

# J. Wyndham Prince Pty. Ltd.

## AREA 20 PRECINCT - DRAINAGE RESERVE No. 1 (REFER FIGURE 4)

### CHANNEL FLOW - MANNINGS

$$Q=(AR^{0.6667}S^{0.5})/n$$

Q (m<sup>3</sup>/s) 6.950 100 Yr flow

S (%) 1.000

n 0.030

Base Width (m) 6.000      OFFSET    LEVEL

Base Crossfall (%) 1.000      -3.000    0.030    6.000

Top Width (m) 17.547      0.000    0.000

Batter Slope (1 in) 6.000      3.000    0.030

Max Depth (m) 1.000      8.774    0.992    6.000

Max Velocity (m/s) 2.000

Freeboard (m) 0.500

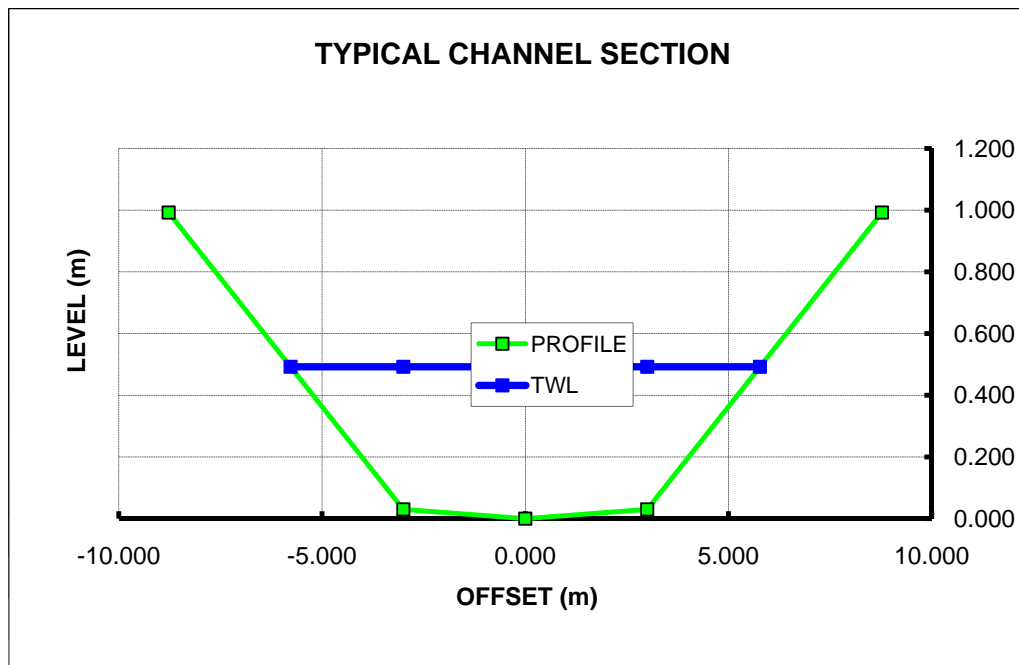
AR<sup>0.667</sup> 2.085

Excavation (sq.m) 11.419

Flow Type	DEPTH (m)	A (m <sup>2</sup> )	P (m)	R (m)	AR <sup>0.67</sup>	WIDTH (m)	V (m/s)	FBRD (m)	F	V*D
Normal	0.492	4.146	11.624	0.357	2.085	11.547	1.676	0.500	0.893	0.825
Critical	0.460	3.781	11.233	0.337	1.830	11.162	1.838	0.532	1.008	0.846

