

Outline Surface Water Management Plan

1867 – GCRE Onllwyn Road Bridge & Embankment

Reason for Issue	For Planning	Author	A Garman
Date	12/12/2023	Checked	F Wyatt
Issue	P03	Approved	T Hull

Introduction

This technical note has been created to accompany the planning application, and provide a high level overview of the Surface Water Management Plan for the GCRE Bridge and Embankment project. For background of the project, existing site information and details regarding the emerging bridge/embankment design, reference should be made to the Expedition RIBA Stage 2 Report: 1867-EXP-RE-001.

This note does not constitute a full Drainage Strategy for Planning or SuDS Approval Body (SAB) Report. This will be produced at the next stage, in consultation with the SAB.

Drainage strategy

A sustainable drainage strategy is proposed, integrated with the landscaping, green infrastructure and existing watercourses and with climate resilience at its heart.

All developments in Wales, that are larger than 100m² must conform to Schedule 3 of the Flood and Water Management Act 2010 [1] and seek approval from the SAB (SuDS Approval Body) before construction can commence. Key strategic aims and principles for the development of this sustainable drainage system will be agreed with the SAB. In this instance, Neath Port Talbot (NPT) are acting as the lead SAB. In the next stage, it will be necessary to undertake drainage network modelling and prepare appropriate documentation to support the drainage strategy, which will need to be reviewed and approved by the SAB.

With reference to the Natural Resources Wales (NRW) Development Advice Map (DAM) [2], the Site is shown to be entirely located in Flood Zone A, which is considered to be at little or no risk of fluvial flooding. Due to the inland location, tidal/coastal flooding is not considered a risk. On this basis, a Flood Consequence Assessment will not be required.

A sketch showing an overview of the existing drainage features on the site is shown below in Figure 1, following a site walkover and review of available desktop information. It is understood that in the existing condition the current bridge and highways drain via positive piped drainage system to local drainage ditches, which will be verified by survey during RIBA3. The local drainage ditches are understood to flow into the River Dulais to the west of the site.

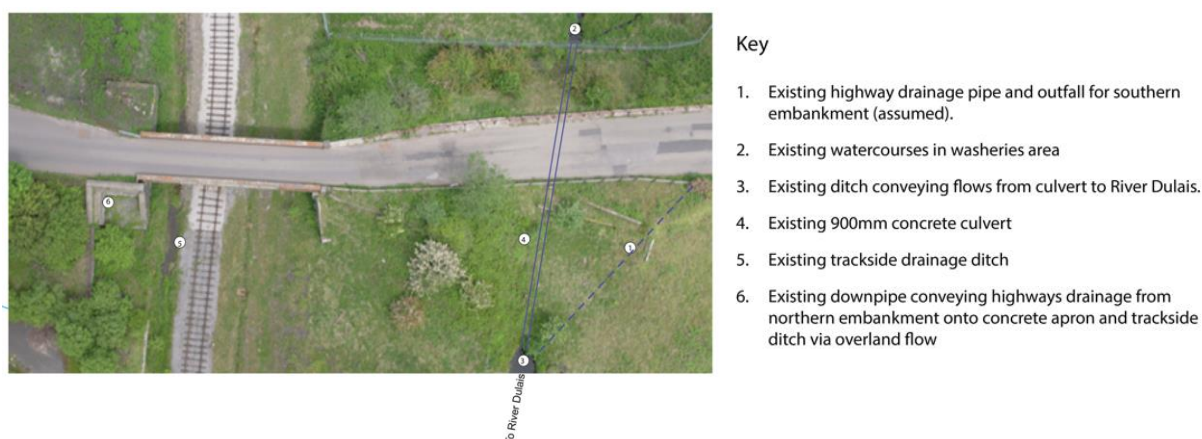


Figure 1: Existing surface water drainage

It is proposed to widen the bridge and realign the road on the approaches to suit and therefore there will be an overall increase in impermeable surfaces on the site, mainly on the bridge and south side of the site. The approximate impermeable surface water catchment area in the existing and proposed condition, is shown in Table 1 below.

