

## **LOT 41 CARDUP SIDING ROAD, CARDUP STORMWATER MANAGEMENT PLAN - ADDENDUM**

### **Background**

In 2015, stormwater design was undertaken for the western portion of Lot 41 Cardup Siding Road to support the development of the land as a transport depot, workshop and office with sealed hardstand and parking areas. Drainage on the site was managed through directing all stormwater to a bio retention swale which discharged into a stormwater basin with capacity to retain the volume generated from a 100 Year Average Recurrence Interval (ARI) rainfall event. The design was also based on the assumption that the entire area would be impervious. The attached **Drawing SK04 Rev B** shows the adopted design with 1,309m<sup>3</sup> of storage in the basin and 332m<sup>3</sup> of storage in the bio retention swale. This storage exceeded the required volume of 1,305m<sup>3</sup> calculated.

Development of the eastern portion of the property commenced in 2018 which would construct a shed containing plastic moulding operations, parking and hardstand facilities. Drainage in this portion was managed by directing stormwater to bio retention swales which discharged into underground storage tanks. As per the western portion, the underground storage had capacity for the 100 Year ARI rainfall event and design was based on the entire area ultimately being impervious. Storage of 487m<sup>3</sup> is provided in the underground tanks which meets the storage volume required with an additional 101m<sup>3</sup> of storage provided in the bio retention swales.

At the time of seeking approvals for development of the eastern portion, discussions were held with Shire Officers regarding the performance of the then existing drainage basin. Due to the predominately clay ground conditions, emptying of the basin by infiltration was not meeting expectations and the basin was effectively retaining water until mid-summer. This was causing concerns from a health perspective due to the potential for mosquitos and from an engineering perspective as the basin being partially full would no longer have the capacity to accommodate the 100 Year rainfall event.

The low infiltration rate was also likely to place similar limitations on the performance of the underground storage tanks. The solution developed with Officers was the provision of two pumps, one to pump water from the underground storage to the basin and one to pump water from the basin (Refer attached **Drawing C350 Rev B**). Both pumps were low flow with the intent being to gradually empty both storages at a controlled rate with discharge less than pre-development flows.

This addendum is to support the current Application for Development Approval which includes seeking approval to modify to the overall drainage system on Lot 41 Cardup Siding Road.

### **Pre-Development Discharge**

Prior to development of the site, Lot 41 was best described as largely pastoral, undeveloped vegetated area which contained a dwelling, sheds and grassed paddocks. The property naturally graded east to west over 300 metres with a level difference of approximately 4 metres. Stormwater

generated by rainfall events would sheet flow across the surface onto the Robertson Road Reserve west of the site.

Pre-development flow is calculated as follows:

Catchment Area = 4.716Ha

Longest flow path = 300m

Tc = 28 minutes

Design Event = 100 Year ARI

Rainfall Intensity I = 74mm/hr

Runoff Coefficient C = 0.3

Discharge Flow Q = CIA/360 m<sup>3</sup>/s

**Q = 0.291 m<sup>3</sup>/s = 291 litres per second**

### **Proposed Modifications To Existing Drainage**

The current design is shown on attached **Drawing C350 Rev 3**.

The design retains the original concept of all drainage in the eastern portion of the site, including the proposed new warehouse development, being directed to the bio retention swales and underground storage units then pumped to the drainage basin to enable gradual emptying.

