Tyddyn Forgan ESS
B068934

Flood Consequence Assessment

For Review

Firstway Energy Limited

21/02/2025

Document prepared on behalf of Tetra Tech Limited. Registered in England numbe 01959704

TETRA TECH

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Document:	Flood Consequence Assessment
Document name:	
Project:	Tyddyn Forgan ESS
Client:	Firstway Energy Limited
Project number:	B068934
File origin:	\\lds-dc-vm-101\Data\Projects\784-B068934_Tyddyn_Forgan_ESS\60_Output\61_WIP\CivilEngineering\Docs\B068934-TTE-XX-XX-RP-C-00500(FCA)\P02\B068934-TTE-XX-XX-RP-C-00500P02(MainText).docx

Revision:	P01	**Prepared by:**	A Jenner
Date:	21/02/2025	**Checked by:**	
Status:	Preliminary	**Approved by:**	
Description of revision:	First Issue		

Revision:	P02	**Prepared by:**	A Jenner
Date:	24/02/2025	**Checked by:**	
Status:		**Approved by:**	
Description of revision:	Client and Team comments incorporated		

Revision:		**Prepared by:**	
Date:		**Checked by:**	
Status:		**Approved by:**	

Description of revision:	

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Appendices

1.0 Introduction

1.1 Tetra Tech has been appointed by Net Zero Twenty Six Limited (the applicant) (managed by Firstway Energy) to prepare a Flood Consequence Assessment in support of a Planning Application for an Energy Storage Facility located at Tyddyn Forgan.

1.2 This report sets out the Flood Risk associated with the chosen site and identifies the measures that can be incorporated to ensure there is no increase in Flood Risk downstream of the proposed development and that the site will not be at increased risk of flooding or that this risk can be managed on site.

1.3 This report has been prepared by Tetra Tech Ltd on behalf of Net Zero Twenty Six Limited (the applicant) (managed by Firstway Energy) in connection with the scope of the report described above and taking into account the particular instructions and requirements set out by Net Zero Twenty Six Limited (the applicant) (managed by Firstway Energy). It is not intended for and should not be relied on by any third party and no responsibility is undertaken to any third party.

1.4 Tetra Tech Ltd accepts no duty or responsibility (including in negligence) to any party other than Net Zero Twenty Six Limited (the applicant) (managed by Firstway Energy) and disclaims all liability of any nature whatsoever to any such party in respect of this report. This report cannot be reproduced without Tetra Tech's written consent.

2.0 Existing site

2.1 The site is located at Tyddyn Forgan in Gwynedd, North Wales as shown in figures 1 and 2. The approximate postcode for the area is LL55 3AN. National Grid coordinates for the site are SH 55680 67275. The What3Words descriptor for the site is: ///Kickers.steam.costs.

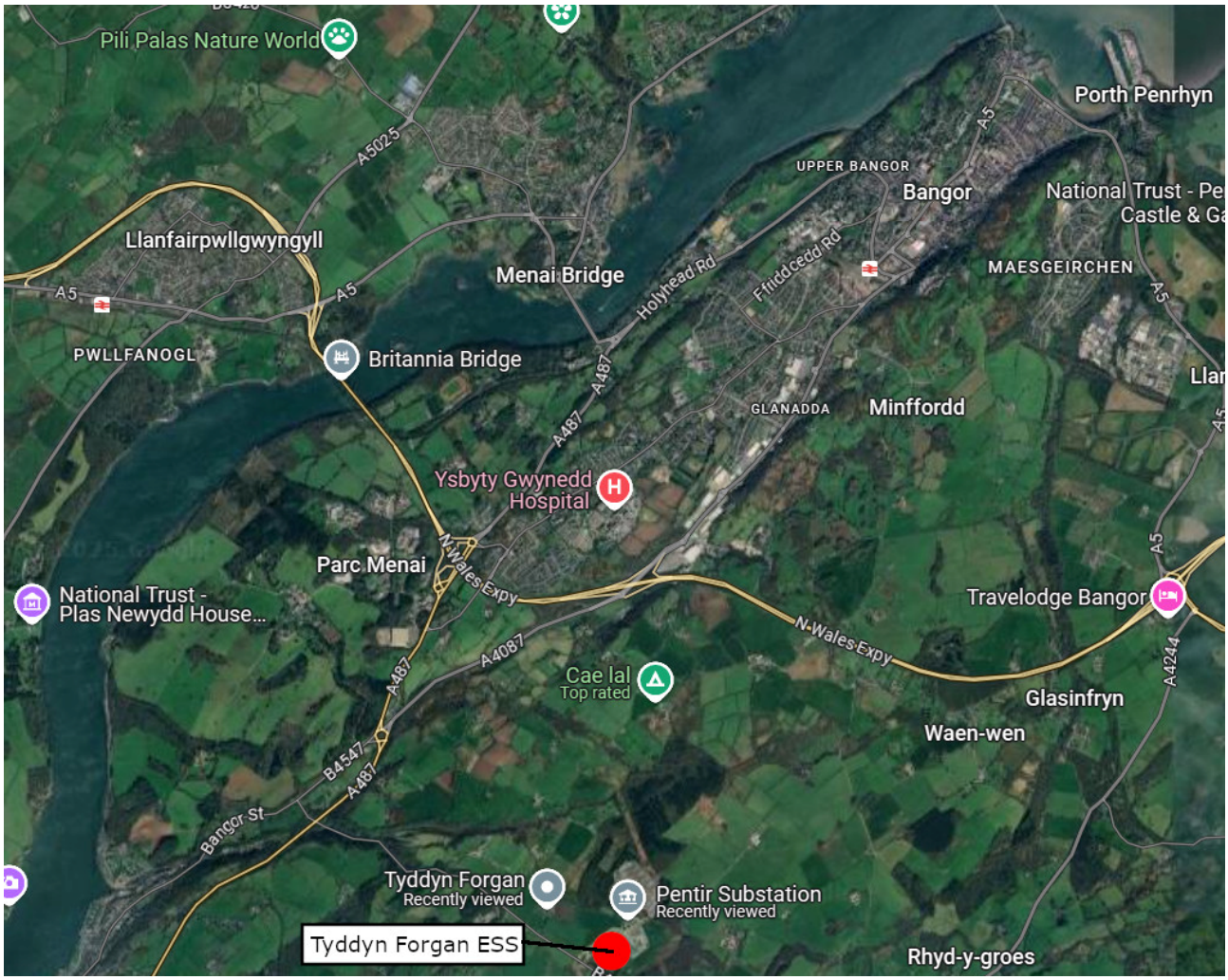

Figure 1 - General Location

2.2 The site is adjacent to an existing National Grid substation and is essentially undeveloped agricultural land. Topographically the site falls from east to west and from north to the line of an existing watercourse that crosses the site from east to west. The southern extremities of the site fall to the north to meet the aforementioned watercourse. A topographic survey of the site can be found in Appendix A.

Figure 2 - Site Location

2.3 The British Geological Survey reports that the bedrock is Minffordd Formation – Sandstone and Conglomerate, interbedded. This is overlain by Till, Devensian – Diamicton, interbedded.

2.4 The coarse scaled hydrogeology mapping indicates that some formations in the area are classified as secondary A aquifers of moderate vulnerability.

2.5 Existing Flood Risk for the site is indicated as low, the bulk of the site is reported as being in Flood Zone A, being the lowest risk classification and entirely compatible with the proposed development.

2.6 There is a small amount of the site that is considered to be Flood Zone B, however, as long as the proposed layouts avoid these areas and do not alter the topography in these areas then there will be no change to the current flood regime.

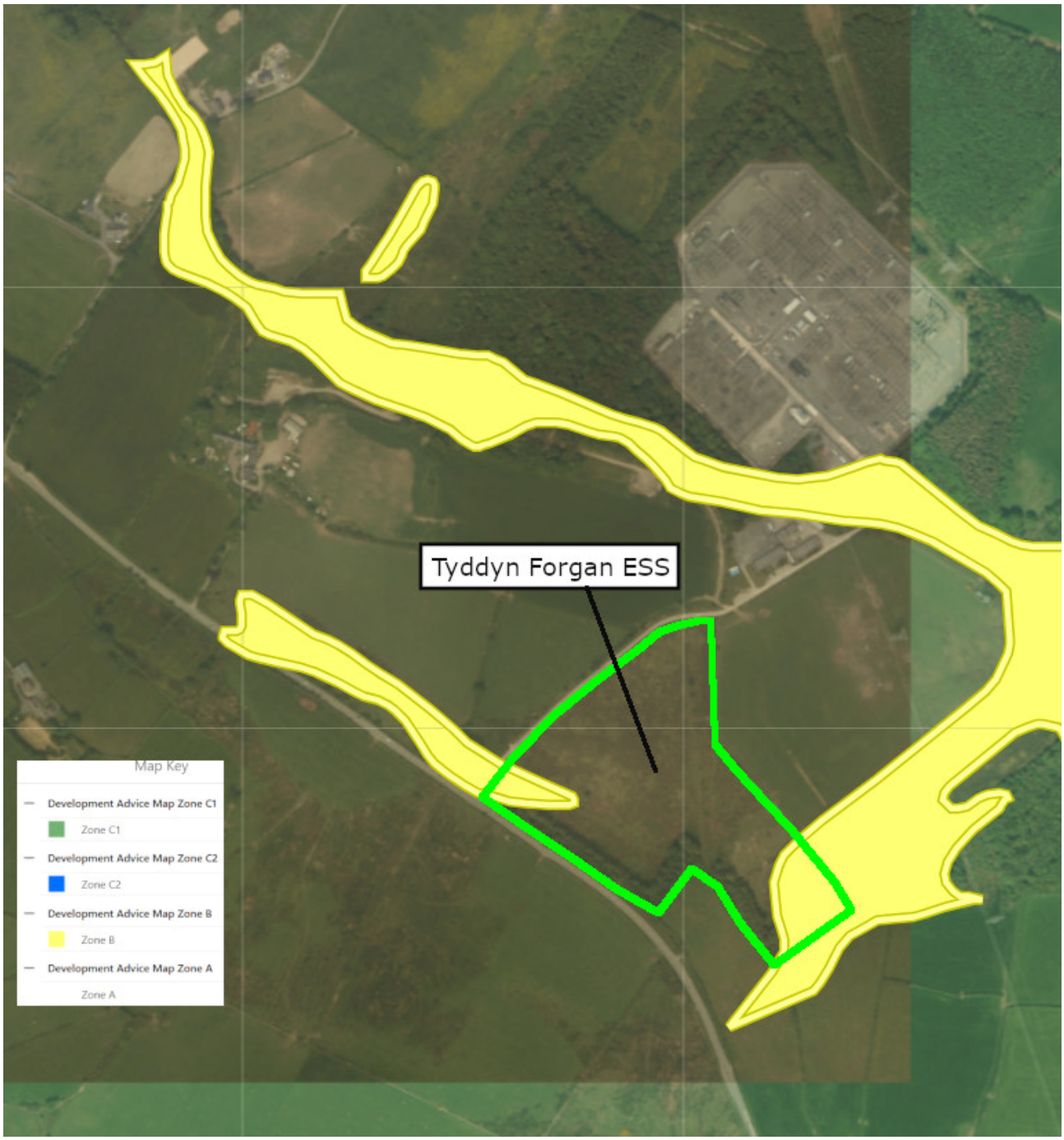

Figure 3 - Development Advice Map

2.7 This is confirmed by the more detailed “Flood Map for Planning” which shows a smaller area of flooding from the existing watercourse that crosses and bounds the site as shown in Figure 4.

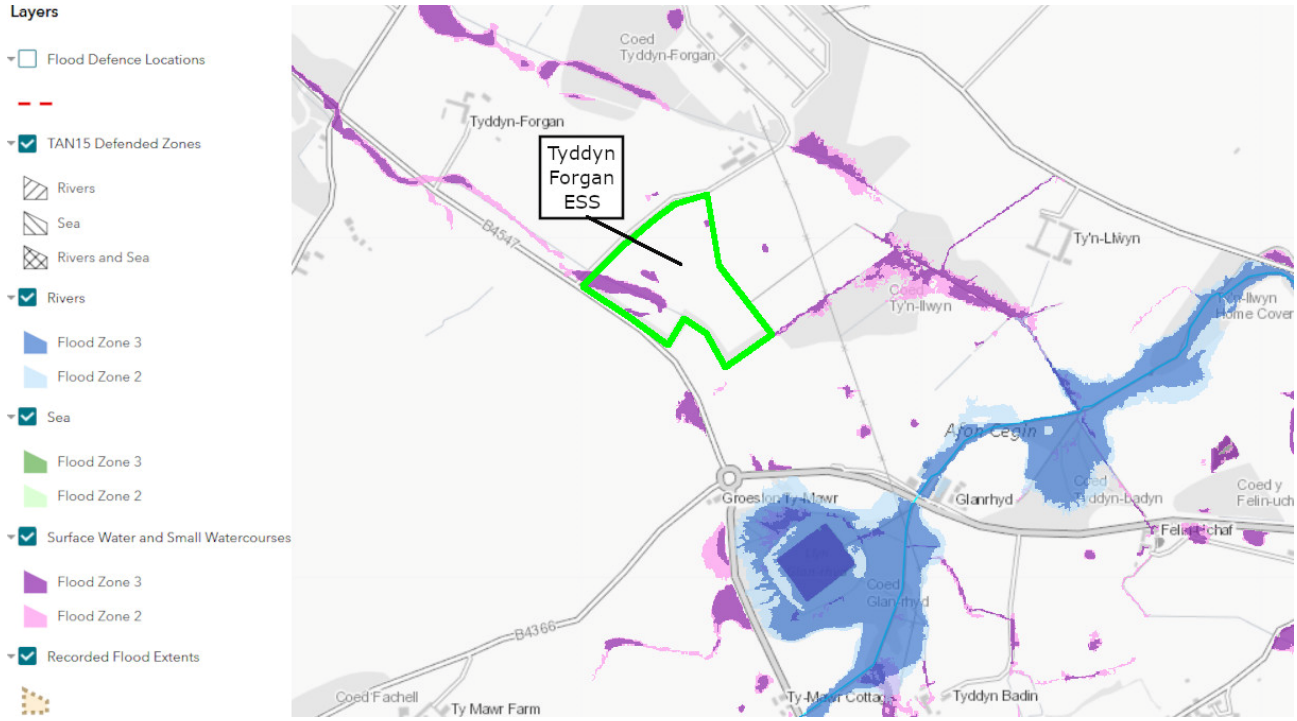

Figure 4 - Flood Map for Planning

2.8 The greenfield runoff for the existing site has been calculated using the FEH method using FEH 22 data. The catchment parameters and the rainfall data employed are shown in Appendix B.

2.9 The greenfield runoff calculations for the existing site are presented in Appendix C. In short the full catchment of 673.25ha is estimated to be 3.239m^3/s which is an average of 4.8l/s/ha.

3.0 Policy Context

3.1 Planning Policy Wales

3.1.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. Section 6.6 in Planning Policy Wales (12th Edition – February 2024) relates to water and flood risk. This document has been consulted and referred to (where relevant) in the production of the FCA.

3.2 Planning Policy Wales Technical Advice Note 15 Development and Flood Risk (TAN 15)

3.2.1 The Planning Policy Wales Technical Advice Note 15 Development and Flood Risk (TAN 15), published in July 2004, provides technical guidance which supplements the policies set out in PPW in relation to flooding and coastal erosion. It provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed. It also provides advice on the consequences of the risks and adapting to and living with flood risk.

3.2.2 The general approach of TAN 15 is to advise caution to in respect to new developments in area of flood risk by setting out a precautionary framework to guide planning decisions. The aim of the framework is to steer new developments away from areas which are at high risk of flooding. Where a development is considered to be located in a high-risk area, it will need to be assessed on the basis of the tests outlined in the technical advice note (i.e. the justification and the assessment of flooding consequences).

3.2.3 This document has been consulted and referred to (where relevant) in the production of the FCA.

3.3 Statutory Standards for Sustainable Drainage Systems – Designing, Constructing, Operating and Maintaining Surface Water Drainage Systems

3.3.1 The Welsh Statutory Standards for Sustainable Drainage Systems, published in 2018, provided a statutory framework to enable designers, property developers,

local authorities and other interested parties to demonstrate they have taken into account the Welsh Governments planning advice on development and flood risk, nature conservation and planning. These standards provide information relating to the design, construction, operation and maintenance of Sustainable Drainage Systems (SuDS) serving new developments in rural or urban settings for more than one dwelling or where the area covered by construction work is equal or larger than 100m2. These standards can also be applied to existing development for the delivery of 'retro-fit' schemes.

3.3.2 This document has been consulted and referred to (where relevant) in the production of the FCA.

3.4 Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026

3.4.1 The Local Development Plan (LDP) is a land use document which sets out how the County will be developed over 15 years. The LDP contains detailed policies which will control the form of new development and setting out what new development should look like. This document provides the framework for decisions to be made up until 2026.

