The Sidings,

Treforest, Pontypridd

Residential Development

Trivallis.

Drainage Strategy & Flood Consequence Assessment

November 2026

phg CONSULTING ENGINEERS

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DOCUMENT CONTROL

Project Number	2795
Project Title	The Sidings, Treforest, Pontypridd
Client	Trivallis
Document Title	Drainage Strategy & FCA

Prepared by	Checked by	Verified by	Approved by
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Issue History

Issue	Revision date	Details
P01	29/06/2026	First Issue
P02	06/07/2026	Second Issue
P03	04/11/2026	Updated to Architect Layout Rev M; drainage strategy unchanged

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1. Introduction

PHG Consulting Engineers have been commissioned to prepare a Drainage Strategy and Flood Consequence Assessment to support the planning and SuDS Approval Body (SAB) applications. This revision reflects the engineering design coordinated with the Architect's Layout Revision M. The overall drainage strategy and contributing impermeable areas remain unchanged.

The site is off The Sidings, Treforest, Pontypridd.

The purpose of this report is to ensure that surface and foul water drainage can be discharged without affecting the downstream catchments detrimentally.

Existing Site

The existing site is brownfield (existing offices) and covers an area of 0.5 Ha (1.1 Acre). The site is bound by The Sidings Road and Treforest Train Station and parking to the east. The site lies within the urban area of Treforest. The site is located at National Grid reference ST082889 and is shown in Figure 1 below.



Figure 1. Site Layout

Topography

The existing site is generally flat at a level of 62.00 to 63.00m AOD. The western boundary rises to 67.00 to 68.00m AOD along Belle Vue Terrace with levels retained by existing gabions.

Geology and Hydrogeology

The site and general local area are underlain by made ground above gravelly soils. Soakaway testing to BRE365 was carried out and only successful in one area. Also there is contamination on site within the made ground. Therefore there is very limited opportunities to utilise infiltration to manage surface water on this site.

Development Proposals

The development comprises 34 residential units, with associated access, parking, landscaping and sustainable drainage infrastructure. The plot positions have been coordinated with Architect's Layout Revision M; this has not altered the total impermeable area or the overall surface water drainage strategy.

Existing Drainage Features

The site is brownfield and currently utilised as offices. Surface water run-off from the development discharges to the local surface water system and to be confirmed via a Topographical & CCTV survey.

Foul Drainage

The site benefits from an existing connection to the local adopted drainage system. Welsh Water has been approached for pre-Planning advice (Ref: PPA0010123) and within Appendix E.

A point of connection from the site shall be via the Welsh Water adopted foul sewer network within The Sidings.

The site foul drainage will ultimately discharge to the Cardiff Bay Wasterwater Treatment Works and there are no issues with capacity, see Appendix E.

All foul drainage within the site will be designed in accordance with Sewers for Adoption (7th Edition) and Welsh Government regulations. Any drainage system serving multiple dwellings will be submitted for adoption by Dŵr Cymru Welsh Water (DCWW) under a Section 104 Agreement.

Surface Water Drainage

The site is in an area where Rhondda Cynon Taff County Borough Council are the Lead Local Flood Authority (LLFA) and SuDS Approval Body (SAB).

The development will adhere to the National Standards for Sustainable Drainage Systems (SuDS) in Wales.

Key Components of the Drainage Strategy:

1. **Surface Water Runoff Destination (Standard S1):**

    - Priority Hierarchy: Direct runoff to the most sustainable destinations, such as infiltration to the ground, before considering alternatives like discharge to surface water bodies or existing drainage systems.

    - Rainwater harvesting has been considered within the drainage hierarchy but is not relied upon for the site-wide hydraulic control. Source-control measures comprise bioretention areas and permeable paving, with a downstream attenuation basin serving the southern housing catchment.

    - The site investigation identifies made ground, variable infiltration performance and contamination constraints. Infiltration is therefore not relied upon as the principal means of surface water disposal. The proposed bioretention and permeable paving features are lined and positively drained.

    - There are no known watercourses near the site.

    - The existing predominantly impermeable brownfield site drains to the existing surface water system. The proposed drainage retains two separate outfalls: the southern housing catchment drains through source-control SuDS and a lined attenuation basin with a 4.5 l/s Hydro-Brake; the northern apartment catchment is treated through SuDS features before discharge to the existing surface water drainage network. The shallow receiving drainage levels constrain the feasibility of conventional below-ground attenuation for the northern catchment.

2. **Hydraulic Control (Standard S2):**

    - The design provides a reduction in the modelled whole-site peak runoff rates of more than 40% for the 1-, 2-, 30- and 100-year return periods compared with the existing brownfield arrangement. The southern housing attenuation basin is controlled by a Hydro-Brake set at 4.5 l/s. The northern apartment drainage has a separate positive outfall following SuDS treatment.

    - The pre-development impermeable area is 2,649.10 m², reducing to 1,319.67 m² post-development (a reduction of approximately 50.2%). The modelled pre-/post-development peak rates are respectively 34.2/19.9 l/s (1 year), 44.4/25.8 l/s (2 year), 80.6/47.9 l/s (30 year) and 99.0/57.9 l/s (100 year). Refer to drawing 2795-103-0 and the supporting MicroDrainage calculations.

- Volume Control: The substantial reduction in impermeable area, together with vegetated source-control SuDS, reduces runoff generation. Infiltration is not assumed for the lined drainage components.
- Interception Storage: Roof runoff is directed where practicable to bioretention areas, while parking areas are provided with permeable paving to intercept and treat frequent rainfall events.
- Attenuation: The southern housing catchment drains to a lined attenuation basin and a Hydro-Brake flow-control chamber restricting discharge to 4.5 l/s. The basin has a base level of 61.293 mAOD, maximum design water level of 62.180 mAOD and top-of-basin level of 62.500 mAOD. Refer to drawing 2795-202-0. The northern apartment catchment has a separate treated gravity discharge, as justified by the receiving network levels.
- Hydraulic Assessment: The September 2026 MicroDrainage pre-development and post-development calculations (2795-MD-001, 2795-MD-002 and 2795-MD-003) support the proposed discharge arrangement. The impermeable areas have been confirmed unchanged following coordination with Architect's Layout Revision M.
- Runoff Coefficients: The pre-development brownfield runoff assessment uses a volumetric runoff coefficient of 0.95; the post-development network calculations use 0.75, as identified in the accompanying MicroDrainage outputs.
- Urban Creep Allowance: The design incorporates the applicable residential urban creep allowance within the hydraulic assessment; the contributing impermeable areas remain unchanged following the architectural plot-position revisions.
- Climate Change Allowance: The surface water design has been assessed for the 1 in 100-year storm event with a 40% climate change rainfall allowance.

3. Water Quality (Standard S3):

- Pollution Prevention: Roof runoff is managed through planted bioretention features where practicable and parking runoff is treated by permeable paving. The SuDS management train incorporates filtration and sediment capture before positive discharge to the receiving network. Details are shown on drawing 2795-200-0.

4. **Amenity (Standard S4) and Biodiversity (Standard S5):**

    - Multi-functional Spaces: Design SuDS features that enhance public spaces, providing recreational and aesthetic benefits.
    - Ecological Enhancement: Incorporate native vegetation and create habitats to support local wildlife.

5. **Design for Maintenance and Structural Integrity (Standard S6):**

    - Accessibility: The attenuation basin, flow-control chamber, bioretention features, permeable paving and drainage chambers are to be accessible for inspection and maintenance in accordance with the accompanying private and adoptable maintenance strategies.
    - Durability: Select materials and designs that ensure long-term functionality and resilience.

Site-Specific Considerations:

- Contamination and Soil Permeability: The brownfield ground conditions, made ground and site investigation findings constrain reliance on infiltration. SuDS components are designed with impermeable lining and positive drainage where shown on the engineering details.

Approval Process:

Pre-SAB consultation is currently underway and will inform the drainage proposals, including the separate northern apartment and southern housing drainage arrangements. The design coordinated to Architect's Layout Revision M retains these established principles.

A Full SAB application will be submitted to Rhondda Cynon Taf County Borough Council for approval prior to construction. The detailed submission will include the coordinated engineering drawings, hydraulic calculations, adoption plan and private/adoptable maintenance strategies.

The coordinated Engineering General Arrangement is drawing 2795-100 Rev A, updated to Architect's Layout Revision M. Supporting drawings include 2795-101-0 (SAB Adoption Plan), 2795-103-0 (Impermeable Areas), 2795-200-0 to 2795-203-0 (SuDS and drainage construction details).

Flood Risk

The site lies within an area adjacent to land at risk from flooding from the sea and rivers. Therefore, the site is within Flood Zone 1.

