

Appendix F

DRAINAGE DESIGN AND ROAD
ALIGNMENT - PROVIDED BY CAPITA
/ JACKSON



Appendix F.1

VERTICAL ALIGNMENT

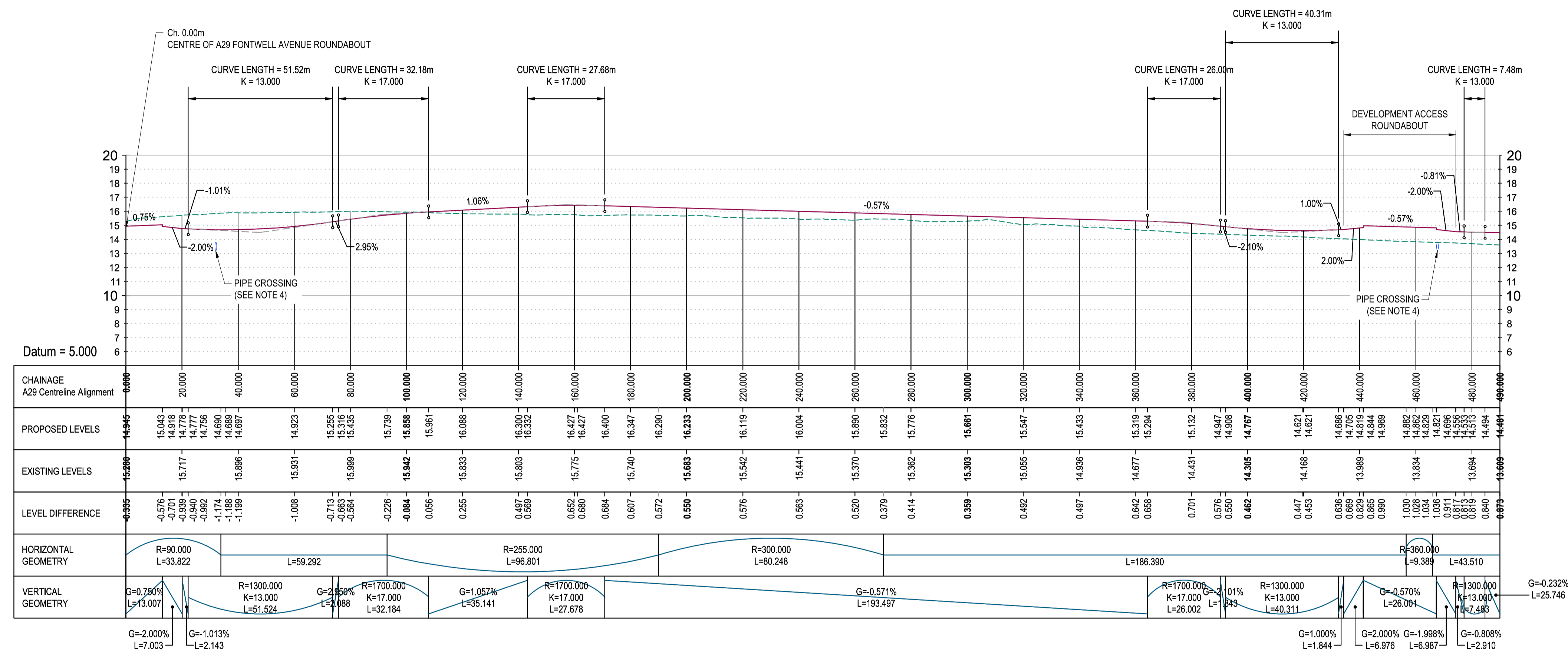


NOTES:

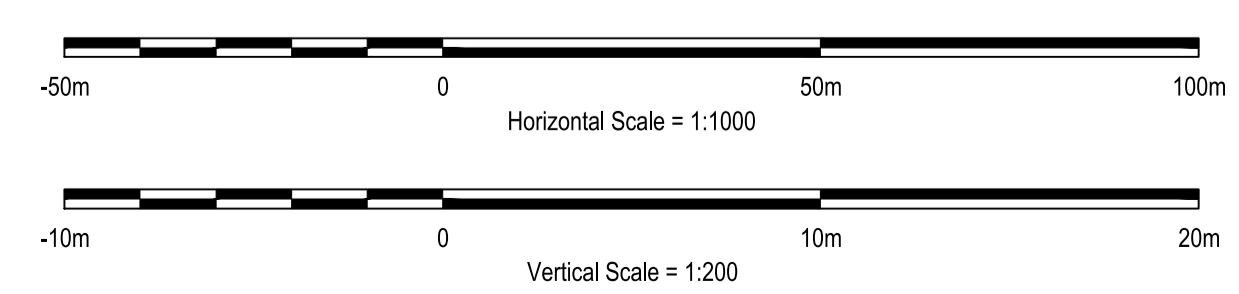
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. FOR PLAN (GENERAL ARRANGEMENT) DETAILS REFER TO DRAWINGS A29-CAP-HGN-00-DR-C-0007 TO 0011.
3. THE EXTENT AND LOCATION OF EXISTING SERVICES IS BASED ON INFORMATION RECEIVED FROM STATUTORY UNDERTAKERS. CAPITA INFRASTRUCTURE AND PROPERTY ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN.
4. PIPE CROSSING INVERTS ARE APPROXIMATE AT THIS TIME AND NEED TO BE COORDINATED WITH THE DETAILED DRAINAGE DESIGN (POND INVERT LEVELS). REFER TO DRAINAGE STRATEGY DRAWING No. A29-CAP-HDG-00-DR-D-0047.

KEY:

- EXISTING GROUND LEVEL
- PROPOSED ROAD LEVEL



Vertical Profile - Ch. 0.00 to Ch. 490.00



Rev	Drawn	Checked	App'd	Description	Date
P02	JPC	DAH	KS	VERTICAL GEOMETRY TEXT TIDIED UP, PIPE CROSSING DEPTH ALTERED	30.03.20
P01	JPC	DAH	KS	FIRST ISSUE	27.03.20

Purpose of Issue
For Review and Comment S3

Classification
Commercial in Confidence



Project
A29 Realignment Scheme

Drawing
Profiles (Long Section)
Sheet 1 of 3

Scale @ A1	Drawn	Checked	Approved
H 1:1000, V 1:200	JPC	DAH	KS

Project No. CS099505 Date 24.03.20

Drawing Identifier
Project - Originator - Zone - Level - File Type - Title - Number
A29-CAP-HGN-00-DR-C-0026 revision P02



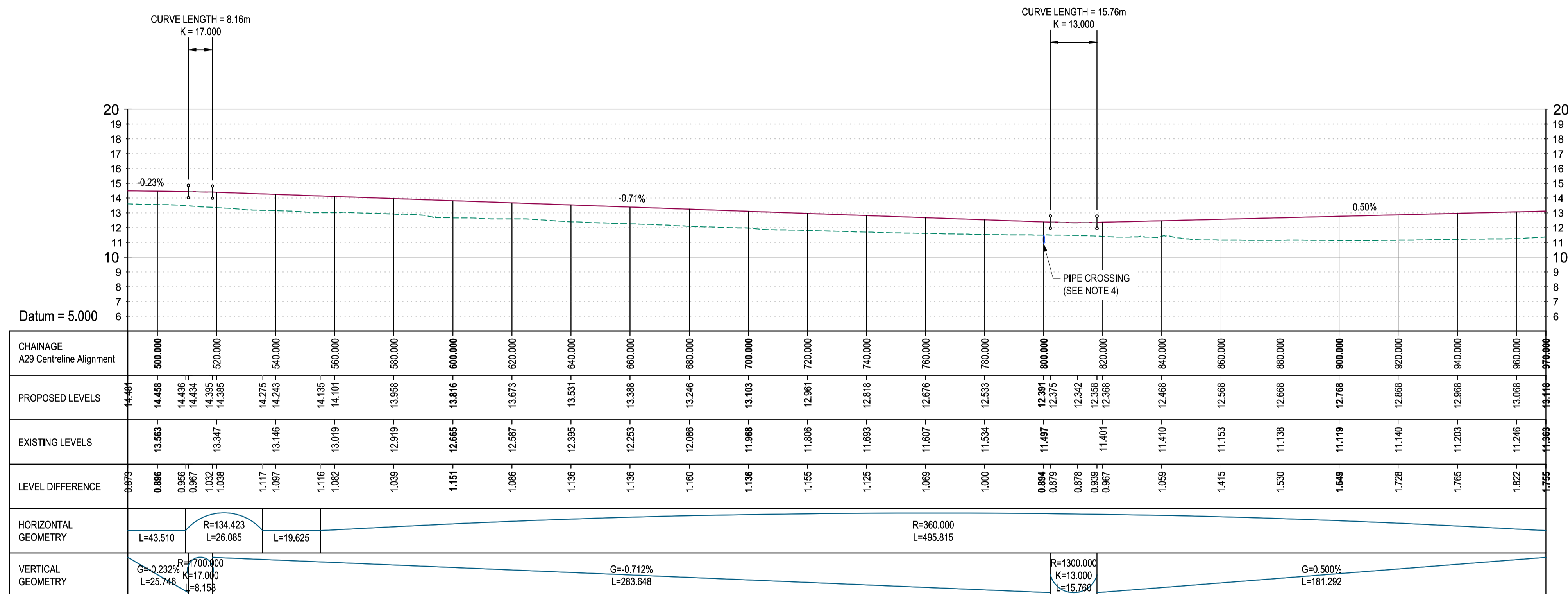
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NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
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KEY:

- EXISTING GROUND LEVEL
- PROPOSED ROAD LEVEL



Vertical Profile - Ch. 490.00 to Ch. 970.00

Rev	Drawn	Checked	App'd	Description	Date
P02	JPC	DAH	KS	PIPE CROSSING DEPTH ALTERED	30.03.20
P01	JPC	DAH	KS	FIRST ISSUE	27.03.20

