Appendix B – Preliminary Water Management Plan for the Albemarle Kemerton Plant 2018

REPORT

Preliminary Water Management Plan

Albermarle Lithium Plant, Kemerton (Albermarle Project Number 7421 / Document Number 606541-4500-DV00-RPT-0003)

Prepared by:
RPS AUSTRALIA WEST PTY LTD
Level 2, 27-31 Troode Street
West Perth, WA 6005
Australia
PO Box 170 West Perth WA 6872

T: +61 8 9211 1111

E: water@rpsgroup.com.au

Prepared for:
WOOD PLC
Level 7, 197 St Georges Terrace
PERTH WA 6000

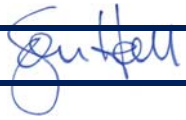
Author: Dan Williams
Reviewed: Shane McSweeney
Approved: Carl Davies
No.: EWP72723.001
Version: Rev 2
Date: March 2018

RPS

Document Status

Version	Purpose of Document	Author	Reviewed by	Review Date
Rev 0	Final for Issue	DanWil	ShaMcS	15.02.18
Rev 1	Final for Issue	DanWil	ShaMcS	22.02.18
Rev 2	Final for Issue	DanWil	ShaMcS	16.03.18

Approval for Issue of Final Report

Name	Signature	Date
John Halleen		16.03.18

Contents

Tables

(contained within report text)

Figures

(contained within report text)

Appendices

Note Regarding Design Storm Terminology

As per the recent revisions to the Australian Rainfall and Runoff (ARR) guidelines, this report adopts the following terminology when describing the design level (expected frequency of occurrence) of a rainfall or storm event. The table describes how the new terminology “annual exceedance probability” relates to the previous terminology “average recurrence interval”.

Relative Frequency	ARI (Years)	AEP (%)	EY (Exceedances Per Year)	Adopted Terminology
Most Frequent	1	63	1	1 EY
	9.49 *	10	0.1	10% AEP
Least Frequent	100	1	0.01	1% AEP

*10% AEP equates to 9.49 years ARI. However, for simplicity this report refers to 10% AEP as being equivalent to the previously used criteria of 10 year ARI.

1 Background

1.1 Planning and Approvals Context

The Kemerton Strategic Industrial Area (KSIA) has long been identified as one of the state's designated "strategic industrial" areas intended to facilitate efficient, internationally competitive and environmentally responsible processing of the state's resources. The KSIA is incorporated in the various planning instruments for the area including the Greater Bunbury Region Scheme (GBRS). A formal environmental assessment of the GBRS was undertaken by the EPA and the subsequent ministerial conditions of approval for the GBRS included a requirement for a Drainage, Nutrient and Water Management Plan (DNWMP) to be prepared. This condition was addressed by the preparation of an Overarching Water Management Strategy (OWMS) for the KSIA.

The OWMS was prepared by RPS in 2016 in support of the KSIA Local Structure Plan and details the regional water management issues for consideration by lot owners and provides the integrated water management strategies for future development of the KSIA. The OWMS provides further detail on the unique planning and approvals framework relating to the KSIA which includes the requirement for individual lot owners to undertake their own technical assessments (such as lot-scale Water Management Plans) to support development proposals.

1.2 This Report

Albermarle Lithium Pty Ltd is proposing to construct and operate a Lithium Plant in the KSIA to process spodumene ore from the Talison Greenbushes Mine for the production of lithium hydroxide.

The engineering design for the site is currently being undertaken and will include further detailed assessment of water management requirements (e.g. stormwater, flooding and groundwater management) at the site, the outcomes of which will be presented in a detailed Water Management Plan to support future works and environmental approvals for the site.

The purpose of this report is to provide preliminary design information relating to water management at the site to support initial earthworks approvals.

2 Site Details

2.1 Existing Site Conditions

The subject site comprises an area of approximately 83 ha and is located within the southern portion of the broader KSIA, approximately 3 km east of Forrest Hwy and 500 m north of Marriot Road. The majority of the site has previously been cleared and used for agricultural and/or pine plantation purposes. The central and western portions of the site are covered with vegetation regrowth whilst the eastern, lower-lying portion contains agricultural drains and vegetation associated with high groundwater such as reeds and grasses.

The site generally slopes from west to east with elevations ranging between approximately 13 m AHD in the west and 11 m AHD in the east, with a significant sand dune ridge running north-south at an elevation up to 18 m AHD within the western portion of the site.

2.2 Development Proposal

Preliminary engineering design including clearing plan, bulk earthwork levels, internal road and drainage layouts are provided as Appendix A. The proposed plant area to be filled and graded comprises approximately 75 ha of the total site area.

The earthworks and drainage strategy involves grading the site to the east where drainage basins will manage stormwater flows near the eastern boundary prior to discharging to an external drain along the eastern boundary of the site. The external drain is a realignment of the existing agricultural drain within the eastern portion of the site. The drain and road are currently being designed by LandCorp as part of the essential infrastructure for the broader KSIA and it will service a larger catchment area upstream (north) of the subject site.

The design earthworks levels for the site range from approximately RL13.05m on the eastern boundary to RL14.8m on the western boundary. The site will generally be graded from a west-east aligned ridgeline to either the north-east or the south-east into open drains that will direct stormwater eastwards to the drainage basins.

3 Surface Water Management

Stormwater management and flood immunity are key factors in the preliminary site and bulk earthworks design. The site must be capable of managing its own stormwater runoff without discharging excessive flow rates to the external drainage system and contributing to downstream flood risk. The site must also consider the potential peak water levels in the external drainage network during a major rainfall event and ensure that adequate freeboard is provided to habitable floor levels, sensitive infrastructure, potential contaminant sources etc.

3.1 Stormwater Drainage Design

The site will utilise a network of open drains/swales aligned with the internal road network to collect and convey stormwater to two main drainage basins located near the eastern boundary of the site. The roadside drains will be relatively shallow v-drains approximately 0.5m deep and will collect and distribute stormwater to larger east-west aligned arterial drains/swales which will convey the flows to the downstream drainage basins. The larger arterial drains will be up to approximately 1m deep.

In accordance with the Overarching Water Management Strategy (OWMS) (RPS 2016) the drainage basins will retain and infiltrate the 10% AEP (10 year ARI) event on site prior to discharging larger rainfall events to the external drainage system. This approach aims to mimic pre-development hydrological conditions at the site where infiltration to the sandy soils is the dominant process and to ensure the site does not increase flood risk to downstream areas.

3.1.1 Design Constraints

The drainage system design must be cognisant of a number of design criteria and constraints including the:

- presence of shallow groundwater at the drainage basin location in the eastern portion of the site
- potential requirement to provide subsoil drainage beneath drainage basins to provide adequate drainage and maintain effective basin storage capacity
- requirement to retain and infiltrate the 10% AEP rainfall event on-site
- potential for peak water levels in the external drainage system to impact the site or restrict discharge from the internal drainage system
- requirement to provide a flow path for the 1% AEP (100 year ARI) event to protect the site from flooding during major events.

The above points have been considered in the stormwater assessment and design and are addressed in the following sections.

3.1.2 Surface Water Modelling

The stormwater management system design has been modelled in XPSWMM. A hydrological model of the site has been developed with the site broken down into approximate sub-catchment areas contributing to various drain locations. The various catchment area types (i.e. landuses) have been calculated from the current plant layout design and included in the model to accurately estimate the rainfall runoff from the various catchment surface types. The contributing catchment area and adopted initial and continuing loss rates for each catchment type are listed in Table 1.

Table 1 Catchment Areas and Loss Parameters

Catchment Type	Area (ha)	Initial Loss (mm)	Continuing Loss (mm/hr)
Road	8.92	1.5	0.1
Building	7.58	1.5	0.1
Bunded Plant Areas	10.51	-	-
Open Area (Compacted Sand / Gravel)	40.61	5	0.3
Drainage Basin	6.60	0	0
Total	**74.22**	**-**	**-**

The loss rates listed above are generally low and considered to provide a relatively conservative estimate of runoff for this assessment. Zero losses are applied to the drainage basins (i.e. 100% of rainfall becomes stormwater runoff) and the continuing loss rate for open areas of 0.3 mm/hr is potentially low given the large contributing area of this catchment type and the likelihood that there will be some losses within these areas from depression storages, zones of higher permeability etc.

The stormwater drainage system is designed as a clean water system to collect only uncontaminated stormwater from the impervious surfaces of the site where stormwater will not come into contact with process water and potential contaminants. Any stormwater generated within process areas where potential mixing with contaminants could occur will be managed separately to ensure no transport of contaminants off-site. Those areas will be bunded and constructed with specially engineered stormwater containment, treatment and recirculation systems. As such, the model does not include any runoff from the areas designated as “bunded plant areas” in the catchment breakdown.

3.1.3 Drainage Basin Levels

The drainage basins have been designed with invert levels that allow for the installation of subsoil drainage beneath the basins to provide a controlled groundwater level and facilitate effective drainage/emptying of the basins in between rainfall events. The design basin invert is between RL12.15m and RL12.50m which allows for a graded base to provide at least 300mm ground clearance above subsoil drainage pipes (the design controlled groundwater level and subsoil pipe levels are discussed in Section 4).

The drainage design proposes to retain and infiltrate the 10% AEP rainfall event within the drainage basins. An overflow pipe or spillway will be provided at the design 10% AEP TWL which will facilitate discharge from the basins during major (e.g. 1% AEP) rainfall events.

Calibre are the consulting engineers undertaking design of the external arterial drainage system for the broader KSIA on behalf of Landcorp. Information provided by Calibre indicates that the 10% AEP and 1% AEP TWLs in the external drainage system adjacent to the site will be RL12.35m and RL12.65m, respectively and that these relate to a critical storm duration of 72 hours. However, no further information on the timing or duration of these peak water levels is currently available.

The high water levels in the external drainage system have the potential to temporarily impact the effectiveness of the site’s subsoil drainage. Therefore, this assessment has conservatively assumed that there will be no infiltration through the drainage basins until the TWL in the basins exceeds the predicted 10% AEP TWL in the external drainage system; when water level in the basins exceeds that elevation a low infiltration rate (<0.15 m/d) is applied to the drainage basins. This is likely to be a conservative assumption in the modelling.

Though not included in the design modelled and presented herein, the option to include a low-flow outlet from the drainage basins may be investigated during detailed design. A small diameter outlet from the invert of the drainage basins would facilitate effective emptying of the basins between rainfall events and also assist in maintaining storage capacity in the drainage basins by discharging stormwater at the beginning of rainfall events when water levels in the external drainage system are lower.

3.1.4 Model Results

The model was used to simulate a range of design rainfall event durations up to 168 hours (7 days) and used the recently revised (ARR 2016) rainfall IFD data and temporal pattern ensembles. The modelled 10% AEP top water levels (TWLs) for the drainage basins is shown below.

