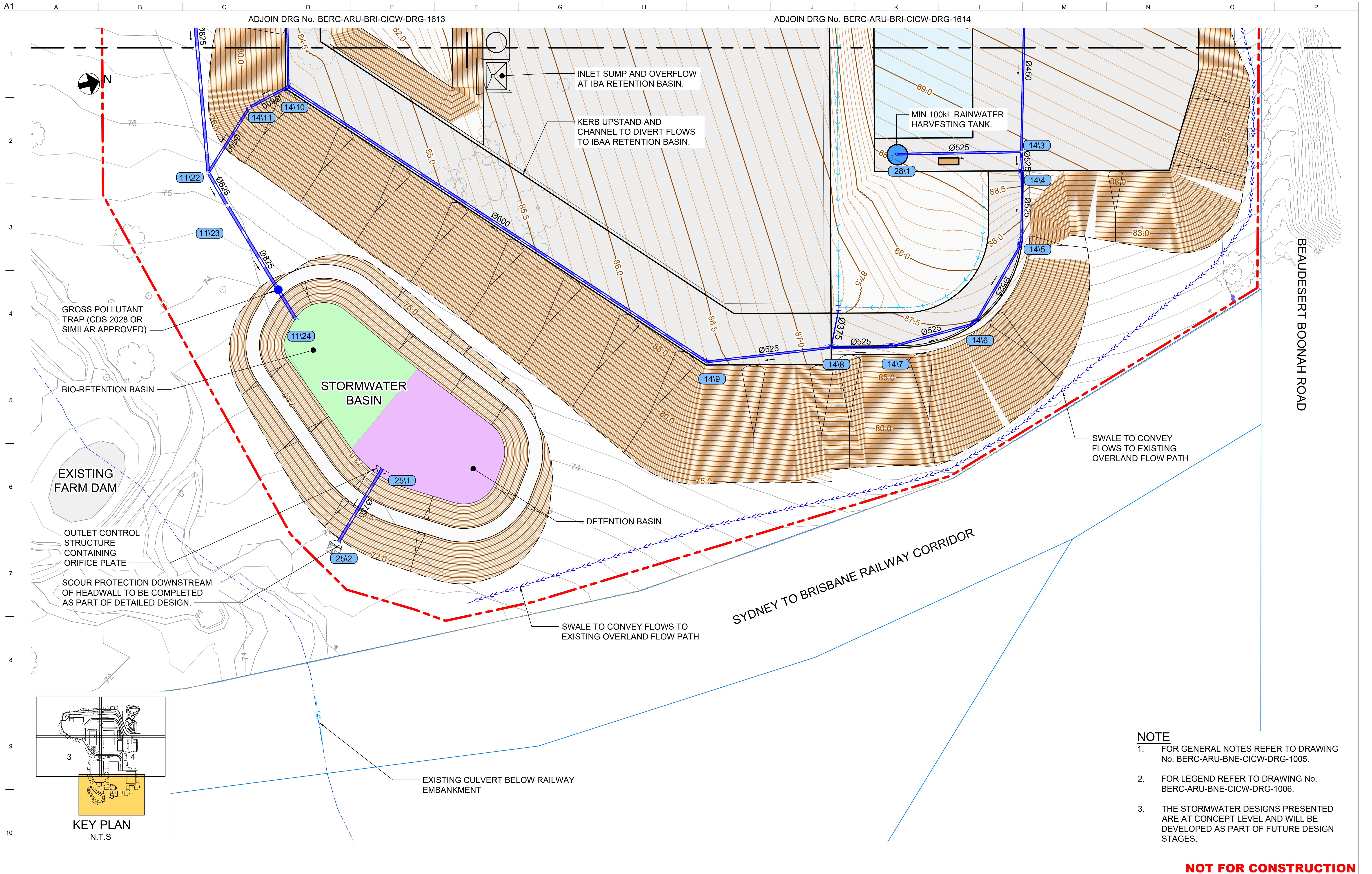
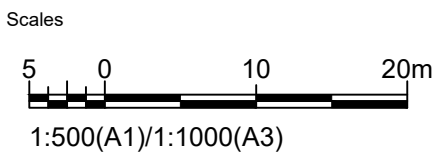




- NOTE**
- 1. FOR GENERAL NOTES REFER TO DRAWING No. BERC-ARU-BNE-CICW-DRG-1005.
 - 2. FOR LEGEND REFER TO DRAWING No. BERC-ARU-BNE-CICW-DRG-1006.
 - 3. THE STORMWATER DESIGNS PRESENTED ARE AT CONCEPT LEVEL AND WILL BE DEVELOPED AS PART OF FUTURE DESIGN STAGES.

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Scale at A1
1:500m

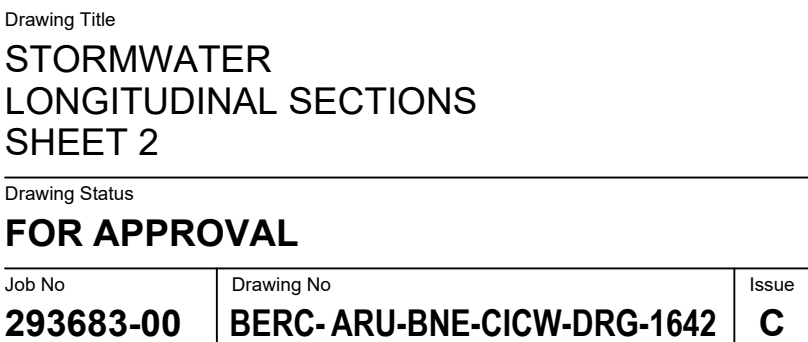
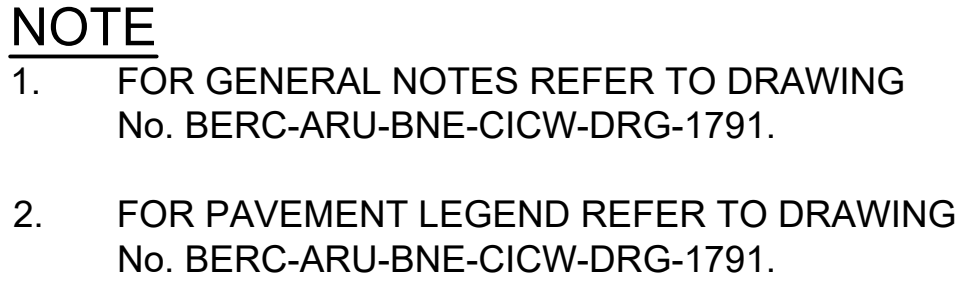
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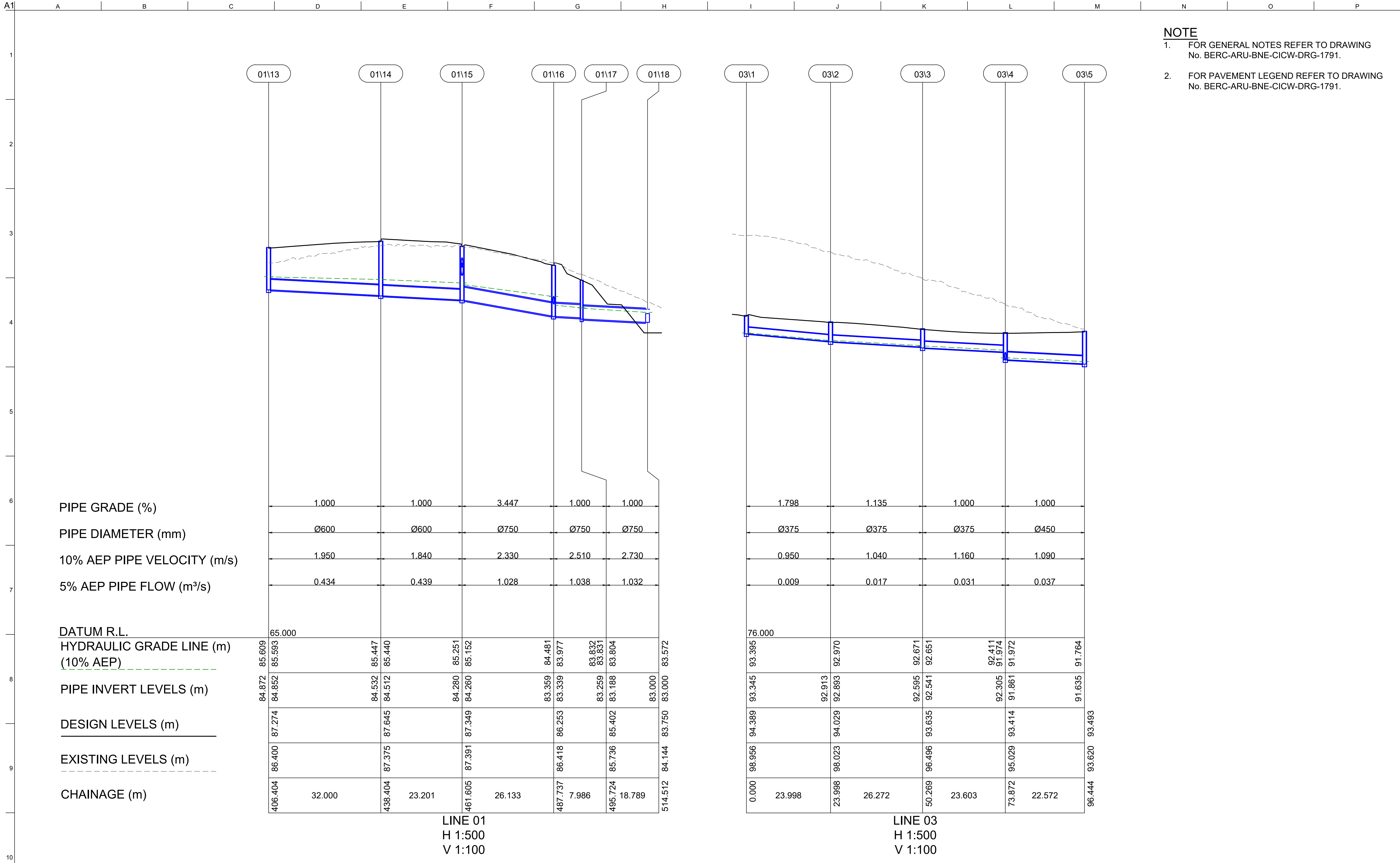
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Job No 293683-00	Drawing No BERC-ARU-BNE-CICW-DRG-1615	Issue C	





NOTE

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2. FOR PAVEMENT LEGEND REFER TO DRAWING
No. BERC-ARU-BNE-CICW-DRG-1791.

Scales

1 0 1 2 3 4 5m

1:100(A1)/1:200(A3)

5 0 10 20m

1:500(A1)/1:1000(A3)

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LONGITUDINAL SECTIONS
SHEET 3

Drawing Status

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Job No

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Drawing No

BERC- ARU-BNE-CICW-DRG-1643

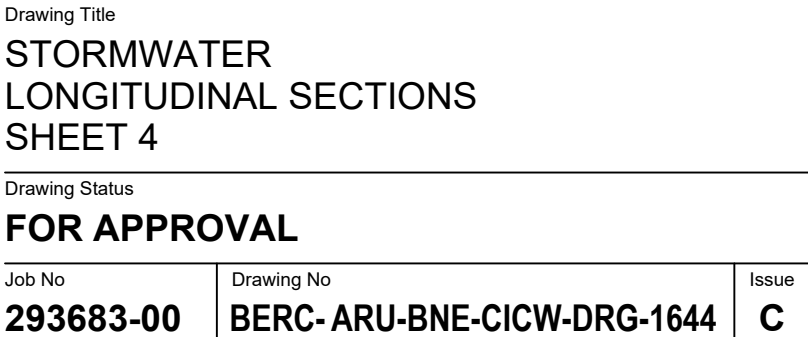
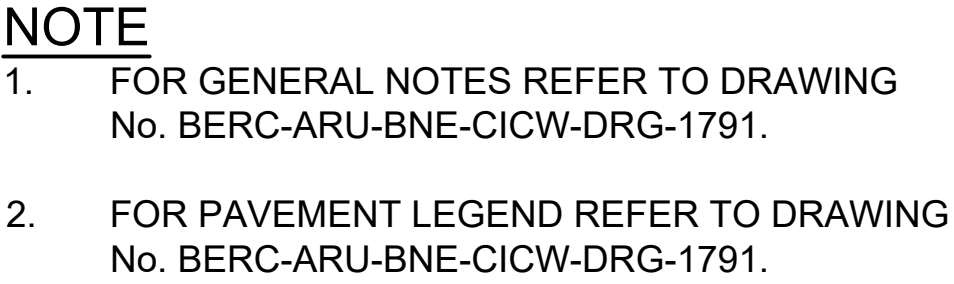
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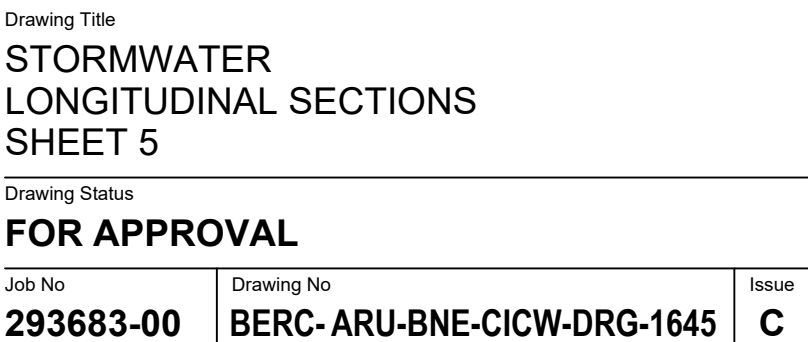
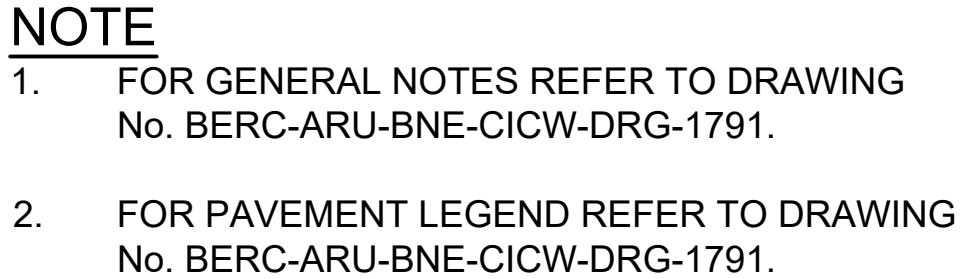
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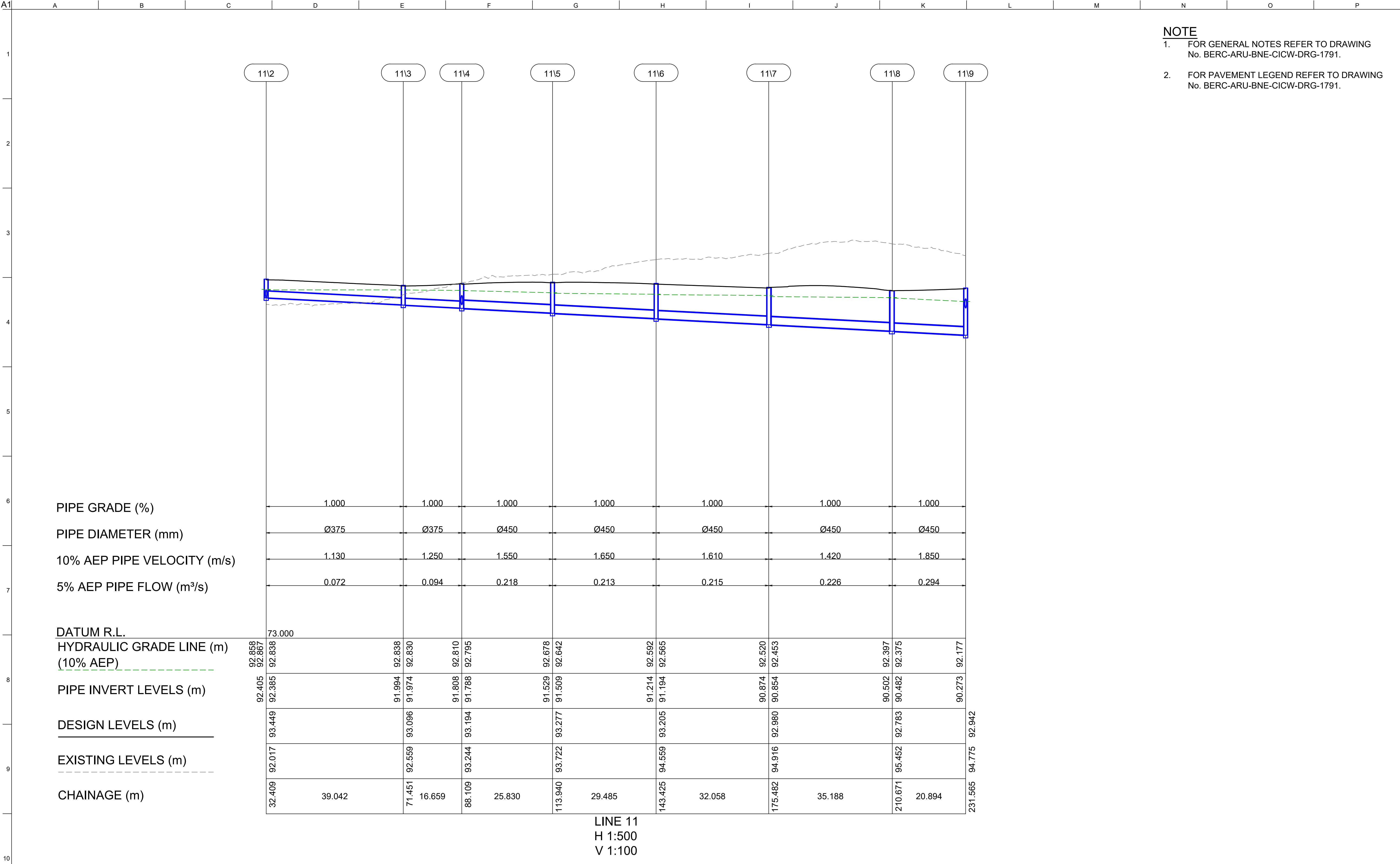
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Do not scale

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- NOTE
1.

FOR GENERAL NOTES REFER TO DRAWING
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2.

FOR PAVEMENT LEGEND REFER TO DRAWING
No. BERC-ARU-BNE-CICW-DRG-1791.

Scales

1 0 1 2 3 4 5m

1:100(A1)/1:200(A3)

5 0 10 20m

1:500(A1)/1:1000(A3)

