Drainage Strategy - Aspall Wetland

Prepared for West Lay Ltd

February 2025

CONFIDENTIAL

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Quality Control Sheet

Title	Drainage Strategy - Aspall Wetland
Client	West Lay Ltd
Issue Date	10/02/2025
Reference	3490537 Aspall Site Effluent \ RPT DS Aspall Wetland

Authors

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Revision History

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REV02	Updated Final	LC	HR	HR	10/02/2025
REV03					
REV04					

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1 INTRODUCTION

1.1 Background

West Lay Ltd (West Lay) has submitted a planning application to Suffolk County Council (SCC) (Application No. SCC/0009/24MS) for the construction and operation of an engineered wetland to provide a non-hazardous waste-water treatment facility through filtration and absorption ponds, and installation of two windmills for aeration on land north of Cyder House, Castle Hill, Aspall, Suffolk, IP14 6NZ.

Aspall Cyder Ltd (Aspall) operate a cider production facility at Cyder House, with the proposed engineered wetland treatment scheme located to the north of the cidery (Figure 1).

Aspall currently operate a biological effluent treatment plant to treat effluent from their cider production facility. Aspall are seeking to use the engineered wetland treatment to replace the existing treatment facility and consider that it is a more sustainable option for managing the existing effluent and planned growth.

Envireau Water have been engaged by West Lay and prepared a Flood Risk Assessment (FRA) (Ref: 3490537 Aspall Site Effluent \ RPT FRA Aspall Wetland) to support the planning application for the development of the engineered wetland (herein referred to as the "Site"), which is currently available on the SCC online planning portal.

The application has been reviewed by the SCC Lead Local Flood Authority (LLFA) who raised a holding objection in a response letter dated 24/06/2024 (Appendix A), until additional information on drainage design and storm volume was discussed and submitted. 2No. Microsoft Teams calls have been undertaken between Envireau Water and the LLFA to discuss the additional information requirements and the contents of a drainage strategy to support the application. This drainage strategy has been produced following on from the discussions with the LLFA.

1.2 FRA Conclusions

The Envireau Water FRA discussed the Site location and setting, the topography, hydrology, soils, geology and hydrogeology and flood risk. For the purpose of brevity, these will not be discussed further within this drainage assessment. A greenfield runoff rate of 23.3 l/s was calculated for the Site and the FRA concluded that:

- The proposed development is classified as water compatible.
- The Site is at low risk of fluvial and surface water flooding.
- The proposed development of the Site is suitable for low risk flood areas.
- The Site is at no risk of flooding from tidal, groundwater or artificial sources.
- The proposed development will not increase the risk of flooding at the Site or elsewhere.

1.3 Environmental Permit

The cidery currently discharges its treated effluent via an Environmental Permit (EPR/GP3432QA) (See Appendix B) issued by the Environment Agency (EA) on 05/03/2021. The current permit allows a discharge of 210m^3/day (2.43 l/s assuming discharge over a 24 hour period) to a local ditch.

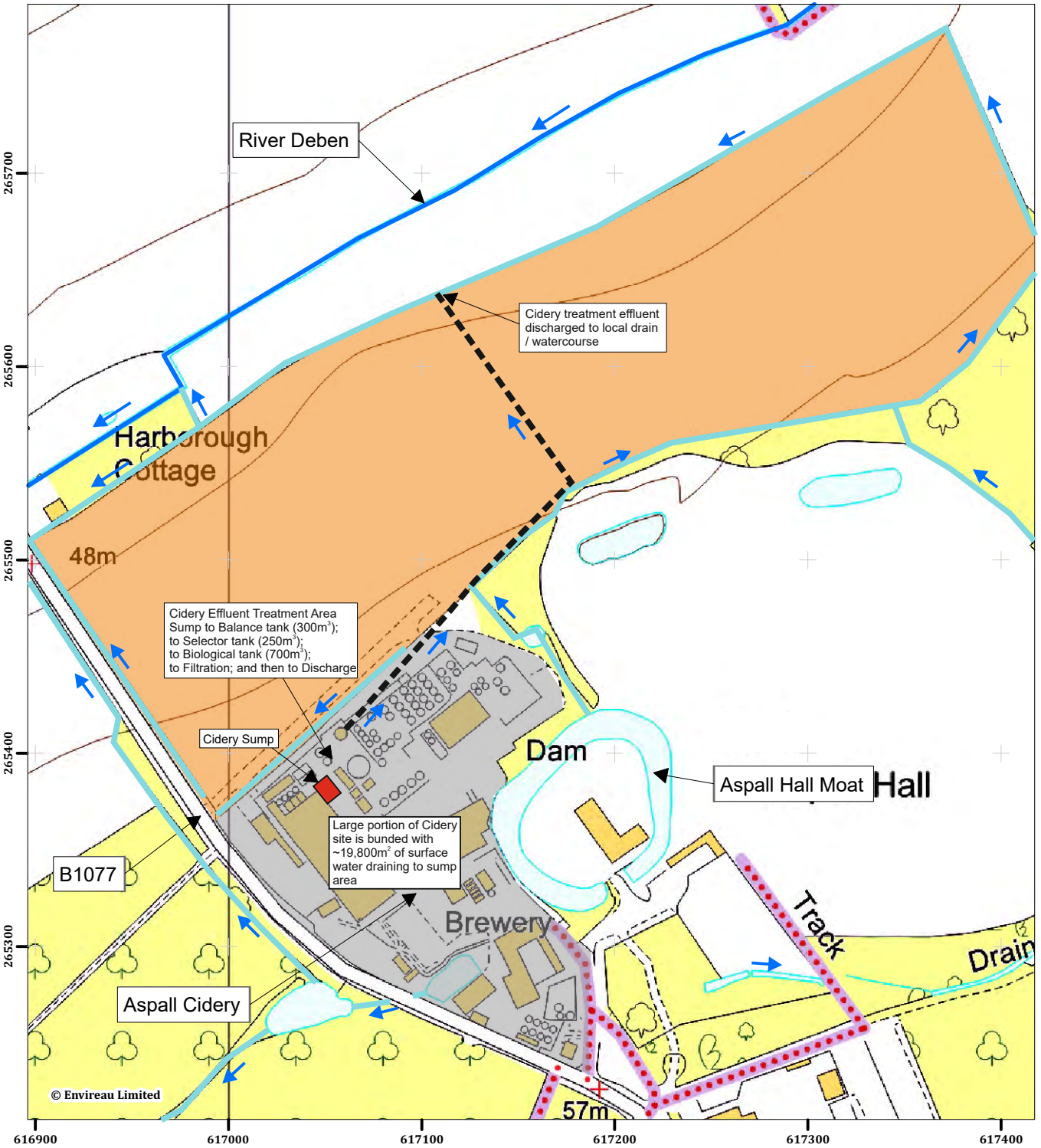


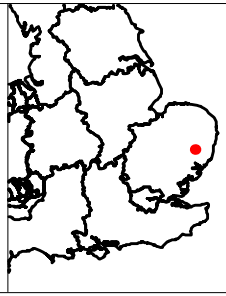
Figure 1: Existing Drainage

Aspall, Suffolk

N

- Proposed Wetland Site Area
- Aspall Cidery Site
- Main Watercourse
- Local Drain / Watercourse
- Cidery Discharge Pipe
- Flow Direction
- Cidery Sump

Notes:



0 30 60 90 120 Meters

Scale: 1:3,000 at A4

18 November 2024

NGR: 617,157 E / 265,499 N

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Drawn by:	LC
Ref:	Existing Drainage

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Discussions are currently ongoing with the EA in relation to waste permits. However, for the purpose of the drainage strategy, it is assumed that an outflow of 2.43 l/s (the current permitted discharge rate) will be the limiting factor for any discharges from the wetland system, be that operationally or during storm events.

1.4 Existing Drainage

The area where the wetland is proposed is currently agricultural land to the north of the cidery site. Drainage for the agricultural land is served by perimeter field drains / watercourses that circumvent the majority of the proposed wetland site area. These drains / watercourses drain to the River Deben to the north (Figure 1).

The main cidery site has a positive drainage system that mixes trade effluent with surface water. The system consists of:

- A surface water site drainage feed and a trade waste feed (from apple pressing with solids screened out) to the cidery sump;
- A trade waste feed to a second sump (yeast pit) to treat yeast separately from apple pressing and surface water;
- A cidery sump that feeds into a balance tank (300m^3), then to a selector tank (250m^3), then to a biological tank (700m^3 with 7-day residence time), then to filtration before being discharged via a throttled pipe to the local drain;
- A surface water site drainage feed that discharges to local drains in the southern section of the cidery site.

The cidery site is bunded to prevent uncontrolled runoff and trade effluent from leaving the site. The surface water site drainage in the southern section represents ~20% of the cidery site. The remaining 80% (~19,800m^2) of the site surface water drainage drains to the cidery sump.

Throughput to the cidery sump and treatment process depends on the time of year and is rainfall dependent. Apple pressing is undertaken in October to December, resulting in the peak period for trade effluent to occur.

Because the site is contained and a large proportion of the surface water drains to the cidery sump and treatment process with limited throughput and a restricted outfall, storm events can inundate the sump area. To combat this, excess water is tankered offsite. This can be a significant number; up to 12 tankers a day when a storm occurs. In 2022, the site required ~1100 tankers.

2 PROPOSED DRAINAGE

2.1 Outline Drainage Strategy

The outline drainage strategy is presented on Figure 2, whilst details of the wetland area are presented in Appendix C. A schematic cross section of the wetland system is presented in Figure 3 showing water levels, freeboard levels, crest levels and storage volumes.

It is proposed that the cidery sump connects to the wetland system via a gravity drain. This will allow decommissioning of the current effluent treatment process and direct trade effluent along with surface water runoff from the cidery site to the proposed wetland treatment system. The wetland treatment system has been designed to provide primary treatment along with containment of storm events.

The wetland system consists of:

- 5 cascading pond areas (Pond H, Pond G, Pond D, Pond C and Pond B). Pond H and G will provide balancing, whilst Ponds D, C and B will be planted;
- 1 in 3 side slopes for the wetland ponds,
- Freely draining interconnecting 150 mm pipes between Pond D, Pond C and Pond B to control pond water levels;
- Valved interconnecting 150 mm pipes (the purple valved pipes on Figure 2) to allow drain down of the ponds when required;
- Valved interconnecting 150 mm pipe (the pink valved pipe on Figure 2) for pollution control;
- High level, interconnecting grassed, reinforced spillways;
- A land storage area to allow dispersal of water over land, if required;
- A bund along the northern boundary to capture runoff and prevent overspill to the local drain / watercourse;
- A restricted 150 mm outflow pipe to the local drain / watercourse (restricted to 2.43 l/s by either an orifice plate or hydrobrake); with pollution control valve (the yellow valved pipe on Figure 2)
- Grated protection on pipe inlets.

The wetland system is designed to drawdown water in the summer months and reach controlled water levels in the winter months. Excess storm water storage is then provided above the controlled water levels to facilitate storm events.

The maximum storage available to pond crest levels is ~51,850 m^3. This consists of ~21,650 m^3 (~42%) of winter "controlled water level" storage; and ~19,270 m^3 (~38%) of storm storage, with the remainder as freeboard.

During pre-application discussions with Suffolk County Council Lead Local Flood Authority (LLFA), it was noted that CIRIA guidance for 1 in 3 side slopes should be observed for the wetland ponds but ideally, the LLFA would ideally be seeking the side slopes to be at 1 in 4. This has been considered and assessed in relation to the wetland design.

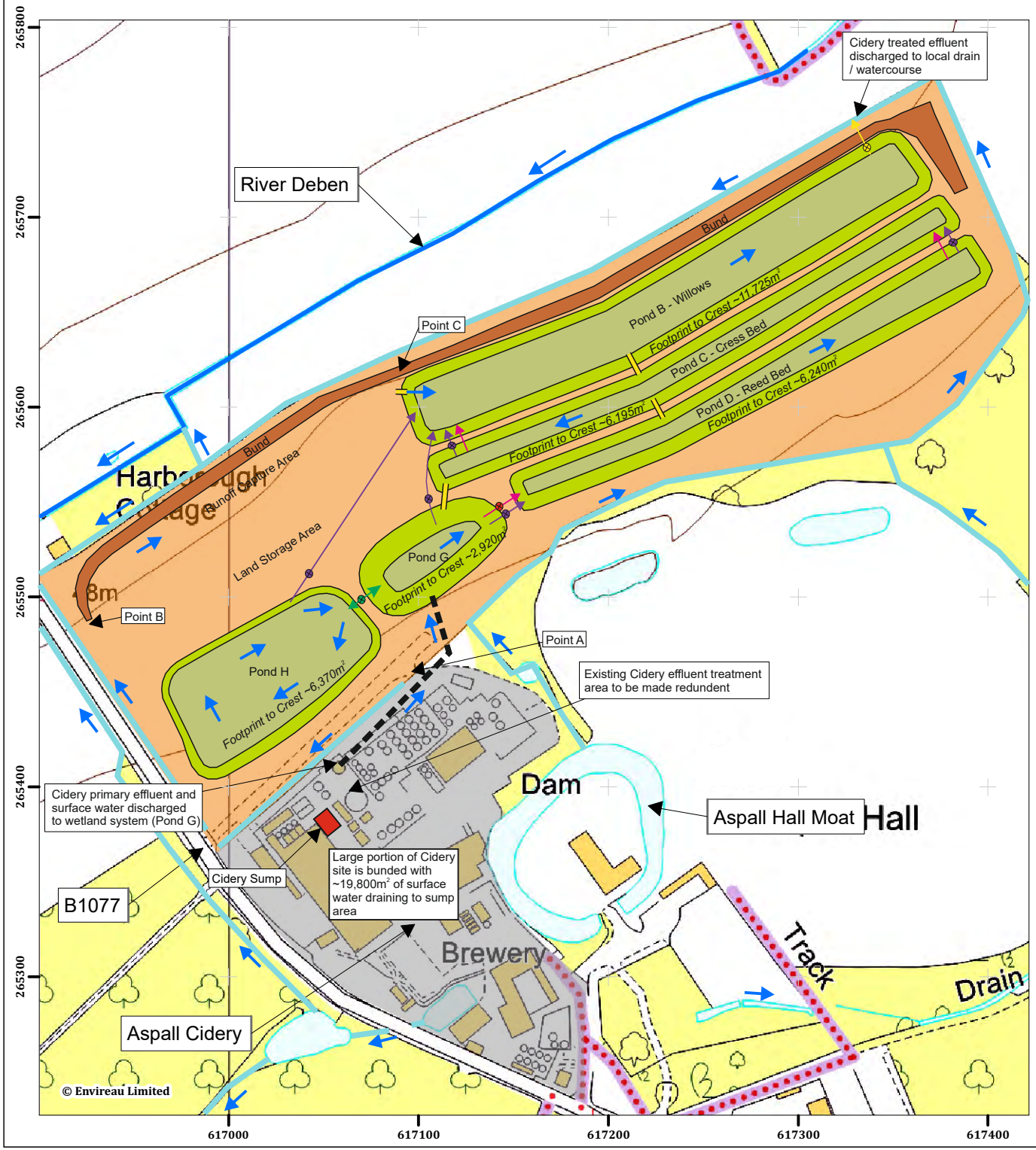

Figure 2: Outline Proposed Drainage

Aspall, Suffolk

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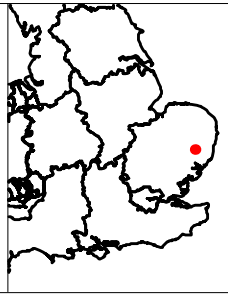
- Proposed Wetland Site Area
- Aspall Cidery Site
- Main Watercourse
- Local Drain / Watercourse
- Cidery Discharge Pipe to Pond G
- Flow Direction
- Cidery Sump
- Wetland Pond
- Earthen Bund
- 150mm Balancing Pipe (Valved)
- 150mm Pond to Pond Pipe (Free Draining)
- 150mm Pond to Pond Pipe (Pollution Valve)
- 150mm Drain Down Pipe (Valved)
- 150mm Wetland Discharge Pipe (Pollution Valve & Flow Restrictor)
- Grassed Reinforced Spillway

Notes:



0 30 60 90 120 Meters

Scale: 1:3,000 at A4

06 February 2025

NGR: 617,161 E / 265,516 N

Project No.	3490537
Client:	West Lay Ltd
Drawn by:	LC
Ref:	Proposed Drainage

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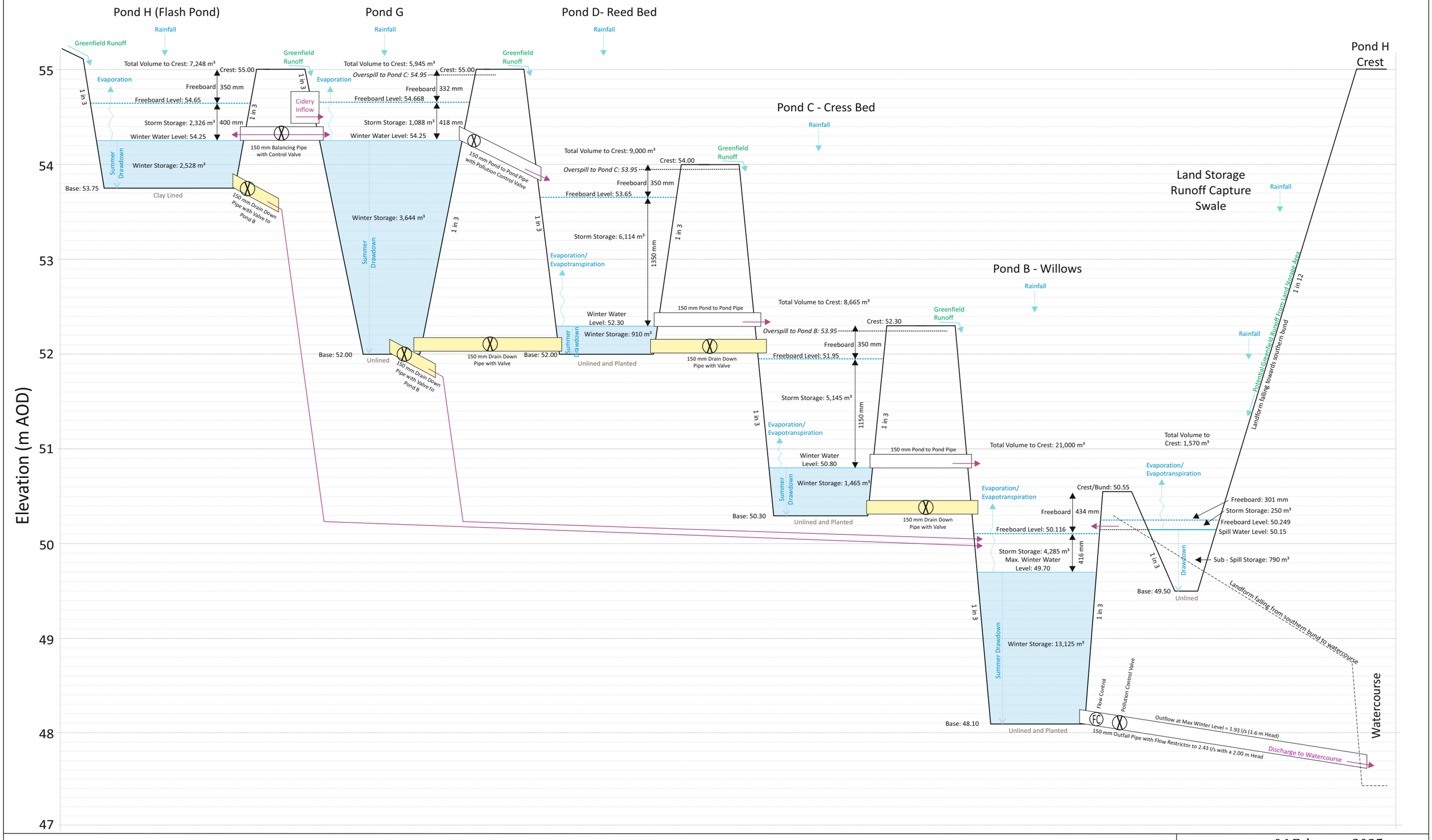

Figure 3: Wetland Schematic Cross Section (Designed)

Not to scale

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Ref:	FIG 3 Schematic (Design)
Drawn by:	LC

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However, given the current footprint taken for the wetland to function as proposed and designed along with other considerations such as protected tree standoffs, a 1 in 4 side slope for the basins was not achievable.

This is considered reasonable given that the primary objective of the system is for it to function as a wetland system. There will also be no public access to the wetlands and will be maintained by professional or specialist personnel.

2.3 Wetland System: Input-Storage-Output

In order to determine water levels in the wetland system, metered and recorded discharge data from January 2020 to December 2023 for the cidery site has been incorporated into an Input-Storage-Output (ISO) Model. A graphed output from the ISO model from 2020 forecasting up to 2030 is provided on Figure 4.

The inputs into the model include the cidery discharge (including the surface water component) and direct rainfall falling onto the wetland catchment area (rainfall data sourced from the Environment Agency gauging station at Earl Soham, ~7 km from the Site). Input data for 2023 is then repeated for 2024 and future years, but with a gradual year on year increase to the cidery site discharge up to 2026. This represents a ~20% increase in cidery production to facilitate the planned growth.

The outputs to the model are derived from potential evapotranspiration data based on typical wetland systems and a restricted discharge that is variable dependent on water level (head) at the discharge pond (Pond B).

The free draining interconnecting pipes within the wetland system are designed to have the capacity to allow water to freely drain through the system during normal operating and rainfall conditions, allowing water levels in Ponds H, G, D and C to be controlled to the invert level of the pipe. For these ponds, this provides up to ~8,500 m^3 of water storage up to the pipe invert level. Therefore, any excess water above pipe invert level will drain down to Pond B.

When inflow rates into Pond B exceed the outfall rate, Pond B will fill above pipe invert level. As the water level increases, the head of water increases the outflow rate until inflow rate equilibrates with outflow rate. Therefore, an important component of the wetland water balance is assessing water volume and levels within Pond B.

Figure 4 shows peaks in water levels to 49.57 m AOD (a water depth of 1.47 m and a water volume of ~13,125 m^3) during the winter and drawdown of water levels to zero in the summer. This equates to a summer outflow of 0 l/s rising to 1.93 l/s at the winter maximum.

This is important to the drainage strategy as it determines what remaining volume and outflow rate is available for storm storage above the winter maximum.

