

Technical Note

Project:	Coed Darcy		
Subject:	Coed Darcy Phase 2 Drainage - PC50 & PC21 Addendum		
Author:	Ellen Read		
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Distribution:	Representing:		

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	For Information	FF	RR	CB	JF	28/05/19
Rev 2.0	Drainage Strategy Updated	AGV	RR	JF	TB	24/10/19
Rev 3.0	Savills' and SMD's comments added	AGV	JM	JF	TB	20/11/19
Rev 4.0	SMD's comments added	AGV	JM	JF	TB	02/12/19
Rev 5.0	Savills' comments on the 2.12.19 added	AGV	JM	TB	TB	03/12/19
Rev 6.0	SMD's comments considered	ER	CB	TB	JM	12/06/2020

Client signoff

Client	St. Modwen Developments
Project	Coed Darcy
Project No.	5041216
Client signature / date	

1. Introduction

An outline planning application for the Coed Darcy development (planning reference P2005/0393) has previously been submitted and granted by Neath Port Talbot Council. The decision to approve the outline planning application included several planning conditions associated with drainage and water management on the site.

Atkins has previously produced a Technical Note (5041216-ENG-RPT-0002080 PC22 Report v4) outlining full details of the strategic drainage system and surface water management which has been submitted to support the discharge of Planning Condition 22 (PC22) of the permitted consent (planning reference P2020/0270).

Acknowledging that the Coed Darcy site is of a significant scale, the outline planning permission also includes Planning Condition 50 (PC50) which seeks information on the phase-specific drainage schemes for each phase of the development, including details of how these smaller schemes are intended to transfer, connect and operate within the strategic sitewide drainage system. PC50 states the following:

“In support of the submission of the first reserved matters application for each phase, a fully detailed phase specific drainage scheme shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall detail a full method statement and schedule of works, as well as showing how the system would transfer, connect and operate within the approved details of the strategic drainage systems and surface water management approved under conditions 21 and 22 of this consent. The approved details shall be fully implemented on site in accordance with the approved schedule of works.”

This Technical Note has been prepared specifically for the interim drainage arrangements to enable Phase 2 of the Coed Darcy development. This note also serves as an addendum to Briefing Note 4 (5092635.118/Drainage Strategy BN 4). Briefing Note 4 successfully discharged Planning Condition 21 of the Outline Planning Application (P2005/0393).

The interim drainage strategy for Phase 2 of the Coed Darcy development is not only proposed to serve Phase 2 of the proposed development but it is also proposed to be designed to accommodate additional interlinked phases within Catchment 1 of the site.

The catchment-specific surface water drainage strategy for Phase 2 is an interim measure towards the final sitewide strategic drainage design and will be designed to accommodate flows from the adjacent Phase 1 area. The final sitewide drainage strategy proposes that all flows from catchments 2,3,4 & 5 (as identified in both Figure 4.1 of the submitted PC22 Technical Note 5041216-ENG-RPT-0002080 and drawing 5041216-ATK-GM-SS-DR-C-6041 in Appendix A of this report) discharge into the South Site Reservoir (SSR) which form part of the Crymlyn Bog hydrological catchment. It can also be noted:

- The SSR requires modification and remedial construction works to allow it to operate effectively and accommodate flows for the sitewide strategy
- The improvement works for the SSR are anticipated to be carried out over the next 3-5 years.
- An interim drainage strategy for Phase 2 is therefore proposed to allow the Phase 2 development to commence without reliance upon the completion of the required construction improvement works to the SSR.
- The Phase 2 interim drainage strategy comprises 2 no. temporary attenuation ponds which in turn connect into an existing ditch course to the north of Phase 2.

The following drawings are relevant to this technical note and are included in Appendix A of this report:

- 5041216-ATK-GM-SS-DR-C-6041 - Whole Site Surface Water Drainage Strategy
- 5041216-ATK-GEN-NS-DR-C-4273 - PHASE 2 PC50 Surface Water Drainage Strategy

- 5041216-ATK-GEN-NS-DR-C-4274 - PHASE 2 PC50 Surface Water Drainage Strategy following Rehabilitation of SSR
- 5041216-ATK-GEN-NS-DR-C-4275 P01 – Phase 2 PC50 FW Drainage Strategy
- 5041216-ATK-GEN-WS-DR-C-6034 - Foul Drain Areas (PC20)
- 5041216-ATK-GM-NS-SK-C-0041 - Current Drainage Status
- 5041216-ATK-S38-NS-DR-C-4328 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 1 of 2)
- 5041216-ATK-S38-NS-DR-C-4329 - S38 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 2 of 2)

The information below supports compliance with the requirements for the strategic drainage system (i.e. PC22) and specifically addresses Sewers, Surface Water Drainage and Water Quality.

2. Sewers

In developing the interim Phase 2 drainage strategy, strategic drainage models have been prepared using WinDes software produced by MicroDrainage Limited. The design requirements fully comply with Sewers for Adoption 7th Edition and meet the agreement of Dwr Cymru Welsh Water (DCWW) as set out at the time of obtaining Technical Approval.

2.1 Foul Water

Condition 20 of the outline planning permission for the Coed Darcy scheme (P2005/0393) concerns 'the provision of a sewerage system capable of accommodating the Coed Darcy Development' and relates to the provision of foul water connection to the public sewer network.

For the purposes of assessing likely foul contributions, the following assumptions have been made;

Residential Areas:	Density 50 houses per hectare
	Peak flow (6xDWF) 4000l/day per dwelling *
Schools:	1 x DWF 80l/day per pupil *²
Retail:	1 x DWF 400l/day per 100m² *²
Commercial:	1 x DWF 300l/day per 100m² *²

* Flow rate taken from Sewers for Adoption 7th Edition

*² Flow rate taken from Surveyor Datafile

Future foul contributions within the table are based on peak flow (6 x DWF) in accordance with Sewers for Adoption 7th Edition design guidelines.

Under the terms of the condition, its wording has been varied with the agreement of DCWW and NPTC to reflect the overall strategy for the site. That strategy can be summarised as follows:

1. DCWW will accept all foul water flows that can drain by gravity to the public sewer in the B4290 road (adjacent to Bridge House). This includes the area of the development north of the railway (Point C as defined on drawing 5041216-ATK-GEN-WS-DR-C-6034 in Appendix A).
2. All other foul water flows are to be directed into the public sewer that runs through Llandarcy Village (Point B as defined on drawing 5041216-ATK-GEN-WS-DR-C-6034 P03 in Appendix A).

The above referenced drawing shows that most of North Site (Area 1) and the Northern Site (north of the railway) will drain by gravity to the public sewer in the B4290 near Bridge House (Point C) with capacity in the network being made available by DCWW on a phased basis in advance of demand. This strategy has been confirmed and agreed with DCWW.

The remaining areas of the development, including the part of North Site outside Area 1 and all South Site (Area 2), will drain to an on-site terminal foul water pumping station. This is referred to as the South Site Pumping Station and will discharge via a rising main to the public network in Llandarcy Village (Point B) at a point of connection agreed with DCWW (the location of which assists in addressing the capacity issues in the network identified in the original PC20). The installation of the South Site Pumping Station upgrades will be designed in such a way to avoid operational problems of the rising main. DCWW are in support of the proposals outlined above.

2.2 Surface Water Drainage

2.2.1 Existing Drainage Arrangements

The Environmental Statement Report (Parsons Brinckerhoff Ltd. Dated February 2005) submitted as part of the outline planning application, outlines the current drainage conditions for the site. The Phase 2 existing drainage arrangement is that surface water runoff flows through the North Site Reservoir (the NSR) which is connected to the main Coed Darcy site via a culvert located on a pipe bridge over the railway, before being pumped eastwards to the River Neath via the Bridge House Outfall sewer (Refer to drawing 5041216-ATK-GM-NS-SK-C-0041 P02 Current Drainage Status in Appendix A).

2.2.2 Proposed Surface Water Strategy (PC22)

The permanent surface water drainage system for Phase 2 has been designed in accordance with Sewers for Adoption 7th Edition, CIRIA C753 The SuDS Manual, the Neath Port Talbot Council Design Guide for SuDS and the TAN 15: "Development and flood risk".

The Phase 2 development area sits within the central surface water catchment which is located within Catchment 1 as identified in Figure 4.3 of the Environmental Statement Report previously referenced in Section 2.2.1:

The proposed permanent strategy will divert and discharge surface water flows from Phase 2 in a north-westerly direction into the Southern Site Reservoir (SSR), for onwards discharge into the Crymlyn Bog. This is shown on drawing 5041216-ATK-GEN-NS-DR-C-4274 Appendix A. The proposed drainage strategy includes the rehabilitation of the SSR. The strategy will improve sustainability and reduce carbon emissions by removing reliance on the existing pump system from the NSR.

2.2.3 Interim Phase 2 Surface Water Arrangements (2020 to 2023)

Works to rehabilitate the SSR are likely to take between 2 and 3 years to complete and to allow development in Phase 2 to progress during that period, a series of interim measures are proposed. These measures propose that surface water flows from Phase 2 will be attenuated in two temporary storage ponds before being discharged into the existing Bridge House outfall. The indicative pond locations are shown on drawing 5041216-ATK-GEN-NS-DR-C-4273 P03 in Appendix A.

2.2.3.1 Controlled Flow Rates

Flow Rates for the interim drainage strategy for Phase 2 are to be taken from the approved document reference 5041216-REM-TN-000109 Surface Water Drainage Strategy Briefing Note 2 – Catchment 1 Revision 4, dated Feb 2012. This document was submitted to support the discharge of Planning Condition 21.

In Briefing Note 2, existing flows from Catchment 1 are identified to total 703 l/s. This document also considers the potential for temporary drainage arrangements on the site due to phasing and states that "Wherever any temporary connection is made, the flow discharged to the possible DCWW surface water sewer will not exceed the agreed rate".

In accordance with CIRIA C753, the computed flow should include an uplift to cater for the effects of climate change impacts on future rainfall intensities. Given that the temporary ponds are proposed to be in existence for up to 3- to 5-years, the lower threshold for climate change allowance of 5% is proposed to be used, in accordance with both TAN 15 and Table 2 of the National Planning Policy Framework. No allowance for urban creep is proposed, given the temporary nature of the interim drainage system.

As Phase 2 sits within the original Catchment 1 site, it is proposed that the interim flow restriction from Phase 2 does not exceed the proportional weighting of the existing calculated flow from Catchment 1.

- Pond A discharge rate is proposed to be limited to 421l/s
- Pond B discharge rate is proposed to be limited to 161l/s

The total discharge rate for the interim Phase 2 drainage design is therefore proposed to be limited to 582l/s.

2.2.3.2 Temporary Pond Storage Volumes

CIRIA C753 (The SuDS Manual) states that “The SuDS should be designed so that runoff is completely contained within the designated drainage system for all events up to the specified standard of service for the critical duration event for the system. This level of service will normally be 1 in 30 years as a minimum...”. Given that the temporary ponds are only proposed to be utilised up to between 3- and 5-years subject to construction programmes, it is proposed that the ponds be designed to accommodate the 1 in 30-year storm for the identified impermeable catchment areas for Phase 2. In conjunction with this proposal, the following should be considered:

- The anticipated buildout rate for the residential development is approximately 80 dwellings per annum. As a result, for the first 2-3 years, the temporary ponds will be providing storage allowance greater than the 1 in 30-year storm requirements due to the reduced impermeable area contributing flows into the interim drainage system.
- The interim drainage design is to be designed such that any exceedance flows will be routed overland to the ditch to the north of Phase 2 which in turn will carry exceedance flows into the SSR. Note that the overland route for these exceedance flows is proposed in an area where no construction works are proposed for the Phase 2 development.

Supporting hydraulic calculations are in Appendix B.

The contributing area to the new ponds has been determined on the assumption that the entirety of the Phase 2 development will be built out within this period. The extent of the contributing catchment is presented on drawing 5041216-ATK-GEN-NS-DR-C-4273 P03 in Appendix A:

- **Pond A:** located east of Road 3, will attenuate flows coming from Road 50 and Persimmon's Phase 1.
- **Pond B:** located north-west of Road 1, will attenuate flows coming from Roads 1 and 60

Probabilities of the storm event occurring during the design life period and respective required attenuation volumes are presented below:

Table 1 – Required Storage Volumes for Interim Period

Storm Return Period	Design Life	Probability of storm event during design life (%)	Attenuation Vol. required Pond A (m3)	Attenuation Vol. required Pond B (m3)
1 in 5yr	3yr	48.80	2900	1300
1 in 10yr + 5%CC*	3yr	27.10	4000	1800
1 in 15yr + 5%CC*	3yr	18.70	4600	2100
1 in 30yr + 5%CC*	3yr	9.67	5700	2600
1 in 100yr + 5%CC*	3yr	2.97	8300	3700

* Climate change allowance taken to be the lower threshold value in accordance with TAN 15 and the NPPF Guidance

Given the temporary nature of the attenuation features, the interim drainage strategy will be designed so that the quality of the discharge achieves the requirements from the Consent to Discharge ref. BP0064319_2005_06_06 in line with the Water Resources Act. 1991. The temporary ponds will be designed to hold back solids from the downstream surface water

drainage network and will be designed to desilt flows before they reach the downstream temporary connections.

Whilst the surface water design network will be maintained by a private management company, the network has been designed in accordance with Sewers for Adoption 7th Edition. Further specific details can be found on drawings 5041216-ATK-S38-NS-DR-C-4328 P01 and 5041216-ATK-S38-NS-DR-C-4329 P02 in Appendix A.

2.2.4 SuDS

The SuDS strategy follows the SUDS management train, which is described in CIRIA C753, TAN 15: "Development and flood risk" and current SuDS guidance "Statutory SuDS Standards" published by the Welsh Ministers.

As stated in point 9 of the Neath Port Talbot Council "*Application Form for Full Application Approval of SuDS on new developments*", the Surface Water Discharge Hierarchy has been considered, encouraging the plot developers to use SuDS on-plot features techniques where appropriate and in a phasing basis.

Given the brownfield nature of the site, recognition will have to be given to the possible mobilisation of residual contamination remaining in the ground after the site has been improved.

Infiltration drainage is not considered suitable for the Phase 2 site as generally the area comprises of fill material (ash, clinker, brick, rubble, reworked natural soils) over natural soils (clayey material, peat, silt grade material, gravel, glacial drift) which overlies sandstone bedrock. The thickness of the layers varies greatly over the site.

In order to ensure satisfactory performance of infiltration drainage systems it will be necessary to appraise ground conditions on a development parcel by parcel basis.

Notwithstanding the provision of strategic flow attenuation facilities, developers will be encouraged to incorporate SuDS techniques where appropriate.

Maintenance Requirements (in accordance with CIRIA Guidance)

Ponds

- To ensure maintenance can be undertaken of all in/outflow structures, spillways, pre-treatments and forebays easy access shall be made from the Highway.
- Grass cutting and litter removal to be undertaken monthly.
- Sediment removal should be undertaken from forebay, pre-treatment structures together with the inspection of flow control structures and vegetation removal/cut back on an annual basis.
- Repair to flow structures, aeration of pond, erosion repair and sediment removal from pond shall be undertaken as required.
- Maintenance work such as silt or vegetation removal should be undertaken during September or November to minimise the impact on wildlife.
- Only 25% to 30% of the pond area on one occasion each year to be carried out to remove any silt or vegetation, to minimise the impact on biodiversity.
- The design of ponds and wetlands should be carried out to avoid the need of special machinery for future maintenance.

Interceptor Swales

- Silt removal required intermittently. However, grass cutting should not be carried out when swale or filter strip is wet.

2.2.5 Exceedance Rainfall Event

Flows in excess of those arising from extreme rainfall events in excess of the design parameters for the drainage system, and which cannot be accommodated within the drainage system are termed exceedance flows. These flows arising from the design events (i.e. 1 in 30 years storm event) up to the 1 in 100 years return period event, plus 40% climate change allowance, will be managed on-site so that they do not adversely affect properties on and off site.

Development of the Phase 2 masterplan will allow for paths for exceedance flows to be routed around properties to avoid flooding. Where possible, exceedance flows will be stored on site within open spaces or paved areas or directed by overland flow towards open flow attenuation features.

To manage exceedance flows from the Phase 2 development area, overland flow routes and landscaped interceptor/carrier swales or ditches could be utilised. Due to the gradient of the Site, consideration of levels, highway features and edging treatment will be required at the junction of Road 1 and Road 50. Flows will be directed to an undeveloped area at the rear of the School Plot (Refer to drawing 5041216-ATK-GEN-NS-DR-C-4273 P03 in Appendix A) and are proposed in turn to be captured by the exceedance flow route. The exceedance flows will be controlled to avoid any isolation of the School Site facilities.

It is proposed that exceedance flows during this design interim period (Refer to drawing 5041216-ATK-GEN-NS-DR-C-4273 P03 in Appendix A) be conveyed from Phase 2 into the SSR via an existing refinery ditch.

- **Existing ditch connecting into SSR:** This existing refinery ditch discharges in a north-westerly direction to direct flows along the crest of the railway cutting to the SSR. The SSR in turn discharges into Crymlyn Bog. Improvement works are proposed to be carried out on the existing refinery ditch to improve its current condition.
- **Proposed exceedance route within Phase 2:** It is proposed that an open shallow depression be formed across the proposed school playing field to provide a route for overland flows to be conveyed from the development site to the existing refinery ditch. The overland flow route will be design with consideration of relevant design guidance.

3. Water Quality

A Construction Environmental Management Plan (CEMP) is to be prepared for each phase, as set out in Planning Conditions 39 and 41 of Outline Planning Application (P2005/0393). The CEMP will include a detailed breakdown of the construction activities as well as details of the proposed temporary protective measures to be carried out to achieve the requirements from the Consent to Discharge ref. BP0064319_2005_06_06 in line with the Water Resources Act. 1991.

As mentioned in Section 2.2.2., the interim drainage design will be carried out with consideration for water quality; particularly the retention of any suspended solids.

4. Summary

This Technical Note has been prepared specifically for the interim drainage arrangements to enable Phase 2 of the Coed Darcy development. This note also serves as an addendum to Briefing Note 4 (5092635.118/Drainage Strategy BN 4). Briefing Note 4 successfully discharged Planning Condition 21 of the Outline Planning Application (P2005/0393).

The information in this report also supports compliance with the requirements for the strategic drainage system (i.e. PC22) and specifically addresses Sewers, Surface Water Drainage and Water Quality.

The catchment-specific surface water drainage strategy for Phase 2 is an interim measure towards the final sitewide strategic drainage design.

The improvement works for the SSR are anticipated to be carried out over the next 3-5 years.

Future foul contributions within the table are based on peak flow (6 x DWF) in accordance with Sewers for Adoption 7th Edition design guidelines.

DCWW will accept all foul water flows that can drain by gravity to the public sewer in the B4290 road (adjacent to Bridge House). This includes the area of the development north of the railway.

All other foul water flows are to be directed into the public sewer that runs through Llandarcy Village.

The Environmental Statement Report (Parsons Brinckerhoff Ltd. Dated February 2005) submitted as part of the outline planning application, outlines the current surface water drainage conditions for the site.

The Phase 2 development area sits within the central surface water catchment which is located within Catchment 1 as identified in Figure 4.3 of the Environmental Statement Report.

The proposed permanent surface water strategy for Phase 2 will divert and discharge surface water flows from Phase 2 in a north-westerly direction into the Southern Site Reservoir (SSR), for onwards discharge into the Crymlyn Bog.

The proposed interim surface water strategy for Phase 2 comprises surface water being attenuated in two temporary on-site storage ponds before being discharged into the existing Bridge House outfall.

Flow Rates for the interim surface water drainage strategy for Phase 2 are to be taken from the approved document reference 5041216-REM-TN-000109 Surface Water Drainage Strategy Briefing Note 2 – Catchment 1 Revision 4, dated Feb 2012. This document was submitted to support the discharge of Planning Condition 21.

- Pond A discharge rate is proposed to be limited to 421l/s
- Pond B discharge rate is proposed to be limited to 161l/s

The total discharge rate for the interim Phase 2 drainage design is proposed to be limited to 582l/s.

Given that the temporary ponds are only proposed to be utilised up to between 3- and 5-years subject to construction programmes, it is proposed that the ponds be designed to accommodate the 1 in 30-year storm for the identified impermeable catchment areas for Phase 2.

The anticipated buildout rate for the residential development is approximately 80 dwellings per annum. As a result, for the first 2-3 years, the temporary ponds will be providing storage allowance greater than the 1 in 30-year storm requirements due to the reduced impermeable area contributing flows into the interim drainage system.

The interim drainage design is to be designed such that any exceedance flows be routed overland to the ditch to the north of Phase 2 which in turn will carry exceedance flows into the SSR. Note that the overland route for these exceedance flows is proposed in an area where no construction works are proposed for the Phase 2 development.

Infiltration drainage is not considered suitable for the Phase 2 site as generally the area comprises of fill material (ash, clinker, brick, rubble, reworked natural soils) over natural soils (clayey material, peat, silt grade material, gravel, glacial drift) which overlies sandstone bedrock.

Maintenance Requirements for the temporary attenuation ponds are to be carried out in accordance with the latest CIRIA Guidance.

