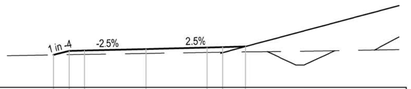
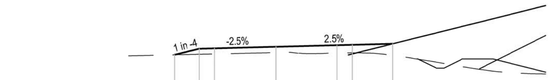


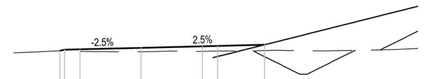
DATUM R.L. 21.00								
DESIGN SURFACE LEVEL	23.115	23.375	23.400	23.500	23.600	23.625	23.663	
DEPTH CUT - / FILL +	0.000	0.244	0.253	0.288	0.324	0.333	0.346	
EXISTING SURFACE LEVEL	23.115	23.131	23.147	23.212	23.276	23.292	23.317	
OFFSET FROM CENTRELINE	-6.04	-5	-4	0	4	5	6.51	

CH 530



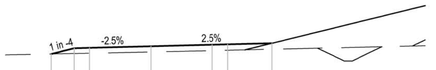
DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.772	23.175	23.200	23.300	23.400	23.425	23.491	
DEPTH CUT - / FILL +	0.000	0.368	0.371	0.383	0.508	0.519	0.757	
EXISTING SURFACE LEVEL	22.772	22.807	22.829	22.917	22.892	22.906	22.734	
OFFSET FROM CENTRELINE	-6.61	-5	-4	0	4	5	7.63	

CH 570



DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.888	22.975	23.000	23.100	23.200	23.225	23.302	
DEPTH CUT - / FILL +	0.000	0.079	0.131	0.257	0.332	0.338	0.380	
EXISTING SURFACE LEVEL	22.888	22.896	22.869	22.843	22.868	22.887	22.921	
OFFSET FROM CENTRELINE	-5.31	-5	-4	0	4	5	8.07	

CH 610

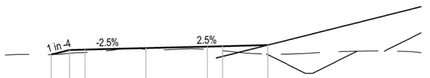


DATUM R.L. 21.00								
DESIGN SURFACE LEVEL	23.048	23.425	23.450	23.550	23.650	23.675	23.748	
DEPTH CUT - / FILL +	0.000	0.347	0.352	0.370	0.382	0.384	0.390	
EXISTING SURFACE LEVEL	23.048	23.078	23.098	23.180	23.268	23.291	23.357	
OFFSET FROM CENTRELINE	-6.51	-5	-4	0	4	5	7.91	

CH 520

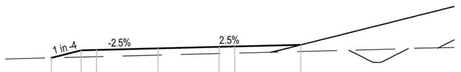
DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.809	23.225	23.250	23.350	23.450	23.475	23.538	
DEPTH CUT - / FILL +	0.000	0.380	0.379	0.376	0.384	0.390	0.488	
EXISTING SURFACE LEVEL	22.809	22.845	22.871	22.974	23.066	23.085	23.051	
OFFSET FROM CENTRELINE	-6.67	-5	-4	0	4	5	7.52	

CH 560



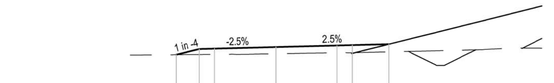
DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.726	23.025	23.050	23.150	23.250	23.275	23.349	
DEPTH CUT - / FILL +	0.000	0.211	0.186	0.076	0.187	0.298	0.593	
EXISTING SURFACE LEVEL	22.726	22.814	22.864	23.074	23.063	22.977	22.756	
OFFSET FROM CENTRELINE	-6.2	-5	-4	0	4	5	7.96	

CH 600



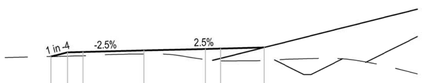
DATUM R.L. 21.00								
DESIGN SURFACE LEVEL	23.004	23.492	23.517	23.617	23.717	23.742	23.851	
DEPTH CUT - / FILL +	0.000	0.439	0.439	0.438	0.437	0.437	0.436	
EXISTING SURFACE LEVEL	23.004	23.053	23.078	23.179	23.280	23.305	23.415	
OFFSET FROM CENTRELINE	-6.95	-5	-4	0	4	5	9.34	

CH 510



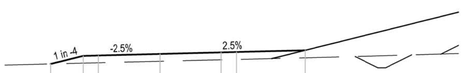
DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.899	23.275	23.300	23.400	23.500	23.525	23.585	
DEPTH CUT - / FILL +	0.000	0.364	0.381	0.437	0.468	0.494	0.497	
EXISTING SURFACE LEVEL	22.899	22.911	22.919	22.963	23.032	23.031	23.087	
OFFSET FROM CENTRELINE	-6.5	-5	-4	0	4	5	7.38	

CH 550



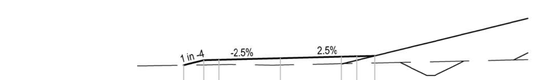
DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.803	23.075	23.100	23.200	23.300	23.325	23.396	
DEPTH CUT - / FILL +	0.000	0.253	0.247	0.230	0.691	0.807	0.852	
EXISTING SURFACE LEVEL	22.803	22.822	22.853	22.970	22.609	22.518	22.545	
OFFSET FROM CENTRELINE	-6.09	-5	-4	0	4	5	7.85	

CH 590



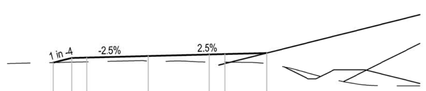
DATUM R.L. 21.00								
DESIGN SURFACE LEVEL	23.079	23.609	23.634	23.734	23.834	23.859	23.971	
DEPTH CUT - / FILL +	0.000	0.479	0.480	0.483	0.486	0.487	0.491	
EXISTING SURFACE LEVEL	23.079	23.130	23.154	23.251	23.347	23.371	23.480	
OFFSET FROM CENTRELINE	-7.12	-5	-4	0	4	5	9.49	

CH 500



DATUM R.L. 21.00								
DESIGN SURFACE LEVEL	22.995	23.325	23.350	23.450	23.550	23.575	23.604	
DEPTH CUT - / FILL +	0.000	0.309	0.319	0.441	0.456	0.459	0.464	
EXISTING SURFACE LEVEL	22.995	23.016	23.031	23.009	23.094	23.116	23.141	
OFFSET FROM CENTRELINE	-6.32	-5	-4	0	4	5	6.17	

CH 540



DATUM R.L. 20.00								
DESIGN SURFACE LEVEL	22.820	23.125	23.150	23.250	23.350	23.375	23.444	
DEPTH CUT - / FILL +	0.000	0.278	0.281	0.341	0.494	0.518	0.694	
EXISTING SURFACE LEVEL	22.820	22.847	22.869	22.909	22.856	22.857	22.749	
OFFSET FROM CENTRELINE	-6.22	-5	-4	0	4	5	7.74	

CH 580

0 2 4 6 8 10m

SCALE 1:200 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

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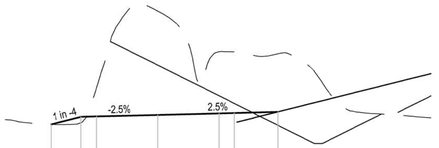
Drawn	J.CASIO	Designer	A.ROBERTS
Drafting Check	P.ETCHELLS	Design Check	D.MORRISON
Approved (Project Director)			
Date			
Scale	1:200	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title PERIMETER ROAD CROSS SECTIONS SHEET 5 OF 7

Original Size A1 Drawing No: 22-18015-C067 Rev: B

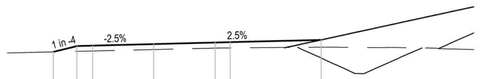
Plot Date: 4 May 2018 - 11:01 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C067.dwg



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	22.132	22.625	22.650	22.750	22.850	22.875	22.946	
DEPTH CUT - / FILL +	0.000	0.380	-1.883	-6.772	-4.030	-3.992	-3.793	
EXISTING SURFACE LEVEL	22.132	22.245	24.533	29.522	26.880	26.867	26.739	
OFFSET FROM CENTRELINE	-6.97	-5	-4	0	4	5	7.83	

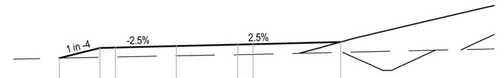
CH 650



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.838	22.225	22.250	22.350	22.450	22.475	22.623	
DEPTH CUT - / FILL +	0.000	0.351	0.352	0.359	0.365	0.377	0.478	
EXISTING SURFACE LEVEL	21.838	21.874	21.898	21.991	22.085	22.098	22.145	
OFFSET FROM CENTRELINE	-6.55	-5	-4	0	4	5	10.92	

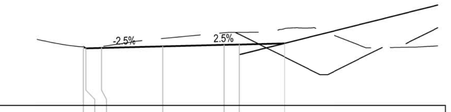
CH 690



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.887	21.550	21.575	21.675	21.775	21.800	21.943	
DEPTH CUT - / FILL +	0.000	0.608	0.613	0.633	0.664	0.669	0.679	
EXISTING SURFACE LEVEL	20.887	20.942	20.962	21.042	21.111	21.131	21.264	
OFFSET FROM CENTRELINE	-7.65	-5	-4	0	4	5	10.72	

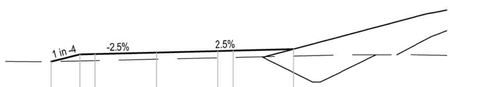
CH 730



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	22.819	22.725	22.750	22.850	22.950	22.975	23.049	
DEPTH CUT - / FILL +	0.000	-0.081	-0.097	-0.520	-0.791	-0.793	-0.962	
EXISTING SURFACE LEVEL	22.819	22.806	22.847	23.370	23.741	23.768	24.011	
OFFSET FROM CENTRELINE	-5.19	-5	-4	0	4	5	7.95	

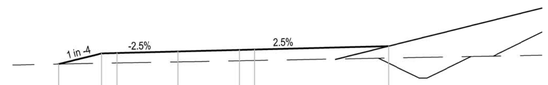
CH 640



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.858	22.325	22.350	22.450	22.550	22.575	22.674	
DEPTH CUT - / FILL +	0.000	0.424	0.426	0.435	0.444	0.446	0.454	
EXISTING SURFACE LEVEL	21.858	21.901	21.924	22.015	22.106	22.129	22.220	
OFFSET FROM CENTRELINE	-6.87	-5	-4	0	4	5	8.95	

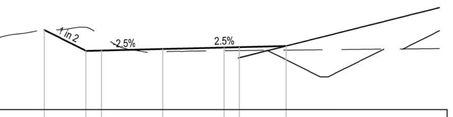
CH 680



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	21.089	21.789	21.814	21.914	22.014	22.039	22.257	
DEPTH CUT - / FILL +	0.000	0.643	0.650	0.684	0.708	0.713	0.773	
EXISTING SURFACE LEVEL	21.089	21.146	21.164	21.230	21.306	21.325	21.484	
OFFSET FROM CENTRELINE	-7.8	-5	-4	0	4	5	13.74	

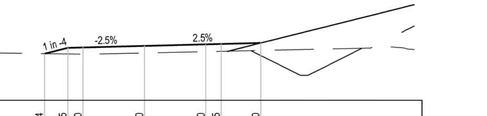
CH 720



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	24.192	22.825	22.850	22.950	23.050	23.075	23.152	
DEPTH CUT - / FILL +	0.000	-1.542	-0.978	0.228	0.211	0.226	0.271	
EXISTING SURFACE LEVEL	24.192	24.367	23.828	22.722	22.839	22.849	22.881	
OFFSET FROM CENTRELINE	-7.73	-5	-4	0	4	5	8.66	

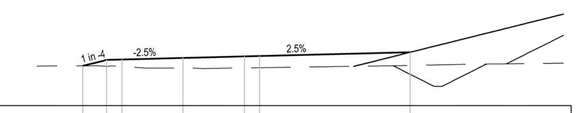
CH 630



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	22.044	22.425	22.450	22.550	22.650	22.675	22.740	
DEPTH CUT - / FILL +	0.000	0.402	0.441	0.464	0.476	0.479	0.487	
EXISTING SURFACE LEVEL	22.044	22.023	22.009	22.086	22.174	22.196	22.253	
OFFSET FROM CENTRELINE	-6.53	-5	-4	0	4	5	7.61	

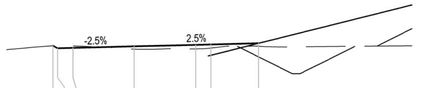
CH 670



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.594	21.981	22.006	22.106	22.206	22.231	22.476	
DEPTH CUT - / FILL +	0.000	0.419	0.451	0.662	0.746	0.759	0.856	
EXISTING SURFACE LEVEL	21.594	21.562	21.555	21.444	21.459	21.472	21.621	
OFFSET FROM CENTRELINE	-6.55	-5	-4	0	4	5	14.83	

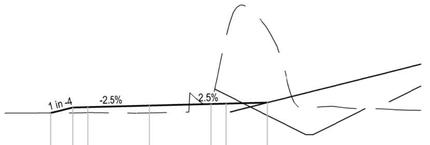
CH 710



DATUM R.L. 20.00

DESIGN SURFACE LEVEL	23.077	22.916	22.941	23.041	23.141	23.166	23.244	
DEPTH CUT - / FILL +	0.000	-0.169	-0.127	0.184	0.267	0.236	0.192	
EXISTING SURFACE LEVEL	23.077	23.085	23.068	22.857	22.874	22.929	23.052	
OFFSET FROM CENTRELINE	-5.32	-5	-4	0	4	5	8.13	

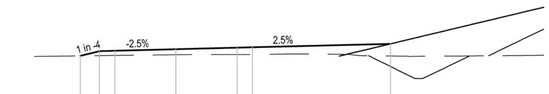
CH 620



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	22.165	22.525	22.550	22.650	22.750	22.775	22.843	
DEPTH CUT - / FILL +	0.000	0.356	0.359	0.482	-0.157	-4.380	-4.805	
EXISTING SURFACE LEVEL	22.165	22.169	22.191	22.168	22.907	27.155	27.648	
OFFSET FROM CENTRELINE	-6.44	-5	-4	0	4	5	7.72	

CH 660



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.813	22.122	22.147	22.247	22.347	22.372	22.597	
DEPTH CUT - / FILL +	0.000	0.294	0.307	0.361	0.448	0.470	0.791	
EXISTING SURFACE LEVEL	21.813	21.828	21.841	21.886	21.899	21.902	21.806	
OFFSET FROM CENTRELINE	-6.24	-5	-4	0	4	5	13.99	

CH 700

0 2 4 6 8 10m

SCALE 1:200 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

HYDRO

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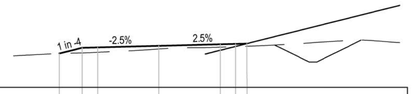
DO NOT SCALE

Drawn	J.CASIO	Designer	A.ROBERTS
Drafting Check	P.ETCHELLS	Design Check	D.MORRISON
Approved (Project Director)			
Date			
Scale	1:200	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title PERIMETER ROAD CROSS SECTION SHEET 6 OF 7

Original Size A1 | Drawing No: 22-18015-C068 | Rev: B

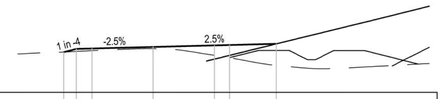
Plot Date: 4 May 2018 - 11:02 AM | Plotted by: Trish Elchells | Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C068.dwg



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.206	20.581	20.606	20.706	20.806	20.831	20.849					
DEPTH CUT - / FILL +	0.000	0.335	0.318	0.203	0.187	0.182	0.172					
EXISTING SURFACE LEVEL	20.206	20.245	20.288	20.503	20.619	20.649	20.677					
OFFSET FROM CENTRELINE	-6.5	-5	-4	0	4	5	5.73					

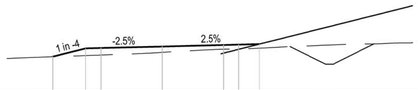
CH 770



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.626	19.835	19.860	19.960	20.060	20.085	20.161					
DEPTH CUT - / FILL +	0.000	0.165	0.138	0.112	0.638	0.824	1.405					
EXISTING SURFACE LEVEL	19.626	19.670	19.722	19.848	19.422	19.261	18.756					
OFFSET FROM CENTRELINE	-5.84	-5	-4	0	4	5	8.05					

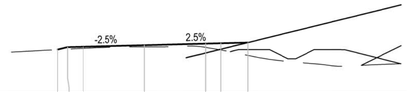
CH 810



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.264	20.802	20.827	20.927	21.027	21.052	21.066					
DEPTH CUT - / FILL +	0.000	0.468	0.458	0.383	0.278	0.283	0.266					
EXISTING SURFACE LEVEL	20.264	20.335	20.369	20.544	20.749	20.769	20.820					
OFFSET FROM CENTRELINE	-7.15	-5	-4	0	4	5	6.36					

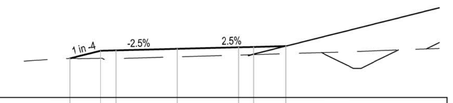
CH 760



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.856	20.020	20.045	20.145	20.245	20.270	20.314					
DEPTH CUT - / FILL +	0.000	0.132	0.110	0.108	0.241	0.438	0.839					
EXISTING SURFACE LEVEL	19.856	19.888	19.935	20.037	20.004	19.832	19.476					
OFFSET FROM CENTRELINE	-5.66	-5	-4	0	4	5	6.77					

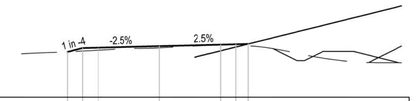
CH 800



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.547	21.050	21.075	21.175	21.275	21.300	21.352					
DEPTH CUT - / FILL +	0.000	0.493	0.549	0.520	0.504	0.500	0.491					
EXISTING SURFACE LEVEL	20.547	20.557	20.526	20.655	20.771	20.800	20.861					
OFFSET FROM CENTRELINE	-7.01	-5	-4	0	4	5	7.1					

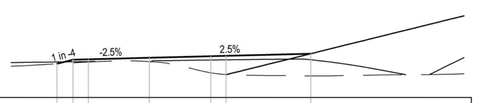
CH 750



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.956	20.205	20.230	20.330	20.430	20.455	20.476					
DEPTH CUT - / FILL +	0.000	0.196	0.167	0.110	0.027	0.046	0.116					
EXISTING SURFACE LEVEL	19.956	20.009	20.063	20.220	20.403	20.409	20.360					
OFFSET FROM CENTRELINE	-6	-5	-4	0	4	5	5.82					

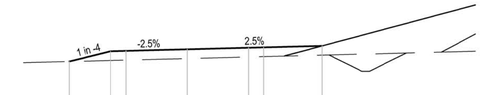
CH 790



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.206	19.468	19.493	19.593	19.693	19.718	19.856					
DEPTH CUT - / FILL +	0.000	0.203	0.178	0.251	1.083	1.220	1.449					
EXISTING SURFACE LEVEL	19.206	19.264	19.315	19.342	18.610	18.497	18.406					
OFFSET FROM CENTRELINE	-6.05	-5	-4	0	4	5	10.52					

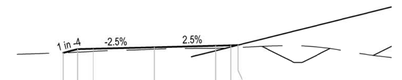
CH 830



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.626	21.300	21.325	21.425	21.525	21.550	21.645					
DEPTH CUT - / FILL +	0.000	0.606	0.605	0.604	0.602	0.602	0.601					
EXISTING SURFACE LEVEL	20.626	20.694	20.720	20.821	20.923	20.948	21.045					
OFFSET FROM CENTRELINE	-7.7	-5	-4	0	4	5	8.81					

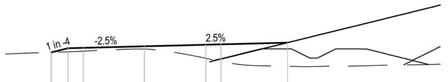
CH 740



DATUM R.L. 18.00

DESIGN SURFACE LEVEL	20.151	20.390	20.415	20.515	20.615	20.640	20.652					
DEPTH CUT - / FILL +	0.000	0.196	0.170	0.126	0.168	0.166	0.156					
EXISTING SURFACE LEVEL	20.151	20.194	20.245	20.389	20.447	20.474	20.496					
OFFSET FROM CENTRELINE	-5.96	-5	-4	0	4	5	5.47					

CH 780



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.376	19.650	19.675	19.775	19.875	19.900	20.008					
DEPTH CUT - / FILL +	0.000	0.237	0.219	0.179	0.882	1.116	1.541					
EXISTING SURFACE LEVEL	19.376	19.413	19.456	19.596	18.993	18.784	18.468					
OFFSET FROM CENTRELINE	-6.09	-5	-4	0	4	5	9.33					

CH 820

0 2 4 6 8 10m

SCALE 1:200 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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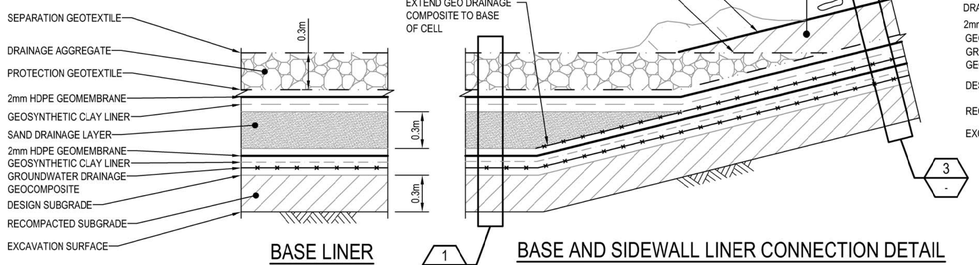
DO NOT SCALE

Drawn	J.CASIO	Designer	A.ROBERTS
Drafting Check	P.ETCHELLS	Design Check	D.MORRISON
Approved (Project Director)			
Date			
Scale	1:200	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: PERIMETER ROAD CROSS SECTION SHEET 7 OF 7

Original Size: A1
Drawing No: 22-18015-C069
Rev: B

Plot Date: 4 May 2018 - 11:03 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C069.dwg

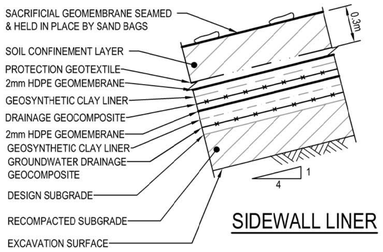


BASE LINER

1 DETAIL
C021,82,133 SCALE 1 : 25

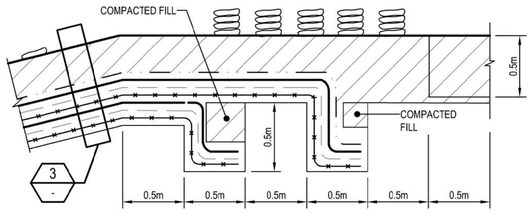
BASE AND SIDEWALL LINER CONNECTION DETAIL

2 DETAIL
C021 & 82 SCALE 1 : 25



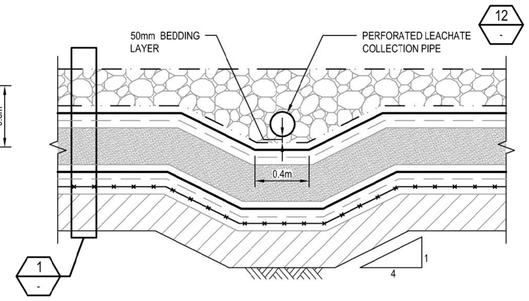
SIDEWALL LINER

3 DETAIL
C021,82,91,132 SCALE 1 : 25



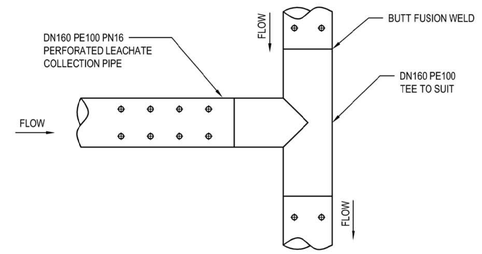
ANCHOR TRENCH TYPICAL DETAIL

4 DETAIL
C021 SCALE 1 : 25



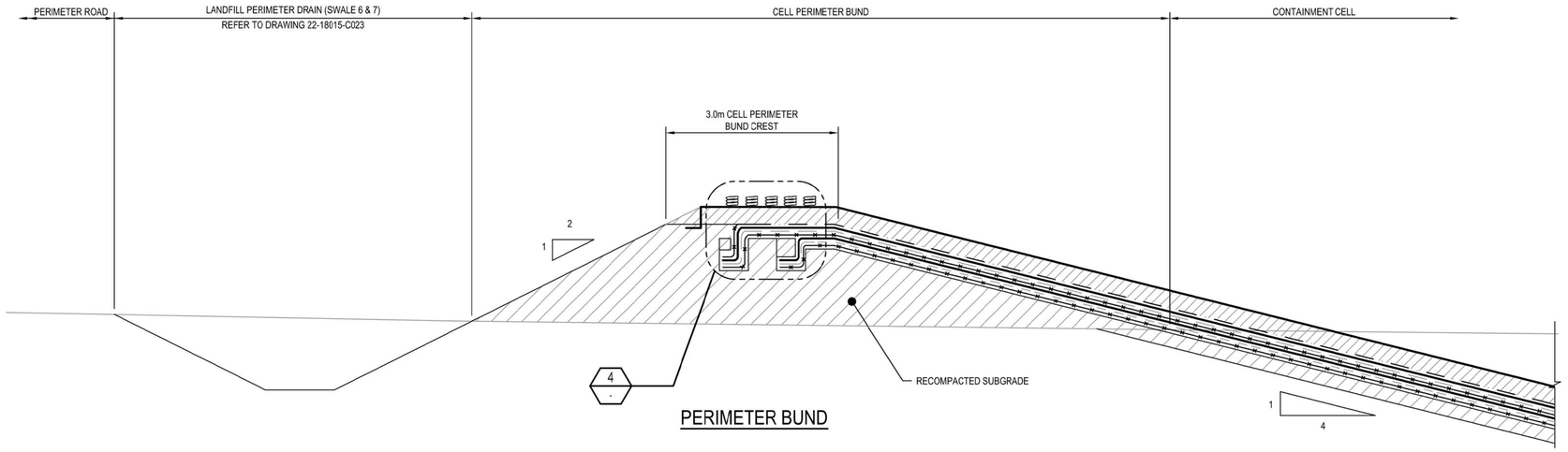
LEACHATE COLLECTION TRENCH

5 DETAIL
C021,72,73 SCALE 1 : 25



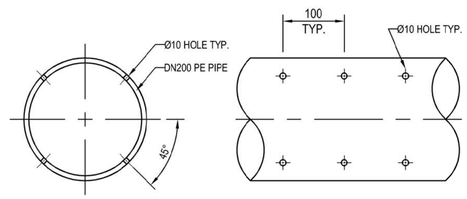
TYPICAL LEACHATE COLLECTION PIPE CONNECTION DETAIL

SCALE 1:10



PERIMETER BUND

C SECTION
C021 SCALE 1 : 50



LEACHATE COLLECTION PIPE PERFORATION

12 DETAIL
- SCALE 1 : 5

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

0 0.05 0.1 0.15 0.2 0.25m
SCALE 1:5 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

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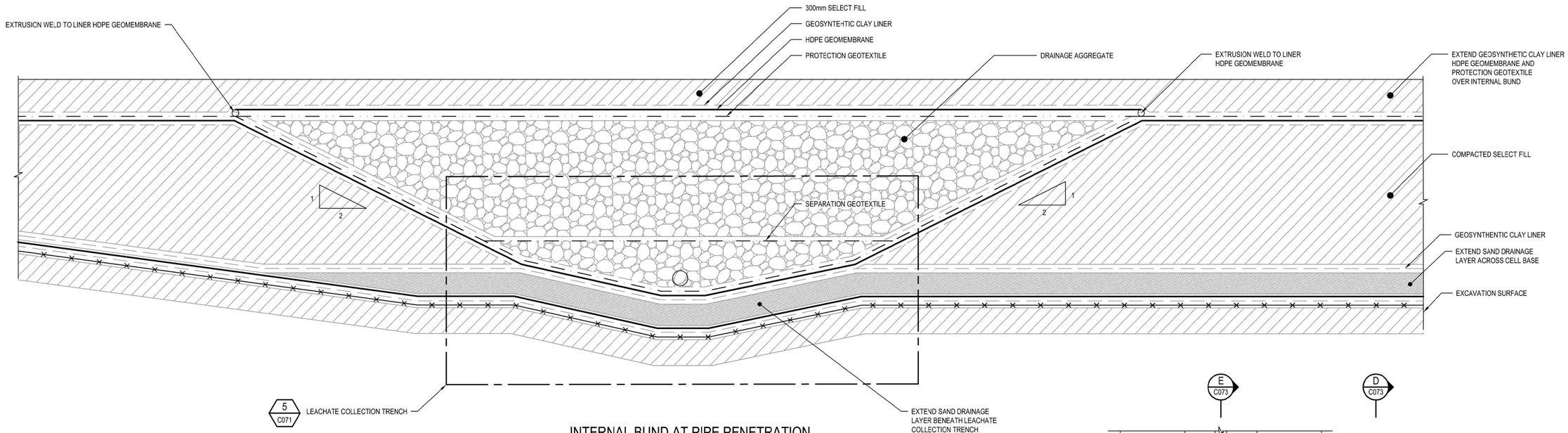
Drawn J. CASIO	Designer A. ROBERTS	Client	HYDRO ALUMINIUM KURRI KURRI PTY LTD
Drafting Check P. ETCHELLS	Design Check D. BARRETT	Project	CONTAINMENT CELL DETAILED DESIGN
Approved (Project Director)		Title	LINER DETAILS SHEET 1 OF 3
Date			
Scale AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	Original Size A1	Drawing No: 22-18015-C071 Rev: C

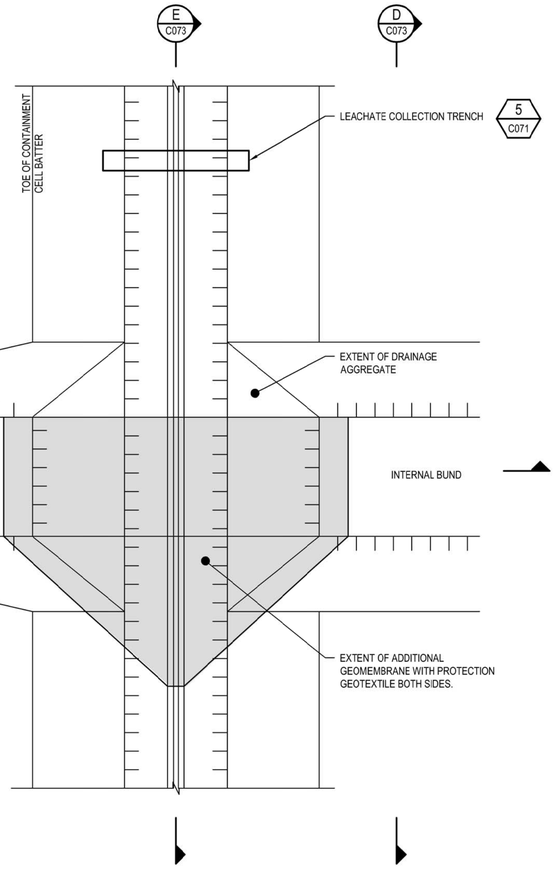
Plot Date: 4 May 2018 - 11:04 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C071.dwg



INTERNAL BUND AT PIPE PENETRATION

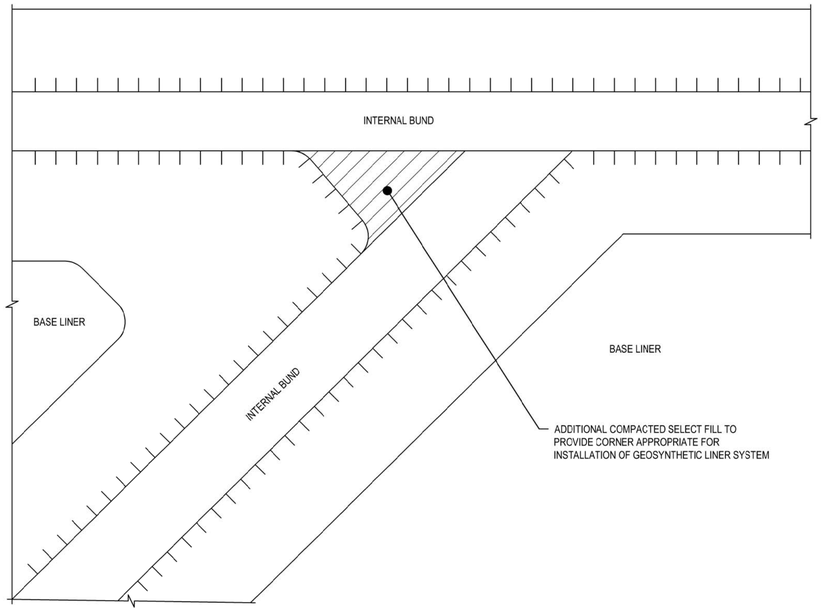
X / - SECTION

SCALE : NTS



PLAN INTERNAL BUND AT PIPE PENETRATION

NTS



CONNECTION OF INTERNAL BUNDS

NTS

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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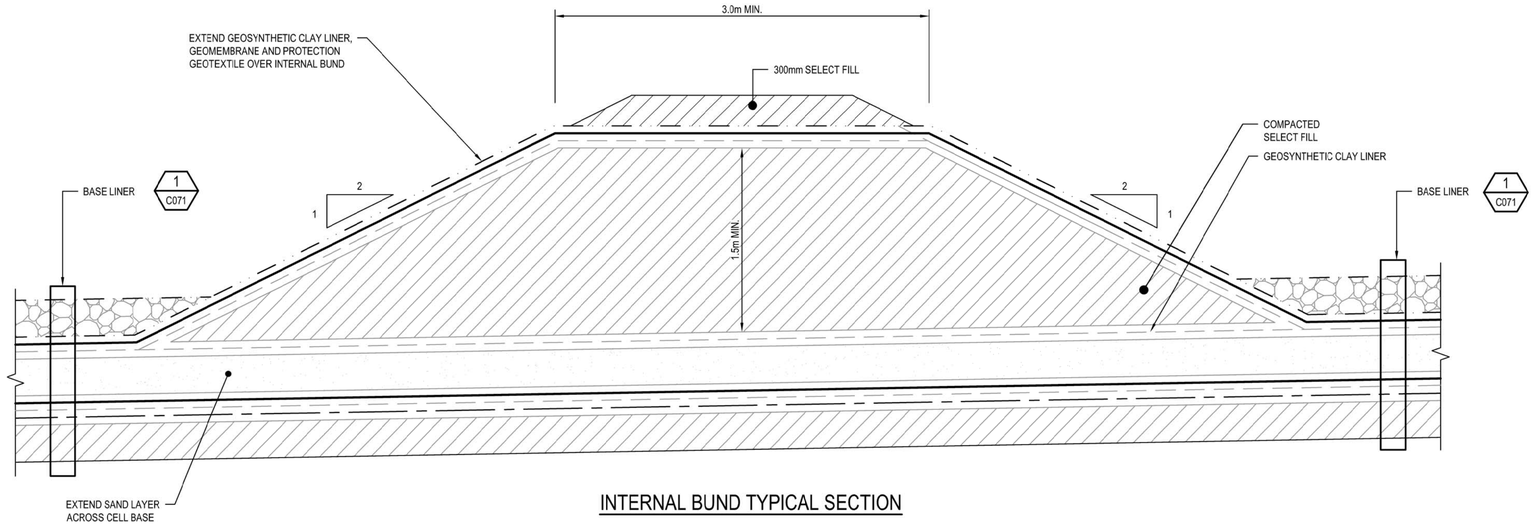
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	NOT TO SCALE	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: LINER DETAILS SHEET 2 OF 3

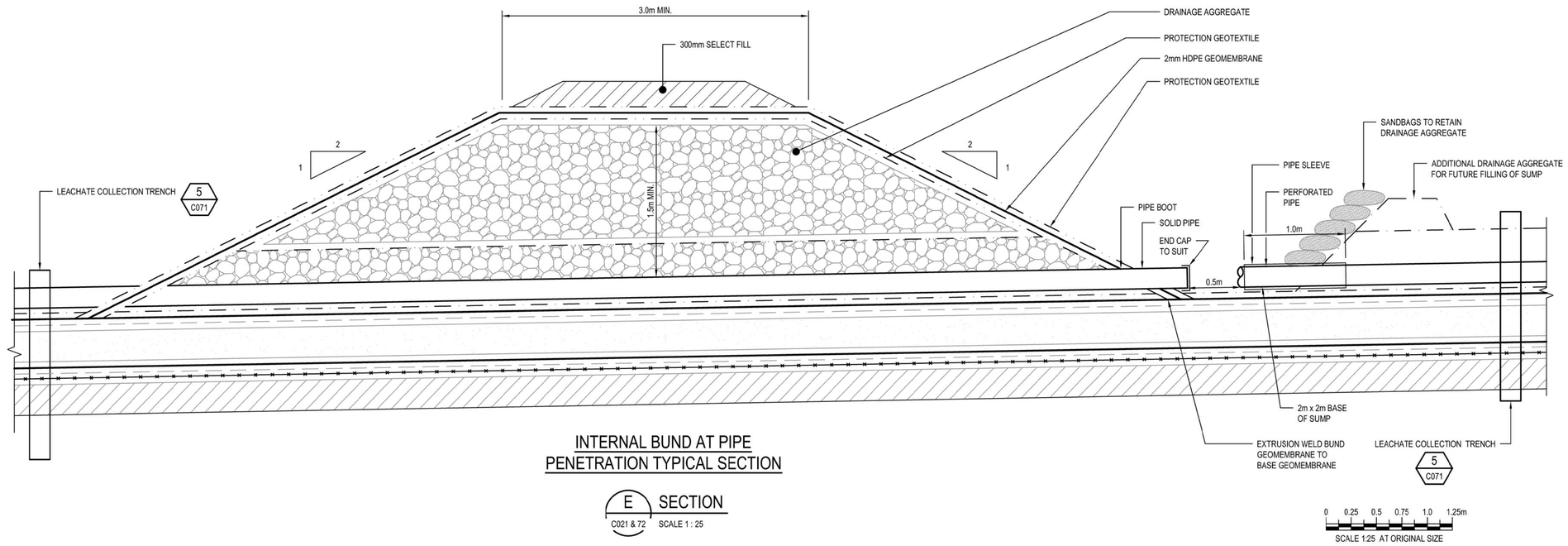
Original Size A1 | Drawing No: 22-18015-C072 | Rev: B

Plot Date: 4 May 2018 - 11:05 AM | Plotted by: Trish Etchells | Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C072.dwg



INTERNAL BUND TYPICAL SECTION

D SECTION
C021 & 72 SCALE 1 : 25



INTERNAL BUND AT PIPE PENETRATION TYPICAL SECTION

E SECTION
C021 & 72 SCALE 1 : 25

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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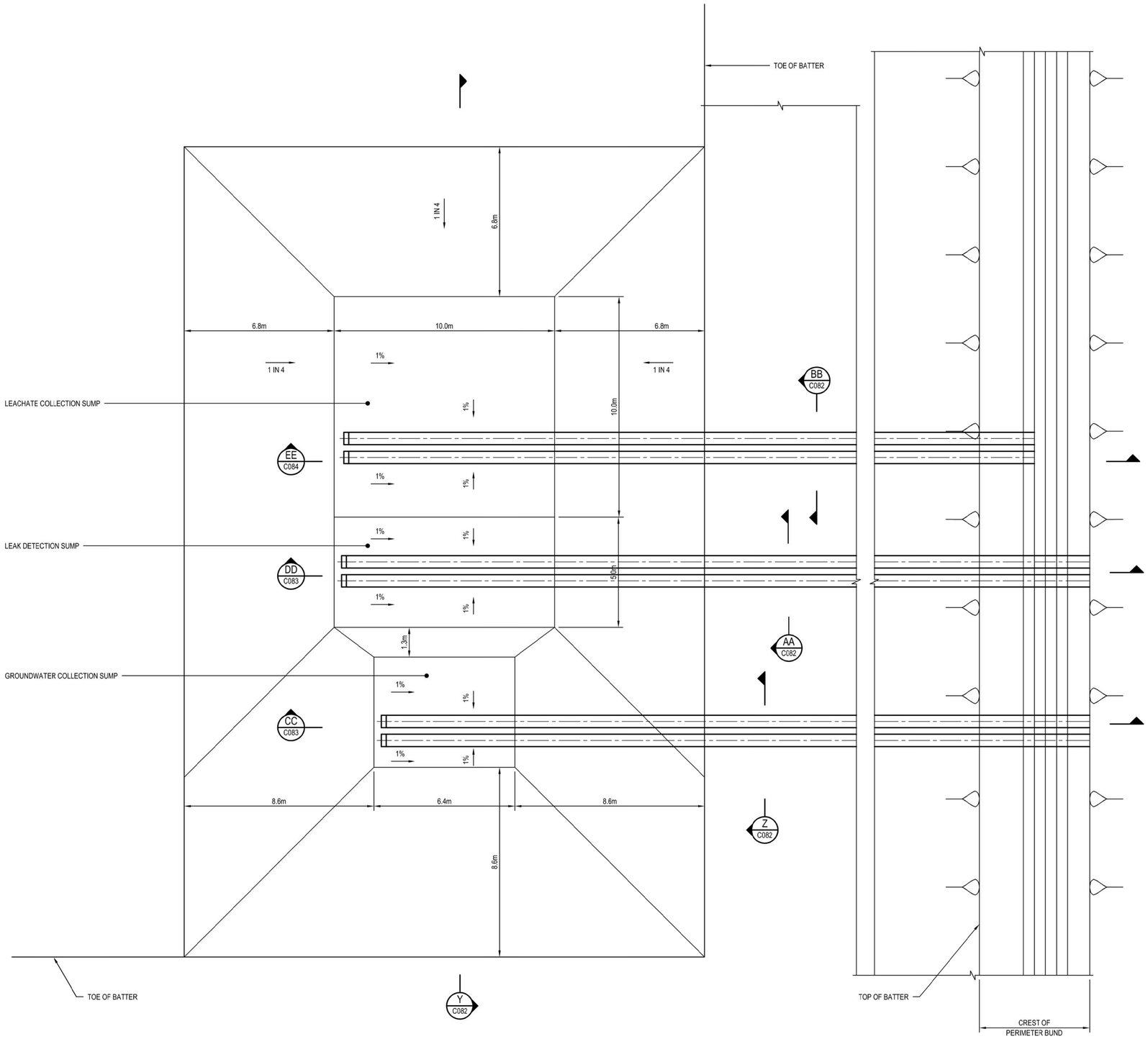
DO NOT SCALE