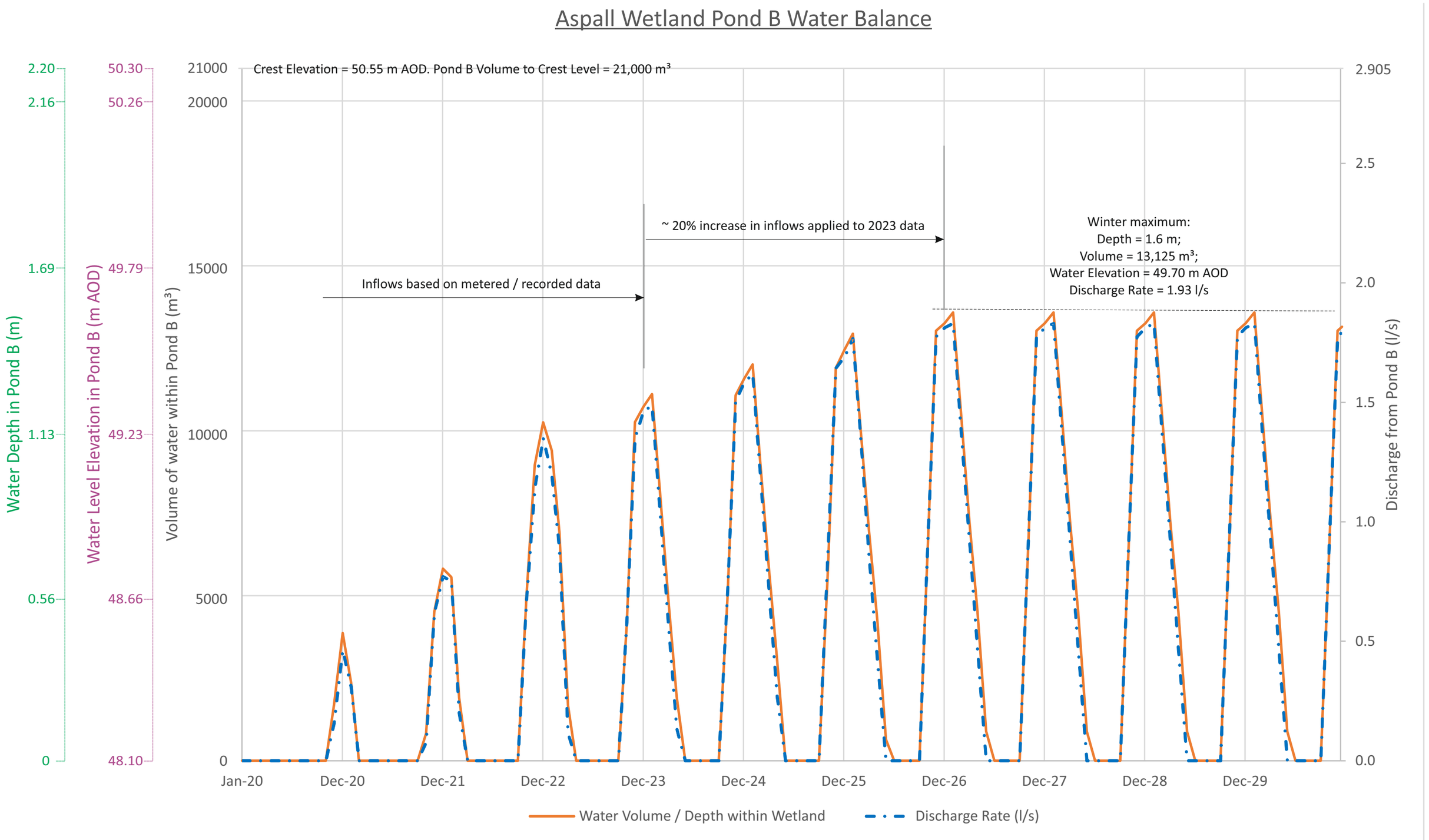

Figure 4: Pond B ISO Model Output

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Ref:	FIG 4 Pond B ISO Model
Drawn by:	LC

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2.4 Drainage Storm Modelling

Drainage modelling for storm events up to the 1 in 1000 year (including the 1 in 100 year +45% climate change) 7 day storm have been undertaken using the drainage modelling software package Causeway Flow+ v12 incorporating FEH22 statistical data (FEH Web Service https://fehweb.ceh.ac.uk/). Model results, long sections and node plan are provided in Appendix D.

Several assumptions have been used for the storm drainage modelling. These are:

- The surface water drainage from the cidery site is all free draining and unrestricted to Pond G of the wetland via drainage pipes;
- The cidery site is 100% impermeable covering an area of ~20,000m^2;
- The wetland pond footprint to the pond crest level is 100% impermeable. (This equates to a total pond footprint of ~33,450m^2);
- No infiltration is available;
- The land storage area and the catchment areas draining to individual ponds will be grassed/ vegetated and have an SPRHost equivalent to the existing agricultural land (SPRHost = 0.37). These are modelled as 10 m wide swales draining to each pond area. (Model runs were checked to ensure the 10 m swale width was sufficient to convey runoff flow generated with no loss of water).
- The maximum winter water level for each pond is taken as the base level for storm storage; (i.e. valves on interconnecting drain down pipes are closed). This represents a worst case / conservative scenario for the modelling.
- The maximum winter water level in Pond B has an outflow of 1.93 l/s at a depth of 1.6 m. Therefore, the maximum outflow rate for the storm modelling is 0.5 l/s (i.e. 2.43 l/s minus 1.93 l/s) with a maximum head of 0.85 m (to crest level).
- The existing perimeter drains circumventing the wetland area are sufficient to convey the 1 in 100 year +45% storm (i.e. there is no flow to the wetland system from surrounding fields).
- Rainfall for all of the wetland area catchment to the south of the proposed bund (~63,900m^2) is captured within the model.

A schematic cross section of the drainage system modelled is provided in Figure 5 and shows the resultant 1 in 100 year +45% critical storm depth within each Pond.

The exact detail of the cidery site drainage system is unknown. However, this has been modelled with 600 mm diameter pipes to allow the drainage to convey the 1 in 100 year +45% climate change storm event to Pond G. In reality, the existing drainage at the cidery site is unlikely to convey the 1 in 100 year +45% storm within storage taken up within the bunded cidery site, and therefore, the modelled scenario represents a worst case scenario.

The inflow to Pond G has been modelled as twin 600 mm diameter pipes. In reality, the soffit depths for 600 mm diameter pipes are likely to be too close to ground surface and therefore, this would be a multi barrelled pipe system with pipes of smaller diameter (i.e. 225 mm or 300 mm).

The results from the modelling show that the wetland system provides significant storm storage and is capable of accommodating the 1 in 100 year +45% storm event whilst maintaining freeboard within the Ponds.

The modelled maximum outflow rate (0.5 l/s) is based on the permitted discharge rate (2.43 l/s). This is much lower than the calculated Qbar year greenfield runoff rate (23.3 l/s) for the Site (including the cidery site input) and therefore, provides significant flood risk betterment.

2.5 Rainwater Harvesting

In principle, rainwater harvesting is feasible from the proposed wetlands. This could feed back into the cidery site and offset some of the water usage within the cider making process. However, this would depend on the water quality at each stage of the wetland treatment process, the volume of rainfall dilution and at what time of year, i.e. summer drawdown levels will result in minimal to no standing water being present in the wetlands.

Once the wetland system is in operation, its performance will be monitored for water quality, including whether it is viable to re-circulate water back to the cidery site.

However, at present, it is understood that rainwater harvesting will not be undertaken.

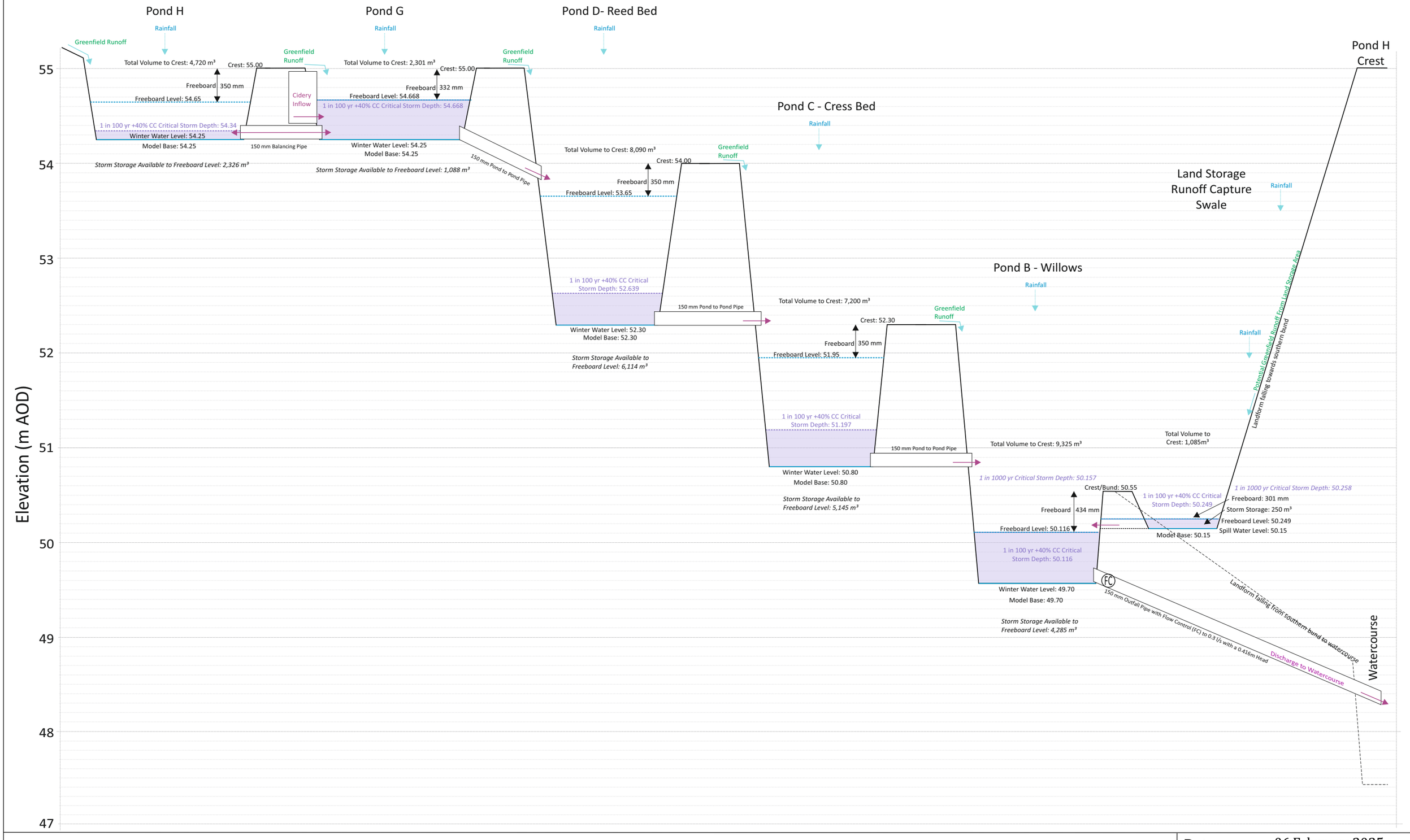

Figure 5: Wetland Schematic Cross Section (Modelled)

Not to scale

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Project No.	3490537
Client:	West Lay Ltd
Ref:	FIG 5 Schematic (Model)
Drawn by:	LC

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2.6 Flood Exceedance Routes

To assess potential flood exceedance routes, the wetland system has been modelled for events greater than the 1 in 1,000 year event with results provided in Appendix E. Three storm events were run. These were:

- The 1 in 1,000 year +20% storm, 15 minute to 7 day duration;
- The 1 in 1,000 year +50% storm, 15 minute to 7 day duration;
- The 1 in 1,000 year +85% storm, 15 minute to 7 day duration;

Using FEH22 statistical data, these events equated to a circa. 1 in 2,000 year, 1 in 5,000 year and 1 in 10,000 year storm. The modelling results showed that:

- For the 1 in 1,000 year +20% storm, the wetland system can accommodate this event without any overspill from the wetland. The cidery site is in flood, with a flood volume of ~43 m^3 for the critical storm (15 minute duration).
- For the 1 in 1,000 year +50% storm, the wetland system can accommodate this event without any overspill from the wetland with the exception of,
    - Inflow from cidery site to Pond G, with up to ~220 m^3 of flooding for the 600 minute critical storm
- For the 1 in 1,000 year +85% storm, the wetland system can accommodate this event without any overspill from the wetland with the exception,
    - Inflow from cidery site to Pond G, with up to ~905 m^3 of flooding for the 720 minute critical storm;

  In addition; the cidery site is in flood with up to ~230 m^3 of flooding for the 10080 minute storm.

For the 1 in 1,000 year +85% storm, Pond B is not shown to flood but is close to capacity with a water level at 50.48m AOD, 7 cm below the crest height for the northern bund.

Based on the modelling results, if the bunds within the cidery site were to be inundated during an extreme storm event, the spill point from the cidery site would be at Point A as labelled on Figure 2. Some of the overspill flow would find its way to the periphery field ditch system but a proportion could enter into either Pond H and Pond G.

The most likely place for flood exceedance to occur for the wetland system is at Points B and C as labelled on Figure 2, where water would potentially spill around or over the northern bund. The exceedance route would be direct to the local watercourse to the north, which is located in Flood Zone 2 and 3 as shown in the Envireau Water FRA.

3 Wetland Design

3.1 Treatment Design and Pollution

The design of the wetland system for the treatment of the effluent has been undertaken by others to meet the criteria / standard of the current Environmental Permit (provided in Appendix B) to allow discharge to the local watercourse.

The wetland system will exceed the mitigation potential for the CIRIA Suds Index (CIRIA SuDS Manual (Woods Ballard, et al., 2015)). However, the Index tool has been used with the criteria that the cidery site has a high pollution hazard. The output from the index shows the wetland system to be sufficient to mitigate this hazard. The summary from the Index tool is provided in Appendix F.

There is the potential for fires to occur at the cidery site and this may produce site pollution from fire trucks. The system of ponds are designed to hold accidental or emergency discharge including fire water from the cidery site.

The pipe connection from the input wetland pond (Pond G) to the downstream Pond D, will be fitted with a pollution stop valve. In instances where fires occur at the cidery site, the valve will be activated to hold effluent and potential "fire" water pollution within Pond G in combination with Pond H, which will provide further capacity and balancing. This will prevent flow into the wider wetland system. As a fail-safe, the outfall from the final wetland pond (Pond B) will also be fitted with a pollution stop valve. Therefore, any pollution from fire trucks can be contained, and later treated within the wetland system, or if the pollutant cannot go through the wetland system, it will be contained in Pond G and H and be tankered off site following the event.

3.2 Biodiversity

Biodiversity documents have been submitted with the planning application and are available on the SCC planning portal (Ref: Statutory_Biodiversity_Metric.xlsx; Biodiversity Net Gain Assessment Summary.pdf produced by Liz Lord Ecology, & Appendix 9 of the Planning Statement document, produced by Stephenson Halliday along with ecological appraisals and a Habitat Management and Monitoring Plan.

The biodiversity net gain report sets out the increases in habitat that will occur as a result of the development, including reed beds, cress beds, willow planting and marginal vegetation. This represents a significant gain over the current agricultural land.

It is conceivable that, certainly during the summer months, the ponds could be described as 'standing water – Ponds' which is a priority habitat. The reedbeds, which will act as filters for fine suspended solids, are also a priority habitat which is promoted for reinstatement/creation.

3.3 Health and Safety

CIRIA SuDS Manual (Woods Ballard, et al., 2015) guidance generally recommends that standard storm attenuation basins have a maximum standing water depth off 900 mm plus a freeboard giving a maximum total basin depth of 1.2 m. This is generally associated with Health and Safety requirements. Due to the nature and design of the

wetland system to facilitate effluent treatment, basin depths will be greater than this and some water depths will also be greater than recommended.

It is **not** proposed that the wetland system will be a local amenity nor an amenity to the workers at the cidery site. This is to ensure the safety requirements of the wetland can be met.

The slopes of the wetland ponds are 1 in 3, on the basis that the development footprint will not accommodate 1 in 4 slopes with the design proposed. Also Pond G and Pond B have the potential to have deep water depths during the winter maximum, both of which provide a health and safety risk. Both of Pond G and Pond B will be fenced to restrict access, have "Danger" signage stating that deep water is present, and have buoyancy aids available and clearly visible.

Table 1 shows the expected water depths for each pond.

Table 1 Wetland Pond Depths

Pond	Pond Depth: Base to Crest (m)	Summer Drawdown Water Depth (m)	Winter Maximum Water Depth (m)	1 in 100 year + 45% CC Critical Storm Flood Depth (m)	Combined Flood and Winter Maximum Water Depth (m)
Pond H	1.25	0 – 0.20	0.50	0.09	0.59
Pond G	3.00		2.25	0.418	2.668
Pond D	2.00		0.30	0.339	0.639
Pond C	2.00		0.50	0.397	0.897
Pond B	2.20		1.47	0.416	1.886

The deep water in Pond G and Pond B is essential for:

a) Providing primary silt settlement and accumulation in Pond G;

b) providing a sump for effluent concentrates and concentrated liquor in Pond G; and,

c) providing capacity in the system to allow flow through to Pond B to allow discharge at the permitted rate whilst providing storage for the winter maximum water level at Pond B.

Silts and concentrates will be periodically removed from Pond G via pumping or excavation and removed off site.

3.4 Adoption

The wetland system will be privately owned and maintained. It is not proposed that the wetland system will be adopted by SCC or Anglian Water.

3.5 CDM Designers Risk Assessment

A CDM Designers Risk Assessment will be produced for the construction works of the wetland system.

4 MAINTENANCE PLAN

4.1 Wetland Maintenance

The application is also supported by a Landscape and Ecological Maintenance Plan (LEMP) dated 3/11/2024 located on the SCC planning portal. This details the native species that will be planted on all areas and the manner in which coppicing and reedbed maintenance will be carried out. It also contains the details of the methods of control of water flows. The document has currently been redacted due to the removal of land mounds at the request of SCC, with a revised document to be submitted. This drainage document has been produced on the basis that the land mounds are not present.

General information provided in the LEMP in relation to the coppicing and reedbed maintenance is still valid. The wetland system has been designed to accumulate silts and concentrates within the sump of Pond G. These will be periodically removed from Pond G via pumping or excavation and removed off site.

4.2 Maintenance Responsibility

The wetland drainage system will be operated, inspected and maintained by West Lay Ltd using site maintenance workers and specialist contractors.

4.2.1 Wetland Drainage Asset Maintenance Schedule

This section outlines the maintenance and management schedules for the proposed wetland drainage assets. The schedules have been formulated in line with guidelines contained within the CIRIA SuDS Manual (Woods Ballard, et al., 2015). There are three categories of maintenance activities (including inspections and monitoring) referred to in this report:

- **Regular maintenance** – tasks which are required to be undertaken on a weekly or monthly basis, or as required.
- **Occasional maintenance** – tasks which are required to be undertaken periodically, typically at intervals of 3 months or more.
- **Remedial maintenance** – tasks which are not required on a regular basis but are done when necessary.

This section is intended to give an overview of the operation and maintenance for the range of drainage features included within the wetland system and in relation to typical/standard details only.

Maintenance schedules for the proposed drainage components are provided in Tables 2 to 4. These schedules are not exhaustive and should be reassessed at regular intervals to determine if any additional maintenance is required to preserve the performance and condition of the drainage system.

4.2.2 Drainage Pipes and Manholes

A maintenance schedule for drainage pipes and manholes is provided in Table 2.

Table 2 Drainage Pipes and Manholes Maintenance Schedule

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove any accumulation of silt, sediment, leaves and debris etc	Monthly, or as required
	Inspect for evidence of poor operation	Monthly (during the first year), then half yearly
Occasional maintenance	High pressure water jet removal of silt build-up and avoid blockages, particularly at bends or changes in direction	Six monthly, or as required
	Remove or control tree roots where they are encroaching pipe runs, using recommended methods	As required
Remedial actions	Clear pipework and gully grates of blockages	As required
	Replace any damaged or failed pipes, gullies or manholes	As required

4.2.3 Flow Controls and Valves

A typical schedule of maintenance activities for flow controls and valves is included in Table 3.

Table 3 Flow Controls & Valve Maintenance Schedule

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect/check pipework to ensure that the flow control / valve is in good condition and operating as designed	Monthly
	Inspect for evidence of poor operation	Monthly, or as required
Occasional maintenance	High pressure water jet removal of silt build-up	Six monthly, or as required
Remedial actions	Replace the flow control / valve if it becomes damaged	As required
	Clear pipework of blockages	As required

4.2.4 Attenuation Basins Maintenance Schedule

A typical schedule of maintenance activities for wetland basins is included in Table 4.

Table 4 Wetland Basin Maintenance Schedule

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove Litter and debris	Monthly
	Manage vegetation and remove nuisance plants	Monthly, or as required
	Inspect inlet and outlet pipes and grates for blockages and clear if required	Monthly
	Inspect base of basin for silt accumulation / debris accumulation	Monthly, or when required
	Inspect banksides for evidence of physical damage.	Monthly
	Inspect inlets, outlets and basin surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then half yearly, or as required
Occasional maintenance	Remove sediment from inlet, outlet and basin surface when required.	Six monthly, or as required
	Re-seed areas of poor vegetation growth, alter plant types to better suit conditions, if required.	As Required
Remedial actions	Replace the flow control if it becomes damaged	As required
	Relevel uneven surfaces and reinstate design levels	As required

5 CONCLUSIONS

West Lay Ltd has submitted a planning application to Suffolk County Council (Application No. SCC/0009/24MS) for the construction and operation of non-hazardous waste-water treatment facility through filtration and absorption ponds, and installation of two windmills for aeration on land north of Cyder House, Castle Hill, Aspall, Suffolk, IP14 6NZ.

The application has been reviewed by the SCC LLFA who raised a holding objection until additional information on drainage design and storm volume was discussed and submitted. 2No. Microsoft Teams calls have been undertaken between Envireau Water and the LLFA, and this drainage strategy provides those additional information requirements.

Drainage modelling for storm events up to the 1 in 100 year +45% climate change, 7 day storm have been undertaken using the drainage modelling software package Causeway Flow+ v12. The drainage modelling incorporates data from an ISO model to determine maximum winter water levels within the wetland. These levels provide the base level for wetland ponds within the drainage model.

The results from the modelling show that the wetland system provides significant storm storage and is capable of accommodating the 1 in 100 year +45% climate change storm event whilst maintaining freeboard within the Ponds.

The modelled storm outflow rate (0.5 l/s) is based on the currently permitted discharge rate (2.43 l/s). This is much lower than the calculated Qbar greenfield runoff rate (23.3 l/s) for the Site (including the cidery site input) and therefore, provides flood risk betterment.

The wetland design and water management ensure that there will be no increase in flood risk at the Site or elsewhere.

No rainwater harvesting is currently proposed for the wetland system.

The wetland system will exceed the mitigation potential for the CIRIA Suds Index and will provide protection against pollution including incidents where fire trucks and “fire” water would be required.

The wetland system will provide a biodiversity net gain.

The wetland system will not provide a local amenity, for health and safety reasons. Due to the nature and design of the wetland system to facilitate effluent treatment, basin depths will range from 1.25 to 3.00 m and winter maximum water depths in Pond G and B will be greater than 900 mm. Ponds G and B will be fenced and have appropriate safety signage and buoyancy aids.

The wetland drainage system will not be adopted by SCC or Anglian Water and will be managed and maintained by West Lay Ltd using site maintenance personnel and specialist contractors in accordance with the LEMP and proposed drainage asset maintenance plan.

APPENDICES

Appendix A SCC LLFA Holding Objection Letter

From: GHI Floods Planning
Sent: 24 June 2024 09:23
To: SCC Planning Mailbox
Cc: Charlotte Brinkley
Subject: 2024-06-24 JS Reply Land north of Cyder House, Catle Hill, Aspall Ref SCC/0009/24MS

Dear Charlotte Brinkley,

Subject: Land north of Cyder House, Catle Hill, Aspall Ref SCC/0009/24MS

Suffolk County Council, as Lead Local Flood Authority (LLFA), have reviewed application ref SCC/0009/24MS

The following submitted document[s] have/has been reviewed and the LLFA recommends a **holding objection** at this time:

- Flood Risk Assessment for Aspall Wetland Ref 3490537 Aspall Site Effluent \ RPT FRA Aspall Wetland

A holding objection is necessary because whilst the applicant has assessed the predicted flood risk, there is insufficient detail around the proposed discharge of the treated water into the River Deben. This treated water will need to meet the requirements of the EA from quality.

The proposed ponds will count as a impermeable are, the applicant will need to design the ponds so that the can include a volume of storage for surface water.

The level of information suppled shall be in accordance with the lead local flood authority's guidance.

The holding objection is a temporary position to allow reasonable time for the applicant and the LLFA to discuss what additional information is required to overcome the objection(s). This Holding Objection will remain the LLFA's formal position until the local planning authority (LPA) is advised to the contrary. If the LLFA position remains as a Holding Objection at the point the LPA wishes to determine the application, the LPA should treat the Holding Objection as a Formal Objection and recommendation for Refusal to the proposed development. The LPA should provide at least 2 weeks prior notice of the publication of the committee report so that the LLFA can review matters and provide suggested planning conditions, even if the LLFA position is a Formal Objection.

