Monbank, Newport

Residential Development

Monmouthshire Housing Association

Drainage Strategy

2nd Issue

May 2024

107 Cowbridge Road East

CARDIFF, CF11 9AG

t: 029 2030 2521

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DOCUMENT CONTROL

Project Number	2460
Project Title	Monbank, Newport
Client	Monmouthshire Housing Association
Document Title	Drainage Strategy

Prepared by	Checked by	Verified by	Approved by
Pat Obermajer Civil Engineer	Stephen Davis Director	Tony Owens-Redwood Director	Stephen Davis Director

Revision History

Revision	Revision date	Details	Authorized by	Position
1st	23/02/2024	First Issue	Pat Obermajer	Civil Engineer
2nd	21/05/2024	Second Issue	Stephen Davis	Director

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1. Introduction

PHG Consulting is involved in a project located in Newport and has been appointed to undertake a drainage strategy report to support a planning application for a residential development at Monbank, Newport.

The report explains the drainage system for the development, covering how the water will be released and the flow controlled.

Existing Site

The existing site is brownfield. The development site is split into two areas either side of Monmouth Castle Drive and covers a combined area of 0.91 ha. It is located just off B4237, Newport, at the National Grid reference ST303867. Site location is presented in Figure 1 below.

Figure 1. Site Location Plan. OS Grid Reference ST303867

Geology and Hydrogeology

According to the Winter Rain Acceptance Potential (WRAP) map, the site would be WRAP class level 3, meaning the underlying soils are generally of poor permeability. The site investigation report has confirmed that the existing soil within the site area comprises made ground. The thickness of made ground varies between 4 and 6 metres.

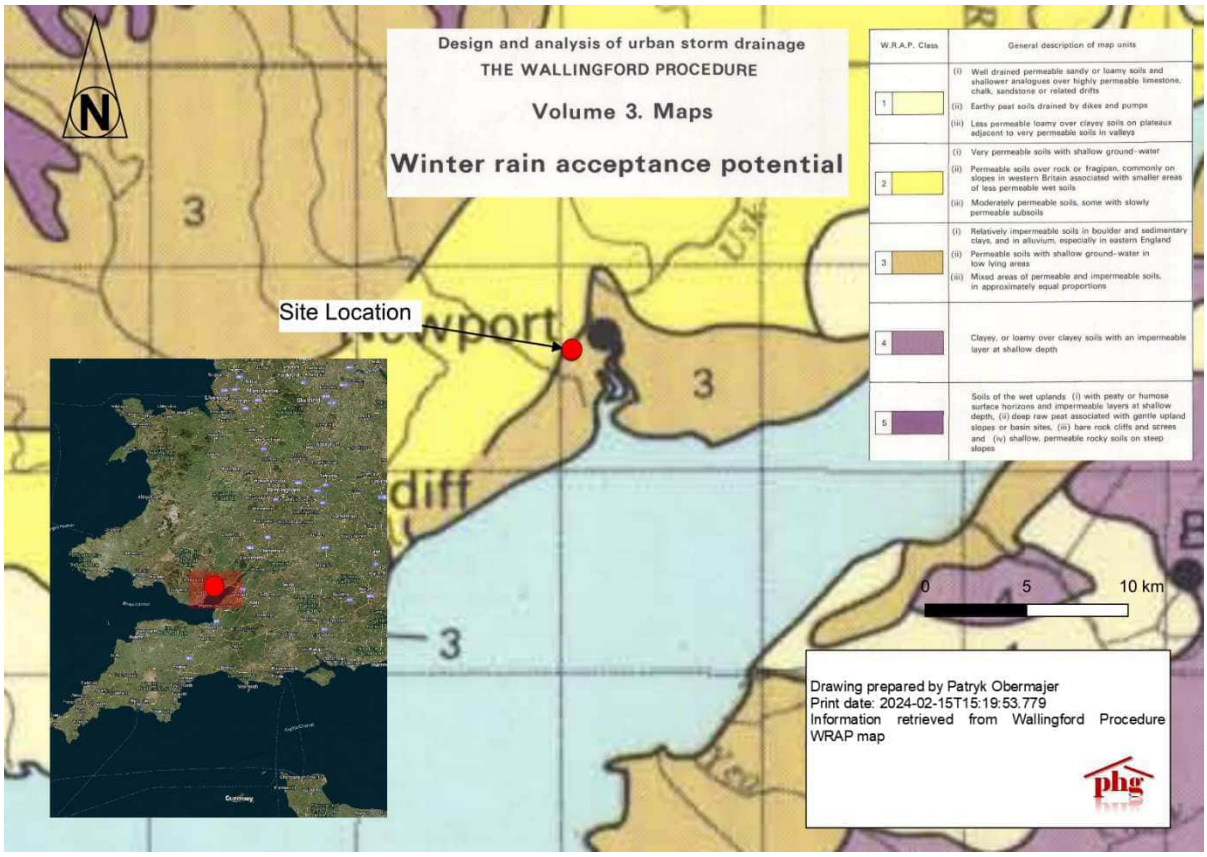

Figure 2 WRAP Map

Development Proposals

The proposed development will involve construction of 42 residential units along with associated infrastructure including SuDS and POS.

2. Drainage Strategy

Surface Water Features

The site is located approximately 300 m north of unnamed watercourses which are tributaries to the Ebbw River. There are no watercourses within the site. The watercourses in question have been ruled out as point of discharge due to topography and positioning on the other side of the railway track.

The site is located 1250 m northwest of the River Usk.

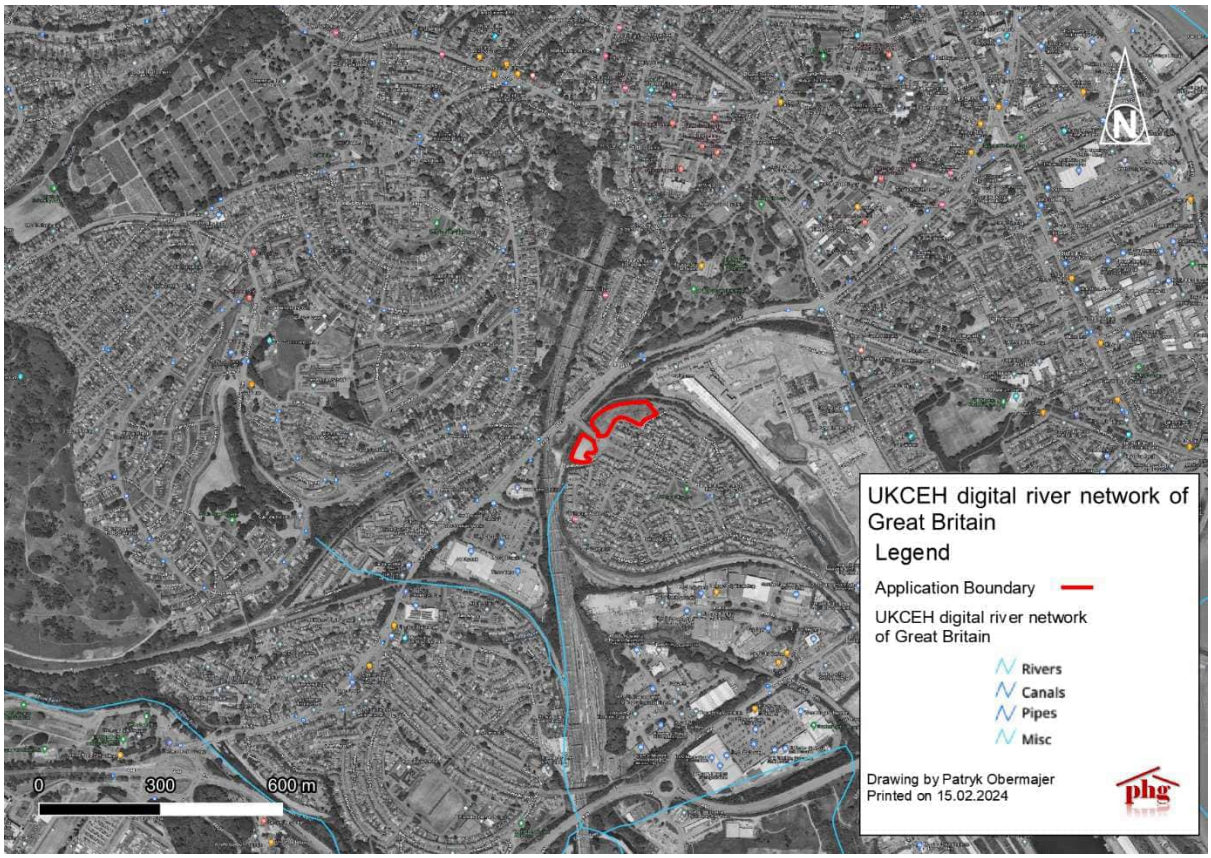

Figure 3. Watercourses near the site

Existing Sewers

The Welsh Water (DCWW) sewer records show that there are 150 mm and 225 diameter surface water and foul water sewers in the proximity of the site. The sewers were constructed to serve previous phases of the development at Monbank and had been adequately designed to manage flows from this phase of the development. The wider development is referred to as Land Known As Mon Bank Sidings Cardiff Road Newport, under planning application reference 12/0433. The DCWW records are shown in Figure 4 and Appendix C.

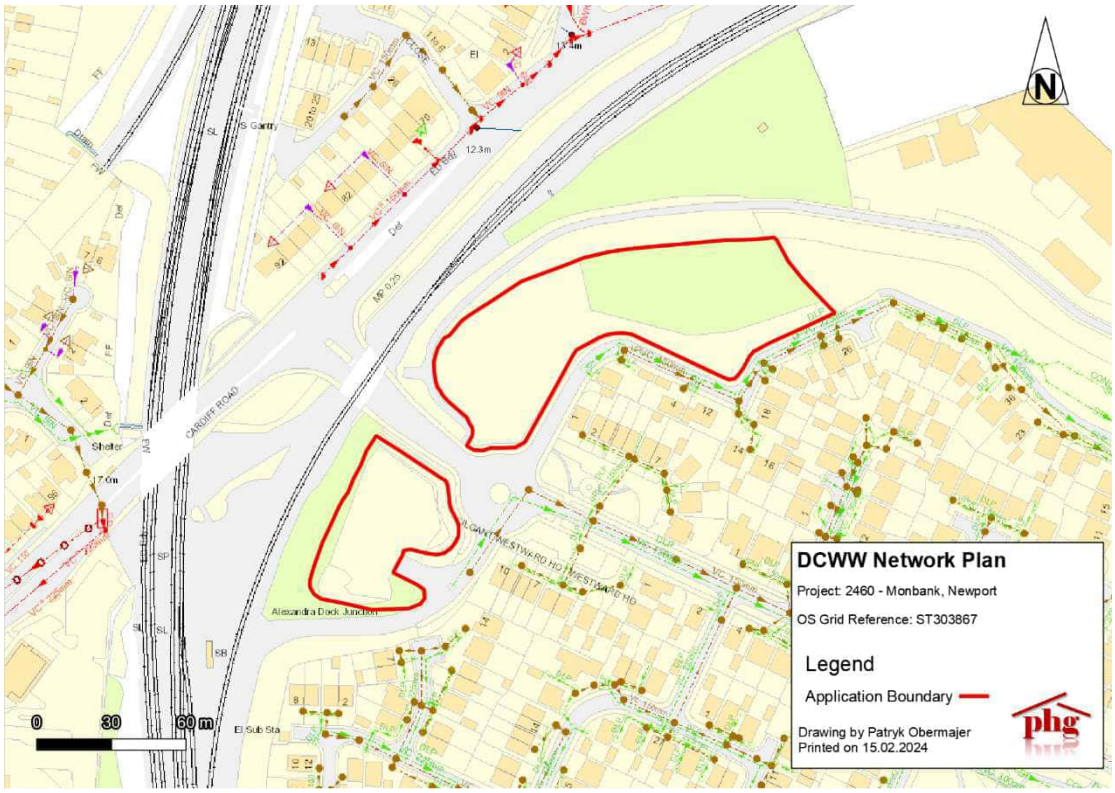

Figure 4. DCWW Sewer Records

Foul Drainage

Foul water system will connect into the foul water sewer utilising a connection to a manhole in Abberley Hallroad. The existing foul sewer had been designed with an adequate allowance for this development to connect. The proposed foul system will be a conventional gravity system.

A Section 104 application will be made to Welsh Water.

Surface Water Drainage

The site is located in an area where Newport County Councils are the Lead Local Flood Authority (LLFA) and the Sustainable Drainage Approval Body (SAB).

Surface water drainage will need to be designed in accordance with the SuDS Standards[1] and a Full SAB application will have to be submitted and approved prior to any works being undertaken. The design of the surface water drainage system will need to comply with the principles and standards set out in the SuDS standards and take guidance from the Ciria SuDS Manual[2].

Therefore, the surface water drainage strategy will comply with the principles and standards as set out in the Welsh Government's Statutory standards for sustainable drainage systems – designing,

[1] Sustainable Drainage (SuDS) Statutory Guidance, Welsh Government 2019

[2] The SuDS Manual. CIRIA 753, 2015

constructing, operating and maintaining surface water drainage systems. This document sets 11 principles and 6 standards;

Principles

- Manage water on or close to the surface and as close to the source of the runoff as possible;
- Treat rainfall as a valuable natural resource;
- Ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;
- Manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development;
- Take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep;
- Use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single “end of pipe” feature, such as a pond, to serve the whole development);
- Maximise the delivery of benefits for amenity and biodiversity;
- Seek to make the best use of available land through multifunctional usage of public spaces and the public realm;
- Perform safely, reliably and effectively over the design life of the development taking into account the need for reasonable levels of maintenance;
- Avoid the need for pumping where possible; and
- Be affordable, taking into account both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.

Standards

S1 *Surface water runoff destinations;*

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water body;

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer

S2 Surface water runoff hydraulic control

The aim of Standard S2 is to manage the surface water runoff from and on a site to protect people on the site from flooding from the drainage system for events up to a suitable return period, to mitigate any increased flood risk to people and property downstream of the site as a result of the development, and to protect the receiving water body from morphological damage.