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:25	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title LINER DETAILS SHEET 3 OF 3

Original Size A1 Drawing No: 22-18015-C073 Rev: C

Plot Date: 4 May 2018 - 11:06 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C073.dwg



SOUTHERN SUMP AREA PLAN - (SIMILAR FOR NORTHERN SUMP AREA)

SCALE 1:100

0 1 2 3 4 5m

SCALE 1:100 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on orignal issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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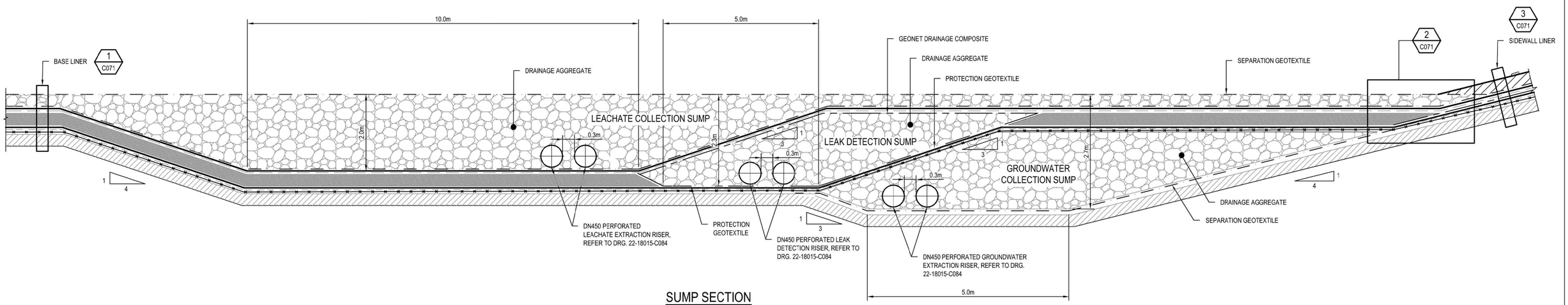
DO NOT SCALE

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:100	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title SUMP DETAILS
SHEET 1 OF 4

Original Size A1 Drawing No: 22-18015-C081 Rev: B

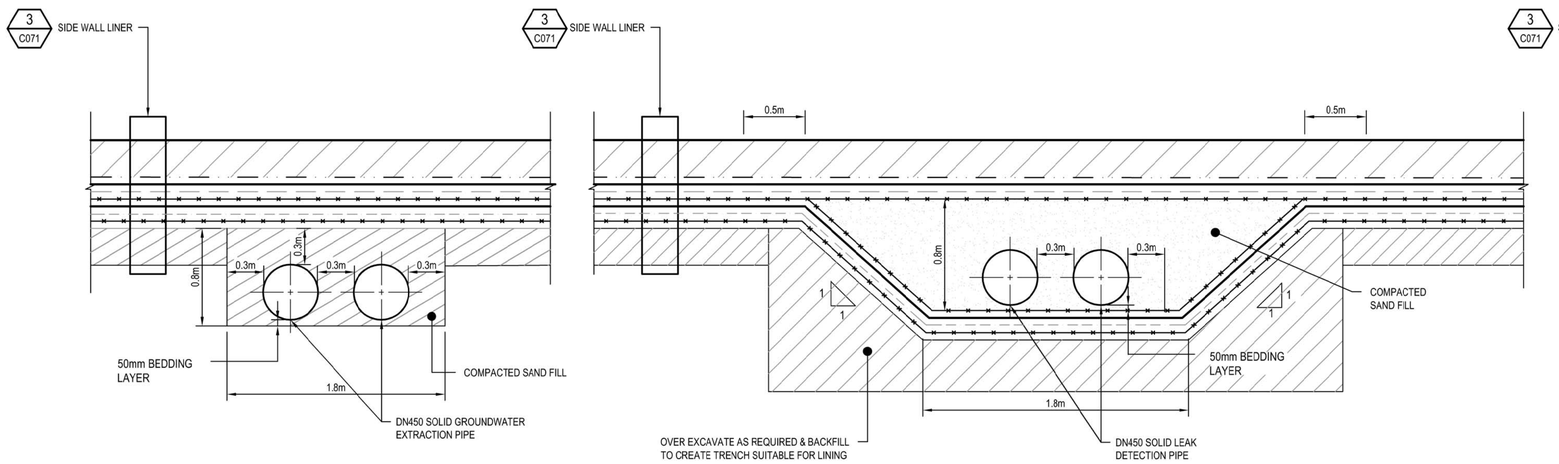
Plot Date: 4 May 2018 - 11:07 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C081.dwg



SUMP SECTION

Y C081 SECTION

SCALE 1 : 50



GROUNDWATER RISER

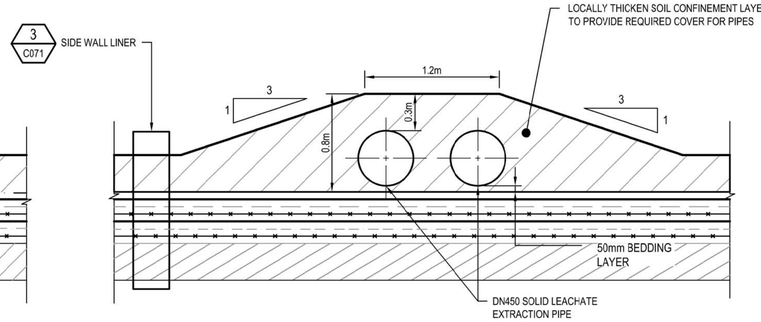
Z C081 SECTION

SCALE 1 : 25

LEAK DETECTION RISER

AA C081 SECTION

SCALE 1 : 25



LEACHATE RISER

BB C081 SECTION

SCALE 1 : 25

0 0.5 1.0 1.5 2.0 2.5m

SCALE 1:50 AT ORIGINAL SIZE

0 0.25 0.5 0.75 1.0 1.25m

SCALE 1:25 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * irdicates signatures on orignal issue of drawing or last revision of drawing

REGROWTH KURRI KURRI

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DO NOT SCALE

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD

Project CONTAINMENT CELL DETAILED DESIGN

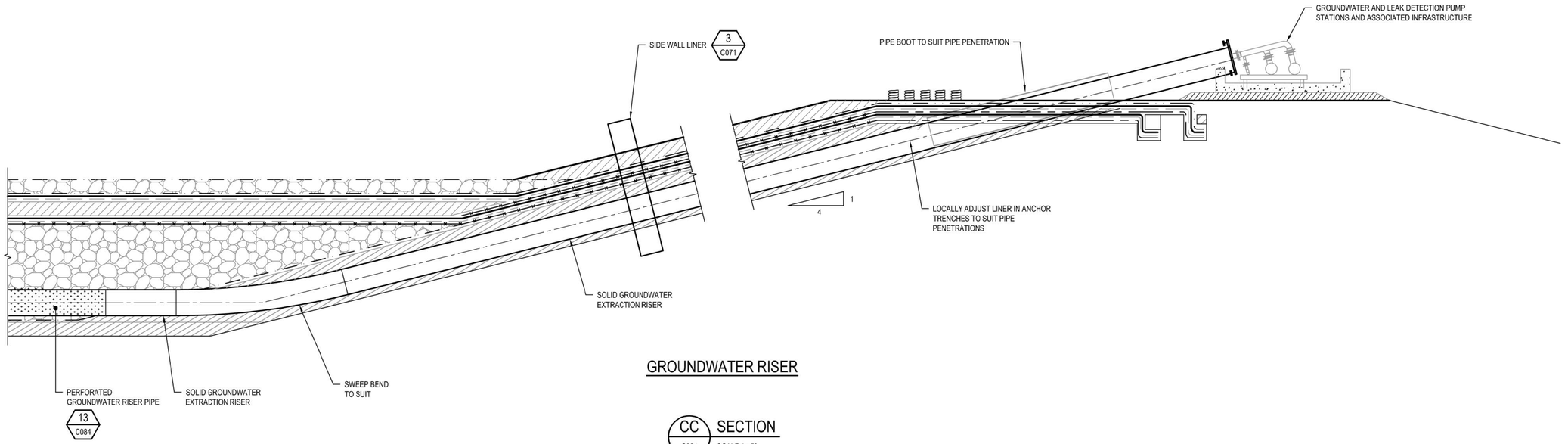
Title SUMP DETAILS
SHEET 2 OF 4

Original Size A1

Drawing No: 22-18015-C082

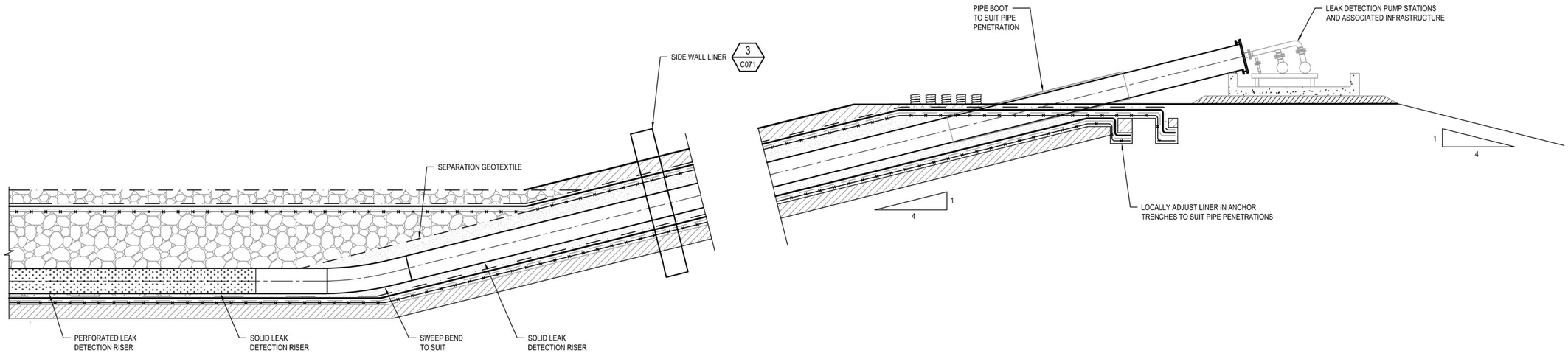
Rev: B

Plot Date: 4 May 2018 - 11:08 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C082.dwg



GROUNDWATER RISER

CC C081 SECTION
SCALE 1 : 50



LEAK DETECTION RISER

DD C081 SECTION
SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

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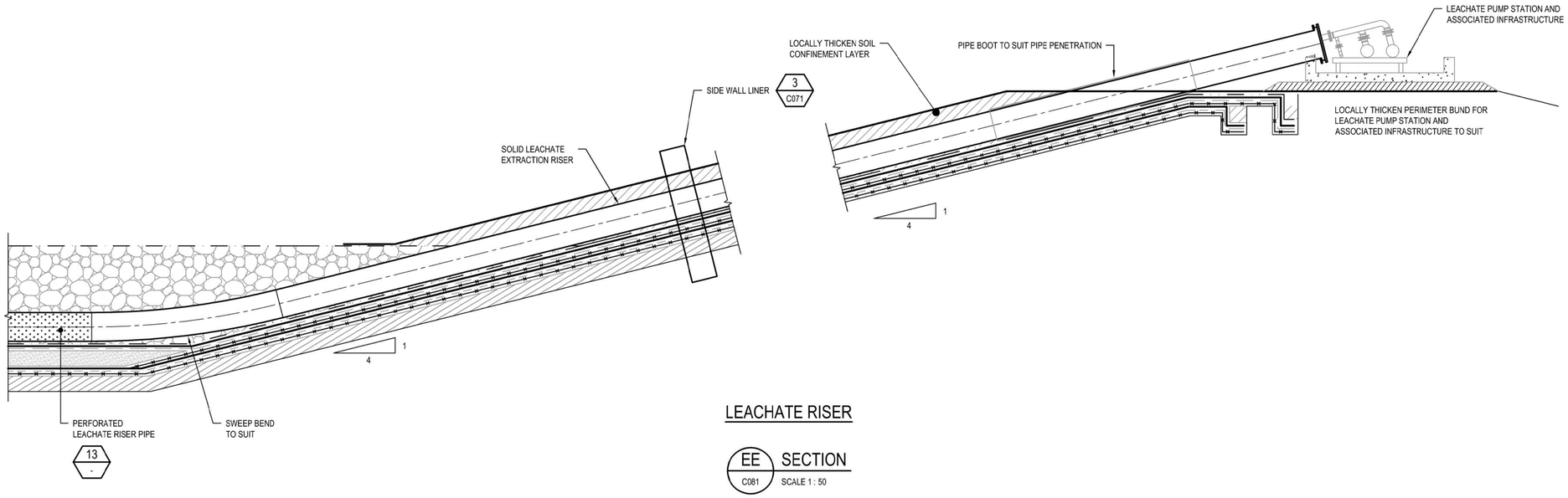
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:50	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: SUMP DETAILS
SHEET 3 OF 4

Original Size A1 | Drawing No: 22-18015-C083 | Rev: B

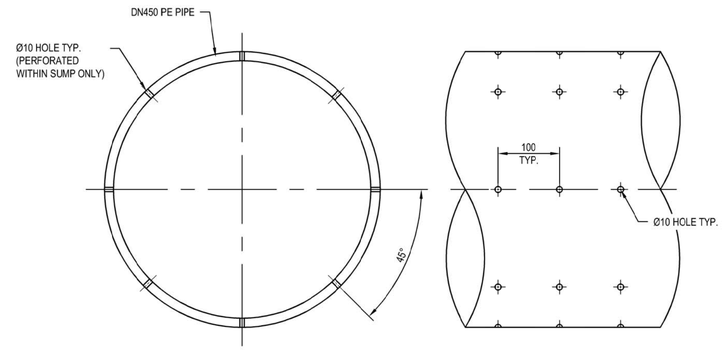
Plot Date: 4 May 2018 - 11:09 AM | Plotted by: Trish Etchells | Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C083.dwg



LEACHATE RISER

EE C081 SECTION

SCALE 1 : 50



RISER PIPE PERFORATION

13 - DETAIL

SCALE 1 : 5

0 0.05 0.1 0.15 0.2 0.25m

SCALE 1:5 AT ORIGINAL SIZE

0 0.5 1.0 1.5 2.0 2.5m

SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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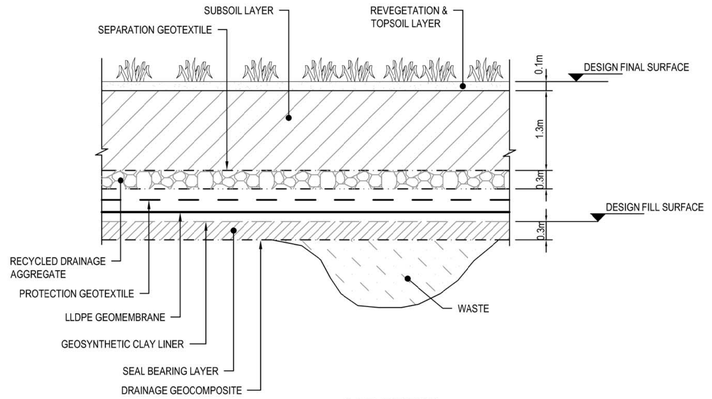
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: SUMP DETAILS SHEET 4 OF 4

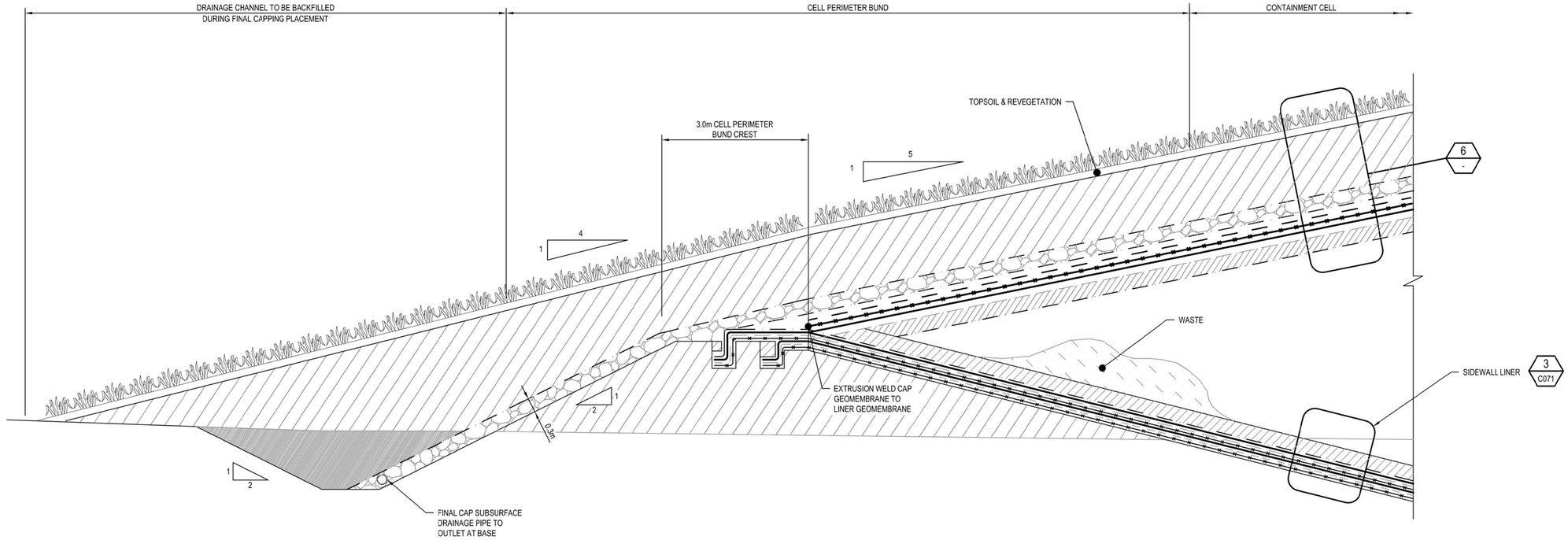
Original Size: A1
Drawing No: 22-18015-C084
Rev: B

Plot Date: 4 May 2018 - 11:11 AM Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C084.dwg



CAP DETAIL

6 DETAIL
C025,92,141 SCALE 1 : 50



CAP TERMINATION DETAIL

W SECTION
C025 SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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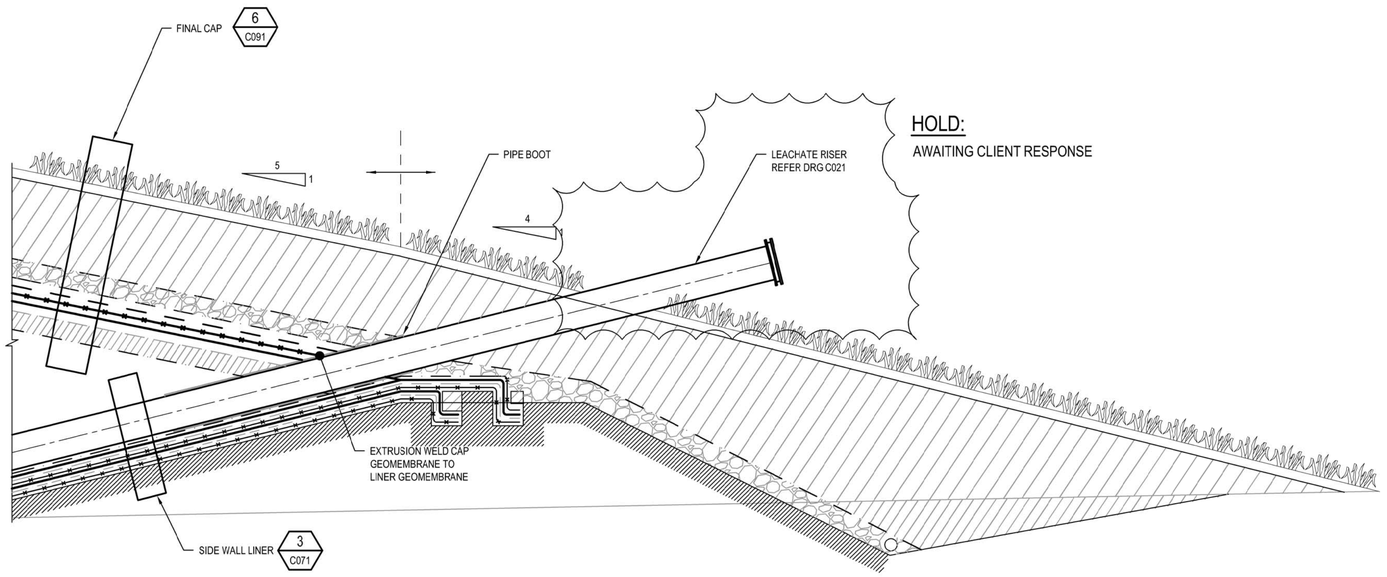
DO NOT SCALE

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:50	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title CAPPING DETAILS SHEET 1 OF 2

Original Size A1 Drawing No: 22-18015-C091 Rev: C

Plot Date: 4 May 2018 - 11:12 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C091.dwg



CAP TO RISER PIPE CONNECTION DETAIL

11 / C025 DETAIL
SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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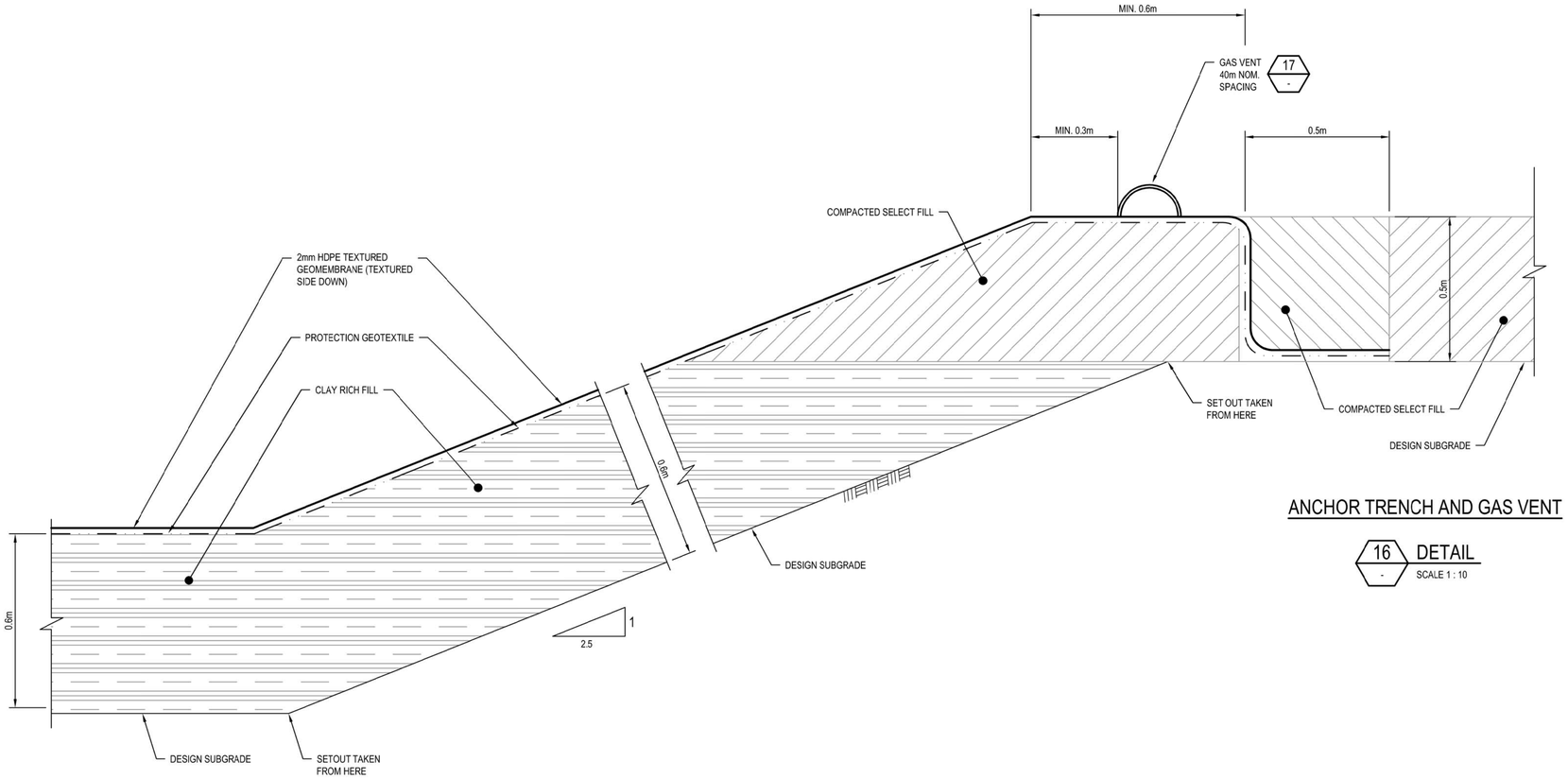
DO NOT SCALE

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:50	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title CAPPING DETAILS
SHEET 2 OF 2

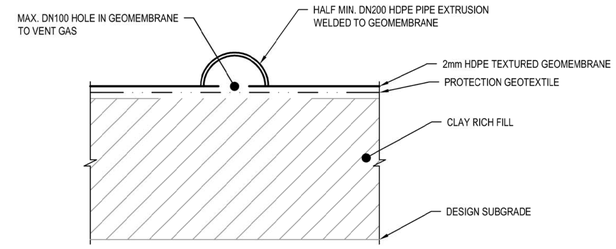
Original Size A1
Drawing No: 22-18015-C092
Rev: C

Plot Date: 4 May 2018 - 11:13 AM Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C092.dwg



ANCHOR TRENCH AND GAS VENT

16 - DETAIL
SCALE 1 : 10

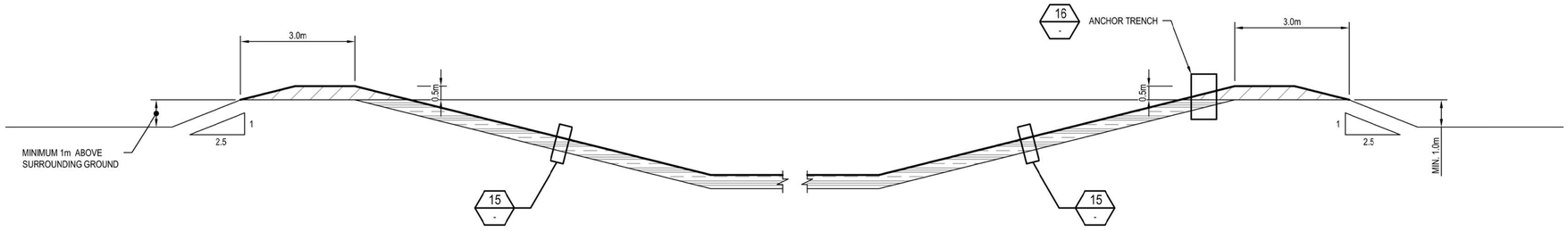


GAS VENT

17 - DETAIL
SCALE 1 : 10

LEACHATE BUFFER STORAGE DAM LINING SYSTEM

15 - DETAIL
SCALE 1 : 10



TYPICAL SECTION
LEACHATE BUFFER STORAGE DAM

JJ - C102 SECTION
SCALE 1 : 100

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

0 1 2 3 4 5m
SCALE 1:100 AT CRIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on orignal issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
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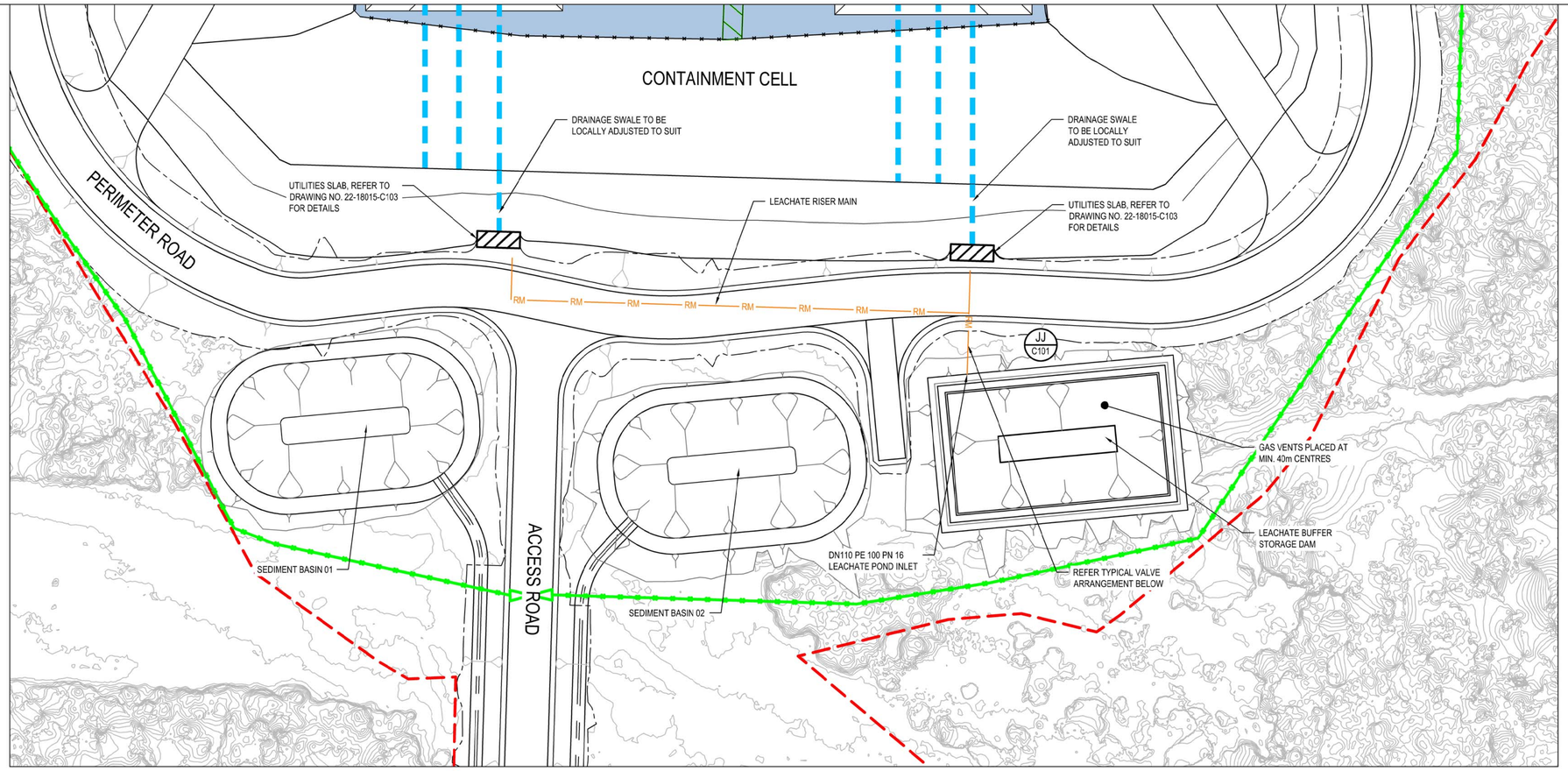
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title LEACHATE BUFFER STORAGE DAM DETAILS

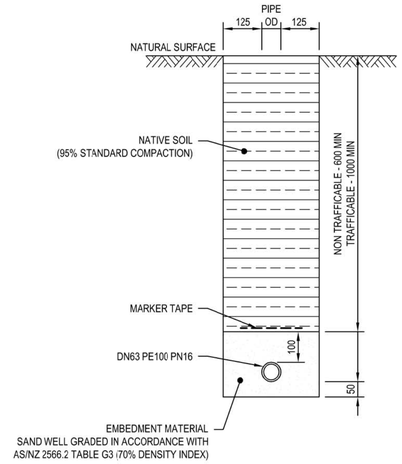
Original Size A1
Drawing No: 22-18015-C101
Rev: C

Plot Date: 4 May 2018 - 11:14 AM Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C101.dwg



LEACHATE POND INLET WORKS PLAN

SCALE 1:500

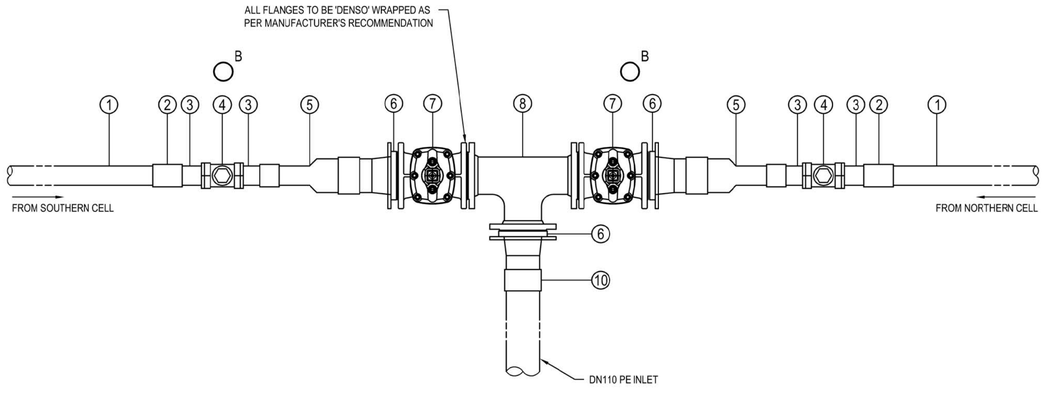


TYPICAL TRENCH DETAIL

SCALE 1:10

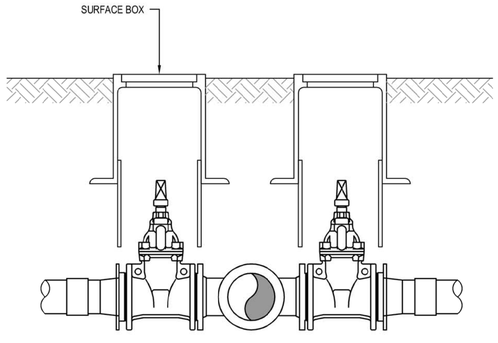
PIPEWORK FITTINGS SCHEDULE		
ITEM No.	DESCRIPTION	QTY.
1	DN63 PE100 PN16 PIPE LENGTH TO SUIT	2
2	DN63 PE ELECTROFUSION COUPLING	2
3	DN63 PE TO 2" SS TRANSITION COUPLING	4
4	2" SS SPRING CHECK VALVE. PROVIDE 150 PVC RISER TO SURFACE FOR VALVE SPIGOT CAP RISER AT SURFACE	2
5	DN110 DN63 PE REDUCING COUPLING C/W ELECTROFUSION COUPLINGS	2
6	OD110 PE STUB FLANGE AND S/S BACKING RING TO AS4087	3
7	DN100 DICL SLUICE VALVE FL-FL. PROVIDE 150 PVC RISER TO SURFACE FOR SURFACE BOX	2
8	DN100x100 DICL TEE FL-FL-FL	1
9	DN100 BLANK FLANGE	1
10	DN110 PE ELETROFUSION COUPLING	1

B BOLLARD
- PROVIDE 165 x 6 CHS 6 PL CAP TOP 1100mm HIGH PAINTED YELLOW DRIVEN 1200mm INTO GROUND



TYPICAL VALVE ARRANGEMENT

SCALE 1:10



TYPICAL VALVE COVER DETAIL

SCALE 1:10

NOTE: DETAIL TO BE READ IN CONJUNCTION WITH TCC STANDARD DRAWINGS SD-350 AND SD-355

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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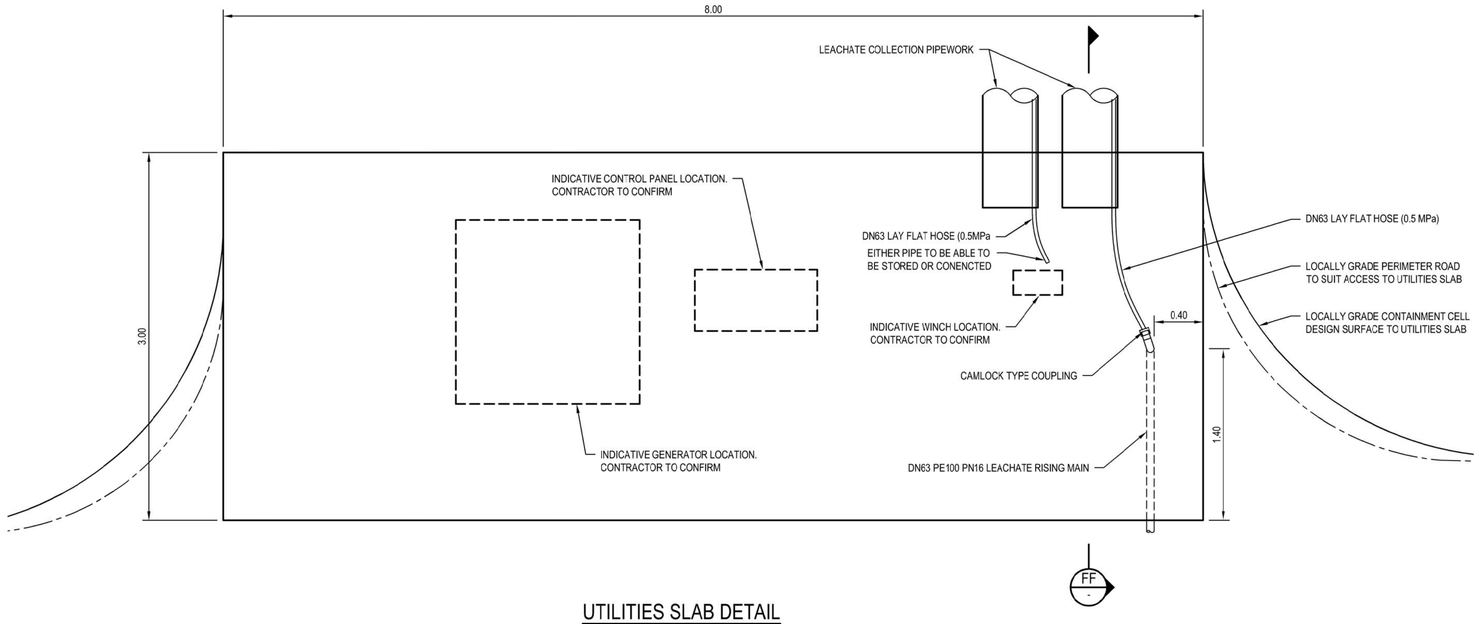
Drawn J. CASIO | Designer A. ROBERTS
Drafting Check P. ETCHELLS | Design Check D. BARRETT
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title LEACHATE TRANSFER SYSTEM PLAN AND DETAILS

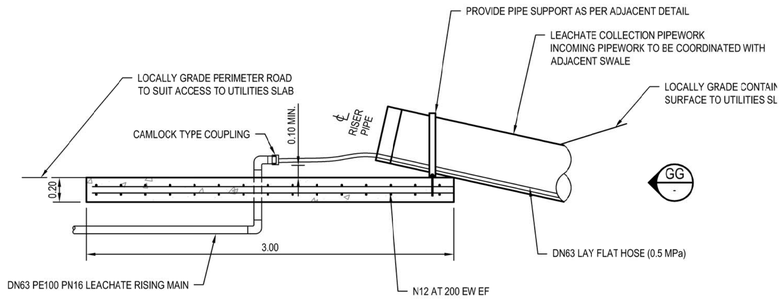
Original Size A1
Drawing No: 22-18015-C102
Rev: C

Plot Date: 4 May 2018 - 11:15 AM Plotted by: Trish Elchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C102.dwg

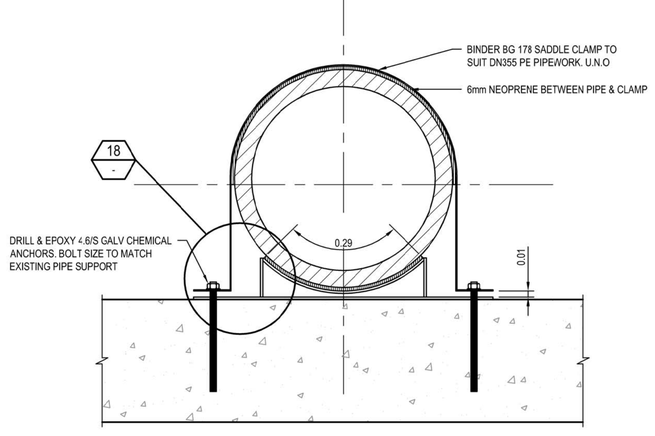


UTILITIES SLAB DETAIL

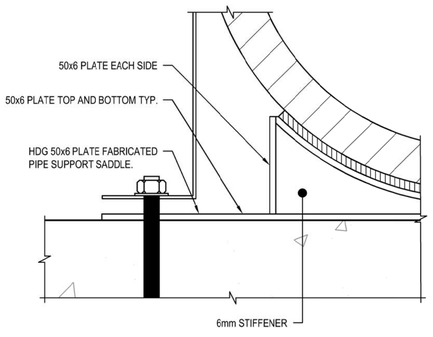
SCALE 1:25
(REFER TO DRG No. C102 FOR PLAN LOCATION)



FF SECTION
SCALE 1 : 25



GG ELEVATION
SCALE 1 : 5



18 DETAIL
SCALE 1 : 2

NOTE

1. ALL PIPE SUPPORTS TO BE HDG AND FULLY WELDED

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

0 0.05 0.1 0.15 0.2 0.25m
SCALE 1:5 AT ORIGINAL SIZE

0 0.02 0.04 0.06 0.08 0.1m
SCALE 1:20 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
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A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

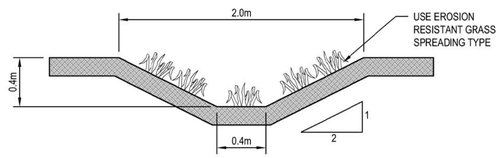
Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title LEACHATE TRANSFER SYSTEM
UTILITIES SLAB DETAILS

Original Size A1 Drawing No: **22-18015-C103** Rev: C

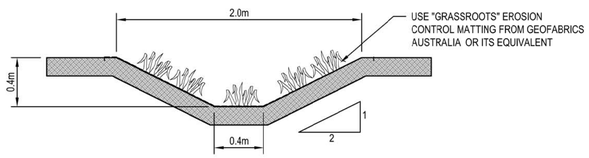
Plot Date: 4 May 2018 - 11:16 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C103.dwg

NOTES:

1. ALL DRAINAGE WORKS TO BE CONSTRUCTED WITH MIN. LONGITUDINAL 1% FALL.
2. ALL DISTURBED AREAS TO BE REVEGETATED.
3. SURFACE PREPARATION AS REQUIRED FOR ESTABLISHMENT OF GRASS LINING.
4. REFER 22-18015-C151 TO 22-18015-C158 FOR SWALE DETAILS.