The points below detail the actions required to overcome our current objection:-

1. As a minimum, we require the following documents and information to be submitted for a full planning application

Document to be submitted, and brief description of details required:	**Full**
Details of how the proposed Drainage Strategy will deliver on each of the four pillars of SuDS	✓
Flood Risk Assessment (FZ3 or Site >1Ha) Evaluation of fluvial, tidal, pluvial, reservoir & groundwater flood risk onsite – this will guide layout and location of open spaces. (SCC may require flood modelling if EA Flood Maps are not available)	✓

Contour Plan Assessment of topography/existing flow paths/blue corridors	✓
Drainage Strategy / Statement Document that explains how the site is to be drained using SuDS principles. Shall include information on: • Existing drainage (including adjacent highway systems) • Impermeable Area (Pre and Post Development), if unknown use conservative estimate e.g., 60% and justify • Proposed SuDS, recommended land take of 12-15% of the site if the proposed impermeable area is unknown (see below) • Hydraulic Calculations (see below) • Treatment Design (i.e., interception, CIRIA pollution indices) • Adoption/Maintenance Details	✓
Impermeable Areas Plan Plan to illustrate new impervious surfaces and total areas	✓
Evidence of any agreements to discharge to a third-party system (i.e., Anglian Water or adjacent landowner) Written evidence of any permissions or permits being obtained	✓
Detailed Development Layout and SuDS Provision Plan Dimensioned plans showing the detailed layout including SuDS, landscaping details, open spaces, and exceedance routes	✓
Full Site Investigation Report Detailed assessment of ground conditions • Widespread coverage of trial pits to BRE 365, proportionate to the scale of the development with a minimum of 2 for the smallest sites • Contamination/Pollution check • Groundwater Monitoring	✓
Detailed Drainage Scheme Plan Dimensioned plan showing main aspects of the drainage infrastructure. Plans should include: • SuDS details (size/volume) • Pipe Numbers/Sizes/Levels • Outfall & Permitted Discharge Rate (if applicable)	✓
Detailed SuDS Drawings (Open SuDS) Dimensioned plans of proposed SuDS components i.e., scaled cross sections/long sections	✓
Full hydraulic calculations (MicroDrainage "Network", Causeway Flow, or similar equivalent output) At this stage, SCC require simulations of the drainage network including SuDS components for 3.33% AEP and 1% AEP+CC storms. (Source Control files are useful but not enough on their own)	✓
Discharge Agreements Agreement to discharge to third party infrastructure if the scheme is reliant on it.	✓
Health and Safety Risk Assessment Where open SuDS (water level >0.3m) are proposed a CDM compliant designers risk assessment will be required.	✓
SuDS Maintenance & Management Plan Plans should include schedules which specify when and how maintenance should be undertaken	✓

Kind Regards

Jason Skilton
Flood and Water Engineer
Suffolk County Council

From: Planning@suffolk.gov.uk <Planning@suffolk.gov.uk>
Sent: Friday, June 21, 2024 8:49 AM
To: RM Archaeology Mailbox <archaeology@suffolk.gov.uk>; RM Ecology <ecology@suffolk.gov.uk>; GHI Floods Planning <floods.planning@suffolk.gov.uk>; GHI Highways Development Control <Highways.DevelopmentControl@suffolk.gov.uk>; Isolde Cutting <Isolde.Cutting@suffolk.gov.uk>; GHI PROW Planning <PROWplanning@suffolk.gov.uk>; eastofengland@historicengland.org.uk; consultations@naturalengland.org.uk
Subject: Planning Application SCC/0009/24MS - Land north of Cyder House, Catle Hill, Aspall

Good morning,

Please find attached our consultation letter for the above application.

Any views/comments you may wish to make should be received by 12 July 2024

Regards,

Planning Section
Growth, Highways & Infrastructure
Suffolk County Council | Endeavour House | 8 Russell Road | Ipswich | IP1 2BX

Tel: 01473 265066
Email: Planning@suffolk.gov.uk
www.suffolk.gov.uk

Appendix B Current Environmental Permit

Permit with introductory note

The Environmental Permitting (England & Wales) Regulations 2016

Aspall Cyder Limited

The Cyder House
Aspall
Stowmarket
IP14 6PD

Permit number

EPR/GP3432QA

The Cyder House
Permit number EPR/GP3432QA

Introductory note

This introductory note does not form a part of the permit

The main features of the permit are as follows.

Aspall Cyder Limited operates a production, processing, bottling, and kegging facility for the production of vinegar, juice and cyder. The site is located at National Grid Reference TM 17115 65360, Suffolk, approximately 1km north of Debenham, in a rural setting. The site first began cyder production in 1729, Aspall Cyder began operations at the site in 2018. The processing capacity of Aspall Cyder site will exceed the 300 tonnes per day threshold for the treatment and processing of vegetable raw materials, this is as a consequence of continued business growth. The site will become subject to permitting under the following sections of the Environmental Permitting Regulations 2016:

Section 6.8, Part A(1) (d)(ii): Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed (where the weight of the finished product excludes packaging) - only vegetable raw materials with a finished product production capacity greater than 300 tonnes per day.

Section 5.4, Part A (a)(i): Disposal of non-hazardous waste involving biological treatment - with a capacity exceeding 50 tonnes per day.

The site covers an area of approximately 3.5Ha comprising a pressing building, a tank farm, an effluent treatment plant, a packaging building, an engineering building, a vinegar production area, an office building, areas of hardstanding, access roads and soft landscaping. The processing of vegetable raw materials producing apple juice; the fermentation of apple juice producing cyder; and the blending of purchased malt, red wine and white wine vinegar as well as the acetification of cyder producing cyder vinegars; and bottling of vinegar and cyders. The processes undertaken at the site are: fermentation; flash pasteurisation; filtration and cooling via refrigeration.

The following directly associated activities also occur on site:

- Heat and Steam Generation – heat is used in the fermentation process and steam is used for pasteurisation. The site has a 3.16MWth gas-oil fired boiler and a back-up boiler with a thermal rating of 274KW which is used in emergencies or during main boiler maintenance. The main emission to air arises from this boilers
- Raw Materials Storage – raw materials are stored on site in both solid and liquid form. Liquids are primarily delivered in Intermediate Bulk Containers (IBCs) and smaller drums, some liquids are delivered to site and stored in tanks. Liquid sugar will be stored in tanks with bunded areas.
- Waste Storage – wastes are segregated at source and stored in this manner onsite until collected. All hazardous materials are stored individually in approved containers. Wastes are kept on site for minimal times before collection for recovery.
- Cleaning in Place (CIP) – CIP is a method of cleaning the interior surfaces of pipes, vessels, process equipment, and associated fittings without disassembly.
- Use of refrigerants - refrigerant gases are stored on site for use for refrigeration.

Process effluent is treated by an onsite effluent treatment plant. Liquid process waste is collected in a dedicated sump in the effluent treatment area, effluent is transferred to a drum screen to remove solids into a dolav unit – which are transferred to a dedicated waste skip for disposal. Screened effluent flows into a series of balance, divert and aeration tanks. Biological sludge from the aeration tank flows through a Membrane Bioreactor (MBR). Treated effluent discharge passes through a MCERTS flowmeter with a flow proportional 24 hour composite sampler, before discharging to a surface drain and ultimately The Gulls river leading to River Deben.

A second sump within the effluent treatment area collects high strength liquid from the fermentation filtration crossflow process including yeast material – this is then transferred by a level switch controlled pump into a tank where it is then collected and tankered offsite for landspreading.

Uncontaminated surface water runoff passes through a drainage system with hydraulic attenuation sump and an oil/water interceptors and separators with 6 discharge points to surface water/drains into The Gulls river and ultimately discharges to River Deben.

The nearest residential receptors lie approximately 180m of the northern site boundary. There are no SACs, SPAs or Ramsars within 10km of the installation boundary or any SSSI's within 2km. There is a Local Wildlife Site and Ancient Woodland named Aspall Wood approximately 230m northeast of the northern site boundary.

The status log of the permit sets out the permitting history, including any changes to the permit reference number.

Status log of the permit		
Description	**Date**	**Comments**
Application EPR/GP3432QA/A001	Duly made 20/09/2019	Application for an Environmental Permit
Additional information received	20/03/2020	Updated BAT assessment.
	25/06/2020	Further information regarding the water quality and discharge from the ETP.
	20/11/2020	Environment Management System Noise Action Plan Updated Emissions Plan
Permit determined EPR/GP3432QA (PAS Billing ref. GP3432QA)	05/03/2021	Permit issued to Aspall Cyder Limited

End of introductory note

Permit

The Environmental Permitting (England and Wales) Regulations 2016

Permit number

EPR/GP3432QA

The Environment Agency hereby authorises, under regulation 13 of the Environmental Permitting (England and Wales) Regulations 2016

Aspall Cyder Limited ("the operator"),

whose registered office is

137 High Street
Burton-On-Trent
England
DE14 1JZ

company registration number 02032494

to operate an installation at

The Cyder House
Aspall
Stowmarket
IP14 6PD

to the extent authorised by and subject to the conditions of this permit.

Name	Date
Anne Lloyd	**05/03/2021**

Authorised on behalf of the Environment Agency

Conditions

1 Management

1.1 General management

1.1.1 The operator shall manage and operate the activities:

(a) in accordance with a written management system that identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances, closure and those drawn to the attention of the operator as a result of complaints; and

(b) using sufficient competent persons and resources.

1.1.2 Records demonstrating compliance with condition 1.1.1 shall be maintained.

1.1.3 Any person having duties that are or may be affected by the matters set out in this permit shall have convenient access to a copy of it kept at or near the place where those duties are carried out.

1.2 Energy efficiency

1.2.1 For the following activities referenced in schedule 1, table S1.1. The operator shall:

(a) take appropriate measures to ensure that energy is used efficiently in the activities;

(b) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and

(c) take any further appropriate measures identified by a review.

1.3 Efficient use of raw materials

1.3.1 The operator shall:

(a) take appropriate measures to ensure that raw materials and water are used efficiently in the activities;

(b) maintain records of raw materials and water used in the activities;

(c) review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and

(d) take any further appropriate measures identified by a review.

1.4 Avoidance, recovery and disposal of wastes produced by the activities

1.4.1 The operator shall take appropriate measures to ensure that:

(a) the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste by the activities; and

(b) any waste generated by the activities is treated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive; and

(c) where disposal is necessary, this is undertaken in a manner which minimises its impact on the environment.

1.4.2 The operator shall review and record at least every four years whether changes to those measures should be made and take any further appropriate measures identified by a review.

2 Operations

2.1 Permitted activities

2.1.1 The operator is only authorised to carry out the activities specified in schedule 1 table S1.1 (the "activities").

2.2 The site

2.2.1 The activities shall not extend beyond the site, being the land shown edged in green on the site plan at schedule 7 to this permit.

2.3 Operating techniques

2.3.1 The activities shall, subject to the conditions of this permit, be operated using the techniques and in the manner described in the documentation specified in schedule 1, table S1.2, unless otherwise agreed in writing by the Environment Agency.

2.3.2 If notified by the Environment Agency that the activities are giving rise to pollution, the operator shall submit to the Environment Agency for approval within the period specified, a revision of any plan or other documentation ("plan") specified in schedule 1, table S1.2 or otherwise required under this permit which identifies and minimises the risks of pollution relevant to that plan , and shall implement the approved revised plan in place of the original from the date of approval, unless otherwise agreed in writing by the Environment Agency.

2.3.3 Any raw materials or fuels listed in schedule 2 table S2.1 shall conform to the specifications set out in that table.

2.4 Improvement programme

2.4.1 The operator shall complete the improvements specified in schedule 1 table S1.3 by the date specified in that table unless otherwise agreed in writing by the Environment Agency.

2.4.2 Except in the case of an improvement which consists only of a submission to the Environment Agency, the operator shall notify the Environment Agency within 14 days of completion of each improvement.

3 Emissions and monitoring

3.1 Emissions to water, air or land

3.1.1 There shall be no point source emissions to water, air or land except from the sources and emission points listed in schedule 3 tables S3.1 and S3.2.

3.1.2 The limits given in schedule 3 shall not be exceeded.

3.1.3 Periodic monitoring shall be carried out at least once every 5 years for groundwater and 10 years for soil, unless such monitoring is based on a systematic appraisal of the risk of contamination.

3.2 Emissions of substances not controlled by emission limits

3.2.1 Emissions of substances not controlled by emission limits (excluding odour) shall not cause pollution. The operator shall not be taken to have breached this condition if appropriate measures, including, but not limited to, those specified in any approved emissions management plan, have been taken to prevent or where that is not practicable, to minimise, those emissions.

3.2.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution, submit to the Environment Agency for approval within the period specified, an emissions management plan which identifies and minimises the risks of pollution from emissions of substances not controlled by emission limits;

(b) implement the approved emissions management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.2.3 All liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container.

3.3 Odour

3.3.1 Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.

3.3.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, submit to the Environment Agency for approval within the period specified, an odour management plan which identifies and minimises the risks of pollution from odour;

(b) implement the approved odour management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.4 Noise and vibration

3.4.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration.

3.4.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration, submit to the Environment Agency for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration;

(b) implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.5 Monitoring

3.5.1 The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring specified in the following tables in schedule 3 to this permit:

(a) point source emissions specified in tables S3.1 and S3.2.

3.5.2 The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

3.5.3 Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme and the environmental or other monitoring specified in condition 3.5.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate), where available, unless otherwise agreed in writing by the Environment Agency.

3.5.4 Permanent means of access shall be provided to enable sampling/monitoring to be carried out in relation to the emission points specified in schedule 3 tables S3.1 and S3.2 unless otherwise agreed in writing by the Environment Agency.

3.6 Pests

3.6.1 The activities shall not give rise to the presence of pests which are likely to cause pollution, hazard or annoyance outside the boundary of the site. The operator shall not be taken to have breached this condition if appropriate measures, including, but not limited to, those specified in any approved pests management plan, have been taken to prevent or where that is not practicable, to minimise the presence of pests on the site.

3.6.2 The operator shall:

(a) if notified by the Environment Agency, submit to the Environment Agency for approval within the period specified, a pests management plan which identifies and minimises risks of pollution from pests;

(b) implement the pests management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

4 Information

4.1 Records

4.1.1 All records required to be made by this permit shall:

(a) be legible;

(b) be made as soon as reasonably practicable;

(c) if amended, be amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval; and

(d) be retained, unless otherwise agreed in writing by the Environment Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:

(i) off-site environmental effects; and

(ii) matters which affect the condition of the land and groundwater.

4.1.2 The operator shall keep on site all records, plans and the management system required to be maintained by this permit, unless otherwise agreed in writing by the Environment Agency.

4.2 Reporting

4.2.1 The operator shall send all reports and notifications required by the permit to the Environment Agency using the contact details supplied in writing by the Environment Agency.

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to the Environment Agency by 31 January (or other date agreed in writing by the Environment Agency) each year. The report(s) shall include as a minimum:

(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;

(b) the annual production /treatment data set out in schedule 4 table S4.2; and

(c) the performance parameters set out in schedule 4 table S4.3 using the forms specified in table S4.4 of that schedule.

4.2.3 Within 28 days of the end of the reporting period the operator shall, unless otherwise agreed in writing by the Environment Agency, submit reports of the monitoring and assessment carried out in accordance with the conditions of this permit, as follows:

(a) in respect of the parameters and emission points specified in schedule 4 table S4.1;

(b) for the reporting periods specified in schedule 4 table S4.1 and using the forms specified in schedule 4 table S4.4 ; and

(c) giving the information from such results and assessments as may be required by the forms specified in those tables.

4.2.4 The operator shall, unless notice under this condition has been served within the preceding four years, submit to the Environment Agency, within six months of receipt of a written notice, a report assessing whether there are other appropriate measures that could be taken to prevent, or where that is not practicable, to minimise pollution.

4.3 Notifications

4.3.1 In the event:

(a) that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately—

(i) inform the Environment Agency,

(ii) take the measures necessary to limit the environmental consequences of such an incident or accident, and

(iii) take the measures necessary to prevent further possible incidents or accidents;

(b) of a breach of any permit condition the operator must immediately—

(i) inform the Environment Agency, and

(ii) take the measures necessary to ensure that compliance is restored within the shortest possible time;

(c) of a breach of permit condition which poses an immediate danger to human health or threatens to cause an immediate significant adverse effect on the environment, the operator must immediately suspend the operation of the activities or the relevant part of it until compliance with the permit conditions has been restored.

4.3.2 Any information provided under condition 4.3.1 (a)(i), or 4.3.1 (b)(i) where the information relates to the breach of a limit specified in the permit, shall be confirmed by sending the information listed in schedule 5 to this permit within the time period specified in that schedule.

4.3.3 The Environment Agency shall be notified within 14 days of the occurrence of the following matters, except where such disclosure is prohibited by Stock Exchange rules:

Where the operator is a registered company:

(a) any change in the operator's trading name, registered name or registered office address; and

(b) any steps taken with a view to the operator going into administration, entering into a company voluntary arrangement or being wound up.

Where the operator is a corporate body other than a registered company:

(a) any change in the operator's name or address; and

(b) any steps taken with a view to the dissolution of the operator.

In any other case:

(a) the death of any of the named operators (where the operator consists of more than one named individual);

(b) any change in the operator's name(s) or address(es); and

(c) any steps taken with a view to the operator, or any one of them, going into bankruptcy, entering into a composition or arrangement with creditors, or, in the case of them being in a partnership, dissolving the partnership.

4.3.4 Where the operator proposes to make a change in the nature or functioning, or an extension of the activities, which may have consequences for the environment and the change is not otherwise the subject of an application for approval under the Regulations or this permit:

(a) the Environment Agency shall be notified at least 14 days before making the change; and

(b) the notification shall contain a description of the proposed change in operation.

4.3.5 The Environment Agency shall be given at least 14 days notice before implementation of any part of the site closure plan.

4.4 Interpretation

4.4.1 In this permit the expressions listed in schedule 6 shall have the meaning given in that schedule.

4.4.2 In this permit references to reports and notifications mean written reports and notifications, except where reference is made to notification being made "immediately", in which case it may be provided by telephone.

Schedule 1 – Operations

Table 1.1 Activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
Section 6.8 Part A(1)(d) (ii) Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed (where the weight of the finished product excludes packaging) — only vegetable raw materials with a finished product production capacity greater than 300 tonnes per day	Processing, bottling and kegging facility for the supply of vinegar, juice and cyder to the retail sector	From receipt of raw materials to dispatch of finished packaged products
Section 5.4 (a)(i) disposal of non-hazardous waste with the capacity exceeding 50 tonnes per day by biological treatment	Treatment by aeration followed by a Membrane Bioreactor (MBR) of collected process effluent	Collection and treatment of process effluent to discharge of treated effluent to surface water
Directly Associated Activity		
DAA1	Heat and Steam Generation	Operation of a 3.16MWth main boiler fired with gas-oil for the generation of heat and steam. Operation of a 274Kwth boiler as the back-up boiler in case of emergencies or main boiler maintenance.
DAA2	Raw Materials Handling and Storage	Includes receipt and storage, of bulk raw materials to be used in process.
DAA3	Waste Storage	Generation, storage and handling of liquid and solid wastes. From generation of waste to their removal off-site.
DAA4	Cleaning in Place	Dry and wet cleaning of equipment.
DAA5	Refrigerant usage	From receipt of refrigerant to use in refrigeration and air conditioning processes.

Table S1.2 Operating techniques		
Description	**Parts**	**Date Received**
Application	The following application Supporting Information Report: Section iv – Non-Technical Summary Section 5 – Environmental Risks and Effects Appendix B – Site Plans Appendix C – Environment Risk Assessment Appendix D – Site Condition Report	Duly Made 20/09/2020
Response to Schedule 5 Notice dated 19/02/2020	Response to question 1, 2, 3 and 4: Updated 'Section 6' of 'supporting information report': Best Available Techniques (BAT) Assessment to include updated BAT assessment with reference to the Food and Drink Sector Guidance EPR 6.10 and the Food, Drink and Milk Industries BREF.	20/03/2020
Response to Schedule 5 Notice dated 11/08/2020	Response to question 1 – Updated Environmental Management System Response to question 4 - Appendix C (Updated Emission Point Plan Drawing EPAPPEP01)	20/11/2020

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC1	The Operator shall implement the actions stated in the Noise Action Plan dated November 2020. Once these actions have been completed the Operator shall submit a comprehensive noise assessment undertaken by an experienced and suitably qualified person (i.e. a noise consultant with an appropriate qualification accredited by the Institute of Acoustics), in accordance with the procedures given in BS4142:2019 (Rating industrial noise affecting mixed residential and industrial areas) and BS7445:2003 (Description and measurement of environmental noise). On completion of the assessment a copy of the survey shall be submitted in the form of a report with an interpretation of the results and conclusions drawn to the Environment Agency for approval.	Within 12 months of permit issue.
IC2	The operator shall undertake a comprehensive sampling programme for the detection and quantification of residual pesticides in the effluent discharge. The programme shall include but not be limited to: <u>GCMS/LCMS scans</u> Representative samples of the effluent should be take on 12 separate occasions, at suitable intervals at least 24 hours apart, for GCMS/LCMS scan analysis. Each sample should be analysed using GCMS/LCMS scans, ensuring that the laboratory can achieve a Limit of Qualification equivalent to or better than that achieved by the National Laboratory Service. <u>Fully-quantitative analysis</u> Representative samples of the effluent should be take on 12 separate occasions, at suitable intervals at least 24 hours apart, to allow fully quantitative analysis of the following substances, if there is any possibility that they may be present in the effluent: Abamectin, Beta-Cyfluthrin,	02/11/2021

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	Cinerin II, Cyfluthrin, Cypermethrin, Deltamethrin, Lambda-Cyhalothrin, Pyrethrin I, and Pyrethrin II. The sampling results shall be submitted to the Environment Agency for review prior to being used to complete the requirements of IC3. Or else provide a justification why fully quantitative analysis has not been carried out?	
IC3	The operator shall undertake a comprehensive assessment of the impact of residual pesticides in the effluent discharge on surface and ground water, using the information collected upon completion of IC2. The assessments shall be undertaken in accordance with our guidance "Surface water pollution risk assessment for your environmental permit" and "Groundwater risk assessment for your environmental permit". The assessments and their conclusions shall be submitted to the Environment Agency for review. Where the outcome of any assessment demonstrates an impact which is liable to cause pollution of surface or groundwater, contrary to the provisions of the Water Framework Directive and Groundwater Regulations, the operator shall provide details of an improvement programme to further mitigate against the risks, with time scales for implementation, for approval in writing by the Environment Agency.	Within 3 months of completion of IC2.
IC4	The operator shall update their Environmental Management System to include: • A requirement for their suppliers to notify them immediately if a new pesticide or chemical has been used in the production of the raw materials they are processing, or there is a significant increase in use of a pesticide or chemical used in the production of the raw materials they are processing and; • A system in place to identify if any new pesticides or chemicals are applied or a significant increase in use of a pesticide or chemical and that a risk assessment of the new chemicals is undertaken to ensure there is no negative impact on the effluent discharge quality and receiving environment.	Within 1 month of permit issue.
IC5	The operator shall ensure the sites protocols, procedures and management of the flow meter is fully aligned with the MCERTS scheme in line with condition 3.5.3 and table S3.2. The operator shall update the Environment Management System to include the relevant protocols, procedures and management of the flow meter and confirm in writing to the Environment Agency when this has been completed.	Within 6 months of permit issue.

Schedule 2 – Waste types, raw materials and fuels

Table S2.1 Raw materials and fuels	
Raw materials and fuel description	**Specification**
Fuel oil	Less than 0.1% sulphur content.