Purpose of Issue
For Review and Comment S3

Classification
Commercial in Confidence



Project
A29 Realignment Scheme

Drawing
Profiles (Long Section)
Sheet 2 of 3

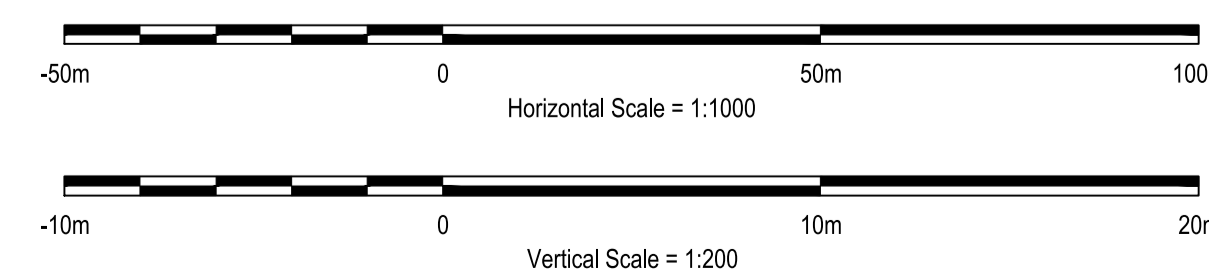
Scale @ A1	Drawn	Checked	Approved
H 1:1000, V 1:200	JPC	DAH	KS

Project No.	Date
CS099505	24.03.20

Project - Originator - Zone - Level - File Type - Title - Number	revision
A29-CAP-HGN-00-DR-C-0027	P02

CAPITA

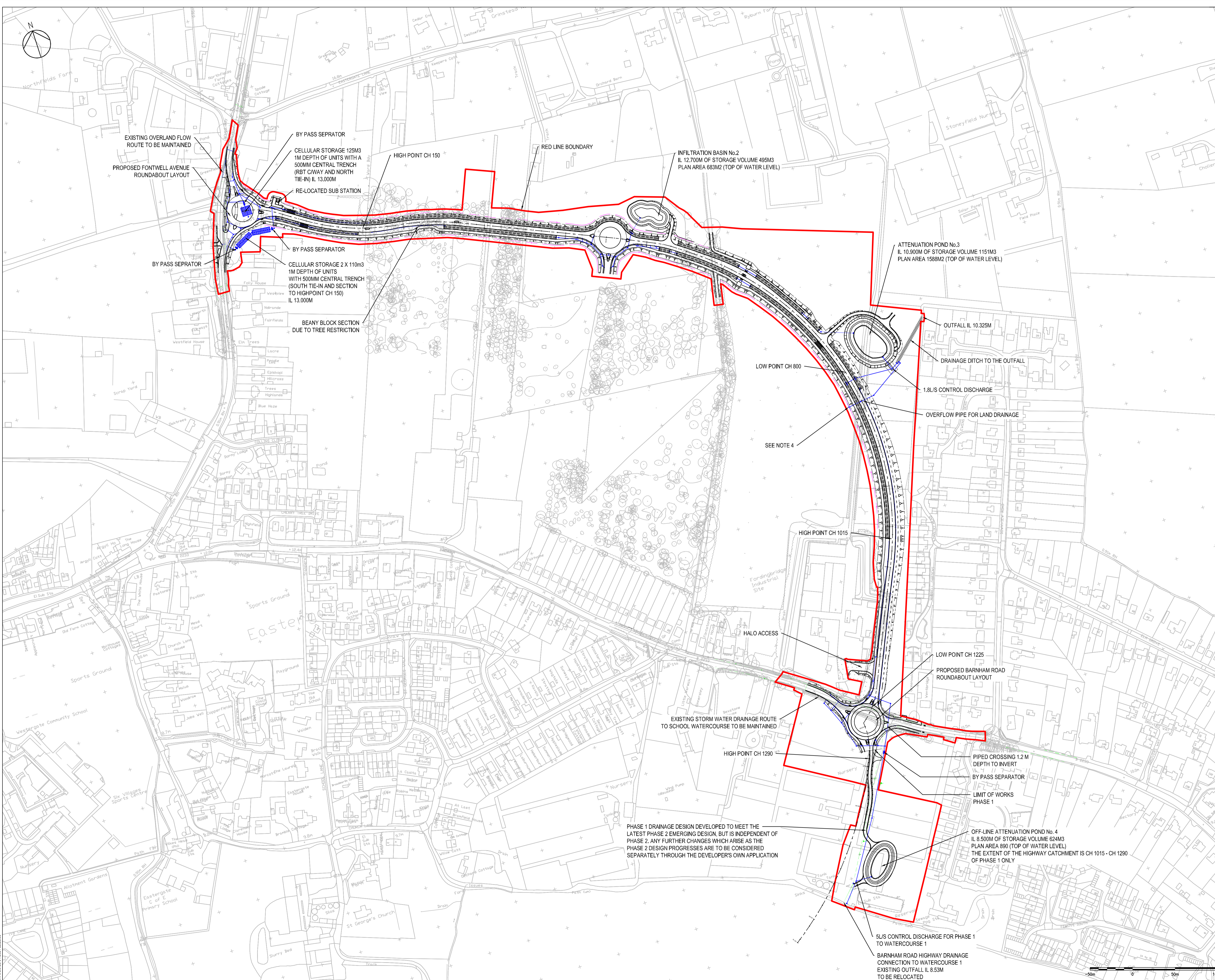
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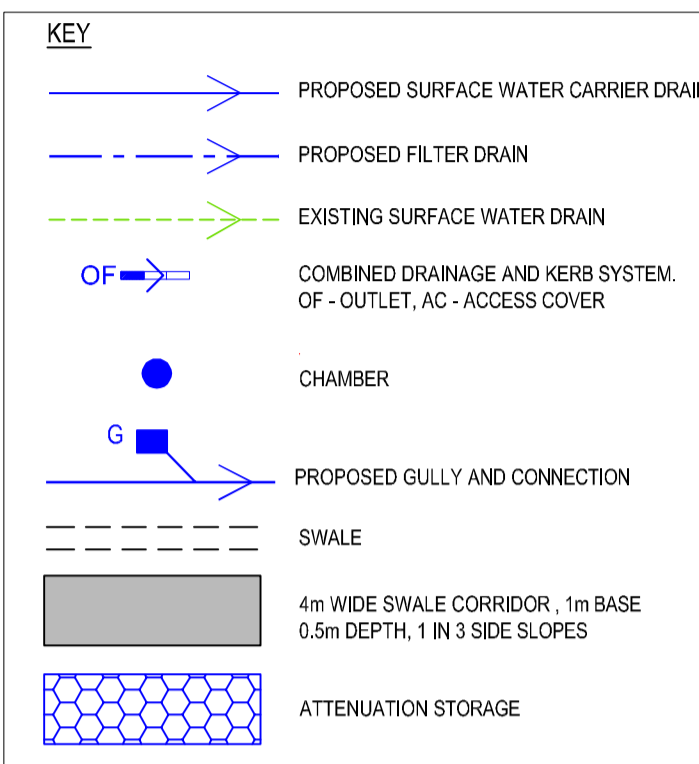
Appendix F.2

DRAINAGE PROPOSALS





- NOTES**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATION APPENDIX 500 SERIES DOCUMENT NO A29-CAP-GEN-00-SP-C-0032.
 - THE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH REQUIREMENTS OF WSCC.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE TECHNICAL NOTES:
 - A29-CAP-HDG-00-AND-0052 DRAINAGE STRATEGY
 - A29-CAP-HDG-00-AND-0058 SUDS MANAGEMENT TRAIN
 - AS A TEMPORARY SITUATION UNTIL THE SITE DEVELOPED WITH BARRATT'S PROPOSED SUDS (WHICH WILL MANAGE ALL DRAINAGE WITHIN THE SITE), A FRENCH DRAIN IS PROPOSED TO ALLOW ANY EXCESS FLOWS THAT CANNOT INFILTRATE, TO DISCHARGE TO THE SOUTH WEST SIDE OF THE A29 REALIGNMENT EMBANKMENT AS LAND DRAINAGE. AN OVERFLOW PIPE CROSSING IS PROVIDED BENEATH THE EMBANKMENT AT CHAINAGE CH 840, WHICH CONNECTS INTO THE PROPOSED DRAINAGE DITCH TO THE EXISTING BARNHAM LANE DITCH / RIFE.



Location Key Plan (Not to Scale)

Rev	Drawn	Checked	App'd	Description	Date
P11	KS	KS	AB	SCALE BAR ADDED, DRG PURPOSE CHANGED	23.04.2021
P10	JD	KS	AB	NEW LOCATION FOR SUB STATION AND RED LINE BOUNDARY AMENDED, NOTE 4 ADDED, POND 4 ROTATED AND MOVED, FONTWELL AV RST AND RED LINE BOUNDARY UPDATED	08.04.2021
P09	KS	RP	AB	POND 2 AND 4 OUTLINE AMENDED, BUS STOP AREAS ADDED AND RLB UPDATED	14.10.2020
P08	KS	RP	AB	POND 2 AND 4 OUTLINES AMENDED, RED LINE BOUNDARY ADDED	11.09.2020
P07	KS	RP	AB	NOTE 3 ADDED, RED LINE BOUNDARY ADDED	31.07.2020
P06	KS	RP	AB	POND 1 LEVELS UPDATED, POND 3 CHANGES TO OFF-LINE	15.07.2020
P05	KS	KS	AB	POND 2 AND 4 OUTLINES AMENDED AND RLB UPDATED	18.05.2020
P04	KS	RP	AB	POND 1L ADDED, DRAINAGE AMENDED TO SUIT PROPOSED RBT, SWALE DETAILS TO KEY ADDED	16.03.2020
P03	KS	RP	AB	POND SIZES REVISED, PROPOSED RBT LAYOUT ADDED	12.03.2020
P02	KS	RP	AB	POND LOCATIONS AMENDED, MIDDLE RBT RELOCATED	08.03.2020
P01	CS	RP	AB	FIRST ISSUE	13.02.2020

Purpose of Issue
For Planning S0

Classification
Public



Project
A29 Realignment Scheme

Drawing
Drainage Strategy Layout

Scale @ A1	Drawn	Checked	Approved
1:1250	CS	RP	KS

Project No.	Date
CS099505	12.02.20

Drawing Identifier
 Project-Original - Zone-Level-File Type-Risk-Number
A29-CAP-HDG-00-DR-C-0047 P11



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Technical Note

01 September 2020

To Jackson Civil Engineering

CC

Subject CS/099505 Drainage Strategy

Document Reference A29-CAP-HDG-00-AN-D-0052 S3-P05

The technical note supports the drainage strategy drainage layout drawing A29-CAP-HDG-00-SK-D-0047 and covers the following information:

- Outline details of the various infiltration and attenuation ponds
- Ground water levels
- Control discharge rates to watercourses
- Overland flows

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1. Infiltration and attenuation ponds

Pond Ref No.	No.1	No. 2	No. 3	No. 4
Type	Infiltration (cellular storage)	Infiltration	Attenuation (Off-line)	Attenuation (Off-Line)
Chainage	Ch 0	Ch 470	Ch 780	Ch 1420
Chainage distance	Roundabout tie-in areas and Ch 0 – Ch 160	Ch 160 – Ch 470	Ch 470 – Ch800 and Ch 800 – Ch 1000	Ch 1015 – Ch 1290
Catchment Area (ha)	0.535	0.717	1.135	0.590
Invert level of the Storage volume (m AOD)	1A - 13.000 1B - 13.000	12.700	10.900	8.500
Base Level (m AOD)	1A - 13.000 1B - 13.000	12.700	10.730	8.325
Infiltration rate (m/hr)	0.144	0.064	N/A	N/A
Discharge Rate (l/s)	N/A	N/A	1.8l/s (See section 2.0)	5l/s (See section 2.0)
Volume of storage (m3)	345	495	1151	408
Plan area (m2)	345	683	1588 (top of water)	807 (top of water)
Ground water level (m AOD) (See section 2.0)	12.700 BH 2 (Recorded GWL)	12.531 BH 104A (Recorded GWL)	11.454 DS102 (Winter Monitored GWL)	9.449 DS103 (Winter Monitored GWL)
Existing ground level (m AOD)	15.500	13.760	11.620	10.050
Proposed Road CL level	14.880	14.650	12.540	10.470

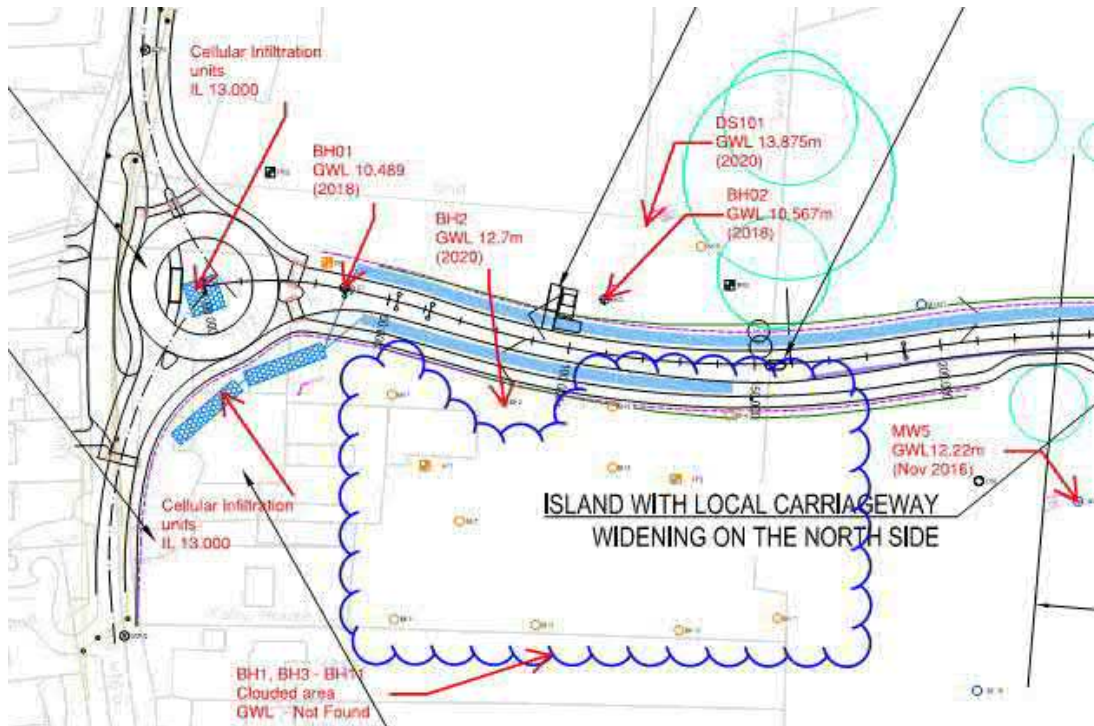
Note: As agreed with WSCC/ Arun DC the 1m clearance between peak GWL and IL of infiltration units is not required.

2. Ground Water Level

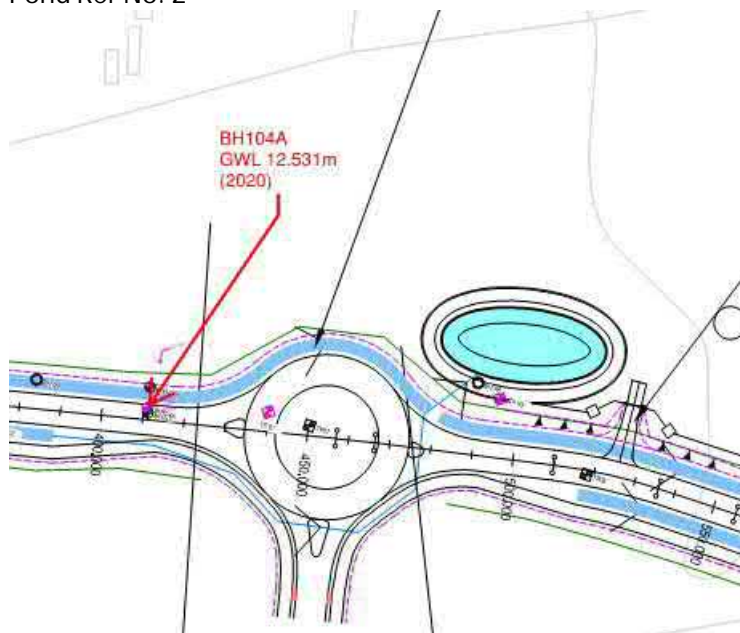
This section provides images for the location of the GWL data locations.

Pond Ref No. 1

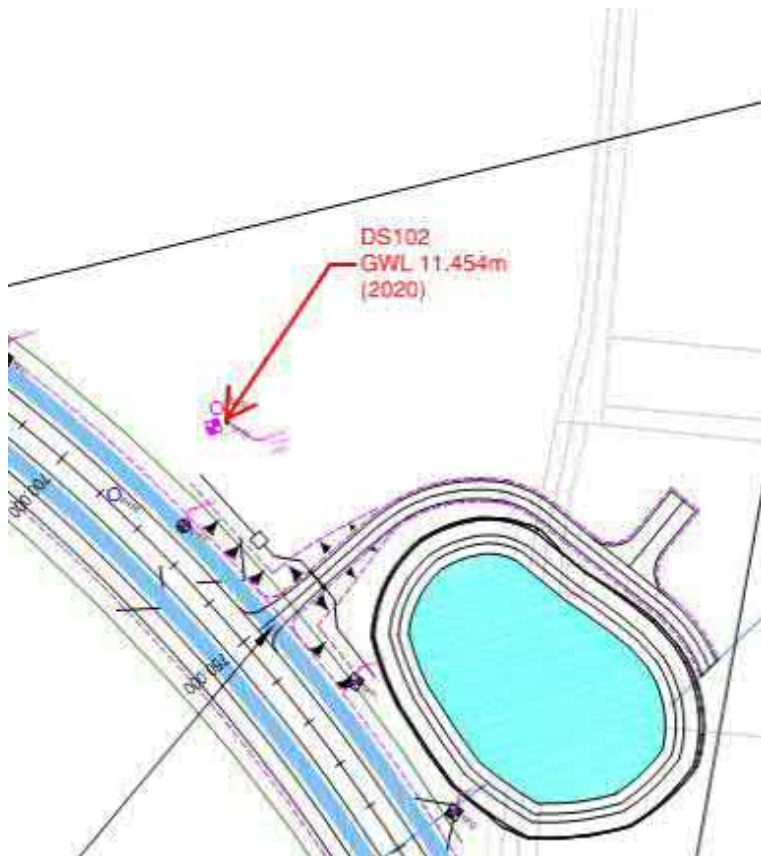
Due to uncertainty of the GWL in the area of the infiltration units, additional soakaway testing will be undertaken in winter 2021, prior to finalising the design.



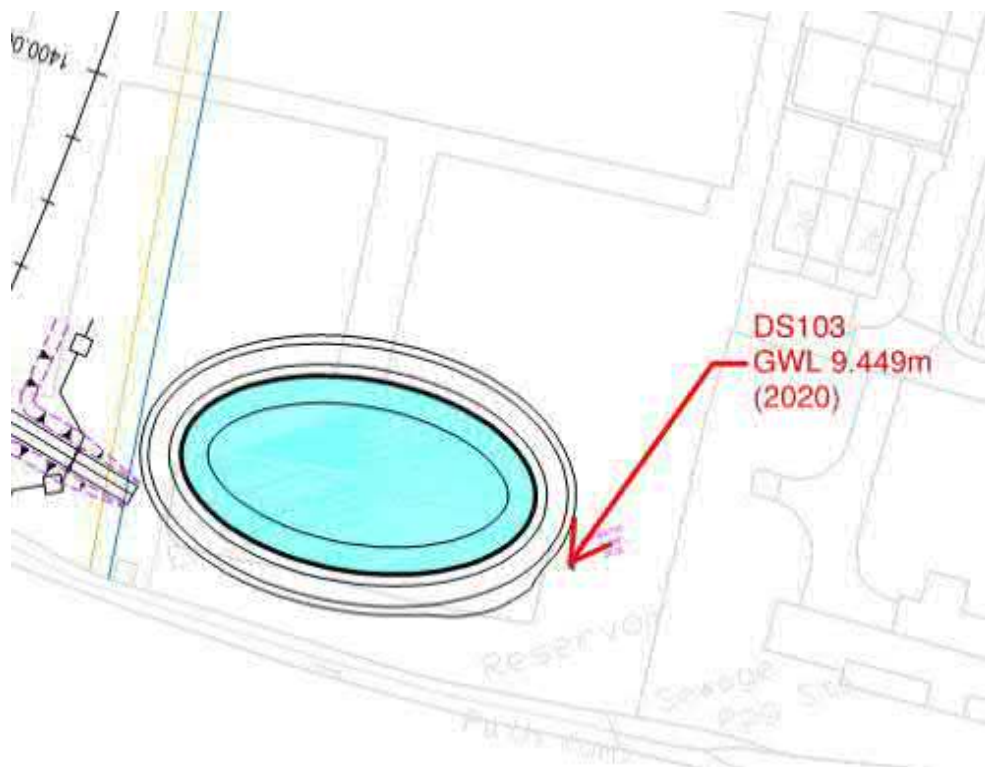
Pond Ref No. 2



Pond Ref No.3



Pond Ref No. 4



3. Control discharge rates to watercourses

3.1. Barnham Lane Ditch

The catchment area of infiltration pond no. 3 is 1.135ha.