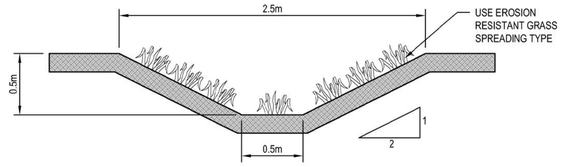


K SECTION
C023 SCALE 1 : 25



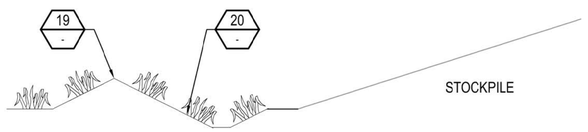
L SECTION
C023 & C032 SCALE 1 : 25

DIVERSION DRAIN



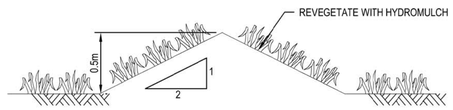
O N SECTION
C023 C023 SCALE 1 : 25

ACCESS ROAD TABLE DRAIN



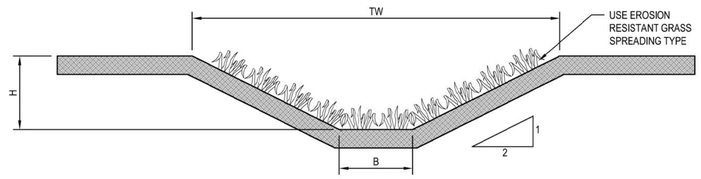
M SECTION
C023 & C032 SCALE 1 : 50

STOCKPILE PERIMETER DRAIN



19 DETAIL
- SCALE 1 : 25

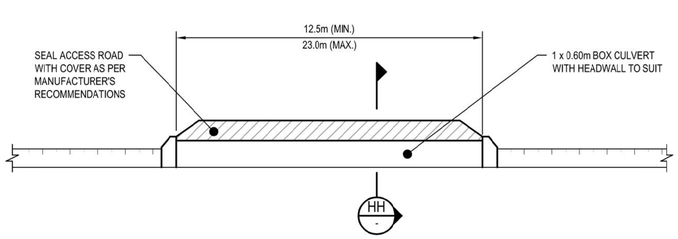
TYPICAL BUND DETAIL



20 DETAIL
- SCALE 1 : 25

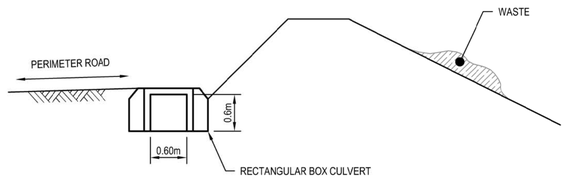
STOCKPILE PERIMETER DRAIN DETAIL

SWALE DIMENSIONS			
SWALE	TW (m)	H (m)	B (m)
1	2.5	0.5	0.5
2	2.0	0.4	0.4
3	1.6	0.3	0.4
4	3.0	0.6	0.6
5	2.0	0.4	0.4
6	3.0	0.6	0.6
7	3.0	0.6	0.6

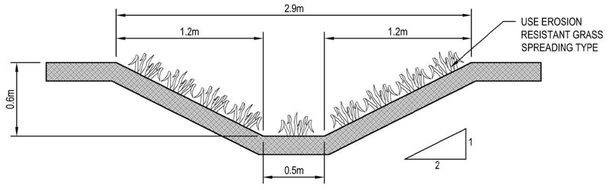


P SECTION
C023 SCALE 1 : 50

ACCESS ROAD CULVERTS



HH SECTION
- SCALE 1 : 50



Q SECTION
C023 SCALE 1 : 25

CONTAINMENT CELL PERIMETER DRAIN

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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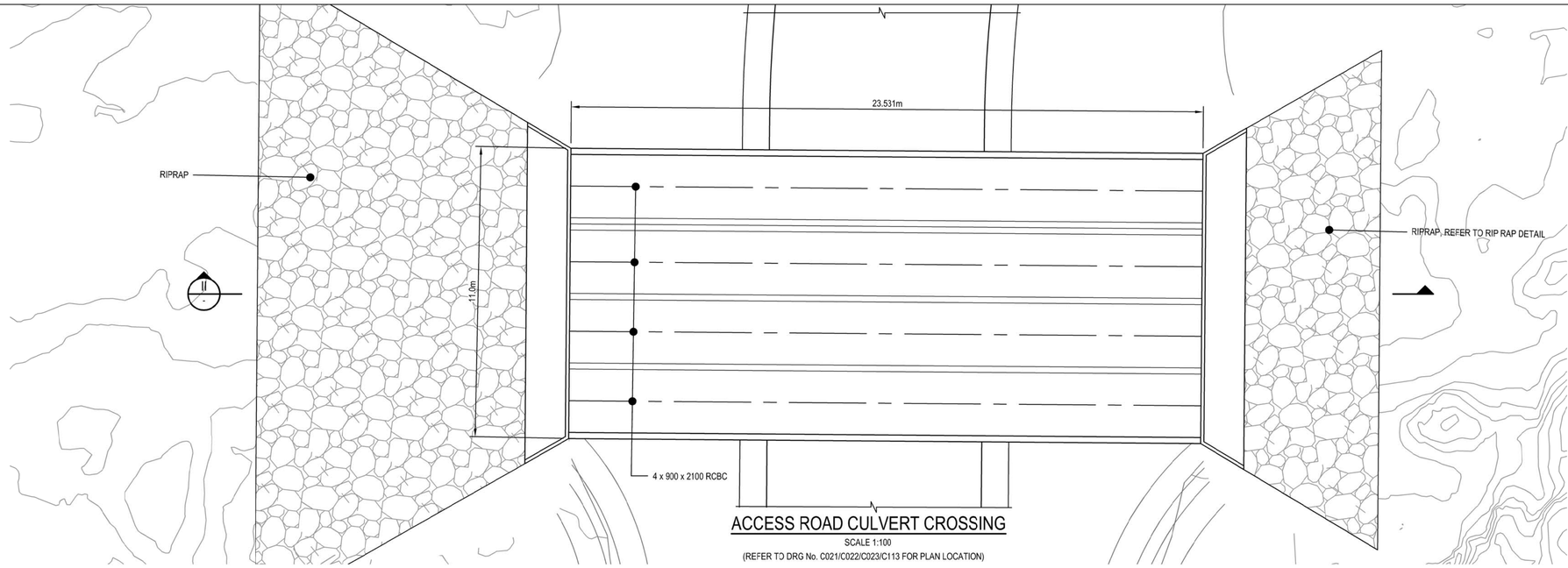
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title STORMWATER DETAILS SHEET 1 OF 2

Original Size A1 Drawing No: 22-18015-C111 Rev: C

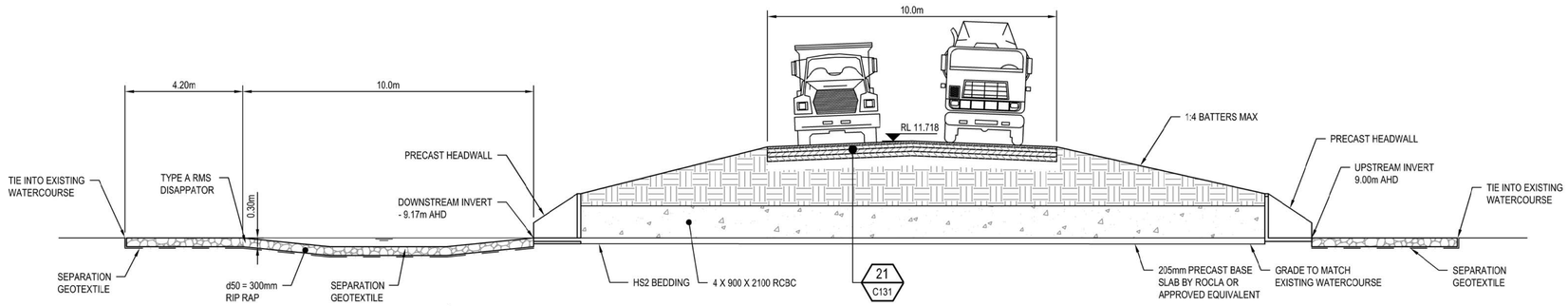
Plot Date: 4 May 2018 - 11:17 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C111.dwg



ACCESS ROAD CULVERT CROSSING

SCALE 1:100

(REFER TO DRG No. C021/C022/C023/C113 FOR PLAN LOCATION)



II - SECTION

SCALE 1 : 100

ACCESS ROAD CULVERT CROSSING SECTION

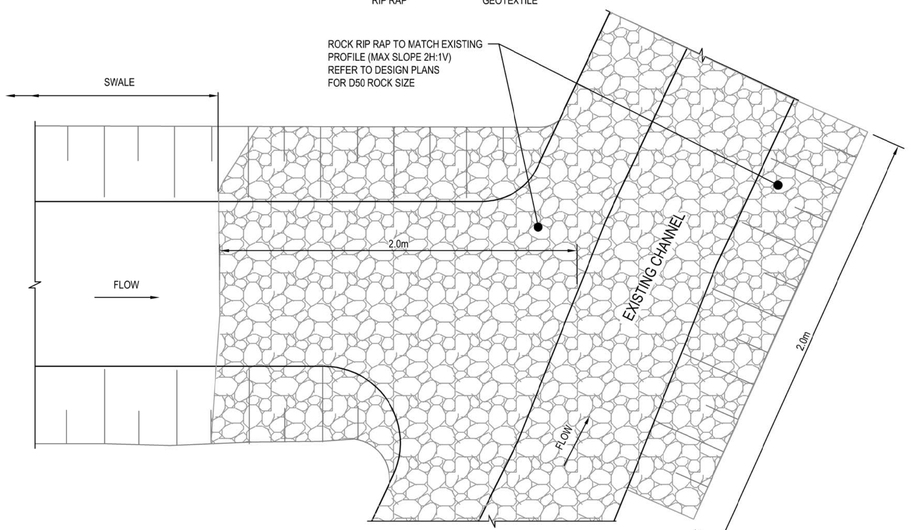
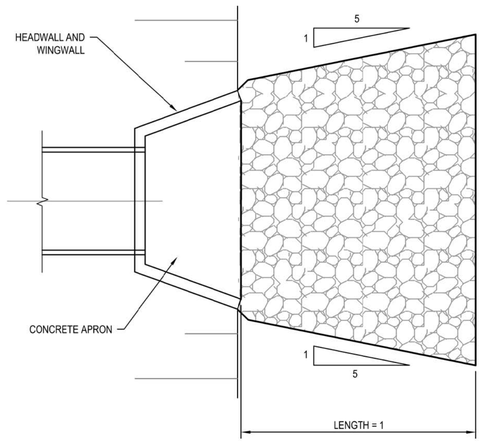


TABLE DRAIN CONNECTION TO EXISTING WATERCOURSE

NTS

(REFER TO DRG No. C023 FOR PLAN LOCATION)



CULVERT RIP RAP APRON

NTS

(REFER TO DRG No. C023 FOR PLAN LOCATION)

0 1 2 3 4 5m

SCALE 1:100 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD

Project CONTAINMENT CELL DETAILED DESIGN

Title STORMWATER DETAILS
SHEET 2 OF 2

Original Size A1

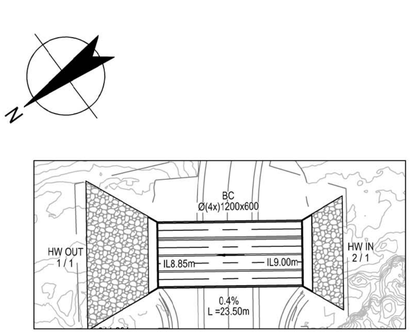
Drawing No: 22-18015-C112

Rev: C

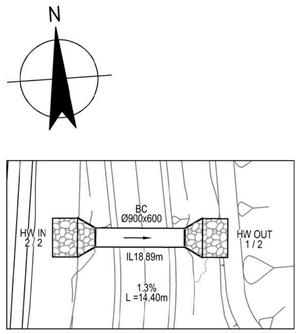
Plot Date: 4 May 2018 - 11:18 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C112.dwg

NOTE:

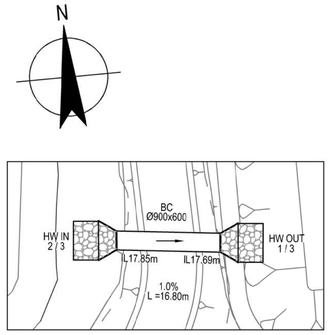
1. REFER DRAWING 22-18015-C023 FOR CULVERT LOCATION.



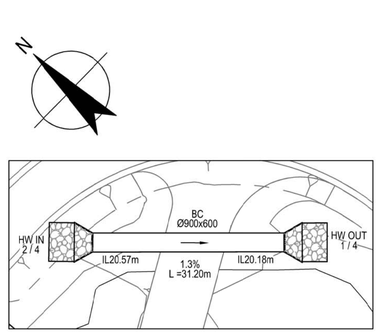
CULVERT 01



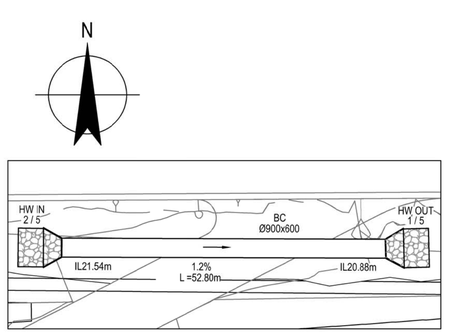
CULVERT 02



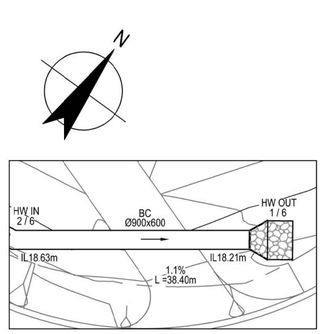
CULVERT 03



CULVERT 04



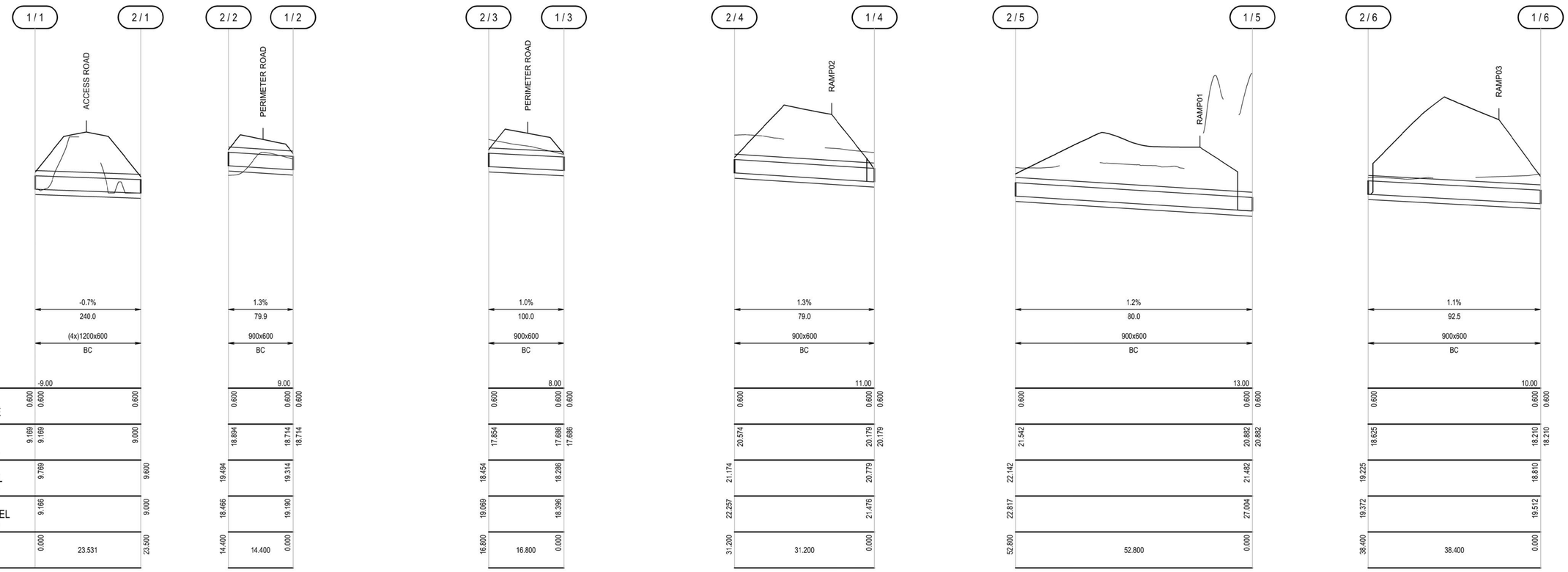
CULVERT 05



CULVERT 06

PLAN - CULVERTS

SCALE 1:500



	CULVERT 01	CULVERT 02	CULVERT 03	CULVERT 04	CULVERT 05	CULVERT 06
PIPE GRADE (%)	-0.7%	1.3%	1.0%	1.3%	1.2%	1.1%
PIPE SLOPE (1 IN X)	240.0	79.9	100.0	79.0	80.0	92.5
PIPE SIZE (mm)	(4x)1200x600	900x600	900x600	900x600	900x600	900x600
PIPE CLASS	BC	BC	BC	BC	BC	BC
DATUM R.L.	-9.00	9.00	8.00	11.00	13.00	10.00
DEPTH TO INVERT FROM DESIGN SURFACE	0.600 / 0.600 / 0.600	0.600 / 0.600 / 0.600	0.600 / 0.600 / 0.600	0.600 / 0.600 / 0.600	0.600 / 0.600 / 0.600	0.600 / 0.600 / 0.600
INVERT LEVEL	9.169 / 9.169 / 9.000	18.894 / 18.714 / 18.714	17.854 / 17.686 / 17.686	20.574 / 20.179 / 20.179	21.542 / 20.882 / 20.882	18.625 / 18.210 / 18.210
DESIGN SURFACE LEVEL	9.769 / 9.600	19.494 / 19.314	18.454 / 18.286	21.174 / 20.779	22.142 / 21.482	19.225 / 18.810
EXISTING SURFACE LEVEL	9.166 / 9.000	18.466 / 19.190	19.069 / 18.396	22.257 / 21.476	22.817 / 27.004	19.372 / 19.512
CHAINAGE	0.000 / 23.531 / 23.500	14.400 / 14.400 / 0.000	16.800 / 16.800 / 0.000	31.200 / 31.200 / 0.000	52.800 / 52.800 / 0.000	38.400 / 38.400 / 0.000

LONGITUDINAL SECTION - CULVERTS

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100 AT ORIGINAL SIZE 0 1 2 3 4 5m

HORIZONTAL 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25m

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on orignal issue of drawing or last revision of drawing

REGROWTH KURRI KURRI

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Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

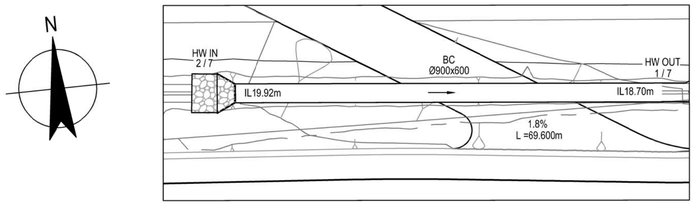
Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: CULVERT LONGITUDINAL SECTIONS SHEET 1 OF 2

Original Size A1 | Drawing No: 22-18015-C113 | Rev: C

Plot Date: 4 May 2018 - 11:19 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C113.dwg

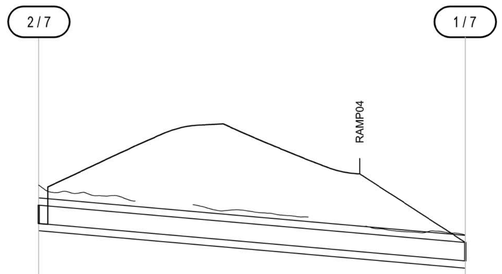
NOTE:

1. REFER DRAWING 22-18015-C023 FOR CULVERT LOCATION.



PLAN - CULVERT 07

SCALE 1:500



PIPE GRADE (%)	1.8%	
PIPE SLOPE (1 IN X)	57.1	
PIPE SIZE (mm)	900x600	
PIPE CLASS	BC	
DATUM R.L.		10.00
DEPTH TO INVERT FROM DESIGN SURFACE	0.600	0.600 0.600
INVERT LEVEL	19.918	18.700 18.700
DESIGN SURFACE LEVEL	20.518	19.300
EXISTING SURFACE LEVEL	21.172	19.546
CHAINAGE	69.600	69.600 0.000

LONGITUDINAL SECTION - CULVERT 07

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100 AT ORIGINAL SIZE 0 1 2 3 4 5m

HORIZONTAL 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25m

DETAIL DESIGN

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

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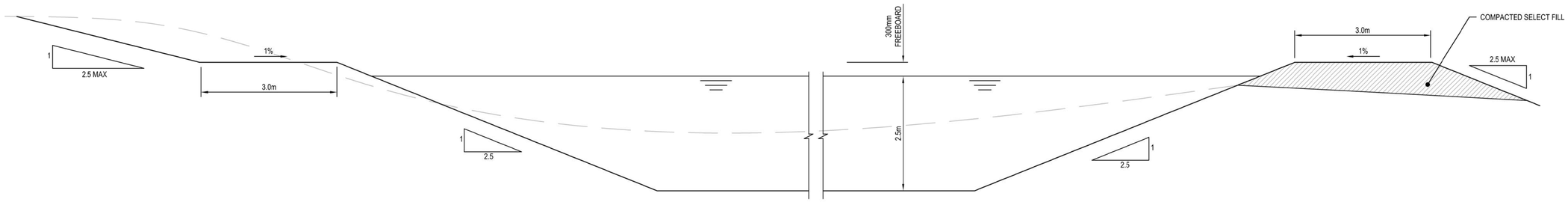
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title CULVERT LONGITUDINAL SECTION SHEET 2 OF 2

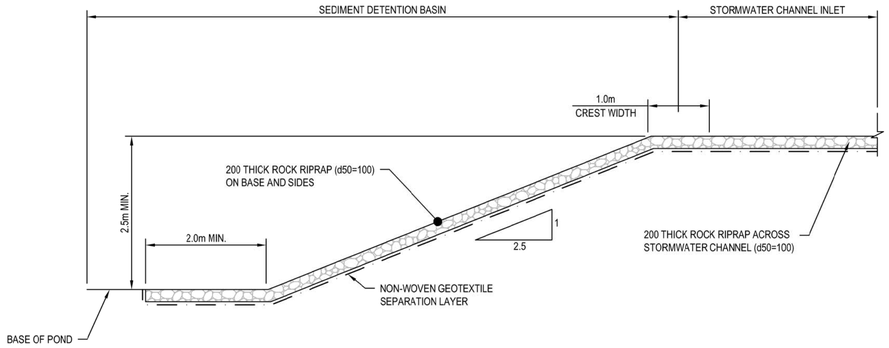
Original Size A1 Drawing No: 22-18015-C114 Rev: C

Plot Date: 4 May 2018 - 11:20 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C114.dwg



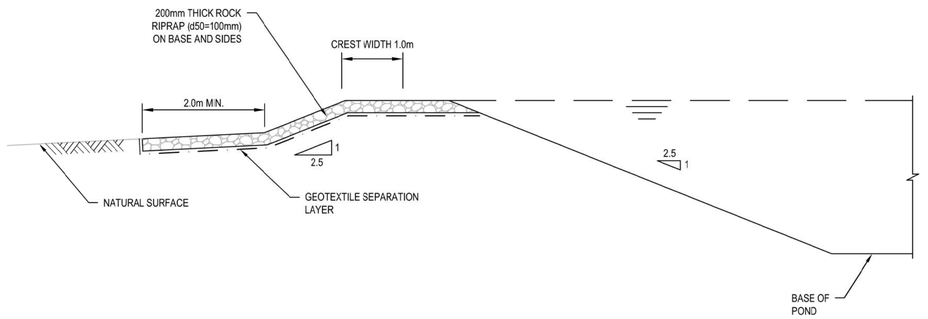
SEDIMENT BASIN TYPICAL SECTION

U C024 SECTION SCALE 1 : 50



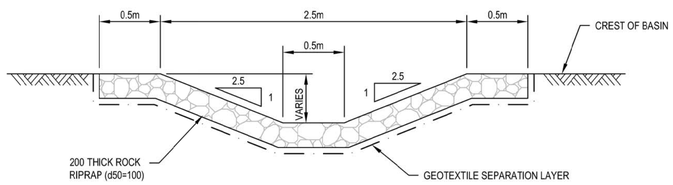
SEDIMENT BASIN INLET CHANNEL TYPICAL SECTION

R C024 SECTION SCALE 1 : 50



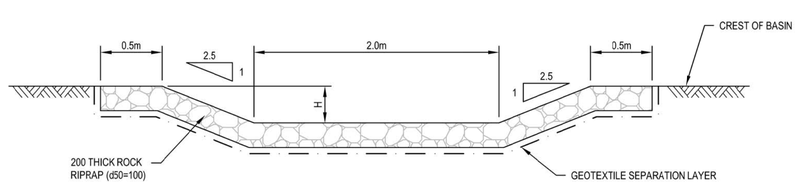
SEDIMENT BASIN OVERFLOW CHANNEL TYPICAL SECTION

S C024 SECTION SCALE 1 : 50



INLET CHANNEL

V C024 SECTION SCALE 1 : 25



SPILLWAY DIMENSIONS	
SEDIMENT BASIN	H (mm)
1	400
2	350
3	300

OVERFLOW CHANNEL

T C024 SECTION SCALE 1 : 25

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * irdicates signatures on orignal issue of drawing or last revision of drawing

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DO NOT SCALE

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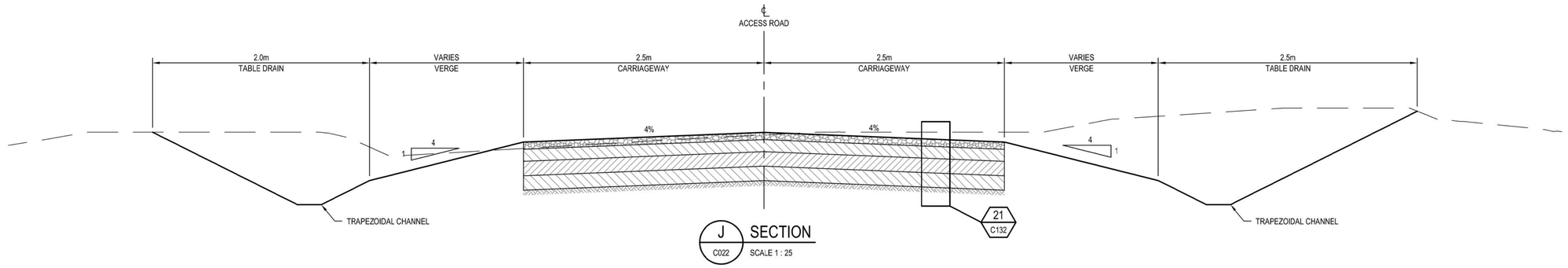
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title SEDIMENT DETENTION BASIN DETAILS

Original Size A1 Drawing No: 22-18015-C121 Rev: B

Plot Date: 4 May 2018 - 11:21 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C121.dwg



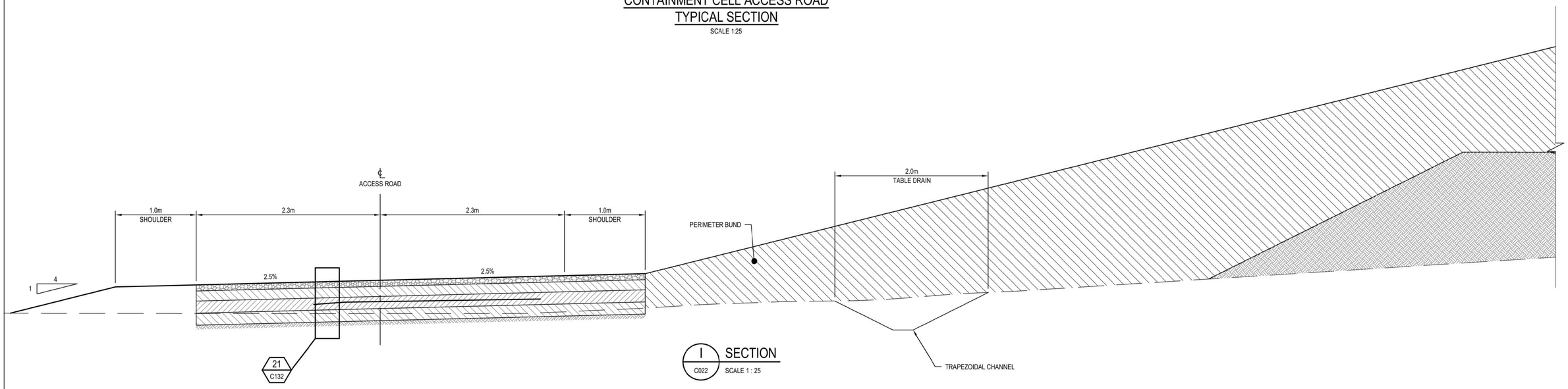
J SECTION
C022 SCALE 1 : 25

CONTAINMENT CELL ACCESS ROAD TYPICAL SECTION

SCALE 1:25

PAVEMENT DESIGN NOTES

1. GRAVEL PAVEMENT DESIGN IS BASED ON TRAFFIC LOADING 1.81 x 10 ESA AND ASSUMED SUBGRADE CBR OF 3%.
2. THE CONTRACTOR SHALL ORGANIZE SUBGRADE CBR TESTING TO VERIFY THE ASSUMPTION MADE CBR VALUES.
3. TESTING SHALL BE DONE PRIOR TO CONSTRUCTION.

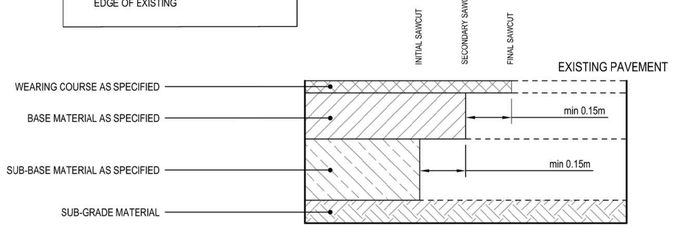


I SECTION
C022 SCALE 1 : 25

PERIMETER ROAD TYPICAL SECTION

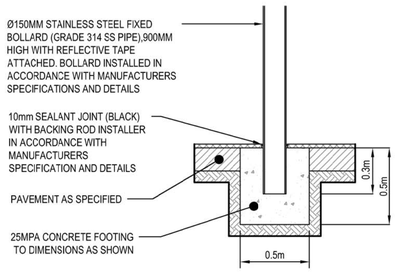
SCALE 1:25

NOTES:
- MATCH ASPHALT NEATLY WITH EXISTING
- FINAL SAWCUT TO BE UNDERTAKEN AT A TIME TO ENSURE MINIMAL DAMAGE / CHIPPING OCCURS TO EDGE OF EXISTING



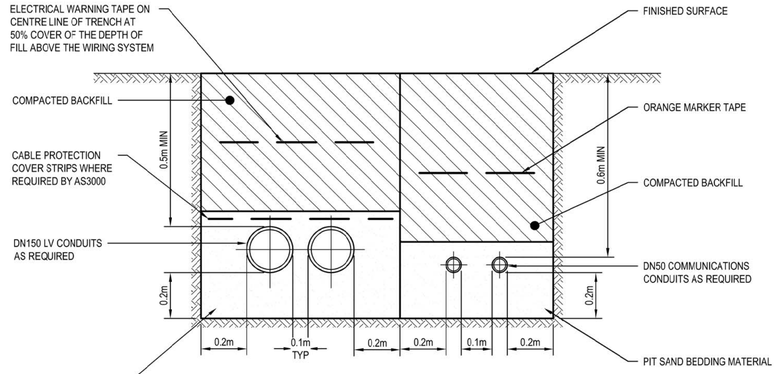
PAVEMENT INTERFACE DETAIL

SCALE 1:10



BOLLARD DETAIL

SCALE 1:20



CONDUIT TRENCH DETAIL

SCALE 1:10

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

0 0.2 0.4 0.6 0.8 1.0m
SCALE 1:20 AT ORIGINAL SIZE

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
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A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

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DO NOT SCALE

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Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title ACCESS ROAD DETAILS SHEET 1 OF 3

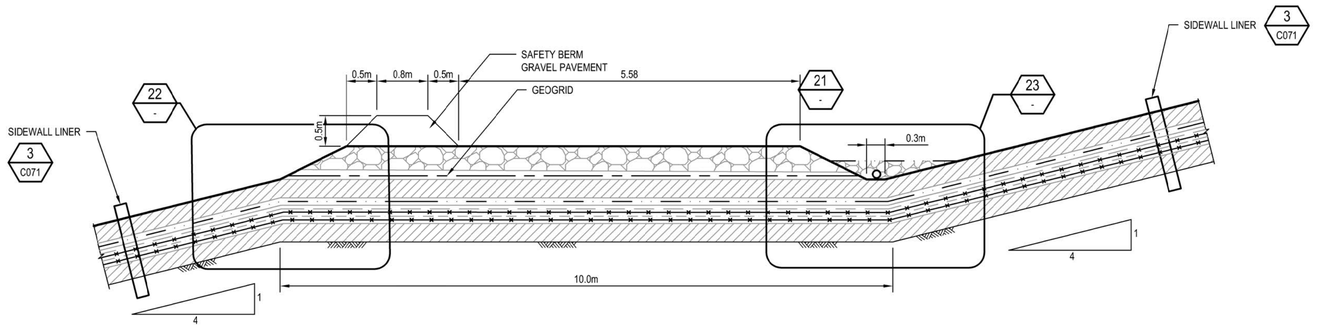
Original Size A1 Drawing No: 22-18015-C131 Rev: B

Plot Date: 4 May 2018 - 11:22 AM Plotted by: Trish Elchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C131.dwg

TABLE 1 - WEARING COURSE MATERIALS PROPERTIES	
PROPERTY	VALUE
	WEARING COURSE
SIEVE SIZE (mm)	
19.000	80-100
9.500	-
4.750	-
2.360	35 - 65
0.425	15 - 50
0.075	10 - 40
PLASTIC INDEX	MAX. 12
WEIGHTED PLASTICITY INDEX	MAX. 250
LINEAR SHRINKLE x % PASSING 0.425mm	N/A
4 DAY SOAKED CBR	MIN. 40%
MAXIMUM AGGREGATE SIZE	20mm
% PASSING 0.075mm	10 - 40

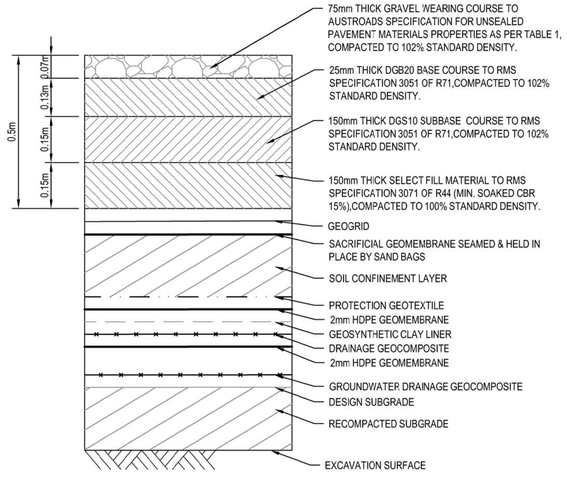
PAVEMENT DESIGN NOTES

1. GRAVEL PAVEMENT DESIGN IS BASED ON TRAFFIC LOADING 1.81 x 10^6 ESA AND ASSUMED SUBGRADE CBR OF 3%.
2. THE CONTRACTOR SHALL ORGANIZE SUBGRADE CBR TESTING TO VERIFY THE ASSUMPTION MADE CBR VALUES.
3. TESTING SHALL BE DONE PRIOR TO DELIVERY OF MATERIALS.