Schedule 3 – Emissions and monitoring

Table S3.1 Point source emissions to air – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (including unit)**	**Reference period**	**Monitoring frequency**	**Monitoring standard or method**
A1 referenced on drawing EPAPPEP01	Main boiler stack	--	No limit set	--	--	--
A3 referenced on drawing EPAPPEP01	Back up diesel generator exhaust	-	No limits set	-	-	-
A4 referenced on drawing EPAPPEP01	Lab fume cupboard	-	No limits set	-	-	-
A5 – A21 referenced on drawing EPAPPEP01	Cyder fermentation vessels	-	No limits set	-	-	-
A22 – A41 referenced on drawing EPAPPEP01	Cyder storage	-	No limits set	-	-	-
A42 – A82 referenced on drawing EPAPPEP01	Cyder process tanks	-	No limits set	-	-	-
A83 – A84 referenced on drawing EPAPPEP01	DAL storage	-	No limits set	-	-	-
A85 referenced on drawing EPAPPEP01	Nitrogen storage	-	No limits set	-	-	-
A86 – A100 referenced on drawing EPAPPEP01	Aseptic and press vessels	-	No limits set	-	-	-
A101 – A108 referenced on drawing EPAPPEP01	Vinegar packaging storage	-	No limits set	-	-	-
A109 – A111 referenced on drawing EPAPPEP01	Vinegar fermentation	-	No limits set	-	-	-
A112 – A174 referenced on drawing EPAPPEP01	Vinegar storage tanks	-	No limits set	-	-	-

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W1 on Drawing EPAPPEP01 emission to a drain [Note1]	Waste water treatment plant	Total daily volume of discharge	210 m^3/day	24 hour total	Continuous	MCERTS self-monitoring of flow scheme (in accordance with IC5)
		Total suspended solids	20 mg/l	24 hour flow proportional composite sample	Daily	BS EN 872
		Biological Oxygen Demand	10 mg/l	24 hour flow proportional composite sample	Monthly	BS EN 1899-1
		Ammonia (as N)	3 mg/l	24 hour flow proportional composite sample	Daily	BS EN ISO 11732
		Total Phosphorus	1 mg/l	24 hour flow proportional composite sample	Daily	BS EN ISO 15681-1
		Total Nitrogen	20 mg/l	24 hour flow proportional composite sample	Daily	BS EN 12260
		pH	6.0 – 9.0	Instantaneous	Continuous	BS ISO 10523
		Chemical Oxygen Demand	120 mg/l	24 hour flow proportional composite sample	Daily	BS ISO 15705
		Total pesticides	Requirements to be determined on the basis of outcome of IC2 & IC3			
W2 on Drawing EPAPPEP01 emission to a drain [Note1]	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
W3 on Drawing EPAPPEP01 emission to a drain [Note1]	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]

Table S3.2 Point Source emissions to water (other than sewer) and land – emission limits and monitoring requirements						
Emission point ref. & location	**Source**	**Parameter**	**Limit (incl. unit)**	**Reference Period**	**Monitoring frequency**	**Monitoring standard or method**
W4 on Drawing EPAPPEP01 emission to horse pond	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
W5 on Drawing EPAPPEP01 emission to horse pond	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
W6 on Drawing EPAPPEP01 emission to the moat	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
W6 on Drawing EPAPPEP01 emission to a drain [Note1]	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
W7 on drawing EPAPPEP01 emission to a drain [Note1]	Uncontaminated surface water runoff.	Oil and grease	None visible	Instantaneous	Weekly	Visual inspection [Note 2]
Note 1 – drain flows approximately southwest leading to river The Gulls. Note 2 – Records to be retained for inspection by the Environment Agency, as required.						

Schedule 4 – Reporting

Parameters, for which reports shall be made, in accordance with conditions of this permit, are listed below.

Table S4.1 Reporting of monitoring data			
Parameter	**Emission or monitoring point/reference**	**Reporting period**	**Period begins**
Emissions to air Parameters as required by condition 3.5.1.	A1	Every 3 years	1 January
Emissions to water Parameters as required by condition 3.5.1	W1	Monthly	1st of each month

Table S4.2: Annual production/treatment	
Parameter	**Units**
Total production	tonnes

Table S4.3 Performance parameters		
Parameter	**Frequency of assessment**	**Units**
Water usage	Annually	tonnes
Energy usage	Annually	MWh
Total raw material used	Annually	tonnes
Refrigerant usage	Annually	tonnes

Table S4.4 Reporting forms		
Media/parameter	**Reporting format**	**Date of form**
Air	Form Air1 or other form as agreed in writing by the Environment Agency	05/03/2021
Water and Land	Form Water1 or other form as agreed in writing by the Environment Agency	05/03/2021
Water usage	Form WaterUsage1 or other form as agreed in writing by the Environment Agency	05/03/2021
Energy usage	Form Energy1 or other form as agreed in writing by the Environment Agency	05/03/2021
Other performance indicators	Form Performance1 or other form as agreed in writing by the Environment Agency	05/03/2021

Schedule 5 – Notification

These pages outline the information that the operator must provide.

Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the EP Regulations.

Part A

Permit Number	
Name of operator	
Location of Facility	
Time and date of the detection	

(a) Notification requirements for any malfunction, breakdown or failure of equipment or techniques, accident, or emission of a substance not controlled by an emission limit which has caused, is causing or may cause significant pollution	
To be notified within 24 hours of detection	
Date and time of the event	
Reference or description of the location of the event	
Description of where any release into the environment took place	
Substances(s) potentially released	
Best estimate of the quantity or rate of release of substances	
Measures taken, or intended to be taken, to stop any emission	
Description of the failure or accident.	

(b) Notification requirements for the breach of a limit	
To be notified within 24 hours of detection unless otherwise specified below	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value and uncertainty	
Date and time of monitoring	

(b) Notification requirements for the breach of a limit	
To be notified within 24 hours of detection unless otherwise specified below	
Measures taken, or intended to be taken, to stop the emission	

Time periods for notification following detection of a breach of a limit	
Parameter	**Notification period**

(c) Notification requirements for the detection of any significant adverse environmental effect	
To be notified within 24 hours of detection	
Description of where the effect on the environment was detected	
Substances(s) detected	
Concentrations of substances detected	
Date of monitoring/sampling	

Part B – to be submitted as soon as practicable

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission	
The dates of any unauthorised emissions from the facility in the preceding 24 months.	

Name*	
Post	
Signature	
Date	

* authorised to sign on behalf of the operator

Schedule 6 – Interpretation

“accident” means an accident that may result in pollution.

“application” means the application for this permit, together with any additional information supplied by the operator as part of the application and any response to a notice served under Schedule 5 to the EP Regulations.

“authorised officer” means any person authorised by the Environment Agency under section 108(1) of The Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, any power specified in section 108(4) of that Act.

“disposal”. Means any of the operations provided for in Annex I to Directive 2008/98/EC of the European Parliament and of the Council on waste.

“EP Regulations” means The Environmental Permitting (England and Wales) Regulations SI 2016 No.1154 and words and expressions used in this permit which are also used in the Regulations have the same meanings as in those Regulations.

“emissions of substances not controlled by emission limits” means emissions of substances to air, water or land from the activities, either from the emission points specified in schedule 3 or from other localised or diffuse sources, which are not controlled by an emission limit.

“groundwater” means all water, which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

“Industrial Emissions Directive” means DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions

“MCERTS” means the Environment Agency’s Monitoring Certification Scheme.

“Medium Combustion Plant” or ”MCP” means a combustion plant with a rated thermal input equal to or greater than 1 MW but less than 50 MW.

“Medium Combustion Plant Directive” or “MCPD” means Directive 2015/2193/EU of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from medium combustion plants.

“recovery” means any of the operations provided for in Annex II to Directive 2008/98/EC of the European Parliament and of the Council on waste.

“Waste Framework Directive” or “WFD” means Waste Framework Directive 2008/98/EC of the European Parliament and of the Council on waste

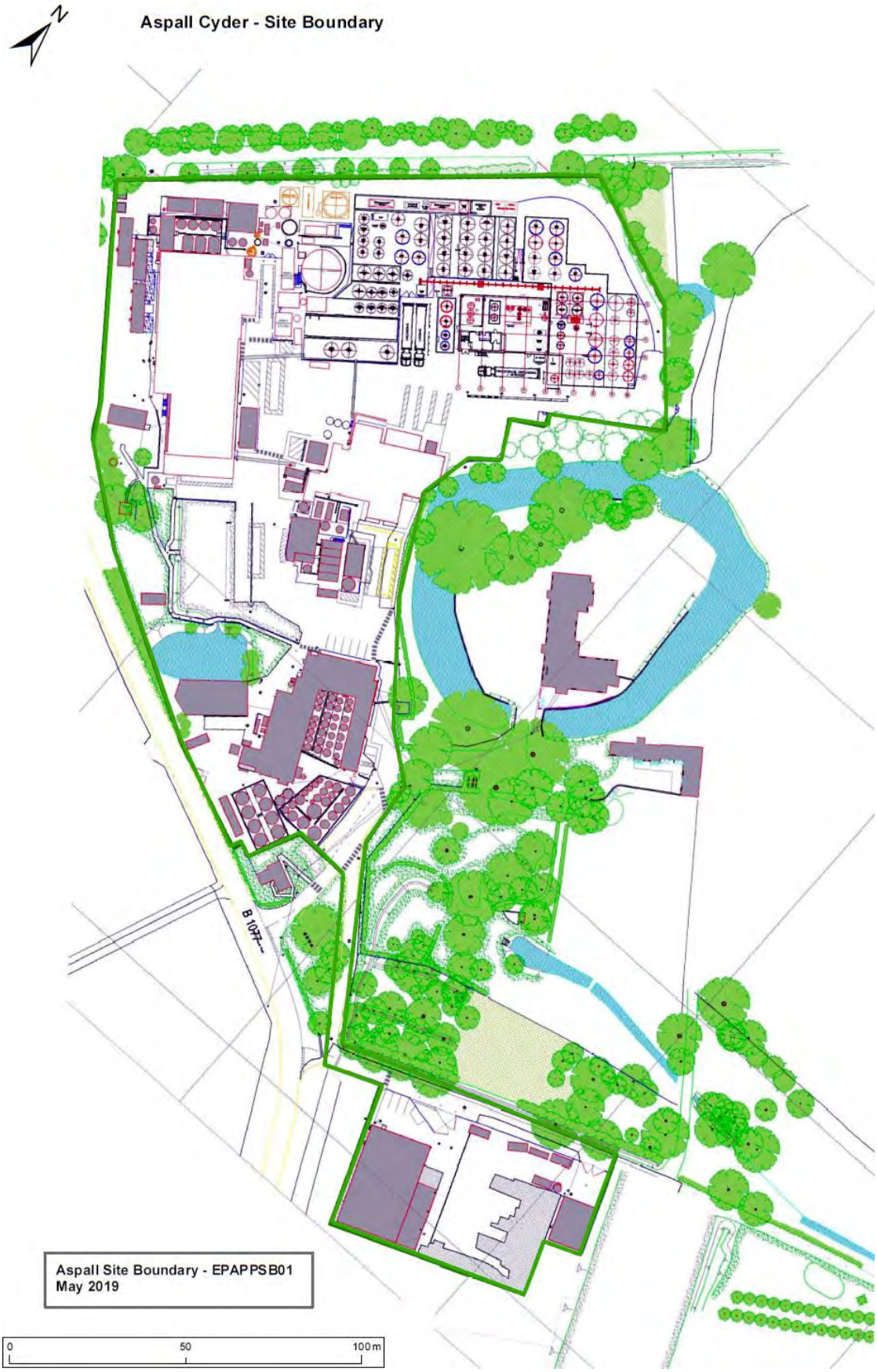
Where a minimum limit is set for any emission parameter, for example pH, reference to exceeding the limit shall mean that the parameter shall not be less than that limit.

Unless otherwise stated, any references in this permit to concentrations of substances in emissions into air means:

- in relation to emissions from combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry for liquid and gaseous fuels, 6% dry for solid fuels; and/or
- in relation to emissions from non-combustion sources, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for water vapour content.

“year” means calendar year ending 31 December.

Schedule 7 – Site plan

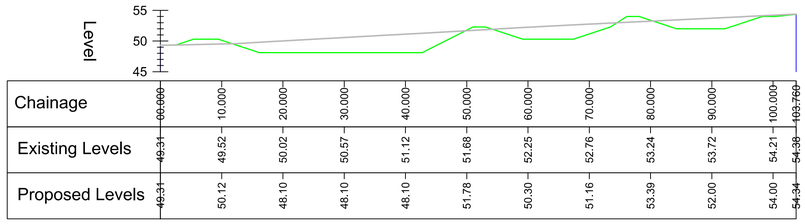


END OF PERMIT

Appendix C Wetland Details

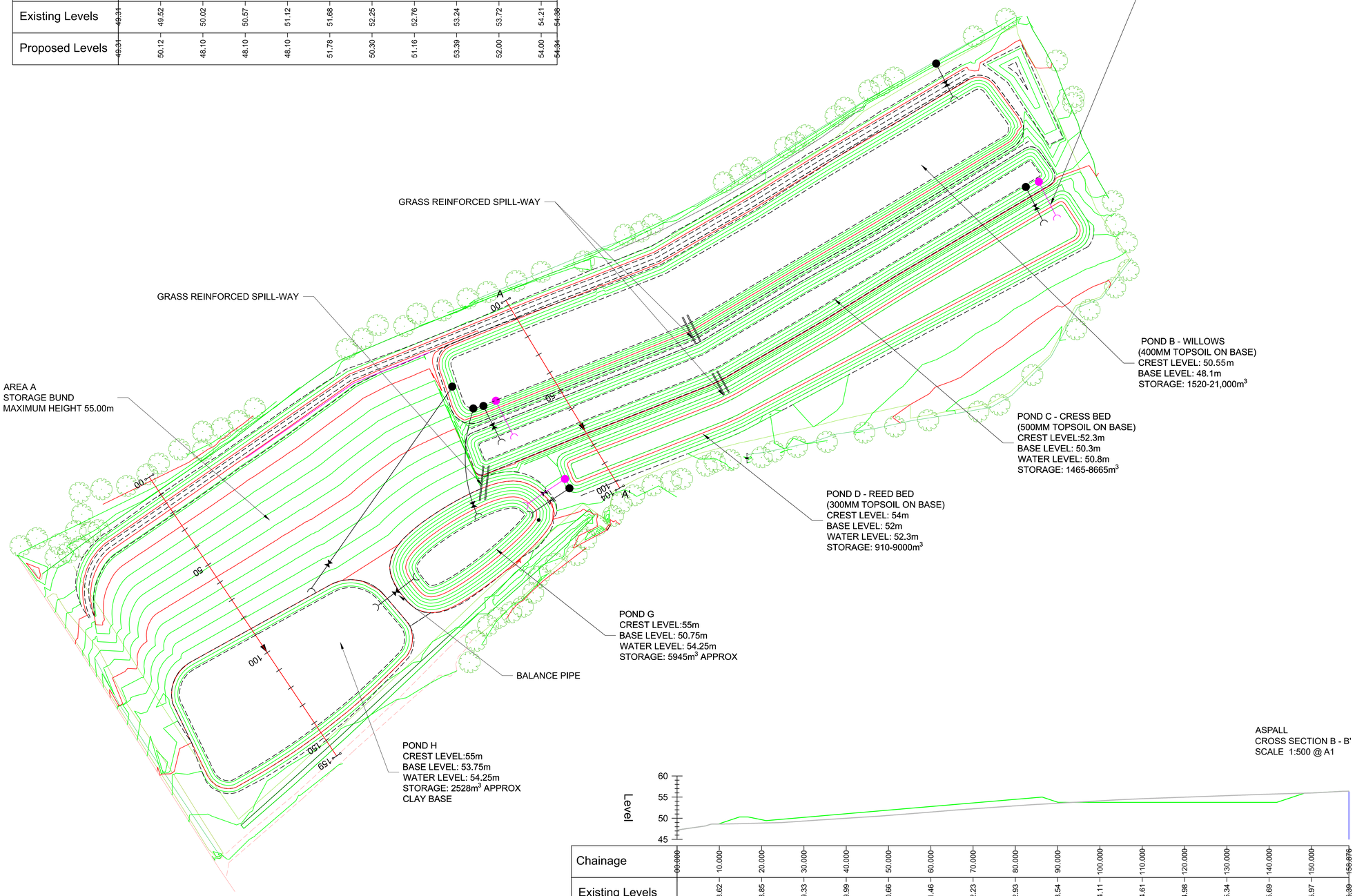
ASPALL
CROSS SECTION A - A'
SCALE 1:500 @ A1

A - A'



Chainage	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	103.760
Existing Levels	49.31	49.52	50.02	50.57	51.12	51.68	52.25	52.76	53.24	53.72	54.21	54.38
Proposed Levels	49.31	50.12	48.10	48.10	48.10	51.78	50.30	51.16	53.39	52.00	54.00	54.34

BESPOKE MANUALLY OPERATED DRAIN VALVES, AND OVERFLOWS
DIAMETER: 150mm. OVERFLOW FITTED WITH FLOATING DEBRIS 'HALO' SCREEN.
OVERFLOWS TO BE SET TO NORMAL DESIGNED TOP WATER LEVEL.
OUTFALLING PIPE TO HAVE A "PUDDLE FLANGE", AND CONCRETED INTO THE BANK.
AT POINT OF OUTFALL WATER TO FALL ONTO A 150MM DEEP GABION MATTRESS
OF NEXT LAGOON, WITH A TERRAM MEMBRANE BELOW TO PREVENT SOIL EROSION.
LOWEST PIPE AND VALVE CONTROL TO EXTEND OUTWARDS TO FALL INTO CENTRAL SECTION OF
ADJOINING WATERCOURSE, AND BE MARKED WITH A WHITE PAINTED MARKER POST.



APPROX. NORTH

ASPALL
SITE SURVEY
SCALE 1:1000 @ A1

0 40 80 Meters

ASPALL
CROSS SECTION B - B'
SCALE 1:500 @ A1

B - B'

Chainage	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	159.876
Existing Levels	48.62	48.85	49.33	49.99	50.66	51.46	52.23	52.93	53.54	54.11	54.61	54.98	55.34	55.69	55.97	56.39	
Proposed Levels	48.71	49.64	50.20	51.06	51.91	52.76	53.61	54.46	53.78	53.75	53.75	53.75	53.75	53.75	55.97	56.39	

LEGEND

- TOP / BOTTOM OF SLOPE
- 2.5m MAJOR CONTOUR
- 0.5m MINOR CONTOURS
- WATER LINE / LEVEL
- BUILDING
- FENCING
- HEDGE
- TREE (DEFINED BY
- BANK TOP
- BANK BOTTOM
- CHANGE OF (HARD) SURFACE
- VERGE / EDGE OF GRASS
- BB — BOTTOM OF BANK
- LOCKABLE VALVE

APPROX. NORTH

REV	DATE	INITIALS	NOTES
REV H	27.09.24	AH	MOVE POND H SOUTH 1M FROM HEDGE) AND TOP BUND 2M AWAY FROM DITCH. GENTLY GRADE AREA A.
REV G	20.09.24	AH	MOVE POND D NORTH 2M AND CREATE 1 BUND
REV F	30.11.23	AH	POND G MAX STORAGE CAPACITY 6000M3
REV E	16.11.23	AH	DESIGN PROPOSAL REVISED
REV D	12.09.23	AH	DESIGN PROPOSAL REVISED
REV C	03.08.23	AH	DESIGN PROPOSAL REVISED
REV B	15.09.22	MP	DESIGN PROPOSAL REVISED
REV A	12.09.22	MP	DESIGN PROPOSAL REVISED
REV -	17.08.22	MP	DESIGN PROPOSAL

SITE: FIELD NORTH OF ASPAL ROAD, ASPALL
CLIENT: ASPALL CIDER
DRAWING TITLE: DESIGN PROPOSAL
DRAWING NUMBER: MWE_22203_ASP_DP_02_09.23
SCALE: AS SHOWN | PAPER SIZE: A1 | DATE: 17.08.22
PROJECT NO.: 22203 | DRAWN BY: MP | REVISION: H
STATUS: SKETCH ☑ PLANNING ☐ CONSTRUCTION ☐
CHECKED BY: MWE ☑ OTHER ☐ NAME:

MILES WATER ENGINEERING
ADDRESS: SCHOOL HOUSE FARM, GREAT ASHFIELD, BURY ST. EDMUNDS, SUFFOLK IP31 3HJ. PHONE: 01359 242356
E-MAIL: CONTACT@MILES-WATER.COM. WEBSITE: WWW.MILES-WATER.COM

\\server03\SharedData\Miles Water Engineering\35. Project Folders\2022\22203 Watts - Aspall\Drawings\MWE Drawings\Drawing 02\MWE_22203_ASP_DP_02_08.22_RevH.dwg

Appendix D Drainage Model Results – Up to the 1 in 1000 year event

617000
617100
617200
617300
617400
265800
265700
265600
265500

J14_Watercourse In
Junction
Pond B to Watercourse
150mm
J13_Pond B Out
Junction
Pond B Area In_Upstream
Junction
Pond B Area In
Open 10000x150mm
Pond B Area In_Downstream
Junction
J7_Pond C In
Junction
Pond D to Pond C
150mm
J6_Pond D Out
Junction
Pond C Area In_Downstream
Junction
Pond C Area In
Open 10000x150mm
Pond C Area In_Upstream
Junction
J12_Pond B In from LS Swale Area
LS Swale Area to Pond B
Junction
J9_Pond B In
Junction
Pond C to Pond B
150mm
J8_Pond C Out
Junction
Pond D Area In_Downstream
Junction
Pond D Area In
Open 10000x150mm
Pond D Area In_Upstream
Junction
J5_Pond D In
Junction
Pond G to Pond D
150mm
J4_Pond G Out
Junction
J3_Pond G Flash In/Out
Junction
Pond G to Pond H
150mm
Pond G Area In_Downstream
Junction
Pond G Area In
Open 10000x150mm

617000
617200
617300
617400
265400
265300
265200

J10_LS Swale Area In
Junction

Land Storage Area In
Open 10000x150mm

Land Storage Area In
Junction

J2_Pond H Flash In/Out
Junction

Cidery Site Area In_Downstream
Junction

Pond G Area In_Upstream
Junction

Cidery Site Area In
2x600mm

Pond H Area In_Downstream
Junction

Pond H Area In
Open 10000x150mm

Pond H Area In_Upstream
Junction

Cidery Site Area In_Upstream
2100mm

Cidery 3 to Cidery Site Area In
600mm

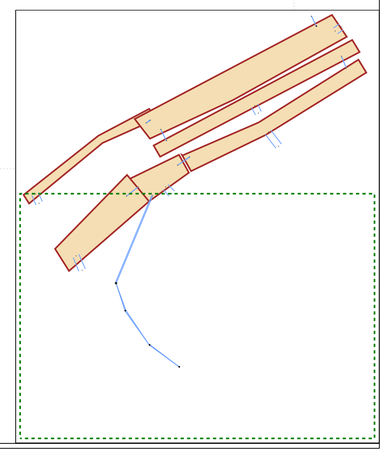
Cidery 3
1200mm

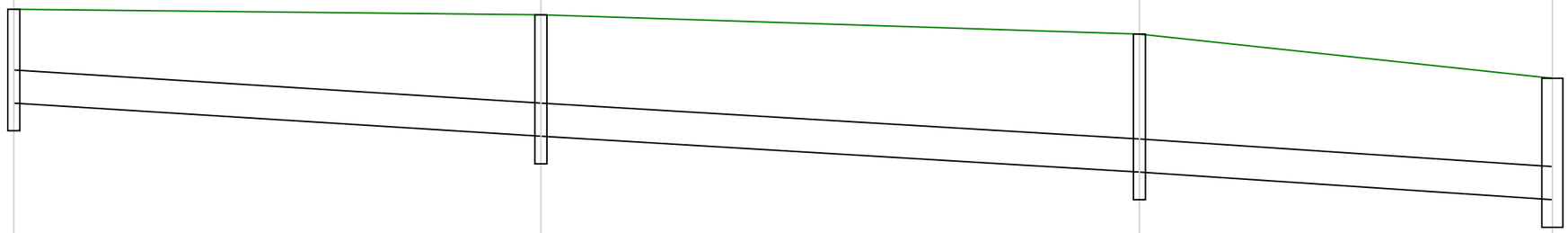
Cidery 2 to 3
600mm

Cidery 2
1200mm

Cidery 1 to 2
600mm

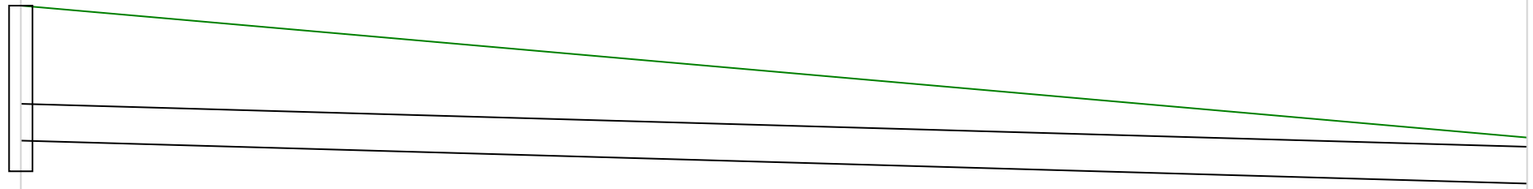
Cidery 1
1200mm





Node Name	Cidery 1	Cidery 2	Cidery 3	Cidery Site Area In_Upstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 44.000				
Link Name	Cidery 1 to 2	Cidery 2 to 3	Cidery 3 to Cidery Site Area In	
Section Type	600mm	600mm	600mm	
Slope (1:X)	87.7	91.9	82.5	
Cover Level (m)	58.400	58.300	57.950	57.150
Invert Level (m)	56.700	56.100 56.100	55.450 55.450	54.950
Length (m)	52.634	59.767	41.230	