It should be noted that the modelled TWLs below do not include an overflow or outlet from the basins so as to demonstrate the relative maximum retention volumes for the various design storm durations. However, a major event overflow will be provided at the design 10% AEP TWL which will limit the water level in the basins.

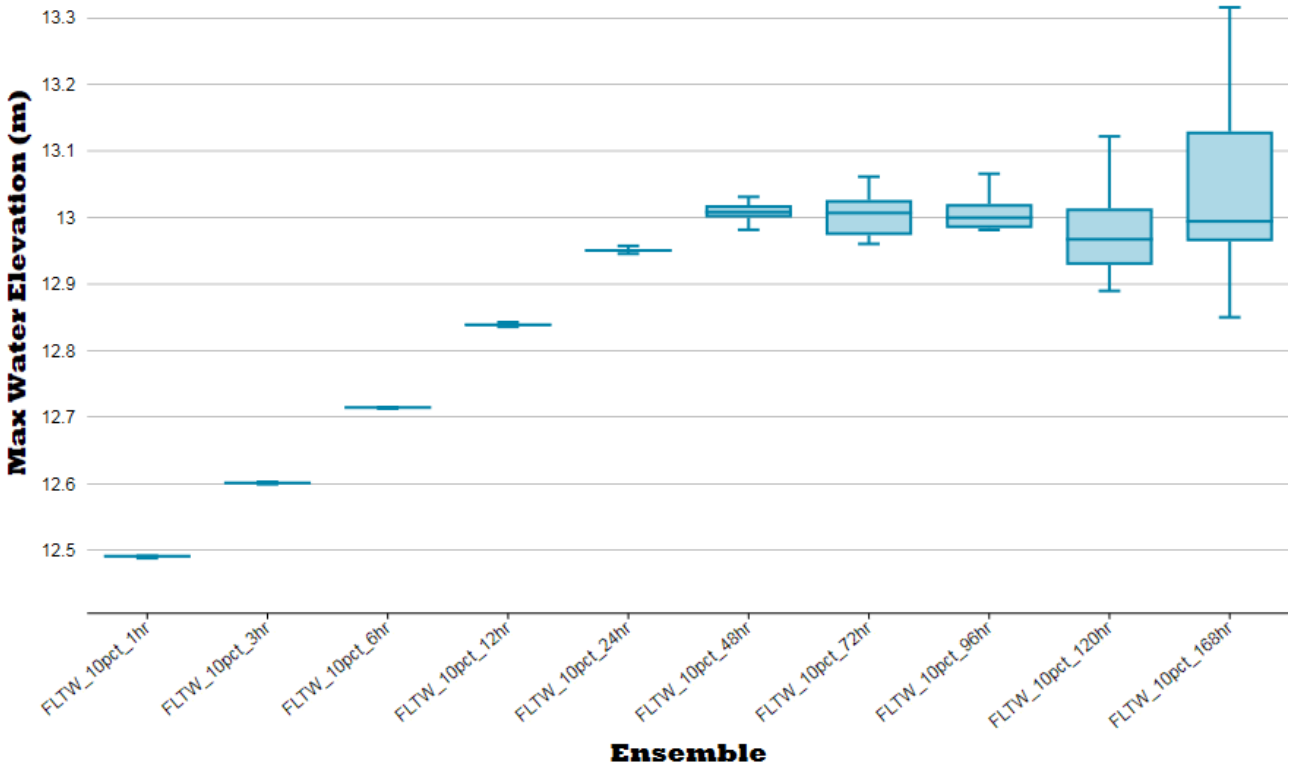


Figure 1 Modelled 10% AEP TWL (Assuming no Outfall)

Figure 1 shows that the critical event duration is likely to be 24hrs or greater with the shorter duration rainfall events resulting in lower stormwater volumes / TWLs. The drainage design has adopted the 10% AEP / 24 hour event as the design level for the drainage basins and therefore will set the overflow level at RL12.95m in order to contain the 10% AEP/24hr event prior to discharging to the external drainage system. This represents a significant degree of stormwater retention and will effectively mitigate any potential flood impacts from the site to downstream areas.

Whilst the model results shown in Figure 1 indicate that the TWL in the drainage basins may slightly exceed RL12.95m for events of longer duration than 24 hours, it is expected that due to the conservative assumptions discussed above (e.g. low loss rates, no or minimal infiltration from the basin) the modelled TWLs for the long duration events may be overestimated in the model. Therefore, the 10 year/24 hour event has been adopted as the critical storm duration and the basis for the site drainage basin design.

As detailed in Table 2 below, the modelled 10% AEP stormwater volumes for the northern and southern drainage basins are 22,200 m^3 and 21,300 m^3, respectively. This does not include the additional storage within the network of open drains.

Table 2 10% AEP Design Details for Drainage Basins

Design Criteria	Northern Basin	Southern Basin
Minimum Invert (mRL)	12.15	12.20
10% AEP Volume (m3)	22,200	21,300
10% AEP TWL (mRL)	12.95	12.95
10% AEP Depth (m)	0.80	0.75

3.2 Flood Protection

RPS understands that the future Kemerton Road which will be constructed along the eastern boundary of the site (to be designed and constructed by Landcorp) will be at an elevation of RL13.50m. The road will separate the site from the external drainage system. The level of the road makes an overland flow path for the 1% AEP event impractical as it would mean finished floor levels in the site would need to be raised significantly higher than the 1% AEP TWL in the regional drainage system which RPS understands, from information provided by Calibre, to be RL12.65m.

Therefore, the site will be connected to the external drainage system by culverts to be installed beneath the future Kemerton Road. The culverts will be sized and designed by Calibre as part of the Kemerton Road works to facilitate flow of the major (1% AEP) rainfall events from industrial lots into the external drainage system with minimal backwater impacts to the lots.

The 1% AEP TWL within the site will be controlled by the level of the overflow from the basins. The model was used to assess several overflow / spillway configurations and identified that the 1% AEP TWL in the basins is likely to be only marginally higher (~0.1m) than the 10% AEP TWL and overflow level. Therefore, the estimated 1% AEP TWL within the site is RL13.05m. A concept schematic of the relative levels of the drainage infrastructure and overflow arrangement is provided in Figure 2 below. The exact configuration and design of the outfall will be determined during detailed design and documented in the final Water Management Plan.

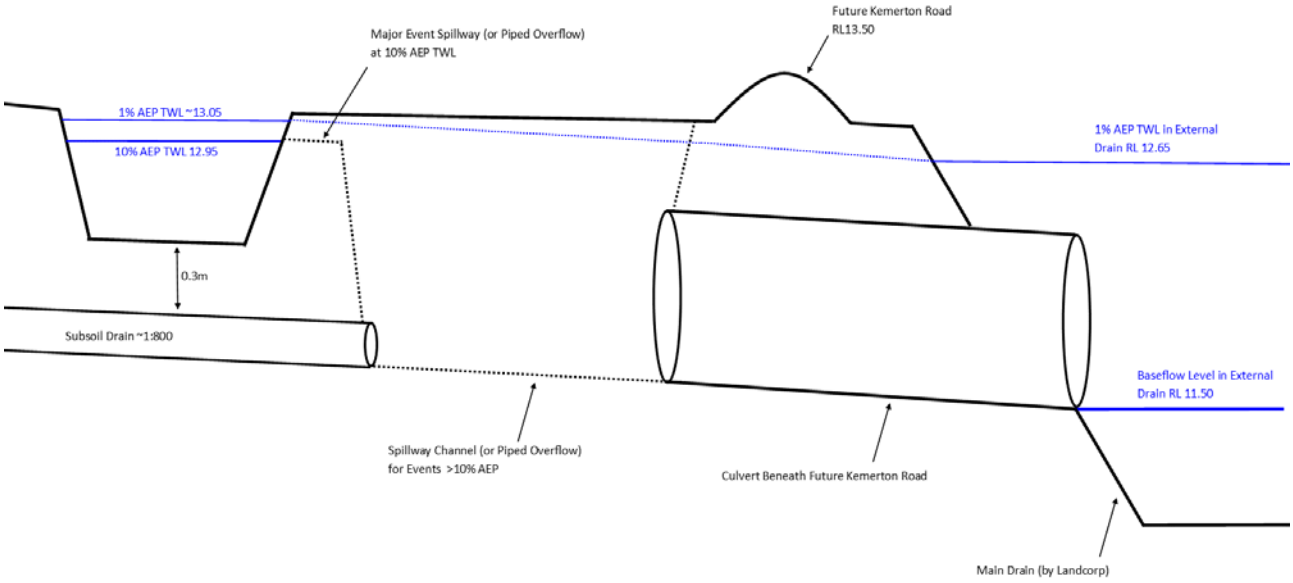


Figure 2 Basin Relative Water Levels and Overflow

Based on the above, the preliminary flood protection level for the eastern portion of the site, near the drainage basins, is approximately RL13.35 m to provide 0.3 m freeboard to the 1% AEP TWL. Based on the bulk earthworks plan (Appendix A) the majority of the site will be filled to above this level thus providing the required level of flood protection. Only some very minor areas in the north-east and south-east corners of the site have a design level below RL13.35. However, these areas are associated with driveways and carparks which do not need to be elevated above the 1% AEP TWL in the basins.

The entire site will be more than 0.3 m above the 1% AEP TWL in the regional drainage system, estimated by Calibre to be RL12.65 m.

3.3 Conceptual Drainage Design

Figure 3 below provides the drainage concept which shows the configuration and elevations of the key drainage elements including drainage basins, open drains, subsoil drainage (beneath the basins only), major event overflow path from the basins and outfall to the external drainage system.