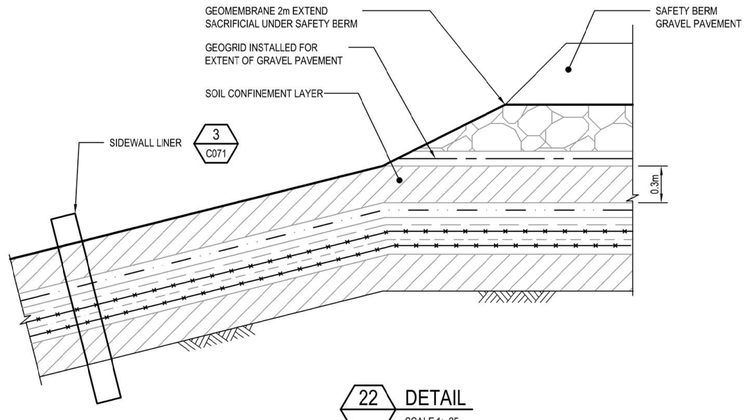
ACCESS RAMP TYPICAL SECTION

F / C022 SECTION
SCALE 1 : 50

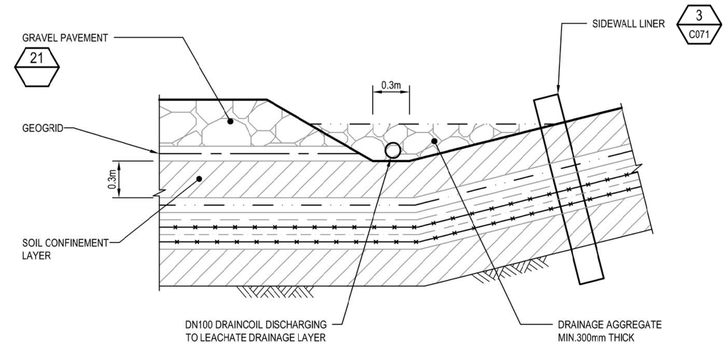


GRAVEL PAVEMENT

21 / C131 DETAIL
SCALE 1 : 10



22 / - DETAIL
SCALE 1: 25



23 / - DETAIL
SCALE 1: 25

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
D	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
C	100% DETAILED DESIGN - RE-ISSUE		CG	DB*	IG*	19.10.17
B	100% DETAILED DESIGN REVIEW COMMENTS		CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.18

REGROWTH KURRI KURRI

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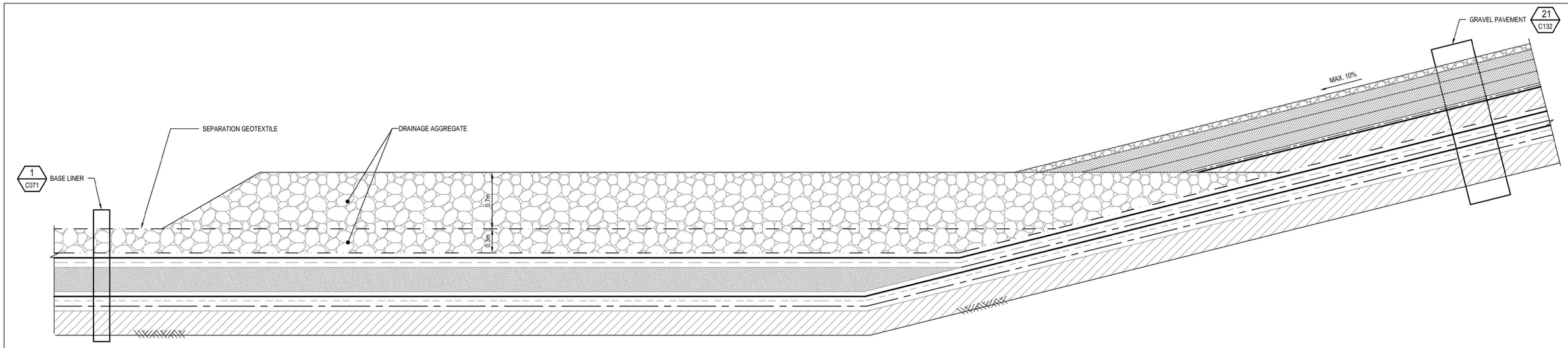
E centralcoastmail@ghd.com W www.ghd.com

Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title ACCESS ROAD DETAILS SHEET 2 OF 3

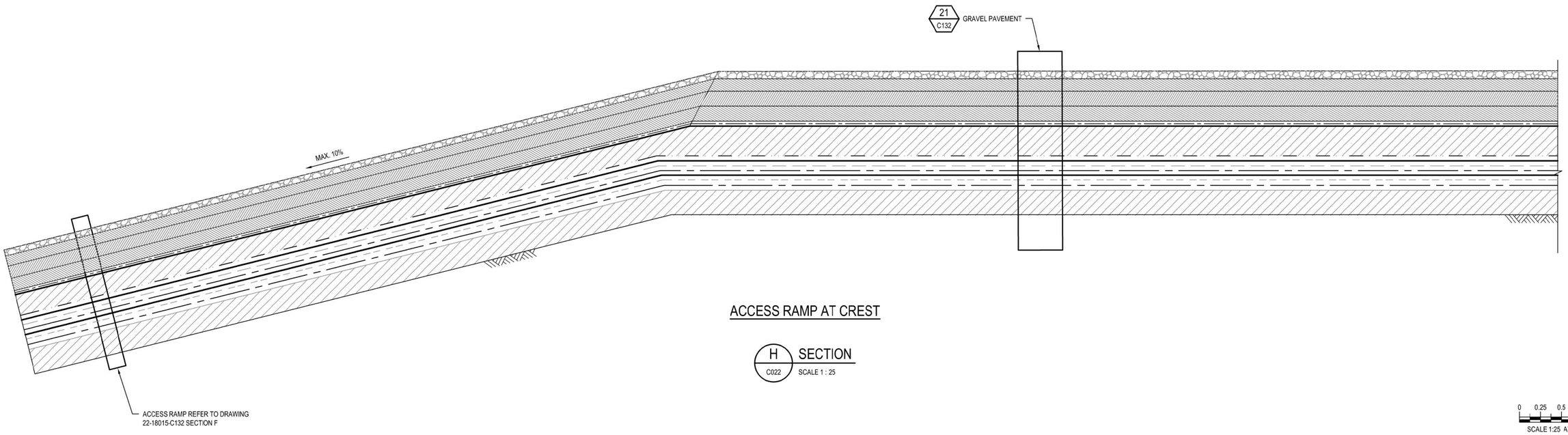
Original Size A1
Drawing No: 22-18015-C132
Rev: D

Plot Date: 4 May 2018 - 11:24 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C132.dwg



ACCESS RAMP AT TOE

G SECTION
C022 SCALE 1 : 25



ACCESS RAMP AT CREST

H SECTION
C022 SCALE 1 : 25

0 0.25 0.5 0.75 1.0 1.25m
SCALE 1:25 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
B	100% DETAILED DESIGN RE-ISSUE		HT	DB	IG	04.05.18
A	100% DETAILED DESIGN		JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

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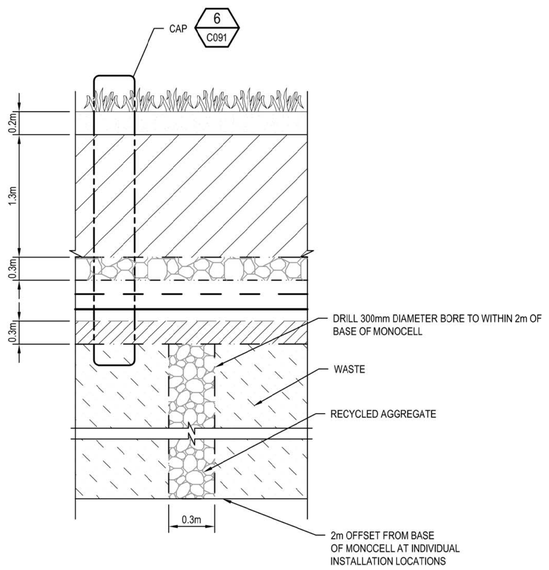
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:25	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title ACCESS ROAD DETAILS
SHEET 3 OF 3

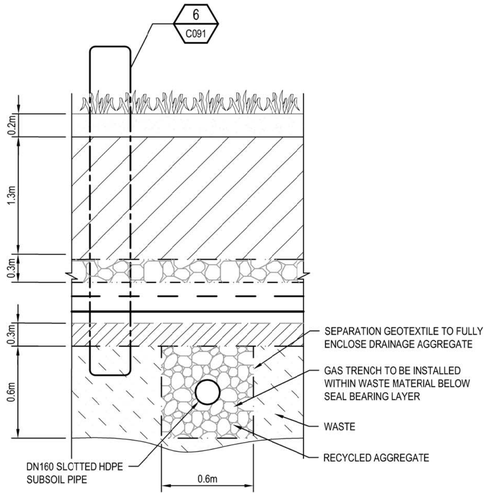
Original Size A1 Drawing No: 22-18015-C133 Rev: B

Plot Date: 4 May 2018 - 11:25 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C133.dwg



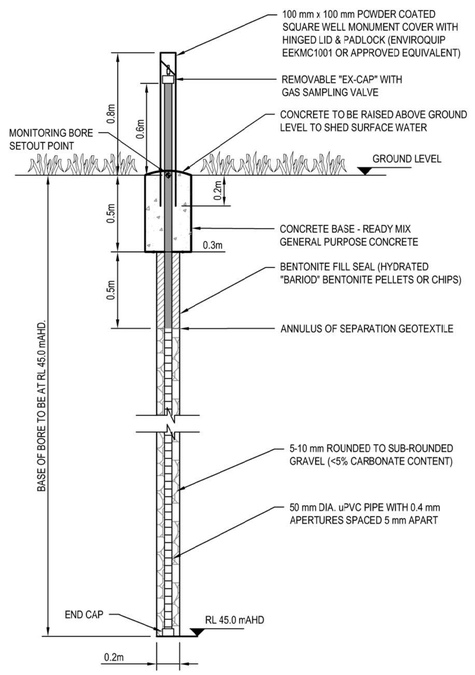
VERTICAL GAS BORE

7 / C025 DETAIL
SCALE 1 : 20



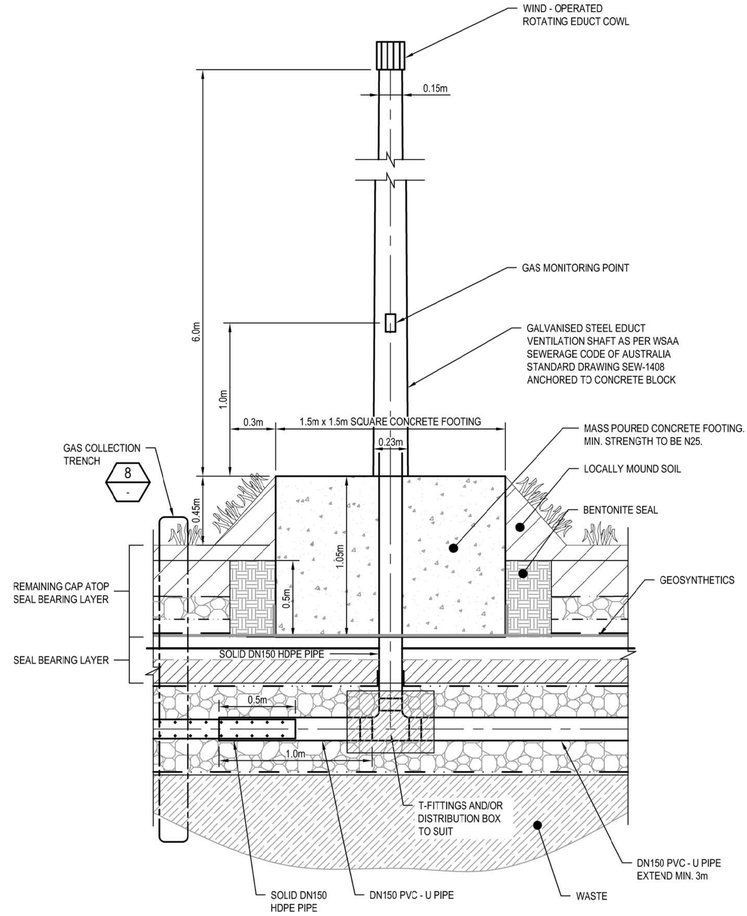
HORIZONTAL GAS TRENCH

8 / C025 DETAIL
SCALE 1 : 20



PERIMETER LANDFILL GAS MONITORING BORE

9 / C025 DETAIL
SCALE 1 : 20



LANDFILL GAS VENT

10 / C025 DETAIL
SCALE 1 : 20

0 0.2 0.4 0.6 0.8 1.0m
SCALE 1:20 AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on orignal issue of drawing or last revision of drawing

REGROWTH KURRI KURRI

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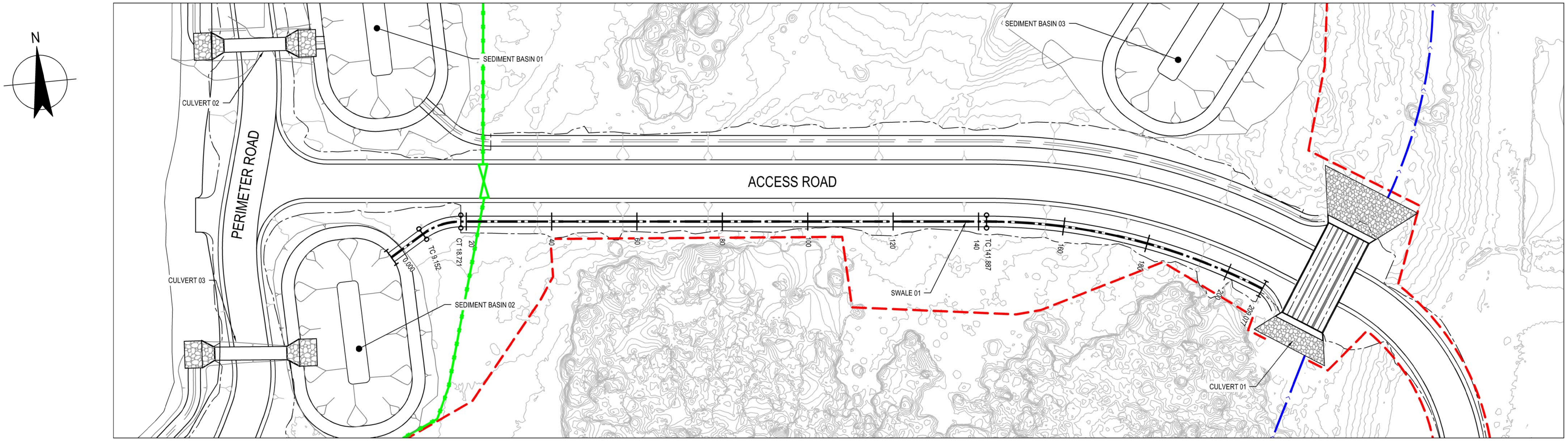
Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. BARRETT
Approved (Project Director)			
Date			
Scale	1:20	This Drawing must not be used for Construction unless signed as Approved	

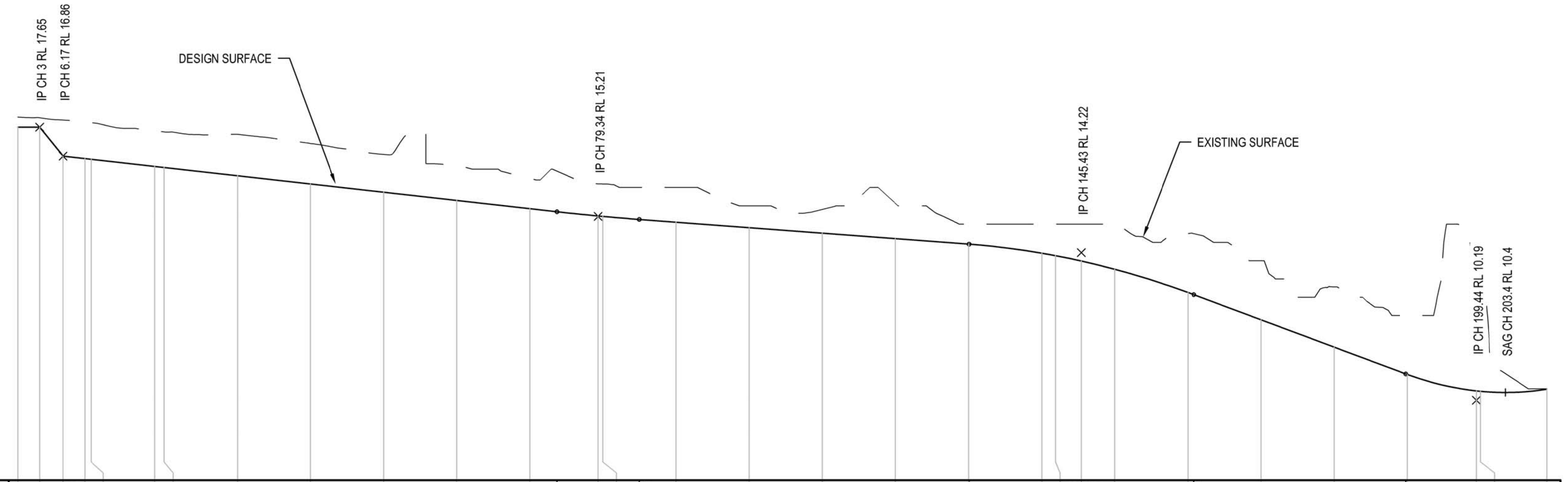
Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: LANDFILL GAS MANAGEMENT SYSTEM DETAILS

Original Size: A1
Drawing No: 22-18015-C141
Rev: C

Plot Date: 4 May 2018 - 11:26 AM
Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C141.dwg



PLAN
SCALE 1:500



DATUM RL. 8.00

VERTICAL ALIGNMENT: L=3m G=0% | L=3.17m G=-25% | L=67.55m G=-2.25% | K=15 L=11.25m | L=45.09m G=-1.5% | K=5.15 L=30.75m | L=28.99m G=-7.47% | K=1.82 L=19.28m | G=3.12%

HORIZONTAL ALIGNMENT: L=9.15m | L=9.57m R=15.00m | L=123.17m | L=67.19m R=140.55m

LEVEL DIFFERENCE CUT - / FILL +	-0.27	-0.26	-0.99	-1.01	-1.00	-0.96	-0.97	-1.13	-1.11	-1.03	-0.94	-0.83	-0.88	-0.89	-0.95
DESIGN SURFACE LEVEL	17.650	17.650	16.858	16.791	16.772	16.576	16.547	16.322	16.097	15.872	15.647	15.422	15.222	15.210	15.052
EXISTING SURFACE LEVEL	17.92	17.91	17.84	17.80	17.77	17.54	17.52	17.45	17.20	16.90	16.59	16.25	16.10	16.10	16.00
CHAINAGE	0.00	3.00	6.17	9.15	10.00	18.72	20.00	30.00	40.00	50.00	60.00	70.00	79.34	80.00	90.00

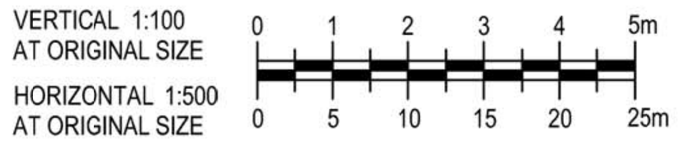
LEVEL DIFFERENCE CUT - / FILL +	-0.60	-0.65	-0.97	-0.55	-0.79	-0.86	-1.01	-1.23	-1.61	-1.62	-1.65	-1.61	-3.47	-3.39	-0.01
DESIGN SURFACE LEVEL	14.902	14.752	14.602	14.452	14.206	14.138	13.991	13.766	13.131	12.385	11.638	10.891	10.441	10.430	10.487
EXISTING SURFACE LEVEL	15.50	15.40	15.57	15.00	15.00	15.00	15.00	15.00	14.75	14.00	13.28	12.50	13.91	13.82	10.50
CHAINAGE	100.00	110.00	120.00	130.00	140.00	141.89	145.43	150.00	160.00	170.00	180.00	190.00	199.44	200.00	209.08

LONGITUDINAL SECTION - SWALE 01
SCALE HOR. 1:500 VERT. 1:100

SWALE 01 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	357191.437	6371384.753	17.650
9.152	357199.395	6371389.274	16.791
13.937	357203.702	6371391.721	16.683
18.721	357208.620	6371391.121	16.576
141.887	357330.880	6371376.206	14.138
175.482	357364.877	6371372.058	11.975
209.077	357393.155	6371352.735	10.487

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
2. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.



VERTICAL 1:100
AT ORIGINAL SIZE
HORIZONTAL 1:500
AT ORIGINAL SIZE

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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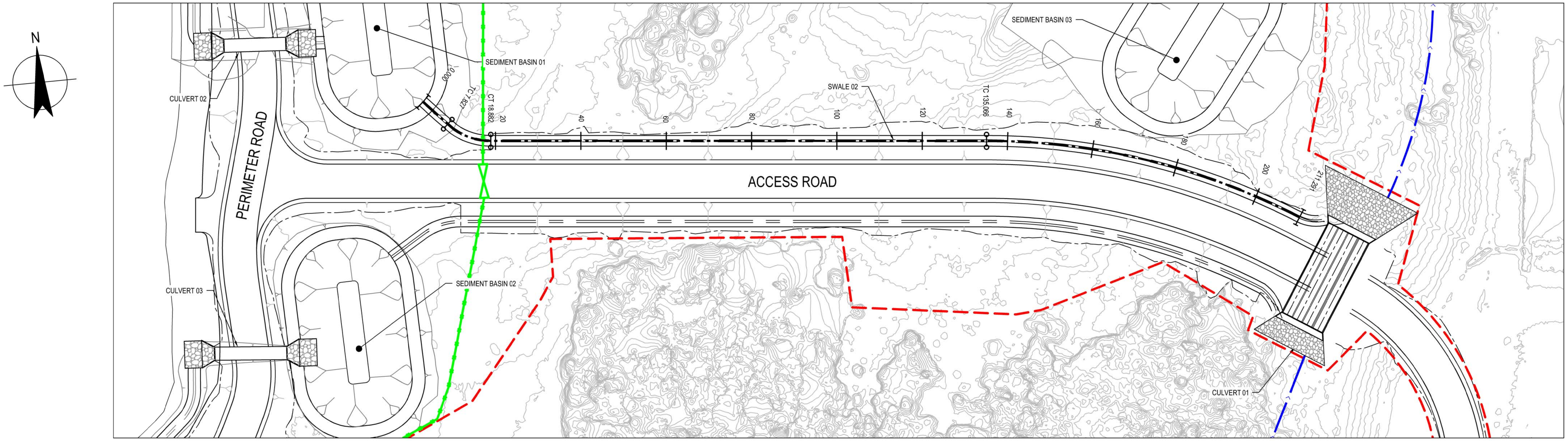
DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION**
SHEET 1 OF 8

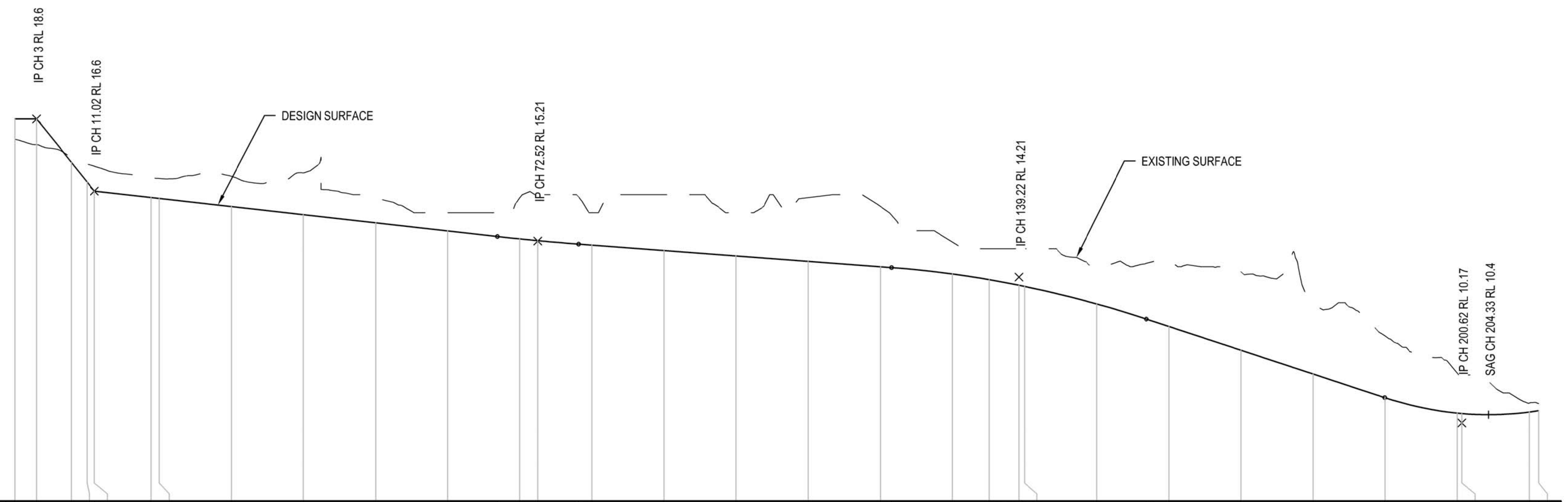
Original Size **A1**
Drawing No: 22-18015-C151
Rev: C

Plot Date: 4 May 2018 - 11:27 AM
Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C151.dwg



PLAN

SCALE 1:500



DATUM RL. 8.00

VERTICAL ALIGNMENT: L=3m G=0% | L=8.02m G=-25% | L=55.87m G=-2.25% | K=15 L=11.25m | L=43.41m G=-1.5% | K=6.95 L=35.34m | L=33.06m G=-6.59% | K=2.18 L=21.33m | G=3.19%

HORIZONTAL ALIGNMENT: L=7.83m | L=11.06m R=-15.00m | L=116.18m | L=76.23m R=159.45m | L=0.00m

CHAINAGE	0.00	3.00	7.83	10.00	11.02	18.88	20.00	30.00	40.00	50.00	60.00	70.00	72.52	80.00	90.00	100.00
LEVEL DIFFERENCE CUT - / FILL +	0.57	0.72	-0.12	-0.50	-0.70	-0.54	-0.55	-0.84	-1.16	-0.68	-0.51	-1.14	-1.28	-0.90	-1.55	-1.20
DESIGN SURFACE LEVEL	18.600	18.600	17.393	16.850	16.596	16.419	16.393	16.168	15.943	15.718	15.493	15.272	15.222	15.100	14.950	14.800
EXISTING SURFACE LEVEL	18.03	17.88	17.52	17.35	17.29	16.96	16.95	17.01	17.10	16.40	16.00	16.41	16.50	16.00	16.50	16.00

CHAINAGE	110.00	120.00	130.00	135.07	139.22	140.00	150.00	160.00	170.00	180.00	190.00	200.00	200.62	210.00	211.29
LEVEL DIFFERENCE CUT - / FILL +	-1.77	-1.67	-0.89	-0.86	-1.01	-1.05	-1.10	-1.79	-2.18	-1.98	-1.71	-1.11	-1.07	-0.25	-0.20
DESIGN SURFACE LEVEL	14.650	14.500	14.298	14.142	13.987	13.955	13.467	12.843	12.185	11.526	10.868	10.440	10.428	10.471	10.508
EXISTING SURFACE LEVEL	16.42	16.17	15.18	15.00	15.00	15.00	14.56	14.63	14.36	13.51	12.58	11.55	11.50	10.72	10.70

LONGITUDINAL SECTION - SWALE 02

SCALE HOR. 1:500 VERT. 1:100

SWALE 02 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	357203.188	6371420.045	18.600
7.827	357208.304	6371414.121	17.393
13.355	357212.090	6371409.737	16.543
18.882	357217.840	6371409.036	16.419
135.066	357333.168	6371394.966	14.142
173.178	357371.738	6371390.261	11.975
211.291	357403.819	6371368.340	10.508
211.291	357403.819	6371368.340	10.508

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
2. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.

VERTICAL 1:100 AT ORIGINAL SIZE 0 1 2 3 4 5m
HORIZONTAL 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25m

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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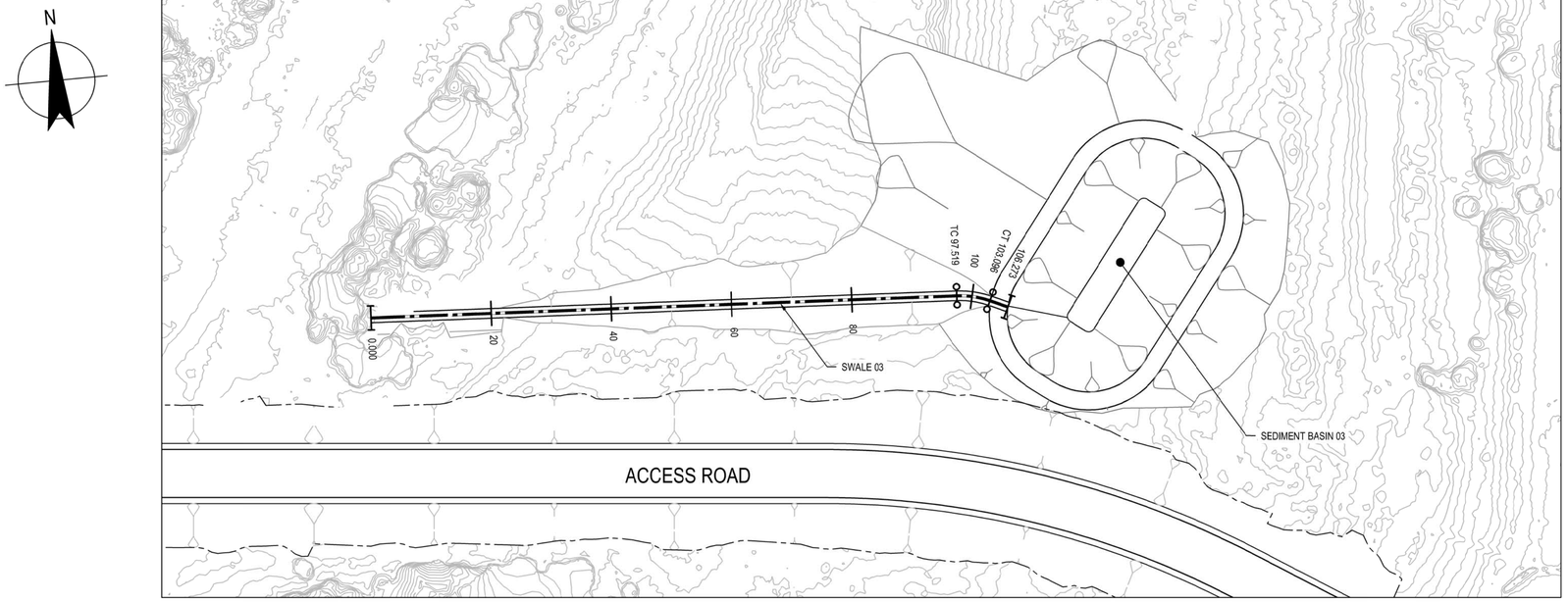
DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION SHEET 2 OF 8**
Original Size **A1** Drawing No: **22-18015-C152** Rev: **C**

Plot Date: 4 May 2018 - 11:28 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C152.dwg

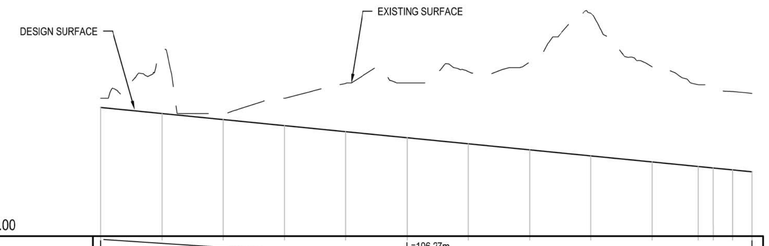


PLAN

SCALE 1:500

(REFER TO DRG No. C022 FOR PLAN LOCATION)

SWALE 03 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	357260.048	6371420.446	16.200
97.519	357357.227	6371412.303	14.273
100.307	357360.037	6371412.367	14.218
103.096	357362.571	6371410.827	14.163
106.273	357365.425	6371409.429	14.100



DATUM RL. 12.00

VERTICAL ALIGNMENT	L=106.27m G=-1.98%													
HORIZONTAL ALIGNMENT	L=97.52m											L=5.58m R=15.00m	L=3.13m	
LEVEL DIFFERENCE CUT - / FILL +	-0.30	-2.10	-0.20	-0.89	-1.58	-1.79	-2.35	-2.67	-4.65	-3.10	-2.67	-2.67	-2.56	-2.56
DESIGN SURFACE LEVEL	16.200	16.002	15.805	15.607	15.410	15.212	15.014	14.817	14.619	14.422	14.273	14.224	14.163	14.100
EXISTING SURFACE LEVEL	16.50	18.10	16.00	16.50	16.99	17.00	17.37	17.68	19.27	17.53	16.95	16.89	16.72	16.66
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	97.52	100.00	103.10	106.27

LONGITUDINAL SECTION - SWALE 03

SCALE HOR. 1:500 VERT. 1:100

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
2. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.

VERTICAL 1:100 AT ORIGINAL SIZE 0 1 2 3 4 5m

HORIZONTAL 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25m

DETAIL DESIGN

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

REGROWTH KURRI KURRI

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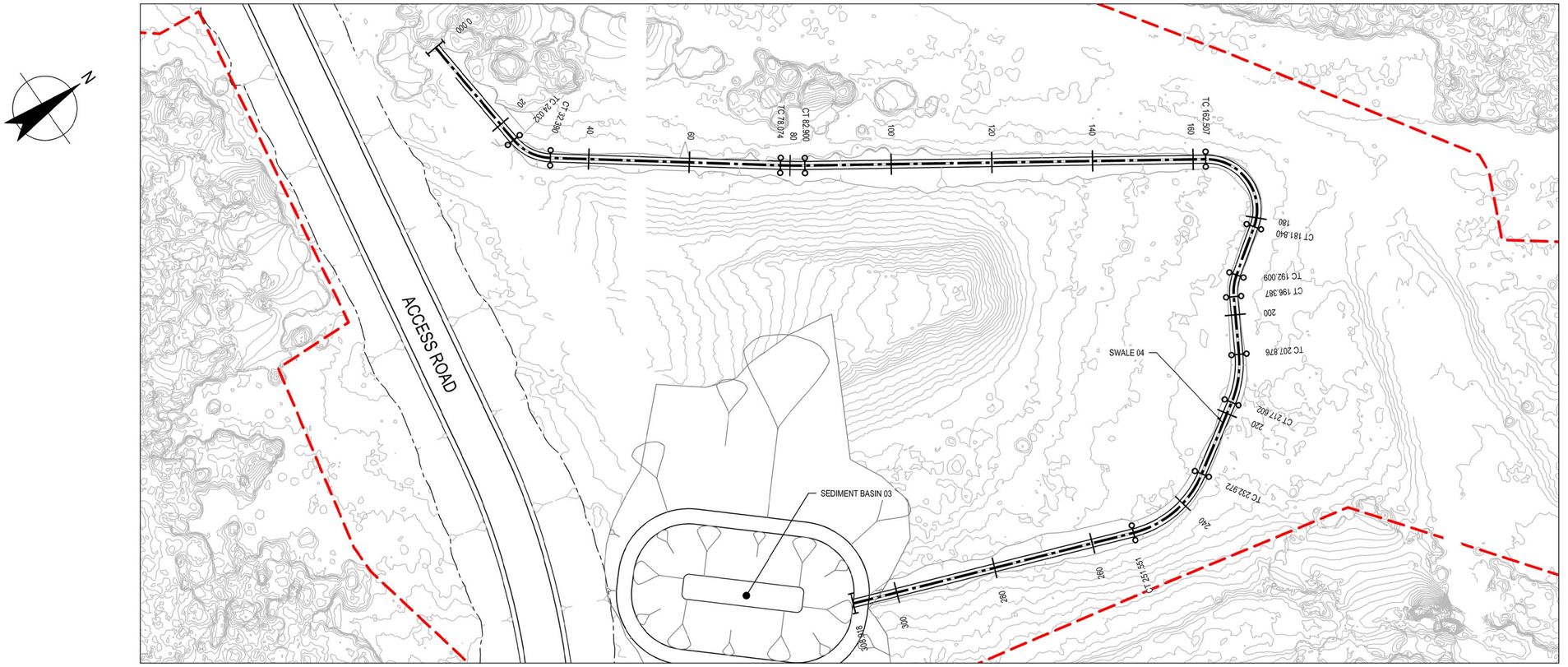
Drawn J. CASIO | Designer A. ROBERTS
Drafting Check P. ETCHELLS | Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN

This Drawing must not be used for Construction unless signed as Approved

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title SWALE LONGITUDINAL SECTION SHEET 3 OF 8

Original Size A1 Drawing No: 22-18015-C153 Rev: C

Plot Date: 4 May 2018 - 11:29 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C153.dwg



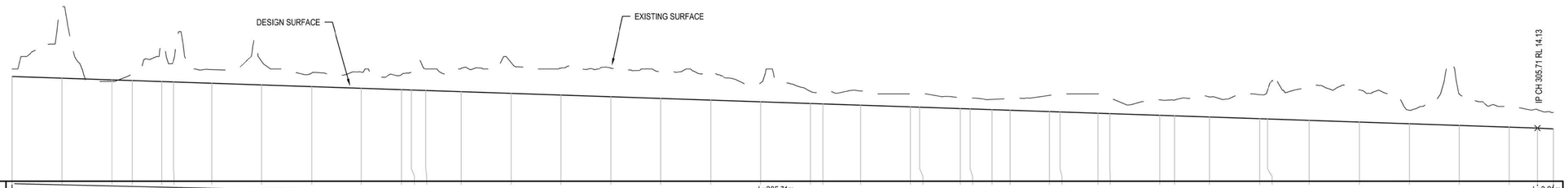
PLAN

SCALE 1:500

SWALE 04 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	357260.048	6371420.446	16.200
24.032	357283.849	6371423.771	16.037
28.211	357288.247	6371424.385	16.009
32.390	357290.740	6371428.059	15.981
78.074	357316.395	6371465.860	15.671
80.487	357317.750	6371467.857	15.655
82.900	357319.007	6371469.917	15.639
162.507	357360.482	6371537.866	15.100
172.173	357368.030	6371550.232	15.034
181.840	357376.916	6371538.789	14.969
192.009	357383.153	6371530.758	14.900
194.198	357384.517	6371529.001	14.885
196.387	357386.498	6371527.988	14.870
207.876	357396.727	6371522.757	14.792
212.739	357401.144	6371520.498	14.760
217.602	357403.993	6371516.437	14.727
232.972	357412.821	6371503.854	14.623
242.262	357418.576	6371495.651	14.560
251.551	357415.451	6371486.130	14.497
308.918	357397.560	6371431.625	14.098

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
2. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.