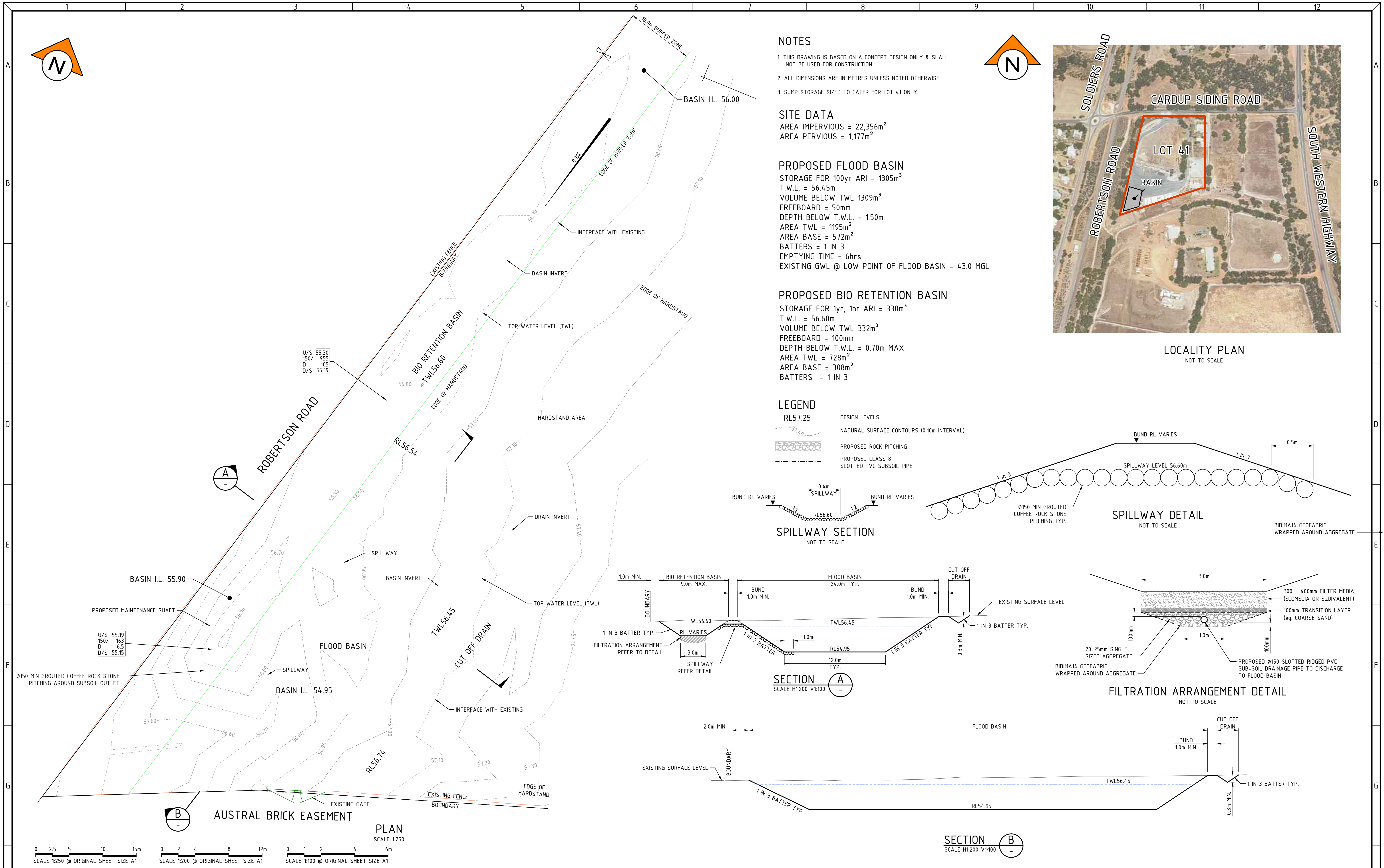
Drainage of the western portion of the site remains unchanged apart from modification to the discharge from the basin. It is now proposed to gradually discharge stormwater by pumping into a 150mm diameter perforated pipe which extends 150m along the western boundary of Lot 41. The pipe will be wrapped in a filter media (Flitersock) and be contained within loose limestone spalls covering the pipe. This will ensure stormwater slowly discharges along the length of the pipe in a controlled manner with no potential to cause scour.

The basin discharge pump will have a maximum pumping rate of 23 litres per second which is roughly 8% of the calculated pre-development flow. Discharging over the 150m length also mimics the pre-development sheet flow conditions rather than concentrating flow at a single discharge point.



Mick Beaverstock  
**JDSi Consulting Engineers**





### NOTES

1. THIS DRAWING IS BASED ON A CONCEPT DESIGN ONLY & SHALL NOT BE USED FOR CONSTRUCTION.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. SUMP STORAGE SIZED TO CATER FOR LOT 41 ONLY.