Node Name	Cidery Site Area In_Upstream	Cidery Site Area In_Downstream



A3 drawing

Hor Scale 550
Ver Scale 100

Datum (m) 43.000

Link Name	Cidery Site Area In
Section Type	2x600mm
Slope (1:X)	193.0
Cover Level (m)	57.150 / 55.000
Invert Level (m)	54.950 / 54.250
Length (m)	135.082

Node Name		Pond D Area In_Upstream	Pond D Area In_Downstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 41.000			
Link Name		Pond D Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		25.0	
Cover Level (m)		55.000	54.000
Invert Level (m)		54.850	53.850
Length (m)		25.025	

Node Name		Pond H Area In_Upstream	Pond H Area In_Downstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 43.000			
Link Name		Pond H Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		44.0	
Cover Level (m)		55.500	55.000
Invert Level (m)		55.350	54.850
Length (m)		22.020	

Node Name		j2_Pond H Flash In/Out	j3_Pond G Flash In/Out

A3 drawing

Hor Scale 550
Ver Scale 100

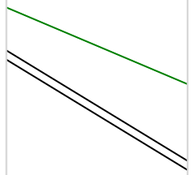
Datum (m) 42.000

Link Name	Pond G to Pond H
Section Type	150mm
Slope (1:X)	2140.1
Cover Level (m)	55.000 / 55.000
Invert Level (m)	54.250 / 54.240
Length (m)	21.401

Node Name		j4_Pond G Out	j5_Pond D In
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 41.000			
Link Name		Pond G to Pond D	
Section Type		150mm	
Slope (1:X)		42.5	
Cover Level (m)		55.000	54.000
Invert Level (m)		54.240	53.750
Length (m)		20.809	

Node Name		J6_Pond D Out	J7_Pond C In
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 40.000	Link Name	Pond D to Pond C	
	Section Type	150mm	
	Slope (1:X)	3677.0	
	Cover Level (m)	54.000	54.000
	Invert Level (m)	52.300	52.295
	Length (m)	18.385	

Node Name		J8_Pond C Out	J9_Pond B In
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 39.000			
Link Name		Pond C to Pond B	
Section Type		150mm	
Slope (1:X)		3618.0	
Cover Level (m)		52.300	52.300
Invert Level (m)		50.800	50.795
Length (m)		18.090	

Node Name		j13_Pond B Out	j14_Watercourse In
			
Link Name		Pond B to Watercourse	
Section Type		150mm	
Slope (1:X)		9.0	
Cover Level (m)		50.550	49.300
Invert Level (m)		49.700	47.900
Length (m)		16.245	

A3 drawing

Hor Scale 550
Ver Scale 100

Datum (m) 37.000

Node Name		Land Storage Area In	J10_LS Swale Area In
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 39.000			
Link Name		Land Storage Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		8.4	
Cover Level (m)		52.000	50.550
Invert Level (m)		51.850	50.150
Length (m)		14.225	

Node Name		Pond G Area In_Upstream	Pond G Area In_Downstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 43.000			
Link Name		Pond G Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		25.8	
Cover Level (m)		55.500	55.000
Invert Level (m)		55.350	54.850
Length (m)		12.914	

Node Name		Pond C Area In_Upstream	Pond C Area In_Downstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 40.000			
Link Name		Pond C Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		3.8	
Cover Level (m)		54.000	52.300
Invert Level (m)		53.850	50.800
Length (m)		11.678	

Node Name		Pond B Area In_Upstream	Pond B Area In_Downstream
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 38.000			
Link Name		Pond B Area In	
Section Type		Open 10000x150mm	
Slope (1:X)		34.5	
Cover Level (m)		50.550	50.550
Invert Level (m)		50.000	49.700
Length (m)		10.336	

Node Name		J11_LS Swale Area Out	J12_Pond B In from LS Swale Area
A3 drawing Hor Scale 550 Ver Scale 100 Datum (m) 38.000			
Link Name		LS Swale Area to Pond B	
Section Type		Open 1000x150mm	
Slope (1:X)		7211.1	
Cover Level (m)		50.550	50.550
Invert Level (m)		50.150	50.149
Length (m)		7.211	

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.500
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	1.000	Connection Type	Level Inverts		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	499	1350	749	1500	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75	Velocity	Manning
Barrels	1	Follow Ground	x	ks (mm) / n	0.010

Available Diameters (mm)

100 150

Swale Link Type

Shape	Open User Defined	Width (mm)	1000	Follow Ground	✓	ks (mm) / n	0.030
Barrels	1	Auto Increment (mm)	100	Velocity	Manning		

Available Diameters (mm)

150

Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total
0.000	1.000	0.100	0.000	0.900	0.000	1.000	1.000

Swale 2 Link Type

Shape	Open User Defined	Width (mm)	10000	Follow Ground	✓	ks (mm) / n	0.030
Barrels	1	Auto Increment (mm)	100	Velocity	Manning		

Available Diameters (mm)

150

Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total
0.000	1.000	0.100	0.000	0.900	0.000	1.000	1.000

Double Barrel Link Type

Shape	Circular	Barrels	2	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

150

sFa8 Link Type Group

Link Type	Link Type
Highway	Private

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
Pond H Area In_Downstream			55.000			616989.000	265406.000	0.739
J2_Pond H Flash In/Out		5.00	55.000			617061.000	265491.000	0.750
J3_Pond G Flash In/Out			55.000			617078.000	265504.000	0.760
J4_Pond G Out		5.00	55.000			617134.000	265535.000	0.760
J5_Pond D In			54.000			617151.000	265547.000	1.674
J6_Pond D Out		5.00	54.000			617375.000	265673.000	1.700
J7_Pond C In			54.000			617368.000	265690.000	3.171
J8_Pond C Out		5.00	52.300			617118.441	265570.000	1.500
J9_Pond B In			52.300			617110.000	265586.000	2.571

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
J13_Pond B Out		5.00	50.550			617332.441	265732.559	0.850
J14_Watercourse In			49.300			617325.000	265747.000	1.400
J11_LS Swale Area Out		5.00	50.550			617089.000	265595.000	0.400
J12_Pond B In from LS Swale Area			50.550			617095.000	265599.000	0.821
J10_LS Swale Area In			50.550			616931.000	265494.000	0.400
Pond H Area In_Upstream	0.075	5.00	55.500			616997.593	265385.726	0.150
Land Storage Area In	0.433	5.00	52.000			616936.329	265480.811	0.150
Pond G Area In_Upstream	0.054	5.00	55.500			617125.610	265494.607	0.150
Pond G Area In_Downstream			55.000			617116.863	265504.107	0.753
Pond D Area In_Upstream	0.282	5.00	55.000			617278.311	265561.943	0.150
Pond D Area In_Downstream			54.000			617263.828	265582.351	1.674
Pond C Area In_Upstream	0.069	5.00	54.000			617249.481	265609.290	0.150
Pond C Area In_Downstream			52.300			617244.258	265619.735	1.500
Pond B Area In_Upstream	0.095	5.00	50.550			617367.481	265731.937	0.550
Pond B Area In_Downstream			50.550			617359.028	265725.989	0.850
Cidery Site Area In_Downstream			55.000			617098.167	265491.821	0.753
Cidery Site Area In_Upstream	0.500	5.00	57.150	2100	0.500	617046.095	265367.179	2.700
Cidery 3	0.500	5.00	57.950	1200	0.500	617059.358	265328.140	3.000
Cidery 2	0.500	5.00	58.300	1200	0.500	617093.958	265279.407	2.700
Cidery 1	0.500	5.00	58.400	1200	0.500	617136.356	265248.218	2.200

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
Pond G to Pond H	J2_Pond H Flash In/Out	J3_Pond G Flash In/Out	21.401	0.010	54.250	54.240	0.010	2140.1	150	6.47	50.0
Pond G to Pond D	J4_Pond G Out	J5_Pond D In	20.809	0.010	54.240	53.750	0.490	42.5	150	5.20	50.0
Pond C to Pond B	J8_Pond C Out	J9_Pond B In	18.090	0.010	50.800	50.795	0.005	3618.0	150	6.62	50.0
Pond D to Pond C	J6_Pond D Out	J7_Pond C In	18.385	0.010	52.300	52.295	0.005	3677.0	150	6.66	50.0
Pond B to Watercourse	J13_Pond B Out	J14_Watercourse In	16.245	0.010	49.700	47.900	1.800	9.0	150	5.07	50.0
LS Swale Area to Pond B	J11_LS Swale Area Out	J12_Pond B In from LS Swale Area	7.211	0.030	50.150	50.149	0.001	7211.1	150	6.28	50.0
Pond H Area In	Pond H Area In_Upstream	Pond H Area In_Downstream	22.020	0.030	55.350	54.850	0.500	44.0	150	5.28	50.0
Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	14.225	0.030	51.850	50.150	1.700	8.4	150	5.08	50.0
Pond G Area In	Pond G Area In_Upstream	Pond G Area In_Downstream	12.914	0.030	55.350	54.850	0.500	25.8	150	5.12	50.0
Pond D Area In	Pond D Area In_Upstream	Pond D Area In_Downstream	25.025	0.030	54.850	53.850	1.000	25.0	150	5.24	50.0
Pond C Area In	Pond C Area In_Upstream	Pond C Area In_Downstream	11.678	0.030	53.850	50.800	3.050	3.8	150	5.04	50.0
Pond B Area In	Pond B Area In_Upstream	Pond B Area In_Downstream	10.336	0.030	50.000	49.700	0.300	34.5	150	5.12	50.0
Cidery Site Area In	Cidery Site Area In_Upstream	Cidery Site Area In_Downstream	135.082	0.010	54.950	54.250	0.700	193.0	600	6.96	50.0
Cidery 1 to 2	Cidery 1	Cidery 2	52.634	0.010	56.700	56.100	0.600	87.7	600	5.29	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
Pond G to Pond H	0.242	4.3	0.0	0.600	0.610	0.000	0.0	0	0.000
Pond G to Pond D	1.719	30.4	0.0	0.610	0.100	0.000	0.0	0	0.000
Pond C to Pond B	0.186	3.3	0.0	1.350	1.355	0.000	0.0	0	0.000
Pond D to Pond C	0.185	3.3	0.0	1.550	1.555	0.000	0.0	0	0.000
Pond B to Watercourse	3.729	65.9	0.0	0.700	1.250	0.000	0.0	0	0.000
LS Swale Area to Pond B	0.094	12.6	0.0	0.250	0.251	0.000	0.0	0	0.000
Pond H Area In	1.320	1781.8	13.5	0.000	0.000	0.075	0.0	8	0.208
Land Storage Area In	3.028	4087.8	78.2	0.000	0.250	0.433	0.0	14	0.675
Pond G Area In	1.724	2326.8	9.8	0.000	0.000	0.054	0.0	6	0.205
Pond D Area In	1.751	2363.8	51.0	0.000	0.000	0.282	0.0	16	0.411
Pond C Area In	4.476	6043.0	12.4	0.000	1.350	0.069	0.0	4	0.415
Pond B Area In	1.492	2014.5	17.2	0.400	0.700	0.095	0.0	9	0.246
Cidery Site Area In	2.032	1149.2	361.4	1.600	0.150	2.000	0.0	231	1.799
Cidery 1 to 2	3.014	852.2	90.4	1.100	1.600	0.500	0.0	132	1.962

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
Cidery 2 to 3	Cidery 2	Cidery 3	59.767	0.010	56.100	55.450	0.650	91.9	600	5.63	50.0
Cidery 3 to Cidery Site Area In	Cidery 3	Cidery Site Area In_Upstream	41.230	0.010	55.450	54.950	0.500	82.5	600	5.85	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
Cidery 2 to 3	2.944	832.4	180.7	1.600	1.900	1.000	0.0	190	2.354
Cidery 3 to Cidery Site Area In	3.109	879.0	271.1	1.900	1.600	1.500	0.0	229	2.739

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
Pond G to Pond H	21.401	2140.1	150	Circular	55.000	54.250	0.600	55.000	54.240	0.610
Pond G to Pond D	20.809	42.5	150	Circular	55.000	54.240	0.610	54.000	53.750	0.100
Pond C to Pond B	18.090	3618.0	150	Circular	52.300	50.800	1.350	52.300	50.795	1.355
Pond D to Pond C	18.385	3677.0	150	Circular	54.000	52.300	1.550	54.000	52.295	1.555
Pond B to Watercourse	16.245	9.0	150	Circular	50.550	49.700	0.700	49.300	47.900	1.250
LS Swale Area to Pond B	7.211	7211.1	150	Swale	50.550	50.150	0.250	50.550	50.149	0.251
Pond H Area In	22.020	44.0	150	Swale 2	55.500	55.350	0.000	55.000	54.850	0.000
Land Storage Area In	14.225	8.4	150	Swale 2	52.000	51.850	0.000	50.550	50.150	0.250

Link	US Node	Dia (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Sump (m)	Node Type	MH Type
Pond G to Pond H	J2_Pond H Flash In/Out			Junction		J3_Pond G Flash In/Out			Junction	
Pond G to Pond D	J4_Pond G Out			Junction		J5_Pond D In			Junction	
Pond C to Pond B	J8_Pond C Out			Junction		J9_Pond B In			Junction	
Pond D to Pond C	J6_Pond D Out			Junction		J7_Pond C In			Junction	
Pond B to Watercourse	J13_Pond B Out			Junction		J14_Watercourse In			Junction	
LS Swale Area to Pond B	J11_LS Swale Area Out			Junction		J12_Pond B In from LS Swale Area			Junction	
Pond H Area In	Pond H Area In_Upstream			Junction		Pond H Area In_Downstream			Junction	
Land Storage Area In	Land Storage Area In			Junction		J10_LS Swale Area In			Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
Pond G Area In	12.914	25.8	150	Swale 2	55.500	55.350	0.000	55.000	54.850	0.000
Pond D Area In	25.025	25.0	150	Swale 2	55.000	54.850	0.000	54.000	53.850	0.000
Pond C Area In	11.678	3.8	150	Swale 2	54.000	53.850	0.000	52.300	50.800	1.350
Pond B Area In	10.336	34.5	150	Swale 2	50.550	50.000	0.400	50.550	49.700	0.700
Cidery Site Area In	135.082	193.0	600	Double Barrel	57.150	54.950	1.600	55.000	54.250	0.150
Cidery 1 to 2	52.634	87.7	600	Circular	58.400	56.700	1.100	58.300	56.100	1.600
Cidery 2 to 3	59.767	91.9	600	Circular	58.300	56.100	1.600	57.950	55.450	1.900
Cidery 3 to Cidery Site Area In	41.230	82.5	600	Circular	57.950	55.450	1.900	57.150	54.950	1.600

Link	US Node	Dia (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Sump (m)	Node Type	MH Type
Pond G Area In	Pond G Area In_Upstream			Junction		Pond G Area In_Downstream			Junction	
Pond D Area In	Pond D Area In_Upstream			Junction		Pond D Area In_Downstream			Junction	
Pond C Area In	Pond C Area In_Upstream			Junction		Pond C Area In_Downstream			Junction	
Pond B Area In	Pond B Area In_Upstream			Junction		Pond B Area In_Downstream			Junction	
Cidery Site Area In	Cidery Site Area In_Upstream	2100	0.500	Manhole	Adoptable	Cidery Site Area In_Downstream			Junction	
Cidery 1 to 2	Cidery 1	1200	0.500	Manhole	Adoptable	Cidery 2	1200	0.500	Manhole	Adoptable
Cidery 2 to 3	Cidery 2	1200	0.500	Manhole	Adoptable	Cidery 3	1200	0.500	Manhole	Adoptable
Cidery 3 to Cidery Site Area In	Cidery 3	1200	0.500	Manhole	Adoptable	Cidery Site Area In_Upstream	2100	0.500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Pond H Area In_Downstream	616989.000	265406.000	55.000	0.739			1	Pond H Area In	54.850	150
J2_Pond H Flash In/Out	617061.000	265491.000	55.000	0.750			0	Pond G to Pond H	54.250	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
J3_Pond G Flash In/Out	617078.000	265504.000	55.000	0.760			1	Pond G to Pond H	54.240	150
J4_Pond G Out	617134.000	265535.000	55.000	0.760			0	Pond G to Pond D	54.240	150
J5_Pond D In	617151.000	265547.000	54.000	1.674			1	Pond G to Pond D	53.750	150
J6_Pond D Out	617375.000	265673.000	54.000	1.700			0	Pond D to Pond C	52.300	150
J7_Pond C In	617368.000	265690.000	54.000	3.171			1	Pond D to Pond C	52.295	150
J8_Pond C Out	617118.441	265570.000	52.300	1.500			0	Pond C to Pond B	50.800	150
J9_Pond B In	617110.000	265586.000	52.300	2.571			1	Pond C to Pond B	50.795	150
J13_Pond B Out	617332.441	265732.559	50.550	0.850			0	Pond B to Watercourse	49.700	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
J14_Watercourse In	617325.000	265747.000	49.300	1.400			1	Pond B to Watercourse	47.900	150
										
J11_LS Swale Area Out	617089.000	265595.000	50.550	0.400						
							0	LS Swale Area to Pond B	50.150	150
J12_Pond B In from LS Swale Area	617095.000	265599.000	50.550	0.821			1	LS Swale Area to Pond B	50.149	150
										
J10_LS Swale Area In	616931.000	265494.000	50.550	0.400			1	Land Storage Area In	50.150	150
										
Pond H Area In_Upstream	616997.593	265385.726	55.500	0.150						
							0	Pond H Area In	55.350	150
Land Storage Area In	616936.329	265480.811	52.000	0.150						
							0	Land Storage Area In	51.850	150
Pond G Area In_Upstream	617125.610	265494.607	55.500	0.150						
							0	Pond G Area In	55.350	150
Pond G Area In_Downstream	617116.863	265504.107	55.000	0.753			1	Pond G Area In	54.850	150
										

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Pond D Area In_Upstream	617278.311	265561.943	55.000	0.150			 0	Pond D Area In	54.850	150
Pond D Area In_Downstream	617263.828	265582.351	54.000	1.674			1 	Pond D Area In	53.850	150
Pond C Area In_Upstream	617249.481	265609.290	54.000	0.150			 0	Pond C Area In	53.850	150
Pond C Area In_Downstream	617244.258	265619.735	52.300	1.500			1 	Pond C Area In	50.800	150
Pond B Area In_Upstream	617367.481	265731.937	50.550	0.550			 0	Pond B Area In	50.000	150
Pond B Area In_Downstream	617359.028	265725.989	50.550	0.850			1 	Pond B Area In	49.700	150
Cidery Site Area In_Downstream	617098.167	265491.821	55.000	0.753			1 	Cidery Site Area In	54.250	600
Cidery Site Area In_Upstream	617046.095	265367.179	57.150	2.700	2100	0.500	 1 0	Cidery 3 to Cidery Site Area In Cidery Site Area In	54.950 54.950	600 600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Cidery 3	617059.358	265328.140	57.950	3.000	1200	0.500	1	Cidery 2 to 3	55.450	600
							0	Cidery 3 to Cidery Site Area In	55.450	600
Cidery 2	617093.958	265279.407	58.300	2.700	1200	0.500	1	Cidery 1 to 2	56.100	600
							0	Cidery 2 to 3	56.100	600
Cidery 1	617136.356	265248.218	58.400	2.200	1200	0.500	0	Cidery 1 to 2	56.700	600

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)		100 year (l/s)	82.8
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	1.000	Drain Down Time (mins)	240	2 year (l/s)	20.7		
Winter CV	1.000	Additional Storage (m³/ha)	20.0	30 year (l/s)	59.3		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	0	0
30	0	0	0	1000	0	0	0
100	0	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	BFIHost	0.310	Growth Factor 100 year	2.48	Q 30 year (l/s)	
Greenfield Method	FEH	Region	5	Betterment (%)	0	Q 100 year (l/s)	
Positively Drained Area (ha)	6.388	QBar/QMed conversion factor	1.124	QMed	20.7		
SAAR (mm)	614	Growth Factor 1 year	0.85	QBar	23.3		
Host	24	Growth Factor 30 year	1.95	Q 1 year (l/s)			

Node J13_Pond B Out Online Orifice Control

Flap Valve	x	Invert Level (m)	49.700	Design Flow (l/s)	0.5	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Depth (m)	0.850	Diameter (m)	0.016		

Node J2_Pond H Flash In/Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	111.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.250	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

Pond H Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	5630.0	0.0	0.750	6371.0	0.0

Node J4_Pond G Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	67.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.240	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)	320	Main Channel n	0.035

Inlets

J3_Pond G Flash In/Out	Cidery Site Area In_Downstream	Pond G Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2469.0	0.0	0.750	2929.0	0.0

Node J6_Pond D Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	261.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.300	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J5_Pond D In | Pond D Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3257.0	0.0	1.700	6239.0	0.0

Node J8_Pond C Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	293.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	50.800	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J7_Pond C In | Pond C Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3309.0	0.0	1.500	6195.0	0.0

Node J13_Pond B Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	293.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	49.700	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J12_Pond B In from LS Swale Area | J9_Pond B In | Pond B Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	9650.0	0.0	0.850	12330.0	0.0

Node J11_LS Swale Area Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	196.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	50.150	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)	200	Main Channel n	0.035

Inlets

J10_LS Swale Area In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2458.0	0.0	0.400	2992.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	100.838	28.534	2 year 360 minute summer	15.101	3.886
2 year 15 minute winter	70.764	28.534	2 year 360 minute winter	9.816	3.886
2 year 30 minute summer	64.210	18.169	2 year 480 minute summer	11.821	3.124
2 year 30 minute winter	45.060	18.169	2 year 480 minute winter	7.853	3.124
2 year 60 minute summer	42.323	11.185	2 year 600 minute summer	9.601	2.626
2 year 60 minute winter	28.118	11.185	2 year 600 minute winter	6.560	2.626
2 year 120 minute summer	30.243	7.992	2 year 720 minute summer	8.487	2.275
2 year 120 minute winter	20.093	7.992	2 year 720 minute winter	5.704	2.275
2 year 180 minute summer	24.341	6.264	2 year 960 minute summer	6.877	1.811
2 year 180 minute winter	15.822	6.264	2 year 960 minute winter	4.556	1.811
2 year 240 minute summer	19.611	5.183	2 year 1440 minute summer	4.920	1.319
2 year 240 minute winter	13.029	5.183	2 year 1440 minute winter	3.306	1.319

