

# Ffos-y-Fran, Merthyr Tydfil

## Catchment and Flow Analysis

Nant Morlais Catchment Area

February 2026

| Project Information |                                                                                                                         |
|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| Project:            | Ffos-y-Fran, Merthyr Tydfil                                                                                             |
| Report Title:       | Catchment & Flow Analysis – Nant Morlais                                                                                |
| Client:             | Merthyr (South Wales) Ltd                                                                                               |
| Instruction:        | The instruction to undertake this Catchment & Flow Analysis was received from Chris Barber of Merthyr (South Wales) Ltd |
| File Ref:           | 15840- Hydrology Assessment - Morlais - 01                                                                              |

| Approval Record |                                       |
|-----------------|---------------------------------------|
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| Document History |            |             |
|------------------|------------|-------------|
| Revision         | Date       | Comment     |
| 01               | 16/02/2026 | First issue |
|                  |            |             |
|                  |            |             |

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## Introduction

Waterco has been instructed to prepare a Catchment Assessment and Flow Analysis in respect of restoration proposals of the former opencast mine at Ffos-y-Fran, Merthyr Tydfil, CF48 4AH (the site). This study specifically relates to the western extent of the site and catchment areas which drain to the Nant Morlais catchment.

The purpose of this report is to:

- Derive the on-site catchment areas draining to the Nant Morlais catchment.
- Derive the peak flow from the site catchment areas draining to the Nant Morlais catchment.
- Derive the capacity of the culverts draining the site to downstream tributaries of Nant Morlais, determining whether they have sufficient capacity to accommodate flow from the site in storm conditions.
- Derive the capacity of the receiving watercourses off-site, determining whether they have sufficient capacity to accommodate flow from the site in storm conditions.
- Determine whether any on-site flow control and attenuation storage is required.

## Existing Conditions

The wider Ffos-y-Fran site covers an area of approximately 400 hectares (ha) and is centred at National Grid Reference (NGR): 307512, 206905. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed February 2026) shows that the site currently comprises an opencast coal mine, with operations having ceased in November 2023. Part of the site has been restored, including the western extent of the site which drains into the Nant Morlais Catchment.

## Local Topography

Topographic levels to m AOD have been derived from a 1m resolution NRW composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data shows that the western extent of the site (which drains towards the Nant Morlais catchment) flows from 380 metres Above Ordnance Datum in the east, to approximately 286m AOD in the south-west. A LiDAR Extract is provided as Appendix B.

## Existing Drainage Arrangement

The majority of the western extent of the site has been restored and benefits from a formal drainage system. The western extent of the site slopes from east to west and a number of contour grips have been installed on the slope to intercept rainfall runoff and direct flows to watercourses on the western boundary of the site. The watercourses on the western boundary of the site drain to the Nant Morlais catchment and

discharge from the site via 2no. culverts. An additional 2no. culverts are located in the south-western extent of the site and accommodate flow from overland runoff. The culvert locations are shown on the Location Plan in Appendix A. The location of the contour grips and watercourses, in context to the sub-catchment areas, are shown on the Draft Watercourses plan in Appendix C.

A summary of the on-site drainage sub-catchments draining to the Nant Morlais catchment is provided below:

#### **Catchment A**

Catchment A is served by a watercourse on the western site boundary which drains to a 1.4m diameter concrete culvert at NGR 306587, 207117 which directs flow west beneath the A4060 (road) and into Goat Mill Brook (a tributary of Nant Morlais). The catchment area is approximately 28.346ha.

#### **Catchment B**

Catchment B is served by a watercourse on the western site boundary which drains to a 1.5m diameter concrete culvert at NGR 306361, 206573 which directs flow north-west beneath the A4060 (road) and into Bradley Gardens stream (a tributary of Nant Morlais). The catchment area is approximately 36.798ha.

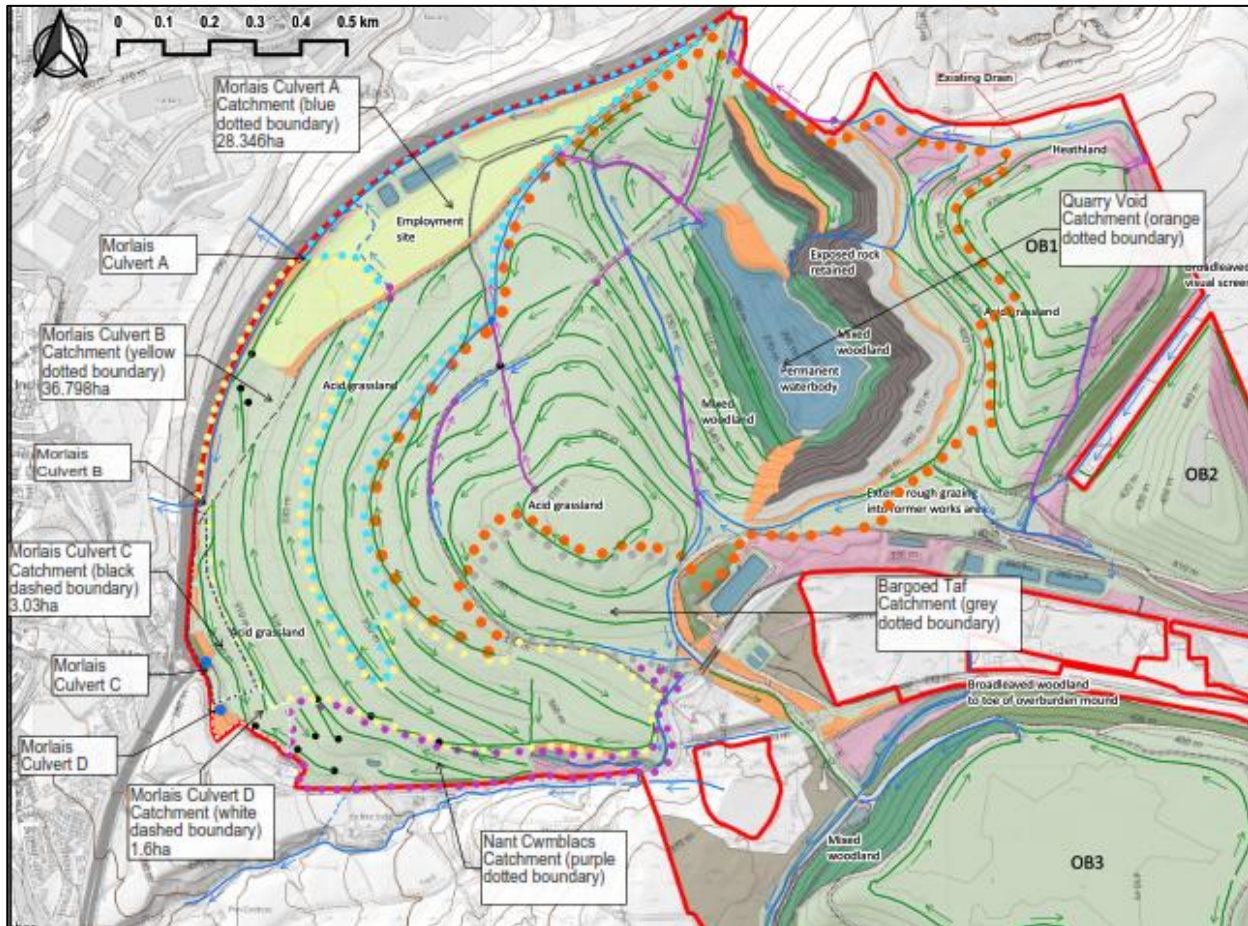
#### **Catchment C**

Catchment C drains to a 250mm diameter culvert located at NGR 306384, 206226. The culvert drains to the highway drainage network in Bogey Road to the west. A connection is made to a highway gully at NGR 306383, 206146. The catchment area is approximately 3.03ha.

#### **Catchment D**

Catchment D drains to a 250mm diameter culvert located at NGR 306404, 206147. The culvert drains to the highway drainage network in Bogey Road to the west. A connection is made to a highway gully at NGR 306361, 206206. The catchment area is approximately 1.6ha.

Figure 1 identifies the catchment boundaries and culvert locations.



**Figure 1 – Catchment Boundaries with Culvert Locations**

## Catchment Analysis

The following catchment analysis details the peak rainfall runoff rates from the individual sub-catchment areas; the capacity of the receiving culverts (Morlais Culverts A – D) and the capacity of the receiving watercourses downstream of the site (applicable to discharge from Morlais Culverts A and B).

### Methodology

#### Peak Rainfall Runoff Analysis

The peak runoff rate from each catchment has been derived using ReFH2 software. Rainfall data has been obtained from the Flood Estimation Handbook (FEH) web service (point data). ReFH2 outputs are included in Appendix D.

#### Culvert Capacity Assessment

The full bore discharge capacity of the existing culverts has been estimated using the Colebrook White equation. All culverts are concrete pipes and as such a roughness coefficient value ( $K_s$  – mm) of 0.15 has been applied. The roughness coefficient represents concrete pipes in ‘normal condition’ and is derived from the HR Wallingford ‘Tables for the hydraulic design of pipes and sewers – 4<sup>th</sup> Edition’. The individual pipe sizes, lengths and gradients are detailed in the following report sections.

The culvert capacity calculations are provided as Appendix E.

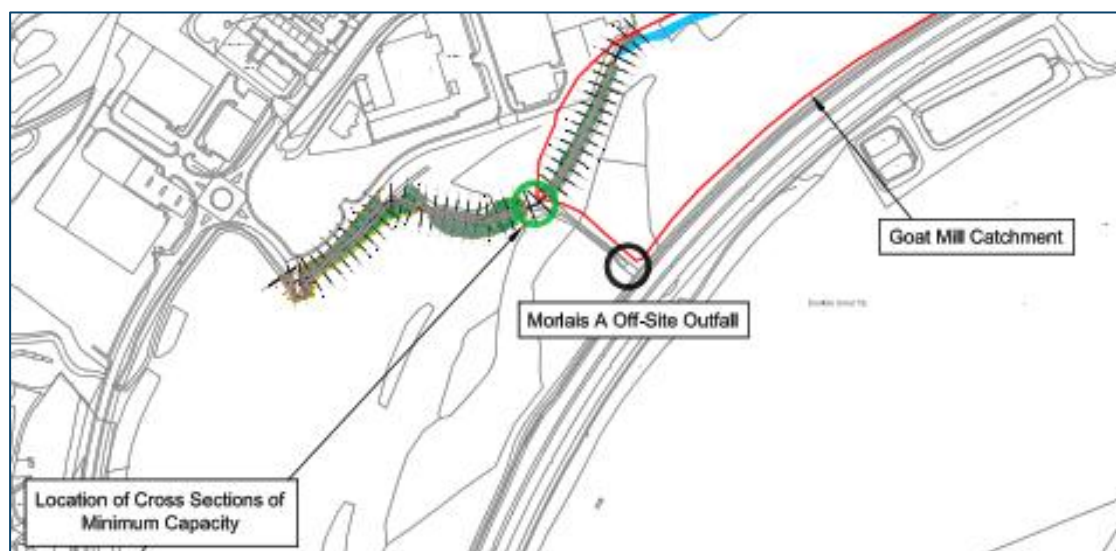
### Watercourse Capacity Assessment

Morlais catchment culverts A and B flow west and into tributaries of Nant Morlais. Culvert A drains into Goat Mill Brook. Culvert B drains into Bradley Gardens stream. The flow capacity of the receiving watercourses has been estimated using the Mannings Formula. A Mannings “n” value of 0.035 has been applied, which represents the channel roughness and is typical of straight natural channels with weeds and stones.

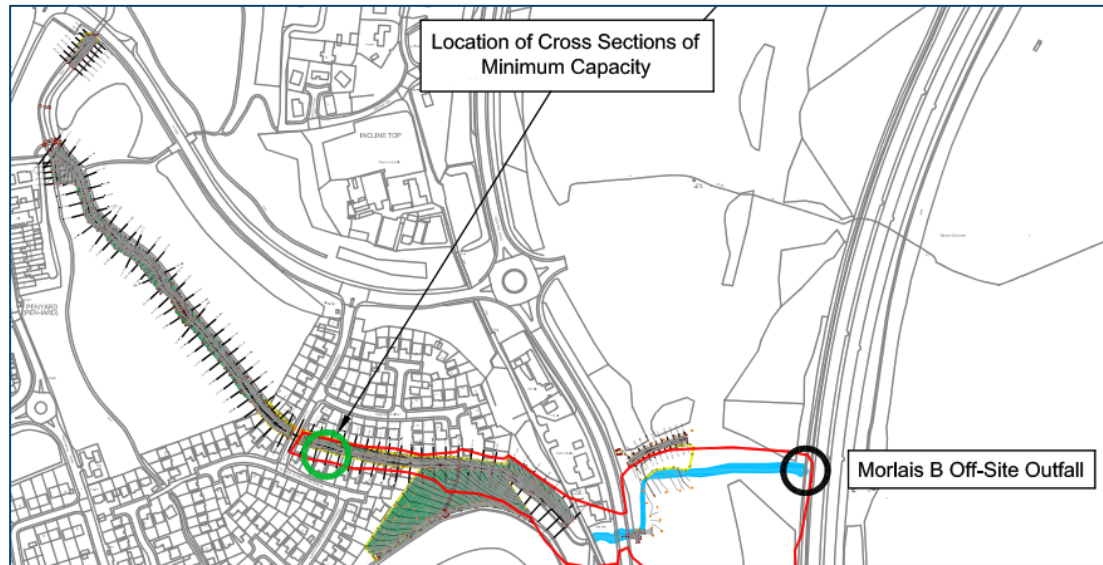
The cross-sectional areas of the receiving watercourses have been obtained from the watercourse channel survey. Extracts of the watercourse channel survey are included in Appendix F. The watercourse cross section at ‘chainage 200’ has been used to inform the watercourse capacity calculations for the Goat Mill Brook. Chainage 200 has the smallest cross-sectional area of all surveyed cross sections downstream of the point of inflow from the site. The watercourse channel cross-sectional area at Goat Mill Brook chainage 200 is 1.271m<sup>2</sup>.

The watercourse cross section at ‘chainage 200’ has been used to inform the watercourse capacity calculations for the Bradley Gardens stream. Chainage 200 has the smallest cross-sectional area of all surveyed cross sections downstream of the point of inflow from the site. The watercourse channel cross-sectional area at Bradley Gardens stream chainage 200 is 1.124m<sup>2</sup>.

The cross-sectional chainage locations with the minimum capacity are shown in Figures 2 and 3, and also on the location plan in Appendix A, and on the ‘location of topographical survey channel cross sections’ drawing in Appendix F.



**Figure 2 – Goat Mill Brook – Location of Minimum Channel Capacity Cross Section**



**Figure 3 – Bradley Gardens – Location of Minimum Channel Capacity Cross Section**

The watercourse channel capacity calculations are included as Appendix G.

## Results

### Morlais Culvert A Catchment

#### Peak Runoff

Based on a catchment area of 28.346ha, a peak runoff rate of 1,636.8 l/s has been estimated for the 1 in 100 year plus 40% climate change event. A peak runoff rate of 1,609.7 l/s has been estimated for the 1 in 1000 year event.

#### Culvert Capacity

Morlais culvert A is 1.4m in diameter and has an invert level of 315.45m AOD at the inlet and 314.4m AOD at the outlet. The culvert is 60m long and has a hydraulic gradient of 1 in 57.

The full-bore culvert capacity is 9,609.3 l/s. The culvert is therefore of sufficient capacity to accommodate the peak runoff rate from the receiving catchment during the 1 in 100 year plus 40% CC and 1 in 1000 year events.

#### Goat Mill Channel Capacity

Cross section chainage 200 is the smallest point on Goats Mill watercourse with a cross-sectional area of 1.27m<sup>2</sup>. The longitudinal fall from upstream chainage 170 to chainage 200 is 1 in 100 (0.3m fall over 30m). The longitudinal fall from chainage 170 to chainage 220 is 1 in 45.9 (1.09m fall over 50m). A longitudinal fall of 1 in 100 has been used in the calculation of channel capacity as a conservative value.

Based on the channel dimensions and cross-sectional area derived from the topographical survey, and a longitudinal fall of 1 in 100, the capacity at chainage 200 is 1.8483m<sup>3</sup>/s (1848.3 l/s).