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Issue

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SHEET 6

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Job No

293683-00

Drawing No

BERC-ARU-BNE-CICW-DRG-1646

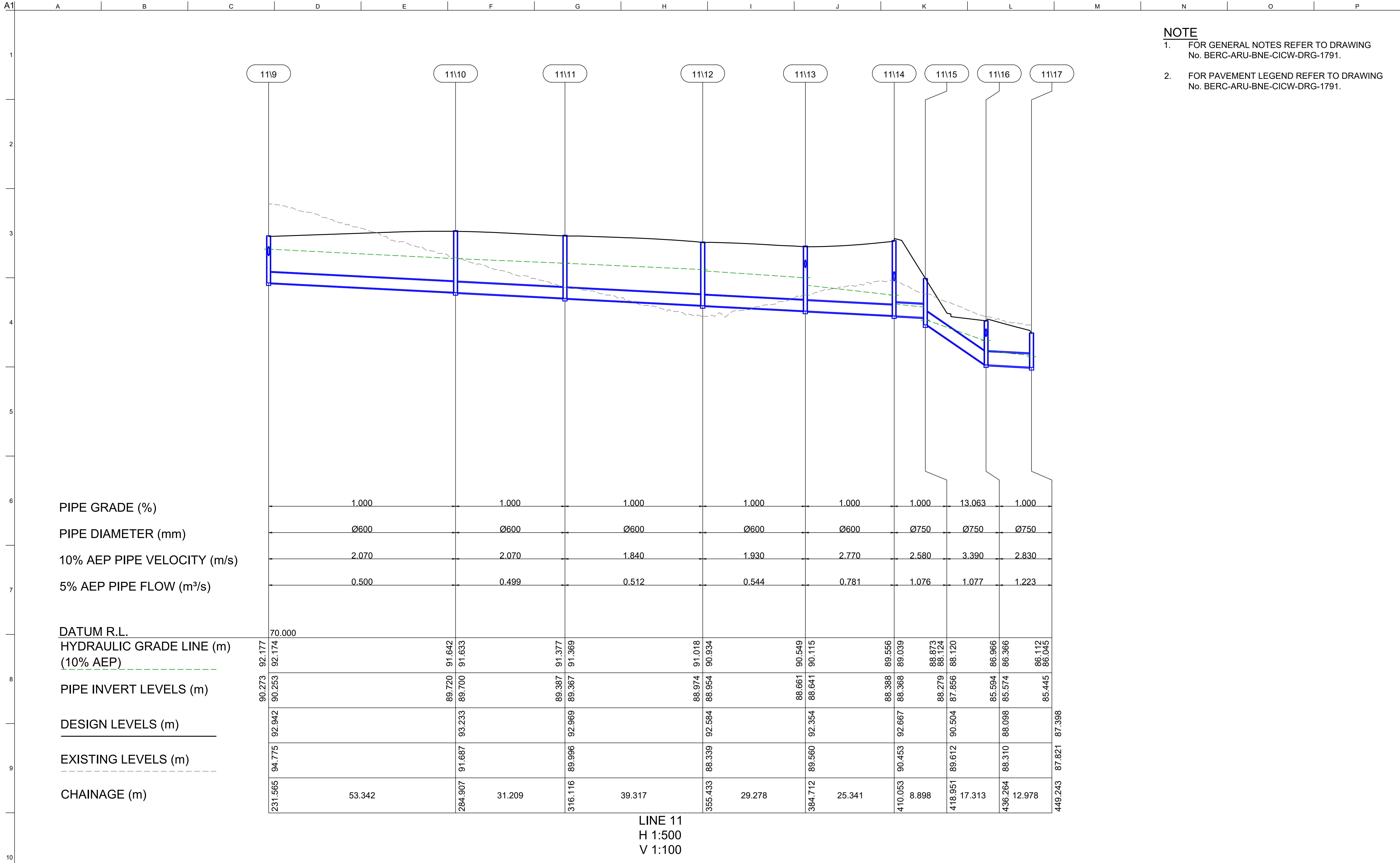
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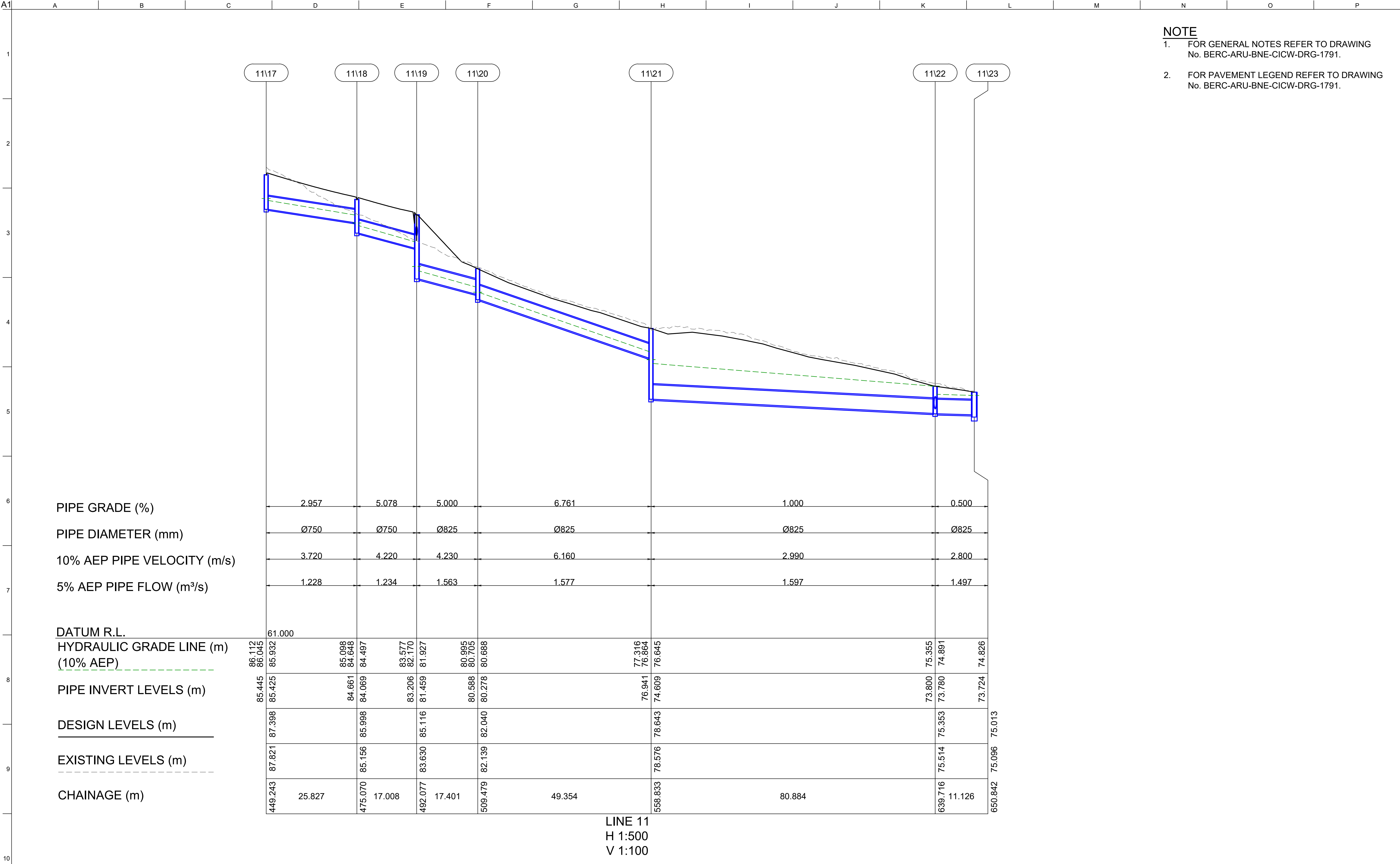
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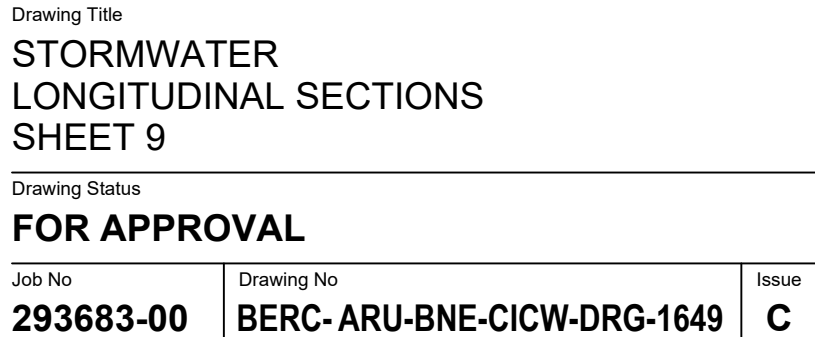
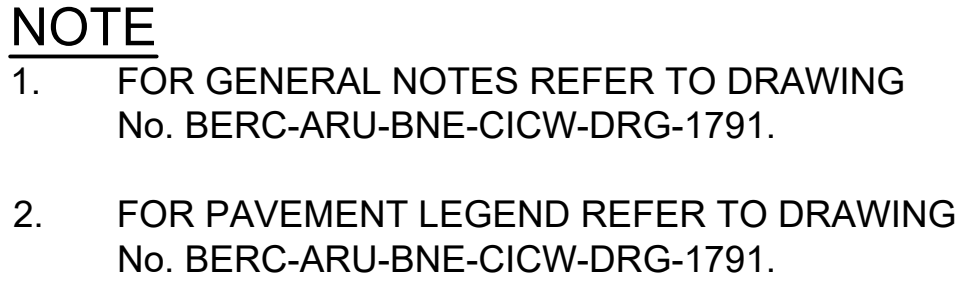
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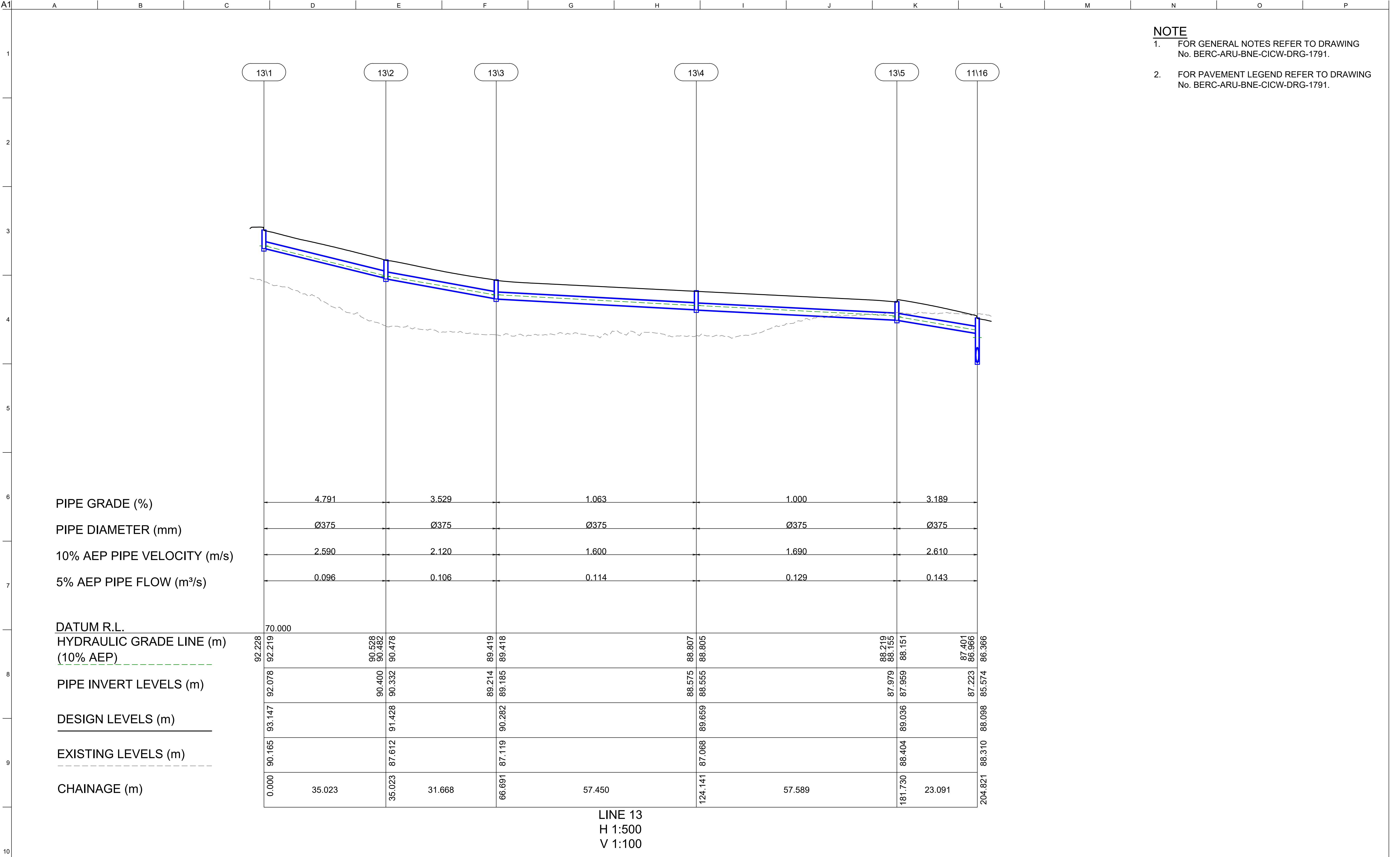
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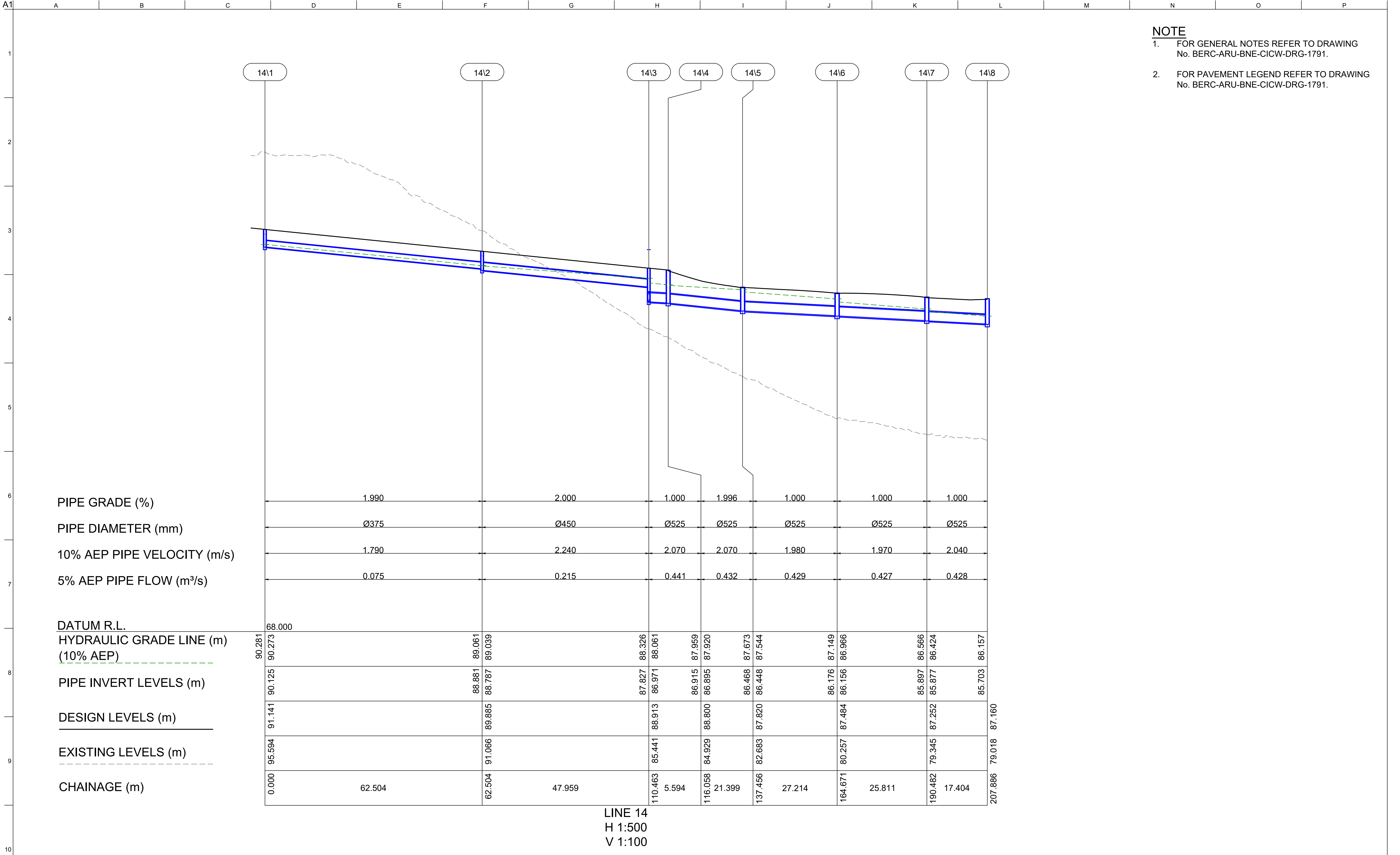
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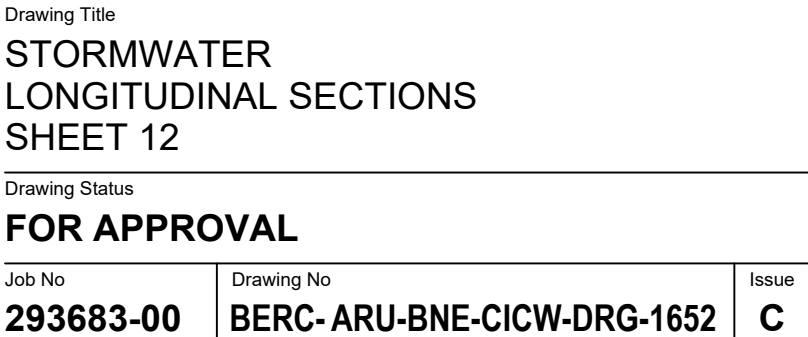
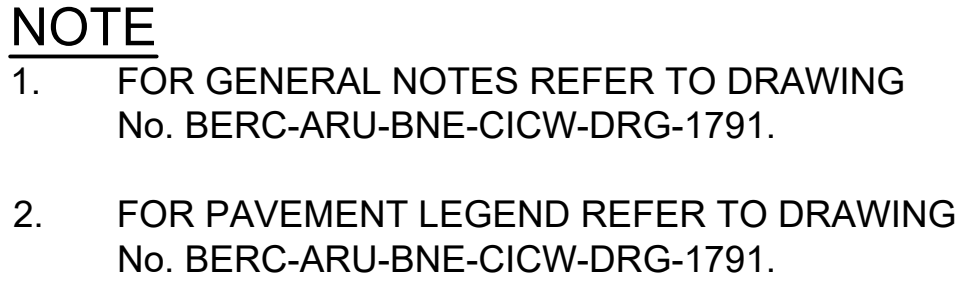


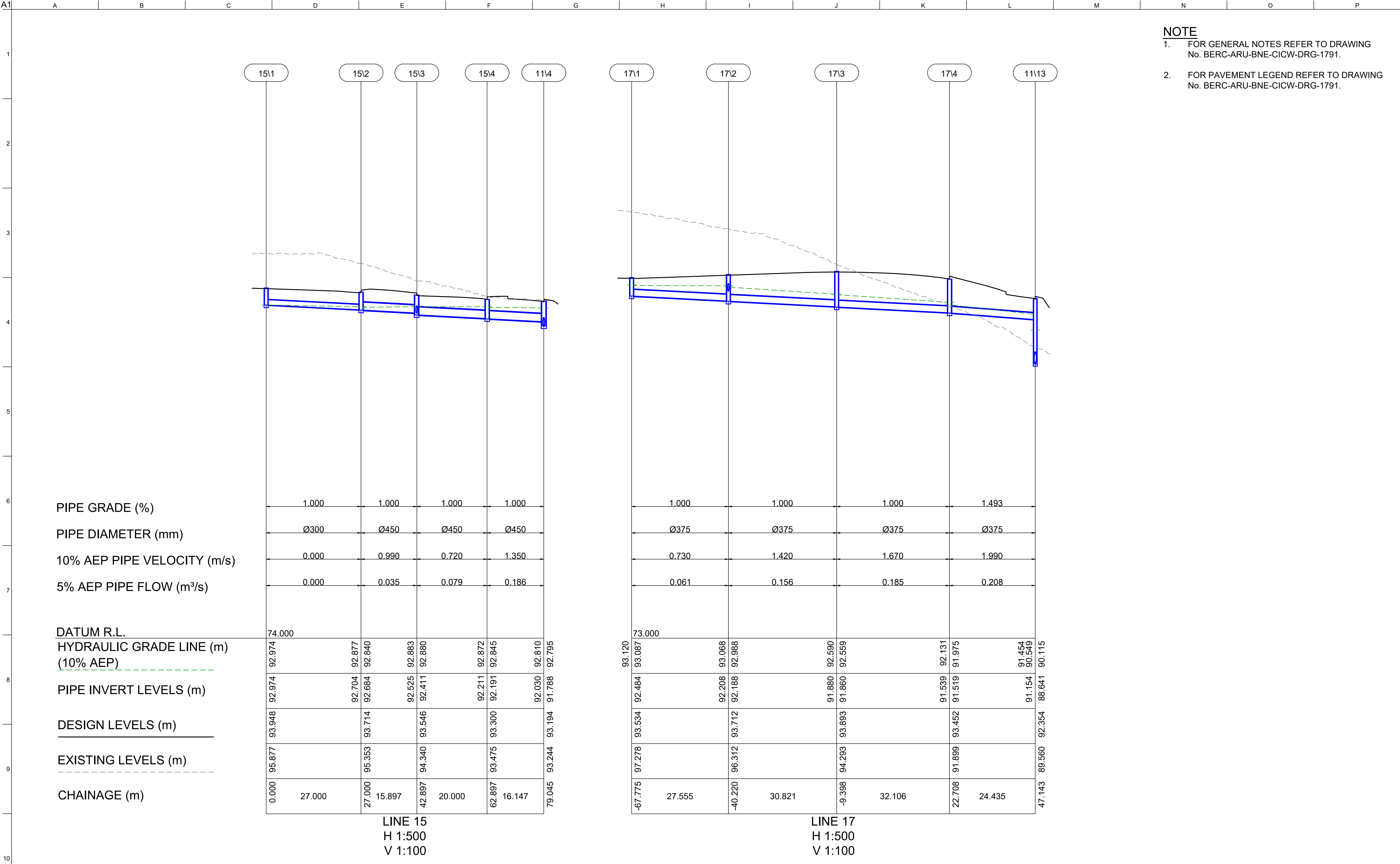












NOTE

1. FOR GENERAL NOTES REFER TO DRAWING
No. BERC-ARU-BNE-CICW-DRG-1791.

2. FOR PAVEMENT LEGEND REFER TO DRAWING
No. BERC-ARU-BNE-CICW-DRG-1791.

Scales

1 0 1 2 3 4 5m

1:100(A1)/1:200(A3)

5 0 10 20m

1:500(A1)/1:1000(A3)