	Existing area (Ha)	Proposed area (Ha)
North embankment	0.060	0.058
South embankment	0.025	0.035
Bridge	0.010	0.024
Total	0.095	0.117

Table 1: Approximate impermeable surface water catchment areas

There is an existing 900mm diameter concrete culvert (“southern culvert” herein) running beneath the south approach of the embankment (refer to Figure 2 and 3 below), which conveys flows from the washeries area to a ditch located at the bottom of the south-west embankment, ultimately discharging into the River Dulais. The invert levels of the existing culvert are included in Appendix B. The current RIBA2 design assumes that the southern culvert will be replaced and realigned to accommodate the increase in overburden from the new embankment above and to suit potential future development options for the GCRE site. This will likely require permission through the SAB for an ordinary watercourse diversion and will need to be checked hydraulically (through a separate enabling works package) with the proposed levels, associated head loss, and effect on upstream channels.

If the strategy changes, and the existing culvert is to be retained, there will be a requirement to undertake a survey to assess the structural condition and suitability of the culvert pipe, including a loading assessment from the new raised embankment (c.3m increase) and providing an extension to suit the new embankment layout. It may be necessary to provide a bridging structure over the existing culvert to accommodate the additional load associated with the raised embankment.



Figure 2: Picture downstream of the culvert



Figure 3: Picture of existing culvert

The surface water drainage strategy, shown in Appendix A (drawing 1867-C081-P2), has been developed in line with the following key principles and policies:

- Adopting the most sustainable disposal route for surface water drainage flows, in line with the drainage hierarchy set out in the SuDS Manual [3]
- Implementing source control measures to reduce surface water runoff and intercept diffuse pollutants at source.
- Controlling erosion of receiving watercourses
- Contribution to enhancing biodiversity and amenity
- Implementing a resilient approach to flooding considering the effects of climate change and making a positive contribution to reducing off-site flood risk, in line with BS EN 752 [4].
- Ensuring that the performance of the system is maintained over its life through active maintenance.

The SuDS Manual [19] defines the following drainage hierarchy in order of preference: infiltration to the maximum extent that is practical where it is safe and acceptable to do so; discharge to surface water courses; discharge to surface water sewers; and discharge to combined sewers, as a last resort.

Due to the high presence of ground water and low infiltration rates, it is not deemed appropriate to use infiltration. This will be verified through the GI and testing in accordance with BRE365 [5].

On that basis it is proposed to discharge all surface water runoff from the impermeable areas to the local drainage ditches on each side of the bridge, with the ultimate point of discharge to the River Dulais to the west of the site. This replicates the existing situation.

Attenuation is provided to ensure that existing runoff from the site will not be increased and a small betterment will be achieved. The exact betterment will be confirmed at the next stage and in agreement with the SAB.

Due to site constraints in the landscaping on the north side of the bridge, it is proposed that the surface water flows from the northern catchment of impermeable areas (which includes the northern embankment highway surface only) will discharge unattenuated into the existing trackside drainage ditch. Roadside raingardens are incorporated to provide an element of source control and pollution mitigation measures for a proportion of the highways runoff. A swale and filter drain will be incorporated into the landscape beside the toe of the north-eastern embankment, discharging directly to the trackside ditch.

For the southern catchment of impermeable areas (which includes the bridge itself and the southern embankment highway surface), it is proposed to create roadside raingardens to provide attenuation and pollution control measures for a proportion of the highways runoff. A series of ecological streams and channels will be created to convey rainwater runoff to a new offline wetland feature with a proportion of permanent water, providing further attenuation and pollution control measures for the whole southern catchment. This will be integrated into the landscape to provide varied ecological habitats and maximise amenity. There will be a controlled discharge via a weir and chamber with an orifice plate or hydrobrake to the existing drainage ditch, to convey flows to the River Dulais.

The controlled discharge rate for the southern catchment will be set to achieve a betterment in global runoff rates for the whole site, as noted above.