Subcritical

Subcritical



# J. Wyndham Prince Pty. Ltd.

## AREA 20 PRECINCT - DRAINAGE RESERVE No. 2 (REFER FIGURE 4)

### CHANNEL FLOW - MANNINGS

$Q=(AR^{0.6667}S^{0.5})/n$

Q (m<sup>3</sup>/s) 17.900 100 Yr flow

S (%) 1.000

n 0.030

Base Width (m) 22.000      OFFSET    LEVEL

Base Crossfall (%) 1.000      -11.000    0.110    6.000

Top Width (m) 32.439      0.000    0.000

Batter Slope (1 in) 6.000      11.000    0.110

Max Depth (m) 1.000      16.220    0.980    6.000

Max Velocity (m/s) 2.000

Freeboard (m) 0.500

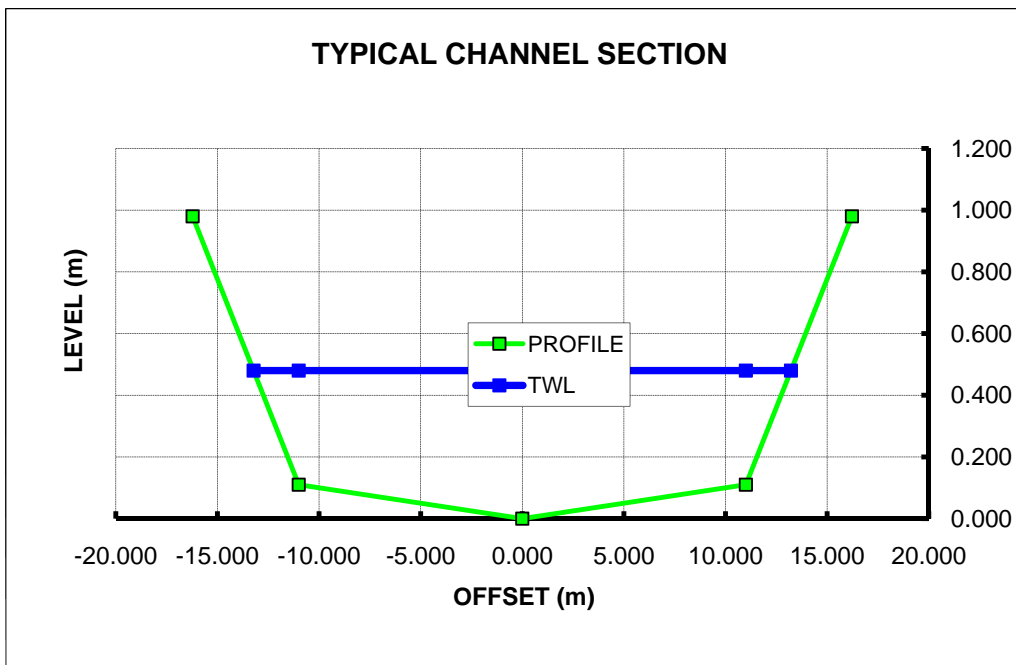
AR<sup>0.667</sup> 5.370

Excavation (sq.m) 24.889

Flow Type	DEPTH (m)	A (m <sup>2</sup> )	P (m)	R (m)	AR <sup>0.67</sup>	WIDTH (m)	V (m/s)	FBRD (m)	F	V*D
Normal	0.480	10.169	26.501	0.384	5.370	26.439	1.760	0.500	0.906	0.845
Critical	0.454	9.485	26.185	0.362	4.820	26.127	1.887	0.526	1.000	0.857

Subcritical

Subcritical



## **Attachment G**

# **Drainage Reserves / Easements Hydraulic Calculations (Including the Impact of Climate Change)**

# J. Wyndham Prince Pty. Ltd.

## AREA 20 PRECINCT - DRAINAGE RESERVE No. 1 (REFER FIGURE 4) INCLUDING CLIMATE CHANGE

### CHANNEL FLOW - MANNINGS

$$Q=(AR^{0.6667}S^{0.5})/n$$

Q (m<sup>3</sup>/s) 8.630 100 Yr flow

S (%) 1.000

n 0.030

Base Width (m) 6.000      **OFFSET**    **LEVEL**

Base Crossfall (%) 1.000      -3.000    0.030    6.000

Top Width (m) 15.841      0.000    0.000

Batter Slope (1 in) 6.000      3.000    0.030

Max Depth (m) 1.000      7.920    0.850    6.000

Max Velocity (m/s) 2.000

Freeboard (m) 0.300

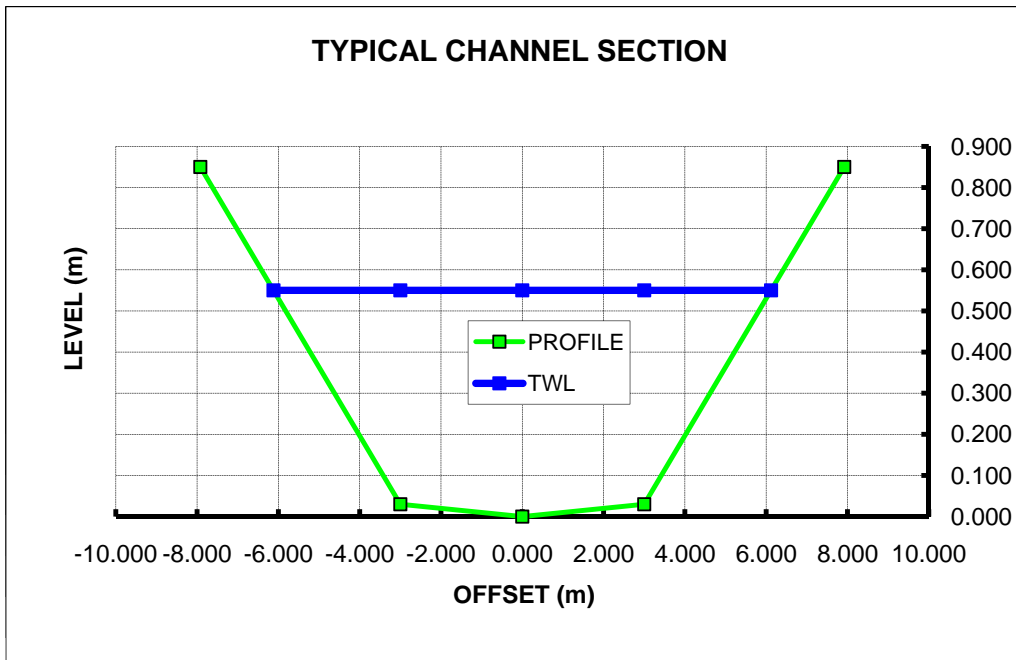
AR<sup>0.667</sup> 2.589

Excavation (sq.m) 9.045

Flow Type	DEPTH (m)	A (m <sup>2</sup> )	P (m)	R (m)	AR <sup>0.67</sup>	WIDTH (m)	V (m/s)	FBRD (m)	F	V*D
Normal	0.550	4.833	12.327	0.392	2.589	12.241	1.786	0.300	0.907	0.982
Critical	0.460	3.781	11.233	0.337	1.830	11.162	2.282	0.390	1.252	1.050