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SHEET 13

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Job No

293683-00

Drawing No

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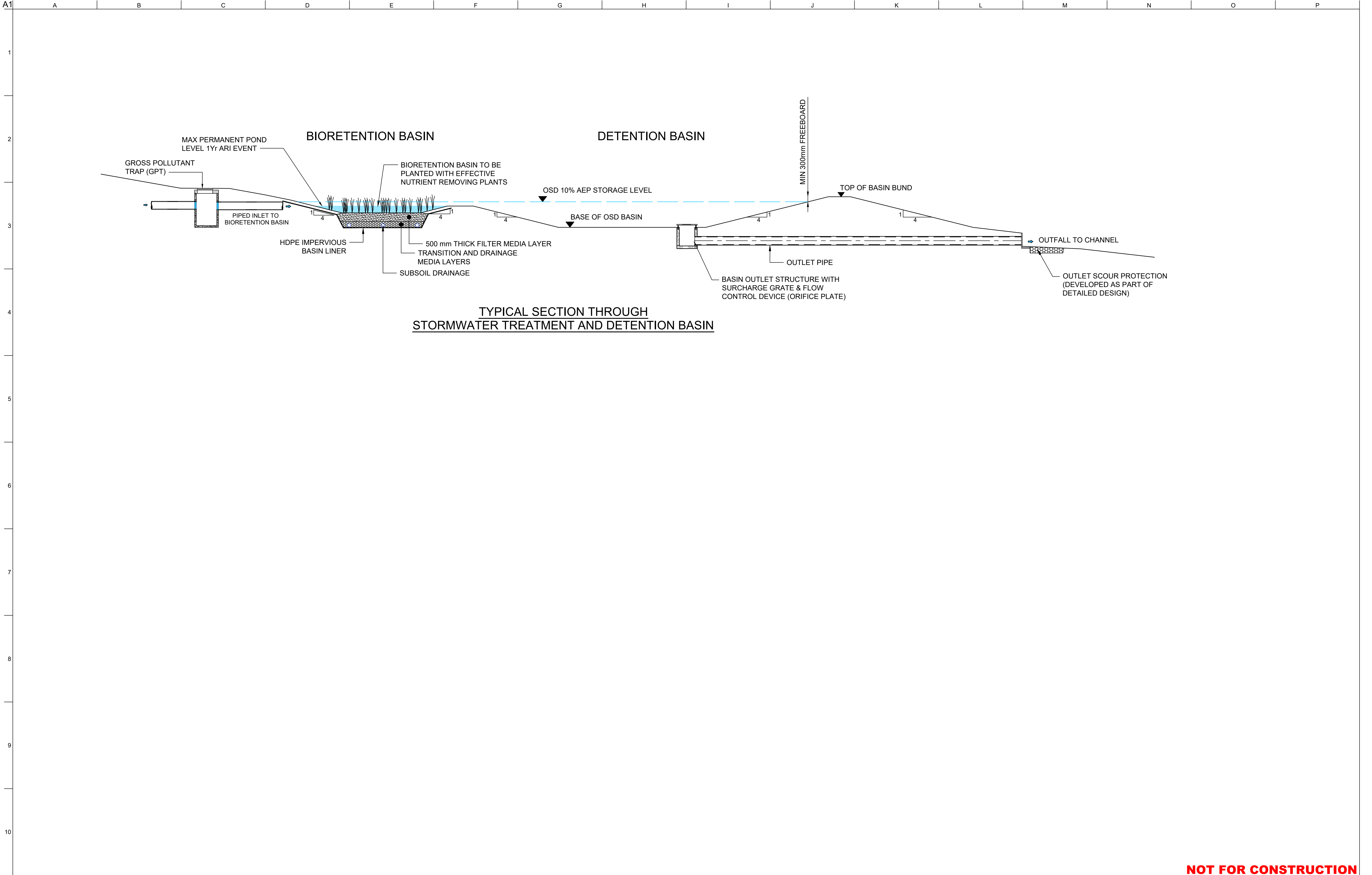
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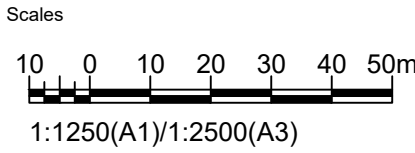
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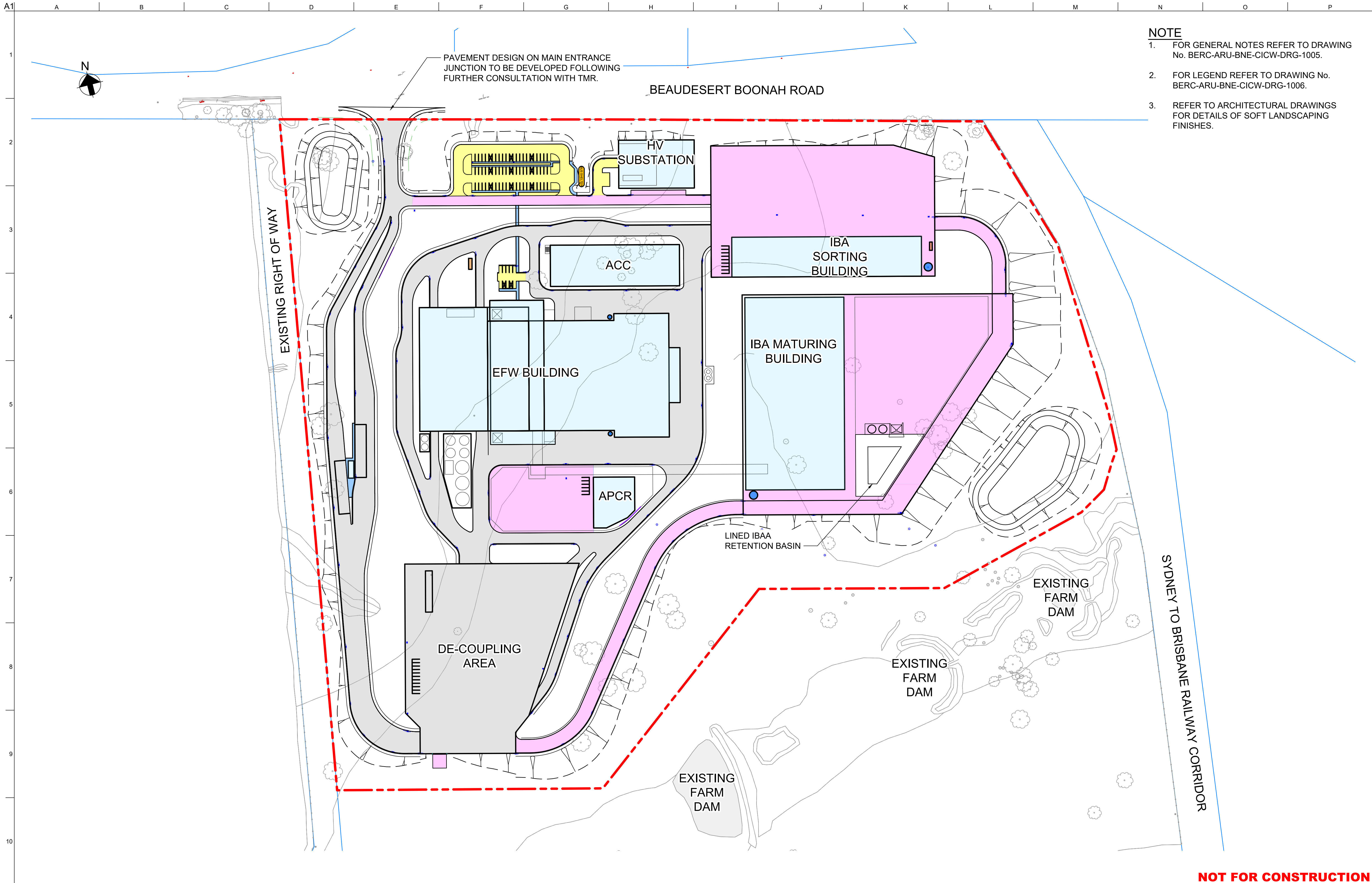
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STORMWATER MISCELLANEOUS DETAILS

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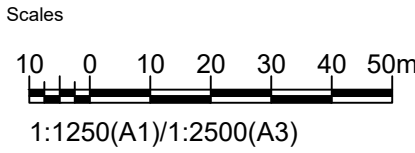
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Job No	Drawing No	Issue
293683-00	BERC-ARU-BNE-CICW-DRG-1691	C



- NOTE**
- 1. FOR GENERAL NOTES REFER TO DRAWING No. BERC-ARU-BNE-CICW-DRG-1005.
 - 2. FOR LEGEND REFER TO DRAWING No. BERC-ARU-BNE-CICW-DRG-1006.
 - 3. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS OF SOFT LANDSCAPING FINISHES.

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C	16.01.26	PDA	ERA	EGM
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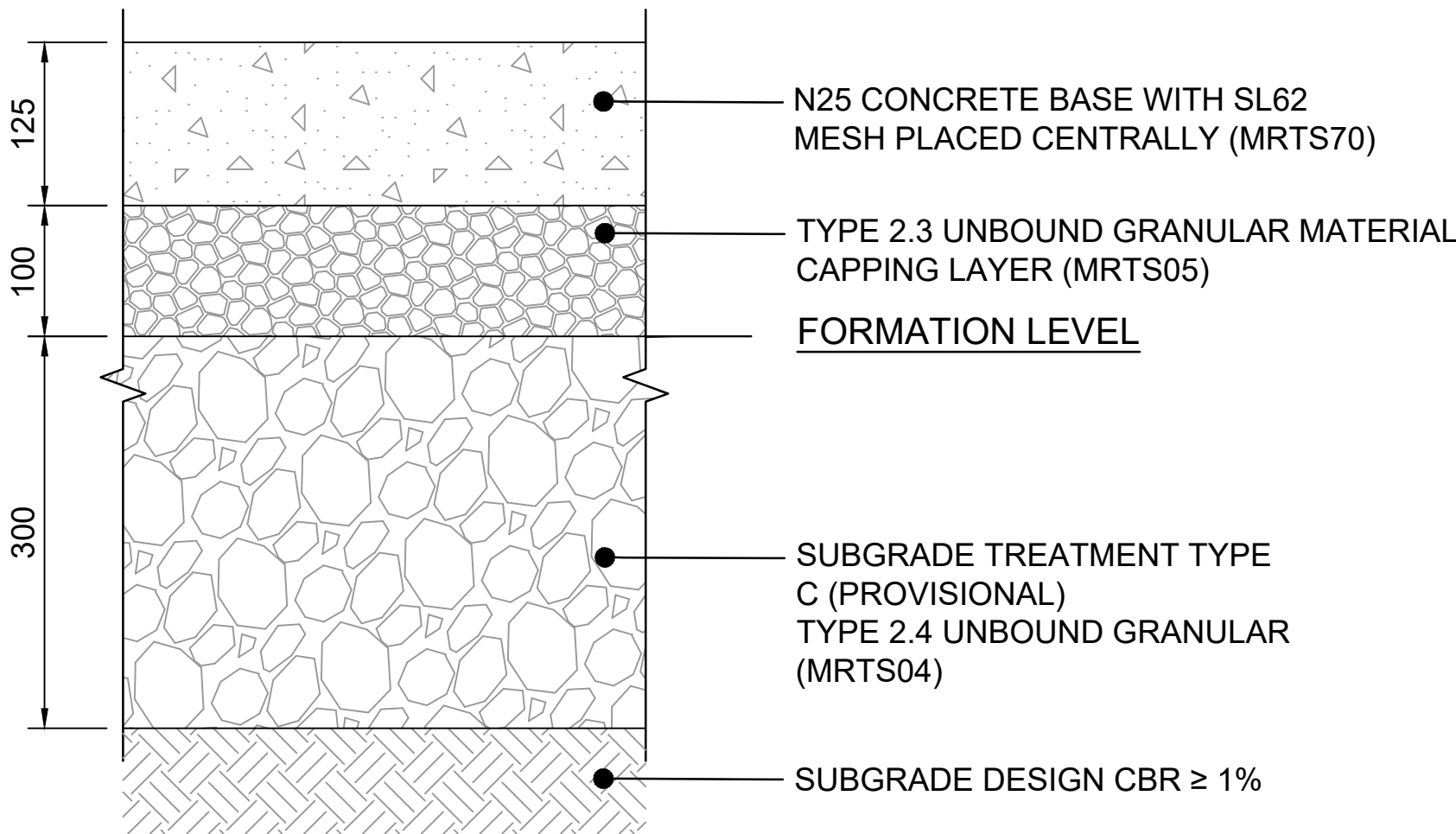
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PAVEMENT PLAN

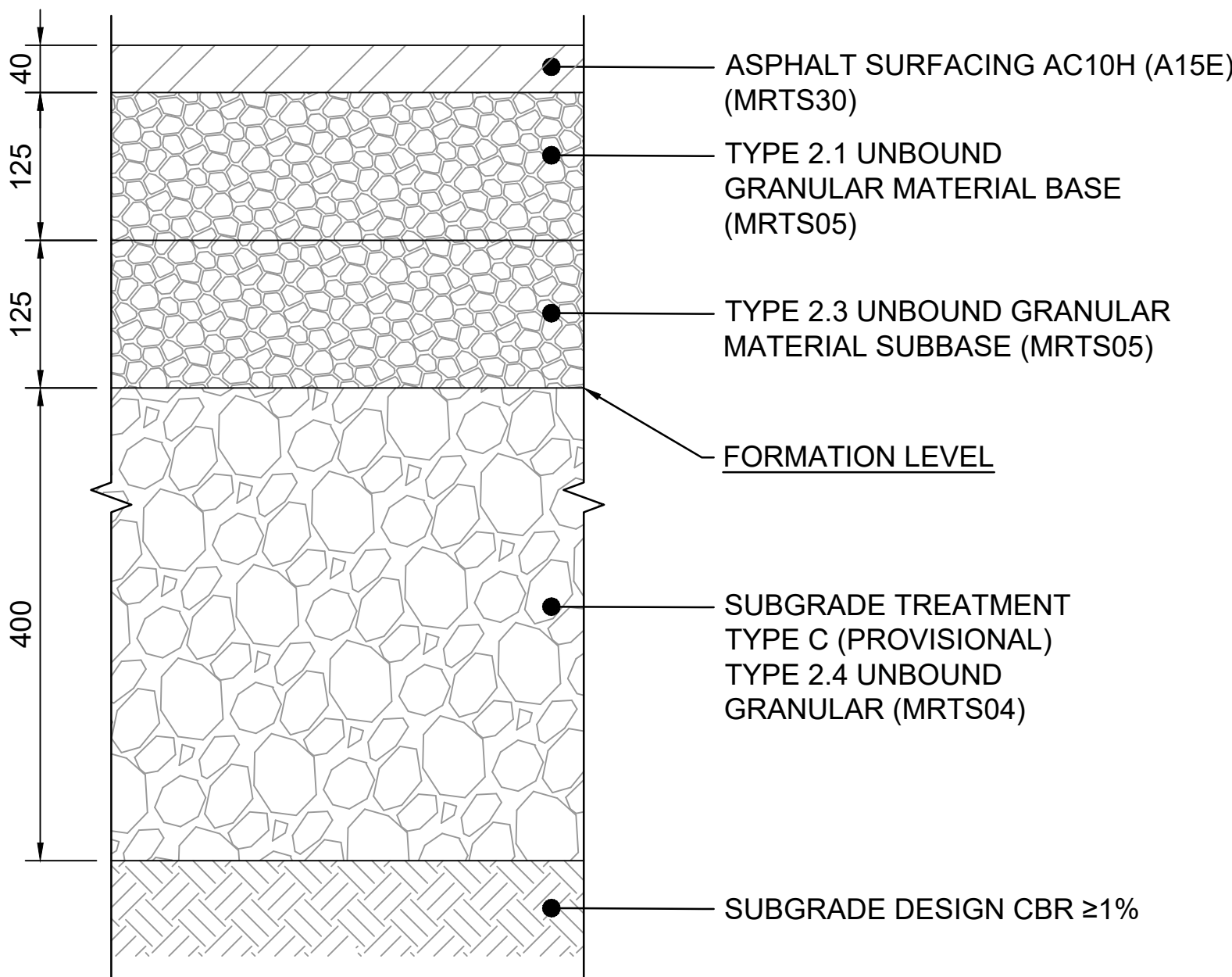
Drawing Status

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Job No **293683-00** Drawing No **BERC-ARU-BNE-CICW-DRG-1700** Issue **C**



RP2 - JOINTED REINFORCED CONCRETE PAVEMENT (JRCP) FOOTPATH



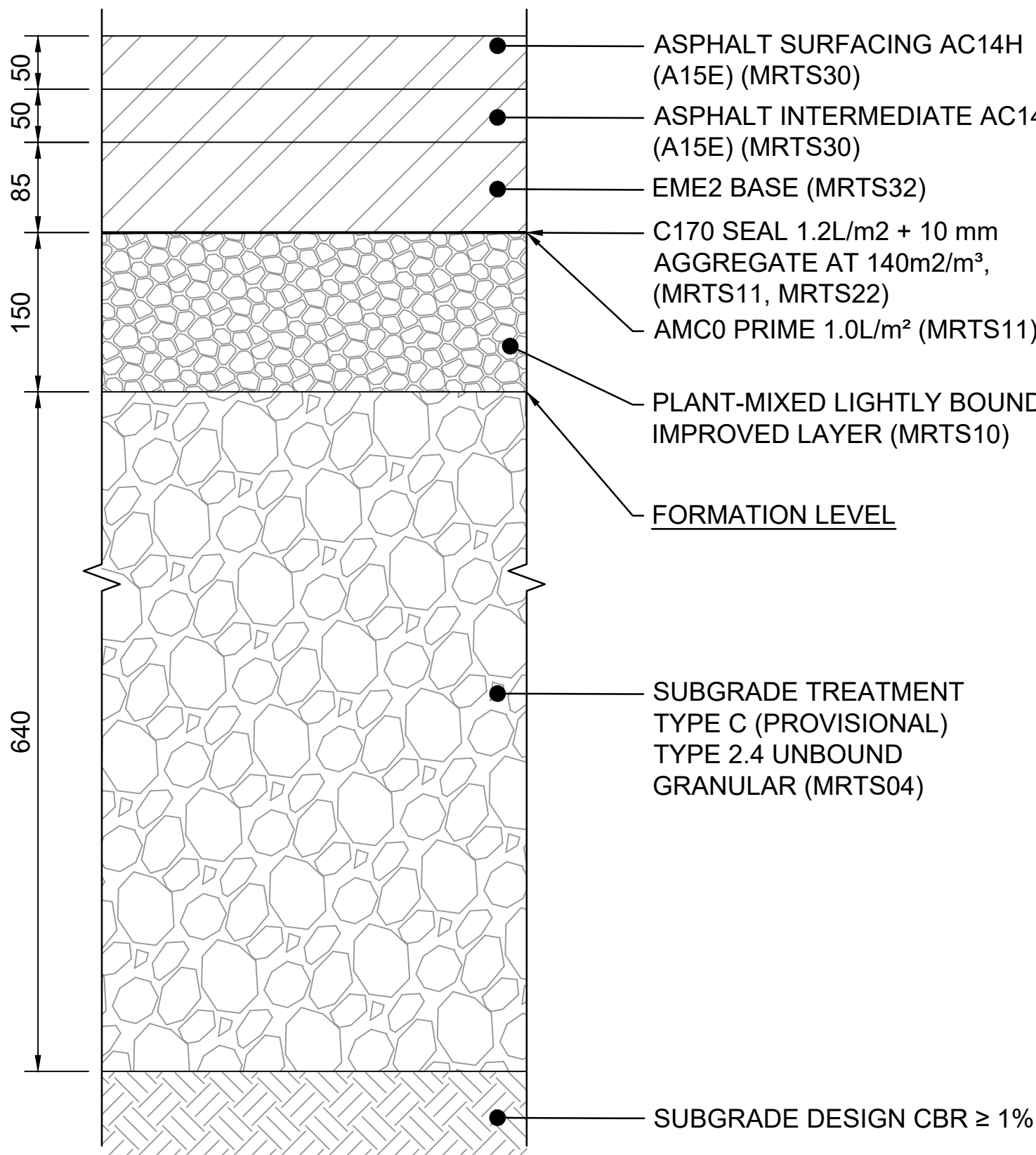
FP1 - GRANULAR PAVEMENT WITH THIN ASPHALT SURFACING (CARPARK)

NOTES:

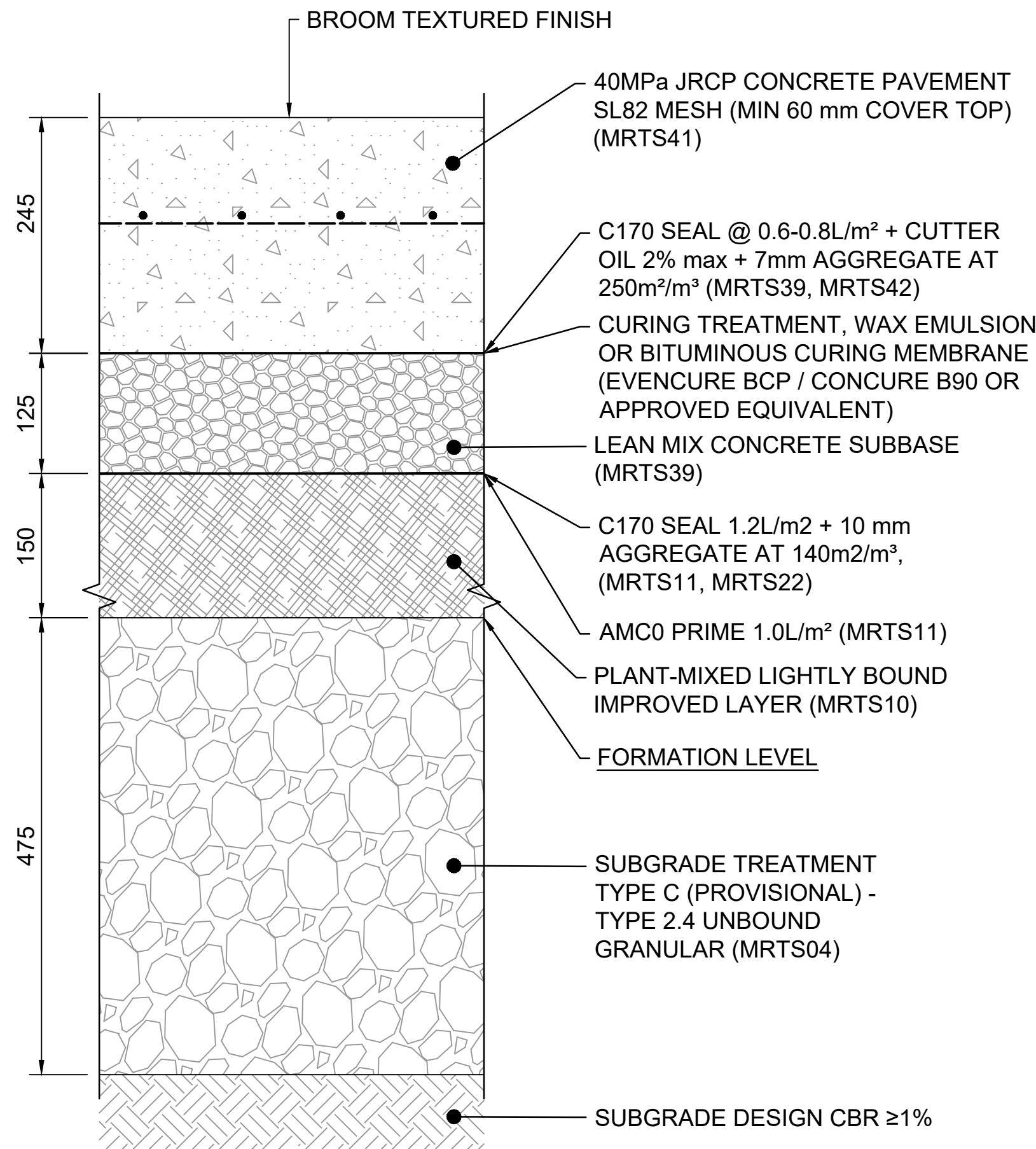
1. EARTHWORKS AND SUBGRADE PREPARATION TO BE IN ACCORDANCE WITH MRTS04.
2. THE SUBGRADE WILL BE VERIFIED IN ACCORDANCE WITH MRTS04.
3. SUB-SURFACE DRAINAGE BELOW LOW AND HIGH SIDE OF KERBS & CHANNELS TO BE PROVIDED. EXACT DETAILS TO BE INCLUDED WITHIN DETAILED DESIGN.
4. DESIGNS ARE BASED ON THE SUBGRADE ACHIEVING A CBR OF 3% AS PER SECTION 6.9 OF DOUGLAS PARTNERS REPORT ON GEOTECHNICAL INVESTIGATION, BROMELTON ENERGY & RESOURCES CENTRE (BERC), AUGUST 2023.
5. SUBGRADE TREATMENT IS RECOMMENDED FOR USE WHERE 97% COMPACTION OR THE PROOF ROLLING REQUIREMENTS STIPULATED WITHIN MRTS04 ARE NOT MET. APPROPRIATE SUBGRADE TREATMENT TYPE MAY BE VARIED AS DIRECTED BY THE ADMINISTRATOR. SUBGRADE TREATMENTS ALLOWED FOR IN THIS CONTRACT INCLUDE:
 - SUBGRADE TREATMENT TYPE C - 150-400 mm TYPE 2.4 UNBOUND.
 - SUBGRADE TREATMENT TYPE E - 150-250 mm LIGHTLY BOUND BASE.
 - SUBGRADE TREATMENT TYPE J - 300 mm GEOTEXTILE WRAPPED ROCK FILL LAYER.
6. SUBGRADE CBR %TO BE CONFIRMED VIA 4-DAY SOAKED CBRs AND DCPs TO 1.5 m DEPTH BELOW SUBGRADE SURFACE LEVEL PRIOR TO CONSTRUCTION (REFER TO MRTS04 APPENDIX A).
7. JOINTED REINFORCED CONCRETE PAVEMENT JOINTS SHALL BE IN ACCORDANCE WITH THE TRANSPORT FOR NEW SOUTH WALES JRCP STANDARD DRAWINGS.
8. PAVEMENT SUBSOIL DRAINAGE DESIGNS TO BE DEVELOPED AS PART OF FUTURE DESIGN STAGES IN ACCORDANCE WITH REQUIREMENTS OF PART 10: SUBSURFACE DRAINAGE OF THE AUSTRROADS GUIDE TO PAVEMENT TECHNOLOGY.