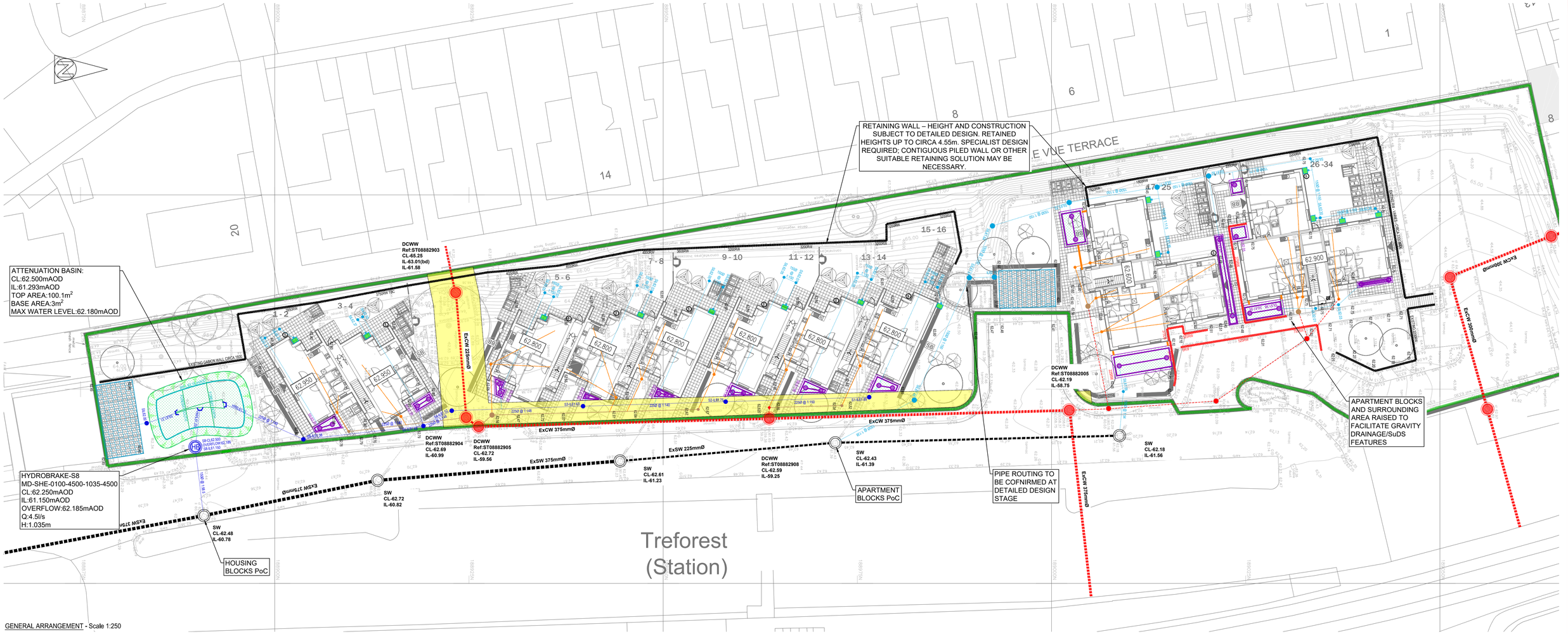
The latest NRW Flood Risk Map is shown within Appendix D.

There are small areas within the current development showing estimated flooding from surface water run-off, which is common for existing developments such as this. This is due to localised low points within the current development plateau and will be engineered out as part of the new developments design.

Conclusions

- The development is in Flood Zone 1 from Rivers and Sea (FMfP).
- Foul water will discharge into the existing public sewer adjacent to the site within The Sidings.
- The development reduces the modelled whole-site peak surface water runoff rates by more than 40% for the assessed 1-, 2-, 30- and 100-year events. The southern housing basin outfall is restricted to 4.5 l/s; the northern apartment catchment discharges separately following SuDS treatment.
- The surface water drainage design accommodates the 1 in 100-year rainfall event with a 40% climate change allowance. The proposed lined attenuation basin, flow control, bioretention and permeable paving are shown on the coordinated engineering drawings.
- Pre-SAB consultation has informed the drainage strategy. Architectural Layout Revision M has altered plot positions only; the impermeable areas, hydraulic calculations and overall drainage strategy remain unchanged.
- A Full SAB application will be submitted for approval before construction, supported by the coordinated engineering drawings, September 2026 hydraulic calculations and separate private and adoptable drainage maintenance strategies.
- The proposed reduction in impermeable area and peak runoff rates provides betterment relative to the existing brownfield drainage arrangement and is intended to avoid increasing downstream flood risk.

Appendix A – Engineering Appraisal



GENERAL ARRANGEMENT - Scale 1:250

LEGEND

- Foul Water Sewer/Lateral Drain (Existing)
- Foul Water Manhole (Existing)
- Foul Water Sewer Proposed Adoptable
- Surface Water Sewer (Existing)
- Foul Water Drain (non-adoptable)
- Type 3 Foul Water Inspection Chamber
- Type 4 Foul Water Inspection Chamber
- Surface Water Sewer (adoptable)
- Surface Water Manhole (adoptable)
- Surface Water Drain (non-adoptable)
- Rising Main (Adoptable)
- Type 3 Surface Water Inspection Chamber
- Type 4 Surface Water Inspection Chamber
- Storm Water Rodding Eye
- 134.50 — Building D.P.C. Level
- 135.50 — Proposed Finished Ground Level
- 450 — Additional Underbuild (below d.p.c. as shown)
- 3000RW — Retaining Wall - (Height shows difference in levels - finished levl at bottom and top).
- 03S — Steps (to be Part M Compliant)
- 1 in 2.2m MAX gradient batters to be used - subject to approval by a suitably qualified Geo-technical Engineer.
- DCWW Easement
- Development Boundary

LEGEND - SABS FEATURES

- Dished Channel Block
- Private Raingarden / Bio-Retention Area
- Proposed Private Permeable Paving (nominal sub-base)
- Proposed Private SuDS Planter
- HB — Proposed Private SuDS Planter
- Proposed Geogrow Headwall or approved similar
- Proposed Attenuation Basin
- Attenuation Basin Max Water Level
- Proposed Water Butt



SITE LOCATION PLAN - NTS

GENERAL NOTES

1. The contractor is to check and verify all buildings and site dimensions and levels, including existing sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
2. Positions of existing services/statutory undertakers apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work.
3. This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specifications and any structural, geotechnical or other specialist document provided.
4. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
5. Where trees adjacent to the highway are proposed, root barriers of an approved type are required to prevent future structural damage to the highway.
6. Any anomaly or contradictions between any of the above is to be reported immediately to PHG Consulting Engineers.

ROAD AND SEWER ADOPTIONS

1. All works for adoption under a Section 38 agreement shall be carried out to the Highway Authority Specification for Road Construction in Residential Areas and to the approval of the Area Highway Authority.
2. All works for adoption under a Section 104 agreement shall be carried out to the National Water Council guide "Sewers for Adoption" 7th Edition and shall be in accordance with the Drainage Authority's additions and amendments.
3. Any works carried out on site prior to confirmation of technical approval for Section 104 and Section 38 Agreements (including street lighting approval) are entirely at the developers risk.
4. Street lighting positions to be pegged on site and agreed by the Local Authority PRIOR to erection commencing.
5. A clause is to be included within the Section 38 Agreement requiring that, prior to adoption, the developer is to process a Traffic Regulation Order covering whatever restrictions may be determined to be necessary in relation to on-street parking restrictions within the site roads. The situation will be monitored once all new dwellings are occupied.
6. A clause is to be included within the Section 38 Agreement requiring that additional speed reducing measures are to be implemented if judged necessary by the Highway Authority in the event that excessive vehicle speeds become evident prior to adoption of the works.

DRAINAGE NOTES

1. All private drainage shall be in accordance with BS8301 and relevant sections of Approved Document H of the Building Regulations.
2. The contractor is to check the level of existing sewers being used as outfalls or crossing proposed drainage runs PRIOR to laying any pipes. Any discrepancies are to be reported to PHG Consulting Engineers.
3. Position of soil pipes, stubstacks, WC outlets, rainwater downpipes, etc., positions are to be checked against the housetype working drawings.
4. Private house drainage will be flexibly jointed plastic or clay pipework. Diameter 100mm unless shown otherwise.
5. All connections for House Drainage shall be 100mm unless noted otherwise and must extend 500mm behind the back of footway/homezone road. All connections when laid shall be plugged, protected as necessary and marked with a stake for future use.
6. For private drains where cover to pipes is less than 900mm in vehicular areas or 500mm in other areas protection in the form of a 100mm thick concrete pad shall be provided over the pipe granular surround.
7. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided over. Under buildings pipes shall be surrounded with 150mm thickness of granular material. Where drains pass within 1m of buildings the wall foundation shall be taken down below the invert of the pipe.
8. Where drains do not exceed 600mm deep, plastic or clay access fittings minimum diameter 225mm shall be used. Elsewhere proprietary plastic or precast concrete inspection chambers shall be used. Unless shown otherwise FW inspection chambers are to be 750mm below dpc level and SW chambers and rodding eyes to be 600mm below dpc.
9. All gullies and rainwater downpipes connected directly to drains are to be roddable.
10. House levels shown are dpc and adjacent garage floors are to be 150mm lower unless shown otherwise. Levels at drainage access points are inverts.
11. Drainage runs should be laid at a minimum of 5.0m from the rear of properties where practical to allow for future extensions.
12. All drainage shall be laid upstream and each run between manholes shall be laid complete prior to backfilling. Where this is not practical trial holes or other means of identifying the line and level of services shall be carried out prior to works commencing.
13. All branch drains, or connections, are to discharge to the collectors obliquely, and in the direction of the main flow.
14. All low spots on hardstanding areas to have yard gullies unlesspermeable paving is used.
15. The developer must self-vet and certify that the design criteria, material standards and workmanship specifications for the proposed adoptable sewers are in accordance with those set out in "Sewers for Adoption" 7th Edition, A Section 106 application to connect must be made to the water authority, the developer shall give 21 days' notice prior to connection, and the works may only be undertaken by a SSIP accredited contractor.
16. The foul sewers must achieve a minimum flow velocity of 0.75 m/s at one third design flow or when the sewer has a nominal internal diameter of 100mm or where 10 properties or less are connected the sewer must be laid at minimum of 1:80. Where the sewer has a nominal internal diameter of 150mm and at least 10 dwelling units are connected the sewer will be laid at a minimum gradient of 1:150. The maximum gradient a sewer can be laid is 1:5.
17. The surface water sewers must achieve a minimum flow velocity of 1 m/s at pipe full flow or when the sewer has a nominal internal diameter of 100mm the sewer must be laid at minimum of 1:100. Where the sewer has a nominal internal diameter of 150mm or greater the sewer will be laid at a minimum gradient of 1:150. The maximum gradient a sewer can be laid is 1:5.
18. All inspection chamber and manhole covers should adhere to BS EN 124 and be suitable for where the chambers and manholes are situated.
19. Where sewers are located in proximity or between buildings refer to Figures B.1 and B.2.