3.4.2 The two separate authorities (Anglesey and Cyngor Gwynedd) agreed to cease their joint working agreement on Planning Policy matters on 31 March 2023. Since then a new LDP is being developed by Cyngor Gwynedd, but this has not been adopted.

3.4.3 Joint Local Development Plan 2011 - 2026 Web Link

3.5 Anglesey & Gwynedd Joint Local Development Plan Strategic Flood Consequence Assessment (Stage 1)

3.5.1 The Anglesey/Cyngor Gwynedd Strategic Flood Consequence Assessment (SFCA) provides an overview of flood risk from all potential sources and informs flooding policies including the allocation of land for development. The report provides an assessment of the level of flooding geographically and outlines the constraints of flooding on future development proposals.

3.5.2 The following points provide a summary of the SFCA Report and recommendations:

- Flooding is an issue which is a central consideration to the LDP process since future development should be guided to land located outside flood-risk areas.
- Within the JLDP area, flooding from both rivers and the sea pose a particular threat to existing communities and will also affect the future pattern of growth of settlements.
- The aim of Stage One of the SFCA was to collect all the data available on flooding within Anglesey and Gwynedd, which would then provide an overview of flooding and in particular flooding risk issues prevalent within the JLDP area.

3.5.3 Strategic Flood Consequence Assessment (Stage 1) Web Link

3.6 Cyngor Gwynedd Local Flood Risk Management Strategy DRAFT

3.6.1 The Local Flood Risk Management Strategy (LFRMS) presents the Council's Objectives and Measures for managing the risk of flooding from local sources in Cyngor Gwynedd which forms the framework within which communities have a greater say in local flood risk management decisions.

3.6.2 The Action Plan is a detailed plan for managing local flood risk. These include specific tasks, activities or initiatives to deliver the objectives and measures contained in the Strategy.

3.6.3 DARFT Local Flood Risk Management Strategy Web Link

3.7 Statutory Standards for Sustainable Drainage Systems – Designing, Constructing, Operating and Maintaining Surface Water Drainage Systems

3.7.1 The Welsh Statutory Standards for Sustainable Drainage Systems, published in 2018, provided a statutory framework to enable designers, property developers, local authorities and other interested parties to demonstrate they have taken into account the Welsh Governments planning advice on development and flood risk,

nature conservation and planning. These standards provide information relating to the design, construction, operation and maintenance of Sustainable Drainage Systems (SuDS) serving new developments in rural or urban settings for more than one dwelling or where the area covered by construction work is equal or larger than 100m2.

3.7.2 This document has been consulted and referred to (where relevant) in the production of the FCA.

3.8 Climate Change Allowances

3.8.1 Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales Web Link

3.8.2 The Welsh Government 'Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales (August 2022)' states that to allow for the predicted impacts of climate change on peak river flows, the following increases in river flood flows as a result of climate change should be allowed for:

Table 1 - West Wales River Climate Change Allowances

West Wales	Total potential change anticipated for the 2020s (2015 to 2039)	Total potential change anticipated for the 2050s (2040 to 2069)	Total potential change anticipated for the 2080s (2070 to 2115)
Upper (90th)	25%	40%	75%
Central (50th)	15%	25%	30%

3.8.3 The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels. Therefore, an allowance of 30% would achieve the policy requirements in assessing the flood risk associated with the development.

3.8.4 The Welsh Government 'Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorise in Wales (August 2022)' states that to allow for the predicted impacts of climate change on surface water run-off, the following increases in rainfall intensities due to climate change should be allowed:

Table 2 - All Wales Rainfall Climate Change Allowances

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

3.8.5 Both the central and upper estimates should be assessed to understand the range of impact. As a minimum, development proposals should be assessed against the central estimate to inform design levels. As with river flood flows, it is recommended that the 2080s changes are used when considering any time beyond 2115. Therefore, a 40% allowance for climate change will be used when designing the drainage strategy for the proposed development.

3.9 Justification Test, Development Advice Map and TAN 15 Policy Requirements

3.9.1 The objective of the Justification Test outlined in TAN 15 is to direct new development towards suitable land within Flood Zone A,. Where there are no reasonably available sites in Flood Zone A, local planning authorities in their decision making should consider the flood risk vulnerability of land uses and examine reasonably available sites in Flood Zone B before Flood Zone C is evaluated.

3.9.2 As demonstrated in Section 2 the site is located in DAM Zone A on the Natural Resources Wales online Flood Risk Map Viewer. As such, the Justification Test is not applicable and there are no constraints with regards to river and coastal flooding, other than to avoid increasing flood risk elsewhere. Local and national surface water policy requirements are still required to be adhered to.

4.0 Sources of flooding

4.1 General

4.1.1 The TAN 15 requires flood risk from the following sources to be assessed, each of which are assessed separately below:

- Fluvial sources (river flooding);
- Tidal sources (flooding from the sea);
- Groundwater sources;
- Pluvial sources (flooding resulting from overland flows);
- Sewer Flooding;
- Artificial sources, canals, reservoirs etc.; and,
- It also requires the risk from increases in surface water discharge to be assessed (surface water management).

4.2 Flood Zone Designation

4.2.1 Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. Planning Policy Wales TAN 15 defines Flood Zones as follows:

- Flood Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Justification test is not applied and do not need to consider further,
- Flood Zone B: Areas known to have flooded historically. Evidenced by sedimentary deposits. Used as part of the precautionary approach to indicate where site levels should be checked against the extreme (0.1% annual probability) flood. No need to consider flood risks further if site levels are greater than the extreme flood level,
- Flood Zone C: Based on Environment Agency extreme flood outline (0.1% annual probability). Indicates that flooding issues should be considered as an integral part of the decision making by the application of the justification test, including FCA.
- Flood Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. Indicates that development can

take place subject to the application of the justification test, including acceptability of consequences.

- Flood Zone C2: Areas of the floodplain without significant flood defence infrastructure. Indicates that only 'less vulnerable' development should be considered, subject to the application of the justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

4.2.2 The Development Advice Map was shown in Section 2 and identifies that the bulk of the site, and certainly the proposed operational areas, will be situated within Flood Zone A.

4.3 Tidal Flood Risk

4.3.1 The site is located 3.3km from the Menai Straits at a lowest elevation of 107.4m AOD. Therefore, tidal flood risk at the site can be ruled as negligible.

4.4 Fluvial Flood Risk

4.4.1 The NRW 'Flood Map for Planning' in Figure 4 provides an almost identical flood zone extents as their Development Advice Map in Figure 3 presented in Section 2.

4.4.2 The majority of the site, including the area outlined for development, is located within Flood Zone 1 at a less than 0.1% annual chance of flooding.

4.4.3 Therefore, the risk of fluvial flooding at the area outlined for development is assessed to be low.

4.5 Pluvial Flood Risk

4.5.1 The NRWs Flood Map for Planning (Figure 4) shows that the majority of the area outlined for development is not at risk of surface water flooding.

4.5.2 A small area, adjacent to the western boundary, is shown to be within Flood Zone 3, defined as an area with greater than 1% chance of flooding in a given year, including the effects of climate change, from the small watercourse that crosses the site.

4.5.3 Surface water flow paths across the site broadly direct water to the existing watercourse and the flood risk associated with this watercourse appears, on inspection of the site, to be a function of culverting of the watercourse to form the access road to the adjacent sub-station.

4.5.4 Overall, the risk of pluvial flooding to the areas of proposed development are assessed to be low.

4.6 Groundwater Flood Risk

4.6.1 The Strategic Flood Consequence Assessment 2008 has uncovered no evidence of groundwater flood risk within the county.

4.6.2 There is limited existing ground investigation information that can shed light on the presence or otherwise of groundwater or what level it is likely to be encountered at.

4.6.3 As the site is not developing in a manner sensitive the groundwater flooding (e.g. basements), groundwater flood risk to the site is assessed to be low.

4.7 Sewer Flood Risk

4.7.1 NRW are the statutory sewerage undertaker for the site. The SFCA have provided no evidence of any recorded incidents of sewer flooding at the site

4.7.2 Additionally, due to the site's rural location, it is unlikely that there is public sewer infrastructure underlying the area proposed for the development or surrounding area.

4.7.3 The risk of flooding from sewers is therefore considered to be low.

4.8 Flood Risk from Artificial Sources

4.8.1 According to the NRW Flood Map for Planning, the site does not fall within an area at risk of flooding from reservoirs.

4.8.2 Consequently, the risk of flooding from reservoirs is assessed to be low.

5.0 Drainage Strategy

5.1 General

5.1.1 Natural Resources Wales (NRW) Statutory standards technical guidance for Sustainable Drainage Systems (SuDS) and CIRIA Guidance C753 “The SuDS Manual” have been used to determine the appropriate SuDS Strategy, which considers the spatial and environmental constraints of the Site.

5.1.2 In accordance with the Planning Policy Wales (PPW), an allowance of 40% for the effects of climate change will achieve the policy requirements for the proposed development.

5.2 Proposed Sustainable Drainage Systems (SuDS)

5.2.1 In accordance with the Welsh Ministers Statutory Standards for SuDS, surface water run-off should be disposed of according to the following hierarchy:

- Priority Level 1 – surface water run-off is collected for use;
- Priority Level 2 – surface water run-off is infiltrated to ground
- Priority Level 3 – surface water run-off is discharged to a surface water body
- Priority Level 4 – surface water run-off is discharged to a surface water sewer, highway drain, or another drainage system,
- Priority Level 5 – surface water runoff is discharged to a combined sewer

5.2.2 The site is effectively automated with little or no permanent manned presence. Consequently, the demand for water re-use in the form of toilet flushing or irrigation is very low making interception and storage for re-use inefficient as the system will potentially sit full with little or no demand being placed upon it.

5.2.3 As such storage and re-use is not considered feasible for this application.

5.2.4 Infiltration to the ground remains unproven. The underlying geology, described in Section 2, may support infiltration but this will have to be confirmed by physical ground investigation, which can be a condition of planning.

5.2.5 Given the presence of both a watercourse and areas on the topographic survey labelled as “marsh” it is likely that percolation will, at best, be marginal. Without positive data applicable to this site the conditions would not make infiltration likely enough to base a drainage strategy around.

5.2.6 Discharge to a surface water body can be achieved, although the existing watercourse is shown to be relatively shallow which will limit storage options. For the purposes of this planning application this is the form of drainage proposed as the highest method in the hierarchy that can be positively implemented.

Table 3 - CIRIA C753 SuDS Management Train

Zero T	Infiltration Devices (Source Control)
Constraints:	Limited physical investigation information or percolation testing coupled with the presence of surface water features within and adjacent to the site indicates a low probability of infiltration options.
Opportunities:	None but physical testing could be undertaken to confirm the efficacy
Type:	Lined Permeable Paving (Source Control)
Constraints:	The proposed access tracks around the site are likely to be simple stone tracks which usually following compaction present limited permeability. Secondly the unproven ground conditions mean that positive drainage is still likely to be required. The shallow outfall depth will also constrain the amount of sub-base storage that can be achieved
Opportunities:	Limited potential given the simple nature of the proposed access tracks
Type:	Rainwater Harvesting (source control)
Constraints:	The benefits of rainwater harvesting on a specific design storm event cannot be quantified due to the seasonal availability of storage within the structure. Considering the use of the site the benefits of rainwater harvesting are limited.
Opportunities:	None

Type:	Swales etc. (Permeable Conveyance)
Constraints:	In order to provide practical attenuation benefits 1:3 side slope swales tend to require a significant land-take. However steeper sided conveyance/attenuation can be utilised where the site layout allows
Opportunities:	Swales before discharging into the drainage system. Additionally, swales/ditches can help with the relatively shallow outfall
Type:	Filter Drains (Treatment and Conveyance)
Constraints:	As the ground conditions are unlikely to support percolation it will be necessary to install a perforated collector pipe within the filter trench
Opportunities:	Relatively simple construction that can be incorporated as an edge of road treatment without large land take. Adjacent impermeable areas can be connected by pipe directly into the collector drainage
Type:	Tree Pits/Rain Gardens
Constraints:	Considering the proposed use of the site there are limited benefits to introducing these features
Opportunities:	None
Type:	Green Roofs
Constraints:	Not compatible with the proposed development
Opportunities:	None
Type:	Attenuation Tanks (End of pipe treatment)
Constraints:	Shallow outfall will limit effective depth of storage when cover over the tank is taken into account
Opportunities:	Limited
Type:	Attenuation Basin
Constraints:	Shallow outfall and low existing ground levels will require a large area to be dedicated to attenuation

Opportunities:	Simple and easily inspected component can occupy otherwise fallow areas of the development site

5.2.7 After consideration of the CIRIA C753 approach, the most viable SuDS options for the development would be a combined solution of ditches and filter trenches (French drains) with perforated collector pipes alongside the stone tracks discharging through an attenuation basin. These SuDS options will be in sequence with flow control devices to provide the necessary storage and treatment for up to the 1 in 100-year storm event including an allowance of 40% for climate change. The proposed drainage strategy is included within Appendix D.

5.3 Surface Water

5.3.1 The planning red line boundary area equates to approximately 4.65ha and is currently Greenfield area. Post-development, approximately 0.7ha of the site will become impermeable.

5.3.2 Existing peak Greenfield run-off rates for the Site were calculated in MicroDrainage using the FEH Method, as described in Section 2. Based on a limiting discharge of 4.8l/s/ha the limiting discharge from the site should not exceed 3.4l/s.

5.3.3 Flow modelling results show there is no flooding for the Site for the 1 in 100-year storm event including an allowance of 40% for climate change rainfall event. Flow modelling results are included within Appendix E.

5.3.4 The surface water systems are split into 3 separate networks based on the position of the existing watercourse and the layout of the proposed development.

5.3.5 The first network is the section of access track from the main road to the watercourse. It is proposed to drain this via a 100mm perforated pipe in a filter drain with surface water runoff being directed off the edge of the access track. This network has not been modelled but it is considered that the small area coupled with the long time of concentration associated with overland flows across the stone track coupled with the time to filter through the filter trench and enter the collector pipe will result in a slow discharge into the existing watercourse that will not require any explicit outflow control.

5.3.6 The second network is the section of access track from the existing watercourse to the main facility. As with the first network it is proposed to drain this via a 100mm perforated pipe in a filter drain with surface water runoff being directed off the edge of the access track. This network has not been modelled but it is considered that the small area coupled with the long time of concentration associated with overland flows across the stone track coupled with the time to filter through the filter trench and enter the collector pipe will result in a slow discharge into the existing watercourse that will not require any explicit outflow control.

5.3.7 The third and main surface water network is the filter trenches, collector pipes, ditches and attenuation basin that serve the main facility. Discharge from this system is limited to 2l/s for all storms up to and including the 1:100+40% event.

5.4 Surface Water Quality

5.4.1 The recommended stage of treatment in terms of water quality would be provided through the use of swales, permeable paving and the inclusion of a downstream defender. In line with the SuDS Manual C753, Tables 26.2 and 26.3, the pollution hazard and mitigation indices associated with sites with heavy pollution are mitigated by the provision of SuDS features. This is provided in Appendix F.

5.4.2 Based on the CIRIA 753 Simple Index Treatment Method, the Site would have an associated pollution hazard level of ‘Medium’.

5.4.3 The level of treatment provided by the proposed SuDS and drainage features for the site is summarised below:

5.4.4 It is considered that the nature of the site results in a classification of “low risk” in normal operation since there will be very low numbers of both personnel and vehicles.

5.4.5 Low Risk is described as: “Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and nonresidential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day”

POLLUTION INDICES

Risk	TSS	Metals	Hydrocarbons
Low	0.5	0.4	0.4
MITIGATION INDICES			
Networks 01 and 02 (filter drain only)			
Filter Drain	0.4	0.4	0.4
Check:	0.1	0.0	0.0
Network 03 (Ditch and Attenuation Basin)			
Ditch	0.5	0.6	0.6
Attenuation Basin	0.5 x 0.5 = 0.25	0.5 x 0.5 = 0.25	0.5 x 0.6 = 0.3
Total Mitigation	0.75	0.85	0.9
Check	-0.25	-0.45	-0.5
Network 03 (Filter Drain and Attenuation Basin)			
Ditch	0.4	0.4	0.4
Attenuation Basin	0.5 x 0.5 = 0.25	0.5 x 0.5 = 0.25	0.5 x 0.6 = 0.3
Total Mitigation	0.65	0.65	0.7
Check	-0.15	-0.25	-0.3

5.4.6 The combination of two forms of treatment within network 03 provides sufficient mitigation to address the low risk pollution indices. The single treatment provided in networks 1 and 2 can handle the Metals and hydrocarbons but will struggle with suspended solids. It is proposed to include a catchpit prior to outfall to trap any residual suspended solids to address this potential shortfall.

