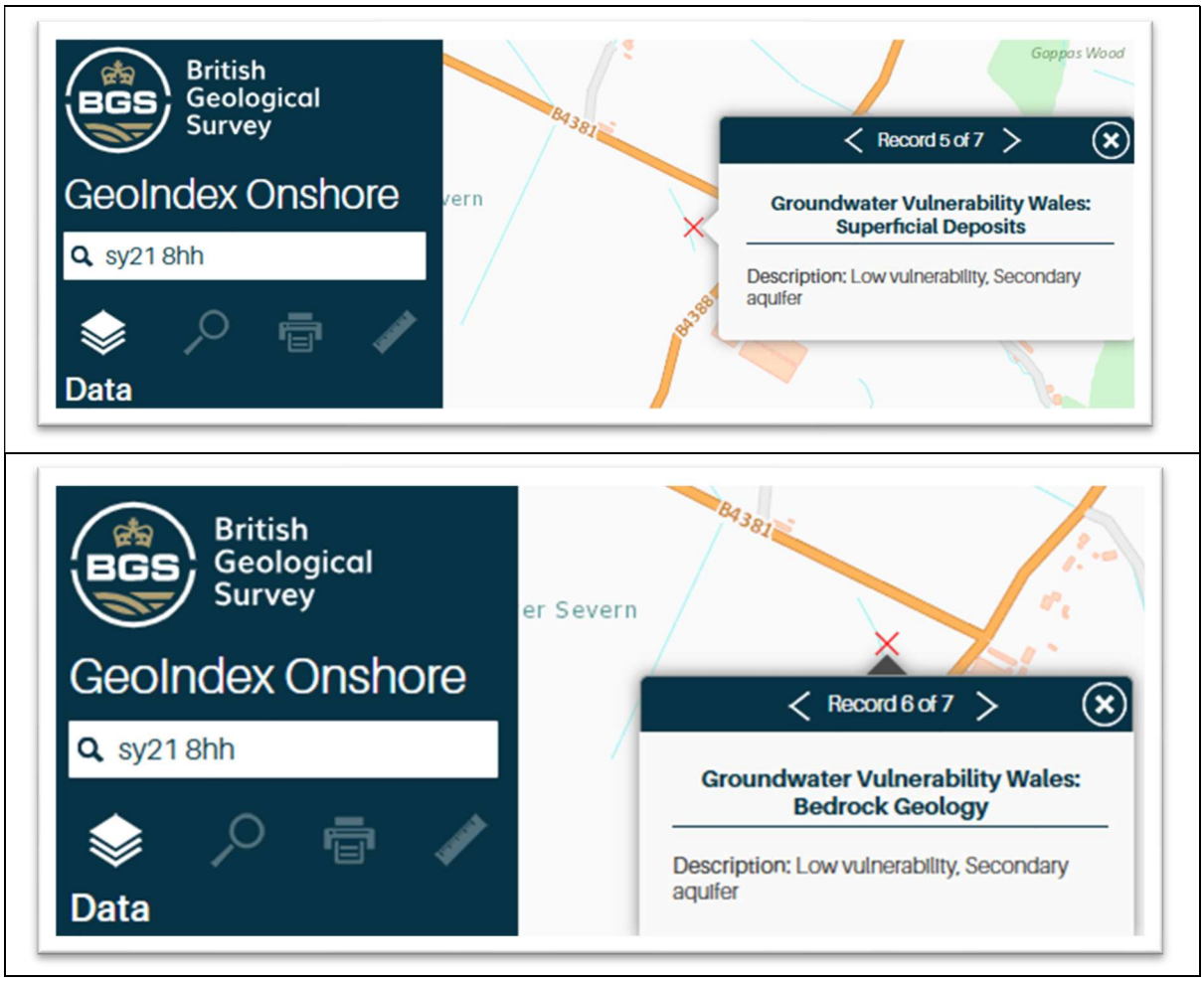


Figure 11:BGS Maps Groundwater Vulnerability Wales: Bedrock Geology & Superficial Deposits

3.1.5 Flood Risk from Sewers

There is no public sewer within the vicinity of the site, therefore, there is minimal risk of flooding from sewers in this area.

4. ASSESSMENT OF FLOOD RISK FOR PROPOSED DEVELOPMENT

4.1 Development Proposals

The planning application is for the erection of an AD unit at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH. The area of the site is 4.7ha.The site is a field on a farm. Please see the proposed site layout in Figure 12.

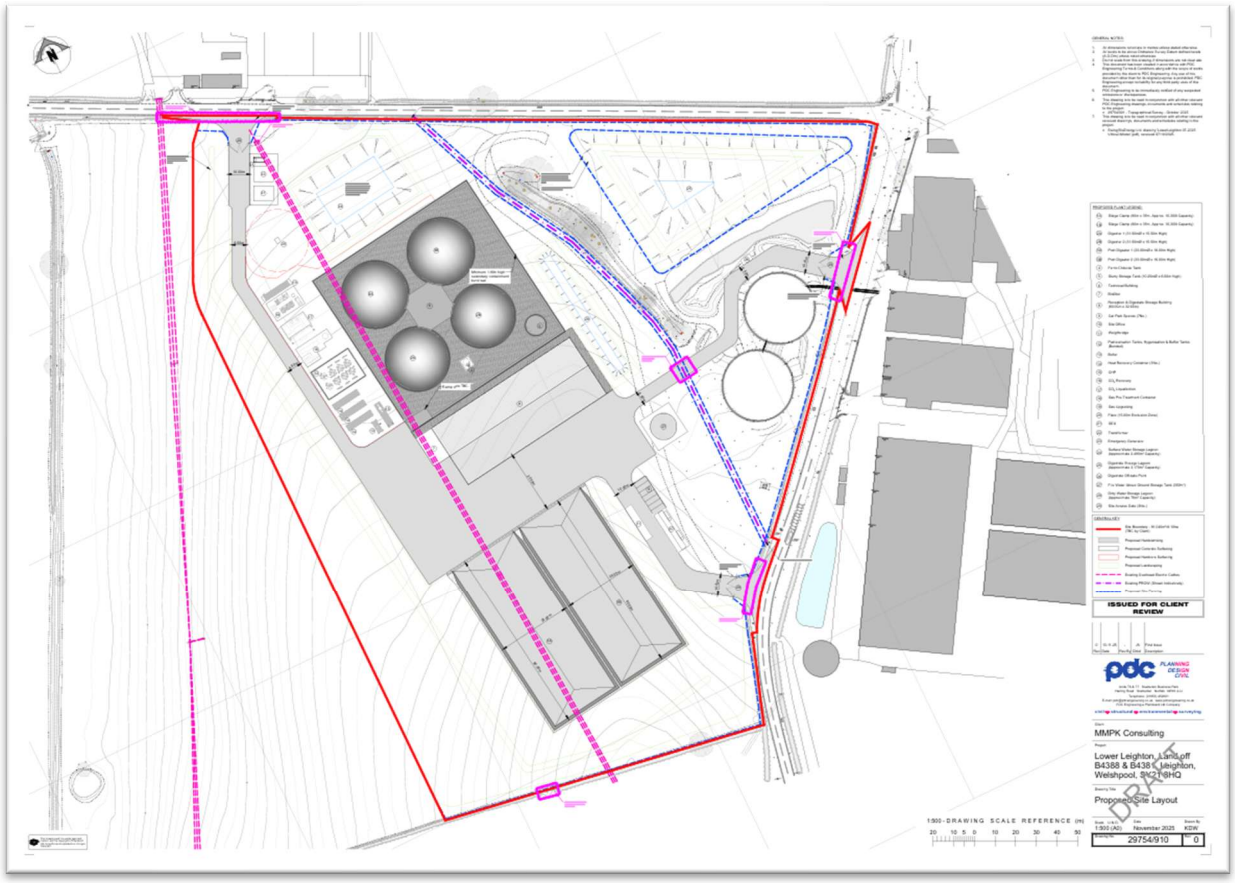


Figure 12: Proposed Site Layout

4.2 Fluvial Flood Management

The site is in a Fluvial Flood Zone 1 (low risk) and is not at risk from the River Severn. Therefore, no mitigation is required.