DATUM RL. 12.00

VERTICAL ALIGNMENT: L=305.71m G=-0.68% | L=3.21m G=-1%

HORIZONTAL ALIGNMENT: L=24.03m | L=8.36m R=-10.00m | L=45.68m | L=4.83m R=-100.00m | L=79.61m | L=19.33m R=10.00m | L=10.17m | L=4.38m R=-10.00m | L=11.49m | L=9.73m R=20.00m | L=15.37m | L=18.58m R=20.00m | L=57.37m

LEVEL DIFFERENCE CUT - / FILL +	-0.30	-2.87	0.06	-0.27	-1.50	-0.86	-0.55	-0.95	-0.55	-0.65	-0.60	-0.72	-0.86	-0.94	-1.23
DESIGN SURFACE LEVEL	16.200	16.132	16.065	16.037	15.997	15.981	15.929	15.861	15.794	15.726	15.671	15.658	15.639	15.591	15.523
EXISTING SURFACE LEVEL	16.50	19.00	16.00	16.30	17.50	16.84	16.48	16.81	16.34	16.37	16.28	16.38	16.50	16.53	16.75
CHAINAGE	0.00	10.00	20.00	24.03	30.00	32.39	40.00	50.00	60.00	70.00	78.07	80.00	82.90	90.00	100.00

LEVEL DIFFERENCE CUT - / FILL +	-1.08	-1.15	-1.06	-1.16	-0.76	-0.49	-0.54	-0.57	-0.52	-0.53	-0.43	-0.43	-0.41	-0.47	-0.65
DESIGN SURFACE LEVEL	15.455	15.387	15.320	15.252	15.184	15.117	15.100	15.049	14.981	14.969	14.913	14.900	14.870	14.846	14.792
EXISTING SURFACE LEVEL	16.53	16.53	16.38	16.42	15.94	15.61	15.64	15.62	15.50	15.50	15.34	15.33	15.28	15.31	15.44
CHAINAGE	110.00	120.00	130.00	140.00	150.00	160.00	162.51	170.00	180.00	181.84	190.00	192.01	196.39	200.00	207.88

LEVEL DIFFERENCE CUT - / FILL +	-0.72	-0.77	-0.62	-0.62	-0.63	-0.80	-0.96	-1.15	-1.33	-1.29	-0.54	-1.26	-0.83	-0.74	-0.66
DESIGN SURFACE LEVEL	14.778	14.727	14.710	14.643	14.623	14.575	14.507	14.497	14.439	14.372	14.304	14.236	14.169	14.130	14.098
EXISTING SURFACE LEVEL	15.50	15.50	15.33	15.27	15.25	15.38	15.47	15.65	15.77	15.66	14.84	15.50	15.00	14.87	14.76
CHAINAGE	210.00	217.60	220.00	230.00	232.97	240.00	250.00	251.55	260.00	270.00	280.00	290.00	300.00	305.71	308.92

LONGITUDINAL SECTION - SWALE 04

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100
AT ORIGINAL SIZE
0 1 2 3 4 5m
HORIZONTAL 1:500
AT ORIGINAL SIZE
0 5 10 15 20 25m

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

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E centralcoastmail@ghd.com W www.ghd.com

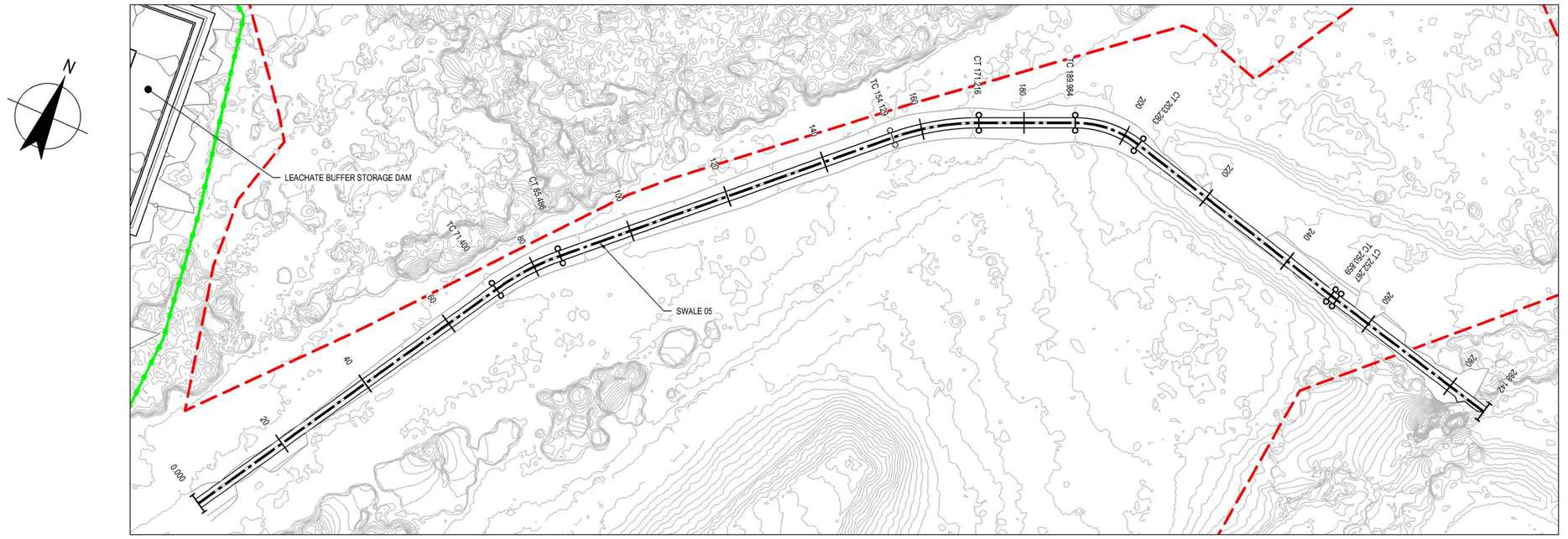
DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION**
SHEET 4 OF 8

Original Size **A1**
Drawing No: **22-18015-C154**
Rev: **C**

Plot Date: 4 May 2018 - 11:30 AM
Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C154.dwg



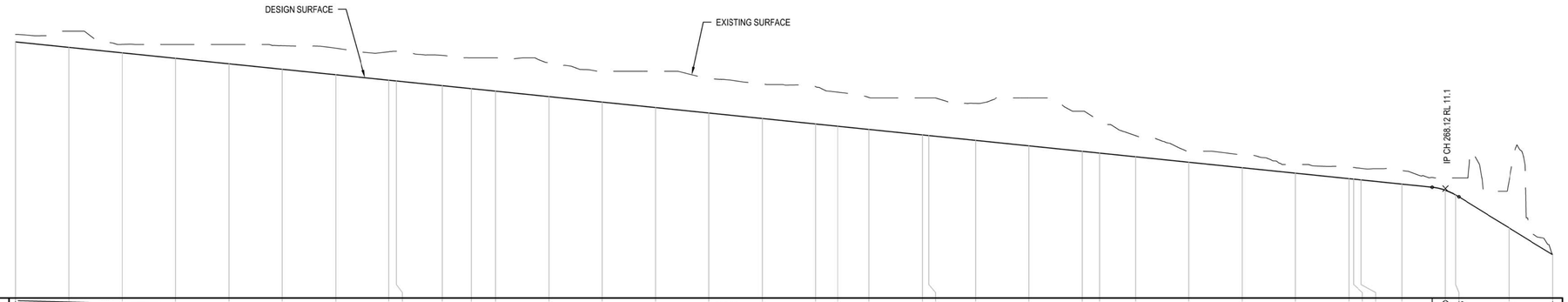
PLAN

SCALE 1:500

SWALE 05 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	357239.500	6371432.256	16.600
71.400	357280.107	6371490.984	15.135
78.443	357284.140	6371496.815	14.991
85.486	357289.634	6371501.296	14.846
154.129	357342.832	6371544.677	13.438
162.672	357349.518	6371550.130	13.263
171.216	357357.644	6371553.026	13.088
189.984	357375.324	6371559.328	12.703
196.634	357381.828	6371561.646	12.566
203.283	357388.378	6371559.457	12.430
250.859	357433.501	6371544.376	11.454
251.563	357434.168	6371544.153	11.440
252.267	357434.839	6371543.939	11.425
288.150	357469.028	6371533.045	8.618

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
2. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION



DATUM RL. 7.00

VERTICAL ALIGNMENT: L=265.62m G=-2.05% | K=0.48 L=5m | L=17.53m G=-12.39%

HORIZONTAL ALIGNMENT: L=71.40m | L=14.09m R=50.00m | L=68.64m | L=17.09m R=50.00m | L=18.77m | L=13.30m R=20.00m | L=47.58m | L=1.41m R=-100.00m | L=35.88m

LEVEL DIFFERENCE CUT - / FILL +	-0.28	-0.61	-0.31	-0.52	-0.72	-0.88	-1.00	-1.06	-1.11	-1.14	-1.15	-1.25	-1.27	-1.16	-1.36	-1.29	-1.29	-1.40	-1.27
DESIGN SURFACE LEVEL	16.600	16.395	16.190	15.985	15.779	15.574	15.369	15.164	15.135	14.959	14.846	14.754	14.549	14.344	14.138	13.933	13.728	13.523	13.438
EXISTING SURFACE LEVEL	16.88	17.00	16.50	16.50	16.50	16.46	16.36	16.23	16.25	16.09	16.00	16.00	15.82	15.50	15.50	15.22	15.02	14.92	14.71
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	71.40	80.00	85.49	90.00	100.00	110.00	120.00	130.00	140.00	150.00	154.13

LEVEL DIFFERENCE CUT - / FILL +	-1.20	-1.39	-1.41	-1.39	-1.80	-1.50	-1.21	-0.79	-0.41	-0.48	-0.32	-0.42	-0.44	-0.43	-0.50	-0.48	-0.64	-1.76	0.00
DESIGN SURFACE LEVEL	13.318	13.113	13.088	12.908	12.703	12.497	12.430	12.292	12.087	11.882	11.677	11.472	11.454	11.425	11.267	11.035	10.863	9.628	8.618
EXISTING SURFACE LEVEL	14.52	14.50	14.50	14.29	14.50	14.00	13.64	13.08	12.50	12.36	12.00	11.89	11.89	11.86	11.77	11.52	11.50	11.39	8.62
CHAINAGE	160.00	170.00	171.22	180.00	189.98	200.00	203.28	210.00	220.00	230.00	240.00	250.00	250.86	252.27	260.00	268.12	270.00	280.00	288.15

LONGITUDINAL SECTION - SWALE 05

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100 AT ORIGINAL SIZE 0 1 2 3 4 5m
HORIZONTAL 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25m

DETAIL DESIGN

No	Revision	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

Note: * indicates signatures on original issue of drawing or last revision of drawing

REGROWTH
KURRI KURRI

HYDRO

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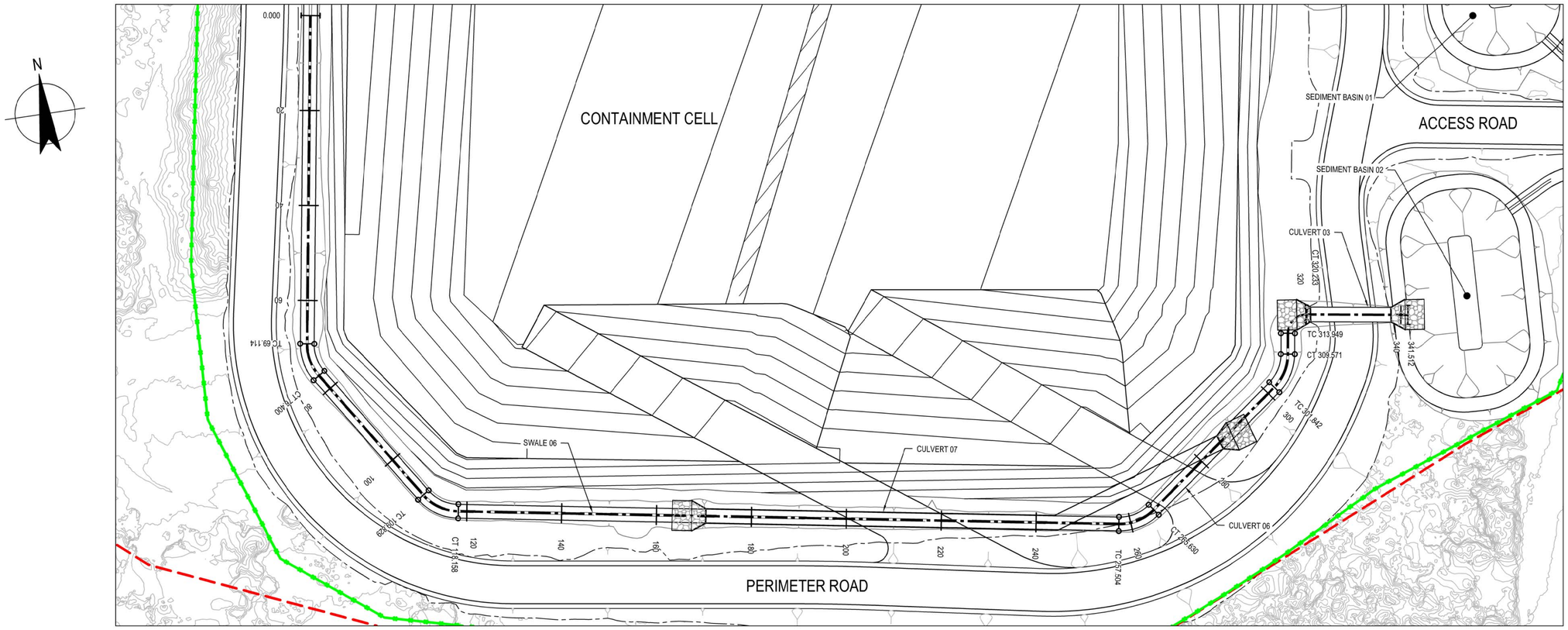
DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION SHEET 5 OF 8**
Original Size **A1**
Drawing No: **22-18015-C155**
Rev: **C**

Plot Date: 4 May 2018 - 11:31 AM
Plotted by: Trish Etchells
Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C155.dwg



PLAN

SCALE 1:500

SWALE 06 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	356944.680	6371452.538	24.200
69.114	356936.588	6371383.899	22.127
72.757	356936.142	6371380.112	22.017
76.400	356938.330	6371376.989	21.908
109.829	356957.514	6371349.613	20.978
113.994	356960.052	6371345.990	20.905
118.158	356964.440	6371345.432	20.832
257.504	357102.670	6371327.834	18.490
261.567	357106.938	6371327.291	18.449
265.630	357110.267	6371330.016	18.409
301.842	357138.288	6371352.954	18.047
305.706	357141.437	6371355.532	18.008
309.571	357141.891	6371359.576	17.969
313.949	357142.380	6371363.927	17.926
317.091	357142.826	6371367.902	17.894
320.233	357146.801	6371367.455	17.863
341.512	357167.947	6371365.080	17.650

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
3. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.

DATUM RL. 16.00

VERTICAL ALIGNMENT
L=104m G=-3%
L=140.65m G=-1.75%
L=96.86m G=-1%

HORIZONTAL ALIGNMENT
L=69.11m
L=7.29m R=-10.00m
L=33.43m
L=8.33m R=-10.00m
L=139.35m
L=8.13m R=-10.00m
L=36.21m
L=7.73m R=-10.00m
L=4.38m
L=6.28m R=4.00m
L=21.28m

CHAINAGE	LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
0.00	-0.77	24.200	24.97
10.00	-1.00	23.900	24.90
20.00	-1.03	23.600	24.63
30.00	-1.13	23.300	24.43
40.00	-1.46	23.000	24.46
50.00	-1.49	22.700	24.19
60.00	-1.23	22.400	23.63
69.11	-1.17	22.127	23.29
70.00	-1.10	22.100	23.20
76.40	-1.00	21.908	22.91
80.00	-0.98	21.800	22.78
90.00	-0.74	21.500	22.24
100.00	-0.80	21.200	22.00
104.00	-0.83	21.080	21.91
109.83	-0.81	20.978	21.79
118.16	-0.84	20.832	21.67
120.00	-0.86	20.800	21.66
130.00	-0.87	20.625	21.50
140.00	-1.12	20.450	21.57
150.00	-1.25	20.275	21.53
160.00	-1.16	20.100	21.26
170.00	-1.31	19.925	21.24
180.00	-1.08	19.750	20.83
190.00	-1.10	19.575	20.67
200.00	-0.93	19.400	20.33
210.00	-0.97	19.225	20.19
220.00	-0.91	19.050	19.96
230.00	-0.78	18.875	19.65
240.00	-0.85	18.700	19.55
244.65	-0.75	18.619	19.37
250.00	-0.72	18.565	19.29
257.50	-0.77	18.490	19.26
260.00	-0.83	18.465	19.29
265.63	-0.89	18.409	19.30
270.00	-0.97	18.365	19.34
280.00	-1.16	18.265	19.43
290.00	-1.13	18.165	19.29
300.00	-0.99	18.065	19.06
301.84	-1.02	18.047	19.07
309.57	-1.28	17.969	19.25
313.95	-1.46	17.926	19.39
320.00	-1.27	17.865	19.13
330.00	-1.00	17.765	18.77
340.00	-0.63	17.665	18.29
341.51	-0.57	17.650	18.22

LONGITUDINAL SECTION - SWALE 06

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100
AT ORIGINAL SIZE
0 1 2 3 4 5m

HORIZONTAL 1:500
AT ORIGINAL SIZE
0 5 10 15 20 25m

DETAIL DESIGN

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

REGROWTH
KURRI KURRI

HYDRO

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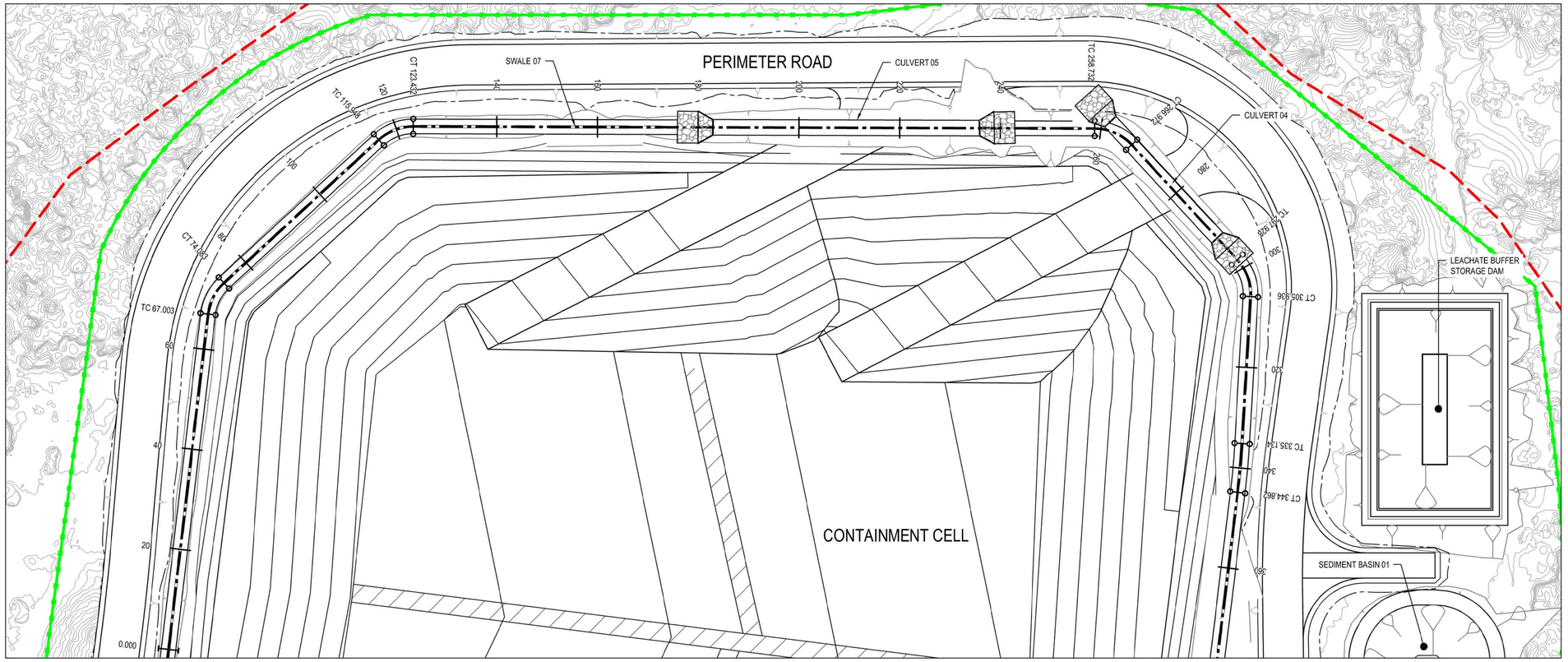
E centralcoastmail@ghd.com W www.ghd.com

DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION**
SHEET 6 OF 8
Original Size **A1**
Drawing No: **22-18015-C156**
Rev: **C**

Plot Date: 4 May 2018 - 11:32 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C156.dwg



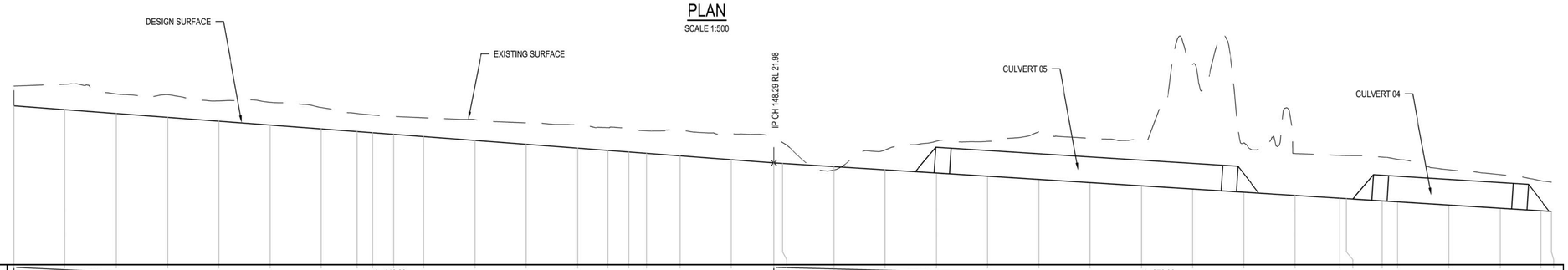
PLAN

SCALE 1:500

SWALE 07 SETOUT POINTS			
CHAINAGE	EASTING	NORTHING	HEIGHT
0.000	356944.680	6371452.538	24.200
67.003	356952.525	6371519.080	23.195
70.543	356952.958	6371522.751	23.142
74.083	356955.673	6371525.257	23.089
115.948	356986.436	6371553.653	22.461
119.690	356989.322	6371556.317	22.405
123.432	356993.249	6371556.305	22.349
258.732	357128.548	6371555.898	20.595
262.852	357132.918	6371555.885	20.544
266.972	357135.877	6371552.669	20.492
297.928	357156.835	6371529.887	20.105
301.932	357159.700	6371526.772	20.055
305.936	357159.459	6371522.546	20.005
335.134	357157.794	6371493.395	19.640
339.998	357157.516	6371488.537	19.579
344.862	357156.924	6371483.708	19.519
385.428	357151.991	6371443.443	19.011
388.633	357151.489	6371439.345	18.971
391.838	357155.601	6371438.973	18.931
418.343	357181.998	6371436.586	18.600

NOTE:

1. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
3. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION.



DATUM RL. 18.00

VERTICAL ALIGNMENT: L=148.29m G=-1.5% | L=270.06m G=-1.25%

HORIZONTAL ALIGNMENT: L=67.00m | L=7.08m R=10.00m | L=41.86m | L=7.48m R=10.00m | L=135.30m | L=8.24m R=10.00m | L=30.96m | L=8.01m R=10.00m

LEVEL DIFFERENCE CUT - / FILL +	-0.77	-0.99	-0.76	-0.89	-0.79	-0.89	-0.83	-0.71	-0.69	-0.70	-0.74	-0.81	-0.85
DESIGN SURFACE LEVEL	24.200	24.050	23.900	23.750	23.600	23.450	23.300	23.195	23.150	23.089	23.000	22.850	22.700
EXISTING SURFACE LEVEL	24.97	25.04	24.66	24.64	24.39	24.34	24.13	23.90	23.84	23.79	23.74	23.66	23.55
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	67.00	70.00	74.08	80.00	90.00	100.00

LEVEL DIFFERENCE CUT - / FILL +	-0.91	-0.89	-0.90	-0.88	-1.01	-1.01	-0.96	-0.81	0.13	-0.77	-1.24	-1.36	-1.86
DESIGN SURFACE LEVEL	22.550	22.461	22.400	22.349	22.250	22.100	21.976	21.954	21.829	21.704	21.579	21.454	21.329
EXISTING SURFACE LEVEL	23.46	23.35	23.30	23.23	23.26	23.11	22.94	22.77	21.70	22.48	22.82	22.81	23.18
CHAINAGE	110.00	115.95	120.00	123.43	130.00	140.00	148.29	150.00	160.00	170.00	180.00	190.00	200.00

LEVEL DIFFERENCE CUT - / FILL +	-1.73	-1.71	-4.86	-1.93	-1.64	-1.67	-1.68	-1.71	-1.66	-1.38	-1.31	-1.17	-1.14
DESIGN SURFACE LEVEL	21.204	21.079	20.954	20.829	20.704	20.595	20.579	20.492	20.454	20.329	20.204	20.105	20.079
EXISTING SURFACE LEVEL	22.93	22.79	25.81	22.76	22.34	22.27	22.26	22.20	22.11	21.71	21.52	21.28	21.22
CHAINAGE	210.00	220.00	230.00	240.00	250.00	258.73	260.00	266.97	270.00	280.00	290.00	297.93	300.00

LONGITUDINAL SECTION - SWALE 07

SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100
AT ORIGINAL SIZE
0 1 2 3 4 5m

HORIZONTAL 1:500
AT ORIGINAL SIZE
0 5 10 15 20 25m

DETAIL DESIGN

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
B	100% DETAILED DESIGN REVIEW COMMENTS	CD	DB*	IG*	15.09.17
A	100% DETAILED DESIGN	JSC	DB*	IG*	04.08.17

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DO NOT SCALE

Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
Scale AS SHOWN
This Drawing must not be used for Construction unless signed as Approved

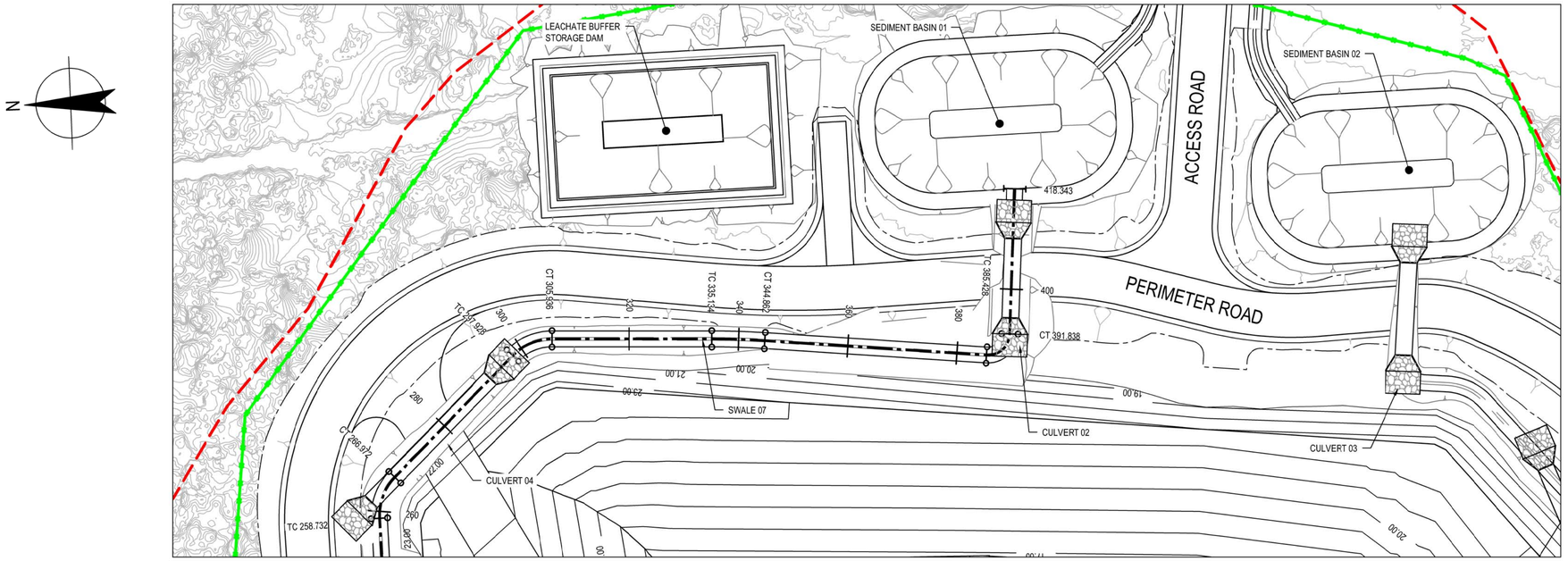
Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION**
SHEET 7 OF 8

Original Size **A1** Drawing No: **22-18015-C157** Rev: **C**

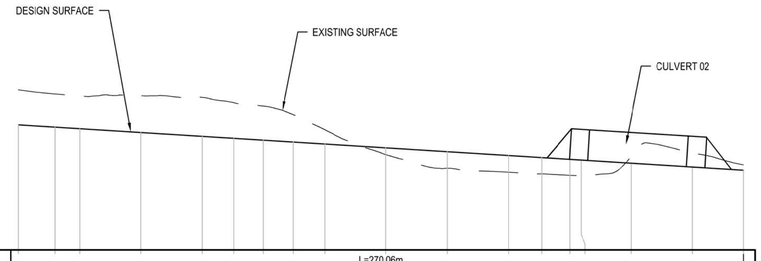
Plot Date: 4 May 2018 - 11:33 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C157.dwg

NOTES:

1. REFER DRAWING 22-18015-C157 FOR SETOUT TABLE.
2. REFER DRAWING 22-18015-C111 FOR SWALE DETAILS.
3. REFER DRAWING 22-18015-C023 FOR PLAN LOCATION



PLAN
SCALE 1:500



DATUM RL. 16.00

VERTICAL ALIGNMENT	L=270.06m G=-1.25%																	
HORIZONTAL ALIGNMENT	L=8.01m R=10.00m	L=29.20m				L=9.73m R=150.00m		L=40.57m					L=6.41m R=-4.00m		L=26.50m			
LEVEL DIFFERENCE CUT - / FILL +	-1.14	-1.08	-1.07	-1.20	-1.27	-1.16	-1.11	-0.89	-0.47	0.22	0.54	0.55	0.53	0.52	0.51	-0.22	-0.45	-0.17
DESIGN SURFACE LEVEL	20.079	20.005	19.954	19.829	19.704	19.640	19.579	19.519	19.454	19.329	19.204	19.079	19.011	18.954	18.931	18.829	18.704	18.600
EXISTING SURFACE LEVEL	21.22	21.09	21.02	21.03	20.98	20.80	20.69	20.41	19.92	19.11	18.66	18.53	18.48	18.43	18.43	19.05	19.16	18.77
CHAINAGE	300.00	305.94	310.00	320.00	330.00	335.13	340.00	344.86	350.00	360.00	370.00	380.00	385.43	390.00	391.84	400.00	410.00	418.34

LONGITUDINAL SECTION - SWALE 07 CONTINUED
SCALE HOR. 1:500 VERT. 1:100

VERTICAL 1:100
AT ORIGINAL SIZE
0 1 2 3 4 5m
HORIZONTAL 1:500
AT ORIGINAL SIZE
0 5 10 15 20 25m

DETAIL DESIGN

No	Revision Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Job Manager	Project Director	Date
C	100% DETAILED DESIGN RE-ISSUE	HT	DB	IG	04.05.18
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Drawn J. CASIO
Designer A. ROBERTS
Drafting Check P. ETCHELLS
Design Check D. MORRISON
Approved (Project Director)
Date
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Client **HYDRO ALUMINIUM KURRI KURRI PTY LTD**
Project **CONTAINMENT CELL DETAILED DESIGN**
Title **SWALE LONGITUDINAL SECTION**
SHEET 8 OF 8

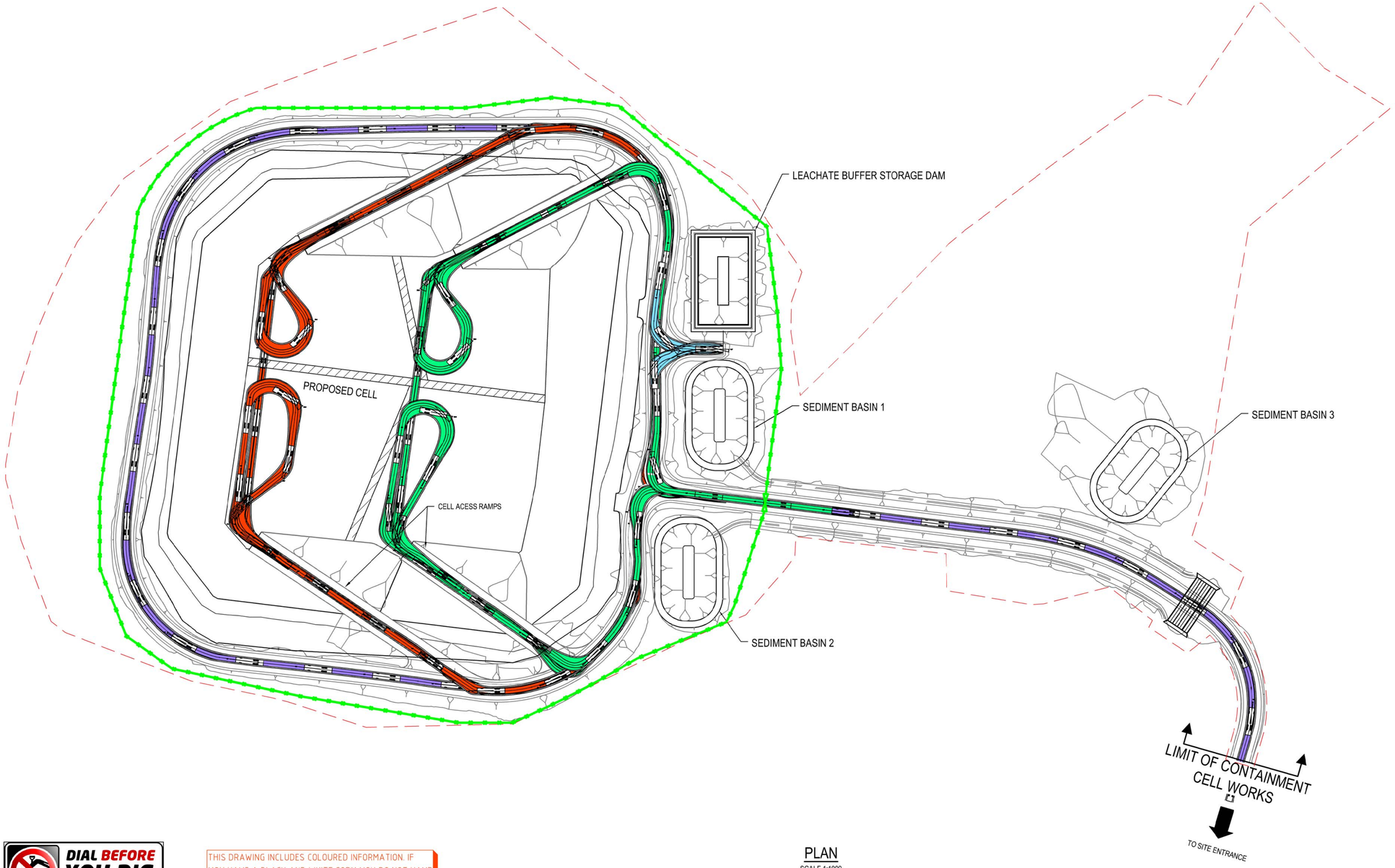
Original Size **A1** Drawing No: **22-18015-C158** Rev: **C**

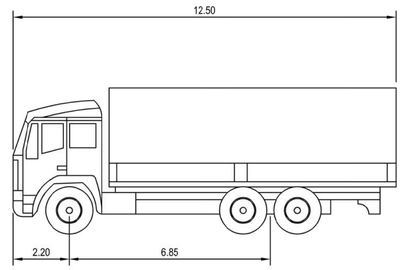
Plot Date: 4 May 2018 - 11:34 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C158.dwg

N

LEGEND:

- CONTAINMENT CELL WORKS AREA
- EXISTING CONTOURS
- VEHICLE TURN PATH 01
- VEHICLE TURN PATH 02
- VEHICLE TURN PATH 03
- VEHICLE TURN PATH 04





SU TRUCK

WIDTH	: 2.5m
TRACK	: 2.5m
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 36.6m

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PLAN
SCALE 1:1000

0 10 20 30 40 50m
SCALE 1:1000 A1 ORIGINAL SIZE

DETAIL DESIGN

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Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	1:1000	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: VEHICLE TRACKING PLAN

Original Size A1 | Drawing No: 22-18015-C161 | Rev: B

Plot Date: 4 May 2018 - 11:36 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C161.dwg

N

LEGEND:

CONTAINMENT CELL WORKS AREA

E E E ELECTRICAL CONDUITS - 2x1000mm Ø

C C C COMMS CONDUITS - 2x1000mm Ø
(REFER TO DRG. 22-18015-C131
FOR CONDUIT TRENCH DETAIL)

LEA

CONDUITS TO BE CAPPED
FOR FUTURE CONNECTION
1m BEYOND EDGE OF
PERIMETER ROAD

FOR CONDUIT TRENCH
DETAIL, REFER TO DRG.
22-18015-C131

CONNECTION POINT FOR
PROPOSED SERVICES TO
BE AGREED

EXISTING ACCESS GATE

LIMIT OF CONTAINMENT
CELL WORKS

TO SITE ENTRANCE

PLAN
SCALE 1:1000

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

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Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	1:1000	This Drawing must not be used for Construction unless signed as Approved	

Client HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project CONTAINMENT CELL DETAILED DESIGN
Title SECURITY AND UTILITIES PLAN

Original Size A1
Drawing No: 22-18015-C162
Rev: C

Plot Date: 4 May 2018 - 11:37 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C162.dwg

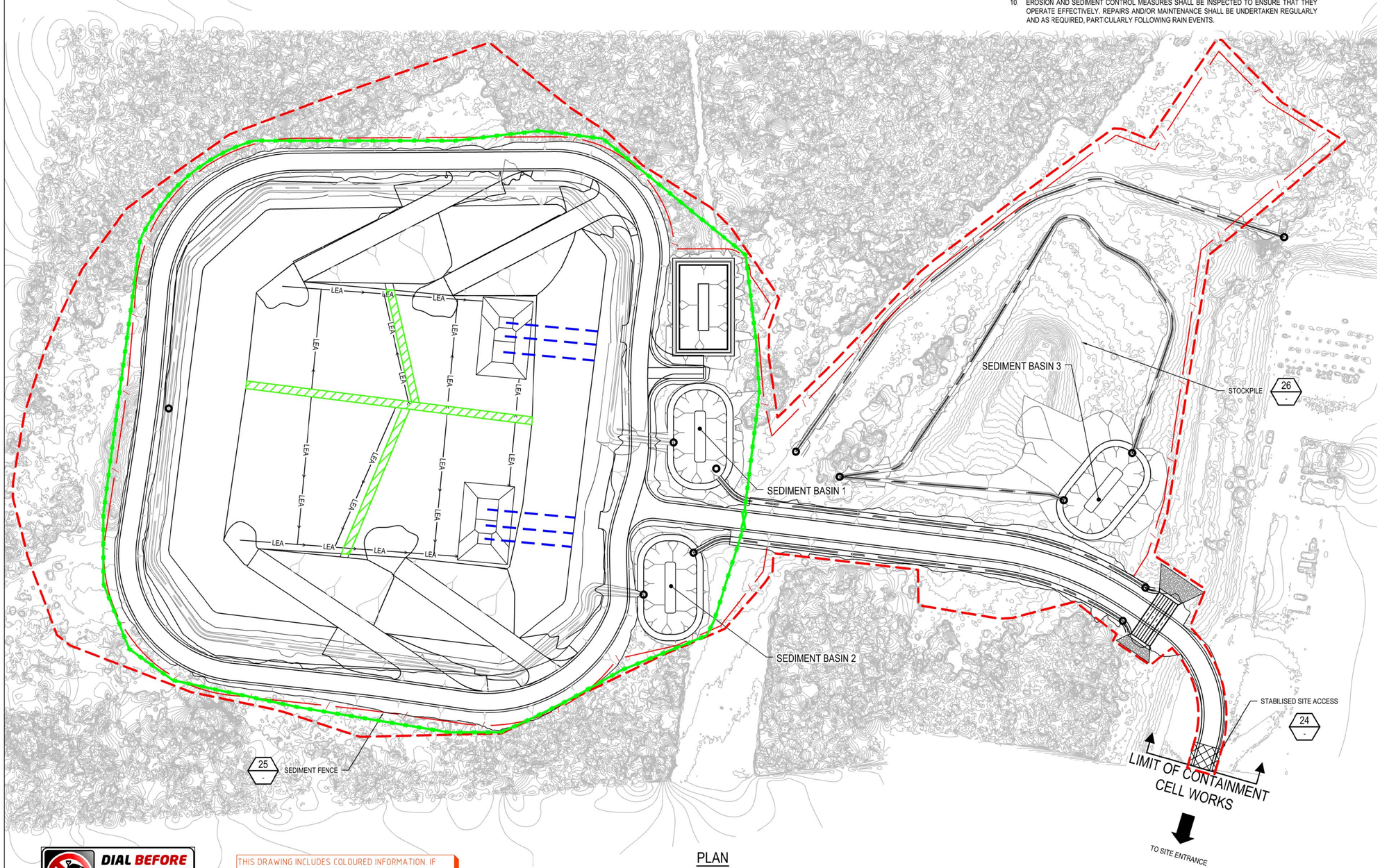
N

NOTES:

1. ALL STOCKPILE LOCATIONS LOCATED OUTSIDE OF CONTAINMENT CELL WORKS AREA. FINAL LOCATIONS TO BE AGREED WITH HYDRO WITHIN MAIN SITE AREA.
2. THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY. CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCILS DESIGN, OTHER REGULATORY AUTHORITY REQUIREMENTS AND MAKE GOOD PAYMENTS OF ALL FEES.
3. THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH STATUTORY REQUIREMENTS AND IN PARTICULAR THE 'BLUE BOOK' (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION), PRODUCED BY THE DEPARTMENT OF HOUSING AND COUNCILS POLICIES. THESE MEASURES ARE TO BE INSPECTED AND MAINTAINED ON A DAILY BASIS.
4. THE CONTRACTOR SHALL INFORM ALL SUB CONTRACTOR OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.
5. WHERE PRACTICAL, THE SOIL EROSION HAZED ON THE SITE SHALL BE KEPT AS LOW AS POSSIBLE TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE.
   - 5.1 CONSTRUCT TEMPORARY STABILISED SITE ACCESS INCLUSIVE OF SHAKE DOWN / WASHPAD.
   - 5.2 INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES WHERE FENCES ADJACENT EACH OTHER, THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
   - 5.3 INSTALL SEDIMENT CONTROL MEASURE AS OUTLINED ON THE APPROVED PLANS.
6. AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL ENSURING CONFORMITY TO REGULATORY AUTHORITY REQUIREMENTS.
7. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT BEEN FILTERED OUT.
8. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
9. ALLOW FOR GRASS STABILISATION OF EXPOSED AREAS, OPEN CHANNELS AND ROCK BATTERS DURING ALL PHASES OF CONSTRUCTION.
10. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING RAIN EVENTS.