S3 Surface water quality management

Standard S3 addresses the drainage design requirements to minimise the potential pollution risk posed by the surface water runoff to the receiving water body.

S4 Amenity

Standard S4 addresses the design of SuDS components to ensure that, where possible, they enhance the provision of high quality, attractive public space which can help provide health and wellbeing benefits, they improve liveability for local communities and they contribute to improving the climate resilience of new developments.

S5 Biodiversity

Standard S5 addresses the design of SuDS to ensure, where possible, they create ecologically rich green and blue corridors in developments and enrich biodiversity value by linking networks of habitats and ecosystems together. Biodiversity should be considered at the early design stage of a development to ensure the potential benefits are maximised.

S6 Design of drainage for Construction, Operation and Maintenance

Standard S6 deals with designing robust surface water drainage systems so they can be easily and safely constructed, maintained and operated, taking account of the need to minimise negative impacts on the environment and natural resources

.

S1 – Surface Water Destination

Level 1 – Surface Water runoff is collected for use

The collection of water for re-use will be evaluated during the detailed design stage, however, the use of individual rainwater harvesting systems for this scheme is proving uneconomical. The use of rainwater butt will be looked at during detailed design.

Level 2 – Surface Water runoff is infiltrated to ground

Unlikely to be feasible due to the location in the town centre, due to presence of made ground, and proximity of buildings within less than 5 m.

Level 3 – Surface Water runoff is discharged to a surface water body

There are no surface water bodies or watercourses near the site with a feasible route to this location.

Level 4 - Surface water runoff is discharged to a surface water sewer Highway drain or another drainage system.

There is a surface water sewer serving the wider development including previous phases. The system had been designed with an allowance for this development to be connected in.

Level 5 - Surface water runoff is discharged to a combined sewer

NA – higher priority met.

S2 – Surface Water runoff hydraulic control.

Attenuation and flow control are provided downstream as agreed with local authority, please refer to 12/0433 - partial discharge of condition 22 (surface water drainage). This phase of the development will discharge unattenuated at free discharge into the wider system. An allowance had been made in the original design for an impermeable area going into the system no larger than 6000 m^2, as shown in the calculations and original Drainage Strategy drawing (included in Appendix E). The contributing impermeable area of this development will remain well below the 6000 m^2 limit and the final figure will be within 4000 to 5000 m^2 range, i.e. free discharge is justified and attenuation and flow control will be ensured downstream in accordance with the original design.

The SuDS scheme is designed to ensure there is no runoff during the first 5 mm of the majority of events, this is achieved by relying on shallow features with plan areas compliant with Table G2.1 of the National Standards for SuDS. The reduction of discharge rate and volumes will reduce surface water flood risk within the development and wider area.

S3 – Water Quality

The proposed scheme will feature multiple green SuDS features to ensure sufficient water quality.

S4 – Amenity

The proposed SuDS features should offer significant and satisfactory amenity value for the site users.

S5 – Biodiversity

The proposed SuDS features should create significant biodiversity value for the proposed site users. To maximise the benefits of SuDS features being integrated into the site, it is recommended that a planting list is utilised to ensure biodiversity and amenity enhancements are maximised for the lifetime of the development.

S6 – Construction, Operation and Maintenance of systems

The SuDS system is design so that can be easily and safely constructed, maintained and operated, taking account of the need to minimise negative impacts on the environment and natural resources. Some of the SuDS features, which serve more than one house, will be offered for adoption to Newport SAB.

3. Conclusions

- The proposed development site is of 0.91 ha plan area. It is a brownfield development.
- The development will not increase flood risk elsewhere. Attenuation will be provided downstream in the system serving the wider development as agreed as part of 12/0433 planning application.
- The system serving the wider development including previous phases had been designed with an allowance of 6000 m^2 impermeable area contributing from this phase at free discharge. The contributing impermeable area of the site in question will remain well within the limit and the final figure will be in the range of 4000 and 5000 m^2.
- The proposed SUDS areas provide biodiversity and amenity benefits.
- The foul drainage would flow by gravity to the nearest foul water system, which had been adequately designed to manage additional flows from this development.
- Considering the details provided, the development is deemed to be appropriately designed regarding its drainage strategy.

Appendix A Site Location Plan

Site Location Plan

Scale: 1 in 1800 @ A4

Project: 2460 - Monbank, Newport
Produced by: Pat Obermajer
Printed on: 19.02.2024
Client: Monmouthshire Housing Association

OS Grid Reference: ST303867

PHG Consulting
107 Cowbridge Rd East,
Cardiff
CF11 9AG

Key

Application Boundary

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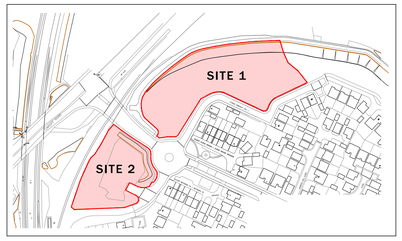
Appendix B Proposed Architectural Layout

A0 DRAWING SHEET



KEY PLAN - NTS

SITE LAYOUT 1:250

0 2.5 5 7.5 10 12.5 m

SCALE 1:250

KEY SCHEDULE

- DENOTES SITE APPLICATION BOUNDARY
- **TYPE A: GARDEN FENCE** DENOTES 1800MM HIGH TREATED CLOSE BOARDED FENCE.
- **TYPE B: ACOUSTIC FENCE** DENOTES 2.1 - 2.4M HIGH ACOUSTIC FENCE ALONG NORTHERN BOUNDARY BETWEEN DEVELOPMENT AND NETWORK RAIL TRACKS
- **TYPE C: RAILINGS** DENOTES 900MM HIGH GALVANISED FLAT TOP RAILINGS.
- **TYPE D: REAR GARDEN WALLS** DENOTES 1.8M HIGH FACING BRICKWORK BOUNDARY WALLS TO KEY POSITIONS.
- **TYPE E: RETAINING WALLS WITH FENCE** DENOTES FACING BRICKWORK RETAINING WALLS [HEIGHT VARIES] WITH 1800MM TREATED CLOSE BOARDED FENCE ONTOP.
- **TYPE F: RETAINING WALLS** DENOTES FACING BRICKWORK RETAINING WALLS - HEIGHT VARIES.
- DENOTES AREA IN 'TOBERMORE' PERMEABLE PAVING SYSTEM AS DENOTED - COLOUR: MULTI RED / BRNDL
- DENOTES 2.4M X 4.8M 'TOBERMORE' PERMEABLE PAVING SYSTEM PARKING BAYS WITH 50MM X 100MM PC CONCRETE PATH EDGING TO DELINEATE BAYS.
- DENOTES AREA OF NEW 2M WIDE TARMACADAM FOOTWAYS TO PERIMETER OF SITE.
- DENOTES AREA OF NEW TARMACADAM ACCESS ROAD INTO SITE.
- DENOTES AREAS OF 450 X 450MM P.C CONC. PAVING SLABS TO FORM PATIO AREAS AND 900MM MIN FOOTPATHS TO TO CURTILAGE OF HOUSES AND 1200MM WIDE TO TO CURTILAGE OF FLATS.
- DENOTES AREAS OF INFORMAL PLANTING / LANDSCAPING AREAS , AS PER TREE / SPECIES MIX IN LANDSCAPING SCHEDULE.
- DENOTES AREAS OF RAIN GARDENS TO ASSIST SUDDS DRAINAGE DESIGN & BIDOVERSITY AS PER TREE / SPECIES MIX IN LANDSCAPING SCHEDULE.
- DENOTES 1.8M HIGH - 900MM WIDE TIMBER GATE WITH A SECURITY LOCK, IN COMPLIANCE WITH BS8300 - NOTE GATE TO BE SIMILAR HEIGHT TO ADJACENT WALL/GATE IF APPLICABLE.
- DENOTES NEW TREE PLANTING (REFER TO LANDSCAPE DRAWING FOR TYPES AND SCHEDULES)
- DENOTES 2.9M DIAMETER ROTARY DRYER SET IN CONCRETE. - PROVIDING 4M MIN. OF LINE FOR 2 BED DWELLINGS, 6M MIN. FOR 3 BED DWELLINGS.
- DENOTES PAVED CONCRETE HARDSTANDING FOR COMMUNAL BIN STORE HOSTING REFUSE BINS TO SUIT LA REQUIREMENTS
- DENOTES ROBUST TREATED TIMBER FRAMED SHED WITH 1NO.,2NO. SHEFFIELD OR SIMILAR TYPE STEEL FRAMED BIKE RACK, BOTH BOLTED TO 150MM THICK CONCRETE BASE - PROVIDING SPACE FOR 1NO/2NO BICYCLES AND 1M² GARDEN STORE SPACE. PERMANENT LOCK TO BE PROVIDED TO SHED DOOR. CONFORMING TO BS 3621:2004.
- SB — DENOTES POSITION OF IBSTOCK OR SIMILAR SWIFT BOX IN SMOOTH RED - TO BE INSTALLED AT MIN. 5M FROM EXTERNAL GROUND LEVEL
- BB — DENOTES POSITION OF IBSTOCK BAT BRICK (TYPE A) OR SIMILAR - REFER TO INDIVIDUAL ELEVATIONS FOR EXACT LOCATION

PLOT SCHEDULE - SITE 1 [NORTH]

2P 1B FLAT TYPE	-	8
4P 2B HOUSE TYPE	-	19
5P 3B HOUSE TYPE	-	3
TOTAL NUMBER OF UNITS	-	30

PARKING SCHEDULE - SITE 1 [NORTH]

UNIT TYPE	No.s	TOTAL SPACES
4 PERSON 2 BEDROOM HOUSE TYPE - [MIN 1 SPACE EACH]	19	38
5 PERSON 3 BEDROOM HOUSE TYPE - [MIN 2 SPACES EACH]	3	6
2 PERSON 1 BEDROOM FLAT TYPE - [MIN 1 SPACE EACH]	8	8
Sub Total	-	52
VISITORS (5%)		2
TOTAL	-	54

PLOT SCHEDULE - SITE 2 [SOUTH]

2P 1B FLAT TYPE	-	8
4P 2B HOUSE TYPE	-	2
5P 3B HOUSE TYPE	-	2
TOTAL NUMBER OF UNITS	-	12

PARKING SCHEDULE - SITE 1 [NORTH]

UNIT TYPE	No.s	TOTAL SPACES
5 PERSON 3 BEDROOM HOUSE TYPE - [MIN 2 SPACES EACH]	4	8
2 PERSON 1 BEDROOM FLAT TYPE - [MIN 1 SPACE EACH]	8	8
Sub Total	-	16
VISITORS (5%)		1
TOTAL	-	17

REFER TO CONSULTING ENGINEERING DRAWINGS FOR PLOT FINISHED FLOOR LEVELS AND DRAINAGE DETAILS.
REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR DETAILS OF LANDSCAPING PROPOSALS.

DENOTES 2.4M X 4.8M PARKING BAY.
LTH DENOTES 'LIFE TIME HOME' COMPLIANT PARKING SPACE.

Do not scale from this drawing
The source of this drawing shall check all dimensions and report any omissions to LeTruccoDesign.

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Revisions
REV A - NOVEMBER 23 UPDATED TO REFLECT LATEST TOPOGRAPHICAL SURVEY.
REV B - JAN 24 UPDATED TO SUIT CUBES COMMENTS, ACOUSTIC REPORT AND COUNCIL REPORT
REV C - FEB 24 LAYOUT REVISED TO SUIT TRANSPORT CONSULTANTS COMMENTS.
REV D - March 24 Minor amendments to suit further issues & transport comments.
REV E - March 24 Planning Submission.

Drawing Purpose	Drawing No	Scale	Revision
PLANNING	LT2402.04.01	1:250 @ A0	P1
Client	**Drawing Title**	**Date**	**Checked**
Monmouthshire H.A.	Proposed Site Layouts	Sept 23	KML
Job Title			
Mons Bank, Newport			