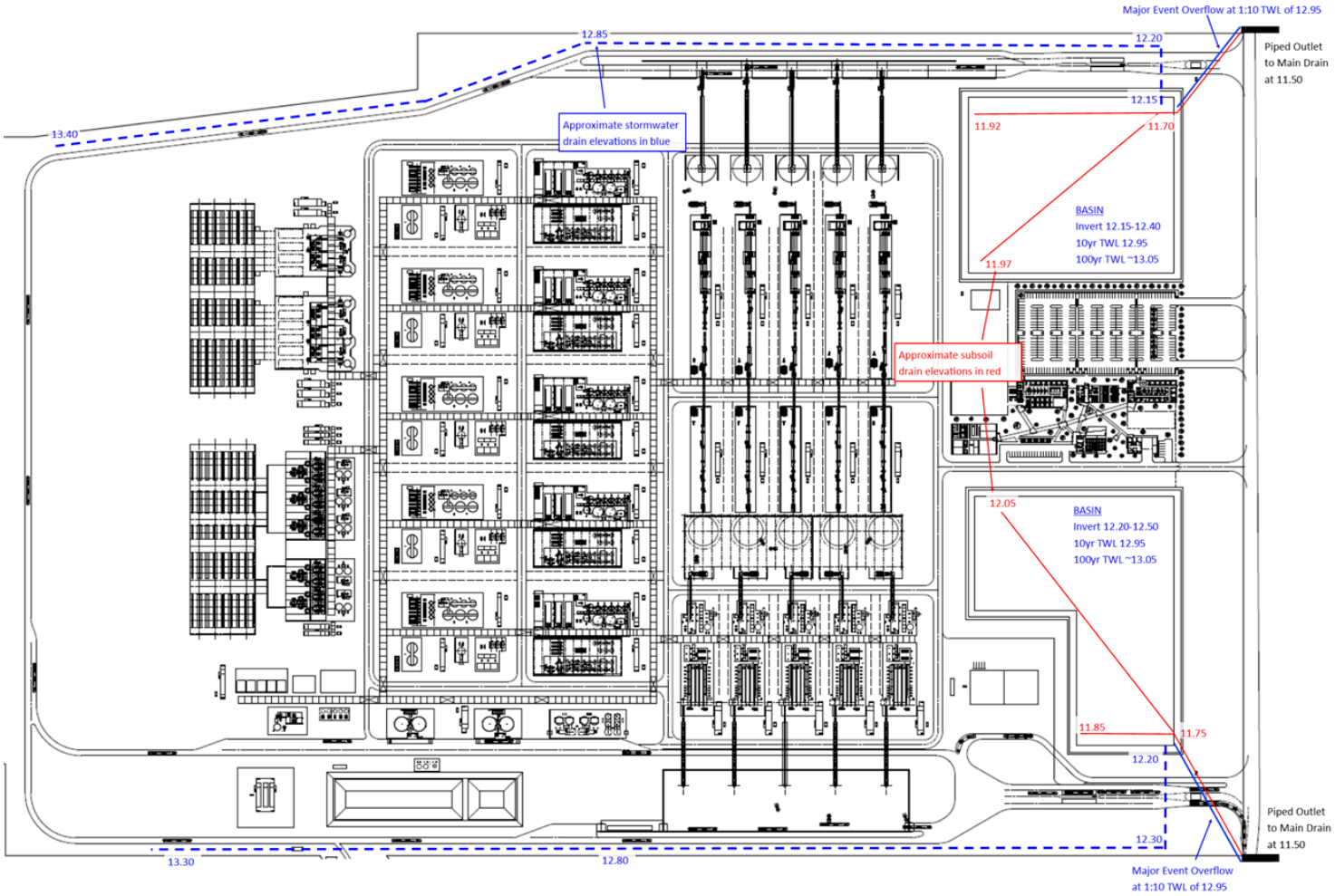


Figure 3 Concept Drainage Design

4 Groundwater Management

4.1 Pre-Development Groundwater Levels

An assessment of existing groundwater levels has been undertaken to estimate post-development groundwater clearance and the potential requirement for subsoil drainage to provide a controlled groundwater level. The assessment used data from eight on-site monitoring bores as well as 13 additional bores from the surrounding KSIA area and four regional DWER bores for long-term trend analysis.

The Average Annual Maximum Groundwater Level (AAMGL) is calculated to range from approximately 11.25 m AHD at the east and west boundaries, to 11.8 m AHD at the centre of the site. This indicates there is some mounding at the centre of the site, with groundwater flowing to the south, east and west. The Maximum Groundwater Level (MGL) is calculated to range from approximately 11.7 m AHD along the existing drainage line at the eastern part of the site, to 12.5 m AHD at the site's north-central boundary. Refer to Figures 4 and 5 for the mapped AAMGL and MGL contours, respectively.

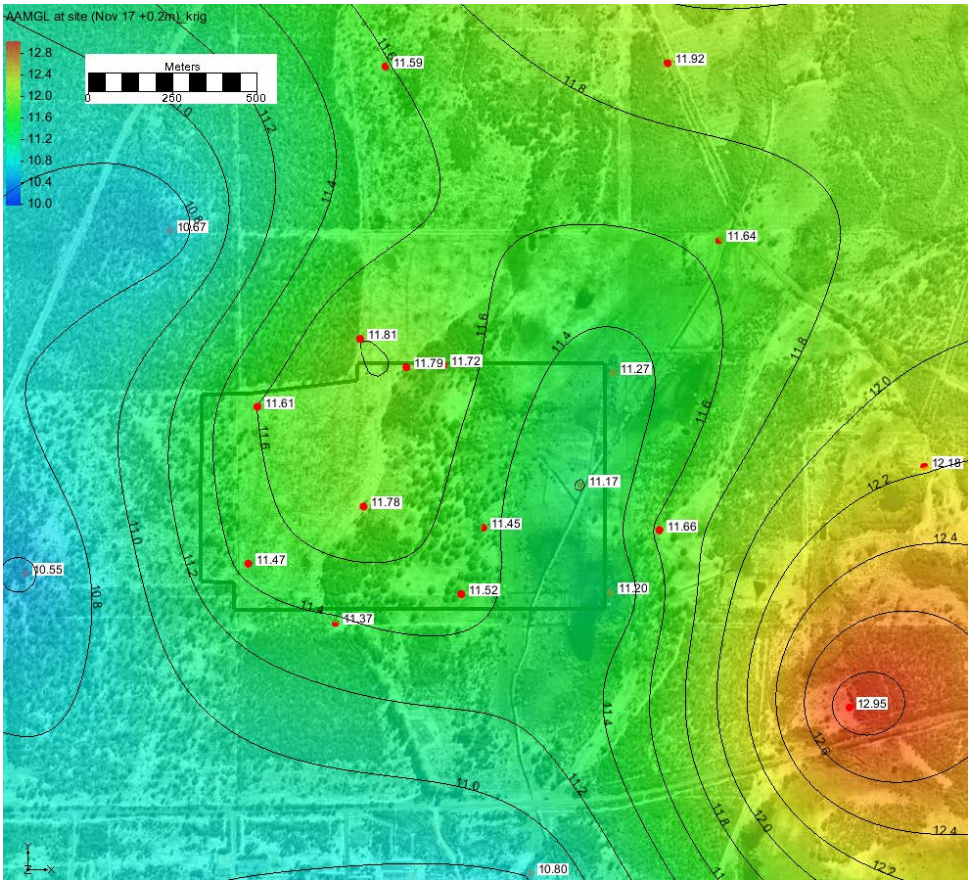


Figure 4 Calculated AAMGL

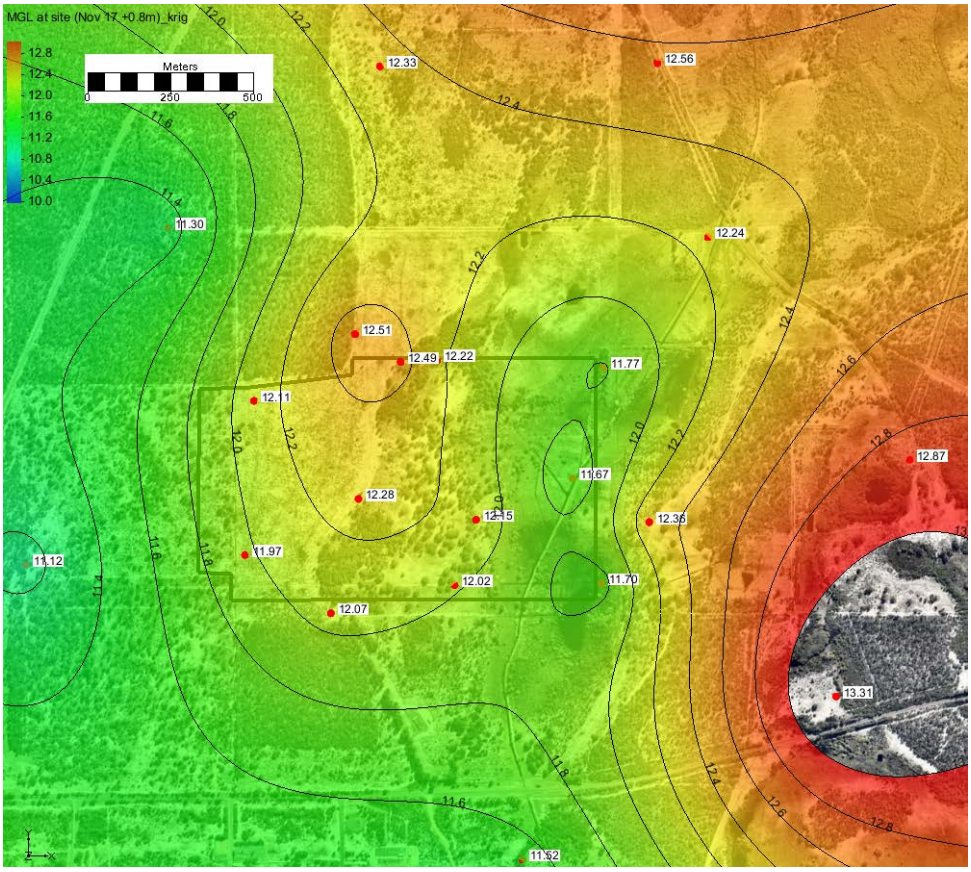


Figure 5 Calculated MGL

4.2 Controlled Groundwater Level

It is proposed to use subsoil drains where required to control the post-development groundwater level, including any post-development groundwater level rise that may occur. However, given the relatively high imperviousness of the site, post-development groundwater levels are not necessarily expected to rise.

Based on information provided by Calibre, RPS understands that a baseflow level of approximately RL11.50m is expected in the external drainage system adjacent to the site; this level is largely governed by the elevation of an existing culvert at Marriott Road downstream from the site. Based on this level and the estimated AAMGL contours, the drainage design proposes to set the controlled groundwater level at the eastern site boundary at RL11.50m, with subsoil drains to be graded back from this elevation.

Conceptual subsoil drainage elevations are provided in Figure 6 below and are compared to the mapped MGL. The subsoil drain elevations are generally above the MGL which indicates that the controlled groundwater level is not likely to have any environmental impact on groundwater dependent ecosystems.

