Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 11.9.6: Flood Risk Assessment – Annexes 1-2 – Clean Version

Book 5

VERSION: 3.0

DATE: AUGUST 2024

Application Document Ref: 5.3

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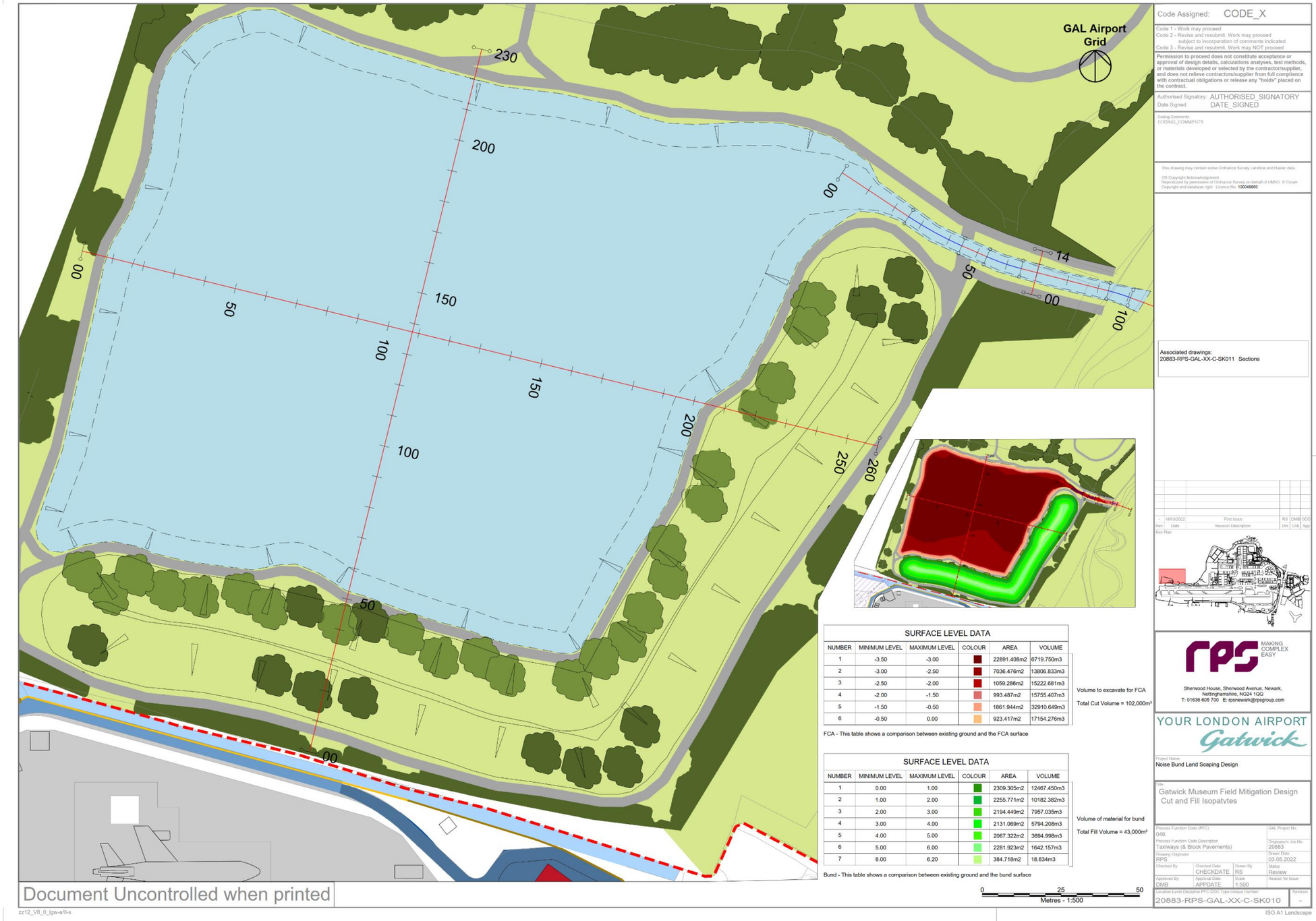
APFP Regulations 5(2)(a) **Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009**

Annex 1

Fluvial Mitigation Measures Indicative Designs



SURFACE LEVEL DATA

NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	-3.50	-3.00		22891.408m2	6719.750m3
2	-3.00	-2.50		7036.476m2	13806.833m3
3	-2.50	-2.00		1059.286m2	15222.681m3
4	-2.00	-1.50		993.487m2	15755.407m3
5	-1.50	-0.50		1861.944m2	32910.649m3
6	-0.50	0.00		923.417m2	17154.276m3

Volume to excavate for FCA

Total Cut Volume = 102,000m³

FCA - This table shows a comparison between existing ground and the FCA surface

SURFACE LEVEL DATA

NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	0.00	1.00		2309.305m2	12467.450m3
2	1.00	2.00		2255.771m2	10182.382m3
3	2.00	3.00		2194.449m2	7957.035m3
4	3.00	4.00		2131.069m2	5794.208m3
5	4.00	5.00		2067.322m2	3694.998m3
6	5.00	6.00		2281.923m2	1642.157m3
7	6.00	6.20		384.718m2	18.634m3

Volume of material for bund

Total Fill Volume = 43,000m³

Bund - This table shows a comparison between existing ground and the bund surface

Code Assigned: CODE_X

Code 1 - Work may proceed
Code 2 - Revise and resubmit. Work may proceed subject to incorporation of comments indicated
Code 3 - Revise and resubmit. Work may NOT proceed

Permission to proceed does not constitute acceptance or approval of design details, calculations analyses, test methods, or materials developed or selected by the contractor/supplier, and does not relieve contractors/supplier from full compliance with contractual obligations or release any "holds" placed on the contract.

Authorised Signatory: AUTHORISED_SIGNATORY
Date Signed: DATE_SIGNED

Coding Comments: CODING_COMMENTS

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Associated drawings:
20883-RPS-GAL-XX-C-SK011 Sections

Rev	Date	Revision Description	DRI	CHK	APP
-	16/03/2022	First Issue	RS	DMB	GDG

Key Plan

MAKING COMPLEX EASY
Sherwood House, Sherwood Avenue, Newark, Nottinghamshire, NG24 1QQ
T: 01636 605 700 E: rpsnewark@rpsgroup.com

YOUR LONDON AIRPORT Gatwick

Project Name: Noise Bund Land Scaping Design

Title: Gatwick Museum Field Mitigation Design Cut and Fill Isopatvtes

Process Function Code (PFC): 046	GAL Project No:
Process Function Code Description: Taxiways (& Block Pavements)	Originator's Job No: 20883
Drawing Originator: RPS	Drawn Date: 03.05.2022
Checked By: DMB / Checked Date: CHECKDATE / Drawn By: RS	Status: Review
Approved By: DMB / Approval Date: APPDATE / Scale: 1:500	Reason for Issue:
Location Level Discipline PFC-DOC Type Unique Number: 20883-RPS-GAL-XX-C-SK010	Revision: -