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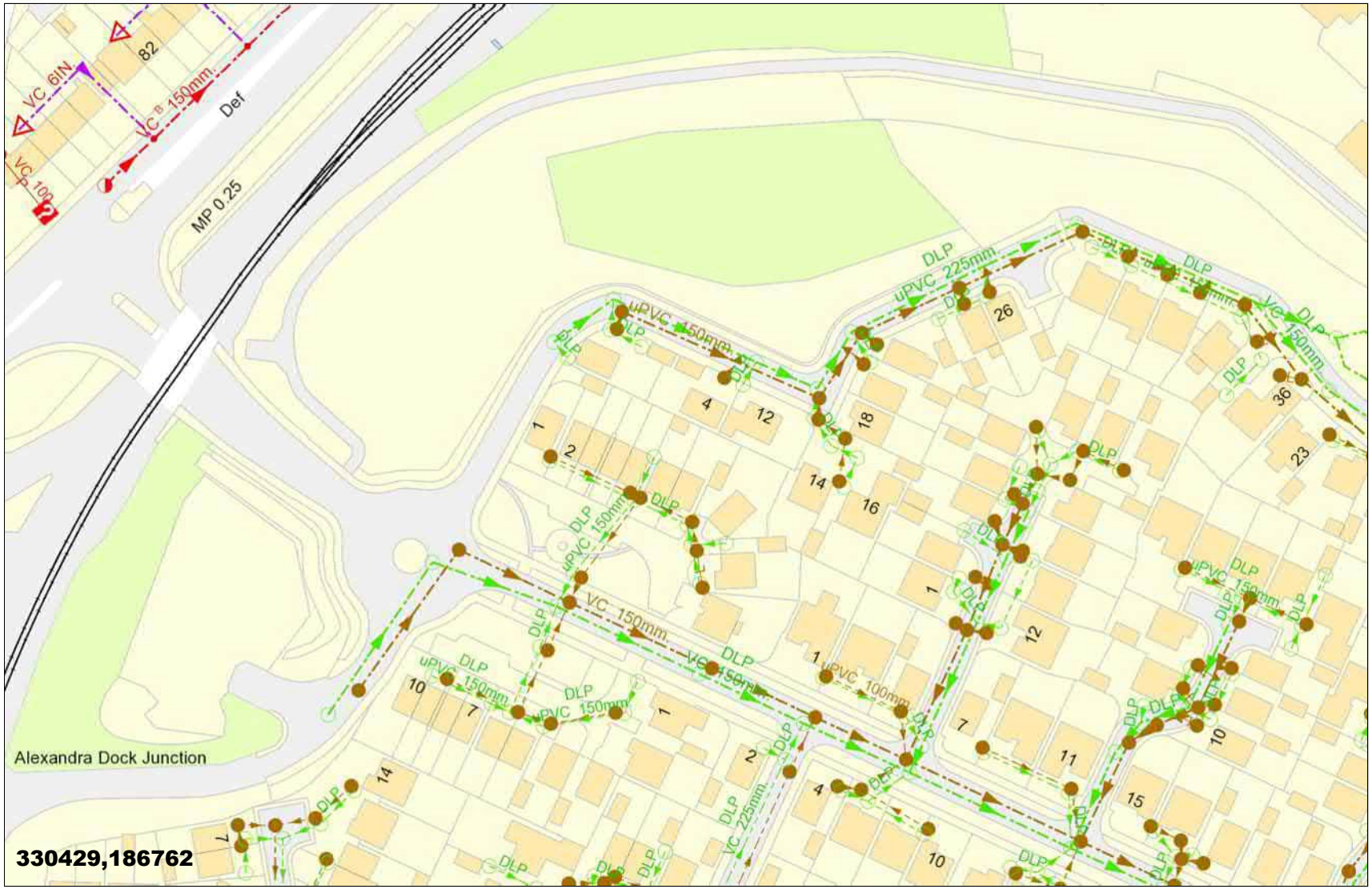
Appendix C DCWW Maps

Dŵr Cymru
Welsh Water

01/07/2023

Scale: 1: 1423



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

Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No: WU298565.

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 D Engineering Layout

Appendix E Wider development – planning information

GENERAL NOTES

1. Do not scale
2. The contractor is to check and verify all buildings and site dimensions and levels, including sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current Building Legislation, NRSWA1991, British Standards, Building Regulations etc.
3. Positions of existing services/statutory undertakers apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work
4. This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specification and any structural, geotechnical or other specialist document provided.
5. Any anomaly or contradiction between any of the above is to be reported to Monmouthshire Housing Association.
6. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions

ROAD AND SEWER ADOPTION NOTES

1. All works for Adoption under a Section 38 Agreement shall be carried out to the approval of Newport Council.
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 Dwr Cymru Welsh Water's requirements.
3. Street lighting positions to be pegged on site and agreed by the local authority prior to erection commencing.

Legend

179.50	Finished Floor Level (FFL) +/-450mm
120DPR	Retaining Wall
	Existing DCWW Surface Water Sewer
	Existing DCWW Foul Sewer
	SuDS Bioretention Area
	SuDS Permeable Paving (private) average subbase depth 0.4 m
	SuDS Permeable Paving (adopted) average depth 0.5 m
	Filter Drain
	Private surface water drain (100Ø unless shown otherwise)
	SuDS basin - adopted

Rev:	Date	Details	By:	Chk:
A	21/05/24	Updated following site layout review.	SJD	TOR
-	23/02/24	First Issue	PBO	SJD

Amendments

Client:

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Project:

Monmouthshire Housing
Monbank
Newport

Drawing title:

Engineering Layout

Drawn:	Chk:	Status:	Scale:
SJD	TOR	Planning	1:500 @ A1

Date:	Job no.	Drg. no.	Rev.
Feb-24	2460	100	A

Dŵr Cymru
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Your ref: CONEX/12/0433
Our ref: DS/MDE/NCC/20/
Enquiries: Rebecca Parfitt
Telephone: 0800 917 2652

For the attention of Gail Parkhouse

18th May 2012

Dear Sir

Re: Discharge of Condition 22 (Surface Water Drainage) – Land to rear of Whitehead Works, Cardiff Road, Newport

We write regarding the above and offer the following comments.

Upon assessing the information enclosed with your letter dated 2nd May 2012 including Drawing Ref. 1038508-D-531 Rev D it appears that the applicant intends utilizing private surface water drainage facilities in the form of a nearby watercourse, we have no comment to make.

We trust the above is acceptable however if you have any further queries please do not hesitate to contact us.

Yours faithfully

Rebecca Parfitt
Developer Services

glas
Glas Cymru Cyfyngedig

Welsh Water is owned by Glas Cymru - a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru - cwmni 'nid-er-elw'.

We welcome correspondence in Welsh and English.

Dwr Cymru Cyf, a limited company registered in Wales no. 2366777. Registered office: Pentwyn Road, Nelson, Treharris, Mid Glamorgan CF46 6LY.

Rydym yn croesawu gohebiaeth yn y Gymraeg neu yn Saesneg.

Dwr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn, Nelson, Treharris, Morgannwg Ganol CF46 6LY.

At original drawing size (A1) this line measures 100mm

Key

- Proposed primary foul sewer
- Proposed primary surface water sewer

Version	Amendment	Drawn Date	Checked Date	Approved Date
D	Drainage networks amended.	LLR 09.03.12	JLW 09.03.12	JLW 09.03.12
C	Drainage networks, highways and contours amended.	JLW 23.02.12	JLW 23.02.12	JLW 23.02.12
B	Drainage networks redrawn. Proposed contours added.	JLW 06.02.12	JLW 06.02.12	JLW 06.02.12
A	First Issue	GMS 06.01.12	JLW 06.01.12	JLW 06.01.12

Client: Redrow Homes Ltd.

Project: Monmouthshire Bank

Drawing Title: Site Drainage Strategy

mouchel

Office: Bristol

Tel No: 0117 9062300

Scales (at A1 size): 1:1,250

Purpose of Issue: Preliminary

Drawing No: 1038508-D-531

Version: D

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 01N-03.SWS Some Cells

Pipe Sizes 1038508 Manhole Sizes 1038508

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	10
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	5.000
Ratio R	0.316	Maximum Backdrop Height (m)	20.000
Maximum Rainfall (mm/hr)	0	Min Design Depth for Optimisation (m)	1.500
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500
PIMP (%)	100		

Designed with Level Soffits

Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	45.978	0.143	321.5	0.600	5.00	0.0	0.600	o	375
2.000	23.763	1.696	14.0	0.300	5.00	0.0	0.600	o	225
1.001	30.965	0.077	402.1	0.000	0.00	0.0	0.600	o	450
1.002	37.033	1.000	37.0	0.000	0.00	0.0	0.600	o	450
3.000	66.073	0.206	320.7	0.600	5.00	0.0	0.600	o	375
3.001	60.676	0.189	321.0	0.000	0.00	0.0	0.600	o	375
1.003	53.466	0.121	441.9	0.000	0.00	0.0	0.600	o	525
4.000	22.909	0.071	322.7	0.600	5.00	0.0	0.600	o	375

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	5.76	14.450	0.600	0.0	0.0	0.0	1.00	111.0	0.0
2.000	0.00	5.11	16.153	0.300	0.0	0.0	0.0	3.51	139.7	0.0
1.001	0.00	6.27	14.232	0.900	0.0	0.0	0.0	1.01	160.3	0.0
1.002	0.00	6.46	14.155	0.900	0.0	0.0	0.0	3.35	532.7	0.0
3.000	0.00	6.09	13.625	0.600	0.0	0.0	0.0	1.01	111.1	0.0
3.001	0.00	7.10	13.419	0.600	0.0	0.0	0.0	1.01	111.1	0.0
1.003	0.00	7.94	13.080	1.500	0.0	0.0	0.0	1.06	229.3	0.0
4.000	0.00	5.38	13.862	0.600	0.0	0.0	0.0	1.00	110.8	0.0

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Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
4.001	58.521	0.682	85.8	0.000	0.00	0.0	0.600	o	375
1.004	69.257	0.467	148.3	0.000	0.00	0.0	0.600	o	525
5.000	69.837	0.218	320.4	0.600	5.00	0.0	0.600	o	375
1.005	42.016	0.084	500.2	0.000	0.00	0.0	0.600	o	675
1.006	50.641	0.101	501.4	0.000	0.00	0.0	0.600	o	675
1.007	21.134	0.848	24.9	0.000	0.00	0.0	0.600	o	675
6.000	50.857	0.455	111.8	0.600	5.00	0.0	0.600	o	375
6.001	54.161	0.769	70.4	0.000	0.00	0.0	0.600	o	375
1.008	26.172	0.226	115.8	0.000	0.00	0.0	0.600	o	675
7.000	57.763	0.180	320.9	0.600	5.00	0.0	0.600	o	375
1.009	47.002	1.281	36.7	0.000	0.00	0.0	0.600	o	675
8.000	16.601	0.052	319.3	0.600	5.00	0.0	0.600	o	375
8.001	7.144	0.022	324.7	0.000	0.00	0.0	0.600	o	375
8.002	51.708	0.161	321.2	0.000	0.00	0.0	0.600	o	375

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)
4.001	0.00	5.88	13.791	0.600	0.0	0.0	0.0	1.96	216.1	0.0
1.004	0.00	8.57	12.959	2.100	0.0	0.0	0.0	1.84	397.7	0.0
5.000	0.00	6.16	12.860	0.600	0.0	0.0	0.0	1.01	111.2	0.0
1.005	0.00	9.17	12.342	2.700	0.0	0.0	0.0	1.17	416.9	0.0
1.006	0.00	9.90	12.258	2.700	0.0	0.0	0.0	1.16	416.4	0.0
1.007	0.00	9.96	12.157	2.700	0.0	0.0	0.0	5.26	1883.5	0.0
6.000	0.00	5.49	12.833	0.600	0.0	0.0	0.0	1.71	189.2	0.0
6.001	0.00	5.91	12.378	0.600	0.0	0.0	0.0	2.16	238.7	0.0
1.008	0.00	10.14	11.309	3.300	0.0	0.0	0.0	2.43	871.3	0.0
7.000	0.00	5.96	11.563	0.600	0.0	0.0	0.0	1.01	111.1	0.0
1.009	0.00	10.32	11.083	3.900	0.0	0.0	0.0	4.34	1551.5	0.0
8.000	0.00	5.27	13.373	0.600	0.0	0.0	0.0	1.01	111.4	0.0
8.001	0.00	5.39	13.321	0.600	0.0	0.0	0.0	1.00	110.4	0.0
8.002	0.00	6.25	13.299	0.600	0.0	0.0	0.0	1.01	111.1	0.0

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Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
9.000	41.112	1.185	34.7	0.600	5.00	0.0	0.600	o	300
8.003	38.568	0.794	48.6	0.000	0.00	0.0	0.600	o	375
10.000	39.580	0.123	321.8	0.600	5.00	0.0	0.600	o	375
10.001	15.710	0.049	320.6	0.000	0.00	0.0	0.600	o	375
10.002	8.142	0.026	313.2	0.000	0.00	0.0	0.600	o	375
8.004	50.870	0.102	498.7	0.000	0.00	0.0	0.600	o	600
8.005	15.357	0.031	495.4	0.000	0.00	0.0	0.600	o	600
8.006	25.532	0.051	500.6	0.000	0.00	0.0	0.600	o	600
8.007	87.434	1.653	52.9	0.000	0.00	0.0	0.600	o	600
11.000	28.756	0.581	49.5	0.600	5.00	0.0	0.600	o	300
11.001	57.250	0.179	319.8	0.000	0.00	0.0	0.600	o	375
11.002	16.885	0.053	318.6	0.000	0.00	0.0	0.600	o	375
12.000	31.832	1.050	30.3	0.600	5.00	0.0	0.600	o	300
11.003	25.632	0.052	492.9	0.000	0.00	0.0	0.600	o	525
11.004	46.974	0.687	68.4	0.000	0.00	0.0	0.600	o	525

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)
9.000	0.00	5.26	14.398	0.600	0.0	0.0	0.0	2.68	189.3	0.0
8.003	0.00	6.50	13.138	1.200	0.0	0.0	0.0	2.61	287.8	0.0
10.000	0.00	5.66	12.542	0.600	0.0	0.0	0.0	1.00	111.0	0.0
10.001	0.00	5.92	12.419	0.600	0.0	0.0	0.0	1.01	111.2	0.0
10.002	0.00	6.05	12.370	0.600	0.0	0.0	0.0	1.02	112.5	0.0
8.004	0.00	7.28	12.119	1.800	0.0	0.0	0.0	1.08	306.4	0.0
8.005	0.00	7.51	12.017	1.800	0.0	0.0	0.0	1.09	307.4	0.0
8.006	0.00	7.91	11.986	1.800	0.0	0.0	0.0	1.08	305.8	0.0
8.007	0.00	8.34	11.935	1.800	0.0	0.0	0.0	3.35	948.2	0.0
11.000	0.00	5.21	12.326	0.600	0.0	0.0	0.0	2.24	158.4	0.0
11.001	0.00	6.16	11.670	0.600	0.0	0.0	0.0	1.01	111.3	0.0
11.002	0.00	6.44	11.491	0.600	0.0	0.0	0.0	1.01	111.5	0.0
12.000	0.00	5.19	12.563	0.600	0.0	0.0	0.0	2.87	202.6	0.0
11.003	0.00	6.87	11.288	1.200	0.0	0.0	0.0	1.00	216.9	0.0
11.004	0.00	7.15	11.236	1.200	0.0	0.0	0.0	2.71	587.0	0.0