Based on a greenfield runoff rate for 1 in 2 year as 2.1 l/s/ha the allowable discharge rate is 1.8l/s.

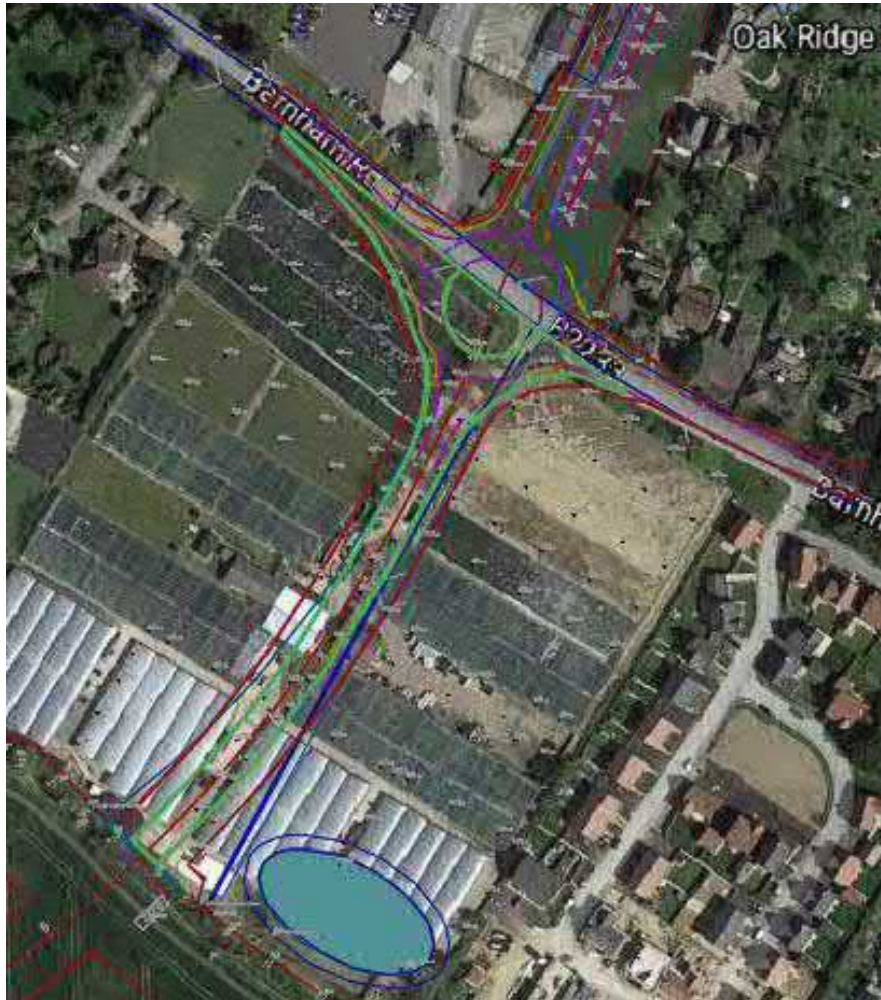
The WSP Flood Risk Statement Report (FRS) identified the catchment (referred to as Area 1) currently discharging to the Barnham Lane Ditch. The proposed alignment of the A29 will isolate 7.8ha of the existing catchment from the ditch, this equates to a reduction in greenfield runoff of 16.4 l/s. Therefore, the proposed discharge rate of 1.8l/s from pond no. 3 is a betterment to the net discharge into the Barnham Lane Ditch.

The existing FRS had concluded that no culvert was required to enable catchment Area 1 to continue to discharge into the Barnham Lane Ditch, as the surface runoff would go to the south watercourse.

Once the development is constructed this seems reasonable, but it is unclear how surface water flows will behave in the short term.

3.2. School watercourse

The section of the new roundabout and southern road section extending to the school watercourse is approx. 4235m², as per green outline in the image below. The area is split between impermeable and permeable areas as it passes through the existing nursery site.



Calculated discharge rate based on current conditions:

Existing Permeable area = 2750m²

Based on greenfield runoff rate for 1 in 2 year as 2.1l/s/ha the effective flow rate is 0.58l/s

Impermeable area = 1485m²

Based on Wallingford procedure the 1 in 2 year flow rate is 4.5l/s

The total existing flow for a 1 in 2 year event from the green area is therefore 5.08l/s

With reference to WSCC Highway Drain Criteria and Document W5-074-A-TR-1 'Preliminary rainfall runoff management for developments' item 17. The practicable minimum limit on the discharge rate is set a 5l/s.

Therefore, providing the 5l/s from pond no. 4 does not offer betterment but is no worse than the existing discharge to School Watercourse.

4. Overland Flow

4.1. Fontwell Avenue Roundabout

An existing overland flow route has been identified along Fontwell Avenue running from north to south through the location of the proposed roundabout. The existing drainage system and levels through this area are to be investigated and measures put in place, during the detailed design, to prevent any increase in flood water levels in this area.

4.2. Barnham Road Roundabout

An existing overland flow route has been identified along Barnham Road running west to east through the location of the proposed roundabout. This area currently drains to the School Watercourse located to the south of Barnham Rd. The existing drainage system is to be investigated and the detailed design will be developed to maintain or improve the capacity of the system to discharge flows to the School Watercourse and so avoid any increase to flood levels in this area.

File Note

31 July 2020

A29 Realignment Scheme - SuDS Management Train

A29-CAP-HDG-00-AN-D-0058

Issue/Revision S3-P04

Prepared by: Rob Prior

Checked by: Kim Still

Authorised by: Andrew Burrows

INTRODUCTION

The drainage strategy is indicated on drawing A29-CAP-HDG-00-DR-D-0047.

With reference to the WSP Flood Risk Statement undertaken for the Business Case, the Drainage strategy report item 9.4 Proposed Water Quality Management, *'it indicates a simple assessment has been undertaken using HAWRAT to examine the short-term risk related to the intermittent nature of highway runoff in accordance with Method A of DMRB HD 45/09'*. The assessment advises that the *'proposed SuDS features will be sufficient to address the potential risk of pollution. Therefore, further additional mitigation measures for the water quality of the proposed road run-off discharge into the watercourse is not required'*.

This note has been prepared to outline the SuDS treatment that is proposed for each catchment and provide justification that the overall system for each catchment is appropriate, following the development of the drainage strategy since the Client's outline design. The Client's outline design has swales and storage ponds to maintain discharge rates to green field levels. No water treatment facilities (oil interceptors etc) are included within the outline design.

The aim of this advice note is to explain the revised proposals that have been developed to avoid, where possible, the need to include oil interceptors into the drainage network.

The assessment shows that the proposals achieve or nearly achieve the minimum standards set out in CIRIA C753. We recommend that the proposals set out below are adopted.

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CATCHMENTS

Following the preliminary design by WSP the scheme is considered as 4 no. catchments with catchment 1 being sub-divided into two parts, A and B.

Catchment Ref.	Outfall Location	SuDS scheme
1A	Infiltration (Cellular structure)	See Schedule 1A
1B	Infiltration (Cellular Structure)	See Schedule 1B
2	Infiltration Pond	See Schedule 2
3	Barnham Lane Ditch	See Schedule 3
4	School Brook (Watercourse 1 in the Flood Risk Statement report).	See Schedule 4

Along the main line of the bypass there is typically a swale and footway/cycleway located on one side and a soft verge and swale on the other. On the side of the footway/cycleway the swale is located between the carriageway and the footway/cycleway and an 'over the edge' approach is proposed. In the vicinity of roundabout junctions, a kerbed drainage collection system is required. On the side of the soft verge and swale an 'over the edge' approach is also proposed. The swales have an under drain to maximise the steps in the SUD's management train. This approach provides adequate storage and improved water quality in line with current best practice.

ASSESSMENT APPROACH

The CIRIA guidance sets out an assessment approach based on different types of treatment but does not consider 'mixed networks'. All of our drainage networks contain a mix of treatment trains leading to each outfall. Our approach, set out below, has been to assess each subsection of each network and then sum the component sections with a weighting based on their impermeable area, so giving an overall network treatment figure. We believe this is the best approach to applying the available guidance to the A29 Realignment Scheme.

ROAD CLASSIFICATION

With reference to CIRIA C753 Table 4.3 the minimum water quality management requirements for discharging to receiving surface waters is selected based on the land use.

Road Reference	Land Use	Pollution hazard level	Requirements for discharge to surface waters
A29 Realignment Scheme	All roads except low traffic roads and trunk roads/ motorways	Medium	Simple index approach

WATER QUALITY MANAGEMENT ASSESSMENT

In accordance with CIRIA C753 Chapter 26 – Water quality management: design method, the tables 26.2 and 26.3 provide the hazard indices and mitigation indices to achieve for each SuDS component against each land use and the respective pollution hazard level.

The following schedules reviews the various combinations of SuDS components and indicates if the required mitigation indices for each of the catchments is acceptable.