zz12_V8_0_lgw-a1-s

ISO A1 Landscape

Figure 10.1.1 Preliminary Museum Field FCA Design

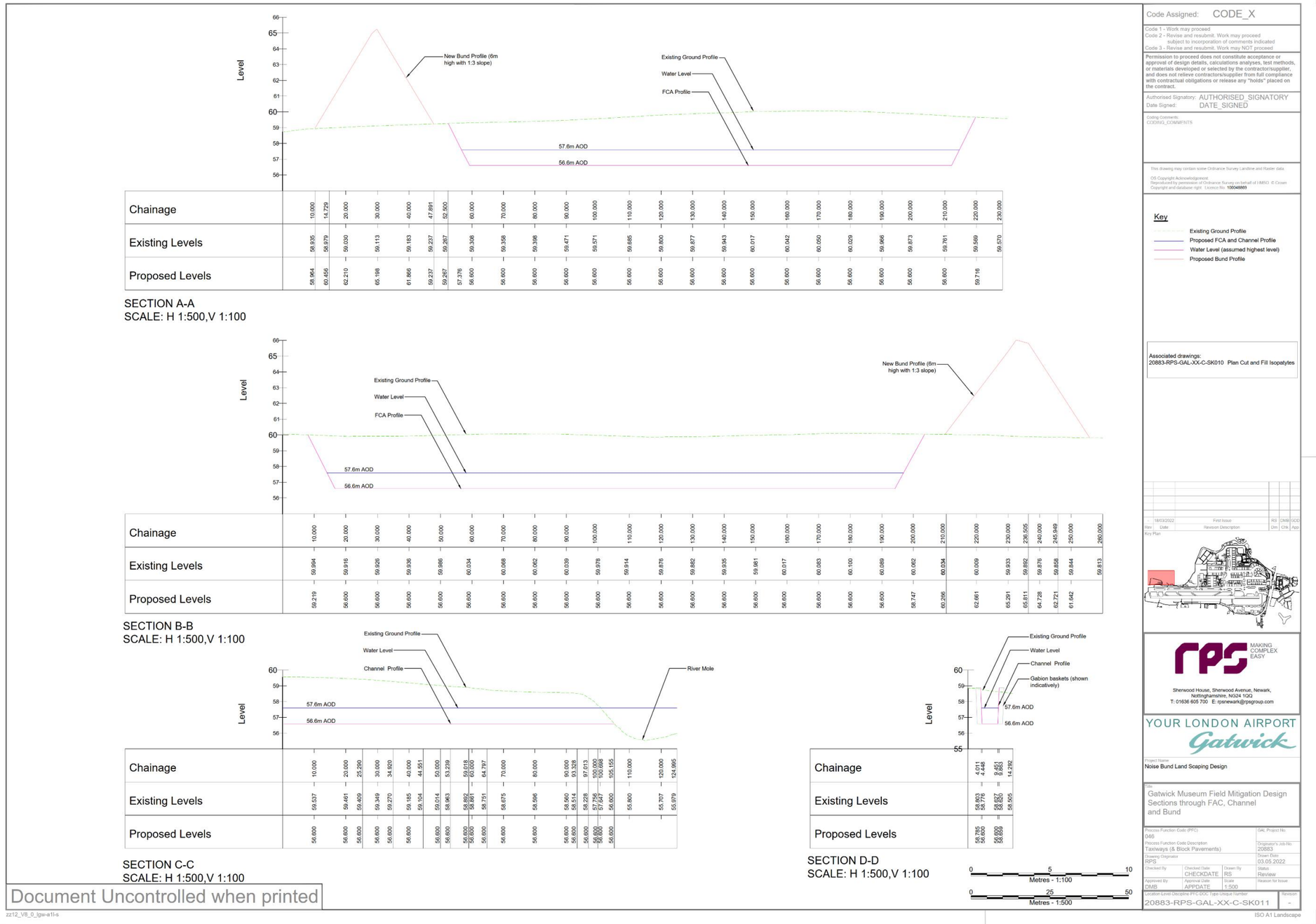

Figure 10.1.2 Preliminary Design Museum Field FCA Section

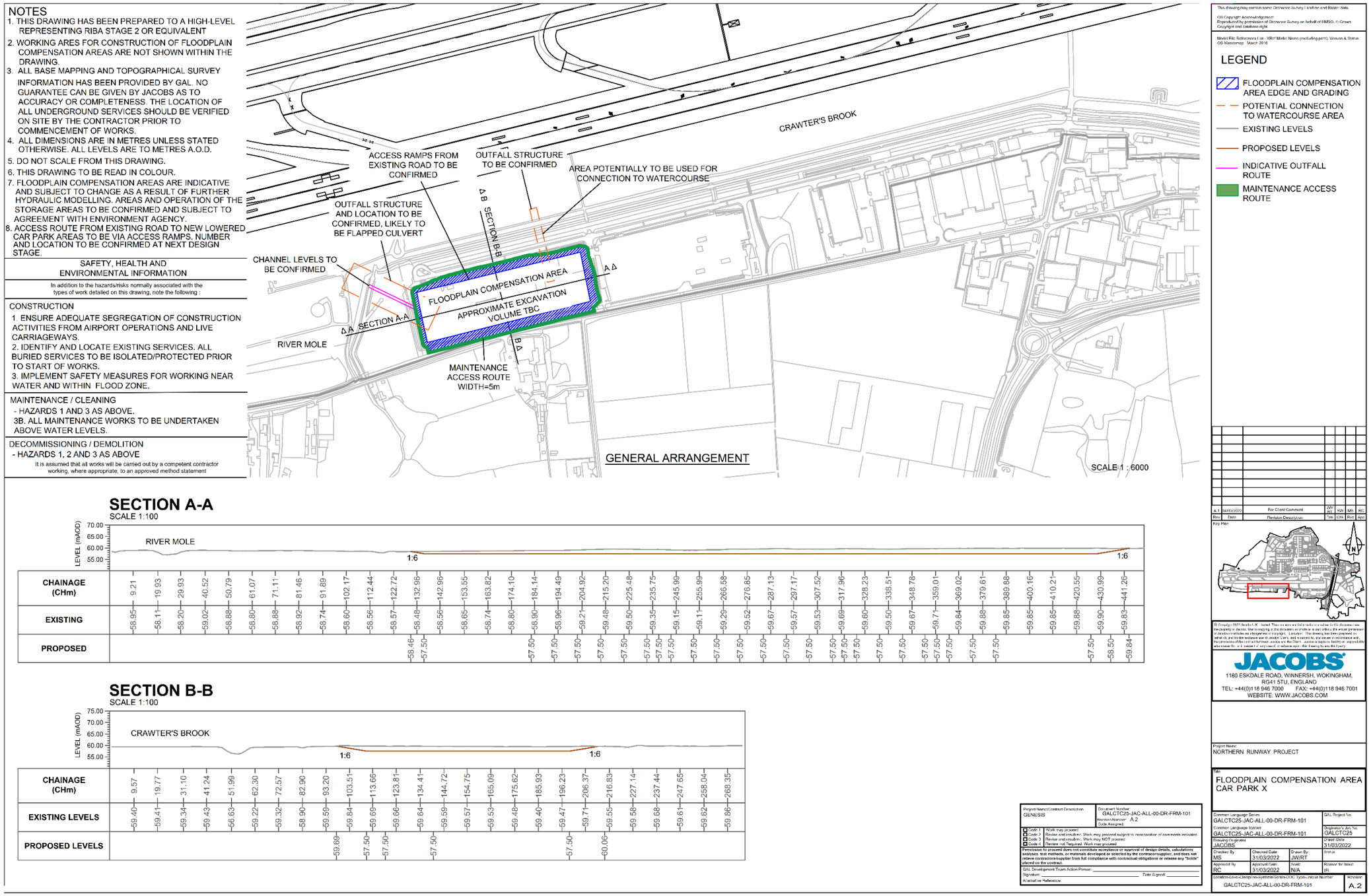

Figure 10.1.3 Preliminary Design Car Park X FCA

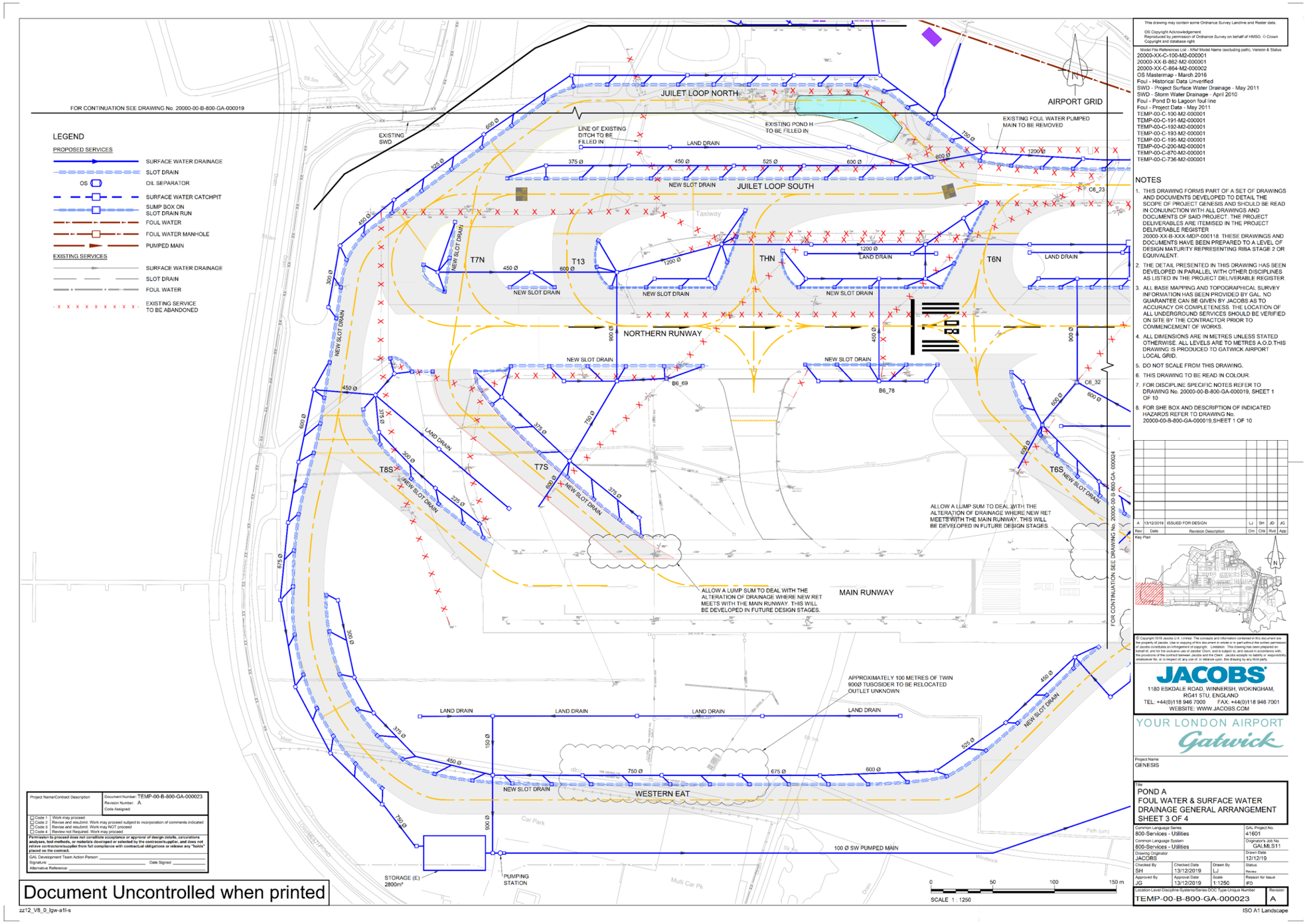

Figure 10.1.4 New southwest area Project drainage network

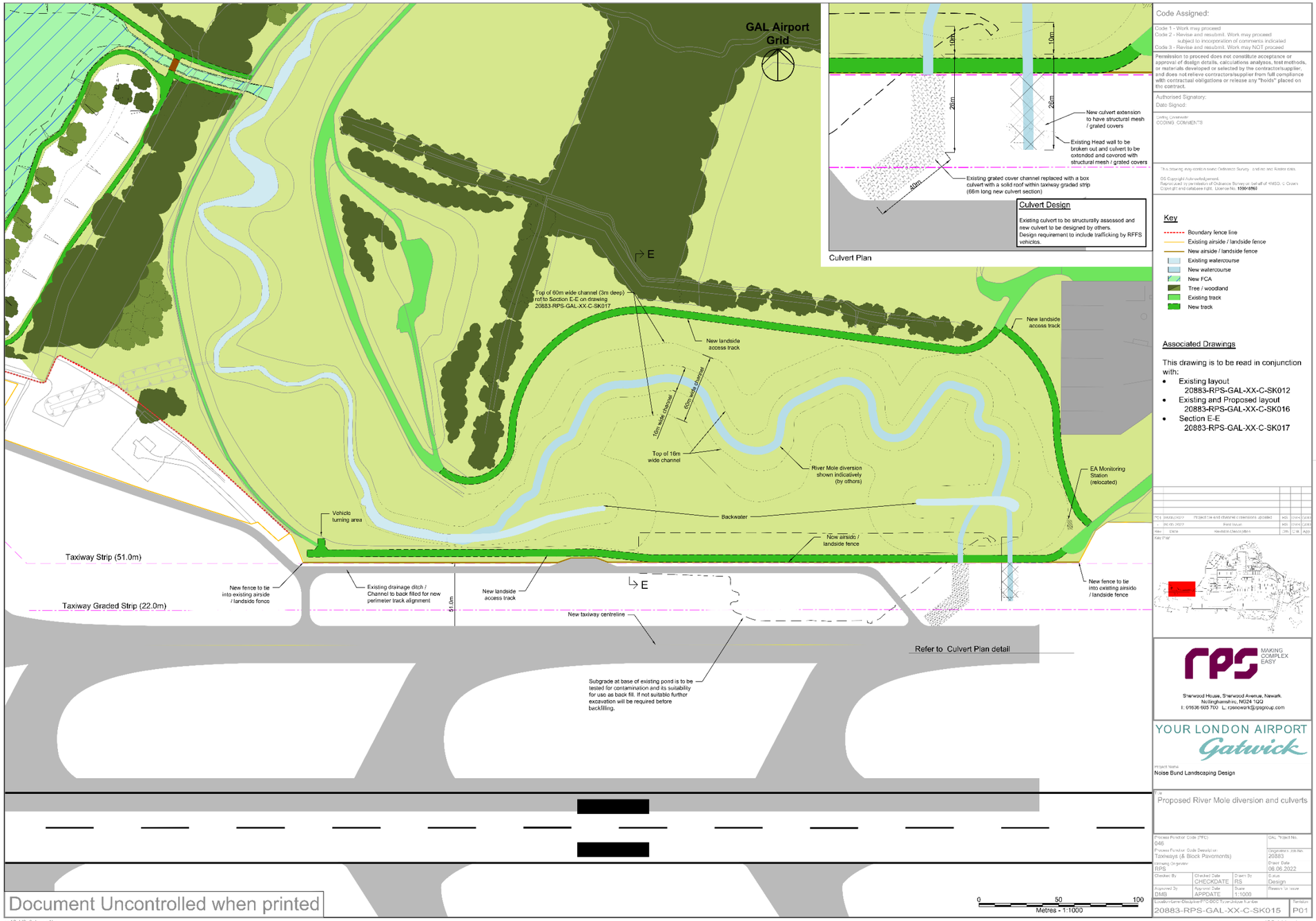

Figure 10.1.5 River Mole Realignment

Annex 2

Surface Access Highways Surface Water Drainage Strategy

Introduction

A2.1 The surface water drainage strategy for the proposed highway works associated with the Project has been developed in consultation with West Sussex County Council (WSCC) and Surrey County Council (SCC) as Local Lead Flood Authorities (LLFAs) and the National Highways SES team. The key aspects of the drainage strategy are set out below with this information having informed this FRA assessment.

A2.2 The report is based on the final preliminary design submitted as part of the Development Consent Order (DCO) submission.