Rev.	Date	Details	By	Chk.
A	04/11/26	UPDATED TO ARCHITECT LAYOUT V-M	MP	SJD
0	23/09/26	FIRST ISSUE	MP	SJD

Amendments

Client: Trivallis.

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Project: THE SIDINGS

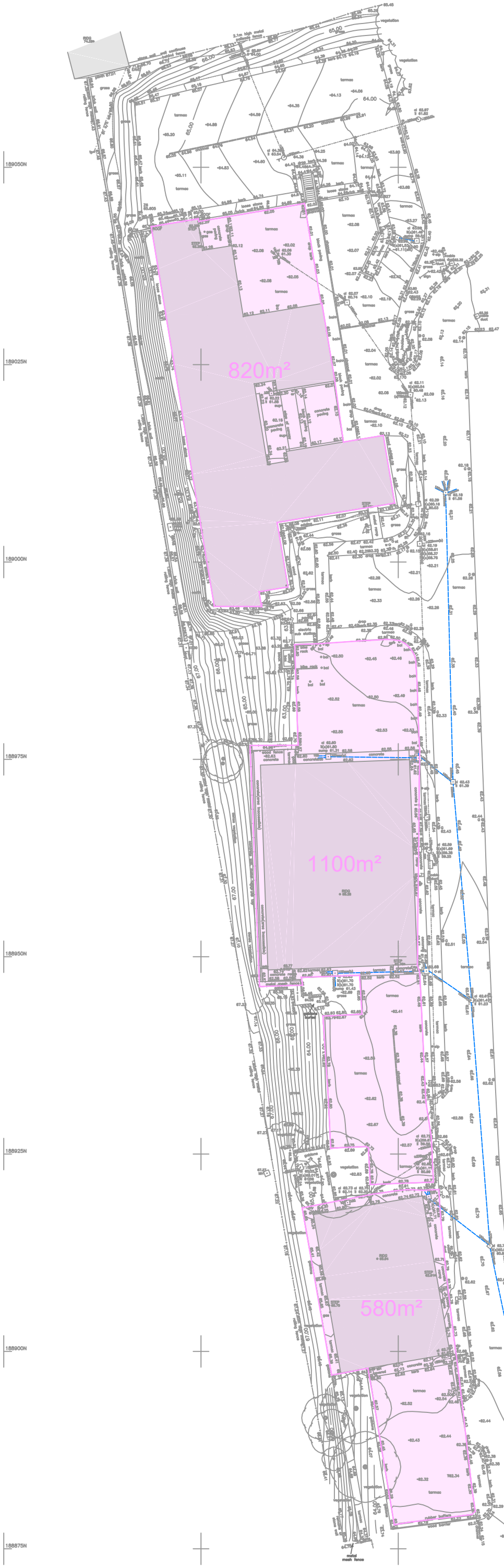
Drawing title: ENGINEERING GENERAL ARRANGEMENT

Drawn:	Chk:	Status:	Scale:
MP	SD	APPROVAL	1:250@A1

Date:	Job no.	Drg. no.	Rev.
SEP 2026	2795	100	A

File name: 2795-100-A-Engineering-General Arrangement.dwg

Appendix B – Existing Impermeabilty Plan



Rev.	Date.	Details.	By.	Chk.
/	29.06.26	First issue.	SJD	TOR

Amendments

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Project:

The Sidings
Treforest, Pontypridd

Drawing title:

Existing Impermeable Areas

Drawn:	Chk:	Status:	Scale at A3:
SJD	TOR	Preliminary	1:500

Date:	Job no.	Drg. no.	Rev.
June 2026	2795	501	/

Appendix C – Proposed Impermeability Plan





PRE-DEVELOPMENT
IMPERMEABLE AREA = 2649.10m^2

PRE-DEVELOPMENT DISCHARGE RATES:

1YR	=	34.2 l/s
2YR	=	44.4 l/s
30YR	=	80.6 l/s
100YR	=	99.0 l/s

POST-DEVELOPMENT
IMPERMEABLE AREAS
(ROOF/PATIO/PARKING) = 1319.67m^2

1YR	=	19.9 l/s
2YR	=	25.8 l/s
30YR	=	47.9 l/s
100YR	=	57.9 l/s

REV.	DATE	DETAILS	BY.	CHK.
0	23/09/26	FIRST ISSUE	MP	SJD

AMENDMENTS

CLIENT:

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PROJECT:

THE SIDINGS

DRAWING TITLE:

IMPERMEABLE AREAS PLAN

DRAWN:	CHK:	STATUS:	SCALE:
MP	SD	APPROVAL	1:500@A1

DATE:	JOB NO.	DRG. NO.	REV.
SEP 2026	2795	102	0

File name: 2795-103-Impermeable Areas Plan.dwg

Appendix D – NRW Flood Map

Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Basic

Enter title (max 35 characters)



Legend

TAN15 Defended Zones

Rivers

Sea

Rivers and Sea

Rivers and Sea

Flood Zone 3

Flood Zone 2

Surface Water and Small Watercourses

Flood Zone 3

Flood Zone 2

Scale at A3: 1:2,500

Date: 08/10/2025

0.1 0.05 0 0.1

km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en

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Appendix E – Welsh Water Correspondance

Dŵr Cymru
Welsh Water

Developer Services
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Cardiff
CF30 0EH

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Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

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Blwch Post 3146
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E.bost: developer.services@dwrcymru.com

Mr Stephen Davis
PHG Consulting Engineers
107
Cowbridge Road East
Cardiff
Cardiff
CF11 9AG

Date: 01/06/2026
Our Ref: PPA0010123

Dear Mr Davis

Grid Ref: 308261 188991
Site Address: The Sidings, Treforest
Development: 35 dwellings

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

APPRAISAL

Firstly, we note that the proposal relates to 35 Residential units at The Sidings and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

PUBLIC SEWERAGE NETWORK

proposed development site is located in the immediate vicinity of a combined public sewerage system which drains to Cardiff Bay Wastewater Treatment Works (WwTW).

This site is crossed by public combined sewers, with their approximate position being marked on the attached Statutory Public Sewer Record. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. No part of any building will be permitted within the protection zone of the public sewers measured 3 metres either side of the centreline. Please note, the distance specified for this protection zone is indicative and based on industry standard guidelines. However, the depth of the asset will need to be

verified on site which may infer a greater protection zone. For completeness, we recommend the developer refer to their title deeds to confirm if there are any covenants or restrictions associated with the assets crossing the proposed development site.

Accordingly, it is recommended that the developer contact our Plan and Protect team (PlanandProtect@dwrcymru.com) to carry out a survey to verify the location of this asset and establish its relationship to the proposed development. Our strong recommendation is that your site layout takes into account the location of the assets crossing the site and should be referred to in any master-planning exercises or site layout plans submitted as part of any subsequent planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

SURFACE WATER DRAINAGE

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy preferring infiltration (PL2) and, where infiltration is not possible, disposal to a surface water body (PL3), in liaison with the Lead Local Flood Authority and/or Natural Resources Wales, or surface water sewer or highway drain (PL4) in liaison with the riparian owner and/or Local Highways Authority.

Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note and our Developer Services website at https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems.

In the absence of an accompanying surface water drainage strategy, it is recommended that the developer engage in consultation with Rhondda Cynon Taff Council as the determining SuDS Approval

Body (SAB), in relation to their proposals for SuDS features. Please be advised that due to capacity constraints with the downstream public sewerage network, under no circumstances would we allow surface water runoff highway run-off from the proposed development to communicate directly or indirectly with the public combined sewerage system. In addition, please note, no amount of land drainage run-off is permitted to discharge directly or indirectly into the public sewerage system.

Furthermore, Planning Policy Wales (PPW) acknowledges that discharge of surface water to foul sewers is prohibited and highlights that any additional surface water from new developments should not be discharged to combined systems because of the risk of pollution when combined systems overflow (Para 6.6.3). Moreover, PPW recognises the challenges faced from rainfall intensity causing surface water flooding and diffuse pollution (Para 6.6.14) along with the importance of well-maintained sewerage networks (Para 6.6.15), particularly as a result of run-off from built surfaces and the sewage discharges from overloaded sewers (Para 6.6.16).