Subcritical

Subcritical





# J. Wyndham Prince Pty. Ltd.

## AREA 20 PRECINCT - DRAINAGE RESERVE No. 2 (REFER FIGURE 4) INCLUDING CLIMATE CHANGE

### CHANNEL FLOW - MANNINGS

$$Q=(AR^{0.6667}S^{0.5})/n$$

Q (m<sup>3</sup>/s) 20.800 100 Yr flow

S (%) 1.000

n 0.030

		OFFSET	LEVEL	
Base Width (m)	22.000	-15.253	0.819	
Base Crossfall (%)	1.000	-11.000	0.110	6.000
Top Width (m)	30.506	0.000	0.000	
Batter Slope (1 in)	6.000	11.000	0.110	
Max Depth (m)	1.000	15.253	0.819	6.000
Max Velocity (m/s)	2.000			
Freeboard (m)	0.300			

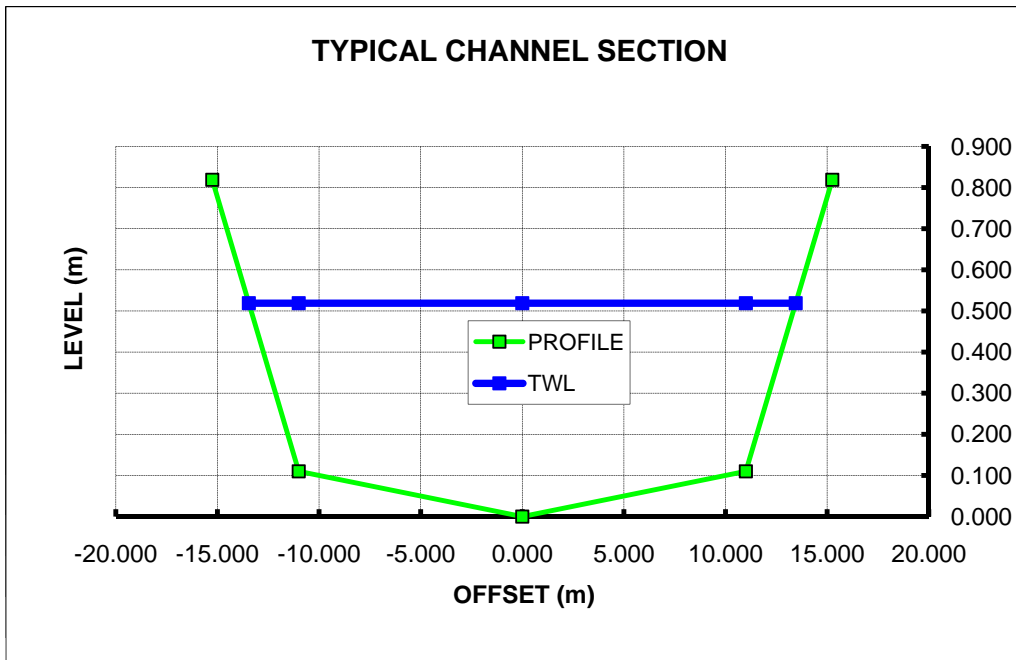
AR<sup>0.667</sup> 6.240

Excavation (sq.m) 19.819

Flow Type	DEPTH (m)	A (m <sup>2</sup> )	P (m)	R (m)	AR <sup>0.67</sup>	WIDTH (m)	V (m/s)	FBRD (m)	F	V*D
Normal	0.519	11.207	26.975	0.415	6.240	26.906	1.856	0.300	0.918	0.963
Critical	0.494	10.548	26.675	0.395	5.682	26.610	1.972	0.325	1.000	0.975

Subcritical

Subcritical



**Attachment H**  
**Flood Safety Evaluation**



15 June 2010

Mr Daniel Gardiner  
Water Resources Engineer  
J. Wyndham Prince  
PO Box 4366  
PENRITH WESTFIELD 2750

Dear Daniel

**Re: Area 20 Rouse Hill – Flood Safety Evaluation**

Thankyou for sending through the latest flood extent and subdivision layout for Area 20 at Rouse Hill.

As requested we have analysed the information and formed the following views with regard to flood safety aspects of the proposed development.

1. The development is all above 42m AHD which is well above the 26m AHD probable maximum flood (PMF) level on the Hawkesbury Nepean River. The development is therefore outside of any influence from backwater flooding from the Hawkesbury Nepean River. Flooding from the River is therefore not an issue with regard to safety in the development;
2. All residential development will be above the 1 in 500 flood level from the local creek so there is a low probability that any homes will get flooded;
3. The creek PMF does not extend very far into the residential areas and is no more than 2m deep on any residential land. Even such an event is likely to pose a low risk to life for people in residential dwellings who should be able to shelter in place because:
  - a. the ground floor level of all homes will be at least 300mm above ground level;
  - b. most of the homes that will be built will be double storey and;
  - c. the duration of PMF flooding within homes is likely to be less than an hour;
4. The proposed subdivision layout means that flooding will not cut roads in and out of the subdivision and isolate homes within the subdivision, although it will cut roads joining either side of the subdivision. This will minimise the risk of people entering high hazard flood waters to enter or leave their homes and evacuation of large areas would not be necessary;
5. Were individual homes to flood (and there is a low probability of this occurring) and people chose to evacuate (not necessary as most will be able to shelter in place) the scale of evacuation compared to the size of the subdivision and the short duration of the flooding means that staying with neighbours is a realistic and likely option.
6. It is unlikely that evacuation of these homes would interfere with flood evacuation from Windsor and McGraths Hill and, in my view, does not need to be considered.
7. Serious consideration should be given to designing future assets at the electrical substation so that they are well above the 1 in 500 level, perhaps even above the PMF given the space available on the block.

Should you require further clarification on any of the above matters please do not hesitate to contact me.