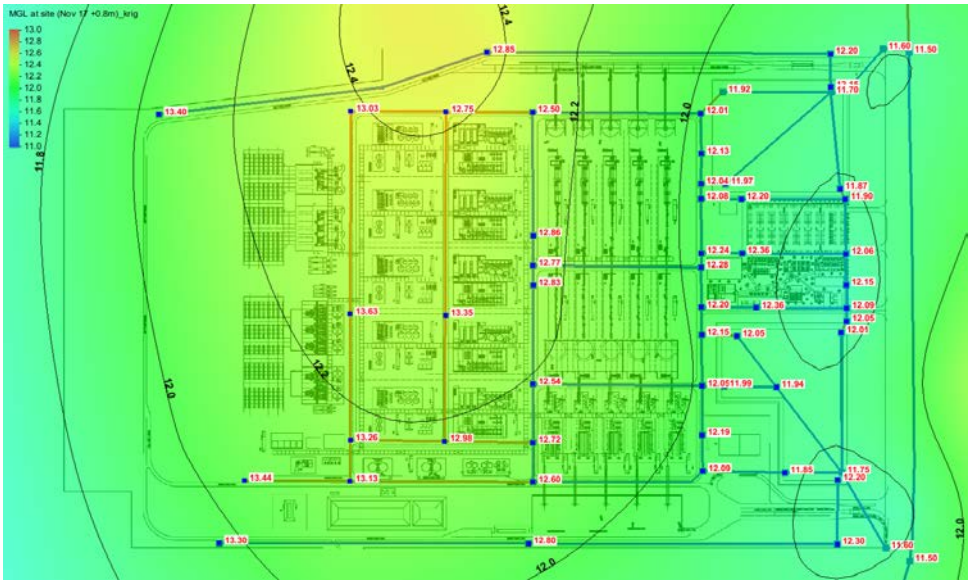


Figure 6 Conceptual Subsoil Drain Levels

4.3 Post-development Groundwater Clearance

Figure 7 below compares the bulk earthworks levels to the calculated AAMGL. The earthworks levels are 2 to 3 metres above the AAMGL which provides a reasonable amount of clearance. However, groundwater levels may change after development due to factors such as removal of evapotranspiration. Groundwater modelling is currently being undertaken to estimate post-development groundwater levels and ensure adequate clearance is provided through appropriate placement of subsoil drainage.

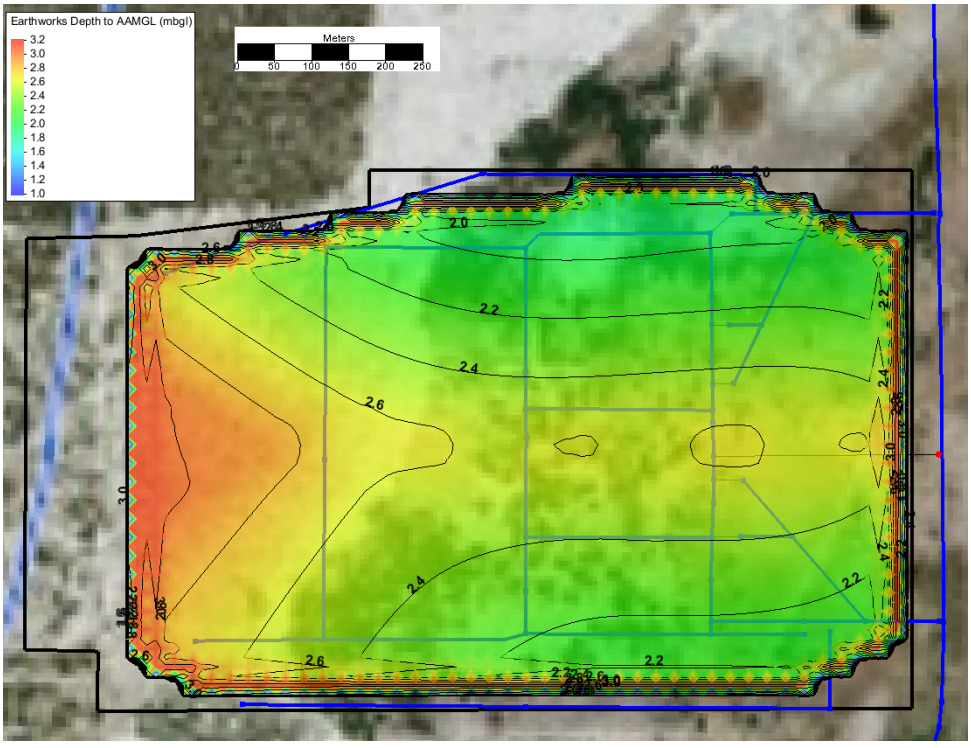


Figure 7 Depth to AAMGL from Bulk Earthworks Levels

5 Temporary Drainage Management

5.1 Temporary Drainage Requirements

As shown in the Clearing Plan (Appendix A) the bulk earthworks will include realignment of the existing agricultural drain within the eastern portion of the site. The drain will be realigned to suit the ultimate drainage design alignment of the Kemerton Road and arterial drain being undertaken by Landcorp. However, the final road and arterial drain upgrades will be undertaken by Landcorp.

The drainage basins will be formed as part of the bulk earthworks and used for capturing and infiltrating stormwater from the filled and compacted site. Temporary drains will be excavated along the northern and southern portions of the site to intercept runoff and direct it to the basins. This will ensure that the post-earthworks site does not impact on the downstream drainage systems in terms of increased runoff or potential sediment mobilisation.

Diversion drainage channels and bunds will be constructed where required along the perimeter of the site to maintain drainage flow paths around the filled site, directing stormwater towards existing low-lying areas and open drains.

5.2 Acid Sulfate Soils Management

The management of Acid Sulfate Soils (ASS) throughout the bulk earthworks phase will be addressed in an Acid Sulfate Soil and Dewatering Management Plan (ASSDMP) which will be assessed and approved by the Department of Water and Environmental Regulation (DWER).

6 Further Work and Approvals

6.1 Future Approvals

The detailed design for the site is currently being progressed which will involve further detailed assessment and modelling of the site's engineering and drainage design. Further assessment to be undertaken in support of detailed design includes an assessment of post-development groundwater levels (e.g. post-development groundwater level rise and subsoil drain design) as well as further hydraulic modelling of the final drainage basin and outfall design.

The final detailed design and associated technical assessments will be provided in a subsequent, more detailed revision of this Water Management Plan to support works and environmental approvals.

6.2 Post-Development Monitoring

The final Water Management Plan will also detail the requirements for post-development monitoring. This may include monitoring of post-development groundwater and surface water levels and quality to demonstrate that the drainage system functions as intended and that the site does not impact nearby environmental receptors.

6.3 Implementation Plan

The final Water Management Plan will also include an implementation plan to detail roles, responsibilities and timing of the actions required to properly implement the Water Management Plan. This will focus particularly on the maintenance and monitoring requirements related to the drainage system.

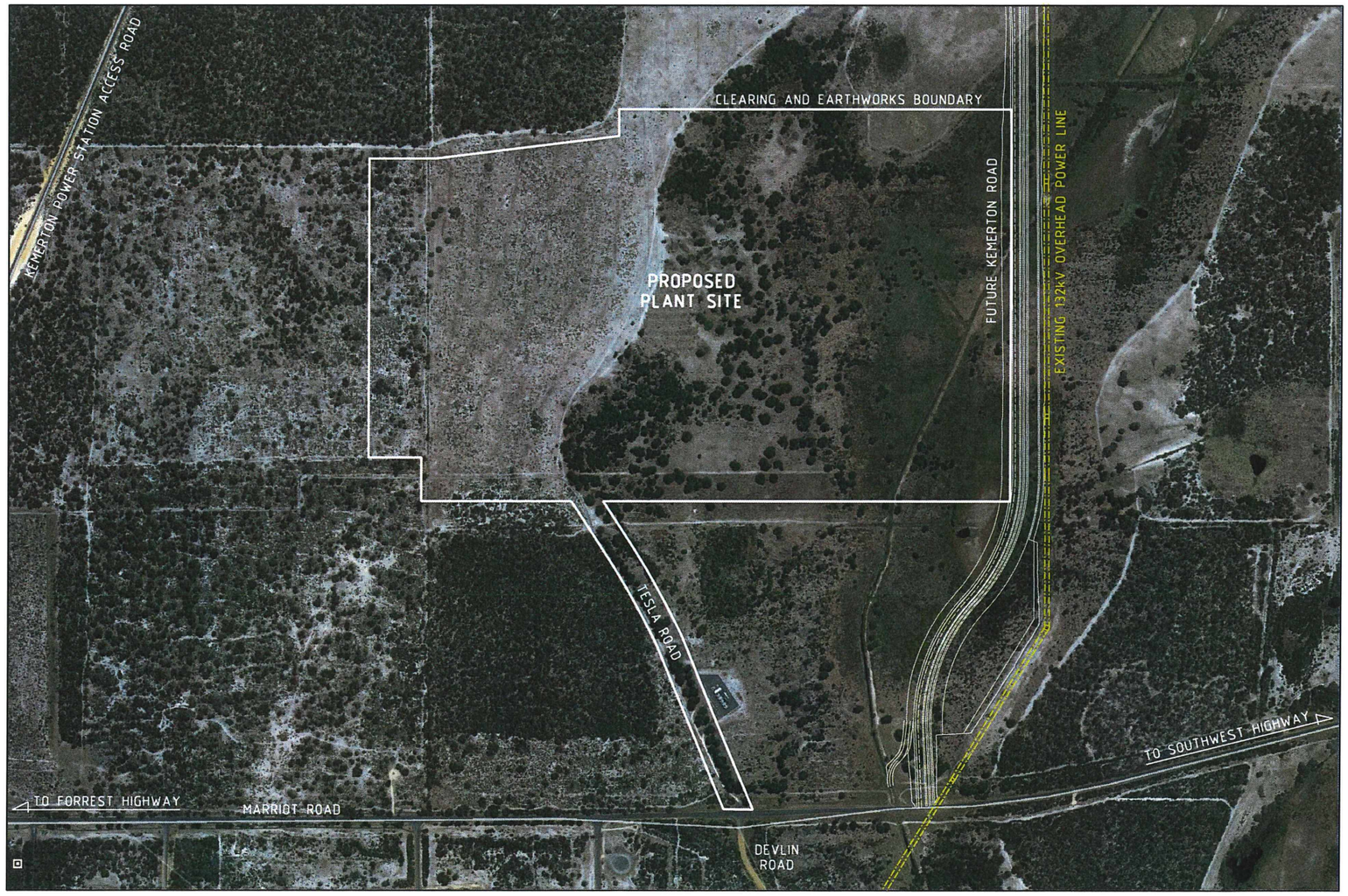
Appendix A

Engineering Plans

PROJECT : ALBEMARLE KEMERTON PLANT
CLIENT : ALBEMARLE
JOB NUMBER : 606541

DRAWING LIST :