5.5 Fire Suppression Water

5.5.1 Firewater arising from a fire incident may result in high concentrations of substances which are harmful to the aquatic environment. If these substances are allowed to enter into soil, drains or watercourses in an uncontrolled manner, it has the potential to cause significant environmental damage

5.5.2 To address this the basin is proposed to be lined with an impermeable membrane and a manual/automatic penstock has been added to the drainage network, downstream of the attenuation basin and upstream of the Hydrobrake, to trap firewater within the network, should a fire arise on site which could contaminate runoff. The penstock would automatically activate on the detection of pollutants within the water and the maintenance company would be notified. The penstock can also be activated manually.

5.5.3 Once the emergency event has passed the system will be pumped out and the potentially contaminated water tankered off-site to a suitable disposal site.

5.5.4 In the critical storm event the basin is approximately 76% full. The remaining volume within the basin is sufficient to accommodate the contents of the on-site water tank, ensuring that even if an emergency event were to coincide with the future critical storm event the fire suppression water could be contained.

5.5.5 The proposed control chamber arrangement can be seen in Appendix F.

5.6 Future Maintenance

5.6.1 Maintenance of the drainage system, including the swale, will be carried out by a maintenance company; the name of the management company is to be advised. All maintenance will be in accordance with best practice and in line with guidance given in the CIRIA Manual C753. A detailed Maintenance and Management Plan can be secured via planning condition.

6.0 Conclusions

6.1 This Flood Consequence Assessment and Drainage Strategy has been prepared to demonstrate the compliance of the proposed Energy Storage System with the requirements of Sustainable Drainage and Flood Risk Management.

6.2 This report has shown that the selected site is in Flood Zone 1 and is completely compatible with the proposed land use. Being in Flood Zone 1 there is no need for any further sequential test.

6.3 The greenfield runoff from the existing site has been assessed using the latest FEH data.

6.4 Discharge from the site has been limited to Qmed for all storm events up to and including the 1:100 year return period with a 40% allowance for climate change.

6.5 The proposed drainage system makes use of Sustainable features including:

- Filter drains which provide treatment and increase the time of concentration delaying the peak runoff,
- Open ditches/swales which provide open water conveyance, attenuation and treatment,
- Attenuation basin.

6.6 A simple index assessment of the treatment train has shown that sufficient treatment is provided by the selected features to meet the likely risks in normal use.

6.7 Overall, there should be no objection to this development on drainage grounds.

Appendix A: Existing Topographical Survey

N

0 5 10 15 20 25 m

SCALE 1:500

PRELIMINARY ISSUE

Rev	Description	Date	Drn	Chk	App
P02	CLIENT NAME AMENDED	24.02.25	aj	AJ	AJ
P01	PRELIMINARY FIRST ISSUE	21.02.25	aj	AJ	AJ

Document Control

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NET ZERO TWENTY SIX LIMTED
MANAGED BY
FIRSTWAY ENERGY

Project Name

TYDDYN FORGAN ESS

Sheet Title

EXISTING TOPOGRAPHICAL SURVEY

Model Reference

N/A

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A1	Status
B068934	aj	Feb '25	AJ	Feb '25	AJ	Feb '25	1:500	S0

Client Project Number	Originator	Function	Spatial	Form	Role	Number	Revision
B068934	- TTE -	XX -	XX -	DR -	C -	00100	P02

TTE_MT_v3

Appendix B: FEH Data

VERSION	"FEH CD-ROM"	Version	5.0.1	exported at	11:18:43	GMT	Mon	03-Feb-25	
CATCHMENT	GB	255350	367800	SH 55350 67800					
CENTROID	GB	255533	367397	SH 55533 67397					
AREA	0.9625								
ALTBAR	114								
ASPBAR	353								
ASPVAR	0.48								
BFIHOST	0.566								
BFIHOST19	0.586								
DPLBAR	0.69								
DPSBAR	32.5								
FARL	1								
FPEXT	0.0675								
FPDBAR	0.491								
FPLOC	0.502								
LDP	1.43								
PROPWET	0.45								
RMED-1H	10.3								
RMED-1D	41.6								
RMED-2D	56.4								
SAAR	1224								
SAAR4170	1211								
SPRHOST	38.34								
URBCONC1990	-999999								
URBEXT1990	0								
URBLOC1990	-999999								
URBCONC2000	-999999								
URBEXT2000	0								
URBLOC2000	-999999								
C	-0.032								
D1	0.4238								
D2	0.45077								
D3	0.36655								
E	0.30599								
F	2.41493								
C(1 km)	-0.032								
D1(1 km)	0.415								
D2(1 km)	0.456								
D3(1 km)	0.361								
E(1 km)	0.305								
F(1 km)	2.404								

VERSION "FEH Web Service (2.2.9112.33086) " Version 1.0.0 exported at 11:18:49 GMT Mon 03-Feb-25

Parameters

Rainfall model= FEH22

Calculation type= Design rainfall

Calculation mode= Typical point in catchment

Calculation location= Catchment GB 255350 367800 SH 55350 67800

Catchment area= 0.96 km**2

Fixed duration= no

Annual maximum= yes

Duration hours	Duration days	2 year rainfall (mm)	5 year rainfall (mm)	10 year rainfall (mm)	20 year rainfall (mm)	30 year rainfall (mm)	50 year rainfall (mm)	75 year rainfall (mm)	100 year rainfall (mm)	150 year rainfall (mm)	200 year rainfall (mm)	500 year rainfall (mm)	1000 year rainfall (mm)	10000 year rainfall (mm)
0.25	0.01041667	6.45	10.04	12.72	15.28	16.89	18.98	20.7	21.98	23.89	25.31	30.28	34.6	50.13
0.5	0.02083333	8.74	13.93	17.67	21.39	23.74	26.84	29.33	31.15	34.05	36.23	43.74	50.06	74.18
0.75	0.03125	10.33	16.35	20.95	25.4	28.27	32.05	35.13	37.41	40.91	43.56	52.75	60.56	90.7
1	0.04166667	11.63	18.39	23.45	28.59	31.83	36.04	39.56	42.19	46.17	49.17	59.71	68.72	103.23
1.25	0.05208333	13.04	20.23	25.53	30.98	34.36	38.77	42.48	45.27	49.45	52.59	63.61	72.98	108.29
1.5	0.0625	14.4	21.87	27.33	32.97	36.42	40.97	44.81	47.69	52.01	55.23	66.54	76.11	111.78
1.75	0.07291667	15.68	23.35	28.92	34.68	38.19	42.84	46.77	49.72	54.13	57.43	68.93	78.64	114.5
2	0.08333333	16.88	24.7	30.36	36.21	39.76	44.49	48.5	51.5	55.99	59.33	70.99	80.79	116.77
2.25	0.09375	17.88	25.91	31.67	37.65	41.27	46.1	50.19	53.24	57.81	61.22	73.07	82.98	119.21
2.5	0.10416667	18.82	27.02	32.89	38.98	42.66	47.58	51.74	54.84	59.48	62.96	74.97	84.98	121.43
2.75	0.11458333	19.69	28.06	34.02	40.21	43.95	48.96	53.18	56.33	61.03	64.56	76.73	86.83	123.47
3	0.125	20.5	29.03	35.08	41.36	45.16	50.25	54.53	57.71	62.48	66.06	78.37	88.54	125.37
3.25	0.13541667	21.27	29.94	36.08	42.45	46.3	51.46	55.79	59.01	63.83	67.46	79.9	90.15	127.13
3.5	0.14583333	21.99	30.8	37.02	43.47	47.38	52.61	56.98	60.24	65.11	68.79	81.34	91.66	128.8
3.75	0.15625	22.68	31.62	37.92	44.44	48.41	53.7	58.12	61.4	66.33	70.04	82.71	93.09	130.36
4	0.16666667	23.34	32.4	38.77	45.36	49.38	54.73	59.19	62.51	67.48	71.23	84.01	94.44	131.85
4.25	0.17708333	23.97	33.14	39.59	46.24	50.31	55.72	60.22	63.56	68.58	72.37	85.24	95.74	133.26
4.5	0.1875	24.57	33.85	40.37	47.07	51.2	56.66	61.19	64.56	69.64	73.45	86.42	96.97	134.62
4.75	0.19791667	25.15	34.53	41.13	47.88	52.06	57.56	62.13	65.53	70.65	74.49	87.55	98.16	135.91
5	0.20833333	25.7	35.19	41.85	48.65	52.88	58.43	63.03	66.46	71.62	75.49	88.63	99.3	137.15
5.25	0.21875	26.24	35.82	42.54	49.39	53.67	59.26	63.9	67.35	72.56	76.46	89.68	100.4	138.35
5.5	0.22916667	26.75	36.42	43.21	50.11	54.43	60.07	64.74	68.22	73.47	77.39	90.69	101.46	139.5
5.75	0.23958333	27.25	37.01	43.86	50.81	55.17	60.85	65.56	69.05	74.35	78.3	91.67	102.48	140.62
6	0.25	27.73	37.58	44.49	51.48	55.88	61.6	66.34	69.87	75.2	79.17	92.62	103.48	141.69
6.25	0.26041667	28.2	38.12	45.09	52.13	56.57	62.33	67.11	70.67	76.04	80.03	93.56	104.46	142.75
6.5	0.27083333	28.65	38.65	45.68	52.77	57.24	63.04	67.86	71.44	76.85	80.87	94.48	105.41	143.77
6.75	0.28125	29.09	39.16	46.25	53.39	57.88	63.73	68.59	72.2	77.64	81.68	95.37	106.34	144.76
7	0.29166667	29.52	39.65	46.8	53.99	58.51	64.4	69.3	72.94	78.41	82.47	96.24	107.24	145.73
7.25	0.30208333	29.93	40.13	47.34	54.57	59.12	65.05	69.99	73.66	79.16	83.24	97.08	108.12	146.67
7.5	0.3125	30.33	40.6	47.86	55.14	59.72	65.68	70.66	74.36	79.89	84	97.9	108.97	147.59
7.75	0.32291667	30.73	41.06	48.37	55.7	60.3	66.3	71.32	75.04	80.6	84.73	98.71	109.81	148.48
8	0.33333333	31.11	41.51	48.87	56.24	60.86	66.91	71.96	75.71	81.3	85.45	99.49	110.62	149.36
8.25	0.34375	31.48	41.94	49.35	56.77	61.42	67.5	72.58	76.37	81.98	86.15	100.26	111.42	150.21
8.5	0.35416667	31.85	42.37	49.83	57.29	61.96	68.07	73.2	77	82.65	86.84	101.01	112.2	151.04
8.75	0.36458333	32.2	42.78	50.29	57.8	62.49	68.64	73.8	77.63	83.3	87.51	101.74	112.96	151.86
9	0.375	32.55	43.19	50.74	58.29	63	69.19	74.38	78.24	83.94	88.17	102.46	113.7	152.66
9.25	0.38541667	32.89	43.59	51.19	58.78	63.51	69.73	74.96	78.84	84.57	88.81	103.16	114.43	153.44
9.5	0.39583333	33.23	43.98	51.62	59.26	64.01	70.26	75.52	79.43	85.18	89.44	103.85	115.15	154.21
9.75	0.40625	33.55	44.36	52.04	59.72	64.49	70.78	76.08	80.01	85.78	90.06	104.52	115.84	154.96
10	0.41666667	33.87	44.74	52.46	60.18	64.97	71.29	76.62	80.58	86.37	90.67	105.18	116.53	155.7
10.25	0.42708333	34.19	45.1	52.87	60.63	65.44	71.79	77.15	81.13	86.95	91.27	105.83	117.2	156.42
10.5	0.4375	34.5	45.46	53.27	61.07	65.9	72.28	77.68	81.68	87.52	91.85	106.47	117.86	157.13
10.75	0.44791667	34.8	45.82	53.66	61.5	66.35	72.77	78.19	82.21	88.08	92.43	107.09	118.51	157.83
11	0.45833333	35.09	46.17	54.05	61.93	66.8	73.24	78.7	82.74	88.63	92.99	107.7	119.14	158.52
11.25	0.46875	35.38	46.51	54.42	62.35	67.23	73.71	79.19	83.26	89.17	93.55	108.3	119.77	159.19
11.5	0.47916667	35.67	46.85	54.8	62.76	67.66	74.17	79.68	83.77	89.71	94.1	108.9	120.38	159.86
11.75	0.48958333	35.95	47.18	55.16	63.17	68.08	74.62	80.16	84.27	90.23	94.64	109.48	120.98	160.51
12	0.5	36.23	47.5	55.52	63.56	68.5	75.07	80.63	84.76	90.74	95.17	110.05	121.58	161.15
12.25	0.51041667	36.49	47.83	55.87	63.95	68.91	75.51	81.1	85.24	91.25	95.68	110.6	122.15	161.79
12.5	0.52083333	36.76	48.14	56.22	64.34	69.31	75.94	81.55	85.71	91.74	96.19	111.14	122.72	162.42
12.75	0.53125	37.02	48.46	56.56	64.71	69.71	76.37	82	86.17	92.23	96.69	111.67	123.28	163.03
13	0.54166667	37.27	48.76	56.89	65.09	70.1	76.79	82.44	86.62	92.71	97.19	112.19	123.83	163.64
13.25	0.55208333	37.53	49.07	57.22	65.45	70.49	77.2	82.87	87.07	93.18	97.68	112.71	124.37	164.24
13.5	0.5625	37.77	49.37	57.54	65.81	70.87	77.61	83.3	87.52	93.65	98.16	113.22	124.9	164.83
13.75	0.57291667	38.02	49.66	57.86	66.17	71.25	78.02	83.73	87.95	94.11	98.63	113.72	125.42	165.41
14	0.58333333	38.26	49.95	58.18	66.52	71.62	78.41	84.14	88.39	94.56	99.1	114.21	125.94	165.98
14.25	0.59375	38.5	50.24	58.49	66.87	71.99	78.81	84.56	88.81	95.01	99.56	114.69	126.45	166.55
14.5	0.60416667	38.73	50.53	58.8	67.21	72.35	79.19	84.96	89.23	95.45	100.01	115.17	126.95	167.1
14.75	0.61458333	38.96	50.81	59.1	67.55	72.71	79.58	85.37	89.64	95.89	100.46	115.64	127.44	167.65
15	0.625	39.19	51.08	59.4	67.89	73.06	79.96	85.76	90.05	96.32	100.9	116.11	127.93	168.19
15.25	0.63541667	39.42	51.36	59.7	68.22	73.41	80.33	86.15	90.46	96.75	101.34	116.57	128.41	168.72
15.5	0.64583333	39.64	51.63	59.99	68.54	73.75	80.7	86.54	90.86	97.17	101.77	117.02	128.88	169.25
15.75	0.65625	39.86	51.89	60.28	68.87	74.09	81.07	86.92	91.25	97.58	102.19	117.47	129.35	169.77
16	0.66666667	40.08	52.16	60.57	69.18	74.43	81.43	87.3	91.64	97.99	102.61	117.91	129.81	170.28
16.25	0.67708333	40.29	52.42	60.85	69.5	74.76	81.78	87.68	92.03	98.4	103.03	118.35	130.26	170.78
16.5	0.6875	40.51	52.67	61.13	69.81	75.09	82.14	88.05	92.41	98.8	103.44	118.78	130.71	171.28
16.75	0.69791667	40.72	52.93	61.41	70.12	75.42	82.49	88.41	92.79	99.19	103.84	119.2	131.16	171.77
17	0.70833333	40.92	53.18	61.68	70.42	75.74	82.83	88.78	93.16	99.58	104.25	119.62	131.59	172.26
17.25	0.71875	41.13	53.43	61.95	70.73	76.06	83.18	89.13	93.53	99.97	104.64	120.04	132.02	172.73
17.5	0.72916667	41.33	53.67	62.22	71.02	76.38	83.51	89.49	93.89	100.35	105.03	120.45	132.45	173.21
17.75	0.73958333	41.53	53.92	62.48	71.32	76.69	83.85	89.84	94.26	100.73	105.42	120.86	132.87	173.67
18	0.75	41.73	54.16	62.75	71.61	77	84.18	90.19	94.61	101.1	105.8	121.26	133.29	174.13
18.25	0.76041667	41.93	54.39	63.01	71.9	77.31	84.51	90.53	94.97	101.47	106.18	121.66	133.7	174.58
18.5	0.77083333	42.12	54.63	63.27	72.19	77.61	84.84	90.88	95.33	101.84	106.56	122.05	134.1	175.02
18.75	0.78125	42.32	54.86	63.52	72.47	77.92	85.16	91.22	95.68	102.21	106.93	122.44	134.5	175.45
19	0.79166667	42.51	55.09	63.78	72.76	78.21	85.48	91.55	96.03	102.56	107.3	122.83	134.89	175.88
19.25	0.80208333	42.7	55.31	64.03	73.04	78.51	85.8	91.89	96.37	102.92	107.66	123.21	135.28	176.3
19.5	0.8125	42.89	55.54	64.28	73.31	78.81	86.11	92.22	96.71	103.27	108.02	123.59	135.67	176.72
19.75	0.82291667	43.08	55.76	64.53	73.59	79.1	86.42	92.55	97.05	103.62	108.37	123.97	136.05	177.13
20	0.83333333	43.26	55.98	64.77	73.86	79.38	86.73	92.87	97.39	103.97	108.73	124.34	136.42	177.54
20.25	0.84375	43.44	56.2	65.02	74.13	79.67	87.03	93.19	97.72	104.31	109.07	124.7	136.8	177.95