Appendix A

DRAWINGS:

- A.1 5041216-ATK-GM-SS-DR-C-6041 Whole Site Surface Water Drainage Strategy
- A.2 5041216-ATK-GEN-NS-DR-C-4273 - PHASE 2 PC50 Surface Water Drainage Strategy prior rehabilitation of SSR
- A.3 5041216-ATK-GEN-NS-DR-C-4274 - PHASE 2 PC50 Surface Water Drainage Strategy following rehabilitation of SSR
- A.4 5041216-ATK-GEN-NS-DR-C-4275 - PHASE 2 PC50 FW Drainage Strategy
- A.5 5041216-ATK-GEN-WS-DR-C-6034 Foul Drain Areas (PC20)
- A.6 5041216-ATK-GM-NS-SK-C-0041 Current Drainage Status
- A.7 5041216-ATK-S38-NS-DR-C-4328 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 1 of 2)
- A.8 5041216-ATK-S38-NS-DR-C-4329 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 2 of 2)

100
0
10
Millimetres

ATTENUATION FEATURES						
CATCHMENT	REFERENCE	IL (mAoD)	CL (mAoD)	VOLUME (m3)	IMPERMEABLE AREA - 75% IMP. RATE (m2)	DISCHARGE RATE (l/s)
CATCHMENT 2	SOUTH SITE RESERVOIR (SSR) **	16.50	21.80	IMPOUNDED VOL. = 31.400 FULL VOL. (NO FREEBOARD) = 78.200 ATTENUATION VOLUME = 42.800	35.42	87.00*
CATCHMENT 4	1	25.20	27.00	3.100	3.19	22.50
	2	26.20	28.00	1.900	2.10	19.60
	3	12.20	14.00	8.300	8.75	64.10
	4	18.20	20.00	6.000	6.50	47.60
	5	23.70	25.50	6.000	6.40	46.20
	6	13.20	15.00	4.300	4.50	33.10
	7 (SOUTH BAY)**	7.30	9.30	EXISTING VOL. = 8.020 ADDITIONAL VOL. = 3.700	4.00	29.30
	8	52.20	54.00	6.100	6.60	48.40
	9	43.70	45.50	1.800	2.00	14.30
	ELLEN'S POND***	TBC	TBC	EXISTING VOL. = 690	TBC	TBC
CATCHMENT 3	CRYMLYN BOG LAGOONS **	7.30	9.10	EXISTING VOL. = 20.394	77.55	560 (TBC) *
	WEST BAY **	6.50	9.00	EXISTING VOL. = 2.600	TBC	TBC
	TOTAL ADDITIONAL ATTENUATION VOL.			89.200		
CATCHMENT 3	10	44.20	46.00	2.500	2.70	19.80
CATCHMENT 3A	11	26.2	28.00	2.700	2.92	21.45

*BASED ON DISCHARGE RATE "5.5 L/S/HA OF GROSS AREA" AND CATCHMENT AREA AS SHOWN IN ENVIRONMENTAL STATEMENT FIG 4.3

**EXISTING ATTENUATION FEATURE TO BE UTILISED AS A DRAINAGE ATTENUATION FEATURE.

*** EXITING ATTENUATION FEATURE NOT TO BE UTILISED AS A DRAINAGE ATTENUATION FEATURE

OUTFALL DETAILS				
CATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
SUBCATCHMENT 4-1-1	9.455	7.091	POND 3 - 8300	52.004
SUBCATCHMENT 4-1-2	2.243	1.682		12.336
TOTAL	11.6982	8.7736	8300	64.3400

OUTFALL DETAILS				
SUBCATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
4-2	6.017	4.513	POND 7 - 11720 (SEE NOTE 8)	33.095
4-6-1	7.951	5.963	POND 5 - 6000	43.729
4-6-2	0.448	0.336		2.4613
4-7-1	1.987	1.491	POND 2 - 1900	10.931
4-7-2	1.579	1.184		8.685
4-8	8.791	6.593	POND 8 - 6100	48.350
4-9	2.596	1.947	POND 9 - 1800	14.278
			WEST BAY - 2600 (SEE NOTE 8)	
			LAGOONS - 20394 (SEE NOTE 8)	
TOTAL	29.3690	22.027	50514	161.5295

OUTFALL DETAILS				
SUBCATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
4-3	6.017	4.5129	POND 6 - 4300	33.095
4-4-1	8.020	6.0147	POND 4 - 4000	44.108
4-4-2	0.631	0.4735		3.4726
TOTAL	14.668	11.0012	8300	80.6753

NOTES

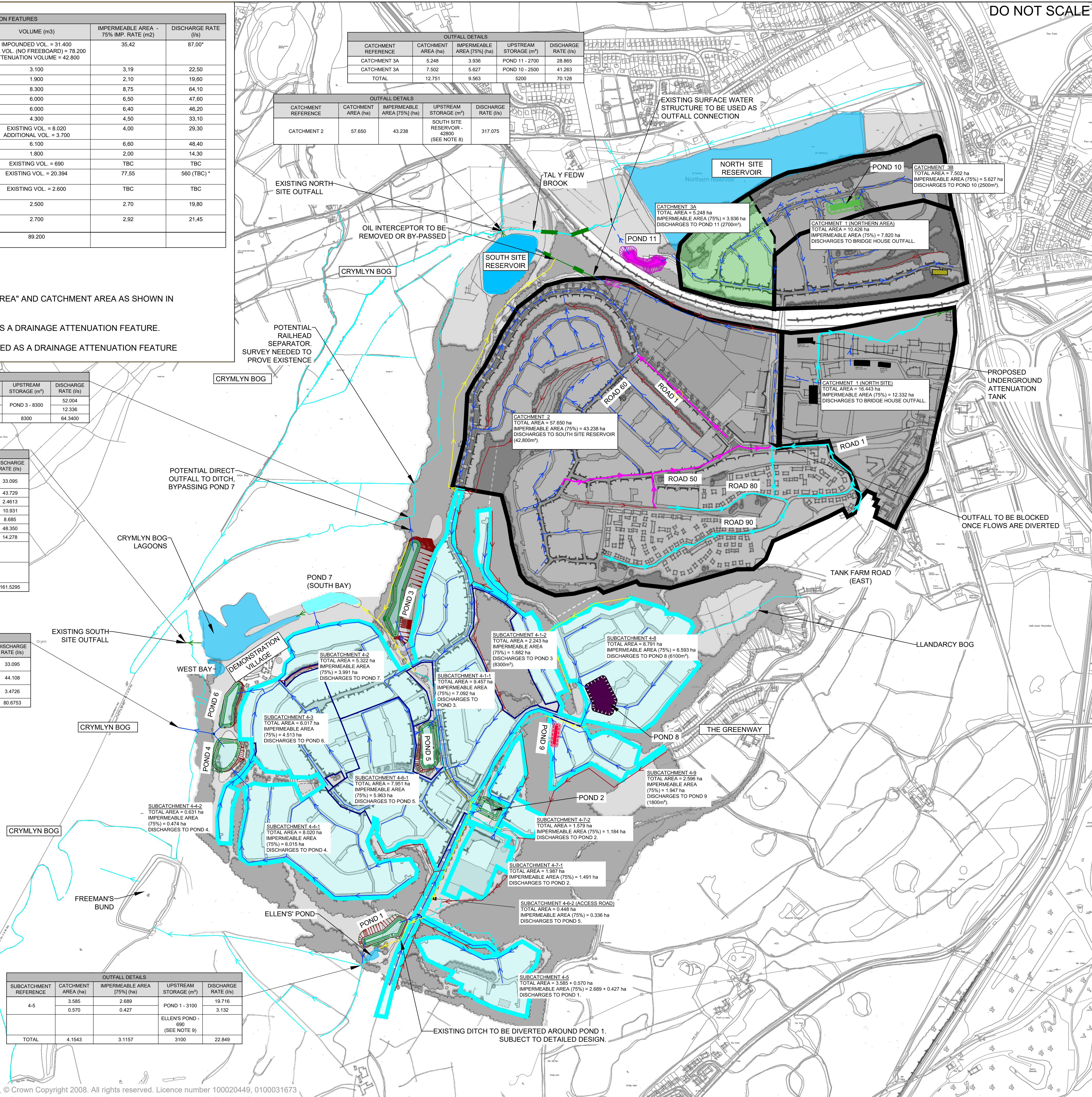
- DISCHARGE RATE CONSIDERED TO BE 5.5 L/S/HA OF GROSS AREA AS AGREED WITH NRW. REFER TO MINUTES 5041216-ENG-MN-0002022 - NRW 2nd Meeting Minutes
- DRAINAGE LAYOUT ADAPTED TO REFLECT ROBERTS LIMBRICK PROVING LAYOUT
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PLANNING CONDITION 22 REPORT 5041216-ENG-RPT-0001835
- THIS DRAWING & THE DESIGN DEPICTED ARE COPYRIGHT OF ATKINS AND MAY NOT BE REPRODUCED OR AMENDED EXCEPT BY WRITTEN PERMISSION. NO LIABILITY WILL BE ACCEPTED FOR AMENDMENTS MADE BY OTHER PERSONS.
- ATTENUATION PONDS HAVE BEEN SIZED USING MICRODRAINAGE - SOURCE CONTROL (MODELLED FOR ALL STORM DURATIONS UP TO AND INCLUDING THE 1in100 + CLIMATE CHANGE STORM EVENT) AND ARE THEREFORE INDICATIVE ONLY. POND VOLUMES ARE SUBJECT TO DETAILED DESIGN AND DETAILED MODELING CALCULATIONS.
- ATTENUATION PONDS HAVE BEEN SIZED BASED ON THE FOLLOWING ASSUMPTIONS:
 - 1.5m DEPTH
 - 1 IN 100YR STORM EVENT
 - 300mm FREEBOARD ALLOWANCE
 - CLIMATE CHANGE (40%)
- BASED ON DISCHARGE RATE "5.5 L/S/HA OF GROSS AREA" AND CATCHMENT AREA AS SHOWN IN ENVIRONMENTAL STATEMENT FIG 4.3

OUTFALL DETAILS				
SUBCATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
4-5	3.585	2.689	POND 1 - 3100	19.716
	0.570	0.427		3.132
			ELLEN'S POND - 690 (SEE NOTE 9)	
TOTAL	4.1543	3.1157	3100	22.849

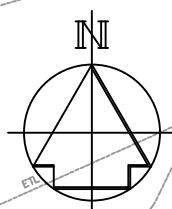
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OUTFALL DETAILS				
CATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
CATCHMENT 3A	5.248	3.936	POND 11 - 2700	28.865
CATCHMENT 3A	7.502	5.627	POND 10 - 2500	41.263
TOTAL	12.751	9.563	5200	70.128

OUTFALL DETAILS				
CATCHMENT REFERENCE	CATCHMENT AREA (ha)	IMPERMEABLE AREA (75%) (ha)	UPSTREAM STORAGE (m³)	DISCHARGE RATE (l/s)
CATCHMENT 2	57.650	43.238	SOUTH SITE RESERVOIR - 42800 (SEE NOTE 8)	317.075



0 10 100
Millimetres



DO NOT SCALE

KEY

- CONSTRUCTED SURFACE WATER SEWER NETWORK (PRIVATE NETWORK, OPERATED AND MAINTAINED BY CDL LTD).
- EXISTING SURFACE WATER SEWER ADOPTED BY DCWW
- EXISTING REFINERY SURFACE WATER SEWER NETWORK
- PROPOSED GRAVITY SURFACE WATER SEWER NETWORK
- EXISTING REFINERY CULVERT
- PROPOSED EXCEEDANCE FLOWS SWALE WITH UNDER PIPE
- EXISTING EXCEEDANCE FLOWS SWALE
- PROPOSED POND
- PROPOSED CUT AREA
- PROPOSED FILL AREA
- POND A CATCHMENT AREA
- POND B CATCHMENT AREA
- PROPOSED EXCEEDANCE FLOWS ROUTE

NOTES

- DRAINAGE DESIGN AND CONSTRUCTION TO BE IN ACCORDANCE WITH SEWER FOR ADOPTION 7th EDITION AD THE REQUIREMENTS OF THE STATUTORY UNDERTAKER.
- FOR CLARITY ROCKFACE AND LAND DRAINAGE NOT SHOWN.
- DRAINAGE LAYOUT ADAPTED TO REFLECT ROBERTS LIMBRICK PROVING LAYOUT
- FOR DETAILS REFER TO DRAWINGS 5041216-ATK-GEN-NS-DR- C-4261 AND 5041216-ATK-S38-NS-DR-C-4201
- SIZES AND FOOTPRINTS OF PONDS ARE INDICATIVE AND SUBJECT TO CHANGE

Rev.	Date	Description	By	Chk'd	App'd
P3	15/11/19	FLOOD ROUTE ADDED. PONDS SIZE UPDATED	AGV	JF	JM
P2	22/10/19	DRAINAGE UPDATED AND TEMPORARY PONDS ADDED	GI	AGV	JF
P1	31/05/19	FOR INFORMATION	FF	RR	JF

Drawing Status	Suitability
FOR INFORMATION	S2

ATKINS

The Axis
10 Holliday Street
Birmingham
B1 1TF

Tel: +44 (0)1214 835000
Fax: +44 (0)1214 835252
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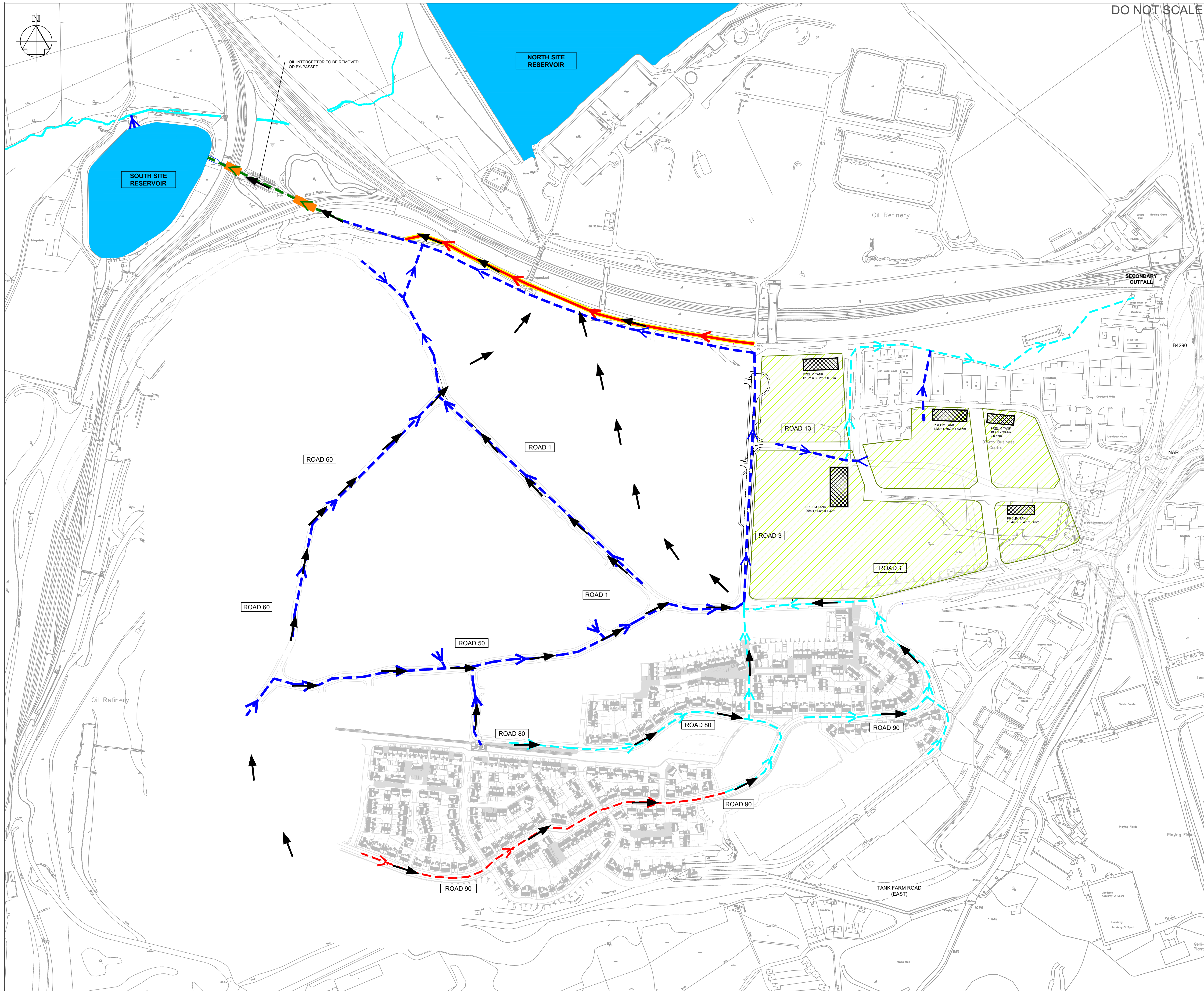
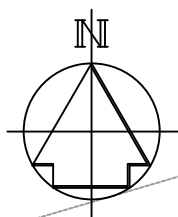
COED DARCY

Drawing Title

PHASE 2 PC50 SURFACE WATER DRAINAGE STRATEGY
PRIOR REHABILITATION OF SSR

Scale	Designed	Drawn	Checked	Authorised
1:2000	AGV	FF	RR	JF
Original Size	Date	Date	Date	Date
A1	31/05/19	31/05/19	31/05/19	31/05/19
Drawing Number				Revision
5041216-ATK-GEN-NS-DR-4273				P 3

100
0 10
Millimetres



DO NOT SCALE

KEY

- CONSTRUCTED SWS NETWORK (PRIVATE NETWORK, OPERATED AND MAINTAINED BY CDL LTD).
- EXISTING SURFACE WATER SEWER ADOPTED BY DCWW
- EXISTING REFINERY SURFACE WATER SEWER NETWORK
- PROPOSED GRAVITY SURFACE WATER SEWER NETWORK
- CONCEPT ATTENUATION TANK STORAGE
- CONCEPT ATTENUATION TANK AREA BOUNDARY
- EXISTING REFINERY CULVERT
- PROPOSED EXCEEDENCE FLOWS DITCH
- REED BED INDICATIVE LOCATION
- PROPOSED EXCEEDENCE FLOWS ROUTE

NOTES

- APPLICATION REQUIRED TO NATURAL RESOURCES WALES TO AGREE CRYMLYN BOG OUTFALL ARRANGEMENTS AND ALLOWABLE DISCHARGE RATE
- ALL FOUL INFRASTRUCTURE OUTSIDE OF CONSTRUCTED NETWORKS REQUIRE DETAILED DESIGN AND ARE SHOWN IN CONCEPT ONLY
- FOR CLARITY ROCKFACE AND LAND DRAINAGE NOT SHOWN.
- DRAINAGE LAYOUT ADAPTED TO REFLECT ROBERTS LIMBRICK PROVING LAYOUT
- FOR DETAILS REFER TO DRAWINGS:
5041216-ATK-S38-NS-DR-C-4328 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 1 of 2) AND
5041216-ATK-S38-NS-DR-C-4329 - S38 - Road 50, 80, 1 (CH304-865) - Drainage layout (Sheet 2 of 2)

P2 03/12/19 KEY REVIEWED. EXCEEDANCE FLOW ARROWS ADDED AGV JM TB

P1 31/05/19 FOR INFORMATION FF RR JF

Rev. Date Description By Chkd App'd

Drawing Status S2

ATKINS
The Axis
10 Holliday Street
Birmingham
B1 1TF

Tel: +44 (0)1214 835000
Fax: +44 (0)1214 835252
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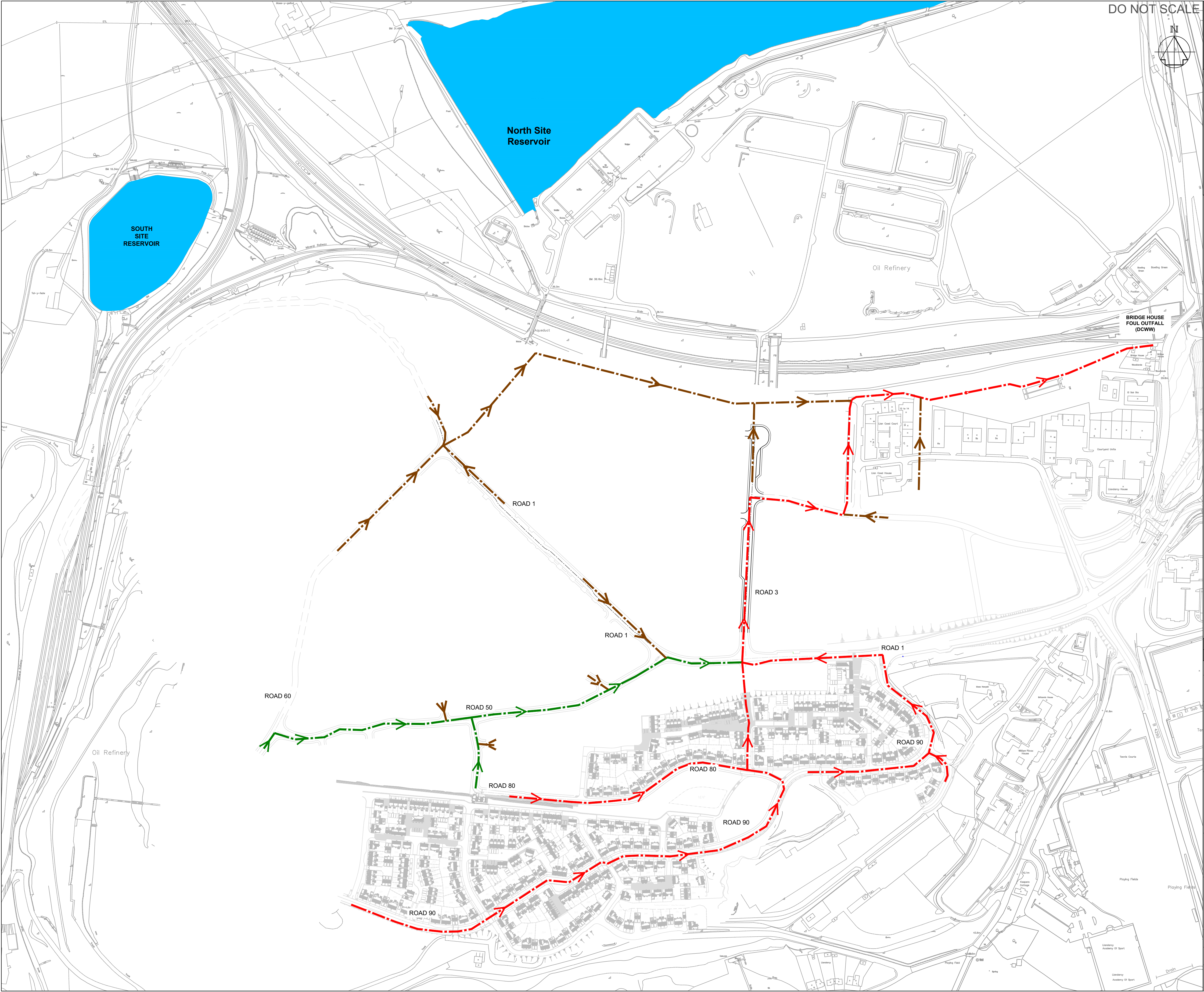
Drawing Title
PHASE 2 PC50 SURFACE WATER DRAINAGE STRATEGY FOLLOWING REHABILITATION OF SSR