A2.3 The report addresses the drainage strategy relating to the permanent highway works only and does not deal with the temporary construction works and associated drainage considerations. The **ES Appendix 5.3.2: CoCP Annex 1 – Water Management Plan** [REP3-020] sets out how water and drainage would be managed during construction. An appropriate drainage strategy would be developed to ensure all flood risks related to construction activities would be mitigated or safely managed within the Project site boundary.

A2.4 Highway mitigation proposals have been developed to accommodate the anticipated increase in traffic volumes associated with the planned Airport developments. Proposals include junction improvements at the North Terminal roundabout, South Terminal roundabout and Longbridge roundabout. The indicative programme is for construction of these works to take place between 2028 and 2032.

A2.5 The amendments made to this Annex in August 2024 address a request made by West Sussex County Council in the Statement of Common Ground Update at Deadline 5 to provide the change in impermeable area and discharge locations for each catchment.

Existing Drainage

A2.6 Existing drainage information was obtained from various sources including Highways Agency Drainage Data Management System (HADDMS), design/as-built drawings, drainage data from GAL, topographical survey (LiDAR point cloud), OS mapping and site walkovers. Limited areas had no information of existing drainage. For these areas, an estimation was made using best engineering judgment.

A2.7 In total, 18 existing drainage networks have been identified. Each network outfalls to various surface water bodies. The existing catchments are illustrated in **ES Appendix 11.9.6 Figure 10.1.10** (Doc Ref. 5.3).

A2.8 The highways improvement elements of the Project interact with the following watercourses designated as a 'Main River' by the Environment Agency: Burstow Stream, Haroldslea Stream, Gatwick Stream, River Mole and Withy Brook. It also interacts with various ordinary watercourses.

Longbridge Roundabout

A2.9 The highway authorities responsible for maintaining the existing highway drainage systems are WSCC for the A23 London Road and SCC for the Longbridge roundabout and the other three associated roads, i.e. A23 Brighton Road, A217 and Povey Cross Road.

A2.10 There are seven drainage networks (drainage network 8, 9, 10, 11, 12, 13 and 14) in this section.

A2.11 The highway runoff is collected by kerb and gully, combined kerb drainage (CKD) and iron shallow bridge deck units systems. The gullies and CKD are believed to be connected to ditches which convey the runoff to River Mole for Longbridge roundabout, A23 London Road and Brighton Road. The A217's gullies are believed to be connected to a ditch which convey the runoff to a tributary of Withy Brook. The outfall for Povey Cross network is unknown.

North Terminal Roundabout

A2.12 The highway authorities responsible for maintaining the existing highway drainage systems are WSCC for the A23 London Road; GAL for the airport access roads connecting to North Terminal roundabout; and National Highways (NH) for the North Terminal roundabout, A23 London Road merge and diverge connections to North Terminal roundabout, Airport Way and A23 London Road diverge to Airport Way eastbound, which form part of the Strategic Road Network.

A2.13 There are four drainage networks (drainage network 4, 5, 6 and 7) in this section.

A2.14 The highway runoff is collected by kerb and gully and kerb inlets system. These gullies and kerb inlets are connected to carrier drains / ditches and outfall to River Mole for all drainage networks except for the A23 London Road diverge to Airport Way eastbound which outfalls to Gatwick Stream. Drainage network 7 (GAL's roads) benefit from existing attenuation (Gatwick Pond D).

South Terminal Roundabout

A2.15 The highway authorities responsible for maintaining the existing highway drainage systems are GAL for the Ring Road North and South airport access road connection to South Terminal roundabout; NH for the South Terminal roundabout, M23 Spur motorway and Airport Way; SCC for B2036 Balcombe Road North of M23 Spur; and WSCC for B2036 Balcombe Road South of M23 Spur.

A2.16 There are seven drainage networks (drainage network 3, 2a, 2, 1b, 1a, 1 and 0) in this section.

The highway runoff is collected by kerb and gully, CKD and slot drainage systems. These are connected to carrier pipes / ditches. All drainage networks west of the Balcombe Road underbridge outfall to Gatwick Stream. Drainage network 3 (GAL's roads) benefit from existing attenuation (Gatwick Pond F). Drainage network of the M23 Spur also benefits from existing attenuation (Pond 8-5) prior to discharging its runoff to a tributary of Burstow Stream. One gully immediately east of Airport Way Rail Bridge directly outfall to an unnamed watercourse. Likewise, a gully immediately east of Balcombe Road underbridge outfall to Haroldslea Stream. Runoff from Balcombe Road is also believed to outfall to Haroldslea Stream.

Drainage Design Proposals

A2.17 The proposed preliminary drainage design layout including details of proposed attenuation features is shown in **ES Appendix 11.9.6 Figure 10.1.6** to **Figure 10.1.9** (Doc Ref 5.3). The proposed preliminary design catchments are illustrated in **ES Appendix 11.9.6 Figure 10.1.11** (Doc Ref. 5.3).

Proposed Highway Works

A2.18 The proposed highway works include a full grade separation upgrade of South Terminal Roundabout and modifications to the M23 Spur; a partial grade separation and signalisation works at North Terminal Roundabout; and roundabout widening and signalisation works at Longbridge Roundabout. A full description of the proposed highway works is set out in section 5.2 of **ES Chapter 5: Project Description** [REP6-013]. The total net increase in paved areas as a result of the proposed highway work is 2.91 ha.

A2.19 Proposed catchment areas with net increased/decreased in impermeable areas for all proposed networks are summarised in Table A2.1. This includes the area of attenuation basins and pond.

A2.20 Total net increase in impermeable areas per outfalls and total net increase for the surface access element of the scheme is summarised in Table A2.2.

Table A2.1: Proposed Catchment Areas

Proposed Sub-Catchment	Proposed impermeable catchment (ha)	Proposed gross permeable catchment (ha)	Proposed vs existing impermeable areas (+/-ha)	Outfall to:
0	0.17	0.20	0.00	Burstow Stream
1	2.08	0.07	+0.26	Pond 8-5
1A	0.00	0.47	-0.02	Haroldslea Stream
1B	0.18	0.00	+0.02	Haroldslea Stream
2	2.90	3.95	+1.11	Gatwick Stream
2A	0.00	0.11	-0.03	Unnamed watercourse
3	0.10	0.07	0.00	Gatwick Stream
4	1.21	1.22	-0.01	Gatwick Stream
5	2.65	4.60	+0.43	River Mole
6	1.71	0.12	+0.53	River Mole
7	0.91	1.18	+0.11	River Mole
8	0.00	0.03	-0.05	River Mole
9	0.00	0.04	-0.15	River Mole
10	0.00	0.04	-0.26	River Mole
11	1.10	0.26	+0.83	River Mole
12	0.30	0.03	+0.11	River Mole
13	0.12	0.00	0.00	Unknown
14	0.22	0.00	+0.03	Withy Brook

Table A2.2: Net increase in impermeable areas per outfall

Outfall	Net increase in impermeable areas (ha)
Existing Pond 8-5	0.26
Haroldslea Stream	0.00
Gatwick Stream	1.10
River Mole	1.55
Withy Brook	0.03
Total net increase in impermeable areas (ha)	2.91

Surface Water Management and Sustainable Drainage System

A2.21 Surface Water Management (SWM) proposals have been developed in consultation with the LLFAs (WSCC and SCC) and National Highways. It has also been developed in accordance with the LLFA's policies on SWM and Sustainable Drainage Systems (SuDS) and the Design Manual for Roads and Bridges (DMRB) standard CG 501 and LA 113.

A2.22 The existing outfalls to surface water bodies are proposed to be retained with provision for attenuation. Discharging to ground via infiltration is not assumed at this preliminary design stage due to the soil type (heavy clay) and lack of information on the ground water table and ground condition.