FOOTPATH NOTES

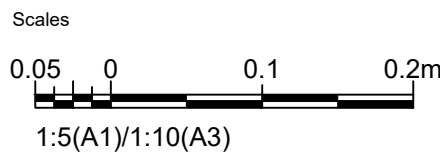
1. CONCRETE FOOTPATH SURFACE TO BE NON-SLIP TO AS 4586 (SLIP RESISTANCE CLASSIFICATION OF NEW PEDESTRIAN SURFACE MATERIALS).
2. CONCRETE PAVEMENT JOINTING SHALL BE IN ACCORDANCE WITH NOTE 5 OF SCENIC RIM COUNCIL STANDARD DRAWING R-13 WHICH HAS MAXIMUM SPACING OF 2.5 m.



FP2 - FULL DEPTH ASPHALT PAVEMENT (WORKING AREAS)



RP1 - JOINTED REINFORCED CONCRETE PAVEMENT (JRCP)



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A	18.08.25	PDA	ERA	EGM
DRAFT FEED ISSUE				
Issue	Date	By	Chkd	Appd

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Issue

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Appendix C – Stormwater Drainage Calculations

Step 1: Coefficient of discharge

$C_y = F_y \cdot C_{10}$

F_y

ARI (years)	F_y
1	0.80
2	0.85
5	0.95
10	1.00
20	1.05
50	1.15
100	1.20
From Table 4.05.2 (QUDM)	

f_i

Category	Fraction Impervious, f_i
Central Business	1
Commercial, Local Business, Neighbouring Facilities, Service	0.9
Industry, General Industry, Home Industry	0.9
Significant Paved Areas (Roads etc)	0.7 - 0.9
Urban Residential. (high density)	0.45 - 0.85
Urban Residential. (low density incl. roads)	0.40 - 0.75
Urban Residential. (low density excl. roads)	0.1 - 0.2
Rural Residential	0
Open Space and parks etc.	
From Table 4.05.1 (QUDM)	

C_{10}

t_{10} (mm/hr)	Fraction impervious, f_i										
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
39 - 44	0.32	0.38	0.44	0.50	0.55	0.61	0.67	0.73	0.78	0.84	0.90
45 - 49	0.39	0.44	0.49	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90
50 - 54	0.46	0.51	0.55	0.60	0.64	0.68	0.72	0.77	0.81	0.86	0.90
55 - 59	0.53	0.57	0.60	0.64	0.68	0.72	0.75	0.79	0.83	0.86	0.90
60 - 64	0.59	0.62	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.90
65 - 69	0.66	0.69	0.71	0.74	0.76	0.78	0.80	0.83	0.85	0.88	0.90
70 - 90	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.88	0.90
From Table 4.05.3(a) (QUDM)											

	Fraction Impervious	F_{10}	F_{100}	t_{10} (60 min, 10% AEP)	C_{10}	C_{100}
Pre-development	0	1	1.2	53.8	0.46	0.552
Post-development	0.495	1	1.2	53.8	0.66	0.792

Step 2: Time of concentration

$t = (107 \cdot n \cdot L^{0.333}) / S^{0.2}$

Friends Equation for pre-development

	A (ha)	L (m)	S (%)	n	t (mins)
Pre-development	8.7704	300	4.8	0.15	78.4

Post Development Flow and Time of Concentration: In Accordance with Section 4.6 of QUDM
There are two primary stormwater trunk drains flowing to the basin. The time of concentration calculated is the average of each trunk.

Sub-Catchment 1a - De-Coupling Hardstand to Basin	Length	t (mins)	Ref
Overland Sheet Flow on Hardstand to First Inlet Pit	5	5	Table 4.6.2 of QUDM
Pipe Flow from Inlet Pit to Basin (L= 486m)	486	4.05	Section 4.6.9 of QUDM (based on 2 m/s)
Total		9.05	
Sub-Catchment 1b - HV Substation to Basin.	Length	t (mins)	Ref
Overland Sheet Flow on Hardstand to First Inlet Pit	5	5	Table 4.6.2 of QUDM
Pipe Flow from Inlet Pit to Basin (L= 182m)	182	1.52	Section 4.6.9 of QUDM (based on 2 m/s)
Total		6.52	
Average of Sub-Catchments 1a & 1b	Tc	7.78	

Post Development Catchment Area	6.24	ha
Impervious Area	3.09	ha

Surface condition	n
Concrete or Asphalt	0.010-0.013
Bare Sand	0.010-0.016
Gravelled Surface	0.012-0.030
Bare Clay-Loam Soil (erodible)	0.012-0.033
Sparse Vegetation	0.053-0.130
Short Grass Paddock	0.100-0.200
Lawns	0.170-0.480
Table 4.06.4 - Surface roughness or retardance factors (QUDM pg 4-5)	

Step 3: Flow

$Q_y = 1/360 \cdot C_y \cdot I_y \cdot A$

	$^{78.4} I_{10}$	$^{78.4} I_{100}$	Q_{10}	Q_{100}
Pre-development	45.4	70.4	0.51	0.95
Post-development	$^{1.78} I_{10}$	$^{1.78} I_{100}$	Q_{10}	Q_{100}
	160.3	239.8	1.83	3.29

Step 4: Storage Volume Required

Section 7.2.7 of Guide to Road design Part 5A: Drainage - Road Surface, Networks, Basins and Subsurface

All items presented below are for the 10% AEP Event

Reduction Ratio	r	0.723	
Inflow Volume	V_i	825.065	Eqn 47
	V_s/V_i	0.589	Eqn 43
	V_s	485.892	
	V_s	596.158	Eqn 44
	V_s/V_i	0.597	Eqn 45
	V_s	492.784	
Average		524.945	
Highest		596.158	Min Basin Volume

If the Rational Method is used for the determination of Q , then the initial estimate of the inflow volume (V_i) may be determined as:

$$V_i = \frac{4 t_c r Q_i}{3}$$
 47

where

t_c = Time of concentration (sec)

The above equations are most appropriate when it is necessary to limit the peak discharge for only the nominated design storm, such as the ARI 100 year event. In those circumstances, where it is necessary to ensure the post-development peak discharge for each tested storm duration is not increased, then these equations are likely to underestimate the required detention volume.

Guide to Road Design Part 5A: Drainage – Road Surface, Networks, Basins and Subsurface

$$\frac{V_s}{V_i} = \frac{r(1+2r)}{3}$$
 (Culp 1948) 43

$$\frac{V_s}{V_i} = r$$
 (Boyd 1989) 44

$$\frac{V_s}{V_i} = \frac{r(3+5r)}{8}$$
 (Carroll 1990) 45

$$\frac{V_s}{V_i} = \frac{r(2+r)}{3}$$
 (Basha 1994) 46

where

r = Reduction ratio, calculated as $r = \frac{(Q_i - Q_o)}{Q_i}$ (for Q_i and Q_o , see below)

V_s = Required storage volume (max) (m^3)

V_i = Inflow volume (m^3) (see Equation 47 below, or from hydrograph, see Figure 7.3)

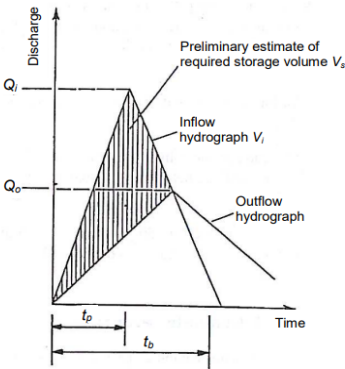
Q_i = Peak inflow discharge (m^3/s) (from hydrologic calculations)

Q_o = Peak outflow discharge (m^3/s) (outflow adopted for the basin)

7.2.7 Initial Design and Feasibility

Preliminary design may be conducted using a simple set of calculations however in many cases it is just as easy to undertake preliminary sizing using the same techniques as used for the detailed design. Preliminary sizing will determine if a detention basin is feasible, or if there is any significant flood mitigation effect to be obtained from such a basin. If a simplified technique is used, it will need to be checked using detailed design techniques.

Figure 7.3: Triangular shaped hydrographs



Notes:
 t_p – time to peak discharge.
 t_b – can be taken as $2.67 t_p$ when no better information is available.
Source: DTMR (2010).

BERC Stormwater Detention Basin Calculations - Basin 2 (SE)

Date 23/07/2025
Author Emann-Ray Arago
Reviewed: Karen Seeto

Step 1: Coefficient of discharge

$C_y = F_y \cdot C_{10}$

F_y

ARI (years)	F_y
1	0.80
2	0.85
5	0.95
10	1.00
20	1.05
50	1.15
100	1.20

From Table 4.05.2 (QUDM)

f_i

Category	Fraction Impervious, f_i
Central Business	1
Commercial, Local Business, Neighbouring Facilities, Service Industry, General Industry, Home Industry	0.9
Significant Paved Areas (Roads etc)	0.9
Urban Residential, (high density)	0.7 - 0.9
Urban Residential, (low density incl. roads)	0.45 - 0.85
Urban Residential, (low density excl. roads)	0.40 - 0.75
Rural Residential	0.1 - 0.2
Open Space and parks etc.	0

From Table 4.05.1 (QUDM)

C_{10}

t_{10} (mm/hr)	Fraction impervious, f_i										
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
39 - 44	0.32	0.38	0.44	0.50	0.55	0.61	0.67	0.73	0.78	0.84	0.90
45 - 49	0.39	0.44	0.49	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90
50 - 54	0.46	0.51	0.55	0.60	0.64	0.68	0.72	0.77	0.81	0.86	0.90
55 - 59	0.53	0.57	0.60	0.64	0.68	0.72	0.75	0.79	0.83	0.86	0.90
60 - 64	0.59	0.62	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.90
65 - 69	0.66	0.69	0.71	0.74	0.76	0.78	0.80	0.83	0.85	0.88	0.90
70 - 90	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.88	0.90

From Table 4.05.3(a) (QUDM)

	Fraction Impervious	F_{10}	F_{100}	t_{10} (60 min, 10% AEP)	C_{10}	C_{100}
Pre-development	0	1	1.2	53.8	0.46	0.552
Post-development	0.61	1	1.2	53.8	0.725	0.87

Step 2: Time of concentration

$t = (107 \cdot n \cdot L^{0.333}) / S^{0.2}$

Friends Equation for pre-development

	A (ha)	L (m)	S (%)	n	t (mins)
Pre-development	0.875	250	5.80	0.15	71.0

Post Development Flow and Time of Concentration: In Accordance with Section 4.6 of QUDM
There are two primary stormwater trunk drains flowing to the basin. The time of concentration calculated is the average of each trunk.

Catchment 1 - De-Coupling Hardstand to Basin.

Length	t (mins)	Ref
Overland Sheet Flow on Hardstand to First Inlet Pit	5	Table 4.6.2 of QUDM
Pipe Flow from Inlet Pit to Basin (L= 423m)	423	3.525 Section 4.6.9 of QUDM (2 m/s)
Total	8.525	

Catchment 2 - EfW Building Roof to Basin.

Length	t (mins)	Ref
Overland Sheet Flow on Hardstand to First Inlet Pit	5	Table 4.6.2 of QUDM
Pipe Flow from Inlet Pit to Basin (L= 600m)	600	5.00 Section 4.6.9 of QUDM (2 m/s)
Total	10.00	

Average of Catchment 1 & 2

Tc	9.26
----	------

Post Development Catchment Area	15.25	ha
Impervious Area	9.30	ha

n

Surface condition	n
Concrete or Asphalt	0.010-0.013
Bare Sand	0.010-0.016
Gravelled Surface	0.012-0.030
Bare Clay-Loam Soil (exposed)	0.012-0.033
Sparse Vegetation	0.053-0.130
Short Grass Paddock	0.100-0.200
Lawns	0.170-0.480

Table 4.06.4 - Surface roughness or retardance factors (QUDM pg 4-

Step 3: Flow

$$Q_y = 1/360 \cdot C_y \cdot I_y \cdot A$$

	$83.8 I_{10}$	$83.8 I_{100}$	Q_{10}	Q_{100}
Pre-development	43.02	67	0.05	0.09
Post-development	$9.28 I_{10}$	$9.28 I_{100}$	Q_{10}	Q_{100}
	151.4	225.3	4.65	8.30

Step 4: Storage Volume Required

Section 7.2.7 of Guide to Road design Part 5A: Drainage - Road Surface, Networks, Basins and Subsurface

All items presented below are for the 10% AEP Event

Reduction Ratio	r	0.990	
Inflow Volume	V_i	3409.836	Eqn 47
	V_s/V_i	0.983	Eqn 43
	V_s	3351.292	
	V_s	3374.564	Eqn 44
	V_s/V_i	0.983	Eqn 45
	V_s	3352.747	
Average		3359.534	
Highest		3374.564	Min Basin Volume

If the Rational Method is used for the determination of Q , then the initial estimate of the inflow volume may be determined as:

$$V_i = \frac{4 t_c r Q_i}{3}$$

where

$$t_c = \text{Time of concentration (sec)}$$

The above equations are most appropriate when it is necessary to limit the peak discharge for only the nominated design storm, such as the ARI 100 year event. In those circumstances, where it is necessary to ensure the post-development peak discharge for each tested storm duration is not increased, then these equations are likely to underestimate the required detention volume.

Guide to Road Design Part 5A: Drainage - Road Surface, Networks, Basins and Subsurface

$$\frac{V_s}{V_i} = \frac{r(1+2r)}{3} \quad (\text{Culp 1948}) \quad 43$$

$$\frac{V_s}{V_i} = r \quad (\text{Boyd 1989}) \quad 44$$

$$\frac{V_s}{V_i} = \frac{r(3+5r)}{8} \quad (\text{Carroll 1990}) \quad 45$$

$$\frac{V_s}{V_i} = \frac{r(2+r)}{3} \quad (\text{Basha 1994}) \quad 46$$

where

r = Reduction ratio, calculated as $r = \frac{(Q_i - Q_o)}{Q_i}$ (for Q_i and Q_o see below)

V_s = Required storage volume (max) (m^3)

V_i = Inflow volume (m^3) (see Equation 47 below, or from hydrograph, see Figure 7.3)

Q_i = Peak inflow discharge (m^3/s) (from hydrologic calculations)

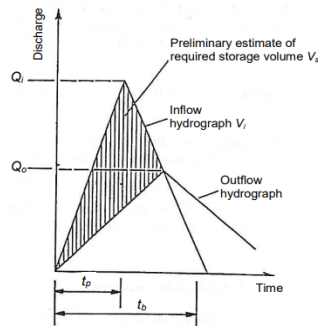
Q_o = Peak outflow discharge (m^3/s) (outflow adopted for the basin)

Reference Guidelines

7.2.7 Initial Design and Feasibility

Preliminary design may be conducted using a simple set of calculations however in many cases it is just as easy to undertake preliminary sizing using the same techniques as used for the detailed design. Preliminary sizing will determine if a detention basin is feasible, or if there is any significant flood mitigation effect to be obtained from such a basin. If a simplified technique is used, it will need to be checked using detailed design techniques.

Figure 7.3: Triangular shaped hydrographs



Notes:
 t_p = time to peak discharge.
 t_o = can be taken as $2.67 t_p$ when no better information is available.
 Source: DTMR (2010).

4.6.5 Travel times from roof to main system connection

In cases where the use of a standard inlet time is not considered appropriate, the following roof to drainage system flow travel times are recommended:

Table 4.6.3 – Recommended roof drainage system travel times

Development category	Time to point A (minutes)
Rural residential, residential low-density For the roof, downpipes and pipe connection system from the building to the kerb and channel or a rear-of-allotment drainage system (Figure 4.2).	5
Residential medium and high-density, commercial, industrial and central business district For the roof and downpipe collection pipe to the connection point to the internal allotment drainage system abutting the building (Figure 4.3).	5

Note: The flow time from point A (figures 4.2 & 4.3) through the internal allotment pipe system to the kerb and channel, street underground system or rear of allotment system for the more intense developments noted should be calculated separately.

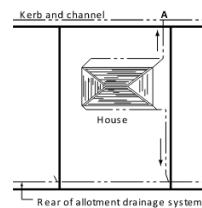


Figure 4.2 – Typical roof drainage systems (residential)

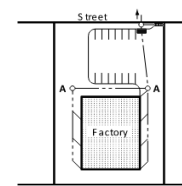


Figure 4.3 – Typical roof drainage systems (industrial)

Note (figures 4.2 & 4.3): Point A is referred to in Table 4.6.3

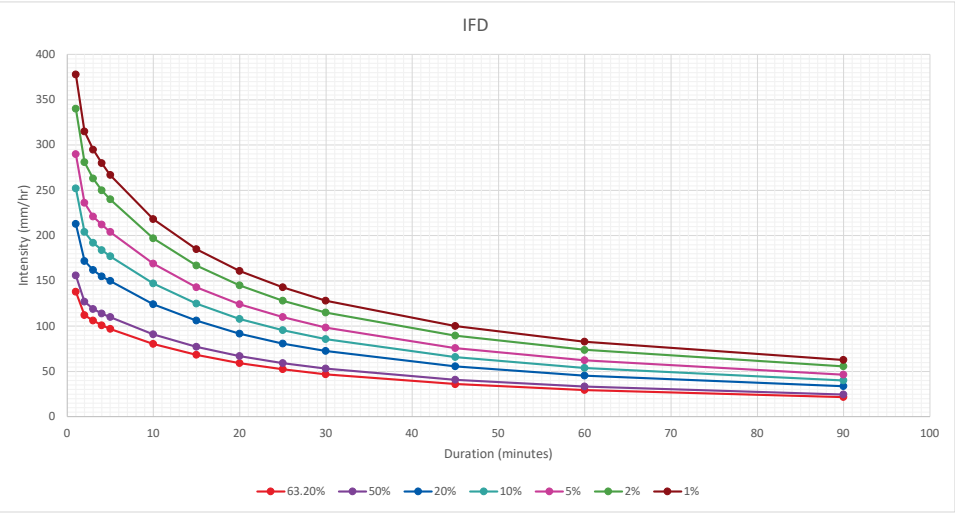
IFD Design Rainfall Intensity (mm/h)
Issued: 2-May-23
Location Label:
Requested cr Latitude -27.977 Longitude 152.925
Nearest grid r Latitude 27.9875 (Longitude 152.9375 (E)

		Annual Exceedance Probability (AEP)						
Duration	Duration in n	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	138	156	213	252	290	340	378
2 min	2	112	127	172	204	236	281	315
3 min	3	106	119	162	192	221	263	295
4 min	4	101	114	155	184	212	250	280
5 min	5	97	110	150	177	204	240	267
10 min	10	80.3	91	124	147	169	197	218
15 min	15	68.2	77.2	106	125	143	167	185
20 min	20	59.1	67	91.5	108	124	145	161
25 min	25	52.3	59.2	80.8	95.4	110	128	143
30 min	30	46.9	53.1	72.5	85.6	98.4	115	128
45 min	45	36	40.7	55.6	65.8	75.9	89.5	100
1 hour	60	29.4	33.2	45.4	53.8	62.3	73.8	82.7
1.5 hour	90	21.8	24.6	33.7	40.1	46.6	55.6	62.7
2 hour	120	17.6	19.8	27.2	32.5	37.8	45.3	51.3
3 hour	180	12.9	14.6	20.1	24.1	28.3	34.1	38.8
4.5 hour	270	9.58	10.8	15	18.1	21.3	25.8	29.4
6 hour	360	7.79	8.82	12.3	14.9	17.5	21.3	24.3
9 hour	540	5.89	6.69	9.4	11.4	13.5	16.4	18.8
12 hour	720	4.87	5.55	7.83	9.53	11.3	13.7	15.8
18 hour	1080	3.77	4.31	6.13	7.47	8.87	10.8	12.4
24 hour	1440	3.15	3.62	5.17	6.31	7.49	9.12	10.4
30 hour	1800	2.74	3.16	4.53	5.53	6.56	8	9.15
36 hour	2160	2.45	2.82	4.06	4.96	5.88	7.17	8.19
48 hour	2880	2.04	2.36	3.4	4.15	4.92	5.99	6.84
72 hour	4320	1.54	1.79	2.59	3.15	3.73	4.55	5.2
96 hour	5760	1.24	1.44	2.08	2.54	3	3.66	4.18
120 hour	7200	1.03	1.19	1.73	2.11	2.49	3.03	3.47
144 hour	8640	0.873	1.01	1.46	1.78	2.1	2.56	2.94
168 hour	10080	0.75	0.867	1.25	1.53	1.81	2.19	2.52

INPUTS TO STEP 3

	Basin 1		Basin 2	
	10%	1%	10%	1%
Pre-Dev	45.3973	70.4333	43.0227	66.9667
Post Dev	160.32	239.756	151.44	225.252

	Basin 1		Basin 2	
	78.4	0.61333	83.6	0.78667
Pre	78.4	0.61333	83.6	0.78667
Post	7.78	0.556	9.29	0.852



Appendix D - MUSIC Model Outputs

Refer to separate folder for
MUSIC Model outputs.

Appendix E – Correspondence with Seqwater

Project Discussions: Cleanaway BERC and Seqwater

Date:	18/09/2025	Chair:	Rachael Leeson
Time:	1.00 pm – 2.00 pm BNE		
Venue:	Teams		
Objectives:	Discuss potential impacts of the proposed Cleanaway BERC facility on Seqwater interests, and any requirements that may apply in relation to this.		
Attendees:	OCG: Rachael Leeson (RL), Felicity McCann (FM), Amanda Koenig (AK) SeqWater: Philip Chan (PC), Jessica Fraser (JF), Chris Thompson (CT), Medina Handley (MH), David Fox (DF), Will Hardy (WH) CWY: Ricky McNally (RM), Michael Hartley (MH) Arup: Anna Stewart (AS), Euan Mitchell (EM) Therefor: Andrew Crawford (AC), Gabriella Tomarchio (GT)		

Meeting Notes

Refer to copy of the slide deck presentation.

1.0 Introductions

2.0 Overview

- AK opened the meeting noting that the intention was to discuss the Cleanaway BERC proposal, any impacts on SeqWater Interests and any SeqWater requirements that the BERC project team should consider.
- AS share and explained the masterplan for the BERC and provided a high level overview of the Energy from Waste Process.
- AS noted, previous engagement with SeqWater in 2023 and the 2025 all agency briefing.

3.0 Matters of Interest for SEQwater

- **Stormwater/Overland Flow**
 - EM discussed stormwater and overland flow paths including the flood modelling of pre and post development conditions.
 - Noted that 22.5 ha is the proposed development area of the 63 ha site area.
 - SEQ Water queried the setback distance of the stormwater basin to the waterway. EM noted that a drawing showing the offsets has been prepared. The basin is at least 25m from the waterway.
 - EM noted that this is some ambiguity in how the drainage feature onsite is mapped based on different legislation – Fisheries Act, Water Act, Vegetation Management Act.
 - DRDMW confirmed in 2023 that they classified the flow path in centre of site as “drainage feature.”
 - Seqwater noted that the Development Guideline is based on the stream order under Vegetation Management Act.
 - SeqWater confirmed the waterway is identified as Stream Order 1.
 - SeqWater noted that the southern basin is disconnected to the Logan River and queried if it was known what rainfall event is required to provide connection (specific AEP).