SCHEDULE 1 – SUDS MANAGEMENT TRAIN CATCHMENT 1

Selection of SuDS components for Catchment 1A: Fontwell Avenue north tie-in and roundabout circulatory carriageway.		
Water quantity	Runoff collection mechanism	Kerb drainage system either side of carriageway.
	Interception mechanism	None
	Storage	Cellular storage with infiltration to ground. (no flooding on the site for the 1 in 100 year event plus 40% climate change).
	Conveyance	Pipe system to cellular storage structure. (SDS Geolight with a central filter pipe)
	Exceedance	Provision is to be made for existing flood flows to continue to use the 'existing carriageway' which becomes a service road on the west side of the roundabout in the proposed layout. Network - no flooding for the 1 in 100 year event plus 40% climate change
Water quality	Discharge to groundwater	Yes, Infiltration Ground water level is 12.700m (BH 2) approx. 2.8m below EGL. (Refer to the Technical note – Drainage Strategy A29-CAP-HDG-00-AN-D-0052 for location of GWL data locations) Medium hazard indices TSS 0.7, Metals 0.6, HCs 0.7
	Discharge to surface waters	No
	Groundwater protection measures	Overall indices for catchment 1A. <u>Roundabout</u> SuDS Mitigation indices % Not achieved:

		<p>TSS 57%, Metals 67%, HCs 57% (treatment indices as % of target, above 100% means treatment train is exceeding target).</p> <p>Provide a by-pass oil/petrol interceptor upstream of cellular units for groundwater protection. An alternative to an oil interceptor would be a Downstream Defender (Hydro International).</p>
Amenity	N/A	
Biodiversity	None	

Selection of SuDS components for Catchment 1B: Link road (Chainage 0 – 160) and Fontwell Avenue south tie-in.		
Water quantity	Runoff collection mechanism	Kerb drainage system either side of carriageway for roundabout southern arm. Swales along the Link road
	Interception mechanism	None
	Storage	Cellular storage with infiltration to ground. (no flooding on the site for the 1 in 100 year event plus 40% climate change).
	Conveyance	Pipe system and swales to cellular storage structure. (SDS Geolight with a central filter pipe).
	Exceedance	Provision is to be made for existing flood flows to continue to use the 'existing carriageway' which becomes a service road on the west side of the roundabout in the proposed layout. Network - no flooding for the 1 in 100 year event plus 40% climate change.
Water quality	Discharge to groundwater	Yes. Ground water level is 12.700m (BH 2) approx. 2.8m below EGL (Refer to the Technical note – Drainage Strategy A29-CAP-HDG-00-AN-D-0052 for location of GWL data locations) Medium hazard indices TSS 0.7, Metals 0.6, HCs 0.7
	Discharge to surface waters	No.
	Groundwater protection measures	No.

		<p><u>Roundabout</u></p> <p>SuDS Mitigation indices</p> <p>TSS: 0.4 = 0.4 Metals: 0.4 = 0.4 HCs: 0.4 = 0.4</p> <p>% Not achieved:</p> <p>TSS 57%, Metals 67%, HCs 57% (treatment indices as % of target, above 100% means treatment train is exceeding target).</p> <p>Provide a by-pass oil/petrol interceptor upstream of cellular units for groundwater protection. An alternative to an oil interceptor would be a Downstream Defender (Hydro International).</p>
		<p>Link road</p> <p>SuDS Mitigation indices</p> <p>TSS: $0.5 + (0.5 \times 0.4) = 0.7$ Metals: $0.6 + (0.5 \times 0.4) = 0.8$ HCs: $0.6 + (0.5 \times 0.4) = 0.8$</p> <p>% Achieved:</p> <p>TSS 100%, Metals 133%, HCs 114% (treatment indices as % of target, above 100% means treatment train is exceeding target).</p>
<p>Amenity</p>	<p>N/A</p>	
<p>Biodiversity</p>	<p>None</p>	

SCHEDULE 2 – SUDS MANAGEMENT TRAIN CATCHMENT 2

Selection of SuDS components for Catchment 2: Link Road (Chainage 160 - 470)		
Water quantity	Runoff collection mechanism	North side of carriageway: 'over the edge' discharge to swale. South side of carriageway: over the edge' discharge to swale, combined drainage and kerb system.
	Interception mechanism	Grass swale
	Storage	Infiltration pond (no flooding on the site for the 1 in 100 year event plus 40% climate change)
	Conveyance	North side - 'over the edge' discharge to swale. South side - 'over the edge' discharge to swale.
	Exceedance	Network - no flooding for the 1 in 100 year event plus 40% climate change.
Water quality	Discharge to groundwater	Yes, infiltration can occur through the base of the swales and the pond. Ground water level varies but is typically, 12.53 (BH 104/A4) with a 1.23m depth below EGL. (Refer to the Technical note – Drainage Strategy A29-CAP-HDG-00-AN-D-0052 for location of GWL data locations) Medium hazard indices TSS 0.7, Metals 0.6, HCs 0.7
	Discharge to surface waters	No.
	Groundwater protection measures	North side, highway runoff (no kerb, over the edge): medium hazard: simple index approach. SuDS Mitigation indices: TSS: $0.5 + (0.5 \times 0.5) = 0.75$ Metals: $0.6 + (0.5 \times 0.5) = 0.85$ HCs: $0.6 + (0.5 \times 0.6) = 0.9$ Acceptable % Achieved: TSS 107%, Metals 142%, HCs 129% (treatment indices as % of target, above 100% means treatment train is exceeding target).

		<p>East side highway runoff (no kerb, over the edge): medium hazard: simple index approach.</p> <p>SuDS Mitigation indices: TSS: $0.5 + (0.5 \times 0.5) = 0.75$ Metals: $0.6 + (0.5 \times 0.5) = 0.85$ HCs: $0.6 + (0.5 \times 0.6) = 0.9$</p> <p>Acceptable % Achieved: TSS 107%, Metals 142%, HCs 129% (treatment indices as % of target, above 100% means treatment train is exceeding target).</p>
Amenity	N/A	Planting at the top of the swale as part of traffic calming measures.
Biodiversity	None.	Some benefits where planting is proposed.

SCHEDULE 3 – SUDS MANAGEMENT TRAIN CATCHMENT 3

Selection of SuDS components for Catchment 3: Link Road (Chainage 470 – 800 and 800 - 1015)		
Water quantity	Runoff collection mechanism	North-east side of carriageway: 'over the edge' discharge to swale. South-west side of carriageway: over the edge' discharge to swale.
	Interception mechanism	Grass swale
	Storage	Off-line Pond – limited discharge 1.8l/s to Barnham Lane Ditch (no flooding on the site for the 1 in 100 year event plus 40% climate change).
	Conveyance	North/East side - 'over the edge' discharge to swale or filter drain. South/West side - 'over the edge' discharge to swale.
	Exceedance	Network - no flooding for the 1 in 100 year event plus 40% climate change.
Water quality	Discharge to groundwater	No infiltration Wet pond to be lined due to high ground water level.
	Discharge to surface waters	Link Road: Medium hazard indices TSS 0.7, Metals 0.6, HCs 0.7
	Surface water protection measures	Swale or filter drain and pond. medium hazard: simple index approach SuDS Mitigation indices TSS: $0.5 + (0.5 \times 0.7) = 0.85$ Metals: $0.6 + (0.5 \times 0.7) = 0.95$ HCs: $0.6 + (0.5 \times 0.5) = 0.85$ Acceptable % Achieved TSS 121%, Metals: 158%, HCs 121% (treatment indices as % of target, above 100% means treatment train is exceeding target)
Amenity	Some benefits where planting is proposed.	Planting at the top of the swale is proposed as part of traffic calming measures.
Biodiversity	None	Some benefits where planting is proposed

SCHEDULE 4 – SUDS MANAGEMENT TRAIN CATCHMENT 4

Selection of SuDS components for Catchment 4: Link Road (Chainage 1015 – End of Phase 1)		
Water quantity	Runoff collection mechanism	Combined drainage and kerb system (Ch 1015 to Ch 1205), kerb and gullies on the Barnham Road Roadabout, tie-ins and link road south to the roundabout to the Phase 1 Limit of Works.
	Interception mechanism	None
	Storage	Offline Pond – limited discharge 5l/s to the School Brook (no flooding on the site for the 1 in 100 year event plus 40% climate change).
	Conveyance	Combined drainage and kerb system – Piped conveyance to attenuation pond. Road gullies - Piped conveyance to attenuation pond.
	Exceedance	At low points on the Barnham Road carriageway, provision is to be made for flood flows to pass through the existing highway drainage system (which outfalls to school watercourse to the south). Subject to the CCTV survey of the existing drainage system. Network - no flooding for the 1 in 100 year event plus 40% climate change.
Water quality	Discharge to groundwater	No infiltration. Wet pond to be lined due to high ground water level.
	Discharge to surface waters and	Link Road: Medium hazard indices TSS 0.7, Metals 0.6, HCs 0.7
	Surface water protection measures	Highway runoff (Kerb and gullies - direct connection to pond): SuDS Mitigation indices TSS: 0.7 = 0.7 Metals: 0.7 = 0.7 HCs: 0.5 = 0.5 Nearly Achieved TSS 100%, Metals: 117%, HCs 71% (treatment indices as % of target, above 100% means treatment train is exceeding target)

		Provide a by-pass oil/petrol interceptor upstream of pond for surface water protection. An alternative to an oil interceptor would be a Downstream Defender (Hydro International).
Amenity	N/A	
Biodiversity	None	

SUMMARY

Catchment Ref	SuDS Mitigation indices	Protection measures
1A and 1B	Not achieved	Provide a by-pass oil/petrol interceptor
2	Achieved	Not required
3	Achieved	Not required
4	Nearly achieved	Provide a by-pass oil/petrol interceptor

[REDACTED]

From: [REDACTED]@arun.gov.uk>
Sent: 06 April 2020 15:40
To: [REDACTED]
Cc: [REDACTED]
([REDACTED]@westsussex.gov.uk)
Subject: RE: A29 Drainage Strategy

Hi [REDACTED]

Comments below. These are in addition to those comments already made by [REDACTED] to [REDACTED] on the 30th March.

1. Our preference would be for open features as opposed to crates (pond/tank 1).
2. Discharge to the Barnham Lane ditch from pond 3 – restrict discharge to QBAR (ie. 1 in 2.3 year storm) bearing in mind the known issues downstream. I appreciate that this will need to be run past WSCC highways due to their min. 5 l/s discharge requirement, however, a hydrobrake in combination with upstream measures can be utilised to reduce any risk of blockage to the control, as that is probably their primary concern.
3. As I do not currently have access to the previous groundwater monitoring and infiltration testing data, please ensure that the worst winter infiltration rate achieved (at the proposed depth of the structure) at each pond location (ponds 1 and 2) is used and that peak winter groundwater levels are taken into account. Groundwater levels appear to arrange between 5m bgl and 2.124m bgl at the four pond locations and infiltration rates of 1.24×10^{-4} and 1.78×10^{-5} (at pond 1 & 2), according to the current Technical Note (March 2020). This will need to be verified against previous data received.
4. Whilst ponds 3 and 4 are relying attenuation/restricted discharge, infiltration must be utilised where ever possible in their respective catchment areas (taking into account item 3 above). A hybrid arrangement of infiltration and restricted discharge to watercourses is the likely solution.
5. Due to the shallow ditch to which pond 3 is going to discharge too, connection via a shallow channel/swale is probably going to be needed as opposed to pipework. Environment Agency approval will be required due to this section being 'main river'.
6. Has winter groundwater monitoring and infiltration testing been carried out south of Barnham Road, in order to inform the design of pond 4?