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 2160 minute summer	3.502	0.968
2 year 2160 minute winter	2.413	0.968
2 year 2880 minute summer	2.925	0.784
2 year 2880 minute winter	1.966	0.784
2 year 4320 minute summer	2.277	0.595
2 year 4320 minute winter	1.500	0.595
2 year 5760 minute summer	1.944	0.498
2 year 5760 minute winter	1.258	0.498
2 year 7200 minute summer	1.717	0.438
2 year 7200 minute winter	1.108	0.438
2 year 8640 minute summer	1.558	0.397
2 year 8640 minute winter	1.005	0.397
2 year 10080 minute summer	1.443	0.368
2 year 10080 minute winter	0.931	0.368
30 year 15 minute summer	275.411	77.932
30 year 15 minute winter	193.271	77.932
30 year 30 minute summer	177.653	50.270
30 year 30 minute winter	124.669	50.270
30 year 60 minute summer	117.372	31.018
30 year 60 minute winter	77.979	31.018
30 year 120 minute summer	72.137	19.064
30 year 120 minute winter	47.926	19.064
30 year 180 minute summer	54.733	14.085
30 year 180 minute winter	35.578	14.085
30 year 240 minute summer	42.665	11.275
30 year 240 minute winter	28.346	11.275
30 year 360 minute summer	31.668	8.149
30 year 360 minute winter	20.585	8.149
30 year 480 minute summer	24.355	6.436
30 year 480 minute winter	16.181	6.436
30 year 600 minute summer	19.553	5.348
30 year 600 minute winter	13.360	5.348
30 year 720 minute summer	17.134	4.592
30 year 720 minute winter	11.515	4.592
30 year 960 minute summer	13.692	3.605
30 year 960 minute winter	9.070	3.605
30 year 1440 minute summer	9.587	2.569
30 year 1440 minute winter	6.443	2.569
30 year 2160 minute summer	6.652	1.838
30 year 2160 minute winter	4.584	1.838
30 year 2880 minute summer	5.438	1.458
30 year 2880 minute winter	3.655	1.458
30 year 4320 minute summer	4.074	1.065
30 year 4320 minute winter	2.683	1.065
30 year 5760 minute summer	3.367	0.862
30 year 5760 minute winter	2.179	0.862
30 year 7200 minute summer	2.891	0.737
30 year 7200 minute winter	1.866	0.737
30 year 8640 minute summer	2.560	0.653
30 year 8640 minute winter	1.652	0.653
30 year 10080 minute summer	2.321	0.592
30 year 10080 minute winter	1.498	0.592
100 year 15 minute summer	348.035	98.482
100 year 15 minute winter	244.235	98.482
100 year 30 minute summer	226.683	64.143
100 year 30 minute winter	159.076	64.143
100 year 60 minute summer	150.612	39.802
100 year 60 minute winter	100.063	39.802
100 year 120 minute summer	90.501	23.917
100 year 120 minute winter	60.126	23.917
100 year 180 minute summer	68.115	17.528
100 year 180 minute winter	44.276	17.528
100 year 240 minute summer	52.942	13.991
100 year 240 minute winter	35.174	13.991

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 360 minute summer	39.322	10.119
100 year 360 minute winter	25.560	10.119
100 year 480 minute summer	30.323	8.014
100 year 480 minute winter	20.146	8.014
100 year 600 minute summer	24.425	6.681
100 year 600 minute winter	16.689	6.681
100 year 720 minute summer	21.478	5.756
100 year 720 minute winter	14.434	5.756
100 year 960 minute summer	17.287	4.552
100 year 960 minute winter	11.451	4.552
100 year 1440 minute summer	12.216	3.274
100 year 1440 minute winter	8.210	3.274
100 year 2160 minute summer	8.494	2.347
100 year 2160 minute winter	5.853	2.347
100 year 2880 minute summer	6.918	1.854
100 year 2880 minute winter	4.649	1.854
100 year 4320 minute summer	5.092	1.331
100 year 4320 minute winter	3.353	1.331
100 year 5760 minute summer	4.132	1.058
100 year 5760 minute winter	2.674	1.058
100 year 7200 minute summer	3.493	0.891
100 year 7200 minute winter	2.254	0.891
100 year 8640 minute summer	3.050	0.778
100 year 8640 minute winter	1.969	0.778
100 year 10080 minute summer	2.731	0.697
100 year 10080 minute winter	1.763	0.697
100 year +45% CC 15 minute summer	504.651	142.799
100 year +45% CC 15 minute winter	354.141	142.799
100 year +45% CC 30 minute summer	328.690	93.008
100 year +45% CC 30 minute winter	230.660	93.008
100 year +45% CC 60 minute summer	218.388	57.713
100 year +45% CC 60 minute winter	145.092	57.713
100 year +45% CC 120 minute summer	131.226	34.679
100 year +45% CC 120 minute winter	87.183	34.679
100 year +45% CC 180 minute summer	98.766	25.416
100 year +45% CC 180 minute winter	64.201	25.416
100 year +45% CC 240 minute summer	76.766	20.287
100 year +45% CC 240 minute winter	51.002	20.287
100 year +45% CC 360 minute summer	57.017	14.672
100 year +45% CC 360 minute winter	37.062	14.672
100 year +45% CC 480 minute summer	43.969	11.620
100 year +45% CC 480 minute winter	29.212	11.620
100 year +45% CC 600 minute summer	35.417	9.687
100 year +45% CC 600 minute winter	24.199	9.687
100 year +45% CC 720 minute summer	31.143	8.347
100 year +45% CC 720 minute winter	20.930	8.347
100 year +45% CC 960 minute summer	25.066	6.601
100 year +45% CC 960 minute winter	16.604	6.601
100 year +45% CC 1440 minute summer	17.713	4.747
100 year +45% CC 1440 minute winter	11.904	4.747
100 year +45% CC 2160 minute summer	12.317	3.404
100 year +45% CC 2160 minute winter	8.486	3.404
100 year +45% CC 2880 minute summer	10.031	2.688
100 year +45% CC 2880 minute winter	6.741	2.688
100 year +45% CC 4320 minute summer	7.383	1.930
100 year +45% CC 4320 minute winter	4.862	1.930
100 year +45% CC 5760 minute summer	5.992	1.534
100 year +45% CC 5760 minute winter	3.878	1.534
100 year +45% CC 7200 minute summer	5.065	1.292
100 year +45% CC 7200 minute winter	3.269	1.292
100 year +45% CC 8640 minute summer	4.423	1.128
100 year +45% CC 8640 minute winter	2.855	1.128
100 year +45% CC 10080 minute summer	3.960	1.010
100 year +45% CC 10080 minute winter	2.556	1.010

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1000 year 15 minute summer	513.972	145.436	1000 year 720 minute winter	26.802	10.688
1000 year 15 minute winter	360.682	145.436	1000 year 960 minute summer	32.827	8.644
1000 year 30 minute summer	340.370	96.313	1000 year 960 minute winter	21.745	8.644
1000 year 30 minute winter	238.856	96.313	1000 year 1440 minute summer	23.593	6.323
1000 year 60 minute summer	228.000	60.254	1000 year 1440 minute winter	15.856	6.323
1000 year 60 minute winter	151.478	60.254	1000 year 2160 minute summer	16.391	4.530
1000 year 120 minute summer	137.873	36.436	1000 year 2160 minute winter	11.294	4.530
1000 year 120 minute winter	91.600	36.436	1000 year 2880 minute summer	13.188	3.535
1000 year 180 minute summer	106.649	27.444	1000 year 2880 minute winter	8.863	3.535
1000 year 180 minute winter	69.325	27.444	1000 year 4320 minute summer	9.415	2.461
1000 year 240 minute summer	85.348	22.555	1000 year 4320 minute winter	6.200	2.461
1000 year 240 minute winter	56.703	22.555	1000 year 5760 minute summer	7.384	1.890
1000 year 360 minute summer	66.882	17.211	1000 year 5760 minute winter	4.779	1.890
1000 year 360 minute winter	43.475	17.211	1000 year 7200 minute summer	6.013	1.534
1000 year 480 minute summer	53.675	14.185	1000 year 7200 minute winter	3.881	1.534
1000 year 480 minute winter	35.660	14.185	1000 year 8640 minute summer	5.062	1.291
1000 year 600 minute summer	44.458	12.160	1000 year 8640 minute winter	3.267	1.291
1000 year 600 minute winter	30.376	12.160	1000 year 10080 minute summer	4.373	1.115
1000 year 720 minute summer	39.880	10.688	1000 year 10080 minute winter	2.822	1.115

Results for 2 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	Pond H Area In_Downstream	6540	54.271	0.010	0.4	0.0000	0.0000	OK
10080 minute summer	J2_Pond H Flash In/Out	6540	54.271	0.021	0.7	0.0000	0.0000	OK
360 minute summer	J3_Pond G Flash In/Out	232	54.344	0.104	3.3	0.0000	0.0000	OK
240 minute summer	J4_Pond G Out	160	54.351	0.111	63.3	0.0000	0.0000	OK
2160 minute summer	J5_Pond D In	1500	52.430	0.104	15.3	0.0000	0.0000	OK
2160 minute summer	J6_Pond D Out	1500	52.428	0.128	11.1	0.0000	0.0000	OK
5760 minute summer	J7_Pond C In	3540	50.945	0.116	7.2	0.0000	0.0000	OK
8640 minute summer	J8_Pond C Out	5460	50.907	0.107	6.0	0.0000	0.0000	OK
10080 minute summer	J9_Pond B In	10320	49.857	0.127	5.6	0.0000	0.0000	OK
10080 minute summer	J13_Pond B Out	10320	49.856	0.156	3.9	0.0000	0.0000	SURCHARGED
10080 minute summer	J14_Watercourse In	10320	47.906	0.006	0.2	0.0000	0.0000	OK
480 minute summer	J11_LS Swale Area Out	344	50.190	0.040	10.8	0.0000	0.0000	OK
10080 minute summer	J12_Pond B In from LS Swale Area	10320	49.856	0.127	1.6	0.0000	0.0000	OK
180 minute summer	J10_LS Swale Area In	116	50.207	0.057	27.3	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.358	0.008	12.3	0.0797	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
10080 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	0.3	0.001	0.000	88.2470	
10080 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-0.6	-0.208	-0.131	0.0629	
360 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	49.3	0.020	0.011	269.5623	
240 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	27.2	1.942	0.895	0.2913	
2160 minute summer	J5_Pond D In	Flow through pond	J6_Pond D Out	11.1	0.015	0.002	385.4305	
2160 minute summer	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	7.7	0.593	2.373	0.2359	
5760 minute summer	J7_Pond C In	Flow through pond	J8_Pond C Out	5.9	0.010	0.000	306.5737	
8640 minute summer	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	5.6	0.528	1.712	0.1919	
10080 minute summer	J9_Pond B In	Flow through pond	J13_Pond B Out	3.9	0.005	0.000	1396.4126	
10080 minute summer	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.2	0.843	0.003	0.0040	56.9
480 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	3.7	0.170	0.292	0.1578	
10080 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	3.9	0.005	0.000	1396.4126	
180 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	11.7	0.036	0.023	71.4719	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	11.0	0.200	0.006	1.2101	

Results for 2 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.863	0.013	71.2	0.7758	0.0000	OK
15 minute summer	Pond G Area In_Upstream	11	55.355	0.005	8.9	0.0396	0.0000	OK
360 minute summer	Pond G Area In_Downstream	224	54.352	0.105	3.0	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	11	54.864	0.014	46.5	0.5352	0.0000	OK
2160 minute summer	Pond D Area In_Downstream	1500	52.428	0.102	2.7	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.854	0.004	11.3	0.0322	0.0000	OK
8640 minute summer	Pond C Area In_Downstream	5460	50.907	0.107	0.3	0.0000	0.0000	OK
15 minute summer	Pond B Area In_Upstream	10	50.008	0.008	15.7	0.0288	0.0000	OK
10080 minute summer	Pond B Area In_Downstream	10320	49.856	0.156	0.4	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Downstream	13	54.357	0.111	311.9	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	55.168	0.218	322.2	1.7456	0.0000	OK
15 minute summer	Cidery 3	10	55.689	0.239	243.2	1.2268	0.0000	OK
15 minute summer	Cidery 2	10	56.285	0.185	163.5	1.0495	0.0000	OK
15 minute summer	Cidery 1	10	56.826	0.126	82.3	0.8816	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	70.4	0.405	0.017	2.7984	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	8.6	0.208	0.004	0.5340	
360 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	49.3	0.020	0.011	269.5623	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	44.5	0.387	0.019	2.8806	
2160 minute summer	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	11.1	0.015	0.002	385.4305	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	11.2	0.088	0.002	1.6464	
8640 minute summer	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	6.0	0.009	0.000	313.2788	
15 minute summer	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	15.5	0.098	0.008	1.6423	
10080 minute summer	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	3.9	0.005	0.000	1396.4126	
15 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	173.0	0.100	0.040	138.3690	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	311.9	1.716	0.271	24.5527	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	243.4	2.543	0.277	4.0427	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	161.1	1.831	0.194	5.3294	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	81.3	1.408	0.095	3.0647	

Results for 30 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	Pond H Area In_Downstream	672	54.292	0.031	6.5	0.0000	0.0000	OK
480 minute summer	J2_Pond H Flash In/Out	672	54.292	0.042	13.2	0.0000	0.0000	OK
180 minute summer	J3_Pond G Flash In/Out	132	54.423	0.183	11.5	0.0000	0.0000	OK
180 minute summer	J4_Pond G Out	140	54.481	0.241	157.8	0.0000	0.0000	SURCHARGED
960 minute winter	J5_Pond D In	840	52.525	0.198	32.5	0.0000	0.0000	OK
960 minute winter	J6_Pond D Out	855	52.521	0.221	24.4	0.0000	0.0000	SURCHARGED
1440 minute winter	J7_Pond C In	1380	51.025	0.196	14.9	0.0000	0.0000	OK
2880 minute summer	J8_Pond C Out	2460	50.955	0.155	11.4	0.0000	0.0000	SURCHARGED
10080 minute winter	J9_Pond B In	10320	49.961	0.231	7.9	0.0000	0.0000	OK
10080 minute winter	J13_Pond B Out	10320	49.958	0.258	4.9	0.0000	0.0000	SURCHARGED
10080 minute winter	J14_Watercourse In	10320	47.907	0.007	0.3	0.0000	0.0000	OK
240 minute summer	J11_LS Swale Area Out	176	50.217	0.067	35.9	0.0000	0.0000	OK
10080 minute winter	J12_Pond B In from LS Swale Area	10320	49.958	0.229	1.8	0.0000	0.0000	OK
60 minute summer	J10_LS Swale Area In	42	50.240	0.090	126.6	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.365	0.015	33.6	0.1453	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-5.5	0.008	-0.001	205.2617	
480 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-11.0	-0.966	-2.580	0.2165	
180 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	157.8	0.036	0.036	603.8660	
180 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	32.6	1.947	1.073	0.3663	
960 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	24.4	0.031	0.004	715.3513	
960 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	15.2	0.890	4.656	0.2943	
1440 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	11.4	0.028	0.001	474.2777	
2880 minute summer	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	10.4	0.667	3.168	0.2650	
10080 minute winter	J9_Pond B In	Flow through pond	J13_Pond B Out	4.9	0.005	0.000	2446.3738	
10080 minute winter	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.3	0.907	0.004	0.0048	80.0
240 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	10.9	0.280	0.863	0.2822	
10080 minute winter	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	4.9	0.005	0.000	2446.3738	
60 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	37.7	0.067	0.074	125.5135	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	32.1	0.302	0.018	2.3396	

Results for 30 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.875	0.025	194.5	1.4188	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.360	0.010	24.3	0.0711	0.0000	OK
240 minute summer	Pond G Area In_Downstream	172	54.481	0.235	11.6	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	11	54.876	0.026	127.0	0.9827	0.0000	OK
960 minute winter	Pond D Area In_Downstream	855	52.521	0.195	7.1	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.856	0.006	31.0	0.0590	0.0000	OK
2880 minute summer	Pond C Area In_Downstream	2460	50.955	0.155	1.0	0.0000	0.0000	OK
15 minute summer	Pond B Area In_Upstream	10	50.015	0.015	42.8	0.0526	0.0000	OK
10080 minute winter	Pond B Area In_Downstream	10320	49.958	0.258	0.4	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Downstream	12	54.522	0.275	867.0	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	55.358	0.408	880.7	3.2709	0.0000	OK
15 minute summer	Cidery 3	11	55.915	0.465	667.2	2.3880	0.0000	OK
15 minute summer	Cidery 2	10	56.450	0.350	447.7	1.9881	0.0000	OK
15 minute summer	Cidery 1	10	56.921	0.221	224.8	1.5500	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	193.3	0.685	0.047	5.2222	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	23.6	0.302	0.010	1.0076	
240 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	131.4	0.032	0.030	603.5044	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	123.1	0.577	0.052	5.3419	
960 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	24.4	0.031	0.004	715.3513	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	30.8	0.185	0.005	2.3756	
2880 minute summer	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	11.4	0.017	0.001	482.9334	
15 minute summer	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	42.5	0.219	0.021	2.0204	
10080 minute winter	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	4.9	0.005	0.000	2446.3738	
15 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	743.5	0.190	0.171	367.9366	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	867.0	2.209	0.754	53.8514	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	664.1	3.063	0.756	9.0472	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	442.4	2.188	0.531	12.1118	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	222.8	1.689	0.261	6.9723	

Results for 100 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	Pond H Area In_Downstream	750	54.308	0.046	7.6	0.0000	0.0000	OK
600 minute summer	J2_Pond H Flash In/Out	750	54.307	0.057	13.3	0.0000	0.0000	OK
180 minute summer	J3_Pond G Flash In/Out	136	54.466	0.226	13.3	0.0000	0.0000	OK
180 minute summer	J4_Pond G Out	148	54.544	0.304	187.3	0.0000	0.0000	SURCHARGED
1440 minute winter	J5_Pond D In	1140	52.572	0.245	32.5	0.0000	0.0000	OK
1440 minute winter	J6_Pond D Out	1140	52.567	0.267	26.1	0.0000	0.0000	SURCHARGED
1440 minute winter	J7_Pond C In	1380	51.091	0.262	17.9	0.0000	0.0000	OK
2160 minute winter	J8_Pond C Out	2220	50.984	0.184	14.1	0.0000	0.0000	SURCHARGED
10080 minute summer	J9_Pond B In	10320	50.006	0.276	11.0	0.0000	0.0000	OK
10080 minute summer	J13_Pond B Out	10320	50.003	0.303	6.8	0.0000	0.0000	SURCHARGED
10080 minute summer	J14_Watercourse In	10320	47.907	0.007	0.3	0.0000	0.0000	OK
240 minute summer	J11_LS Swale Area Out	168	50.229	0.079	46.3	0.0000	0.0000	OK
10080 minute summer	J12_Pond B In from LS Swale Area	10320	50.003	0.274	3.0	0.0000	0.0000	OK
60 minute summer	J10_LS Swale Area In	41	50.255	0.105	162.4	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.367	0.017	42.5	0.1664	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-5.9	0.006	-0.001	294.1340	
600 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-12.6	-1.059	-2.937	0.2415	
180 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	187.3	0.040	0.043	768.6839	
180 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	34.3	1.949	1.128	0.3663	
1440 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	26.1	0.025	0.004	884.8203	
1440 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	17.9	1.030	5.480	0.3042	
1440 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	14.1	0.028	0.001	571.3139	
2160 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	12.9	0.771	3.917	0.2789	
10080 minute summer	J9_Pond B In	Flow through pond	J13_Pond B Out	6.8	0.004	0.000	2917.9509	
10080 minute summer	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.3	0.928	0.004	0.0051	87.6
240 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	15.1	0.325	1.199	0.3386	
10080 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	6.8	0.004	0.000	2917.9509	
60 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	57.7	0.082	0.113	158.5445	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	40.8	0.331	0.023	2.7161	

Results for 100 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.878	0.028	245.8	1.6322	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.361	0.011	30.7	0.0818	0.0000	OK
180 minute summer	Pond G Area In_Downstream	148	54.544	0.297	9.5	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.880	0.030	160.4	1.1311	0.0000	OK
1440 minute winter	Pond D Area In_Downstream	1140	52.568	0.241	6.4	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.857	0.007	39.1	0.0679	0.0000	OK
2160 minute winter	Pond C Area In_Downstream	2220	50.985	0.185	1.1	0.0000	0.0000	OK
15 minute summer	Pond B Area In_Upstream	10	50.017	0.017	54.0	0.0605	0.0000	OK
10080 minute summer	Pond B Area In_Downstream	10320	50.003	0.303	0.7	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Downstream	12	54.578	0.331	1077.7	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	55.437	0.487	1097.5	3.9041	0.0000	OK
15 minute summer	Cidery 3	11	56.162	0.712	853.5	3.6518	0.0000	SURCHARGED
15 minute summer	Cidery 2	11	56.522	0.422	565.7	2.3951	0.0000	OK
15 minute summer	Cidery 1	10	56.959	0.259	284.1	1.8144	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	244.4	0.753	0.060	6.2008	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	29.9	0.330	0.013	1.1728	
180 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	187.3	0.040	0.043	768.6839	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	155.7	0.632	0.066	6.1647	
1440 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	26.1	0.025	0.004	884.8203	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	38.9	0.219	0.006	2.5958	
2160 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	14.1	0.023	0.001	590.4959	
15 minute summer	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	53.6	0.257	0.027	2.1776	
10080 minute summer	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	6.8	0.004	0.000	2917.9509	
15 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	960.8	0.217	0.221	467.4350	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1077.7	2.304	0.938	64.4795	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	826.6	3.151	0.940	10.8622	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	569.4	2.220	0.684	14.7471	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	281.7	1.733	0.330	8.6130	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	Pond H Area In_Downstream	1035	54.347	0.086	9.0	0.0000	0.0000	OK
960 minute summer	J2_Pond H Flash In/Out	1035	54.347	0.097	15.7	0.0000	0.0000	OK
180 minute summer	J3_Pond G Flash In/Out	148	54.562	0.322	17.2	0.0000	0.0000	OK
180 minute winter	J4_Pond G Out	176	54.692	0.452	185.3	0.0000	0.0000	SURCHARGED
2160 minute winter	J5_Pond D In	1620	52.651	0.325	32.5	0.0000	0.0000	OK
2160 minute winter	J6_Pond D Out	1680	52.646	0.346	28.1	0.0000	0.0000	SURCHARGED
2160 minute winter	J7_Pond C In	1860	51.217	0.387	21.6	0.0000	0.0000	OK
2880 minute winter	J8_Pond C Out	2820	51.045	0.245	18.1	0.0000	0.0000	SURCHARGED
10080 minute summer	J9_Pond B In	10320	50.142	0.412	14.7	0.0000	0.0000	OK
10080 minute summer	J13_Pond B Out	10320	50.136	0.436	8.9	0.0000	0.0000	SURCHARGED
10080 minute summer	J14_Watercourse In	10320	47.908	0.008	0.3	0.0000	0.0000	OK
180 minute summer	J11_LS Swale Area Out	128	50.253	0.103	82.1	0.0000	0.0000	OK
10080 minute summer	J12_Pond B In from LS Swale Area	10320	50.136	0.407	4.4	0.0000	0.0000	OK
60 minute summer	J10_LS Swale Area In	39	50.283	0.133	235.5	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.371	0.021	61.6	0.2064	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-7.2	-0.004	-0.001	518.6872	
960 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-15.7	-1.200	-3.665	0.3077	
180 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	273.3	0.047	0.063	1166.1216	
180 minute winter	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	38.0	2.158	1.250	0.3663	
2160 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	28.1	0.024	0.004	1182.0100	
2160 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	21.6	1.231	6.630	0.3136	
2160 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	18.2	0.023	0.001	809.2849	
2880 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	16.8	0.971	5.093	0.2955	
10080 minute summer	J9_Pond B In	Flow through pond	J13_Pond B Out	8.9	0.006	0.000	4349.0732	
10080 minute summer	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.3	0.980	0.005	0.0058	108.8
180 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	26.5	0.415	2.101	0.4650	
10080 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	8.9	0.006	0.000	4349.0732	
60 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	106.9	0.110	0.210	220.8260	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	59.6	0.382	0.033	3.4380	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.885	0.035	356.4	2.0383	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.364	0.014	44.5	0.1021	0.0000	OK
180 minute winter	Pond G Area In_Downstream	180	54.692	0.445	12.2	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.888	0.038	232.6	1.4176	0.0000	OK
2160 minute winter	Pond D Area In_Downstream	1680	52.646	0.320	6.7	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.859	0.009	56.7	0.0848	0.0000	OK
2880 minute winter	Pond C Area In_Downstream	2760	51.045	0.245	1.3	0.0000	0.0000	OK
10080 minute summer	Pond B Area In_Upstream	10320	50.136	0.136	1.0	0.4695	0.0000	OK
10080 minute summer	Pond B Area In_Downstream	10320	50.136	0.436	1.0	0.0000	0.0000	OK
180 minute winter	Cidery Site Area In_Downstream	168	54.702	0.455	351.6	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	55.984	1.034	1478.8	8.2840	0.0000	SURCHARGED
15 minute summer	Cidery 3	11	57.213	1.763	1112.5	9.0478	0.0000	SURCHARGED
15 minute summer	Cidery 2	11	57.928	1.828	759.2	10.3741	0.0000	SURCHARGED
15 minute summer	Cidery 1	11	58.085	1.385	411.9	9.7128	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	354.6	0.862	0.087	8.2480	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	43.6	0.380	0.019	1.4820	
180 minute winter	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	185.3	0.051	0.043	1169.1482	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	227.0	0.731	0.096	7.7727	
2160 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	28.1	0.024	0.004	1182.0100	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	56.5	0.283	0.009	2.8381	
2880 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	18.1	0.020	0.001	815.7213	
10080 minute summer	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	1.0	0.003	0.000	13.2273	
10080 minute summer	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	8.9	0.006	0.000	4349.0732	
180 minute winter	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	185.3	0.051	0.043	1169.1482	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1450.1	2.576	1.262	74.1196	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	1085.9	3.856	1.235	11.6136	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	728.6	2.587	0.875	16.8350	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	369.2	1.684	0.433	14.8258	