4.3 Surface water Flooding

According to the Surface Water Flood maps, the majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water flooding running through the site, following the path of the stream, that is within Flood Zone 2 and Flood Zone 3.

No development will be placed in the Surface Water Flood Zone 2 and 3 areas, and development will be appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events.

Therefore, flood risk from surface water is believed to be low at the site.

4.4 Groundwater Flooding

As previously stated, groundwater flooding in Wales is thought to be very unlikely according the NRW & EA Severn Preliminary Flood Risk Assessment December 2018. Therefore, the site is thought to be at low risk of groundwater flooding.

4.5 Infrastructure Flooding

There is no existing infrastructure on the site, therefore, the risk of flooding from infrastructure to the site is believed to be low.

5. DRAINAGE STRATEGY

Please find below the drainage strategy.

5.1 Existing Drainage Arrangements

5.1.1 Surface Water

The existing drainage arrangements is that all the surface water from the existing site drains to the ground as it is a field.

5.2 Infiltration Rates

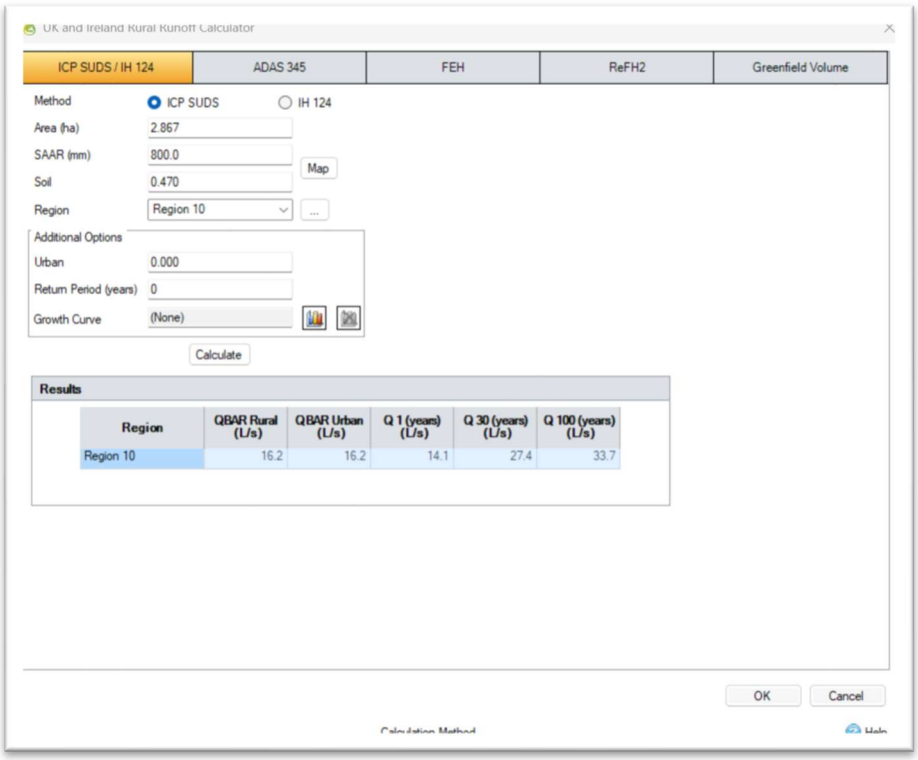
Soilscapes data indicates that the site is unlikely to be suitable for infiltration, and the sites vicinity to the river and watercourses makes it likely that groundwater is too high within the site for infiltration to work successfully.

5.3 Run-off

The discharge has been set at a greenfield runoff rate set up to a Q-bar of 16l/s. The discharge has been split between two outfalls. The north part of the site will drain at 5l/s. The southern section of the site will drain at 10l/s. This is less than the Qbar greenfield rates.

Please see the calculations below:

Table 5: Greenfield Rates



5.4 Surface Water Drainage Strategy

5.4.1 Hierarchy of Discharge

In accordance with the Flood Risk and Coastal Change Planning Practice Guidance, where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:

1. Into the ground (infiltration);

2. To a watercourse;

3. To a surface water sewer, highway drain, or another drainage system; and

4. To a combined sewer.

Infiltration: Infiltration has been discounted due to the soil conditions.

Watercourse: There is a stream/watercourse within the site. Both attenuation basins are discharging to the watercourse. The northern basin will discharge at 5l/s into the culvert running on the northern boundary. The southern basin will drain at 10l/s into the watercourse running through the site.

Conclusion: Infiltration is not feasible at this site and there is a watercourse within the site, therefore, it is proposed to discharge the sites surface water to the watercourse.

All lower options on the hierarchy will be discounted.

5.4.2 Sizing of SUDS Features

As discussed in section 4.1 of this report, the proposed area of the buildings and associated features is approximately 2.867ha. Infiltration SUDS systems have been discounted due to the soil conditions.

The discharge will be restricted to a greenfield runoff rates of 15l/s in all events via a Hydro-brake up the 1 in 100 year event plus climate change (40%). The storage will be held in 2 lined attenuation basins, up to and including the 1 in 100 year event plus 40% climate change. The attenuation basin to the south will discharge at 10l/s and the northern one will discharge at 5l/s.

Modelling of the surface water runoff to the design parameters was carried out using Infodrainage Flow, an industry leading software which allows design and analysis of SuDS features. The Infodrainage Flow modelling results are in Appendix C. The following conservative assumptions and design parameters have been set within the Hydraulic model:

- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology, and increased by 40%, over the 100 years design life of the proposed commercial development, in line with the requirements of the TAN15;
- The proposed impermeable area is 2.867ha, the coefficient has been set at 100%;
- No runoff losses have been assumed in the modelling, therefore, all the design rainfall landing on the impermeable surfaces is expected to reach the attenuation basins up to and including the 1 in 100 year event plus 40% climate change;
- As per the conclusions in Section 3.3, the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- A Hydro-Brake has been used to restrict the total discharge from the site to 15l/s. The northern basin will discharge at 5l/s and the southern basin will discharge at 10l/s.

Please find below a summary of the basins (please note in InfoDrainage ponds and basins are the same thing).

Table 6: Summary of the Results

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond	FSR: 100 years: +40 %: 2160 mins: Winter	79.519	79.519	1.239	1.239	35.1	0.000	10.0	1761.894	1022	22	OK
Pond (1)	FSR: 100 years: +40 %: 1440 mins: Winter	72.587	72.587	1.157	1.157	42.3	0.000	5.3	771.969	1982	88	OK