DRAWING	TITLE
606541-4100-DD10-LST-0001	LOCALITY PLAN AND DRAWING LIST
606541-4110-DD10-GAD-0001	OVERALL PLANT CLEARING AND GRUBBING PLAN
606541-4120-DD10-GAD-0001	OVERALL PLANT BULK EARTHWORKS GENERAL ARRANGEMENT
606541-4120-DD10-GAD-0002	OVERALL PLANT DRAINAGE CONCEPT PLAN
606541-4130-DD10-GAD-0001	OVERALL PLANT INTERNAL ROAD LAYOUT PLAN
606541-4120-DD10-DTL-0001	OVERALL PLANT BULK EARTHWORKS SECTIONS AND DETAILS
606541-4130-DD10-DTL-0001	OVERALL PLANT INTERNAL ROADS SECTIONS AND DETAILS



DRAWING No.	REFERENCE DRAWINGS

CLIENT: ALBEMARLE

CLIENT PROJECT No. 7421

No.	BY	DATE	REVISION	CHECKED	APPROV.
B	SC	13.01.18	ISSUED FOR USE	KC	
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC	

	BY	DATE
PROJECT APPR.		
DESIGN APPR.		
DESIGNED		
CHECKED		
DRAWN		

SCALE 1:5000

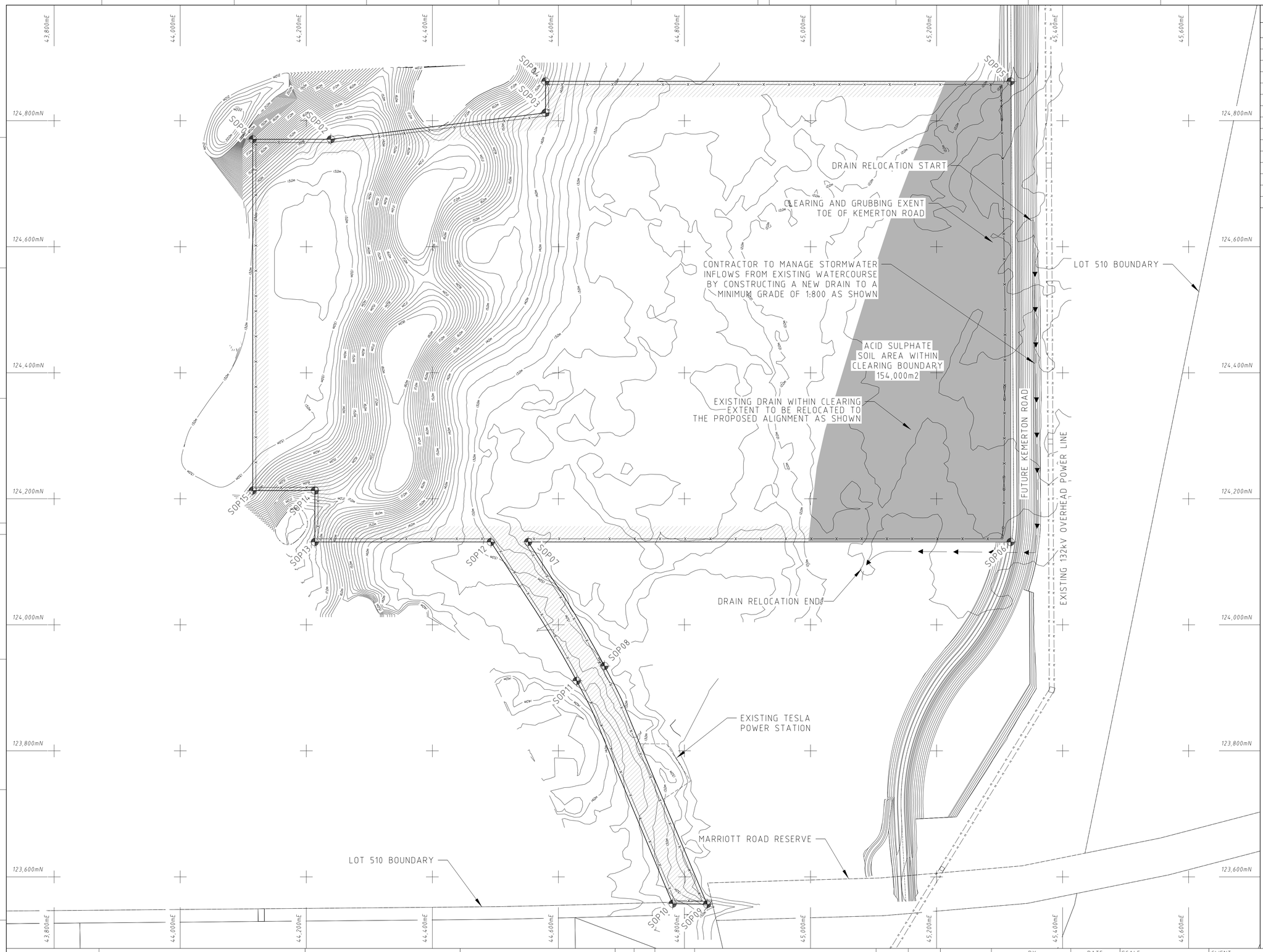
TRUE NORTH

CLIENT ALBEMARLE

TITLE ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
LOCALITY PLAN AND DRAWING LIST

PROJECT No. 606541 | DRG SIZE A1 | DRAWING No. 606541-4100-DD10-LST-0001 | REV No. B | ISSUE#:

Date: 2/13/2018 Time: 4:08:57 PM Plotted By: sally.currie Pentable: LZR.TBL Plotdriver: Follow-You-CLRA3.plt Filename: W:\Lithium\606541\Drawings\Civil\606541-4100-DD10-LST-0001.dgn



CLEAR AND GRUB SETOUT

POINT	EASTING (mE)	NORTHING (mN)	LEVEL (m)
SOP01	E 44,115.000	N 124,770.500	-
SOP02	E 44,238.980	N 124,770.500	-
SOP03	E 44,579.500	N 124,812.500	-
SOP04	E 44,579.500	N 124,862.500	-
SOP05	E 45,317.460	N 124,862.500	-
SOP06	E 45,317.460	N 124,131.500	-
SOP07	E 44,552.000	N 124,131.500	-
SOP08	E 44,701.240	N 123,879.110	-
SOP09	E 44,835.850	N 123,556.590	-
SOP10	E 44,781.280	N 123,557.390	-
SOP11	E 44,654.340	N 123,861.520	-
SOP12	E 44,492.810	N 124,131.500	-
SOP13	E 44,213.500	N 124,131.500	-
SOP14	E 44,213.500	N 124,213.000	-
SOP15	E 44,115.000	N 124,213.000	-

GENERAL NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT STANDARDS AND SPECIFICATIONS
2. DESIGN BASED ON STRIPPED SURFACE UAV SURVEY DATA SUPPLIED BY HARLEY DYKSTRA NOV 2017
3. SITE PREPARATION AND EARTHWORKS CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATION 606541-0000-DD10-SPC-0001
4. ALL DIMENSIONS ARE IN MILLIMETRES UON. ALL CO-ORDINATES ARE IN METRES UON TO PCG94 (PERTH COASTAL GRID). ALL ELEVATIONS ARE IN AHD(m) (AUSTRALIAN HEIGHT DATUM).
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONSTRUCT TEMPORARY DRAINAGE (AS REQUIRED) TO MAINTAIN A FREE DRAINING FACILITY DURING CONSTRUCTION
6. EXTENT OF SITE CLEARING AND GRUBBING SHALL BE STRICTLY WITHIN THE LIMITS SHOWN ON THE DRAWING UNLESS OTHERWISE AGREED TO WITH THE ENGINEER
7. TOPSOIL TO A NOMINAL DEPTH OF 100mm SHALL BE STRIPPED FROM THE ENTIRE SITE AND STOCKPILED AT LOCATIONS TO BE AGREED ON WITH THE ENGINEER

LEGEND

- PROPOSED DRAIN REALIGNMENT
- EXISTING DRAIN
- EXTENT OF CLEAR AND GRUB
- PROPOSED FENCE LINE
- EXISTING CONTOURS

0 50 100 200 300
SCALE 1:3000

4120-DD10-GAD-0001	BULK EARTHWORKS PLAN
4120-DD10-DTL-0001	BULK EARTHWORKS SECTIONS AND DETAILS
DRAWING No.	REFERENCE DRAWINGS

wood.

CLIENT: ALBEMARLE®

CLIENT PROJECT No. 7421

No.	BY	DATE	REVISION	CHECKED	APPROV.
C	SC	21.02.18	RE-ISSUED FOR USE	KC	AB
B	SC	13.02.18	ISSUED FOR USE	KC	AB
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC	