Regards

[REDACTED]
Principal Engineer (Drainage)

[REDACTED] | Principal Engineer (Drainage), Engineering Services, [Arun District Council](#) | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

Internal: [REDACTED] | External: [REDACTED] | Fax: [REDACTED] | E-mail: [REDACTED]@arun.gov.uk

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From: [REDACTED] <[REDACTED]@jackson-civils.co.uk>
Sent: 02 April 2020 16:30
To: [REDACTED] <[REDACTED]@arun.gov.uk>
Cc: [REDACTED] <[REDACTED]@jackson-civils.co.uk>
Subject: RE: A29 Drainage Strategy

Hi [REDACTED]

[REDACTED] has asked me to share the attached with you.

We would appreciate any comments you may have on our outline drainage strategy proposals for the A29 Realignment scheme.

Many thanks.

Regards



[REDACTED]
Project Design Lead
T [REDACTED]



24 Hours in JCE
#Readyfortomorrow
GOOD WORKS

From: [REDACTED] [[mailto:\[REDACTED\]@westsussex.gov.uk](mailto:[REDACTED]@westsussex.gov.uk)]
Sent: 02 April 2020 15:45
To: [REDACTED] <[REDACTED]@jackson-civils.co.uk>; [REDACTED] <[REDACTED]@jackson-civils.co.uk>
Subject: FW: A29 Drainage Strategy

Fyi

[REDACTED]
Engineering Project Manager - Major Projects
Highways, Transport and Planning
Highways and Transport
West Sussex County Council

Location: 1st Floor Northleigh, County Hall, Chichester, West Sussex PO19 1RH
Contact: Internal: [REDACTED] | External: [REDACTED] | Mobile: [REDACTED] 0 | E-mail: [REDACTED]@westsussex.gov.uk

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From: [REDACTED] [[mailto:\[REDACTED\]@arun.gov.uk](mailto:[REDACTED]@arun.gov.uk)]
Sent: 01 April 2020 14:13
To: [REDACTED]
Subject: RE: A29 Drainage Strategy

[REDACTED]

I am afraid our IT dept are unable to download any files for us since they need to be in the office to do so and all are working from home.

Will have to let Kevin review the proposals (assuming he has managed to get them).

Regards


Principal Engineer (Drainage)



























 | Principal Engineer (Drainage), Engineering Services, [Arun District Council](#) | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

Internal:  | External:  | Fax:  | E-mail: @[arun.gov.uk](#)

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From: E  <@[westsussex.gov.uk](#)>
Sent: 01 April 2020 13:30
To:  <@[arun.gov.uk](#)>;  y <@[westsussex.gov.uk](#)>; 
<@[westsussex.gov.uk](#)>;  <@[wsp.com](#)>; 
<@[pellfrischmann.com](#)>;  <@[barratthomes.co.uk](#)>; 
<@[pellfrischmann.com](#)>;  <@[pellfrischmann.com](#)>; Y 
<@[pellfrischmann.com](#)>
Cc:  <@[jackson-civils.co.uk](#)>;  <@[jackson-civils.co.uk](#)>; 
<@[fgould.com](#)>;  <@[fgould.com](#)>
Subject: A29 Drainage Strategy




Good afternoon


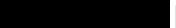
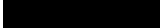
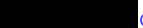
Please find at this [link](#) the draft drainage strategy and associated documents for discussion at tomorrow's 14:00 online meeting for the A29 realignment scheme.

If you have declined the meeting I would be happy for you to comment via email.

Best regards



Engineering Project Manager - Major Projects
Highways, Transport and Planning
Highways and Transport
West Sussex County Council

 CALL  IM  EMAIL

Location: 1st Floor Northleigh, County Hall, Chichester, West Sussex, PO19 1RH
Contact: Internal:  | External:  | Mobile:  | E-mail: @[westsussex.gov.uk](#)

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Emmitt Plant Ltd - 30 White House Road, Ipswich, Suffolk IP1 5LT United Kingdom. Registered Number: 01450866

SEH French Construction Limited - Registered Office: 30 White House Road, Ipswich, Suffolk IP1 5LT United Kingdom.
Registered Number: 01621424

SEH French Building Ltd - Registered Office: 30 White House Road, Ipswich, Suffolk IP1 5LT United Kingdom.
Registered Number: 10734280

SEH Ipswich Ltd - 30 White House Road, Ipswich, Suffolk IP1 5LT United Kingdom. Registered Number: 02389994

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[REDACTED]

From: [REDACTED]@westsussex.gov.uk>
Sent: 06 August 2020 12:38
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: A29 meeting dated 3 July 2020 - Drainage Proposals

[REDACTED],

Further to your email dated 30th July 2020. Please find below [REDACTED] and my comments on your notes following the meeting dated 3 July 2020.

Regards,

[REDACTED]

[REDACTED]
Flood Risk Management – Team Leader
Highways, Transport and Planning
Place Services
West Sussex County Council

 CALL  IM  EMAIL

Location: Western Area Office, Drayton Lane, Nr. Chichester, West Sussex. PO20 2AJ.

Contact: Internal: [REDACTED] | External: [REDACTED] | Mobile: [REDACTED]

E-mail: kevin.macknay@westsussex.gov.uk

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From: [REDACTED]@wsp.com]
Sent: 05 August 2020 11:23
To: [REDACTED]
Cc: [REDACTED]n
Subject: RE: A29 meeting dated 3 July 2020 - Drainage Proposals

Hi [REDACTED] and [REDACTED],

Hope you are well.
Please could you respond to the below email?
Thank you

Kind regards,

[REDACTED]
Engineer – Water Specialisms



T [REDACTED]

Mountbatten House, Basing View
Basingstoke, Hampshire
RG21 4HJ

wsp.com

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From: [REDACTED]
Sent: 30 July 2020 10:29
To: [REDACTED]@arun.gov.uk>; [REDACTED]@westsussex.gov.uk>
Cc: [REDACTED]@wsp.com>; [REDACTED]@westsussex.gov.uk>; [REDACTED]
<[REDACTED]@fgould.com>; [REDACTED]@wsp.com>
Subject: A29 meeting dated 3 July 2020 - Drainage Proposals

Dear [REDACTED] and [REDACTED],

Please could Arun District Council and West Sussex County Council (acting as the LLFA) confirm the below as discussed during the meeting dated 3 July 2020 regarding the drainage strategy proposals.

- They have reviewed the drainage strategy proposals for the A29 Phase 1 (Detailed planning application) and they are happy with a relaxation from the SuDS Manual CIRIA 753 regarding a minimum clearance for infiltration between base of infiltration feature and recorded groundwater level of 1m. They agree that the proposed drainage strategy incorporate sufficient treatment levels for the discharge to ground despite not achieving the 1m recommended clearance.

As far as I'm aware we have not seen the complete A29 Phase 1 Drainage Strategy i.e. the strategy that will be submitted as part of the planning application. What we did see before the meeting on the 3 July 2020 was the following:

Capita file note dated 20 May 2020 entitled – A29 Realignment Scheme – SuDS Management Train, and

Noted entitled - A29 Realignment Phase 1 – Drainage Strategy for Catchment 1 update following review of latest GWL data – dated 16 July 2020.

At the meeting dated 3 July 2020 it was accepted that ground water level within the Barnham area do not generally allow designs to meet to 1m buffer between base of infiltration features and recorded groundwater levels. It was accepted that ADC would be happy with a relaxation of they own guidance and the SuDS Manual CIRIA 753.

- They are aware and agree with the risk that the drainage strategy is based on a groundwater level encountered during the drilling of the borehole (BH2) which is considered representative for the location. The closest groundwater monitoring location in the area is DS101 and it shows a maximum groundwater level of 13.34 mAOD which is higher than the proposed invert levels of the proposed SuDS in Catchment 1 (IL 12.7 mAOD). This borehole is located approximately 130m north-east to the proposed infiltration features for Catchment 1.
It was agreed at the meeting on the 3 July 2020 that this was the best information we had. However, due to the differences between the data available engineering judgement and interpretation would be required to support the design within the drainage strategy. It was also agreed that an additional borehole could be install within the proposed Phase 1 infiltration area and any amendment to the design made prior to construction. This additional monitoring would be reflexed in the drainage strategy.
- They are aware and agree with the design approach of how Jackson/Capita intend to deal with the overland flow flood events raised by WSP in that –
 - At the Fontwell Avenue tie-in, the existing alignment is relatively flat and the gradient does not have a constant fall with a number of low and high points existing along the existing kerb line. The

overland flow route with the proposed roundabout will be along the west side kerb line, where we propose to provide extra gullies at the low points:-

- Along the retained section of the A29, for the service access between the north and south roundabout arms, and at the tie in locations where there are existing low points we would propose to install additional gullies for the runoff to discharge to the existing highway drainage.
- At the northern end where the access is closed, proposed to provide a section of flat channel to allow the overflow to continue along the service road. This will mitigate against any increase in flooding depths that might otherwise occur once the new scheme is constructed.

Generally happy with these proposals. Any design should not direct additional water along the service road unless additional measures, i.e. drainage, have been installed to ensure this area does not flood.

- At the Barnham Road tie-in, the existing road is very flat to the west of the proposed roundabout where it has been indicated that some overland flow may be occurring. With our proposed alignment of roundabout raising the carriageway level there is a risk that an existing flooding issues may be exacerbated. We therefore propose to provide extra gullies at the low point, these will connect to the existing highway drainage. If the existing drainage network has insufficient capacity for the (existing) flows then we would recommend that WSCC consider upgrading the existing highway drainage that runs from this location to the school watercourse outfall. An alternative option for a highway ditch along the SW corner and the southern arm to the school watercourse would require additional land take and has therefore not been recommended. The proposed final solution is however subject to the CCTV condition survey of the existing highway drainage network.