FOUL WATER DRAINAGE – SEWERAGE NETWORK

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the combined sewer at or downstream of manholes ST08892005, located in the highway to the east of the site.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

Potable Water Supply

A water supply can be made available to service this proposed development. Initial indications are that a connection can be made from the 110mm diameter watermain in 308275.57, 188998.24 location. The

cost of providing new on-site watermains can be calculated upon the receipt of detailed site layout plans which should be sent to the above address.

Dwr Cymru Welsh Water is not responsible for fire protection or for providing suitable fire flows for firefighting. If a dedicated fire suppression main for a development is required a separate application can be made to DCWW. We cannot guarantee the constant availability of water, flow or pressure required for such systems and these aspects must be considered when designing a dedicated sprinkler/fire suppression system. If a dedicated fire suppression main for a commercial/industrial development is needed a separate application for is required. It is not mandatory for DCWW to accept a connection for fire suppression purposes on a development of this nature. Each application will be assessed on a case-by-case basis.

Providing fire flows and fire protection are the responsibility of the appropriate regional Fire Services. We refer you to the 3rd Edition of the National Guidance Document on the Provision of Water for Fire Fighting published by the Local Government Association and Water UK.

More information on Potable Water Connections can be found online at https://developers.dwrcymru.com/en/applications/water-connections

Sewage Treatment

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

FURTHER CONTACT

If you have any questions about the above response, please contact Bethan Davies who is the Development Planning Officer for Rhondda Cynon Taff at developer.services@dwrcymru.com or on 0800 917 2652. They will be happy to assist you further.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at developer.services@dwrcymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,

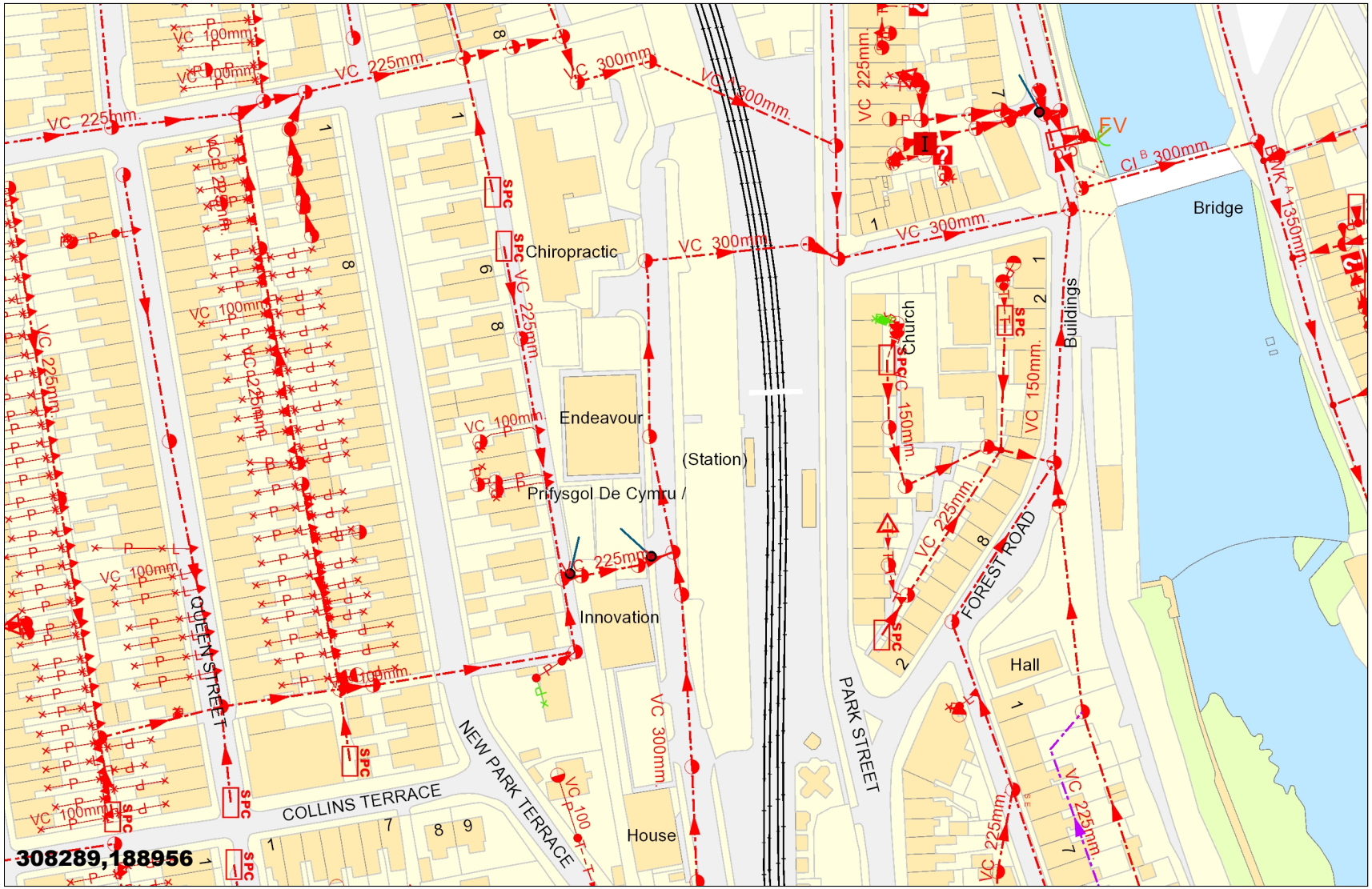
Matthew Lord
Planning Liaison Manager
Developer Services

<u>Please Note</u> that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.

Dŵr Cymru
Welsh Water

08/10/2025

Scale: 1: 1587



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon In the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby the company, is done so in accordance with statutory requirements of sections 198 and 199 f the water industry Act 1991 based upon the best Information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclosure the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information us entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

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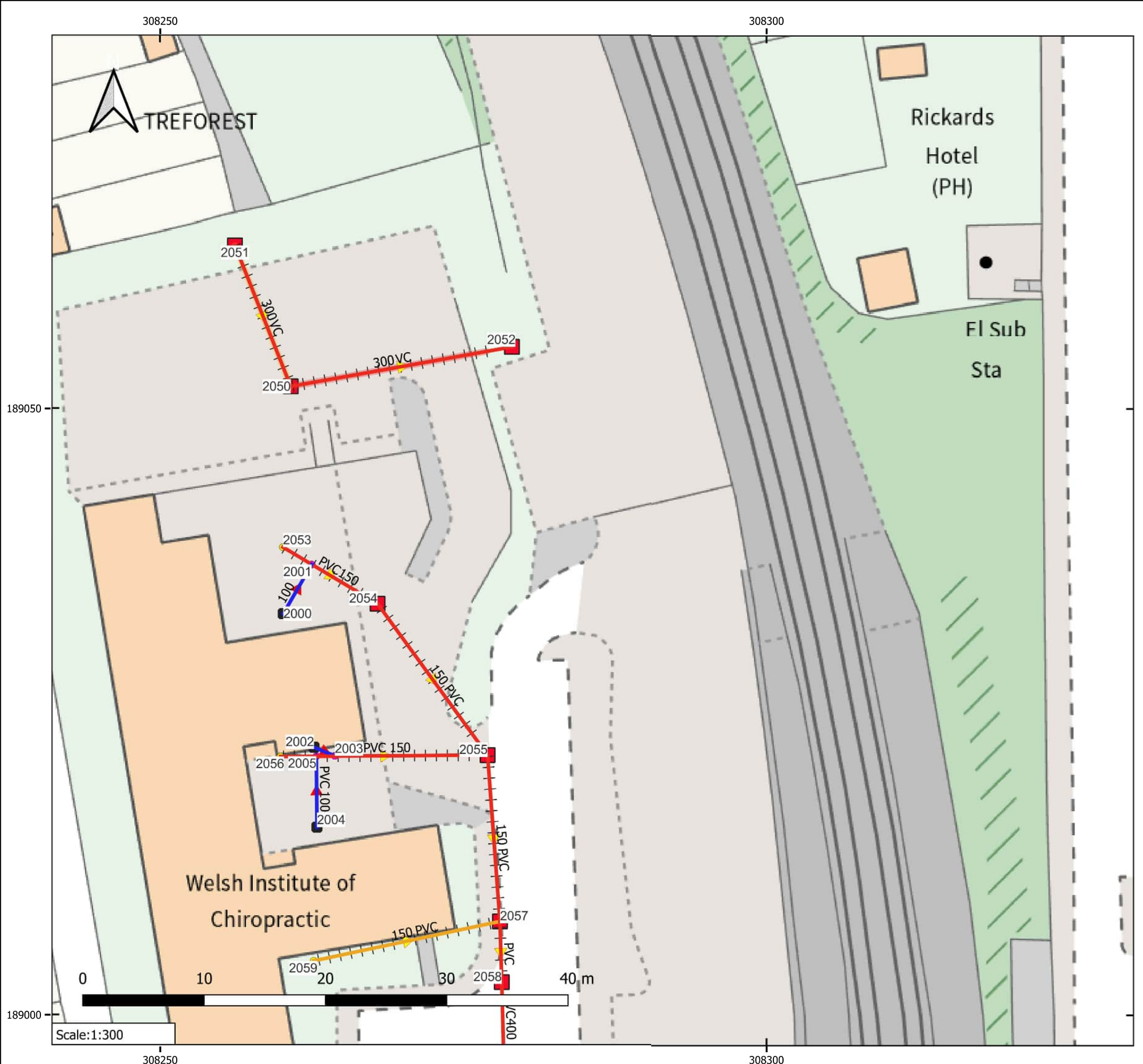
Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Appendix F – CCTV Plan

Scheme: Trivallis The Sidings



Legend

Inspection Status
- Grade 3
- Grade 4
- Grade 5

Nodes
- SW Catchpit
- Outfall/Inlet
- Rodding Eye
- Head of run/Plot to show line
- Gully
- Blind Connection
- Inspection Chamber
- SW Manhole
- CW Manhole
- Combined Manhole
- Foul Manhole
- CW Catchpit
- Lamphole
- SW Soakaway
- Land Drainage MH

Sections
- Surface Water
- Foul Water
- Culverted Watercouse
- Combined
- Land Drainage
- Trade Effluent
- Beany Kerbs
- Ditch

Notes: Lines are for illustrative purposes only exact positions should be verified prior to any potential works.