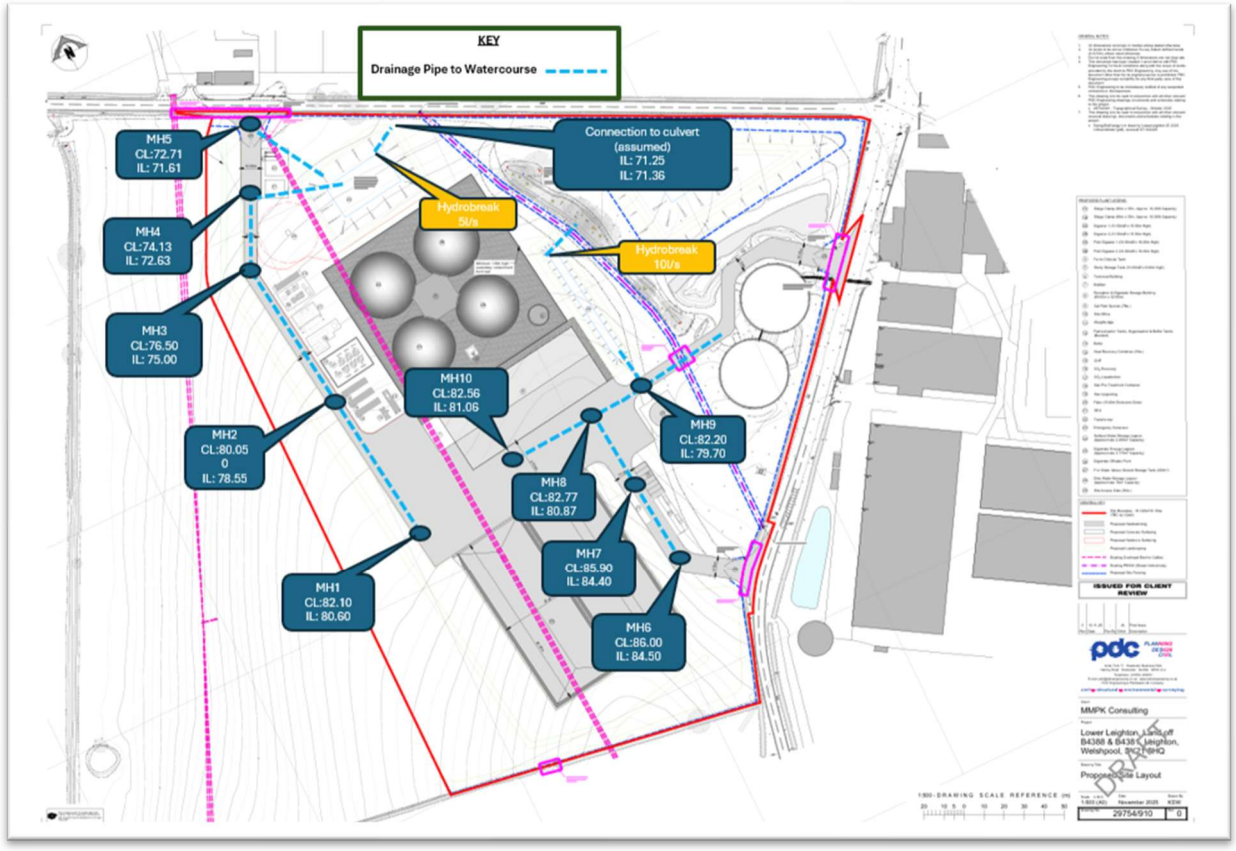


Figure 13: Drainage Strategy Design

Please see Appendix C for the full drainage strategy and calculations.

5.4.3 Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g., after heavy rainfall, should be established by the site owners to reduce the risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed the owner will maintain the basins:

Table 7: Operation and Maintenance Requirements for Attenuation Basins

TABLE 22.1 Operation and maintenance requirements for detention basins

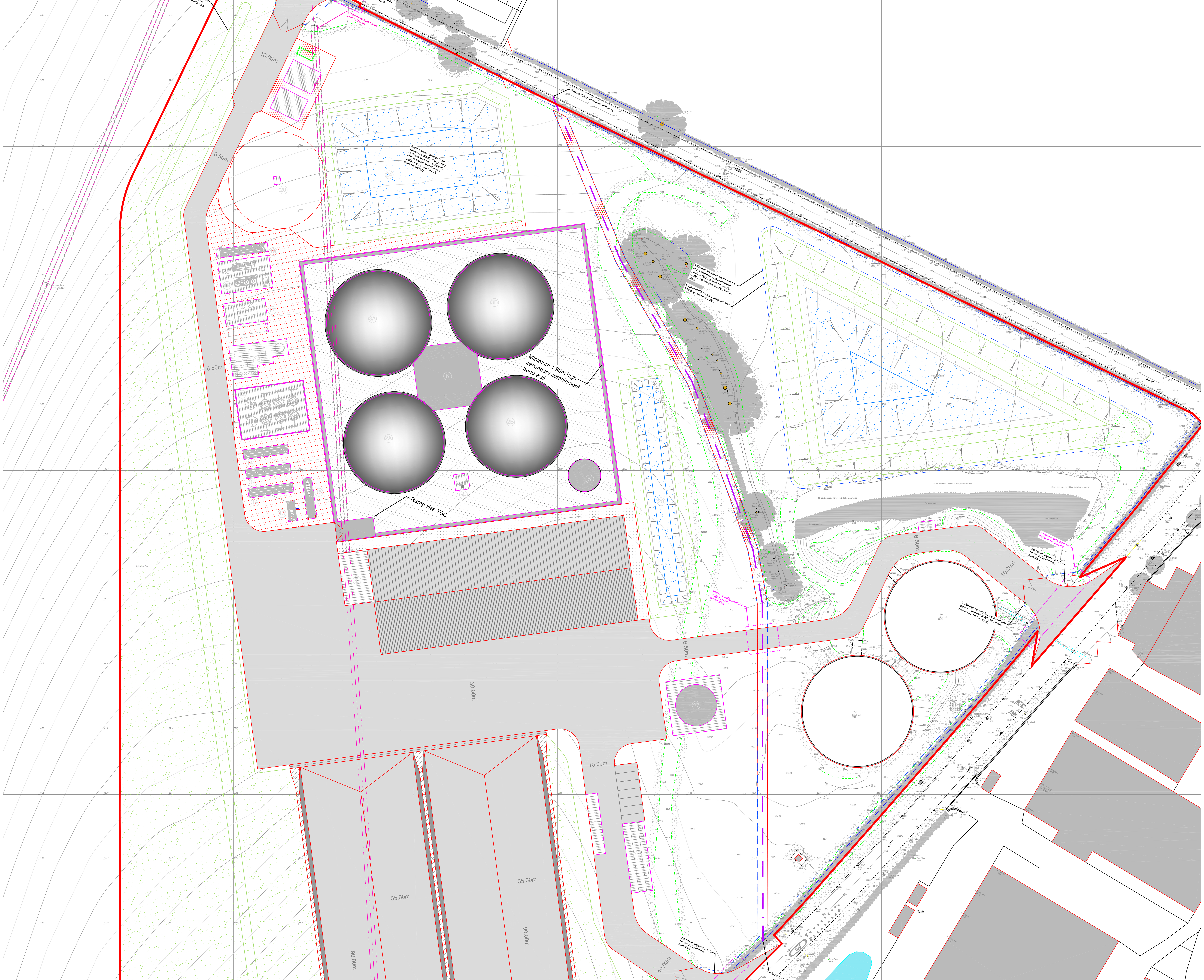
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

6. SUMMARY & CONCLUSIONS

A summary of the main conclusions for the FCA and Drainage Strategy is presented below:

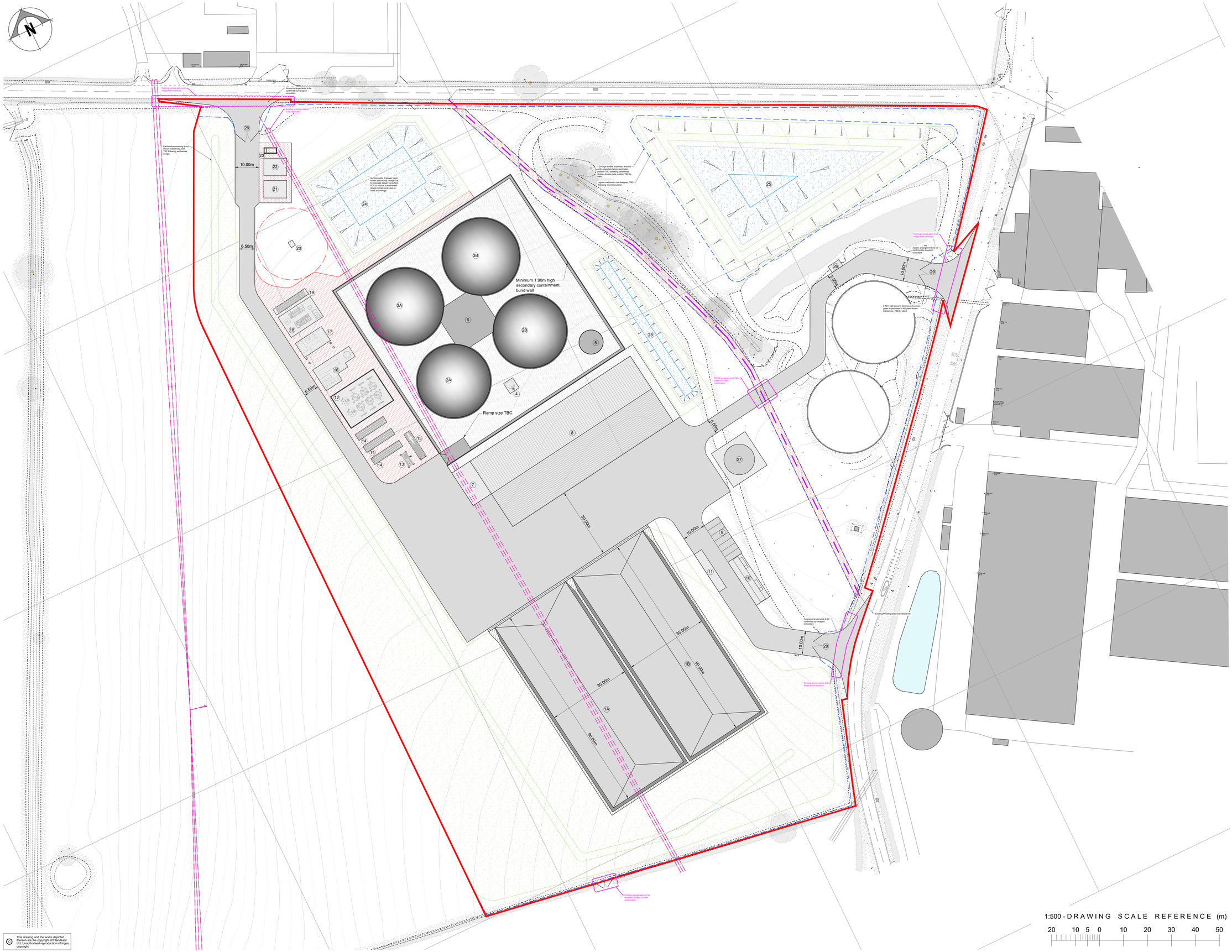
- Development proposals are for a proposed AD unit development at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH;
- The development site is approximately 4.7ha. The site is a greenfield/brownfield mix;
- The site is within Fluvial Flood Zone 1, an area at low risk of fluvial flooding;
- the majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water flooding running through the site, following the path of the stream, that is within Flood Zone 2 and Flood Zone 3;
- No development will be placed in the Surface Water Flood Zone 2 and 3 areas, and development will be appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events. Therefore, flood risk from surface water is believed to be low at the site;
- It is believed that the site is at low risk of groundwater, sewer and infrastructure flooding;
- Infiltration is not feasible at this site due to clay soils that drain to the stream network. There is a watercourse within the site, therefore, it is proposed to discharge the sites surface water to the watercourse;
- The storage will be held in 2 lined attenuation basins, up to and including the 1 in 100 year event plus 40% climate change. The pond will be lined to avoid ingress from groundwater; and
- The total discharge from the site will be 15l/s. The discharge has been split for the northern section the attenuation basin will discharge at 5l/s and the southern section will discharge at 10l/s.

Appendix A: Topographical Survey



10.00m
6.50m
6.50m
Minimum 1.90m high secondary containment bund wall
Ramp size TBC.
30.00m
6.50m
10.00m
6.50m
10.00m
10.00m
35.00m
35.00m
90.00m
90.00m
10.00m
Tanks

Appendix B: Location Plan



GENERAL NOTES:

1. All dimensions noted are in metres unless stated otherwise.
2. All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
3. Do not scale from this drawing, if dimensions are not clear ask.
4. This document has been created in accordance with PDC Engineering Terms & Conditions along with the scope of works provided by the client to PDC Engineering. Any use of this document other than for its original purpose is prohibited, PDC Engineering accept no liability for any third party uses of this document.
5. PDC Engineering to be immediately notified of any suspected omissions or discrepancies.
6. This drawing is to be read in conjunction with all other relevant PDC Engineering drawings, documents and schedules relating to the project.
   - 29754/001 - Topographical Survey - October 2025
7. This drawing is to be read in conjunction with all other relevant received drawings, documents and schedules relating to the project.
   - Swing BioEnergy Ltd. drawing 'LowerLeighton 07-2025 V4bis2-Model' (pdf), received 07/10/2025.

PROPOSED PLANT LEGEND:

1A	Silage Clamp (90m x 35m, Approx. 10,300t Capacity)
1B	Silage Clamp (90m x 35m, Approx. 10,300t Capacity)
2A	Digester 1 (31.50mØ x 15.50m High)
2B	Digester 2 (31.50mØ x 15.50m High)
3A	Post Digester 1 (33.00mØ x 16.00m High)
3B	Post Digester 2 (33.00mØ x 16.00m High)
4	Ferric Chloride Tank
5	Slurry Storage Tank (10.25mØ x 6.00m High)
6	Technical Building
7	Biofilter
8	Reception & Digestate Storage Building (80.00m x 32.65m)
9	Car Park Spaces (7No.)
10	Site Office
11	Weighbridge
12	Pasteurisation Tanks, Hygenisation & Buffer Tanks (Bunded)
13	Boiler
14	Heat Recovery Container (3No.)
15	CHP
16	CO_2 Recovery
17	CO_2 Liquefaction
18	Gas Pre-Treatment Container
19	Gas Upgrading
20	Flare (15.00m Exclusion Zone)
21	GEU
22	Transformer
23	Emergency Generator
24	Surface Water Storage Lagoon (Approximate 2,495m³ Capacity)
25	Digestate Storage Lagoon (Approximate 3,170m³ Capacity)
26	Digestate Off-take Point
27	Fire Water Above Ground Storage Tank (350m³)
28	Dirty Water Storage Lagoon (Approximate 78m³ Capacity)
29	Site Access Gate (3No.)

GENERAL KEY:

- Site Boundary - 81,040m²/8.10ha (TBC by Client)
- Proposed Hardstanding
- Proposed Concrete Surfacing
- Proposed Hardcore Surfacing
- Proposed Landscaping
- Existing Overhead Electric Cables
- Existing PROW (Shown Indicatively)
- Proposed Site Fencing

ISSUED FOR CLIENT REVIEW

Rev	Date	Rev By	Chkd	Description
0	13-11-25	-	JA	First Issue

pdc PLANNING DESIGN CIVIL

Units T6 & T7 Snetterton Business Park
Harling Road Snetterton Norfolk NR16 2JU
Telephone: (01953) 452001
E-mail: pdc@pdcengineering.co.uk www.pdcengineering.co.uk
PDC Engineering a Plandescil Ltd Company

civil • structural • environmental • surveying

Client

MMPK Consulting

Project

Lower Leighton, Land off B4388 & B4381, Leighton, Welshpool, SY21 8HQ

Drawing Title

Proposed Site Layout

DRAFT

1:500 - DRAWING SCALE REFERENCE (m)