The southern catchment drainage system will be designed for:

- No surface water flooding for all events up to 1 in 30-year return period
- Containment on site for extreme events up to the 1 in 100-year return period with an additional allowance for climate change of 20%.
- Managing flow velocities within the proposed system to control slope stability, soil erosion and scour.

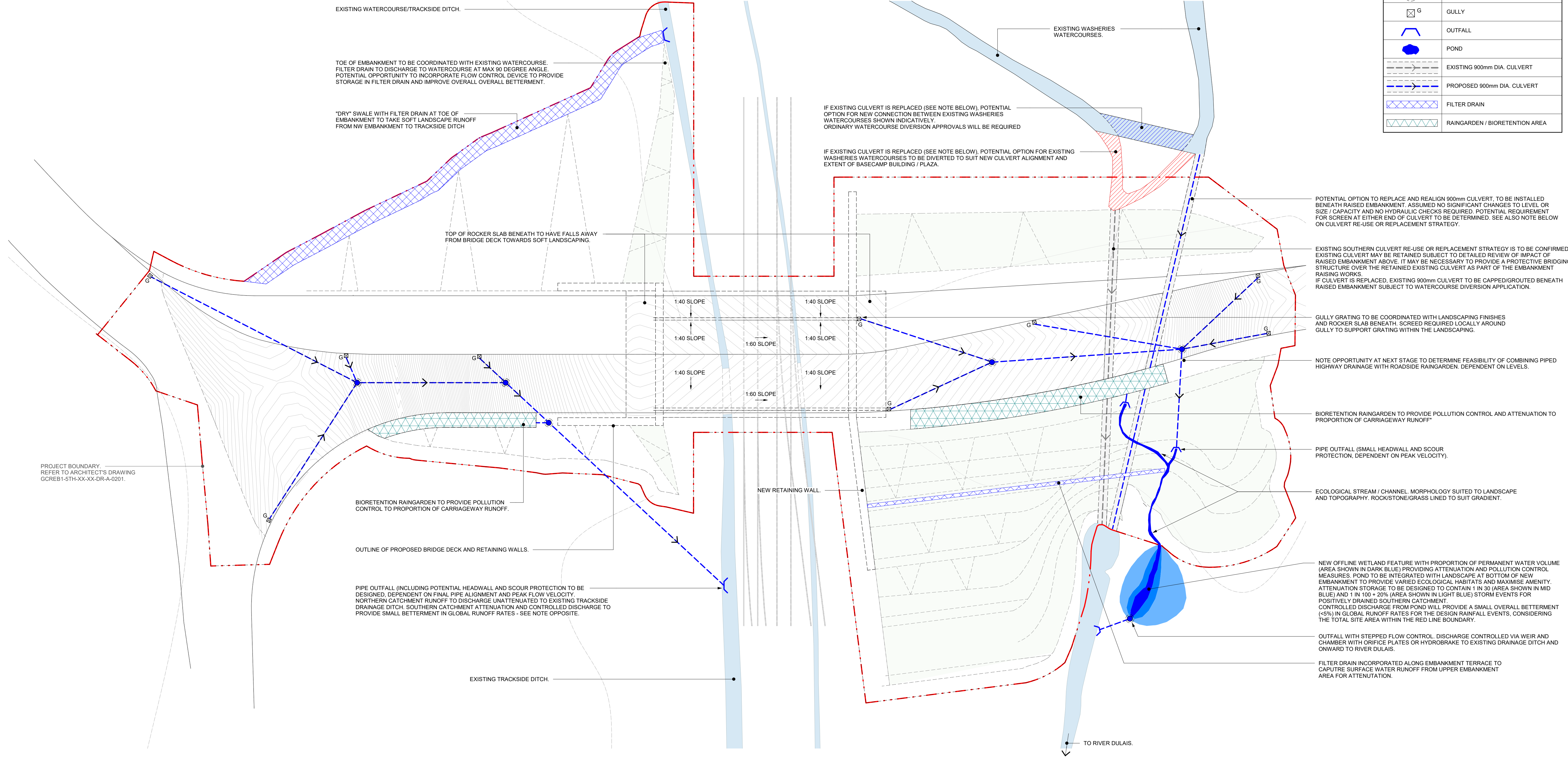
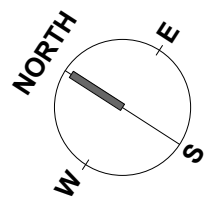
These parameters will be discussed and agreed with the SAB during RIBA Stage 3.