Scale	Designed	Drawn	Checked	Authorised
1:2000	AGV	FF	RR	JF

Original Size	Date	Date	Date	Date
A1	31/05/19	31/05/19	31/05/19	31/05/19

Drawing Number	Revision
5041216-ATK-GEN-NS-DR-4274	P 2

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Millimetres



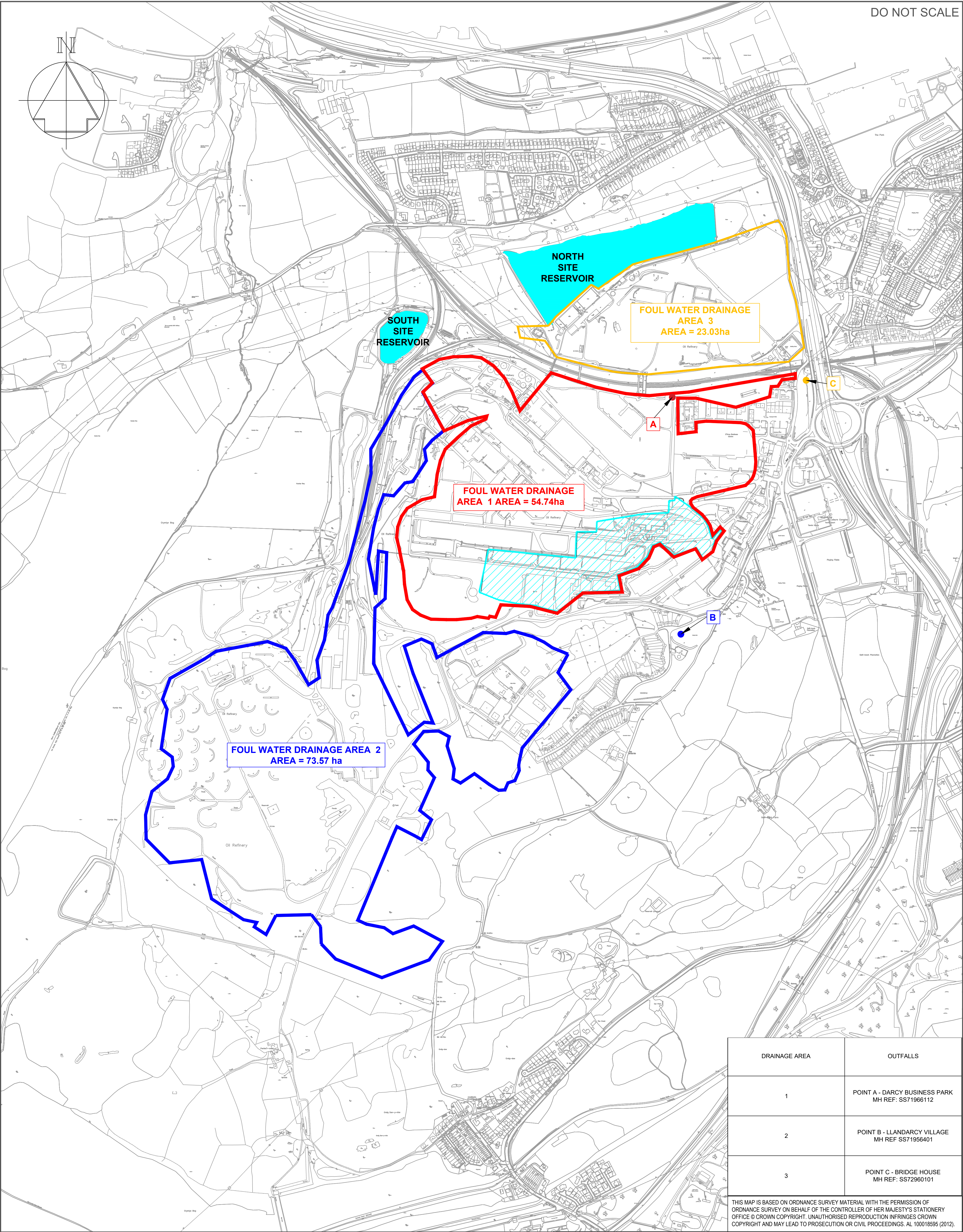
DO NOT SCALE

FOUL SEWER INFRASTRUCTURE

- ADOPTED (\$104) DCWW FOUL NETWORK
- TECHNICALLY APPROVED DCWW FOUL NETWORK
- PROPOSED CENTRAL SITE GRAVITY CATCHMENT FOUL NETWORK

- NOTES**
- THIS CENTRAL SITE DRAINAGE STRATEGY HAS BEEN DEVELOPED IN ACCORDANCE WITH THE DCWW POSITION STATEMENT (NOVEMBER 2014) ON P2005/0390 - PLANNING CONDITION 20, AND SUBSEQUENT DCWW STRATEGY DISCUSSIONS.
 - DEVELOPMENT PLOT POSITIONS SUBJECT TO FUTURE DETAILED PLOT DESIGN, AND MAY VARY FROM POSITIONS SHOWN.
 - PURSUANCE OF THE STRATEGY OUTLINED WITHIN THIS DRAWING WILL REQUIRE A SUBMISSION TO VARY P2005/0390 - PLANNING CONDITION 20.
 - FOR DETAILS REFER TO 5041216-ATK-GEN-NS-DR-C-4265 AND 5041216-ATK-S38-NS-DR-C-4201
 - THE PHASE 2 FOUL NETWORK DRAINAGE STRATEGY HAS BEEN DEVELOPED ON THE BASIS OF ACCEPTANCE OF THE UPDATED PC20 SUBMISSION (5041216-OSW-TN-1875 MAY 2019).

P1	31/05/19	FOR INFORMATION	FF	RR	JF
Rev.	Date	Description	By	Chk'd	App'd
Drawing Status			Suitability		
FOR INFORMATION			S2		
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Project Title		COED DARCY			
Drawing Title		PHASE 2 PC50 FW DRAINAGE STRATEGY			
Scale	Designed	Drawn	Checked	Authorised	
1:2000	FF	AGV	RR	JF	
Original Size	Date	Date	Date	Date	
A1	31/05/2019	31/05/2019	31/05/2019	31/05/2019	
Drawing Number	Revision				
5041216-ATK-GEN-NS-DR-C-4275	P 1				



DRAINAGE AREA	OUTFALLS
1	POINT A - DARCY BUSINESS PARK MH REF: SS71966112
2	POINT B - LLANDRACY VILLAGE MH REF: SS71956401
3	POINT C - BRIDGE HOUSE MH REF: SS72960101

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NOTES:

- THE FOUL WATER DRAINAGE AREAS ARE INDICATED IN ACCORDANCE WITH THE DCWW POSITION STATEMENT (NOVEMBER 2016) ON P2005/0390 - PLANNING CONDITION 20, AND SUBSEQUENT SUBMISSION TO VARY P2005/0390 - PLANNING CONDITION 20.
- DEVELOPMENT PLOT POSITIONS SUBJECT TO FUTURE DETAILED PLOT DESIGN, AND MAY VARY FROM POSITIONS SHOWN.

KEY:

- FOUL WATER DRAINAGE AREA 1 - AREA DRAINING TO THE PUBLIC SEWER IN B4290 (BRIDGE HOUSE)
- FOUL WATER DRAINAGE AREA 2 - AREA DRAINING INTO THE PUBLIC SEWER IN LLANDRACY VILLAGE
- FOUL WATER DRAINAGE AREA 3 - AREA DRAINING TO THE PUBLIC SEWER IN B4290 (BRIDGE HOUSE)
- EXISTING 300 DWELLINGS DRAINING BY ADOPTED GRAVITY SYSTEM TO THE PUBLIC SEWER IN B4290 (BRIDGE HOUSE)

P03	15/04/19	BOUNDARIES AND OUTFALLS UPDATED	MK	AGV	TB
P02	20/08/18	BOUNDARIES UPDATED	RE	JF	TB
P01	03/05/18	FIRST ISSUE TO DCWW AND SAVILS FOR COMMENTS	AGV	JF	TB
Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

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Client

Birmingham Office
The Axis
10 Holiday Street
Birmingham
B1 1TF
Tel: +44 (0)121 483 5000
Fax: +44 (0)121 483 5252
www.atkinsglobal.com

ST.MODWEN

Suitability

S2

Project Title

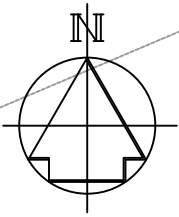
COED DARCY

Drawing Title

**WHOLE SITE
FOUL WATER DRAINAGE AREAS (PC20)**

Scale	Designed	Drawn	Checked	Authorised
1:5000	AGV	AGV	JF	TB
Original Size	Date	Date	Date	Date
A1	24/05/18	24/05/18	24/05/18	24/05/18
Drawing Number	Revision			
5041216-ATK-GEN-WS-DR-C-6034				P03

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Millimetres



196500N

196400N

196300N

196200N

196100N

196000N

195900N

195800N

195700N

195600N

195500N

270800E

270900E

271000E

271100E

271200E

271300E

271400E

271500E

271600E

271700E

271800E

271900E

272000E

DO NOT SCALE

KEY

SURFACE WATER SEWER INFRASTRUCTURE

CONSTRUCTED SWS NETWORK (PRIVATE NETWORK, OPERATED AND MAINTAINED BY CDL LTD).

EXISTING REFINERY SWS NETWORK

EXISTING LINED TRAPEZOIDAL DITCH COURSE

NSR PUMPING MAIN

PHASE 2 BOUNDARY

EXISTING CATCHMENT BOUNDARY - PERSIMMONS PHASE 1

PROPOSED SCHOOL DEVELOPMENT

BRIDGE HOUSE OUTFALL
DICHARGE RATE = 583 l/s

PROPOSED SCHOOL
DEVELOPMENT

PHASE 1 - EXISTING 300
DWELLINGS (8.91 ha)
DEVELOPED AREA BY
OCTOBER 2019

FOR INFORMATION

ATKINS

The Hub
500 Park Avenue
Aztec West
Bristol
BS32 4RZ
Tel: +44 (0)1454 662000
Fax: +44 (0)1454 663333
www.atkinsglobal.com

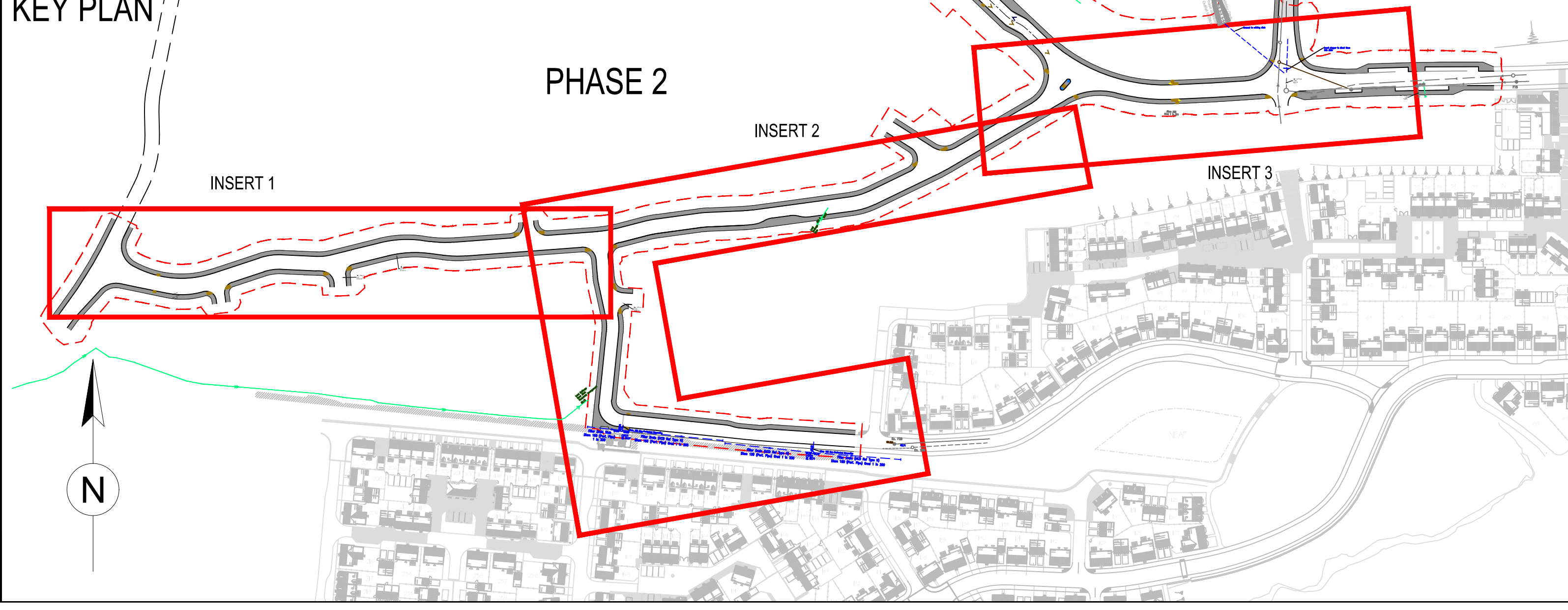
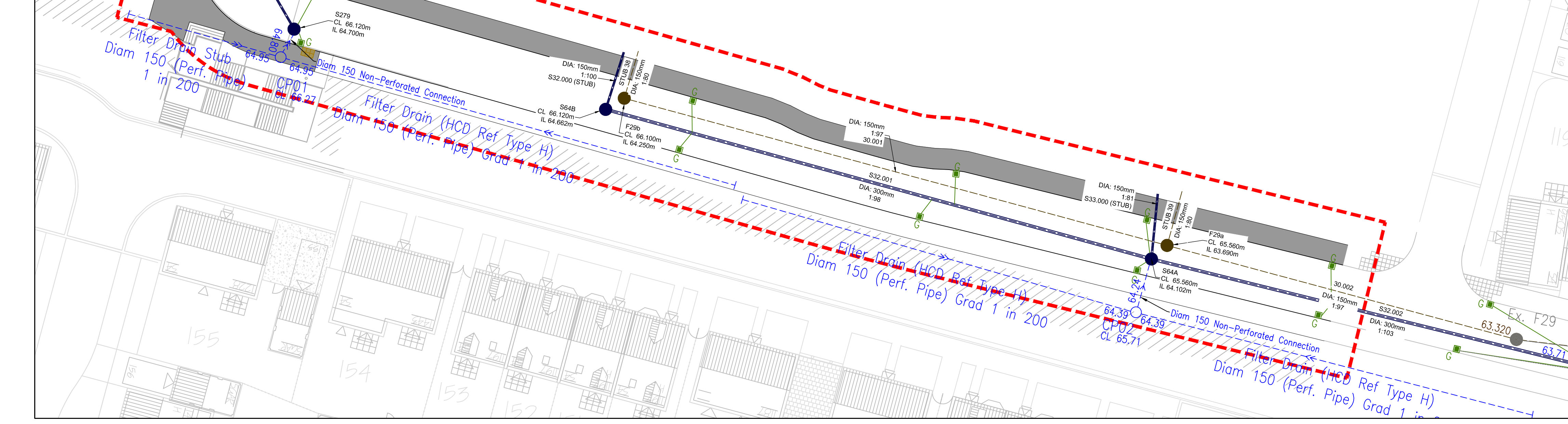
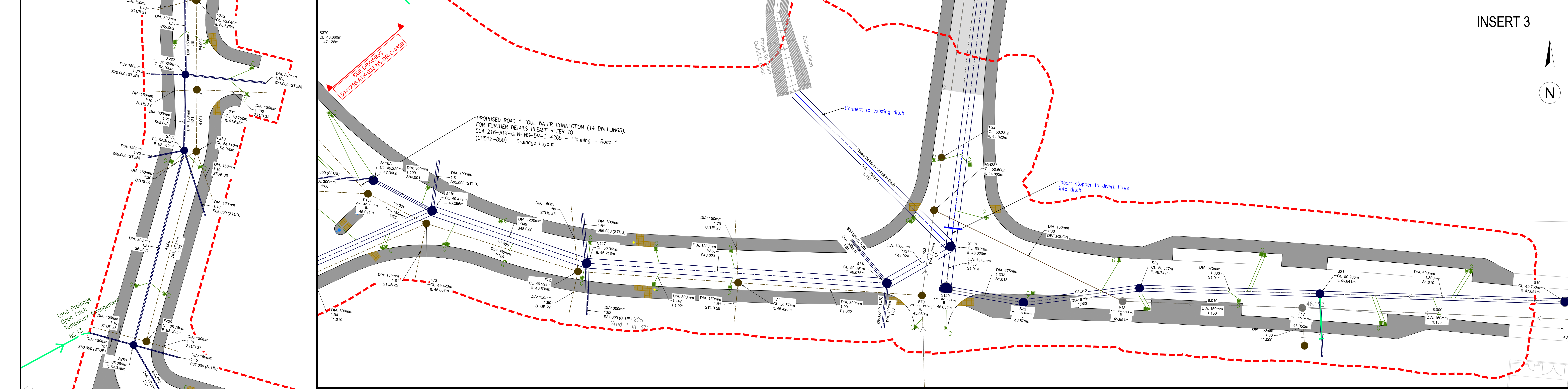
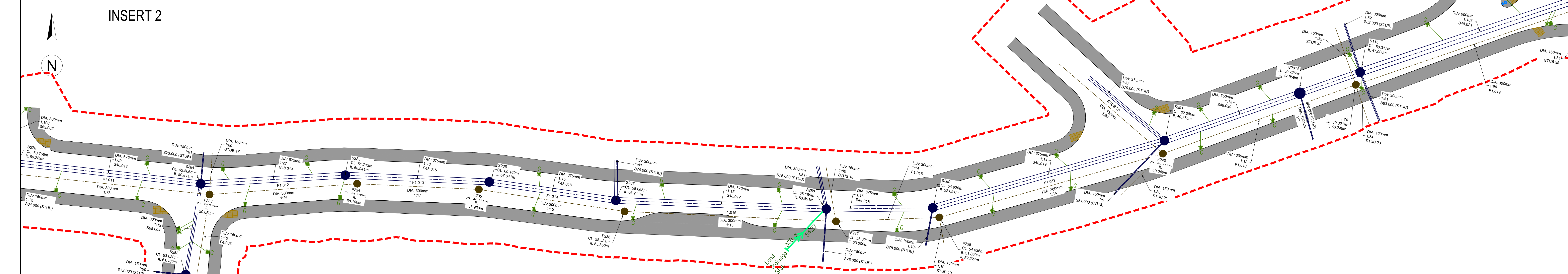
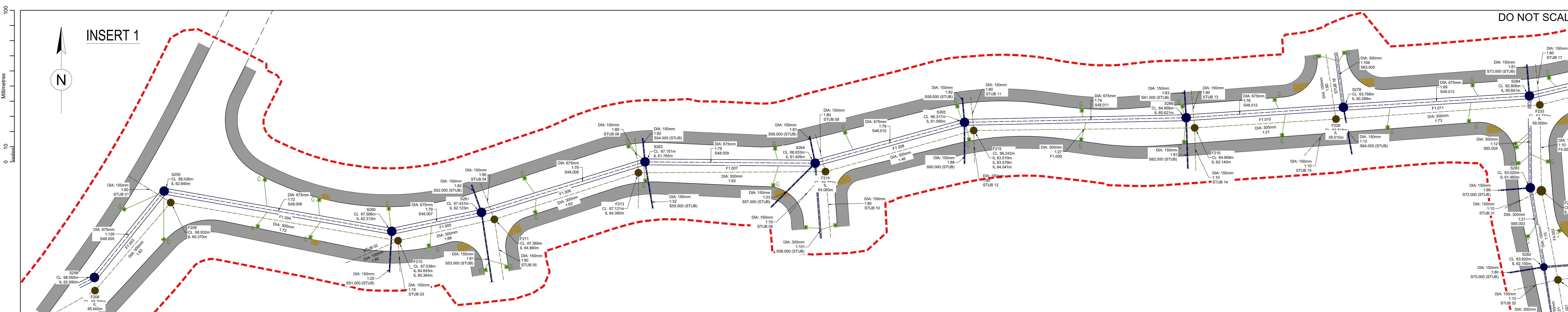
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COED DARCY