Overview shown

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Project:

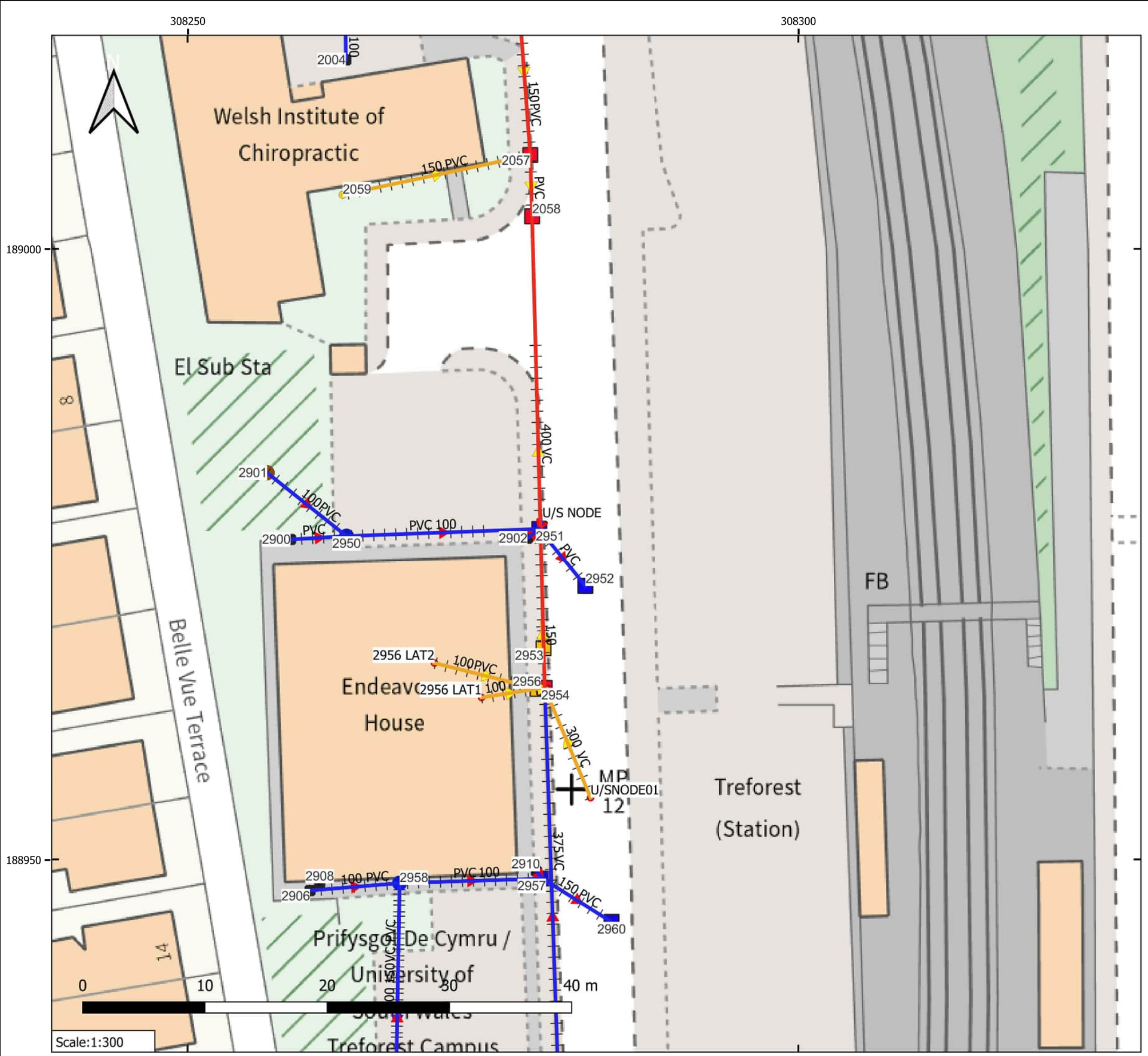
Drawing Title:Overview

Job No:	Revision: 01	Dwg No:01
Drawn by: DJH	Date: 01/06/2026	Dept:

Arch Utility Services Ltd
Unit 2 Llanwonno road ind est
Ynyshir, Porth
Rhondda Cynon Taff
CF39 0HU

ArchServices
www.archservices.co.uk

Scheme: Trivallis The Sidings



Legend

Inspection Status
- Grade 3
- Grade 4
- Grade 5

Nodes
- SW Catchpit
- Outfall/Inlet
- Rodding Eye
- Head of run/Plot to show line
- Gully
- Blind Connection
- Inspection Chamber
- SW Manhole
- CW Manhole
- Combined Manhole
- Foul Manhole
- CW Catchpit
- Lamphole
- SW Soakaway
- Land Drainage MH

Sections
- Surface Water
- Foul Water
- Culverted Watercouse
- Combined
- Land Drainage
- Trade Effluent
- Beany Kerbs
- Ditch

Notes: Lines are for illustrative purposes only exact positions should be verified prior to any potential works .

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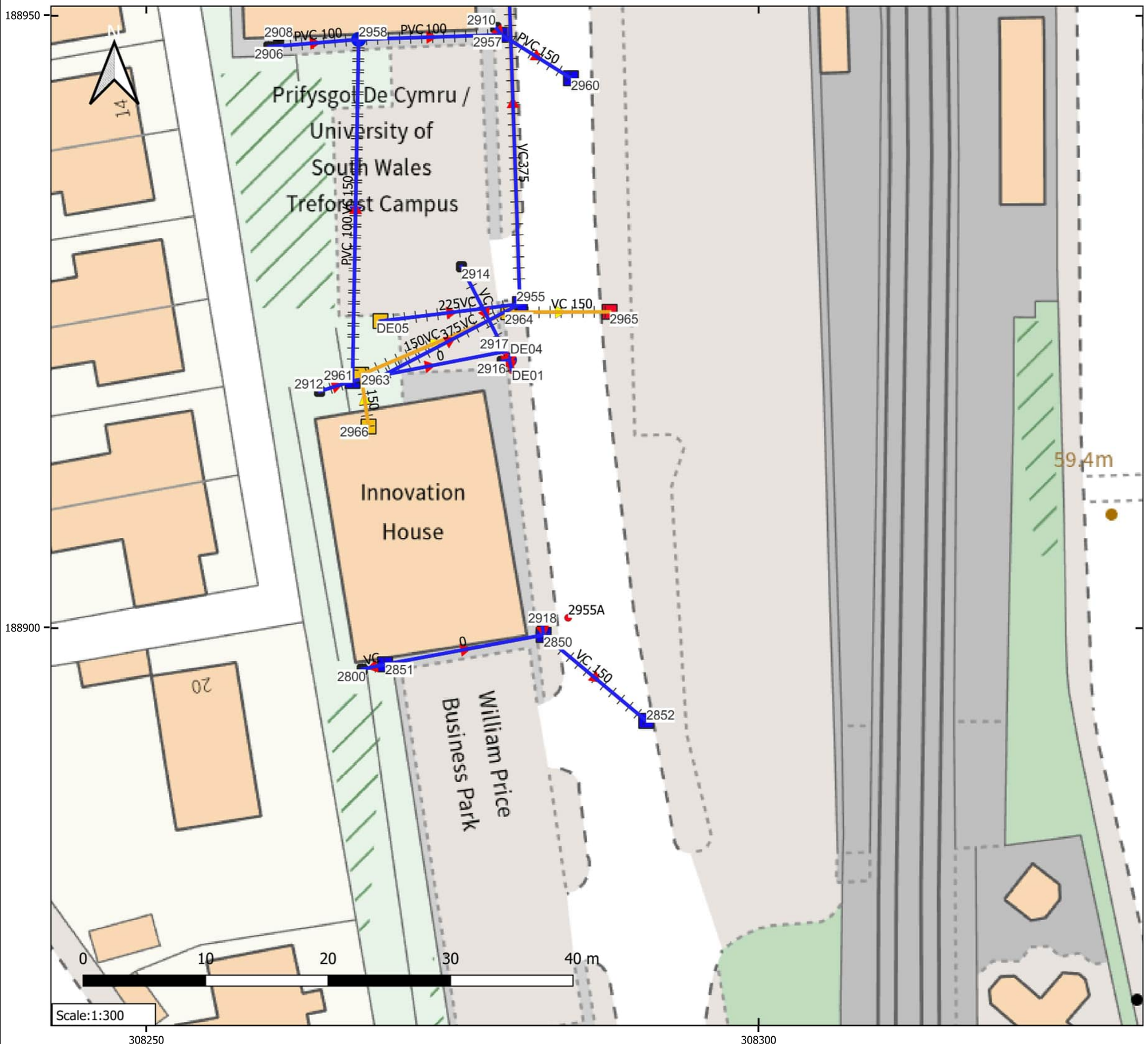
Project:

Drawing Title:

Job No:	Revision: 01	Dwg No:02
Drawn by: DJH	Date: 01/06/2026	Dept:

Arch Utility Services Ltd
Unit 2 Llanwonno road ind est
Ynyshir, Porth
Rhondda Cynon Taff
CF39 0HU



Scheme: Trivallis The Sidings

Legend

Inspection Status
- Grade 3
- Grade 4
- Grade 5

Nodes
- SW Catchpit
- Outfall/Inlet
- Rodding Eye
- Head of run/Plot to show line
- Gully
- Blind Connection
- Inspection Chamber
- SW Manhole
- CW Manhole
- Combined Manhole
- Foul Manhole
- CW Catchpit
- Lamphole
- SW Soakaway
- Land Drainage MH

Sections
- Surface Water
- Foul Water
- Culverted Watercouse
- Combined
- Land Drainage
- Trade Effluent
- Beany Kerbs
- Ditch

Notes: Lines are for illustrative purposes only exact positions should be verified prior to any potential works,

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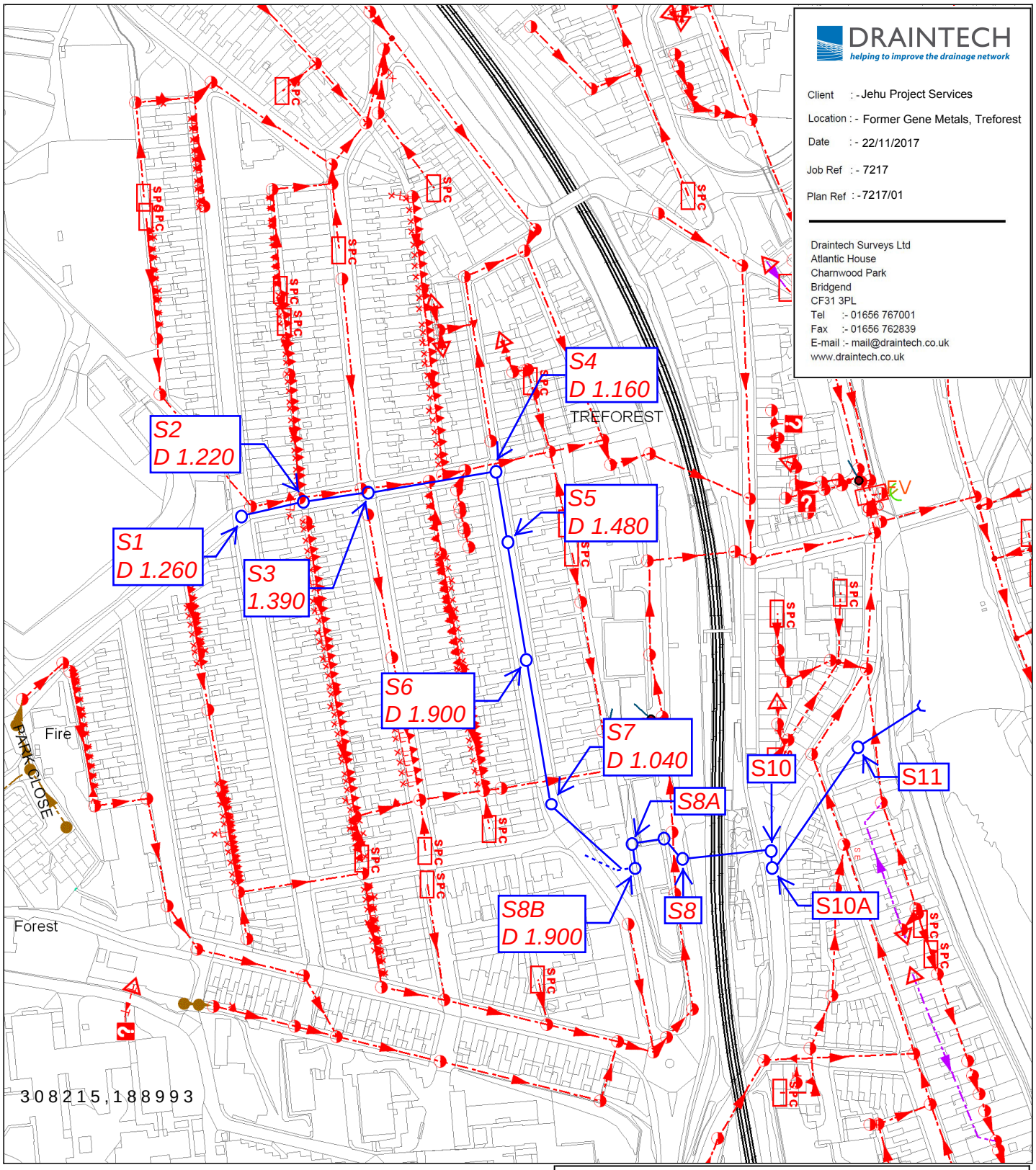
Project: RCT Contracted drainage works

Drawing Title:

Job No:	Revision: 01	Dwg No:03
Drawn by: DJH	Date: 01/06/2026	Dept:

Arch Utility Services Ltd
Unit 2 Llanwonno road ind est
Ynyshir, Porth
Rhondda Cynon Taff
CF39 0HU

Appendix G – Existing RCT LLFA Culvert Sewer Records



DRAINTECH
helping to improve the drainage network

Client : - Jehu Project Services
Location : - Former Gene Metals, Treforest
Date : - 22/11/2017
Job Ref : - 7217
Plan Ref : - 7217/01

Draintech Surveys Ltd
Atlantic House
Charnwood Park
Bridgend
CF31 3PL
Tel :- 01656 767001
Fax :- 01656 762839
E-mail :- mail@draintech.co.uk
www.draintech.co.uk

LEGEND

- Sluice Valve
- Air Valve SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- Bulk Meter
- Fire Hydrant
- Cap
- Non Dwr Cymru
- Existing Distribution Main
- Inspection Chamber
- Gravity Sewer
- Rising Main
- Outfall
- Pumping Station
- Lamphole
- Combined Sewer Overflow
- Special Purpose Chamber
- Treatment Works
- Private Sewer Transfer
- Lateral Drain

NB:
Sewer symbol colour indicates the sewer type.

RED - Combined
GREEN - Surface Water
BROWN - Foul

Dŵr Cymru
Welsh Water

Treforest

Scale: 1:2650
27/11/2017

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

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Allotment Gardens
Allotment Gardens
Playing Field
GEN-TEG ED
Club
TREFOREST WARD
Playing Field
Shelter
Play Area
Playing Field
Scrap Yard
Playing Field
PONTYPRIDD
Tip
Scrap Yard
PONTYPRIDD ED CONST
Playing Field
Mast
ssues
Sinks
RHONDDA CYNON TAF. – RHONDDA CYNON TAFF
SOUTH WALES EURO CONST
PONTYPRIDD C
PONTYPRIDD
TREFOREST
PONTYPRIDD ED CONST
TREFOREST ED
Sloping masonry
CARDIFF ROAD
Cattle Grid
Castle Bridge
Sluice
Weir
OUTFALL
Garages
KINGSLAND TERRACE
QUEEN STREET
BELL PARK TERRACE
SHARON STREET
Nursery School
The Bridge (PH)
BRIDGE STREET
Capel Saron
Saron House
Hall
Club
PARK STREET
Car Park
Richards Hotel (PH)
RIVER STREET
Car Park
CASTLE STREET
Castle Buildings
Church
Castle Square
Congregational Church
Funeral Home
FOREST ROAD
Castle Buildings
Trefforest Station
Trefforest Station
Dr Wilson Price Business Centre
The Bungalow
Hall
PH
Shelter
FOREST ROAD
PARK STREET
Rees Terrace
JOHN STREET
JOHN PLACE
BROOK STREET
Brookdale
Graig-yr-eos
Penygarn
Ashton Villa
Delfan
Cefn Coed
Hillside
COLLINS TERRACE
NEW PARK TERRACE
BELLE VUE TERRACE
Belle Vue Terrace
Diver Terrace
KING STREET
BAYFORD STREET
PARK CLOSE
CWRT GLYNDWR
Fire Sta
Fire Station
Police Houses
Park Pride
Forest View Bungalow
Birchwood Bungalow
Englewood
Track
Path
Path (um)
Coed Ffrost-i-
Glamor
Sinks
BIRCHLEA
DUKE STREET
BM 68.05m
68.4m
PC
60.8m
LB
60.3m
59.1m
58.5m
56.8m
BM 56.51m
66.6m
BM 69.83m
69.6m
73.6m
78.6m
BM 72.00m
70.8
78.8m
77.5m
76.1m
77.4m
72.8m
80.4m
84.3m
El Sub Sta
El Sub Sta
El Sub Sta
El Sub Sta
El Sub Sta
FB
MP 12
300VC
225VC
375CD
450VC
150VC
ABOVE
INVERT
INVERT FROM PROPOSED MANHOLE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 450mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 300mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 225mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 375mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 150mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL DUCKS TO BE CONSTRUCTED IN 300mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL DUCKS TO BE CONSTRUCTED IN 225mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL DUCKS TO BE CONSTRUCTED IN 375mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL DUCKS TO BE CONSTRUCTED IN 150mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL DUCKS TO BE CONSTRUCTED IN 450mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 450mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 300mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 225mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 375mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 150mm DIA PIPE
ALL STORM RUNS FROM HERE TO OUTFALL TO BE CONSTRUCTED IN 450mm DIA PIPE
OUTLET
INLET STORM
OUTLET STORM