Yours faithfully

For Molino Stewart Pty Ltd

Steven Molino

Principal

Y:\Jobs\2009\0369 Water Cycle Management\Reports\In Progress\0369 Flood Safety Evaluation  
Precinct 20 Draft.doc

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**LEGEND**

— AREA 20 PRECINCT BOUNDARY

PMF FLOOD DEPTHS

Depth [m]
0
1
2
3
4
5

**FIGURE 1**

F			
E			
D			
C			
B	AMENDMENTS FOR RAIL CORRIDOR	OCT 11	DG
A	FIRST ISSUE	SEPT 09	NM
ISSUE	AMENDMENT	DATE	BY

**J. WYNDHAM PRINCE** CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS

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DESIGNED -----  
 DRAWN -----  
 CHECKED -----

DATUM: \_\_\_\_\_  
 ORIGIN: \_\_\_\_\_  
 SCALES: \_\_\_\_\_

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AREA 20 PRECINCT, ROUSE HILL

PMF FLOOD DEPTH MAP

PLAN No. 8622/SW11 **B**

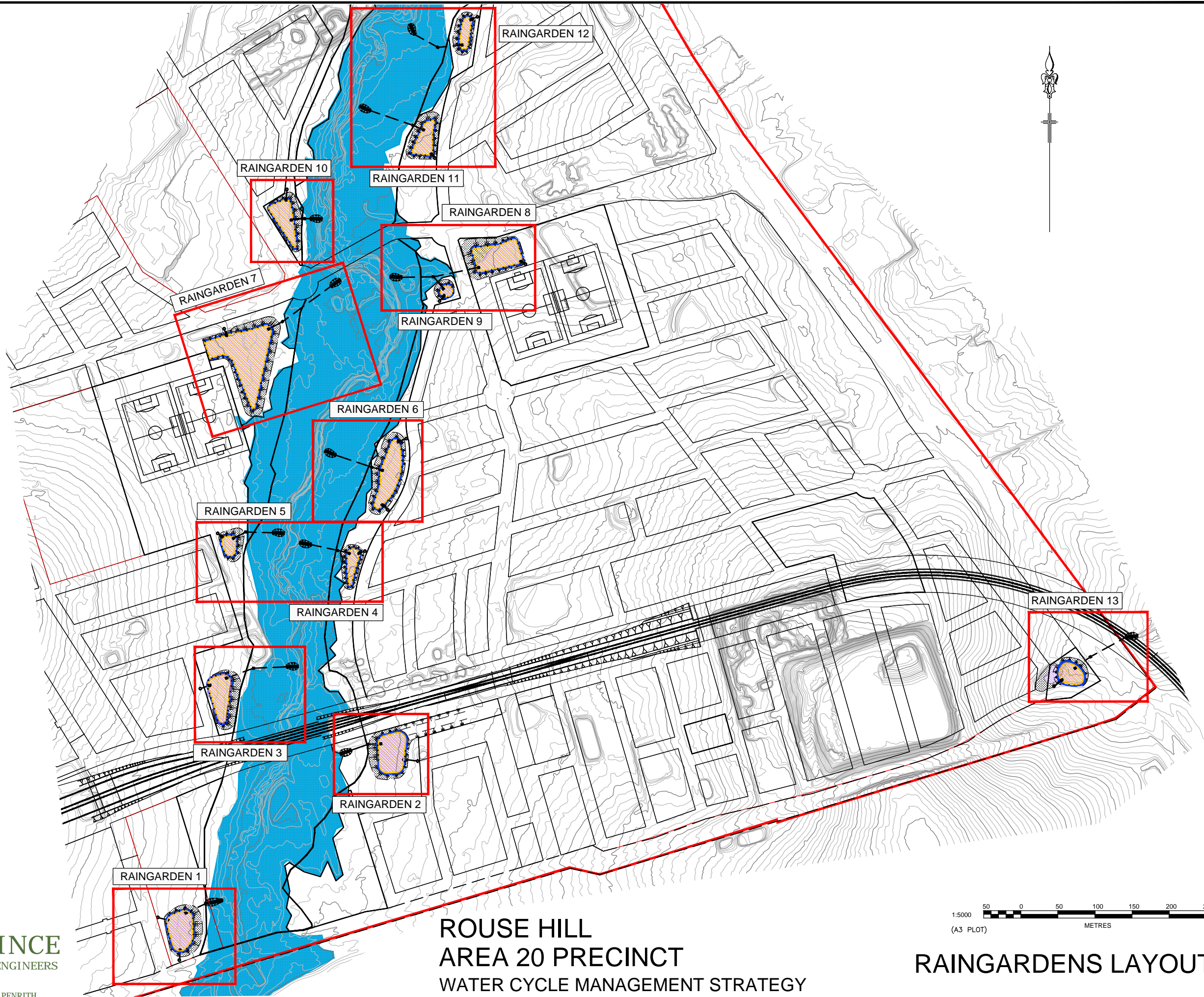
FILE No. 8622SW11

SHEET 1 OF 1 SHEETS

## **Attachment I**

# **Detailed Concept Designs and Estimates of Quantities**





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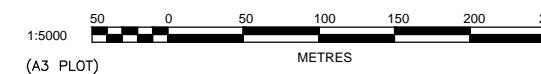
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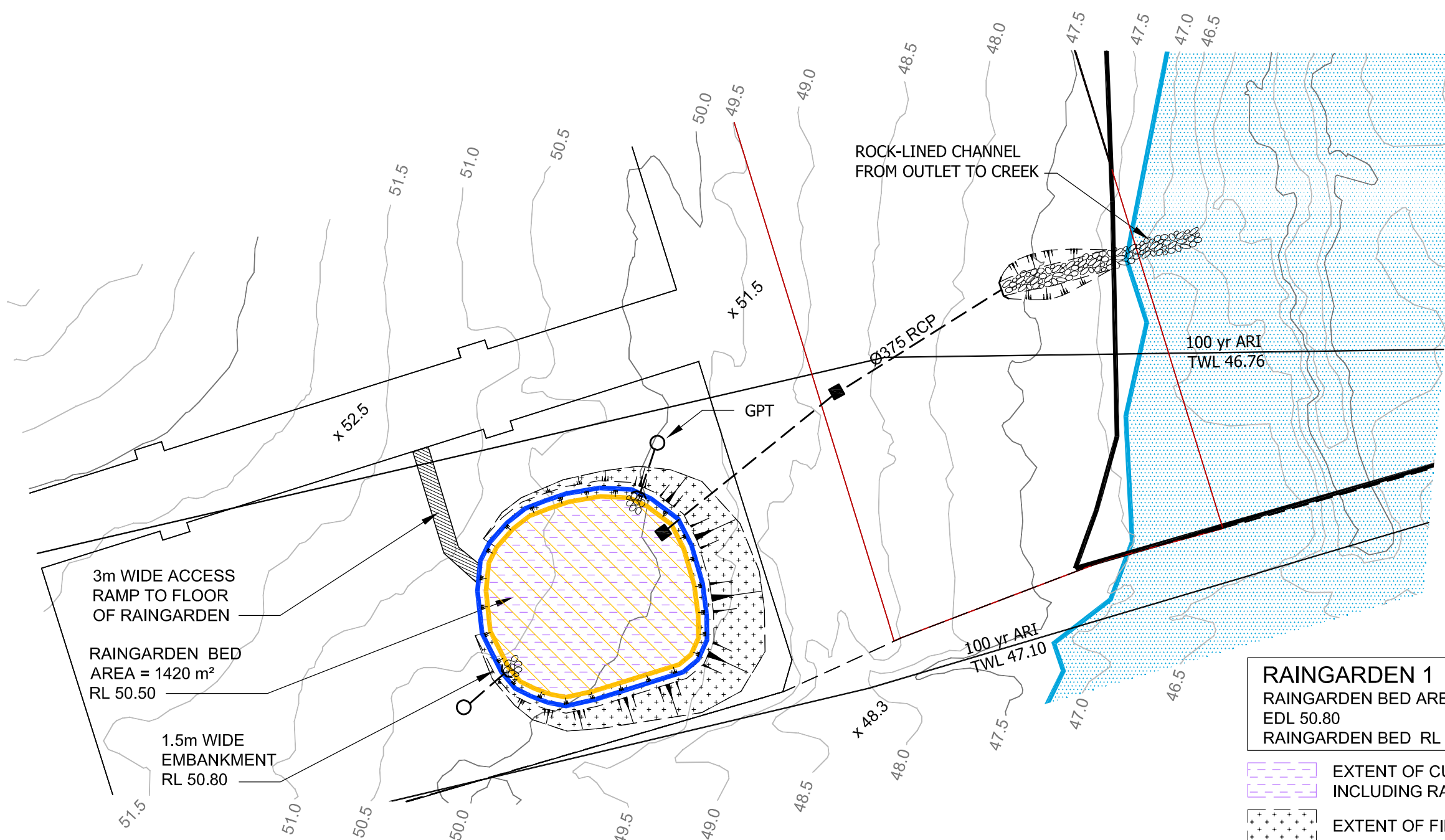