- *Post Meeting Note: We have reached out to our flood modeller who noted that: The model only extends to the Beaudesert Boonah Rd crossing just east of the site. Logan River is ~7 km downstream. The model extents do not allow us to identify at what event the site and Logan River would be connected.*
 - EM noted that MUSIC modelling has been completed for the concept design that demonstrates the stormwater design achieves the pollution reduction targets set by Seqwater, which are noted as being more stringent than the requirements set within Bromelton SDA.
 - EM described the filling and excavation approach for the site.
- **Hazard & Risk**
 - AS presented the outcomes of the hazard and risk assessment noting that Air Pollution Control Residue and diesel would be stored on the site. It was noted that these goods were stored more than 100 m from the watercourse.
- **Layout and Set Backs**
 - EM presented the setbacks from the watercourse noting that the layout has been developed to ensure that the SeqWater offset requirements have been met.
- **Water Demand**
 - AS presented the potable water requirements for the BERC noting that a Service Advice Notice was sought from Queensland Urban Utilities. QUU have confirmed that there is sufficient capacity in the existing DN375 main to support the full BERC operational demand.
 - SeqWater advised that there is a current project to connect Beaudesert to the grid. There are delays in finalising the connection and SeqWater require water volumes and demands of the development proposal to ensure it can be catered for.
 - SeqWater require timeline for connection into the network (construction and operation).
 - AS noted, if approved construction would start in 2028. The facility would be operation in 2032. No phasing is planned i.e full water demand from Day 1.
 - *PMN: An additional timeline slide has been added to the slide pack with program information.*
 - AS noted that in community engagement members of the public are concerned about water allocation and if queried if SeqWater could provide some additional details on this.
 - SeqWater advised that as the facility will be connected to the QUU water network, water allocation is not applicable to the project.
 - Recycled water was disused. It was noted that potential for recycled water had been explored with QUU but no mains were nearby. If a network was extended into SDA, Cleanaway could investigate options for servicing process water demand.
 - *PMN: Water demands*

Type	Volume	Approach	Additional Commentary
Waste- Domestic	1.995 m3/day 0.08 m3/h	Connection to QUU main in Beaudesert Boonah Rd	
Waste – Process	545 m3/day 22.7 m3/h		
Water – Total	Applied for with QUU 550 m3/day 32 m3/hr (8.9l/s)		Note: Higher flow rate applied for with QUU to allow for peak demand during operation
- **Sewer**
 - EM provided a summary of the approach to sewer connection noting that no process water wastewater would be discharged.
 - EM noted that two separate, on site sewer systems proposed to serve main EfW Building and IBA Sorting Building.
 - EM noted that an opportunity has been identified for irrigation using treated wastewater.

- SeqWater noted that as the proposal has 55 staff, it may trigger an ERA 63 of EP Regulation based on the 'equivalent people'.
- SEQ Water noted that any irrigation with treated wastewater would need to be robust and thoroughly reviewed by SeqWater as the site is in a drinking catchment.
- SeqWater noted that catchment was sensitive and was experiencing "death by 100 cuts" primarily due to industry and a lack of wastewater infrastructure.
- SeqWater noted that design would need to be informed by specific boreholes.
- SeqWater queried if discussion has been had with DETSI on ERA 63.
- AC noted that ERAs have been discussed with DETSI but ERA 63 would need to be discussed if irrigation of wastewater was to be pursued.
- AS queried how developed the design would need to be for SeqWater to provide comment and if irrigation for wastewater was not included in the application would the opportunity be available to explore in later design stages.
- FM noted that a viable solution need to be proposed in the planning application. Opportunities including connection to an extended QUU wastewater network or irrigation of waste water could be explore later (via appropriate approvals).
- SEQ Water queried the makeup of the IBA and how the IBA retention basin has been designed to prevent overtopping etc.
- AS noted that the IBA composition is provided in the Waste Management Technical Report.

4.0 Questions/AOB

- We will need to run to ground if ERA 63 is triggered with consideration to the preferred sewage treatment options.



Bromleton Energy and Resource Centre

18th September 2025

Agenda

1.0 Introductions

2.0 Overview

- Masterplan
- Previous engagement

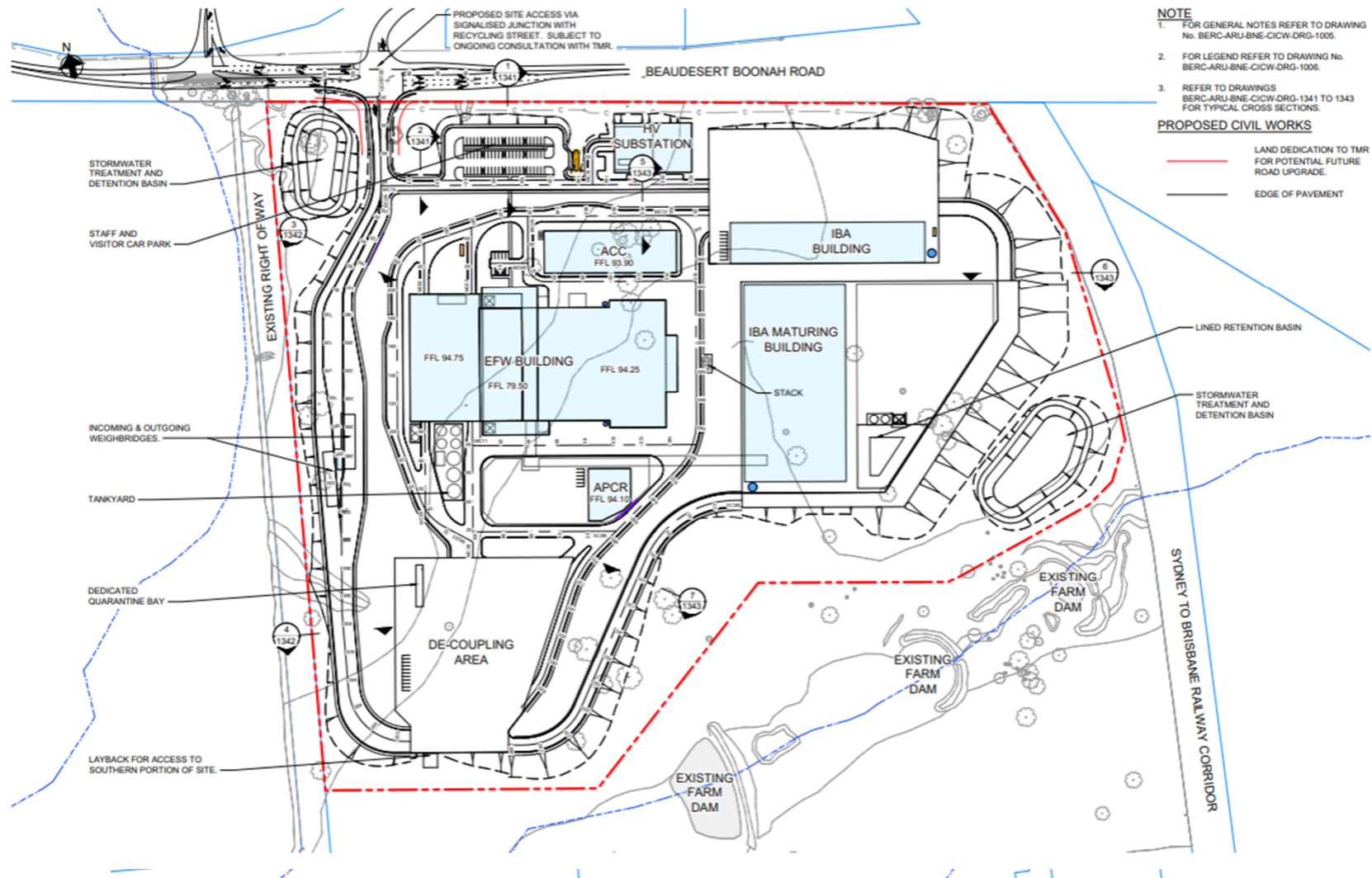
2.0 Matters of Interest for Seq Water

- Stormwater / Overland Flow
- Layout and Set Backs
- Water Demand
- Sewer

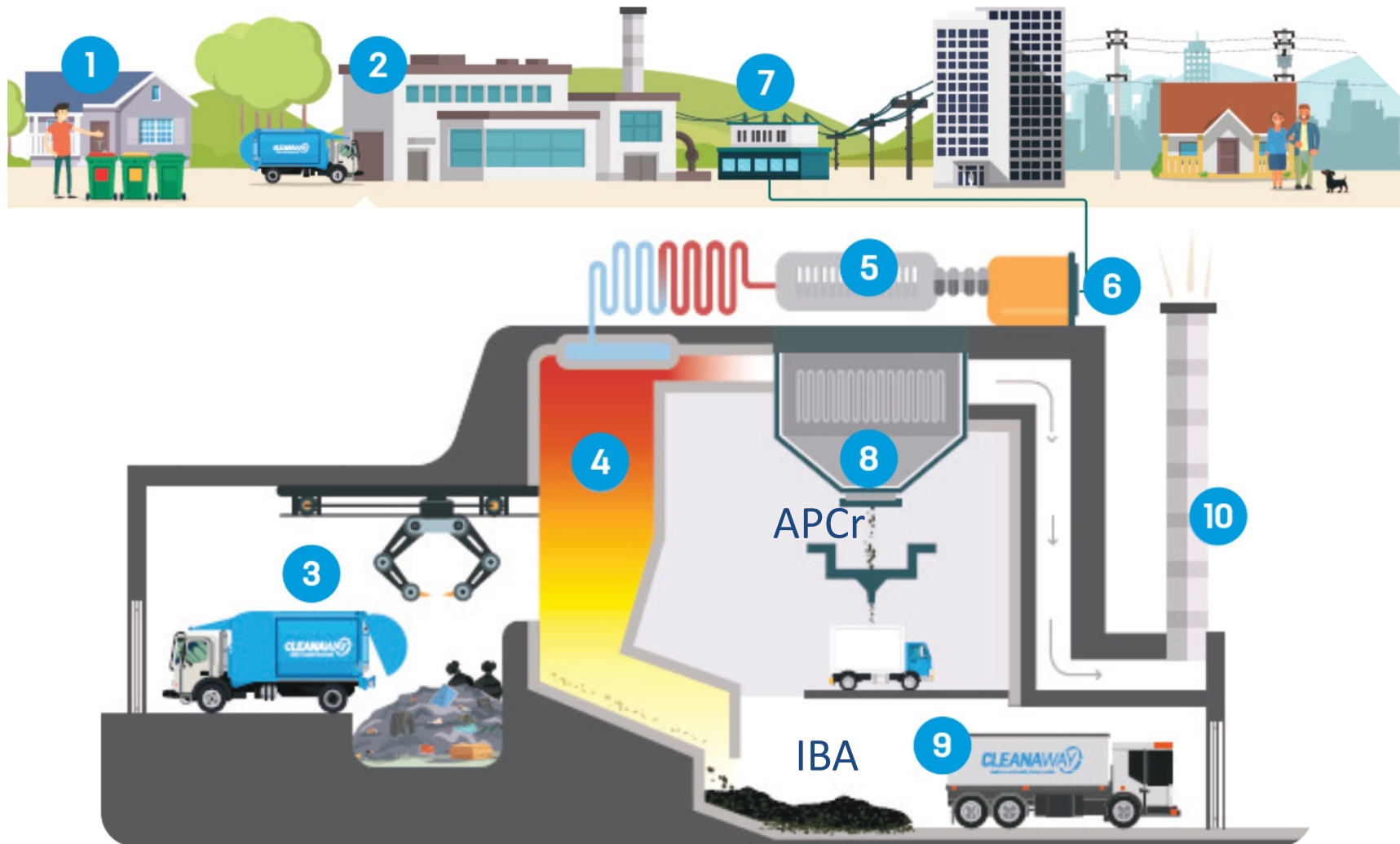
4.0 Questions / AOB



Project Update – Masterplan



Overview



Previous Engagement

11 May 2023 Meeting with QUU & SeqWater

27 July 2023 Meeting SeqWater to discuss an earlier version of the proposed development.

14 August 2025 All agency briefing (attended by Leah Snerling)

Matter of Interest – Stormwater / Overland Flow

Existing Condition

Site features 2 primary ridgelines separating site into 3 distinct catchments.

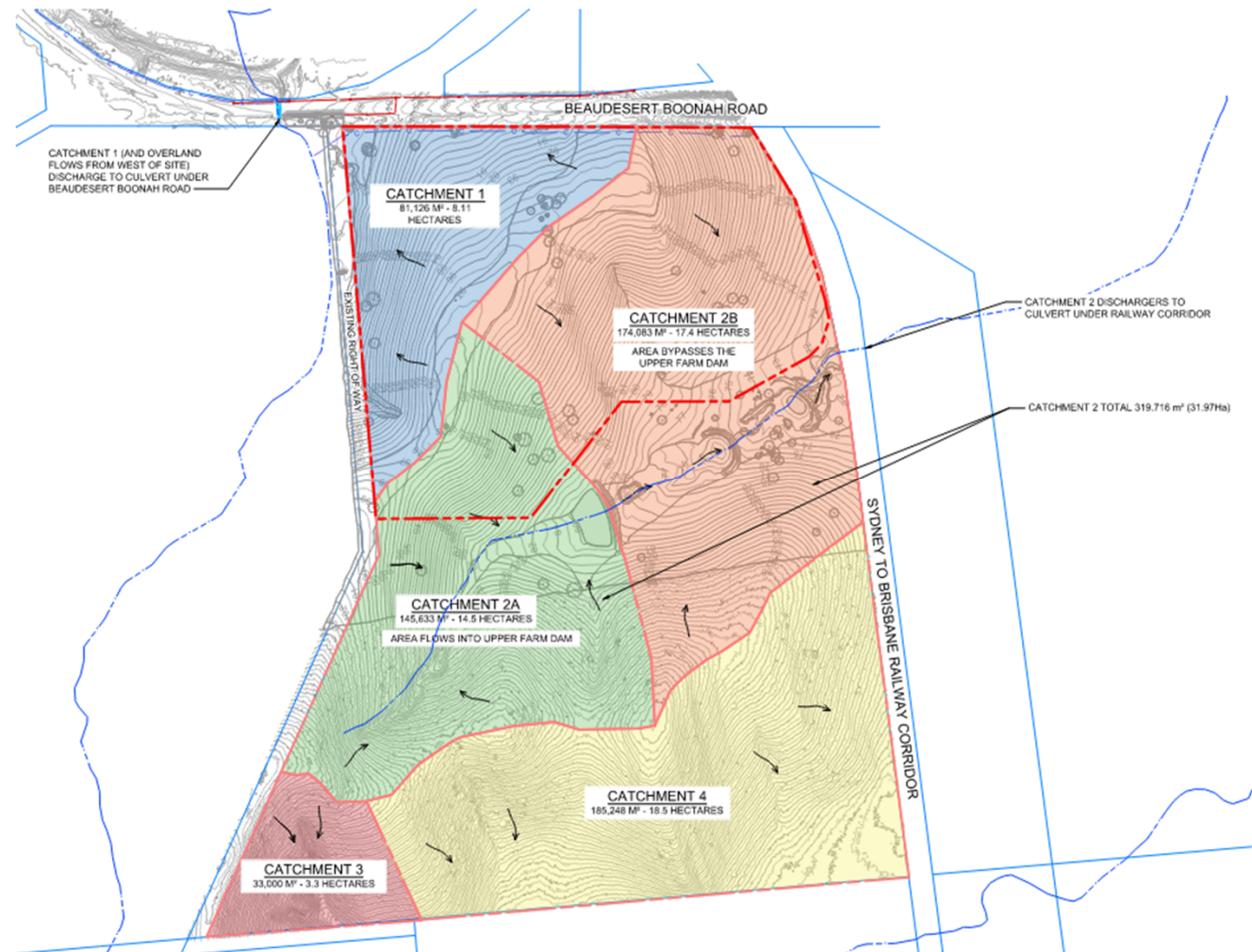
Majority of site (Catchment 2A & 2B) currently drains overland, via 3 No farm dams.

Flows pass through existing culvert below railway embankment to Lot to East.

1.85m culvert under railway

No formal piped stormwater system on site.

DRDMW completed watercourse determination that the unmapped water feature through the centre of the site is a "drainage feature".

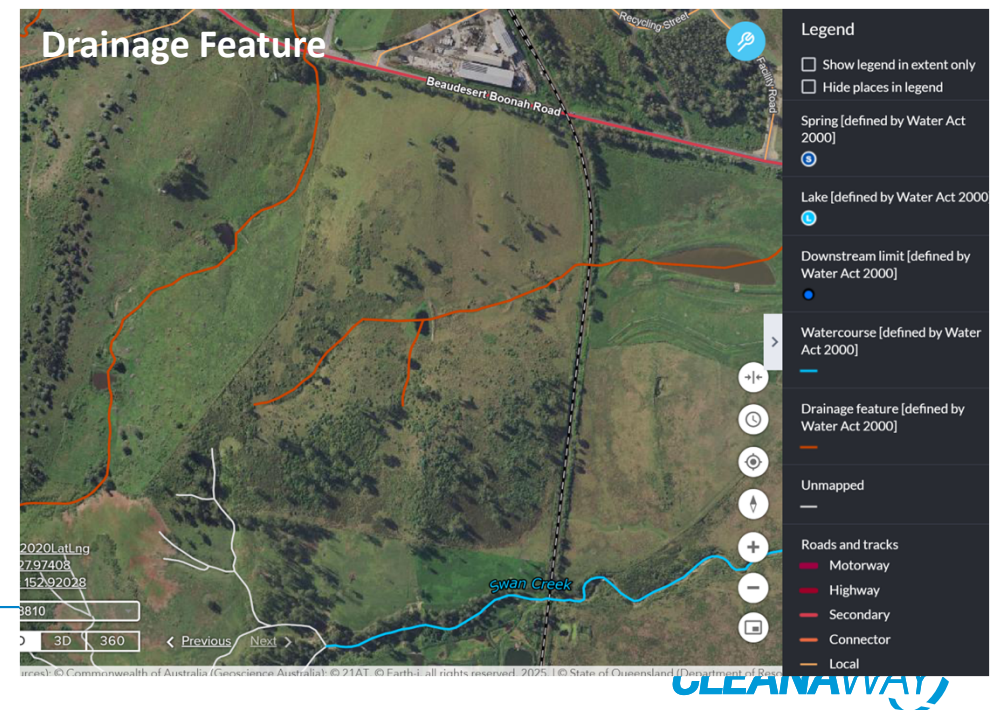
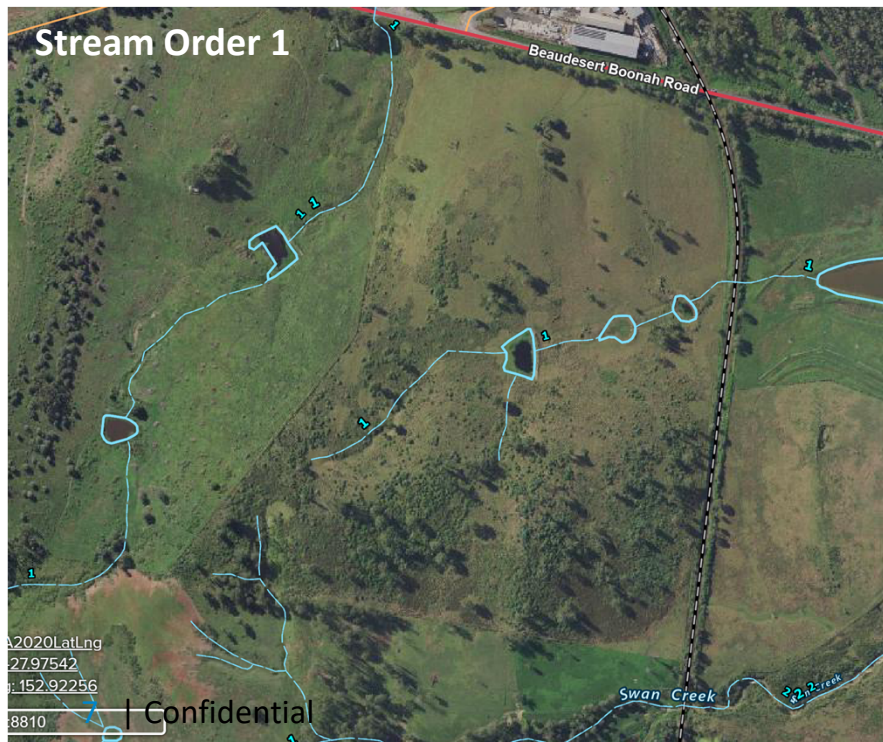


Drainage Line

Fisheries Act – low risk waterway (unmapped → low risk)

Water Act – Drainage Line (unmapped → drainage feature)

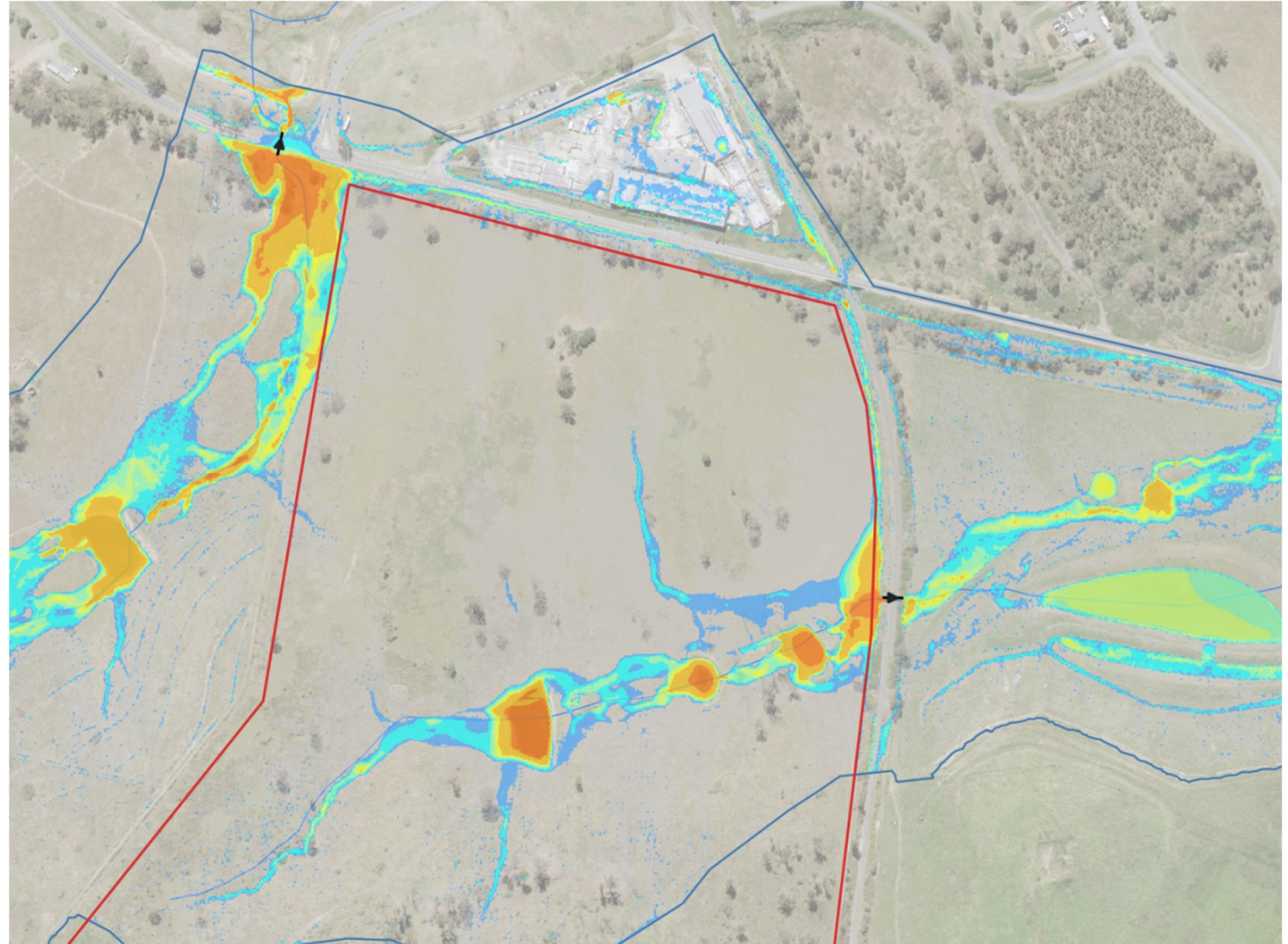
Vegetation Management Act –Stream Order 1



Matter of Interest – Stormwater / Overland Flow

Existing Flood Assessment - 1% AEP Event

Flooding evident at existing farm dams and general build up adjacent to railway corridor indicative of throttling effect of the culvert below the railway embankment.