DRAINTECH
helping to improve the drainage network

Client : - Jehu

Location : - Former Gene Metals

Date : - 22/11/2017

Job Ref : - 7217

Plan Ref : - 7217/01

Draintech Surveys Ltd
Atlantic House
Charnwood Park
Bridgend
CF31 3PL
Tel :- 01656 767001
Fax :- 01656 762839
E-mail :- mail@draintech.co.uk
www.draintech.co.uk

Appendix H – Pre-Development Runoff Estimation (2795-MD-001)

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.250	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.950	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.207	4-8	0.058

Total Area Contributing (ha) = 0.265

Total Pipe Volume (m³) = 0.577

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	9.500	0.540	17.6	0.265	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	5.000	0.100	50.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.05	61.470	0.265	0.0	0.0	0.0	3.13	124.6	45.5
S1.001	50.00	5.10	60.930	0.265	0.0	0.0	0.0	1.85	73.7	45.5

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.265	0.265	0.265
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.265	0.265	0.265

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	62.750	60.830	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.100	Storm Duration (mins)	30
Ratio R	0.300		

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	17.100	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	1	+0%	30/15 Summer				61.560
S1.001	S2	15 Summer	1	+0%	30/15 Summer				61.081

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.135	0.000	0.33			34.4	OK	
S1.001	S2	-0.074	0.000	0.77			34.2	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	17.100	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	2	+0%	30/15 Summer				61.574
S1.001	S2	15 Summer	2	+0%	30/15 Summer				61.124

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.121	0.000	0.43			44.5	OK	
S1.001	S2	-0.031	0.000	1.00			44.4	OK	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	17.100	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	30	+0%	30/15 Summer				61.708
S1.001	S2	15 Summer	30	+0%	30/15 Summer				61.374

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.013	0.000	0.79			80.9	SURCHARGED	
S1.001	S2	0.219	0.000	1.81			80.6	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	17.100	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	100	+0%	30/15 Summer				62.059
S1.001	S2	15 Summer	100	+0%	30/15 Summer				61.544

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.364	0.000	0.96			98.7	SURCHARGED	
S1.001	S2	0.389	0.000	2.22			99.0	SURCHARGED	

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Appendix I – Post-Development Hydraulic Calculations (2795-MD-002 / 003)

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.250	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm at outfall S-HOUSING OUTFALL (pipe S1.007)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.059	4-8	0.019

Total Area Contributing (ha) = 0.079

Total Pipe Volume (m³) = 3.820

Time Area Diagram at outfall S-APARTMENT OUTFALL (pipe S2.001)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.041	4-8	0.005

Total Area Contributing (ha) = 0.046

Total Pipe Volume (m³) = 0.411

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	18.488	0.123	150.3	0.017	4.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.29	61.890	0.017	0.0	0.0	0.0	1.06	42.3	2.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	18.365	0.131	140.2	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	16.912	0.114	148.4	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	4.143	0.028	148.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	15.538	0.110	141.3	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	13.583	0.091	149.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	5.082	0.143	35.5	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	8.899	0.152	58.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	10.196	0.090	113.3	0.046	4.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	13.036	0.087	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	50.00	4.57	61.767	0.036	0.0	0.0	0.0	1.10	43.8	4.9
S1.002	50.00	4.83	61.636	0.055	0.0	0.0	0.0	1.07	42.6	7.4
S1.003	50.00	4.89	61.522	0.055	0.0	0.0	0.0	1.07	42.6	7.4
S1.004	50.00	5.13	61.494	0.074	0.0	0.0	0.0	1.10	43.7	10.0
S1.005	50.00	5.34	61.384	0.074	0.0	0.0	0.0	1.07	42.5	10.0
S1.006	50.00	5.38	61.293	0.079	0.0	0.0	0.0	2.20	87.5	10.6
S1.007	50.00	5.49	61.150	0.079	0.0	0.0	0.0	1.32	23.3	10.6
S2.000	50.00	4.18	61.570	0.046	0.0	0.0	0.0	0.94	16.7	6.3
S2.001	50.00	4.45	61.480	0.046	0.0	0.0	0.0	0.82	14.5	6.3

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.017	0.017	0.017
1.001	-	-	100	0.019	0.019	0.019
1.002	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.019	0.019	0.019
1.005	-	-	100	0.000	0.000	0.000
1.006	User	-	100	0.005	0.005	0.005
1.007	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.021	0.021	0.021
	User	-	100	0.021	0.021	0.043
	User	-	100	0.003	0.003	0.046
2.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.125	0.125	0.125

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.007	S-HOUSING OUTFALL	62.480	60.998	0.000	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S2.001	S-APARTMENT OUTFALL	62.430	61.393	61.390	375	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Region	England and Wales
Return Period (years)	2	M5-60 (mm)	19.000

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Synthetic Rainfall Details

Ratio R	0.250	Cv (Winter)	0.840
Profile Type	Summer	Storm Duration (mins)	30
Cv (Summer)	0.750		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S8(HB), DS/PN: S1.007, Volume (m³): 2.1

Unit Reference	MD-SHE-0100-4500-1035-4500
Design Head (m)	1.035
Design Flow (l/s)	4.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	61.150
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.035	4.5
Flush-Flo™	0.308	4.5
Kick-Flo®	0.655	3.6
Mean Flow over Head Range	-	3.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.8	3.000	7.4	7.000	11.1
0.200	4.4	1.400	5.2	3.500	8.0	7.500	11.4
0.300	4.5	1.600	5.5	4.000	8.5	8.000	11.8
0.400	4.4	1.800	5.8	4.500	9.0	8.500	12.1
0.500	4.3	2.000	6.1	5.000	9.4	9.000	12.5
0.600	4.0	2.200	6.4	5.500	9.9	9.500	12.8
0.800	4.0	2.400	6.7	6.000	10.3		
1.000	4.4	2.600	6.9	6.500	10.7		

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Storage Structures for Storm

Tank or Pond Manhole: S7(BASIN), DS/PN: S1.006

Invert Level (m) 61.293

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2.8	1.207	100.1

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	1	+0%	100/15 Summer			
S1.001	S2	15 Summer	1	+0%	100/15 Summer			
S1.002	S3	15 Summer	1	+0%	100/15 Summer			
S1.003	S4	15 Summer	1	+0%	30/15 Summer			
S1.004	S5	15 Summer	1	+0%	30/15 Summer			
S1.005	S6	30 Summer	1	+0%	30/15 Summer			
S1.006	S7(BASIN)	30 Summer	1	+0%	30/15 Summer			
S1.007	S8(HB)	30 Summer	1	+0%	1/15 Summer			
S2.000	S-NORTH 1	15 Summer	1	+0%	30/15 Summer			
S2.001	S-NORTH 2	15 Summer	1	+0%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	61.930	-0.185	0.000	0.07			2.7	OK
S1.001	S2	61.820	-0.172	0.000	0.13			5.0	OK
S1.002	S3	61.703	-0.158	0.000	0.19			7.3	OK

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.003	S4	61.598	-0.149	0.000	0.25			7.3	OK
S1.004	S5	61.570	-0.149	0.000	0.25			9.5	OK
S1.005	S6	61.496	-0.113	0.000	0.25			9.3	OK
S1.006	S7(BASIN)	61.489	-0.029	0.000	0.12			6.2	OK
S1.007	S8(HB)	61.486	0.186	0.000	0.22			4.5	SURCHARGED
S2.000	S-NORTH 1	61.645	-0.075	0.000	0.50			7.5	OK
S2.001	S-NORTH 2	61.562	-0.068	0.000	0.57			7.5	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S1.004	S5	
S1.005	S6	
S1.006	S7(BASIN)	
S1.007	S8(HB)	
S2.000	S-NORTH 1	
S2.001	S-NORTH 2	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	30	+0%	100/15 Summer			
S1.001	S2	60 Summer	30	+0%	100/15 Summer			
S1.002	S3	60 Summer	30	+0%	100/15 Summer			
S1.003	S4	60 Summer	30	+0%	30/15 Summer			
S1.004	S5	60 Summer	30	+0%	30/15 Summer			
S1.005	S6	60 Summer	30	+0%	30/15 Summer			
S1.006	S7(BASIN)	60 Summer	30	+0%	30/15 Summer			
S1.007	S8(HB)	60 Summer	30	+0%	1/15 Summer			
S2.000	S-NORTH 1	15 Summer	30	+0%	30/15 Summer			
S2.001	S-NORTH 2	15 Summer	30	+0%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	61.953	-0.162	0.000	0.18			6.7	OK
S1.001	S2	61.867	-0.125	0.000	0.26			10.2	OK
S1.002	S3	61.861	0.000	0.000	0.40			15.3	OK