A maintenance and management plan will be developed to safeguard the performance of the drainage system over its entire design life. This will be based on guidance from the SuDS Manual (CIRIA C753) [3] and will cover all elements of the system including attenuation basins, flow control devices, gullies, pipes, inspection chambers and outfalls. The system will be offered for adoption to the NPT Highways Authority for future maintenance.

References

- [1] Flood and Water Management Act, “Schedule 3: Sustainable drainage”, 2010
- [2] Natural Resources Wales (NRW) Development Advice Map (DAM), 2020, available at:
<https://naturalresourceswales.gov.uk/flooding/flood-map-for-planning-development-advice-map/>
(06/07/2023)
- [3] CIRIA, “C753 - The SuDS Manual”, 2015
- [4] BSI Group, BS EN 752:2017, “Drain and sewer systems outside buildings – sewer system management”, 2017
- [5] The British Research Establishment (BRE), “BRE Digest 365 – Soakway design”

Appendix A – Proposed Drainage General Arrangement: 1867-C081-P3



NOTES:

- THE SIZING OF BRIDGE/EMBANKMENT ONLY SURFACE WATER FEATURES IS INDICATIVE AT THIS STAGE AND TO BE DEVELOPED AT DETAILED DESIGN IN CONSULTATION WITH THE SuDS APPROVAL BODY (SAB)
- SURFACE WATER FEATURES COLLECTING AND CONVEYING RUNOFF FROM THE WIDER SITE (PHASE 1A, PHASE 2, BASECAMP ETC) ARE ASSUMED TO BE SEPARATE FROM THE DRAINAGE SYSTEM FOR THE BRIDGE AND EMBANKMENT.
- THE EXISTING SOUTHERN CULVERT RE-USE OR REPLACEMENT STRATEGY IS TO BE CONFIRMED. THIS DRAWING SHOWS AN OPTION FOR REALIGNING THE EXISTING CULVERT BENEATH ONLLWYN ROAD TO SAFEGUARD SPACE FOR THE FUTURE PLAZA AND HQ BUILDING - AS CONFIRMED BY 5TH STUDIO / GCRE. THE INVERT LEVELS FOR THE PROPOSED CULVERT ALIGNMENT AND UPSTREAM/DOWNSTREAM WATER COURSES, NEED TO BE VERIFIED. THIS WILL BE NEEDED TO CONFIRM LIKE-FOR-LIKE REPLACEMENT AND VALIDATE HYDRAULIC PERFORMANCE. IT IS ASSUMED THIS WILL BE DONE AS PART OF A SEPARATE ENABLING WORKS PACKAGE.
- FOR SETTING OUT INFORMATION REFER TO ARCHITECT'S DRAWING: GCREB1-5TH-XX-XX-DR-A-0201. FOR ROAD LEVELS REFER TO HIGHWAYS DRAWINGS.
- FOR PROPOSED SURFACING AND LANDSCAPING REFER TO LANDSCAPE ARCHITECTS DRAWING OW181-JCLA-DR-L-0001.

PROPOSED DRAINAGE GA

1 : 200

Safety, Health and Environment Information	
In addition to the hazards / risks that a competent contractor would normally associate with the types of work detailed on this drawing, note the following risks and information:	
Design & Construction	1. Extreme rainfall events during construction.
	2. Contamination entering watercourses and surrounding embankment.
	3. Temporary water management during culvert diversion.
Dismantling / Demolition (Future)	None
For information relating to Use, Cleaning and Maintenance see the Health and Safety File. It is assumed that all works will be carried out by a competent contractor working, where applicable, to an approved method statement.	

Rev	Description	Date	Chk	App
P3	ISSUED FOR OUTLINE PLANNING	23/11/23	AG	TH
P2	ISSUED FOR RIBA 2	26/07/23	AG	TH
P1	ISSUED FOR RIBA 2	07/07/23	AG	TH

Drawing notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, STRUCTURAL AND CIVIL ENGINEER'S DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES AOD.
3. DO NOT SCALE FROM THIS DRAWING OR THE DIGITAL DATA. ONLY FIGURED DIMENSIONS ARE TO BE USED.

4. THE CONTRACTOR IS TO NOTIFY THE CONTRACT ADMINISTRATOR OF ANY DISCREPANCIES BETWEEN THE STRUCTURAL DRAWINGS AND ANY OTHER CONTRACT DOCUMENTS.

Status
FOR PLANNING

Client
GCRE

Title
PROPOSED DRAINAGE GENERAL ARRANGEMENT

Scales
As indicated@A1

Drawn
LR

Project
ONLLWYN ROAD BRIDGE

Drg No.
C081

Job No.
1867

Rev
P3

Expedition Engineering
Temple Chambers
3-7 Temple Avenue
London EC4Y 0HP

T +44 (0) 20 7307 1000
E info@expedition.uk.com
W www.expedition.uk.com



Appendix B – Culvert Level Survey

LOCATION OF DRAINAGE WITHIN THE CLOUD IS TO BE REVISION AS PART OF COORDINATION WITH PROPOSED ONLLWYN ROAD BRIDGE REPLACEMENT.

EXISTING SEDIMENT PONDS TO BE DRAINED AND INFILLED. REFER TO EARTHWORKS DRAWINGS FOR REQUIREMENTS.

FOR CONTINUATION SEE GCRE001-AWJV-XX-XX-DR-DH-01C

900mm CONCRETE PIPE

CDM010

1A_E-1.037, 1A_E-1.038, 1A_E-2.002, 1A_E-2.001, 1A_E-2.000, 1A_E-1.039, 1A_E-1.040, 44, 45, 46, 41, 40, 39, 43

ADJUSTMENT OF DRAINAGE WITHIN THE CLOUD IS TO REVISION AS PART OF COORDINATION WITH PROPOSED ONLLWYN ROAD BRIDGE REPLACEMENT.

900Ø CONCRETE PIPE

EXISTING SEDIMENT PONDS TO BE DRAINED AND INFILLED. REFER TO EARTHWORKS DRAWINGS FOR REQUIREMENTS.

FOR CONTINUATION SEE GCRE001-AWJV-XX-XX-DR-DH-01C

CDM010

1A_E-1.037, 1A_E-1.038, 1A_E-2.002, 1A_E-2.001, 1A_E-2.000, 1A_E-1.039, 1A_E-1.040

39, 40, 41, 44, 45, 46

E 284134.060 N 210470.848 INV. 227.241

E 284161.429 N 210486.920 INV. 227.539

IFICATION. DITCH TO F FROM EXISTING THE NORTH.

1A_E-1.037

1A_E-1.038

1A_E-2.002

1A_E-2.001

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1A_E-1.039

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CDM010

FOR CONTINUATION SEE GCRE001-AWJV-XX-XX-DR-DH-01C

E 284134.060

N 210470.848

INV. 227.241

900mm CONCRETE PIPE

E 284161.429

N 210486.920

INV. 227.539

EXISTING SEDIMENT PONDS TO BE DRAINED AND INFILLED. REFER TO EARTHWORKS DRAWINGS FOR REQUIREMENTS.

TION OF DRAINAGE WITHIN THE CLOUD IS TO REVISION AS ART OF COORDINATION WITH POSED ONLLWYN ROAD BRIDGE REPLACEMENT.

IFICATION. DITCH TO F FROM EXISTING THE NORTH.

1A_E-1.037

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1A_E-1.040

CDM010

FOR CONTINUATION SEE GCRE001-AWJV-XX-XX-DR-DH-01C

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N 210470.848

INV. 227.241

900mm CONCRETE PIPE

E 284161.429

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