Results for 1000 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Pond H Area In_Downstream	1410	54.390	0.128	10.3	0.0000	0.0000	OK
1440 minute summer	J2_Pond H Flash In/Out	1410	54.389	0.139	18.4	0.0000	0.0000	OK
360 minute summer	J3_Pond G Flash In/Out	248	54.601	0.361	19.4	0.0000	0.0000	OK
480 minute summer	J4_Pond G Out	336	54.769	0.529	159.9	0.0000	0.0000	FLOOD RISK
2160 minute winter	J5_Pond D In	1860	52.731	0.405	33.6	0.0000	0.0000	OK
2160 minute winter	J6_Pond D Out	1860	52.725	0.425	30.7	0.0000	0.0000	SURCHARGED
2160 minute winter	J7_Pond C In	2160	51.332	0.503	24.4	0.0000	0.0000	OK
2880 minute winter	J8_Pond C Out	3060	51.100	0.300	21.1	0.0000	0.0000	SURCHARGED
4320 minute winter	J9_Pond B In	4560	50.194	0.465	19.1	0.0000	0.0000	OK
10080 minute winter	J13_Pond B Out	10320	50.178	0.478	8.7	0.0000	0.0000	SURCHARGED
10080 minute winter	J14_Watercourse In	10320	47.908	0.008	0.4	0.0000	0.0000	OK
360 minute summer	J11_LS Swale Area Out	224	50.261	0.111	54.3	0.0000	0.0000	OK
360 minute summer	J12_Pond B In from LS Swale Area	224	50.180	0.450	31.8	0.0000	0.0000	OK
60 minute summer	J10_LS Swale Area In	39	50.286	0.136	245.8	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.371	0.021	62.7	0.2084	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-8.4	0.003	-0.001	763.5270	
1440 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-18.4	-1.273	-4.295	0.3706	
360 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	192.3	0.038	0.044	1361.7212	
480 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	39.8	2.259	1.309	0.3663	
2160 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	30.7	0.026	0.005	1491.9456	
2160 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	24.4	1.389	7.486	0.3178	
2160 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	21.2	0.023	0.001	987.7415	
2880 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	19.7	1.125	5.985	0.3044	
4320 minute winter	J9_Pond B In	Flow through pond	J13_Pond B Out	11.4	0.010	0.000	3567.0613	
10080 minute winter	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.4	0.994	0.006	0.0060	115.6
360 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	31.8	0.450	2.516	0.5128	
360 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	30.9	0.032	0.001	539.1396	
60 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	114.6	0.113	0.225	229.1356	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	60.6	0.384	0.034	3.4756	

Results for 1000 year Critical Storm Duration. Lowest mass balance: 96.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.886	0.036	363.0	2.0607	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.364	0.014	45.3	0.1033	0.0000	OK
480 minute summer	Pond G Area In_Downstream	336	54.770	0.523	8.2	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.888	0.038	236.9	1.4334	0.0000	OK
2160 minute winter	Pond D Area In_Downstream	1860	52.726	0.400	8.9	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.859	0.009	57.8	0.0858	0.0000	OK
2880 minute winter	Pond C Area In_Downstream	3060	51.100	0.300	1.7	0.0000	0.0000	OK
10080 minute winter	Pond B Area In_Upstream	10320	50.178	0.178	0.7	0.6157	0.0000	SURCHARGED
10080 minute winter	Pond B Area In_Downstream	10320	50.178	0.478	0.7	0.0000	0.0000	OK
480 minute summer	Cidery Site Area In_Downstream	328	54.779	0.532	298.0	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	56.044	1.094	1504.1	8.7601	0.0000	SURCHARGED
15 minute summer	Cidery 3	11	57.316	1.866	1130.8	9.5751	0.0000	SURCHARGED
15 minute summer	Cidery 2	11	58.048	1.948	776.6	11.0567	0.0000	FLOOD RISK
15 minute summer	Cidery 1	11	58.208	1.508	419.5	10.5757	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	361.1	0.868	0.088	8.3661	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	44.4	0.383	0.019	1.4985	
480 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	159.9	0.034	0.037	1381.9055	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	231.3	0.736	0.098	7.8620	
2160 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	30.7	0.026	0.005	1491.9456	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	57.6	0.290	0.010	2.8509	
2880 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	21.1	0.020	0.001	1022.4655	
10080 minute winter	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	0.7	0.002	0.000	13.9552	
10080 minute winter	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	8.7	0.007	0.000	4815.2935	
480 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	159.9	0.034	0.037	1381.9055	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1474.8	2.620	1.283	74.2571	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	1103.9	3.919	1.256	11.6136	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	742.1	2.635	0.892	16.8350	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	376.0	1.690	0.441	14.8258	

Appendix E Drainage Model Results – Greater than the 1 in 1000 year event

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.500
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	1.000	Connection Type	Level Inverts		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	499	1350	749	1500	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75	Velocity	Manning
Barrels	1	Follow Ground	x	ks (mm) / n	0.010

Available Diameters (mm)

100 150

Swale Link Type

Shape	Open User Defined	Width (mm)	1000	Follow Ground	✓	ks (mm) / n	0.030
Barrels	1	Auto Increment (mm)	100	Velocity	Manning		

Available Diameters (mm)

150

Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total
0.000	1.000	0.100	0.000	0.900	0.000	1.000	1.000

Swale 2 Link Type

Shape	Open User Defined	Width (mm)	10000	Follow Ground	✓	ks (mm) / n	0.030
Barrels	1	Auto Increment (mm)	100	Velocity	Manning		

Available Diameters (mm)

150

Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total	Width / Total	Depth / Total
0.000	1.000	0.100	0.000	0.900	0.000	1.000	1.000

Double Barrel Link Type

Shape	Circular	Barrels	2	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

150

sFa8 Link Type Group

Link Type	Link Type
Highway	Private

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
Pond H Area In_Downstream			55.000			616989.000	265406.000	0.739
J2_Pond H Flash In/Out		5.00	55.000			617061.000	265491.000	0.750
J3_Pond G Flash In/Out			55.000			617078.000	265504.000	0.760
J4_Pond G Out		5.00	55.000			617134.000	265535.000	0.760
J5_Pond D In			54.000			617151.000	265547.000	1.674
J6_Pond D Out		5.00	54.000			617375.000	265673.000	1.700
J7_Pond C In			54.000			617368.000	265690.000	3.171
J8_Pond C Out		5.00	52.300			617118.441	265570.000	1.500
J9_Pond B In			52.300			617110.000	265586.000	2.571

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
J13_Pond B Out		5.00	50.550			617332.441	265732.559	0.850
J14_Watercourse In			49.300			617325.000	265747.000	1.400
J11_LS Swale Area Out		5.00	50.550			617089.000	265595.000	0.400
J12_Pond B In from LS Swale Area			50.550			617095.000	265599.000	0.821
J10_LS Swale Area In			50.550			616931.000	265494.000	0.400
Pond H Area In_Upstream	0.075	5.00	55.500			616997.593	265385.726	0.150
Land Storage Area In	0.433	5.00	52.000			616936.329	265480.811	0.150
Pond G Area In_Upstream	0.054	5.00	55.500			617125.610	265494.607	0.150
Pond G Area In_Downstream			55.000			617116.863	265504.107	0.753
Pond D Area In_Upstream	0.282	5.00	55.000			617278.311	265561.943	0.150
Pond D Area In_Downstream			54.000			617263.828	265582.351	1.674
Pond C Area In_Upstream	0.069	5.00	54.000			617249.481	265609.290	0.150
Pond C Area In_Downstream			52.300			617244.258	265619.735	1.500
Pond B Area In_Upstream	0.095	5.00	50.550			617367.481	265731.937	0.550
Pond B Area In_Downstream			50.550			617359.028	265725.989	0.850
Cidery Site Area In_Downstream			55.000			617098.167	265491.821	0.753
Cidery Site Area In_Upstream	0.500	5.00	57.150	2100	0.500	617046.095	265367.179	2.700
Cidery 3	0.500	5.00	57.950	1200	0.500	617059.358	265328.140	3.000
Cidery 2	0.500	5.00	58.300	1200	0.500	617093.958	265279.407	2.700
Cidery 1	0.500	5.00	58.400	1200	0.500	617136.356	265248.218	2.200

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
Pond G to Pond H	J2_Pond H Flash In/Out	J3_Pond G Flash In/Out	21.401	0.010	54.250	54.240	0.010	2140.1	150	6.47	50.0
Pond G to Pond D	J4_Pond G Out	J5_Pond D In	20.809	0.010	54.240	53.750	0.490	42.5	150	5.20	50.0
Pond C to Pond B	J8_Pond C Out	J9_Pond B In	18.090	0.010	50.800	50.795	0.005	3618.0	150	6.62	50.0
Pond D to Pond C	J6_Pond D Out	J7_Pond C In	18.385	0.010	52.300	52.295	0.005	3677.0	150	6.66	50.0
Pond B to Watercourse	J13_Pond B Out	J14_Watercourse In	16.245	0.010	49.700	47.900	1.800	9.0	150	5.07	50.0
LS Swale Area to Pond B	J11_LS Swale Area Out	J12_Pond B In from LS Swale Area	7.211	0.030	50.150	50.149	0.001	7211.1	150	6.28	50.0
Pond H Area In	Pond H Area In_Upstream	Pond H Area In_Downstream	22.020	0.030	55.350	54.850	0.500	44.0	150	5.28	50.0
Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	14.225	0.030	51.850	50.150	1.700	8.4	150	5.08	50.0
Pond G Area In	Pond G Area In_Upstream	Pond G Area In_Downstream	12.914	0.030	55.350	54.850	0.500	25.8	150	5.12	50.0
Pond D Area In	Pond D Area In_Upstream	Pond D Area In_Downstream	25.025	0.030	54.850	53.850	1.000	25.0	150	5.24	50.0
Pond C Area In	Pond C Area In_Upstream	Pond C Area In_Downstream	11.678	0.030	53.850	50.800	3.050	3.8	150	5.04	50.0
Pond B Area In	Pond B Area In_Upstream	Pond B Area In_Downstream	10.336	0.030	50.000	49.700	0.300	34.5	150	5.12	50.0
Cidery Site Area In	Cidery Site Area In_Upstream	Cidery Site Area In_Downstream	135.082	0.010	54.950	54.250	0.700	193.0	600	6.96	50.0
Cidery 1 to 2	Cidery 1	Cidery 2	52.634	0.010	56.700	56.100	0.600	87.7	600	5.29	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
Pond G to Pond H	0.242	4.3	0.0	0.600	0.610	0.000	0.0	0	0.000
Pond G to Pond D	1.719	30.4	0.0	0.610	0.100	0.000	0.0	0	0.000
Pond C to Pond B	0.186	3.3	0.0	1.350	1.355	0.000	0.0	0	0.000
Pond D to Pond C	0.185	3.3	0.0	1.550	1.555	0.000	0.0	0	0.000
Pond B to Watercourse	3.729	65.9	0.0	0.700	1.250	0.000	0.0	0	0.000
LS Swale Area to Pond B	0.094	12.6	0.0	0.250	0.251	0.000	0.0	0	0.000
Pond H Area In	1.320	1781.8	13.5	0.000	0.000	0.075	0.0	8	0.208
Land Storage Area In	3.028	4087.8	78.2	0.000	0.250	0.433	0.0	14	0.675
Pond G Area In	1.724	2326.8	9.8	0.000	0.000	0.054	0.0	6	0.205
Pond D Area In	1.751	2363.8	51.0	0.000	0.000	0.282	0.0	16	0.411
Pond C Area In	4.476	6043.0	12.4	0.000	1.350	0.069	0.0	4	0.415
Pond B Area In	1.492	2014.5	17.2	0.400	0.700	0.095	0.0	9	0.246
Cidery Site Area In	2.032	1149.2	361.4	1.600	0.150	2.000	0.0	231	1.799
Cidery 1 to 2	3.014	852.2	90.4	1.100	1.600	0.500	0.0	132	1.962

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
Cidery 2 to 3	Cidery 2	Cidery 3	59.767	0.010	56.100	55.450	0.650	91.9	600	5.63	50.0
Cidery 3 to Cidery Site Area In	Cidery 3	Cidery Site Area In_Upstream	41.230	0.010	55.450	54.950	0.500	82.5	600	5.85	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
Cidery 2 to 3	2.944	832.4	180.7	1.600	1.900	1.000	0.0	190	2.354
Cidery 3 to Cidery Site Area In	3.109	879.0	271.1	1.900	1.600	1.500	0.0	229	2.739

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
Pond G to Pond H	21.401	2140.1	150	Circular	55.000	54.250	0.600	55.000	54.240	0.610
Pond G to Pond D	20.809	42.5	150	Circular	55.000	54.240	0.610	54.000	53.750	0.100
Pond C to Pond B	18.090	3618.0	150	Circular	52.300	50.800	1.350	52.300	50.795	1.355
Pond D to Pond C	18.385	3677.0	150	Circular	54.000	52.300	1.550	54.000	52.295	1.555
Pond B to Watercourse	16.245	9.0	150	Circular	50.550	49.700	0.700	49.300	47.900	1.250
LS Swale Area to Pond B	7.211	7211.1	150	Swale	50.550	50.150	0.250	50.550	50.149	0.251
Pond H Area In	22.020	44.0	150	Swale 2	55.500	55.350	0.000	55.000	54.850	0.000
Land Storage Area In	14.225	8.4	150	Swale 2	52.000	51.850	0.000	50.550	50.150	0.250

Link	US Node	Dia (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Sump (m)	Node Type	MH Type
Pond G to Pond H	J2_Pond H Flash In/Out			Junction		J3_Pond G Flash In/Out			Junction	
Pond G to Pond D	J4_Pond G Out			Junction		J5_Pond D In			Junction	
Pond C to Pond B	J8_Pond C Out			Junction		J9_Pond B In			Junction	
Pond D to Pond C	J6_Pond D Out			Junction		J7_Pond C In			Junction	
Pond B to Watercourse	J13_Pond B Out			Junction		J14_Watercourse In			Junction	
LS Swale Area to Pond B	J11_LS Swale Area Out			Junction		J12_Pond B In from LS Swale Area			Junction	
Pond H Area In	Pond H Area In_Upstream			Junction		Pond H Area In_Downstream			Junction	
Land Storage Area In	Land Storage Area In			Junction		J10_LS Swale Area In			Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
Pond G Area In	12.914	25.8	150	Swale 2	55.500	55.350	0.000	55.000	54.850	0.000
Pond D Area In	25.025	25.0	150	Swale 2	55.000	54.850	0.000	54.000	53.850	0.000
Pond C Area In	11.678	3.8	150	Swale 2	54.000	53.850	0.000	52.300	50.800	1.350
Pond B Area In	10.336	34.5	150	Swale 2	50.550	50.000	0.400	50.550	49.700	0.700
Cidery Site Area In	135.082	193.0	600	Double Barrel	57.150	54.950	1.600	55.000	54.250	0.150
Cidery 1 to 2	52.634	87.7	600	Circular	58.400	56.700	1.100	58.300	56.100	1.600
Cidery 2 to 3	59.767	91.9	600	Circular	58.300	56.100	1.600	57.950	55.450	1.900
Cidery 3 to Cidery Site Area In	41.230	82.5	600	Circular	57.950	55.450	1.900	57.150	54.950	1.600

Link	US Node	Dia (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Sump (m)	Node Type	MH Type
Pond G Area In	Pond G Area In_Upstream			Junction		Pond G Area In_Downstream			Junction	
Pond D Area In	Pond D Area In_Upstream			Junction		Pond D Area In_Downstream			Junction	
Pond C Area In	Pond C Area In_Upstream			Junction		Pond C Area In_Downstream			Junction	
Pond B Area In	Pond B Area In_Upstream			Junction		Pond B Area In_Downstream			Junction	
Cidery Site Area In	Cidery Site Area In_Upstream	2100	0.500	Manhole	Adoptable	Cidery Site Area In_Downstream			Junction	
Cidery 1 to 2	Cidery 1	1200	0.500	Manhole	Adoptable	Cidery 2	1200	0.500	Manhole	Adoptable
Cidery 2 to 3	Cidery 2	1200	0.500	Manhole	Adoptable	Cidery 3	1200	0.500	Manhole	Adoptable
Cidery 3 to Cidery Site Area In	Cidery 3	1200	0.500	Manhole	Adoptable	Cidery Site Area In_Upstream	2100	0.500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Pond H Area In_Downstream	616989.000	265406.000	55.000	0.739			1	Pond H Area In	54.850	150
J2_Pond H Flash In/Out	617061.000	265491.000	55.000	0.750			0	Pond G to Pond H	54.250	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
J3_Pond G Flash In/Out	617078.000	265504.000	55.000	0.760			1	Pond G to Pond H	54.240	150
J4_Pond G Out	617134.000	265535.000	55.000	0.760			0	Pond G to Pond D	54.240	150
J5_Pond D In	617151.000	265547.000	54.000	1.674			1	Pond G to Pond D	53.750	150
J6_Pond D Out	617375.000	265673.000	54.000	1.700			0	Pond D to Pond C	52.300	150
J7_Pond C In	617368.000	265690.000	54.000	3.171			1	Pond D to Pond C	52.295	150
J8_Pond C Out	617118.441	265570.000	52.300	1.500			0	Pond C to Pond B	50.800	150
J9_Pond B In	617110.000	265586.000	52.300	2.571			1	Pond C to Pond B	50.795	150
J13_Pond B Out	617332.441	265732.559	50.550	0.850			0	Pond B to Watercourse	49.700	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
J14_Watercourse In	617325.000	265747.000	49.300	1.400			1	Pond B to Watercourse	47.900	150
J11_LS Swale Area Out	617089.000	265595.000	50.550	0.400			0	LS Swale Area to Pond B	50.150	150
J12_Pond B In from LS Swale Area	617095.000	265599.000	50.550	0.821			1	LS Swale Area to Pond B	50.149	150
J10_LS Swale Area In	616931.000	265494.000	50.550	0.400			1	Land Storage Area In	50.150	150
Pond H Area In_Upstream	616997.593	265385.726	55.500	0.150			0	Pond H Area In	55.350	150
Land Storage Area In	616936.329	265480.811	52.000	0.150			0	Land Storage Area In	51.850	150
Pond G Area In_Upstream	617125.610	265494.607	55.500	0.150			0	Pond G Area In	55.350	150
Pond G Area In_Downstream	617116.863	265504.107	55.000	0.753			1	Pond G Area In	54.850	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Pond D Area In_Upstream	617278.311	265561.943	55.000	0.150			0	Pond D Area In	54.850	150
Pond D Area In_Downstream	617263.828	265582.351	54.000	1.674			1	Pond D Area In	53.850	150
Pond C Area In_Upstream	617249.481	265609.290	54.000	0.150			0	Pond C Area In	53.850	150
Pond C Area In_Downstream	617244.258	265619.735	52.300	1.500			1	Pond C Area In	50.800	150
Pond B Area In_Upstream	617367.481	265731.937	50.550	0.550			0	Pond B Area In	50.000	150
Pond B Area In_Downstream	617359.028	265725.989	50.550	0.850			1	Pond B Area In	49.700	150
Cidery Site Area In_Downstream	617098.167	265491.821	55.000	0.753			1	Cidery Site Area In	54.250	600
Cidery Site Area In_Upstream	617046.095	265367.179	57.150	2.700	2100	0.500	1	Cidery 3 to Cidery Site Area In	54.950	600
							0	Cidery Site Area In	54.950	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Connections	Link	IL (m)	Dia (mm)
Cidery 3	617059.358	265328.140	57.950	3.000	1200	0.500	1	Cidery 2 to 3	55.450	600
							0	Cidery 3 to Cidery Site Area In	55.450	600
Cidery 2	617093.958	265279.407	58.300	2.700	1200	0.500	1	Cidery 1 to 2	56.100	600
							0	Cidery 2 to 3	56.100	600
Cidery 1	617136.356	265248.218	58.400	2.200	1200	0.500	0	Cidery 1 to 2	56.700	600

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)		100 year (l/s)	82.8
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	1.000	Drain Down Time (mins)	240	2 year (l/s)	20.7		
Winter CV	1.000	Additional Storage (m³/ha)	20.0	30 year (l/s)	59.3		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1000	20	0	0	1000	85	0	0
1000	50	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	BFIHost	0.310	Growth Factor 100 year	2.48	Q 30 year (l/s)	
Greenfield Method	FEH	Region	5	Betterment (%)	0	Q 100 year (l/s)	
Positively Drained Area (ha)	6.388	QBar/QMed conversion factor	1.124	QMed	20.7		
SAAR (mm)	614	Growth Factor 1 year	0.85	QBar	23.3		
Host	24	Growth Factor 30 year	1.95	Q 1 year (l/s)			

Node J13_Pond B Out Online Orifice Control

Flap Valve	x	Invert Level (m)	49.700	Design Flow (l/s)	0.5	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Depth (m)	0.730	Diameter (m)	0.016		

Node J2_Pond H Flash In/Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	111.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.250	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

Pond H Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	5630.0	0.0	0.750	6371.0	0.0

Node J4_Pond G Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	67.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	54.240	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J3_Pond G Flash In/Out	Cidery Site Area In_Downstream	Pond G Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2469.0	0.0	0.750	2929.0	0.0

Node J6_Pond D Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	261.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	52.300	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J5_Pond D In | Pond D Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3257.0	0.0	1.700	6239.0	0.0

Node J8_Pond C Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	293.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	50.800	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J7_Pond C In | Pond C Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	3309.0	0.0	1.500	6195.0	0.0

Node J13_Pond B Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	293.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	49.700	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J12_Pond B In from LS Swale Area | J9_Pond B In | Pond B Area In_Downstream

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	9650.0	0.0	0.850	12330.0	0.0

Node J11_LS Swale Area Out Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	196.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	50.150	Main Channel Slope (1:X)	9999.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.035

Inlets

J10_LS Swale Area In

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2458.0	0.0	0.400	2992.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1000 year +20% CC 15 minute summer	616.766	174.523	1000 year +20% CC 360 minute summer	80.259	20.653
1000 year +20% CC 15 minute winter	432.818	174.523	1000 year +20% CC 360 minute winter	52.170	20.653
1000 year +20% CC 30 minute summer	408.444	115.576	1000 year +20% CC 480 minute summer	64.410	17.022
1000 year +20% CC 30 minute winter	286.628	115.576	1000 year +20% CC 480 minute winter	42.792	17.022
1000 year +20% CC 60 minute summer	273.601	72.305	1000 year +20% CC 600 minute summer	53.349	14.592
1000 year +20% CC 60 minute winter	181.774	72.305	1000 year +20% CC 600 minute winter	36.451	14.592
1000 year +20% CC 120 minute summer	165.448	43.723	1000 year +20% CC 720 minute summer	47.856	12.826
1000 year +20% CC 120 minute winter	109.919	43.723	1000 year +20% CC 720 minute winter	32.162	12.826
1000 year +20% CC 180 minute summer	127.979	32.933	1000 year +20% CC 960 minute summer	39.393	10.373
1000 year +20% CC 180 minute winter	83.189	32.933	1000 year +20% CC 960 minute winter	26.094	10.373
1000 year +20% CC 240 minute summer	102.418	27.066	1000 year +20% CC 1440 minute summer	28.311	7.588
1000 year +20% CC 240 minute winter	68.044	27.066	1000 year +20% CC 1440 minute winter	19.027	7.588