A2.23 The drainage strategy seeks to achieve an overall betterment to the existing outfalls on brownfield sites with climate change allowances. This will reduce the flood risks on the receiving surface water bodies.

A2.24 Where practical, the discharge from greenfield and brownfield sites are proposed to be limited to the 100 per cent (1 in 1) Annual Exceedance Probability (AEP) (Q1) greenfield runoff rates (GRR) for storm event of up to 1 in 100 (1 per cent AEP) for the drainage networks within WSCC boundaries and limited to Q1, Q30 and Q100 GRR for the corresponding storm event for the drainage networks within SCC boundaries with climate change allowances. This is proposed to be achieved via proposed attenuation ponds, basins and swales.

A2.25 Where limiting to GRR is not practical, it is proposed to not exceed the existing discharge rate as a minimum requirement. Attenuation oversized pipes have been proposed to limit the discharge rates to existing for these drainage networks.

A2.26 Hydraulic models have been produced for the existing and proposed drainage networks. Betterment will be achieved in discharge rates to the River Mole and Gatwick Stream respectively as a result of the proposed drainage. Proposed net increased in paved areas for drainage networks that outfalls to River Mole and Gatwick Stream forms 90 per cent of the total net increase in paved area of the scheme. Betterment in these two watercourses will have a number of benefits including a reduced risk of flooding for these watercourses.

A2.27 Existing discharge rates to the tributary of Burstow Stream, Haroldslea Stream and the tributary of Withy Brook will not be exceeded as a result of the proposed drainage.

A2.28 The design would ensure that the post development runoff would be managed within the site up to 1 in 100-year event with climate change allowance.

A2.29 Areas of paved catchment are proposed to be removed where practicable to reduce discharge rates and improve water quality to receiving watercourses.

A2.30 Ponds, basins and swales shall be design in accordance with DMRB CD 532 and CIRIA (C753) SuDS Manual.

Highway Drainage Design Criteria

A2.31 The highway drainage is to be designed in accordance with DMRB CG 501 and LA 113 for National Highway (NH) unless agreed otherwise.

A2.32 The final drainage design for NH assets shall be self-certified as per Design Manual for Roads and Bridges (DMRB) CG 502 - The certification of drainage design at a future design stage and prior to construction of any drainage work in in relation to the proposed surface access (highway) works associated with the Project.

A2.33 For highways drainage works to be adopted by WSCC and SCC, the requirements and approval process of each local authority shall be followed.

A2.34 Following guidance from the LLFAs which aligns with both DMRB guidance and industry good practice the proposed highway drainage design adopts the below hierarchy for the preferred method of discharge (in order of preference):

- Infiltration to ground (subject to the outcome of further ground investigation to confirm ground infiltration rates, groundwater levels, potential contaminated land presence etc. and taking into account localised flood plains considerations)
- Discharge to a surface water body,
- Discharge to an existing public surface water sewer,
- Discharge to an existing highway drain, or other private drainage system, or
- Discharge to an existing foul or combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.

Allowance for Climate Change

A2.35 Climate change allowances adopted for SWM are based on the Environment Agency's peak rainfall allowance map for the Mole Management Catchment. The 2070s epoch and upper end allowance was adopted which includes 40 per cent climate change allowance for peak rainfall of 1 per cent (1 in 100) AEP event, as well as 35 per cent for 3.33 per cent (1 in 30) AEP event.

A2.36 Climate change allowance adopted for drainage design is 20 per cent based on DMRB CG 501.

Runoff Collection Systems

A2.37 Surface runoff collection systems have not been designed at this preliminary design stage.

A2.38 Where a kerb is proposed due to adjacent footway provision or other reasons, kerb and gully systems shall be proposed where practical for ease of maintenance. This shall be designed in accordance with DMRB CD 526. Where not practical, CKD shall be proposed.

A2.39 Grassed surface water channels (SWCs) or other open vegetative systems shall be selected as preferred solution at edge of the carriageway where possible. Where not practical, concrete SWCs shall be proposed for ease of maintenance. This shall be designed in accordance with DMRB CD 521.

A2.40 Subsurface drainage shall be provided at lower edge of carriageway where needed.

A2.41 The proposed highway re-alignment of A23 London Road Diverge to Airport Way and changes to Airport Way requires the existing gullies to be re-aligned to the proposed pavement edge if possible or replaced with new gullies.

Land Drainage

A2.42 The proposed highway works have limited impacts on existing land drainage. Land drainage is impacted to the southeast of the Balcombe Road underbridge south of the M23 Spur. A short section of the existing land drainage is proposed to be diverted before connecting to Haroldslea Stream as seen in **ES Appendix 11.9.6 Figure 10.1.9** (Doc Ref. 5.3).

Culverts

A2.43 No culverts on Main Rivers are impacted by the proposed highway works of the Project.

A2.44 Balcombe Road underbridge is proposed to be converted to a single span bridge requiring culverting the ordinary watercourse on the western side of Balcombe Road as seen **in ES Appendix 11.9.6 Figure 10.1.9** (Doc Ref. 5.3). There are two more short culverts proposed under proposed access from Balcombe Road

for the same ordinary watercourse. These culverts shall be designed in accordance with WSCC LLFA Culvert Policy.

A2.45 Existing culverts EX-CU2 (refer to **ES Appendix 11.9.6 Figure 10.1.9** (Doc Ref 5.3) for location under M23 Spur) and EX-CU4 (refer to **ES Appendix 11.9.6 Figure 10.1.6** (Doc Ref 5.3) for location under A23 Brighton Road) are to be extended to accommodate proposed road widening at these locations. Further information on the condition and capacity of the existing culverts are to be obtained following completion of the DCO process to inform the detailed design proposals.

Exceedance Routes

A2.46 Drainage design should cope with events that exceeds design capacity of drainage networks so that excess runoff can be safely stored within the site without adverse impact.

A2.47 Existing site benefits from flood defences from Gatwick Airport. These are proposed to be retained.

A2.48 300mm freeboard shall be provided for all attenuation ponds and basins. Additionally, overflow weirs shall be provided in ponds, basins and proposed flow control chambers to cope with risk of blockage.

Water Quality

A2.49 In accordance with DMRB LA 113, assessments for routine runoff and spillage risk have been undertaken using the Highways England Water Risk Assessment Tool (HEWRAT) to determine any pollution risk resulting from surface water routine runoff to the receiving water environment as a result of the proposed highways work of the Project. The final results of the HEWRAT assessment can be found in **ES Appendix 11.9.3: Water Quality HEWRAT Assessment** [REP5-025].

A2.50 Each of the proposed drainage outfalls 'Pass' all parameters (Environmental Quality Standards (EQS) for copper and zinc, Runoff Specific Thresholds (RST) 6-hour and 24-hour for copper and zinc and sediment-bound pollutants). Further information is included in the **ES Appendix 11.9.3: Water Quality HEWRAT Assessment** [REP5-025].

Conclusions

A2.51 The proposed highways works to be undertaken as part of the Project would result in an increase in highways capacity and a corresponding increase in paved areas. Proposed highway works would be required at three locations: Longbridge Roundabout, North Terminal Junction and South Terminal Junction.

A2.52 The additional runoff that would result from the increase in paved areas would be stored in new facilities and attenuated to achieve an overall betterment in discharge rates to reduce flood risk at receiving surface water bodies.