20 10 5 0 10 20 30 40 50

Scale U.N.O.	Date	Drawn By
1:500 (A0)	November 2025	KDW

Drawing No.	Rev
29754/910	0

Appendix C: Drainage Strategy and Calculation

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		

Catchment Area Type : Catchment Area

Area (ha)	0.761

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 (1) Type : Catchment Area

Area (ha)	0.315

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 (2) Type : Catchment Area

Area (ha)	0.115

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 (3) Type : Catchment Area

Area (ha)	0.384

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 (4) Type : Catchment Area

Area (ha)	0.269

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 (5) Type : Catchment Area

Area (ha)	0.034

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 (6) Type : Catchment Area

Area (ha)	0.735

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 (7) 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 (%)	100

Catchment Area (8) 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 (%)	100

Catchment Area (9) Type : Catchment Area

Area (ha)	0.067

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 (10) Type : Catchment Area

Area (ha)	0.035

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 (11) Type : Catchment Area

Area (ha)	0.04

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (12)

Type : Catchment Area

Area (ha)	0.052

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

Pond

Type : Pond

Dimensions

Exceedance Level (m)	79.780
Depth (m)	1.500
Base Level (m)	78.280
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	1296.754

Depth (m)	Area (m²)	Volume (m³)
0.000	675.00	0.000
1.000	900.00	784.808
1.500	1153.00	1296.754

Inlets

Inlet

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

Inlet (3)

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

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

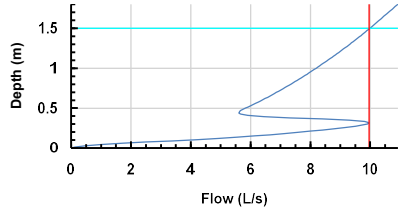
Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®

Invert Level (m)	78.280
Design Depth (m)	1.500
Design Flow (L/s)	10.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0131-1000-1500-1000



Advanced

Perimeter	Circular
Length (m)	79.386
Friction Scheme	Manning's n
n	0.025

Pond (1) Type : Pond

Dimensions

Exceedance Level (m)	76.430
Depth (m)	5.000
Base Level (m)	71.430
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.609
Total Volume (m³)	9051.300

Depth (m)	Area (m²)	Volume (m³)
0.000	550.00	0.000
1.000	1300.00	898.526
3.000	2300.00	4451.300

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Inlets

Inlet (1)

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

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	No Delay (4)
Bypass Destination	(None)
Capacity Type	No Restriction

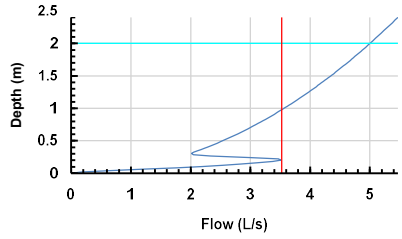
Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	No Delay (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (2)
Outlet Type	Hydro-Brake®
Invert Level (m)	71.430
Design Depth (m)	2.000
Design Flow (L/s)	5.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0086-5000-2000-5000



Advanced

Perimeter	Circular
Length (m)	73.125
Friction Scheme	Manning's n
n	0.025

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Summer	0.76	573.2	248.607
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Summer	0.31	236.9	102.746
Catchment Area (2)	FSR: 100 years: +40 %: 15 mins: Summer	0.12	86.9	37.675
Catchment Area (3)	FSR: 100 years: +40 %: 15 mins: Summer	0.38	289.2	125.445
Catchment Area (4)	FSR: 100 years: +40 %: 15 mins: Summer	0.27	202.8	87.950
Catchment Area (5)	FSR: 100 years: +40 %: 15 mins: Summer	0.03	25.5	11.067
Catchment Area (6)	FSR: 100 years: +40 %: 15 mins: Summer	0.74	553.5	240.066
Catchment Area (7)	FSR: 100 years: +40 %: 15 mins: Summer	0.08	62.0	26.896
Catchment Area (8)	FSR: 100 years: +40 %: 15 mins: Summer	0.03	20.4	8.844
Catchment Area (9)	FSR: 100 years: +40 %: 15 mins: Summer	0.07	50.7	22.000
Catchment Area (10)	FSR: 100 years: +40 %: 15 mins: Summer	0.04	26.7	11.559
Catchment Area (11)	FSR: 100 years: +40 %: 15 mins: Summer	0.04	22.7	9.870
Catchment Area (12)	FSR: 100 years: +40 %: 15 mins: Summer	0.05	39.0	16.923

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH10	FSR: 100 years: +40 %: 15 mins: Summer	82.560	81.060	81.559	0.499	553.5	1.270	0.000	542.2	240.009	OK
MH (8)	FSR: 100 years: +40 %: 15 mins: Summer	82.770	80.870	81.167	0.297	824.3	0.757	0.000	815.0	364.544	OK
MH (9)	FSR: 100 years: +40 %: 15 mins: Summer	82.200	79.700	80.603	0.903	860.9	4.084	0.000	853.0	384.441	OK
MH (6)	FSR: 100 years: +40 %: 15 mins: Summer	86.000	84.500	84.736	0.236	62.0	0.416	0.000	58.5	26.867	OK
MH (7)	FSR: 100 years: +40 %: 15 mins: Summer	85.900	84.400	84.497	0.097	81.3	0.171	0.000	79.4	36.695	OK
MH (1)	FSR: 100 years: +40 %: 15 mins: Summer	82.100	80.600	80.600	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH (2	FSR: 100 years: +40 %: 15 mins: Summer	80.050	78.550	78.550	0.000	0.0	0.000	0.000	0.0	0.000	OK
MH (3)	FSR: 100 years: +40 %: 15 mins: Summer	76.500	75.000	75.234	0.234	50.7	0.265	0.000	50.2	21.997	OK
MH (4)	FSR: 100 years: +40 %: 15 mins: Summer	74.130	72.630	73.484	0.854	339.3	0.966	0.000	335.2	147.435	OK
connection to culvert	FSR: 100 years: +40 %: 2160 mins: Winter	73.750	71.250	71.316	0.066	3.8	0.000	0.000	3.8	824.208	OK
MH (5)	FSR: 100 years: +40 %: 15 mins: Summer	72.710	71.610	72.706	1.096	65.7	3.797	0.000	45.9	27.076	Flood Risk

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

Critical Storm Per Item: Rank By: Max. Outflow

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 100 years: +40 %: 8640 mins: Summer	79.062	79.062	0.782	0.782	17.6	0.000	10.0	2333.695	54.175	OK
Pond (1)	FSR: 100 years: +40 %: 2160 mins: Winter	72.658	72.658	1.228	1.228	30.5	0.000	3.8	824.286	86.672	OK

Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	MH10	MH (8)	82.560	81.559	0.398	240.009	2.7	1.05	542.2	OK
Pipe (1)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	MH (8)	MH (9)	82.770	81.167	0.600	364.544	2.9	0.49	815.0	OK
Pipe (4)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	MH (6)	MH (7)	86.000	84.736	0.166	26.867	1.5	1.12	58.5	OK
Pipe (5)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	MH (7)	MH (8)	85.900	84.497	0.197	36.695	1.6	0.23	79.4	OK
No Delay	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (9)	Pond		80.603	0.315	384.672	0.0		852.3	
No Delay (1)	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (1)	MH (2		80.600	0.000	0.000	0.0		0.0	
No Delay (2)	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (2	MH (3)		78.550	0.000	0.000	0.0		0.0	
No Delay (3)	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (3)	MH (4)		75.234	0.056	22.002	0.0		50.1	
Pipe (2)	FSR: 100 years: +40 %: 2160 mins: Winter	Pipe	Pond (1)	connection to culvert	76.430	72.658	0.067	824.208	0.7	0.78	3.8	Surcharged
No Delay (4)	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (5)	Pond (1)		72.706	0.056	27.127	0.0		45.9	
No Delay (5)	FSR: 100 years: +40 %: 15 mins: Summer	No Delay	MH (4)	Pond (1)		73.484	0.149	147.451	0.0		334.6	