VERSION "FEH Web Service (2.2.9112.33086) " Version 1.0.0 exported at 11:18:49 GMT Mon 03-Feb-25

Parameters

Rainfall model= FEH22

Calculation type= Design rainfall

Calculation mode= Typical point in catchment

Calculation location= Catchment GB 255350 367800 SH 55350 67800

Catchment area= 0.96 km**2

Fixed duration= no

Annual maximum= yes

Duration hours	Duration days	2 year rainfall (mm)	5 year rainfall (mm)	10 year rainfall (mm)	20 year rainfall (mm)	30 year rainfall (mm)	50 year rainfall (mm)	75 year rainfall (mm)	100 year rainfall (mm)	150 year rainfall (mm)	200 year rainfall (mm)	500 year rainfall (mm)	1000 year rainfall (mm)	10000 year rainfall (mm)
20.5	0.85416667	43.63	56.42	65.26	74.4	79.95	87.34	93.51	98.05	104.65	109.42	125.07	137.17	178.35
20.75	0.86458333	43.81	56.63	65.5	74.66	80.24	87.64	93.82	98.37	104.98	109.76	125.42	137.53	178.74
21	0.875	43.99	56.85	65.74	74.92	80.51	87.93	94.14	98.69	105.31	110.1	125.78	137.89	179.14
21.25	0.88541667	44.16	57.06	65.97	75.19	80.79	88.23	94.45	99.01	105.64	110.43	126.13	138.25	179.53
21.5	0.89583333	44.34	57.27	66.21	75.44	81.07	88.52	94.75	99.33	105.97	110.76	126.48	138.6	179.91
21.75	0.90625	44.52	57.48	66.44	75.7	81.34	88.81	95.06	99.64	106.29	111.09	126.83	138.96	180.29
22	0.91666667	44.69	57.68	66.67	75.96	81.61	89.1	95.36	99.96	106.61	111.42	127.17	139.3	180.67
22.25	0.92708333	44.86	57.89	66.9	76.21	81.88	89.38	95.66	100.26	106.92	111.74	127.51	139.65	181.04
22.5	0.9375	45.03	58.09	67.13	76.46	82.14	89.67	95.95	100.57	107.24	112.06	127.84	139.99	181.41
22.75	0.94791667	45.2	58.3	67.35	76.71	82.41	89.95	96.25	100.87	107.55	112.37	128.18	140.32	181.78
23	0.95833333	45.37	58.5	67.58	76.96	82.67	90.22	96.54	101.17	107.86	112.69	128.5	140.66	182.14
23.25	0.96875	45.54	58.7	67.8	77.2	82.93	90.5	96.83	101.47	108.16	113	128.83	140.99	182.5
23.5	0.97916667	45.71	58.89	68.02	77.45	83.19	90.77	97.12	101.77	108.47	113.3	129.15	141.32	182.86
23.75	0.98958333	45.87	59.09	68.24	77.69	83.44	91.05	97.4	102.06	108.77	113.61	129.47	141.64	183.21
24	1	46.04	59.29	68.46	77.93	83.7	91.32	97.68	102.35	109.06	113.91	129.79	141.97	183.56
24.25	1.01041667	46.2	59.48	68.69	78.17	83.95	91.58	97.96	102.63	109.35	114.21	130.11	142.29	183.93
24.5	1.02083333	46.37	59.68	68.91	78.41	84.2	91.85	98.24	102.92	109.65	114.51	130.42	142.62	184.3
24.75	1.03125	46.53	59.88	69.12	78.65	84.45	92.11	98.51	103.2	109.93	114.8	130.73	142.94	184.66
25	1.04166667	46.69	60.07	69.34	78.89	84.7	92.37	98.78	103.47	110.22	115.09	131.04	143.26	185.03
25.25	1.05208333	46.85	60.26	69.56	79.13	84.95	92.63	99.05	103.75	110.5	115.38	131.35	143.58	185.39
25.5	1.0625	47.01	60.45	69.77	79.36	85.19	92.89	99.32	104.02	110.78	115.66	131.65	143.89	185.74
25.75	1.07291667	47.17	60.65	69.99	79.6	85.44	93.15	99.58	104.29	111.06	115.95	131.95	144.2	186.1
26	1.08333333	47.33	60.84	70.2	79.83	85.68	93.4	99.85	104.56	111.33	116.23	132.25	144.51	186.45
26.25	1.09375	47.49	61.02	70.41	80.06	85.92	93.66	100.11	104.83	111.61	116.51	132.54	144.82	186.8
26.5	1.10416667	47.65	61.21	70.62	80.29	86.16	93.91	100.37	105.09	111.88	116.78	132.84	145.12	187.14
26.75	1.11458333	47.8	61.4	70.83	80.51	86.39	94.16	100.62	105.35	112.15	117.06	133.13	145.42	187.49
27	1.125	47.96	61.58	71.04	80.74	86.63	94.4	100.88	105.61	112.42	117.33	133.41	145.72	187.83
27.25	1.13541667	48.11	61.77	71.25	80.97	86.86	94.65	101.13	105.87	112.68	117.6	133.7	146.02	188.16
27.5	1.14583333	48.26	61.95	71.45	81.19	87.1	94.89	101.38	106.13	112.94	117.87	133.98	146.31	188.5
27.75	1.15625	48.42	62.13	71.66	81.41	87.33	95.13	101.63	106.38	113.21	118.13	134.26	146.61	188.83
28	1.16666667	48.57	62.31	71.86	81.63	87.56	95.38	101.88	106.63	113.46	118.4	134.54	146.9	189.16
28.25	1.17708333	48.72	62.5	72.06	81.85	87.79	95.61	102.13	106.88	113.72	118.66	134.82	147.18	189.49
28.5	1.1875	48.87	62.68	72.26	82.07	88.01	95.85	102.37	107.13	113.98	118.92	135.09	147.47	189.81
28.75	1.19791667	49.02	62.85	72.46	82.29	88.24	96.09	102.61	107.38	114.23	119.18	135.37	147.75	190.13
29	1.20833333	49.17	63.03	72.66	82.5	88.46	96.32	102.85	107.62	114.48	119.43	135.64	148.03	190.45
29.25	1.21875	49.32	63.21	72.86	82.72	88.69	96.56	103.09	107.87	114.73	119.69	135.9	148.31	190.77
29.5	1.22916667	49.46	63.38	73.06	82.93	88.91	96.79	103.33	108.11	114.98	119.94	136.17	148.59	191.08
29.75	1.23958333	49.61	63.56	73.26	83.14	89.13	97.02	103.57	108.35	115.23	120.19	136.43	148.86	191.39
30	1.25	49.76	63.73	73.45	83.35	89.35	97.25	103.8	108.59	115.47	120.44	136.7	149.13	191.7
30.25	1.26041667	49.9	63.91	73.64	83.56	89.57	97.47	104.04	108.83	115.71	120.68	136.96	149.4	192
30.5	1.27083333	50.05	64.08	73.84	83.77	89.78	97.7	104.27	109.06	115.95	120.93	137.21	149.67	192.31
30.75	1.28125	50.19	64.25	74.03	83.98	90	97.92	104.5	109.3	116.19	121.17	137.47	149.94	192.61
31	1.29166667	50.33	64.42	74.22	84.19	90.21	98.15	104.73	109.53	116.43	121.41	137.72	150.2	192.91
31.25	1.30208333	50.47	64.59	74.41	84.39	90.42	98.37	104.95	109.76	116.67	121.65	137.98	150.47	193.2
31.5	1.3125	50.62	64.76	74.6	84.6	90.64	98.59	105.18	109.99	116.9	121.89	138.23	150.73	193.5
31.75	1.32291667	50.76	64.93	74.79	84.8	90.85	98.81	105.41	110.22	117.14	122.13	138.48	150.98	193.79
32	1.33333333	50.9	65.1	74.98	85	91.06	99.03	105.63	110.44	117.37	122.37	138.72	151.24	194.08
32.25	1.34375	51.04	65.27	75.16	85.21	91.27	99.24	105.85	110.67	117.6	122.6	138.97	151.5	194.36
32.5	1.35416667	51.18	65.43	75.35	85.41	91.47	99.46	106.07	110.89	117.83	122.83	139.21	151.75	194.65
32.75	1.36458333	51.31	65.6	75.54	85.61	91.68	99.67	106.29	111.11	118.05	123.06	139.46	152	194.93
33	1.375	51.45	65.76	75.72	85.8	91.88	99.89	106.51	111.33	118.28	123.29	139.7	152.25	195.21
33.25	1.38541667	51.59	65.93	75.9	86	92.09	100.1	106.73	111.55	118.5	123.52	139.93	152.5	195.49
33.5	1.39583333	51.73	66.09	76.09	86.2	92.29	100.31	106.94	111.77	118.73	123.75	140.17	152.74	195.77
33.75	1.40625	51.86	66.25	76.27	86.39	92.49	100.52	107.15	111.99	118.95	123.97	140.41	152.99	196.04
34	1.41666667	52	66.41	76.45	86.59	92.69	100.73	107.37	112.2	119.17	124.19	140.64	153.23	196.31
34.25	1.42708333	52.13	66.58	76.63	86.78	92.89	100.94	107.58	112.42	119.39	124.42	140.87	153.47	196.58
34.5	1.4375	52.27	66.74	76.81	86.97	93.09	101.14	107.79	112.63	119.6	124.64	141.1	153.71	196.85
34.75	1.44791667	52.4	66.9	76.99	87.17	93.29	101.35	108	112.84	119.82	124.86	141.33	153.95	197.11
35	1.45833333	52.54	67.06	77.16	87.36	93.49	101.55	108.21	113.05	120.04	125.07	141.56	154.18	197.38
35.25	1.46875	52.67	67.21	77.34	87.55	93.68	101.75	108.41	113.26	120.25	125.29	141.79	154.42	197.64
35.5	1.47916667	52.8	67.37	77.52	87.74	93.88	101.96	108.62	113.47	120.46	125.51	142.01	154.65	197.9
35.75	1.48958333	52.93	67.53	77.69	87.92	94.07	102.16	108.83	113.68	120.67	125.72	142.24	154.88	198.15
36	1.5	53.06	67.69	77.87	88.11	94.26	102.36	109.03	113.88	120.88	125.93	142.46	155.11	198.41
36.25	1.51041667	53.19	67.84	78.04	88.3	94.46	102.56	109.23	114.09	121.09	126.15	142.68	155.34	198.66
36.5	1.52083333	53.32	68	78.21	88.48	94.65	102.75	109.43	114.29	121.3	126.36	142.9	155.57	198.91
36.75	1.53125	53.45	68.15	78.39	88.67	94.84	102.95	109.63	114.49	121.51	126.56	143.12	155.79	199.16
37	1.54166667	53.58	68.31	78.56	88.85	95.03	103.15	109.83	114.69	121.71	126.77	143.33	156.02	199.41
37.25	1.55208333	53.71	68.46	78.73	89.04	95.22	103.34	110.03	114.9	121.92	126.98	143.55	156.24	199.66
37.5	1.5625	53.84	68.61	78.9	89.22	95.4	103.54	110.23	115.09	122.12	127.19	143.76	156.46	199.9
37.75	1.57291667	53.97	68.77	79.07	89.4	95.59	103.73	110.43	115.29	122.32	127.39	143.97	156.68	200.14
38	1.58333333	54.09	68.92	79.24	89.58	95.78	103.92	110.62	115.49	122.52	127.59	144.18	156.9	200.38
38.25	1.59375	54.22	69.07	79.41	89.76	95.96	104.11	110.81	115.69	122.72	127.8	144.39	157.11	200.62
38.5	1.60416667	54.35	69.22	79.57	89.94	96.15	104.3	111.01	115.88	122.92	128	144.6	157.33	200.86
38.75	1.61458333	54.47	69.37	79.74	90.12	96.33	104.49	111.2	116.07	123.12	128.2	144.81	157.54	201.09
39	1.625	54.6	69.52	79.91	90.3	96.51	104.68	111.39	116.27	123.31	128.4	145.02	157.76	201.33
39.25	1.63541667	54.72	69.67	80.07	90.47	96.69	104.87	111.58	116.46	123.51	128.59	145.22	157.97	201.56
39.5	1.64583333	54.85	69.82	80.24	90.65	96.87	105.06	111.77	116.65	123.7	128.79	145.43	158.18	201.79
39.75	1.65625	54.97	69.96	80.4	90.82	97.05	105.24	111.96	116.84	123.9	128.99	145.63	158.39	202.02
40	1.66666667	55.1	70.11	80.56	91	97.23	105.43	112.15	117.03	124.09	129.18	145.83	158.6	202.25
40.25	1.67708333	55.22	70.26	80.73	91.17	97.41	105.61	112.34	117.22	124.28	129.37	146.03	158.8	202.47
40.5	1.6875	55.34	70.4	80.89	91.35	97.59	105.79	112.52	117.41	124.47	129.57	146.23	159.01	202.69

VERSION "FEH Web Service (2.2.9112.33086) " Version 1.0.0 exported at 11:18:49 GMT Mon 03-Feb-25