### SITE DATA

AREA IMPERVIOUS = 22,356m<sup>2</sup>  
AREA PERVIOUS = 1,177m<sup>2</sup>

### PROPOSED FLOOD BASIN

STORAGE FOR 100yr ARI = 1305m<sup>3</sup>  
T.W.L. = 56.45m  
VOLUME BELOW TWL 1309m<sup>3</sup>  
FREEBOARD = 50mm  
DEPTH BELOW T.W.L. = 150m  
AREA TWL = 1195m<sup>2</sup>  
AREA BASE = 572m<sup>2</sup>  
BATTERS = 1 IN 3  
EMPTYING TIME = 6hrs  
EXISTING GWL @ LOW POINT OF FLOOD BASIN = 43.0 MGL

### PROPOSED BIO RETENTION BASIN

STORAGE FOR 1yr, 1hr ARI = 330m<sup>3</sup>  
T.W.L. = 56.60m  
VOLUME BELOW TWL 332m<sup>3</sup>  
FREEBOARD = 100mm  
DEPTH BELOW T.W.L. = 0.70m MAX.  
AREA TWL = 728m<sup>2</sup>  
AREA BASE = 308m<sup>2</sup>  
BATTERS = 1 IN 3

### LEGEND

- RL57.25 DESIGN LEVELS
- NATURAL SURFACE CONTOURS (0.10m INTERVAL)
- PROPOSED ROCK PITCHING
- PROPOSED CLASS 8 SLOTTED PVC SUBSOIL PIPE