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.003	S4	61.854	0.107	0.000	0.43			12.7	SURCHARGED
S1.004	S5	61.852	0.133	0.000	0.44			17.1	SURCHARGED
S1.005	S6	61.845	0.236	0.000	0.44			16.3	SURCHARGED
S1.006	S7(BASIN)	61.839	0.321	0.000	0.11			5.7	SURCHARGED
S1.007	S8(HB)	61.836	0.536	0.000	0.22			4.5	SURCHARGED
S2.000	S-NORTH 1	61.837	0.117	0.000	1.19			17.7	SURCHARGED
S2.001	S-NORTH 2	61.702	0.072	0.000	1.34			17.7	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S1.004	S5	
S1.005	S6	
S1.006	S7(BASIN)	
S1.007	S8(HB)	
S2.000	S-NORTH 1	
S2.001	S-NORTH 2	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	30 Summer	100	+40%	100/15 Summer			
S1.001	S2	30 Summer	100	+40%	100/15 Summer			
S1.002	S3	30 Summer	100	+40%	100/15 Summer			
S1.003	S4	60 Summer	100	+40%	30/15 Summer			
S1.004	S5	60 Summer	100	+40%	30/15 Summer			
S1.005	S6	120 Summer	100	+40%	30/15 Summer			
S1.006	S7(BASIN)	120 Summer	100	+40%	30/15 Summer			
S1.007	S8(HB)	120 Summer	100	+40%	1/15 Summer			
S2.000	S-NORTH 1	15 Summer	100	+40%	30/15 Summer			
S2.001	S-NORTH 2	15 Summer	100	+40%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	62.361	0.246	0.000	0.25			9.5	FLOOD RISK
S1.001	S2	62.341	0.349	0.000	0.52			20.3	SURCHARGED
S1.002	S3	62.286	0.425	0.000	0.82			30.9	SURCHARGED

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.003	S4	62.221	0.474	0.000	0.87			25.8	SURCHARGED
S1.004	S5	62.200	0.481	0.000	0.90			34.5	SURCHARGED
S1.005	S6	62.188	0.579	0.000	0.65			23.9	SURCHARGED
S1.006	S7(BASIN)	62.180	0.662	0.000	0.10			5.2	SURCHARGED
S1.007	S8(HB)	62.177	0.877	0.000	0.22			4.5	SURCHARGED
S2.000	S-NORTH 1	62.451	0.731	0.000	2.06			30.7	FLOOD RISK
S2.001	S-NORTH 2	62.036	0.406	0.000	2.35			31.0	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S1.004	S5	
S1.005	S6	
S1.006	S7(BASIN)	
S1.007	S8(HB)	
S2.000	S-NORTH 1	
S2.001	S-NORTH 2	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.250	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.059	4-8	0.019

Total Area Contributing (ha) = 0.079

Total Pipe Volume (m³) = 3.820

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	18.488	0.123	150.3	0.017	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	18.365	0.131	140.2	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	16.912	0.114	148.4	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	4.143	0.028	148.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	15.538	0.110	141.3	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	13.583	0.091	149.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	5.082	0.143	35.5	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.29	61.890	0.017	0.0	0.0	0.0	1.06	42.3	2.3
S1.001	50.00	4.57	61.767	0.036	0.0	0.0	0.0	1.10	43.8	4.9
S1.002	50.00	4.83	61.636	0.055	0.0	0.0	0.0	1.07	42.6	7.4
S1.003	50.00	4.89	61.522	0.055	0.0	0.0	0.0	1.07	42.6	7.4
S1.004	50.00	5.13	61.494	0.074	0.0	0.0	0.0	1.10	43.7	10.0
S1.005	50.00	5.34	61.384	0.074	0.0	0.0	0.0	1.07	42.5	10.0
S1.006	50.00	5.38	61.293	0.079	0.0	0.0	0.0	2.20	87.5	10.6

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.007	8.899	0.152	58.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.007	50.00	5.49	61.150	0.079	0.0	0.0	0.0	1.32	23.3	10.6

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.017	0.017	0.017
1.001	-	-	100	0.019	0.019	0.019
1.002	-	-	100	0.019	0.019	0.019
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.019	0.019	0.019
1.005	-	-	100	0.000	0.000	0.000
1.006	User	-	100	0.005	0.005	0.005
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.079	0.079	0.079

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.007	S	62.480	60.998	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.250		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S8, DS/PN: S1.007, Volume (m³): 2.1

Unit Reference	MD-SHE-0100-4500-1035-4500
Design Head (m)	1.035
Design Flow (l/s)	4.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	61.150
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.035	4.5
Flush-Flo™	0.308	4.5
Kick-Flo®	0.655	3.6
Mean Flow over Head Range	-	3.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.8	3.000	7.4	7.000	11.1
0.200	4.4	1.400	5.2	3.500	8.0	7.500	11.4
0.300	4.5	1.600	5.5	4.000	8.5	8.000	11.8
0.400	4.4	1.800	5.8	4.500	9.0	8.500	12.1
0.500	4.3	2.000	6.1	5.000	9.4	9.000	12.5
0.600	4.0	2.200	6.4	5.500	9.9	9.500	12.8
0.800	4.0	2.400	6.7	6.000	10.3		
1.000	4.4	2.600	6.9	6.500	10.7		

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Storage Structures for Storm

Tank or Pond Manhole: S7, DS/PN: S1.006

Invert Level (m) 61.293

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2.8	1.207	100.1

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	1	+0%	100/15 Summer				61.930
S1.001	S2	15 Summer	1	+0%	100/15 Summer				61.820
S1.002	S3	15 Summer	1	+0%	100/15 Summer				61.703
S1.003	S4	15 Summer	1	+0%	30/15 Summer				61.598
S1.004	S5	15 Summer	1	+0%	30/15 Summer				61.570
S1.005	S6	30 Summer	1	+0%	30/15 Summer				61.496
S1.006	S7	30 Summer	1	+0%	30/15 Summer				61.489
S1.007	S8	30 Summer	1	+0%	1/15 Summer				61.486

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.185	0.000	0.07			2.7	OK	
S1.001	S2	-0.172	0.000	0.13			5.0	OK	
S1.002	S3	-0.158	0.000	0.19			7.3	OK	
S1.003	S4	-0.149	0.000	0.25			7.3	OK	
S1.004	S5	-0.149	0.000	0.25			9.5	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.005	S6	-0.113	0.000	0.25			9.3	OK	
S1.006	S7	-0.029	0.000	0.12			6.2	OK	
S1.007	S8	0.186	0.000	0.22			4.5	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	30	+0%	100/15 Summer				61.953
S1.001	S2	60 Summer	30	+0%	100/15 Summer				61.867
S1.002	S3	60 Summer	30	+0%	100/15 Summer				61.861
S1.003	S4	60 Summer	30	+0%	30/15 Summer				61.854
S1.004	S5	60 Summer	30	+0%	30/15 Summer				61.852
S1.005	S6	60 Summer	30	+0%	30/15 Summer				61.845
S1.006	S7	60 Summer	30	+0%	30/15 Summer				61.839
S1.007	S8	60 Summer	30	+0%	1/15 Summer				61.836

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.162	0.000	0.18			6.7	OK	
S1.001	S2	-0.125	0.000	0.26			10.2	OK	
S1.002	S3	0.000	0.000	0.40			15.3	OK	
S1.003	S4	0.107	0.000	0.43			12.7	SURCHARGED	
S1.004	S5	0.133	0.000	0.44			17.1	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.005	S6	0.236	0.000	0.44			16.3	SURCHARGED	
S1.006	S7	0.321	0.000	0.11			5.7	SURCHARGED	
S1.007	S8	0.536	0.000	0.22			4.5	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.250
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	30 Summer	100	+40%	100/15 Summer				62.361
S1.001	S2	30 Summer	100	+40%	100/15 Summer				62.341
S1.002	S3	30 Summer	100	+40%	100/15 Summer				62.286
S1.003	S4	60 Summer	100	+40%	30/15 Summer				62.221
S1.004	S5	60 Summer	100	+40%	30/15 Summer				62.200
S1.005	S6	120 Summer	100	+40%	30/15 Summer				62.188
S1.006	S7	120 Summer	100	+40%	30/15 Summer				62.180
S1.007	S8	120 Summer	100	+40%	1/15 Summer				62.177

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.246	0.000	0.25			9.5	FLOOD RISK	
S1.001	S2	0.349	0.000	0.52			20.3	SURCHARGED	
S1.002	S3	0.425	0.000	0.82			30.9	SURCHARGED	
S1.003	S4	0.474	0.000	0.87			25.8	SURCHARGED	
S1.004	S5	0.481	0.000	0.90			34.5	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.005	S6	0.579	0.000	0.65			23.9	SURCHARGED	
S1.006	S7	0.662	0.000	0.10			5.2	SURCHARGED	
S1.007	S8	0.877	0.000	0.22			4.5	SURCHARGED	

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