Parameters

Rainfall model= FEH22

Calculation type= Design rainfall

Calculation mode= Typical point in catchment

Calculation location= Catchment GB 255350 367800 SH 55350 67800

Catchment area= 0.96 km**2

Fixed duration= no

Annual maximum= yes

Duration hours	Duration days	2 year rainfall (mm)	5 year rainfall (mm)	10 year rainfall (mm)	20 year rainfall (mm)	30 year rainfall (mm)	50 year rainfall (mm)	75 year rainfall (mm)	100 year rainfall (mm)	150 year rainfall (mm)	200 year rainfall (mm)	500 year rainfall (mm)	1000 year rainfall (mm)	10000 year rainfall (mm)
40.75	1.69791667	55.46	70.55	81.05	91.52	97.77	105.98	112.71	117.59	124.66	129.76	146.43	159.21	202.92
41	1.70833333	55.59	70.69	81.21	91.69	97.94	106.16	112.89	117.78	124.85	129.95	146.62	159.41	203.14
41.25	1.71875	55.71	70.84	81.37	91.86	98.12	106.34	113.07	117.96	125.04	130.14	146.82	159.62	203.36
41.5	1.72916667	55.83	70.98	81.53	92.03	98.29	106.52	113.26	118.15	125.22	130.33	147.01	159.82	203.57
41.75	1.73958333	55.95	71.13	81.69	92.2	98.47	106.7	113.44	118.33	125.41	130.52	147.21	160.02	203.79
42	1.75	56.07	71.27	81.85	92.37	98.64	106.88	113.62	118.51	125.59	130.7	147.4	160.21	204
42.25	1.76041667	56.19	71.41	82.01	92.54	98.81	107.05	113.8	118.69	125.78	130.89	147.59	160.41	204.22
42.5	1.77083333	56.31	71.56	82.17	92.71	98.99	107.23	113.98	118.87	125.96	131.07	147.78	160.61	204.43
42.75	1.78125	56.43	71.7	82.32	92.87	99.16	107.41	114.16	119.05	126.14	131.26	147.97	160.8	204.64
43	1.79166667	56.55	71.84	82.48	93.04	99.33	107.58	114.33	119.23	126.33	131.44	148.16	160.99	204.84
43.25	1.80208333	56.67	71.98	82.63	93.21	99.5	107.76	114.51	119.41	126.51	131.62	148.35	161.19	205.05
43.5	1.8125	56.78	72.12	82.79	93.37	99.67	107.93	114.69	119.59	126.69	131.8	148.53	161.38	205.26
43.75	1.82291667	56.9	72.26	82.94	93.54	99.84	108.11	114.86	119.76	126.86	131.98	148.72	161.57	205.46
44	1.83333333	57.02	72.4	83.1	93.7	100	108.28	115.04	119.94	127.04	132.16	148.9	161.76	205.66
44.25	1.84375	57.13	72.54	83.25	93.86	100.17	108.45	115.21	120.11	127.22	132.34	149.09	161.95	205.87
44.5	1.85416667	57.25	72.68	83.41	94.03	100.34	108.62	115.38	120.29	127.4	132.52	149.27	162.13	206.07
44.75	1.86458333	57.37	72.81	83.56	94.19	100.5	108.79	115.56	120.46	127.57	132.7	149.45	162.32	206.26
45	1.875	57.48	72.95	83.71	94.35	100.67	108.96	115.73	120.63	127.75	132.87	149.63	162.5	206.46
45.25	1.88541667	57.6	73.09	83.86	94.51	100.83	109.13	115.9	120.8	127.92	133.05	149.81	162.69	206.66
45.5	1.89583333	57.71	73.23	84.01	94.67	101	109.3	116.07	120.97	128.09	133.22	149.99	162.87	206.85
45.75	1.90625	57.83	73.36	84.16	94.83	101.16	109.47	116.24	121.14	128.26	133.4	150.17	163.05	207.05
46	1.91666667	57.94	73.5	84.31	94.99	101.32	109.63	116.41	121.31	128.44	133.57	150.34	163.23	207.24
46.25	1.92708333	58.06	73.63	84.46	95.15	101.49	109.8	116.57	121.48	128.61	133.74	150.52	163.41	207.43
46.5	1.9375	58.17	73.77	84.61	95.31	101.65	109.96	116.74	121.65	128.78	133.91	150.7	163.59	207.62
46.75	1.94791667	58.28	73.9	84.76	95.46	101.81	110.13	116.91	121.82	128.95	134.09	150.87	163.77	207.81
47	1.95833333	58.4	74.04	84.91	95.62	101.97	110.29	117.07	121.98	129.12	134.26	151.04	163.95	207.99
47.25	1.96875	58.51	74.17	85.05	95.78	102.13	110.46	117.24	122.15	129.28	134.42	151.22	164.12	208.18
47.5	1.97916667	58.62	74.3	85.2	95.93	102.29	110.62	117.4	122.31	129.45	134.59	151.39	164.3	208.36
47.75	1.98958333	58.73	74.44	85.35	96.09	102.45	110.78	117.57	122.48	129.62	134.76	151.56	164.47	208.55
48	2	58.84	74.57	85.49	96.24	102.61	110.95	117.73	122.64	129.78	134.93	151.73	164.65	208.73
48.25	2.01041667	58.95	74.7	85.63	96.38	102.75	111.09	117.88	122.79	129.93	135.08	151.88	164.79	208.87
48.5	2.02083333	59.06	74.82	85.77	96.53	102.9	111.24	118.03	122.94	130.08	135.23	152.02	164.94	209.01
48.75	2.03125	59.17	74.95	85.9	96.67	103.04	111.39	118.18	123.09	130.23	135.38	152.17	165.08	209.15
49	2.04166667	59.27	75.07	86.04	96.81	103.19	111.54	118.33	123.24	130.38	135.52	152.31	165.23	209.29
49.25	2.05208333	59.38	75.2	86.17	96.95	103.33	111.69	118.47	123.39	130.53	135.67	152.46	165.37	209.43
49.5	2.0625	59.49	75.32	86.3	97.09	103.48	111.83	118.62	123.53	130.67	135.82	152.6	165.51	209.56
49.75	2.07291667	59.59	75.45	86.44	97.24	103.62	111.98	118.77	123.68	130.82	135.96	152.75	165.65	209.7
50	2.08333333	59.7	75.57	86.57	97.38	103.76	112.12	118.91	123.83	130.97	136.11	152.89	165.79	209.84
50.25	2.09375	59.8	75.7	86.7	97.52	103.91	112.27	119.06	123.97	131.11	136.26	153.03	165.94	209.97
50.5	2.10416667	59.91	75.82	86.84	97.65	104.05	112.41	119.21	124.12	131.26	136.4	153.18	166.08	210.11
50.75	2.11458333	60.01	75.94	86.97	97.79	104.19	112.56	119.35	124.26	131.4	136.54	153.32	166.22	210.24
51	2.125	60.12	76.07	87.1	97.93	104.33	112.7	119.49	124.41	131.55	136.69	153.46	166.36	210.38
51.25	2.13541667	60.22	76.19	87.23	98.07	104.47	112.84	119.64	124.55	131.69	136.83	153.6	166.49	210.51
51.5	2.14583333	60.33	76.31	87.36	98.21	104.61	112.99	119.78	124.69	131.83	136.97	153.74	166.63	210.64
51.75	2.15625	60.43	76.43	87.49	98.35	104.75	113.13	119.92	124.84	131.98	137.12	153.88	166.77	210.77
52	2.16666667	60.53	76.55	87.62	98.48	104.89	113.27	120.07	124.98	132.12	137.26	154.02	166.91	210.9
52.25	2.17708333	60.64	76.67	87.75	98.62	105.03	113.41	120.21	125.12	132.26	137.4	154.16	167.04	211.03
52.5	2.1875	60.74	76.8	87.88	98.76	105.17	113.55	120.35	125.26	132.4	137.54	154.29	167.18	211.16
52.75	2.19791667	60.84	76.92	88.01	98.89	105.31	113.69	120.49	125.41	132.54	137.68	154.43	167.32	211.29
53	2.20833333	60.95	77.04	88.14	99.03	105.45	113.83	120.63	125.55	132.68	137.82	154.57	167.45	211.42
53.25	2.21875	61.05	77.16	88.27	99.16	105.59	113.97	120.77	125.69	132.82	137.96	154.71	167.59	211.55
53.5	2.22916667	61.15	77.28	88.4	99.3	105.72	114.11	120.91	125.83	132.96	138.1	154.84	167.72	211.68
53.75	2.23958333	61.25	77.39	88.53	99.43	105.86	114.25	121.05	125.97	133.1	138.24	154.98	167.85	211.81
54	2.25	61.35	77.51	88.65	99.57	106	114.39	121.19	126.11	133.24	138.38	155.11	167.99	211.93
54.25	2.26041667	61.46	77.63	88.78	99.7	106.13	114.53	121.33	126.24	133.38	138.52	155.25	168.12	212.06
54.5	2.27083333	61.56	77.75	88.91	99.83	106.27	114.67	121.47	126.38	133.52	138.66	155.38	168.25	212.19
54.75	2.28125	61.66	77.87	89.04	99.97	106.41	114.81	121.61	126.52	133.66	138.79	155.52	168.38	212.31
55	2.29166667	61.76	77.99	89.16	100.1	106.54	114.94	121.75	126.66	133.79	138.93	155.65	168.52	212.44
55.25	2.30208333	61.86	78.11	89.29	100.23	106.68	115.08	121.88	126.8	133.93	139.07	155.78	168.65	212.56
55.5	2.3125	61.96	78.22	89.41	100.36	106.81	115.22	122.02	126.93	134.07	139.2	155.92	168.78	212.69
55.75	2.32291667	62.06	78.34	89.54	100.49	106.94	115.35	122.16	127.07	134.2	139.34	156.05	168.91	212.81
56	2.33333333	62.16	78.46	89.66	100.63	107.08	115.49	122.29	127.21	134.34	139.47	156.18	169.04	212.93
56.25	2.34375	62.26	78.57	89.79	100.76	107.21	115.63	122.43	127.34	134.48	139.61	156.31	169.17	213.06
56.5	2.35416667	62.36	78.69	89.91	100.89	107.35	115.76	122.57	127.48	134.61	139.74	156.44	169.3	213.18
56.75	2.36458333	62.46	78.81	90.04	101.02	107.48	115.9	122.7	127.61	134.75	139.88	156.58	169.43	213.3
57	2.375	62.56	78.92	90.16	101.15	107.61	116.03	122.84	127.75	134.88	140.01	156.71	169.55	213.42
57.25	2.38541667	62.66	79.04	90.29	101.28	107.74	116.16	122.97	127.88	135.01	140.15	156.84	169.68	213.54
57.5	2.39583333	62.75	79.15	90.41	101.41	107.88	116.3	123.11	128.02	135.15	140.28	156.97	169.81	213.66
57.75	2.40625	62.85	79.27	90.53	101.54	108.01	116.43	123.24	128.15	135.28	140.41	157.1	169.94	213.78
58	2.41666667	62.95	79.38	90.66	101.67	108.14	116.56	123.37	128.28	135.41	140.54	157.23	170.06	213.9
58.25	2.42708333	63.05	79.5	90.78	101.79	108.27	116.7	123.51	128.42	135.55	140.68	157.35	170.19	214.02
58.5	2.4375	63.15	79.61	90.9	101.92	108.4	116.83	123.64	128.55	135.68	140.81	157.48	170.32	214.14
58.75	2.44791667	63.24	79.73	91.02	102.05	108.53	116.96	123.77	128.68	135.81	140.94	157.61	170.44	214.26
59	2.45833333	63.34	79.84	91.14	102.18	108.66	117.09	123.9	128.82	135.94	141.07	157.74	170.57	214.38
59.25	2.46875	63.44	79.96	91.27	102.31	108.79	117.23	124.04	128.95	136.07	141.2	157.87	170.69	214.5
59.5	2.47916667	63.54	80.07	91.39	102.43	108.92	117.36	124.17	129.08	136.21	141.33	157.99	170.82	214.61
59.75	2.48958333	63.63	80.18	91.51	102.56	109.05	117.49	124.3	129.21	136.34	141.46	158.12	170.94	214.73
60	2.5	63.73	80.3	91.63	102.69	109.18	117.62	124.43	129.34	136.47	141.59	158.25	171.07	214.85
60.25	2.51041667	63.83	80.41	91.75	102.81	109.31	117.75	124.56	129.47	136.6	141.72	158.37	171.19	214.96
60.5	2.52083333	63.92	80.52	91.87	102.94	109.44	117.88	124.69	129.6	136.73	141.85	158.5	171.31	215.08
60.75	2.53125	64.02	80.63	91.99	103.06	109.56	118.01	124.82	129.73	136.86	141.98	158.62	171.44	215.2

VERSION "FEH Web Service (2.2.9112.33086) " Version 1.0.0 exported at 11:18:49 GMT Mon 03-Feb-25

Parameters

Rainfall model= FEH22

Calculation type= Design rainfall

Calculation mode= Typical point in catchment

Calculation location= Catchment GB 255350 367800 SH 55350 67800

Catchment area= 0.96 km**2

Fixed duration= no

Annual maximum= yes

Duration hours	Duration days	2 year rainfall (mm)	5 year rainfall (mm)	10 year rainfall (mm)	20 year rainfall (mm)	30 year rainfall (mm)	50 year rainfall (mm)	75 year rainfall (mm)	100 year rainfall (mm)	150 year rainfall (mm)	200 year rainfall (mm)	500 year rainfall (mm)	1000 year rainfall (mm)	10000 year rainfall (mm)
61	2.54166667	64.12	80.75	92.11	103.19	109.69	118.14	124.95	129.86	136.99	142.11	158.75	171.56	215.31
61.25	2.55208333	64.21	80.86	92.23	103.32	109.82	118.27	125.08	129.99	137.12	142.24	158.87	171.68	215.43
61.5	2.5625	64.31	80.97	92.35	103.44	109.95	118.4	125.21	130.12	137.25	142.37	159	171.8	215.54
61.75	2.57291667	64.4	81.08	92.47	103.57	110.08	118.53	125.34	130.25	137.37	142.5	159.12	171.93	215.66
62	2.58333333	64.5	81.19	92.59	103.69	110.2	118.66	125.47	130.38	137.5	142.62	159.25	172.05	215.77
62.25	2.59375	64.59	81.31	92.71	103.81	110.33	118.79	125.6	130.51	137.63	142.75	159.37	172.17	215.88
62.5	2.60416667	64.69	81.42	92.82	103.94	110.46	118.91	125.73	130.64	137.76	142.88	159.49	172.29	216
62.75	2.61458333	64.78	81.53	92.94	104.06	110.58	119.04	125.86	130.76	137.89	143.01	159.62	172.41	216.11
63	2.625	64.88	81.64	93.06	104.19	110.71	119.17	125.98	130.89	138.01	143.13	159.74	172.53	216.22
63.25	2.63541667	64.97	81.75	93.18	104.31	110.83	119.3	126.11	131.02	138.14	143.26	159.86	172.65	216.34
63.5	2.64583333	65.07	81.86	93.3	104.43	110.96	119.42	126.24	131.15	138.27	143.38	159.99	172.77	216.45
63.75	2.65625	65.16	81.97	93.41	104.56	111.08	119.55	126.37	131.27	138.39	143.51	160.11	172.89	216.56
64	2.66666667	65.25	82.08	93.53	104.68	111.21	119.68	126.49	131.4	138.52	143.64	160.23	173.01	216.67
64.25	2.67708333	65.35	82.19	93.65	104.8	111.33	119.8	126.62	131.53	138.65	143.76	160.35	173.13	216.78
64.5	2.6875	65.44	82.3	93.76	104.92	111.46	119.93	126.75	131.65	138.77	143.89	160.47	173.25	216.89
64.75	2.69791667	65.53	82.41	93.88	105.05	111.58	120.06	126.87	131.78	138.9	144.01	160.59	173.37	217
65	2.70833333	65.63	82.52	94	105.17	111.71	120.18	127	131.91	139.02	144.14	160.72	173.49	217.12
65.25	2.71875	65.72	82.63	94.11	105.29	111.83	120.31	127.13	132.03	139.15	144.26	160.84	173.6	217.23
65.5	2.72916667	65.81	82.73	94.23	105.41	111.96	120.43	127.25	132.16	139.27	144.38	160.96	173.72	217.34
65.75	2.73958333	65.91	82.84	94.34	105.53	112.08	120.56	127.38	132.28	139.4	144.51	161.08	173.84	217.45
66	2.75	66	82.95	94.46	105.65	112.2	120.68	127.5	132.41	139.52	144.63	161.2	173.96	217.55
66.25	2.76041667	66.09	83.06	94.58	105.77	112.32	120.81	127.63	132.53	139.64	144.76	161.32	174.07	217.66
66.5	2.77083333	66.19	83.17	94.69	105.89	112.45	120.93	127.75	132.66	139.77	144.88	161.44	174.19	217.77
66.75	2.78125	66.28	83.28	94.81	106.01	112.57	121.06	127.88	132.78	139.89	145	161.55	174.31	217.88
67	2.79166667	66.37	83.38	94.92	106.13	112.69	121.18	128	132.91	140.02	145.13	161.67	174.42	217.99
67.25	2.80208333	66.46	83.49	95.03	106.25	112.82	121.3	128.12	133.03	140.14	145.25	161.79	174.54	218.1
67.5	2.8125	66.55	83.6	95.15	106.37	112.94	121.43	128.25	133.15	140.26	145.37	161.91	174.66	218.21
67.75	2.82291667	66.65	83.71	95.26	106.49	113.06	121.55	128.37	133.28	140.38	145.49	162.03	174.77	218.31
68	2.83333333	66.74	83.81	95.38	106.61	113.18	121.67	128.5	133.4	140.51	145.61	162.15	174.89	218.42
68.25	2.84375	66.83	83.92	95.49	106.73	113.3	121.8	128.62	133.52	140.63	145.74	162.27	175	218.53
68.5	2.85416667	66.92	84.03	95.6	106.85	113.42	121.92	128.74	133.65	140.75	145.86	162.38	175.12	218.64
68.75	2.86458333	67.01	84.13	95.72	106.97	113.54	122.04	128.86	133.77	140.87	145.98	162.5	175.23	218.74
69	2.875	67.1	84.24	95.83	107.09	113.67	122.16	128.99	133.89	141	146.1	162.62	175.35	218.85
69.25	2.88541667	67.19	84.35	95.94	107.21	113.79	122.29	129.11	134.01	141.12	146.22	162.74	175.46	218.96
69.5	2.89583333	67.28	84.45	96.06	107.33	113.91	122.41	129.23	134.13	141.24	146.34	162.85	175.57	219.06
69.75	2.90625	67.37	84.56	96.17	107.44	114.03	122.53	129.35	134.26	141.36	146.46	162.97	175.69	219.17
70	2.91666667	67.47	84.67	96.28	107.56	114.15	122.65	129.48	134.38	141.48	146.58	163.09	175.8	219.27
70.25	2.92708333	67.56	84.77	96.4	107.68	114.27	122.77	129.6	134.5	141.6	146.7	163.2	175.92	219.38
70.5	2.9375	67.65	84.88	96.51	107.8	114.39	122.89	129.72	134.62	141.72	146.82	163.32	176.03	219.48
70.75	2.94791667	67.74	84.98	96.62	107.91	114.51	123.01	129.84	134.74	141.84	146.94	163.43	176.14	219.59
71	2.95833333	67.83	85.09	96.73	108.03	114.63	123.14	129.96	134.86	141.96	147.06	163.55	176.26	219.69
71.25	2.96875	67.92	85.19	96.84	108.15	114.74	123.26	130.08	134.98	142.08	147.18	163.66	176.37	219.8
71.5	2.97916667	68.01	85.3	96.96	108.27	114.86	123.38	130.2	135.1	142.2	147.3	163.78	176.48	219.9
71.75	2.98958333	68.1	85.4	97.07	108.38	114.98	123.5	130.32	135.23	142.32	147.42	163.9	176.59	220.01
72	3	68.18	85.51	97.18	108.5	115.1	123.62	130.44	135.35	142.44	147.54	164.01	176.71	220.11
72.25	3.01041667	68.27	85.61	97.29	108.61	115.22	123.74	130.56	135.47	142.56	147.66	164.13	176.82	220.22
72.5	3.02083333	68.36	85.72	97.4	108.73	115.34	123.86	130.68	135.59	142.68	147.78	164.24	176.93	220.32
72.75	3.03125	68.45	85.82	97.51	108.85	115.46	123.98	130.8	135.71	142.8	147.9	164.35	177.04	220.42
73	3.04166667	68.54	85.92	97.62	108.96	115.57	124.1	130.92	135.83	142.92	148.01	164.47	177.15	220.53
73.25	3.05208333	68.63	86.03	97.73	109.08	115.69	124.22	131.04	135.94	143.04	148.13	164.58	177.27	220.63
73.5	3.0625	68.72	86.13	97.84	109.19	115.81	124.34	131.16	136.06	143.16	148.25	164.7	177.38	220.73
73.75	3.07291667	68.81	86.24	97.95	109.31	115.93	124.45	131.28	136.18	143.28	148.37	164.81	177.49	220.84
74	3.08333333	68.9	86.34	98.06	109.43	116.05	124.57	131.4	136.3	143.39	148.48	164.92	177.6	220.94
74.25	3.09375	68.99	86.44	98.17	109.54	116.16	124.69	131.52	136.42	143.51	148.6	165.04	177.71	221.04
74.5	3.10416667	69.07	86.55	98.28	109.66	116.28	124.81	131.64	136.54	143.63	148.72	165.15	177.82	221.14
74.75	3.11458333	69.16	86.65	98.39	109.77	116.4	124.93	131.76	136.66	143.75	148.84	165.27	177.93	221.25
75	3.125	69.25	86.75	98.5	109.88	116.51	125.05	131.88	136.78	143.87	148.95	165.38	178.04	221.35
75.25	3.13541667	69.34	86.86	98.61	110	116.63	125.16	132	136.89	143.98	149.07	165.49	178.15	221.45
75.5	3.14583333	69.43	86.96	98.72	110.11	116.75	125.28	132.11	137.01	144.1	149.19	165.6	178.26	221.55
75.75	3.15625	69.51	87.06	98.83	110.23	116.86	125.4	132.23	137.13	144.22	149.3	165.72	178.37	221.65
76	3.16666667	69.6	87.16	98.94	110.34	116.98	125.52	132.35	137.25	144.33	149.42	165.83	178.48	221.75
76.25	3.17708333	69.69	87.27	99.05	110.46	117.1	125.64	132.47	137.37	144.45	149.54	165.94	178.59	221.86
76.5	3.1875	69.78	87.37	99.16	110.57	117.21	125.75	132.58	137.48	144.57	149.65	166.05	178.7	221.96
76.75	3.19791667	69.86	87.47	99.27	110.68	117.33	125.87	132.7	137.6	144.69	149.77	166.17	178.81	222.06
77	3.20833333	69.95	87.57	99.37	110.8	117.44	125.99	132.82	137.72	144.8	149.88	166.28	178.92	222.16
77.25	3.21875	70.04	87.68	99.48	110.91	117.56	126.1	132.94	137.84	144.92	150	166.39	179.03	222.26
77.5	3.22916667	70.13	87.78	99.59	111.02	117.67	126.22	133.05	137.95	145.03	150.12	166.5	179.14	222.36
77.75	3.23958333	70.21	87.88	99.7	111.14	117.79	126.34	133.17	138.07	145.15	150.23	166.61	179.25	222.46
78	3.25	70.3	87.98	99.81	111.25	117.9	126.45	133.29	138.19	145.27	150.35	166.72	179.35	222.56
78.25	3.26041667	70.39	88.08	99.91	111.36	118.02	126.57	133.4	138.3	145.38	150.46	166.84	179.46	222.66
78.5	3.27083333	70.47	88.18	100.02	111.48	118.13	126.69	133.52	138.42	145.5	150.58	166.95	179.57	222.76
78.75	3.28125	70.56	88.28	100.13	111.59	118.25	126.8	133.64	138.53	145.61	150.69	167.06	179.68	222.86
79	3.29166667	70.65	88.39	100.24	111.7	118.36	126.92	133.75	138.65	145.73	150.81	167.17	179.79	222.96
79.25	3.30208333	70.73	88.49	100.34	111.81	118.48	127.04	133.87	138.77	145.84	150.92	167.28	179.9	223.06
79.5	3.3125	70.82	88.59	100.45	111.93	118.59	127.15	133.99	138.88	145.96	151.04	167.39	180	223.16
79.75	3.32291667	70.91	88.69	100.56	112.04	118.71	127.27	134.1	139	146.08	151.15	167.5	180.11	223.26
80	3.33333333	70.99	88.79	100.67	112.15	118.82	127.38	134.22	139.11	146.19	151.26	167.61	180.22	223.36
80.25	3.34375	71.08	88.89	100.77	112.26	118.94	127.5	134.33	139.23	146.31	151.38	167.72	180.33	223.46
80.5	3.35416667	71.16	88.99	100.88	112.37	119.05	127.61	134.45	139.35	146.42	151.49	167.83	180.43	223.56
80.75	3.36458333	71.25	89.09	100.99	112.48	119.16	127.73	134.57	139.46	146.53	151.61	167.94	180.54	223.66
81	3.375	71.34	89.19	101.09	112.6	119.28	127.84	134.68	139.58	146.65	151.72	168.05	180.65	223.75