Sufficient capacity is therefore available in the receiving Goat Mill watercourse to accommodate flows from Morlais Culvert Catchment A.

## Morlais Culvert B Catchment

### Peak Runoff

Based on a catchment area of 36.798ha, a peak runoff rate of 2120.5 l/s has been estimated for the 1 in 100 year plus 40% climate change event. A peak runoff rate of 2085.4 l/s has been estimated for the 1 in 1000 year event.

### Culvert Capacity

Morlais catchment culvert B is 1.5m in diameter and has an invert level of 295.89m AOD at the inlet and 293.8m AOD at the outlet. The culvert is 61m long and has a hydraulic gradient of 1 in 29.

The full-bore culvert capacity is 16,159.8 l/s. The culvert is therefore of sufficient capacity to accommodate the peak runoff rate from the receiving catchment during the 1 in 100 year plus 40% CC and 1 in 1000 year events.

### Bradley Gardens Channel Capacity

Cross section chainage 200 is the smallest point on the Bradley Gardens stream with a cross-sectional area of 1.124m<sup>2</sup>. Chainage 200 represents an isolated shallow point in the channel with the channel cross section area varying from 2.115m<sup>2</sup> at chainage 190, 1.514m<sup>2</sup> at chainage 210 and 2.288m<sup>2</sup> at chainage 220.

The longitudinal fall from upstream chainage 190 to chainage 200 is 1 in 21.74 (0.46m fall over 10m). The longitudinal fall from chainage 190 to chainage 210 is 1 in 31.74 (0.63m fall over 20m). A longitudinal fall of 1 in 31.74 has been used in the calculation of channel capacity as a conservative value.

Based on the channel dimensions and cross-sectional area derived from the topographical survey, and a longitudinal fall of 1 in 31.74, the capacity at chainage 200 is 2.5102m<sup>3</sup>/s (2,510.2 l/s).

Sufficient capacity is therefore available in the receiving Bradley Gardens stream to accommodate flows from Morlais Culvert Catchment B.

## Morlais Culvert C Catchment

### Peak Runoff

Based on a catchment area of 3.03ha, a peak runoff rate of 177 l/s has been estimated for the 1 in 100 year plus 40% climate change event. A peak runoff rate of 174.1 l/s has been estimated for the 1 in 1000 year event.

### Culvert Capacity

Morlais culvert C is 250mm in diameter and has an invert level of 287.57m AOD at the inlet and 280.47m AOD at the outlet. The culvert is 82m long and has a hydraulic gradient of 1 in 11.55.

The full-bore culvert capacity is 239.6 l/s. The culvert is therefore of sufficient capacity to accommodate the peak runoff rate from the receiving catchment during the 1 in 100 year plus 40% CC and 1 in 1000 year events.

## Morlais Culvert D Catchment

### Peak Runoff

Based on a catchment area of 1.6ha, a peak runoff rate of 93.7 l/s has been estimated for the 1 in 100 year plus 40% climate change event. A peak runoff rate of 92.1 l/s has been estimated for the 1 in 1000 year event.

### Culvert Capacity

Morlais culvert D is 250mm in diameter and has an invert level of 286.08m AOD at the inlet and 279.53m AOD at the outlet. The culvert is 76m long and has a hydraulic gradient of 1 in 11.6.

The full-bore culvert capacity is 239.1 l/s. The culvert is therefore of sufficient capacity to accommodate the peak runoff rate from the receiving catchment during the 1 in 100 year plus 40% CC and 1 in 1000 year events.

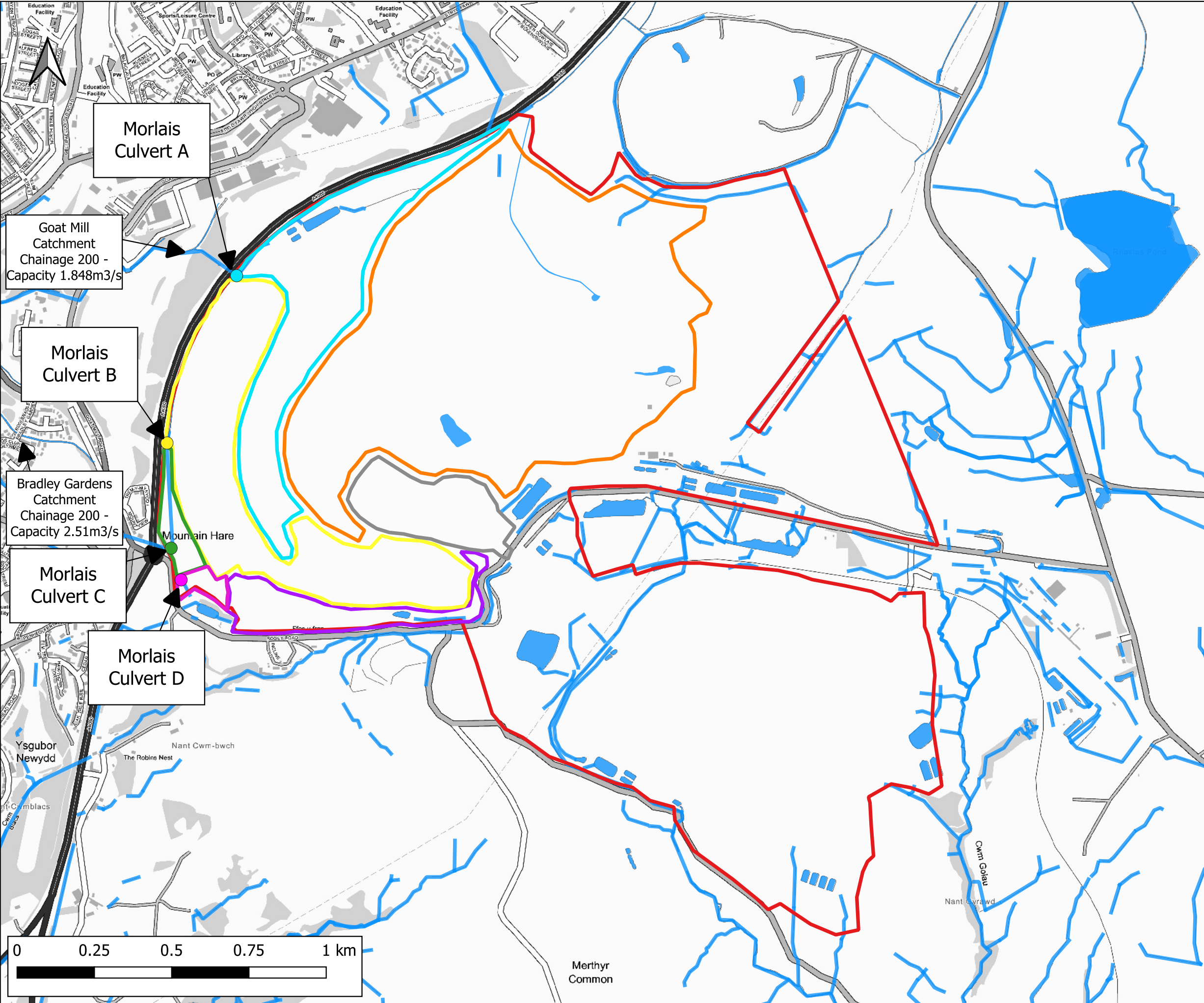
## Conclusions

The purpose of this study is to:

- Derive the on-site catchment areas draining to the Nant Morlais catchment.
- Derive the peak flow from the site catchment areas draining to the Nant Morlais catchment.
- Derive the capacity of the culverts draining the site to downstream tributaries of Nant Morlais, determining whether they have sufficient capacity to accommodate flow from the site in storm conditions.
- Derive the capacity of the receiving watercourses off-site, determining whether they have sufficient capacity to accommodate flow from the site in storm conditions.
- Determine whether any on-site flow control and attenuation storage is required.

Based on the analysis of peak flows, culvert capacities and capacities of receiving watercourses, it can be concluded that the culverts which drain the on-site catchment areas to the Nant Morlais catchment, and the receiving watercourses (Goat Mill Brook and Bradley Gardens Stream) are of sufficient capacity to accommodate the 1 in 100 year plus 40% climate change event and the 1 in 1000 year event. As such, additional on-site attenuation storage is not required. The existing storage lagoons located within culvert catchment A will be retained.

## Appendix A    Location Plan



**Notes:**  
 1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

**LEGEND**

- Site Boundary
- Watercourses
- Waterbodies
- Morlais Culvert A Catchment
- Morlais Culvert B Catchment
- Morlais Culvert C Catchment
- Morlais Culvert D Catchment
- Nant Cwmblacs Catchment
- Quarry Void Catchment
- Morlais Culvert A
- Morlais Culvert B
- Morlais Culvert C
- Morlais Culvert D

**CLIENT:**  
 Merthyr (South Wales) Ltd

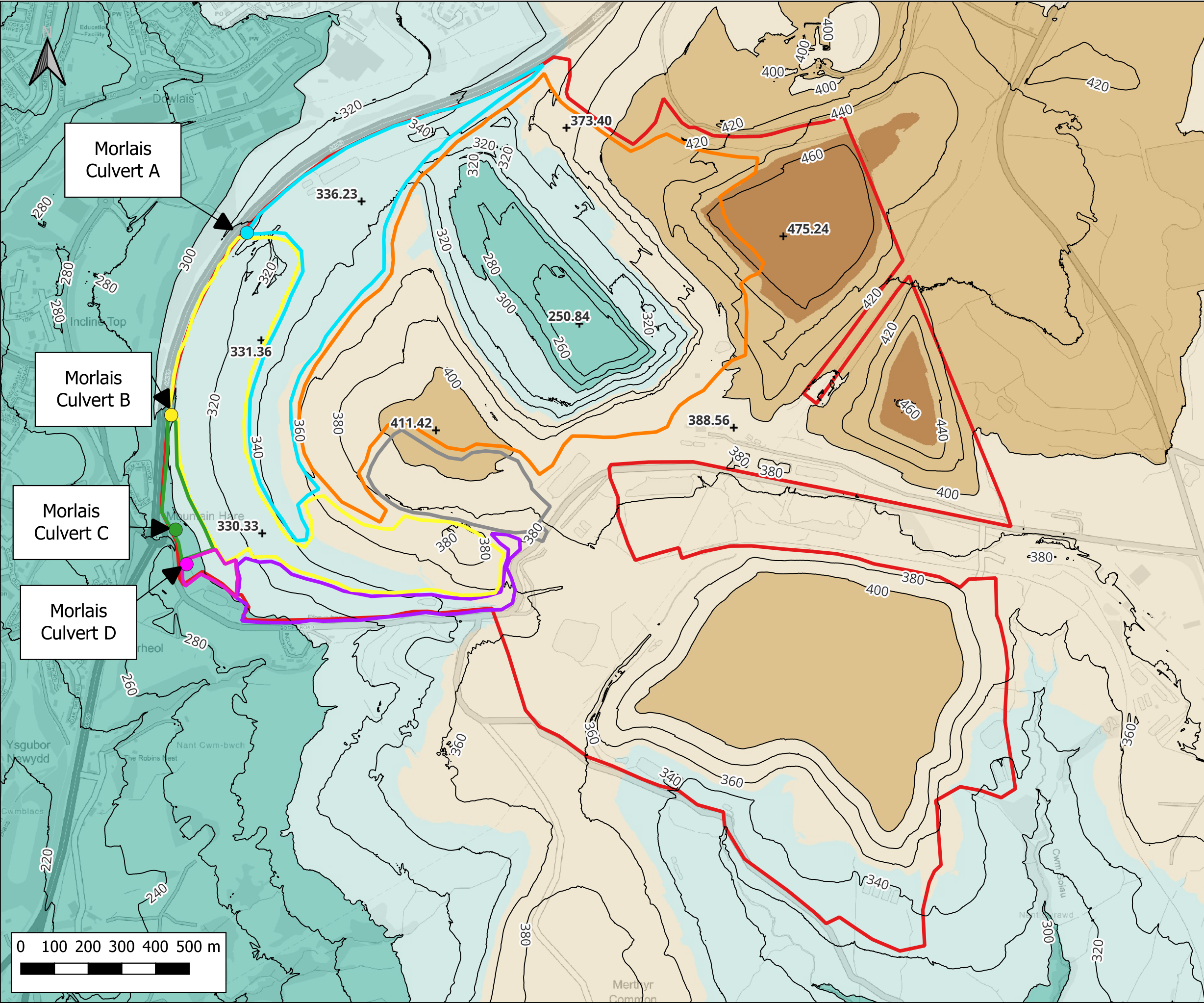
**waterco**  
 www.waterco.co.uk

**SCHEME:**  
 Ffos-y-Fran, Merthyr Tydfil

**PLOT TITLE:**  
 Location Plan

|                                          |                            |                        |                                     |
|------------------------------------------|----------------------------|------------------------|-------------------------------------|
| <b>PLOT STATUS:</b><br>FINAL             | <b>DATE:</b><br>03-02-2026 |                        |                                     |
| <b>DRAWN:</b><br>MJW                     | <b>CHECKED:</b><br>AW      | <b>APPROVED:</b><br>MW | <b>PLOT SCALE AT A3:</b><br>1:12000 |
| <b>PLOT NAME:</b><br>15840_Location_Plan |                            |                        | <b>REVISION:</b><br>-               |

## Appendix B    LiDAR Extract



Notes:  
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

**LEGEND**

Site boundary

Ground Elevations (m AOD)

<= 300

300 - 350

350 - 400

400 - 450

> 450

Morlais Culvert A Catchment

Morlais Culvert B Catchment

Morlais Culvert C Catchment

Morlais Culvert D Catchment

Bargoed Taf Catchment

Nant Cwmblics Catchment

Quarry Void Catchment

Morlais Culvert A

Morlais Culvert B

Morlais Culvert C

Morlais Culvert D

CLIENT:

Merthyr (South Wales) Ltd

**waterco**

www.waterco.co.uk

SCHEME:

Fros-y-Fran, Merthyr Tydfil

PLOT TITLE:

LiDAR Plan  
1m Resolution  
Data from NRW

PLOT STATUS:

FINAL

DATE:

16-02-2026

DRAWN:

LH

CHECKED:

AW

APPROVED:

MW

PLOT SCALE AT A3:

1:11000

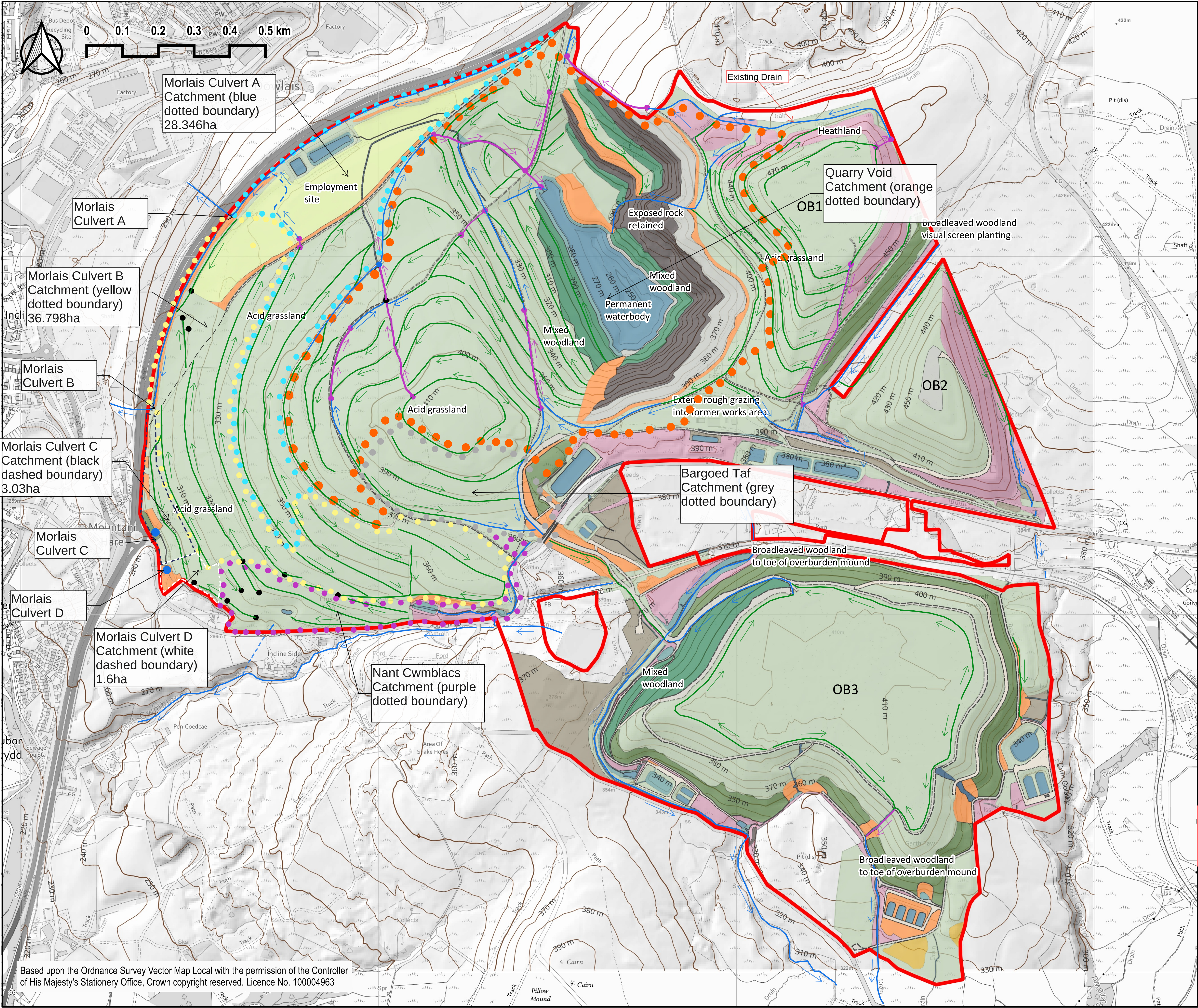
PLOT NAME:

15840\_LiDAR\_Plan

REVISION:

-

## Appendix C Site Watercourse / Drainage Plan



Cleient / Client:

**MERTHYR  
(SOUTH WALES)  
LIMITED**

Enw project / Project name:

**FFOS-Y-FRAN FINAL RESTORATION**

Teitl lliniad / Drawing title:

**Restoration and Aftercare**

Eglurhad / Key:

Application boundary

Proposed contour (10 m interval)

Land cover (indicative) [acres]

Improved grass

Unimproved grass

Mixed woodland

Broad-leaved woodland

Native shrub / Hedgerows

Heathland

Bog

Inland rock and scree (natural regeneration)

Standing water

Running water

Freshwater marsh

Other built structure

Metalled roadway

Pathway

Unimproved grass (allocated employment site)

Bare surface

Existing & Proposed Watercourses

Proposed Blockstone Watercourses

Direction of Flow

Existing & Proposed Contour Grips

Direction of Flow

Soakaway

**DRAFT WATERCOURSES  
(inc CATCHMENTS)**

Graddfa / Scale (A1):  
**1:5,000 @ A1**

**NOV 2025**

Darlunwyd gan:  
Rhif lliniad / Drawing number:  
**3274-RML-DR-L-54**

Darlunwyd gan:  
Checked by:  
Revision:  
**JS**  
**01**

**MERTHYR (SOUTH WALES) LIMITED**

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## Appendix D    RefH2 Outputs

## Morlais Culvert A Catchment

| DOCUMENT VERIFICATION RECORD |                                             |
|------------------------------|---------------------------------------------|
| <b>Project:</b>              | Ffos Y Fran – Morlais A                     |
| <b>Client:</b>               | Merthyr (South Wales) Ltd                   |
| <b>Report Title:</b>         | 15840 – Hydrology Assessment – Morlais - 01 |
| <b>Date:</b>                 | 13/02/2026                                  |

| DOCUMENT REVIEW & APPROVAL |                                       |
|----------------------------|---------------------------------------|
| <b>Author:</b>             | Aled Williams BSc (Hons) MCIWEM C.WEM |
| <b>Checker:</b>            | Jessica Joy BSc (Hons) MCIWEM         |
| <b>Approver:</b>           | Nigel Jones BEng (Hons) CEng MICE     |

| ReFH2 RUNOFF RATES – MORLAIS A* |                          |
|---------------------------------|--------------------------|
| Return Period (Years)           | As-rural Peak Flow (l/s) |
| 1                               | 363.7558                 |
| 2                               | 418.0892                 |
| 5                               | 591.4597                 |
| 10                              | 710.6767                 |
| 30                              | 897.5988                 |
| 50                              | 986.6994                 |
| 75                              | 1059.606                 |
| 100                             | 1112.625                 |
| 100 + 40% CC                    | 1636.819                 |
| 200                             | 1244.87                  |
| 1000                            | 1609.737                 |

\*Runoff Rates printed from the ReFH Flood Modelling software package and have been calculated based on a total area of 28.346ha.

# UK Design Flood Estimation

Generated on 19 January 2026 10:53:10 by aled.williams  
Printed from the ReFH2 Flood Modelling software package, version 4.1.8704.23947

## Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

### Site details

Checksum: BF04-C84C

Site name: FEH\_Catchment\_Descriptors\_308000\_206250\_v5\_0\_1

Easting: 308000

Northing: 206250

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.28 [2.13]\*

Using plot scale calculations: No

Model: 2.3

Site description: None

## Model run: 100 year 1.4 CC

### Summary of results

|                        |       |                                |       |
|------------------------|-------|--------------------------------|-------|
| Rainfall - FEH22 (mm): | 78.11 | Total runoff (ML):             | 12.22 |
| Total Rainfall (mm):   | 61.64 | Total flow (ML):               | 17.47 |
| Peak Rainfall (mm):    | 6.45  | Peak flow (m <sup>3</sup> /s): | 1.64  |

### Parameters

*Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.*

*\* Indicates that the user locked the duration/timestep*

#### Rainfall parameters (Rainfall - FEH22)

| Name                             | Value    | User-defined? |
|----------------------------------|----------|---------------|
| Duration (hh:mm:ss)              | 02:30:00 | No            |
| Timestep (hh:mm:ss)              | 00:06:00 | No            |
| SCF (Seasonal correction factor) | 0.8      | No            |
| ARF (Areal reduction factor)     | 0.98     | No            |
| Seasonality                      | Winter   | No            |
| Climate change factor            | 1.40     | Yes           |

#### Loss model parameters

| Name                        | Value  | User-defined? |
|-----------------------------|--------|---------------|
| Cini (mm)                   | 124.55 | No            |
| Cmax (mm)                   | 222.11 | No            |
| Use alpha correction factor | No     | No            |
| Alpha correction factor     | n/a    | No            |

#### Routing model parameters

| Name    | Value | User-defined? |
|---------|-------|---------------|
| Tp (hr) | 1     | No            |
| Up      | 0.65  | No            |
| Uk      | 0.8   | No            |

#### Baseflow model parameters

| Name                    | Value | User-defined? |
|-------------------------|-------|---------------|
| BF0 (m <sup>3</sup> /s) | 0.02  | No            |
| BL (hr)                 | 21.2  | No            |
| BR                      | 0.43  | No            |

#### Urbanisation parameters

| Name                                      | Value | User-defined? |
|-------------------------------------------|-------|---------------|
| Sewer capacity (m <sup>3</sup> /s)        | 0     | No            |
| Exporting drained area (km <sup>2</sup> ) | 0     | No            |
| Urban area (km <sup>2</sup> )             | 0     | No            |
| Effective URBEXT2000                      | 0     | n/a           |
| Impervious runoff factor                  | 0.7   | No            |
| Imperviousness factor                     | 0.4   | No            |
| Tp scaling factor                         | 0.75  | No            |
| Depression storage depth (mm)             | 0.5   | No            |

# Time series data

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 00:00:00           | 0.510        | 0.000                             | 0.287            | 0.000                         | 0.024                           | 0.024                             |
| 00:06:00           | 0.641        | 0.000                             | 0.362            | 0.001                         | 0.024                           | 0.025                             |
| 00:12:00           | 0.805        | 0.000                             | 0.457            | 0.003                         | 0.024                           | 0.027                             |
| 00:18:00           | 1.009        | 0.000                             | 0.577            | 0.008                         | 0.024                           | 0.031                             |
| 00:24:00           | 1.265        | 0.000                             | 0.730            | 0.015                         | 0.024                           | 0.038                             |
| 00:30:00           | 1.583        | 0.000                             | 0.924            | 0.025                         | 0.024                           | 0.049                             |
| 00:36:00           | 1.978        | 0.000                             | 1.170            | 0.040                         | 0.024                           | 0.064                             |
| 00:42:00           | 2.468        | 0.000                             | 1.485            | 0.060                         | 0.024                           | 0.084                             |
| 00:48:00           | 3.073        | 0.000                             | 1.886            | 0.087                         | 0.024                           | 0.111                             |
| 00:54:00           | 3.812        | 0.000                             | 2.400            | 0.122                         | 0.024                           | 0.146                             |
| 01:00:00           | 4.706        | 0.000                             | 3.052            | 0.169                         | 0.024                           | 0.193                             |
| 01:06:00           | 5.743        | 0.000                             | 3.860            | 0.228                         | 0.024                           | 0.252                             |
| 01:12:00           | 6.447        | 0.000                             | 4.510            | 0.302                         | 0.025                           | 0.327                             |
| 01:18:00           | 5.743        | 0.000                             | 4.175            | 0.395                         | 0.025                           | 0.420                             |
| 01:24:00           | 4.706        | 0.000                             | 3.532            | 0.505                         | 0.026                           | 0.531                             |
| 01:30:00           | 3.812        | 0.000                             | 2.934            | 0.630                         | 0.027                           | 0.657                             |
| 01:36:00           | 3.073        | 0.000                             | 2.413            | 0.765                         | 0.028                           | 0.793                             |
| 01:42:00           | 2.468        | 0.000                             | 1.969            | 0.905                         | 0.030                           | 0.934                             |
| 01:48:00           | 1.978        | 0.000                             | 1.598            | 1.045                         | 0.032                           | 1.077                             |
| 01:54:00           | 1.583        | 0.000                             | 1.291            | 1.181                         | 0.034                           | 1.214                             |
| 02:00:00           | 1.265        | 0.000                             | 1.040            | 1.306                         | 0.036                           | 1.343                             |
| 02:06:00           | 1.009        | 0.000                             | 0.835            | 1.416                         | 0.039                           | 1.455                             |
| 02:12:00           | 0.805        | 0.000                             | 0.669            | 1.504                         | 0.041                           | 1.545                             |
| 02:18:00           | 0.641        | 0.000                             | 0.535            | 1.561                         | 0.044                           | 1.606                             |
| 02:24:00           | 0.510        | 0.000                             | 0.427            | 1.588                         | 0.047                           | 1.635                             |
| 02:30:00           | 0.000        | 0.000                             | 0.000            | 1.586                         | 0.050                           | 1.637                             |
| 02:36:00           | 0.000        | 0.000                             | 0.000            | 1.561                         | 0.053                           | 1.615                             |
| 02:42:00           | 0.000        | 0.000                             | 0.000            | 1.516                         | 0.056                           | 1.573                             |
| 02:48:00           | 0.000        | 0.000                             | 0.000            | 1.456                         | 0.059                           | 1.515                             |
| 02:54:00           | 0.000        | 0.000                             | 0.000            | 1.384                         | 0.061                           | 1.445                             |
| 03:00:00           | 0.000        | 0.000                             | 0.000            | 1.303                         | 0.064                           | 1.367                             |
| 03:06:00           | 0.000        | 0.000                             | 0.000            | 1.218                         | 0.066                           | 1.284                             |
| 03:12:00           | 0.000        | 0.000                             | 0.000            | 1.131                         | 0.068                           | 1.199                             |
| 03:18:00           | 0.000        | 0.000                             | 0.000            | 1.045                         | 0.070                           | 1.115                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 03:24:00           | 0.000        | 0.000                             | 0.000            | 0.961                         | 0.072                           | 1.033                             |
| 03:30:00           | 0.000        | 0.000                             | 0.000            | 0.880                         | 0.073                           | 0.953                             |
| 03:36:00           | 0.000        | 0.000                             | 0.000            | 0.802                         | 0.075                           | 0.877                             |
| 03:42:00           | 0.000        | 0.000                             | 0.000            | 0.729                         | 0.076                           | 0.805                             |
| 03:48:00           | 0.000        | 0.000                             | 0.000            | 0.660                         | 0.077                           | 0.737                             |
| 03:54:00           | 0.000        | 0.000                             | 0.000            | 0.594                         | 0.078                           | 0.672                             |
| 04:00:00           | 0.000        | 0.000                             | 0.000            | 0.532                         | 0.079                           | 0.611                             |
| 04:06:00           | 0.000        | 0.000                             | 0.000            | 0.472                         | 0.079                           | 0.552                             |
| 04:12:00           | 0.000        | 0.000                             | 0.000            | 0.415                         | 0.080                           | 0.495                             |
| 04:18:00           | 0.000        | 0.000                             | 0.000            | 0.361                         | 0.080                           | 0.441                             |
| 04:24:00           | 0.000        | 0.000                             | 0.000            | 0.310                         | 0.080                           | 0.390                             |
| 04:30:00           | 0.000        | 0.000                             | 0.000            | 0.261                         | 0.081                           | 0.342                             |
| 04:36:00           | 0.000        | 0.000                             | 0.000            | 0.216                         | 0.081                           | 0.297                             |
| 04:42:00           | 0.000        | 0.000                             | 0.000            | 0.175                         | 0.081                           | 0.256                             |
| 04:48:00           | 0.000        | 0.000                             | 0.000            | 0.138                         | 0.081                           | 0.219                             |
| 04:54:00           | 0.000        | 0.000                             | 0.000            | 0.107                         | 0.081                           | 0.187                             |
| 05:00:00           | 0.000        | 0.000                             | 0.000            | 0.081                         | 0.080                           | 0.162                             |
| 05:06:00           | 0.000        | 0.000                             | 0.000            | 0.061                         | 0.080                           | 0.141                             |
| 05:12:00           | 0.000        | 0.000                             | 0.000            | 0.045                         | 0.080                           | 0.125                             |
| 05:18:00           | 0.000        | 0.000                             | 0.000            | 0.032                         | 0.080                           | 0.112                             |
| 05:24:00           | 0.000        | 0.000                             | 0.000            | 0.022                         | 0.079                           | 0.102                             |
| 05:30:00           | 0.000        | 0.000                             | 0.000            | 0.015                         | 0.079                           | 0.094                             |
| 05:36:00           | 0.000        | 0.000                             | 0.000            | 0.009                         | 0.079                           | 0.088                             |
| 05:42:00           | 0.000        | 0.000                             | 0.000            | 0.006                         | 0.078                           | 0.084                             |
| 05:48:00           | 0.000        | 0.000                             | 0.000            | 0.003                         | 0.078                           | 0.081                             |
| 05:54:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.078                           | 0.079                             |
| 06:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.077                           | 0.077                             |
| 06:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.077                           | 0.077                             |
| 06:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.076                           | 0.076                             |
| 06:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.076                           | 0.076                             |
| 06:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.076                           | 0.076                             |
| 06:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 06:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 06:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 06:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 06:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |
| 07:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |
| 07:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 07:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 07:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 07:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 07:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 07:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 07:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 07:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 07:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 08:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 08:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 08:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 08:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |
| 08:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |
| 08:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |
| 08:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 08:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 08:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 08:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 09:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 09:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 09:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 09:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 09:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 09:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 09:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 09:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 09:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 09:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 10:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 10:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 10:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |
| 10:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 10:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |
| 10:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 10:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 10:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 10:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 10:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 11:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 11:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 11:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 11:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 11:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 11:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 11:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |
| 11:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |
| 11:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |
| 11:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 12:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 12:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 12:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 12:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 12:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 12:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 12:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 12:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 12:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 12:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 13:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 13:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 13:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 13:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 13:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 13:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 13:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 13:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 13:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 13:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 14:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 14:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 14:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 14:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 14:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 14:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 14:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 14:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 14:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 14:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 15:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 15:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 15:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 15:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 15:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 15:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 15:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 15:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 15:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 15:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 16:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 16:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 16:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 16:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 16:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 16:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 16:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 16:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 16:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 16:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 17:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 17:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 17:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 17:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 17:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 17:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 17:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 17:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 17:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 17:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 18:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 18:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 18:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 18:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 18:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 18:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 18:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 18:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 18:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 18:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 19:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 19:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 19:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 19:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 19:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 19:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 19:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 19:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 19:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 19:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 20:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 20:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 20:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 20:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 20:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 21:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 21:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 21:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 21:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 21:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 22:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 22:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 22:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 22:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 22:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 23:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 23:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 23:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 23:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 23:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 24:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 24:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 24:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 24:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 24:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 24:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 24:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 24:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 24:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 24:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 25:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.031                           | 0.031                             |
| 25:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 25:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 25:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 26:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 26:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 26:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 26:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.030                           | 0.030                             |
| 26:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 26:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 26:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 26:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 26:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 26:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 27:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 27:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.029                           | 0.029                             |
| 27:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |
| 27:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.028                           | 0.028                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 27:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.027                           | 0.027                             |
| 28:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 28:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 28:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.026                           | 0.026                             |
| 29:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 29:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 29:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 29:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 29:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 30:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 30:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 30:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 30:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.025                           | 0.025                             |
| 30:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.024                           | 0.024                             |
| 30:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.024                           | 0.024                             |