We are not aware of any existing overland flow from the Phase 1 site that end up on Barnham Road. The recent CCTV survey of the Barnham Road system will highlight any issues with the existing pipe runs which should be repaired prior to the Phase 1 roundabout construction. If existing overland flow does reach Barnham Road the existing system should be able to cope with the additional gullies you are proposing.

Kind regards,

[Redacted Signature]

Engineer – Water Specialisms



T [Redacted]

Mountbatten House, Basing View
Basingstoke, Hampshire
RG21 4HJ

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-LAEmHhHzdJzBITWfa4Hgs7pbKI

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Appendix F.3

DISCHARGE CONSENT



[REDACTED]

From: J [REDACTED] <[REDACTED]@environment-agency.gov.uk>
Sent: 22 April 2020 08:16
To: [REDACTED]
Subject: RE: A29 - Highway Drainage Discharge Into Existing Watercourse

Hi [REDACTED]

Rather than me spend time on another email, are you happy to go through the contents of your email over the phone?

I have 2 hours worth of telephone conference calls in a short while but are you available to discuss at 11am. If so I will call you on the mobile number provided.

Otherwise I am available until 3pm, if that suits you better.

Please confirm

regards - [REDACTED]

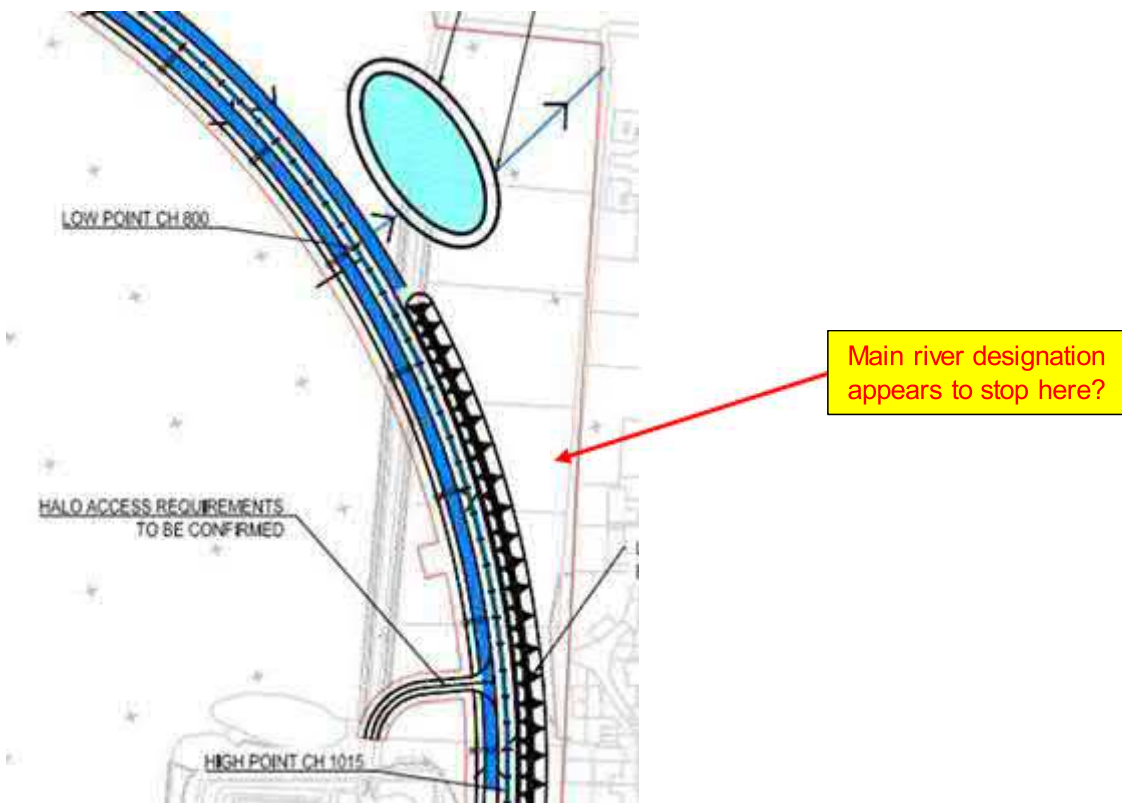
From: [REDACTED] [mailto:[REDACTED]@jackson-civils.co.uk]
Sent: 21 April 2020 17:03
To: [REDACTED] <[REDACTED]@environment-agency.gov.uk>; PSO West Sussex <PSOWestSussex@environment-agency.gov.uk>
Cc: [REDACTED] <[REDACTED]@jackson-civils.co.uk>
Subject: RE: A29 - Highway Drainage Discharge Into Existing Watercourse

Hi [REDACTED],

Many thanks for your response on this.

Noted that a Flood Risk Activity Permit (FRAP) [formerly known as a Flood Defence Consent] will be required. You ask when I will require the FRAP application forms – is there any harm in asking for these now so we can start the process ASAP (apologies, I've not needed to undertake this process before so I'm unsure as to the requirements and how far along the design process is necessary so to start the application process)?

With regards to your point concerning the proposed noise bund and if its within 8metres from the watercourse bank edges as this element of work may also fall within the requirements of a FRAP – the location of the noise bund is shown indicatively for now and the extents of this won't be confirmed for several weeks. However we are not necessarily confined to providing an earth bund solution so we have some (albeit I suspect limited) flexibility here. However I have a query on this – the EA main river map shows the extents of the main river stopping short of the currently shown pinch-point of the noise bund (see screen shots below) – can you therefore confirm that the 8m constraint is just associated with the limits identified on the EA main river map, or does it apply to the full length of the Barnham Rife Ditch?



With regards to your comment concerning where the road route runs southwards past your main river (the blue line on your map with red arrow) – please can you explain further where you are referring to when talking about a culvert?

Currently the limit of our design works for the road terminates just south of the new Barnham Road Roundabout, with our only works south of Barnham Road associated with the construction of the new pond nr. 4 and associated drainage pipework, discharging into the existing “school watercourse”. We understand that this existing school watercourse is not classified as a “main river” under the jurisdiction of the EA, and as such approvals are obtained through the Lead Local Flood Authority (LLFA). In this instance we understand the LLFA to be Arun District Council, and as such we are to obtain consent from them for these works. Please can you confirm my understanding on this is correct?

Regarding your comment concerning the reference made to a Flood Risk Assessment (FRA) and that this is not something that you have made comment on – the FRA was completed by WSP working on behalf of WSCC before our involvement on the scheme. We are currently preparing supporting documents associated with the schemes planning application that WSP are currently pulling together, and it is currently anticipated that the formal planning application will be made in July 2020. I assume this is when you will be consulted further on this.

Finally, you say that on the basis it is assumed that the run off will be clean, a ‘consent to discharge’ would not be required. I’ve recently completed the EA online enquiry form to request pre-application advice for the standard rules permit – does your comment mean therefore that I do not have to take this any further forwards?

Many thanks.

Regards



From: [redacted] [mailto:[redacted]@environment-agency.gov.uk]
Sent: 21 April 2020 09:45
To: [redacted] <[redacted]@jackson-civils.co.uk>; PSO West Sussex <PSOWestSussex@environment-agency.gov.uk>
Subject: RE: A29 - Highway Drainage Discharge Into Existing Watercourse

Hi [redacted]

I have now looked at the road proposals.

Seems our organisations have different meanings for the terms 'on line' When someone says 'on line' to the EA it's normally in reference to an existing watercourse whereas someone wishes to build a pond on line'of it. I can see from the plans that Pond 3 is not to be built on line of a watercourse, so therefore does not apply.

The proposed Pond 3 would eventually discharge into the Barnham Rife Ditch (a classified 'main river' under the jurisdiction of the EA) so therefore the outfall, would need to have a Flood Risk Activity Permit (FRAP) [formerly known as a Flood Defence Consent]

It also noted that where the road layout bends, the proposed noise bund is located in very close proximity to the 'main river' If it is within 8metres from the watercourse bank edges, this element of work may also fall within the requirements of a FRAP. It's not a showstopper, but I think we would just need to ensure, that future maintenance works to the ditch were not compromised, and byelaw widths, if applicable, can easily be agreed.

I am also uncertain that where the road route runs southwards past our main river (the blue line on your map with red arrow), whether this continues as a culvert? This is something you would need to establish on site and with the Lead Local Flood Authority (LLFA) [West Sussex County Council] as this may be subject to a separate consent with the LLFA.

On the basis it is assumed that the run off will be clean, a 'consent to discharge' would not be required.

It is noted that in Capita's Drainage Strategy, reference is made to a Flood Risk Assessment (FRA) As a statutory consultee within the planning process this is not something that we have made comment on. There is potentially the tinniest amount of road shown as being possibly within the floodplain, although I really don't think it is significant enough to be having to look at any form of flood compensation. I would assume we will be consulted in due course when full details have been established.

However it should be borne in mind that the proposed siting of Pond 3 (and possibly the road itself, where it runs parallel with Downview Road) it is understood to be in the immediate vicinity where historically localised waterlogging has been experienced.

In terms of the run off rates, pond design etc these matters are not determined by the EA but would be done so by the LLFA

Hope this helps, and let me know when you require the FRAP application forms.

many thanks adrian

From: [redacted] [mailto:[redacted]@jackson-civils.co.uk]
Sent: 17 April 2020 08:56
To: [redacted] <[redacted]@environment-agency.gov.uk>
Cc: PSO West Sussex <PSOWestSussex@environment-agency.gov.uk>; [redacted] <[redacted]@jackson-civils.co.uk>
Subject: RE: A29 - Highway Drainage Discharge Into Existing Watercourse

Hi [redacted],

Thanks for your email, look forward to hearing back from you soon.

Regards



From: [redacted] [mailto:[redacted]@environment-agency.gov.uk]
Sent: 17 April 2020 08:53
To: [redacted] <[redacted]@jackson-civils.co.uk>
Cc: PSO West Sussex <PSOWestSussex@environment-agency.gov.uk>
Subject: RE: A29 - Highway Drainage Discharge Into Existing Watercourse

Dear [redacted] – Thank you for your email regarding the drainage proposals. I will start to look at this for you in detail next week.

Generally the EA don't support on-line ponds, and have a preference for off line ponds with an 'inlet' and 'outlet' This is mainly for ecology reasons e.g siltation issues and fish passage.

However the ditch in question is essentially dry for most of the time, so there may be some compromise on this, if it's considered the aquatic environment is unlikely to be impacted.