EXISTING SURFACE
DRAINAGE STRATEGY
OCROBER 2019

Scale	1:2000	Designed	AGV	Drawn	AGV	Checked	JF	Authorised	TB
Original Size	A1	Date	09/01/18	Date	09/01/18	Date	09/01/18	Date	09/01/18
Drawing Number	5041216-ATK-GM-NS-SK-C-0041							Revision	P 2



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

WORKING ADJACENT TO ASBESTOS, OPERATIONAL SITE, BURIED STRUCTURES, NESTING BIRDS, DEEP EXCAVATION, CONTAMINATION OF SSSI, NEARBY RESIDENTIAL PROPERTIES, BURIED ELECTRICITY CABLE, BURIED GAS MAINS, PRESSURE PIPES, OPEN HOLES, ROCK FACE, HAZARDOUS SUBSTANCES, CONTAMINATED GROUND AND GROUNDWATER

MAINTENANCE/CLEANING

WORKING ADJACENT TO ASBESTOS, OPERATIONAL SITE, BURIED STRUCTURES, NESTING BIRDS, DEEP EXCAVATION, CONTAMINATION OF SSSI, NEARBY RESIDENTIAL PROPERTIES, BURIED ELECTRICITY CABLE, BURIED GAS MAINS, PRESSURE PIPES, OPEN HOLES, ROCK FACE, HAZARDOUS SUBSTANCES, CONTAMINATED GROUND AND GROUNDWATER

DECOMMISSIONING/DEMOLITION

WORKING ADJACENT TO ASBESTOS, OPERATIONAL SITE, BURIED STRUCTURES, NESTING BIRDS, DEEP EXCAVATION, CONTAMINATION OF SSSI, NEARBY RESIDENTIAL PROPERTIES, BURIED ELECTRICITY CABLE, BURIED GAS MAINS, PRESSURE PIPES, OPEN HOLES, ROCK FACE, HAZARDOUS SUBSTANCES, CONTAMINATED GROUND AND GROUNDWATER

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

NOTES:

- ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH "SPECIFICATION FOR HIGHWAYS WORKS".
- LEVELS TO BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.
- TACTILE PAVING - BUFF COLOURED ON ALL UNCONTROLLED CROSSINGS AND RED COLOURED ON ALL CONTROLLED CROSSINGS
- FOR DRAINAGE SCHEDULE REFER TO DRAWING 508491/R5080/520
- NEW TEMPORARY WORKS SIGNS, LOCATIONS TO BE AGREED - THESE WILL BE OUTSIDE OF THE SITE BOUNDARY SHOWN.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH 508491/R5080/510, 508491/R5080/520 AND 508491/R5080/530
- THIS DRAWING AND CONSTRUCTION WORKS DEPICTED ARE COPYRIGHT OF ATKINS AND MAY NOT BE REPRODUCED OR AMENDED EXCEPT BY WRITTEN PERMISSION. NO LIABILITY WILL BE ACCEPTED FOR AMENDMENTS MADE BY OTHER PERSONS.
- ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE.
- ALL ADAPTABLE DRAINAGE WORKS TO BE CONSTRUCTED AS DETAILED IN SEWERS FOR ADOPTION 7th EDITION OR AS STIPULATED IN THAMES WATERS ADDENDUM.
- WHERE PIPES CROSS, PLASTIC MEMBRANE IS TO BE USED FOR PROTECTION TO ELIMINATE ANY CHANCES OF CROSS CONTAMINATION.
- PRECAST CONCRETE MANHOLE RINGS WILL NOT BE CUT UNDER ANY CIRCUMSTANCES. OTHER OPTIONS ARE TO BE USED SUCH AS BUILDING UP THE MANHOLE WITH CONCRETE OR BRICK WORK TO THE TOP OF THE PIPE.
- COVER AND FRAMES SHOULD BE ITEMKARKED.
- PIPES OF DIFFERENT DIAMETERS ENTERING MANHOLES SHOULD BE INSTALLED WITH SOFFITS AT THE SAME LEVEL.
- THE OUTSIDE OF THE SEWER SHOULD BE IN VEHICLE CARRIAGEWAY (NOT FOOTPATH) AND BE AT LEAST 1m FROM THE KERB LINE. THE OUTSIDE MANHOLES SHOULD BE AT LEAST 0.5m FROM THE KERB LINE.
- MARKER AND INDICATOR POST SHALL BE ERECTED TO SHOW THE LOCATION OF STUB ENDS. THE STUB CONNECTION POINTS ARE TO BE SEALED AND WATERPROOFED IN ACCORDANCE WITH CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7TH EDITION.

KEY:

- FOUL WATER DRAINAGE ROAD 50/80/1
- SURFACE WATER DRAINAGE ROAD 50/80/1
- GULLY
- FILTER DRAIN
- LAND DRAIN
- PLANNING BOUNDARY
- EXISTING SW MANHOLE
- EXISTING FW MANHOLE
- PROPOSED FOOTWAY FOR ADOPTION

Rev	Date	Description	By	Chk'd	App'd	Submittal
P01	30/07/19	FIRST ISSUE	AGV	JF	TB	

FOR INFORMATION

ATKINS

The Axis
10 Holiday Street
Birmingham
B1 1TF

Tel: +44 (0)1214 835000
Fax: +44 (0)1214 835202
www.atkinsglobal.com

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Client

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Project Title

COED DARCY

Drawing Title

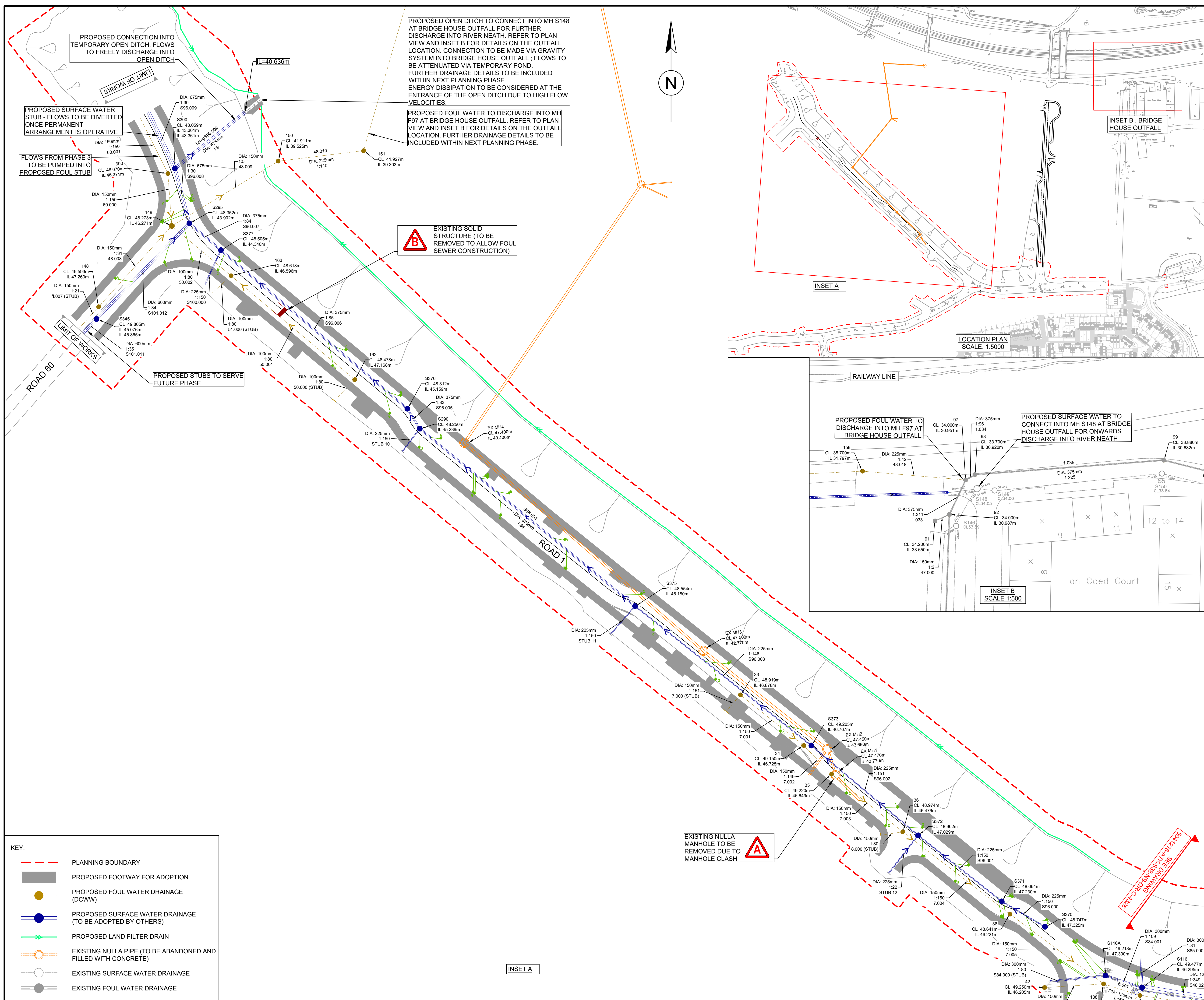
ROAD 50, 80 & 1 (CH 304-865) DRAINAGE LAYOUT (SHEET 1 OF 2)

Scale	Designed	Drawn	Checked	Authorised
1:250	AGV	AGV	JF	TB

Original	Date	Date	Date	Date
A0	30/07/19	30/07/19	30/07/19	30/07/19

Drawing Number	Revision
5041216-ATK-S38-NS-DR-C-4328	P01

100
0 10
Millimetres



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION									
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:									
CONSTRUCTION									
SERVICES (UNDERGROUND) HAZARDOUS SUBSTANCES - CONTAMINATED GROUND AND GROUNDWATER ROCK FACE EXISTING CULVERTS AND NULLA PIPE									
MAINTENANCE/CLEANING									
SERVICES (UNDERGROUND) HAZARDOUS SUBSTANCES - CONTAMINATED GROUND AND GROUNDWATER ROCK FACE									
DECOMMISSIONING/DEMOLITION									
SERVICES (UNDERGROUND) HAZARDOUS SUBSTANCES - CONTAMINATED GROUND AND GROUNDWATER ROCK FACE									
It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement									
NOTES:									
1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH "SPECIFICATION FOR HIGHWAYS WORKS".									
2. LEVELS TO BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.									
3. THIS DRAWING AND CONSTRUCTION WORKS DEPICTED ARE COPYRIGHT OF ATKINS AND MAY NOT BE REPRODUCED OR AMENDED EXCEPT BY WRITTEN PERMISSION. NO LIABILITY WILL BE ACCEPTED FOR AMENDMENTS MADE BY OTHER PERSONS.									
4. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE.									
5. DRAINAGE DESIGN AND CONSTRUCTION TO BE IN ACCORDANCE WITH SEWER FOR ADOPTION 7 th EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER									
6. WHERE PIPES CROSS, PLASTIC MEMBRANE IS TO BE USED FOR PROTECTION TO ELIMINATE ANY CHANCES OF CROSS CONTAMINATION.									
7. PRECAST CONCRETE MANHOLE RINGS WILL NOT BE CUT UNDER ANY CIRCUMSTANCES. OTHER OPTIONS ARE TO BE USED SUCH AS BUILDING UP THE MANHOLE WITH CONCRETE OR BRICK WORK TO THE TOP OF THE PIPE.									
8. COVER AND FRAMES SHOULD BE KITEMARKED.									
9. PIPES OF DIFFERENT DIAMETERS ENTERING MANHOLES SHOULD BE INSTALLED WITH SOFFITS AT THE SAME LEVEL.									
10. THE OUTSIDE OF THE SEWER SHOULD BE IN VEHICLE CARRIAGEWAY (NOT FOOTPATH) AND BE AT LEAST 1m FROM THE KERB LINE. THE OUTSIDE MANHOLES SHOULD BE AT LEAST 0.5m FROM THE KERB LINE.									
11. MARKER AND INDICATOR POST SHALL BE ERECTED TO SHOW THE LOCATION OF STUB ENDS. THE STUB CONNECTION POINTS ARE TO BE SEALED AND WATERPROOFED IN ACCORDANCE WITH CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7TH EDITION.									
P2	07/11/19	FOR TENDER				CW	RR		MJ
P1	30/07/19	FIRST ISSUE				GI	AGV		MJ
Rev.	Date	Description				By	Chk'd	App'd	
Drawing Status								Suitability	
FOR TENDER								D2	
ATKINS						The Axis 10 Holliday Street Birmingham B1 1TF			
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Drawing Title									
ROAD 50, 80 & 1 (CH 304-865) DRAINAGE LAYOUT (SHEET 2 OF 2)									
Scale	Designed	Drawn	Checked	Authorised					
1:500	AGV	GI	AGV	JF					
Original Size	Date	Date	Date	Date					
A1	30/07/19	30/07/19	30/07/19	30/07/19					
Drawing Number								Revision	
5041216-ATK-S38-NS-DR-C-4329								P02	

Appendix B

CALCULATIONS:

- B.1 Temporary Ponds SW Windes Calculation results for 1 in 30 year + 5%
- B.2 Roads 1,50,80 and 3 SW Windes Calculations for 1 in 1,1 in 30 years + 5% CC and 1 in 100 year + 40% CC.
- B.3 Road 50 and 80 FW Windes Calculation
- B.4 Road 1 FW Windes Calculation

Atkins Limited				Page 1	
Woodcote Grove		Coed Darcy			
Epsom		Temp SW			
Surrey KT18 5BW		POND A			
Date 20/11/2019 13:21		Designed by MK			
File North site (South to Ro...		Checked by AGV			
Micro Drainage		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+5%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	35.484	0.484	181.5	2291.9	O K
30 min Summer	35.652	0.652	278.4	3089.0	O K
60 min Summer	35.827	0.827	330.5	3913.7	O K
120 min Summer	35.971	0.971	368.1	4599.6	O K
180 min Summer	36.041	1.041	384.9	4927.1	O K
240 min Summer	36.077	1.077	393.3	5099.5	O K
360 min Summer	36.110	1.110	400.9	5254.6	O K
480 min Summer	36.112	1.112	401.3	5264.9	O K
600 min Summer	36.099	1.099	398.4	5203.3	O K
720 min Summer	36.078	1.078	393.7	5104.4	O K
960 min Summer	36.026	1.026	381.5	4860.2	O K
1440 min Summer	35.921	0.921	355.6	4361.1	O K
2160 min Summer	35.793	0.793	321.2	3755.6	O K
2880 min Summer	35.701	0.701	294.0	3320.4	O K
4320 min Summer	35.597	0.597	247.5	2825.4	O K
5760 min Summer	35.534	0.534	210.4	2526.6	O K
7200 min Summer	35.490	0.490	185.0	2320.5	O K
8640 min Summer	35.458	0.458	166.0	2166.3	O K
10080 min Summer	35.431	0.431	150.8	2042.9	O K
15 min Winter	35.541	0.541	214.5	2561.0	O K
30 min Winter	35.731	0.731	303.1	3463.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	61.536	0.0	2180.5	25	
30 min Summer	43.091	0.0	3132.7	37	
60 min Summer	29.036	0.0	4429.5	64	
120 min Summer	18.997	0.0	5829.3	104	
180 min Summer	14.619	0.0	6745.0	136	
240 min Summer	12.061	0.0	7429.5	170	
360 min Summer	9.196	0.0	8511.4	238	
480 min Summer	7.574	0.0	9355.1	306	
600 min Summer	6.510	0.0	10055.9	374	
720 min Summer	5.749	0.0	10659.8	440	
960 min Summer	4.721	0.0	11670.7	568	
1440 min Summer	3.568	0.0	13212.3	818	
2160 min Summer	2.691	0.0	15092.3	1180	
2880 min Summer	2.200	0.0	16440.0	1536	
4320 min Summer	1.659	0.0	18528.3	2252	
5760 min Summer	1.358	0.0	20366.7	2992	
7200 min Summer	1.163	0.0	21796.5	3680	
8640 min Summer	1.026	0.0	23036.8	4416	
10080 min Summer	0.922	0.0	24114.6	5144	
15 min Winter	61.536	0.0	2465.7	25	
30 min Winter	43.091	0.0	3533.7	37	
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Atkins Limited				Page 2	
Woodcote Grove		Coed Darcy			
Epsom		Temp SW			
Surrey KT18 5BW		POND A			
Date 20/11/2019 13:21		Designed by MK			
File North site (South to Ro...		Checked by AGV			
Micro Drainage		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+5%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	35.931	0.931	358.0	4407.5	O K
120 min Winter	36.093	1.093	397.1	5176.1	O K
180 min Winter	36.161	1.161	412.4	5497.5	O K
240 min Winter	36.190	1.190	418.8	5635.0	O K
360 min Winter	36.200	1.200	420.9	5683.9	Flood Risk
480 min Winter	36.178	1.178	416.0	5576.9	O K
600 min Winter	36.141	1.141	408.0	5403.9	O K
720 min Winter	36.099	1.099	398.4	5203.3	O K
960 min Winter	36.011	1.011	377.9	4788.7	O K
1440 min Winter	35.857	0.857	338.7	4057.6	O K
2160 min Winter	35.695	0.695	292.0	3289.6	O K
2880 min Winter	35.607	0.607	253.4	2873.9	O K
4320 min Winter	35.511	0.511	197.0	2418.8	O K
5760 min Winter	35.453	0.453	163.4	2146.2	O K
7200 min Winter	35.414	0.414	141.0	1958.5	O K
8640 min Winter	35.385	0.385	124.8	1821.4	O K
10080 min Winter	35.362	0.362	112.1	1714.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	29.036	0.0	4974.4	64	
120 min Winter	18.997	0.0	6542.4	114	
180 min Winter	14.619	0.0	7568.3	144	
240 min Winter	12.061	0.0	8335.1	182	
360 min Winter	9.196	0.0	9547.3	258	
480 min Winter	7.574	0.0	10492.6	330	
600 min Winter	6.510	0.0	11278.0	400	
720 min Winter	5.749	0.0	11954.9	468	
960 min Winter	4.721	0.0	13088.9	600	
1440 min Winter	3.568	0.0	14820.3	854	
2160 min Winter	2.691	0.0	16913.7	1212	
2880 min Winter	2.200	0.0	18425.7	1560	
4320 min Winter	1.659	0.0	20776.5	2292	
5760 min Winter	1.358	0.0	22817.5	3000	
7200 min Winter	1.163	0.0	24421.4	3744	
8640 min Winter	1.026	0.0	25815.6	4424	
10080 min Winter	0.922	0.0	27037.2	5240	
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Atkins Limited		Page 3
Woodcote Grove Epsom Surrey KT18 5BW	Coed Darcy Temp SW POND A	
Date 20/11/2019 13:21 File North site (South to Ro...	Designed by MK Checked by AGV	
Micro Drainage		Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.258	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+5