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Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
11.005	20.935	0.118	177.4	0.000	0.00	0.0	0.600	o	525
11.006	36.275	0.074	490.2	0.000	0.00	0.0	0.600	o	525
8.008	16.398	0.037	443.2	0.000	0.00	0.0	0.600	o	675
8.009	29.791	0.060	496.5	0.000	0.00	0.0	0.600	o	1050
8.010	39.742	0.079	503.1	0.000	0.00	0.0	0.600	o	1050
13.000	16.784	0.052	322.8	0.600	5.00	0.0	0.600	o	375
13.001	56.525	1.608	35.2	0.000	0.00	0.0	0.600	o	375
8.011	38.049	0.076	500.6	0.000	0.00	0.0	0.600	o	1050
8.012	77.216	0.154	501.4	0.000	0.00	0.0	0.600	o	1050
1.010	14.774	0.030	492.5	0.000	0.00	0.0	0.600	o	1050
1.011	46.476	0.093	499.7	0.000	0.00	0.0	0.600	o	1050
1.012	43.174	0.087	496.3	0.000	0.00	0.0	0.600	o	1050
14.000	24.563	0.337	72.9	0.600	5.00	0.0	0.600	o	300
14.001	22.422	0.226	99.2	0.000	0.00	0.0	0.600	o	300
14.002	28.783	0.395	72.9	0.000	0.00	0.0	0.600	o	300
1.013	28.682	0.057	503.2	0.000	0.00	0.0	0.600	o	1050

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)
11.005	0.00	7.36	10.549	1.200	0.0	0.0	0.0	1.68	363.4	0.0
11.006	0.00	7.96	10.431	1.200	0.0	0.0	0.0	1.00	217.5	0.0
8.008	0.00	8.56	10.207	3.000	0.0	0.0	0.0	1.24	443.2	0.0
8.009	0.00	8.89	9.795	3.000	0.0	0.0	0.0	1.54	1333.2	0.0
8.010	0.00	9.32	9.735	3.000	0.0	0.0	0.0	1.53	1324.4	0.0
13.000	0.00	5.28	11.991	0.600	0.0	0.0	0.0	1.00	110.8	0.0
13.001	0.00	5.59	11.939	0.600	0.0	0.0	0.0	3.06	338.5	0.0
8.011	0.00	9.73	9.656	3.600	0.0	0.0	0.0	1.53	1327.7	0.0
8.012	0.00	10.57	9.580	3.600	0.0	0.0	0.0	1.53	1326.7	0.0
1.010	0.00	10.73	9.426	7.500	0.0	0.0	0.0	1.55	1338.7	0.0
1.011	0.00	11.24	9.396	7.500	0.0	0.0	0.0	1.53	1328.9	0.0
1.012	0.00	11.70	9.303	7.500	0.0	0.0	0.0	1.54	1333.6	0.0
14.000	0.00	5.22	10.924	0.600	0.0	0.0	0.0	1.84	130.3	0.0
14.001	0.00	5.46	10.587	0.600	0.0	0.0	0.0	1.58	111.6	0.0
14.002	0.00	5.72	10.361	0.600	0.0	0.0	0.0	1.84	130.3	0.0
1.013	0.00	12.02	9.216	8.100	0.0	0.0	0.0	1.53	1324.3	0.0

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Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.014	24.899	0.117	212.8	0.000	0.00	0.0	0.600	o	1050
15.000	11.833	0.283	41.8	0.600	5.00	0.0	0.600	o	300
15.001	57.230	0.534	107.2	0.000	0.00	0.0	0.600	o	375
15.002	17.740	0.379	46.8	0.000	0.00	0.0	0.600	o	375
15.003	58.214	0.651	89.4	0.000	0.00	0.0	0.600	o	375
15.004	42.801	0.164	261.0	0.000	0.00	0.0	0.600	o	375
15.005	40.014	0.153	261.5	0.000	0.00	0.0	0.600	o	375
16.000	16.465	0.266	61.9	0.600	5.00	0.0	0.600	o	300
15.006	14.475	0.029	499.1	0.000	0.00	0.0	0.600	o	525
15.007	42.333	0.090	470.4	0.000	0.00	0.0	0.600	o	525
15.008	6.193	0.076	81.5	0.000	0.00	0.0	0.600	o	525
15.009	30.572	0.710	43.1	0.000	0.00	0.0	0.600	o	525
15.010	13.311	0.044	302.5	0.000	0.00	0.0	0.600	o	525
17.000	30.304	0.095	319.0	0.600	5.00	0.0	0.600	o	375
15.011	51.587	0.103	500.8	0.000	0.00	0.0	0.600	o	600
18.000	41.913	0.490	85.5	0.600	5.00	0.0	0.600	o	300

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.014	0.00	12.19	9.159	8.100	0.0	0.0	0.0	2.36	2042.2	0.0
15.000	0.00	5.08	15.275	0.600	0.0	0.0	0.0	2.44	172.4	0.0
15.001	0.00	5.63	14.917	0.600	0.0	0.0	0.0	1.75	193.3	0.0
15.002	0.00	5.74	14.383	0.600	0.0	0.0	0.0	2.65	293.2	0.0
15.003	0.00	6.24	14.004	0.600	0.0	0.0	0.0	1.92	211.7	0.0
15.004	0.00	6.88	13.353	0.600	0.0	0.0	0.0	1.12	123.3	0.0
15.005	0.00	7.48	13.189	0.600	0.0	0.0	0.0	1.12	123.2	0.0
16.000	0.00	5.14	13.377	0.600	0.0	0.0	0.0	2.00	141.5	0.0
15.006	0.00	7.72	12.886	1.200	0.0	0.0	0.0	1.00	215.6	0.0
15.007	0.00	8.41	12.857	1.200	0.0	0.0	0.0	1.03	222.1	0.0
15.008	0.00	8.45	12.767	1.200	0.0	0.0	0.0	2.48	537.5	0.0
15.009	0.00	8.60	12.691	1.200	0.0	0.0	0.0	3.42	740.4	0.0
15.010	0.00	8.77	11.981	1.200	0.0	0.0	0.0	1.28	277.6	0.0
17.000	0.00	5.50	12.182	0.600	0.0	0.0	0.0	1.01	111.4	0.0
15.011	0.00	9.57	11.862	1.800	0.0	0.0	0.0	1.08	305.7	0.0
18.000	0.00	5.41	12.549	0.600	0.0	0.0	0.0	1.70	120.2	0.0

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Network Design Table for 01N-03.SWS Some Cells

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
15.012	38.947	0.123	316.6	0.000	0.00	0.0	0.600	o	600
15.013	41.426	0.272	152.3	0.000	0.00	0.0	0.600	o	600
15.014	9.164	0.113	81.1	0.000	0.00	0.0	0.600	o	600
15.015	57.164	0.715	79.9	0.000	0.00	0.0	0.600	o	600
15.016	5.580	0.072	77.5	0.000	0.00	0.0	0.600	o	600
15.017	21.494	0.299	71.9	0.000	0.00	0.0	0.600	o	600
15.018	17.906	0.210	85.3	0.000	0.00	0.0	0.600	o	600
15.019	37.411	0.298	125.5	0.000	0.00	0.0	0.600	o	600
15.020	26.379	0.145	181.9	0.000	0.00	0.0	0.600	o	600
15.021	9.592	0.022	436.0	0.000	0.00	0.0	0.600	o	675
1.015	39.119	0.078	501.5	0.000	0.00	0.0	0.600	o	1050
1.016	31.513	1.162	27.1	0.000	0.00	0.0	0.600	o	1050
1.017	19.461	0.500	38.9	0.000	0.00	0.0	0.600	o	1050
1.018	23.126	0.200	115.6	0.000	0.00	0.0	0.600	o	300
1.019	43.050	0.375	114.8	0.000	0.00	0.0	0.600	o	300
1.020	3.796	0.025	151.8	0.000	0.00	0.0	0.600	o	300

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)
15.012	0.00	10.04	11.759	2.400	0.0	0.0	0.0	1.36	385.4	0.0
15.013	0.00	10.40	11.636	2.400	0.0	0.0	0.0	1.97	557.3	0.0
15.014	0.00	10.45	11.364	2.400	0.0	0.0	0.0	2.71	765.0	0.0
15.015	0.00	10.80	11.251	2.400	0.0	0.0	0.0	2.73	770.5	0.0
15.016	0.00	10.83	10.536	2.400	0.0	0.0	0.0	2.77	782.7	0.0
15.017	0.00	10.96	10.464	2.400	0.0	0.0	0.0	2.87	812.8	0.0
15.018	0.00	11.07	10.165	2.400	0.0	0.0	0.0	2.64	746.0	0.0
15.019	0.00	11.36	9.955	2.400	0.0	0.0	0.0	2.17	614.2	0.0
15.020	0.00	11.60	9.657	2.400	0.0	0.0	0.0	1.80	509.6	0.0
15.021	0.00	11.73	9.437	2.400	0.0	0.0	0.0	1.25	446.8	0.0
1.015	0.00	12.62	9.040	10.500	0.0	0.0	0.0	1.53	1326.5	0.0
1.016	0.00	12.70	8.962	10.500	0.0	0.0	0.0	6.63	5741.1	0.0
1.017	0.00	12.76	7.800	10.500	0.0	0.0	0.0	5.53	4790.4	0.0
1.018	0.00	13.02	7.300	10.500	0.0	0.0	0.0	1.46	103.3	0.0
1.019	0.00	13.51	7.100	10.500	0.0	0.0	0.0	1.47	103.7	0.0
1.020	0.00	13.56	6.725	10.500	0.0	0.0	0.0	1.27	90.0	0.0

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	375	301	16.325	14.450	1.500	Open Manhole	1350
2.000	o	225	302	17.878	16.153	1.500	Open Manhole	1200
1.001	o	450	303	18.094	14.232	3.412	Open Manhole	1350
1.002	o	450	304	17.594	14.155	2.989	Open Manhole	1350
3.000	o	375	305	15.500	13.625	1.500	Open Manhole	1350
3.001	o	375	306	16.392	13.419	2.598	Open Manhole	1350
1.003	o	525	307	17.024	13.080	3.419	Open Manhole	1500
4.000	o	375	308	15.737	13.862	1.500	Open Manhole	1350
4.001	o	375	309	15.920	13.791	1.754	Open Manhole	1350
1.004	o	525	310	16.200	12.959	2.716	Open Manhole	1500
5.000	o	375	311	14.735	12.860	1.500	Open Manhole	1350
1.005	o	675	312	15.358	12.342	2.341	Open Manhole	1500
1.006	o	675	313	15.002	12.258	2.069	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	45.978	321.5	303	18.094	14.307	3.412	Open Manhole	1350
2.000	23.763	14.0	303	18.094	14.457	3.412	Open Manhole	1350
1.001	30.965	402.1	304	17.594	14.155	2.989	Open Manhole	1350
1.002	37.033	37.0	307	17.024	13.155	3.419	Open Manhole	1500
3.000	66.073	320.7	306	16.392	13.419	2.598	Open Manhole	1350
3.001	60.676	321.0	307	17.024	13.230	3.419	Open Manhole	1500
1.003	53.466	441.9	310	16.200	12.959	2.716	Open Manhole	1500
4.000	22.909	322.7	309	15.920	13.791	1.754	Open Manhole	1350
4.001	58.521	85.8	310	16.200	13.109	2.716	Open Manhole	1500
1.004	69.257	148.3	312	15.358	12.492	2.341	Open Manhole	1500
5.000	69.837	320.4	312	15.358	12.642	2.341	Open Manhole	1500
1.005	42.016	500.2	313	15.002	12.258	2.069	Open Manhole	1500
1.006	50.641	501.4	314	14.511	12.157	1.679	Open Manhole	1500

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	o	675	314	14.511	12.157	1.679	Open Manhole	1500
6.000	o	375	315	14.708	12.833	1.500	Open Manhole	1350
6.001	o	375	316	14.253	12.378	1.500	Open Manhole	1350
1.008	o	675	317	14.332	11.309	2.348	Open Manhole	1500
7.000	o	375	318	13.438	11.563	1.500	Open Manhole	1350
1.009	o	675	319	13.924	11.083	2.166	Open Manhole	1500
8.000	o	375	320	15.248	13.373	1.500	Open Manhole	1350
8.001	o	375	321	15.258	13.321	1.562	Open Manhole	1350
8.002	o	375	322	15.435	13.299	1.761	Open Manhole	1350
9.000	o	300	323	16.198	14.398	1.500	Open Manhole	1200
8.003	o	375	324	15.676	13.138	2.163	Open Manhole	1350
10.000	o	375	325	14.417	12.542	1.500	Open Manhole	1350
10.001	o	375	326	14.647	12.419	1.853	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.007	21.134	24.9	317	14.332	11.309	2.348	Open Manhole	1500
6.000	50.857	111.8	316	14.253	12.378	1.500	Open Manhole	1350
6.001	54.161	70.4	317	14.332	11.609	2.348	Open Manhole	1500
1.008	26.172	115.8	319	13.924	11.083	2.166	Open Manhole	1500
7.000	57.763	320.9	319	13.924	11.383	2.166	Open Manhole	1500
1.009	47.002	36.7	347	12.755	9.802	2.278	Open Manhole	1800
8.000	16.601	319.3	321	15.258	13.321	1.562	Open Manhole	1350
8.001	7.144	324.7	322	15.435	13.299	1.761	Open Manhole	1350
8.002	51.708	321.2	324	15.676	13.138	2.163	Open Manhole	1350
9.000	41.112	34.7	324	15.676	13.213	2.163	Open Manhole	1350
8.003	38.568	48.6	328	15.035	12.344	2.316	Open Manhole	1500
10.000	39.580	321.8	326	14.647	12.419	1.853	Open Manhole	1350
10.001	15.710	320.6	327	14.931	12.370	2.186	Open Manhole	1350