Please bear in mind that my access to our IT systems is limited at the present, but I will be in touch as soon as I can.

many thanks - [redacted]

From: [redacted] [mailto:[redacted]@jackson-civils.co.uk]
Sent: 16 April 2020 11:21
To: [redacted] <[redacted]@environment-agency.gov.uk>; Enquiries, Unit <enquiries@environment-agency.gov.uk>
Cc: [redacted] <[redacted]@jackson-civils.co.uk>
Subject: A29 - Highway Drainage Discharge Into Existing Watercourse

Good morning [redacted],

I've been passed your email address from WSCC Project Manager [redacted]. I'm working on behalf of West Sussex County Council on the design of the A29 Realignment Scheme Phase 1 at Eastergate. Phase 1 delivers a new road from the existing A29 south of Eastergate Lane to a new junction with Barnham Road.

We are in the early stages of the design currently preparing the schemes highway drainage strategy, and for part of the scheme our design team have proposed a new permanent on-line attenuation pond which is to discharge into an existing ditch we call "Barnham Lane Ditch" – please see the location of this ditch indicated below.



I've attached our drainage strategy plan along with Drainage Strategy Technical Note which provide further information on this. Section 1 of this note provides outline details of pond 3 (the pond proposed to discharge into the Barnham Lane Ditch), and section 2 provides outline details of the controlled discharge rates proposed into this existing watercourse and how we believe the proposals provide betterment to the net discharge into the Barnham Lane Ditch.

I am seeking guidance please on if flood defence consent is required from the EA and how to apply for permission to permanently discharge into this existing ditch from the Environment Agency.

Any help you can provide me on this would be most appreciated.

If you need any further information on this then please do contact me.

Many thanks.

Regards

Jackson
[Redacted Name] Project Design Lead
T [Redacted] | M [Redacted]

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[Redacted]

From: [Redacted]
Sent: 23 April 2020 16:16
To: [Redacted]
Cc: [Redacted]
Subject: FW: A29 Drainage Strategy
Attachments: Application Form for Ordinary Watercourse Consent_April_2020.pdf; 1b OWC Application Guidance notes_April 2020.pdf

Hi,
See attached and below.
Thanks
[Redacted]

From: [Redacted]@westsussex.gov.uk>
Sent: 23 April 2020 16:13
To: [Redacted]@fgould.com>; [Redacted]@fgould.com>
Cc: [Redacted]@fgould.com>; [Redacted]@wsp.com>
Subject: FW: A29 Drainage Strategy

fyi

[Redacted]
Engineering Project Manager - Major Projects
Highways, Transport and Planning
Highways and Transport
West Sussex County Council



Location: 1st Floor Northleigh, County Hall, Chichester, West Sussex PO19 1RH
Contact: Internal: [Redacted] | External: [Redacted] | Mobile: [Redacted] 0 | E-mail: [Redacted]@westsussex.gov.uk

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From: [Redacted]@arun.gov.uk]
Sent: 23 April 2020 15:57
To: [Redacted]
Cc: [Redacted]
Subject: RE: A29 Drainage Strategy

Hi [Redacted]

Land drainage consent for the connection to the ordinary watercourse (school ditch) would need to be obtained from myself, on behalf of the LLFA (with whom we have a partner arrangement). Any alterations to ditches or culverts also require consent.

Application form, etc enclosed. The application needs to be supported by fully detailed drawings.

Regards

[Redacted]
[Principal Engineer \(Drainage\)](#)

██████████ | Principal Engineer (Drainage), Engineering Services, [Arun District Council](#) | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
Internal: ██████████ | External: ██████████ | Fax: ██████████ | E-mail: ██████████@[arun.gov.uk](#)
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From: ██████████@[jackson-civils.co.uk](#)>
Sent: 23 April 2020 15:43
To: ██████████@[arun.gov.uk](#)>
Cc: ██████████@[jackson-civils.co.uk](#)>; ██████████@[westsussex.gov.uk](#)>
Subject: RE: A29 Drainage Strategy

Hi ██████████,

I've been speaking with the Environment Agency today with regards to approvals for discharging our proposed pond 3 into the existing Barnham Rife Ditch. These discussions have all been very positive and ██████████ has been very helpful.

It has occurred to me that we haven't yet discussed with you the procedures we need to follow so to obtain consent/approval for our proposals for discharging into the existing school watercourse from pond 4. I understand we need approval from the Lead Local Flood Authority here and this is subject to a separate consent with the LLFA, but am I right in assuming that this consent is required through yourself?

Could you kindly advise on who we need to engage with on this and the procedures we need to follow?

Many thanks.

Regards

The banner features the Jackson logo on the left. In the center, it reads 'Project Design Lead' with contact details 'T ██████████ | M ██████████'. On the right, there is a '24 Hours in JCE' logo with the hashtag '#Readyfortomorrow' and a 'GOOD WORKS' badge.

From: ██████████@[arun.gov.uk](#)
Sent: 06 April 2020 15:40
To: ██████████@[jackson-civils.co.uk](#)>
Cc: T ██████████@[jackson-civils.co.uk](#)>; ██████████@[westsussex.gov.uk](#)>; ██████████@[westsussex.gov.uk](#)>; ██████████@[westsussex.gov.uk](#)>
<██████████@[westsussex.gov.uk](#)>
Subject: RE: A29 Drainage Strategy

Hi ██████████,

Comments below. These are in addition to those comments already made by ██████████ on the 30th March.

1. Our preference would be for open features as opposed to crates (pond/tank 1).
2. Discharge to the Barnham Lane ditch from pond 3 – restrict discharge to QBAR (ie. 1 in 2.3 year storm) bearing in mind the known issues downstream. I appreciate that this will need to be run past WSCC highways due to their min. 5 l/s discharge requirement, however, a hydrobrake in combination with upstream measures can be utilised to reduce any risk of blockage to the control, as that is probably their primary concern.
3. As I do not currently have access to the previous groundwater monitoring and infiltration testing data, please ensure that the worst winter infiltration rate achieved (at the proposed depth of the structure) at each pond location (ponds 1 and 2) is used and that peak winter groundwater levels are taken into account. Groundwater levels appear to arrange between 5m bgl and 2.124m bgl at the four pond locations and infiltration rates of 1.24×10^{-4} and 1.78×10^{-5} (at pond 1 & 2), according to the current Technical Note (March 2020). This will need to be verified against previous data received.
4. Whilst ponds 3 and 4 are relying attenuation/restricted discharge, infiltration must be utilised where ever possible in their respective catchment areas (taking into account item 3 above). A hybrid arrangement of infiltration and restricted discharge to watercourses is the likely solution.
5. Due to the shallow ditch to which pond 3 is going to discharge too, connection via a shallow channel/swale is probably going to be needed as opposed to pipework. Environment Agency approval will be required due to this section being 'main river'.
6. Has winter groundwater monitoring and infiltration testing been carried out south of Barnham Road, in order to inform the design of pond 4?

Regards

██████████
Principal Engineer (Drainage)

██████████	Principal Engineer (Drainage), Engineering Services, Arun District Council	Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
Internal: ██████████	External: ██████████	Fax: ██████████ E-mail: ██████████@arun.gov.uk
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From: ██████████@jackson-civils.co.uk>
Sent: 02 April 2020 16:30
To: ██████████@arun.gov.uk>
Cc: ██████████@jackson-civils.co.uk>
Subject: RE: A29 Drainage Strategy

Hi ██████████,

██████████ has asked me to share the attached with you.

We would appreciate any comments you may have on our outline drainage strategy proposals for the A29 Realignment scheme.

Many thanks.

Regards



Project Design Lead
T [redacted] | M [redacted]



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From: [redacted]@westsussex.gov.uk]
Sent: 02 April 2020 15:45
To: [redacted]@jackson-civils.co.uk>; [redacted]@jackson-civils.co.uk>
Subject: FW: A29 Drainage Strategy

Fyi

[redacted]
Engineering Project Manager - Major Projects
Highways, Transport and Planning
Highways and Transport
West Sussex County Council



Location: 1st Floor Northleigh, County Hall, Chichester, West Sussex PO19 1RH
Contact: Internal: [redacted] | External: [redacted] | Mobile: [redacted] | E-mail: [redacted]@westsussex.gov.uk

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From: [redacted]@arun.gov.uk]
Sent: 01 April 2020 14:13
To: [redacted]
Subject: RE: A29 Drainage Strategy

I am afraid our IT dept are unable to download any files for us since they need to be in the office to do so and all are working from home.

Will have to let Kevin review the proposals (assuming he has managed to get them).

Regards

[redacted]
Principal Engineer (Drainage)

[redacted] | Principal Engineer (Drainage), Engineering Services, [Arun District Council](#) | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
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From: [REDACTED] <[REDACTED]@westsussex.gov.uk>

Sent: 01 April 2020 13:30

To: [REDACTED] <[REDACTED]@arun.gov.uk>; [REDACTED] <[REDACTED]@westsussex.gov.uk>; [REDACTED]

<[REDACTED]@westsussex.gov.uk>; [REDACTED] <[REDACTED]@wsp.com>; [REDACTED]

<[REDACTED]@pellfrischmann.com>; [REDACTED] <[REDACTED]@barratthomes.co.uk>; [REDACTED]

<[REDACTED]@pellfrischmann.com>; [REDACTED] <[REDACTED]@pellfrischmann.com>; [REDACTED]

<[REDACTED]@pellfrischmann.com>

Cc: [REDACTED] <[REDACTED]@jackson-civils.co.uk>; [REDACTED] <[REDACTED]@jackson-civils.co.uk>; [REDACTED]

<[REDACTED]@fgould.com>; [REDACTED] <[REDACTED]@fgould.com>

Subject: A29 Drainage Strategy

Good afternoon

Please find at this [link](#) the draft drainage strategy and associated documents for discussion at tomorrow's 14:00 online meeting for the A29 realignment scheme.

If you have declined the meeting I would be happy for you to comment via email.

Best regards

[REDACTED]

[REDACTED]

Engineering Project Manager - Major Projects
Highways, Transport and Planning
Highways and Transport
West Sussex County Council

Location: 1st Floor Northleigh, County Hall, Chichester, West Sussex PO19 1RH

Contact: Internal: [REDACTED] | External: [REDACTED] | Mobile: [REDACTED] | E-mail: [REDACTED]@westsussex.gov.uk

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