## Appendix

### Catchment descriptors \*

| Name                              | Value       | User-defined value used? |
|-----------------------------------|-------------|--------------------------|
| Area (km <sup>2</sup> )           | 0.28 [2.13] | Yes                      |
| ALTBAR                            | 400         | No                       |
| ASPBAR                            | 176         | No                       |
| ASPVAR                            | 0.62        | No                       |
| BFIHOST                           | 0.29        | No                       |
| BFIHOST19                         | 0.3         | No                       |
| DPLBAR (km)                       | 1.32        | No                       |
| DPSBAR (mkm <sup>-1</sup> )       | 198.7       | No                       |
| FARL                              | 1           | No                       |
| LDP                               | 1.51        | No                       |
| PROPWET                           | 0.54        | No                       |
| RMED1H                            | 11.4        | No                       |
| RMED1D                            | 51.1        | No                       |
| RMED2D                            | 67.6        | No                       |
| SAAR (mm)                         | 1493        | No                       |
| SAAR4170 (mm)                     | 1552        | No                       |
| SPRHOST                           | 49.86       | No                       |
| URBEXT2000                        | 0           | No                       |
| URBEXT1990                        | 0           | No                       |
| URBCONC                           | 0           | No                       |
| URBLOC                            | 0           | No                       |
| DDF parameter C                   | -0.03       | No                       |
| DDF parameter D1                  | 0.46        | No                       |
| DDF parameter D2                  | 0.44        | No                       |
| DDF parameter D3                  | 0.38        | No                       |
| DDF parameter E                   | 0.29        | No                       |
| DDF parameter F                   | 2.51        | No                       |
| DDF parameter C (1km grid value)  | -0.03       | No                       |
| DDF parameter D1 (1km grid value) | 0.45        | No                       |
| DDF parameter D2 (1km grid value) | 0.43        | No                       |
| DDF parameter D3 (1km grid value) | 0.38        | No                       |
| DDF parameter E (1km grid value)  | 0.29        | No                       |
| DDF parameter F (1km grid value)  | 2.51        | No                       |

*Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM*

## Morlais Culvert B Catchment

| DOCUMENT VERIFICATION RECORD |                                             |
|------------------------------|---------------------------------------------|
| <b>Project:</b>              | Ffos Y Fran – Morlais B                     |
| <b>Client:</b>               | Merthyr (South Wales) Ltd                   |
| <b>Report Title:</b>         | 15840 – Hydrology Assessment – Morlais - 01 |
| <b>Date:</b>                 | 13/02/2026                                  |

| DOCUMENT REVIEW & APPROVAL |                                       |
|----------------------------|---------------------------------------|
| <b>Author:</b>             | Aled Williams BSc (Hons) MCIWEM C.WEM |
| <b>Checker:</b>            | Jessica Joy BSc (Hons) MCIWEM         |
| <b>Approver:</b>           | Nigel Jones BEng (Hons) CEng MICE     |

| ReFH2 RUNOFF RATES – Morlais B* |                          |
|---------------------------------|--------------------------|
| Return Period (Years)           | As-rural Peak Flow (l/s) |
| 1                               | 471.3924                 |
| 2                               | 541.7886                 |
| 5                               | 766.4029                 |
| 10                              | 920.8487                 |
| 30                              | 1162.994                 |
| 50                              | 1278.413                 |
| 75                              | 1372.853                 |
| 100                             | 1441.529                 |
| 100 + 40% CC                    | 2120.463                 |
| 200                             | 1612.826                 |
| 1000                            | 2085.387                 |

\*Runoff Rates printed from the ReFH Flood Modelling software package and have been calculated based on a total area of 36.798ha.

# UK Design Flood Estimation

Generated on 19 January 2026 10:55:37 by aled.williams  
Printed from the ReFH2 Flood Modelling software package, version 4.1.8704.23947

## Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

### Site details

Checksum: 55F1-1C75

Site name: FEH\_Catchment\_Descriptors\_308000\_206250\_v5\_0\_1

Easting: 308000

Northing: 206250

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.37 [2.13]\*

Using plot scale calculations: No

Model: 2.3

Site description: None

## Model run: 100 year 1.4 CC

### Summary of results

|                        |       |                                |       |
|------------------------|-------|--------------------------------|-------|
| Rainfall - FEH22 (mm): | 78.11 | Total runoff (ML):             | 15.83 |
| Total Rainfall (mm):   | 61.53 | Total flow (ML):               | 22.64 |
| Peak Rainfall (mm):    | 6.44  | Peak flow (m <sup>3</sup> /s): | 2.12  |

### Parameters

*Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.*

*\* Indicates that the user locked the duration/timestep*

#### Rainfall parameters (Rainfall - FEH22)

| Name                             | Value    | User-defined? |
|----------------------------------|----------|---------------|
| Duration (hh:mm:ss)              | 02:30:00 | No            |
| Timestep (hh:mm:ss)              | 00:06:00 | No            |
| SCF (Seasonal correction factor) | 0.8      | No            |
| ARF (Areal reduction factor)     | 0.98     | No            |
| Seasonality                      | Winter   | No            |
| Climate change factor            | 1.40     | Yes           |

#### Loss model parameters

| Name                        | Value  | User-defined? |
|-----------------------------|--------|---------------|
| Cini (mm)                   | 124.55 | No            |
| Cmax (mm)                   | 222.11 | No            |
| Use alpha correction factor | No     | No            |
| Alpha correction factor     | n/a    | No            |

#### Routing model parameters

| Name    | Value | User-defined? |
|---------|-------|---------------|
| Tp (hr) | 1     | No            |
| Up      | 0.65  | No            |
| Uk      | 0.8   | No            |

#### Baseflow model parameters

| Name                    | Value | User-defined? |
|-------------------------|-------|---------------|
| BF0 (m <sup>3</sup> /s) | 0.03  | No            |
| BL (hr)                 | 21.2  | No            |
| BR                      | 0.43  | No            |

#### Urbanisation parameters

| Name                                      | Value | User-defined? |
|-------------------------------------------|-------|---------------|
| Sewer capacity (m <sup>3</sup> /s)        | 0     | No            |
| Exporting drained area (km <sup>2</sup> ) | 0     | No            |
| Urban area (km <sup>2</sup> )             | 0     | No            |
| Effective URBEXT2000                      | 0     | n/a           |
| Impervious runoff factor                  | 0.7   | No            |
| Imperviousness factor                     | 0.4   | No            |
| Tp scaling factor                         | 0.75  | No            |
| Depression storage depth (mm)             | 0.5   | No            |

# Time series data

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 00:00:00           | 0.509        | 0.000                             | 0.286            | 0.000                         | 0.031                           | 0.031                             |
| 00:06:00           | 0.640        | 0.000                             | 0.361            | 0.001                         | 0.031                           | 0.032                             |
| 00:12:00           | 0.803        | 0.000                             | 0.456            | 0.004                         | 0.031                           | 0.035                             |
| 00:18:00           | 1.008        | 0.000                             | 0.576            | 0.010                         | 0.031                           | 0.041                             |
| 00:24:00           | 1.263        | 0.000                             | 0.728            | 0.019                         | 0.031                           | 0.050                             |
| 00:30:00           | 1.580        | 0.000                             | 0.922            | 0.033                         | 0.031                           | 0.063                             |
| 00:36:00           | 1.975        | 0.000                             | 1.168            | 0.052                         | 0.031                           | 0.082                             |
| 00:42:00           | 2.464        | 0.000                             | 1.482            | 0.078                         | 0.031                           | 0.108                             |
| 00:48:00           | 3.067        | 0.000                             | 1.883            | 0.113                         | 0.031                           | 0.143                             |
| 00:54:00           | 3.806        | 0.000                             | 2.395            | 0.159                         | 0.031                           | 0.189                             |
| 01:00:00           | 4.698        | 0.000                             | 3.046            | 0.219                         | 0.031                           | 0.250                             |
| 01:06:00           | 5.733        | 0.000                             | 3.852            | 0.296                         | 0.031                           | 0.327                             |
| 01:12:00           | 6.436        | 0.000                             | 4.501            | 0.392                         | 0.032                           | 0.424                             |
| 01:18:00           | 5.733        | 0.000                             | 4.166            | 0.512                         | 0.033                           | 0.544                             |
| 01:24:00           | 4.698        | 0.000                             | 3.524            | 0.655                         | 0.034                           | 0.688                             |
| 01:30:00           | 3.806        | 0.000                             | 2.928            | 0.816                         | 0.035                           | 0.851                             |
| 01:36:00           | 3.067        | 0.000                             | 2.407            | 0.991                         | 0.037                           | 1.028                             |
| 01:42:00           | 2.464        | 0.000                             | 1.964            | 1.172                         | 0.039                           | 1.211                             |
| 01:48:00           | 1.975        | 0.000                             | 1.594            | 1.354                         | 0.041                           | 1.395                             |
| 01:54:00           | 1.580        | 0.000                             | 1.288            | 1.530                         | 0.044                           | 1.573                             |
| 02:00:00           | 1.263        | 0.000                             | 1.037            | 1.693                         | 0.047                           | 1.739                             |
| 02:06:00           | 1.008        | 0.000                             | 0.833            | 1.835                         | 0.050                           | 1.885                             |
| 02:12:00           | 0.803        | 0.000                             | 0.668            | 1.948                         | 0.054                           | 2.002                             |
| 02:18:00           | 0.640        | 0.000                             | 0.534            | 2.023                         | 0.058                           | 2.080                             |
| 02:24:00           | 0.509        | 0.000                             | 0.426            | 2.057                         | 0.061                           | 2.118                             |
| 02:30:00           | 0.000        | 0.000                             | 0.000            | 2.055                         | 0.065                           | 2.120                             |
| 02:36:00           | 0.000        | 0.000                             | 0.000            | 2.023                         | 0.069                           | 2.092                             |
| 02:42:00           | 0.000        | 0.000                             | 0.000            | 1.964                         | 0.073                           | 2.037                             |
| 02:48:00           | 0.000        | 0.000                             | 0.000            | 1.886                         | 0.076                           | 1.962                             |
| 02:54:00           | 0.000        | 0.000                             | 0.000            | 1.793                         | 0.080                           | 1.872                             |
| 03:00:00           | 0.000        | 0.000                             | 0.000            | 1.688                         | 0.083                           | 1.771                             |
| 03:06:00           | 0.000        | 0.000                             | 0.000            | 1.578                         | 0.086                           | 1.664                             |
| 03:12:00           | 0.000        | 0.000                             | 0.000            | 1.465                         | 0.089                           | 1.554                             |
| 03:18:00           | 0.000        | 0.000                             | 0.000            | 1.353                         | 0.091                           | 1.444                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 03:24:00           | 0.000        | 0.000                             | 0.000            | 1.245                         | 0.093                           | 1.338                             |
| 03:30:00           | 0.000        | 0.000                             | 0.000            | 1.139                         | 0.095                           | 1.234                             |
| 03:36:00           | 0.000        | 0.000                             | 0.000            | 1.039                         | 0.097                           | 1.136                             |
| 03:42:00           | 0.000        | 0.000                             | 0.000            | 0.944                         | 0.098                           | 1.042                             |
| 03:48:00           | 0.000        | 0.000                             | 0.000            | 0.855                         | 0.100                           | 0.954                             |
| 03:54:00           | 0.000        | 0.000                             | 0.000            | 0.770                         | 0.101                           | 0.871                             |
| 04:00:00           | 0.000        | 0.000                             | 0.000            | 0.689                         | 0.102                           | 0.791                             |
| 04:06:00           | 0.000        | 0.000                             | 0.000            | 0.612                         | 0.103                           | 0.715                             |
| 04:12:00           | 0.000        | 0.000                             | 0.000            | 0.538                         | 0.103                           | 0.642                             |
| 04:18:00           | 0.000        | 0.000                             | 0.000            | 0.468                         | 0.104                           | 0.572                             |
| 04:24:00           | 0.000        | 0.000                             | 0.000            | 0.401                         | 0.104                           | 0.506                             |
| 04:30:00           | 0.000        | 0.000                             | 0.000            | 0.339                         | 0.105                           | 0.443                             |
| 04:36:00           | 0.000        | 0.000                             | 0.000            | 0.280                         | 0.105                           | 0.385                             |
| 04:42:00           | 0.000        | 0.000                             | 0.000            | 0.226                         | 0.105                           | 0.331                             |
| 04:48:00           | 0.000        | 0.000                             | 0.000            | 0.179                         | 0.105                           | 0.283                             |
| 04:54:00           | 0.000        | 0.000                             | 0.000            | 0.138                         | 0.105                           | 0.243                             |
| 05:00:00           | 0.000        | 0.000                             | 0.000            | 0.105                         | 0.104                           | 0.209                             |
| 05:06:00           | 0.000        | 0.000                             | 0.000            | 0.079                         | 0.104                           | 0.183                             |
| 05:12:00           | 0.000        | 0.000                             | 0.000            | 0.058                         | 0.104                           | 0.161                             |
| 05:18:00           | 0.000        | 0.000                             | 0.000            | 0.041                         | 0.103                           | 0.145                             |
| 05:24:00           | 0.000        | 0.000                             | 0.000            | 0.029                         | 0.103                           | 0.132                             |
| 05:30:00           | 0.000        | 0.000                             | 0.000            | 0.019                         | 0.102                           | 0.122                             |
| 05:36:00           | 0.000        | 0.000                             | 0.000            | 0.012                         | 0.102                           | 0.114                             |
| 05:42:00           | 0.000        | 0.000                             | 0.000            | 0.007                         | 0.102                           | 0.109                             |
| 05:48:00           | 0.000        | 0.000                             | 0.000            | 0.004                         | 0.101                           | 0.105                             |
| 05:54:00           | 0.000        | 0.000                             | 0.000            | 0.002                         | 0.101                           | 0.102                             |
| 06:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.100                           | 0.100                             |
| 06:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.100                           | 0.100                             |
| 06:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.099                           | 0.099                             |
| 06:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.099                           | 0.099                             |
| 06:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.098                           | 0.098                             |
| 06:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.098                           | 0.098                             |
| 06:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.097                           | 0.097                             |
| 06:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.097                           | 0.097                             |
| 06:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.096                           | 0.096                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 06:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.096                           | 0.096                             |
| 07:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.095                           | 0.095                             |
| 07:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.095                           | 0.095                             |
| 07:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.095                           | 0.095                             |
| 07:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.094                           | 0.094                             |
| 07:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.094                           | 0.094                             |
| 07:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.093                           | 0.093                             |
| 07:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.093                           | 0.093                             |
| 07:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.092                           | 0.092                             |
| 07:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.092                           | 0.092                             |
| 07:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.092                           | 0.092                             |
| 08:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.091                           | 0.091                             |
| 08:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.091                           | 0.091                             |
| 08:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.090                           | 0.090                             |
| 08:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.090                           | 0.090                             |
| 08:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.089                           | 0.089                             |
| 08:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.089                           | 0.089                             |
| 08:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.089                           | 0.089                             |
| 08:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.088                           | 0.088                             |
| 08:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.088                           | 0.088                             |
| 08:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.087                           | 0.087                             |
| 09:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.087                           | 0.087                             |
| 09:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.086                           | 0.086                             |
| 09:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.086                           | 0.086                             |
| 09:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.086                           | 0.086                             |
| 09:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.085                           | 0.085                             |
| 09:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.085                           | 0.085                             |
| 09:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.084                           | 0.084                             |
| 09:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.084                           | 0.084                             |
| 09:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.084                           | 0.084                             |
| 09:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.083                           | 0.083                             |
| 10:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.083                           | 0.083                             |
| 10:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.082                           | 0.082                             |
| 10:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.082                           | 0.082                             |
| 10:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.082                           | 0.082                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 10:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.081                           | 0.081                             |
| 10:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.081                           | 0.081                             |
| 10:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.081                           | 0.081                             |
| 10:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.080                           | 0.080                             |
| 10:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.080                           | 0.080                             |
| 10:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.079                           | 0.079                             |
| 11:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.079                           | 0.079                             |
| 11:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.079                           | 0.079                             |
| 11:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.078                           | 0.078                             |
| 11:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.078                           | 0.078                             |
| 11:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.078                           | 0.078                             |
| 11:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.077                           | 0.077                             |
| 11:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.077                           | 0.077                             |
| 11:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.077                           | 0.077                             |
| 11:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.076                           | 0.076                             |
| 11:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.076                           | 0.076                             |
| 12:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 12:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 12:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.075                           | 0.075                             |
| 12:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |
| 12:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |
| 12:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.074                           | 0.074                             |
| 12:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 12:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 12:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.073                           | 0.073                             |
| 12:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 13:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 13:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.072                           | 0.072                             |
| 13:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 13:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 13:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.071                           | 0.071                             |
| 13:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 13:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 13:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.070                           | 0.070                             |
| 13:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 13:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |
| 14:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.069                           | 0.069                             |
| 14:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 14:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 14:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.068                           | 0.068                             |
| 14:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 14:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 14:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.067                           | 0.067                             |
| 14:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 14:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 14:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.066                           | 0.066                             |
| 15:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 15:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 15:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 15:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.065                           | 0.065                             |
| 15:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 15:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 15:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.064                           | 0.064                             |
| 15:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |
| 15:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |
| 15:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.063                           | 0.063                             |
| 16:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 16:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 16:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 16:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.062                           | 0.062                             |
| 16:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 16:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 16:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.061                           | 0.061                             |
| 16:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 16:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 16:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 17:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.060                           | 0.060                             |
| 17:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |
| 17:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |
| 17:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.059                           | 0.059                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 17:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 17:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 17:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 17:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.058                           | 0.058                             |
| 17:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 17:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 18:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 18:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.057                           | 0.057                             |
| 18:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 18:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 18:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 18:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.056                           | 0.056                             |
| 18:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 18:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 18:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.055                           | 0.055                             |
| 18:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 19:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 19:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 19:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.054                           | 0.054                             |
| 19:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 19:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 19:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 19:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.053                           | 0.053                             |
| 19:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 19:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 19:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 20:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.052                           | 0.052                             |
| 20:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 20:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 20:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 20:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 20:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.051                           | 0.051                             |
| 20:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 20:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 20:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 20:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.050                           | 0.050                             |
| 21:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 21:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 21:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 21:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.049                           | 0.049                             |
| 21:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 21:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 21:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 21:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 21:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.048                           | 0.048                             |
| 21:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 22:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 22:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 22:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.047                           | 0.047                             |
| 22:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 22:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 22:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 22:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 22:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.046                           | 0.046                             |
| 22:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 22:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 23:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 23:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.045                           | 0.045                             |
| 23:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 23:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 23:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 23:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 23:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.044                           | 0.044                             |
| 23:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 23:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 23:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 24:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 24:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.043                           | 0.043                             |
| 24:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 24:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 24:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 24:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 24:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.042                           | 0.042                             |
| 24:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 24:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 24:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 25:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 25:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.041                           | 0.041                             |
| 25:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.040                           | 0.040                             |
| 25:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 25:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 26:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 26:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 26:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.039                           | 0.039                             |
| 26:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.038                           | 0.038                             |
| 26:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 27:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 27:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 27:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 27:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.037                           | 0.037                             |
| 27:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 27:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 27:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 27:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 27:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 27:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.036                           | 0.036                             |
| 28:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.035                           | 0.035                             |
| 28:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 28:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 28:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 28:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 29:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 29:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 29:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.034                           | 0.034                             |
| 29:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.033                           | 0.033                             |
| 29:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |
| 30:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.032                           | 0.032                             |