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.002	o	375	327	14.931	12.370	2.186	Open Manhole	1350
8.004	o	600	328	15.035	12.119	2.316	Open Manhole	1500
8.005	o	600	329	14.751	12.017	2.134	Open Manhole	1500
8.006	o	600	330	14.620	11.986	2.034	Open Manhole	1500
8.007	o	600	331	14.310	11.935	1.775	Open Manhole	1500
11.000	o	300	332	14.126	12.326	1.500	Open Manhole	1050
11.001	o	375	333	13.545	11.670	1.500	Open Manhole	1350
11.002	o	375	334	13.405	11.491	1.539	Open Manhole	1350
12.000	o	300	335	14.363	12.563	1.500	Open Manhole	1050
11.003	o	525	336	13.745	11.288	1.932	Open Manhole	1500
11.004	o	525	337	13.540	11.236	1.779	Open Manhole	1500
11.005	o	525	338	12.575	10.549	1.501	Open Manhole	1500
11.006	o	525	339	12.457	10.431	1.501	Open Manhole	1500
8.008	o	675	340	12.505	10.207	1.623	Open Manhole	1500
8.009	o	1050	341	12.346	9.795	1.501	Open Manhole	1800
8.010	o	1050	342	12.399	9.735	1.614	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.002	8.142	313.2	328	15.035	12.344	2.316	Open Manhole	1500
8.004	50.870	498.7	329	14.751	12.017	2.134	Open Manhole	1500
8.005	15.357	495.4	330	14.620	11.986	2.034	Open Manhole	1500
8.006	25.532	500.6	331	14.310	11.935	1.775	Open Manhole	1500
8.007	87.434	52.9	340	12.505	10.282	1.623	Open Manhole	1500
11.000	28.756	49.5	333	13.545	11.745	1.500	Open Manhole	1350
11.001	57.250	319.8	334	13.405	11.491	1.539	Open Manhole	1350
11.002	16.885	318.6	336	13.745	11.438	1.932	Open Manhole	1500
12.000	31.832	30.3	336	13.745	11.513	1.932	Open Manhole	1500
11.003	25.632	492.9	337	13.540	11.236	1.779	Open Manhole	1500
11.004	46.974	68.4	338	12.575	10.549	1.501	Open Manhole	1500
11.005	20.935	177.4	339	12.457	10.431	1.501	Open Manhole	1500
11.006	36.275	490.2	340	12.505	10.357	1.623	Open Manhole	1500
8.008	16.398	443.2	341	12.346	10.170	1.501	Open Manhole	1800
8.009	29.791	496.5	342	12.399	9.735	1.614	Open Manhole	1800
8.010	39.742	503.1	345	12.481	9.656	1.775	Open Manhole	1800

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
13.000	o	375	343	13.866	11.991	1.500	Open Manhole	1350
13.001	o	375	344	13.909	11.939	1.595	Open Manhole	1350
8.011	o	1050	345	12.481	9.656	1.775	Open Manhole	1800
8.012	o	1050	346	12.555	9.580	1.925	Open Manhole	1800
1.010	o	1050	347	12.755	9.426	2.279	Open Manhole	1800
1.011	o	1050	348	12.445	9.396	1.999	Open Manhole	1800
1.012	o	1050	349	12.139	9.303	1.786	Open Manhole	1800
14.000	o	300	350	12.724	10.924	1.500	Open Manhole	1200
14.001	o	300	351	12.388	10.587	1.501	Open Manhole	1200
14.002	o	300	352	12.162	10.361	1.501	Open Manhole	1200
1.013	o	1050	353	11.929	9.216	1.663	Open Manhole	1800
1.014	o	1050	354	11.806	9.159	1.597	Open Manhole	1800
15.000	o	300	355	17.075	15.275	1.500	Open Manhole	1050
15.001	o	375	356	16.792	14.917	1.500	Open Manhole	1350
15.002	o	375	357	16.258	14.383	1.500	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
13.000	16.784	322.8	344	13.909	11.939	1.595	Open Manhole	1350
13.001	56.525	35.2	345	12.481	10.331	1.775	Open Manhole	1800
8.011	38.049	500.6	346	12.555	9.580	1.925	Open Manhole	1800
8.012	77.216	501.4	347	12.755	9.426	2.279	Open Manhole	1800
1.010	14.774	492.5	348	12.445	9.396	1.999	Open Manhole	1800
1.011	46.476	499.7	349	12.139	9.303	1.786	Open Manhole	1800
1.012	43.174	496.3	353	11.929	9.216	1.663	Open Manhole	1800
14.000	24.563	72.9	351	12.388	10.587	1.501	Open Manhole	1200
14.001	22.422	99.2	352	12.162	10.361	1.501	Open Manhole	1200
14.002	28.783	72.9	353	11.929	9.966	1.663	Open Manhole	1800
1.013	28.682	503.2	354	11.806	9.159	1.597	Open Manhole	1800
1.014	24.899	212.8	380	11.690	9.042	1.598	Open Manhole	1800
15.000	11.833	41.8	356	16.792	14.992	1.500	Open Manhole	1350
15.001	57.230	107.2	357	16.258	14.383	1.500	Open Manhole	1350
15.002	17.740	46.8	358	15.878	14.004	1.499	Open Manhole	1350

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.003	o	375	358	15.878	14.004	1.499	Open Manhole	1350
15.004	o	375	359	15.228	13.353	1.500	Open Manhole	1350
15.005	o	375	360	15.064	13.189	1.500	Open Manhole	1350
16.000	o	300	361	15.177	13.377	1.500	Open Manhole	1050
15.006	o	525	362	15.282	12.886	1.871	Open Manhole	1500
15.007	o	525	363	15.165	12.857	1.783	Open Manhole	1500
15.008	o	525	364	14.792	12.767	1.500	Open Manhole	1500
15.009	o	525	365	14.716	12.691	1.500	Open Manhole	1500
15.010	o	525	366	14.456	11.981	1.950	Open Manhole	1500
17.000	o	375	367	14.057	12.182	1.500	Open Manhole	1350
15.011	o	600	368	14.363	11.862	1.901	Open Manhole	1500
18.000	o	300	369	14.349	12.549	1.500	Open Manhole	1200
15.012	o	600	370	14.032	11.759	1.673	Open Manhole	1500
15.013	o	600	371	13.737	11.636	1.501	Open Manhole	1500
15.014	o	600	372	13.465	11.364	1.501	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.003	58.214	89.4	359	15.228	13.353	1.500	Open Manhole	1350
15.004	42.801	261.0	360	15.064	13.189	1.500	Open Manhole	1350
15.005	40.014	261.5	362	15.282	13.036	1.871	Open Manhole	1500
16.000	16.465	61.9	362	15.282	13.111	1.871	Open Manhole	1500
15.006	14.475	499.1	363	15.165	12.857	1.783	Open Manhole	1500
15.007	42.333	470.4	364	14.792	12.767	1.500	Open Manhole	1500
15.008	6.193	81.5	365	14.716	12.691	1.500	Open Manhole	1500
15.009	30.572	43.1	366	14.456	11.981	1.950	Open Manhole	1500
15.010	13.311	302.5	368	14.363	11.937	1.901	Open Manhole	1500
17.000	30.304	319.0	368	14.363	12.087	1.901	Open Manhole	1500
15.011	51.587	500.8	370	14.032	11.759	1.673	Open Manhole	1500
18.000	41.913	85.5	370	14.032	12.059	1.673	Open Manhole	1500
15.012	38.947	316.6	371	13.737	11.636	1.501	Open Manhole	1500
15.013	41.426	152.3	372	13.465	11.364	1.501	Open Manhole	1500
15.014	9.164	81.1	373	13.352	11.251	1.501	Open Manhole	1500

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PIPELINE SCHEDULES for 01N-03.SWS Some Cells

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.015	o	600	373	13.352	11.251	1.501	Open Manhole	1500
15.016	o	600	374	12.637	10.536	1.501	Open Manhole	1500
15.017	o	600	375	12.565	10.464	1.501	Open Manhole	1500
15.018	o	600	376	12.266	10.165	1.501	Open Manhole	1500
15.019	o	600	377	12.057	9.955	1.502	Open Manhole	1500
15.020	o	600	378	11.759	9.657	1.502	Open Manhole	1500
15.021	o	675	379	11.614	9.437	1.502	Open Manhole	1500
1.015	o	1050	380	11.690	9.040	1.600	Open Manhole	1800
1.016	o	1050	381	11.769	8.962	1.757	Open Manhole	1800
1.017	o	1050	382	10.200	7.800	1.350	Open Manhole	1800
1.018	o	300	383	10.200	7.300	2.600	Open Manhole	1800
1.019	o	300	384	10.445	7.100	3.045	Open Manhole	1200
1.020	o	300	385	9.576	6.725	2.551	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.015	57.164	79.9	374	12.637	10.536	1.501	Open Manhole	1500
15.016	5.580	77.5	375	12.565	10.464	1.501	Open Manhole	1500
15.017	21.494	71.9	376	12.266	10.165	1.501	Open Manhole	1500
15.018	17.906	85.3	377	12.057	9.955	1.502	Open Manhole	1500
15.019	37.411	125.5	378	11.759	9.657	1.502	Open Manhole	1500
15.020	26.379	181.9	379	11.614	9.512	1.502	Open Manhole	1500
15.021	9.592	436.0	380	11.690	9.415	1.600	Open Manhole	1800
1.015	39.119	501.5	381	11.769	8.962	1.757	Open Manhole	1800
1.016	31.513	27.1	382	10.200	7.800	1.350	Open Manhole	1800
1.017	19.461	38.9	383	10.200	7.300	1.850	Open Manhole	1800
1.018	23.126	115.6	384	10.445	7.100	3.045	Open Manhole	1200
1.019	43.050	114.8	385	9.576	6.725	2.551	Open Manhole	1200
1.020	3.796	151.8	385	7.500	6.700	0.500	Open Manhole	0

Free Flowing Outfall Details for 01N-03.SWS Some Cells

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.020	385	7.500	6.700	0.000	0	0

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Simulation Criteria for 01N-03.SWS Some Cells

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	3
Number of Online Controls	3	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)	20.000	Storm Duration (mins)	30
Ratio R	0.316		

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Online Controls for 01N-03.SWS Some Cells

Complex Manhole: 317, DS/PN: 1.008, Volume (m³): 18.2

Orifice

Diameter (m) 0.070 Discharge Coefficient 0.600 Invert Level (m) 11.309

Complex Manhole: 366, DS/PN: 15.010, Volume (m³): 10.7

Orifice

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 11.981

Complex Manhole: 383, DS/PN: 1.018, Volume (m³): 22.7

Hydro-Brake®

Design Head (m) 0.600 Hydro-Brake® Type Md4 Invert Level (m) 7.300
Design Flow (l/s) 45.0 Diameter (mm) 225

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.5	1.200	43.5	3.000	68.3	7.000	104.4
0.200	18.5	1.400	46.7	3.500	73.8	7.500	108.0
0.300	35.1	1.600	49.9	4.000	78.9	8.000	111.6
0.400	45.9	1.800	52.9	4.500	83.7	8.500	115.0
0.500	47.7	2.000	55.8	5.000	88.2	9.000	118.4
0.600	44.5	2.200	58.5	5.500	92.5	9.500	121.6
0.800	39.6	2.400	61.1	6.000	96.6		
1.000	40.6	2.600	63.6	6.500	100.6		

Orifice

Diameter (m) 0.165 Discharge Coefficient 0.600 Invert Level (m) 8.650

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Storage Structures for 01N-03.SWS Some Cells

Complex Manhole: 317, DS/PN: 1.008

Cellular Storage

Invert Level (m) 11.309 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	384.0	0.0	1.350	0.0	0.0
1.320	384.0	0.0	2.000	0.0	0.0

Tank or Pond

Invert Level (m) 11.309

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	0.0	1.990	0.0	2.000	2400.0	3.000	2400.0

Complex Manhole: 366, DS/PN: 15.010

Cellular Storage

Invert Level (m) 11.981 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	192.0	0.0	1.350	0.0	0.0
1.320	192.0	0.0			

Tank or Pond

Invert Level (m) 11.981

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	0.0	1.990	0.0	2.000	3600.0	2.500	3600.0

Tank or Pond Manhole: 383, DS/PN: 1.018

Invert Level (m) 7.300

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Tank or Pond Manhole: 383, DS/PN: 1.018

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	379.0	0.800	668.0	1.600	1011.0	2.400	1408.0
0.100	413.0	0.900	708.0	1.700	1058.0	2.500	1461.0
0.200	447.0	1.000	749.0	1.800	1105.0	2.600	1516.0
0.300	482.0	1.100	791.0	1.900	1154.0	2.700	1619.0
0.400	518.0	1.200	833.0	2.000	1203.0	2.800	2105.0
0.500	554.0	1.300	876.0	2.100	1253.0	2.900	2596.0
0.600	591.0	1.400	921.0	2.200	1304.0		
0.700	629.0	1.500	965.0	2.300	1355.0		

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
2.000	30 Winter	1	0%	100/30 Winter				
1.001	30 Winter	1	0%	30/30 Winter				
1.002	30 Winter	1	0%	100/30 Winter				
3.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			2
3.001	30 Winter	1	0%	30/30 Winter				
1.003	30 Winter	1	0%	30/30 Winter				
4.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
4.001	30 Winter	1	0%	100/30 Winter				
1.004	30 Winter	1	0%	30/30 Winter				
5.000	30 Winter	1	0%	30/30 Winter				
1.005	30 Winter	1	0%	30/30 Winter				
1.006	30 Winter	1	0%	30/30 Winter	30/360 Winter			
1.007	30 Winter	1	0%	30/120 Winter	30/360 Winter			
6.000	30 Winter	1	0%	30/180 Winter				
6.001	30 Winter	1	0%	30/120 Winter	30/360 Winter			
1.008	600 Winter	1	0%	1/240 Winter				
7.000	30 Winter	1	0%	30/30 Winter				
1.009	30 Winter	1	0%					
8.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
8.001	30 Winter	1	0%	30/30 Winter				
8.002	30 Winter	1	0%	30/30 Winter				
9.000	30 Winter	1	0%	100/30 Winter	100/30 Winter			1
8.003	30 Winter	1	0%	30/30 Winter				
10.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
10.001	30 Winter	1	0%	30/30 Winter				
10.002	30 Winter	1	0%	30/30 Winter				
8.004	30 Winter	1	0%	30/30 Winter				
8.005	30 Winter	1	0%	30/30 Winter				
8.006	30 Winter	1	0%	30/30 Winter				
8.007	30 Winter	1	0%					
11.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
11.001	30 Winter	1	0%	30/30 Winter				
11.002	30 Winter	1	0%	30/30 Winter				
12.000	30 Winter	1	0%	100/30 Winter				
11.003	30 Winter	1	0%	30/30 Winter				
11.004	30 Winter	1	0%	100/30 Winter				
11.005	30 Winter	1	0%	30/30 Winter				
11.006	30 Winter	1	0%	30/30 Winter				