12/10/10 Issue: B  
 8622\_Raingardens\_2 - RG\_LAYOUT  
 SHEET 1 OF 11

**ROUSE HILL  
 AREA 20 PRECINCT  
 WATER CYCLE MANAGEMENT STRATEGY  
 RAINGARDEN CONCEPT DESIGNS - RAINGARDEN LAYOUT PLAN**

**RAINGARDENS LAYOUT**







3m WIDE ACCESS RAMP TO FLOOR OF RAINGARDEN

RAINGARDEN BED AREA = 1420 m<sup>2</sup>  
RL 50.50

1.5m WIDE EMBANKMENT  
RL 50.80

ROCK-LINED CHANNEL FROM OUTLET TO CREEK

100 yr ARI  
TWL 46.76

100 yr ARI  
TWL 47.10

**RAINGARDEN 1**  
RAINGARDEN BED AREA = 1420m<sup>2</sup>  
EDL 50.80  
RAINGARDEN BED RL 50.50

EXTENT OF CUT - 850m<sup>3</sup> (Approx) INCLUDING RAINGARDEN

EXTENT OF FILL - 900m<sup>3</sup> (Approx)

APPROXIMATE EXTENT OF PROPOSED RAINGARDEN

100 yr ARI HEC-RAS SECTION AND 100 YEAR ARI FLOOD LEVEL (ULTIMATE SITE CONDITIONS)

ALL BATTERS TO BE MAXIMUM 6:1

APPROXIMATE EXTENT OF 100 YEAR ARI FLOODING (ULTIMATE SITE CONDITIONS)

CONTOURS DENOTE EXISTING GROUND LEVELS

DENOTES INDICATIVE DESIGN ROAD LEVEL

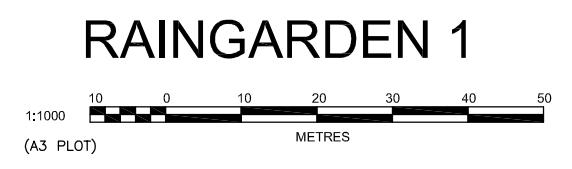
**ROUSE HILL  
AREA 20 PRECINCT  
WATER CYCLE MANAGEMENT STRATEGY  
RAINGARDEN CONCEPT DESIGNS - RAINGARDEN 1**