## Appendix

### Catchment descriptors \*

| Name                              | Value       | User-defined value used? |
|-----------------------------------|-------------|--------------------------|
| Area (km <sup>2</sup> )           | 0.37 [2.13] | Yes                      |
| ALTBAR                            | 400         | No                       |
| ASPBAR                            | 176         | No                       |
| ASPVAR                            | 0.62        | No                       |
| BFIHOST                           | 0.29        | No                       |
| BFIHOST19                         | 0.3         | No                       |
| DPLBAR (km)                       | 1.32        | No                       |
| DPSBAR (mkm <sup>-1</sup> )       | 198.7       | No                       |
| FARL                              | 1           | No                       |
| LDP                               | 1.51        | No                       |
| PROPWET                           | 0.54        | No                       |
| RMED1H                            | 11.4        | No                       |
| RMED1D                            | 51.1        | No                       |
| RMED2D                            | 67.6        | No                       |
| SAAR (mm)                         | 1493        | No                       |
| SAAR4170 (mm)                     | 1552        | No                       |
| SPRHOST                           | 49.86       | No                       |
| URBEXT2000                        | 0           | No                       |
| URBEXT1990                        | 0           | No                       |
| URBCONC                           | 0           | No                       |
| URBLOC                            | 0           | No                       |
| DDF parameter C                   | -0.03       | No                       |
| DDF parameter D1                  | 0.46        | No                       |
| DDF parameter D2                  | 0.44        | No                       |
| DDF parameter D3                  | 0.38        | No                       |
| DDF parameter E                   | 0.29        | No                       |
| DDF parameter F                   | 2.51        | No                       |
| DDF parameter C (1km grid value)  | -0.03       | No                       |
| DDF parameter D1 (1km grid value) | 0.45        | No                       |
| DDF parameter D2 (1km grid value) | 0.43        | No                       |
| DDF parameter D3 (1km grid value) | 0.38        | No                       |
| DDF parameter E (1km grid value)  | 0.29        | No                       |
| DDF parameter F (1km grid value)  | 2.51        | No                       |

*Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM*

## Morlais Culvert C Catchment

| DOCUMENT VERIFICATION RECORD |                                             |
|------------------------------|---------------------------------------------|
| <b>Project:</b>              | Ffos Y Fran – Morlais C                     |
| <b>Client:</b>               | Merthyr (South Wales) Ltd                   |
| <b>Report Title:</b>         | 15840 – Hydrology Assessment – Morlais - 01 |
| <b>Date:</b>                 | 13/02/2026                                  |

| DOCUMENT REVIEW & APPROVAL |                                       |
|----------------------------|---------------------------------------|
| <b>Author:</b>             | Aled Williams BSc (Hons) MCIWEM C.WEM |
| <b>Checker:</b>            | Jessica Joy BSc (Hons) MCIWEM         |
| <b>Approver:</b>           | Nigel Jones BEng (Hons) CEng MICE     |

| ReFH2 RUNOFF RATES – Morlais C* |                          |
|---------------------------------|--------------------------|
| Return Period (Years)           | As-rural Peak Flow (l/s) |
| 1                               | 39.2692                  |
| 2                               | 45.1416                  |
| 5                               | 63.88467                 |
| 10                              | 76.77728                 |
| 30                              | 96.99773                 |
| 50                              | 106.6386                 |
| 75                              | 114.5283                 |
| 100                             | 120.2663                 |
| 100 + 40% CC                    | 177.0308                 |
| 200                             | 134.5809                 |
| 1000                            | 174.0975                 |

\*Runoff Rates printed from the ReFH Flood Modelling software package and have been calculated based on a total area of 3.03ha.

# UK Design Flood Estimation

Generated on 19 January 2026 10:56:59 by aled.williams  
Printed from the ReFH2 Flood Modelling software package, version 4.1.8704.23947

## Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

### Site details

Checksum: 8E31-EEEE6

Site name: FEH\_Catchment\_Descriptors\_308000\_206250\_v5\_0\_1

Easting: 308000

Northing: 206250

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.03 [2.13]\*

Using plot scale calculations: No

Model: 2.3

Site description: None

## Model run: 100 year 1.4 CC

### Summary of results

|                        |       |                                |      |
|------------------------|-------|--------------------------------|------|
| Rainfall - FEH22 (mm): | 78.11 | Total runoff (ML):             | 1.32 |
| Total Rainfall (mm):   | 62.25 | Total flow (ML):               | 1.89 |
| Peak Rainfall (mm):    | 6.51  | Peak flow (m <sup>3</sup> /s): | 0.18 |

### Parameters

*Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.*

*\* Indicates that the user locked the duration/timestep*

#### Rainfall parameters (Rainfall - FEH22)

| Name                             | Value    | User-defined? |
|----------------------------------|----------|---------------|
| Duration (hh:mm:ss)              | 02:30:00 | No            |
| Timestep (hh:mm:ss)              | 00:06:00 | No            |
| SCF (Seasonal correction factor) | 0.8      | No            |
| ARF (Areal reduction factor)     | 0.99     | No            |
| Seasonality                      | Winter   | No            |
| Climate change factor            | 1.40     | Yes           |

#### Loss model parameters

| Name                        | Value  | User-defined? |
|-----------------------------|--------|---------------|
| Cini (mm)                   | 124.55 | No            |
| Cmax (mm)                   | 222.11 | No            |
| Use alpha correction factor | No     | No            |
| Alpha correction factor     | n/a    | No            |

#### Routing model parameters

| Name    | Value | User-defined? |
|---------|-------|---------------|
| Tp (hr) | 1     | No            |
| Up      | 0.65  | No            |
| Uk      | 0.8   | No            |

#### Baseflow model parameters

| Name                    | Value | User-defined? |
|-------------------------|-------|---------------|
| BF0 (m <sup>3</sup> /s) | 0     | No            |
| BL (hr)                 | 21.2  | No            |
| BR                      | 0.43  | No            |

#### Urbanisation parameters

| Name                                      | Value | User-defined? |
|-------------------------------------------|-------|---------------|
| Sewer capacity (m <sup>3</sup> /s)        | 0     | No            |
| Exporting drained area (km <sup>2</sup> ) | 0     | No            |
| Urban area (km <sup>2</sup> )             | 0     | No            |
| Effective URBEXT2000                      | 0     | n/a           |
| Impervious runoff factor                  | 0.7   | No            |
| Imperviousness factor                     | 0.4   | No            |
| Tp scaling factor                         | 0.75  | No            |
| Depression storage depth (mm)             | 0.5   | No            |

# Time series data

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m³/s) | Net Rain<br>(mm) | Runoff<br>(m³/s) | Baseflow<br>(m³/s) | Total Flow<br>(m³/s) |
|--------------------|--------------|----------------------|------------------|------------------|--------------------|----------------------|
| 00:00:00           | 0.515        | 0.000                | 0.290            | 0.000            | 0.003              | 0.003                |
| 00:06:00           | 0.648        | 0.000                | 0.366            | 0.000            | 0.003              | 0.003                |
| 00:12:00           | 0.813        | 0.000                | 0.462            | 0.000            | 0.003              | 0.003                |
| 00:18:00           | 1.020        | 0.000                | 0.583            | 0.001            | 0.003              | 0.003                |
| 00:24:00           | 1.278        | 0.000                | 0.737            | 0.002            | 0.003              | 0.004                |
| 00:30:00           | 1.599        | 0.000                | 0.933            | 0.003            | 0.003              | 0.005                |
| 00:36:00           | 1.998        | 0.000                | 1.182            | 0.004            | 0.003              | 0.007                |
| 00:42:00           | 2.493        | 0.000                | 1.500            | 0.006            | 0.003              | 0.009                |
| 00:48:00           | 3.103        | 0.000                | 1.907            | 0.009            | 0.003              | 0.012                |
| 00:54:00           | 3.851        | 0.000                | 2.426            | 0.013            | 0.003              | 0.016                |
| 01:00:00           | 4.753        | 0.000                | 3.087            | 0.018            | 0.003              | 0.021                |
| 01:06:00           | 5.800        | 0.000                | 3.905            | 0.025            | 0.003              | 0.027                |
| 01:12:00           | 6.512        | 0.000                | 4.564            | 0.033            | 0.003              | 0.035                |
| 01:18:00           | 5.800        | 0.000                | 4.226            | 0.043            | 0.003              | 0.045                |
| 01:24:00           | 4.753        | 0.000                | 3.576            | 0.055            | 0.003              | 0.057                |
| 01:30:00           | 3.851        | 0.000                | 2.972            | 0.068            | 0.003              | 0.071                |
| 01:36:00           | 3.103        | 0.000                | 2.444            | 0.083            | 0.003              | 0.086                |
| 01:42:00           | 2.493        | 0.000                | 1.994            | 0.098            | 0.003              | 0.101                |
| 01:48:00           | 1.998        | 0.000                | 1.619            | 0.113            | 0.003              | 0.116                |
| 01:54:00           | 1.599        | 0.000                | 1.308            | 0.128            | 0.004              | 0.131                |
| 02:00:00           | 1.278        | 0.000                | 1.054            | 0.141            | 0.004              | 0.145                |
| 02:06:00           | 1.020        | 0.000                | 0.846            | 0.153            | 0.004              | 0.157                |
| 02:12:00           | 0.813        | 0.000                | 0.678            | 0.163            | 0.004              | 0.167                |
| 02:18:00           | 0.648        | 0.000                | 0.542            | 0.169            | 0.005              | 0.174                |
| 02:24:00           | 0.515        | 0.000                | 0.433            | 0.172            | 0.005              | 0.177                |
| 02:30:00           | 0.000        | 0.000                | 0.000            | 0.172            | 0.005              | 0.177                |
| 02:36:00           | 0.000        | 0.000                | 0.000            | 0.169            | 0.006              | 0.175                |
| 02:42:00           | 0.000        | 0.000                | 0.000            | 0.164            | 0.006              | 0.170                |
| 02:48:00           | 0.000        | 0.000                | 0.000            | 0.158            | 0.006              | 0.164                |
| 02:54:00           | 0.000        | 0.000                | 0.000            | 0.150            | 0.007              | 0.156                |
| 03:00:00           | 0.000        | 0.000                | 0.000            | 0.141            | 0.007              | 0.148                |
| 03:06:00           | 0.000        | 0.000                | 0.000            | 0.132            | 0.007              | 0.139                |
| 03:12:00           | 0.000        | 0.000                | 0.000            | 0.122            | 0.007              | 0.130                |
| 03:18:00           | 0.000        | 0.000                | 0.000            | 0.113            | 0.008              | 0.121                |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 03:24:00           | 0.000        | 0.000                             | 0.000            | 0.104                         | 0.008                           | 0.112                             |
| 03:30:00           | 0.000        | 0.000                             | 0.000            | 0.095                         | 0.008                           | 0.103                             |
| 03:36:00           | 0.000        | 0.000                             | 0.000            | 0.087                         | 0.008                           | 0.095                             |
| 03:42:00           | 0.000        | 0.000                             | 0.000            | 0.079                         | 0.008                           | 0.087                             |
| 03:48:00           | 0.000        | 0.000                             | 0.000            | 0.071                         | 0.008                           | 0.080                             |
| 03:54:00           | 0.000        | 0.000                             | 0.000            | 0.064                         | 0.008                           | 0.073                             |
| 04:00:00           | 0.000        | 0.000                             | 0.000            | 0.058                         | 0.008                           | 0.066                             |
| 04:06:00           | 0.000        | 0.000                             | 0.000            | 0.051                         | 0.009                           | 0.060                             |
| 04:12:00           | 0.000        | 0.000                             | 0.000            | 0.045                         | 0.009                           | 0.054                             |
| 04:18:00           | 0.000        | 0.000                             | 0.000            | 0.039                         | 0.009                           | 0.048                             |
| 04:24:00           | 0.000        | 0.000                             | 0.000            | 0.034                         | 0.009                           | 0.042                             |
| 04:30:00           | 0.000        | 0.000                             | 0.000            | 0.028                         | 0.009                           | 0.037                             |
| 04:36:00           | 0.000        | 0.000                             | 0.000            | 0.023                         | 0.009                           | 0.032                             |
| 04:42:00           | 0.000        | 0.000                             | 0.000            | 0.019                         | 0.009                           | 0.028                             |
| 04:48:00           | 0.000        | 0.000                             | 0.000            | 0.015                         | 0.009                           | 0.024                             |
| 04:54:00           | 0.000        | 0.000                             | 0.000            | 0.012                         | 0.009                           | 0.020                             |
| 05:00:00           | 0.000        | 0.000                             | 0.000            | 0.009                         | 0.009                           | 0.017                             |
| 05:06:00           | 0.000        | 0.000                             | 0.000            | 0.007                         | 0.009                           | 0.015                             |
| 05:12:00           | 0.000        | 0.000                             | 0.000            | 0.005                         | 0.009                           | 0.013                             |
| 05:18:00           | 0.000        | 0.000                             | 0.000            | 0.003                         | 0.009                           | 0.012                             |
| 05:24:00           | 0.000        | 0.000                             | 0.000            | 0.002                         | 0.009                           | 0.011                             |
| 05:30:00           | 0.000        | 0.000                             | 0.000            | 0.002                         | 0.008                           | 0.010                             |
| 05:36:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.008                           | 0.009                             |
| 05:42:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.008                           | 0.009                             |
| 05:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.009                             |
| 05:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 06:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 06:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 07:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 08:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 08:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.008                           | 0.008                             |
| 08:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 08:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 09:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 10:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 10:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 11:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 11:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.007                           | 0.007                             |
| 11:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 11:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 12:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 13:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 13:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.006                           | 0.006                             |
| 14:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 14:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 14:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 15:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 16:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 17:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 17:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 18:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.005                           | 0.005                             |
| 19:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 19:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 20:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 20:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 21:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 22:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 23:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 24:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 24:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 24:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 24:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 24:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 24:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 24:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 24:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 24:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 24:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 25:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 26:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 27:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 27:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 28:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 29:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 30:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |

## Appendix

### Catchment descriptors \*

| Name                              | Value       | User-defined value used? |
|-----------------------------------|-------------|--------------------------|
| Area (km <sup>2</sup> )           | 0.03 [2.13] | Yes                      |
| ALTBAR                            | 400         | No                       |
| ASPBAR                            | 176         | No                       |
| ASPVAR                            | 0.62        | No                       |
| BFIHOST                           | 0.29        | No                       |
| BFIHOST19                         | 0.3         | No                       |
| DPLBAR (km)                       | 1.32        | No                       |
| DPSBAR (mkm <sup>-1</sup> )       | 198.7       | No                       |
| FARL                              | 1           | No                       |
| LDP                               | 1.51        | No                       |
| PROPWET                           | 0.54        | No                       |
| RMED1H                            | 11.4        | No                       |
| RMED1D                            | 51.1        | No                       |
| RMED2D                            | 67.6        | No                       |
| SAAR (mm)                         | 1493        | No                       |
| SAAR4170 (mm)                     | 1552        | No                       |
| SPRHOST                           | 49.86       | No                       |
| URBEXT2000                        | 0           | No                       |
| URBEXT1990                        | 0           | No                       |
| URBCONC                           | 0           | No                       |
| URBLOC                            | 0           | No                       |
| DDF parameter C                   | -0.03       | No                       |
| DDF parameter D1                  | 0.46        | No                       |
| DDF parameter D2                  | 0.44        | No                       |
| DDF parameter D3                  | 0.38        | No                       |
| DDF parameter E                   | 0.29        | No                       |
| DDF parameter F                   | 2.51        | No                       |
| DDF parameter C (1km grid value)  | -0.03       | No                       |
| DDF parameter D1 (1km grid value) | 0.45        | No                       |
| DDF parameter D2 (1km grid value) | 0.43        | No                       |
| DDF parameter D3 (1km grid value) | 0.38        | No                       |
| DDF parameter E (1km grid value)  | 0.29        | No                       |
| DDF parameter F (1km grid value)  | 2.51        | No                       |

*Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM*

## Morlais Culvert D Catchment

| DOCUMENT VERIFICATION RECORD |                                             |
|------------------------------|---------------------------------------------|
| <b>Project:</b>              | Ffos Y Fran – Morlais D                     |
| <b>Client:</b>               | Merthyr (South Wales) Ltd                   |
| <b>Report Title:</b>         | 15840 – Hydrology Assessment – Morlais - 01 |
| <b>Date:</b>                 | 13/02/2026                                  |

| DOCUMENT REVIEW & APPROVAL |                                       |
|----------------------------|---------------------------------------|
| <b>Author:</b>             | Aled Williams BSc (Hons) MCIWEM C.WEM |
| <b>Checker:</b>            | Jessica Joy BSc (Hons) MCIWEM         |
| <b>Approver:</b>           | Nigel Jones BEng (Hons) CEng MICE     |

| ReFH2 RUNOFF RATES – Morlais D* |                          |
|---------------------------------|--------------------------|
| Return Period (Years)           | As-rural Peak Flow (l/s) |
| 1                               | 20.77061                 |
| 2                               | 23.87729                 |
| 5                               | 33.79343                 |
| 10                              | 40.6147                  |
| 30                              | 51.31355                 |
| 50                              | 56.41484                 |
| 75                              | 60.58964                 |
| 100                             | 63.62592                 |
| 100 + 40% CC                    | 93.66585                 |
| 200                             | 71.20067                 |
| 1000                            | 92.11347                 |

\*Runoff Rates printed from the ReFH Flood Modelling software package and have been calculated based on a total area of 1.6ha.

# UK Design Flood Estimation

Generated on 19 January 2026 10:59:05 by aled.williams

Printed from the ReFH2 Flood Modelling software package, version 4.1.8704.23947

## Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

### Site details

Checksum: B516-0493

Site name: FEH\_Catchment\_Descriptors\_308000\_206250\_v5\_0\_1

Easting: 308000

Northing: 206250

Country: England, Wales or Northern Ireland

Catchment Area (km<sup>2</sup>): 0.02 [2.13]\*

Using plot scale calculations: No

Model: 2.3

Site description: None

## Model run: 100 year 1.4 CC

### Summary of results

|                        |       |                                |      |
|------------------------|-------|--------------------------------|------|
| Rainfall - FEH22 (mm): | 78.11 | Total runoff (ML):             | 0.70 |
| Total Rainfall (mm):   | 62.36 | Total flow (ML):               | 1.00 |
| Peak Rainfall (mm):    | 6.52  | Peak flow (m <sup>3</sup> /s): | 0.09 |

### Parameters

*Where the user has overridden a system-generated value, this original value is shown in square brackets after the value used.*

*\* Indicates that the user locked the duration/timestep*

#### Rainfall parameters (Rainfall - FEH22)

| Name                             | Value    | User-defined? |
|----------------------------------|----------|---------------|
| Duration (hh:mm:ss)              | 02:30:00 | No            |
| Timestep (hh:mm:ss)              | 00:06:00 | No            |
| SCF (Seasonal correction factor) | 0.8      | No            |
| ARF (Areal reduction factor)     | 0.99     | No            |
| Seasonality                      | Winter   | No            |
| Climate change factor            | 1.40     | Yes           |

#### Loss model parameters

| Name                        | Value  | User-defined? |
|-----------------------------|--------|---------------|
| Cini (mm)                   | 124.55 | No            |
| Cmax (mm)                   | 222.11 | No            |
| Use alpha correction factor | No     | No            |
| Alpha correction factor     | n/a    | No            |

#### Routing model parameters

| Name    | Value | User-defined? |
|---------|-------|---------------|
| Tp (hr) | 1     | No            |
| Up      | 0.65  | No            |
| Uk      | 0.8   | No            |

#### Baseflow model parameters

| Name                    | Value | User-defined? |
|-------------------------|-------|---------------|
| BF0 (m <sup>3</sup> /s) | 0     | No            |
| BL (hr)                 | 21.2  | No            |
| BR                      | 0.43  | No            |

#### Urbanisation parameters

| Name                                      | Value | User-defined? |
|-------------------------------------------|-------|---------------|
| Sewer capacity (m <sup>3</sup> /s)        | 0     | No            |
| Exporting drained area (km <sup>2</sup> ) | 0     | No            |
| Urban area (km <sup>2</sup> )             | 0     | No            |
| Effective URBEXT2000                      | 0     | n/a           |
| Impervious runoff factor                  | 0.7   | No            |
| Imperviousness factor                     | 0.4   | No            |
| Tp scaling factor                         | 0.75  | No            |
| Depression storage depth (mm)             | 0.5   | No            |

# Time series data

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 00:00:00           | 0.516        | 0.000                             | 0.290            | 0.000                         | 0.001                           | 0.001                             |
| 00:06:00           | 0.649        | 0.000                             | 0.366            | 0.000                         | 0.001                           | 0.001                             |
| 00:12:00           | 0.814        | 0.000                             | 0.462            | 0.000                         | 0.001                           | 0.002                             |
| 00:18:00           | 1.021        | 0.000                             | 0.584            | 0.000                         | 0.001                           | 0.002                             |
| 00:24:00           | 1.280        | 0.000                             | 0.739            | 0.001                         | 0.001                           | 0.002                             |
| 00:30:00           | 1.602        | 0.000                             | 0.935            | 0.001                         | 0.001                           | 0.003                             |
| 00:36:00           | 2.002        | 0.000                             | 1.184            | 0.002                         | 0.001                           | 0.004                             |
| 00:42:00           | 2.497        | 0.000                             | 1.503            | 0.003                         | 0.001                           | 0.005                             |
| 00:48:00           | 3.109        | 0.000                             | 1.910            | 0.005                         | 0.001                           | 0.006                             |
| 00:54:00           | 3.857        | 0.000                             | 2.431            | 0.007                         | 0.001                           | 0.008                             |
| 01:00:00           | 4.761        | 0.000                             | 3.093            | 0.010                         | 0.001                           | 0.011                             |
| 01:06:00           | 5.810        | 0.000                             | 3.912            | 0.013                         | 0.001                           | 0.014                             |
| 01:12:00           | 6.523        | 0.000                             | 4.573            | 0.017                         | 0.001                           | 0.019                             |
| 01:18:00           | 5.810        | 0.000                             | 4.235            | 0.023                         | 0.001                           | 0.024                             |
| 01:24:00           | 4.761        | 0.000                             | 3.584            | 0.029                         | 0.001                           | 0.030                             |
| 01:30:00           | 3.857        | 0.000                             | 2.978            | 0.036                         | 0.002                           | 0.038                             |
| 01:36:00           | 3.109        | 0.000                             | 2.449            | 0.044                         | 0.002                           | 0.045                             |
| 01:42:00           | 2.497        | 0.000                             | 1.999            | 0.052                         | 0.002                           | 0.053                             |
| 01:48:00           | 2.002        | 0.000                             | 1.622            | 0.060                         | 0.002                           | 0.062                             |
| 01:54:00           | 1.602        | 0.000                             | 1.311            | 0.068                         | 0.002                           | 0.069                             |
| 02:00:00           | 1.280        | 0.000                             | 1.056            | 0.075                         | 0.002                           | 0.077                             |
| 02:06:00           | 1.021        | 0.000                             | 0.848            | 0.081                         | 0.002                           | 0.083                             |
| 02:12:00           | 0.814        | 0.000                             | 0.679            | 0.086                         | 0.002                           | 0.088                             |
| 02:18:00           | 0.649        | 0.000                             | 0.543            | 0.089                         | 0.003                           | 0.092                             |
| 02:24:00           | 0.516        | 0.000                             | 0.434            | 0.091                         | 0.003                           | 0.094                             |
| 02:30:00           | 0.000        | 0.000                             | 0.000            | 0.091                         | 0.003                           | 0.094                             |
| 02:36:00           | 0.000        | 0.000                             | 0.000            | 0.089                         | 0.003                           | 0.092                             |
| 02:42:00           | 0.000        | 0.000                             | 0.000            | 0.087                         | 0.003                           | 0.090                             |
| 02:48:00           | 0.000        | 0.000                             | 0.000            | 0.083                         | 0.003                           | 0.087                             |
| 02:54:00           | 0.000        | 0.000                             | 0.000            | 0.079                         | 0.003                           | 0.083                             |
| 03:00:00           | 0.000        | 0.000                             | 0.000            | 0.075                         | 0.004                           | 0.078                             |
| 03:06:00           | 0.000        | 0.000                             | 0.000            | 0.070                         | 0.004                           | 0.074                             |
| 03:12:00           | 0.000        | 0.000                             | 0.000            | 0.065                         | 0.004                           | 0.069                             |
| 03:18:00           | 0.000        | 0.000                             | 0.000            | 0.060                         | 0.004                           | 0.064                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 03:24:00           | 0.000        | 0.000                             | 0.000            | 0.055                         | 0.004                           | 0.059                             |
| 03:30:00           | 0.000        | 0.000                             | 0.000            | 0.050                         | 0.004                           | 0.055                             |
| 03:36:00           | 0.000        | 0.000                             | 0.000            | 0.046                         | 0.004                           | 0.050                             |
| 03:42:00           | 0.000        | 0.000                             | 0.000            | 0.042                         | 0.004                           | 0.046                             |
| 03:48:00           | 0.000        | 0.000                             | 0.000            | 0.038                         | 0.004                           | 0.042                             |
| 03:54:00           | 0.000        | 0.000                             | 0.000            | 0.034                         | 0.004                           | 0.038                             |
| 04:00:00           | 0.000        | 0.000                             | 0.000            | 0.030                         | 0.004                           | 0.035                             |
| 04:06:00           | 0.000        | 0.000                             | 0.000            | 0.027                         | 0.004                           | 0.032                             |
| 04:12:00           | 0.000        | 0.000                             | 0.000            | 0.024                         | 0.005                           | 0.028                             |
| 04:18:00           | 0.000        | 0.000                             | 0.000            | 0.021                         | 0.005                           | 0.025                             |
| 04:24:00           | 0.000        | 0.000                             | 0.000            | 0.018                         | 0.005                           | 0.022                             |
| 04:30:00           | 0.000        | 0.000                             | 0.000            | 0.015                         | 0.005                           | 0.020                             |
| 04:36:00           | 0.000        | 0.000                             | 0.000            | 0.012                         | 0.005                           | 0.017                             |
| 04:42:00           | 0.000        | 0.000                             | 0.000            | 0.010                         | 0.005                           | 0.015                             |
| 04:48:00           | 0.000        | 0.000                             | 0.000            | 0.008                         | 0.005                           | 0.012                             |
| 04:54:00           | 0.000        | 0.000                             | 0.000            | 0.006                         | 0.005                           | 0.011                             |
| 05:00:00           | 0.000        | 0.000                             | 0.000            | 0.005                         | 0.005                           | 0.009                             |
| 05:06:00           | 0.000        | 0.000                             | 0.000            | 0.003                         | 0.005                           | 0.008                             |
| 05:12:00           | 0.000        | 0.000                             | 0.000            | 0.003                         | 0.005                           | 0.007                             |
| 05:18:00           | 0.000        | 0.000                             | 0.000            | 0.002                         | 0.005                           | 0.006                             |
| 05:24:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.004                           | 0.006                             |
| 05:30:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.004                           | 0.005                             |
| 05:36:00           | 0.000        | 0.000                             | 0.000            | 0.001                         | 0.004                           | 0.005                             |
| 05:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.005                             |
| 05:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.005                             |
| 05:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 06:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 06:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 07:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 08:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 09:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 10:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.004                           | 0.004                             |
| 10:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 10:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 11:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 12:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 13:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 13:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 14:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 15:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 16:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 17:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.003                           | 0.003                             |
| 17:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 18:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 19:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 20:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 20:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 21:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 22:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 23:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 24:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 24:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 25:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 26:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 27:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |

| Time<br>(hh:mm:ss) | Rain<br>(mm) | Sewer Loss<br>(m <sup>3</sup> /s) | Net Rain<br>(mm) | Runoff<br>(m <sup>3</sup> /s) | Baseflow<br>(m <sup>3</sup> /s) | Total Flow<br>(m <sup>3</sup> /s) |
|--------------------|--------------|-----------------------------------|------------------|-------------------------------|---------------------------------|-----------------------------------|
| 27:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.002                           | 0.002                             |
| 28:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 28:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 28:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:42:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:48:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 29:54:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:00:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:06:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:12:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:18:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:24:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:30:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |
| 30:36:00           | 0.000        | 0.000                             | 0.000            | 0.000                         | 0.001                           | 0.001                             |