	BY	DATE
PROJECT APPR.		
DESIGN APPR.		
DESIGNED		
CHECKED		
DRAWN		

SCALE 1:3000

TRUE NORTH

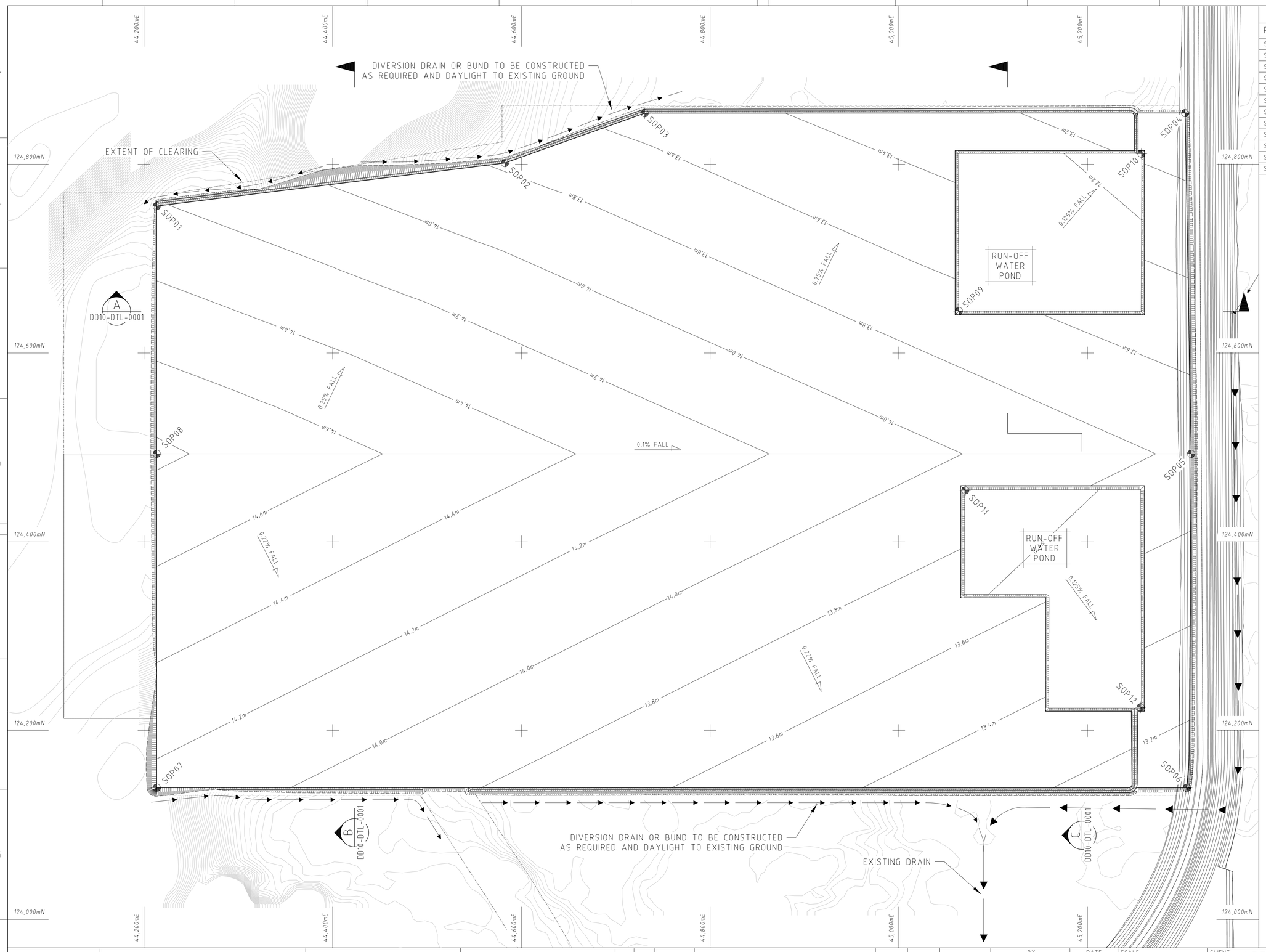
CLIENT ALBEMARLE

TITLE
ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
CLEARING AND GRUBBING
PLAN

PROJECT No.	DRG SIZE	DRAWING No.	REV No.
606541	A1	606541-4110-DD10-GAD-0001	C

ISSUE#:

Date: 2/21/2018 Time: 4:00:51 PM Plotted By: sally.currie Pentable: LZR.TBL Plotdriver: pdf - BW.plt Filename: W:\Lithium\606541\Doc_Control\Transfer_to_DCD\From Sally Currie\606541-4110-DD10-GAD-0001_C.dgn



BULK EARTHWORKS SETOUT

POINT	EASTING (mE)	NORTHING (mN)	LEVEL (m)
SOP01	44,213.500	124,755.690	RL 14.220
SOP02	44,582.600	124,801.290	RL 13.780
SOP03	44,730.680	124,854.060	RL 13.520
SOP04	45,303.540	124,854.230	RL 12.970
SOP05	45,309.810	124,493.220	RL 13.790
SOP06	45,305.150	124,139.500	RL 13.060
SOP07	44,213.500	124,139.500	RL 14.140
SOP08	44,213.500	124,493.220	RL 14.830
SOP09	45,063.580	124,644.360	RL 12.400
SOP10	45,257.600	124,811.620	RL 12.150
SOP11	45,069.770	124,455.260	RL 12.500
SOP12	45,257.240	124,223.810	RL 12.200

NOTES

1. FOR GENERAL NOTES REF DRG 606541-4110-DD10-GAD-0001
2. DIVERSION DRAIN OR BUND TO BE CONSTRUCTED AS REQUIRED AND DAYLIGHT TO EXISTING GROUND

LEGEND

- 14.0m — DESIGN MAJOR CONTOURS
- DESIGN MINOR CONTOURS
- EXISTING CONTOURS
- PROPOSED DIVERSION DRAIN/BUND
- PROPOSED DRAIN REALIGNMENT

										PROJECT APPR.	
										DESIGN APPR.	
C	SC	21.02.18	RE-ISSUED FOR USE	KC	AB					DESIGNED	
B	SC	13.02.18	ISSUED FOR USE	KC	AB					CHECKED	
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC						DRAWN	
No.	BY	DATE	REVISION	CHECKED	APPROV.					BY	DATE

4120-DD10-DTL-0001 | BULK EARTHWORKS SECTIONS AND DETAILS
DRAWING No. | REFERENCE DRAWINGS

wood.

CLIENT: ALBEMARLE®

CLIENT PROJECT No. 7421

SCALE 1:2000

TRUE NORTH

CLIENT ALBEMARLE

TITLE ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
BULK EARTHWORKS
PLAN

PROJECT No. 606541 | DRG SIZE A1 | DRAWING No. 606541-4120-DD10-GAD-0001 | REV No. C

ISSUE#:

Date: 2/21/2018 Time: 4:01:12 PM Plotted By: sally.currie Pentable: LZR.TBL Plotdriver: pdf - BW.plt
Filename: W:\Lithium\606541\Doc_Control\Transfer_to_DCD\From Sally Currie\606541-4120-DD10-GAD-0001_C.dgn

NORTHERN INTERNAL PERIMETER DRAIN

SPILLWAY / OVERFLOW CHANNEL
OVER 1 IN 10 YEAR ARI AT TWL 12.950

EXTENT OF CLEARING

RUN-OFF WATER POND

RUN-OFF WATER POND

SPILLWAY / OVERFLOW CHANNEL
OVER 1 IN 10 YEAR ARI AT TWL 12.950

SOUTHERN INTERNAL PERIMETER DRAIN

44,200mE 44,400mE 44,600mE 44,800mE 45,000mE 45,200mE

124,800mN 124,600mN 124,400mN 124,200mN 124,000mN

NOTES

1. FOR GENERAL NOTES REF DRG 606541-4110-DD10-GAD-0001

LEGEND

- 14.0m – DESIGN MAJOR CONTOURS
- DESIGN MINOR CONTOURS
- EXISTING CONTOURS
- PROPOSED INTERNAL PERIMETER DRAINS
- ROADSIDE SWALE FLOW PATH
- FUTURE KEMERTON ROAD MAIN DRAIN
- PROPOSED OUTLET CULVERTS (BY OTHERS)
- PROPOSED INTERNAL ROAD CULVERT CROSSINGS
- PAD FALL DIRECTION
- 11.80 11.73 – SUBSOIL DRAIN NETWORK AND INVERT LEVELS

0 20 40 80 120 160 200m
SCALE 1:2000

										PROJECT APPR.	
										DESIGN APPR.	
										DESIGNED	
										CHECKED	
										DRAWN	
4120-DD10-GAD-0001	OVERALL PLANT BULK EARTHWORKS PLAN	C	SC	21.02.18	RE-ISSUED FOR USE	KC	AB				
DRAWING No.	REFERENCE DRAWINGS	B	SC	13.02.18	ISSUED FOR USE	KC	AB				
		A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC					
		No.	BY	DATE	REVISION	CHECKED	APPROV.				

wood.

CLIENT: ALBEMARLE®

CLIENT PROJECT No. 7421

SCALE 1:2000

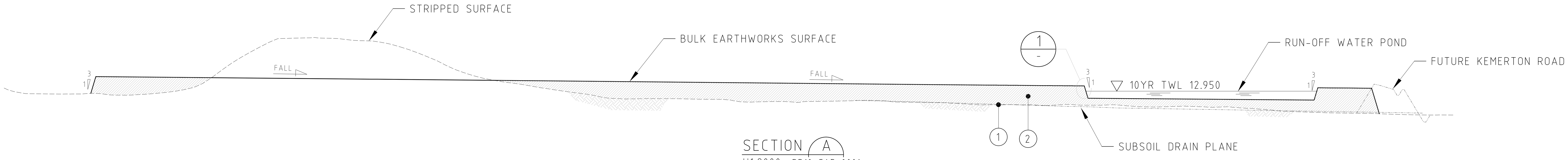
TRUE NORTH

CLIENT ALBEMARLE

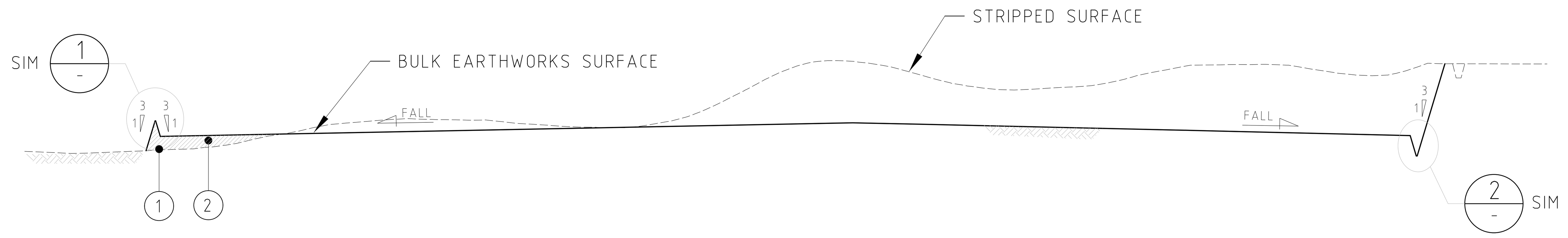
TITLE
ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
INTERNAL DRAINAGE CONCEPT
PLAN

PROJECT No. 606541 | DRG SIZE A1 | DRAWING No. 606541-4120-DD10-GAD-0002 | REV No. C | ISSUE#:

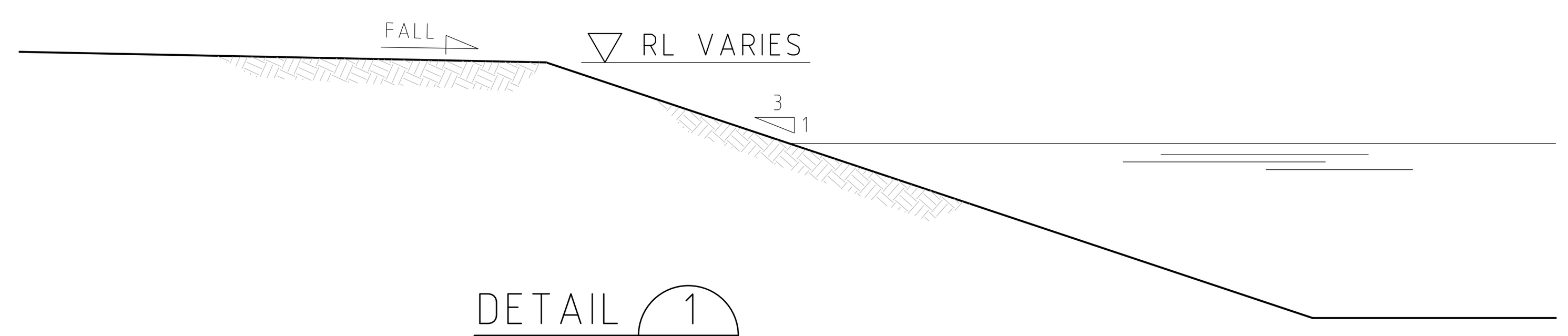
Date: 2/21/2018 Time: 4:01:22 PM Plotted By: sally.currie Pentable: LZR.TBL Plotdriver: pdf - BW.plt Filename: W:\Lithium\606541\Doc_Control\Transfer_to_DCD\From Sally Currie\606541-4120-DD10-GAD-0002_C.dgn