Time Area Diagram

Total Area (ha) 20.886

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	6.962	4 8	6.962	8 12	6.962

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0 4	0.000

Atkins Limited		Page 4
Woodcote Grove Epsom Surrey KT18 5BW	Coed Darcy Temp SW POND A	
Date 20/11/2019 13:21 File North site (South to Ro...	Designed by MK Checked by AGV	
Micro Drainage		Source Control 2019.1
<u>Model Details</u> Storage is Online Cover Level (m) 36.500 <u>Tank or Pond Structure</u> Invert Level (m) 35.000 Depth (m) Area (m²) 0.000 4735.0 <u>Orifice Outflow Control</u> Diameter (m) 0.452 Discharge Coefficient 0.600 Invert Level (m) 35.000		
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Atkins Limited				Page 1	
Woodcote Grove		Coed Darcy			
Epsom		Temp SW			
Surrey KT18 5BW		POND B			
Date 20/11/2019 13:20		Designed by MK			
File North site (North throu...		Checked by AGV			
Micro Drainage		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+5%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	35.507	0.507	94.7	1019.7	O K
30 min Summer	35.676	0.676	114.3	1389.0	O K
60 min Summer	35.848	0.848	131.2	1776.6	O K
120 min Summer	35.986	0.986	143.4	2100.9	O K
180 min Summer	36.047	1.047	148.4	2245.1	O K
240 min Summer	36.078	1.078	151.0	2321.4	O K
360 min Summer	36.107	1.107	153.3	2392.7	O K
480 min Summer	36.111	1.111	153.6	2400.2	O K
600 min Summer	36.100	1.100	152.7	2375.1	O K
720 min Summer	36.083	1.083	151.3	2332.5	O K
960 min Summer	36.038	1.038	147.7	2224.7	O K
1440 min Summer	35.941	0.941	139.6	1994.5	O K
2160 min Summer	35.813	0.813	128.0	1698.0	O K
2880 min Summer	35.712	0.712	118.0	1468.0	O K
4320 min Summer	35.570	0.570	102.5	1156.5	O K
5760 min Summer	35.478	0.478	90.9	959.3	O K
7200 min Summer	35.417	0.417	82.4	829.4	O K
8640 min Summer	35.381	0.381	75.8	754.4	O K
10080 min Summer	35.356	0.356	68.9	703.5	O K
15 min Winter	35.564	0.564	101.7	1143.8	O K
30 min Winter	35.754	0.754	122.2	1562.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	61.536	0.0	1037.0	24	
30 min Summer	43.091	0.0	1469.7	37	
60 min Summer	29.036	0.0	2028.7	64	
120 min Summer	18.997	0.0	2661.7	112	
180 min Summer	14.619	0.0	3075.9	142	
240 min Summer	12.061	0.0	3385.5	176	
360 min Summer	9.196	0.0	3875.2	246	
480 min Summer	7.574	0.0	4257.3	314	
600 min Summer	6.510	0.0	4575.0	382	
720 min Summer	5.749	0.0	4849.1	450	
960 min Summer	4.721	0.0	5309.2	584	
1440 min Summer	3.568	0.0	6015.4	840	
2160 min Summer	2.691	0.0	6838.1	1216	
2880 min Summer	2.200	0.0	7451.0	1584	
4320 min Summer	1.659	0.0	8410.3	2296	
5760 min Summer	1.358	0.0	9213.2	3000	
7200 min Summer	1.163	0.0	9862.4	3688	
8640 min Summer	1.026	0.0	10428.9	4416	
10080 min Summer	0.922	0.0	10928.8	5144	
15 min Winter	61.536	0.0	1166.7	24	
30 min Winter	43.091	0.0	1651.5	38	
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Atkins Limited				Page 2	
Woodcote Grove		Coed Darcy			
Epsom		Temp SW			
Surrey KT18 5BW		POND B			
Date 20/11/2019 13:20		Designed by MK			
File North site (North throu...		Checked by AGV			
Micro Drainage		Source Control 2019.1			
<u>Summary of Results for 30 year Return Period (+5%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	35.945	0.945	139.9	2004.3	O K
120 min Winter	36.104	1.104	153.0	2383.5	O K
180 min Winter	36.162	1.162	157.5	2525.9	O K
240 min Winter	36.191	1.191	159.7	2597.5	O K
360 min Winter	36.207	1.207	160.9	2638.2	Flood Risk
480 min Winter	36.193	1.193	159.9	2603.5	O K
600 min Winter	36.165	1.165	157.8	2534.4	O K
720 min Winter	36.130	1.130	155.1	2448.9	O K
960 min Winter	36.054	1.054	149.0	2262.9	O K
1440 min Winter	35.906	0.906	136.5	1912.9	O K
2160 min Winter	35.731	0.731	119.9	1509.9	O K
2880 min Winter	35.604	0.604	106.4	1230.2	O K
4320 min Winter	35.449	0.449	86.9	897.1	O K
5760 min Winter	35.375	0.375	74.1	742.3	O K
7200 min Winter	35.338	0.338	63.9	665.9	O K
8640 min Winter	35.311	0.311	56.6	611.6	O K
10080 min Winter	35.291	0.291	51.0	570.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	29.036	0.0	2275.0	64	
120 min Winter	18.997	0.0	2984.0	118	
180 min Winter	14.619	0.0	3447.9	150	
240 min Winter	12.061	0.0	3794.8	188	
360 min Winter	9.196	0.0	4343.3	264	
480 min Winter	7.574	0.0	4771.3	340	
600 min Winter	6.510	0.0	5127.3	412	
720 min Winter	5.749	0.0	5434.4	484	
960 min Winter	4.721	0.0	5949.9	620	
1440 min Winter	3.568	0.0	6742.3	884	
2160 min Winter	2.691	0.0	7660.9	1260	
2880 min Winter	2.200	0.0	8348.0	1620	
4320 min Winter	1.659	0.0	9425.8	2332	
5760 min Winter	1.358	0.0	10320.3	3000	
7200 min Winter	1.163	0.0	11047.9	3688	
8640 min Winter	1.026	0.0	11683.7	4416	
10080 min Winter	0.922	0.0	12247.4	5152	
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Atkins Limited		Page 3
Woodcote Grove Epsom Surrey KT18 5BW	Coed Darcy Temp SW POND B	
Date 20/11/2019 13:20 File North site (North throu...	Designed by MK Checked by AGV	
Micro Drainage		Source Control 2019.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.258	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+5

Time Area Diagram

Total Area (ha) 9.435

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	3.145	4	8	3.145	8	12	3.145

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area		
From:	To:	(ha)
0	4	0.000

Atkins Limited		Page 4
Woodcote Grove Epsom Surrey KT18 5BW	Coed Darcy Temp SW POND B	
Date 20/11/2019 13:20 File North site (North throu...	Designed by MK Checked by AGV	
Micro Drainage Source Control 2019.1		

Model Details

Storage is Online Cover Level (m) 36.500

Tank or Pond Structure

Invert Level (m) 35.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1892.8	1.200	2488.7	1.500	2650.4

Orifice Outflow Control

Diameter (m) 0.273 Discharge Coefficient 0.600 Invert Level (m) 35.000

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Atkins		Page 0
Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface water - SSR

Pipe Sizes NEAP SWS 131014 working Manhole Sizes NEAP SWS 131014 working

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.256	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	150	Maximum Backdrop Height (m)	0.000
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)	300

Designed with Level Soffits

Network Design Table for Surface water - SSR

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S96.000	14.219	0.095	150.0	0.026	5.00	0.0	0.600		o	225	Pipe/Conduit	
S96.001	30.193	0.201	150.0	0.034	0.00	0.0	0.600		o	225	Pipe/Conduit	
S97.000	59.574	2.746	21.7	0.044	5.00	0.0	0.600		o	225	Pipe/Conduit	
S96.002	39.508	0.262	150.6	0.045	0.00	0.0	0.600		o	225	Pipe/Conduit	
S96.003	63.682	0.436	145.9	0.098	0.00	0.0	0.600		o	225	Pipe/Conduit	
S98.000	10.594	0.071	150.0	0.213	5.00	0.0	0.600		o	225	Pipe/Conduit	
S96.004	79.064	0.941	84.0	0.107	0.00	0.0	0.600		o	375	Pipe/Conduit	
S99.000	8.161	0.054	150.0	0.273	5.00	0.0	0.600		o	225	Pipe/Conduit	
S96.005	6.653	0.079	84.0	0.105	0.00	0.0	0.600		o	375	Pipe/Conduit	
S96.006	69.343	0.820	84.6	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S96.000	38.76	5.22	47.325	0.026	0.0	0.0	0.0	1.07	42.4	2.8
S96.001	37.50	5.69	47.230	0.060	0.0	0.0	0.0	1.07	42.4	6.1
S97.000	38.41	5.35	49.775	0.044	0.0	0.0	0.0	2.82	112.2	4.6
S96.002	35.99	6.31	47.029	0.149	0.0	0.0	0.0	1.06	42.3	14.6
S96.003	33.88	7.30	46.767	0.248	0.0	0.0	0.0	1.08	42.9	22.7
S98.000	38.92	5.17	46.401	0.213	0.0	0.0	0.0	1.07	42.4	22.5
S96.004	32.62	7.96	46.180	0.568	0.0	0.0	0.0	1.98	218.5	50.2
S99.000	39.03	5.13	45.443	0.273	0.0	0.0	0.0	1.07	42.4	28.9
S96.005	32.52	8.02	45.239	0.947	0.0	0.0	0.0	1.98	218.5	83.4
S96.006	31.51	8.61	45.159	0.947	0.0	0.0	0.0	1.97	217.7	83.4

Atkins		Page 1
Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51	Designed by AGV	
File 1. COED DARCY - OVERALL TEMPO...	Checked by NL	
Innovyze	Network 2018.1.1	

Network Design Table for Surface water - SSR

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S100.000	10.641	0.071	150.0	0.000	5.00	0.0	0.600		o	225	Pipe/Conduit	
S96.007	11.731	0.139	84.6	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
S101.009	75.835	6.703	11.3	0.128	0.00	0.0	0.600		o	450	Pipe/Conduit	
S101.010	10.770	0.812	13.3	0.206	0.00	0.0	0.600		o	600	Pipe/Conduit	
S101.011	27.605	0.789	35.0	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
S101.012	37.770	1.122	33.7	0.060	0.00	0.0	0.600		o	600	Pipe/Conduit	
S96.008	16.091	0.541	29.8	0.156	0.00	0.0	0.600		o	675	Pipe/Conduit	
S96.009	25.475	2.021	12.6	0.000	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.005	18.320	0.145	126.3	0.156	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.006	38.117	0.530	71.9	0.040	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.007	15.128	0.192	78.8	0.090	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.008	28.223	0.358	78.8	0.016	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.009	28.074	0.356	78.9	0.032	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.010	25.533	0.324	78.8	0.029	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.011	36.578	0.464	78.8	0.030	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.012	25.974	0.332	78.2	0.042	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.013	30.742	0.448	68.6	0.035	0.00	0.0	0.600		o	675	Pipe/Conduit	
S123.000	12.855	0.250	51.4	0.039	5.00	0.0	0.600		o	150	Pipe/Conduit	
S123.001	33.131	1.500	22.1	0.039	0.00	0.0	0.600		o	225	Pipe/Conduit	
S123.002	12.501	0.700	17.9	0.086	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)
S100.000	38.92	5.17	44.800	0.000	0.0	0.0	0.0	1.07	42.4	0.0
S96.007	31.34	8.70	44.340	0.947	0.0	0.0	0.0	1.97	217.7	83.4
S101.009	32.88	7.82	53.530	2.672	0.0	0.0	0.0	6.07	965.4	238.0
S101.010	32.83	7.85	46.677	4.008	0.0	0.0	0.0	6.71	1897.1	356.4
S101.011	32.63	7.96	45.865	4.726	0.0	0.0	0.0	4.13	1166.5	417.7
S101.012	32.36	8.11	45.076	4.786	0.0	0.0	0.0	4.21	1189.5	419.5
S96.008	31.25	8.76	43.902	5.888	0.0	0.0	0.0	4.82	1723.2	498.4
S96.009	31.16	8.82	43.361	5.888	0.0	0.0	0.0	7.41	2650.4	498.4
S106.005	36.14	6.25	62.990	3.573	0.0	0.0	0.0	2.33	834.0	349.6
S106.006	35.66	6.46	62.845	3.613	0.0	0.0	0.0	3.09	1106.9	349.6
S106.007	35.47	6.54	62.315	3.814	0.0	0.0	0.0	2.95	1057.3	366.4
S106.008	35.12	6.70	62.123	3.909	0.0	0.0	0.0	2.95	1057.0	371.8
S106.009	34.78	6.86	61.765	4.087	0.0	0.0	0.0	2.95	1056.8	384.9
S106.010	34.48	7.00	61.409	4.222	0.0	0.0	0.0	2.95	1057.2	394.2
S106.011	34.06	7.21	61.085	4.454	0.0	0.0	0.0	2.95	1057.0	410.8
S106.012	33.77	7.36	60.621	4.718	0.0	0.0	0.0	2.97	1061.0	431.4
S106.013	33.45	7.52	60.289	5.457	0.0	0.0	0.0	3.17	1133.2	494.3
S123.000	38.96	5.15	64.700	0.039	0.0	0.0	0.0	1.41	24.8	4.1
S123.001	38.41	5.35	64.375	0.324	0.0	0.0	0.0	2.80	111.2	33.7
S123.002	38.23	5.42	62.875	0.487	0.0	0.0	0.0	3.11	123.7	50.4

Atkins		Page 2
Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51	Designed by AGV	
File 1. COED DARCY - OVERALL TEMPO...	Checked by NL	
Innovyze	Network 2018.1.1	

Network Design Table for Surface water - SSR

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S123.003	13.260	0.640	20.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S123.004	15.168	1.244	12.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
S106.014	23.870	0.900	26.5	0.037	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.015	23.754	1.300	18.3	0.026	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.016	21.127	1.400	15.1	0.084	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.017	34.731	2.350	14.8	0.021	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.018	17.557	1.200	14.6	0.032	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.019	39.780	2.841	14.0	0.017	0.00	0.0	0.600		o	675	Pipe/Conduit	
S106.020	34.202	2.625	13.0	0.039	0.00	0.0	0.600		o	750	Pipe/Conduit	
S106.021	41.685	0.405	102.9	0.036	0.00	0.0	0.600		o	900	Pipe/Conduit	
S106.022	26.903	0.077	349.4	0.096	0.00	0.0	0.600		o	1200	Pipe/Conduit	
S106.023	49.648	0.142	349.6	0.110	0.00	0.0	0.600		o	1200	Pipe/Conduit	
S106.024	12.135	0.036	337.1	0.167	0.00	0.0	0.600		o	1200	Pipe/Conduit	
S179.000	5.781	0.058	99.7	0.048	5.00	0.0	0.600		o	150	Pipe/Conduit	
S179.001	54.737	0.327	167.2	0.065	0.00	0.0	0.600		o	150	Pipe/Conduit	
S179.002	44.296	0.430	103.0	0.036	0.00	0.0	0.600		o	225	Pipe/Conduit	
S106.025	56.349	0.209	270.0	0.071	0.00	0.0	0.600		o	1350	Pipe/Conduit	
S106.026	49.846	3.486	14.3	0.062	0.00	0.0	0.600		o	1350	Pipe/Conduit	
S106.027	39.232	4.115	9.5	1.786	0.00	0.0	0.600		o	1350	Pipe/Conduit	
S197.000	74.811	5.534	13.5	0.000	5.00	0.0	0.600		o	225	Pipe/Conduit	
S197.001	25.440	1.817	14.0	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)
S123.003	38.06	5.48	62.100	0.630	0.0	0.0	0.0	3.47	245.2	64.9
S123.004	37.91	5.54	61.460	0.630	0.0	0.0	0.0	4.53	320.0	64.9
S106.014	33.30	7.60	59.841	6.192	0.0	0.0	0.0	5.10	1825.7	558.4
S106.015	33.18	7.66	58.941	6.218	0.0	0.0	0.0	6.15	2200.5	558.7
S106.016	33.08	7.71	57.641	6.302	0.0	0.0	0.0	6.77	2421.9	564.6
S106.017	32.92	7.80	56.241	6.383	0.0	0.0	0.0	6.84	2447.3	569.1
S106.018	32.84	7.84	53.891	6.569	0.0	0.0	0.0	6.87	2459.7	584.4
S106.019	32.67	7.93	52.691	6.679	0.0	0.0	0.0	7.03	2514.4	591.0
S106.020	32.54	8.01	49.775	8.052	0.0	0.0	0.0	7.78	3435.6	709.6
S106.021	32.14	8.23	47.000	8.379	0.0	0.0	0.0	3.09	1964.9	729.4
S106.022	31.76	8.46	46.295	8.475	0.0	0.0	0.0	2.00	2257.1	729.4
S106.023	31.07	8.87	46.218	8.875	0.0	0.0	0.0	2.00	2256.4	746.9
S106.024	30.92	8.97	46.076	9.042	0.0	0.0	0.0	2.03	2298.2	757.1
S179.000	39.12	5.10	64.758	0.048	0.0	0.0	0.0	1.01	17.8	5.1
S179.001	36.08	6.27	64.700	0.113	0.0	0.0	0.0	0.77	13.7	11.0
S179.002	34.81	6.85	64.140	0.197	0.0	0.0	0.0	1.29	51.2	18.6
S106.025	28.80	10.44	45.895	16.339	0.0	0.0	0.0	2.44	3496.4	1274.4
S106.026	28.70	10.51	45.686	16.569	0.0	0.0	0.0	10.66	15255.3	1287.7
S106.027	28.63	10.56	42.201	18.355	0.0	0.0	0.0	13.05	18686.7	1423.3
S197.000	38.41	5.35	42.344	0.000	0.0	0.0	0.0	3.58	142.3	0.0
S197.001	36.50	6.10	36.810	0.214	0.0	0.0	0.0	3.52	139.8	21.3

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW					Coed Darcy Road 1,50,80 Temp. SW						
Date 24/10/2019 10:51					Designed by AGV						
File 1. COED DARCY - OVERALL TEMPO...					Checked by NL						
Innovyze					Network 2018.1.1						
Manhole Schedules for Surface water - SSR											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S370	48.750	1.425	Open Manhole	1200	S96.000	47.325	225				
S371	48.660	1.430	Open Manhole	1200	S96.001	47.230	225	S96.000	47.230	225	
S286	51.200	1.425	Open Manhole	1050	S97.000	49.775	225				
S372	48.962	1.933	Open Manhole	1500	S96.002	47.029	225	S96.001	47.029	225	
								S97.000	47.029	225	
S373	49.200	2.433	Open Manhole	1200	S96.003	46.767	225	S96.002	46.767	225	
S288	48.680	2.279	Junction		S98.000	46.401	225				
S375	48.550	2.370	Open Manhole	1500	S96.004	46.180	375	S96.003	46.330	225	
								S98.000	46.330	225	
S291	48.380	2.937	Junction		S99.000	45.443	225				
S290	48.250	3.011	Open Manhole	1500	S96.005	45.239	375	S96.004	45.239	375	
								S99.000	45.389	225	
S376	48.297	3.137	Open Manhole	1200	S96.006	45.159	375	S96.005	45.159	375	
S294	48.460	3.660	Junction		S100.000	44.800	225				
S377	48.500	4.160	Open Manhole	1350	S96.007	44.340	375	S96.006	44.340	375	
								S100.000	44.729	225	239
S297	58.018	4.488	Open Manhole	1350	S101.009	53.530	450	S101.008	53.530	450	
								S102.001	53.530	450	
S329	52.362	5.685	Open Manhole	1500	S101.010	46.677	600	S101.009	46.827	450	
								S103.002	46.827	450	
S315	51.650	5.785	Open Manhole	1500	S101.011	45.865	600	S101.010	45.865	600	
								S104.005	46.030	450	15
S345	49.805	4.729	Open Manhole	1500	S101.012	45.076	600	S101.011	45.076	600	
S295	48.350	4.448	Open Manhole	1800	S96.008	43.902	675	S96.007	44.201	375	
								S101.012	43.954	600	
S300	48.053	4.692	Open Manhole	1500	S96.009	43.361	675	S96.008	43.361	675	
S	42.300	0.960	Open Manhole	0		OUTFALL		S96.009	41.340	675	
S258	68.267	5.277	Open Manhole	1500	S106.005	62.990	675	S106.004	63.065	600	
S259	68.089	5.244	Open Manhole	1500	S106.006	62.845	675	S106.005	62.845	675	
S260	67.688	5.373	Open Manhole	1500	S106.007	62.315	675	S106.006	62.315	675	
								S109.000	66.035	150	3195
S261	67.481	5.358	Open Manhole	1500	S106.008	62.123	675	S106.007	62.123	675	
								S110.000	65.855	150	3207
								S111.000	65.855	150	3207
S263	67.091	5.326	Open Manhole	1500	S106.009	61.765	675	S106.008	61.765	675	
								S112.000	65.505	150	3215
								S113.000	65.505	150	3215
S264	66.705	5.296	Open Manhole	1500	S106.010	61.409	675	S106.009	61.409	675	
								S114.000	65.265	150	3331
								S115.000	65.265	150	3331
								S116.000	65.190	225	3331
S265	66.159	5.074	Open Manhole	1500	S106.011	61.085	675	S106.010	61.085	675	
								S117.000	64.840	150	3230
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Manhole Schedules for Surface water - SSR

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S118	50.750	4.674	Open Manhole	2100	S106.024	46.076	1200	S106.023	46.076	1200	
								S146.000	46.976	300	
								S147.000	46.976	300	
S64B/1	66.120	1.362	Junction		S179.000	64.758	150				
S64B	66.120	1.420	Open Manhole	1050	S179.001	64.700	150	S179.000	64.700	150	
S64A	65.560	1.420	Open Manhole	1050	S179.002	64.140	225	S179.001	64.373	150	158
								S180.000	64.215	150	
								S181.001	64.140	225	
S178	50.750	4.855	Open Manhole	2100	S106.025	45.895	1350	S106.024	46.040	1200	
								S148.014	46.010	1275	40
S123	48.339	2.653	Open Manhole	2100	S106.026	45.686	1350	S106.025	45.686	1350	
								S195.000	47.563	225	752
S126	44.752	2.551	Open Manhole	2100	S106.027	42.201	1350	S106.026	42.201	1350	
S129	40.628	2.542	Open Manhole	2100		OUTFALL		S106.027	38.086	1350	
S296	47.520	5.176	Open Manhole	1200	S197.000	42.344	225				
S299	43.242	6.432	Open Manhole	1200	S197.001	36.810	225	S197.000	36.810	225	
								S198.001	37.352	225	542

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

PIPELINE SCHEDULES for Surface water - SSR

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)
S96.000	o	225	S370	48.750	47.325	1.200	Open Manhole	1200
S96.001	o	225	S371	48.660	47.230	1.205	Open Manhole	1200
S97.000	o	225	S286	51.200	49.775	1.200	Open Manhole	1050
S96.002	o	225	S372	48.962	47.029	1.708	Open Manhole	1500
S96.003	o	225	S373	49.200	46.767	2.208	Open Manhole	1200
S98.000	o	225	S288	48.680	46.401	2.054	Junction	
S96.004	o	375	S375	48.550	46.180	1.995	Open Manhole	1500
S99.000	o	225	S291	48.380	45.443	2.712	Junction	
S96.005	o	375	S290	48.250	45.239	2.636	Open Manhole	1500
S96.006	o	375	S376	48.297	45.159	2.762	Open Manhole	1200
S100.000	o	225	S294	48.460	44.800	3.435	Junction	
S96.007	o	375	S377	48.500	44.340	3.785	Open Manhole	1350
S101.009	o	450	S297	58.018	53.530	4.038	Open Manhole	1350
S101.010	o	600	S329	52.362	46.677	5.085	Open Manhole	1500
S101.011	o	600	S315	51.650	45.865	5.185	Open Manhole	1500
S101.012	o	600	S345	49.805	45.076	4.129	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)
S96.000	14.219	150.0	S371	48.660	47.230	1.205	Open Manhole	1200
S96.001	30.193	150.0	S372	48.962	47.029	1.708	Open Manhole	1500
S97.000	59.574	21.7	S372	48.962	47.029	1.708	Open Manhole	1500
S96.002	39.508	150.6	S373	49.200	46.767	2.208	Open Manhole	1200
S96.003	63.682	145.9	S375	48.550	46.330	1.995	Open Manhole	1500
S98.000	10.594	150.0	S375	48.550	46.330	1.995	Open Manhole	1500
S96.004	79.064	84.0	S290	48.250	45.239	2.636	Open Manhole	1500
S99.000	8.161	150.0	S290	48.250	45.389	2.636	Open Manhole	1500
S96.005	6.653	84.0	S376	48.297	45.159	2.762	Open Manhole	1200
S96.006	69.343	84.6	S377	48.500	44.340	3.785	Open Manhole	1350
S100.000	10.641	150.0	S377	48.500	44.729	3.546	Open Manhole	1350
S96.007	11.731	84.6	S295	48.350	44.201	3.774	Open Manhole	1800
S101.009	75.835	11.3	S329	52.362	46.827	5.085	Open Manhole	1500
S101.010	10.770	13.3	S315	51.650	45.865	5.185	Open Manhole	1500
S101.011	27.605	35.0	S345	49.805	45.076	4.129	Open Manhole	1500
S101.012	37.770	33.7	S295	48.350	43.954	3.796	Open Manhole	1800