LEGEND:

- CONTAINMENT CELL WORKS AREA
- LEA — LEACHATE COLLECTION TRENCH
- GROUNDWATER, LEAK DETECTION AND LEACHATE RISER PIPEWORK
- SEDIMENT FENCING
- DISCHARGE POINT



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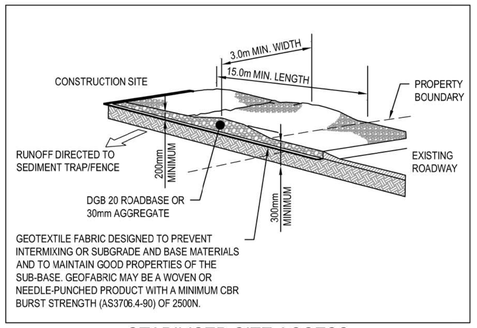
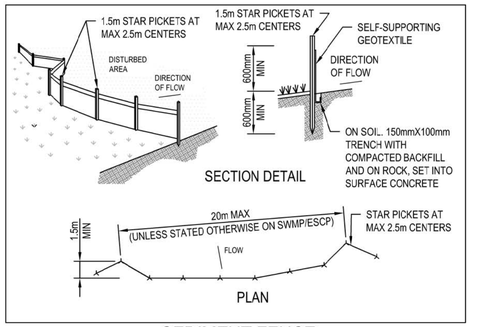
SCALE 1:1000

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE



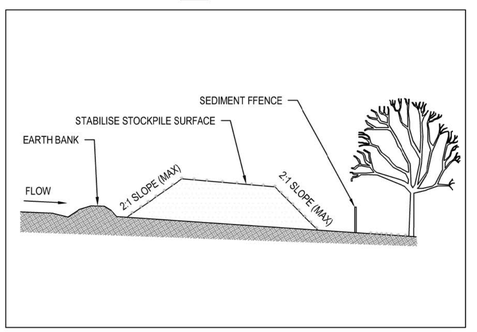
STABILISED SITE ACCESS

24 DETAIL NTS



SEDIMENT FENCE

25 DETAIL NTS



STOCKPILES

26 DETAIL NTS

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Drawn	J. CASIO	Designer	A. ROBERTS
Drafting Check	P. ETCHELLS	Design Check	D. MORRISON
Approved (Project Director)			
Date			
Scale	AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	

Client: HYDRO ALUMINIUM KURRI KURRI PTY LTD
Project: CONTAINMENT CELL DETAILED DESIGN
Title: EROSION AND SEDIMENT CONTROL PLANS AND DETAILS

Original Size: A1
Drawing No: 22-18015-C163
Rev: B

Plot Date: 4 May 2018 - 11:38 AM Plotted by: Trish Etchells Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\22-18015-C163.dwg

Appendix K Schedule of Key Quantities

Preliminary Bill of Quantities

Client:	Hydro Aluminium Kurri Kurri Pty Ltd	**Job Number:**	22-18015
Project:	Containment Cell Design	**Prepared by:**	J. Ryner
Subject:	Material Quantities Estimate	**Checked by:**	D. Barrett
Date of issue:	12-Jul-18	**Revision:**	C

Item #	Description	Quantity	Unit
1	**Site Clearance and Erosion and Sediment Control**		
1.01	Sediment fencing	1,555.0	m
1.02	Clearing and grubbing	6.84	ha
1.03	Strip topsoil and stockpile	6.84	ha
2	**Access Road Culvert Crossing**		
2.01	Remove existing culvert	1	No.
2.02	Excavation for new culvert	25	m^3
2.03	Bedding material	264	m^2
2.04	205mm Precast Base Slab	264	m^2
2.05	900 x 2100 x 2400 RCBC	40	No.
2.06	900 x 2100 x 2400 headwall	2	No.
2.07	205mm Precast Base Slab	259	m^2
2.08	200 thick D50 rip rap	295	m^2
3	**Containment Cell Access Road**		
3.01	Cut to fill to form roads	1,530	m^3
3.02	Extra fill for reuse	695	m^3
3.03	75mm gravel wearing course	3,100	m^2
3.04	125mm DGB20 base	3,100	m^2
3.05	150mm DGS10 sub base	3,100	m^2
3.06	150mm select fill	460	m^3
4	**Haul Roads**		
4.01	75mm gravel wearing course	2,500	m^2
4.02	125mm DGB20 base	2,500	m^2
4.03	150mm DGS10 sub base	2,500	m^2
4.04	150mm select fill	375	m^3
5	**Relocate Stockpiles Within Containment Cell Site**		
5.01	Relocate stockpiled material locally	33,751	m^3
5.02	Relocate 50% of the M15 stockpiled material locally	9,725	m^3
6	**Excavation of Containment Fill**		
6.01	Cut to fill to form containment cell	19,745	m^3
6.02	Excavate and transport to stockpile for reuse	70,610	m^3
6.03	Excavate and transport to stockpile extremely weathered rock strata	6,500	m^3
7	**Temporary Perimeter Access Road**		
7.01	75mm gravel wearing course	7,085	m^2

Preliminary Bill of Quantities

Client:	Hydro Aluminium Kurri Kurri Pty Ltd	**Job Number:**	22-18015
Project:	Containment Cell Design	**Prepared by:**	J. Ryner
Subject:	Material Quantities Estimate	**Checked by:**	D. Barrett
Date of issue:	12-Jul-18	**Revision:**	C

7.02	125mm DGB20 base	7,085	m^2
7.03	150mm DGS10 sub base	7,085	m^2
7.04	150mm select fill	1,063	m^3
8	**Containment Cell Construction**		
8.01	500mm x 500mm anchor trench excavation	1,440	m
8.02	Geonet drainage composite	58,340	m^2
8.03	300mm sand drainage	17,330	m^2
8.04	Geosynthetic clay liner	75,669	m^2
8.05	2mm HDPE geomembrane	75,669	m^2
8.06	Protection geotextile	38,194	m^2
8.07	300mm drainage aggregate	18,048	m^2
8.08	Seperation geotextile	19,125	m^2
8.09	Soil confinement layer	6,798	m^2
8.10	Sacrificial geomembrane	22,658	m^2
8.11	Access ramps to cells	4,450	m^2
8.12	Internal bunds	2,403	m^3
9	**Leachate Pipework**		
9.01	DN200 slotted pipe	630	m
9.02	DN450 solid pipe	300	m
10	**Leachate Transfer System**		
10.01	Detailed excavation	10	m^3
10.02	200 thick reinforced concrete slab	48	m^2
10.03	500 high reinforced concrete block retaining wall	15	m^2
10.04	Strip footing	30	m
10.05	Stainless steel bollards	2	No.
10.06	DN63 solid pipe	120	m
10.07	DN63 hose	200	m
10.08	DN110 Solid pipe	10	m
10.09	Diesel generator, pump, control panel and winch	2	No.
11	**Leachate Buffer Storage**		
11.01	Excavate and stockpile for reuse	1,725	m^3
11.02	Excavate and place clay rich fill	650	m^3
11.03	Excavate anchor trenches	150	m
11.04	Protection geotextile	1,474	m^2
11.05	HDPE geomembrane	1,474	m^2
11.06	Gas vents	3	No.
12	**Swales and culverts**		
12.01	Excavation	1,270	m^3
12.02	Culverts	6	No.

Preliminary Bill of Quantities

Client:	Hydro Aluminium Kurri Kurri Pty Ltd	**Job Number:**	22-18015
Project:	Containment Cell Design	**Prepared by:**	J. Ryner
Subject:	Material Quantities Estimate	**Checked by:**	D. Barrett
Date of issue:	12-Jul-18	**Revision:**	C

12.03	200 thick D50 rip rap	6	m^2
13	**Sediment basin 1**		
13.01	Cut to fill to form containment cell	410	m^3
13.02	Excavate for reuse	2,280	m^3
13.03	200 thick D50 rip rap	110	m^2
13.04	Seperation geotextile	110	m^2
14	**Sediment basin 2**		
14.01	Cut to fill to form containment cell	410	m^3
14.02	Excavate for reuse	1,160	m^3
14.03	200 thick D50 rip rap	90	m^2
14.04	Seperation geotextile	90	m^2
15	**Sediment basin 3**		
15.01	Cut to fill to form containment cell	410	m^3
15.02	Excavate for reuse	5,495	m^3
15.03	200 thick D50 rip rap	75	m^2
15.04	Seperation geotextile	75	m^2
16	**Placement of Demolition Stockpiles within Containment Cell**		
16.01	Load, transport, deliver and compact onsite demolition material	80,560	m^3
16.02	Excavate, load, transport, deliver and compact onsite demolition material	14,930	m^3
16.03	Backfill voids	19,450	m^3
16.04	Excavate, load, transport, deliver and compact offsite demolition material	44,984	m^3
17	**Removal and Stockpiling of Capped Waste**		
17.01	Excavate, load, transport and stockpile stripped capping material	48,000	m^3
18	**Placement and Reinstatement of Capped Waste Stockpile Within Containment Cell**		
18.01	Excavate, load, transport, deliver and compact existing capped waste material	183,599	m^3
18.02	Reinstatement of capped waste stockpiled capping material	48,000	m^3
19	**Replacement of Relocated Stockpiles from Containment Cell**		
19.01	Load, transport, deliver and compact relocated stockpiles	33,751	m^3
19.02	Load, transport, deliver and compact M15 stockpiles	19,450	m^3

Preliminary Bill of Quantities

Client:	Hydro Aluminium Kurri Kurri Pty Ltd	**Job Number:**	22-18015
Project:	Containment Cell Design	**Prepared by:**	J. Ryner
Subject:	Material Quantities Estimate	**Checked by:**	D. Barrett
Date of issue:	12-Jul-18	**Revision:**	C

20	**Decommissioning of Leachate Pond and Vehicle Turnaround Pad 01 and Transfer to Containment Cell Prior to Capping**		
20.01	Gas monitoring equipment	1	No.
20.02	HDPE liner	1,474	m^2
20.03	Geotextile liner	1,474	m^2
20.04	Cut/fill to reshape area	1,725	m^3
21	**Final Cap for Containment Cell**		
21.01	Excavate, load, transport, deliver final capping material	105,700	m^3
21.02	Drainage geotextile	47,000	m^2
21.03	Geosynthetic clay liner	47,000	m^2
21.04	Select fill	14,100	m^3
21.05	LLDPE geomembrane	47,000	m^2
21.06	Protection geotextile	47,000	m^2
21.07	300mm drainage aggregate	47,000	m^2
21.08	Seperation geotextile	51,000	m^2
21.09	1.3m thick subsoil layer	61,100	m^3
21.10	100mm topsoil	47,000	m^2
22	**Gas Management System**		
22.01	DN160 slotted HDPE pipe	850	m
22.02	DN300 bore through waste material	8	No.
22.03	DN150 HDPE pipe	26	m
22.04	1500 x 1500 x 1500 mass concrete footing	1	No.
22.05	6m galv. Steel duct	1	No.
22.06	Monitoring bores	6	No.
23	**10% Gypsum Addition**		
23.01	Gypsum supply and placement into containment cell	36,500	t
23.02	Relocation of existing Southern Weighbridge	1	No.
24	**Third Party Trucking/Treatment of Leachate**		
24.01	Truck/treat and dispose of leachate	13,766	t

Appendix L Constructability Assessment

Hydro Aluminium Kurri Kurri Pty Ltd

Containment Cell Detailed Design

Constructability Assessment

August 2018

Table of contents

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Figure index

Appendices

1. Introduction

1.1 Project overview

GHD Pty Ltd (GHD) has been engaged by Hydro Aluminium Kurri Kurri Pty Ltd (herein referred to as 'Hydro') to prepare a detailed engineering design and supporting documentation for a proposed Containment Cell for the Hydro Demolition and Remediation Project (the Project). GHD's Scope of Services covers the detailed design, constructability review (this report), quality specifications, project cost estimate, schedule and other related requirements. The future Containment Cell will be an engineered facility for the purpose of immobilising and managing various waste streams generated by the Capped Waste Stockpile and the demolition and remediation of the Smelter.

1.2 Purpose and scope of report

The purpose of the report is to integrate constructability principles into the design process and conduct constructability reviews of the design at key stages of the design development.

It should be noted that the intent of this assessment is not to determine how a contractor should construct or stage the works but provide assistance and guidance in the process.

Within the scope of works, Hydro identified some constructability considerations and these include:

- Integration of the cell construction with the greater site works, in particular the demolition activities that may be occurring concurrently.
- Determining quantities of site work low permeability clay (intended for use in lining/capping layers) including clays currently being used as capping versus imported material
- Assessment of available stockpile locations from various materials during construction
- Management of the existing capped waste stockpile during construction/relocation to the new cell, as well as other material sources
- Construction innovations including options to manage existing leachate (capped waste stockpile) stormwater and minimising the exposure of smelter waste to wet weather during the material placement phase
- Flexibility in the design to avoid significant revamps should the need arise to cater for reductions or increases in material volumes encountered during construction
- Placement of certain material which would allow ease of future reclamation if a feasible market for reuse was determined
- Recycling on-site materials (such as crushed concrete and bricks) for possible utilisation in the proposed cell
- Minimising the disturbance and contamination of the surrounding environment
- Minimising settlement risk by crushing of materials

In addition to these additional constructability considerations includes:

- Review of the construction facilities required for the project and any constraints around programme and months of working
- Estimate of traffic movements around site for the movement of earthworks and the stockpile materials (including the capped waste stockpile)

1.3 Related documents

The following documents were considered in the preparation of this report:

- Containment Cell Design – Design Report, GHD
- Detailed Design Drawings, GHD
- Capped Waste Stockpile Assessment, Ramboll Environ, April 2016
- Draft Demolition Phase Diagrams – Environ, January 2015

1.4 Limitations

This report:

1. Has been prepared by GHD for Hydro Aluminium Kurri Kurri Pty Ltd
2. May be used and relied on by Hydro Aluminium Kurri Kurri Pty Ltd
3. May be copied to relevant consultants carrying out approval works for information purposes;
4. Must not be copied to, used by, or relied on (as relevant) by any person other than those listed in 1-3 above without prior written consent of those listed in 1 above;
5. May only be used for the purpose specifically detailed in section 1.2 of this report (and must not be used for any other purpose).

GHD otherwise disclaims responsibility to any person other than Hydro Aluminium Kurri Kurri Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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2. Project background

2.1 Introduction

Background to the project can be found fully detailed with the design report and design drawings. SK001 provides an overview of the proposed works. Overall site plans can be found within the design drawings

2.2 Site Inspection

To understand the constraints around the site a site visit was undertaken by David Morrison (GHD) on 15th December 2016, which involved a walkthrough of the site with Hydro personnel. Photographs taken allowing an appreciation of the site are below. The site visit covered all areas within the Hydro site however did not include visits to the external material sites namely the formal municipal landfill site and Dickson road landfill. In terms of the overall constructability assessment visits to these two areas was deemed not to be important.

2.3 Capped waste stockpile

The Capped waste stockpile is an on-site stockpile comprising mixed smelter wastes that was capped, see Figure 1 and Figure 2 Further information on this stockpile are contained within the Capped Waste Stockpile report prepared by Ramboll Environ.

Figure 1 View from top of capped waste stockpile (looking west)

Figure 2 Birdseye view of capped waste stockpile

2.4 Containment cell site

The containment cell is proposed to be located in an area in the north west of the site, see Figure 3 and Figure 4 below.

Figure 3 View of Containment Cell site looking east

Figure 4 View to south of containment cell site – from Stockpile 1

2.5 Stockpile and laydown area

During the site visit, it was evident that the nominated stockpile and laydown area, see Figure 5 and Figure 6 was not suitable for the works due to the presence of existing M15 stockpiles material, an existing electrical easement and the proximity to the watercourse.

This area would only be suitable if this existing material were removed however, this would involve a greater effort than defining an alternative area for stockpiling material.

Figure 5 View from M15 stockpile and laydown area towards containment cell site

Figure 6 View to north of M15 stockpile and laydown area

2.6 Other stockpiles

Demolition material around the site are currently contained in a combination of states from stored inside existing sheds, stored outside with covers and stored inside sheds in storage bags. The nature of this material is highly variable and the figures below provide an indication of the type of materials around the site. Methodology around the transportation and disposal of these stockpiles will require to be considered, see Figure 7 to Figure 10.

Figure 7 Typical bagged material within rodding shop in carbon plant

Figure 8 Typical External Stockpile – asbestos contaminated material

Figure 9 Typical view of waste material from processing

Figure 10 Typical smelter waste stripped, sorted and stored around site

2.7 Site features

The following site features are important in considering the constraints around the site.

- Watercourse crossing at containment cell site entry (Figure 11)
- Hydro switchyard (Figure 12)
- Portion of 2 pot rooms that will be retained for future development (Figure 11)

Figure 11 View of existing culvert crossing from stockpile area and pot rooms to be retained

Figure 12 Hydro switchyard and transformer yard to north of site

3. Construction staging

3.1 Introduction

This section discusses the potential stages required to construct the works, where stockpiles can potentially be created (including indicative sizes) and constraints identified with each of the stages.

This staging assumes that the site demolition work is underway and the containment cell contractor will require to co-ordinate activities with the demolition contractor. However for the purposes of this assessment is assumed that co-ordination will not cause further delays to the construction or impact on the methodology adopted.

The construction staging and sketches have been developed on the assumption that 250 m of Pot rooms 2 and 3 will be retained for the future development of the site as per Hydro discussions. Pot room 1 shall be demolished.

For the purposes of the staging, it has been assumed that stockpiles will be separated and individually stockpiled within the site.

3.2 Overall staging

The following stages are proposed for the works.

Table 1 Proposed construction stages

Stage No.	Stage description
1	Construct containment cell access road, temporary haul roads and erosion control.
2	Relocate stockpiles within containment cell site
3	Excavation and stockpiling of containment cell site to subgrade level
4	Construction of containment cell liner
5a	Placement of demolition and external stockpiles within containment cell. *Noting that the asbestos contaminated soils should be placed first, before the demolition material to protect the liner materials from damage.*
5b	Placement of materials within areas on site requiring remediation. These include the 5A greenmix area, the 60C carbon bake scrubber footprint and the waste anode stockpile.
6	Removal and stockpiling of capped waste stockpile capping material
7	Placement of capped waste stockpile within containment cell
8	Placement of relocated stockpiles from containment cell site
9	Placement of final cap for containment cell including capped waste stockpile capping material
10	Removal of haul roads and surfacing of access roads

3.3 Stage 1 – Construct containment cell access roads and temporary haul roads

Stage 1 provides access to the containment cell site during the works, refer to SK010. The following components will be required:

- Establishment of site offices
- Establishment of erosion and sediment control measures, fauna exclusion fence and site security fencing
- Site clearance – including clearance through site for temporary access road
- Construction of culvert crossing, including removal of existing crossing
- Construction of access road and haul roads

Key considerations for the stage include:

- Ensuring adequate width of access and haul roads for two way operation of construction vehicles
- Ensuring sediment control measures are in place for stockpile locations

3.4 Stage 2 – Relocate stockpiles located within containment cell site

Stage 2 will clear the containment cell site of the existing stockpiled material and allow the containment cell to be constructed, refer to SK020.

The existing stockpiled material will be relocated to an agreed location prior to replacement back within the containment cell site if it cannot be re-used elsewhere. Table 2 below provides a summary of this volume.

Table 2 Extract from Table 1 – Waste Volumes (Rennie-Golledge survey Enviropacific Services)

Waste Type	m^3
Stockpiled Hydro Land Soils	33,751 m^3 Stockpile 15 at 27,856 m^3 and; Stockpile 42 at 5,895 m^3.

Based on these volumes Table 3 provides an estimate of the stockpile area required.

Table 3 Stage 2 – Approximate stockpile extents

Length (m)	Width (m)	Height (m)	Side Slopes (1 in)
50	50	5.5	3

This relocated stockpile will require to be retained within the overall site in a location agreed with Hydro. However we have assumed that this would be near the haul road, within the confines of the demolition works, refer to SK020.

Key considerations for the stage include:

- Contractor to be satisfied that there is adequate space available to accommodate stockpiles
- Stockpiles to be protected to prevent degradation of material and runoff

3.5 Stage 3 – Excavation of containment cell to subgrade level

Stage 3 includes the excavation of the containment cell to subgrade level see SK030.

This excavated material shall be relocated to a location agreed with Hydro. The contractor is recommended to look at using this material (potentially as general fill) as part of the construction works.

Table 5 Stage 2 – Approximate containment cell excavation stockpile extents outlines the assumed excavated volumes.

Table 4 Extract from Table 2 – Summary of key parameters (GHD Design Report)

Waste Type	m^3
Total excavation to subgrade level	70,610
Excavation of extremely weathered rock	6,500

Based on these volumes Table 5 provides an estimate of the stockpile area required.

Table 5 Stage 2 – Approximate containment cell excavation stockpile extents

Length (m)	Width (m)	Height (m)	Side Slopes (1 in)
150	150	6	3

This relocated stockpile will require to be retained within the overall site in a location agreed with Hydro. However we have assumed that this would be near the haul road, within the confines of the demolition works, adjacent to the stage 2 stockpile, refer to SK030.

Key considerations for this stage include:

- Stockpiles protected to prevent degradation of material and runoff.
- Prevention of stormwater runoff into containment cell excavation through construction of bunds where appropriate.
- Installation of pump out pit within cell to prevent build-up of stormwater.

3.6 Stage 4 – Construction of containment cell liner

Stage 4 includes the construction of the containment cell liner, see SK040.

The construction of the containment cell liner is described fully within Section 4.6 of the design report. However, in terms of staging the following will be constructed:

- Groundwater diversion system
- Secondary liner system
- Primary leak detection and extraction system
- Primary liner system
- Primary liner protection system
- Primary leachate collection and extraction system

The majority of the material will require to be imported from off the site and therefore the contractor should ensure works is sequenced in such as a way as to limit the amount of material required to be stored on site.

Key considerations for this stage include:

- Construction access into the cell
- Protection of liner materials from construction activities, weather, fauna (kangaroos) prior to placement of next layer
- Construction of internal bunds and impact on stormwater flow prior to placement
- Protection of installed pipework from construction loading

3.7 Stage 5 – Placement of demolition stockpiles within containment cell

Stage 5 involves the placement of the various demolition stockpiles within the containment cell, see SK050.

The placement of these shall be sequenced in a way that the material with low risk of damaging the liner system will be placed into the cell first. It is anticipated at this stage that the material will form the first layer to be placed along the slope and floor. The material along the slope will be free draining in nature to facilitate leachate flow. The contractor shall be required to satisfy themselves of the make-up of each of the demolition stockpiles.

The following waste types as summarised from Table 6 which are obtain from the design report.

Table 6 Summary of stockpiled material

Waste Type	m^3
Process wastes	26,330
Smelter Containment Soils	34,328
Hydro Land Contaminated Soils	
Dickson Road Landfill	14,150
Former Municipal Landfill	8,400
Asbestos Contaminated Material	6,700
Kline Street Wastes and Soils	3,074
Non-Recyclable Demolition and Smelter Wastes	21,000
Non-Leachable/Non Hazardous	9,000

3.8 Stage 6 – Removal and stockpiling of capped waste stockpile topsoil and capping material

Stage 6 involves the removal and stockpiling of the topsoil and capping material currently located on top of the capped waste stockpile, see Figure 13.

Figure 13 Construction of capping over capped waste stockpile (photo courtesy of Hydro)

The capped waste stockpile assessment report outlines that the capped waste stockpile is covered by approximately 0.5 m topsoil and 1.1 m of clay material – 1.6 m total thickness.

To access the site this material would require to be stripped progressively and stockpiled for re-use within the containment cell cap.

Waste Type	m^3
Capped waste stockpile capping material	48,000

Based on these volumes the following is an estimate of the stockpile area required.

Table 7 Stage 2 – Approximate containment cell excavation stockpile extents

Length (m)	Width (m)	Height (m)	Side Slopes (1 in)
125	125	4	3

This relocated stockpile will require to be retained within the overall site in a location agreed with Hydro. However we have assumed that this would be adjacent to the capped waste stockpile, refer to SK060.

This material must be readily accessible, as the capped waste capping material will be progressively removed as the capped waste stockpile material is accessed.

3.9 Stage 7 – Placement of capped waste stockpile within containment cell

Stage 7 involves the transfer of the material from the capped waste stockpile into the containment cell, see SK070.

Waste Type	m^3
Capped Waste Stockpile	183,491

The material will be excavated, and then transported via the haul road and placed directly into the containment cell.

Photos from the capped waste stockpile and the material within it are contained below in Figure 14 and Figure 15. The stockpile contains full cathode assemblies with collector bars which will potentially need downsizing at the capped waste stockpile prior to transporting into the containment cell to ensure they are transportable.

Figure 14 View of typical material within capped waste stockpile. (Photo: courtesy of Hydro)

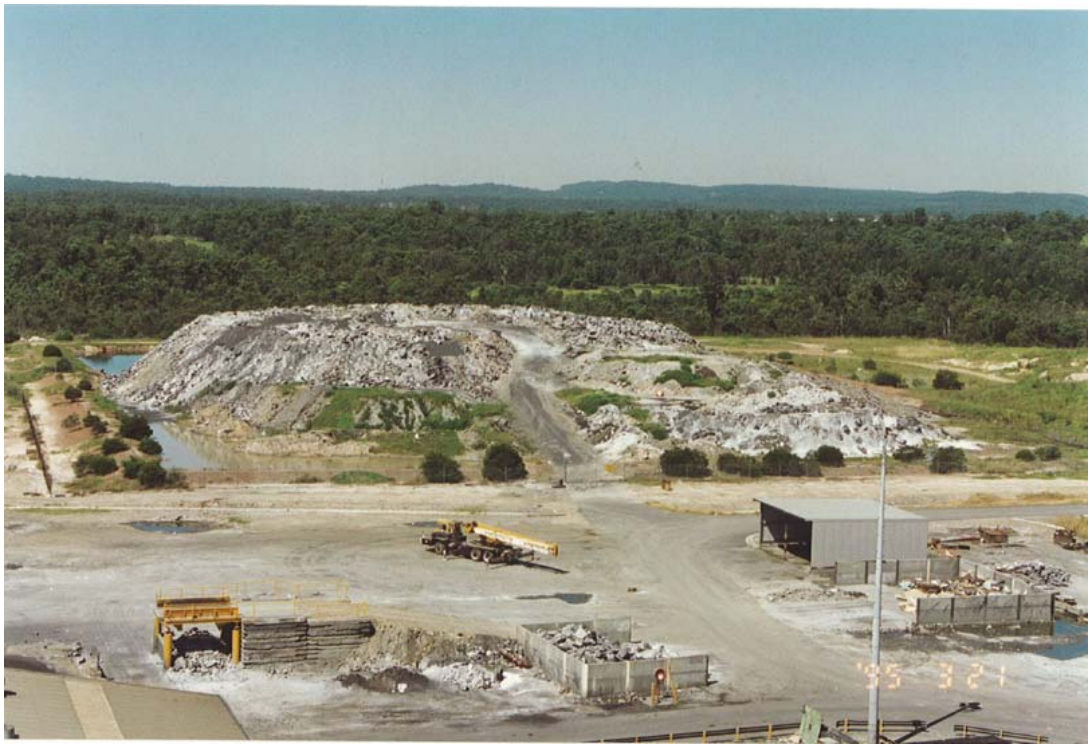


Figure 15 View of capped waste stockpile prior to capping (photo courtesy Hydro)

The material will be placed into the containment cell by using spotters around the perimeter of the cell. The spotters will be used during the first 3 to 4 m of waste placement. The larger items of material will require to be placed once this 3 to 4 m layer of more granular material is placed to ensure that the liner is not pierced.

3.9.1 Gypsum Application

With regards to gypsum application, the following process is anticipated however this process would require to be developed by the contractor appointed to undertake the work.

- Waste will be loaded to trucks and driven over a weighbridge to ascertain total weight

  The existing weighbridge at the southwest gatehouse would be relocated to a position on the Haul Road west of the Capped Waste Stockpile. Once the truck has passed through the weighbridge and the required quantity of gypsum based on a 10% application rate has been calculated, the truck would then progress to the gypsum application station to the west of the weighbridge.
- Gypsum will be added to the loaded waste at the pre-determined w/w percentage using a front end loader with weighing system attached within a specified tolerance
- The truck will be driven to the containment cell and the waste end deposited at the filling face
- The waste will be pushed out by bull dozer and compacted in accordance with the cell filling requirements

Mixing of the waste with gypsum will occur through this process. When considering the waste mass as a whole, the proposed containment will incorporate approximately 8,500 individual 40T truck loads of waste each with the addition of gypsum. Through this method of placement the gypsum addition is considered to be mixed on a macro scale. This level of mixing is sufficient when considering that the waste itself is variable in concentration and highly heterogeneous and

that any pathway of leachate through the cell will inevitably pass through gypsum when designed in this manner.

3.10 Stage 8 – Placement of relocated stockpiles from containment cell site

Stage 8 involves the replacement of the stockpiles, which were relocated from the containment cell site within Stage 2, see SK080. These may be used as general fill around the site and have been tested to confirm this.

Haul road surface to be scraped/graded to remove any spilled waste material and deposited within containment cell.

3.11 Stage 9 – Placement of final cap for containment cell

Stage 9 involves the placement of the final cap to the containment cell, see SK090.

The construction of the containment cell liner is described fully within Section 4.6 of the design report. However, in terms of sequencing the following will be constructed

- Separation geotextile
- Geosynthetic clay Liner
- 300 mm seal bearing layer (utilising existing capping material from capped waste stockpile)
- LLDPE geomembrane
- Protection geotextile
- 300 mm recycled drainage aggregate
- Separation geotextile
- 1300 mm soil subsoil layer
- 150 mm soil topsoil layer to be revegetated

The clay material for the cap shall be taken from the clay material recovered from any capping material left from the containment cell

3.12 Stage 10 – Removal of haul roads and finalising of access road (surfacing)

Stage 10 involves the completion of the works, see SK010 including:

- Completion of access road surfacing
- Removal of haul roads
- Removal of erosion and sediment control measures

4. Waste removal / filling practices

4.1 Introduction

This section describes the practices to be considered by the Contractor in the preparation of their construction management plans relating to the removal, transfer and placement of waste materials at both the capped waste stockpile and the containment cell and associated leachate management.

Handling /treatment of waste and leachate will be required at both the capped waste stockpile and containment cell.

4.2 Active waste area requirements

The capped waste stockpile is where activities related to cap removal, waste removal / treatment and leachate treatment are undertaken.

The containment cell is where activities relating to waste deposition and leachate treatment will occur.

4.2.1 General

The active area changes constantly, as waste removal / placement progresses, but usually comprises the following:

- Access tracks/roads and temporary haul roads
- Manoeuvring areas
- Unloading area
- Working face (for excavation and/or deposition)
- Stockpiles
- Mobile amenities, if applicable

The key features include:

- Haul track runs from the capped waste stockpile to the containment cell
- Access
  - Existing vegetated access ramp onto the capped waste stockpile
  - Containment cell includes four designed access ramps
- Leachate management - Capped waste stockpile
  - Temporary works – Area for 2.5 Ml leachate pond provided (to be designed if necessary)
- Leachate management – Containment cell
  - Temporary in-cell storage
  - 1 Ml designed leachate pond
- Nearby transportable amenities and first aid shed
- Stockpile areas to sort waste
- Area for trucks to turn and be loaded with waste material (and be covered if required)
- Excavator sorting and moving material and depositing in trucks

While the circumstances and available space for establishing and maintaining the individual areas of an active area constantly change, it shall be prioritised to always consider health and safety of staff and contractors when setting up the active area. In particular the potential interference between mobile plant and trucks removing/placing waste from the stockpile shall be considered during the development of each stage.

It would be advisable to allocate a staff member to undertaking supervisory duties in the manoeuvring areas in order to minimise the risk of vehicle accidents, particularly when reversing.

4.2.2 Roads and manoeuvring areas

Haul roads and manoeuvring areas for waste trucks shall be aligned and established at a sufficient distance from the operating area for mobile plant, which always includes the area where trucks load their waste consignments. Depending on the available space, this distance may be in excess of 30 metres to allow for safe reversing of trucks into the loading area.

4.2.3 Loading / unloading area

These areas should be established in close proximity to the working face, ideally terminating at the lower level of the working face, The closer the loading area is located to the working face, the easier it usually is to maintain the area.

The surface should be prepared from materials providing good bearing capacity for trucks, particularly during periods of adverse weather with strong rainfall.

4.2.4 Working face

4.2.4.1 Capped waste stockpile

The working face is the area where waste is to be removed, sorted and loaded onto trucks for transfer to the containment cell.

Dependant on the machinery proposed by the contractor, the working face should be maintained at a safe slope with a gradient no steeper than 1 in 1 (Safe slope gradient to be assessed and proposed by Contractor based on existing conditions).

It is anticipated that the working face should extend out horizontally by no more than 20-30 metres.

The width of the working face can often vary, depending on the geometry of the cell area to be excavated and the types and numbers of equipment in operation, however, it is anticipated to span ca. 30-50 metres.

4.2.4.2 Containment cell

The working face is the area where waste is to be deposited and compacted.

In order to ensure the effectiveness of the placement and compaction equipment, the working face should be maintained at a slope with a gradient of ca. 1 in 3. Based on this gradient, the working face would therefore extend out horizontally by between 30 to 40 metres.

While the width of the working face can often vary, depending on the geometry of the cell area to be filled and the types and numbers of compaction equipment in operation, it would roughly span around 30-50 metres.

The proposed placement method is the onion skin method which is typically used for the compaction of waste.

The onion skin method requires the compactor to operate solely on the gradient of the shallower face during placement of layers of waste.

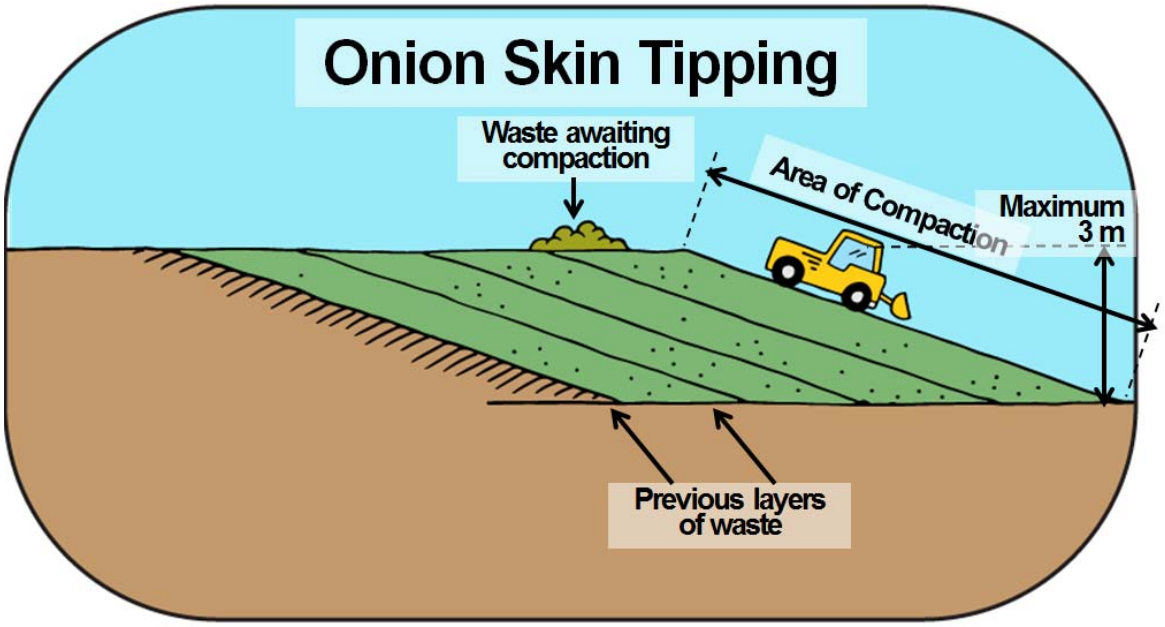


Figure 4-1 Onion skin placement

4.2.5 Stockpiles

One or more stockpiles with cover material for daily and intermediate cover should be maintained in the vicinity of both working faces, without interfering with manoeuvring areas for trucks and mobile plant.

This material can be utilised for daily cover if required and / or emergency cover in preparation for upcoming storm events.

It should be stressed that limiting the open stages to a minimum will reduce the amount of leachate management required to be undertaken by reducing the potential volume.

Temporary bunds shall be used to facilitate storm water controls preventing unnecessary ingress of surface water to the leachate system.

4.2.6 Leachate management

Reference should be made to the GHD Leachate Management Options Assessment Report for further information and guidance.

4.2.6.1 Capped waste stockpile (CWS)

The removal of waste and remediation of the CWS will subsequently result in an improvement in groundwater quality over time. Therefore, it is no longer considered necessary to extract and treat the contaminated groundwater plume extending out from the CWS.

During excavation of waste from the CWS, a layer of contaminated natural ground under the waste material will also be removed. During this activity it is expected that there will be some contaminated groundwater ingress into the excavation.

A capped waste stockpile leachate system is therefore required to manage the following water sources:

- stormwater that falls on the CWS and becomes contaminated during excavation

- residual leachate in the waste material and contaminated groundwater that enters the capped waste stockpile excavation during the extraction of waste material and the underlying contaminated natural ground

Figure 2 below provide an indication of the staged approach potentially required to the opening up of the capped waste stockpile to manage leachate generation. The staging being in line with the stages identified within the leachate management options report.

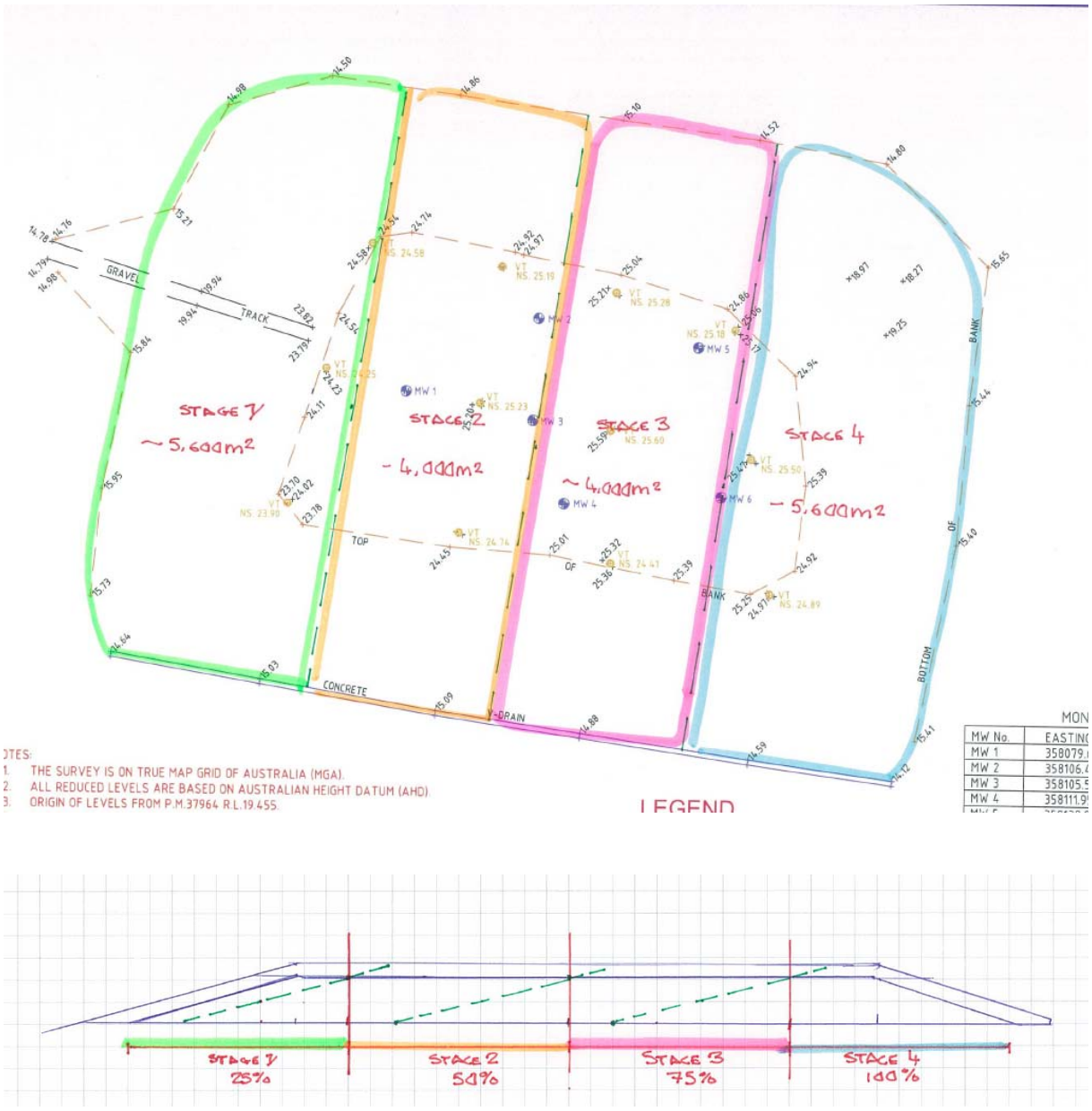


Figure 2 Capped Waste Stockpile Staging

A 2.5 ML leachate buffer dam adjacent to the capped waste stockpile may be required to be designed and constructed. This could be located at the current location of the 'Ahead of schedule Anode Pile', see Figure 3.