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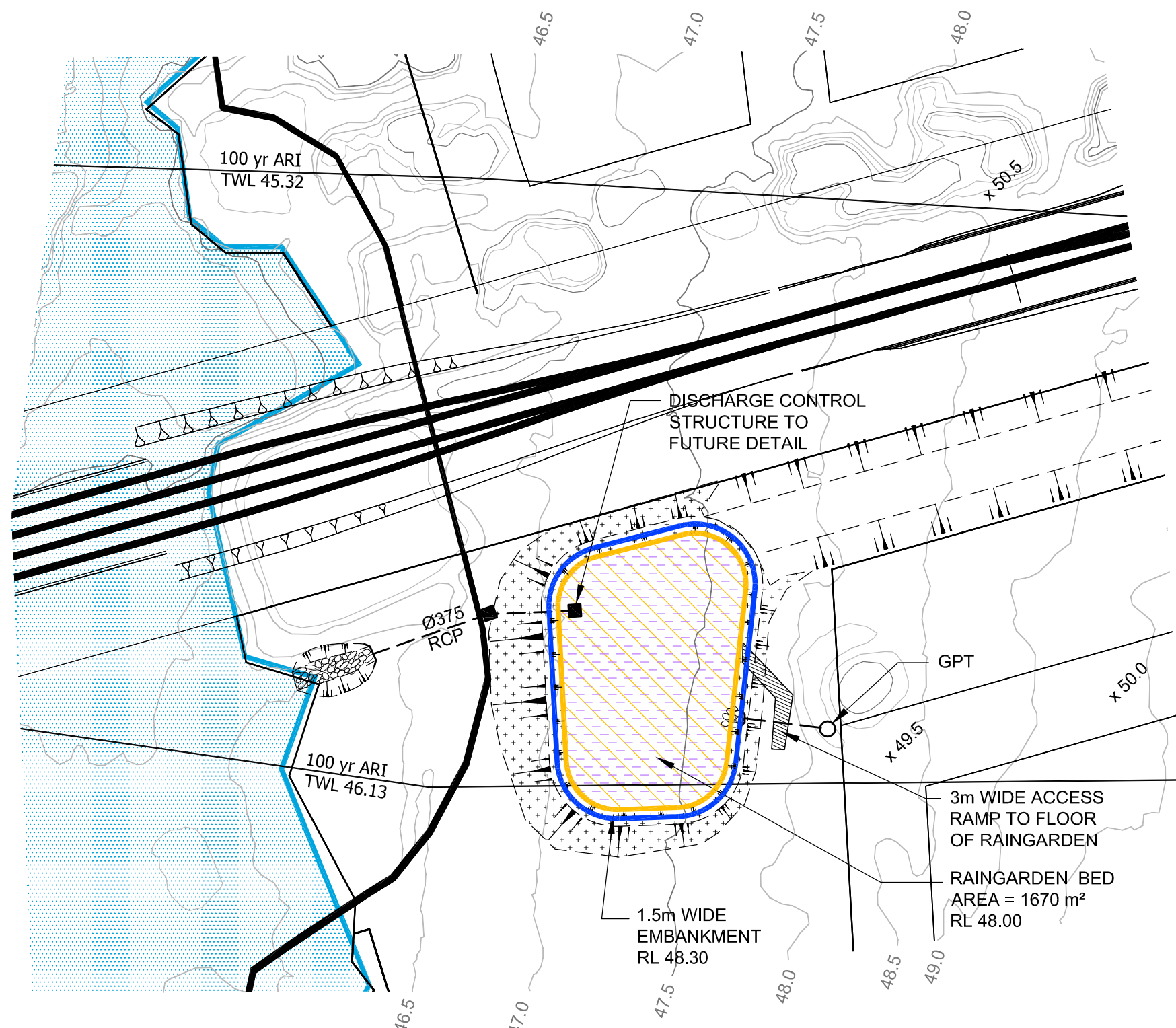
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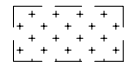

22/10/10 Issue: B  
8622\_Raingardens\_2 - RG\_1  
SHEET 2 OF 11







**RAINGARDEN 2**  
 RAINGARDEN BED AREA = 1670m<sup>2</sup>  
 EDL 48.30  
 RAINGARDEN BED RL 48.00

-  EXTENT OF CUT -1170m<sup>3</sup> (Approx) INCLUDING RAINGARDEN
-  EXTENT OF FILL - 1030m<sup>3</sup> (Approx)
-  APPROXIMATE EXTENT OF PROPOSED RAINGARDEN

100 yr ARI TWL 43.02 HEC-RAS SECTION AND 100 YEAR ARI FLOOD LEVEL (ULTIMATE SITE CONDITIONS)

ALL BATTERS TO BE MAXIMUM 6:1

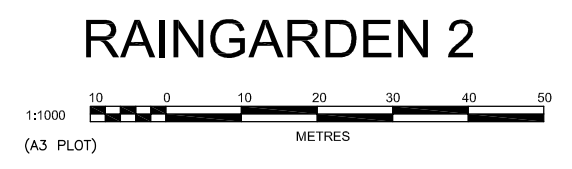
 APPROXIMATE EXTENT OF 100 YEAR ARI FLOODING (ULTIMATE SITE CONDITIONS)