Matter of Interest – Stormwater / Overland Flow

Proposed

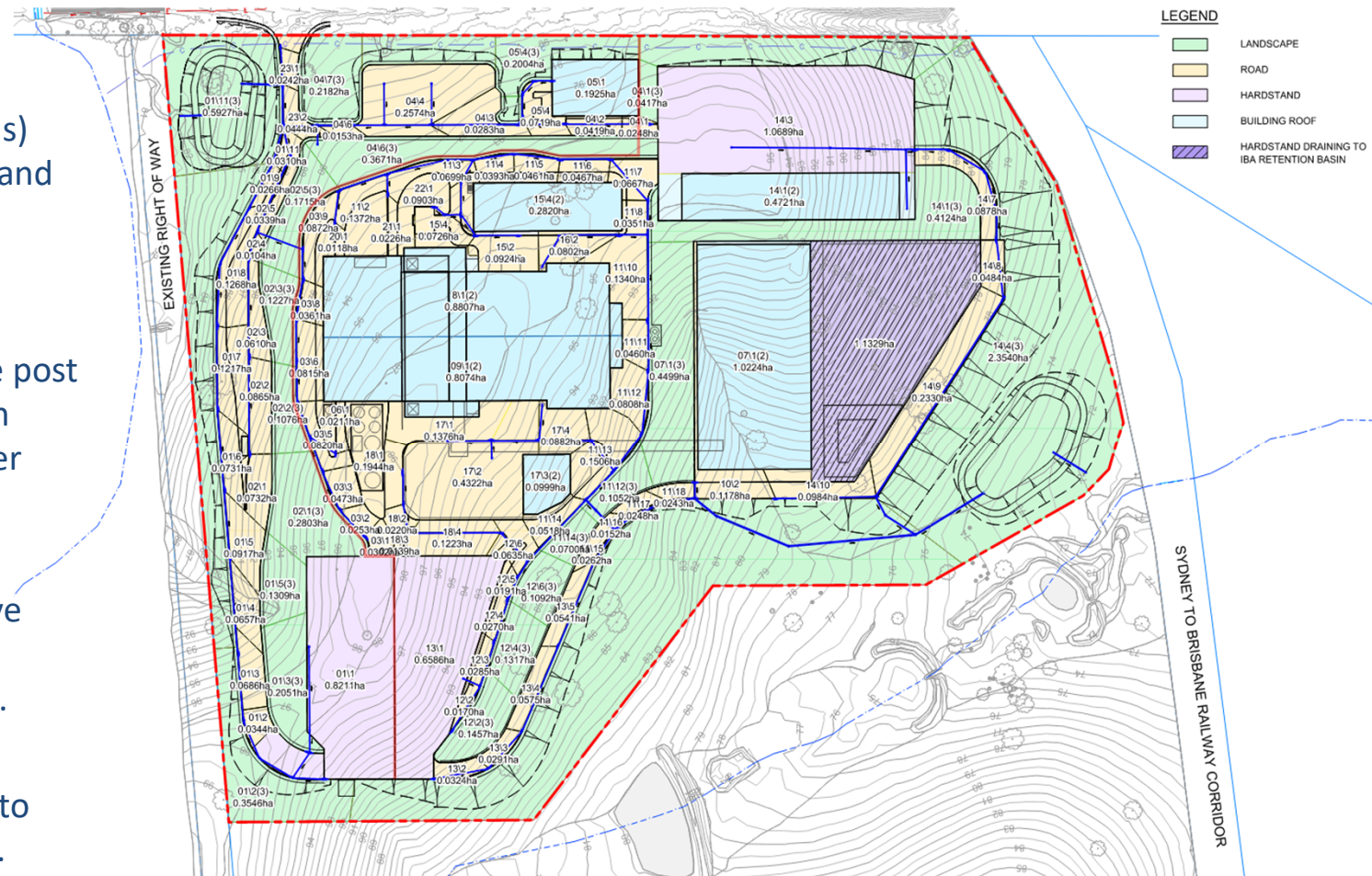
Formal Pit and Pipe system with appropriate treatment measures (GPT's) conveying to two, separate treatment and detention basins.

Basins discharge, at controlled rate, to existing overland flow paths, to ensure post development flows are no greater than pre-development flows for 10% AEP per QUDM guidelines.

Rainwater harvesting proposed to serve primary buildings with water re-used within cooling and maturation process.

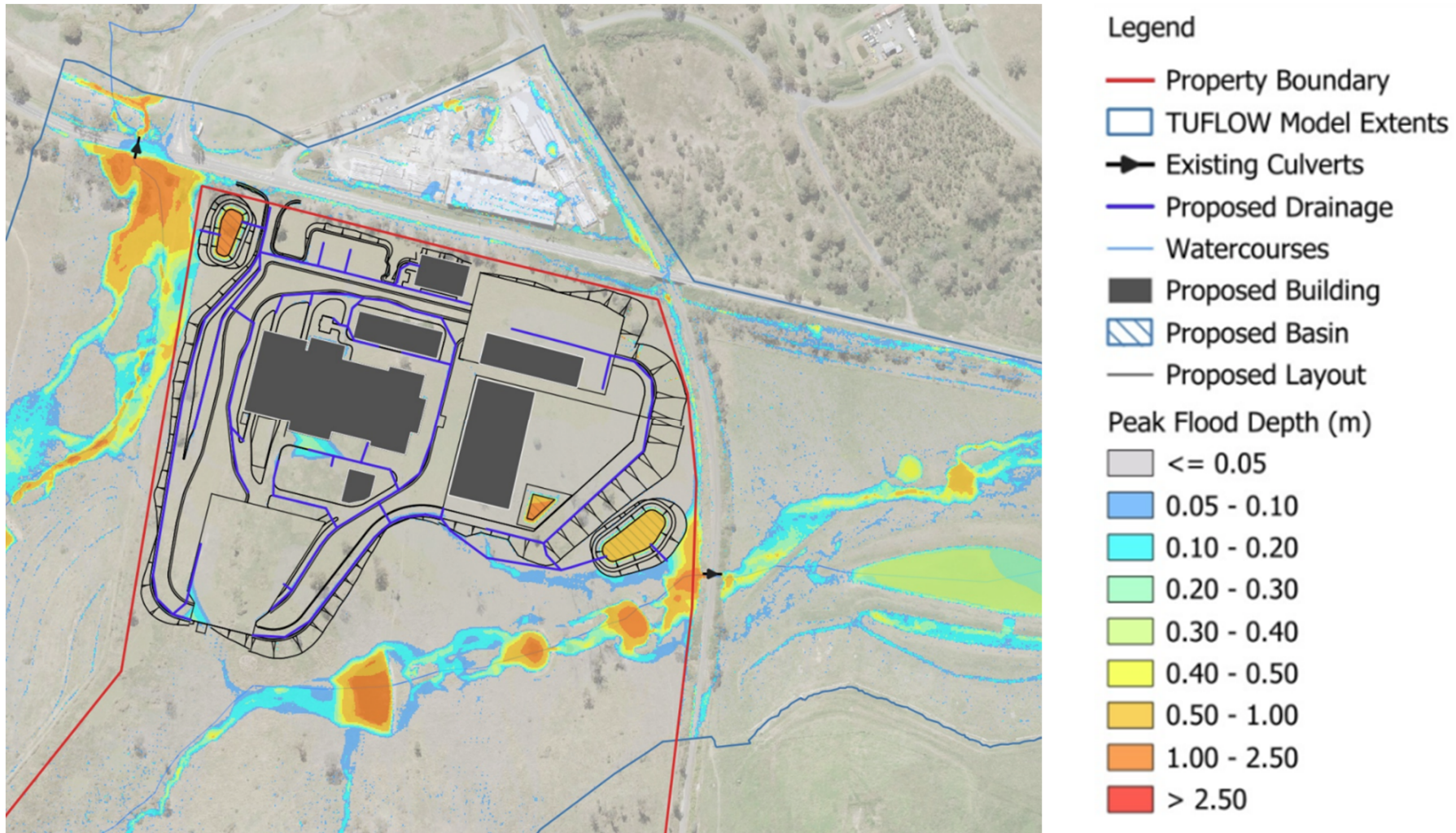
Existing farm dams are being retained to un-developed sections of catchment 2.

MUSIC modelling completed and results will be provided within submission.



Matter of Interest – Stormwater / Overland Flow

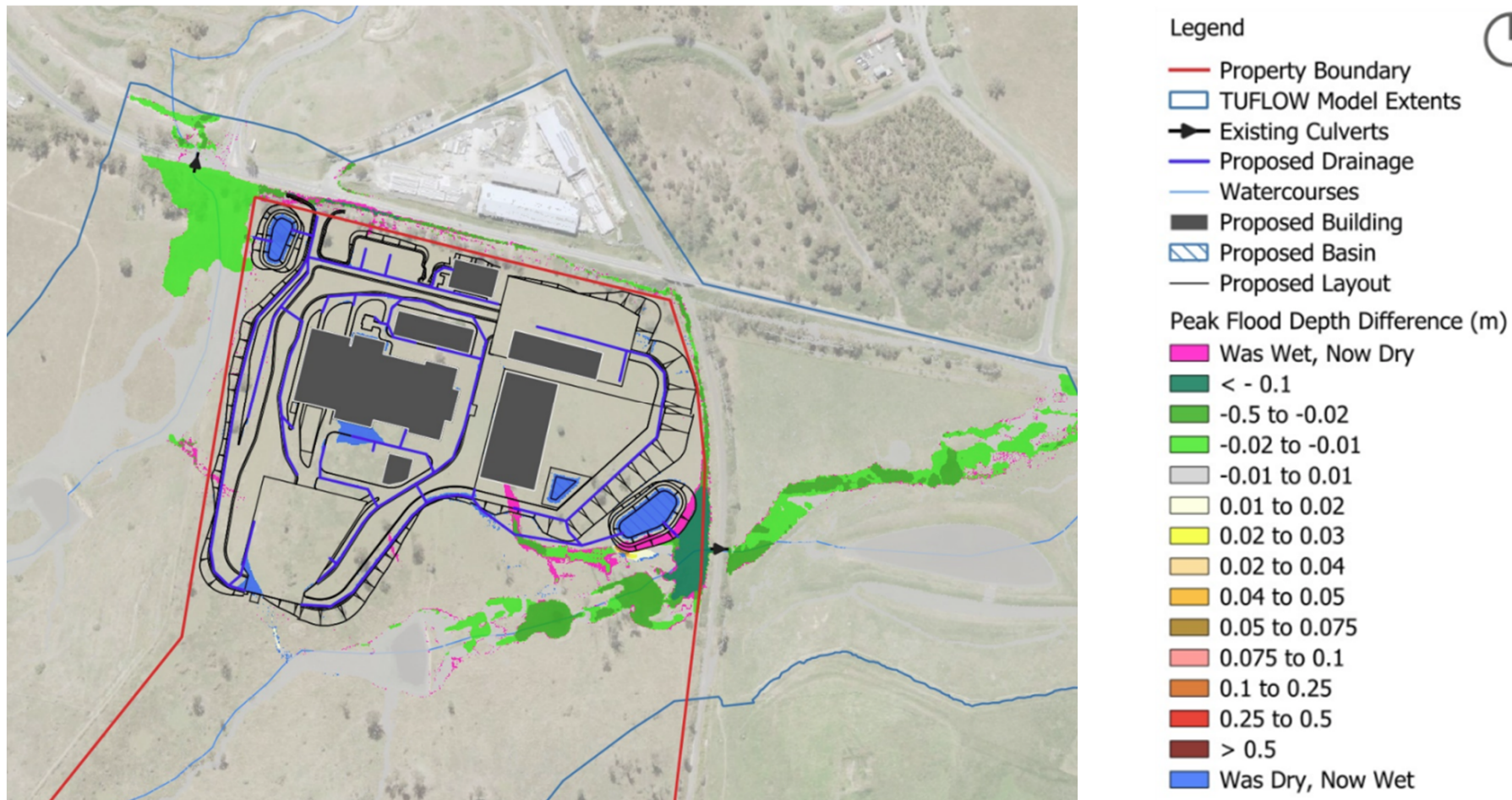
Post Development Flood Levels



Matter of Interest – Stormwater / Overland Flow

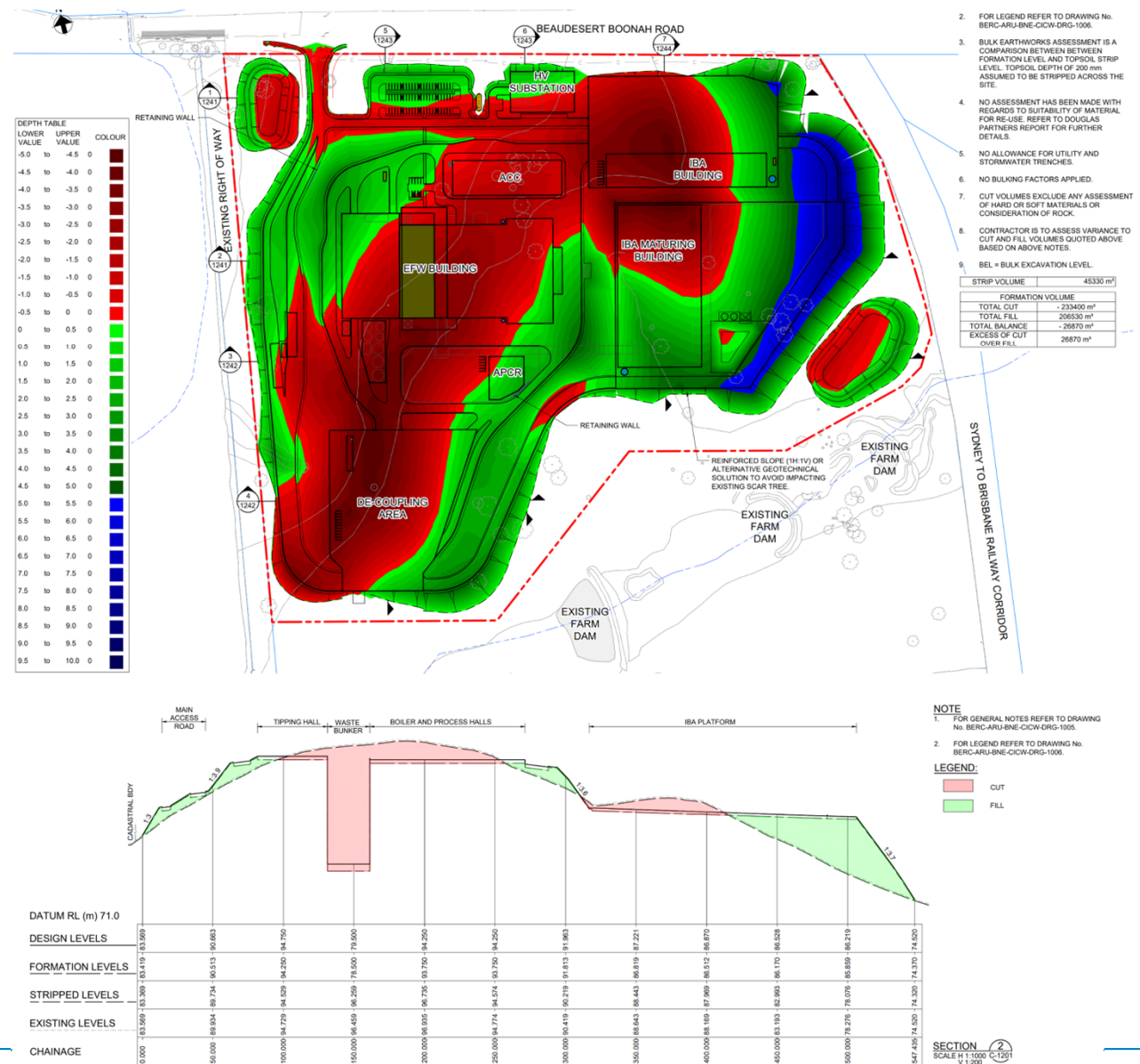
Post Development Flood Impact Assessment

Indicates slight reduction in flood levels immediately adjacent to railway corridor and downstream. This is due to retarding effect of the stormwater basin.



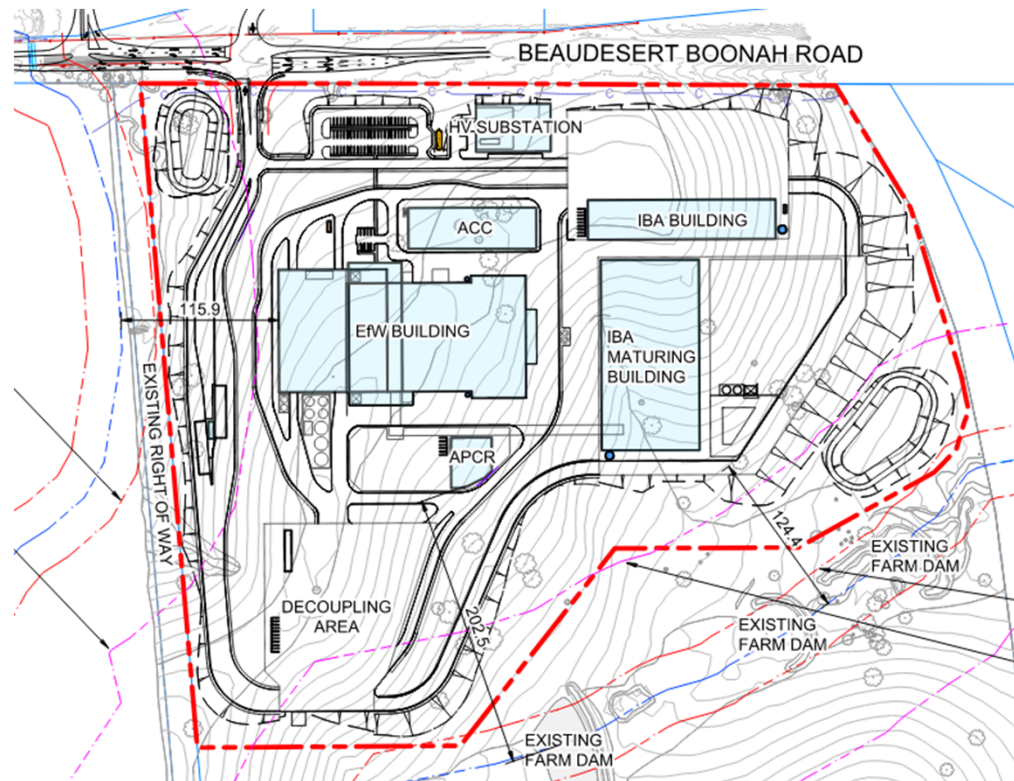
Matter of Interest – Filling and Excavation

- Significant fill at eastern end of development site to maximise workable platforms.
- Typically max 1 in 3 batters
- Footprint of earthworks setback from existing overland flow paths.
- Piling proposed for EfW building & stack.