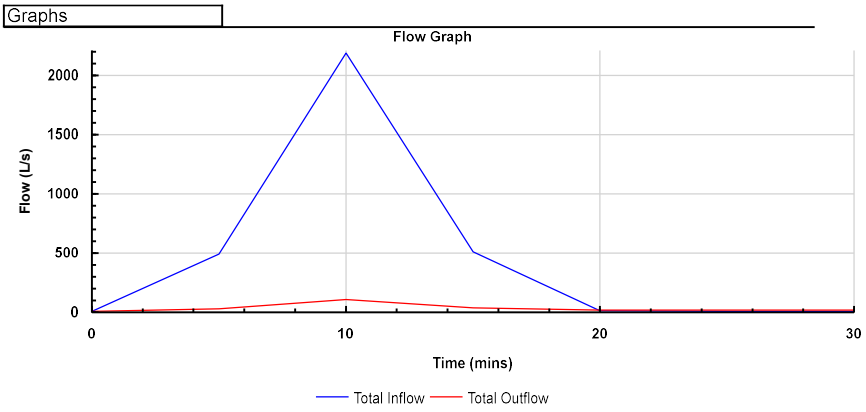
Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

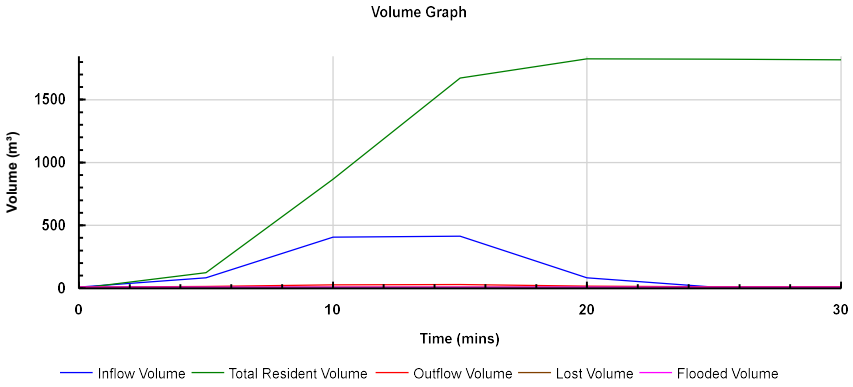
Phase
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Pond			9.8	8.962
connection to culvert			3.4	3.454
TOTAL	2190.1	949.648	100.0	50.091

Graphs





Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

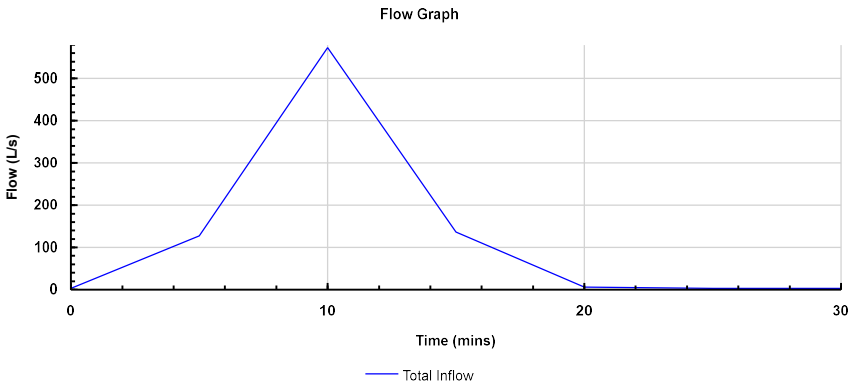
Catchment Area
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	573.2
Total Inflow Volume (m^3)	248.607

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

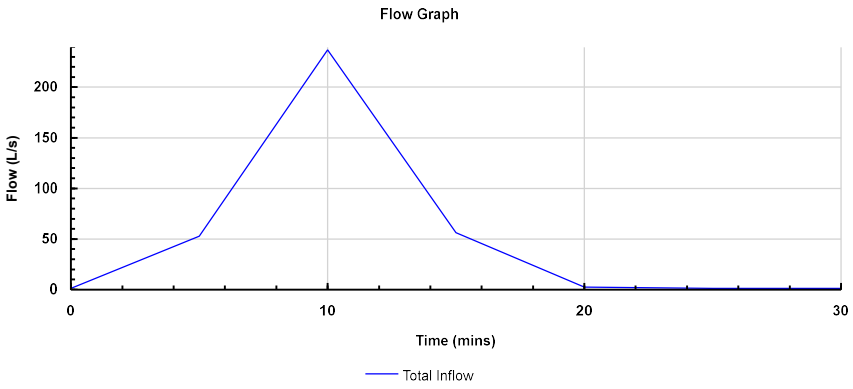
Catchment Area (1)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	236.9
Total Inflow Volume (m^3)	102.746

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

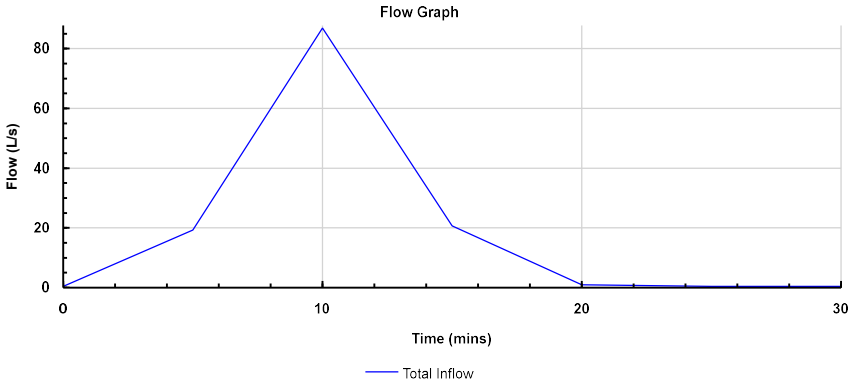
Catchment Area (2)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	86.9
Total Inflow Volume (m^3)	37.675

Graphs



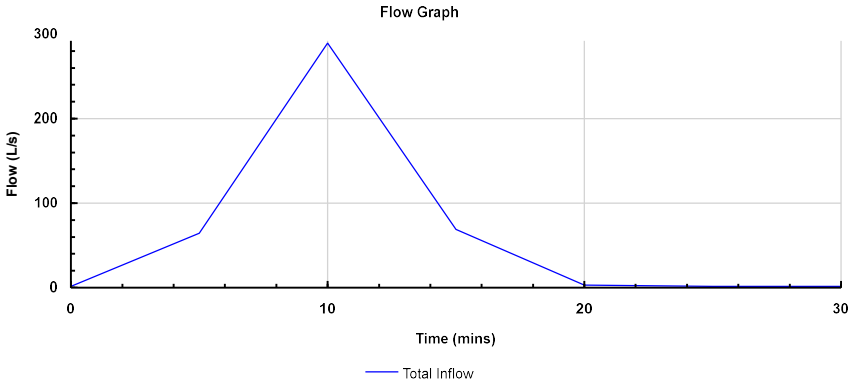
Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

Catchment Area (3) Type : Catchment Area
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Inflow