VERSION "FEH Web Service (2.2.9112.33086) " Version 1.0.0 exported at 11:18:49 GMT Mon 03-Feb-25

Parameters

Rainfall model= FEH22

Calculation type= Design rainfall

Calculation mode= Typical point in catchment

Calculation location= Catchment GB 255350 367800 SH 55350 67800

Catchment area= 0.96 km**2

Fixed duration= no

Annual maximum= yes

Duration hours	Duration days	2 year rainfall (mm)	5 year rainfall (mm)	10 year rainfall (mm)	20 year rainfall (mm)	30 year rainfall (mm)	50 year rainfall (mm)	75 year rainfall (mm)	100 year rainfall (mm)	150 year rainfall (mm)	200 year rainfall (mm)	500 year rainfall (mm)	1000 year rainfall (mm)	10000 year rainfall (mm)
81.25	3.38541667	71.42	89.29	101.2	112.71	119.39	127.96	134.8	139.69	146.76	151.83	168.16	180.76	223.85
81.5	3.39583333	71.51	89.39	101.31	112.82	119.5	128.07	134.91	139.81	146.88	151.95	168.27	180.86	223.95
81.75	3.40625	71.59	89.49	101.41	112.93	119.62	128.19	135.03	139.92	146.99	152.06	168.38	180.97	224.05
82	3.41666667	71.68	89.59	101.52	113.04	119.73	128.3	135.14	140.04	147.11	152.18	168.49	181.08	224.15
82.25	3.42708333	71.76	89.69	101.62	113.15	119.84	128.42	135.26	140.15	147.22	152.29	168.6	181.18	224.25
82.5	3.4375	71.85	89.79	101.73	113.26	119.96	128.53	135.37	140.27	147.33	152.4	168.71	181.29	224.34
82.75	3.44791667	71.93	89.89	101.84	113.37	120.07	128.65	135.49	140.38	147.45	152.52	168.82	181.4	224.44
83	3.45833333	72.02	89.99	101.94	113.48	120.18	128.76	135.6	140.49	147.56	152.63	168.93	181.5	224.54
83.25	3.46875	72.1	90.09	102.05	113.59	120.29	128.87	135.71	140.61	147.68	152.74	169.04	181.61	224.64
83.5	3.47916667	72.19	90.19	102.15	113.71	120.41	128.99	135.83	140.72	147.79	152.85	169.15	181.72	224.74
83.75	3.48958333	72.27	90.29	102.26	113.82	120.52	129.1	135.94	140.84	147.9	152.97	169.25	181.82	224.83
84	3.5	72.36	90.39	102.36	113.93	120.63	129.22	136.06	140.95	148.02	153.08	169.36	181.93	224.93
84.25	3.51041667	72.44	90.49	102.47	114.04	120.74	129.33	136.17	141.06	148.13	153.19	169.47	182.03	225.03
84.5	3.52083333	72.53	90.59	102.57	114.15	120.86	129.44	136.28	141.18	148.24	153.3	169.58	182.14	225.13
84.75	3.53125	72.61	90.69	102.68	114.26	120.97	129.56	136.4	141.29	148.36	153.42	169.69	182.25	225.22
85	3.54166667	72.7	90.78	102.78	114.37	121.08	129.67	136.51	141.41	148.47	153.53	169.8	182.35	225.32
85.25	3.55208333	72.78	90.88	102.89	114.48	121.19	129.78	136.63	141.52	148.58	153.64	169.91	182.46	225.42
85.5	3.5625	72.87	90.98	102.99	114.59	121.3	129.9	136.74	141.63	148.69	153.75	170.01	182.56	225.51
85.75	3.57291667	72.95	91.08	103.1	114.69	121.42	130.01	136.85	141.75	148.81	153.87	170.12	182.67	225.61
86	3.58333333	73.03	91.18	103.2	114.8	121.53	130.12	136.97	141.86	148.92	153.98	170.23	182.77	225.71
86.25	3.59375	73.12	91.28	103.31	114.91	121.64	130.24	137.08	141.97	149.03	154.09	170.34	182.88	225.8
86.5	3.60416667	73.2	91.38	103.41	115.02	121.75	130.35	137.19	142.09	149.14	154.2	170.45	182.98	225.9
86.75	3.61458333	73.29	91.47	103.51	115.13	121.86	130.46	137.31	142.2	149.26	154.31	170.55	183.09	226
87	3.625	73.37	91.57	103.62	115.24	121.97	130.57	137.42	142.31	149.37	154.42	170.66	183.19	226.09
87.25	3.63541667	73.45	91.67	103.72	115.35	122.08	130.69	137.53	142.42	149.48	154.54	170.77	183.3	226.19
87.5	3.64583333	73.54	91.77	103.83	115.46	122.2	130.8	137.64	142.54	149.59	154.65	170.88	183.4	226.29
87.75	3.65625	73.62	91.87	103.93	115.57	122.31	130.91	137.76	142.65	149.71	154.76	170.99	183.51	226.38
88	3.66666667	73.7	91.96	104.03	115.68	122.42	131.02	137.87	142.76	149.82	154.87	171.09	183.61	226.48
88.25	3.67708333	73.79	92.06	104.14	115.79	122.53	131.14	137.98	142.88	149.93	154.98	171.2	183.72	226.57
88.5	3.6875	73.87	92.16	104.24	115.89	122.64	131.25	138.1	142.99	150.04	155.09	171.31	183.82	226.67
88.75	3.69791667	73.95	92.26	104.35	116	122.75	131.36	138.21	143.1	150.15	155.2	171.42	183.93	226.77
89	3.70833333	74.04	92.35	104.45	116.11	122.86	131.47	138.32	143.21	150.26	155.31	171.52	184.03	226.86
89.25	3.71875	74.12	92.45	104.55	116.22	122.97	131.58	138.43	143.33	150.38	155.43	171.63	184.14	226.96
89.5	3.72916667	74.2	92.55	104.66	116.33	123.08	131.7	138.54	143.44	150.49	155.54	171.74	184.24	227.05
89.75	3.73958333	74.29	92.65	104.76	116.44	123.19	131.81	138.66	143.55	150.6	155.65	171.84	184.34	227.15
90	3.75	74.37	92.74	104.86	116.54	123.3	131.92	138.77	143.66	150.71	155.76	171.95	184.45	227.25
90.25	3.76041667	74.45	92.84	104.97	116.65	123.41	132.03	138.88	143.77	150.82	155.87	172.06	184.55	227.34
90.5	3.77083333	74.54	92.94	105.07	116.76	123.52	132.14	138.99	143.89	150.93	155.98	172.16	184.66	227.44
90.75	3.78125	74.62	93.03	105.17	116.87	123.63	132.25	139.1	144	151.04	156.09	172.27	184.76	227.53
91	3.79166667	74.7	93.13	105.27	116.98	123.74	132.36	139.22	144.11	151.16	156.2	172.38	184.87	227.63
91.25	3.80208333	74.78	93.23	105.38	117.08	123.85	132.48	139.33	144.22	151.27	156.31	172.48	184.97	227.72
91.5	3.8125	74.87	93.32	105.48	117.19	123.96	132.59	139.44	144.33	151.38	156.42	172.59	185.07	227.82
91.75	3.82291667	74.95	93.42	105.58	117.3	124.07	132.7	139.55	144.44	151.49	156.53	172.7	185.18	227.91
92	3.83333333	75.03	93.52	105.68	117.41	124.18	132.81	139.66	144.56	151.6	156.64	172.8	185.28	228.01
92.25	3.84375	75.11	93.61	105.79	117.51	124.29	132.92	139.77	144.67	151.71	156.75	172.91	185.38	228.1
92.5	3.85416667	75.2	93.71	105.89	117.62	124.4	133.03	139.89	144.78	151.82	156.86	173.02	185.49	228.2
92.75	3.86458333	75.28	93.81	105.99	117.73	124.51	133.14	140	144.89	151.93	156.97	173.12	185.59	228.29
93	3.875	75.36	93.9	106.09	117.84	124.62	133.25	140.11	145	152.04	157.08	173.23	185.7	228.39
93.25	3.88541667	75.44	94	106.2	117.94	124.73	133.36	140.22	145.11	152.15	157.19	173.34	185.8	228.48
93.5	3.89583333	75.53	94.1	106.3	118.05	124.84	133.47	140.33	145.22	152.26	157.3	173.44	185.9	228.58
93.75	3.90625	75.61	94.19	106.4	118.16	124.95	133.59	140.44	145.33	152.37	157.41	173.55	186.01	228.67
94	3.91666667	75.69	94.29	106.5	118.26	125.06	133.7	140.55	145.45	152.49	157.52	173.66	186.11	228.77
94.25	3.92708333	75.77	94.38	106.6	118.37	125.16	133.81	140.66	145.56	152.6	157.63	173.76	186.21	228.86
94.5	3.9375	75.85	94.48	106.71	118.48	125.27	133.92	140.78	145.67	152.71	157.74	173.87	186.32	228.96
94.75	3.94791667	75.93	94.58	106.81	118.58	125.38	134.03	140.89	145.78	152.82	157.85	173.97	186.42	229.05
95	3.95833333	76.02	94.67	106.91	118.69	125.49	134.14	141	145.89	152.93	157.96	174.08	186.52	229.15
95.25	3.96875	76.1	94.77	107.01	118.8	125.6	134.25	141.11	146	153.04	158.07	174.19	186.63	229.24
95.5	3.97916667	76.18	94.86	107.11	118.9	125.71	134.36	141.22	146.11	153.15	158.18	174.29	186.73	229.34
95.75	3.98958333	76.26	94.96	107.22	119.01	125.82	134.47	141.33	146.22	153.26	158.29	174.4	186.83	229.43
96	4	76.34	95.05	107.32	119.12	125.93	134.58	141.44	146.33	153.37	158.4	174.5	186.94	229.53

Appendix C: Greenfield Runoff

FEH Mean Annual Flood

Input

QMED Method	2008	SAAR (mm)	866	BFIHOST	0.361
Site Location GB 387950 353450 SJ 87950 53450		URBEXT (2000)	0.0687	FARL	1.000
Area (ha)	673.250	SPRHOST	36.280		

Results

QMED Rural (l/s) 3239.0 QMED Urban (l/s) 3485.7

Appendix D: Drainage Strategy

KEY:

INSPECTION CHAMBER

SURFACE WATER SEWER

HALF PERFORATED FILTER DRAIN

STONE FILLED FILTER TRENCH

PRELIMINARY ISSUE

Rev	Description	Date	Drn	Chk	App
P02	CLIENT NAME UPDATED	24.02.25	aj	AJ	AJ
P01	PRELIMINARY FIRST ISSUE	21.02.25	aj	AJ	AJ

Document Control

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Client

NET ZERO TWENTY SIX LIMITED
MANAGED BY
FIRSTWAY ENERGY

Project Name

TYDDYN FORGAN ESS

Sheet Title

DRAINAGE GENERAL ARANGEMENT

Model Reference

N/A

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A1	Status
B068934	aj	Feb '25	AJ	Feb '25	AJ	Feb '25	1:500	S0

Client Project Number	Originator	Function	Spatial	Form	Role	Number	Revision
B068934	- TTE	- XX	- XX	- DR	- C	- 00500	P02