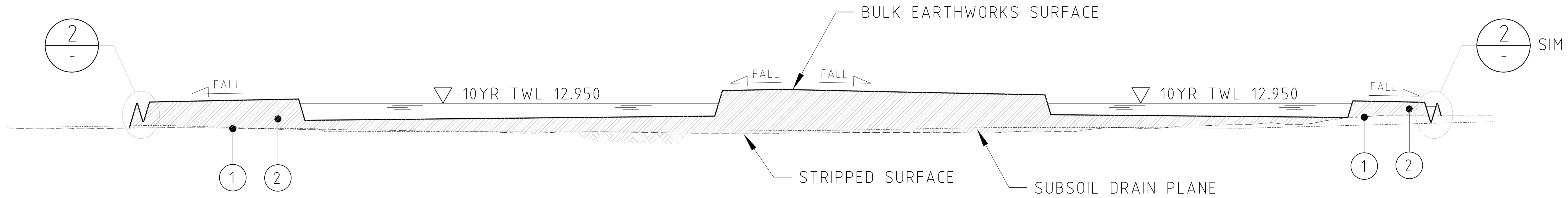
SECTION A
H1:2000 DD10-GAD-0001
V1:200



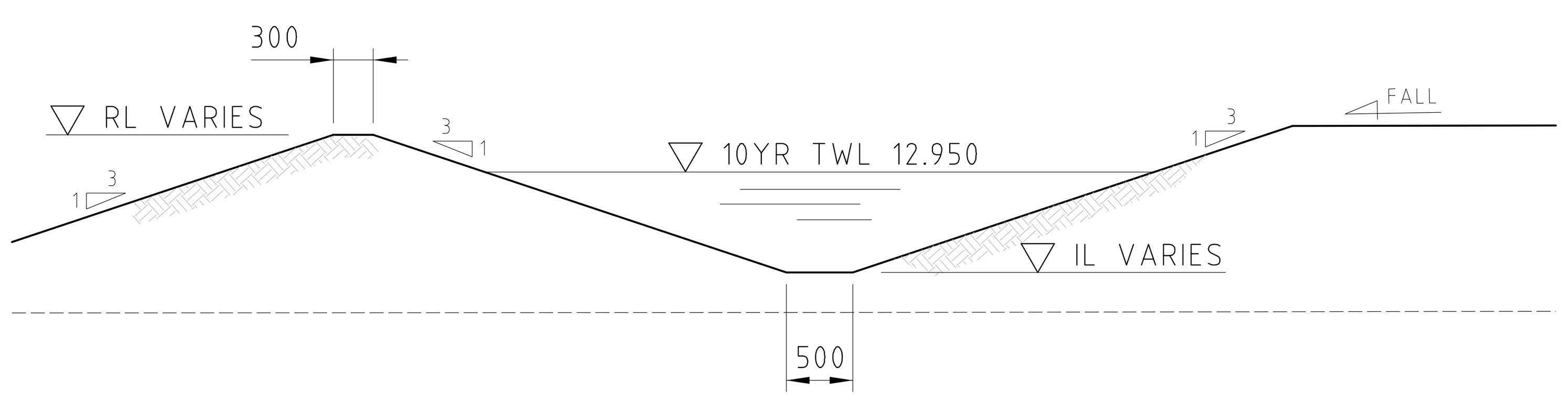
SECTION B
H1:2000 DD10-GAD-0001
V1:200



DETAIL 1
1:50
TYPICAL BASIN ENTRY DETAIL



SECTION C
H1:2000 DD10-GAD-0001
V1:200



DETAIL 2
1:50
TYPICAL INTERNAL PERIMETER DRAIN

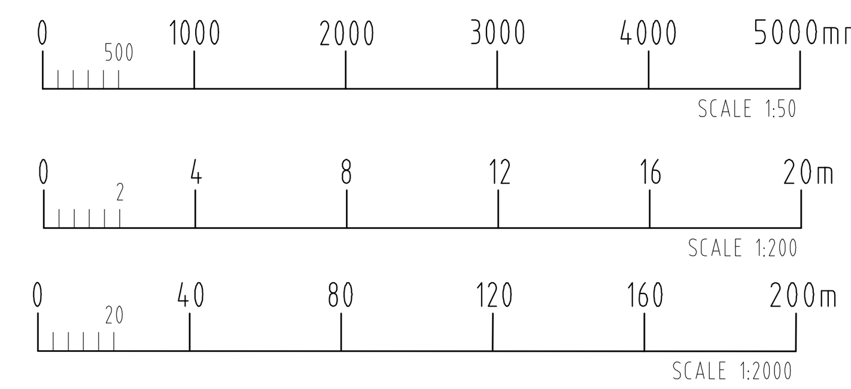
NOTES

1. ALL DIMENSION ARE IN MILLIMETERS UON

PROPOSED LAYERWORKS

(1) SURFACE TO BE PROOF COMPACTED TO A DEPTH OF AT LEAST 0.9m WITH A MIN OF 8 PASSES WHICH SHALL INCLUDE A MIN OVERLAP OF 20%
- ALL WEAK AREAS DEFORMED EXCESSIVELY UNDER ROLLING SHALL BE REMOVED AND REPLACED WITH CLEAN STRUCTURAL FILL
- ON COMPLETION OF VIBRATORY ROLLING, 2 PASSES OF SITE SHOULD BE MADE WITH THE ROLLER OPERATING IN STATIC MODE

(2) GENERAL FILL AS PER GEOTECH REPORT 606541-0000-DD10-RPT-0002 TO BE COMPACTED TO 95% OF MODIFIED MAXIMUM DRY DENSITY, ±2% OMC AT 300mm LAYERS (MAX)



DRAWING No.	REFERENCE DRAWINGS
4120-DD10-GAD-0001	BULK EARTHWORKS PLAN

wood.

CLIENT: ALBEMARLE

CLIENT PROJECT No. 7421

No.	BY	DATE	REVISION	CHECKED	APPROV.
C	SC	21.02.18	RE-ISSUED FOR USE	KC	AB
B	SC	13.02.18	ISSUED FOR USE	KC	AB
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC	

	BY	DATE
PROJECT APPR.		
DESIGN APPR.		
DESIGNED		
CHECKED		
DRAWN		

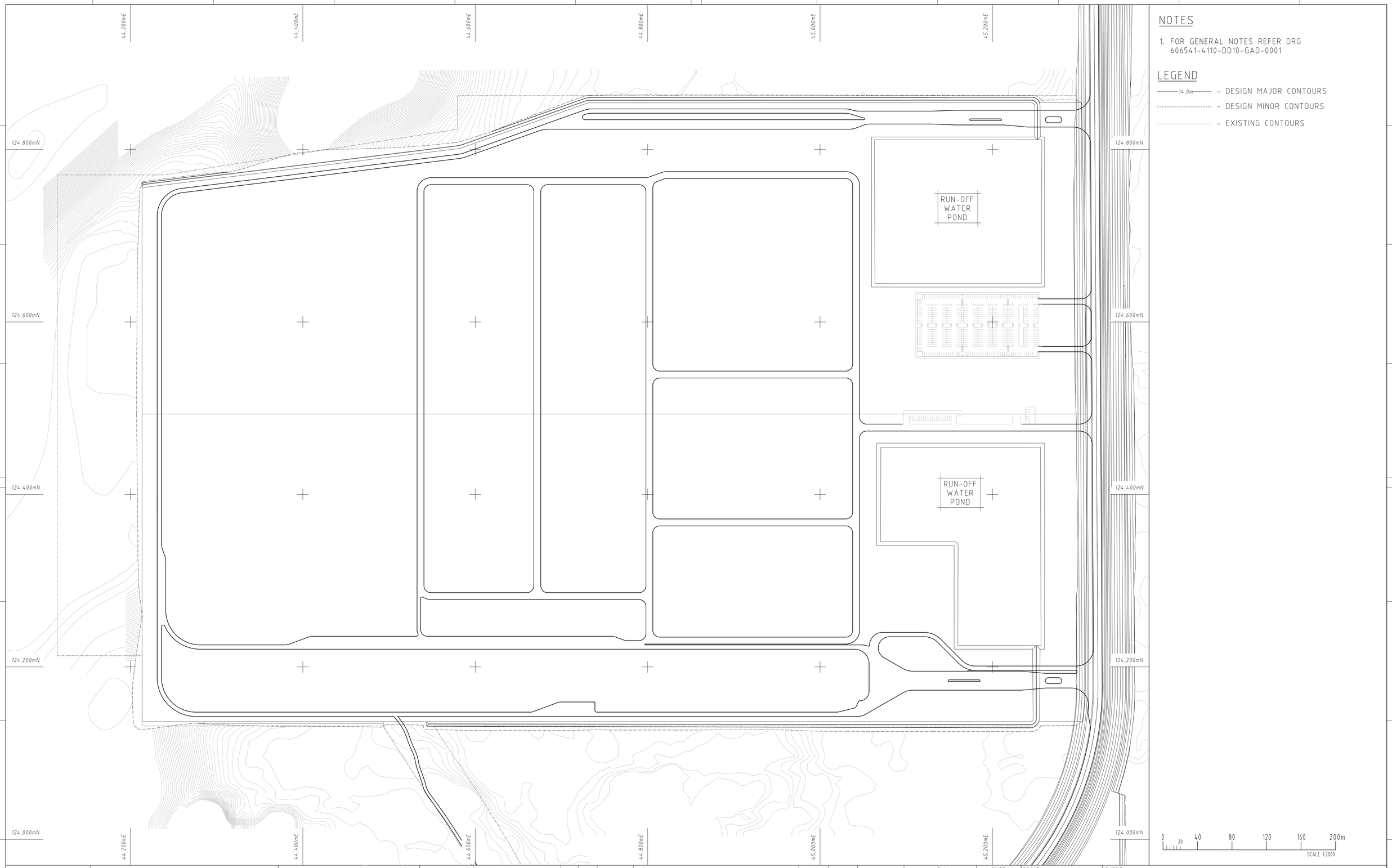
SCALE 1:2000

PROJECT No. 606541 | DRG SIZE A1

CLIENT: ALBEMARLE

TITLE: ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
BULK EARTHWORKS
SECTIONS AND DETAILS

DRAWING No. 606541-4120-DD10-DTL-0001 | REV No. C



NOTES

1. FOR GENERAL NOTES REFER DRG 606541-4110-DD10-GAD-0001

LEGEND

14.0m - DESIGN MAJOR CONTOURS

- DESIGN MINOR CONTOURS

- EXISTING CONTOURS

4130-DD10-DTL-0001	INTERNAL ROAD SECTIONS AND DETAILS
DRAWING No.	REFERENCE DRAWINGS

CLIENT: ALBEMARLE®

CLIENT PROJECT No. 7421

No.	BY	DATE	REVISION	CHECKED	APPROV.
B	SC	13.02.18	ISSUED FOR USE	KC	
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC	