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
8.008	30 Winter	1	0%	30/30 Winter				
8.009	30 Winter	1	0%	100/30 Winter				
8.010	30 Winter	1	0%	100/30 Winter				
13.000	30 Winter	1	0%	30/30 Winter				
13.001	30 Winter	1	0%					
8.011	30 Winter	1	0%	100/30 Winter				
8.012	30 Winter	1	0%	100/30 Winter				
1.010	30 Winter	1	0%	100/30 Winter				
1.011	30 Winter	1	0%	100/30 Winter				
1.012	30 Winter	1	0%	100/30 Winter				
14.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
14.001	30 Winter	1	0%	30/30 Winter				
14.002	30 Winter	1	0%	30/30 Winter				
1.013	30 Winter	1	0%	100/30 Winter				
1.014	30 Winter	1	0%	100/30 Winter				
15.000	30 Winter	1	0%	30/30 Winter				
15.001	30 Winter	1	0%	100/30 Winter				
15.002	30 Winter	1	0%	100/30 Winter				
15.003	30 Winter	1	0%	100/30 Winter				
15.004	30 Winter	1	0%	30/30 Winter				
15.005	30 Winter	1	0%	30/30 Winter				
16.000	30 Winter	1	0%	30/30 Winter				
15.006	30 Winter	1	0%	30/30 Winter				
15.007	30 Winter	1	0%	30/30 Winter				
15.008	30 Winter	1	0%	100/30 Winter				
15.009	30 Winter	1	0%	30/480 Winter				
15.010	600 Winter	1	0%	1/360 Winter				
17.000	30 Winter	1	0%	30/30 Winter				
15.011	30 Winter	1	0%	100/30 Winter				
18.000	30 Winter	1	0%	30/30 Winter	100/30 Winter			1
15.012	30 Winter	1	0%	100/30 Winter				
15.013	30 Winter	1	0%	100/30 Winter				
15.014	30 Winter	1	0%	100/30 Winter				
15.015	30 Winter	1	0%					
15.016	30 Winter	1	0%	100/30 Winter				
15.017	30 Winter	1	0%					
15.018	30 Winter	1	0%	100/30 Winter				
15.019	30 Winter	1	0%	100/30 Winter				
15.020	30 Winter	1	0%	100/30 Winter				
15.021	30 Winter	1	0%	100/30 Winter				
1.015	30 Winter	1	0%	100/30 Winter				
1.016	30 Winter	1	0%	100/120 Winter				
1.017	30 Winter	1	0%	30/30 Winter				
1.018	600 Winter	1	0%	1/30 Winter				
1.019	360 Winter	1	0%	30/120 Winter				
1.020	360 Winter	1	0%	30/30 Winter				

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	301	14.662	-0.163	0.000	0.60	0.0	61.2	OK
2.000	302	16.228	-0.150	0.000	0.24	0.0	31.2	OK
1.001	303	14.500	-0.182	0.000	0.66	0.0	90.8	OK
1.002	304	14.289	-0.316	0.000	0.19	0.0	90.9	OK
3.000	305	13.834	-0.166	0.000	0.58	0.0	60.5	OK
3.001	306	13.624	-0.170	0.000	0.56	0.0	58.4	OK
1.003	307	13.411	-0.194	0.000	0.71	0.0	145.7	OK
4.000	308	14.084	-0.153	0.000	0.65	0.0	61.9	OK
4.001	309	13.933	-0.233	0.000	0.31	0.0	61.7	OK
1.004	310	13.237	-0.247	0.000	0.55	0.0	199.1	OK
5.000	311	13.068	-0.167	0.000	0.58	0.0	61.0	OK
1.005	312	12.785	-0.232	0.000	0.70	0.0	246.3	OK
1.006	313	12.669	-0.264	0.000	0.68	0.0	242.3	OK
1.007	314	12.365	-0.467	0.000	0.21	0.0	242.9	OK
6.000	315	12.987	-0.221	0.000	0.35	0.0	62.0	OK
6.001	316	12.513	-0.240	0.000	0.28	0.0	62.0	OK
1.008	317	12.140	0.156	0.000	0.02	0.0	9.1	SURCHARGED
7.000	318	11.773	-0.165	0.000	0.60	0.0	62.3	OK
1.009	319	11.179	-0.579	0.000	0.05	0.0	64.5	OK
8.000	320	13.629	-0.119	0.000	0.68	0.0	61.3	OK
8.001	321	13.589	-0.107	0.000	0.85	0.0	61.2	OK
8.002	322	13.507	-0.167	0.000	0.58	0.0	60.2	OK
9.000	323	14.521	-0.177	0.000	0.35	0.0	62.4	OK
8.003	324	13.316	-0.197	0.000	0.46	0.0	119.9	OK
10.000	325	12.756	-0.161	0.000	0.61	0.0	61.3	OK
10.001	326	12.663	-0.131	0.000	0.67	0.0	59.8	OK
10.002	327	12.620	-0.125	0.000	0.78	0.0	60.0	OK
8.004	328	12.559	-0.160	0.000	0.65	0.0	173.8	OK
8.005	329	12.496	-0.121	0.000	0.99	0.0	170.3	OK
8.006	330	12.357	-0.229	0.000	0.70	0.0	168.9	OK
8.007	331	12.113	-0.422	0.000	0.19	0.0	169.1	OK
11.000	332	12.464	-0.162	0.000	0.44	0.0	62.4	OK
11.001	333	11.880	-0.165	0.000	0.59	0.0	61.1	OK
11.002	334	11.714	-0.152	0.000	0.66	0.0	60.2	OK
12.000	335	12.683	-0.180	0.000	0.34	0.0	62.4	OK
11.003	336	11.604	-0.209	0.000	0.67	0.0	118.0	OK
11.004	337	11.405	-0.356	0.000	0.23	0.0	118.4	OK
11.005	338	10.836	-0.238	0.000	0.44	0.0	116.1	OK
11.006	339	10.810	-0.146	0.000	0.59	0.0	110.7	OK
8.008	340	10.774	-0.108	0.000	1.00	0.0	264.7	OK
8.009	341	10.232	-0.613	0.000	0.28	0.0	264.5	OK
8.010	342	10.172	-0.613	0.000	0.26	0.0	262.2	OK
13.000	343	12.220	-0.146	0.000	0.69	0.0	62.1	OK
13.001	344	12.052	-0.262	0.000	0.20	0.0	61.9	OK
8.011	345	10.103	-0.603	0.000	0.29	0.0	284.3	OK
8.012	346	10.034	-0.596	0.000	0.25	0.0	279.3	OK
1.010	347	9.953	-0.523	0.000	0.50	0.0	300.2	OK
1.011	348	9.831	-0.615	0.000	0.29	0.0	298.9	OK
1.012	349	9.732	-0.621	0.000	0.29	0.0	297.4	OK

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
14.000	350	11.081	-0.143	0.000	0.54	0.0	62.4	OK
14.001	351	10.761	-0.126	0.000	0.63	0.0	62.4	OK
14.002	352	10.516	-0.145	0.000	0.53	0.0	62.1	OK
1.013	353	9.634	-0.632	0.000	0.34	0.0	309.5	OK
1.014	354	9.538	-0.671	0.000	0.23	0.0	310.5	OK
15.000	355	15.419	-0.156	0.000	0.47	0.0	62.4	OK
15.001	356	15.069	-0.223	0.000	0.34	0.0	61.7	OK
15.002	357	14.512	-0.246	0.000	0.26	0.0	61.9	OK
15.003	358	14.147	-0.232	0.000	0.31	0.0	61.6	OK
15.004	359	13.551	-0.177	0.000	0.54	0.0	61.0	OK
15.005	360	13.386	-0.178	0.000	0.54	0.0	60.3	OK
16.000	361	13.531	-0.146	0.000	0.52	0.0	62.4	OK
15.006	362	13.284	-0.127	0.000	0.93	0.0	112.8	OK
15.007	363	13.145	-0.237	0.000	0.57	0.0	111.6	OK
15.008	364	13.013	-0.279	0.000	0.45	0.0	111.6	OK
15.009	365	12.840	-0.376	0.000	0.18	0.0	111.5	OK
15.010	366	12.553	0.047	0.000	0.02	0.0	3.9	SURCHARGED
17.000	367	12.399	-0.158	0.000	0.63	0.0	62.1	OK
15.011	368	12.086	-0.376	0.000	0.22	0.0	60.3	OK
18.000	369	12.709	-0.140	0.000	0.56	0.0	62.3	OK
15.012	370	12.011	-0.348	0.000	0.37	0.0	119.9	OK
15.013	371	11.839	-0.397	0.000	0.25	0.0	118.9	OK
15.014	372	11.606	-0.358	0.000	0.34	0.0	119.2	OK
15.015	373	11.418	-0.433	0.000	0.17	0.0	118.2	OK
15.016	374	10.778	-0.358	0.000	0.34	0.0	118.8	OK
15.017	375	10.653	-0.411	0.000	0.22	0.0	118.9	OK
15.018	376	10.371	-0.394	0.000	0.26	0.0	118.6	OK
15.019	377	10.149	-0.406	0.000	0.23	0.0	118.4	OK
15.020	378	9.885	-0.372	0.000	0.31	0.0	118.1	OK
15.021	379	9.789	-0.323	0.000	0.54	0.0	117.8	OK
1.015	380	9.490	-0.600	0.000	0.38	0.0	381.0	OK
1.016	381	9.198	-0.814	0.000	0.12	0.0	381.3	OK
1.017	382	8.098	-0.752	0.000	0.18	0.0	381.5	OK
1.018	383	8.470	0.870	0.000	0.52	0.0	47.5	SURCHARGED
1.019	384	7.249	-0.151	0.000	0.49	0.0	47.5	OK
1.020	385	6.941	-0.084	0.000	0.87	0.0	47.5	OK

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
2.000	30 Winter	30	0%	100/30 Winter				
1.001	30 Winter	30	0%	30/30 Winter				
1.002	30 Winter	30	0%	100/30 Winter				
3.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			2
3.001	30 Winter	30	0%	30/30 Winter				
1.003	30 Winter	30	0%	30/30 Winter				
4.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
4.001	30 Winter	30	0%	100/30 Winter				
1.004	30 Winter	30	0%	30/30 Winter				
5.000	30 Winter	30	0%	30/30 Winter				
1.005	30 Winter	30	0%	30/30 Winter				
1.006	30 Winter	30	0%	30/30 Winter	30/360 Winter			
1.007	30 Winter	30	0%	30/120 Winter	30/360 Winter			
6.000	30 Winter	30	0%	30/180 Winter				
6.001	30 Winter	30	0%	30/120 Winter	30/360 Winter			
1.008	600 Winter	30	0%	1/240 Winter				
7.000	30 Winter	30	0%	30/30 Winter				
1.009	30 Winter	30	0%					
8.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
8.001	30 Winter	30	0%	30/30 Winter				
8.002	30 Winter	30	0%	30/30 Winter				
9.000	30 Winter	30	0%	100/30 Winter	100/30 Winter			1
8.003	30 Winter	30	0%	30/30 Winter				
10.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
10.001	30 Winter	30	0%	30/30 Winter				
10.002	30 Winter	30	0%	30/30 Winter				
8.004	30 Winter	30	0%	30/30 Winter				
8.005	30 Winter	30	0%	30/30 Winter				
8.006	30 Winter	30	0%	30/30 Winter				
8.007	30 Winter	30	0%					
11.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
11.001	30 Winter	30	0%	30/30 Winter				
11.002	30 Winter	30	0%	30/30 Winter				
12.000	30 Winter	30	0%	100/30 Winter				
11.003	30 Winter	30	0%	30/30 Winter				
11.004	30 Winter	30	0%	100/30 Winter				
11.005	30 Winter	30	0%	30/30 Winter				
11.006	30 Winter	30	0%	30/30 Winter				

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
8.008	30 Winter	30	0%	30/30 Winter				
8.009	30 Winter	30	0%	100/30 Winter				
8.010	30 Winter	30	0%	100/30 Winter				
13.000	30 Winter	30	0%	30/30 Winter				
13.001	30 Winter	30	0%					
8.011	30 Winter	30	0%	100/30 Winter				
8.012	30 Winter	30	0%	100/30 Winter				
1.010	30 Winter	30	0%	100/30 Winter				
1.011	30 Winter	30	0%	100/30 Winter				
1.012	30 Winter	30	0%	100/30 Winter				
14.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
14.001	30 Winter	30	0%	30/30 Winter				
14.002	30 Winter	30	0%	30/30 Winter				
1.013	30 Winter	30	0%	100/30 Winter				
1.014	30 Winter	30	0%	100/30 Winter				
15.000	30 Winter	30	0%	30/30 Winter				
15.001	30 Winter	30	0%	100/30 Winter				
15.002	30 Winter	30	0%	100/30 Winter				
15.003	30 Winter	30	0%	100/30 Winter				
15.004	30 Winter	30	0%	30/30 Winter				
15.005	30 Winter	30	0%	30/30 Winter				
16.000	30 Winter	30	0%	30/30 Winter				
15.006	30 Winter	30	0%	30/30 Winter				
15.007	30 Winter	30	0%	30/30 Winter				
15.008	30 Winter	30	0%	100/30 Winter				
15.009	30 Winter	30	0%	30/480 Winter				
15.010	600 Winter	30	0%	1/360 Winter				
17.000	30 Winter	30	0%	30/30 Winter				
15.011	30 Winter	30	0%	100/30 Winter				
18.000	30 Winter	30	0%	30/30 Winter	100/30 Winter			1
15.012	30 Winter	30	0%	100/30 Winter				
15.013	30 Winter	30	0%	100/30 Winter				
15.014	30 Winter	30	0%	100/30 Winter				
15.015	30 Winter	30	0%					
15.016	30 Winter	30	0%	100/30 Winter				
15.017	30 Winter	30	0%					
15.018	30 Winter	30	0%	100/30 Winter				
15.019	30 Winter	30	0%	100/30 Winter				
15.020	30 Winter	30	0%	100/30 Winter				
15.021	30 Winter	30	0%	100/30 Winter				
1.015	30 Winter	30	0%	100/30 Winter				
1.016	30 Winter	30	0%	100/120 Winter				
1.017	30 Winter	30	0%	30/30 Winter				
1.018	360 Winter	30	0%	1/30 Winter				
1.019	360 Winter	30	0%	30/120 Winter				
1.020	360 Winter	30	0%	30/30 Winter				