TTE_MT_v3

Appendix E: Drainage Model

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2	Volumetric Runoff Coeff.	0.750
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 255350 367800 SH 55350 67800	Minimum Backdrop Height (m)	0.200
Data Type	Catchment	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	20.617	0.123	167.0	0.010	5.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	-11.23	5.34	108.377	0.010	0.0	0.0	0.0	1.01	40.1	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.001	41.318	0.247	167.0	0.010	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.002	5.234	0.031	167.0	0.005	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.003	23.515	0.141	167.0	0.011	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.004	8.329	0.051	163.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.005	4.658	0.027	173.7	0.007	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.006	32.758	0.196	167.0	0.045	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.000	53.402	0.107	499.2	0.036	5.00	0.0	0.600		2 _/	200	1:2 Ditch	
2.001	2.183	0.013	173.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.007	14.580	0.087	167.6	0.008	0.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.001	-9.96	6.02	108.253	0.020	0.0	0.0	0.0	1.01	40.1	0.0
1.002	-9.82	6.11	108.006	0.025	0.0	0.0	0.0	1.01	40.1	0.0
1.003	-9.23	6.50	107.975	0.036	0.0	0.0	0.0	1.01	40.1	0.0
1.004	-9.04	6.63	107.834	0.036	0.0	0.0	0.0	1.02	40.5	0.0
1.005	-8.94	6.71	107.783	0.043	0.0	0.0	0.0	0.99	39.3	0.0
1.006	-8.27	7.25	107.756	0.088	0.0	0.0	0.0	1.01	40.1	0.0
2.000	-10.01	5.99	108.107	0.036	0.0	0.0	0.0	0.90	110.2	0.0
2.001	-9.95	6.03	107.573	0.036	0.0	0.0	0.0	0.99	39.3	0.0
1.007	-8.01	7.50	107.560	0.132	0.0	0.0	0.0	1.01	40.0	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	81.760	0.490	166.9	0.099	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	8.800	0.053	166.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
4.000	81.760	0.273	299.5	0.166	5.00	0.0	0.600		o	300	Pipe/Conduit	
4.001	9.541	0.032	298.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.000	84.764	0.283	299.5	0.161	5.00	0.0	0.600		o	300	Pipe/Conduit	
6.000	42.916	0.257	167.0	0.076	5.00	0.0	0.600		o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	-9.45	6.35	108.324	0.099	0.0	0.0	0.0	1.01	40.1	0.0
3.001	-9.24	6.49	107.834	0.099	0.0	0.0	0.0	1.01	40.2	0.0
4.000	-9.22	6.51	108.077	0.166	0.0	0.0	0.0	0.90	63.9	0.0
4.001	-8.98	6.68	107.805	0.166	0.0	0.0	0.0	0.91	64.0	0.0
5.000	-9.14	6.56	108.194	0.161	0.0	0.0	0.0	0.90	63.8	0.0
6.000	-10.51	5.71	108.235	0.076	0.0	0.0	0.0	1.01	40.1	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
5.001	27.969	0.093	300.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.002	10.662	0.036	296.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	36.011	0.216	166.7	0.020	5.00	0.0	0.600		o	225	Pipe/Conduit	
7.001	42.409	0.254	167.0	0.031	0.00	0.0	0.600		o	225	Pipe/Conduit	
7.002	5.235	0.017	307.9	0.008	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.002	13.178	0.044	299.5	0.006	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.003	11.256	0.023	500.0	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
3.002	15.840	0.032	500.0	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.001	-8.47	7.08	107.902	0.237	0.0	0.0	0.0	0.90	63.7	0.0
5.002	-8.25	7.28	107.809	0.237	0.0	0.0	0.0	0.91	64.2	0.0
7.000	-10.73	5.59	108.335	0.020	0.0	0.0	0.0	1.01	40.1	0.0
7.001	-9.53	6.29	108.120	0.051	0.0	0.0	0.0	1.01	40.1	0.0
7.002	-9.39	6.39	107.791	0.059	0.0	0.0	0.0	0.89	63.0	0.0
4.002	-7.98	7.52	107.773	0.468	0.0	0.0	0.0	0.90	63.8	0.0
4.003	-7.74	7.75	107.654	0.468	0.0	0.0	0.0	0.80	88.7	0.0
3.002	-7.42	8.08	107.632	0.567	0.0	0.0	0.0	0.80	88.7	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.003	43.344	0.100	433.4	0.000	0.00	0.0		0.045	3 \=/	1000	1:3 Swale	
3.004	3.107	0.027	115.1	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.008	8.266	0.073	113.2	0.000	0.00	0.0	0.600		o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.003	-5.45	11.00	107.600	0.567	0.0	0.0	0.0	0.25	53.8	0.0
3.004	-5.44	11.03	107.500	0.567	0.0	0.0	0.0	1.69	186.5	0.0
1.008	-5.35	11.22	107.473	0.699	0.0	0.0	0.0	0.72	5.7	0.0

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
3S01	109.700	1.323	Open Manhole	600	1.000	108.377	225				
3S02	109.580	1.327	Open Manhole	600	1.001	108.253	225	1.000	108.254	225	1
3S03	109.450	1.444	Open Manhole	600	1.002	108.006	225	1.001	108.006	225	
3S04	109.400	1.425	Open Manhole	600	1.003	107.975	225	1.002	107.975	225	
3S05	109.000	1.166	Open Manhole	600	1.004	107.834	225	1.003	107.834	225	
3S06	108.600	0.817	Open Manhole	600	1.005	107.783	225	1.004	107.783	225	
3S07	108.400	0.644	Open Manhole	600	1.006	107.756	225	1.005	107.756	225	
3S08	108.310	0.203	Junction		2.000	108.107	200				
3S09	108.200	0.627	Open Manhole	600	2.001	107.573	225	2.000	108.000	200	502
3S10	108.200	0.640	Open Manhole	1200	1.007	107.560	225	1.006	107.560	225	
								2.001	107.560	225	
3S11	109.500	1.176	Open Manhole	600	3.000	108.324	225				
3S12	108.500	0.666	Open Manhole	600	3.001	107.834	225	3.000	107.834	225	
3S13	109.600	1.523	Open Manhole	600	4.000	108.077	300				
3S14	108.780	0.976	Open Manhole	600	4.001	107.805	300	4.000	107.804	300	
3S15	109.800	1.606	Open Manhole	600	5.000	108.194	300				
3S16	109.300	1.065	Open Manhole	600	6.000	108.235	225				
3S17	109.400	1.498	Open Manhole	1200	5.001	107.902	300	5.000	107.911	300	9
								6.000	107.978	225	1
3S18	108.600	0.791	Open Manhole	1200	5.002	107.809	300	5.001	107.809	300	
3S19	109.300	0.965	Open Manhole	600	7.000	108.335	225				

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
3S20	108.650	0.531	Open Manhole	600	7.001	108.120	225	7.000	108.119	225	
3S21	108.500	0.709	Open Manhole	1200	7.002	107.791	300	7.001	107.866	225	
3S22	108.500	0.727	Open Manhole	1200	4.002	107.773	300	4.001	107.773	300	
								5.002	107.773	300	
								7.002	107.774	300	1
3S23	108.400	0.746	Open Manhole	1350	4.003	107.654	375	4.002	107.729	300	
3S24	108.310	0.679	Open Manhole	1350	3.002	107.632	375	3.001	107.781	225	
								4.003	107.631	375	
3S25	108.100	0.500	Open Manhole	600	3.003	107.600	1000	3.002	107.600	375	
3S26	108.100	0.600	Open Manhole	600	3.004	107.500	375	3.003	107.500	1000	
Control Chamber 3	108.100	0.627	Open Manhole	2400	1.008	107.473	100	1.007	107.473	225	
								3.004	107.473	375	
Outfall 3	107.800	0.400	Open Manhole	1000 x 1000		OUTFALL		1.008	107.400	100	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
3S01	255694.154	367400.573	255694.154	367400.573	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
3S02	255696.169	367380.055	255696.169	367380.055	Required	
3S03	255655.052	367375.985	255655.052	367375.985	Required	
3S04	255651.735	367371.937	255651.735	367371.937	Required	
3S05	255654.060	367348.537	255654.060	367348.537	Required	
3S06	255655.095	367340.273	255655.095	367340.273	Required	
3S07	255655.344	367335.622	255655.344	367335.622	Required	
3S08	255713.903	367308.458			No Entry	
3S09	255660.757	367303.230	255660.757	367303.230	Required	
3S10	255658.584	367303.025	255658.584	367303.025	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
3S11	255705.877	367398.867	255705.877	367398.867	Required	
3S12	255713.869	367317.498	255713.869	367317.498	Required	
3S13	255733.874	367401.617	255733.874	367401.617	Required	
3S14	255741.867	367320.248	255741.867	367320.248	Required	
3S15	255766.947	367404.865	255766.947	367404.865	Required	
3S16	255779.427	367277.797	255779.427	367277.797	Required	
3S17	255775.220	367320.506	255775.220	367320.506	Required	
3S18	255747.385	367317.776	255747.385	367317.776	Required	
3S19	255783.073	367269.123	255783.073	367269.123	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
3S20	255747.234	367265.602	255747.234	367265.602	Required	
3S21	255743.088	367307.808	255743.088	367307.808	Required	
3S22	255739.045	367311.134	255739.045	367311.134	Required	
3S23	255725.931	367309.841	255725.931	367309.841	Required	
3S24	255714.729	367308.740	255714.729	367308.740	Required	
3S25	255706.597	367295.147	255706.597	367295.147	Required	
3S26	255663.640	367289.374	255663.640	367289.374	Required	
Control Chamber 3	255660.723	367288.602	255660.723	367288.602	Required	
Outfall 3	255652.732	367286.488			No Entry	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.010	0.010	0.010
1.001	-	-	100	0.010	0.010	0.010
1.002	-	-	100	0.005	0.005	0.005
1.003	-	-	100	0.011	0.011	0.011
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.007	0.007	0.007
1.006	-	-	100	0.045	0.045	0.045
2.000	-	-	100	0.036	0.036	0.036
2.001	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.008	0.008	0.008
3.000	-	-	100	0.099	0.099	0.099
3.001	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.166	0.166	0.166
4.001	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.161	0.161	0.161
6.000	-	-	100	0.076	0.076	0.076
5.001	-	-	100	0.000	0.000	0.000
5.002	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.020	0.020	0.020
7.001	-	-	100	0.031	0.031	0.031
7.002	-	-	100	0.008	0.008	0.008
4.002	-	-	100	0.006	0.006	0.006
4.003	-	-	100	0.000	0.000	0.000
3.002	-	-	100	0.000	0.000	0.000
3.003	-	-	100	0.000	0.000	0.000
3.004	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.699	0.699	0.699

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	Outfall 3	107.800	107.400	0.000	1000	1000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	13	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	2	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 255350 367800 SH 55350 67800	Cv (Winter)	0.840
Data Type	Catchment	Storm Duration (mins)	30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: Control Chamber 3, DS/PN: 1.008, Volume (m³): 3.5

Unit Reference	MD-SHE-0073-2000-0600-2000	Sump Available	Yes
Design Head (m)	0.600	Diameter (mm)	73
Design Flow (l/s)	2.0	Invert Level (m)	107.473
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	2.0	Kick-Flo®	0.397	1.7
Flush-Flo™	0.177	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	0.600	2.0	1.600	3.1	2.600	3.9	5.000	5.3	7.500	6.5
0.200	2.0	0.800	2.3	1.800	3.3	3.000	4.2	5.500	5.6	8.000	6.7
0.300	1.9	1.000	2.5	2.000	3.5	3.500	4.5	6.000	5.8	8.500	6.9
0.400	1.7	1.200	2.7	2.200	3.6	4.000	4.8	6.500	6.0	9.000	7.1
0.500	1.8	1.400	2.9	2.400	3.8	4.500	5.1	7.000	6.3	9.500	7.3

Storage Structures for Storm

Filter Drain Manhole: 3S02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	20.6	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	108.253	Number of Pipes	1		

Filter Drain Manhole: 3S03, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	41.3	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	108.006	Number of Pipes	1		

Filter Drain Manhole: 3S04, DS/PN: 1.003

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	5.2	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.975	Number of Pipes	1		

Filter Drain Manhole: 3S05, DS/PN: 1.004

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Trench Length (m)	23.5
Infiltration Coefficient Side (m/hr)	0.00000	Invert Level (m)	107.834	Pipe Diameter (m)	0.225
Safety Factor	2.0	Trench Width (m)	0.6	Pipe Depth above Invert (m)	0.000

Filter Drain Manhole: 3S05, DS/PN: 1.004

Number of Pipes	1	Cap Volume Depth (m)	0.000
Slope (1:X)	167.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 3S07, DS/PN: 1.006

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	4.5	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.756	Number of Pipes	1		

Filter Drain Manhole: 3S12, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	81.8	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.748	Number of Pipes	1		

Filter Drain Manhole: 3S14, DS/PN: 4.001

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	300.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	81.8	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.300	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.898	Number of Pipes	1		

Complex Manhole: 3S17, DS/PN: 5.001

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	84.8	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	108.072	Number of Pipes	1		

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	43.1	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	108.072	Number of Pipes	1		

Filter Drain Manhole: 3S20, DS/PN: 7.001

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	167.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	36.0	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.225	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	108.126	Number of Pipes	1		

Filter Drain Manhole: 3S21, DS/PN: 7.002

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30	Trench Length (m)	42.4
Infiltration Coefficient Side (m/hr)	0.00000	Invert Level (m)	107.872	Pipe Diameter (m)	0.225
Safety Factor	2.0	Trench Width (m)	0.6	Pipe Depth above Invert (m)	0.000

Filter Drain Manhole: 3S21, DS/PN: 7.002

Number of Pipes	1	Cap Volume Depth (m)	0.000
Slope (1:X)	167.0	Cap Infiltration Depth (m)	0.000

Filter Drain Manhole: 3S22, DS/PN: 4.002

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	300.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	5.2	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.300	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.841	Number of Pipes	1		

Filter Drain Manhole: 3S23, DS/PN: 4.003

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	0.6	Slope (1:X)	300.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	13.2	Cap Volume Depth (m)	0.000
Safety Factor	2.0	Pipe Diameter (m)	0.300	Cap Infiltration Depth (m)	0.000
Porosity	0.30	Pipe Depth above Invert (m)	0.000		
Invert Level (m)	107.762	Number of Pipes	1		

Tank or Pond Manhole: 3S26, DS/PN: 3.004

Invert Level (m) 107.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1345.0	0.600	1700.0