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1000 year +20% CC 2160 minute summer	19.669	5.436
1000 year +20% CC 2160 minute winter	13.553	5.436
1000 year +20% CC 2880 minute summer	15.826	4.241
1000 year +20% CC 2880 minute winter	10.636	4.241
1000 year +20% CC 4320 minute summer	11.297	2.954
1000 year +20% CC 4320 minute winter	7.440	2.954
1000 year +20% CC 5760 minute summer	8.861	2.268
1000 year +20% CC 5760 minute winter	5.735	2.268
1000 year +20% CC 7200 minute summer	7.215	1.841
1000 year +20% CC 7200 minute winter	4.657	1.841
1000 year +20% CC 8640 minute summer	6.074	1.550
1000 year +20% CC 8640 minute winter	3.920	1.550
1000 year +20% CC 10080 minute summer	5.247	1.339
1000 year +20% CC 10080 minute winter	3.387	1.339
1000 year +50% CC 15 minute summer	770.958	218.154
1000 year +50% CC 15 minute winter	541.023	218.154
1000 year +50% CC 30 minute summer	510.556	144.470
1000 year +50% CC 30 minute winter	358.285	144.470
1000 year +50% CC 60 minute summer	342.001	90.381
1000 year +50% CC 60 minute winter	227.217	90.381
1000 year +50% CC 120 minute summer	206.810	54.654
1000 year +50% CC 120 minute winter	137.399	54.654
1000 year +50% CC 180 minute summer	159.973	41.167
1000 year +50% CC 180 minute winter	103.987	41.167
1000 year +50% CC 240 minute summer	128.023	33.833
1000 year +50% CC 240 minute winter	85.055	33.833
1000 year +50% CC 360 minute summer	100.324	25.817
1000 year +50% CC 360 minute winter	65.213	25.817
1000 year +50% CC 480 minute summer	80.512	21.277
1000 year +50% CC 480 minute winter	53.490	21.277
1000 year +50% CC 600 minute summer	66.687	18.240
1000 year +50% CC 600 minute winter	45.564	18.240

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1000 year +50% CC 720 minute summer	59.820	16.032
1000 year +50% CC 720 minute winter	40.203	16.032
1000 year +50% CC 960 minute summer	49.241	12.966
1000 year +50% CC 960 minute winter	32.618	12.966
1000 year +50% CC 1440 minute summer	35.389	9.485
1000 year +50% CC 1440 minute winter	23.784	9.485
1000 year +50% CC 2160 minute summer	24.586	6.795
1000 year +50% CC 2160 minute winter	16.941	6.795
1000 year +50% CC 2880 minute summer	19.782	5.302
1000 year +50% CC 2880 minute winter	13.295	5.302
1000 year +50% CC 4320 minute summer	14.122	3.692
1000 year +50% CC 4320 minute winter	9.300	3.692
1000 year +50% CC 5760 minute summer	11.076	2.835
1000 year +50% CC 5760 minute winter	7.169	2.835
1000 year +50% CC 7200 minute summer	9.019	2.301
1000 year +50% CC 7200 minute winter	5.821	2.301
1000 year +50% CC 8640 minute summer	7.593	1.937
1000 year +50% CC 8640 minute winter	4.900	1.937
1000 year +50% CC 10080 minute summer	6.559	1.673
1000 year +50% CC 10080 minute winter	4.233	1.673
1000 year +85% CC 15 minute summer	950.848	269.057
1000 year +85% CC 15 minute winter	667.261	269.057
1000 year +85% CC 30 minute summer	629.685	178.179
1000 year +85% CC 30 minute winter	441.884	178.179
1000 year +85% CC 60 minute summer	421.801	111.470
1000 year +85% CC 60 minute winter	280.234	111.470
1000 year +85% CC 120 minute summer	255.065	67.406
1000 year +85% CC 120 minute winter	169.459	67.406
1000 year +85% CC 180 minute summer	197.301	50.772
1000 year +85% CC 180 minute winter	128.250	50.772
1000 year +85% CC 240 minute summer	157.894	41.727
1000 year +85% CC 240 minute winter	104.901	41.727

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1000 year +85% CC 360 minute summer	123.732	31.841	1000 year +85% CC 2160 minute winter	20.894	8.380
1000 year +85% CC 360 minute winter	80.429	31.841	1000 year +85% CC 2880 minute summer	24.398	6.539
1000 year +85% CC 480 minute summer	99.298	26.242	1000 year +85% CC 2880 minute winter	16.397	6.539
1000 year +85% CC 480 minute winter	65.971	26.242	1000 year +85% CC 4320 minute summer	17.417	4.554
1000 year +85% CC 600 minute summer	82.247	22.496	1000 year +85% CC 4320 minute winter	11.470	4.554
1000 year +85% CC 600 minute winter	56.196	22.496	1000 year +85% CC 5760 minute summer	13.660	3.497
1000 year +85% CC 720 minute summer	73.778	19.773	1000 year +85% CC 5760 minute winter	8.841	3.497
1000 year +85% CC 720 minute winter	49.584	19.773	1000 year +85% CC 7200 minute summer	11.123	2.838
1000 year +85% CC 960 minute summer	60.730	15.992	1000 year +85% CC 7200 minute winter	7.179	2.838
1000 year +85% CC 960 minute winter	40.229	15.992	1000 year +85% CC 8640 minute summer	9.364	2.389
1000 year +85% CC 1440 minute summer	43.647	11.698	1000 year +85% CC 8640 minute winter	6.044	2.389
1000 year +85% CC 1440 minute winter	29.333	11.698	1000 year +85% CC 10080 minute summer	8.089	2.064
1000 year +85% CC 2160 minute summer	30.323	8.380	1000 year +85% CC 10080 minute winter	5.221	2.064

Results for 1000 year +20% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	Pond H Area In_Downstream	1500	54.427	0.165	12.0	0.0000	0.0000	OK
1440 minute summer	J2_Pond H Flash In/Out	1500	54.426	0.176	21.4	0.0000	0.0000	SURCHARGED
360 minute summer	J3_Pond G Flash In/Out	248	54.666	0.426	22.2	0.0000	0.0000	OK
480 minute summer	J4_Pond G Out	344	54.884	0.644	190.2	0.0000	0.0000	FLOOD RISK
2160 minute winter	J5_Pond D In	2100	52.796	0.470	36.0	0.0000	0.0000	OK
2160 minute winter	J6_Pond D Out	2100	52.790	0.490	33.1	0.0000	0.0000	SURCHARGED
2160 minute winter	J7_Pond C In	2220	51.425	0.596	26.9	0.0000	0.0000	OK
2880 minute winter	J8_Pond C Out	3120	51.141	0.341	23.3	0.0000	0.0000	SURCHARGED
5760 minute winter	J9_Pond B In	5820	50.302	0.572	20.3	0.0000	0.0000	OK
10080 minute winter	J13_Pond B Out	10320	50.253	0.553	10.0	0.0000	0.0000	FLOOD RISK
10080 minute winter	J14_Watercourse In	10320	47.908	0.008	0.4	0.0000	0.0000	OK
360 minute summer	J11_LS Swale Area Out	224	50.279	0.129	63.9	0.0000	0.0000	OK
360 minute summer	J12_Pond B In from LS Swale Area	224	50.261	0.532	35.1	0.0000	0.0000	OK
60 minute summer	J10_LS Swale Area In	38	50.302	0.152	295.0	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.373	0.023	75.3	0.2316	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-9.9	0.003	-0.002	977.4792	
1440 minute summer	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-21.4	-1.406	-5.004	0.3768	
360 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	229.5	0.040	0.053	1676.9030	
480 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	42.3	2.403	1.392	0.3663	
2160 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	33.1	0.029	0.005	1752.3059	
2160 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	26.9	1.526	8.226	0.3196	
2160 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	23.3	0.024	0.001	1106.2982	
2880 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	21.6	1.227	6.557	0.3085	
5760 minute winter	J9_Pond B In	Flow through pond	J13_Pond B Out	12.1	0.009	0.000	4935.5425	
10080 minute winter	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.4	1.016	0.006	0.0063	126.9
360 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	35.1	0.447	2.778	0.7638	
360 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	40.1	0.035	0.001	659.9000	
60 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	152.9	0.129	0.300	268.0028	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	72.9	0.412	0.041	3.9013	

Results for 1000 year +20% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.890	0.040	435.5	2.2977	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.366	0.016	54.4	0.1153	0.0000	OK
480 minute summer	Pond G Area In_Downstream	344	54.884	0.637	12.9	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.893	0.043	284.3	1.6006	0.0000	OK
2160 minute winter	Pond D Area In_Downstream	2100	52.790	0.464	10.6	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.860	0.010	69.3	0.0957	0.0000	OK
2880 minute winter	Pond C Area In_Downstream	3120	51.141	0.341	2.0	0.0000	0.0000	OK
10080 minute winter	Pond B Area In_Upstream	10320	50.253	0.253	0.9	0.8736	0.0000	FLOOD RISK
10080 minute winter	Pond B Area In_Downstream	10320	50.253	0.553	0.9	0.0000	0.0000	OK
480 minute summer	Cidery Site Area In_Downstream	336	54.895	0.648	358.0	0.0000	0.0000	OK
15 minute summer	Cidery Site Area In_Upstream	11	56.360	1.410	1676.3	11.2926	0.0000	SURCHARGED
15 minute summer	Cidery 3	10	57.721	2.271	1201.6	11.6541	0.0000	FLOOD RISK
15 minute summer	Cidery 2	10	58.300	2.200	817.1	12.4872	14.0488	FLOOD
15 minute summer	Cidery 1	10	58.400	1.700	503.4	11.9221	28.4690	FLOOD

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	433.5	0.926	0.106	9.6746	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	53.4	0.412	0.023	1.6759	
480 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	190.2	0.037	0.044	1706.9036	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	278.3	0.791	0.118	8.8102	
2160 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	33.1	0.029	0.005	1752.3059	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	69.0	0.326	0.011	2.9082	
2880 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	23.3	0.021	0.001	1184.5275	
10080 minute winter	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	0.9	0.002	0.000	13.9552	
10080 minute winter	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	10.0	0.008	0.000	5653.1885	
480 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	190.2	0.037	0.044	1706.9036	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1630.8	2.895	1.419	74.9272	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	1172.9	4.164	1.334	11.6136	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	738.1	2.621	0.887	16.8350	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	383.1	1.756	0.449	14.8258	

Results for 1000 year +50% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Pond H Area In_Downstream	1590	54.481	0.220	13.5	0.0000	0.0000	OK
1440 minute winter	J2_Pond H Flash In/Out	1590	54.481	0.231	23.9	0.0000	0.0000	SURCHARGED
240 minute summer	J3_Pond G Flash In/Out	172	54.745	0.505	24.5	0.0000	0.0000	OK
240 minute summer	J4_Pond G Out	212	54.989	0.749	361.5	0.0000	0.0000	FLOOD RISK
2160 minute summer	J5_Pond D In	2280	52.872	0.546	41.6	0.0000	0.0000	OK
2160 minute summer	J6_Pond D Out	2280	52.864	0.564	39.4	0.0000	0.0000	SURCHARGED
2880 minute winter	J7_Pond C In	2880	51.561	0.731	29.4	0.0000	0.0000	OK
4320 minute winter	J8_Pond C Out	4320	51.200	0.400	25.4	0.0000	0.0000	SURCHARGED
5760 minute winter	J9_Pond B In	5940	50.456	0.727	23.2	0.0000	0.0000	OK
10080 minute summer	J13_Pond B Out	10320	50.361	0.661	12.5	0.0000	0.0000	FLOOD RISK
10080 minute summer	J14_Watercourse In	10320	47.909	0.009	0.4	0.0000	0.0000	OK
10080 minute summer	J11_LS Swale Area Out	10320	50.361	0.211	7.6	0.0000	0.0000	FLOOD RISK
10080 minute summer	J12_Pond B In from LS Swale Area	10320	50.361	0.632	7.5	0.0000	0.0000	OK
10080 minute summer	J10_LS Swale Area In	10320	50.361	0.211	7.9	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.376	0.026	94.1	0.2635	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-10.6	0.005	-0.002	1295.9049	
1440 minute winter	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-23.9	-1.433	-5.579	0.3768	
240 minute summer	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	361.5	0.053	0.083	2010.1624	
240 minute summer	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	44.5	2.526	1.464	0.3663	
2160 minute summer	J5_Pond D In	Flow through pond	J6_Pond D Out	39.4	0.029	0.006	2060.6614	
2160 minute summer	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	29.5	1.676	9.034	0.3204	
2880 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	26.1	0.022	0.001	1400.4786	
4320 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	23.8	1.350	7.216	0.3118	
5760 minute winter	J9_Pond B In	Flow through pond	J13_Pond B Out	13.9	0.010	0.000	5729.2446	
10080 minute summer	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.4	1.045	0.007	0.0067	139.6
10080 minute summer	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	7.5	0.236	0.591	0.9736	
10080 minute summer	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	12.5	0.008	0.000	6902.8281	
10080 minute summer	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	7.6	0.013	0.015	520.7065	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	91.3	0.447	0.051	4.4919	

Results for 1000 year +50% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.896	0.046	544.5	2.6249	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.368	0.018	68.0	0.1320	0.0000	OK
600 minute summer	Pond G Area In_Downstream	390	54.989	0.742	10.0	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.899	0.049	355.5	1.8309	0.0000	OK
2160 minute summer	Pond D Area In_Downstream	2280	52.864	0.538	19.3	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.862	0.012	86.7	0.1094	0.0000	OK
4320 minute winter	Pond C Area In_Downstream	4320	51.200	0.400	1.8	0.0000	0.0000	OK
10080 minute summer	Pond B Area In_Upstream	10320	50.361	0.361	1.7	1.2488	0.0000	FLOOD RISK
10080 minute summer	Pond B Area In_Downstream	10320	50.361	0.661	1.7	0.0000	0.0000	OK
720 minute summer	Cidery Site Area In_Downstream	420	55.000	0.753	332.4	0.0000	217.4211	FLOOD
15 minute summer	Cidery Site Area In_Upstream	10	56.630	1.680	1821.3	13.4542	0.0000	SURCHARGED
15 minute summer	Cidery 3	10	57.950	2.500	1307.9	12.8275	1.0274	FLOOD
15 minute summer	Cidery 2	9	58.300	2.200	944.0	12.4872	69.3797	FLOOD
15 minute summer	Cidery 1	9	58.400	1.700	629.5	11.9221	66.9830	FLOOD

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	542.1	1.004	0.133	11.4051	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	66.9	0.450	0.029	1.9214	
600 minute summer	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	198.5	0.038	0.046	2010.0223	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	348.8	0.862	0.148	10.1275	
2160 minute summer	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	39.4	0.029	0.006	2060.6614	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	86.4	0.372	0.014	2.9826	
4320 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	25.4	0.019	0.001	1418.6678	
10080 minute summer	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	1.7	0.003	0.001	13.9552	
10080 minute summer	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	12.5	0.008	0.000	6902.8281	
720 minute summer	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	178.9	0.036	0.041	2009.9426	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1754.9	3.115	1.527	75.2292	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	1220.8	4.335	1.389	11.6136	
15 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	745.1	2.645	0.895	16.8350	
15 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	400.2	1.685	0.470	14.8258	

Results for 1000 year +85% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	Pond H Area In_Downstream	2160	54.545	0.284	13.4	0.0000	0.0000	OK
2160 minute winter	J2_Pond H Flash In/Out	2160	54.545	0.295	23.0	0.0000	0.0000	SURCHARGED
60 minute winter	J3_Pond G Flash In/Out	58	54.765	0.525	22.1	0.0000	0.0000	OK
360 minute winter	J4_Pond G Out	248	54.989	0.749	236.8	0.0000	0.0000	FLOOD RISK
2160 minute winter	J5_Pond D In	2280	52.954	0.627	43.7	0.0000	0.0000	OK
2160 minute winter	J6_Pond D Out	2280	52.945	0.645	40.7	0.0000	0.0000	SURCHARGED
2880 minute winter	J7_Pond C In	3060	51.699	0.870	32.0	0.0000	0.0000	OK
4320 minute winter	J8_Pond C Out	4560	51.275	0.475	28.2	0.0000	0.0000	SURCHARGED
7200 minute winter	J9_Pond B In	7260	50.609	0.880	25.0	0.0000	0.0000	OK
10080 minute winter	J13_Pond B Out	10320	50.483	0.783	13.6	0.0000	0.0000	FLOOD RISK
10080 minute winter	J14_Watercourse In	10320	47.909	0.009	0.5	0.0000	0.0000	OK
10080 minute winter	J11_LS Swale Area Out	10320	50.482	0.332	6.2	0.0000	0.0000	FLOOD RISK
10080 minute winter	J12_Pond B In from LS Swale Area	10320	50.482	0.753	6.2	0.0000	0.0000	OK
10080 minute winter	J10_LS Swale Area In	10320	50.482	0.332	6.3	0.0000	0.0000	OK
15 minute summer	Pond H Area In_Upstream	11	55.380	0.030	116.1	0.2978	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	Pond H Area In_Downstream	Flow through pond	J2_Pond H Flash In/Out	-10.0	0.004	-0.002	1670.1978	
2160 minute winter	J2_Pond H Flash In/Out	Pond G to Pond H	J3_Pond G Flash In/Out	-23.0	-1.326	-5.374	0.3768	
60 minute winter	J3_Pond G Flash In/Out	Flow through pond	J4_Pond G Out	769.2	0.110	0.177	1982.3221	
360 minute winter	J4_Pond G Out	Pond G to Pond D	J5_Pond D In	44.5	2.527	1.464	0.3663	
2160 minute winter	J5_Pond D In	Flow through pond	J6_Pond D Out	40.7	0.034	0.006	2409.9827	
2160 minute winter	J6_Pond D Out	Pond D to Pond C	J7_Pond C In	32.2	1.828	9.857	0.3204	
2880 minute winter	J7_Pond C In	Flow through pond	J8_Pond C Out	28.5	0.024	0.001	1602.8750	
4320 minute winter	J8_Pond C Out	Pond C to Pond B	J9_Pond B In	26.5	1.507	8.058	0.3142	
7200 minute winter	J9_Pond B In	Flow through pond	J13_Pond B Out	14.9	0.010	0.000	7387.3789	
10080 minute winter	J13_Pond B Out	Pond B to Watercourse	J14_Watercourse In	0.5	1.073	0.007	0.0071	154.4
10080 minute winter	J11_LS Swale Area Out	LS Swale Area to Pond B	J12_Pond B In from LS Swale Area	6.2	0.216	0.490	0.9736	
10080 minute winter	J12_Pond B In from LS Swale Area	Flow through pond	J13_Pond B Out	13.6	0.009	0.000	8349.3633	
10080 minute winter	J10_LS Swale Area In	Flow through pond	J11_LS Swale Area Out	6.2	0.012	0.012	860.3353	
15 minute summer	Pond H Area In_Upstream	Pond H Area In	Pond H Area In_Downstream	112.6	0.485	0.063	5.1076	

Results for 1000 year +85% CC Critical Storm Duration. Lowest mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Land Storage Area In	10	51.902	0.052	671.4	2.9744	0.0000	OK
15 minute summer	Pond G Area In_Upstream	10	55.371	0.021	83.9	0.1498	0.0000	OK
480 minute winter	Pond G Area In_Downstream	304	54.990	0.743	9.9	0.0000	0.0000	OK
15 minute summer	Pond D Area In_Upstream	10	54.905	0.055	438.2	2.0765	0.0000	OK
2160 minute winter	Pond D Area In_Downstream	2280	52.945	0.619	16.4	0.0000	0.0000	OK
15 minute summer	Pond C Area In_Upstream	10	53.864	0.014	106.9	0.1241	0.0000	OK
4320 minute winter	Pond C Area In_Downstream	4560	51.275	0.475	2.2	0.0000	0.0000	OK
10080 minute winter	Pond B Area In_Upstream	10320	50.483	0.483	1.4	1.6698	0.0000	FLOOD RISK
10080 minute winter	Pond B Area In_Downstream	10320	50.483	0.783	1.4	0.0000	0.0000	OK
600 minute winter	Cidery Site Area In_Downstream	330	55.000	0.753	312.0	0.0000	903.7772	FLOOD
15 minute summer	Cidery Site Area In_Upstream	9	56.865	1.915	1831.1	15.3382	0.0000	FLOOD RISK
15 minute summer	Cidery 3	9	57.950	2.500	1285.4	12.8275	38.8538	FLOOD
30 minute summer	Cidery 2	16	58.300	2.200	992.5	12.4872	118.8471	FLOOD
30 minute summer	Cidery 1	16	58.400	1.700	705.0	11.9221	110.1259	FLOOD

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Land Storage Area In	Land Storage Area In	J10_LS Swale Area In	668.8	1.075	0.164	12.3253	
15 minute summer	Pond G Area In_Upstream	Pond G Area In	Pond G Area In_Downstream	82.7	0.489	0.036	2.1850	
480 minute winter	Pond G Area In_Downstream	Flow through pond	J4_Pond G Out	195.9	0.048	0.045	2011.7949	
15 minute summer	Pond D Area In_Upstream	Pond D Area In	Pond D Area In_Downstream	431.1	0.934	0.182	11.5461	
2160 minute winter	Pond D Area In_Downstream	Flow through pond	J6_Pond D Out	40.7	0.034	0.006	2409.9827	
15 minute summer	Pond C Area In_Upstream	Pond C Area In	Pond C Area In_Downstream	106.5	0.425	0.018	3.2053	
4320 minute winter	Pond C Area In_Downstream	Flow through pond	J8_Pond C Out	28.2	0.020	0.001	1729.6511	
10080 minute winter	Pond B Area In_Upstream	Pond B Area In	Pond B Area In_Downstream	1.4	0.002	0.001	13.9552	
10080 minute winter	Pond B Area In_Downstream	Flow through pond	J13_Pond B Out	13.6	0.009	0.000	8349.3633	
600 minute winter	Cidery Site Area In_Downstream	Flow through pond	J4_Pond G Out	168.2	0.041	0.039	2011.5317	
15 minute summer	Cidery Site Area In_Upstream	Cidery Site Area In	Cidery Site Area In_Downstream	1826.1	3.242	1.589	75.3293	
15 minute summer	Cidery 3	Cidery 3 to Cidery Site Area In	Cidery Site Area In_Upstream	1162.9	4.129	1.323	11.6136	
30 minute summer	Cidery 2	Cidery 2 to 3	Cidery 3	727.5	2.583	0.874	16.8350	
30 minute summer	Cidery 1	Cidery 1 to 2	Cidery 2	373.8	1.729	0.439	14.8258	

Appendix F CIRIA Suds Index

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Waste handling/management/distribution site	These indices should only be used if considered appropriate by the required risk assessment and where approved by the regulator. If they are not considered appropriate, the risk assessment should use alternative measures of pollution hazard for the site.	In Scotland and Northern Ireland, the environmental regulator should be consulted as part of the licensing process required for High Risk sites. In England and Wales, the environmental regulator should be consulted prior to design (for pre-permitting advice) to determine the most appropriate design approach and requirements for risk assessment.		
Pollution Hazard Level	High				
Pollution Hazard Indices					
TSS	0.8				
Metals	0.8				
Hydrocarbons	0.9				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Detention basins should be designed to ensure the effective retention and management of sediment, such that the sediment will not be re-suspended and washed out in subsequent events		
Component 2	Pond or wetland	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events		
Component 3	Pond or wetland	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B	Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events		
SuDS Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Groundwater protection type	Dense vegetation layer underlain by 300 mm minimum depth of soils with good contamination attenuation potential	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Groundwater protection Pollution Mitigation Indices					
TSS	0.6				
Metals	0.5				
Hydrocarbons	0.6				
Combined Pollution Mitigation Indices					
TSS	>0.95	**Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but Interception requires separate evaluation.**	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England		
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				