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	301	15.088	0.263	0.000	1.44	0.0	146.7	SURCHARGED
2.000	302	16.278	-0.100	0.000	0.60	0.0	76.5	OK
1.001	303	14.779	0.097	0.000	1.58	0.0	218.6	SURCHARGED
1.002	304	14.371	-0.234	0.000	0.47	0.0	218.7	OK
3.000	305	14.586	0.586	0.000	1.30	0.0	135.7	SURCHARGED
3.001	306	14.369	0.575	0.000	1.14	0.0	118.7	SURCHARGED
1.003	307	14.151	0.546	0.000	1.53	0.0	315.1	SURCHARGED
4.000	308	14.332	0.095	0.000	1.60	0.0	151.9	SURCHARGED
4.001	309	14.088	-0.078	0.000	0.75	0.0	151.5	OK
1.004	310	13.864	0.380	0.000	1.18	0.0	429.7	SURCHARGED
5.000	311	13.473	0.238	0.000	1.36	0.0	143.1	SURCHARGED
1.005	312	13.222	0.205	0.000	1.53	0.0	535.9	SURCHARGED
1.006	313	13.023	0.090	0.000	1.48	0.0	530.3	SURCHARGED
1.007	314	12.476	-0.356	0.000	0.45	0.0	530.6	OK
6.000	315	13.104	-0.104	0.000	0.87	0.0	152.1	OK
6.001	316	12.607	-0.146	0.000	0.69	0.0	152.2	OK
1.008	317	13.423	1.439	0.000	0.02	0.0	14.7	SURCHARGED
7.000	318	12.126	0.188	0.000	1.45	0.0	151.0	SURCHARGED
1.009	319	11.237	-0.521	0.000	0.12	0.0	154.9	OK
8.000	320	14.292	0.544	0.000	1.50	0.0	136.2	SURCHARGED
8.001	321	14.178	0.482	0.000	1.86	0.0	133.8	SURCHARGED
8.002	322	14.066	0.392	0.000	1.27	0.0	130.6	SURCHARGED
9.000	323	14.615	-0.083	0.000	0.87	0.0	153.0	OK
8.003	324	13.826	0.313	0.000	1.03	0.0	268.3	SURCHARGED
10.000	325	13.441	0.524	0.000	1.34	0.0	135.4	SURCHARGED
10.001	326	13.240	0.446	0.000	1.50	0.0	133.2	SURCHARGED
10.002	327	13.130	0.385	0.000	1.70	0.0	131.2	SURCHARGED
8.004	328	13.019	0.300	0.000	1.45	0.0	388.9	SURCHARGED
8.005	329	12.805	0.188	0.000	2.26	0.0	388.1	SURCHARGED
8.006	330	12.655	0.069	0.000	1.60	0.0	386.9	SURCHARGED
8.007	331	12.214	-0.321	0.000	0.44	0.0	385.5	OK
11.000	332	12.887	0.261	0.000	0.99	0.0	141.9	SURCHARGED
11.001	333	12.316	0.271	0.000	1.33	0.0	138.7	SURCHARGED
11.002	334	11.987	0.121	0.000	1.54	0.0	140.8	SURCHARGED
12.000	335	12.772	-0.091	0.000	0.83	0.0	153.1	OK
11.003	336	11.867	0.054	0.000	1.56	0.0	276.3	SURCHARGED
11.004	337	11.509	-0.252	0.000	0.53	0.0	276.7	OK
11.005	338	11.331	0.257	0.000	1.01	0.0	265.2	SURCHARGED
11.006	339	11.214	0.258	0.000	1.40	0.0	262.1	SURCHARGED
8.008	340	11.072	0.190	0.000	2.44	0.0	645.7	SURCHARGED
8.009	341	10.567	-0.278	0.000	0.68	0.0	639.5	OK
8.010	342	10.513	-0.272	0.000	0.63	0.0	627.7	OK
13.000	343	12.448	0.082	0.000	1.69	0.0	152.6	SURCHARGED
13.001	344	12.123	-0.191	0.000	0.48	0.0	151.8	OK
8.011	345	10.454	-0.252	0.000	0.70	0.0	694.2	OK
8.012	346	10.389	-0.241	0.000	0.60	0.0	673.0	OK
1.010	347	10.313	-0.163	0.000	1.21	0.0	724.9	OK
1.011	348	10.173	-0.273	0.000	0.70	0.0	721.4	OK
1.012	349	10.081	-0.272	0.000	0.71	0.0	722.0	OK

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30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
14.000	350	11.684	0.460	0.000	1.19	0.0	137.7	SURCHARGED
14.001	351	11.209	0.322	0.000	1.39	0.0	136.4	SURCHARGED
14.002	352	10.775	0.114	0.000	1.15	0.0	135.8	SURCHARGED
1.013	353	9.992	-0.274	0.000	0.83	0.0	764.1	OK
1.014	354	9.914	-0.295	0.000	0.57	0.0	775.3	OK
15.000	355	15.648	0.073	0.000	1.13	0.0	151.1	SURCHARGED
15.001	356	15.182	-0.110	0.000	0.83	0.0	150.6	OK
15.002	357	14.598	-0.160	0.000	0.62	0.0	150.3	OK
15.003	358	14.335	-0.044	0.000	0.74	0.0	146.1	OK
15.004	359	14.014	0.286	0.000	1.23	0.0	138.9	SURCHARGED
15.005	360	13.761	0.197	0.000	1.25	0.0	139.6	SURCHARGED
16.000	361	13.889	0.212	0.000	1.22	0.0	146.6	SURCHARGED
15.006	362	13.538	0.127	0.000	2.12	0.0	257.5	SURCHARGED
15.007	363	13.424	0.042	0.000	1.31	0.0	254.9	SURCHARGED
15.008	364	13.231	-0.061	0.000	1.00	0.0	248.6	OK
15.009	365	12.921	-0.295	0.000	0.40	0.0	248.6	OK
15.010	366	13.259	0.753	0.000	0.03	0.0	5.8	SURCHARGED
17.000	367	12.672	0.115	0.000	1.53	0.0	150.6	SURCHARGED
15.011	368	12.259	-0.203	0.000	0.54	0.0	144.4	OK
18.000	369	13.178	0.329	0.000	1.30	0.0	145.2	SURCHARGED
15.012	370	12.195	-0.164	0.000	0.87	0.0	285.4	OK
15.013	371	11.970	-0.266	0.000	0.60	0.0	284.1	OK
15.014	372	11.779	-0.185	0.000	0.82	0.0	284.2	OK
15.015	373	11.519	-0.332	0.000	0.41	0.0	283.0	OK
15.016	374	10.950	-0.186	0.000	0.82	0.0	283.1	OK
15.017	375	10.770	-0.294	0.000	0.52	0.0	283.3	OK
15.018	376	10.506	-0.259	0.000	0.62	0.0	282.8	OK
15.019	377	10.272	-0.283	0.000	0.55	0.0	282.4	OK
15.020	378	10.156	-0.101	0.000	0.70	0.0	268.5	OK
15.021	379	10.095	-0.017	0.000	1.21	0.0	265.0	OK
1.015	380	9.873	-0.217	0.000	0.99	0.0	981.2	OK
1.016	381	9.352	-0.660	0.000	0.30	0.0	979.5	OK
1.017	382	8.887	0.037	0.000	0.45	0.0	975.8	SURCHARGED
1.018	383	9.416	1.816	0.000	1.04	0.0	94.8	SURCHARGED
1.019	384	7.488	0.088	0.000	0.98	0.0	94.8	SURCHARGED
1.020	385	7.128	0.103	0.000	1.73	0.0	94.8	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Winter
Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
2.000	30 Winter	100	+30%	100/30 Winter				
1.001	30 Winter	100	+30%	30/30 Winter				
1.002	30 Winter	100	+30%	100/30 Winter				
3.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			2
3.001	30 Winter	100	+30%	30/30 Winter				
1.003	30 Winter	100	+30%	30/30 Winter				
4.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
4.001	30 Winter	100	+30%	100/30 Winter				
1.004	30 Winter	100	+30%	30/30 Winter				
5.000	30 Winter	100	+30%	30/30 Winter				
1.005	30 Winter	100	+30%	30/30 Winter				
1.006	30 Winter	100	+30%	30/30 Winter	30/360 Winter			
1.007	30 Winter	100	+30%	30/120 Winter	30/360 Winter			
6.000	30 Winter	100	+30%	30/180 Winter				
6.001	30 Winter	100	+30%	30/120 Winter	30/360 Winter			
1.008	600 Winter	100	+30%	1/240 Winter				
7.000	30 Winter	100	+30%	30/30 Winter				
1.009	30 Winter	100	+30%					
8.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
8.001	30 Winter	100	+30%	30/30 Winter				
8.002	30 Winter	100	+30%	30/30 Winter				
9.000	30 Winter	100	+30%	100/30 Winter	100/30 Winter			1
8.003	30 Winter	100	+30%	30/30 Winter				
10.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
10.001	30 Winter	100	+30%	30/30 Winter				
10.002	30 Winter	100	+30%	30/30 Winter				
8.004	30 Winter	100	+30%	30/30 Winter				
8.005	30 Winter	100	+30%	30/30 Winter				
8.006	30 Winter	100	+30%	30/30 Winter				
8.007	30 Winter	100	+30%					
11.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
11.001	30 Winter	100	+30%	30/30 Winter				
11.002	30 Winter	100	+30%	30/30 Winter				
12.000	30 Winter	100	+30%	100/30 Winter				
11.003	30 Winter	100	+30%	30/30 Winter				
11.004	30 Winter	100	+30%	100/30 Winter				
11.005	30 Winter	100	+30%	30/30 Winter				
11.006	30 Winter	100	+30%	30/30 Winter				

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
8.008	30 Winter	100	+30%	30/30 Winter				
8.009	30 Winter	100	+30%	100/30 Winter				
8.010	30 Winter	100	+30%	100/30 Winter				
13.000	30 Winter	100	+30%	30/30 Winter				
13.001	30 Winter	100	+30%					
8.011	30 Winter	100	+30%	100/30 Winter				
8.012	30 Winter	100	+30%	100/30 Winter				
1.010	30 Winter	100	+30%	100/30 Winter				
1.011	30 Winter	100	+30%	100/30 Winter				
1.012	30 Winter	100	+30%	100/30 Winter				
14.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
14.001	30 Winter	100	+30%	30/30 Winter				
14.002	30 Winter	100	+30%	30/30 Winter				
1.013	30 Winter	100	+30%	100/30 Winter				
1.014	30 Winter	100	+30%	100/30 Winter				
15.000	30 Winter	100	+30%	30/30 Winter				
15.001	30 Winter	100	+30%	100/30 Winter				
15.002	30 Winter	100	+30%	100/30 Winter				
15.003	30 Winter	100	+30%	100/30 Winter				
15.004	30 Winter	100	+30%	30/30 Winter				
15.005	30 Winter	100	+30%	30/30 Winter				
16.000	30 Winter	100	+30%	30/30 Winter				
15.006	30 Winter	100	+30%	30/30 Winter				
15.007	30 Winter	100	+30%	30/30 Winter				
15.008	30 Winter	100	+30%	100/30 Winter				
15.009	30 Winter	100	+30%	30/480 Winter				
15.010	600 Winter	100	+30%	1/360 Winter				
17.000	30 Winter	100	+30%	30/30 Winter				
15.011	30 Winter	100	+30%	100/30 Winter				
18.000	30 Winter	100	+30%	30/30 Winter	100/30 Winter			1
15.012	30 Winter	100	+30%	100/30 Winter				
15.013	30 Winter	100	+30%	100/30 Winter				
15.014	30 Winter	100	+30%	100/30 Winter				
15.015	30 Winter	100	+30%					
15.016	30 Winter	100	+30%	100/30 Winter				
15.017	30 Winter	100	+30%					
15.018	30 Winter	100	+30%	100/30 Winter				
15.019	30 Winter	100	+30%	100/30 Winter				
15.020	30 Winter	100	+30%	100/30 Winter				
15.021	30 Winter	100	+30%	100/30 Winter				
1.015	30 Winter	100	+30%	100/30 Winter				
1.016	30 Winter	100	+30%	100/120 Winter				
1.017	30 Winter	100	+30%	30/30 Winter				
1.018	360 Winter	100	+30%	1/30 Winter				
1.019	360 Winter	100	+30%	30/120 Winter				
1.020	360 Winter	100	+30%	30/30 Winter				