A leachate sump would be required in the lowest point of the capped waste stockpile. This sump shall be utilised for leachate management. Leachate can then be pumped to the leachate buffer dam, trucked to the leachate pond at the containment cell site or trucked directly off-site for treatment at a treatment facility.

The sump will require to be sized based on containing an agreed duration of rainfall and contractor proposed extraction methods, i.e. trucking to leachate pond versus piping to leachate pond.

Figure 3 Potential location for 2.5 ML Capped Waste Stockpile Leachate Buffer Dam

4.2.6.2 Containment cell

The designed leachate treatment system located at the containment cell, accounts for

- Stormwater that falls within waste containing sub-cells in the containment cell and becomes contaminated during the placement of waste
- Residual leachate generated from the containment cell following capping of the sub-cells

The leachate system designed includes

- Temporary in-cell storage (during storm events)
- 1 ML Leachate Buffer Dam adjacent to the containment cell.

4.2.6.3 Leachate management plans

Management plans required under the contract to manage leachate during and after rainfall events must consider:

- Compliance with the relevant State legislations, regulations and approvals
- Outline measures to minimise the potential for leachate migration from the capped waste stockpile
- Outline measures to minimise potential leachate migration from storage dams
- Detail a suitable monitoring program for characterising leachate quality
- Detail contingency measures to lower leachate levels
- Wet weather protocols to be implemented by Contractor to include (as a minimum):
  - Daily cover placement

- Sediment laden water run-off treatment
- Cessation of waste removal/placement activities

Mitigation measures that may be able to be incorporated to minimise the risk and consequences associated with the leachate management are summarised below

- Construction of leachate barrier systems
- Control of the leachate within the capped waste stockpile
- Maintaining sufficient freeboard in leachate storage dams
- Treatment of leachate extracted
- Treatment of excess leachate
- Diversion of stormwater into surface water capture systems
- Implementation of contingency leachate management measures, where needed

4.3 Waste materials including asbestos

Work involving cut and fill of waste materials is assumed to contain ACM, and therefore will be conducted by a licensed asbestos removal contractor.

A comprehensive asbestos management plan shall require to be developed for the works. The asbestos management plan is to be developed in accordance with the below Codes of Practice, which provide practical guidance on achieving the standards of health, safety and welfare required under the WHS Act and Regulation in relation to management of asbestos:

- SafeWork NSW 2016. *Code of Practice: How to manage and control asbestos in the workplace* (approved under Clause 274 of the Work Health and Safety Act 2011 NSW).
- SafeWork NSW 2016. *Code of Practice: How to safely remove asbestos* (approved under Clause 274 of the Work Health and Safety Act 2011 NSW).

The asbestos management plan would include but is not limited to the following:

- The identification, location, nature and extent of ACM at the site.
- Legislative and guidance framework.
- Management of asbestos at the site – signage, asbestos in soil management/removal methodologies, capping methodologies, air monitoring, clearance inspection.
- Plant, tools and equipment.
- PPE.
- Decontamination of personnel, plant and equipment, including wetting down of truckloads
- Waste disposal.
- Procedures for emergencies, incidents involving ACM.
- Unexpected finds protocol.
- Consultation, information, training responsibilities to workers carrying out asbestos work.
- Roles and responsibilities of workers.
- Health surveillance requirements.
- Air monitoring and removal procedures.
- PPE requirements and usage (decontamination procedures).
- ACM risk control measures.

- Timetable for managing risks of exposure.

Other control measures for working with waste materials include:

- Minimise the amount of exposed waste at any one time.
- No stockpiling of excavated waste materials is allowed.
- Exposed waste materials must be covered at the end of each working day or sooner if possible.

Control air monitoring is to be conducted by an independent SafeWork NSW Licensed Asbestos Assessor. The contractor is to determine whether exposure monitoring is also required. Air monitoring should be carried out in accordance with the National Occupational Health and Safety Commission *Guidance Note on the Membrane Filter Method of Estimating Airborne Asbestos Fibres, 2nd edition* [NOHSC:3003 (2005)] and the results should be reported by a NATA accredited laboratory.

5. Project interfaces

5.1 Introduction

This section outlines the interfaces require to be considered around the site.

5.2 Site access

The site is accessed via Hart Road in Loxford, which is reached via the Hunter Expressway in the south-western edge of Hydro Land. The Hunter Expressway is a large freeway within the Lower Hunter Region that connects to the Pacific Motorway and Newcastle Link Road in the south and New England Highway in the north.

No issues with access to the site for delivery of materials and construction materials are anticipated.

All site access will be through the Hydro security gates at the main entrance using the main weighbridge.

Figure 4 View of Hydro site access gates

5.3 Demolition works

The demolition works will be partially completed prior to the commencement of the containment cell to ensure that all material to be placed within the containment cell is clearly stockpiled. Some existing sheds may be retained to protect these stockpiles and this will be subject to finalising details with the demolition contractor. If the demolition contractor remains on site during part of the cell works the following will require to be considered.

- Compound locations – an additional compound location will be required for the containment cell contractor if the demolition contractor remains on site. Indicative compound locations are shown in the construction staging sketches within Appendix A.
- Access across the haul road – this will essentially cut the site in two and we would propose that this be fenced off and a formal crossing point controlled by the containment cell contractor to ensure the safe operation of trucks through the site.
- Stockpile locations – locations will require to be secured where demolition contractor has completed works.

- SPL movements as well as planned activities by the Developer will need to be considered.

5.4 Hydro switchyard

The Hydro switchyard to the north of the site, is understood to remain operational during the duration of the works. Access to this will require crossing the site (including the temporary haul road).

The location of the switchyard limits the availability to access the containment cell from the north of the pot rooms.

Ausgrid access to the site must be retained during the works and arrangements must be agreed to maintain this, including access to the easement for feeder 96 W which crosses the main access road to the containment cell and connects into the western end of the switchyard.

Figure 5 Hydro switchyard and transformer yard to north of site

5.5 Adjacent development work

Development work is anticipated to be undertaken after the completion of the containment cell works and therefore have not been considered further at this stage, it should be noted that this may work in parallel and co-ordination may be required.

6. Construction facilities

6.1 Introduction

This section is to provide an indication of where the contractor would set up and likely constraints around working hours, programme etc. This is to feed into Section 7 on traffic movements.

6.2 Construction compound

A construction compound will be required by the containment cell contractor to allow for the following (however two may be required one at the capped waste stockpile and one at the containment cell):

- Contractor facilities
- Contractor parking
- Storage and delivery of materials

These can either be a single area preferably at the entrance to the site, however to reduce the requirement for double handling a material storage area could be nominated adjacent to the containment cell for the delivery of materials specific to the containment cell.

6.3 Compound services

Services required to be supplied to the construction compound will include:

- Water supply
- Sewerage
- Comms
- Power

The availability of these will require to be confirmed by Hydro for the nominated compound. Where these are not available, the contractor will require to provide their own temporary supplies.

7. Traffic movements

7.1 Introduction

This section outlines an estimate of the earthworks traffic movements around the site for each stage based on a number of assumptions outlined below.

7.2 Key assumptions

- Truck Capacity – 40 tonnes capacity (Figure 6)
- Truck Width – 3.43 m

Figure 6 Typical Earthworks Vehicle

- Hours of Operation to be as per Cessnock Council's approval for Stage 1 – 7 am to 6 pm (Monday to Friday), 7am to 1 pm (Saturday). No work on Sundays or Public Holidays unless agreed to by the Statutory Approval Authority.
- Two way operation on all roads and turnaround areas.

7.3 Summary of truck movements

The construction staging plans summarises the calculations for the movement of trucks around the site. This includes the assumptions around time to fill. Table 8 outlines the stages where movements have been estimated. The stages which have not been estimated will all include construction vehicles including trucks, graders and excavators.

Table 8 Heavy Vehicle Movements

Construction Stage	Stage Description	No. of Heavy Vehicle Movements estimated
Stage 1	Construct containment cell access road, temporary construction haul roads to proposed stockpile areas, erosion, and sediment control measures.	No
Stage 2	**Relocate stockpiles within containment cell site to nominated stockpile area**	**Yes**
Stage 3	**Excavation and stockpiling of containment cell site to design level subgrade**	**Yes**
Stage 4	Construction of containment cell liner to allow placement of material	No
Stage 5	**Placement of demolition and external stockpiles within containment cell**	**Yes**
Stage 6	**Removal and stockpiling of capped waste stockpile capping material**	**Yes**
Stage 7	**Placement of capped waste stockpile within containment cell**	**Yes**
Stage 8	**Placement of relocated stockpiles from containment cell site**	**Yes**
Stage 9	Placement of final cap for containment cell	Yes
Stage 10	Removal of haul roads and finalising of access road (surfacing)	No

Table 9 summarises the estimates of movements around the site for each stage.

Table 9 Summary of Truck Movements and Durations

Construction Stage	Total No. of Truck Movements (one way)	Estimated Duration to move material	
		4 trucks	6 trucks
2	1,519	5 weeks	3 weeks
3	2,824	10 weeks	7 weeks
5	4,078	20 weeks	13 weeks
6	1,920	6 weeks	4 weeks
7	8,170	30 weeks	20 weeks
8	315	1 week	1 week
9	1,920	6 weeks	4 weeks
TOTAL	**20,746**	**78 weeks (18 months)**	**52 weeks (12 months)**

Please note that this only includes estimates for moving of earthworks and does not include the time for elements particularly around the construction and testing of the liner, approvals and final capping system for the cell.

8. Materials

8.1 Introduction

This section summarises the materials required for the construction of the containment cell and identifies if any materials within the site would be suitable for use for this purpose. It also summarises if not able to be recycled where in the cell the different material should be placed.

8.2 Construction Materials

Table 10 below summarises the materials nominated for use within the design and identifies if potentially they could be sourced from site won material. This would be subject to further testing to confirm suitability and to identify the volumes required and available for the works.

Table 10 Site Won Material Re-use

Description	Potential for site won material	Potential Source
Sediment Detention Basin		
D50 100 mm Rip Rap	Yes	Crushed Demolition Material
Select Fill	Yes	Crushed Demolition Material
Leachate Buffer Storage Dam		
Clay Rich Fill	Yes	Capped Waste Stockpile Capping
Protection Geotextile	No	
2 mm HDPE Textured Geomembrane	No	
Select Fill	Yes	Crushed Demolition Material
Containment Cell Base and Sidewall Liner		
Groundwater Drainage Geocomposite	No	
Sand Drainage Layer	No	
Geosynthetic Clay Liner	No	
2 mm HDPE Geomembrane	No	
Protection Geotextile	No	
Drainage Aggregate	Yes	Crushed Demolition Material
Separation Geotextile	No	
Perimeter Bund		
Select Fill	Yes	Crushed Demolition Material

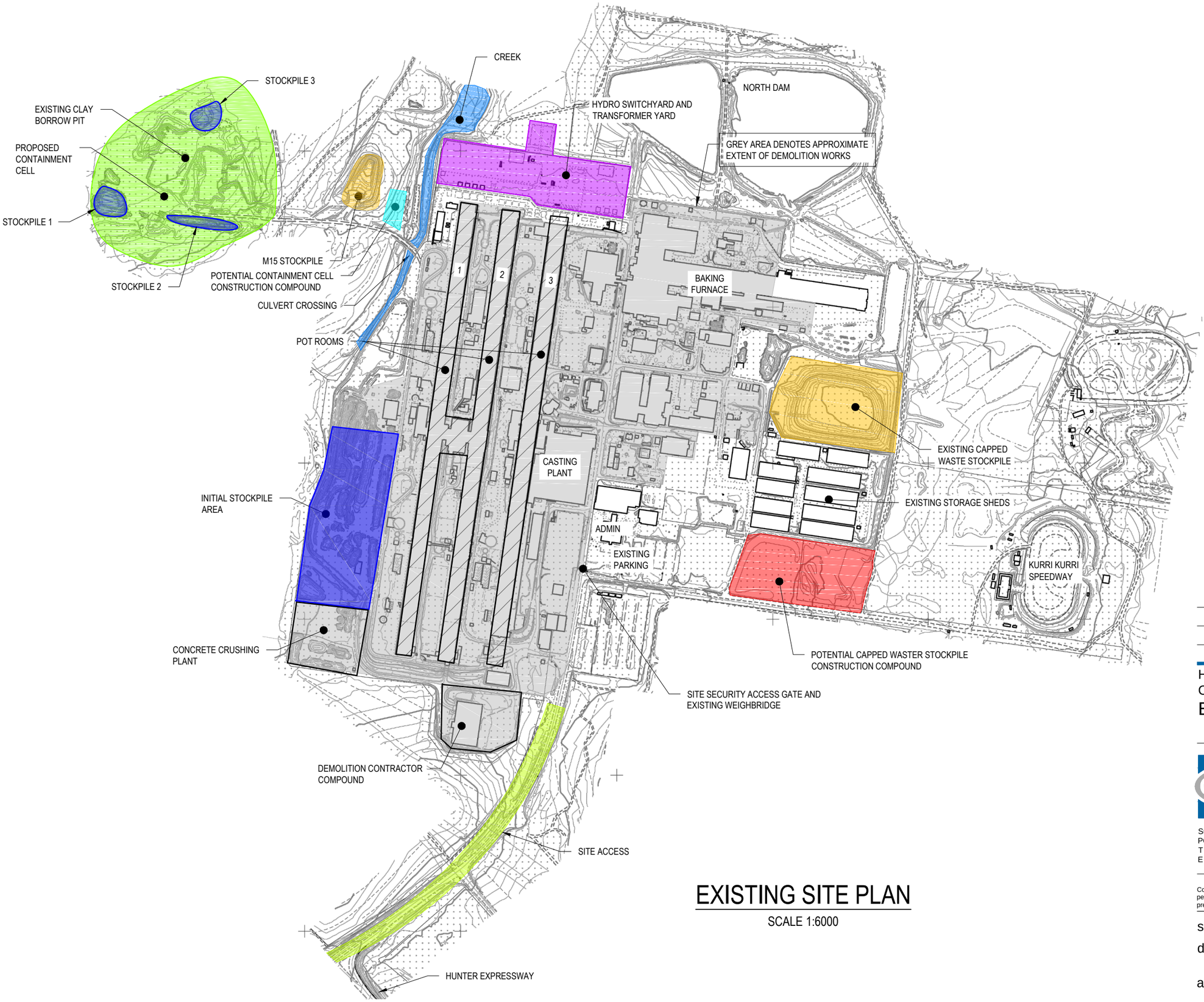
Description	Potential for site won material	Potential Source
Geogrid Geotextile Composite	No	
Geosynthetic Clay Liner	No	
Containment Cell Cap		
Geosynthetic Clay Liner	No	
Seal Bearing Layer	Yes	Capped Waste Stockpile Capping and Clay material below Capped Waste Stockpile
LLDPE Geomembrane	No	
Protective Geotextile	No	
Drainage Aggregate	Yes	Crushed Demolition Material
Separation Geotextile	No	
Subsoil Layer	Yes	Excavated Material from Containment Cell site.
Revegetation and Topsoil Layer	Yes	Excavated material from site – containment cell site or nominated location
Culvert Crossing		
Embankment Fill	Yes	Crushed demolition material
D20 300 mm Rip Rap	Yes	Crushed demolition material
Separation Geotextile	No	
Containment Cell Access Road		
Gravel Wearing Course	No	
Base Course – DGB20	Yes	Crushed demolition material
Select Fill Material	Yes	Crushed demolition material
Temporary Haul Roads		
Road Base – DGB20	Yes	Crushed demolition material

9. Constructability assessment

Appendix B outlines the risk register created to manage the constructability risks discussed as part of this report and within the design meetings on the project.

Appendices

Appendix A – Constructability Sketches



EXISTING SITE PLAN

SCALE 1:6000

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

EXISTING SITE OVERVIEW

GHD

Suite 10, 6 Reliance Drive Tuggerah Business Park
PO Box 3220 Tuggerah NSW 2259
T 61 2 4350 4100 F 61 2 4350 4101
E centralcoastmail@ghd.com W www.ghd.com

scale	1:6000 for A3	job no.	22-18015
date	JULY 2018	rev no.	C

approved (PD) SK001

Plot Date: 27 July 2018 - 11:46 AM Plotted by: Trish Etchells

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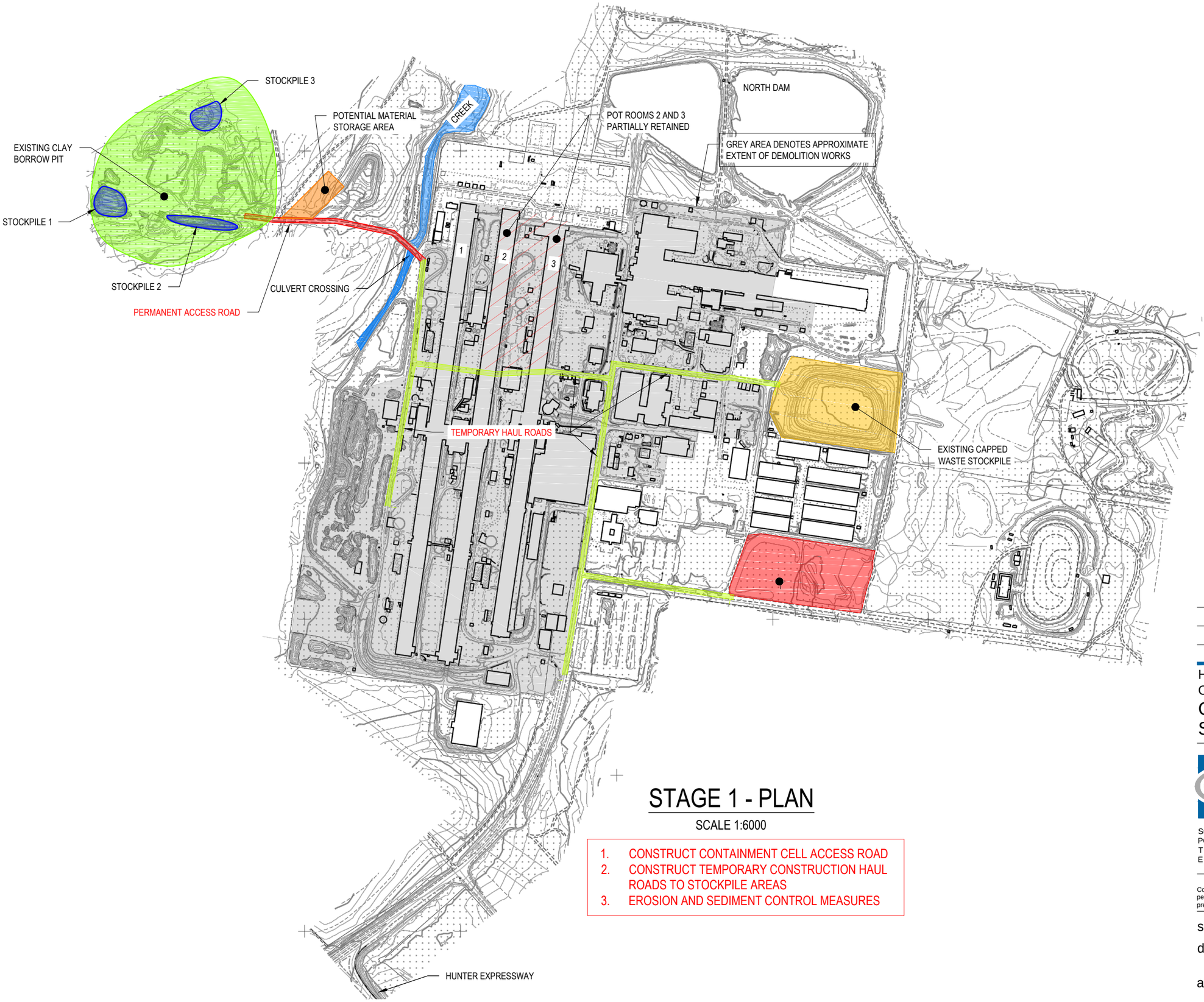

STAGE 1 - PLAN

SCALE 1:6000

1. CONSTRUCT CONTAINMENT CELL ACCESS ROAD
2. CONSTRUCT TEMPORARY CONSTRUCTION HAUL ROADS TO STOCKPILE AREAS
3. EROSION AND SEDIMENT CONTROL MEASURES

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 1

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scale	1:6000 for A3	job no.	22-18015
date	JULY 2018	rev no.	C

approved (PD) SK010

Plot Date: 27 July 2018 - 11:48 AM Plotted by: Trish Etchells
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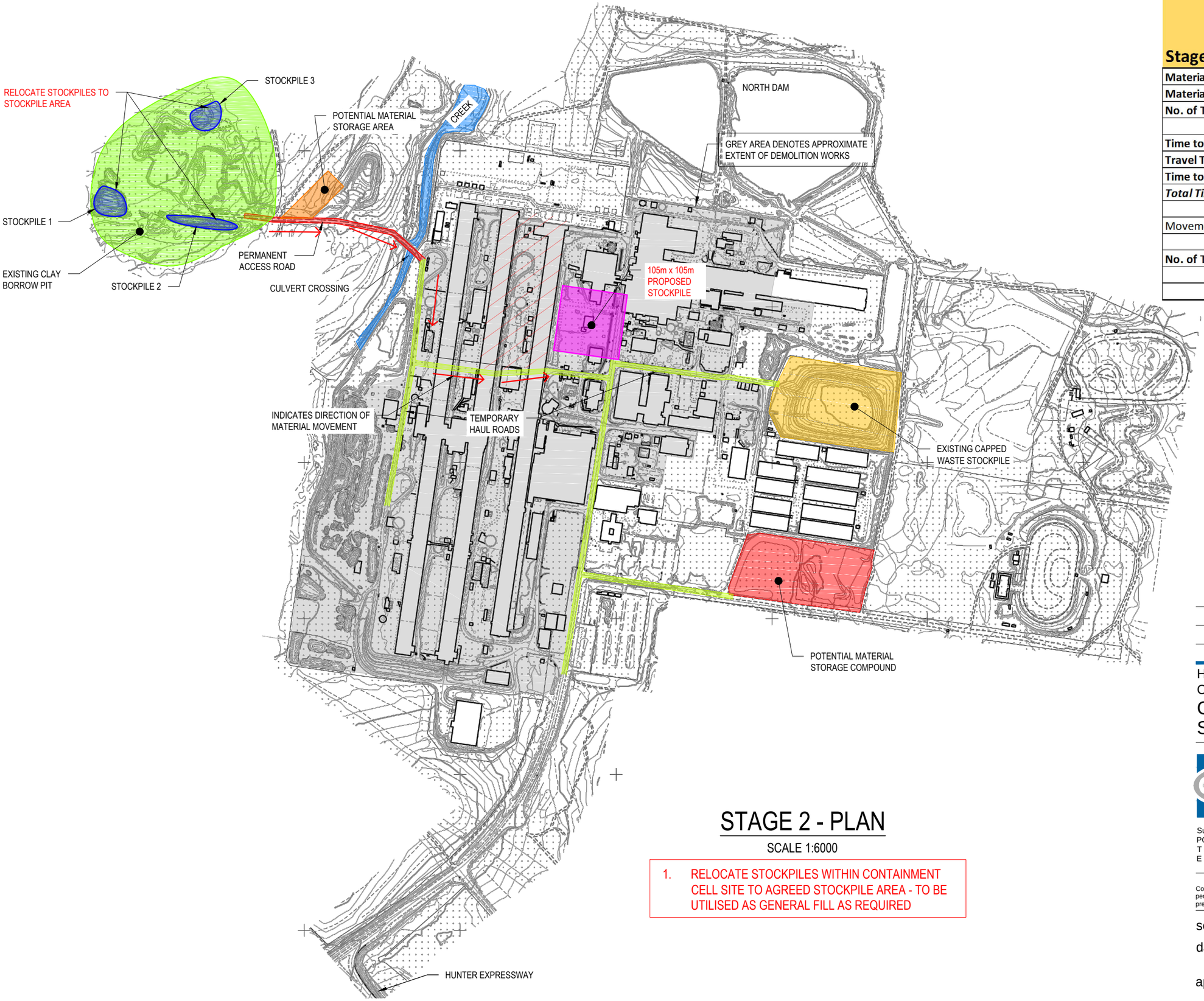

Stage 2	Relocate Stockpiles within Containment Cell Site to Nominated Stockpile	
Material Volume	33,751	m3
Material Weight	60,752	Tonnes
No. of Trucks	1,519	Trucks
Time to Fill	15	minutes
Travel Time	5	minutes
Time to Empty	10	minutes
Total Time	*30*	*minutes*
Movements per day	16	
No. of Trucks	**Duration to move material**	
4	**5**	weeks
6	**3**	weeks

STAGE 2 - PLAN

SCALE 1:6000

1. RELOCATE STOCKPILES WITHIN CONTAINMENT CELL SITE TO AGREED STOCKPILE AREA - TO BE UTILISED AS GENERAL FILL AS REQUIRED

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 2

GHD

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scale 1:6000 for A3 | job no. 22-18015
date JULY 2018 | rev no. C

approved (PD) SK020

Plot Date: 27 July 2018 - 10:53 AM Plotted by: Trish Etchells
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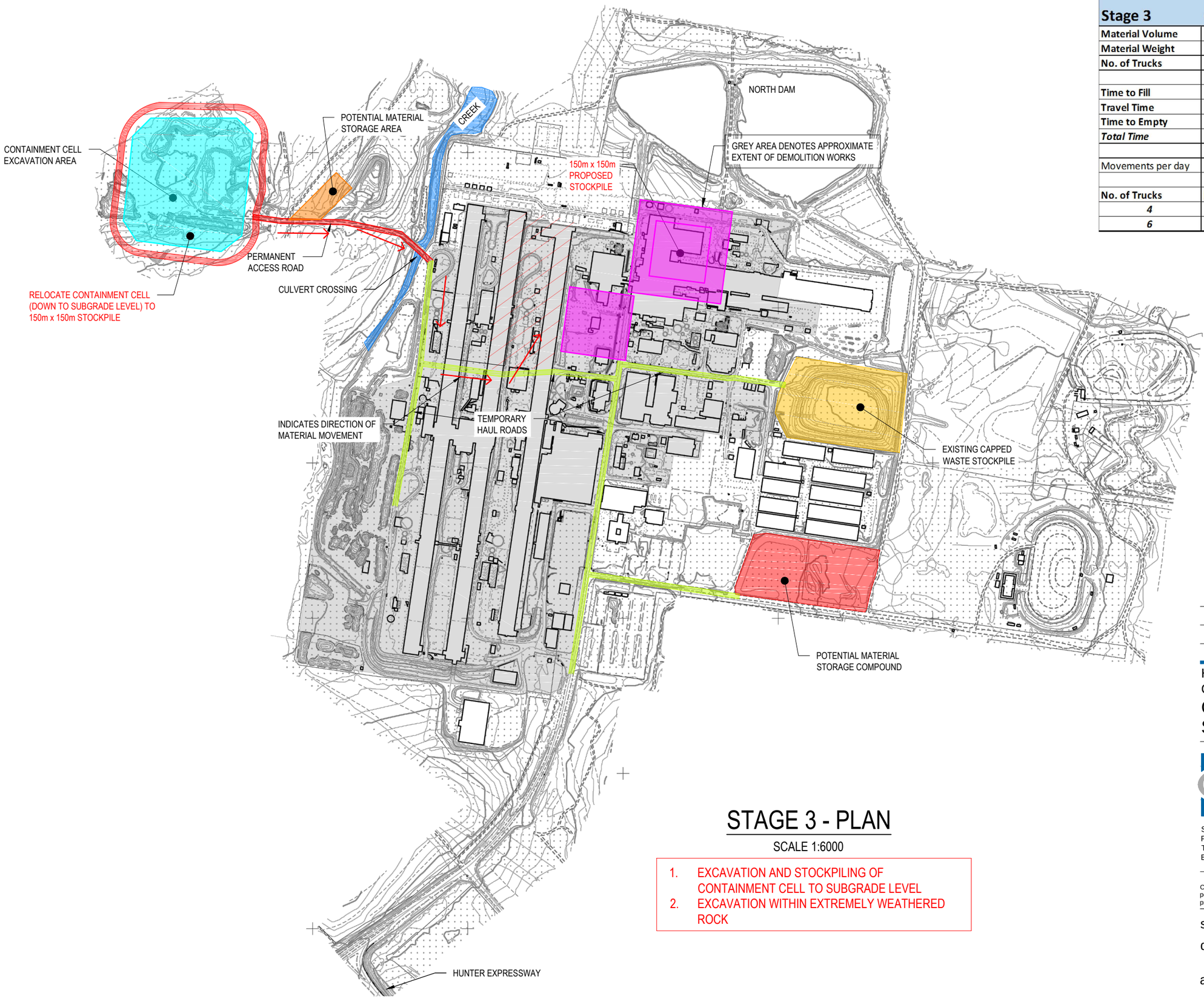

Stage 3	Excavation and Stockpiling of Containment Cell to Subgrade Level	
Material Volume	70,610	m3
Material Weight	112,976	Tonnes
No. of Trucks	2,824	Trucks
Time to Fill	20	minutes
Travel Time	5	minutes
Time to Empty	10	minutes
Total Time	*35*	*minutes*
Movements per day	13.7142857	
No. of Trucks	**Duration to move material**	
4	**10**	weeks
6	**7**	weeks

STAGE 3 - PLAN

SCALE 1:6000

1. EXCAVATION AND STOCKPILING OF CONTAINMENT CELL TO SUBGRADE LEVEL
2. EXCAVATION WITHIN EXTREMELY WEATHERED ROCK

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 3

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scale 1:6000 for A3 | job no. 22-18015
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approved (PD) SK030

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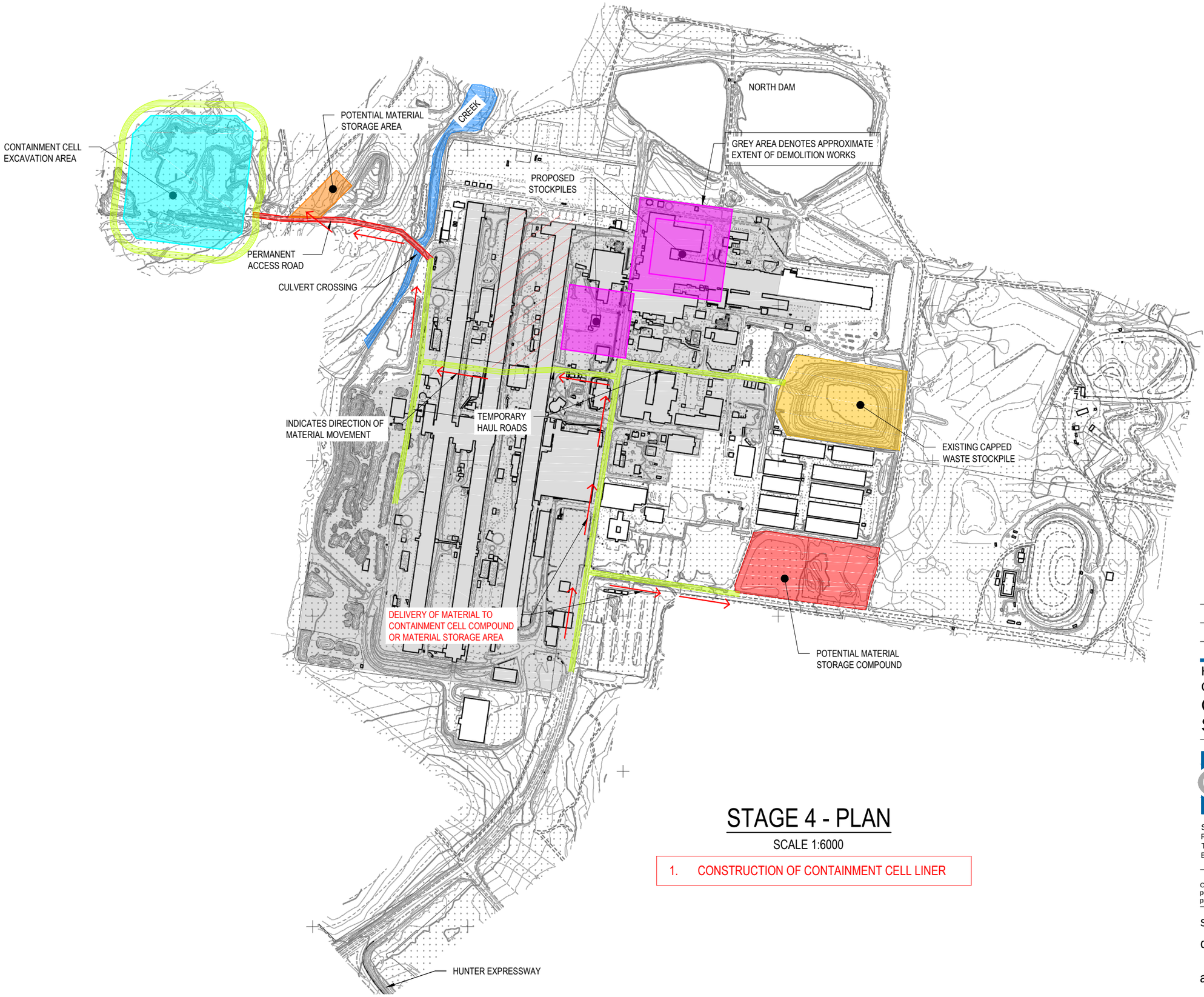

STAGE 4 - PLAN

SCALE 1:6000

1. CONSTRUCTION OF CONTAINMENT CELL LINER

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
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HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 4

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scale 1:6000 for A3 | job no. 22-18015
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approved (PD) SK040

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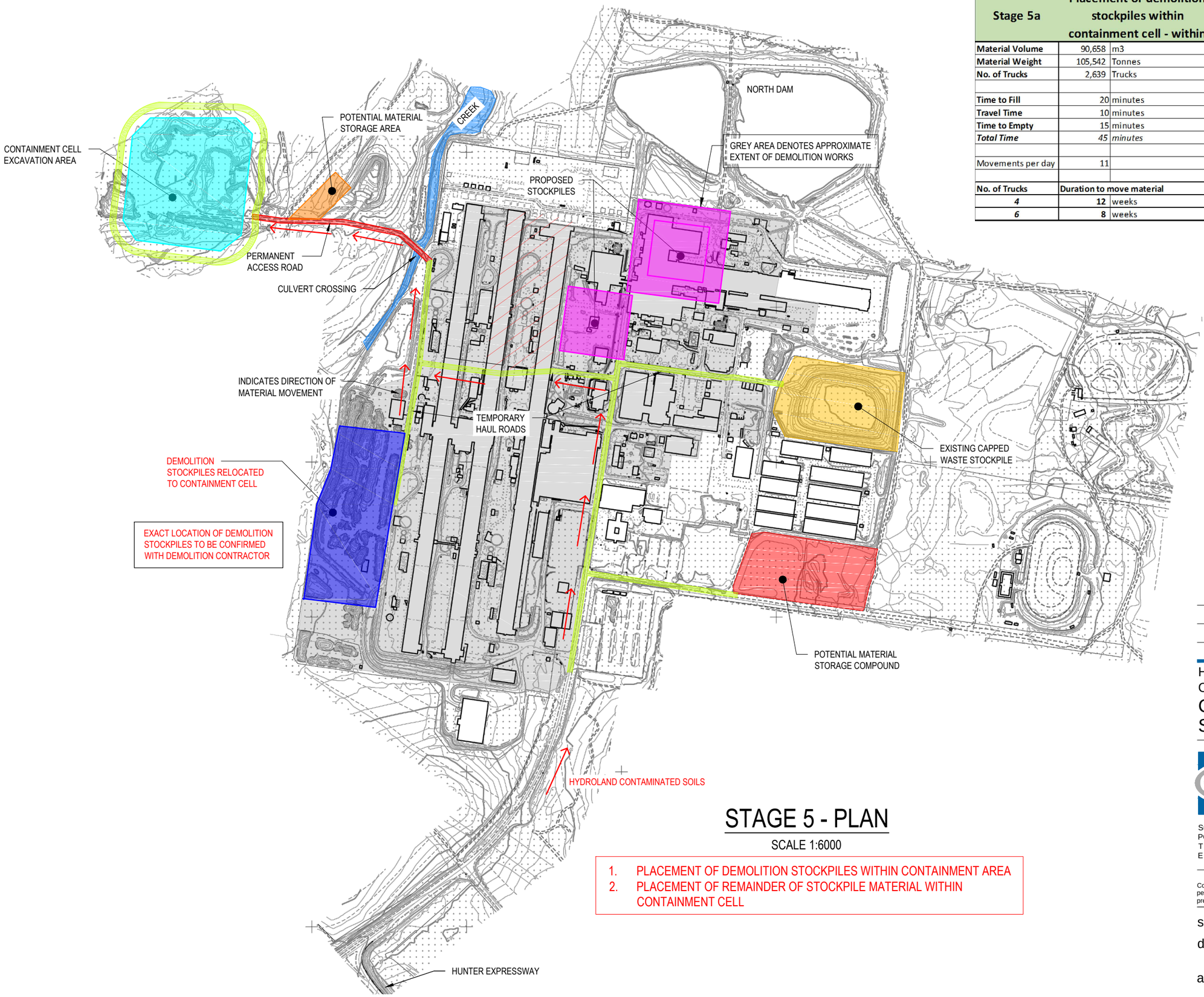

Stage 5a	Placement of demolition stockpiles within containment cell - within		Stage 5b	Placement of stockpiles external to site	
Material Volume	90,658	m3	**Material Volume**	32,324	m3
Material Weight	105,542	Tonnes	**Material Weight**	57,574	Tonnes
No. of Trucks	2,639	Trucks	**No. of Trucks**	1,439	Trucks
Time to Fill	20	minutes	**Time to Fill**	20	minutes
Travel Time	10	minutes	**Travel Time**	20	minutes
Time to Empty	15	minutes	**Time to Empty**	15	minutes
Total Time	*45*	*minutes*	***Total Time***	*55*	*minutes*
Movements per day	11		Movements per day	9	
No. of Trucks	**Duration to move material**		**No. of Trucks**	**Duration to move material**	
4	**12**	weeks	***4***	**8**	weeks
6	**8**	weeks	***6***	**5**	weeks

STAGE 5 - PLAN

SCALE 1:6000

1. PLACEMENT OF DEMOLITION STOCKPILES WITHIN CONTAINMENT AREA
2. PLACEMENT OF REMAINDER OF STOCKPILE MATERIAL WITHIN CONTAINMENT CELL

PRELIMINARY

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C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 5