## Appendix

### Catchment descriptors \*

| Name                              | Value       | User-defined value used? |
|-----------------------------------|-------------|--------------------------|
| Area (km <sup>2</sup> )           | 0.02 [2.13] | Yes                      |
| ALTBAR                            | 400         | No                       |
| ASPBAR                            | 176         | No                       |
| ASPVAR                            | 0.62        | No                       |
| BFIHOST                           | 0.29        | No                       |
| BFIHOST19                         | 0.3         | No                       |
| DPLBAR (km)                       | 1.32        | No                       |
| DPSBAR (mkm <sup>-1</sup> )       | 198.7       | No                       |
| FARL                              | 1           | No                       |
| LDP                               | 1.51        | No                       |
| PROPWET                           | 0.54        | No                       |
| RMED1H                            | 11.4        | No                       |
| RMED1D                            | 51.1        | No                       |
| RMED2D                            | 67.6        | No                       |
| SAAR (mm)                         | 1493        | No                       |
| SAAR4170 (mm)                     | 1552        | No                       |
| SPRHOST                           | 49.86       | No                       |
| URBEXT2000                        | 0           | No                       |
| URBEXT1990                        | 0           | No                       |
| URBCONC                           | 0           | No                       |
| URBLOC                            | 0           | No                       |
| DDF parameter C                   | -0.03       | No                       |
| DDF parameter D1                  | 0.46        | No                       |
| DDF parameter D2                  | 0.44        | No                       |
| DDF parameter D3                  | 0.38        | No                       |
| DDF parameter E                   | 0.29        | No                       |
| DDF parameter F                   | 2.51        | No                       |
| DDF parameter C (1km grid value)  | -0.03       | No                       |
| DDF parameter D1 (1km grid value) | 0.45        | No                       |
| DDF parameter D2 (1km grid value) | 0.43        | No                       |
| DDF parameter D3 (1km grid value) | 0.38        | No                       |
| DDF parameter E (1km grid value)  | 0.29        | No                       |
| DDF parameter F (1km grid value)  | 2.51        | No                       |

*Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM*

## **Appendix E    Culvert Capacity Calculations**

|                                                                                   |                                                 |                    |                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------|--------------------|-------------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | <b>Calculation</b> | ref: <b>15840</b> |
|                                                                                   |                                                 |                    | prefix: A         |
| <b>Scheme:</b> Ffos Y Fran                                                        |                                                 | page no: 1         |                   |
| <b>Section:</b> Morlais A Culvert                                                 |                                                 | dated: 19/01/26    |                   |

Calculation based on Colebrook White equation for water at 15° C.  
(Kinematic viscosity  $1.141 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$ )

**Option 1 - Full bore Velocity / Discharge**

**Input data:**

|                                 |         |
|---------------------------------|---------|
| <b>Diameter (mm)</b>            | 1400.00 |
| <b>Hyd. Gradient (1 in ...)</b> | 57.00   |
| <b>Coeff Ks (mm)</b>            | 0.150   |

**Output details:**

|                                  |          |
|----------------------------------|----------|
| <b>Full bore Velocity (m/s)</b>  | 6.242    |
| <b>Full bore Discharge (L/s)</b> | 9609.324 |

**Pipe losses (m)**

|                |       |
|----------------|-------|
| 0.5 $V^2 / 2g$ | 0.993 |
| $V^2 / 2g$     | 1.986 |
| 1.5 $V^2 / 2g$ | 2.979 |

|                                                                                   |                                                 |                    |                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------|--------------------|-------------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | <b>Calculation</b> | ref: <b>15840</b> |
|                                                                                   |                                                 |                    | prefix: A         |
| <b>Scheme:</b> Ffos Y Fran                                                        |                                                 | page no: 1         |                   |
| <b>Section:</b> Morlais B Culvert                                                 |                                                 | dated: 19/01/26    |                   |

Calculation based on Colebrook White equation for water at 15° C.  
 (Kinematic viscosity  $1.141 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$ )

**Option 1 - Full bore Velocity / Discharge**

**Input data:**

|                                 |         |
|---------------------------------|---------|
| <b>Diameter (mm)</b>            | 1500.00 |
| <b>Hyd. Gradient (1 in ...)</b> | 29.00   |
| <b>Coeff Ks (mm)</b>            | 0.150   |

**Output details:**

|                                  |           |
|----------------------------------|-----------|
| <b>Full bore Velocity (m/s)</b>  | 9.145     |
| <b>Full bore Discharge (L/s)</b> | 16159.817 |

**Pipe losses (m)**

|                |       |
|----------------|-------|
| 0.5 $V^2 / 2g$ | 2.131 |
| $V^2 / 2g$     | 4.262 |
| 1.5 $V^2 / 2g$ | 6.393 |

|                                                                                   |                                                 |                    |                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------|--------------------|-------------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | <b>Calculation</b> | ref: <b>15840</b> |
|                                                                                   |                                                 |                    | prefix: A         |
| <b>Scheme:</b> Ffos Y Fran                                                        |                                                 | page no: 1         |                   |
| <b>Section:</b> Morlais C Culvert                                                 |                                                 | dated: 19/01/26    |                   |

Calculation based on Colebrook White equation for water at 15° C.  
 (Kinematic viscosity  $1.141 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$ )

**Option 1 - Full bore Velocity / Discharge**

**Input data:**

|                          |        |
|--------------------------|--------|
| Diameter (mm)            | 250.00 |
| Hyd. Gradient (1 in ...) | 11.55  |
| Coeff Ks (mm)            | 0.150  |

**Output details:**

|                           |         |
|---------------------------|---------|
| Full bore Velocity (m/s)  | 4.881   |
| Full bore Discharge (L/s) | 239.619 |

**Pipe losses (m)**

|                |       |
|----------------|-------|
| 0.5 $V^2 / 2g$ | 0.607 |
| $V^2 / 2g$     | 1.215 |
| 1.5 $V^2 / 2g$ | 1.822 |

|                                                                                   |                                                 |                    |                   |
|-----------------------------------------------------------------------------------|-------------------------------------------------|--------------------|-------------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | <b>Calculation</b> | ref: <b>15840</b> |
|                                                                                   |                                                 |                    | prefix: A         |
| <b>Scheme:</b> Ffos Y Fran                                                        |                                                 | page no: 1         |                   |
| <b>Section:</b> Morlais D Culvert                                                 |                                                 | dated: 19/01/26    |                   |

Calculation based on Colebrook White equation for water at 15° C.  
 (Kinematic viscosity  $1.141 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$ )

**Option 1 - Full bore Velocity / Discharge**

**Input data:**

|                          |        |
|--------------------------|--------|
| Diameter (mm)            | 250.00 |
| Hyd. Gradient (1 in ...) | 11.60  |
| Coeff Ks (mm)            | 0.150  |

**Output details:**

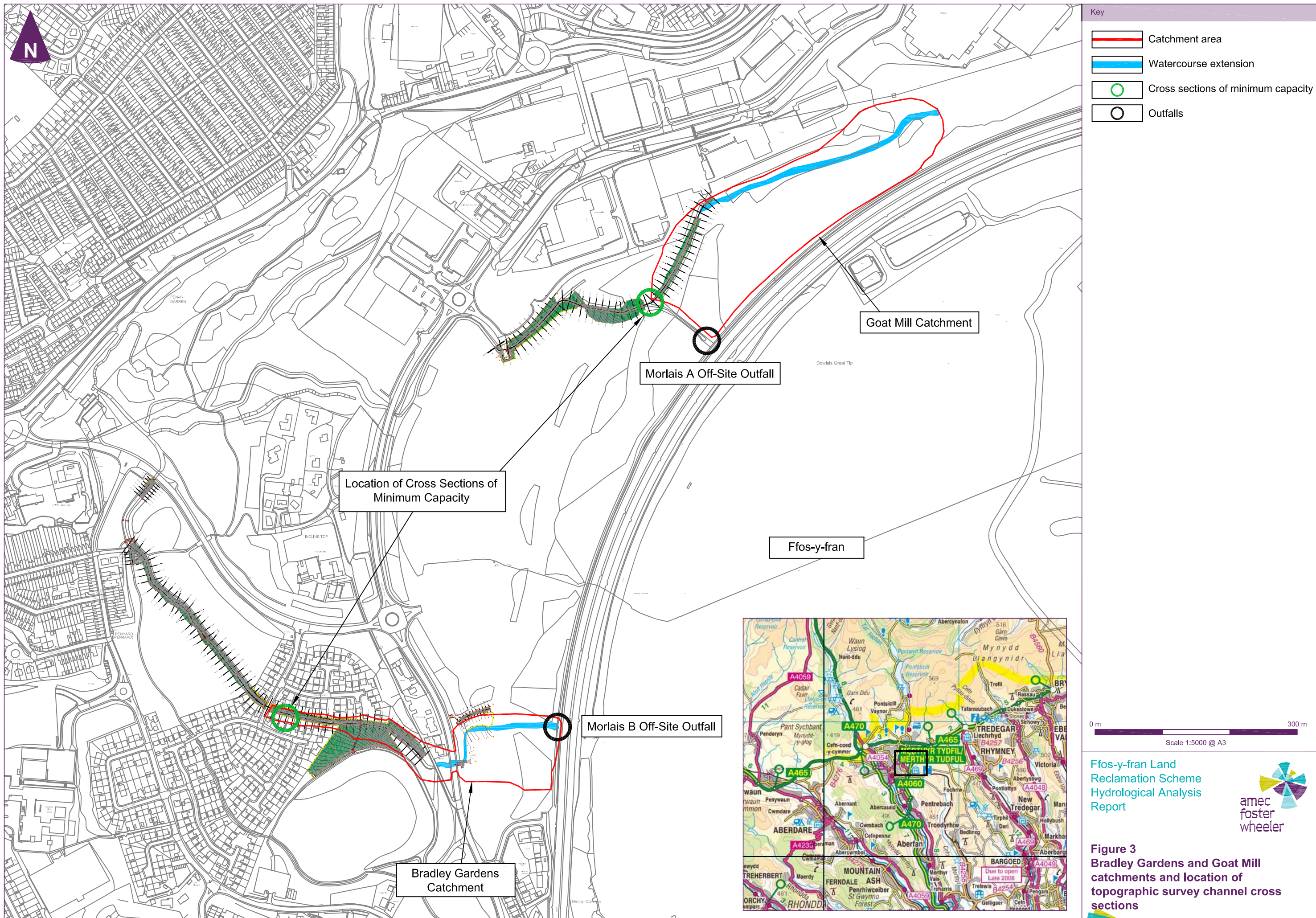
|                           |         |
|---------------------------|---------|
| Full bore Velocity (m/s)  | 4.871   |
| Full bore Discharge (L/s) | 239.096 |

**Pipe losses (m)**

|                |       |
|----------------|-------|
| 0.5 $V^2 / 2g$ | 0.605 |
| $V^2 / 2g$     | 1.209 |
| 1.5 $V^2 / 2g$ | 1.814 |

## Appendix F Watercourse Cross Sectional Data



The diagram illustrates a memory layout with three main sections: Levels, Offsets, and Regular offsets. A vertical axis on the right indicates memory addresses from 255.0 to 265.0. The Levels section shows a sequence of levels (0 to 15) with corresponding offsets (0.000 to 15.000). The Offsets section shows a sequence of offsets (0.000 to 15.000) with corresponding levels (0 to 15). The Regular offsets section shows a sequence of regular offsets (0.000 to 15.000) with corresponding levels (0 to 15). The diagram also includes a 'Datum 250.0' label and a 'Levels' label.

| Levels | Offsets | Regular offsets |
|--------|---------|-----------------|
| 0      | 0.000   | 0.000           |
| 1      | 1.000   | 1.000           |
| 2      | 2.000   | 2.000           |
| 3      | 3.000   | 3.000           |
| 4      | 4.000   | 4.000           |
| 5      | 5.000   | 5.000           |
| 6      | 6.000   | 6.000           |
| 7      | 7.000   | 7.000           |
| 8      | 8.000   | 8.000           |
| 9      | 9.000   | 9.000           |
| 10     | 10.000  | 10.000          |
| 11     | 11.000  | 11.000          |
| 12     | 12.000  | 12.000          |
| 13     | 13.000  | 13.000          |
| 14     | 14.000  | 14.000          |
| 15     | 15.000  | 15.000          |

Datum 251.0

Levels

Offsets

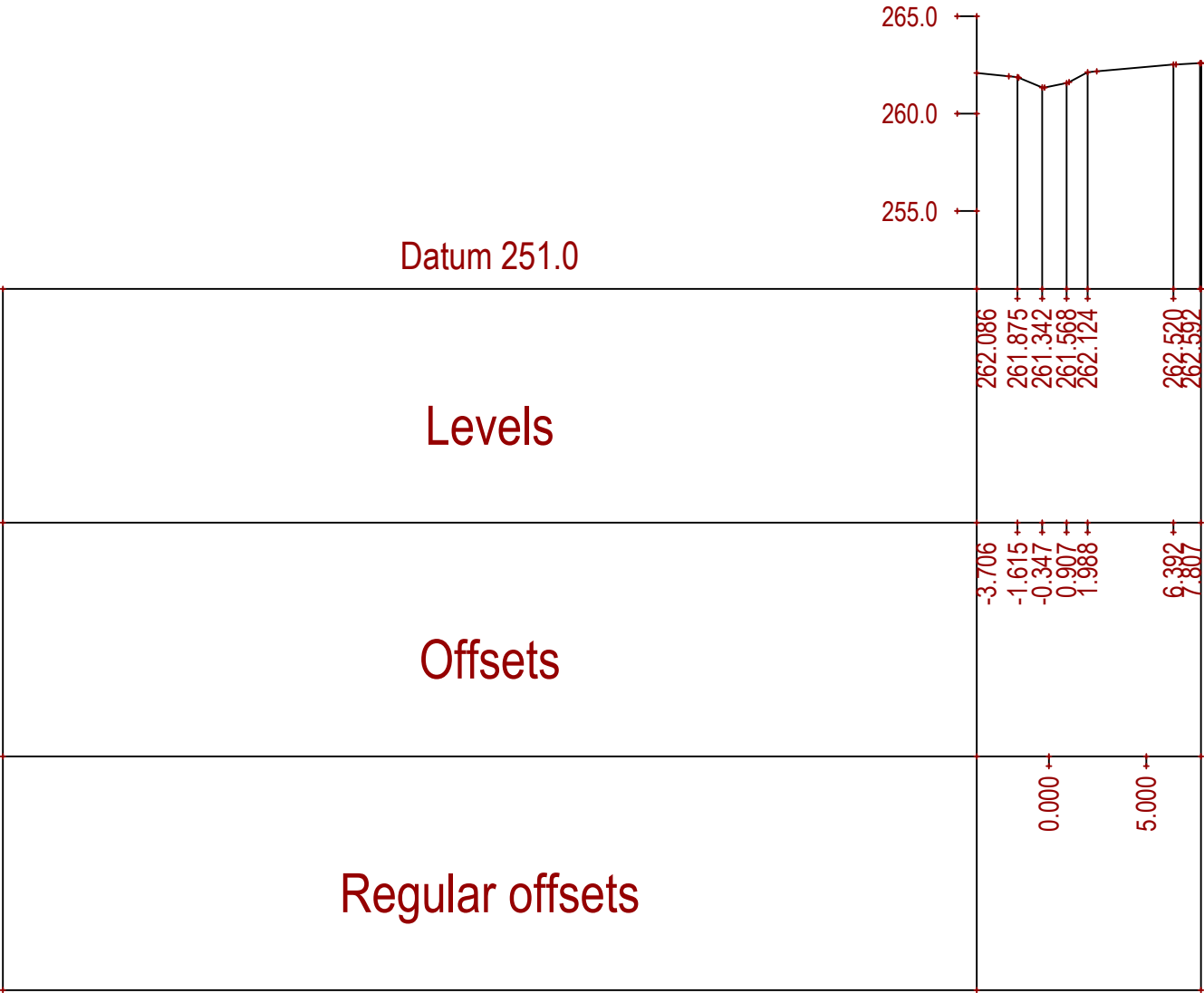
Regular offsets

255.0  
250.0  
245.0  
240.0  
235.0  
230.0  
225.0  
220.0  
215.0  
210.0  
205.0  
200.0  
195.0  
190.0  
185.0  
180.0  
175.0  
170.0  
165.0  
160.0  
155.0  
150.0  
145.0  
140.0  
135.0  
130.0  
125.0  
120.0  
115.0  
110.0  
105.0  
100.0  
95.0  
90.0  
85.0  
80.0  
75.0  
70.0  
65.0  
60.0  
55.0  
50.0  
45.0  
40.0  
35.0  
30.0  
25.0  
20.0  
15.0  
10.0  
5.0  
0.0