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	13	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 255350 367800 SH 55350 67800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	2.5 Second Increment (Extended)	Inertia Status	ON
DTS Status	OFF		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.000	3S01	15 minute 2 year Winter I+0%	109.700	108.405	-0.197	0.000	0.04	0.5	1.3	OK
1.001	3S02	15 minute 2 year Winter I+0%	109.580	108.290	-0.188	0.000	0.06	0.6	2.4	OK
1.002	3S03	15 minute 2 year Winter I+0%	109.450	108.053	-0.178	0.000	0.10	0.5	2.9	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.003	3S04	15 minute 2 year Winter I+0%	109.400	108.025	-0.175	0.000	0.11	0.6	4.0	OK
1.004	3S05	15 minute 2 year Winter I+0%	109.000	107.887	-0.172	0.000	0.13	0.6	4.0	OK
1.005	3S06	15 minute 2 year Winter I+0%	108.600	107.845	-0.163	0.000	0.16	0.5	4.6	OK
1.006	3S07	15 minute 2 year Winter I+0%	108.400	107.831	-0.150	0.000	0.24	0.8	8.9	OK
2.000	3S08	15 minute 2 year Winter I+0%	108.310	108.150	-0.160	0.000	0.04	0.4	4.7	FLOOD RISK*
2.001	3S09	15 minute 2 year Winter I+0%	108.200	107.689	-0.109	0.000	0.16	0.3	4.6	OK
1.007	3S10	15 minute 2 year Winter I+0%	108.200	107.688	-0.097	0.000	0.39	0.7	13.6	OK
3.000	3S11	15 minute 2 year Winter I+0%	109.500	108.414	-0.135	0.000	0.31	0.9	12.1	OK
3.001	3S12	15 minute 2 year Winter I+0%	108.500	107.929	-0.130	0.000	0.36	0.8	11.8	OK
4.000	3S13	15 minute 2 year Winter I+0%	109.600	108.202	-0.175	0.000	0.32	0.8	19.8	OK
4.001	3S14	15 minute 2 year Winter I+0%	108.780	108.001	-0.104	0.000	0.31	0.4	15.5	OK
5.000	3S15	15 minute 2 year Winter I+0%	109.800	108.316	-0.178	0.000	0.31	0.8	19.1	OK
6.000	3S16	15 minute 2 year Winter I+0%	109.300	108.314	-0.146	0.000	0.26	0.8	9.8	OK
5.001	3S17	15 minute 2 year Winter I+0%	109.400	108.054	-0.148	0.000	0.47	0.8	27.3	OK
5.002	3S18	15 minute 2 year Winter I+0%	108.600	108.010	-0.099	0.000	0.50	0.6	25.5	OK
7.000	3S19	15 minute 2 year Winter I+0%	109.300	108.374	-0.186	0.000	0.07	0.6	2.6	OK
7.001	3S20	15 minute 2 year Winter I+0%	108.650	108.179	-0.166	0.000	0.15	0.7	5.9	OK
7.002	3S21	15 minute 2 year Winter I+0%	108.500	107.994	-0.097	0.000	0.12	0.2	5.5	OK
4.002	3S22	15 minute 2 year Winter I+0%	108.500	107.991	-0.082	0.000	0.88	0.8	46.1	OK
4.003	3S23	15 minute 2 year Winter I+0%	108.400	107.948	-0.081	0.000	0.87	0.5	45.3	OK
3.002	3S24	15 minute 2 year Winter I+0%	108.310	107.917	-0.090	0.000	0.93	0.6	53.2	OK
3.003	3S25	15 minute 2 year Winter I+0%	108.100	107.749	-0.351	0.000	0.09	0.2	53.1	OK
3.004	3S26	2160 minute 2 year Winter I+0%	108.100	107.629	-0.246	0.000	0.02	0.3	2.0	OK
1.008	Control Chamber 3	15 minute 2 year Winter I+0%	108.100	107.664	0.091	0.000	0.38	0.7	2.0	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	13	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 255350 367800 SH 55350 67800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	2.5 Second Increment (Extended)	Inertia Status	ON
DTS Status	OFF		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.000	3S01	15 minute 30 year Winter I+0%	109.700	108.421	-0.181	0.000	0.08	0.6	3.0	OK
1.001	3S02	15 minute 30 year Winter I+0%	109.580	108.314	-0.164	0.000	0.16	0.7	6.0	OK
1.002	3S03	15 minute 30 year Winter I+0%	109.450	108.082	-0.149	0.000	0.25	0.6	7.4	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.003	3S04	15 minute 30 year Winter I+0%	109.400	108.057	-0.143	0.000	0.28	0.8	10.4	OK
1.004	3S05	15 minute 30 year Winter I+0%	109.000	107.936	-0.123	0.000	0.31	0.6	9.8	OK
1.005	3S06	15 minute 30 year Winter I+0%	108.600	107.923	-0.085	0.000	0.40	0.5	11.3	OK
1.006	3S07	15 minute 30 year Winter I+0%	108.400	107.916	-0.065	0.000	0.60	1.0	22.7	OK
2.000	3S08	15 minute 30 year Winter I+0%	108.310	108.173	-0.137	0.000	0.10	0.5	10.9	FLOOD RISK*
2.001	3S09	15 minute 30 year Winter I+0%	108.200	107.865	0.067	0.000	0.37	0.3	10.6	SURCHARGED
1.007	3S10	15 minute 30 year Winter I+0%	108.200	107.860	0.075	0.000	0.92	0.8	32.2	SURCHARGED
3.000	3S11	15 minute 30 year Winter I+0%	109.500	108.474	-0.075	0.000	0.71	1.1	27.7	OK
3.001	3S12	30 minute 30 year Winter I+0%	108.500	108.062	0.003	0.000	0.63	0.8	20.6	SURCHARGED
4.000	3S13	15 minute 30 year Winter I+0%	109.600	108.286	-0.091	0.000	0.74	1.0	45.3	OK
4.001	3S14	30 minute 30 year Winter I+0%	108.780	108.170	0.065	0.000	0.63	0.4	31.0	SURCHARGED
5.000	3S15	15 minute 30 year Winter I+0%	109.800	108.398	-0.096	0.000	0.71	1.0	43.7	OK
6.000	3S16	15 minute 30 year Winter I+0%	109.300	108.362	-0.098	0.000	0.59	1.0	22.5	OK
5.001	3S17	30 minute 30 year Winter I+0%	109.400	108.284	0.082	0.000	0.70	0.8	40.0	SURCHARGED
5.002	3S18	30 minute 30 year Winter I+0%	108.600	108.218	0.109	0.000	0.79	0.6	40.4	SURCHARGED
7.000	3S19	15 minute 30 year Winter I+0%	109.300	108.395	-0.165	0.000	0.16	0.7	5.9	OK
7.001	3S20	15 minute 30 year Winter I+0%	108.650	108.221	-0.124	0.000	0.40	0.9	15.2	OK
7.002	3S21	30 minute 30 year Winter I+0%	108.500	108.153	0.062	0.000	0.27	0.3	12.3	SURCHARGED
4.002	3S22	30 minute 30 year Winter I+0%	108.500	108.148	0.075	0.000	1.50	1.1	78.7	SURCHARGED
4.003	3S23	30 minute 30 year Winter I+0%	108.400	108.049	0.020	0.000	1.52	0.7	78.8	SURCHARGED
3.002	3S24	30 minute 30 year Winter I+0%	108.310	108.015	0.008	0.000	1.70	0.9	97.1	FLOOD RISK
3.003	3S25	30 minute 30 year Winter I+0%	108.100	107.805	-0.295	0.000	0.17	0.3	97.1	FLOOD RISK
3.004	3S26	2160 minute 30 year Winter I+0%	108.100	107.746	-0.129	0.000	0.02	0.2	2.2	OK
1.008	Control Chamber 3	15 minute 30 year Winter I+0%	108.100	107.776	0.203	0.000	0.38	0.7	2.0	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	13	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Catchment
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 255350 367800 SH 55350 67800	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	2.5 Second Increment (Extended)	Inertia Status	ON
DTS Status	OFF		

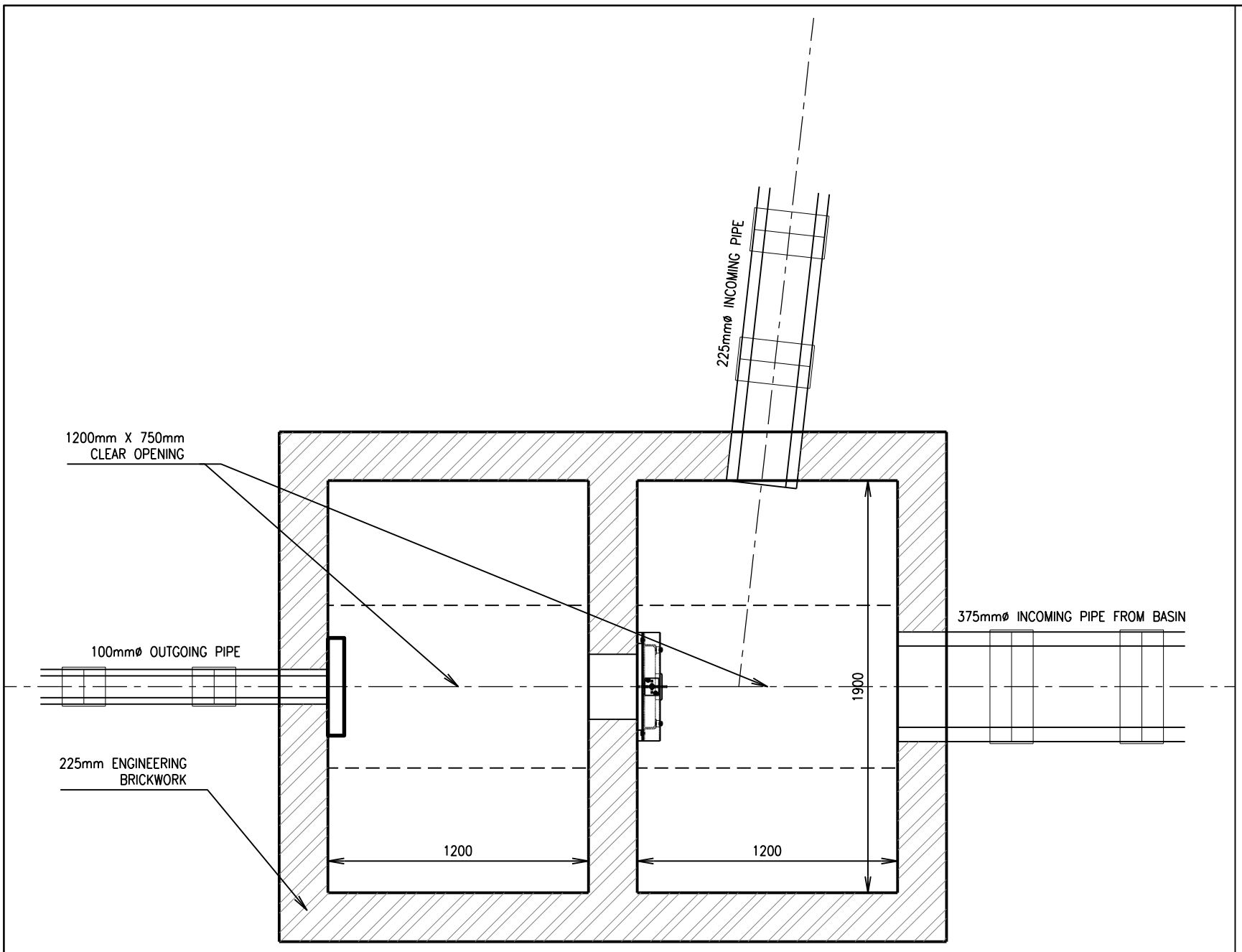
Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.000	3S01	15 minute 100 year Winter I+40%	109.700	108.436	-0.166	0.000	0.15	0.7	5.5	OK
1.001	3S02	15 minute 100 year Winter I+40%	109.580	108.337	-0.141	0.000	0.29	0.8	10.9	OK
1.002	3S03	15 minute 100 year Winter I+40%	109.450	108.181	-0.050	0.000	0.40	0.7	11.8	OK

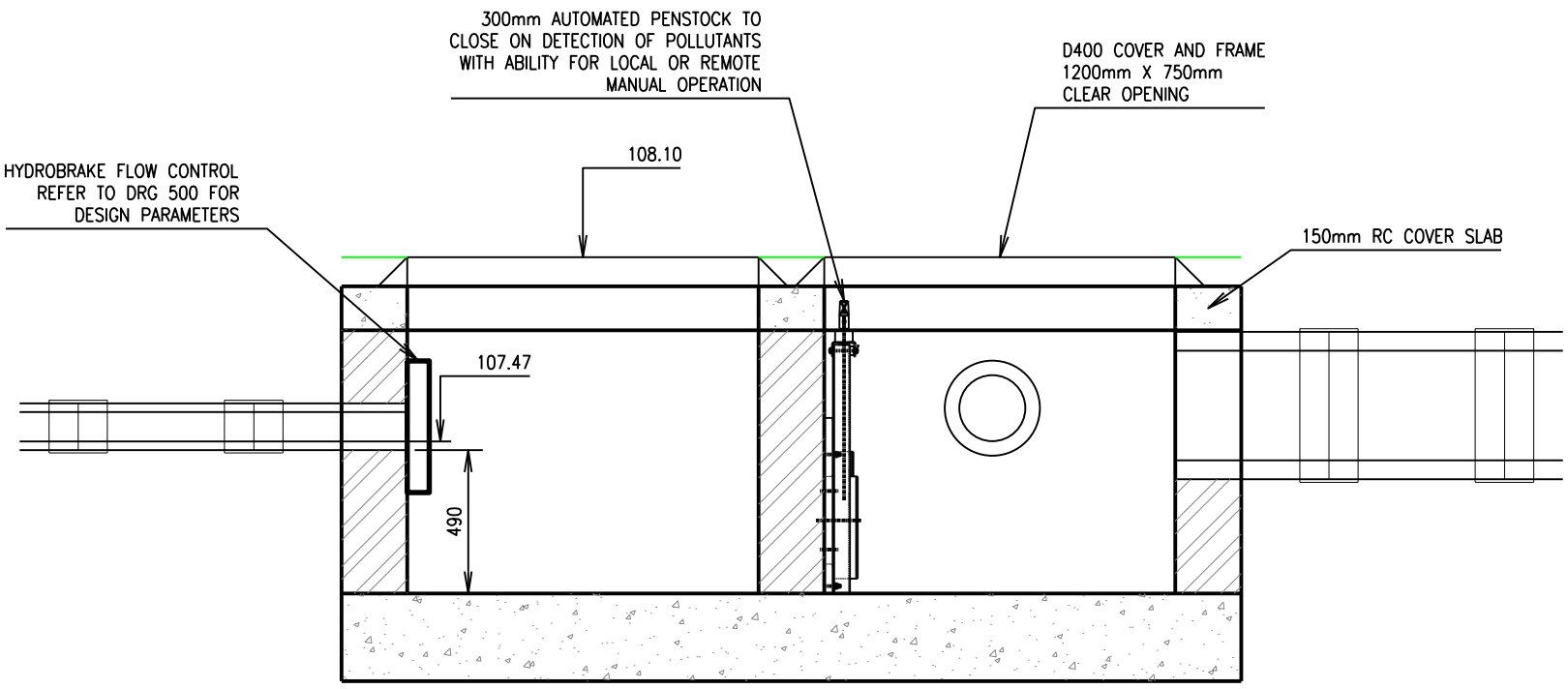
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
1.003	3S04	15 minute 100 year Winter I+40%	109.400	108.175	-0.025	0.000	0.44	0.9	16.4	OK
1.004	3S05	15 minute 100 year Winter I+40%	109.000	108.145	0.086	0.000	0.66	0.6	21.0	SURCHARGED
1.005	3S06	15 minute 100 year Winter I+40%	108.600	108.137	0.129	0.000	0.77	0.6	21.6	SURCHARGED
1.006	3S07	15 minute 100 year Winter I+40%	108.400	108.134	0.153	0.000	0.73	1.0	27.7	FLOOD RISK
2.000	3S08	15 minute 100 year Winter I+40%	108.310	108.197	-0.113	0.000	0.18	0.6	19.9	FLOOD RISK*
2.001	3S09	15 minute 100 year Winter I+40%	108.200	108.023	0.225	0.000	0.66	0.5	18.8	FLOOD RISK
1.007	3S10	15 minute 100 year Winter I+40%	108.200	108.016	0.231	0.000	1.41	1.2	49.5	FLOOD RISK
3.000	3S11	15 minute 100 year Winter I+40%	109.500	108.947	0.398	0.000	1.24	1.3	48.4	SURCHARGED
3.001	3S12	30 minute 100 year Winter I+40%	108.500	108.184	0.125	0.000	1.12	0.9	36.3	SURCHARGED
4.000	3S13	15 minute 100 year Winter I+40%	109.600	108.777	0.400	0.000	1.30	1.2	80.1	SURCHARGED
4.001	3S14	30 minute 100 year Winter I+40%	108.780	108.498	0.393	0.000	1.09	0.8	54.0	FLOOD RISK
5.000	3S15	15 minute 100 year Winter I+40%	109.800	108.892	0.398	0.000	1.25	1.2	77.0	SURCHARGED
6.000	3S16	30 minute 100 year Winter I+40%	109.300	108.731	0.271	0.000	0.86	1.1	32.7	SURCHARGED
5.001	3S17	30 minute 100 year Winter I+40%	109.400	108.665	0.463	0.000	1.17	1.0	67.5	SURCHARGED
5.002	3S18	30 minute 100 year Winter I+40%	108.600	108.539	0.430	0.000	1.33	1.0	67.5	FLOOD RISK
7.000	3S19	30 minute 100 year Winter I+40%	109.300	108.508	-0.052	0.000	0.25	0.8	9.3	OK
7.001	3S20	30 minute 100 year Winter I+40%	108.650	108.496	0.151	0.000	0.54	1.0	20.6	FLOOD RISK
7.002	3S21	30 minute 100 year Winter I+40%	108.500	108.471	0.380	0.000	0.49	0.3	22.5	FLOOD RISK
4.002	3S22	30 minute 100 year Winter I+40%	108.500	108.466	0.393	0.000	2.38	1.8	124.8	FLOOD RISK
4.003	3S23	30 minute 100 year Winter I+40%	108.400	108.215	0.186	0.000	2.41	1.1	125.4	FLOOD RISK
3.002	3S24	30 minute 100 year Winter I+40%	108.310	108.114	0.107	0.000	2.72	1.4	155.1	FLOOD RISK
3.003	3S25	2880 minute 100 year Winter I+40%	108.100	107.965	-0.135	0.000	0.02	0.1	11.9	FLOOD RISK
3.004	3S26	2880 minute 100 year Winter I+40%	108.100	107.964	0.089	0.000	0.02	0.1	2.1	FLOOD RISK
1.008	Control Chamber 3	2880 minute 100 year Winter I+40%	108.100	107.966	0.393	0.000	0.38	0.7	2.0	FLOOD RISK

Appendix F: Control Chamber Arrangement



CONTROL CHAMBER – PLAN



CONTROL CHAMBER – SECTION

PRELIMINARY ISSUE

Rev	Description	Date	Drn	Chk	App
P01	PRELIMINARY FIRST ISSUE	01.08.2020	RLC	MF	AP

Document Control

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Client

NET ZERO TWENTY SIX
MANAGED BY
FIRSTWAY ENERGY LIMITED

Project Name

TYDDYN FORGAN ESS

Sheet Title

CONTROL CHAMBER

Model Reference

N/A

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A3	Status
B068934	aj	Feb '25	AJ	Feb '25	AJ	Feb '25	NTS	S0

Client Project Number	Originator	Function	Spatial	Form	Role	Number	Revision
B068934	- TTE -	XX -	XX -	DR -	C -	00501	P01

TTE_MT_v3