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

PIPELINE SCHEDULES for Surface water - SSR

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)
S96.008	o	675	S295	48.350	43.902	3.773	Open Manhole	1800
S96.009	o	675	S300	48.053	43.361	4.017	Open Manhole	1500
S106.005	o	675	S258	68.267	62.990	4.602	Open Manhole	1500
S106.006	o	675	S259	68.089	62.845	4.569	Open Manhole	1500
S106.007	o	675	S260	67.688	62.315	4.698	Open Manhole	1500
S106.008	o	675	S261	67.481	62.123	4.683	Open Manhole	1500
S106.009	o	675	S263	67.091	61.765	4.651	Open Manhole	1500
S106.010	o	675	S264	66.705	61.409	4.621	Open Manhole	1500
S106.011	o	675	S265	66.159	61.085	4.399	Open Manhole	1500
S106.012	o	675	S266	64.893	60.621	3.597	Open Manhole	1500
S106.013	o	675	S278	63.680	60.289	2.716	Open Manhole	1500
S123.000	o	150	S279	67.206	64.700	2.356	Open Manhole	1200
S123.001	o	225	S280	65.796	64.375	1.196	Open Manhole	1200
S123.002	o	225	S281	64.318	62.875	1.218	Open Manhole	1200
S123.003	o	300	S282	63.615	62.100	1.215	Open Manhole	1200
S123.004	o	300	S283	62.895	61.460	1.135	Open Manhole	1200
S106.014	o	675	S284	62.734	59.841	2.218	Open Manhole	1500
S106.015	o	675	S285	61.721	58.941	2.105	Open Manhole	1500
S106.016	o	675	S286	60.075	57.641	1.759	Open Manhole	1500
S106.017	o	675	S287	58.593	56.241	1.677	Open Manhole	1500
S106.018	o	675	S288	56.163	53.891	1.597	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)
S96.008	16.091	29.8	S300	48.053	43.361	4.017	Open Manhole	1500
S96.009	25.475	12.6	S	42.300	41.340	0.285	Open Manhole	0
S106.005	18.320	126.3	S259	68.089	62.845	4.569	Open Manhole	1500
S106.006	38.117	71.9	S260	67.688	62.315	4.698	Open Manhole	1500
S106.007	15.128	78.8	S261	67.481	62.123	4.683	Open Manhole	1500
S106.008	28.223	78.8	S263	67.091	61.765	4.651	Open Manhole	1500
S106.009	28.074	78.9	S264	66.705	61.409	4.621	Open Manhole	1500
S106.010	25.533	78.8	S265	66.159	61.085	4.399	Open Manhole	1500
S106.011	36.578	78.8	S266	64.893	60.621	3.597	Open Manhole	1500
S106.012	25.974	78.2	S278	63.680	60.289	2.716	Open Manhole	1500
S106.013	30.742	68.6	S284	62.734	59.841	2.218	Open Manhole	1500
S123.000	12.855	51.4	S280	65.796	64.450	1.196	Open Manhole	1200
S123.001	33.131	22.1	S281	64.318	62.875	1.218	Open Manhole	1200
S123.002	12.501	17.9	S282	63.615	62.175	1.215	Open Manhole	1200
S123.003	13.260	20.7	S283	62.895	61.460	1.135	Open Manhole	1200
S123.004	15.168	12.2	S284	62.734	60.216	2.218	Open Manhole	1500
S106.014	23.870	26.5	S285	61.721	58.941	2.105	Open Manhole	1500
S106.015	23.754	18.3	S286	60.075	57.641	1.759	Open Manhole	1500
S106.016	21.127	15.1	S287	58.593	56.241	1.677	Open Manhole	1500
S106.017	34.731	14.8	S288	56.163	53.891	1.597	Open Manhole	1500
S106.018	17.557	14.6	S289	54.919	52.691	1.553	Open Manhole	1500

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

PIPELINE SCHEDULES for Surface water - SSR

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)
S106.019	o	675	S289	54.919	52.691	1.553	Open Manhole	1500
S106.020	o	750	S291	52.124	49.775	1.599	Open Manhole	1800
S106.021	o	900	S115	50.147	47.000	2.247	Open Manhole	1800
S106.022	o	1200	S116	49.389	46.295	1.894	Open Manhole	2100
S106.023	o	1200	S117	50.115	46.218	2.697	Open Manhole	2100
S106.024	o	1200	S118	50.750	46.076	3.474	Open Manhole	2100
S179.000	o	150	S64B/1	66.120	64.758	1.212	Junction	
S179.001	o	150	S64B	66.120	64.700	1.270	Open Manhole	1050
S179.002	o	225	S64A	65.560	64.140	1.195	Open Manhole	1050
S106.025	o	1350	S178	50.750	45.895	3.505	Open Manhole	2100
S106.026	o	1350	S123	48.339	45.686	1.303	Open Manhole	2100
S106.027	o	1350	S126	44.752	42.201	1.201	Open Manhole	2100
S197.000	o	225	S296	47.520	42.344	4.951	Open Manhole	1200
S197.001	o	225	S299	43.242	36.810	6.207	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)
S106.019	39.780	14.0	S291	52.124	49.850	1.599	Open Manhole	1800
S106.020	34.202	13.0	S115	50.147	47.150	2.247	Open Manhole	1800
S106.021	41.685	102.9	S116	49.389	46.595	1.894	Open Manhole	2100
S106.022	26.903	349.4	S117	50.115	46.218	2.697	Open Manhole	2100
S106.023	49.648	349.6	S118	50.750	46.076	3.474	Open Manhole	2100
S106.024	12.135	337.1	S178	50.750	46.040	3.510	Open Manhole	2100
S179.000	5.781	99.7	S64B	66.120	64.700	1.270	Open Manhole	1050
S179.001	54.737	167.2	S64A	65.560	64.373	1.037	Open Manhole	1050
S179.002	44.296	103.0	S64	65.194	63.710	1.259	Open Manhole	1200
S106.025	56.349	270.0	S123	48.339	45.686	1.303	Open Manhole	2100
S106.026	49.846	14.3	S126	44.752	42.201	1.201	Open Manhole	2100
S106.027	39.232	9.5	S129	40.628	38.086	1.192	Open Manhole	2100
S197.000	74.811	13.5	S299	43.242	36.810	6.207	Open Manhole	1200
S197.001	25.440	14.0	S365	37.965	34.993	2.747	Open Manhole	1200

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51	Designed by AGV	
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Innovyze	Network 2018.1.1	

Area Summary for Surface water - SSR

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
96.000	Classification	Grass	15	0.008	0.001	0.001
	Classification	Highways	100	0.025	0.025	0.026
	Classification	Grass	15	0.002	0.000	0.026
96.001	Classification	Highways	100	0.032	0.032	0.032
	Classification	Grass	15	0.008	0.001	0.034
	Classification	Grass	15	0.002	0.000	0.034
97.000	Classification	Highways	100	0.044	0.044	0.044
96.002	Classification	Highways	100	0.043	0.043	0.043
	Classification	Grass	15	0.009	0.001	0.045
96.003	Classification	Default	100	0.084	0.084	0.084
	Classification	Grass	15	0.018	0.003	0.087
	Classification	Highways	100	0.011	0.011	0.098
	Classification	Grass	15	0.003	0.000	0.098
98.000	As Zoned	Default	100	0.001	0.001	0.001
		Residential	65	0.310	0.201	0.202
		Grass	15	0.070	0.011	0.213
96.004	Classification	Highways	100	0.013	0.013	0.013
	Classification	Grass	15	0.003	0.001	0.014
	Classification	Grass	15	0.000	0.000	0.014
	Classification	Grass	15	0.001	0.000	0.014
	Classification	Grass	15	0.004	0.001	0.014
	Classification	Grass	15	0.021	0.003	0.017
	Classification	Highways	100	0.090	0.090	0.107
	Classification	Grass	15	0.001	0.000	0.107
99.000	As Zoned	Default	100	0.003	0.003	0.003
		Residential	65	0.369	0.240	0.243
		Grass	15	0.210	0.031	0.273
96.005	Classification	Highways	100	0.009	0.009	0.009
	Classification	Grass	15	0.003	0.000	0.009
	Classification	Grass	15	0.001	0.000	0.009
	Classification	Highways	100	0.090	0.090	0.099
	Classification	Grass	15	0.002	0.000	0.099
	Classification	Grass	15	0.006	0.001	0.100
	Classification	Grass	15	0.024	0.004	0.104
	Classification	Grass	15	0.004	0.001	0.104
	Classification	Grass	15	0.005	0.001	0.105
96.006	-	-	100	0.000	0.000	0.000
100.000	-	-	100	0.000	0.000	0.000
96.007	-	-	100	0.000	0.000	0.000
101.009	As Zoned	Default	100	0.004	0.004	0.004
		Highways	100	0.050	0.050	0.054
		Residential	65	0.114	0.074	0.128
101.010	User	-	76	0.271	0.206	0.206
101.011	-	-	100	0.000	0.000	0.000
101.012	As Zoned	Default	100	0.008	0.008	0.008
		Highways	100	0.043	0.043	0.050
		Residential	65	0.003	0.002	0.052
		Grass	15	0.051	0.008	0.060
96.008	Classification	Highways	100	0.018	0.018	0.018
	As Zoned	Highways	100	0.012	0.012	0.030
		Residential	65	0.013	0.008	0.021
	As Zoned	Default	100	0.012	0.012	0.050
		Highways	100	0.029	0.029	0.079
		Residential	65	0.102	0.067	0.145
		Grass	15	0.066	0.010	0.156
96.009	-	-	100	0.000	0.000	0.000
106.005	As Zoned	Default	100	0.008	0.008	0.008
		Highways	100	0.022	0.022	0.029

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Innovyze	Network 2018.1.1	

Area Summary for Surface water - SSR

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
		Residential	65	0.042	0.027	0.056
	As Zoned	Default	100	0.003	0.003	0.059
		Highways	100	0.018	0.018	0.077
		Residential	65	0.122	0.079	0.156
106.006	-	-	100	0.040	0.040	0.040
106.007	As Zoned	Highways	100	0.036	0.036	0.036
	As Zoned	Highways	100	0.000	0.000	0.036
		Residential	65	0.084	0.054	0.090
106.008	As Zoned	Highways	100	0.016	0.016	0.016
		Residential	65	0.000	0.000	0.016
106.009	User	-	100	0.032	0.032	0.032
106.010	User	-	100	0.029	0.029	0.029
106.011	User	-	100	0.030	0.030	0.030
106.012	User	-	100	0.042	0.042	0.042
106.013	User	-	100	0.035	0.035	0.035
123.000	-	-	100	0.039	0.039	0.039
123.001	-	-	100	0.039	0.039	0.039
123.002	-	-	100	0.086	0.086	0.086
123.003	-	-	100	0.000	0.000	0.000
123.004	-	-	100	0.000	0.000	0.000
106.014	User	-	100	0.037	0.037	0.037
106.015	User	-	100	0.026	0.026	0.026
106.016	User	-	100	0.025	0.025	0.025
	As Zoned	Highways	100	0.000	0.000	0.025
		Residential	65	0.091	0.059	0.084
106.017	User	-	100	0.021	0.021	0.021
106.018	User	-	100	0.032	0.032	0.032
106.019	User	-	100	0.017	0.017	0.017
106.020	User	-	100	0.039	0.039	0.039
106.021	User	-	100	0.036	0.036	0.036
106.022	User	-	100	0.096	0.096	0.096
106.023	-	-	100	0.110	0.110	0.110
106.024	-	-	100	0.167	0.167	0.167
179.000	-	-	100	0.048	0.048	0.048
179.001	-	-	100	0.065	0.065	0.065
179.002	-	-	100	0.036	0.036	0.036
106.025	-	-	100	0.071	0.071	0.071
106.026	-	-	100	0.062	0.062	0.062
106.027	-	-	100	1.786	1.786	1.786
197.000	-	-	100	0.000	0.000	0.000
197.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				5.807	4.863	4.863

Free Flowing Outfall Details for Surface water - SSR

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S96.009	S	42.300	41.340	0.000	0	0

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
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Innovyze	Network 2018.1.1	

Free Flowing Outfall Details for Surface water - SSR

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S106.027	S129	40.628	38.086	0.000	2100	0
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Simulation Criteria for Surface water - SSR

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	15
Ratio R	0.256		

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Innovyze	Network 2018.1.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
Region England and Wales Ratio R 0.253 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 1, 5, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S96.000	S370	15 Winter	1	+1%	100/15 Summer				47.367
S96.001	S371	15 Winter	1	+1%	30/15 Winter	100/15 Summer			47.289
S97.000	S286	15 Winter	1	+1%					49.806
S96.002	S372	15 Winter	1	+1%	30/15 Summer	100/15 Summer			47.124
S96.003	S373	15 Winter	1	+1%	30/15 Summer				46.888
S98.000	S288	15 Winter	1	+1%					46.531
S96.004	S375	15 Winter	1	+1%	100/15 Summer	100/15 Summer			46.311
S99.000	S291	15 Winter	1	+1%					45.613
S96.005	S290	15 Winter	1	+1%	30/15 Summer	100/15 Winter			45.500
S96.006	S376	15 Winter	1	+1%	30/15 Summer				45.333
S100.000	S294	360 Winter	1	+1%					44.800
S96.007	S377	15 Winter	1	+1%	30/15 Summer				44.553
S101.009	S297	15 Winter	1	+1%	100/15 Summer	100/15 Winter			53.688
S101.010	S329	15 Winter	1	+1%	30/15 Summer				46.941
S101.011	S315	15 Winter	1	+1%	30/15 Summer				46.160
S101.012	S345	15 Winter	1	+1%	30/15 Summer				45.353
S96.008	S295	15 Winter	1	+1%	30/15 Summer				44.270
S96.009	S300	15 Winter	1	+1%					43.612
S106.005	S258	15 Winter	1	+1%	30/15 Summer				63.416
S106.006	S259	15 Winter	1	+1%	30/15 Summer				63.135
S106.007	S260	15 Winter	1	+1%	30/15 Summer				62.718
S106.008	S261	15 Winter	1	+1%	30/15 Summer				62.458
S106.009	S263	15 Winter	1	+1%	30/15 Summer				62.110
S106.010	S264	15 Winter	1	+1%	30/15 Summer				61.771
S106.011	S265	15 Winter	1	+1%	30/15 Summer				61.419
S106.012	S266	15 Winter	1	+1%	30/15 Summer				61.001
S106.013	S278	15 Winter	1	+1%	30/15 Summer				60.665
S123.000	S279	15 Winter	1	+1%	100/15 Summer				64.744
S123.001	S280	15 Winter	1	+1%	100/15 Summer	100/15 Summer			64.465

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Innovyze	Network 2018.1.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
		Depth (m)	Volume (m³)			Flow (l/s)		Exceeded
S96.000	S370	-0.183	0.000	0.08		2.9	OK	5
S96.001	S371	-0.166	0.000	0.15		6.0	OK	
S97.000	S286	-0.194	0.000	0.04		4.8	OK	
S96.002	S372	-0.130	0.000	0.36		14.6	OK	3
S96.003	S373	-0.103	0.000	0.56		23.4	OK	
S98.000	S288	-0.095	0.000	0.62		23.4	OK*	4
S96.004	S375	-0.244	0.000	0.26		53.1	OK	
S99.000	S291	-0.055	0.000	0.91		29.9	OK*	
S96.005	S290	-0.114	0.000	0.81		89.6	OK	3
S96.006	S376	-0.201	0.000	0.44		89.4	OK	
S100.000	S294	-0.225	0.000	0.00		0.0	OK*	3
S96.007	S377	-0.162	0.000	0.61		88.7	OK	
S101.009	S297	-0.292	0.000	0.27		239.8	OK	
S101.010	S329	-0.336	0.000	0.40		357.3	OK	3
S101.011	S315	-0.305	0.000	0.48		428.7	OK	
S101.012	S345	-0.323	0.000	0.43		435.5	OK	
S96.008	S295	-0.307	0.000	0.58		537.4	OK	3
S96.009	S300	-0.425	0.000	0.30		536.4	OK	
S106.005	S258	-0.249	0.000	0.71		343.6	OK	
S106.006	S259	-0.385	0.000	0.38		349.1	OK	3
S106.007	S260	-0.272	0.000	0.66		368.2	OK	
S106.008	S261	-0.340	0.000	0.50		375.8	OK	
S106.009	S263	-0.330	0.000	0.51		388.7	OK	3
S106.010	S264	-0.313	0.000	0.56		400.9	OK	
S106.011	S265	-0.341	0.000	0.49		420.7	OK	
S106.012	S266	-0.295	0.000	0.60		441.5	OK	3
S106.013	S278	-0.299	0.000	0.60		507.1	OK	
S123.000	S279	-0.106	0.000	0.19		4.3	OK	
S123.001	S280	-0.135	0.000	0.33		34.6	OK	4

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
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Innovyze	Network 2018.1.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S123.002	S281	15 Winter	1	+1%	30/15 Summer	100/15 Summer			62.986
S123.003	S282	15 Winter	1	+1%	100/15 Summer				62.220
S123.004	S283	15 Winter	1	+1%	100/15 Summer				61.562
S106.014	S284	15 Winter	1	+1%	30/15 Winter				60.166
S106.015	S285	15 Winter	1	+1%	100/15 Summer				59.233
S106.016	S286	15 Winter	1	+1%	100/15 Summer				57.930
S106.017	S287	15 Winter	1	+1%					56.493
S106.018	S288	15 Winter	1	+1%	100/15 Summer				54.198
S106.019	S289	15 Winter	1	+1%					52.936
S106.020	S291	15 Winter	1	+1%	100/15 Summer				50.044
S106.021	S115	15 Winter	1	+1%	30/15 Summer				47.455
S106.022	S116	15 Winter	1	+1%	30/15 Summer				46.944
S106.023	S117	15 Winter	1	+1%	30/15 Winter				46.880
S106.024	S118	15 Winter	1	+1%	30/15 Summer				46.798
S179.000	S64B/1	15 Winter	1	+1%					64.823
S179.001	S64B	15 Winter	1	+1%	30/15 Summer	100/15 Summer			64.807
S179.002	S64A	15 Winter	1	+1%	30/15 Summer				64.239
S106.025	S178	15 Winter	1	+1%	30/15 Winter				46.564
S106.026	S123	15 Winter	1	+1%					46.017
S106.027	S126	15 Winter	1	+1%					42.530
S197.000	S296	360 Winter	1	+1%					42.344
S197.001	S299	15 Winter	1	+1%					36.871

PN	US/MH Name	Surcharged		Flooded		Pipe		Level	
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded	
S123.002	S281	-0.114	0.000	0.48		50.7	OK		4
S123.003	S282	-0.180	0.000	0.33		66.5	OK		
S123.004	S283	-0.198	0.000	0.25		67.0	OK		
S106.014	S284	-0.350	0.000	0.47		566.1	OK		
S106.015	S285	-0.383	0.000	0.39		566.7	OK		
S106.016	S286	-0.386	0.000	0.38		570.5	OK		
S106.017	S287	-0.423	0.000	0.29		573.1	OK		
S106.018	S288	-0.368	0.000	0.42		586.1	OK		
S106.019	S289	-0.430	0.000	0.28		594.2	OK		
S106.020	S291	-0.481	0.000	0.28		704.2	OK		
S106.021	S115	-0.445	0.000	0.50		724.0	OK		
S106.022	S116	-0.551	0.000	0.49		722.8	OK		
S106.023	S117	-0.538	0.000	0.42		727.2	OK		
S106.024	S118	-0.478	0.000	0.67		727.7	OK		
S179.000	S64B/1	-0.085	0.000	0.35		5.2	OK*		
S179.001	S64B	-0.043	0.000	0.84		11.2	OK		6
S179.002	S64A	-0.126	0.000	0.39		19.1	OK		
S106.025	S178	-0.681	0.000	0.49		1287.0	OK		
S106.026	S123	-1.019	0.000	0.14		1296.0	OK		
S106.027	S126	-1.020	0.000	0.13		1380.2	OK		
S197.000	S296	-0.225	0.000	0.00		0.0	OK		
S197.001	S299	-0.164	0.000	0.16		21.2	OK		

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
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Innovyze	Network 2018.1.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 Hot Start Level (mm) 0 Inlet Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.253 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 1, 5, 40