### SPILLWAY SECTION

NOT TO SCALE

### SPILLWAY DETAIL

NOT TO SCALE

### SECTION A

SCALE H1:200 V1:100

### FILTRATION ARRANGEMENT DETAIL

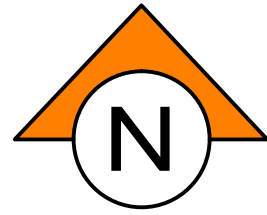
NOT TO SCALE

### SECTION B

SCALE H1:200 V1:100

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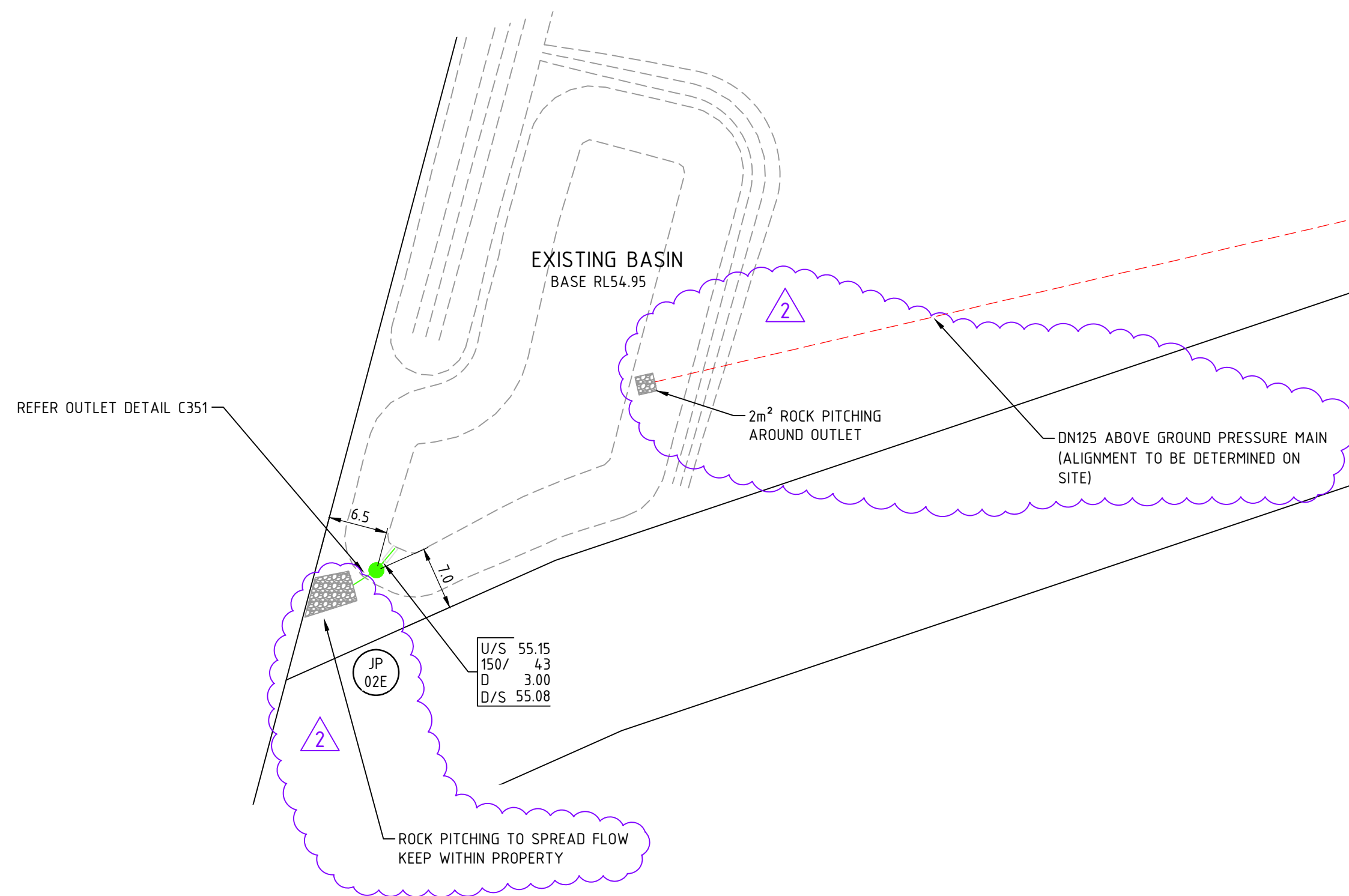
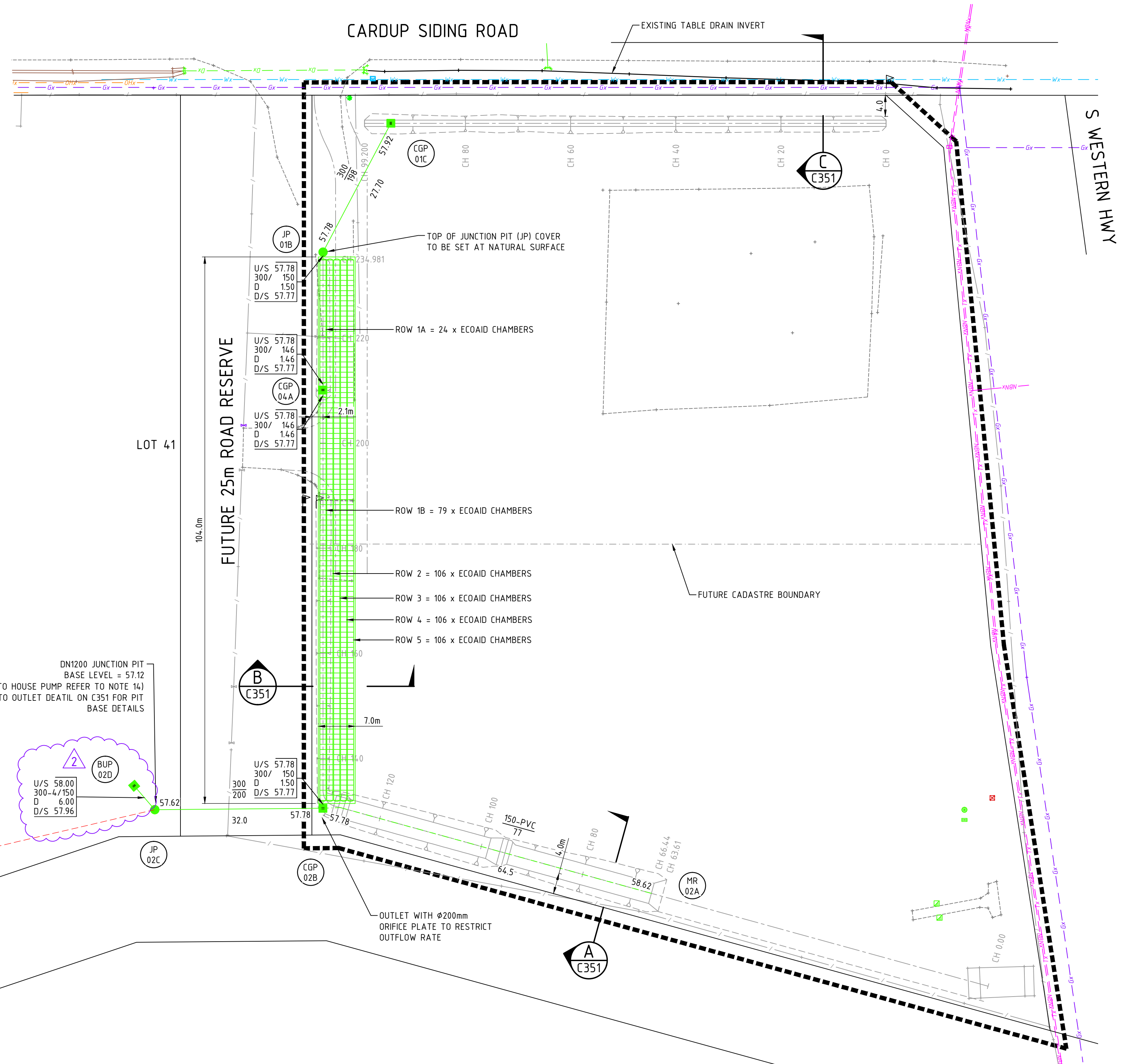