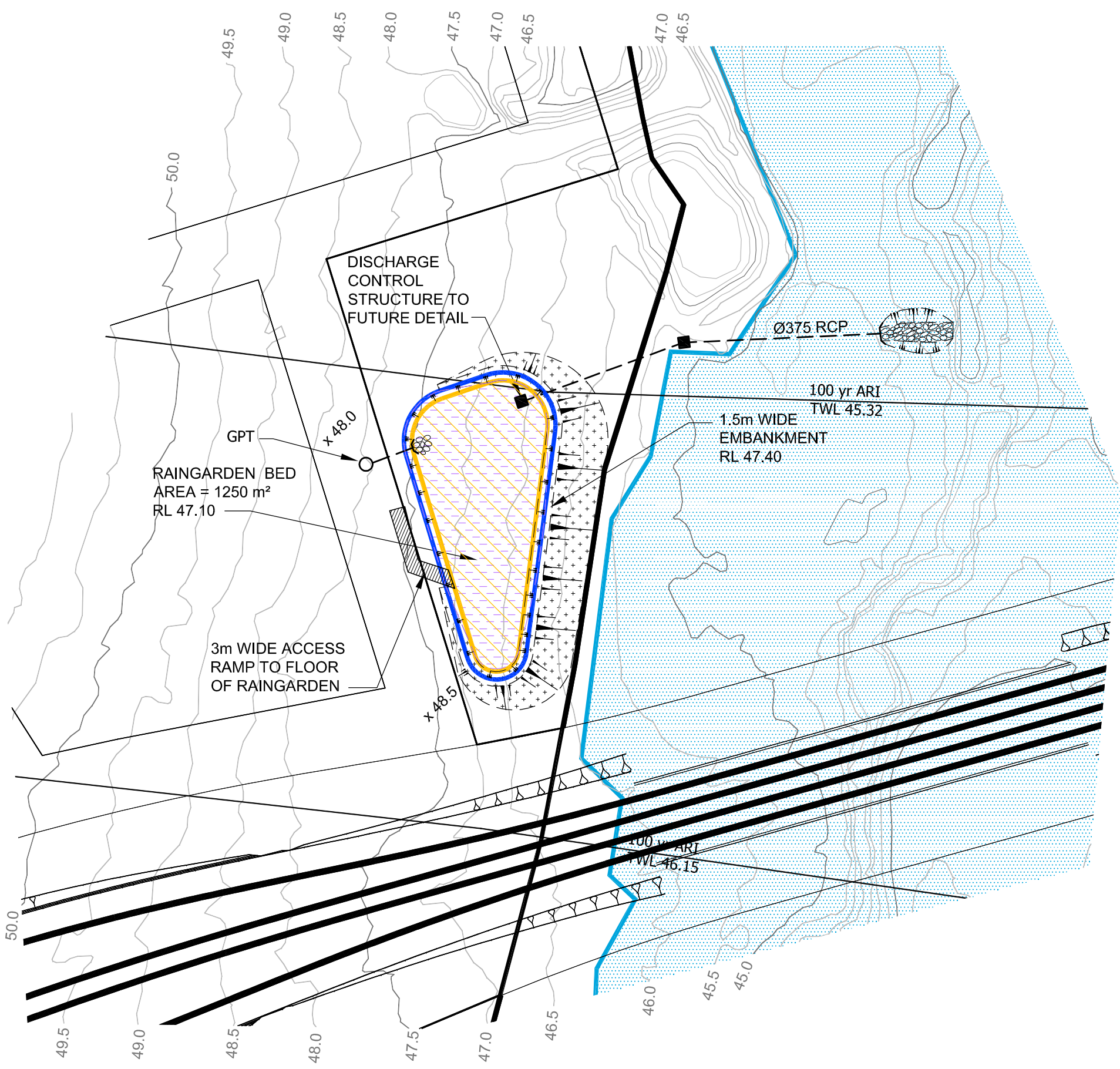
CONTOURS DENOTE EXISTING GROUND LEVELS  
 DENOTES INDICATIVE DESIGN ROAD LEVEL

**ROUSE HILL  
 AREA 20 PRECINCT  
 WATER CYCLE MANAGEMENT STRATEGY  
 RAINGARDEN CONCEPT DESIGNS - RAINGARDEN 2**


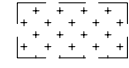

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**RAINGARDEN 3**  
 RAINGARDEN BED AREA = 1250m<sup>2</sup>  
 EDL 47.40  
 RAINGARDEN BED RL 47.10

-  EXTENT OF CUT - 880m<sup>3</sup> (Approx) INCLUDING RAINGARDEN
-  EXTENT OF FILL - 760m<sup>3</sup> (Approx)
-  APPROXIMATE EXTENT OF PROPOSED RAINGARDEN

100 yr ARI TWL 43.02 HEC-RAS SECTION AND 100 YEAR ARI FLOOD LEVEL (ULTIMATE SITE CONDITIONS)

ALL BATTERS TO BE MAXIMUM 6:1

 APPROXIMATE EXTENT OF 100 YEAR ARI FLOODING (ULTIMATE SITE CONDITIONS)