										Water Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)
S96.000	S370	15 Winter	30	+5%	100/15 Summer				47.482	-0.068
S96.001	S371	15 Winter	30	+5%	30/15 Winter	100/15 Summer			47.471	0.016
S97.000	S286	15 Winter	30	+5%					49.826	-0.174
S96.002	S372	15 Winter	30	+5%	30/15 Summer	100/15 Summer			47.440	0.186
S96.003	S373	15 Winter	30	+5%	30/15 Summer				47.275	0.283
S98.000	S288	30 Winter	30	+5%					46.626	0.000
S96.004	S375	15 Winter	30	+5%	100/15 Summer	100/15 Summer			46.538	-0.017
S99.000	S291	60 Winter	30	+5%					45.668	0.000
S96.005	S290	15 Winter	30	+5%	30/15 Summer	100/15 Winter			46.267	0.653
S96.006	S376	15 Winter	30	+5%	30/15 Summer				46.038	0.504
S100.000	S294	30 Winter	30	+5%					45.025	0.000
S96.007	S377	15 Winter	30	+5%	30/15 Summer				45.361	0.646
S101.009	S297	15 Winter	30	+5%	100/15 Summer	100/15 Winter			53.825	-0.155
S101.010	S329	15 Winter	30	+5%	30/15 Summer				48.686	1.409
S101.011	S315	15 Winter	30	+5%	30/15 Summer				47.793	1.328
S101.012	S345	15 Winter	30	+5%	30/15 Summer				46.535	0.859
S96.008	S295	15 Winter	30	+5%	30/15 Summer				45.126	0.549
S96.009	S300	15 Winter	30	+5%					43.796	-0.240
S106.005	S258	15 Winter	30	+5%	30/15 Summer				65.325	1.660
S106.006	S259	15 Winter	30	+5%	30/15 Summer				64.917	1.397
S106.007	S260	15 Winter	30	+5%	30/15 Summer				64.491	1.501
S106.008	S261	15 Winter	30	+5%	30/15 Summer				64.041	1.243
S106.009	S263	15 Winter	30	+5%	30/15 Summer				63.572	1.132
S106.010	S264	15 Winter	30	+5%	30/15 Summer				63.072	0.988
S106.011	S265	15 Winter	30	+5%	30/15 Summer				62.555	0.795
S106.012	S266	15 Winter	30	+5%	30/15 Summer				61.998	0.702
S106.013	S278	15 Winter	30	+5%	30/15 Summer				61.389	0.425
S123.000	S279	15 Winter	30	+5%	100/15 Summer				64.774	-0.076
S123.001	S280	15 Winter	30	+5%	100/15 Summer	100/15 Summer			64.549	-0.051

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)			
S96.000	S370	0.000	0.19	7.1	OK		
S96.001	S371	0.000	0.38	15.0	SURCHARGED		5
S97.000	S286	0.000	0.11	12.2	OK		
S96.002	S372	0.000	0.85	34.2	SURCHARGED		3
S96.003	S373	0.000	1.25	52.1	SURCHARGED		
S98.000	S288	0.000	1.33	49.8	SURCHARGED*		
S96.004	S375	0.000	0.63	130.8	OK		4
S99.000	S291	0.000	1.37	45.1	SURCHARGED*		
S96.005	S290	0.000	1.78	195.8	SURCHARGED		3
S96.006	S376	0.000	0.92	189.7	SURCHARGED		
S100.000	S294	0.000	0.08	2.9	SURCHARGED*		
S96.007	S377	0.000	1.59	231.4	SURCHARGED		
S101.009	S297	0.000	0.74	671.0	OK		3
S101.010	S329	0.000	1.05	950.4	SURCHARGED		
S101.011	S315	0.000	1.26	1121.5	SURCHARGED		
S101.012	S345	0.000	1.13	1133.1	SURCHARGED		
S96.008	S295	0.000	1.43	1333.1	SURCHARGED		
S96.009	S300	0.000	0.74	1335.0	OK		
S106.005	S258	0.000	1.71	823.9	SURCHARGED		
S106.006	S259	0.000	0.90	821.1	SURCHARGED		
S106.007	S260	0.000	1.54	856.7	SURCHARGED		
S106.008	S261	0.000	1.14	862.2	SURCHARGED		
S106.009	S263	0.000	1.17	887.0	SURCHARGED		
S106.010	S264	0.000	1.26	907.9	SURCHARGED		
S106.011	S265	0.000	1.10	950.0	SURCHARGED		
S106.012	S266	0.000	1.36	995.5	SURCHARGED		
S106.013	S278	0.000	1.33	1129.0	SURCHARGED		
S123.000	S279	0.000	0.48	10.8	OK		
S123.001	S280	0.000	0.85	88.5	OK		4

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S123.002	S281	15 Winter	30	+5%	30/15 Summer	100/15 Summer			63.458
S123.003	S282	15 Winter	30	+5%	100/15 Summer				62.312
S123.004	S283	15 Winter	30	+5%	100/15 Summer				61.633
S106.014	S284	15 Winter	30	+5%	30/15 Winter				60.605
S106.015	S285	15 Winter	30	+5%	100/15 Summer				59.437
S106.016	S286	15 Winter	30	+5%	100/15 Summer				58.126
S106.017	S287	15 Winter	30	+5%					56.645
S106.018	S288	15 Winter	30	+5%	100/15 Summer				54.406
S106.019	S289	15 Winter	30	+5%					53.081
S106.020	S291	15 Winter	30	+5%	100/15 Summer				50.205
S106.021	S115	15 Winter	30	+5%	30/15 Summer				48.102
S106.022	S116	15 Winter	30	+5%	30/15 Summer				47.602
S106.023	S117	15 Winter	30	+5%	30/15 Winter				47.513
S106.024	S118	30 Winter	30	+5%	30/15 Summer				47.383
S179.000	S64B/1	60 Winter	30	+5%					64.908
S179.001	S64B	15 Winter	30	+5%	30/15 Summer	100/15 Summer			65.776
S179.002	S64A	15 Winter	30	+5%	30/15 Summer				64.484
S106.025	S178	30 Winter	30	+5%	30/15 Winter				47.308
S106.026	S123	30 Winter	30	+5%					46.202
S106.027	S126	30 Winter	30	+5%					42.718
S197.000	S296	360 Winter	30	+5%					42.344
S197.001	S299	15 Winter	30	+5%					36.915

PN	US/MH Name	Surcharged		Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)			
S123.002	S281	0.358	0.000	1.23		130.9		SURCHARGED	4
S123.003	S282	-0.088	0.000	0.84		169.1		OK	
S123.004	S283	-0.127	0.000	0.63		168.8		OK	
S106.014	S284	0.089	0.000	1.05		1260.8		SURCHARGED	
S106.015	S285	-0.179	0.000	0.88		1271.4		OK	
S106.016	S286	-0.190	0.000	0.85		1282.4		OK	
S106.017	S287	-0.271	0.000	0.66		1291.3		OK	
S106.018	S288	-0.160	0.000	0.94		1308.3		OK	
S106.019	S289	-0.285	0.000	0.63		1314.2		OK	
S106.020	S291	-0.320	0.000	0.62		1585.1		OK	
S106.021	S115	0.202	0.000	1.12		1608.0		SURCHARGED	
S106.022	S116	0.107	0.000	1.08		1598.9		SURCHARGED	
S106.023	S117	0.095	0.000	0.95		1628.6		SURCHARGED	
S106.024	S118	0.107	0.000	1.51		1639.9		SURCHARGED	
S179.000	S64B/1	0.000	0.000	0.52		7.8		SURCHARGED*	
S179.001	S64B	0.926	0.000	1.91		25.5		SURCHARGED	6
S179.002	S64A	0.119	0.000	0.81		39.5		SURCHARGED	
S106.025	S178	0.063	0.000	1.11		2938.7		SURCHARGED	
S106.026	S123	-0.834	0.000	0.31		2960.7		OK	
S106.027	S126	-0.833	0.000	0.31		3205.4		OK	
S197.000	S296	-0.225	0.000	0.00		0.0		OK	
S197.001	S299	-0.120	0.000	0.44		57.2		OK	

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 Hot Start Level (mm) 0 Inlet Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.253 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 1, 5, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S96.000	S370	15 Winter	100	+40%	100/15 Summer				48.748
S96.001	S371	30 Winter	100	+40%	30/15 Winter	100/15 Summer			48.673
S97.000	S286	15 Winter	100	+40%					49.843
S96.002	S372	15 Winter	100	+40%	30/15 Summer	100/15 Summer			48.963
S96.003	S373	15 Summer	100	+40%	30/15 Summer				49.055
S98.000	S288	120 Winter	100	+40%					46.626
S96.004	S375	15 Winter	100	+40%	100/15 Summer	100/15 Summer			48.556
S99.000	S291	180 Winter	100	+40%					45.668
S96.005	S290	15 Winter	100	+40%	30/15 Summer	100/15 Winter			48.251
S96.006	S376	15 Winter	100	+40%	30/15 Summer				47.808
S100.000	S294	15 Winter	100	+40%					45.025
S96.007	S377	30 Summer	100	+40%	30/15 Summer				46.464
S101.009	S297	15 Winter	100	+40%	100/15 Summer	100/15 Winter			58.025
S101.010	S329	15 Winter	100	+40%	30/15 Summer				52.311
S101.011	S315	15 Winter	100	+40%	30/15 Summer				50.630
S101.012	S345	15 Winter	100	+40%	30/15 Summer				48.491
S96.008	S295	15 Winter	100	+40%	30/15 Summer				46.026
S96.009	S300	15 Winter	100	+40%					43.901
S106.005	S258	30 Summer	100	+40%	30/15 Summer				67.149
S106.006	S259	15 Winter	100	+40%	30/15 Summer				66.835
S106.007	S260	15 Winter	100	+40%	30/15 Summer				66.527
S106.008	S261	15 Winter	100	+40%	30/15 Summer				66.119
S106.009	S263	15 Winter	100	+40%	30/15 Summer				65.670
S106.010	S264	15 Winter	100	+40%	30/15 Summer				65.100
S106.011	S265	15 Winter	100	+40%	30/15 Summer				64.426
S106.012	S266	15 Winter	100	+40%	30/15 Summer				63.595
S106.013	S278	30 Summer	100	+40%	30/15 Summer				62.634
S123.000	S279	15 Winter	100	+40%	100/15 Summer				65.963
S123.001	S280	15 Winter	100	+40%	100/15 Summer	100/15 Summer			65.800

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
S96.000	S370	1.198	0.000	0.35		12.9	FLOOD RISK	
S96.001	S371	1.218	13.673	1.32		52.1	FLOOD	5
S97.000	S286	-0.157	0.000	0.19		20.9	OK	
S96.002	S372	1.709	0.910	1.53		61.5	FLOOD	3
S96.003	S373	2.063	0.000	1.50		62.2	FLOOD RISK	
S98.000	S288	0.000	0.000	1.11		41.7	SURCHARGED*	
S96.004	S375	2.000	6.145	0.72		149.5	FLOOD	4
S99.000	S291	0.000	0.000	1.26		41.4	SURCHARGED*	
S96.005	S290	2.638	1.347	2.48		273.3	FLOOD	3
S96.006	S376	2.274	0.000	1.28		263.5	SURCHARGED	
S100.000	S294	0.000	0.000	0.13		4.9	SURCHARGED*	
S96.007	S377	1.750	0.000	1.81		263.9	SURCHARGED	
S101.009	S297	4.045	7.223	0.98		882.9	FLOOD	3
S101.010	S329	5.034	0.000	1.43		1290.5	FLOOD RISK	
S101.011	S315	4.165	0.000	1.65		1464.3	SURCHARGED	
S101.012	S345	2.815	0.000	1.48		1484.3	SURCHARGED	
S96.008	S295	1.449	0.000	1.92		1792.4	SURCHARGED	
S96.009	S300	-0.136	0.000	0.99		1787.0	OK	
S106.005	S258	3.484	0.000	1.93		933.0	SURCHARGED	
S106.006	S259	3.315	0.000	1.05		957.9	SURCHARGED	
S106.007	S260	3.537	0.000	1.74		967.2	SURCHARGED	
S106.008	S261	3.321	0.000	1.28		973.4	SURCHARGED	
S106.009	S263	3.230	0.000	1.30		987.5	SURCHARGED	
S106.010	S264	3.016	0.000	1.42		1024.1	SURCHARGED	
S106.011	S265	2.666	0.000	1.31		1130.9	SURCHARGED	
S106.012	S266	2.299	0.000	1.70		1239.6	SURCHARGED	
S106.013	S278	1.670	0.000	1.59		1346.2	SURCHARGED	
S123.000	S279	1.113	0.000	0.94		21.4	SURCHARGED	
S123.001	S280	1.200	4.436	1.07		112.0	FLOOD	4

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	Coed Darcy Road 1,50,80 Temp. SW	
Date 24/10/2019 10:51 File 1. COED DARCY - OVERALL TEMPO...	Designed by AGV Checked by NL	
Innovyze	Network 2018.1.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface water - SSR

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S123.002	S281	15 Winter	100	+40%	30/15 Summer	100/15 Summer			64.319
S123.003	S282	15 Winter	100	+40%	100/15 Summer				62.898
S123.004	S283	15 Winter	100	+40%	100/15 Summer				62.255
S106.014	S284	15 Winter	100	+40%	30/15 Winter				61.556
S106.015	S285	15 Winter	100	+40%	100/15 Summer				60.043
S106.016	S286	15 Winter	100	+40%	100/15 Summer				58.485
S106.017	S287	30 Winter	100	+40%					56.718
S106.018	S288	30 Winter	100	+40%	100/15 Summer				55.088
S106.019	S289	30 Winter	100	+40%					53.256
S106.020	S291	30 Winter	100	+40%	100/15 Summer				51.380
S106.021	S115	30 Winter	100	+40%	30/15 Summer				49.609
S106.022	S116	30 Winter	100	+40%	30/15 Summer				48.682
S106.023	S117	30 Winter	100	+40%	30/15 Winter				48.383
S106.024	S118	30 Winter	100	+40%	30/15 Summer				48.053
S179.000	S64B/1	180 Winter	100	+40%					64.908
S179.001	S64B	30 Winter	100	+40%	30/15 Summer	100/15 Summer			66.127
S179.002	S64A	30 Winter	100	+40%	30/15 Summer				65.518
S106.025	S178	30 Winter	100	+40%	30/15 Winter				47.715
S106.026	S123	30 Winter	100	+40%					46.333
S106.027	S126	30 Winter	100	+40%					42.861
S197.000	S296	360 Winter	100	+40%					42.344
S197.001	S299	15 Winter	100	+40%					36.952

PN	US/MH Name	Surcharged		Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)			
S123.002	S281	1.219	1.081	1.53		163.2		FLOOD	4
S123.003	S282	0.498	0.000	1.09		217.7		SURCHARGED	
S123.004	S283	0.495	0.000	0.80		216.0		SURCHARGED	
S106.014	S284	1.040	0.000	1.31		1580.7		SURCHARGED	
S106.015	S285	0.427	0.000	1.09		1573.4		SURCHARGED	
S106.016	S286	0.169	0.000	1.07		1598.1		SURCHARGED	
S106.017	S287	-0.198	0.000	0.83		1612.4		OK	
S106.018	S288	0.522	0.000	1.21		1675.4		SURCHARGED	
S106.019	S289	-0.110	0.000	0.81		1701.2		OK	
S106.020	S291	0.855	0.000	0.82		2080.7		SURCHARGED	
S106.021	S115	1.709	0.000	1.51		2170.0		SURCHARGED	
S106.022	S116	1.187	0.000	1.48		2191.9		SURCHARGED	
S106.023	S117	0.965	0.000	1.33		2285.6		SURCHARGED	
S106.024	S118	0.777	0.000	2.13		2321.4		SURCHARGED	
S179.000	S64B/1	0.000	0.000	0.48		7.2		SURCHARGED*	
S179.001	S64B	1.277	7.069	2.03		27.2		FLOOD	6
S179.002	S64A	1.153	0.000	0.86		42.2		FLOOD RISK	
S106.025	S178	0.470	0.000	1.65		4362.3		SURCHARGED	
S106.026	S123	-0.703	0.000	0.47		4414.8		OK	
S106.027	S126	-0.689	0.000	0.48		4918.7		OK	
S197.000	S296	-0.225	0.000	0.00		0.0		OK	
S197.001	S299	-0.083	0.000	0.72		93.4		OK	

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Woodcote Grove Ashley Road Epsom Surrey KT18 5BW	
Date 21/02/2019 18:09 File COED DARCY - FW AND SW D...	Designed by GUTI7531 Checked by
XP Solutions	Network 2017.1.2



FOUL SEWERAGE DESIGN

Design Criteria for RD 90 FWS 130730.FWS

Pipe Sizes RD 90 FWS 130730 Manhole Sizes RD 90 FWS 130730

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	225.00	Maximum Backdrop Height (m)	0.000
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.900
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	300

Designed with Level Soffits

Network Design Table for RD 90 FWS 130730.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.003	19.164	0.230	83.3	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.004	38.021	0.525	72.4	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.005	16.261	0.185	87.9	0.000	15	0.0	1.500	o	300	Pipe/Conduit	
F1.006	24.979	0.270	92.5	0.000	20	0.0	1.500	o	300	Pipe/Conduit	
F1.007	30.853	0.330	93.5	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.008	25.363	0.550	46.1	0.000	10	0.0	1.500	o	300	Pipe/Conduit	
F1.009	36.449	1.370	26.6	0.000	18	0.0	1.500	o	300	Pipe/Conduit	
F1.010	23.353	1.120	20.9	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F3.000	20.466	1.000	20.5	0.000	31	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.003	65.600	0.000	42.6	165	0.0	144	1.50	1.52	107.4	50.3
F1.004	65.370	0.000	42.6	165	0.0	139	1.58	1.63	115.3	50.3
F1.005	64.845	0.000	42.6	180	0.0	148	1.47	1.48	104.6	51.0
F1.006	64.660	0.000	42.6	200	0.0	152	1.45	1.44	101.9	52.0
F1.007	64.390	0.000	42.6	200	0.0	152	1.44	1.43	101.4	52.0
F1.008	64.060	0.000	42.6	210	0.0	125	1.88	2.04	144.5	52.4
F1.009	63.510	0.000	42.6	228	0.0	108	2.32	2.69	190.4	53.3
F1.010	62.140	0.000	42.6	228	0.0	102	2.53	3.04	215.1	53.3
F3.000	60.660	0.000	0.0	31	0.0	21	0.95	1.94	34.3	1.5

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Network Design Table for RD 90 FWS 130730.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.011	33.700	0.460	73.3	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F4.000	32.403	1.400	23.1	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F4.001	10.155	0.475	21.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F4.002	14.972	1.000	15.0	0.000	12	0.0	1.500	o	150	Pipe/Conduit	
F4.003	14.143	1.425	9.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.012	24.414	0.950	25.7	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.013	20.095	1.150	17.5	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.014	24.307	1.600	15.2	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.015	34.914	2.350	14.9	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.016	17.031	1.200	14.2	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.017	38.359	2.750	13.9	0.000	16	0.0	1.500	o	300	Pipe/Conduit	
F5.000	48.042	2.000	24.0	0.000	75	1.0	1.500	o	150	Pipe/Conduit	
F1.018	33.785	2.800	12.1	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F1.019	41.312	0.480	86.1	0.000	34	0.0	1.500	o	300	Pipe/Conduit	
F6.000	16.767	0.215	78.0	0.000	9	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.011	59.510	0.000	42.6	259	0.0	146	1.60	1.62	114.6	54.7
F4.000	63.500	0.000	0.0	10	0.0	13	0.64	1.83	32.3	0.5
F4.001	62.100	0.000	0.0	10	0.0	13	0.65	1.90	33.6	0.5
F4.002	61.625	0.000	0.0	22	0.0	17	0.95	2.27	40.1	1.0
F4.003	60.625	0.000	0.0	22	0.0	15	1.09	2.79	49.3	1.0
F1.012	59.050	0.000	42.6	281	0.0	110	2.37	2.74	193.7	55.8
F1.013	58.100	0.000	42.6	281	0.0	99	2.73	3.33	235.0	55.8
F1.014	56.950	0.000	42.6	281	0.0	96	2.87	3.57	252.1	55.8
F1.015	55.350	0.000	42.6	281	0.0	95	2.90	3.61	254.9	55.8
F1.016	53.000	0.000	42.6	281	0.0	94	2.94	3.69	260.8	55.8
F1.017	51.800	0.000	42.6	297	0.0	94	2.97	3.72	263.1	56.5
F5.000	51.200	0.000	1.0	75	0.0	38	1.27	1.79	31.7	4.5
F1.018	49.050	0.000	43.6	372	0.0	95	3.20	4.00	282.9	61.0
F1.019	46.250	0.000	43.6	406	0.0	166	1.56	1.50	105.7	62.6
F6.000	46.205	0.000	0.0	9	0.0	16	0.40	0.99	17.5	0.4

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Network Design Table for RD 90 FWS 130730.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F7.000	5.098	0.034	149.9	0.000	14	0.0	1.500	o	150	Pipe/Conduit	
F6.001	10.799	0.072	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.020	26.244	0.170	154.0	0.000	9	0.0	1.500	o	300	Pipe/Conduit	
F1.021	26.483	0.180	147.1	0.000	9	0.0	1.500	o	300	Pipe/Conduit	
F1.022	30.397	0.320	95.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	
F30.001	54.396	0.560	97.1	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F30.002	35.000	0.361	97.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F30.003	43.198	0.705	61.3	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.023	62.848	0.561	112.0	0.000	0	0.0	1.500	o	300	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F7.000	46.024	0.000	0.0	14	0.0	24	0.37	0.71	12.6	0.7
F6.001	45.990	0.000	0.0	23	0.0	30	0.43	0.71	12.6	1.1
F1.020	45.770	0.000	43.6	438	0.0	206	1.24	1.12	78.9	64.1
F1.021	45.600	0.000	43.6	447	0.0	203	1.27	1.14	80.8	64.6
F1.022	45.420	0.000	43.6	447	0.0	175	1.51	1.42	100.6	64.6
F30.001	64.250	0.000	0.0	0	0.0	0	0.00	0.89	15.7	0.0
F30.002	63.690	0.000	0.0	0	0.0	0	0.00	0.89	15.7	0.0
F30.003	63.329	0.000	0.0	0	0.0	0	0.00	1.12	19.8	0.0
F1.023	45.100	0.000	43.6	786	0.0	216	1.47	1.31	92.6	80.4