	BY	DATE
PROJECT APPR.		
DESIGN APPR.		
DESIGNED		
CHECKED		
DRAWN		

SCALE 1:2000

TRUE NORTH

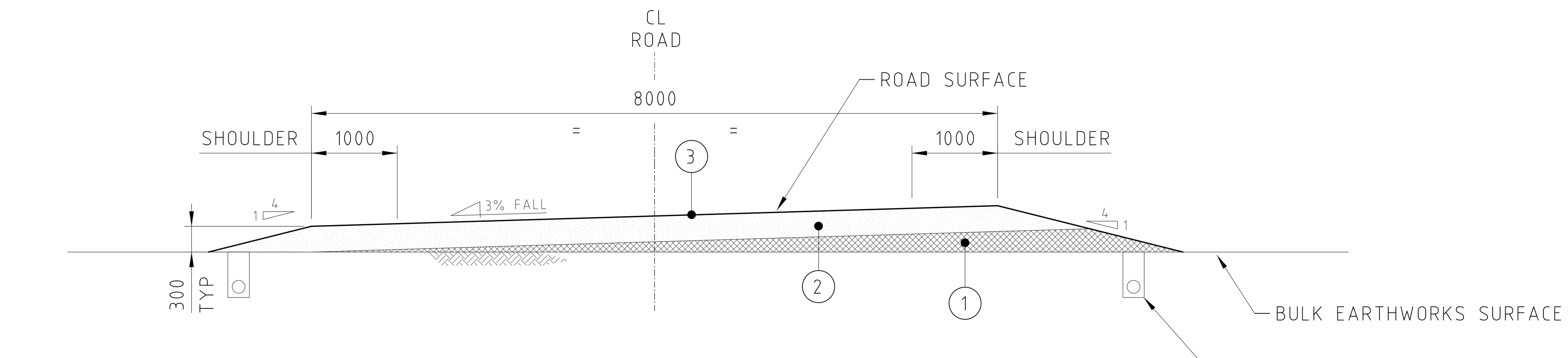
CLIENT ALBEMARLE

TITLE ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
INTERNAL ROAD LAYOUT
PLAN

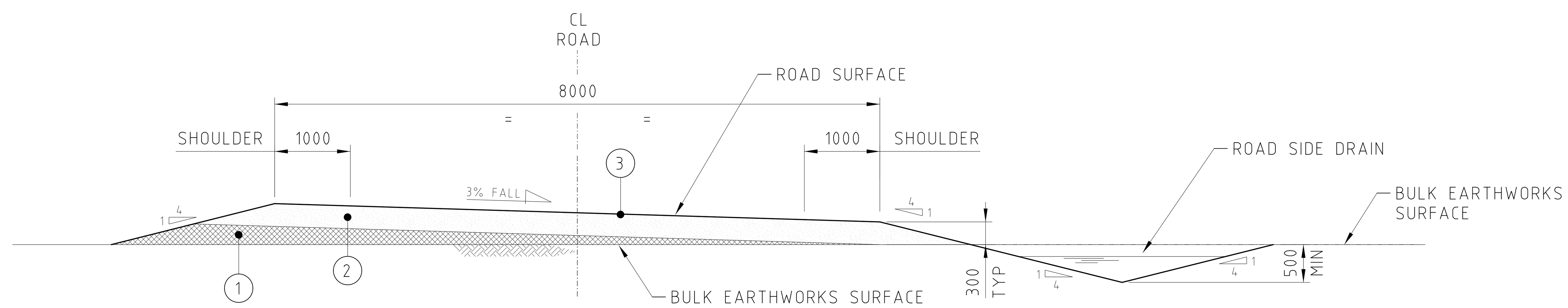
PROJECT No.	DRG SIZE	DRAWING No.	REV No.
606541	A1	606541-4130-DD10-GAD-0001	B

ISSUE#.

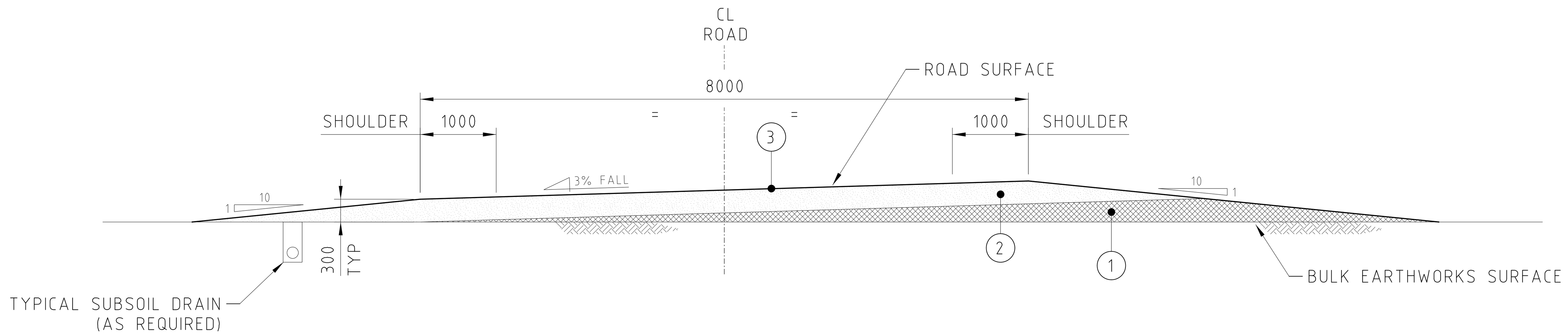
Date: 2/13/2018 Time: 1:33:40 PM Plotted By: sally.currie Pentable: LZR.TBL Plotdriver: pdf - BW.plt Filename: W:\Lithium\606541\Doc_Control\Transfer_to_DCD\From Sally Currie\606541-4130-DD10-GAD-0001_B.dgn



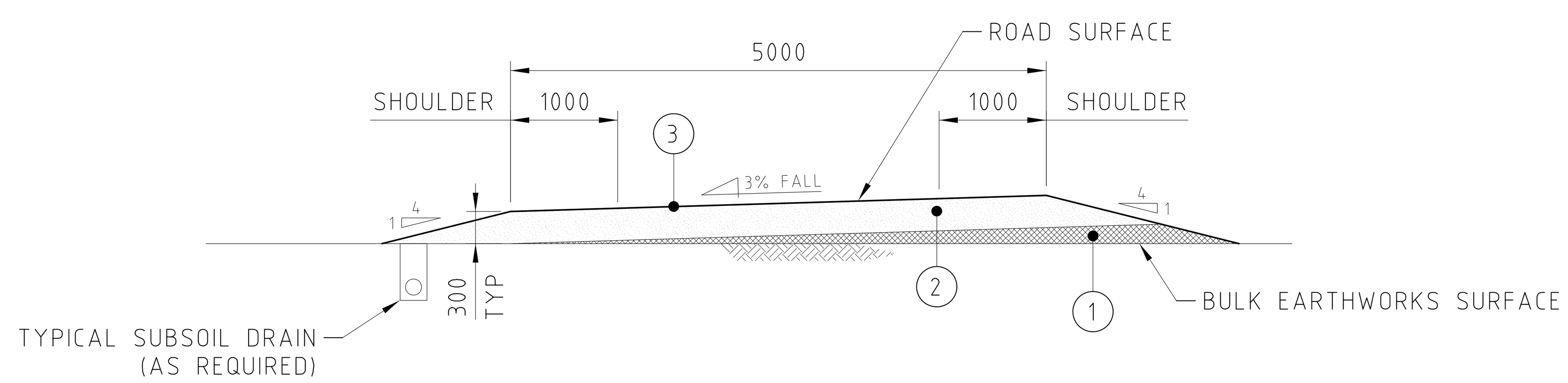
TYPICAL DUAL LANE ROAD SECTION
1:50



TYPICAL DUAL LANE ROAD SECTION WITH DRAIN
1:50



TYPICAL DUAL LANE ROAD SECTION WITH TRAFFICABLE BATTER
1:50



TYPICAL SINGLE LANE ROAD SECTION
1:50

PROPOSED LAYERWORKS

1. GENERAL APPROVED FILL AS PER GEOTECH REPORT 606541-0000-DD10-RPT-0002 TO BE COMPACTED TO 95% OF MODIFIED MAXIMUM DRY DENSITY AT 300mm LAYERS (MAX)
2. WEARING COURSE/SUBBASE MATERIAL SPECIFICATION SHALL BE AS PER ROADWORKS SPECIFICATION 606541-0000-DD10-SPC-0002
3. TWO-COAD SEAL (14/7mm AGGREGATE) TBC

NOTES

1. FOR GENERAL NOTES REFER DRG 606541-4110-DD10-GAD-0001
2. ALL DIMENSIONS ARE IN MILLIMETERS
3. SUBSOIL DRAIN TO BE SLOTTED PVC PIPE OR SIMILAR WITH AGGREGATE FILTER MATERIAL WRAPPED IN NON-WOVEN GEOTEXTILE

0 500 1000 2000 3000 4000 5000mm
SCALE 1:50

DRAWING No.	REFERENCE DRAWINGS
4130-DD10-GAD-0001	INTERNAL ROADS LAYOUT PLAN

wood.

CLIENT: ALBEMARLE®
CLIENT PROJECT No. 7421

No.	BY	DATE	REVISION	CHECKED	APPROV.
B	SC	13.02.18	ISSUED FOR USE	KC	
A	SC	30.01.18	ISSUED FOR INTERNAL REVIEW	KC	

	BY	DATE
PROJECT APPR.		
DESIGN APPR.		
DESIGNED		
CHECKED		
DRAWN		

SCALE 1:50
PROJECT No. 606541
DRG SIZE A1

CLIENT ALBEMARLE

TITLE ALBEMARLE KEMERTON PLANT PROJECT
OVERALL PLANT
INTERNAL ROADS
SECTIONS AND DETAILS

DRAWING No. 606541-4130-DD10-DTL-0001
REV No. B