[illegible][illegible]

Chainage 190.0m ( 305945.2E 206586.6N )

Bradley Gardens Chainage 200



| Datum 276.0     |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| Levels          | 281.78<br>281.56<br>281.34<br>281.12<br>280.90<br>280.68<br>280.46<br>280.24 |
| Offsets         | -0.02<br>-0.04<br>-0.06<br>-0.08<br>-0.10<br>-0.12<br>-0.14<br>-0.16         |
| Regular offsets | -0.02<br>-0.04<br>-0.06<br>-0.08<br>-0.10<br>-0.12<br>-0.14<br>-0.16         |

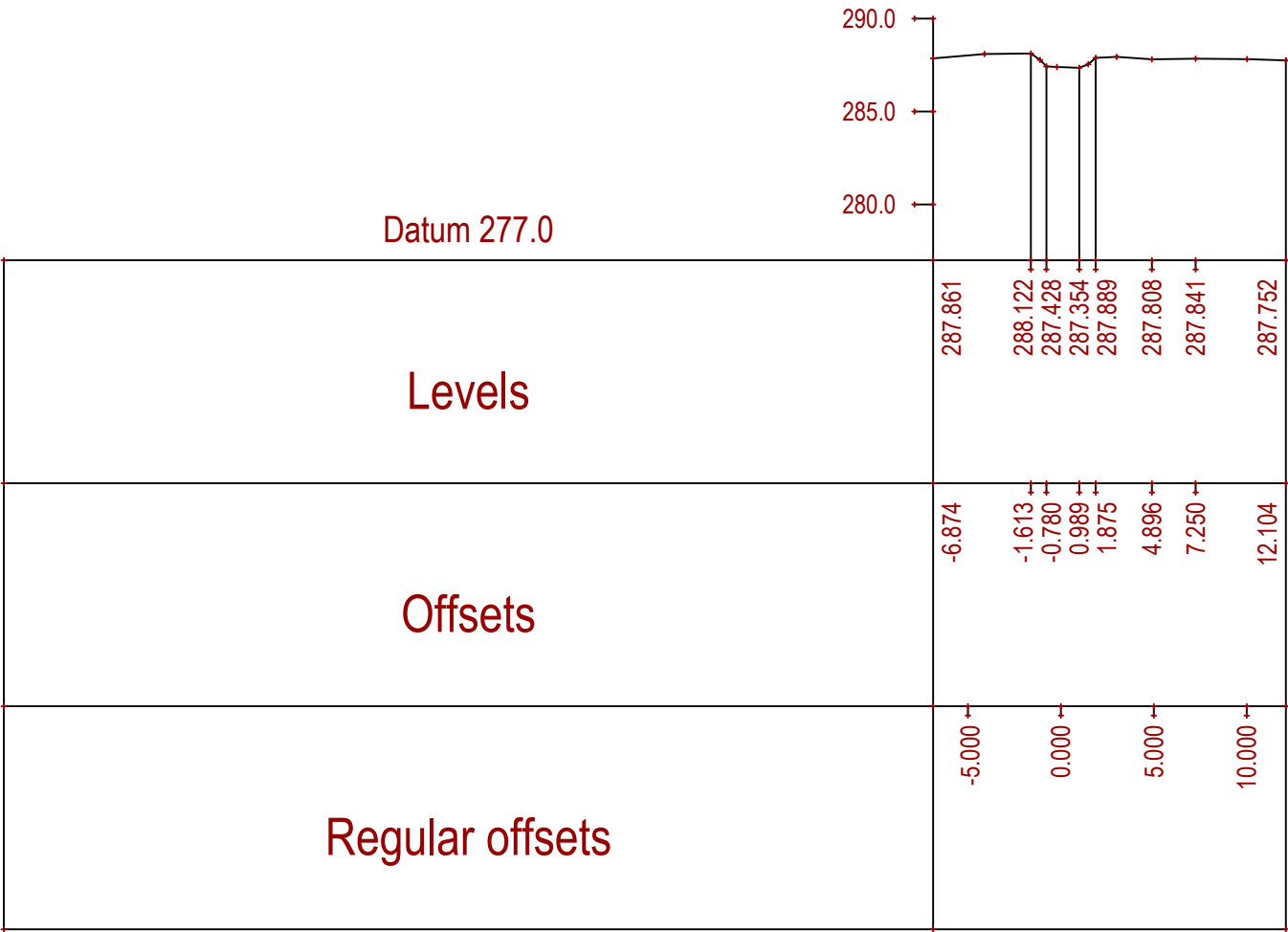
|  | Datum 277.0 | Levels  | Offsets | Regular offsets |
|--|-------------|---------|---------|-----------------|
|  | 292.482     | 292.472 | -1.010  | -0.010          |
|  | 292.621     | 292.611 | -0.010  | 0.000           |
|  | 292.760     | 292.750 | -0.010  | 0.000           |
|  | 292.899     | 292.889 | -0.010  | 0.000           |
|  | 293.038     | 293.028 | -0.010  | 0.000           |
|  | 293.177     | 293.167 | -0.010  | 0.000           |
|  | 293.316     | 293.306 | -0.010  | 0.000           |
|  | 293.455     | 293.445 | -0.010  | 0.000           |
|  | 293.594     | 293.584 | -0.010  | 0.000           |

Diagram illustrating memory layout and offsets for Datum 277.0. The layout shows a stack of memory blocks with levels, offsets, and regular offsets.

| Level     | Offset | Regular Offset |
|-----------|--------|----------------|
| Level 1   | 0.000  | 0.000          |
| Level 2   | 0.000  | 0.000          |
| Level 3   | 0.000  | 0.000          |
| Level 4   | 0.000  | 0.000          |
| Level 5   | 0.000  | 0.000          |
| Level 6   | 0.000  | 0.000          |
| Level 7   | 0.000  | 0.000          |
| Level 8   | 0.000  | 0.000          |
| Level 9   | 0.000  | 0.000          |
| Level 10  | 0.000  | 0.000          |
| Level 11  | 0.000  | 0.000          |
| Level 12  | 0.000  | 0.000          |
| Level 13  | 0.000  | 0.000          |
| Level 14  | 0.000  | 0.000          |
| Level 15  | 0.000  | 0.000          |
| Level 16  | 0.000  | 0.000          |
| Level 17  | 0.000  | 0.000          |
| Level 18  | 0.000  | 0.000          |
| Level 19  | 0.000  | 0.000          |
| Level 20  | 0.000  | 0.000          |
| Level 21  | 0.000  | 0.000          |
| Level 22  | 0.000  | 0.000          |
| Level 23  | 0.000  | 0.000          |
| Level 24  | 0.000  | 0.000          |
| Level 25  | 0.000  | 0.000          |
| Level 26  | 0.000  | 0.000          |
| Level 27  | 0.000  | 0.000          |
| Level 28  | 0.000  | 0.000          |
| Level 29  | 0.000  | 0.000          |
| Level 30  | 0.000  | 0.000          |
| Level 31  | 0.000  | 0.000          |
| Level 32  | 0.000  | 0.000          |
| Level 33  | 0.000  | 0.000          |
| Level 34  | 0.000  | 0.000          |
| Level 35  | 0.000  | 0.000          |
| Level 36  | 0.000  | 0.000          |
| Level 37  | 0.000  | 0.000          |
| Level 38  | 0.000  | 0.000          |
| Level 39  | 0.000  | 0.000          |
| Level 40  | 0.000  | 0.000          |
| Level 41  | 0.000  | 0.000          |
| Level 42  | 0.000  | 0.000          |
| Level 43  | 0.000  | 0.000          |
| Level 44  | 0.000  | 0.000          |
| Level 45  | 0.000  | 0.000          |
| Level 46  | 0.000  | 0.000          |
| Level 47  | 0.000  | 0.000          |
| Level 48  | 0.000  | 0.000          |
| Level 49  | 0.000  | 0.000          |
| Level 50  | 0.000  | 0.000          |
| Level 51  | 0.000  | 0.000          |
| Level 52  | 0.000  | 0.000          |
| Level 53  | 0.000  | 0.000          |
| Level 54  | 0.000  | 0.000          |
| Level 55  | 0.000  | 0.000          |
| Level 56  | 0.000  | 0.000          |
| Level 57  | 0.000  | 0.000          |
| Level 58  | 0.000  | 0.000          |
| Level 59  | 0.000  | 0.000          |
| Level 60  | 0.000  | 0.000          |
| Level 61  | 0.000  | 0.000          |
| Level 62  | 0.000  | 0.000          |
| Level 63  | 0.000  | 0.000          |
| Level 64  | 0.000  | 0.000          |
| Level 65  | 0.000  | 0.000          |
| Level 66  | 0.000  | 0.000          |
| Level 67  | 0.000  | 0.000          |
| Level 68  | 0.000  | 0.000          |
| Level 69  | 0.000  | 0.000          |
| Level 70  | 0.000  | 0.000          |
| Level 71  | 0.000  | 0.000          |
| Level 72  | 0.000  | 0.000          |
| Level 73  | 0.000  | 0.000          |
| Level 74  | 0.000  | 0.000          |
| Level 75  | 0.000  | 0.000          |
| Level 76  | 0.000  | 0.000          |
| Level 77  | 0.000  | 0.000          |
| Level 78  | 0.000  | 0.000          |
| Level 79  | 0.000  | 0.000          |
| Level 80  | 0.000  | 0.000          |
| Level 81  | 0.000  | 0.000          |
| Level 82  | 0.000  | 0.000          |
| Level 83  | 0.000  | 0.000          |
| Level 84  | 0.000  | 0.000          |
| Level 85  | 0.000  | 0.000          |
| Level 86  | 0.000  | 0.000          |
| Level 87  | 0.000  | 0.000          |
| Level 88  | 0.000  | 0.000          |
| Level 89  | 0.000  | 0.000          |
| Level 90  | 0.000  | 0.000          |
| Level 91  | 0.000  | 0.000          |
| Level 92  | 0.000  | 0.000          |
| Level 93  | 0.000  | 0.000          |
| Level 94  | 0.000  | 0.000          |
| Level 95  | 0.000  | 0.000          |
| Level 96  | 0.000  | 0.000          |
| Level 97  | 0.000  | 0.000          |
| Level 98  | 0.000  | 0.000          |
| Level 99  | 0.000  | 0.000          |
| Level 100 | 0.000  | 0.000          |

Chainage 200.0m ( 306441.0E 207198.6N )

Goat Mill Chainage 200



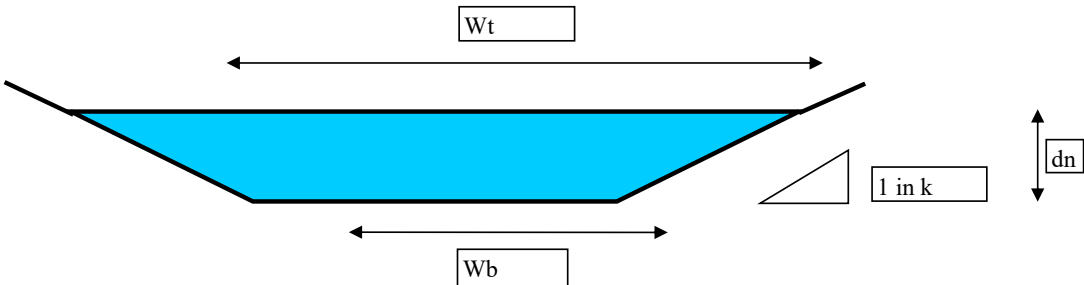
Chainage 200.0m ( 306441.0E 207198.6N )

## **Appendix G    Watercourse Capacity Calculations**

|                                                                                   |                                                 |                 |            |              |
|-----------------------------------------------------------------------------------|-------------------------------------------------|-----------------|------------|--------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | Calculations    | ref        | <b>15840</b> |
| Scheme:                                                                           | Ffos-y-Fran                                     | Prefix Page no. | A          |              |
| Section:                                                                          | Morlais - Bradley Gardens Chainage 200          | Date:           | 19/01/2026 |              |

**Trapezoidal Channel Flow**  
**Output Discharge**



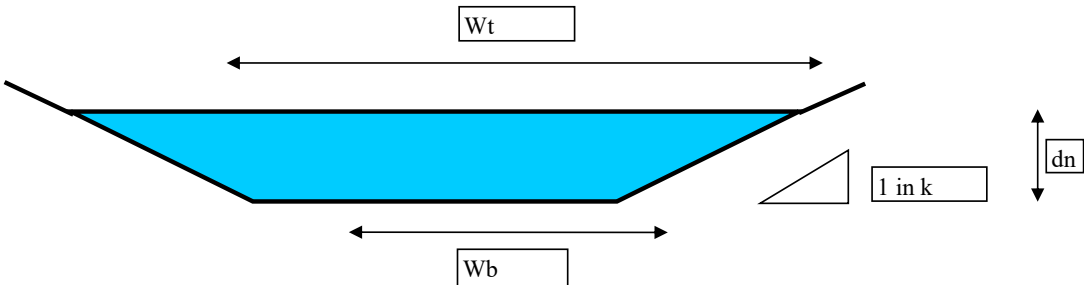
**Manning Formula**       $V = (1/n) * R^{2/3} * S^{1/2}$        $Q = A * V$

|                                 |          |                                      |
|---------------------------------|----------|--------------------------------------|
| Bottom width Wb (m)             | 0.125    |                                      |
| Side slope (1 in k)             | 2.966    |                                      |
| Bed slope (1 in x)              | 31.74    |                                      |
| Manning "n"                     | 0.035    |                                      |
| Depth dn (m)                    | 0.595    |                                      |
| Bed slope s (m/m)               | 0.031506 | 1 / x                                |
| Top width Wt (m)                | 3.655    | $Wb + 2 * k * dn$                    |
| Area A (m <sup>2</sup> )        | 1.124    | $(Wb + Wt) / 2 * dn$                 |
| Perim P (m)                     | 3.850    | $Wb + 2 * dn * \text{SQRT}(1 + k^2)$ |
| Hyd Rad R (m)                   | 0.292    | A / R                                |
| Velocity V (m/s)                | 2.232    | $1/n * R^{2/3} * S^{1/2}$            |
| Discharge Q (m <sup>3</sup> /s) | 2.5102   | A * V                                |

|                                                                                   |                                                 |                 |            |              |
|-----------------------------------------------------------------------------------|-------------------------------------------------|-----------------|------------|--------------|
|  | Eden Court, Lon Parcwr,<br>Ruthin, 01824 702220 | Calculations    | ref        | <b>15840</b> |
| Scheme:                                                                           | Ffos-y-Fran                                     | Prefix Page no. | A          |              |
| Section:                                                                          | Morlais - Goat Mill Chainage 200                | Date:           | 19/01/2026 |              |

**Trapezoidal Channel Flow**  
**Output Discharge**



|                                      |                                     |                                      |
|--------------------------------------|-------------------------------------|--------------------------------------|
| <b><u>Manning Formula</u></b>        | $V = (1/n) * R^{(2/3)} * S^{(1/2)}$ | $Q = A * V$                          |
| Bottom width Wb (m)                  | 1.769                               |                                      |
| Side slope (1 in k)                  | 1.344                               |                                      |
| Bed slope (1 in x)                   | 100.00                              |                                      |
| Manning "n"                          | 0.035                               |                                      |
| Depth dn (m)                         | 0.516                               |                                      |
| Bed slope s (m/m)                    | 0.010000                            | 1 / x                                |
| Top width Wt (m)                     | 3.156                               | $Wb + 2 * k * dn$                    |
| Area A (m <sup>2</sup> )             | 1.271                               | $(Wb + Wt) / 2 * dn$                 |
| Perim P (m)                          | 3.498                               | $Wb + 2 * dn * \text{SQRT}(1 + k^2)$ |
| Hyd Rad R (m)                        | 0.363                               | A / R                                |
| <b>Velocity V (m/s)</b>              | <b>1.455</b>                        | $1/n * R^{(2/3)} * S^{(1/2)}$        |
| <b>Discharge Q (m<sup>3</sup>/s)</b> | <b>1.8483</b>                       | A * V                                |