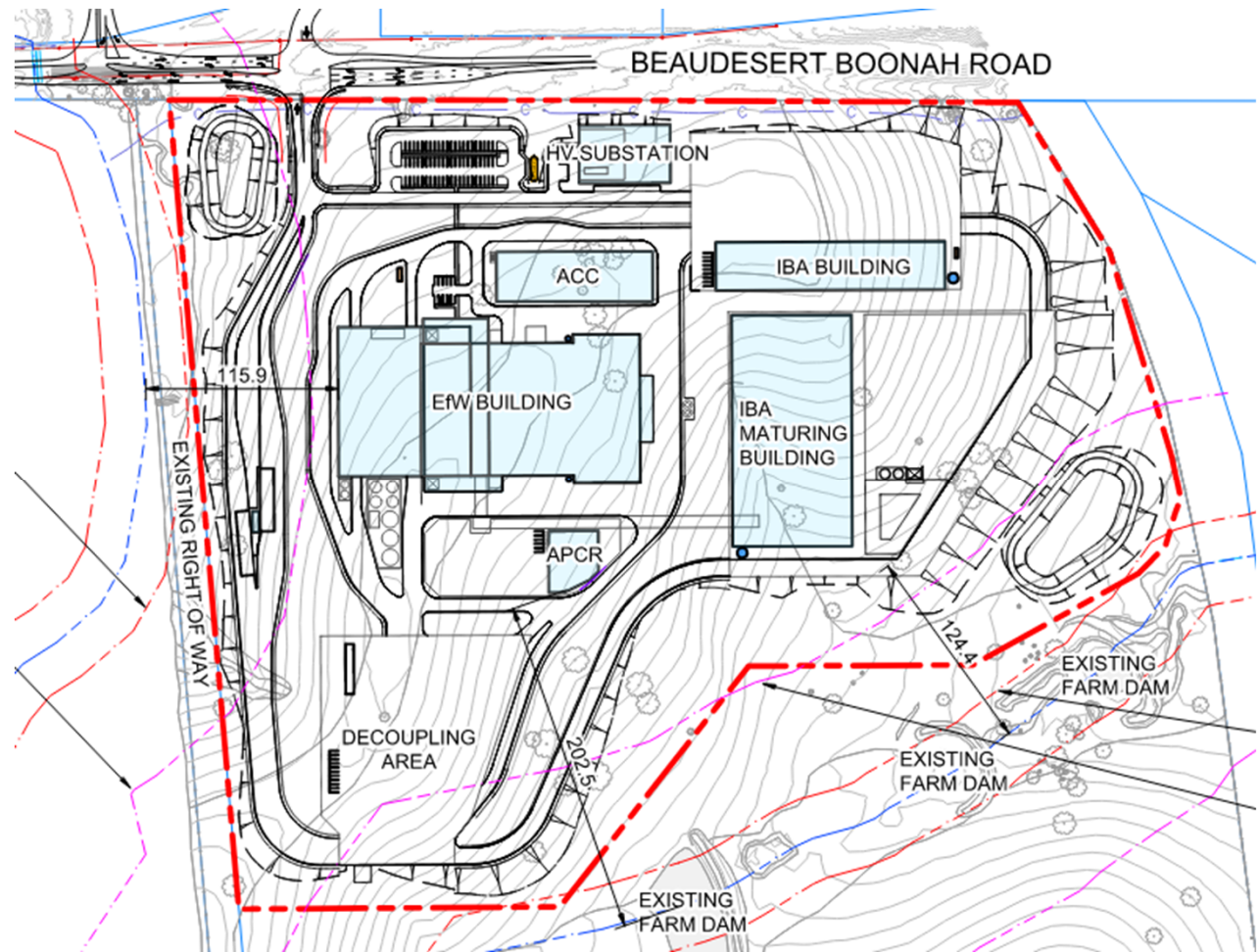
Matter of Interest – Dangerous Goods

- Hazard and Risk assessment has been undertaken which reviews hazardous chemicals and industrial hazards for both the construction and operational phases of the Project.
 - The stored quantity for air pollution control residue (APCr) in the facility exceeds the HCF threshold quantity under the criteria of State Code 21 therefore the facility needs to be assessed against the requirements of the Code.
 - Diesel storage (360kL) exceeds the threshold of 25,000L under notifiable activity of 'petroleum product or oil storage'.
 - The design of the facility shall comply with AS1940-2017 The storage *and handling of flammable and combustible liquids* including bunds, outside storage.



Matter of Interest – Clearances to Flow Paths

- Primary buildings positioned in central area of developed footprint to maximise separation from key constraints such as railway corridor, overland flow paths.
- Building platforms set well above flood level.
- Proposal to include perimeter landscaping and tree planting.



Water Demand & Connection Point



Figure 1: Existing infrastructure within the vicinity of the subject site

- BERC will prioritise water reuse to minimise demand on the local water network. The design includes four 100kL rainwater tanks to capture and store rainwater for reuse across the site. Additionally, process water will be recycled internally wherever possible to further reduce reliance on external water supplies and support sustainable operations.
 - Water use is estimated to be 500m³/day (average of 6.4l/s).
 - Peak flow rate: 32 m³/hour (equivalent to 8.9 L/s)
 - An exiting DN375 DI main which generally follows the Beaudesert Boonah Rd alignment terminates to the east of the BERC site.
 - The main was built in 2018 in anticipation for the Bromelton SDA however there have been no customer connections to date.
-
- A Service Advice Notice was sought from Queensland Urban Utilities (extract below).
 - QUU have confirmed that there is sufficient capacity in the DN375 main to support the full BERC operational demand.

2. Urban Utilities has conducted additional modelling and can confirm that capacity is available within the existing DN375 main to accommodate for the increase water demand, assuming reconnection is established per 23-SAN-64867 advice. Prior advice indicated concern regarding water quality and adequate turnover of the existing DN375. The current proposed demand reduces water age within the existing main to within a more desirable range providing confidence water quality may be provided in accordance with drinking water standards. On this basis, Urban Utilities support the increased demand as it is necessary to effectively commission the existing main.

Sewer and Process Water

Existing Condition

QUU has advised that there is no existing or proposed sewer infrastructure within the vicinity of the site.

Proposed Development

Within the main Energy from Waste Building facility there is no process wastewater discharge.

Run-Off from IBA Maturing Hardstand is collected in a separate, lined retention basin with water treated and re-used for wetting maturing stockpiles. This basin does not discharge to the trunk stormwater system.

Non-Process / Sewer flows are generated from staff / visitor facilities including showers, toilets, kitchen etc.

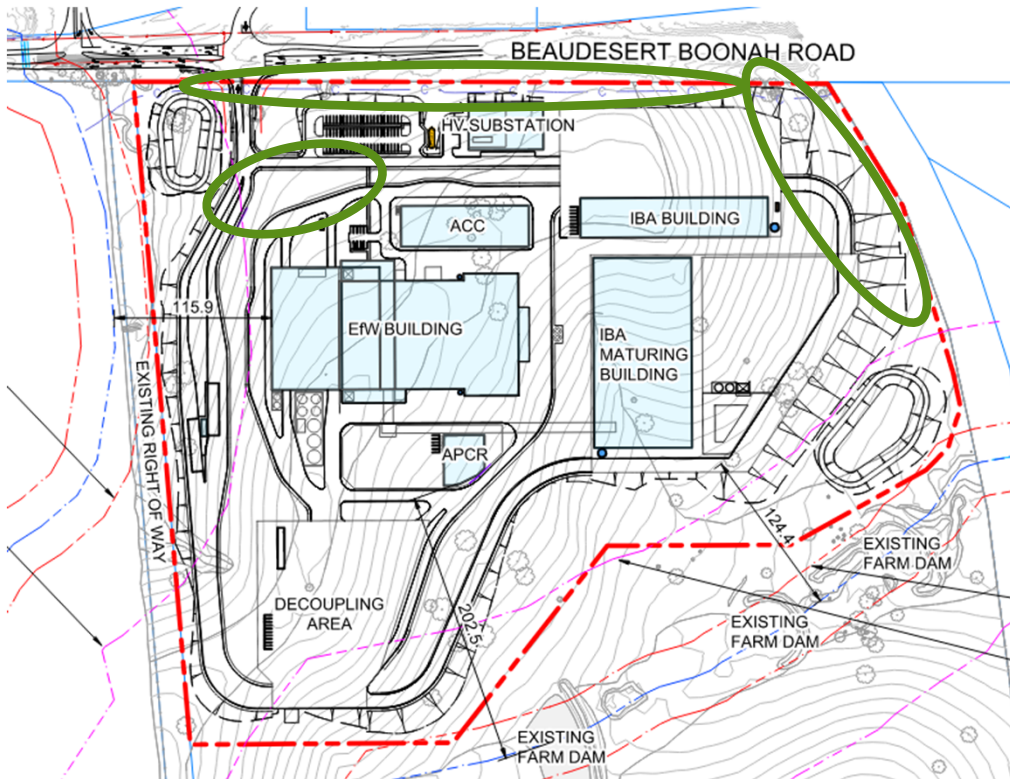
During operation there will be approximately 55 staff working in shifts to facilitate 24/7 operation. Facility includes provision for scheduled visitor parties, likely school and community groups.

Two separate, on site sewer systems proposed to serve main EfW Building and IBA Sorting Building.

Opportunities for Irrigation of Sewage

We are keen to explore opportunities for irrigation of sewerage.

Green circles show the potential locations



Program (Added post meeting)



Questions / AOB

RECORD OF SEQWATER CONSULTATION FROM
2023 BELOW.

Euan Mitchell

From: Kay Casson
Sent: Monday, 31 July 2023 4:24 PM
To: Leah Snerling
Cc: Ian Hustwick; Euan Mitchell; Karsten Forsterling; Jenna Beckett; Andrew Crawford; Keana Munro; 293683-00@qEEP.arup.com
Subject: BERC project - Seqwater meeting notes

Hi Leah

Thanks for your time last week. My notes below.

As the stormwater assessment and wastewater design progresses we will reach out for a further meeting as needed.

Cheers,

Kay

Location:	Teams Meeting	Date: 27/07/2023 2.30pm
Minutes by:	Kay Casson	Issue Date: 31/07/2023

Attendees:		
Leah Snerling (Seqwater)	Andrew Crawford (Wolter)	Kay Casson (Arup)
	Euan Mitchell (Arup)	Jenna Beckett (Arup)
Apologies:		
None		

Summary of Actions:

No.	Item	Notes
1	ERA 63	KC to circulate info from DES in relation to ERA 63 [sent 31/07]
2	Wastewater	LS to circulate Seqwater guidelines/info in relation to wastewater options

Minutes:

Item	Notes	Action
General	- Intros - Leah - Seqwater is an unofficial referral agency - will provide recommendations that the OCG can take or not. - Kay - noting that the unmapped water feature through the site has been confirmed as a drainage line by DRDMW (not a watercourse). Vegetation management drainage layer shows the drainage line as stream order 1. <u>Euan</u> - Overview of site and catchments - Overview of legislative and design requirements - Stormwater quantity - will reference QUDM and most recent AR&R - Proposed design will include detention basins and stormwater system for 10 %AEP - Bioretention basin for 1 yr ARI - Water quality - MUSIC modelling assessment being undertaken. Pollution reduction targets of 80, 60, 45 and 90	

	• Focus is on the northern half of the site where the development is occurring • Southern catchments remain untouched for this scope of work • There will be rainwater harvesting and reuse from EfW and IBA buildings • 2 x bio-retention/attenuation basins • Flood assessment will include a post-development flood assessment of the 10% and 1% AEP events • Assessment is still in progress and will be included with the DA application • QUU have advised there is no sewer infrastructure within vicinity of the site • The strategy for the site is proposed to pursue tankering of sewage. Irrigation to land will also be investigated. <u>Leah</u> • Leah advised Seqwater has recommendations and preferences if treated water is used for irrigation • As this industry doesn't involve waste or water emissions - the setbacks can be more flexible. But the reporting should identify the setbacks that are achieved, mainly for the industrial buildings • EfW is not a use that has Seqwater has assessed before • Seqwater pollution reduction guidelines - 85, 65, 45, 95 which are slightly more stringent • Euan: MUSIC modelling has been set up - indicates 91/92 for gross pollutant reduction • Leah: may be simpler to demonstrate compliance with the Performance outcomes (PO) in the Seqwater development guideline rather than the acceptable outcomes (AO). <u>Wastewater</u> • Euan queried whether the setbacks for sewer would apply to holding tanks. • Leah confirmed setbacks to drainage feature/waterway apply if holding tank or treatment plant with treated discharge • Seqwater reiterated that if the on-site wastewater facilities are under 21 Equivalent Persons (i.e. not ERA63), we would require submission of a site and soil evaluation (on-site wastewater design) prepared by a qualified wastewater designer and a 'medium' or lower risk rating under the Land Use Risk Tool. • Leah - Acceptable outcomes 5.3 of the Seqwater guideline goes into more detail for treatment and disposal • Euan: Equivalent persons (EP) for the site would be approx 20-30 and subject to confirmation. • Project team will confirm applicability of ERA 63 as design progresses. • Seqwater noted consideration of removal of irrigation component as one option to reduce EP. • Seqwater preferences: Sub surface disposal + 50m setback + advanced secondary treatment with disinfection method • Kay: DES have provided guidelines - to forward to Seqwater for comparison. • Leah will provide some information related to the scenarios discussed - including 1) Tankering 2) Irrigation 3) <21 EP 4) >21EP	KC LS
	Next Meeting: Possible further meeting as design and modelling progresses	TBC

Kay Casson

Associate | Environment and Biodiversity | Qld team lead
BSc, MEnvMgt, CEnvP

My work days are Monday, Tuesday, Thursday and Friday

Arup

Level 4 108 Wickham Street Fortitude Valley QLD Australia 4006

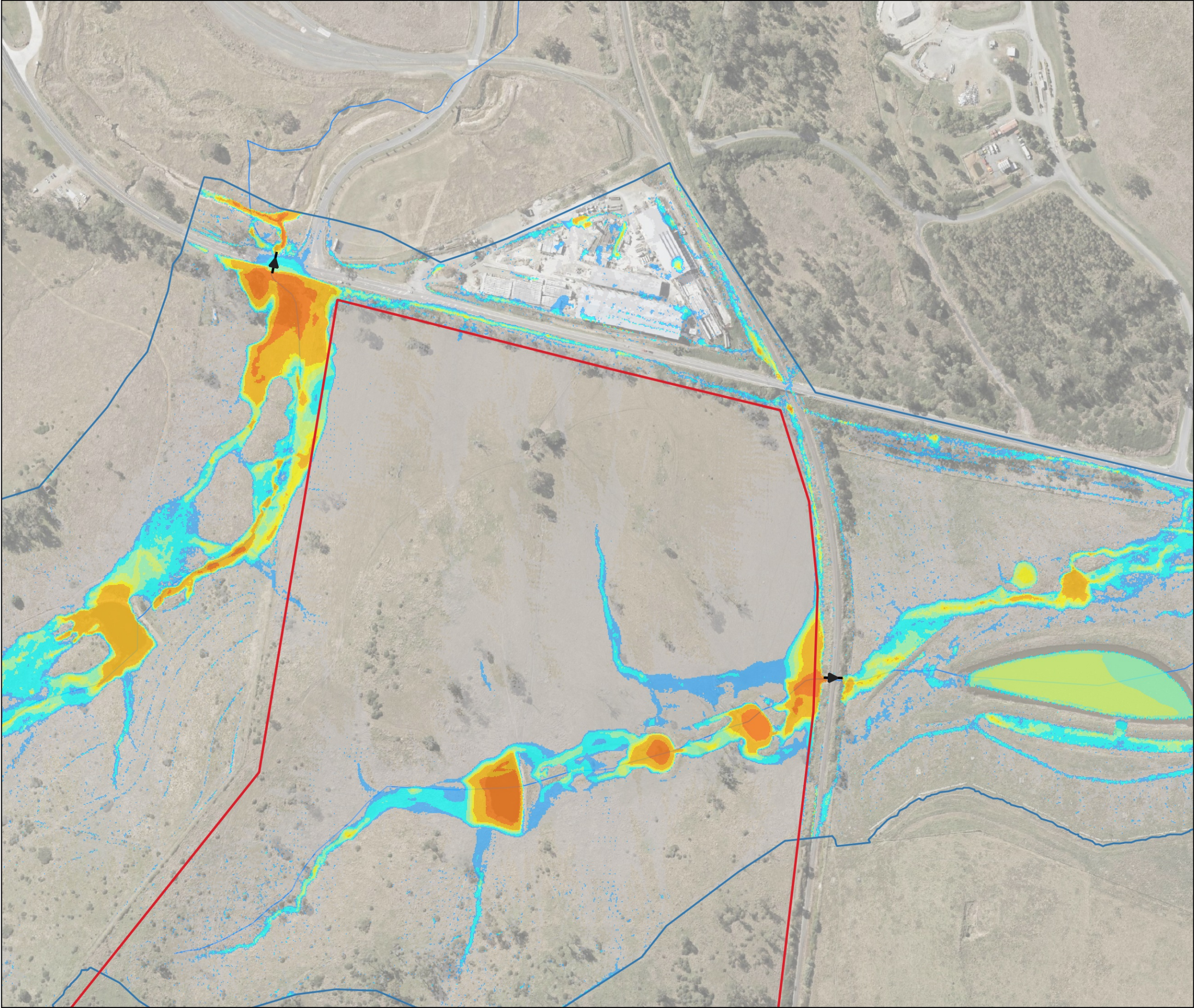
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Appendix F - Flood Mapping



Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd

070140210

m

ARUP

Level 26, 123 Albert Street,
Brisbane, QLD, 4000 Australia

Client

CLEANAWAY

Making a sustainable future possible

Job Title

Cleanaway Bromelton EFW

Figure Title

Existing Case: 1% AEP Flood Depth

Scale at A3
1:4000

Map Projection
GDA2020/MGA Zone 56
EPSG:7856

Job No
293683-00

Drawing Status
For Information

Map No
FIG01

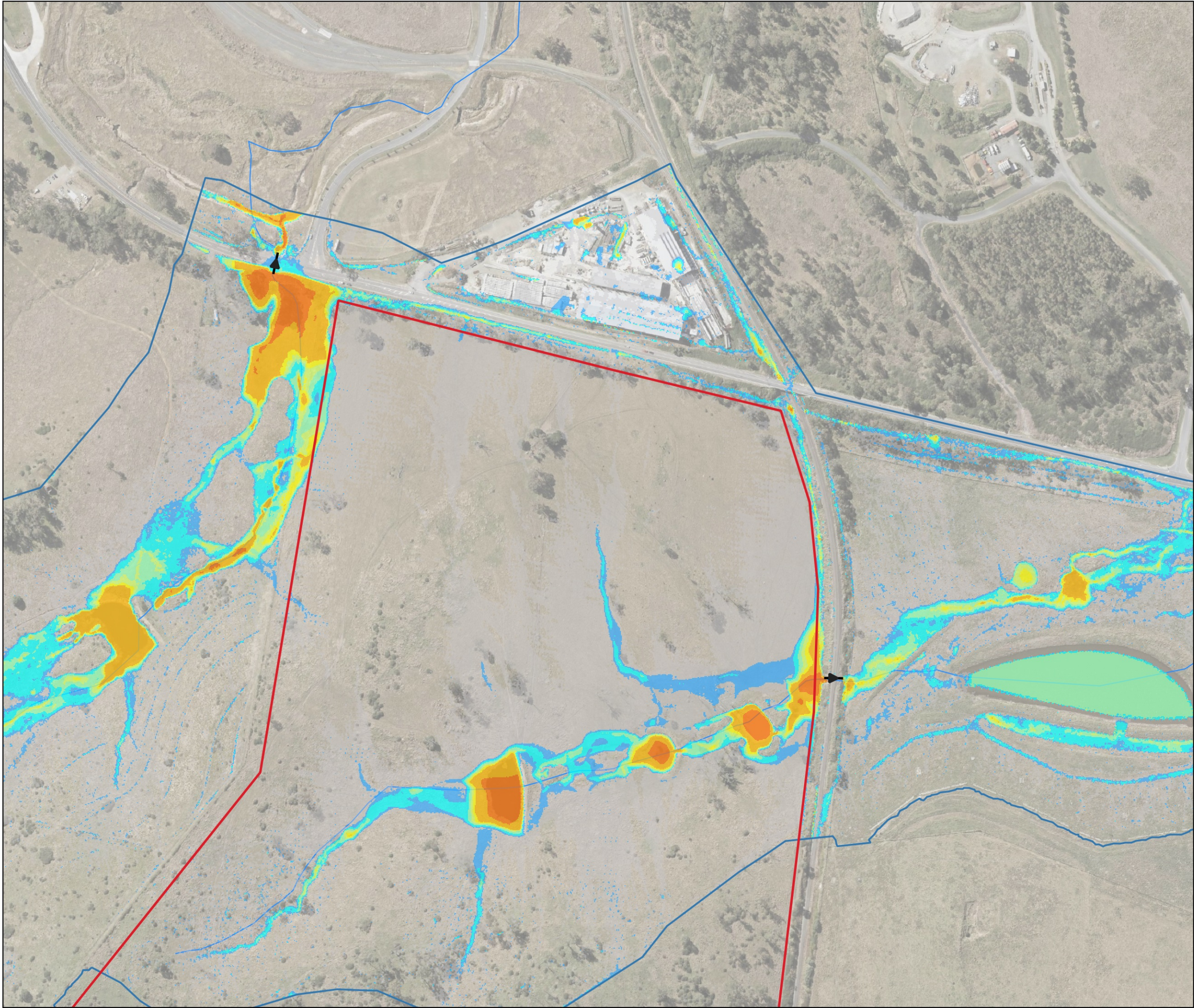
Issue
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Sources: QLD Globe Imagery, QLD Spatial

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd

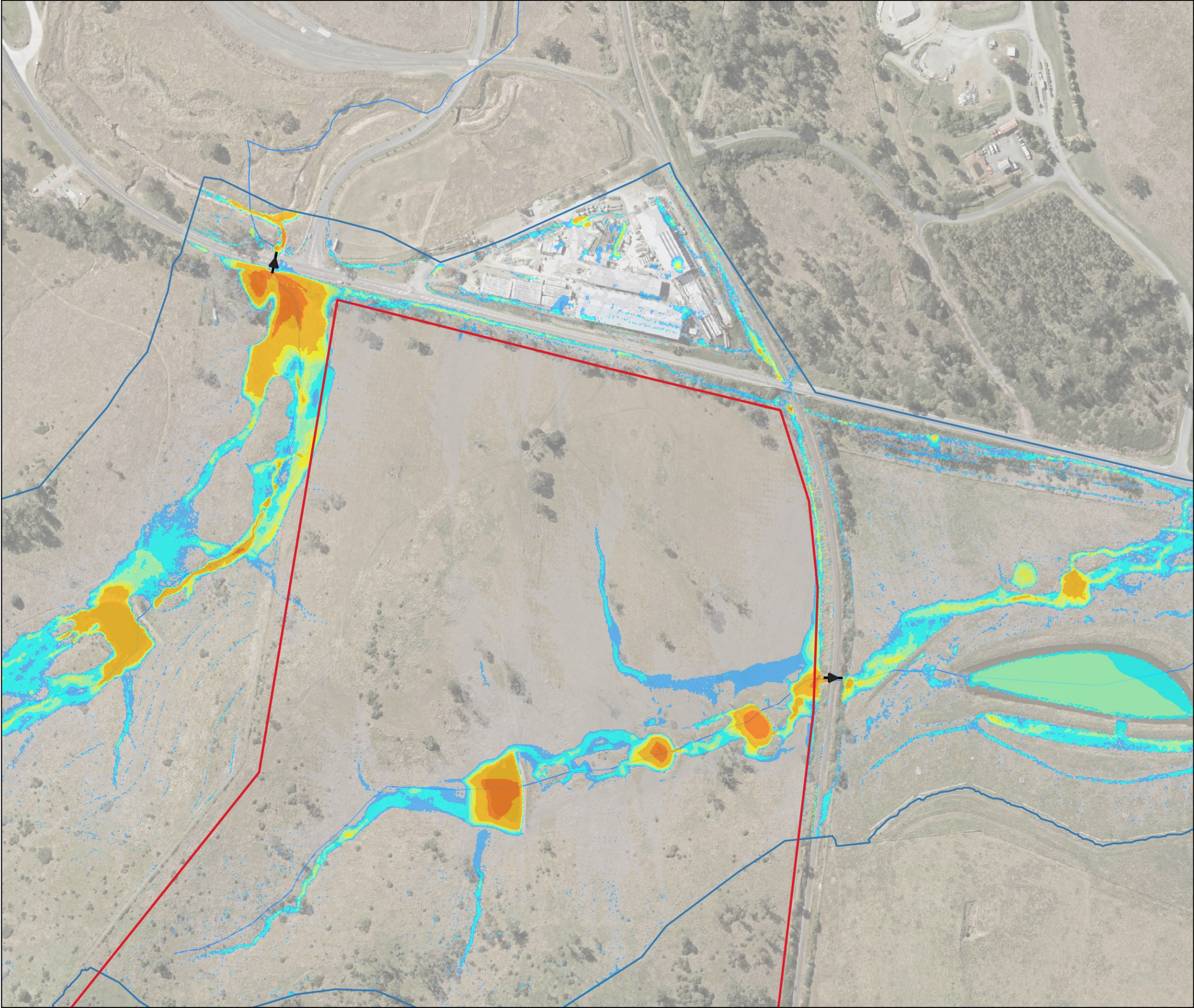
ARUP Level 26, 123 Albert Street,
Brisbane, QLD, 4000 Australia