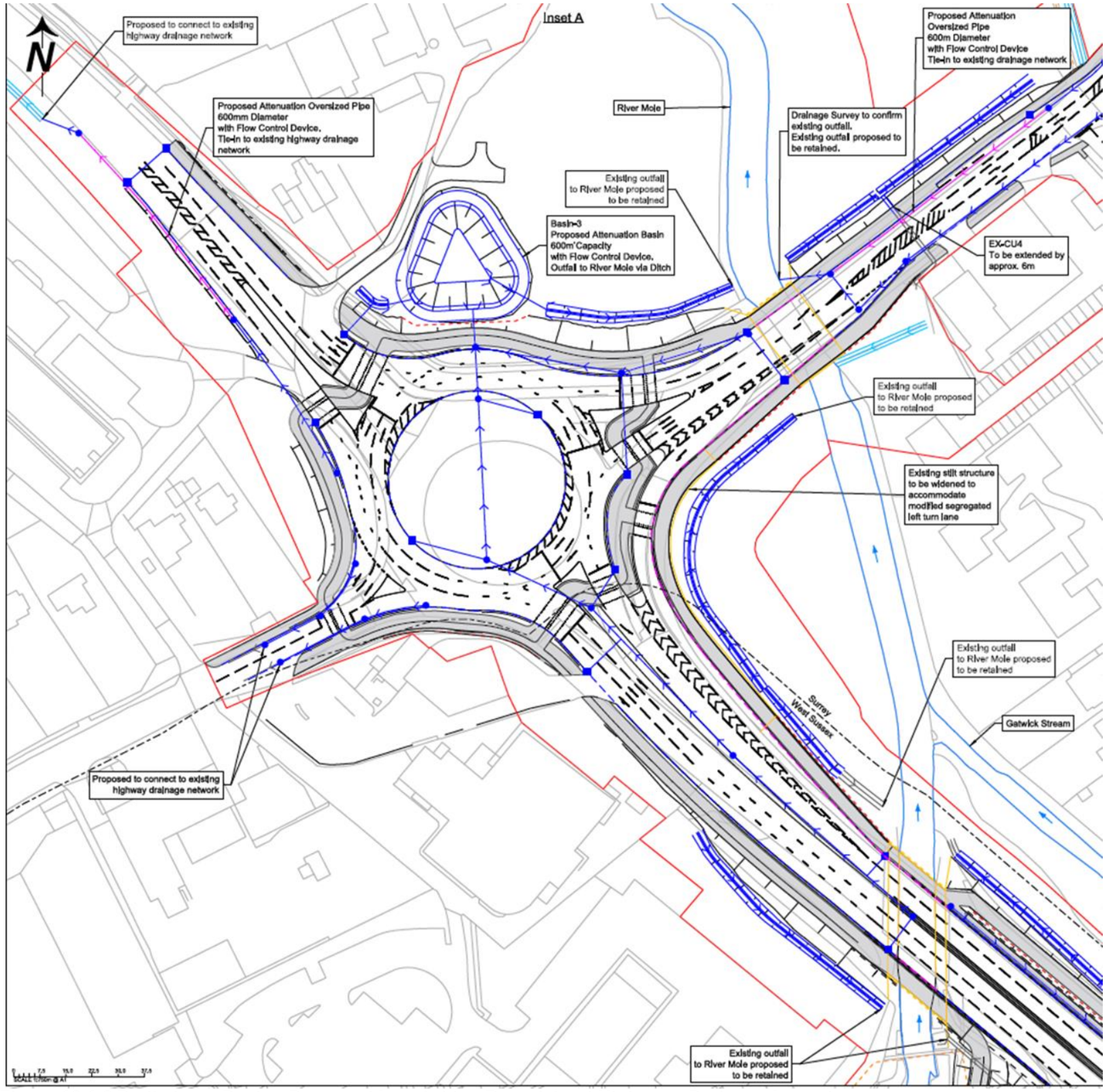

Figure 10.1.6 Preliminary Design Proposed Longbridge Roundabout Highways Drainage Layout

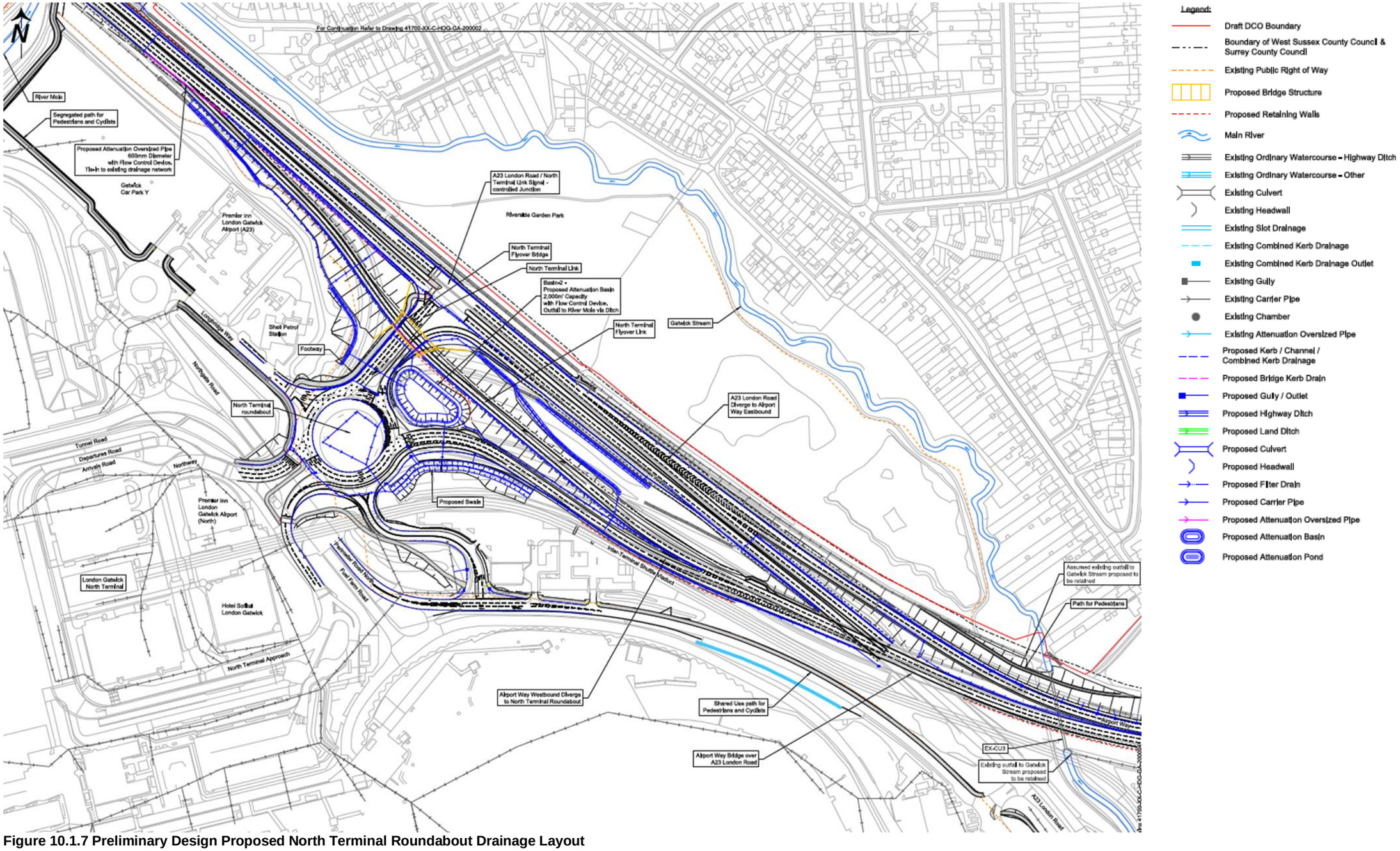

Figure 10.1.7 Preliminary Design Proposed North Terminal Roundabout Drainage Layout