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<u>Manhole Schedules for RD 90 FWS 130730.FWS</u>											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
F208	68.260	2.660	Open Manhole	1200	F1.003	65.600	300	F1.002	65.600	300	1510
F209	68.150	2.780	Open Manhole	1200	F1.004	65.370	300	F1.003	65.370	300	
F210	67.631	2.786	Open Manhole	1200	F1.005	64.845	300	F1.004	64.845	300	
F211	67.445	2.785	Open Manhole	1200	F1.006	64.660	300	F1.005	64.660	300	
F213	67.167	2.777	Open Manhole	1200	F1.007	64.390	300	F1.006	64.390	300	
F214	66.813	2.753	Open Manhole	1200	F1.008	64.060	300	F1.007	64.060	300	
F215	66.311	2.801	Open Manhole	1200	F1.009	63.510	300	F1.008	63.510	300	
F216	64.927	2.787	Open Manhole	1200	F1.010	62.140	300	F1.009	62.140	300	
F227	63.732	3.073	Open Manhole	1200	F3.000	60.660	150				
F228	63.824	4.314	Open Manhole	1200	F1.011	59.510	300	F1.010	61.020	300	
								F3.000	59.660	150	
F229	65.780	2.280	Open Manhole	1200	F4.000	63.500	150				
F230	64.340	2.240	Open Manhole	1200	F4.001	62.100	150	F4.000	62.100	150	
F231	63.760	2.135	Open Manhole	1200	F4.002	61.625	150	F4.001	61.625	150	
F232	63.040	2.415	Open Manhole	1200	F4.003	60.625	150	F4.002	60.625	150	
F233	62.689	3.639	Open Manhole	1200	F1.012	59.050	300	F1.011	59.050	300	
								F4.003	59.200	150	
F234	61.610	3.510	Open Manhole	1200	F1.013	58.100	300	F1.012	58.100	300	
F235	60.271	3.321	Open Manhole	1200	F1.014	56.950	300	F1.013	56.950	300	
F236	58.521	3.171	Open Manhole	1200	F1.015	55.350	300	F1.014	55.350	300	
F237	56.021	3.021	Open Manhole	1200	F1.016	53.000	300	F1.015	53.000	300	
F238	54.848	3.048	Open Manhole	1200	F1.017	51.800	300	F1.016	51.800	300	
F239	53.167	1.967	Open Manhole	1200	F5.000	51.200	150				
F240	52.120	3.070	Open Manhole	1200	F1.018	49.050	300	F1.017	49.050	300	
								F5.000	49.200	150	
F74	50.142	3.892	Open Manhole	1200	F1.019	46.250	300	F1.018	46.250	300	
F42	49.250	3.045	Open Manhole	1200	F6.000	46.205	150				
F43	49.270	3.246	Open Manhole	1200	F7.000	46.024	150				
F42	49.232	3.242	Open Manhole	1200	F6.001	45.990	150	F6.000	45.990	150	
								F7.000	45.990	150	
F73	49.325	3.555	Open Manhole	1200	F1.020	45.770	300	F1.019	45.770	300	
								F6.001	45.918	150	
F72	49.900	4.300	Open Manhole	1200	F1.021	45.600	300	F1.020	45.600	300	
F71	50.470	5.050	Open Manhole	1200	F1.022	45.420	300	F1.021	45.420	300	
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PIPELINE SCHEDULES for RD 90 FWS 130730.FWS

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)
F1.003	o	300	F208	68.260	65.600	2.360	Open Manhole	1200
F1.004	o	300	F209	68.150	65.370	2.480	Open Manhole	1200
F1.005	o	300	F210	67.631	64.845	2.486	Open Manhole	1200
F1.006	o	300	F211	67.445	64.660	2.485	Open Manhole	1200
F1.007	o	300	F213	67.167	64.390	2.477	Open Manhole	1200
F1.008	o	300	F214	66.813	64.060	2.453	Open Manhole	1200
F1.009	o	300	F215	66.311	63.510	2.501	Open Manhole	1200
F1.010	o	300	F216	64.927	62.140	2.487	Open Manhole	1200
F3.000	o	150	F227	63.732	60.660	2.923	Open Manhole	1200
F1.011	o	300	F228	63.824	59.510	4.014	Open Manhole	1200
F4.000	o	150	F229	65.780	63.500	2.130	Open Manhole	1200
F4.001	o	150	F230	64.340	62.100	2.090	Open Manhole	1200
F4.002	o	150	F231	63.760	61.625	1.985	Open Manhole	1200
F4.003	o	150	F232	63.040	60.625	2.265	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)
F1.003	19.164	83.3	F209	68.150	65.370	2.480	Open Manhole	1200
F1.004	38.021	72.4	F210	67.631	64.845	2.486	Open Manhole	1200
F1.005	16.261	87.9	F211	67.445	64.660	2.485	Open Manhole	1200
F1.006	24.979	92.5	F213	67.167	64.390	2.477	Open Manhole	1200
F1.007	30.853	93.5	F214	66.813	64.060	2.453	Open Manhole	1200
F1.008	25.363	46.1	F215	66.311	63.510	2.501	Open Manhole	1200
F1.009	36.449	26.6	F216	64.927	62.140	2.487	Open Manhole	1200
F1.010	23.353	20.9	F228	63.824	61.020	2.504	Open Manhole	1200
F3.000	20.466	20.5	F228	63.824	59.660	4.015	Open Manhole	1200
F1.011	33.700	73.3	F233	62.689	59.050	3.339	Open Manhole	1200
F4.000	32.403	23.1	F230	64.340	62.100	2.090	Open Manhole	1200
F4.001	10.155	21.4	F231	63.760	61.625	1.985	Open Manhole	1200
F4.002	14.972	15.0	F232	63.040	60.625	2.265	Open Manhole	1200
F4.003	14.143	9.9	F233	62.689	59.200	3.339	Open Manhole	1200

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PIPELINE SCHEDULES for RD 90 FWS 130730.FWS

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)
F1.012	o	300	F233	62.689	59.050	3.339	Open Manhole	1200
F1.013	o	300	F234	61.610	58.100	3.210	Open Manhole	1200
F1.014	o	300	F235	60.271	56.950	3.021	Open Manhole	1200
F1.015	o	300	F236	58.521	55.350	2.871	Open Manhole	1200
F1.016	o	300	F237	56.021	53.000	2.721	Open Manhole	1200
F1.017	o	300	F238	54.848	51.800	2.748	Open Manhole	1200
F5.000	o	150	F239	53.167	51.200	1.817	Open Manhole	1200
F1.018	o	300	F240	52.120	49.050	2.770	Open Manhole	1200
F1.019	o	300	F74	50.142	46.250	3.592	Open Manhole	1200
F6.000	o	150	F42	49.250	46.205	2.895	Open Manhole	1200
F7.000	o	150	F43	49.270	46.024	3.096	Open Manhole	1200
F6.001	o	150	F42	49.232	45.990	3.092	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)
F1.012	24.414	25.7	F234	61.610	58.100	3.210	Open Manhole	1200
F1.013	20.095	17.5	F235	60.271	56.950	3.021	Open Manhole	1200
F1.014	24.307	15.2	F236	58.521	55.350	2.871	Open Manhole	1200
F1.015	34.914	14.9	F237	56.021	53.000	2.721	Open Manhole	1200
F1.016	17.031	14.2	F238	54.848	51.800	2.748	Open Manhole	1200
F1.017	38.359	13.9	F240	52.120	49.050	2.770	Open Manhole	1200
F5.000	48.042	24.0	F240	52.120	49.200	2.770	Open Manhole	1200
F1.018	33.785	12.1	F74	50.142	46.250	3.592	Open Manhole	1200
F1.019	41.312	86.1	F73	49.325	45.770	3.255	Open Manhole	1200
F6.000	16.767	78.0	F42	49.232	45.990	3.092	Open Manhole	1200
F7.000	5.098	149.9	F42	49.232	45.990	3.092	Open Manhole	1200
F6.001	10.799	150.0	F73	49.325	45.918	3.257	Open Manhole	1200

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PIPELINE SCHEDULES for RD 90 FWS 130730.FWS

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)
F1.020	o	300	F73	49.325	45.770	3.255	Open Manhole	1200
F1.021	o	300	F72	49.900	45.600	4.000	Open Manhole	1200
F1.022	o	300	F71	50.470	45.420	4.750	Open Manhole	1200
F30.001	o	150	F29b	66.100	64.250	1.700	Open Manhole	1200
F30.002	o	150	F29a	65.560	63.690	1.720	Open Manhole	1200
F30.003	o	150	F48	65.210	63.329	1.731	Open Manhole	1200
F1.023	o	300	F70	50.700	45.100	5.300	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)
F1.020	26.244	154.0	F72	49.900	45.600	4.000	Open Manhole	1200
F1.021	26.483	147.1	F71	50.470	45.420	4.750	Open Manhole	1200
F1.022	30.397	95.0	F70	50.700	45.100	5.300	Open Manhole	1200
F30.001	54.396	97.1	F29a	65.560	63.690	1.720	Open Manhole	1200
F30.002	35.000	97.0	F48	65.210	63.329	1.731	Open Manhole	1200
F30.003	43.198	61.3	F50	64.764	62.624	1.989	Open Manhole	1200
F1.023	62.848	112.0	F73	48.440	44.539	3.601	Open Manhole	1200

Simulation Criteria for RD 90 FWS 130730.FWS

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Region	England and Wales
Return Period (years)	100 M5-60 (mm)		18.000

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<u>Synthetic Rainfall Details</u> Ratio R 0.256 Cv (Winter) 0.840 Profile Type Winter Storm Duration (mins) 15 Cv (Summer) 0.750		
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Micro Drainage		Network 2018.1

FOUL SEWERAGE DESIGN

Design Criteria for RD 90 FWS 130730.FWS

Pipe Sizes RD 90 FWS 130730 Manhole Sizes RD 90 FWS 130730

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	225.00	Maximum Backdrop Height (m)	0.000
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.900
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	1.00
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	300

Designed with Level Soffits

Network Design Table for RD 90 FWS 130730.FWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F7.000	22.625	0.215	105.4	0.000	14	0.0	1.500	o	150	Pipe/Conduit	
F7.001	11.738	0.107	109.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F7.002	25.933	0.200	129.7	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F7.003	32.944	0.260	126.7	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F7.004	9.727	0.084	116.5	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F7.005	28.951	0.170	170.3	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F47.000	57.487	2.874	20.0	0.000	42	0.0	1.500	o	150	Pipe/Conduit	
F47.001	12.816	0.641	20.0	0.000	13	0.0	1.500	o	150	Pipe/Conduit	
F47.002	30.453	1.523	20.0	0.000	1	0.0	1.500	o	150	Pipe/Conduit	
F47.003	54.435	2.722	20.0	0.000	29	0.0	1.500	o	150	Pipe/Conduit	
F47.004	53.198	2.660	20.0	0.000	11	0.0	1.500	o	150	Pipe/Conduit	
F47.005	76.856	2.957	26.0	0.000	39	0.0	1.500	o	150	Pipe/Conduit	
F47.006	9.487	0.379	25.0	0.000	59	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F7.000	46.932	0.000	0.0	14	0.0	22	0.42	0.85	15.1	0.7
F7.001	46.717	0.000	0.0	14	0.0	22	0.41	0.84	14.8	0.7
F7.002	46.610	0.000	0.0	14	0.0	23	0.39	0.77	13.6	0.7
F7.003	46.410	0.000	0.0	14	0.0	23	0.39	0.78	13.7	0.7
F7.004	46.150	0.000	0.0	14	0.0	22	0.40	0.81	14.3	0.7
F7.005	46.067	0.000	0.0	14	0.0	24	0.35	0.67	11.8	0.7
F47.000	62.561	0.000	0.0	42	0.0	25	1.05	1.96	34.7	2.0
F47.001	59.687	0.000	0.0	55	0.0	28	1.14	1.96	34.7	2.6
F47.002	59.046	0.000	0.0	56	0.0	28	1.15	1.96	34.7	2.6
F47.003	57.523	0.000	0.0	85	0.0	34	1.30	1.96	34.7	4.0
F47.004	54.801	0.000	0.0	96	0.0	37	1.35	1.96	34.7	4.5
F47.005	52.142	0.000	0.0	135	0.0	47	1.36	1.72	30.4	6.3
F47.006	49.185	0.000	0.0	194	0.0	56	1.52	1.76	31.0	9.1

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Network Design Table for RD 90 FWS 130730.FWS											
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F48.000	38.067	0.534	71.3	0.000	23	0.0	1.500	o	150	Pipe/Conduit	
F48.001	43.430	0.567	76.6	0.000	6	0.0	1.500	o	150	Pipe/Conduit	
F47.007	61.748	2.433	25.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F49.000	67.685	0.846	80.0	0.000	8	0.0	1.500	o	100	Pipe/Conduit	
F47.008	42.883	6.081	7.1	0.000	132	0.0	1.500	o	150	Pipe/Conduit	
F47.009	104.759	4.012	26.1	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F47.010	98.124	1.258	78.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F47.011	97.488	1.250	78.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F47.012	109.605	1.405	78.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F47.013	106.447	1.088	97.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
Network Results Table											
PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
F48.000	49.806	0.000	0.0	23	0.0	25	0.56	1.04	18.3	1.1	
F48.001	49.272	0.000	0.0	29	0.0	28	0.59	1.00	17.7	1.4	
F47.007	48.705	0.000	0.0	223	0.0	60	1.58	1.74	30.8	10.5	
F49.000	47.168	0.000	0.0	8	0.0	17	0.41	0.74	5.8	0.4	
F47.008	46.272	0.000	0.0	363	0.0	55	2.87	3.31	58.5	17.0	
F47.009	40.191	0.000	0.0	363	0.0	80	1.77	1.72	30.4	17.0	
F47.010	36.179	0.000	0.0	363	0.0	119	1.13	0.99	17.5	17.0	
F47.011	34.921	0.000	0.0	363	0.0	119	1.13	0.99	17.5	17.0	
F47.012	33.671	0.000	0.0	363	0.0	119	1.13	0.99	17.5	17.0	
F47.013	32.191	0.000	0.0	363	0.0	95	1.07	1.16	46.1	17.0	
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Manhole Schedules for RD 90 FWS 130730.FWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
F33	48.935	2.003	Open Manhole	1200	F7.000	46.932	150				
F34	49.168	2.451	Open Manhole	1200	F7.001	46.717	150	F7.000	46.717	150	
F35	49.220	2.610	Open Manhole	1200	F7.002	46.610	150	F7.001	46.610	150	
F36	48.974	2.564	Open Manhole	1200	F7.003	46.410	150	F7.002	46.410	150	
F37	48.643	2.493	Open Manhole	1200	F7.004	46.150	150	F7.003	46.150	150	
F38	48.670	2.603	Open Manhole	1200	F7.005	46.067	150	F7.004	46.067	150	
F162	66.418	3.857	Open Manhole	1200	F47.000	62.561	150				
F163	66.385	6.699	Open Manhole	1200	F47.001	59.687	150	F47.000	59.687	150	
F164	65.885	6.839	Open Manhole	1200	F47.002	59.046	150	F47.001	59.046	150	
F165	64.634	7.110	Open Manhole	1200	F47.003	57.523	150	F47.002	57.523	150	
F165	61.575	6.773	Open Manhole	1200	F47.004	54.801	150	F47.003	54.801	150	
F166	57.788	5.647	Open Manhole	1200	F47.005	52.142	150	F47.004	52.142	150	
F167	52.294	3.110	Open Manhole	1200	F47.006	49.185	150	F47.005	49.185	150	
F167	52.311	2.505	Open Manhole	1200	F48.000	49.806	150				
F168	50.852	1.580	Open Manhole	1200	F48.001	49.272	150	F48.000	49.272	150	
F168	51.637	2.932	Open Manhole	1200	F47.007	48.705	150	F47.006	48.805	150	100
								F48.001	48.705	150	
F170	48.478	1.310	Open Manhole	1200	F49.000	47.168	100				
F169	48.273	2.001	Open Manhole	1500	F47.008	46.272	150	F47.007	46.272	150	
								F49.000	46.322	100	
F180	41.556	1.365	Open Manhole	1200	F47.009	40.191	150	F47.008	40.191	150	
F181	37.544	1.365	Open Manhole	1200	F47.010	36.179	150	F47.009	36.179	150	
F182	38.009	3.088	Open Manhole	1200	F47.011	34.921	150	F47.010	34.921	150	
F183	38.160	4.489	Open Manhole	1200	F47.012	33.671	150	F47.011	33.671	150	
F96	37.446	5.255	Open Manhole	1200	F47.013	32.191	225	F47.012	32.266	150	
								F50.000	35.329	150	3063
								F51.001	35.329	150	3063

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PIPELINE SCHEDULES for RD 90 FWS 130730.FWS

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)
F7.000	o	150	F33	48.935	46.932	1.853	Open Manhole	1200
F7.001	o	150	F34	49.168	46.717	2.301	Open Manhole	1200
F7.002	o	150	F35	49.220	46.610	2.460	Open Manhole	1200
F7.003	o	150	F36	48.974	46.410	2.414	Open Manhole	1200
F7.004	o	150	F37	48.643	46.150	2.343	Open Manhole	1200
F7.005	o	150	F38	48.670	46.067	2.453	Open Manhole	1200
F47.000	o	150	F162	66.418	62.561	3.707	Open Manhole	1200
F47.001	o	150	F163	66.385	59.687	6.549	Open Manhole	1200
F47.002	o	150	F164	65.885	59.046	6.689	Open Manhole	1200
F47.003	o	150	F165	64.634	57.523	6.960	Open Manhole	1200
F47.004	o	150	F165	61.575	54.801	6.623	Open Manhole	1200
F47.005	o	150	F166	57.788	52.142	5.497	Open Manhole	1200
F47.006	o	150	F167	52.294	49.185	2.960	Open Manhole	1200
F48.000	o	150	F167	52.311	49.806	2.355	Open Manhole	1200
F48.001	o	150	F168	50.852	49.272	1.430	Open Manhole	1200
F47.007	o	150	F168	51.637	48.705	2.782	Open Manhole	1200
F49.000	o	100	F170	48.478	47.168	1.210	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)
F7.000	22.625	105.4	F34	49.168	46.717	2.301	Open Manhole	1200
F7.001	11.738	109.4	F35	49.220	46.610	2.460	Open Manhole	1200
F7.002	25.933	129.7	F36	48.974	46.410	2.414	Open Manhole	1200
F7.003	32.944	126.7	F37	48.643	46.150	2.343	Open Manhole	1200
F7.004	9.727	116.5	F38	48.670	46.067	2.453	Open Manhole	1200
F7.005	28.951	170.3	F138	49.232	45.897	3.185	Open Manhole	1200
F47.000	57.487	20.0	F163	66.385	59.687	6.549	Open Manhole	1200
F47.001	12.816	20.0	F164	65.885	59.046	6.689	Open Manhole	1200
F47.002	30.453	20.0	F165	64.634	57.523	6.960	Open Manhole	1200
F47.003	54.435	20.0	F165	61.575	54.801	6.623	Open Manhole	1200
F47.004	53.198	20.0	F166	57.788	52.142	5.497	Open Manhole	1200
F47.005	76.856	26.0	F167	52.294	49.185	2.960	Open Manhole	1200
F47.006	9.487	25.0	F168	51.637	48.805	2.682	Open Manhole	1200
F48.000	38.067	71.3	F168	50.852	49.272	1.430	Open Manhole	1200
F48.001	43.430	76.6	F168	51.637	48.705	2.782	Open Manhole	1200
F47.007	61.748	25.4	F169	48.273	46.272	1.851	Open Manhole	1500
F49.000	67.685	80.0	F169	48.273	46.322	1.851	Open Manhole	1500

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PIPELINE SCHEDULES for RD 90 FWS 130730.FWS

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
F47.008	o	150	F169	48.273	46.272	1.851	Open Manhole	1500
F47.009	o	150	F180	41.556	40.191	1.215	Open Manhole	1200
F47.010	o	150	F181	37.544	36.179	1.215	Open Manhole	1200
F47.011	o	150	F182	38.009	34.921	2.938	Open Manhole	1200
F47.012	o	150	F183	38.160	33.671	4.339	Open Manhole	1200
F47.013	o	225	F96	37.446	32.191	5.030	Open Manhole	1200

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
F47.008	42.883	7.1	F180	41.556	40.191	1.215	Open Manhole	1200
F47.009	104.759	26.1	F181	37.544	36.179	1.215	Open Manhole	1200
F47.010	98.124	78.0	F182	38.009	34.921	2.938	Open Manhole	1200
F47.011	97.488	78.0	F183	38.160	33.671	4.339	Open Manhole	1200
F47.012	109.605	78.0	F96	37.446	32.266	5.030	Open Manhole	1200
F47.013	106.447	97.8	F97	33.800	31.103	2.472	Open Manhole	1200