Max. Inflow (L/s)	289.2
Total Inflow Volume (m^3)	125.445

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

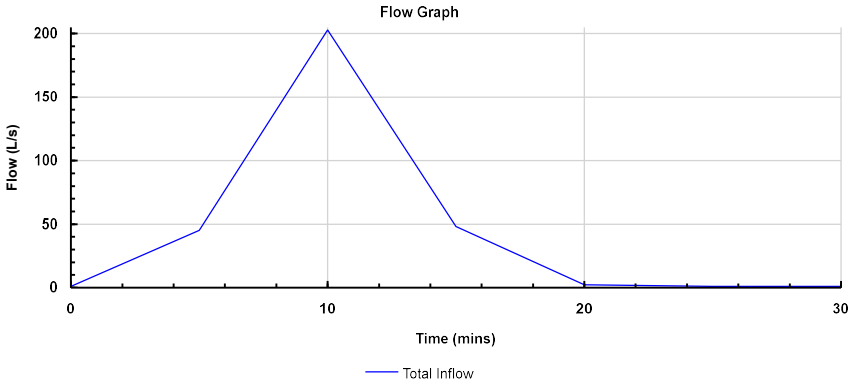
Catchment Area (4)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	202.8
Total Inflow Volume (m^3)	87.950

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

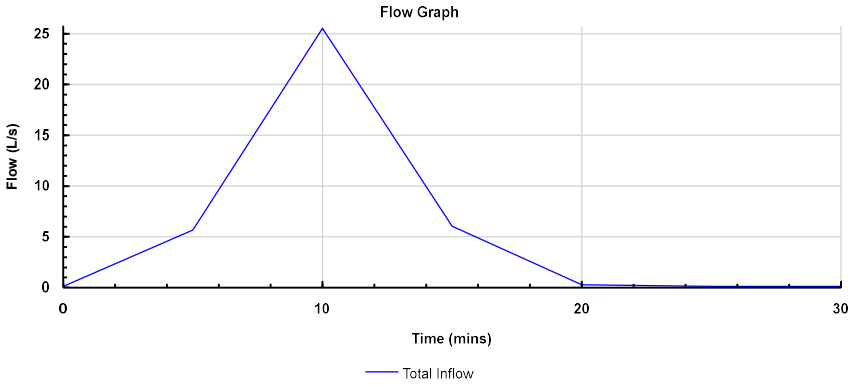
Catchment Area (5)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	25.5
Total Inflow Volume (m^3)	11.067

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

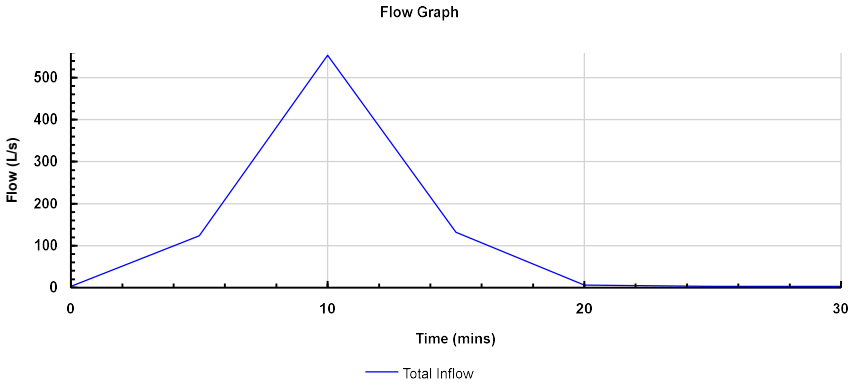
Catchment Area (6)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	553.5
Total Inflow Volume (m^3)	240.066

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

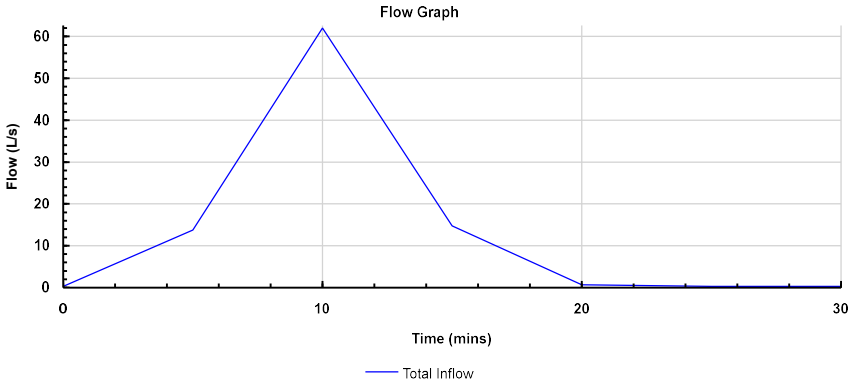
Catchment Area (7)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	62.0
Total Inflow Volume (m^3)	26.896

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

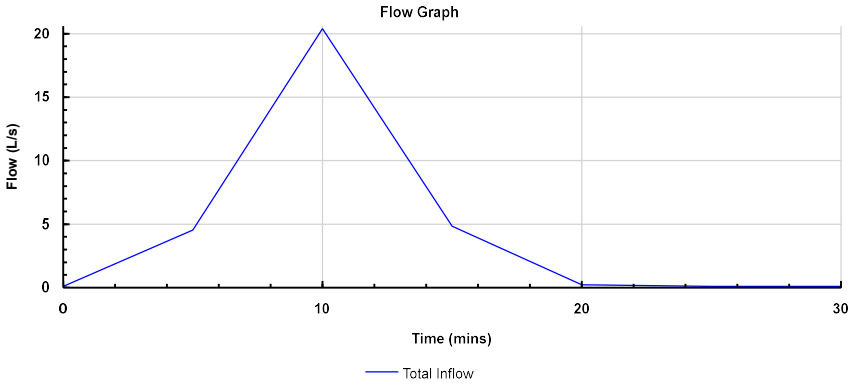
Catchment Area (8)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	20.4
Total Inflow Volume (m^3)	8.844

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

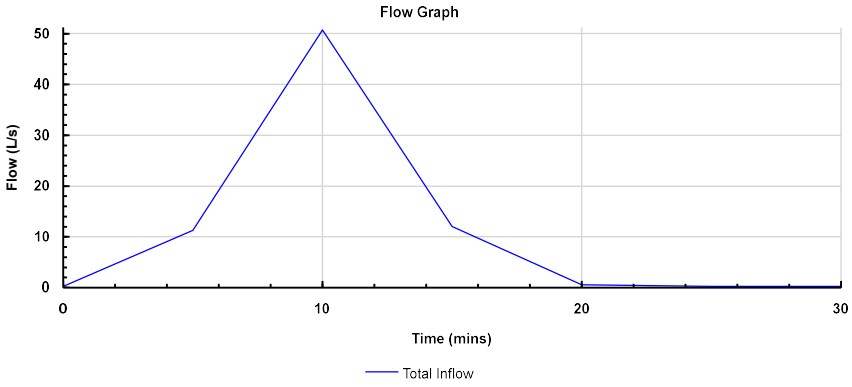
Catchment Area (9)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	50.7
Total Inflow Volume (m^3)	22.000

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

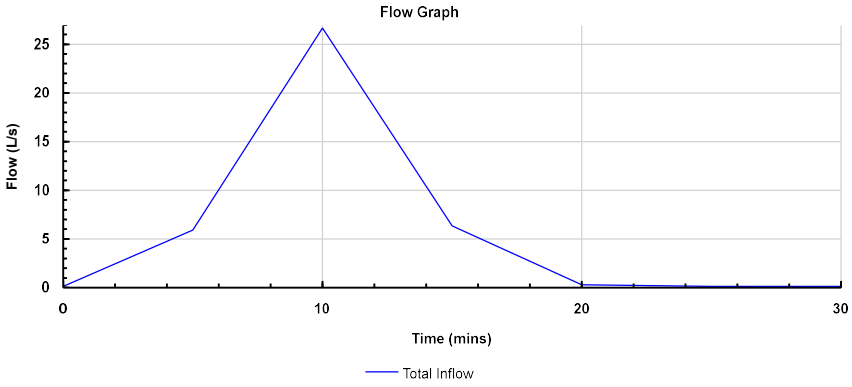
Catchment Area (10)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	26.7
Total Inflow Volume (m^3)	11.559