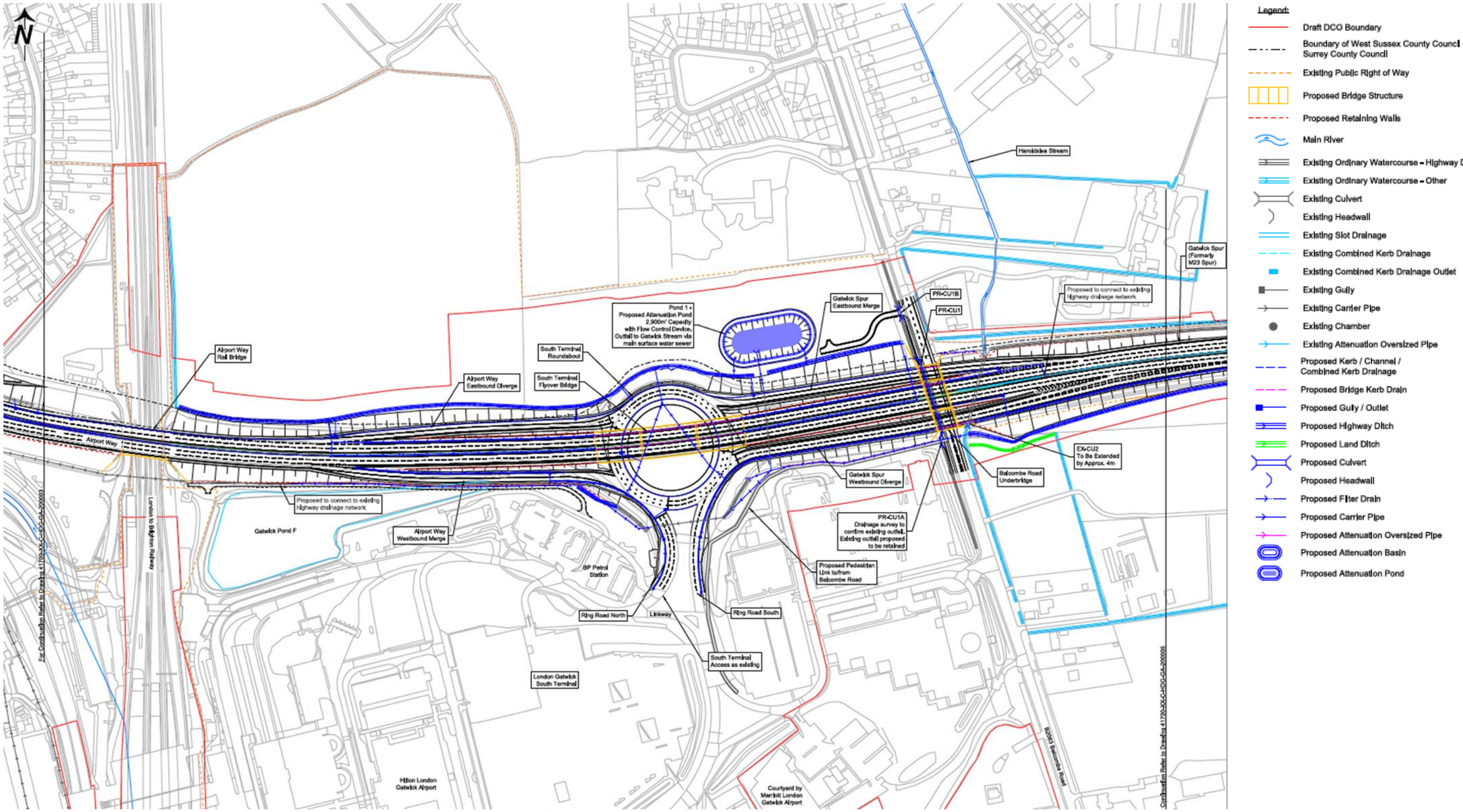

Figure 10.1.8 Preliminary Design Proposed South Terminal Roundabout – West Drainage Layout

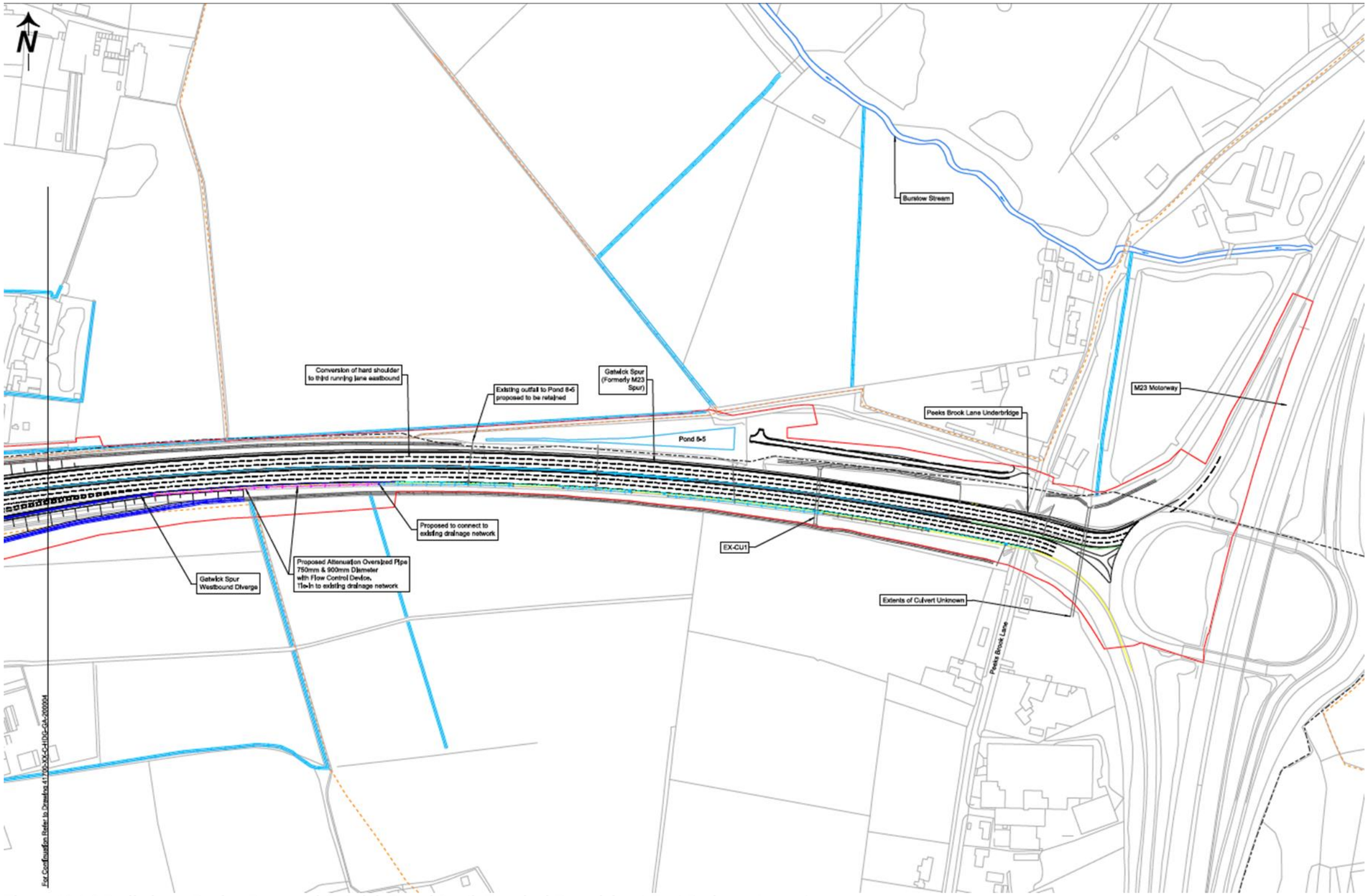

Figure 10.1.9 Preliminary Design Proposed Gatwick Spur / South Terminal Roundabout East Drainage Layout