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E centralcoastmail@ghd.com W www.ghd.com

scale 1:6000 for A3 | job no. 22-18015
date JULY 2018 | rev no. C

approved (PD) SK050

Plot Date: 27 July 2018 - 11:22 AM Plotted by: Trish Etchells
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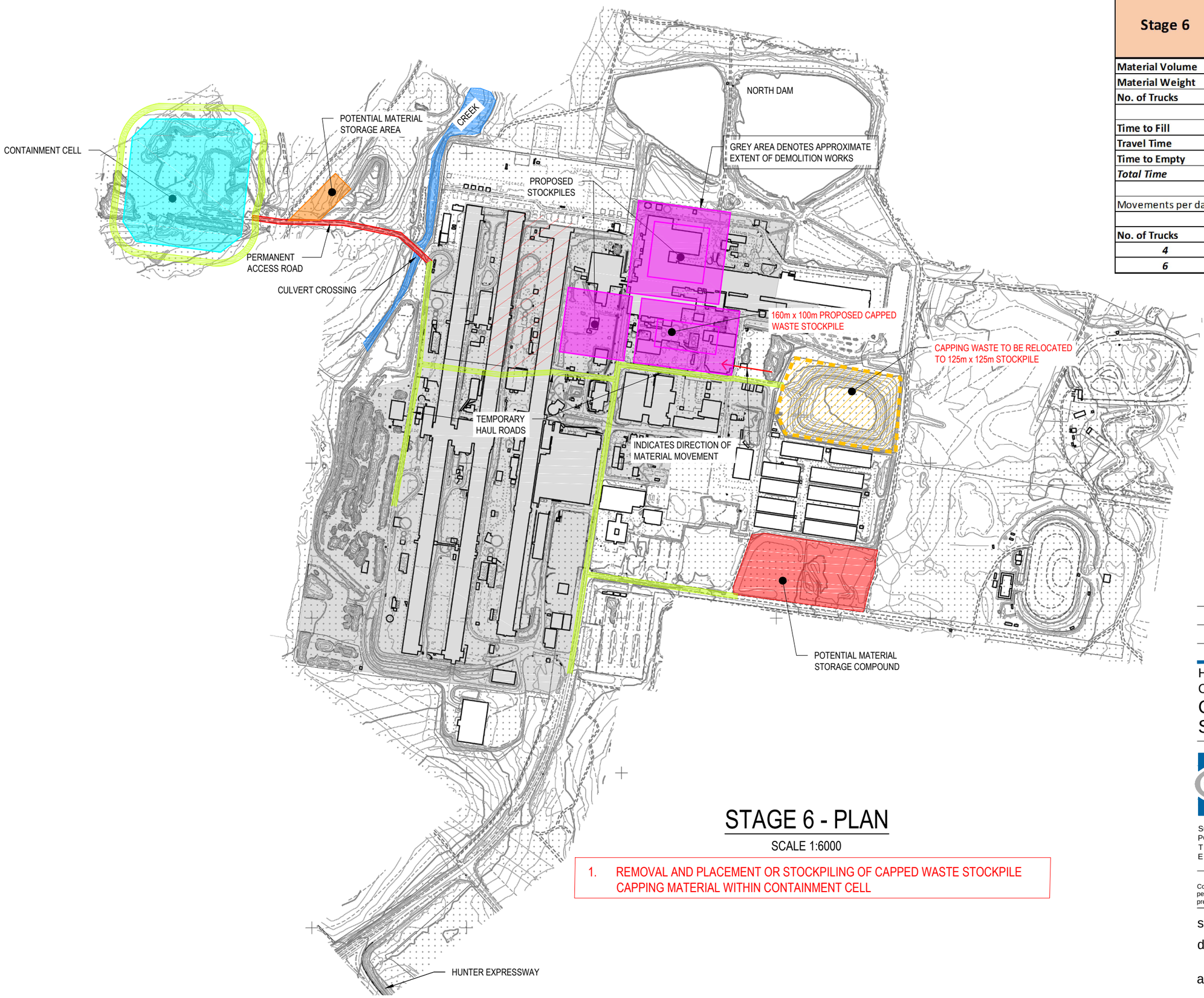

Stage 6	Removal and Stockpiling of Capped Waste Stockpile Capping Material	
Material Volume	48,000	m3
Material Weight	76,800	Tonnes
No. of Trucks	1,920	Trucks
Time to Fill	15	minutes
Travel Time	5	minutes
Time to Empty	10	minutes
Total Time	*30*	*minutes*
Movements per day	16	
No. of Trucks	**Duration to move material**	
4	**6**	weeks
6	**4**	weeks

STAGE 6 - PLAN

SCALE 1:6000

1. REMOVAL AND PLACEMENT OR STOCKPILING OF CAPPED WASTE STOCKPILE CAPPING MATERIAL WITHIN CONTAINMENT CELL

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 6

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scale 1:6000 for A3 | job no. 22-18015
date JULY 2018 | rev no. C

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Plot Date: 27 July 2018 - 11:31 AM Plotted by: Trish Etchells
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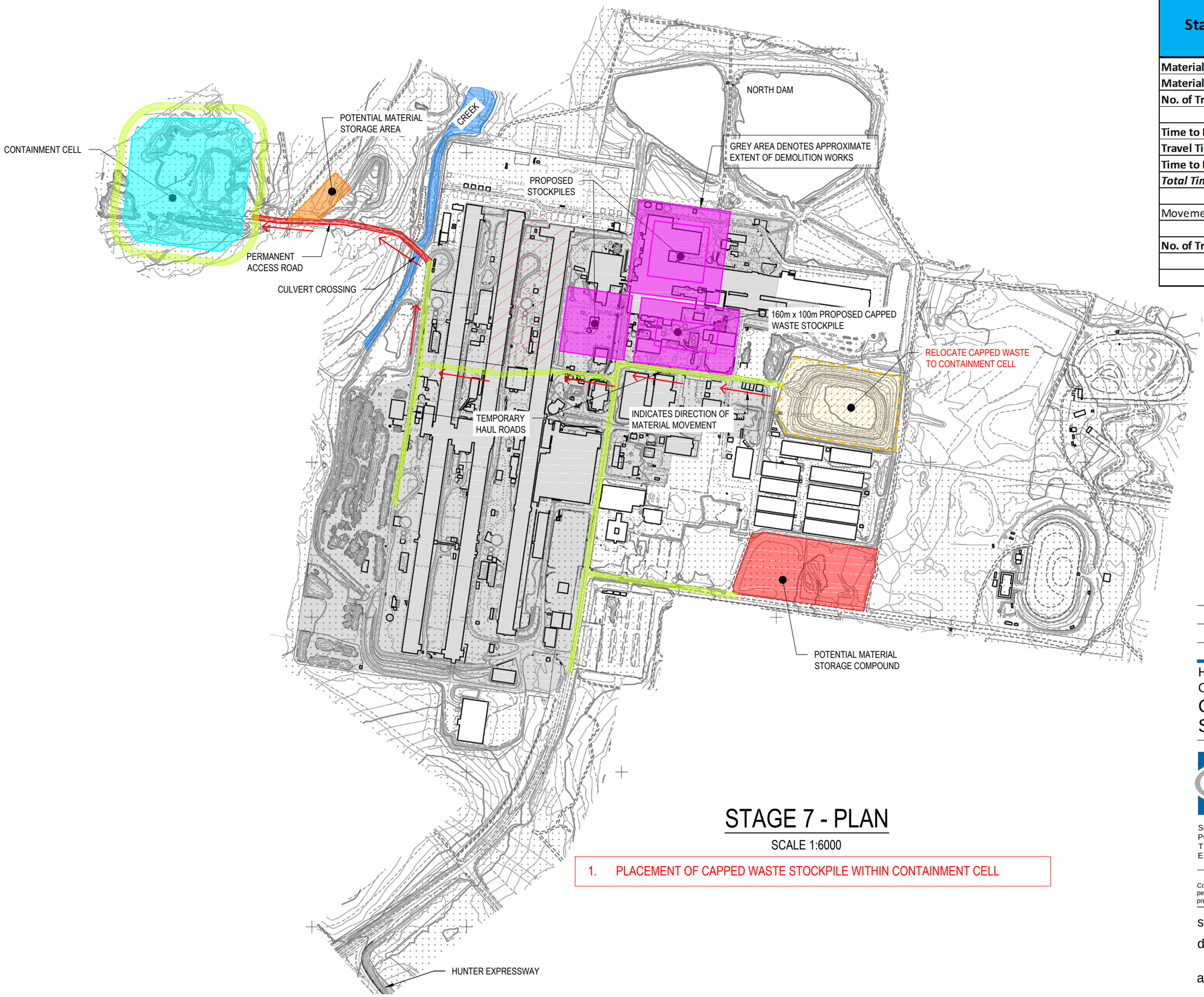

Stage 7	Placement of Capped Waste Stockpile within Containment Cell	
Material Volume	183,491	m3
Material Weight	326,816	Tonnes
No. of Trucks	8,170	Trucks
Time to Fill	10	minutes
Travel Time	10	minutes
Time to Empty	15	minutes
Total Time	*35*	*minutes*
Movements per day	13.7142857	
No. of Trucks	**Duration to move material**	
4	**30**	weeks
6	**20**	weeks

STAGE 7 - PLAN

SCALE 1:6000

1. PLACEMENT OF CAPPED WASTE STOCKPILE WITHIN CONTAINMENT CELL

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 7

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PO Box 3220 Tuggerah NSW 2259
T 61 2 4350 4100 F 61 2 4350 4101
E centralcoastmail@ghd.com W www.ghd.com

scale 1:6000 for A3 | job no. 22-18015
date JULY 2018 | rev no. C

approved (PD) SK070

Plot Date: 27 July 2018 - 11:34 AM Plotted by: Trish Etchells
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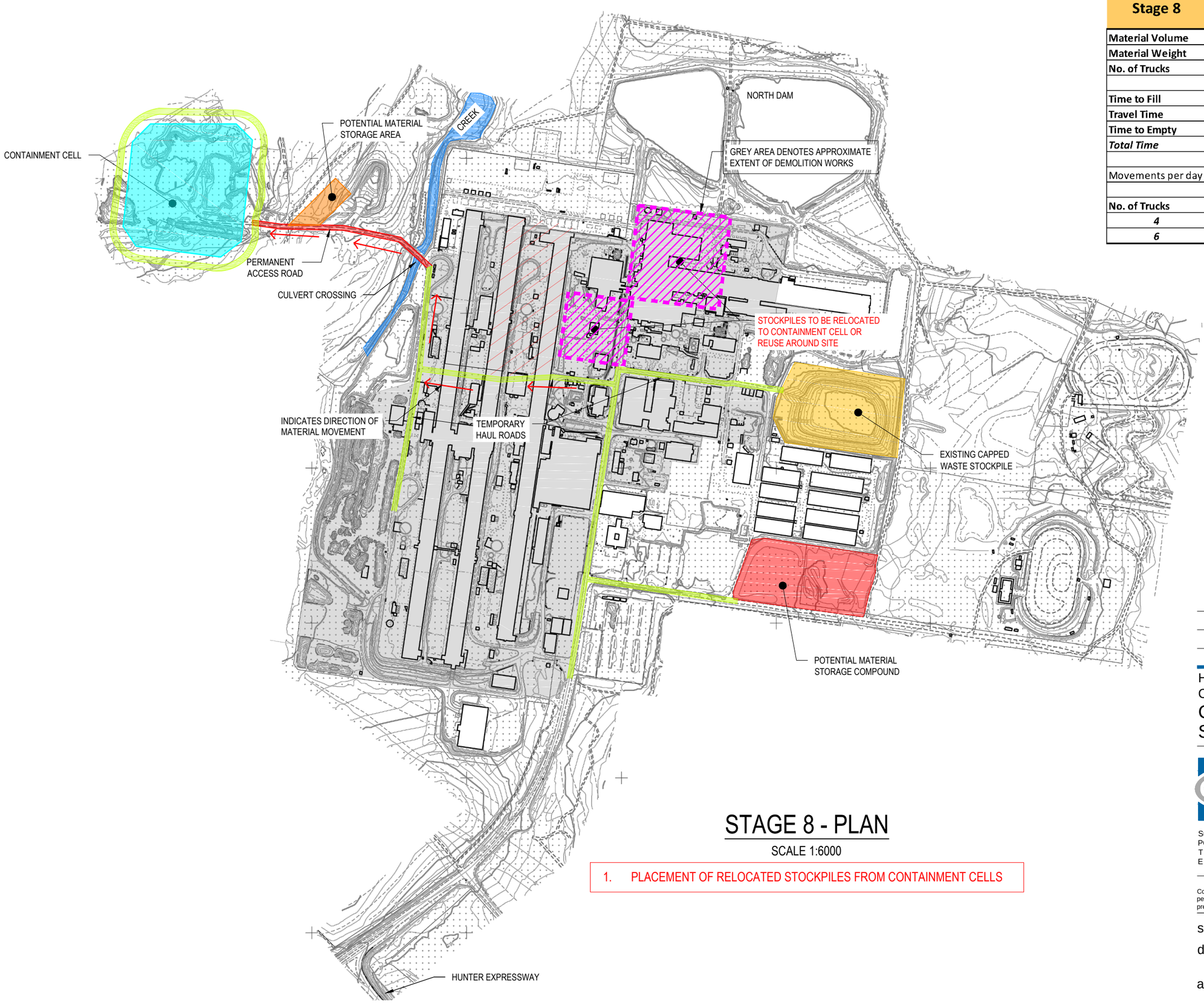

Stage 8	Placement of Relocated Stockpiles from Containment Cells	
Material Volume	6,622	m3
Material Weight	12,611	Tonnes
No. of Trucks	315	Trucks
Time to Fill	15	minutes
Travel Time	5	minutes
Time to Empty	15	minutes
Total Time	*35*	*minutes*
Movements per day	14	
No. of Trucks	**Duration to move material**	
4	**1**	weeks
6	**1**	weeks

N

STAGE 8 - PLAN

SCALE 1:6000

1. PLACEMENT OF RELOCATED STOCKPILES FROM CONTAINMENT CELLS

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 8

Suite 10, 6 Reliance Drive Tuggerah Business Park
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T 61 2 4350 4100 F 61 2 4350 4101
E centralcoastmail@ghd.com W www.ghd.com

scale 1:6000 for A3 | job no. 22-18015
date JULY 2018 | rev no. C

approved (PD) SK080

Plot Date: 27 July 2018 - 11:38 AM Plotted by: Trish Etchells
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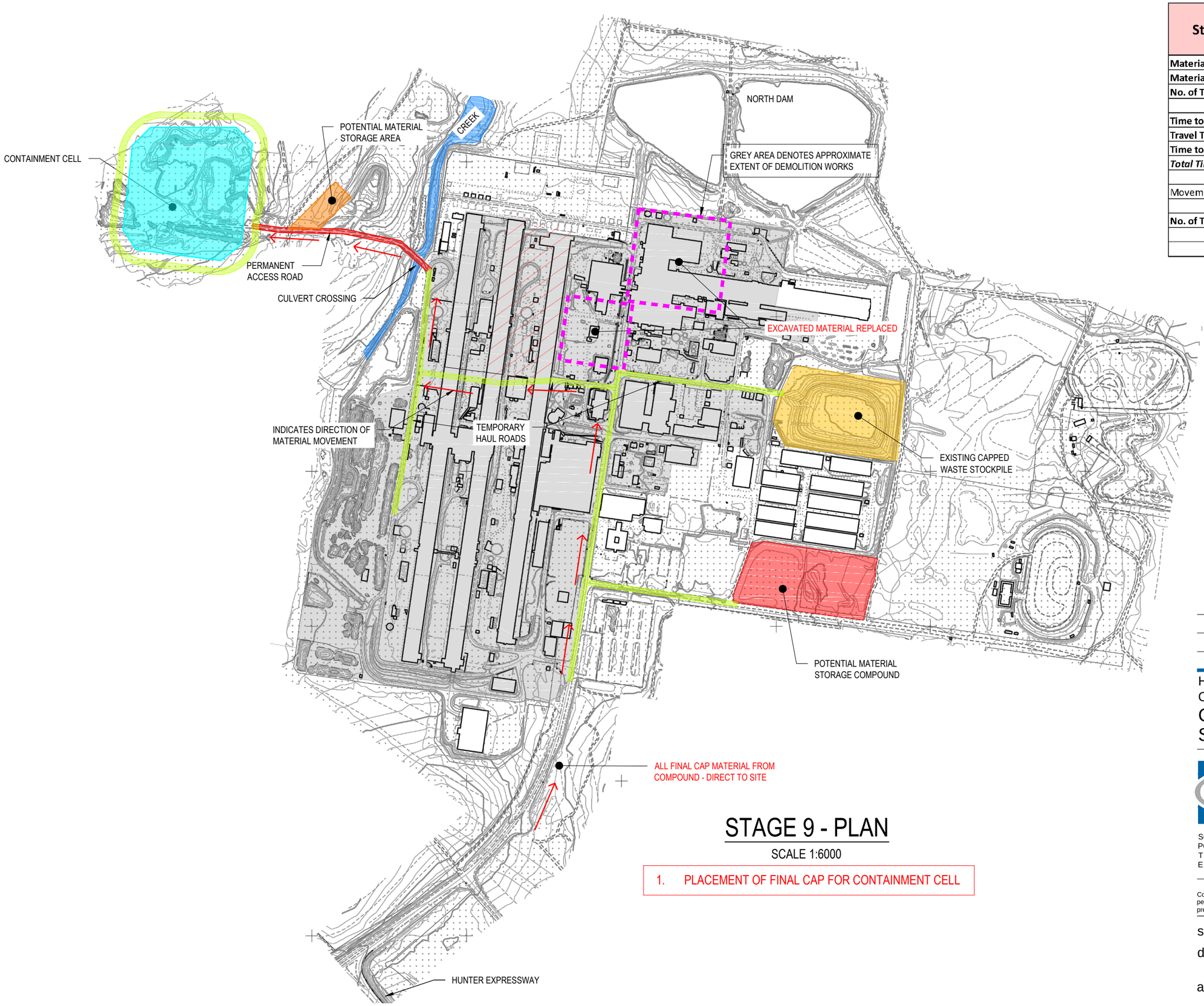

Stage 9	Movement of Capping Material	
Material Volume	48,000	m3
Material Weight	76,800	Tonnes
No. of Trucks	1,920	Trucks
Time to Fill	15	minutes
Travel Time	5	minutes
Time to Empty	10	minutes
Total Time	*30*	*minutes*
Movements per day	16	
No. of Trucks	**Duration to move material**	
4	**6**	weeks
6	**4**	weeks

STAGE 9 - PLAN

SCALE 1:6000

1. PLACEMENT OF FINAL CAP FOR CONTAINMENT CELL

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 9

GHD

Suite 10, 6 Reliance Drive Tuggerah Business Park
PO Box 3220 Tuggerah NSW 2259
T 61 2 4350 4100 F 61 2 4350 4101
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scale	1:6000 for A3	job no.	22-18015
date	JULY 2018	rev no.	C

approved (PD) SK090

Plot Date: 27 July 2018 - 11:40 AM Plotted by: Trish Etchells

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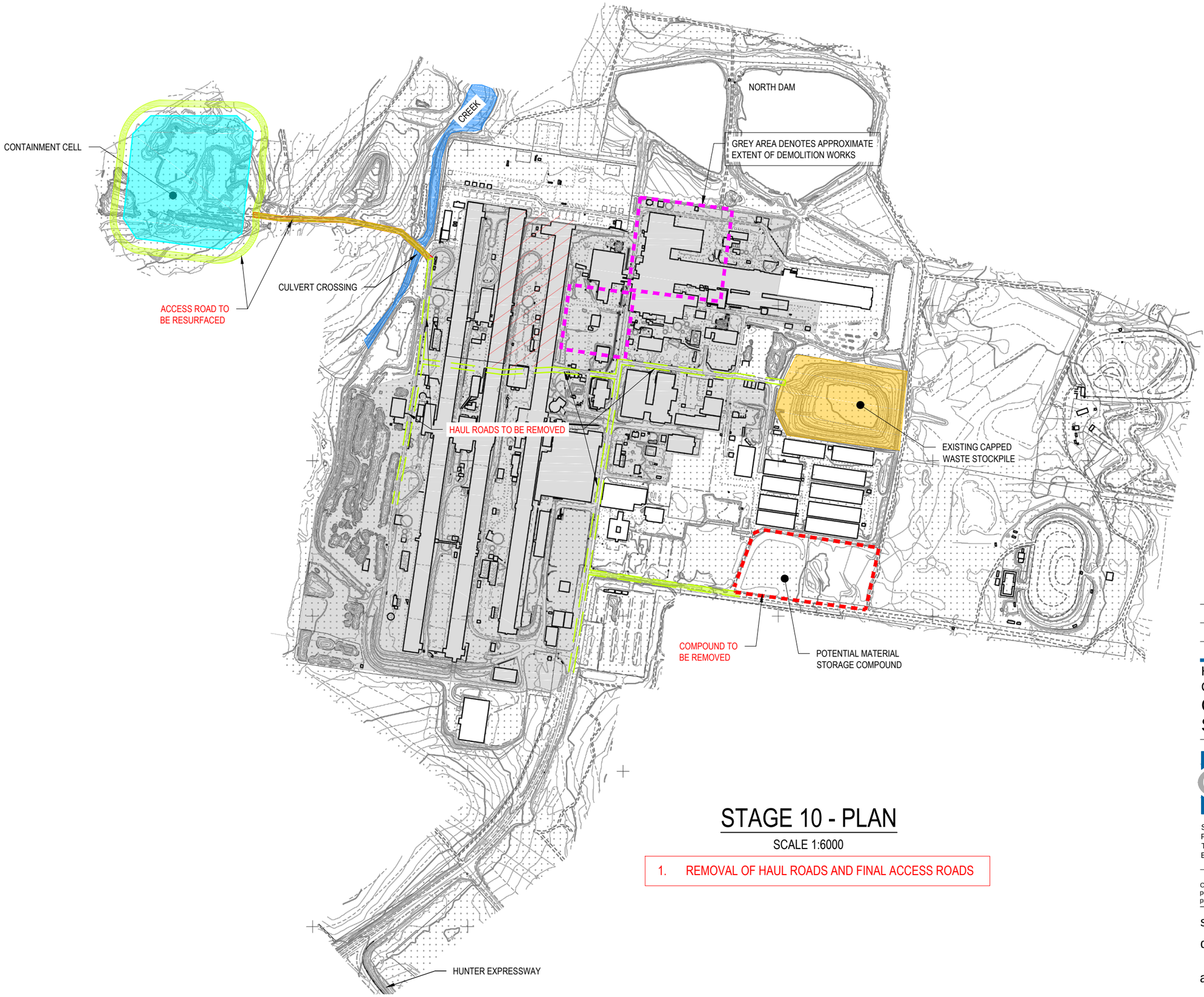

STAGE 10 - PLAN

SCALE 1:6000

1. REMOVAL OF HAUL ROADS AND FINAL ACCESS ROADS

N

PRELIMINARY

rev	description	app'd	date
C	UPDATED WITH COMMENTS	DB	27/07/18
B	FINAL ISSUE	DB	19/10/17

HYDRO ALUMINIUM KURRI KURRI PTY LTD
CONSTRUCTABILITY REVIEW

CONSTRUCTION STAGING STAGE 10

GHD

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PO Box 3220 Tuggerah NSW 2259
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scale	1:6000 for A3	job no.	22-18015
date	JULY 2018	rev no.	C

approved (PD) SK100

Plot Date: 27 July 2018 - 11:42 AM Plotted by: Trish Etchells

Cad File No: N:\AU\Sydney\Projects\22\18015\CADD\Drawings\Drawings\Construction Staging Sketches\18015-SK100 - Construction Staging Stage 10.dwg

Appendix B – Constructability Assessment Issues Register

Constructability Assessment Issue Register

Project name:	**Hydro Aluminium Kurri Kurri** **Containment Cell Design and Associated Services**
Project number:	**2218015**
Region:	**Kurri Kurri**
Project review stage:	**Detailed Design**

Created by:	David Morrison
Date created:	4/10/2016
Revised by:	David Morrison
Date revised:	15/09/2017

Legend
Review Stage: Grey cells indicate the Review Stage applicable to each checklist item.

Reference	Checklist item	Review Stage				Indicate item requires Action or No Action.	Project issue	Relevant document reference	Recommended action			Status	
		Option selection	Concept	Detailed	Contract Doc's				Improvement action or alternative suggestion (include estimated saving for Extreme priority items)	Responsible party	Timetable	Current? (Y/N)	Comment
1.00	**CONSTRUCTION SEQUENCING**												
	Site Access												
1.01	Temporary Access Required					Action	Construction access into site to be clearly defined	Constructino Staging Sketches	HAKK to clearly define site areas of responsibilty within site. I.e what areas are contractor responsible for	HAKK	Prior to construction	Y	Open
1.02	Permananet Access					Action	Permanent access into and around site to be clearly defined.	Detailed Design Drawings	Access road to containment cell to be defined. Design vehicles to be confirmed. Access roads shown on detailed design plans		Detailed Design	N	Closed
	Overall Staging												
1.03	Access Construction					Action	Timelines of demolition contractor and containment cell contractor to be defined. Boundaries with areas of responsibility to be defined	Not Applicable	HAKK to confirm programme overlap between demolition contractor and containment cell contractro	HAKK	Prior to construction	Y	Open
1.04	Demoition Areas					Action	Demoltion areas to be confirmed - dependent on developer requirements	Construction Staging Sketches	HAKK to confirm status of Pot Rooms 2 and 3 - retained or not retained. Top 250m of Pot Rooms 1 and 2 retained. Haul roads updated to reflect		Detailed Design	N	Closed
	CAPPED WASTE STOCKPILE												
1.06	Transfer to Containment Cell					Action	Material from site may not be suitable for reuse (clay, concrete, refactory)	Constructability Report	Testing will not be able to be tested until during construction. Flexibility in design to accommodate unsuitability of material. GHD have identified material that coulc potentially be used. Testing require to confrim if it meet spec outlined within techncial spec	CONTRACTOR	Detailed Desgin	Y	Open
1.07	Capped Wast Stockpile - Opening Up					Action	Opening up of capped waste stockpile	Construction Staging Sketches	Area required for storage of topsoil and cap material. HAKK to nominate area suitable for storage of materials. GHD have nominated potential locations and shown size of stockpiles	HAKK	Construction	Y	Open
1.08	Overland Flow					Action	Dealing with overland flow - diversion	Detailed Design Drawings	Diversion drains to be constructed around containment cell. GHD to provide design to demonstrate . Included within detailed design		Detailed Design	Y	Closed
1.09	Excavation					Action	Direction to commence excavation	Construction Staging Sketches	Construction from west to east. Minimising opening up of exposed matrial. This will form part of the contractors Construction Management Plan	CONTRACTOR	Construction	N	Open
1.10	Post excavation treatment					Action	Treatment of capped waste stockpile post excavation	Construction Staging Sketches	Final solution and treatment of capped waste stockpile to be confirmed. For assessment we have assumed that the cap and top soil replaced onto site	HAKK	Detailed Design	Y	Open
1.11	Waste volumes					Action	Uncertainty in waste volumes	Detailed Design Drawings	Additional capacity required within containment cell. GHD to ensure design flexible to accommodate potential for additional material. Flexibility withn design to accommodate this		Detailed Design	N	Closed
1.12	Plant laydown					Action	Laydown areas for plant to be confirmed	Construction Staging Sketches	Turning facilities for trucks - proposed capacity for 2 trucks at a time. Detailed design to demonstrate adequate area for stormage of vehicles. L		Detailed Design	N	Closed
	CONTAINMENT CELL												
1.05	Storage Areas					Action	Temporary storage of materials to be defined. Access arrangements to material.	Construction Staging Sketches	HAKK to nominate storage areas within site for contractor. GHD to confirm volume and area requirements	HAKK	Prior to construction	Y	Open
	Vehicular access into containment cell					Action	Access into cell for excavation	Detailed Design Drawings	Vehicle tracking to be undertaken to confirm access into and out of containment cell via ramp. Maximu ramp grade to be confirmed. Ramps designed as part of works		Detailed Design	Y	Closed
	Temprary storage of excavated material					Action	Removal of excavated mateiral. Laydown locations to be confirmed	Construction Staging Sketches	Laydown areas to be confirmed. GHD to confirm volumes and areas required. HAKK to confirm availabilty of areas within site. Stockpile ares nominated in constructability sketches	HAKK	Construction	Y	Open
	Leachate generation					Action	Preventing excavated material from generating leachate.	Detailed Design Drawings	Contractor to stage works to ensure leachate generation minimised	CONTRACTOR	Construction	Y	Open
	Vehcile access points					Action	Same access egress points or different. Impact on filling operations to be considered. Poor access to cells will slow the rate at which the cells can be constructed and also filled during operation.	Not Applicable	Contractor to stage works to ensure works can be undertaken within nominated programme	CONTRACTOR	Construction	Y	Open
	Containment Cell Flooding					Action	Flooding of the containment cell could cause traffic issues and increase the potential for leackage	Detailed Design Drawings	Temporary bunds to be designed by contractor to prevent overland flow entering containment cell		Prior to construction	Y	Closed
	Perimiter Bunds					Action	Sequencing of perimiter bunds to retain access during construction. Constructed in advance of excavation to prevent stormwater innundation of excavation	Construction Staging Sketches	Contractor to consider in construction methodology	CONTRACTOR	Prior to construction	Y	Open
						Action	Waste may not fill as predicted, it may slip and flatten along the base of the cell.	Not Applicable	Contractor to develop methodology to accommodate this	CONTRACTOR	Prior to construction	Y	Open
	Final Cap					Action	Source of materials for final cap	Detailed Design Specification	GHD to confirm material spec and volumes required for cap. Provided in specs		Detailed Design	N	Closed
	SERVICES AND UTILITIES												
	Temporary Serivces					Action	Temporary Services required for development of containment cell	Not Applicable	CONTRACTOR to confirm what temporary services will be required to be provided	CONTRACTOR	Detailed Design	Y	Open
	Permanent Services					Action	Permanent services required for containment cel	Detailed Design Drawings	GHD to confirm what permanent services will be required to be provided. Detailed Design plans		Detailed Design	Y	Closed
	Future Services					Action	Future Services required for containment cell (for future development)	Not Applicable	HAKK to confirm what future services will be required for development sites	HAKK	Detailed Design	Y	Open
	Existing Services to be retained					Action	Services to be protected - how do these impact proposed work staging	Not Applicable	GHD to idetify existing services impacted by works and confirm with HAKK strategy for protection/removal. Shown in detailed design plans		Detailed Design	N	Closed
	Existing Services					Action	Existing services may not be suitable for work	Not Applicable	HAKK to confirm capacity of existing services and suitability for re-use.	HAKK	Detailed Design	Y	Open
	Existing Services to to be removed					Action	Services to be removed - dug out and removed or left in place.	Detailed Design Drawings	GHD to identify existing services within works impacted by works and will require removal. Shown in detailed design plans		Detailed Design	N	Closed
	ROADS AND GENERAL CIVIL WORKS												
	Haulage routes					Action	Access from site compound to capped cell waste and containment cell	Construction Staging Sketches	HAKK to confirm route between capped waste stockpile and containment cell.	HAKK	Prior to Construction	Y	Open
	Temporary Roads					Action	Routes from existing materials to containment cell	Construction Staging Sketches	HAKK to confirm routes between existing materials and containment cell	HAKK	Prior to Construction	Y	Open
	Development Proposals - Alternaitve Roads					Action	Alternative route dependent on development proposal	Construction Staging Sketches	HAKK to advise	HAKK	Prior to Construction	Y	Open
	Haulage Road Widths					Action	Width of temporary roads. Two way or single with passing places and traffic controllers	Construction Staging Sketches	HAKK to advise on width available	HAKK	Prior to Construction	Y	Open
	Material sources					Action	Material sources for permanent roads	Detailed Design Drawings	GHD to confrim volumes required for road base - permanent roads. HAKK to confirm volumes available for re-use	HAKK	Detailed Design	Y	Open
	Creek Crossing					Action	Construction across creek - permanent or temporary	Detailed Design Drawings	Status of creek crossing to be confirmed by HAKK - Permanent or Temporary. If Permanent then future requirements to be confirmed.	HAKK	Detailed Design	Y	Open
	Existing Roads to be removed					Action	Staging for removal. How will this impact on proposed works. Timing for removal.	Detailed Design Drawings. Construction Staging sketches	GHD to identify existing roads to be removed and confrim with HAKK impact on future and current operations. No existing roads to be removed within limit of works.	HAKK	Detailed Design	Y	Open
	STORMWATER AND LEACHATE MANAGEMENT												
	Erosion and Sediment Control					Action	location of sediment basin and impact on construction.	Detrailed Design Drawings	Sediment basins to be co-ordinated with storage areas to ensure adequate space. Indicative stockpile areas relocated to accommodate basins and prevent co-ordination issues		Detailed Design	N	Closed
	Gas Disposal					Action	Potential for gas build up during construction works. When will gas system be installed	Detrailed Design Drawings	Sequencing to be considered		Detailed Design	Y	Open
	PROJECT INTERFACES												
	Containment Cell Contractor - HAKK					Action	Any interfaces between HAKK operations and containment cell contractor to access site	Construction Staging Sketces	HAKK to confirm interfaces and provide input into GHD detailed design as required.	HAKK	Detailed Design	Y	Open
	Containment Cell Contractor - Demolition Contractor					Action	Definition of areas of responsibity between containment cell contractor and demolition contractor. Timing between two	Construction Staging Sketces	HAKK to confirm timing of works and confirm defined areas between both parties (if applicable)	HAKK	Prior to Construction	Y	Open
	Ausgrid Staff - Containment Cell Contractor					Action	Ausgrid access to substation during containment cell construction	Construction Staging Sketces	HAKK to confirm current access arrangements for Ausgrid.	HAKK	Prior to Construction	Y	Open
	Containment Cell Contractor and Adjacent Development Work					Action	Any interface considerations between containment cell and future development works	Not applicable	HAKK to confirm programming of development work and containment cell construction.	HAKK	Detailed Design	Y	Open
	CONSTRUCTION FACILITIES												
	Location of Construction Compound within site					Action	location of construction compound to be defined. To ensure adequate space for site sheds, parking, material laydowns	Construction Staging sketches	HAKK to confirm proposed location of construction compound. Indicatively shown on plans	HAKK	Prior to construction	Y	Open
	Access routes					Action	Access routes from construction compound to sites.	Construction Staging sketches	HAKK to confirm access routes from construction compound to site (if necessary). GHD have shown nominally for discussion	HAKK	Prior to construction	Y	Open
	Laydown Areas					Action	Contractor laydown areas to be defined and confirmed.	Construction Staging sketches	HAKK to confirm laydown areas nominated for contractor. GHD have shown nominally for discussuon	HAKK	Prior to construction	Y	Open
	Temporary Services - Water, Sewer, Power, Comms					Action	Confirm availabilty of services for contractor. What services will be made available and what will he need to provide	Constructability Report	HAKK to confirm availability of services for contractor and location of services. GHD have confirmed what services required.	HAKK	Prior to construction	Y	Open
	Programme to undertake works					Action	How long will work take and will this interfere with any future development work	Constructability Report	HAKK to confirm desirable project timelines. GHD to confirm truck numbers required to meet timelines. GHD have provided estimated timelines based on using 4 or 6 trucks at once.	HAKK	Detailed Design	Y	Open

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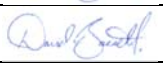
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	David Morrison	David Barrett		David Barrett		19/10/2017
1	David Morrison	David Barrett		David Barrett		23/08/2018

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Appendix M Safety in Design Assessment

Hydro Aluminium Kurri Kurri Pty Ltd.

Containment Cell Detailed Design

Safety in Design Report

July 2018

Table of contents

Appendices

1. Introduction

The aim of this Safety in Design Report is to identify potential occupational health and safety hazards associated with the project or design element described in this report as a workplace during its construction, operational life and maintenance, and to identify the mitigation measures that can be put in place through the preparation of the design, documentation and (where applicable) operational and maintenance procedures to effectively manage the risks.

The Safety in Design process is intended to maximise the likelihood of project safety objectives being achieved and to document the Safety in Design work undertaken and record associated outcomes.

It should be noted that Safety in Design is an ongoing process which will require to be revisited if any fundamental changes to the design are required (e.g. for EPA approval). This report being a live document should be revisited and reassessed as required.

2. Project description

Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) maintains the former Hydro Aluminium Kurri Kurri Aluminium Smelter (HAKK), which is located on Hart Road, Loxford, NSW. The site operated as an aluminium smelter and formally shut down in May 2014. GHD was engaged by Hydro to undertake the detailed design of the proposed Containment Cell for the HAKK Demolition and Remediation Project.

For a complete description of the project, refer to the “Design Report”.

3. Functional requirements

The safety objectives relevant to the design phase include:

- To identify hazards and assess the risks that might be realised in the investigation, construction, operation and maintenance phases of the project life cycle, and associated mitigation measures through the design process, preferably by designing them out (elimination).
- To communicate to Hydro any risks that have not been eliminated in the design and need to be managed during the investigation, construction, operation and maintenance phases.

The stakeholders potentially affected by the project are:

- Hydro Aluminium Kurri Kurri Pty Ltd
- Head contractor
- Sub-contractors
- Other sub-consultants
- Maintenance contractors
- Future developers
- Public

The Containment Cell is a key element of the project as it is to be used for long-term storage of varied wastes. They need to fulfil a number of requirements that have been developed

specifically for the project, including minimising rainwater and surface water from entering the cells during filling operations, closure or post closure, and minimising cell aftercare and post closure maintenance requirements.

The Containment Cell has been designed to prevent the impact on the surrounding by:

- Minimising the clearing of existing vegetation
- Putting in place management structures to minimise contamination of adjacent lands and water bodies and underlying aquifers
- Surrounding the containment cell with perimeter bunding to minimise ingress of floodwaters
- Optimising the cap design to keep a low visual impact and vegetating with flora to minimise maintenance and provide additional screening.
- The cell has been designed to allow progressive capping and closure as well as environmental monitoring and maintenance.

Table 1: Summary of key parameters

Key Design Parameter	Containment cell
Design life	Operation – 2 yrs Post closure – 98 yrs Total – 100 years
Number of stages	4
Capacity requirement	~345,000 m^3
Total excavation	~100,000 m^3
Location of storage capacity	Predominately above ground storage
Intermediate waste batter slopes	1 in 2
Internal batter slopes	1 in 4
External batter slopes	1 in 4 (maximum slope) 1 in 20 (minimum slope to crest)
Nominal cell depth (below ground level)	Bottom of Waste Design Subgrade ~5 m
Nominal cap height (above ground level)	Top of waste ~ 13 m Top of cap ~ 15 m
Access	Via lined access ramp incorporated into design. 1 in 10 (maximum slope)
Leachate extraction	Leachate extraction by pump from two sumps located in the east of the containment for treatment off site
Gas collection system	Passive collection and venting system
Density of in-place materials	1.6 t/m^3 (typical)

4. Specific safety in design aims

The specific aims of this Safety in Design report are to:

- Identify hazards and assess the associated risks
- Identify control measures already in place

- Establish future control measures and ownership of risks and actions
- Assess the current and future risk levels

5. Process for identification of risks

Identification of occupational health and safety risks for the project described in this report has been carried out through an internal GHD Safety in Design Workshop undertaken through the design process. A number of hazards were identified through discussion between workshop participants. The associated risks and mitigation arrangements were added to the Safety in Design Register in Appendix A, assessed and evaluated during the workshop or marked for further action.

Hazards identified in the workshop are added to the risk register that describes the risk, looks at cause and consequence to give an initial risk rating ranging from “negligible” to “extreme” as per the project risk criteria demonstrated in Appendix A. Mitigation measures to eliminate, reduce, transfer or modify risks are then applied and the risk re-evaluated.

The following assumptions were made during the Safety in Design process:

- This Safety in Design risk assessment was completed based on current industry good practice and knowledge.
- A competent contractor will carry out the works and in turn employ competent sub-contractors to carry out the works
- The Contractor will review and update/incorporate any new risks in the contract risk register as required.
- The Contractor will communicate to the appropriate Consultant and the client when/if they need any amendments to the design relating to improved safety.
- This report considers reasonably foreseeable risks pertinent to the construction and use of the site. The risks have ideally been designed out (eliminated), however where this has not been possible, risks need to be controlled to a level, as low as reasonably practicable.
- GHD has only identified reasonably foreseeable risks at this stage of the design at this site and its immediate vicinity.

The achievement of project health and safety objectives is dependent upon:

- Consultant, Client and Stakeholder commitment to the safety management process.
- Communication of this report, risk rating and Safety in Design Register to those parties with nominated actions.
- Incorporation of recommended actions by nominated parties.