Client
Cleanaway Bromelton EFW

Figure Title
Existing Case: 2% AEP Flood Depth

Scale at A3 1:4000	Map Projection GDA2020/MGA Zone 56 EPSG:7856
Job No 293683-00	Drawing Status For Information
Map No FIG02	Issue A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A

30/01/2026

NS

TH

ACS

Phase

Date

By

Chkd

Appd

070140210

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Job Title

Cleanaway Bromelton EFW

Figure Title

Existing Case: 5% AEP Flood Depth

Scale at A3
1:4000

Map Projection
GDA2020/MGA Zone 56
EPSG:7856

Job No
293683-00

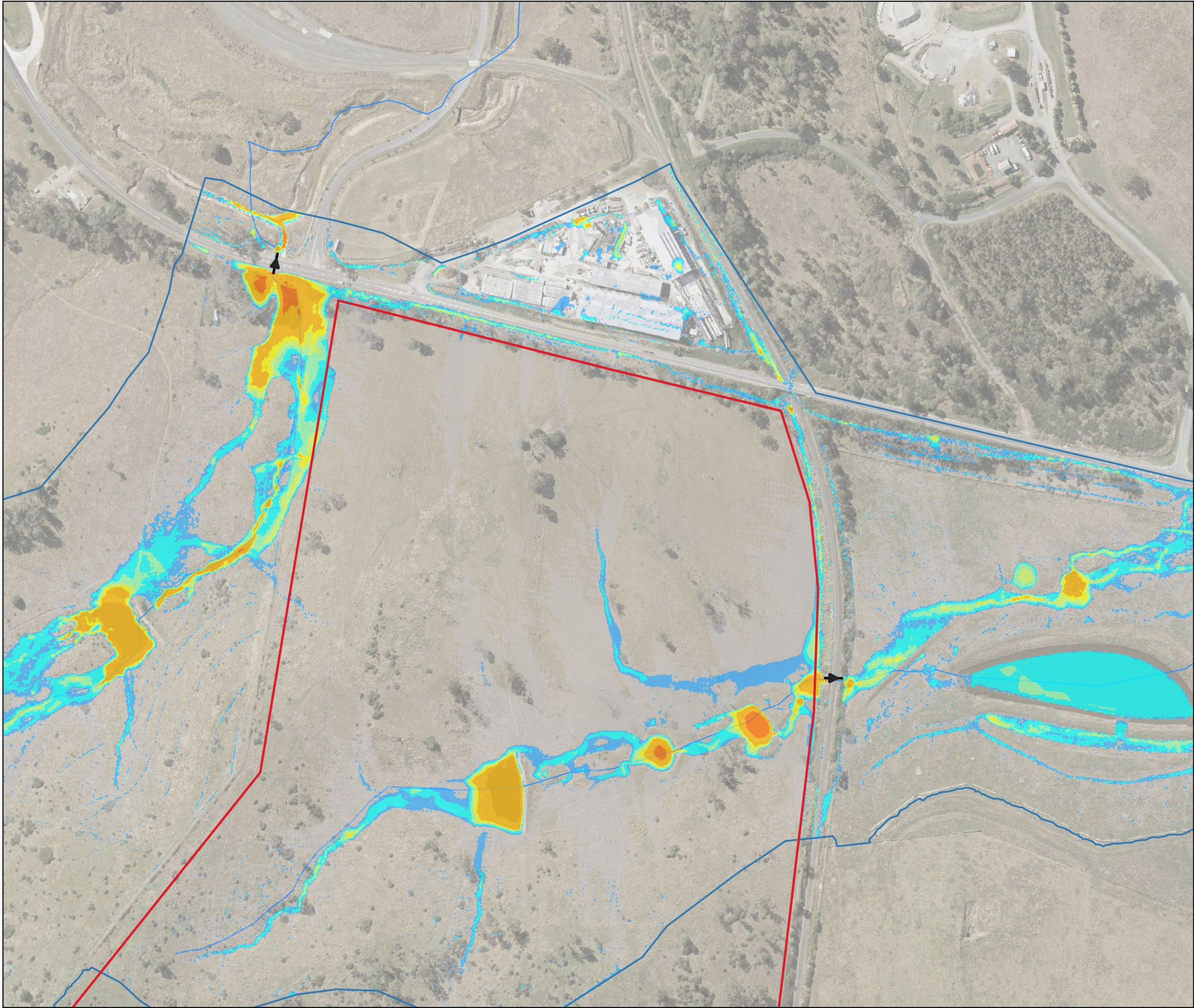
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For Information

Map No
FIG03

Issue
A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd



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Job Title

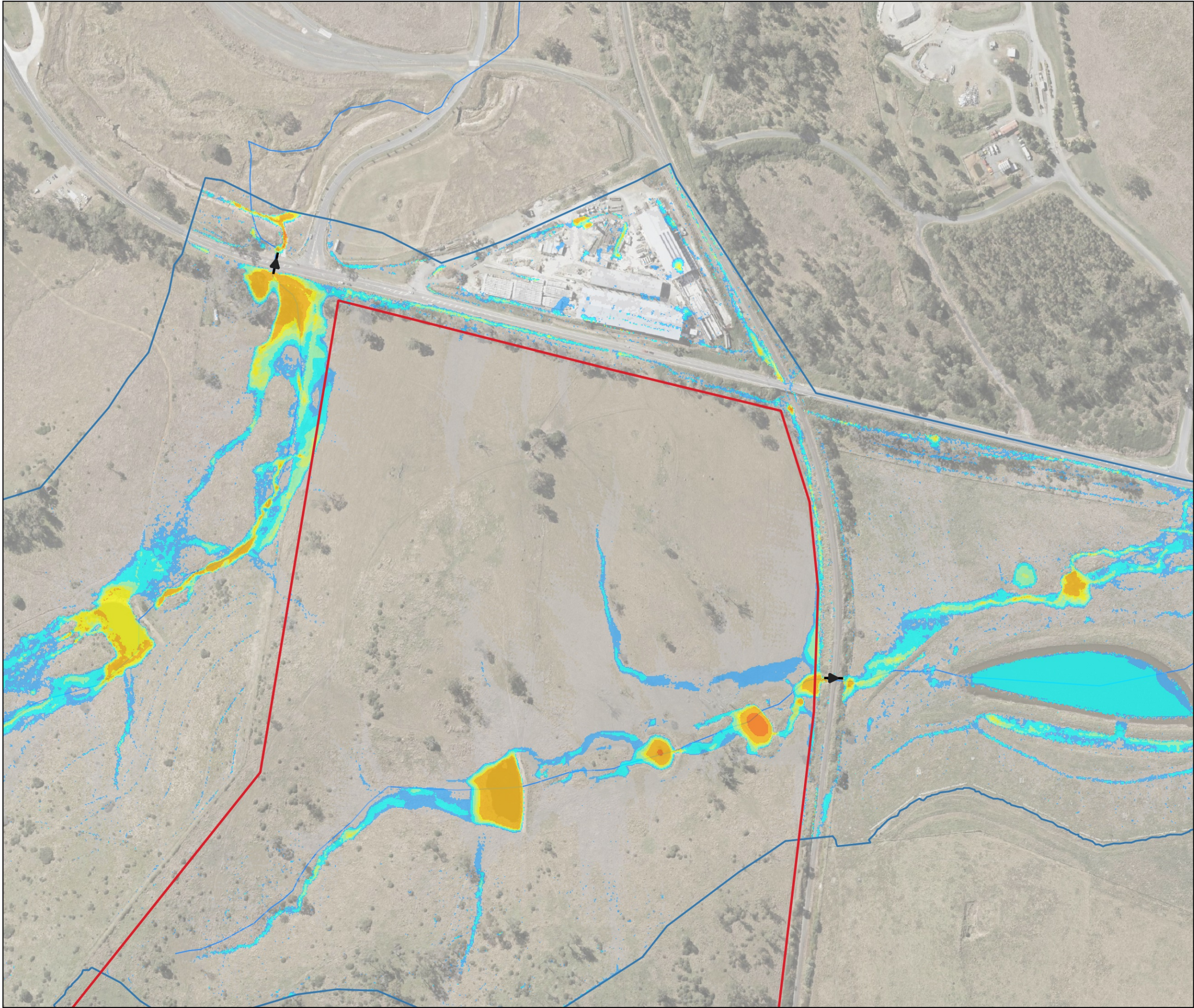
Cleanaway Bromelton EFW

Figure Title

Existing Case: 10% AEP Flood Depth

Scale at A3 1:4000	Map Projection GDA2020/MGA Zone 56 EPSG:7856
Job No 293683-00	Drawing Status For Information
Map No FIG04	Issue A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A

30/01/2026

NS

TH

ACS

Phase

Date

By

Chkd

Appd

070140210

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Client

CLEANAWAY

Making a sustainable future possible

Job Title

Cleanaway Bromelton EFW

Figure Title

Existing Case: 20% AEP Flood Depth

Scale at A3
1:4000

Map Projection
GDA2020/MGA Zone 56
EPSG:7856

Job No
293683-00

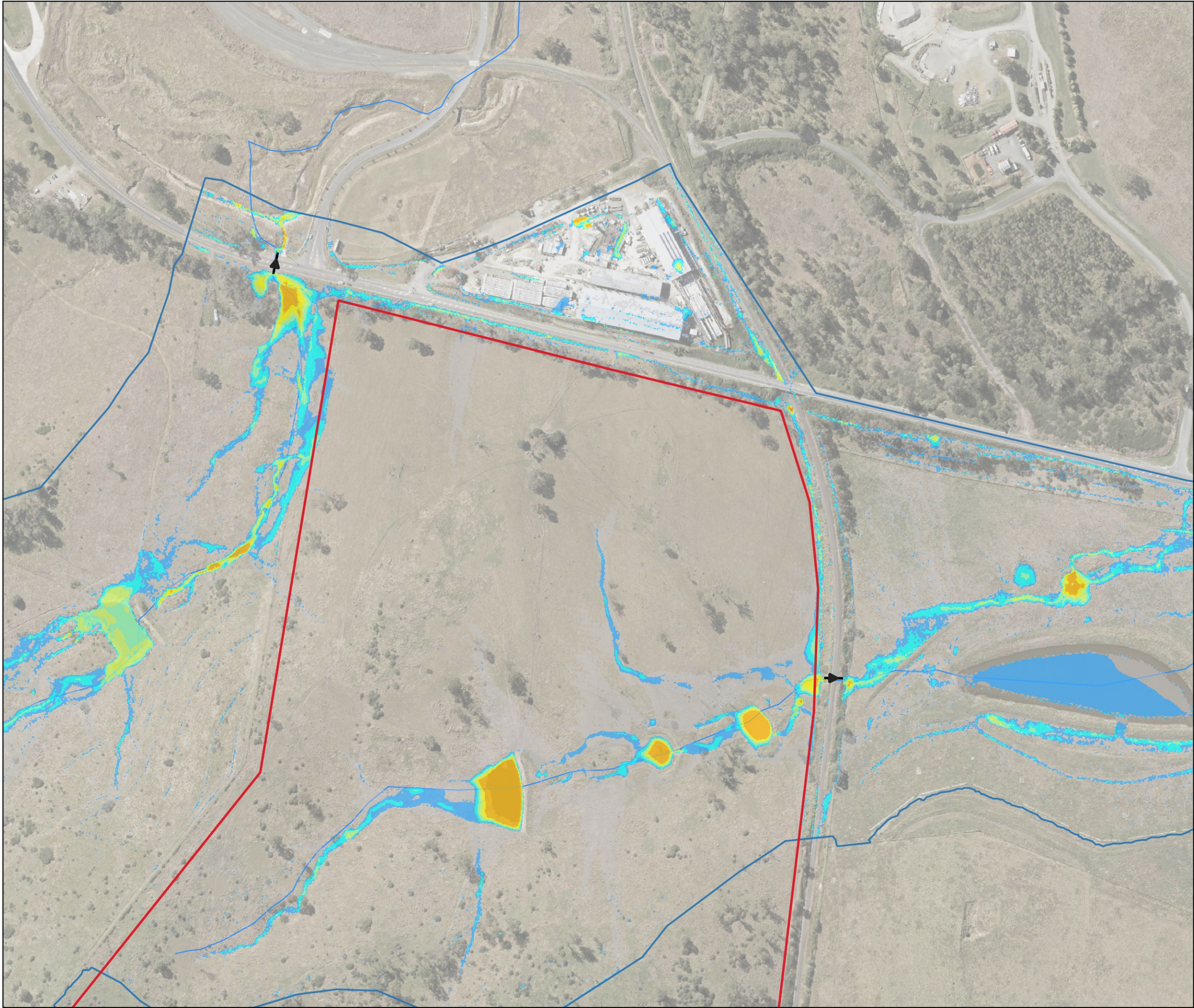
Drawing Status
For Information

Map No
FIG05

Issue
A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd

070140210 m

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Client

CLEANAWAY

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Job Title

Cleanaway Bromelton EFW

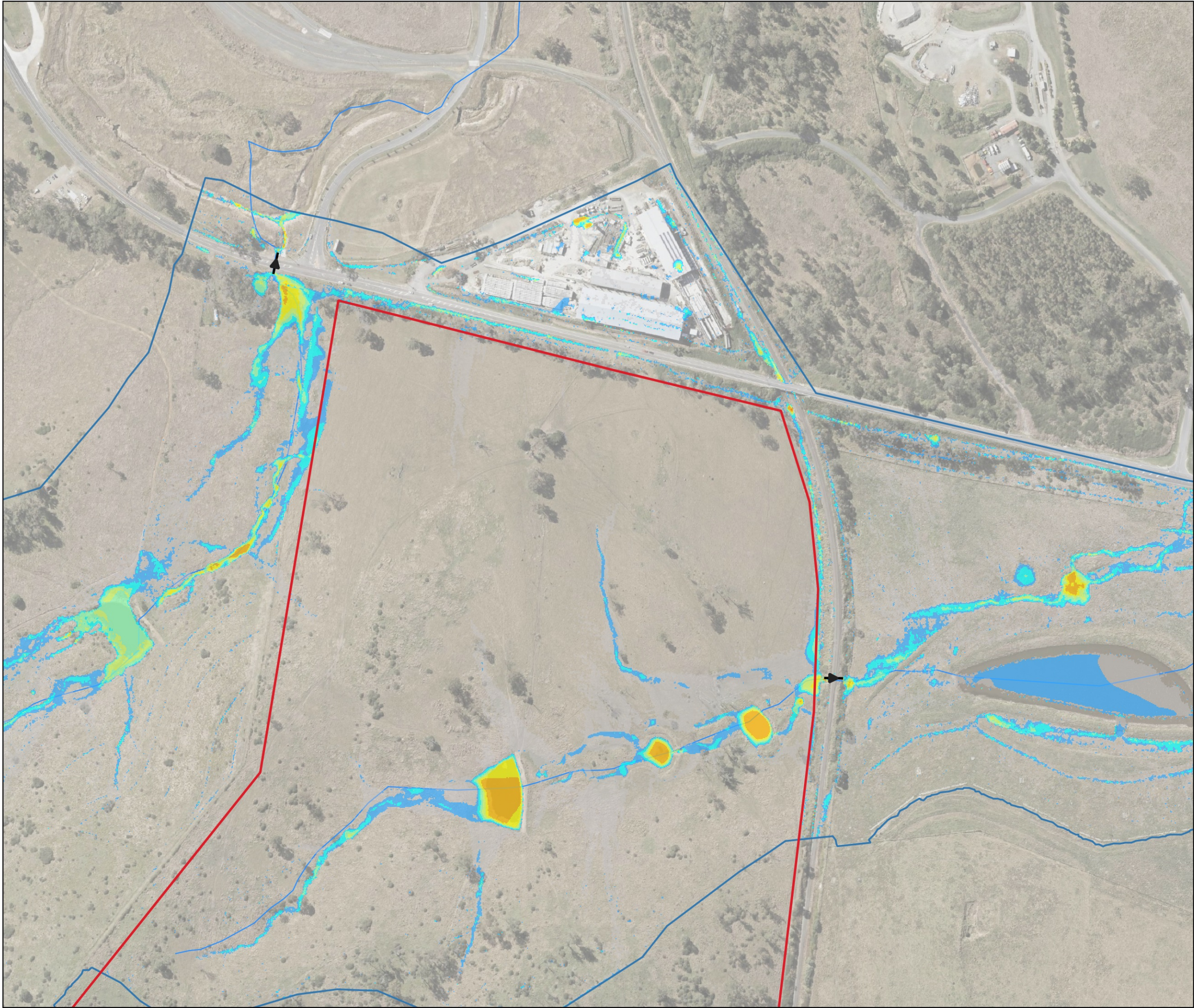
Figure Title

Existing Case: 50% AEP Flood Depth

Scale at A3 1:4000	Map Projection GDA2020/MGA Zone 56 EPSG:7856
Job No 293683-00	Drawing Status For Information
Map No FIG06	Issue A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd

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Client

CLEANAWAY

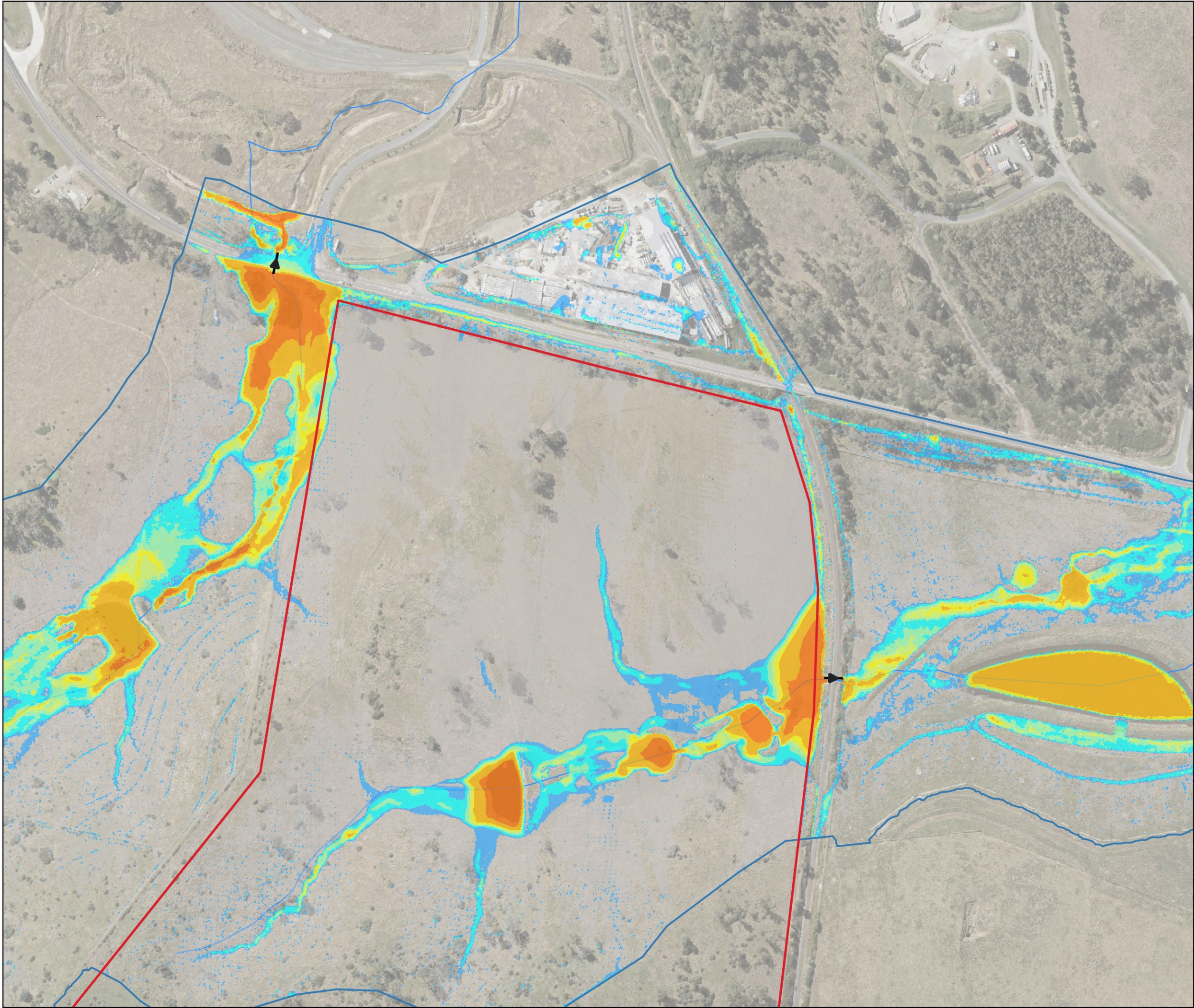
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Job Title
Cleanaway Bromelton EFW

Figure Title
Existing Case: 63.2% AEP Flood Depth

Scale at A3 1:4000	Map Projection GDA2020/MGA Zone 56 EPSG:7856
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Map No FIG07	Issue A

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Legend

Property Boundary

TUFLOW Model Extents

Existing Culverts

Watercourses

Peak Flood Depth (m)

<= 0.05

0.05 - 0.10

0.10 - 0.20

0.20 - 0.30

0.30 - 0.40

0.40 - 0.50

0.50 - 1.00

1.00 - 2.50

> 2.50

A	30/01/2026	NS	TH	ACS
Phase	Date	By	Chkd	Appd

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Client

CLEANAWAY

Making a sustainable future possible

Job Title

Cleanaway Bromelton EFW

Figure Title

Existing Case: 1% AEP + CC SSP2
Flood Depth

Scale at A3 1:4000	Map Projection GDA2020/MGA Zone 56 EPSG:7856
Job No 293683-00	Drawing Status For Information
Map No FIG08	Issue A

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