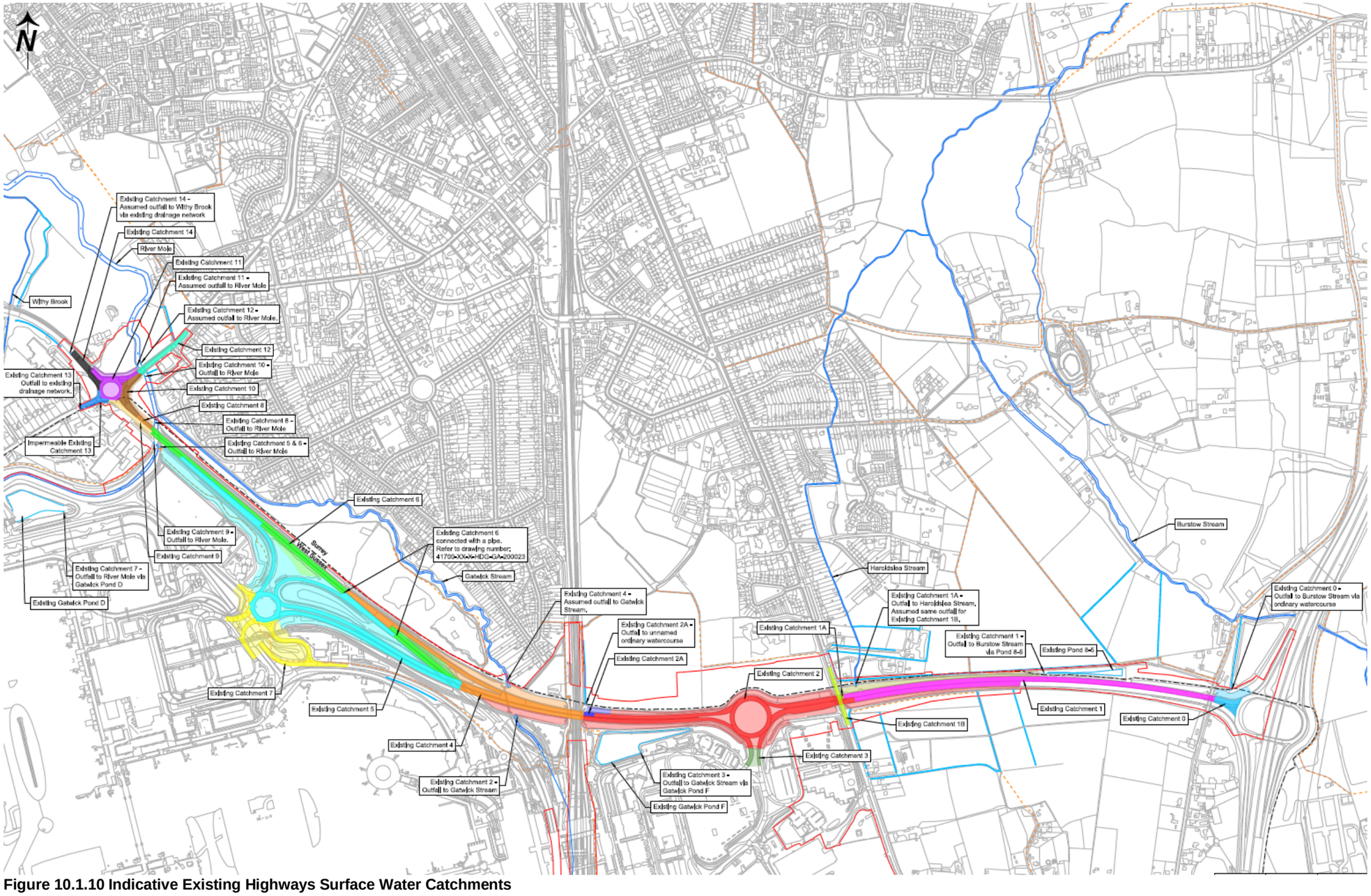

Figure 10.1.10 Indicative Existing Highways Surface Water Catchments

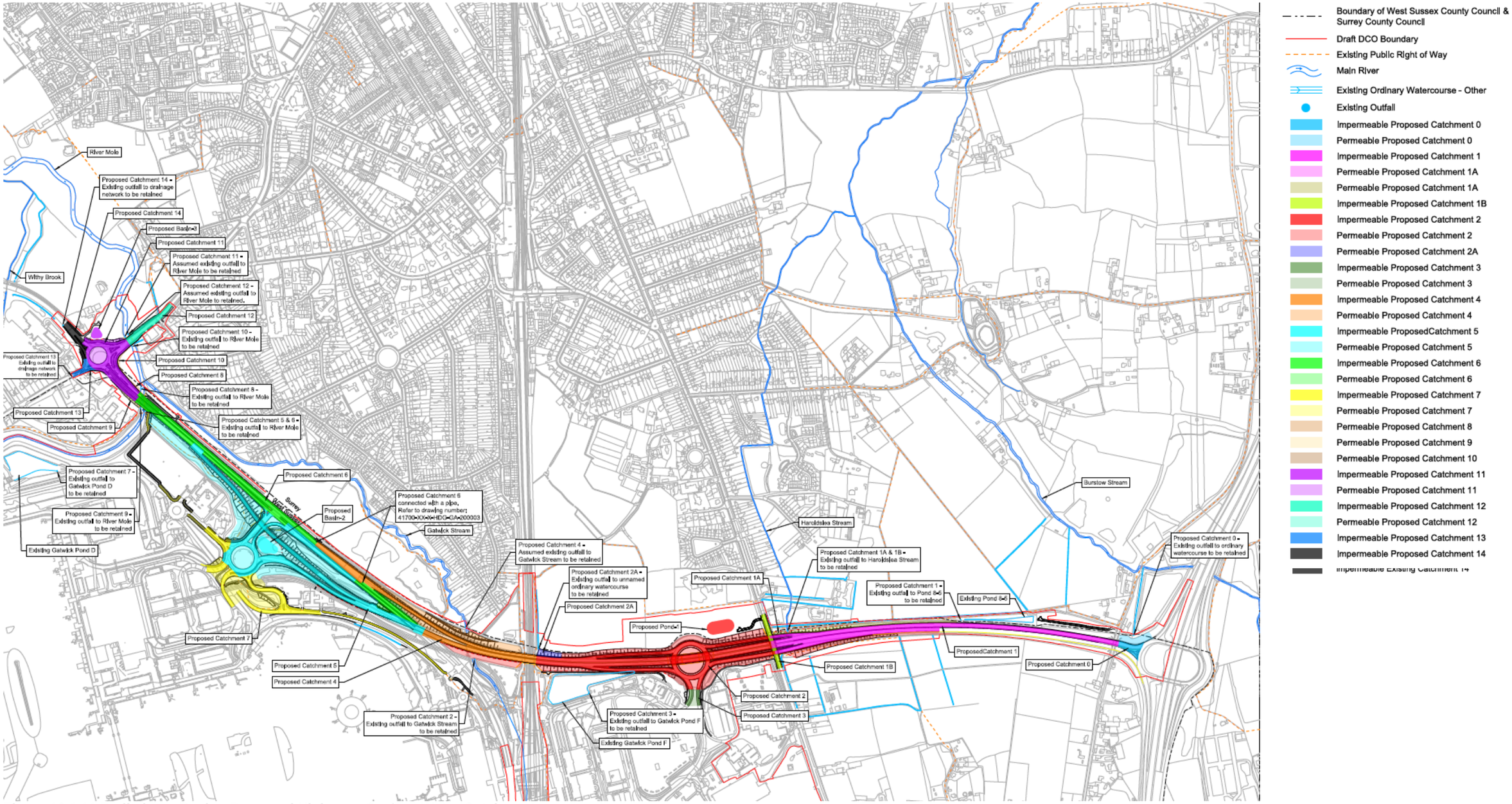

Figure 10.1.11 Preliminary Design Proposed Highways Surface Water Catchments