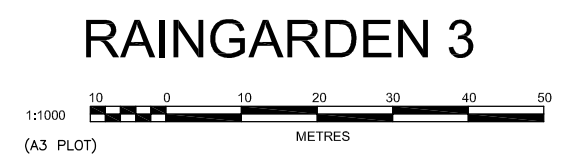
CONTOURS DENOTE EXISTING GROUND LEVELS

+50.0 DENOTES INDICATIVE DESIGN ROAD LEVEL

**ROUSE HILL  
 AREA 20 PRECINCT  
 WATER CYCLE MANAGEMENT STRATEGY  
 RAINGARDEN CONCEPT DESIGNS - RAINGARDEN 3**


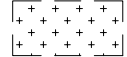
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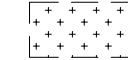
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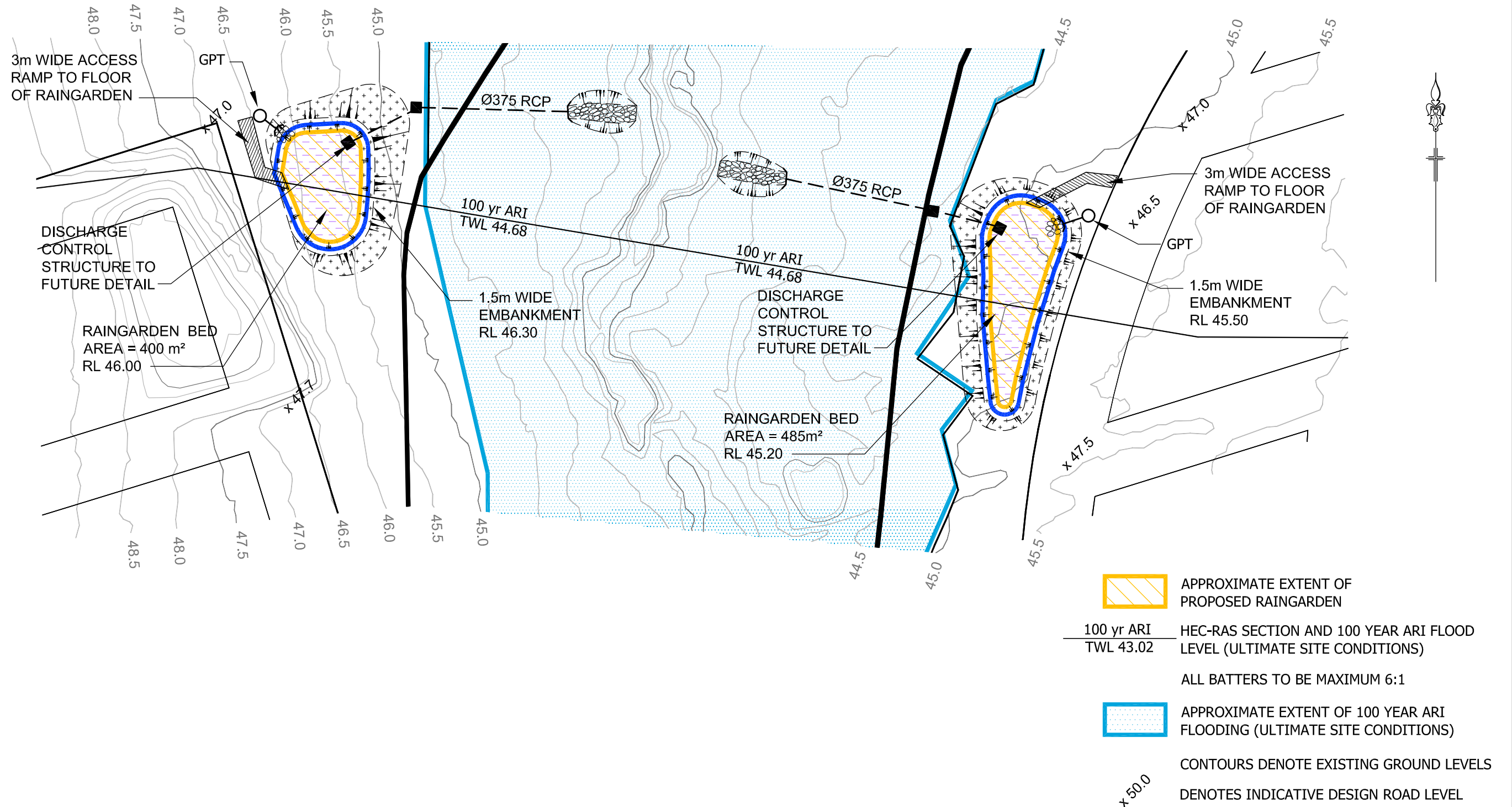
RAINGARDEN BED AREA = 400m<sup>2</sup>  
EDL 46.30  
RAINGARDEN BED RL 46.00


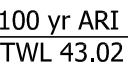

-  EXTENT OF CUT - 300m<sup>3</sup> (Approx) INCLUDING RAINGARDEN
-  EXTENT OF FILL - 350m<sup>3</sup> (Approx)

### RAINGARDEN 4

RAINGARDEN BED AREA = 485m<sup>2</sup>  
EDL 45.50  
RAINGARDEN BED RL 45.20

-  EXTENT OF CUT - 390m<sup>3</sup> (Approx) INCLUDING RAINGARDEN
-  EXTENT OF FILL - 380m<sup>3</sup> (Approx)



-  APPROXIMATE EXTENT OF PROPOSED RAINGARDEN
-  100 yr ARI HEC-RAS SECTION AND 100 YEAR ARI FLOOD LEVEL (ULTIMATE SITE CONDITIONS)
- ALL BATTERS TO BE MAXIMUM 6:1
-  APPROXIMATE EXTENT OF 100 YEAR ARI FLOODING (ULTIMATE SITE CONDITIONS)
- CONTOURS DENOTE EXISTING GROUND LEVELS
- x 50.0 DENOTES INDICATIVE DESIGN ROAD LEVEL