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2. THE CONSTRUCTION OF WORKS SHALL BE TO THE APPROVAL OF THE LOCAL AUTHORITY
3. ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE
4. ALL LEVELS SHALL BE DETERMINED FROM BENCHMARKS ESTABLISHED BY THE PROJECT SURVEYOR
5. ALL TRENCHING, PIPE BEDDING AND BACKFILLING SHALL BE IN ACCORDANCE WITH AS3725
6. ALL DRAINAGE PITS SHALL BE LOCATED AS SHOWN IRRESPECTIVE OF PIPE LENGTHS SHOWN ON THE DRAWINGS
7. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY DISCREPANCY OR CLASH WITH OTHER SERVICES TO THE SUPERINTENDENT
8. ALL JUNCTION PITS SHALL HAVE TRAFFICABLE LIDS
9. IN CIRCUMSTANCES WHERE MULTIPLE PIPES ENTER A LINER A MINIMUM OF 40% OF THE LINER SHALL REMAIN IN ANY HORIZONTAL PLANE
10. SUBSOIL PIPES CROSSING PAVEMENT SHALL BE SOLID PIPE UNDER PAVEMENT (NOT SLOTTED)
11. ALL SUBSOIL PIPES SHALL BE CLASS 8 PVC SWJ
12. CONTRACTOR SHALL LIAISE WITH RELEVANT AUTHORITIES WHEN NEAR EXISTING SERVICES
13. LIMESTONE BLOCK WEIRS CAN BE CONSTRUCTED ACROSS SWALE IN PLACE OF EARTH WEIR. CLIENT TO DETERMINE ON SITE
14. INSTALL PUMP IN PIT JP02C. PROPOSED MAXIMUM PUMPING RATE = 18L/S. PROPOSED PUMP CUT-IN LEVEL 57.87
15. INSTALL PUMP IN PIT JP02E. PROPOSED MAXIMUM PUMPING RATE = 23L/S. PROPOSED PUMP CUT-IN LEVEL 55.33

## LEGEND

-----	LIMIT OF WORKS
2	LOT NUMBER
PIPE DIA-CLASS GRADE	
LL LENGTH(m)	
U/S 00.00 300-4/ 0.0 D 0.0 D/S 00.00	UPSTREAM INVERT LEVEL PIPE DIA-GRADE (CLASS OTHER THAN 2) / GRADE LENGTH DOWNSTREAM INVERT LEVEL
-----	PROPOSED DRAINAGE
-----	PROPOSED SUBSOIL DRAINAGE 150 PVC
-----	EXISTING DRAINAGE
●	PROPOSED JUNCTION PIT
■	PROPOSED CENTRAL GULLY PIT
JP 1	PIT TYPE PIT NUMBER
JP	JUNCTION PIT
CGP	CATCH PIT
MR	MAINTENANCE RISER
-----	EXISTING WATER
-----	EXISTING NBN
-----	EXISTING TELSTRA
-----	EXISTING GAS
-----	EXISTING UNDERGROUND POWER
-----	EXISTING OVERHEAD POWER



0 5 10 20 30m  
SCALE 1:500 @ ORIGINAL SHEET SIZE A1

**WARNING**  
**BEWARE OF UNDERGROUND SERVICES**  
The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

REV	DATE	DRAWN	CHECKED	APPROVED	DESCRIPTION
2	29.05.19	BG	BG	PR	BUP 02D AND ROCK PITCHING ADDED, NOTES 14 & 15 AMENDED
1	04.02.19	BG	BG	OS	DRAINAGE AMENDED
0	23.01.19	BG	BG	OS	SUBSOIL AMENDED TO SUIT BIO SWALE
B	22.08.18	BG	BG	OS	DETAILS MOVED TO C351. DRAINAGE AMENDED
A	18.07.18	DR	OS		ISSUED FOR APPROVAL

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**NOTE:**  
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**Certified Quality System to ISO 9001**

**CONSULTING ENGINEERS**  
Workzone, Level 6, 1 Nash Street, Perth WA 6000  
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT:  
WORMALL CIVIL

PROJECT:  
LOT 41 CARDUP SIDING ROAD  
CARDUP  
DRAWING TITLE:  
STORMWATER DRAINAGE LAYOUT

DRAWN D.RULLO	WAPC No.
DESIGNED O.SILUKA	SCALE: A1 AS SHOWN
PROJECT MANAGER O.SILUKA	DATUM AHD
CO-ORDS PC694	REVISION 2
JDSi PROJECT No. JDS13728.2	DRAWING No. C350

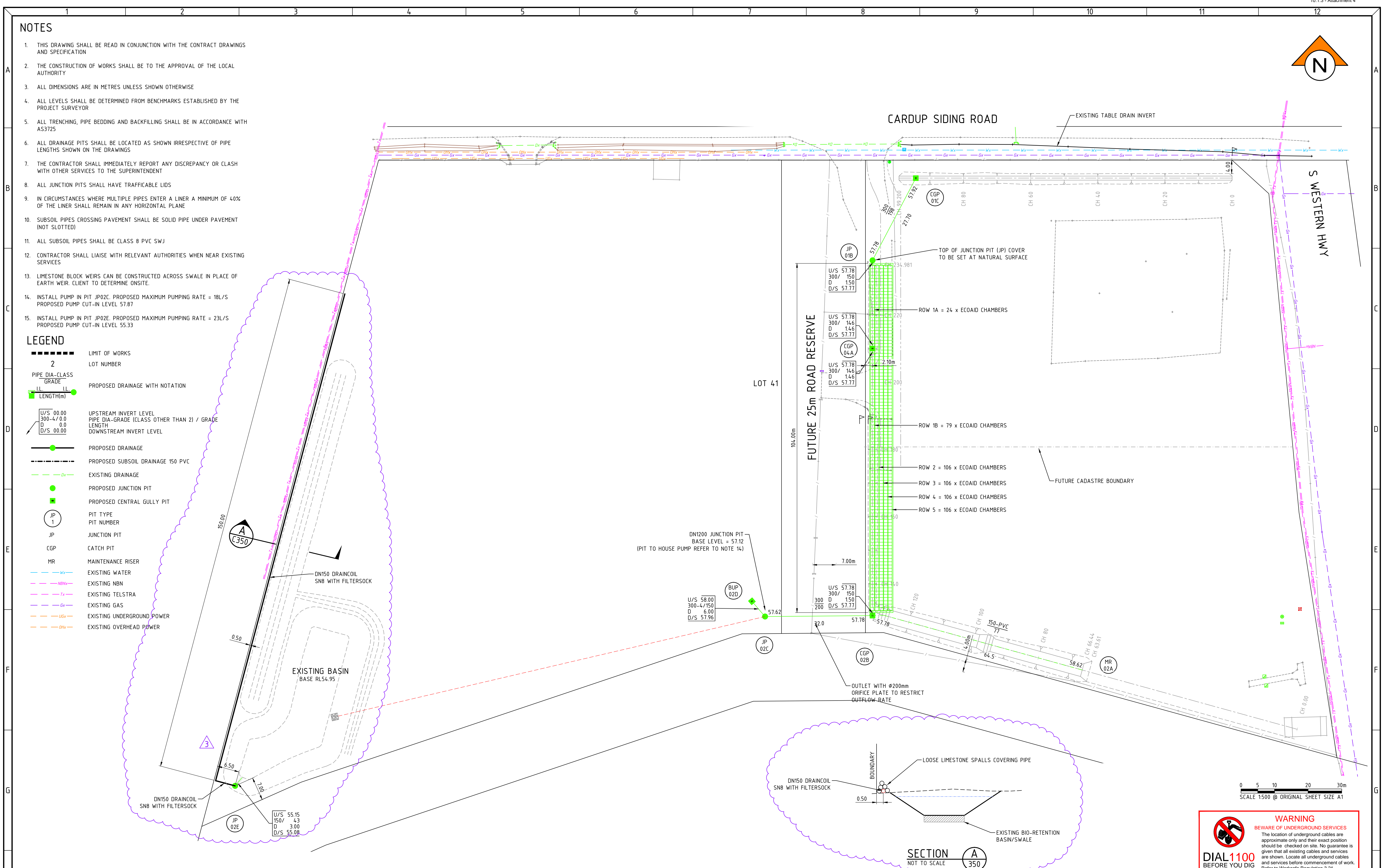
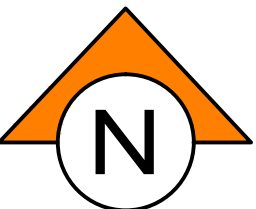


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LEGEND

- LIMIT OF WORKS  
2 LOT NUMBER
- PIPE DIA-CLASS GRADE  
LL LENGTH(m)
- UPSTREAM INVERT LEVEL  
PIPE DIA-CLASS (CLASS OTHER THAN 2) / GRADE  
LENGTH  
DOWNSTREAM INVERT LEVEL
- PROPOSED DRAINAGE  
PROPOSED SUBSOIL DRAINAGE 150 PVC  
EXISTING DRAINAGE  
PROPOSED JUNCTION PIT  
PROPOSED CENTRAL GULLY PIT  
PIT TYPE  
PIT NUMBER  
JP JUNCTION PIT  
CGP CATCH PIT  
MR MAINTENANCE RISER  
EXISTING WATER  
EXISTING NBN  
EXISTING TELSTRA  
EXISTING GAS  
EXISTING UNDERGROUND POWER  
EXISTING OVERHEAD POWER



0 5 10 20 30m  
SCALE 1:500 @ ORIGINAL SHEET SIZE A1

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REV	DATE	DRAWN	CHECKED	APPROVED							
3	13.09.21	AG	BG	MB	MODIFIED OUTLET ADDED						
2	29.05.19	BG	BG	PR	BU 02D AND ROCK PITCHING ADDED, NOTES 14 & 15 AMENDED						
1	04.02.19	BG	BG	OS	DRAINAGE AMENDED						
0	23.01.19	BG	BG	OS	SUBSOIL AMENDED TO SUIT BIO SWALE						
B	22.08.18	BG	BG	OS	DETAILS MOVED TO C351. DRAINAGE AMENDED						
A	18.07.18	DR	OS		ISSUED FOR APPROVAL						