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	301	16.335	1.510	9.982	2.07	0.0	211.5	FLOOD
2.000	302	17.171	0.793	0.000	0.90	0.0	115.7	SURCHARGED
1.001	303	15.991	1.309	0.000	2.22	0.0	307.9	SURCHARGED
1.002	304	15.687	1.082	0.000	0.61	0.0	286.9	SURCHARGED
3.000	305	15.543	1.543	42.539	1.77	0.0	185.0	FLOOD
3.001	306	15.457	1.663	0.000	1.79	0.0	185.9	SURCHARGED
1.003	307	15.334	1.729	0.000	1.96	0.0	403.3	SURCHARGED
4.000	308	15.741	1.504	4.013	2.23	0.0	211.2	FLOOD
4.001	309	15.485	1.319	0.000	0.96	0.0	194.4	SURCHARGED
1.004	310	14.893	1.409	0.000	1.59	0.0	581.6	SURCHARGED
5.000	311	14.673	1.438	0.000	2.10	0.0	221.2	FLOOD RISK
1.005	312	13.728	0.711	0.000	2.27	0.0	793.7	SURCHARGED
1.006	313	13.355	0.422	0.000	2.19	0.0	785.2	SURCHARGED
1.007	314	13.334	0.502	0.000	0.67	0.0	783.4	SURCHARGED
6.000	315	13.729	0.521	0.000	1.41	0.0	246.6	SURCHARGED
6.001	316	13.314	0.561	0.000	1.07	0.0	238.3	SURCHARGED
1.008	317	13.851	1.867	0.000	0.03	0.0	16.2	SURCHARGED
7.000	318	12.813	0.875	0.000	2.42	0.0	251.6	SURCHARGED
1.009	319	11.285	-0.473	0.000	0.20	0.0	258.5	OK
8.000	320	15.275	1.527	26.541	2.10	0.0	191.0	FLOOD
8.001	321	15.152	1.456	0.000	2.76	0.0	198.3	FLOOD RISK
8.002	322	15.034	1.360	0.000	1.89	0.0	194.7	SURCHARGED
9.000	323	16.204	1.506	6.269	1.11	0.0	195.5	FLOOD
8.003	324	14.767	1.254	0.000	1.30	0.0	338.2	SURCHARGED
10.000	325	14.424	1.507	6.922	2.08	0.0	210.0	FLOOD
10.001	326	13.963	1.169	0.000	2.28	0.0	202.8	SURCHARGED
10.002	327	13.709	0.964	0.000	2.63	0.0	202.6	SURCHARGED
8.004	328	13.456	0.737	0.000	1.97	0.0	529.0	SURCHARGED
8.005	329	13.062	0.445	0.000	3.08	0.0	528.9	SURCHARGED
8.006	330	12.784	0.198	0.000	2.18	0.0	528.5	SURCHARGED
8.007	331	12.272	-0.263	0.000	0.60	0.0	528.4	OK
11.000	332	14.137	1.511	10.559	1.42	0.0	203.1	FLOOD
11.001	333	13.283	1.238	0.000	1.83	0.0	190.7	FLOOD RISK
11.002	334	12.781	0.915	0.000	2.04	0.0	185.9	SURCHARGED
12.000	335	13.981	1.118	0.000	1.23	0.0	228.2	SURCHARGED
11.003	336	12.577	0.764	0.000	2.25	0.0	397.8	SURCHARGED
11.004	337	12.326	0.565	0.000	0.76	0.0	393.5	SURCHARGED
11.005	338	11.942	0.868	0.000	1.49	0.0	391.9	SURCHARGED
11.006	339	11.709	0.753	0.000	2.08	0.0	388.9	SURCHARGED
8.008	340	11.480	0.598	0.000	3.44	0.0	909.8	SURCHARGED
8.009	341	11.013	0.168	0.000	0.97	0.0	906.8	SURCHARGED
8.010	342	10.963	0.178	0.000	0.89	0.0	892.1	SURCHARGED
13.000	343	12.736	0.370	0.000	2.85	0.0	257.8	SURCHARGED
13.001	344	12.199	-0.115	0.000	0.82	0.0	257.6	OK
8.011	345	10.904	0.198	0.000	1.05	0.0	1037.2	SURCHARGED
8.012	346	10.834	0.204	0.000	0.89	0.0	995.3	SURCHARGED
1.010	347	10.722	0.246	0.000	1.90	0.0	1133.3	SURCHARGED
1.011	348	10.663	0.217	0.000	1.07	0.0	1108.0	SURCHARGED
1.012	349	10.562	0.209	0.000	1.07	0.0	1098.3	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for 01N-03.SWS Some Cells

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
14.000	350	12.739	1.515	15.073	1.57	0.0	181.9	FLOOD
14.001	351	11.983	1.096	0.000	1.83	0.0	180.1	SURCHARGED
14.002	352	11.291	0.630	0.000	1.53	0.0	180.1	SURCHARGED
1.013	353	10.463	0.197	0.000	1.37	0.0	1263.0	SURCHARGED
1.014	354	10.357	0.148	0.000	0.92	0.0	1260.2	SURCHARGED
15.000	355	17.051	1.476	0.000	1.68	0.0	224.4	FLOOD RISK
15.001	356	16.445	1.153	0.000	1.20	0.0	216.7	SURCHARGED
15.002	357	15.848	1.090	0.000	0.82	0.0	197.8	SURCHARGED
15.003	358	15.603	1.224	0.000	0.98	0.0	193.5	FLOOD RISK
15.004	359	14.978	1.250	0.000	1.71	0.0	193.3	FLOOD RISK
15.005	360	14.498	0.934	0.000	1.74	0.0	194.6	SURCHARGED
16.000	361	15.021	1.344	0.000	1.96	0.0	235.6	FLOOD RISK
15.006	362	14.061	0.650	0.000	3.21	0.0	390.4	SURCHARGED
15.007	363	13.805	0.423	0.000	1.99	0.0	387.1	SURCHARGED
15.008	364	13.445	0.153	0.000	1.56	0.0	387.3	SURCHARGED
15.009	365	13.051	-0.165	0.000	0.62	0.0	387.0	OK
15.010	366	14.062	1.556	0.000	0.04	0.0	7.5	SURCHARGED
17.000	367	13.139	0.582	0.000	2.53	0.0	249.8	SURCHARGED
15.011	368	12.553	0.091	0.000	0.90	0.0	240.8	SURCHARGED
18.000	369	14.352	1.503	3.027	1.98	0.0	221.3	FLOOD
15.012	370	12.490	0.131	0.000	1.39	0.0	453.1	SURCHARGED
15.013	371	12.263	0.027	0.000	0.94	0.0	447.3	SURCHARGED
15.014	372	12.021	0.057	0.000	1.29	0.0	447.9	SURCHARGED
15.015	373	11.605	-0.246	0.000	0.65	0.0	445.4	OK
15.016	374	11.234	0.098	0.000	1.29	0.0	446.8	SURCHARGED
15.017	375	10.994	-0.070	0.000	0.81	0.0	445.4	OK
15.018	376	10.828	0.063	0.000	0.94	0.0	430.3	SURCHARGED
15.019	377	10.659	0.104	0.000	0.80	0.0	414.0	SURCHARGED
15.020	378	10.473	0.216	0.000	1.08	0.0	412.0	SURCHARGED
15.021	379	10.309	0.197	0.000	1.87	0.0	411.6	SURCHARGED
1.015	380	10.257	0.167	0.000	1.67	0.0	1663.5	SURCHARGED
1.016	381	9.532	-0.480	0.000	0.50	0.0	1659.9	OK
1.017	382	9.524	0.674	0.000	0.74	0.0	1615.5	SURCHARGED
1.018	383	10.180	2.580	0.000	1.29	0.0	117.8	FLOOD RISK
1.019	384	7.762	0.362	0.000	1.22	0.0	117.8	SURCHARGED
1.020	385	7.206	0.181	0.000	2.14	0.0	117.8	SURCHARGED

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Appendix F Site Investigation Extract

Monmouthshire Housing Association Limited

LAND PARCELS AT MON BANK, NEWPORT

Site Investigation Report

14234/FG/23/SI

Intégral
Géotechnique

1.0 INTRODUCTION

1.1 GENERAL

Monmouthshire Housing Association Limited are proposing to redevelop two land parcels within the Mon Bank site in Newport for residential end-use. The location of the site is shown on Figure 1, while a site plan is presented in Figure 2.

Intégral Géotechnique (Wales) Limited have been appointed as the Geotechnical Engineers to undertake a site investigation to enable a geotechnical and geoenvironmental appraisal of the site and provide a basis for design.

This report presents the findings of the site investigation and gives recommendations for the design of foundations, floor slabs and other geotechnical and geoenvironmental aspects of the project.

This report (including all appendices to it and any subsequent addendums or correspondence) has been prepared for the sole benefit, use and information of Monmouthshire Housing Association Limited and no third party is entitled or permitted to rely on it. This report may not be used, reproduced or circulated (in whole or part) for any purpose without the written consent of Intégral Géotechnique (Wales) Limited. Intégral Géotechnique (Wales) Limited shall not be liable to any third party who does not have such express written permission to rely on the report for any losses they may suffer.

1.2 PROPOSED DEVELOPMENT

The proposed development will comprise a housing mix including houses, bungalows and flats. The development will include associated infrastructure such as access roads, car parking areas and private driveways and also areas of soft landscaping and private gardens.

A proposed development plan is shown in Figure 3.

1.3 SCOPE OF WORKS

The work instructed included a desk study of available information, site reconnaissance and intrusive investigation. This was followed by laboratory testing, on site monitoring and geotechnical and geoenvironmental reporting.

The desk study comprised a review of:

4.0 SITE ENVIRONMENTAL SETTING

4.1 PHYSICAL SETTING

The site is situated within a mainly residential setting on the northern edge of the Mon Bank development site.

The majority of the site is situated on relatively level ground at an elevation of between 15m and 17m AOD. The southwest corner and the northwest edge of the smaller parcel falls to an elevation of approximately 10m to 12m AOD towards the railway line and falls to an approximate minimum elevation of 14m AOD along the northern edge of the larger land parcel.

4.2 GEOLOGY

The 1:50,000 scale geological map of the area indicates the site to be underlain by St Maughans Formation of the Devonian period. These rocks typically comprise interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calcrete clasts.

Superficial Tidal Flat Deposits of Quaternary period are indicated the overlie the solid strata. These deposits typically comprise unconsolidated sediment, mainly mud and/or sand. The geological boundary of these deposits approximately follows the northern and western boundary of the site and therefore these deposits would be anticipated to thin towards the north and west of the site.

A variable thickness of made ground is anticipated above the superficial deposits across the site. Available information suggests that the made ground could be approximately 4m to 6m in thickness and variable in nature containing various construction materials, ashy materials and reworked natural ground.

A summary of the anticipated geological succession is given below in Table 2.

4.2 GEOLOGY (CONTINUED)

Table 2: Summary of Anticipated Site Geology		
Geological unit	**Horizon**	**Description**
Recent	Made ground	Various materials including construction materials, ashy materials and reworked natural ground
Quaternary	Tidal Flat Deposits	Unconsolidated sediment, mainly mud and/or sand
Devonian	St Maughans Formation	Interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calcrete clasts

4.3 RADON

Information with regard to Radon Protective Measures is provided within the Envirocheck Report and the BGS Radon GeoReport as presented in Appendices B and C respectively. The reports state that the site is located within a lower probability area, as less than 1% of properties are above action level, and that therefore no radon protective measures would be necessary in the construction of new buildings within the site.

4.4 MINING

The site is not located within an area that would be affected by any past, present or future underground mining.

4.5 HYDROLOGY, HYDROGEOLOGY AND FLOOD RISK

The Envirocheck Report indicates that the nearest surface water feature is located 16m to the north of the site. The available maps indicate this to be a small pond. The OS Water Network Lines map indicates the nearest surface water feature to be located 73m to the west. Two additional unnamed features are located 150m and 204m to the northwest. The nearest named feature is Twenty Acres Reen located 383m to the east.

The groundwater vulnerability map and aquifer database classifies the bedrock beneath the site as a Secondary ‘A’ Aquifer. Secondary ‘A’ Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

4.5 HYDROLOGY, HYDROGEOLOGY AND FLOOD RISK (CONTINUED)

The Natural Resources Wales groundwater vulnerability map and aquifer database classifies the superficial deposits beneath the site as Unproductive Strata. Unproductive strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

A perched water body could be encountered within the made ground. This is particularly likely due to the impermeable nature of the underlying Tidal Flat Deposits.

It is considered possible that the existing site drainage could act as a pathway for potential surface contaminants.

There are no active discharge consents recorded within 250m of the site boundary. The nearest consent is recorded 390m to the east where trade and other matter discharge is received by Twenty Acre Reen.

The Envirocheck Report states that there are no water abstractions recorded within 500m of the site. There are no groundwater abstractions recorded within 1km of the site boundary.

Tables 3 and 4 present a summary of the hydrological features and key hydrogeological nature of the site.

Table 3: Summary of Site Hydrology

Feature	Distance from site	Flow	Classification	Abstraction	Discharge
Pond	16m north	Not known	Pond	No	Not known
Unnamed surface water features	73m west, 150m northwest and 204m northwest	Not known	Inland rivers	No	Not known
Twenty Acres Reen	383m east	Southerly	Inland river	No	Cefn Adda Reen
Surface run-off	On site	Flows into site drainage	N/A	No	Not known
Site Drainage	On site	Not known	N/A	No	Not known

11.5 ACCESS ROADS AND CAR PARKING AREAS (CONTINUED)

The near surface cohesive natural soils should be considered frost susceptible.

11.6 DRAINAGE

Protection of formations from surface water and inclement weather will be required.

Shallow soil infiltration testing was undertaken at four trial pit locations. The results of soakaway tests are summarised in Section 7.5 above.

Note that the soakaway test results are specific to the locations and depths of the tests undertaken.

Soil infiltration testing undertaken recorded negligible to limited infiltration over the monitoring period and therefore an infiltration rate could not be calculated for any test location. The tests were undertaken within the shallow made ground deposits.

The soil infiltration testing calculation sheets are presented in Appendix F.

11.7 RECOMMENDED FURTHER WORKS

In order to inform pile design it is recommended at rotary borehole core samples are gained and point load / UCS laboratory testing is carried out.