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

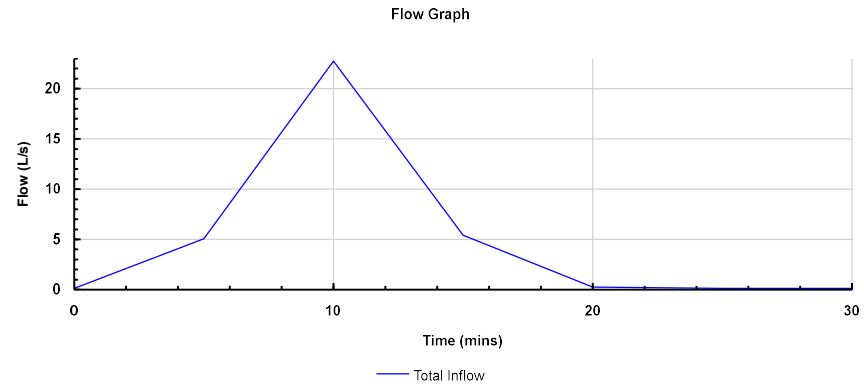
Catchment Area (11)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	22.7
Total Inflow Volume (m^3)	9.870

Graphs



Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Inflow Results Storm Phase: Phase	Company Address:		

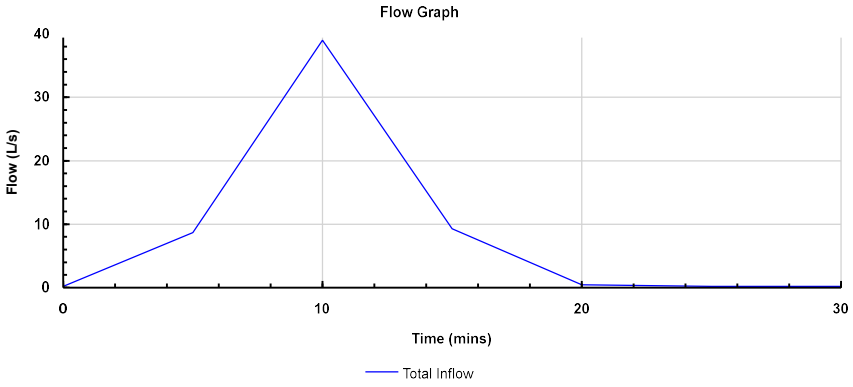
Catchment Area (12)
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	39.0
Total Inflow Volume (m^3)	16.923

Graphs

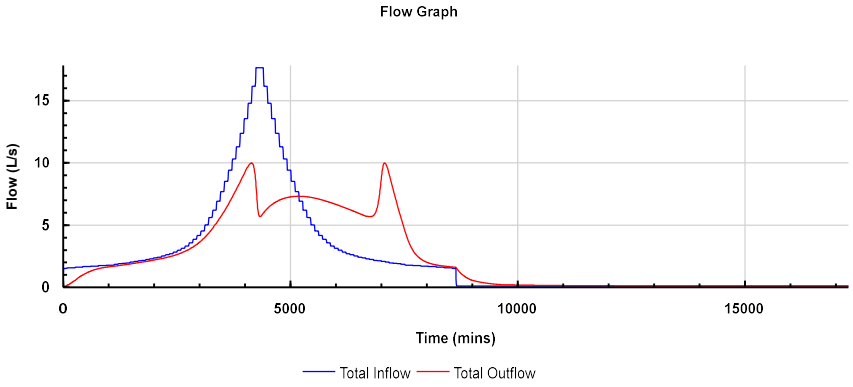


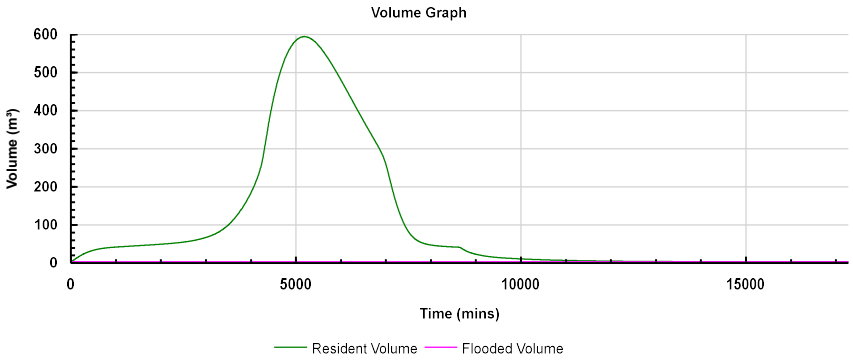
Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Pond Type : Pond

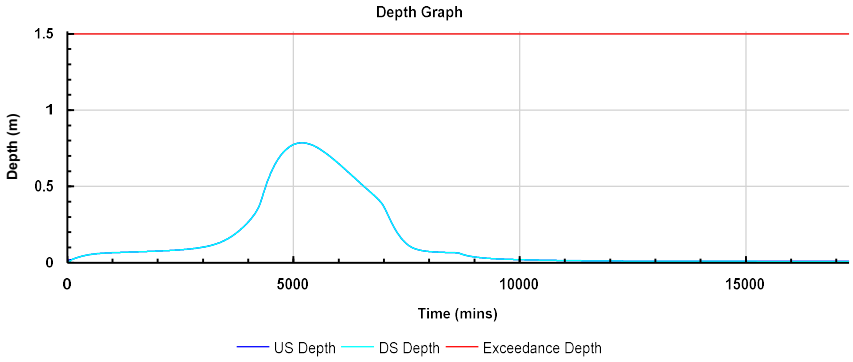
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 8640 mins: Summer

Graphs





Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

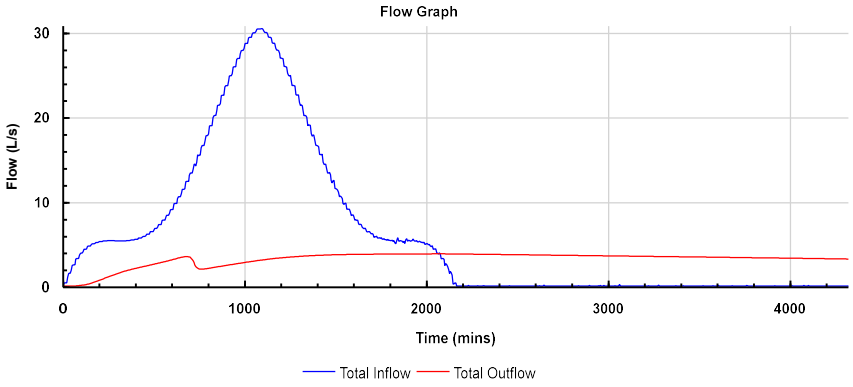


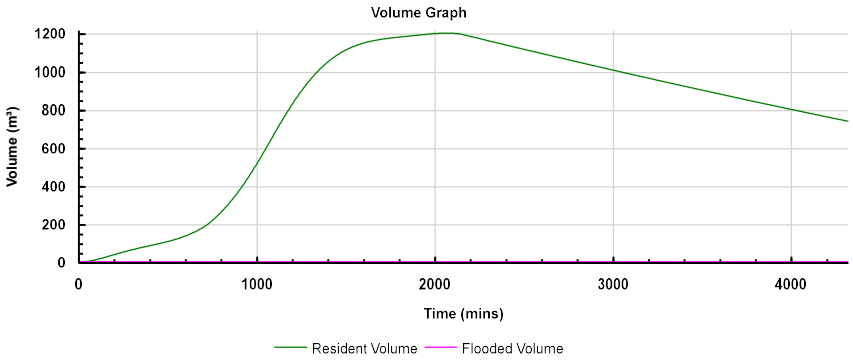
Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Pond (1) Type : Pond

Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 2160 mins: Winter

Graphs





Project:	Date: 29/11/2025		
	Designed by: towns	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: