HANCOCK GALILEE PTY LTD

Kevin's Corner Project | Supplementary Environmental Impact Statement

M | Site Water Management (Basis of Design) Report

Report

Site Water Management (Basis of Design) Report

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Prepared for

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Abbreviations

Abbreviation	Description
AEP	Annual Exceedance Probability
ARI	Average Recurrence Interval
AWBM	Australian Water Balance Model
BFS	Bankable Feasibility Study
CHPP	Coal Handling and Preparation Plant
CMIA	Central Mine Infrastructure Area
DSA	Design Storage Allowance
EC	Electrical Conductivity
EIS	Environmental Impact Statement
HGPL	Hancock Galilee Pty LTD
LIA	Light Industrial Area
LOM	Life of Mine
MAW	Mine Affected Water
MRL	Mandatory Reporting Level
MWD	Mine Water Dam
PDC	Pit Dewatering Dam Central
PDN	Pit Dewatering Dam North
PWDD	Process Water and Decant Dam
ROM	Run of Mine
RWD	Raw Water Dam
SD	Spoil Dam
SEIS	Supplementary Environmental Impact Statement
TLO	Train Load Out
TSF	Tailings Storage Facility
WBM	Water Balance Model
WMS	Water Management System
WTS	Water Transfer System

Introduction

1.1.1 Project Description

The Kevin's Corner Coal Project (the Project) is a proposed 30 Mtpa (product) thermal coal mine to be located in the Galilee Basin, Central Queensland approximately 90 km north of the township of Alpha. Mining will consist of three underground longwall operations (northern, central and southern underground mines) and two open-cut pits (northern and central) with a scheduled life of mine (LOM) in excess of thirty years.

An onsite coal handling and preparation plant (CHPP) will receive run of mine (ROM) coal from underground and open-cut mines where it will be crushed, screened and washed before load out to haul trains at the onsite load out facility. Coarse rejects will be placed in designated locations within the open-cut spoil emplacement areas. Fine tailings will be stored in an out of pit constructed tailings storage facility (TSF) for the first five years of mining operations until completion of mining operations in the northern open-cut pit. Tailings will then be stored in an in-pit TSF which will be established in the northern open-cut pit for the remainder of the LOM.

Mine consumptive water demands will be priority sourced from mine affected water (MAW) from run off and groundwater dewatering with a raw water dam (RWD) providing make up supply and supply to onsite demands where use of MAW is unsuitable. Raw water will be provided to the RWD via a proposed raw water pipeline.

1.2 Relationship to Environmental Impact Study Works

The basis of design builds on the work previously completed for HGPL as part of the environmental impact statement (EIS) submitted to the former Department of Environment and Resource Management (DERM) in 2011 (URS, 2011). The EIS mine Water Management System (WMS) and Flood Management Systems have been updated to take into account modifications to the proposed mine plan and the findings of supplementary environmental impact studies (SEIS). Such changes include:

- Changes to the Water Balance Model (WBM) (such as estimates of groundwater dewatering volumes),
- Finalisation of the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams which provides for additional legislative requirements
- Additional design details developed in the course of preparing the bankable feasibility study (BFS) for the Project

1.3 Purpose

This document presents the basis of design for the proposed regulated structures for the Kevin's Corner Coal Mine Water Management and Flood Protection Systems. The document has been prepared to respond to a request from DEHP to provide concept design details for regulated structures in support of the SEIS submission particularly in relation to the proposed EA conditions presented in Schedule W (Surface Water) and Schedule G (Regulated Structures). The document provides the following information:

- Applicable standards including engineering criteria, industry guidelines, relevant legislation and regulatory documents, relied upon;
- Description of the mine water management system including

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- Design objectives and design considerations
- Documentation of hydrological analyses and estimates required to determine storage capacities and flows volumes;
- Operating rules (including documentation and definition of process inputs in the DSA allowance); and;
- Design criteria including, operational details, size, relative volumes, reporting catchment (if any), location of spillway and fate of overflow water for each dam in the mine water management system.

- Description of the flood protection system including;

- Flooding assessment undertaken to establish flood management system element;
- Diversion design criteria including hydraulic performance guidelines, channel alignment and channel geometry; and,
- Levee design criteria including level of flood protection, alignment, batter slope and crest width, crest slope and cutoff trench requirements

- Operation and maintainance procedures;

- Decommissioning and rehabilitation planning

Key Standards, Guidelines and Codes of Practice

The standards, guidelines and codes of practice which have been relied upon in preparing this basis of design document area listed Table 2-1.

Table 2-1 Relevant Standards, Guidelines and Codes of Practice

Document Reference	**Document Title**
DEHP Manual	Department of Environment and Resource Management, *Manual for Assessing Hazard Categories* and Hydraulic Performance of Dams, February 2012
DNRW 2002	Queensland Department of Natural Resources and Mines, Guidelines for Failure Impact Assessment of Water Dams, April 2002
ANCOLD	Australian National Committee on Large Dams, Guidelines on Tailings Dam Design, Construction and Operation, October 1999
ANCOLD	Australian National Committee on Large Dams, Guidelines on Dam Safety Management, August 2003
ACARP	Australian Coal Association Research Program (ACARP) (Bowen Basin River Diversions – Design and Rehabilitation Criteria July 2002
AS/NZS 4129	Fittings for Polyethylene (PE) Pipes for Pressure Applications
AS/NZS 4130	Polyethylene (PE) Pipes for Pressure Applications
AS/NZS 4131	Polyethylene (PE) Compounds for Pressure Pipes and Fittings.
AS/NZS 2033	Installation of Polyethylene (PE) Pipe Systems
AS/NZS 2566	Buried Flexible Pipelines – Part 1 (Structural Design) and Part 2 (Installation)
AS 4041	Pressure Piping

URS

Water Management System Basis of Design

3.1 Design Objectives

The mine Water Managemetn System (WMS) has been based on the following key design objectives:

- Segregation of waters based on source and assumed quality;
- Minimisation of the onsite generation of mine affected water;
- Preferential reuse of stored inventories of mine affected water to satisfy the mines consumptive water demands;
- Provision of sufficient system capacity to ensure open-cut pit operations are maintained by achieving the target pit availability objective;
- Provision of sufficient system capacity to ensure that the uncontrolled discharge (i.e. spillway discharge) of mine affected water to the receiving environment is minimised to an acceptable likelihood of occurrence; and
- Provision of a water transfer system capable of ensuring that all containment, storage and reuse objectives are met.

Further details on these design objectives are provided Table 3-1 below.

Table 3-1 WMS Design Objectives

Design Objective	Description
Segregation of waters based on source and assumed quality.	Mine affected water (MAW) from all potentially contaminating sources is collected, contained and managed within the mine WMS as appropriate. Identified sources of MAW have been determined as: • All groundwater extracted via the borefield; • Underground mine dewatering; • Open-cut pit dewatering; • Runoff from all active spoil and overburden dumps; • Runoff from all ROM pads/dump, the CMIA and the product stockpile/TLO; and • Tailings decant water.
Minimise the onsite generation of mine affected water.	Consistent with best practice mine water management all clean water is passively diverted around the mine WMS wherever practical ensuring volumes of MAW generated onsite (and thus requiring containment and appropriate management) are minimised as well as providing unimpeded access to both the coal reserves and continuation of operations at key infrastructure areas. This is achieved as follows: • The diversion of Little Sandy and Rocky Creeks; • The provision of flood levees to limit the probability of ingress of water to the open-cut pits and critical infrastructure such as the Central Mine Infrastructure Area (CMIA); and • Appropriate isolation, through the use of high wall dams, diversion and catchment drains, bunding, and other such passive devices, of all disturbed and potentially contaminating catchments, to ensure that, to the greatest extent possible, the ingress of local clean water flows into the mine WMS is minimised.
Preferential reuse of stored inventories of mine affected water.	MAW will be preferentially used to satisfy those mine consumptive water demands for which the quality of MAW is deemed suitable. This ensures that: • Water inventories are continually drawn down freeing system and ensuring the capacity to contain future inflows is maximised; • Reliance on the need to make controlled releases of water to the receiving environment is minimised; and • The Projects reliance on external sources of water is reduced. MAW will be preferentially sourced to satisfy the following water demands: • CHPP process water;

3 Water Management System Basis of Design

Design Objective	Description
	• Underground mining operations; and • Haul road dust suppression. In the event of insufficient MAW being available make up supply will be provided from the raw water dam.
Provision of sufficient system capacity to ensure maintenance of open-cut pit mining operations	Both open-cut pits are subject to inundation from runoff into, and rainfall over each pit. In order to sustain mining operations sufficient system capacity has been provided to ensure that pit availability (defined as less than 20ML of water in either pit) is maintained at 97-98% of total days whilst operational.
The uncontrolled discharge (i.e. spillway discharge) of mine affected water to the receiving environment is minimised to an acceptable likelihood of occurrence	On the basis of a water balance assessment (under modelled historical climatic and simulated operational conditions) sufficient system capacity has been provided to ensure that: • All predicted inflows for the predicted thirty year LOM can be contained without overflows occurring either externally to the receiving environment or internally to another storage or open-cut pit.
Water transfer system capable of ensuring that all containment, storage and reuse objectives are met	On the basis of a water balance assessment (under modelled historical climatic and simulated operational conditions) sufficient water transfer system capacity has been provided to ensure that all the stated design objectives and considerations are able to be met.

3.2 Design Considerations

3.2.1 Hazard Category Assessment

The *Qld Manual for Assessing Hazard Categories and Hydraulic Performance of Dams* (DERM, 2012) states that:

"*All structures which are dams or levees associated with the operation of an environmentally relevant activity, must have their hazard category assessed based on the potential environmental harm that would result from the failure event scenarios (Section 1.1) described in this manual*."

Failure event scenarios are defined as either:

- **Failure to contain** – which encompasses any spills or releases from the structure resulting from any mode not including a dam break. In practical terms this usually means any uncontrolled discharge via the dam's spillway.
- **Dam break** – the collapse of the dam for any reason and subsequent release of contents into the receiving environment.

An additional criterion also places a minimum hazard classification of 'significant' on a dam where it contains, or could potentially contain contaminants that exceed the range of values and storage volumes given in Table 3 of DERM (2012). For salinity (the primary contaminant of concern for Project MAW) this applies to any dam that may contain over 25ML of water with an electrical conductivity (EC) in excess of 4000µS/cm.

In determining the hazard classification for all dams within the Kevin’s Corner mine WMS, (with the exception of Adit/ROM Dam North, Adit/ROM Dam Central, and the ROM Dump Dam) a minimum classification of ‘significant’ has been adopted. Adopted WMS dam classifications also reflect the following additional design considerations:

- Where the overflow destination is the receiving environment (i.e. offsite and not into an open-cut pit, another WMS dam or behind one of the flood control levees) a high hazard classification has been adopted.
- Any dam with a failure mode that could inundate one of the open-cut pits (and put workers safety at risk) has been given a high hazard classification.

It is possible that the hazard classification of some dams may be reduced to significant once their exact location with respect to each pit has been determined. Additional water management infrastructure (high wall dams, bunds etc.) around each pit to prevent the ingress of clean runoff may also prevent ingress from a dam failure. Concept hazard classifications for each dam are given in .

3.2.2 Design Storage Allowance

All storages within the mine WMS (with the exception of the Raw Water Dam (RWD), Adit/ROM Dam North, Adit/ROM Dam Central, and the ROM Dump Dam) have been assessed as regulated structures under the Qld Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EHP, 2012) and are assumed to be either significant or high hazard structures.

The nominated storage capacities for each regulated dam within the mine WMS also include a Design Storage Allowance (DSA), a hydraulic performance criterion that limits the occurrence of an uncontrolled discharge (i.e. spillway discharge) to an acceptably low probability.

The DSA allocates additional storage capacity for containment of predicted wet season inflows and must be made available at the commencement of each wet season on 1st November. The DSA requirement for high hazard dams within the Project site is the total volume of all catchment runoff and direct rainfall over the dam for the 1:100 AEP, three-month critical wet season assuming no evaporative losses or rainfall infiltration (100% runoff). For significant hazard dams it is the equivalent volume for the 1:20 AEP three-month wet season. The Project site DSA rainfall depths have been estimated as 675mm and 607mm respectively for the1:100 AEP and 1:20 AEP wet seasons. The DSA requirement for storages with extensive external catchments (such as the spoil dams) can be considerable and can represent a significant portion of the total required storage capacity.

3.2.3 Proposed Sharing of DSA Volumes

For an interconnected series of dams functioning as an integrated containment system, such as the proposed mine WMS, the DSA calculated for the whole system may be shared over a number regulated dams. However, at a minimum, 20% of any individual dams calculated DSA must be accommodated within that dam.

It is intended that the DSA of several storages within the WMS will be shared with the open-cut pits to minimise the individual storage requirements for each dam. These storages are:

- All four spoil dams;
- The Train Load Out (TLO)/product stockpile dam; and

- All adit/Run of Mine (ROM) dams (with the exception of the southern underground mine ROM pad dam).

3.2.4 Overflow Destinations for Mine Water Management System Dams

All mine WMS storages will be provided with an appropriately sized spillway and downstream conveyance with which to direct overflows to an appropriate receiving location. Wherever possible the preferred overflow destination is one of the two open-cut pits. This may be justified as follows:

- The likelihood of an uncontrolled discharge to the receiving environment is significantly reduced;
- The DSA may then be shared with the pit to the extent that a considerable reduction in nominated storage capacity can be achieved. This is particularity relevant for the spoil dams where the calculated DSA volume greatly exceeds the capacity required to contain predicted runoff inflows alone; and
- Significant gains in storage construction cost and footprint reduction can be achieved by not providing excess additional capacity to contain a volume of water that will only be required during an event with an extremely low probability of occurrence.

3.2.5 Spillway Capacities

Based on the Qld DERM Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (2012) spillway capacities for WMS storages have been determined as follows:

- Significant hazard dams – 1:1,000 AEP; and
- High hazard dams - 1:100,000 AEP.

3.2.6 Mandatory Reporting Level

The Mandatory Reporting Level (MRL) has been estimated in accordance with Qld DERM Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (2012) for each of the structures. This manual specifies that the MRL for high hazard category dams is the lowest of the following from the spillway invert:

- Equivalent runoff volume depth from the 1:100 ARI 72-hour duration storm with no losses; or
- Wave run-up allowance calculations for the 1:100 ARI-72 hour duration storm.

The manual also specifies that the MRL for significant hazard category dams is the lowest of the following from the spillway invert:

- Equivalent runoff volume depth from the 1:10 ARI 72-hour duration storm with no losses; or
- Wave run-up allowance calculations for the 1:10 ARI-72 hour duration storm.

3.2.7 Groundwater Input

Three estimates of groundwater inflow (high, low and base (likely expected)) have been considered in the development of the basis of design. Dam capacities are based on the high groundwater inflow estimate as this represents the highest storage requirement capacities for the WMS dams.

3.2.8 Dam Configurations

Any WMS dam with an external catchment contributing mine affected runoff will be constructed to facilitate gravity-fed inflow. This recognises the fact that the capacity of any pumped inflow arrangement has the potential to fail either due to mechanical failure or though excessive inflow resulting from an extreme rainfall event. Where a dam only receives pumped inflows (such as the borefield dams and the open-cut pit dewatering dams) the preferred arrangement will be a ring dam (‘turkeys nest’). The only exceptions to this will be the large mine water dams (MWD)s which, owing to their large capacity will be of a valley fill construction.

3.3 Water Balance Model

A water balance model (WBM) was constructed using Goldsim software to:

- Quantify the potential volumes of mine water that may be generated throughout the life of mine;
- Determine the storage capacity required for each of the mine water management system dams such that containment objectives for mine affected water are met; and
- Determine the transfer capacities required to move mine affected water around the mine WMS so that containment, productivity (open-cut pit availability, CHPP productivity) and reuse objectives are met.

3.3.1 Model Scenarios

The water balance model was run for thee different scenarios. Each scenario was representative of a differing estimate of the volume and rate of groundwater dewatering required to sustain both underground operations and to prevent seepage into the open-cut pits. The three groundwater scenarios (Table 3-2) each considered the development of Kevin’s Corner in isolation and did not include the potential impact on groundwater availability from the proposed Alpha Coal or Waratah Projects. Dewatering volumes for each scenario are shown in Chart 3-1 and Appendix C.

Table 3-2 Proposed Water Balance Assessment Scenarios

Scenario	Description
1	Base level of groundwater inflows
2	Low level of groundwater inflows
3	High level of groundwater inflows

3.3.2 Modelling Approach

The water balance model was used to run dynamic simulations for the thirty year LOM with all model inputs (catchment areas, water demands and water inputs) varying with simulated mine year. This enabled WMS stress points to be identified. Input climate data comprised of 112 years of rainfall and evaporation data from the Bureau of Meteorology SILO Data Drill. The model was run on a daily timestep for a total of 82 realisations using pseudo Monte Carlo simulations for each model scenario.

3.3.3 Key Modelling Assumptions

The following modelling assumptions were incorporated into the water balance model to inform the concept design:

- Pumped transfers occur 'instantly' within each water balance model timestep (i.e. day) and are based on specific transfer rules;
- No allowance was made for the time taken for water to actually move from one location to the next and pump availability was assumed to be 100% of potential capacity for 100% of the time.
- Pump capacity remains fixed irrespective of head differential in dams due to draw down;
- Performance of the mine WMS was assessed on the basis of historical climate data however the potential changes to climatic extremes resulting from climate change have not been considered;
- No loss of dam storage capacity over time due to sedimentation;
- The CMIA dam and overflow basin have been modelled as a single storage; and
- Model rules governing the transfer of water from dam to dam have been optimised to ensure that the allocated DSA volume is available within in each dam on the 1st November each model year.

3.3.4 Adopted Model Storage Criteria

Conceptual stage-storage relationships were developed for each dam in the WBM. These relationships allow for the calculation of evaporative losses, direct rainfall inputs (i.e. falling within the dam crest) and for calculation of the DSA volume requirements. For the large MWDs the relationship was developed using three dimensional survey data but for all other dams the following assumptions were used to derive the appropriate stage-storage relationships:

- Rectangular trapezoidal configuration;
- 3:1 (H:V) batter slopes;
- 0.5m freeboard (storages up to 50ML), 1m freeboard for storages over 50ML; and
- 5m max water depth (storages up to 50ML), 7m for storages over 50ML.

3.3.5 Discrete Modelling of the CHPP/TSF System

The water demand for the Coal Handling and Preparation Plant (CHPP) (process water) and tailings water provides a significant draw on stored inventories of MAW. Net CHPP water consumption is inclusive of TSF decant return water and has been calculated assuming an overall decant rate of 40% from the TSFs and accounts for all potential losses (evaporative, interstitial and seepage). Consequently it has not been necessary to discretely model tailings water evaporative losses from the TSFs in the WBM.

Each TSF sub model in the WBM still accounts for runoff from the assumed beach areas formed by the deposition of tailings and evaporatiive losses from tailings beach runoff prior to decant pumping to the process water dam where it is reused to satisfy the CHPP process water demand.

3.3.6 Rainfall Runoff Model

WBM calculation of rainfall runoff depths has been carried out using a sub model incorporating the Australian Water Balance Model (AWBM) as per the EIS model. No changes have been made to the parameters or land use types. The land use types considered in the AWBM are presented in Table 3-3 whilst the parameters adopted for the AWBM are presented in Table 3-4. For a full description of the AWBM and its calibration refer URS, 2011.

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Table 3-3 Landuse Types

Land Type	Description	Runoff Management
Natural	All undisturbed areas both upstream of, and within the MLA	Wherever possible to be diverted around the mine WMS.
Revegetated	All previously disturbed areas that have been successfully rehabilitated.	Wherever possible to be diverted around the mine WMS.
Hardstand	All potential sources of contaminated runoff such as open-cut pits, ROM pads etc.	To be contained onsite and managed within the mine WMS.
Spoil	All active spoil and overburden areas.	To be contained onsite and managed within the mine WMS.

Table 3-4 Adopted AWBM Parameters

Parameter	Description	Landuse			
		Natural	Revegetated[1]	Spoil	Hardstand
A1	Partial area	0.047	0.047	0.047	0.047
A2	Partial area	0.172	0.172	0.172	0.172
C1	Surface storage capacity	39.5	39.5	8	5
C2	Surface storage capacity	180.0	180.0	40	25
C3	Surface storage capacity	368.6	368.6	85	50
BFI	Base Flow Index	0.363	0.363	0.363	0
K_b	Base flow recession constant	0.699	0.699	0.699	n/a
K_s	Surface flow recession constant	0.756	0.756	0.1	0.1

1 The WMEP WBM does not contain any rehabilitated areas

3.3.7 Model Input Data

The water balance model uses various input data to define climatic conditions, operational water demands, water inputs and mine catchment areas.

3.3.7.1 Climate Data

Rainfall

112 years (1/1/1900 to 20/02/2012) of rainfall and evaporation data was used from the Bureau of Meteorology SILO Data Drill for the water balance modelling. The Data Drill was fully synthetic data derived from the Bureaus extensive database of recorded observations from its network of weather recording stations. This rainfall data was required to inform the AWBM rainfall-runoff model as well as calculation of direct rainfall inputs to dams (rainfall over the water surface or within the actual crest).

Evaporation

Two different types of evaporation data were used as follows:

- Pan evaporation was used to inform the AWBM and
- Moretons shallow lake evaporation was used to calculate water surface evaporative losses. Storage evaporative losses were calculated with each timestep (daily) and were based on the dams' current water surface area.

3.3.7.2 Catchment Areas

Catchment areas were defined on the basis of the mine layout plan, mine development data and topographical data to enable calculation of the runoff contributions into the various dams and pits (note that not all dams in the mine WMS have external catchments and these are not discussed in this section). Catchment areas either remained fixed for the LOM (e.g. process areas such as ROM pads) or changed dynamically over time (e.g. open-cut pits and spoil/overburden dumps). Catchment land uses were defined on the basis of the assumed process taking place within each catchment area.

Rehabilitation of disturbed catchments

In order to best represent the worst case containment scenario for the mine WMS rehabilitation of disturbed mine catchments was not considered. Consequently catchment areas assumed to be disturbed by mining activity (spoil/overburden dumps and the open-cut pits) remained so for the LOM. Table 3-5 details the catchment landuse areas assigned to the catchment area reporting to each dam. Additional data for the dynamic catchment areas are provided in Appendix A.

Table 3-5 Catchment Landuse Data

Catchment reporting to	Assumed Catchment Area for AWBM (Ha)			
	Natural	**Rehabilitated**	**Spoil**	**Hardstand**
MWD 1	514	0	0	0
MWD 2	303	0	0	0
Open-cut pit north	0	0	0	Varies – refer Appendix A.
Open-cut pit south	0	0	0	Varies – refer Appendix A.
Spoil dam 1	0	0	Varies – refer Appendix A	0
Spoil dam 2	0	0	Varies – Appendix A.	0
Spoil dam 3	0	0	Varies – refer Appendix A.	0
Spoil dam 4	0	0	Varies – refer Appendix A.	0
CMIA dam	150.0	0	0	46.0
TLO/product stockpile dam	0	0	0	22.3
Adit/ROM dam north	0	0	0	2.6
Adit/ROM dam central	0	0	0	2.6
Adit/ROM dam south	0	0	0	2.6
ROM dump dam	0	0	0	2.6

3.3.7.3 Water Inputs

As discussed in section 3.3.1, three differing levels of groundwater inflow were assessed. Chart 3-1 shows the predicted groundwater inflows adopted for each scenario.

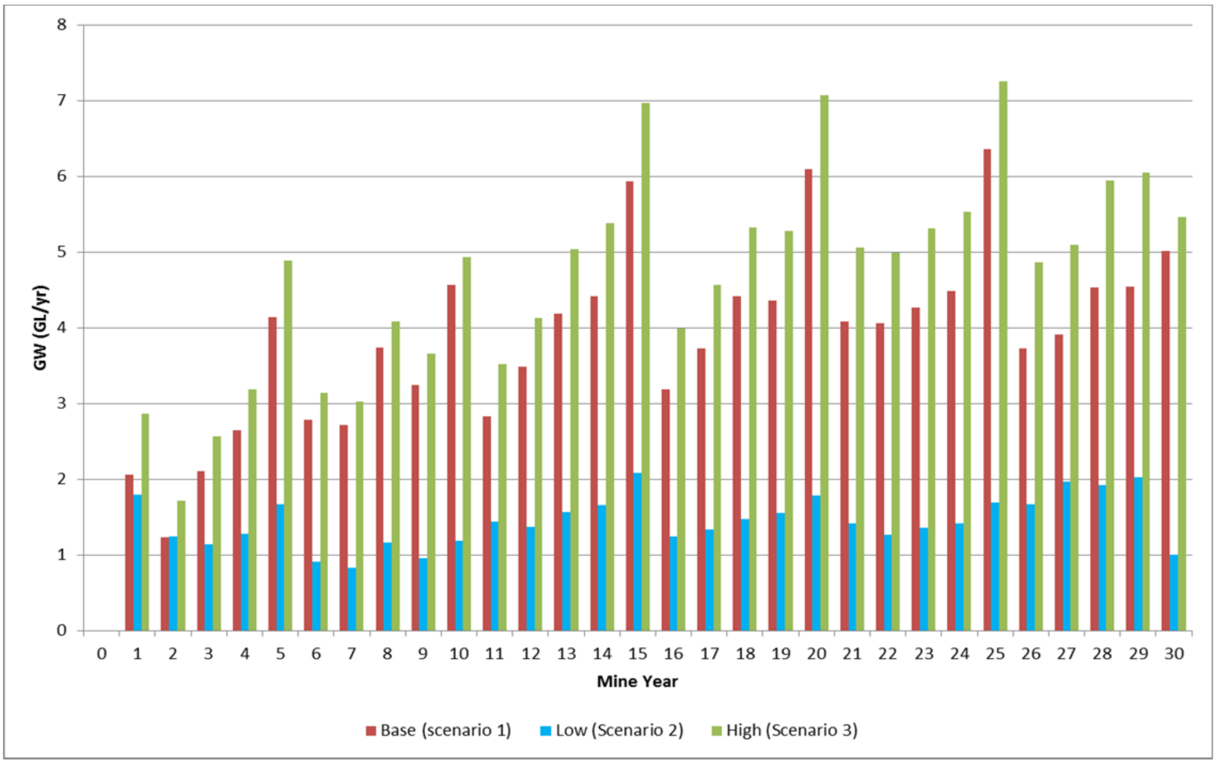


Chart 3-1 Estimated Groundwater Inflows

3.3.8 Water Demands

The mine consumptive water demands incorporated into the water balance model are shown in Table 3-6. The CHPP net water demand is based on the following assumptions:

- CHPP demand is inclusive of return decant water from the TSFs and assumes an overall decant rate of 40%;
- Production ramp up assumptions:
  - Phase 1 (1 CHPP unit operational), years 1-2;
  - Phase 2 (3 CHPP units operational), years 3-6; and
  - Phase 3 (4 CHPP units operational), years 7-30).

Table 3-6 Assumed Water Demand Data

Mine year	Potable (ML/yr)	Haul road dust suppression (ML/yr)	Underground mine operations (ML/yr)	MIA raw water (P&E washdown) (ML/yr)	CHPP net demand (ML/yr)
0	73	0	0	0	0
1	70	1501	16	3.6	2203
2	63	1654	60	3.6	2203
3	57	2021	216	3.6	5800
4	58	1378	403	3.6	5800
5	61	1011	570	3.6	5800
6	63	1011	570	3.6	5800
7	58	1011	644	3.6	7646
8	57	1011	644	3.6	7646
9	58	1011	644	3.6	7646
10	58	1011	644	3.6	7646
11	56	1011	644	3.6	7646
12	57	1011	644	3.6	7646
13	55	1011	644	3.6	7646
14	56	1011	644	3.6	7646
15	57	1011	644	3.6	7646
16	57	1011	644	3.6	7646
17	58	1011	644	3.6	7646
18	58	1011	554	3.6	7646
19	57	1011	554	3.6	7646
20	57	1011	554	3.6	7646
21	58	1011	554	3.6	7646
22	56	1011	554	3.6	7646
23	55	1011	554	3.6	7646
24	55	1011	554	3.6	7646
25	56	1011	548	3.6	7646
26	55	1011	541	3.6	7646
27	53	1011	541	3.6	7646
28	49	1011	528	3.6	7646
29	50	1011	528	3.6	7646
30	50	1011	528	3.6	7646

3.3.9 Model Water Transfer Rules

Model water transfers were governed by a set of rules which dictate when transfers occur, where water is sent to and at what rate the transfer should take place. Table 3-7 summarises the model water transfer rules.

3 Water Management System Basis of Design

Table 3-7 Model Water Transfer Rules

From	To	Condition 1 - Source dam			Criteria	Condition 2 - Destination dam			Rate (L/s)
SD 1	SD 2	SD1	>	0ML	AND	SD2	<	340ML	100
SD2	SD3	SD2	>	0ML	AND	SD3	<	330ML	150
SD3	MWD2	SD3	>	0ML	AND	MWD2	<	6000ML	300
SD4	MWD1	SD4	>	0ML	AND	MWD1	<	5850ML	300
Open-Cut Pit North	Pit Dewater North	North Pit	>	0ML	AND	PDN	<	220ML	350
Pit dewater north	MWD 2	PDN	>	0ML	AND	MWD 2	<	6000ML	300
Open-cut Pit Central	Pit dewater central	Central pit	>	0ML	AND	PDC	<	400ML	500
Pit Dewater central	MWD 1	PDC	>	0ML	AND	MWD1	<	5850ML	400
MWD 1	MWD2	MWD1	>	5800ML	AND	MWD2	<	6800ML	300
MWD2	MWD1	MWD2	>	200ML	AND	MWD 1	<	1500ML	300
Adit/ROM dam north	MWD1	Adit/Rom dam north	>	0ML	AND	MWD1	<	5925ML	50
Adit/ROM dam Central	MWD1	Adit/Rom dam Central	>	0ML	AND	MWD1	<	5925ML	50
Adit/ROM dam south	MWD1	Adit/Rom dam south	>	0ML	AND	MWD1	<	5925ML	50
ROM Dump dam	MWD1	ROM Dump dam	>	0ML	AND	MWD1	<	3850ML	50
CMIA dam	MWD2	CMIA dam	>	0ML	AND	MWD2	<	6000ML	150
Borefield dam 1	MWD1	BFD1	>	0ML	AND	MWD1	<	5925ML	150
Borefield dam 2	MWD1	BFD2	>	0ML	AND	MWD1	<	5925ML	150
TSF1	Process water/Decant Dam	TSF1	>	10ML	AND	PWDD	<	120ML	200
TSF2	Process water/Decant Dam	TSF2	>	10ML	AND	PWDD	<	120ML	250
Process water/Decant Dam	MWD2	PWDD	>	130ML	AND	MWD2	<	6000ML	250
TLO/Product stockpile dam	MWD2	TLO	>	0ML	AND	MWD2	<	6000ML	100
MWD 1	Process water/Decant Dam	MWD 1	>	20ML	AND	PWDD	<	70ML	300

3.3.10 Water Balance Results - System Capacity Required to Limit Uncontrolled Discharges

WMS dam capacities were determined on the basis of the water balance results from the high groundwater inflow scenario (scenario 3). This conservative approach, combined with the additional modelling assumption that no rehabilitation of disturbed mine catchments would occur ensures that the proposed WMS components would have adequate capacity to contain all predicted inflows with additional contingency capacity to contain possible additional inflows over and above those assessed.

3 Water Management System Basis of Design

In addition the mine plan includes two contingency storages (MWD3 and MWD4) in the highly unlikely event that additional storage is required.

Dam capacities are given in . Probability history plots for MWD 1 and 2 are shown in and and shows the whole of site water volume probability history plot. Additional water balance results including exceedance probability plots for MWD 1 and 2 are shown in Appendix A

Table 3-8 Summary of WMS Dam Configurations, DSA Allocations and Overflow Destinations

WMS System Component	Storage Facility	Hazard Category	Configuration	Inflows	Storage Properties							Overflow Destination
					Total Storage (ML)	Max Vol. 1st Nov. (ML)	DSA Accommodated in structure (ML)		DSA Accommodated in other structures (ML)		Critical Storm Volume Contained[1] (ML)	
Contaminated Water System/Mine Water Dam	MWD 1	High	Valley fill	Catchment runoff and pumped transfer	9300	5800	3500	100%	-	0%	4900	Middle Creek
	MWD 2	High	Valley fill	catchment runoff and pumped transfer	7400	5350	2050	100%	-	0%	2100	Sandy Creek
	MWD 3	High	Valley fill	Catchment runoff and pumped transfer	2550	950	1600	100%	-	0%	1470	Sandy Creek
	MWD 4	High	Valley fill	catchment runoff and pumped transfer	830	230	600	100%	-	0%	1200	Sandy Creek
Spoil Runoff System	Spoil Dam 1	High	Void	gravity	300	85	215	20%	860	80%	N/A	Northern open-cut pit/TSF 2
	Spoil Dam 2	High	Void	gravity	350	160	190	20%	760	80%	N/A	Northern open-cut pit/TSF 2
	Spoil Dam 3	High	Void	gravity	400	131	270	20%	1075	80%	N/A	Northern open-cut pit/TSF 2
	Spoil Dam 4	High	Void	gravity	1200	320	880	20%	3490	80%	N/A	Central open-cut pit
Groundwater Collection System	Borefield dam 1	High	Turkeys nest	Pumped borefield dewatering	60	48	12	100%	-	0%	N/A	Little sandy/Rocky Creek diversion
	Borefield dam 2	High	Turkeys nest	Pumped borefield dewatering	60	48	12	100%	-	0%	N/A	Little sandy/Rocky Creek diversion
	Adit/ROM dam south	High	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	30	6	24	100%	-	0%	N/A	Sandy Creek
	Adit/ROM dam central	Low	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	14	10	4	20%	16	80%	N/A	Central open-cut pit
	Adit/ROM dam north	Low	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	14	10	4	20%	16	80%	N/A	CMIA dam
	ROM dump dam	Low	Void	Gravity	7	3	4	20%	16	80%	N/A	CMIA dam
	TLO dam	Significant	Void	Gravity	45	16	29	20%	116	80%	N/A	Behind stockpile levee
Raw Water System	Raw water dam	N/A	Turkeys nest	Pumped (external pipeline)	1500	N/A	N/A	N/A	N/A	N/A	N/A	Receiving environment (unnamed watercourse)
Open-Cut Pit Dewatering System	CMIA dam & overflow basin	High	Void	Gravity	280	35	245	20%	985	80%	N/A	Overflow basin/CMIA
	Process water and decant dam	High	Turkeys nest	Pumped	150	126	24	100%	-	0%	N/A	Northern open-cut pit/TSF2
	Pit dewatering dam north	High	Turkeys nest	Pumped	200	170	30	100%	-	0%	N/A	Northern open-cut pit/TSF 2
	Pit dewatering dam central	High	Turkeys nest	Pumped	450	390	60	100%	-	0%	N/A	Central open-cut pit

1 Defined as the storage volume contained between the spillway invert and the embankment crest assuming no spillway discharge

3 Water Management System Basis of Design

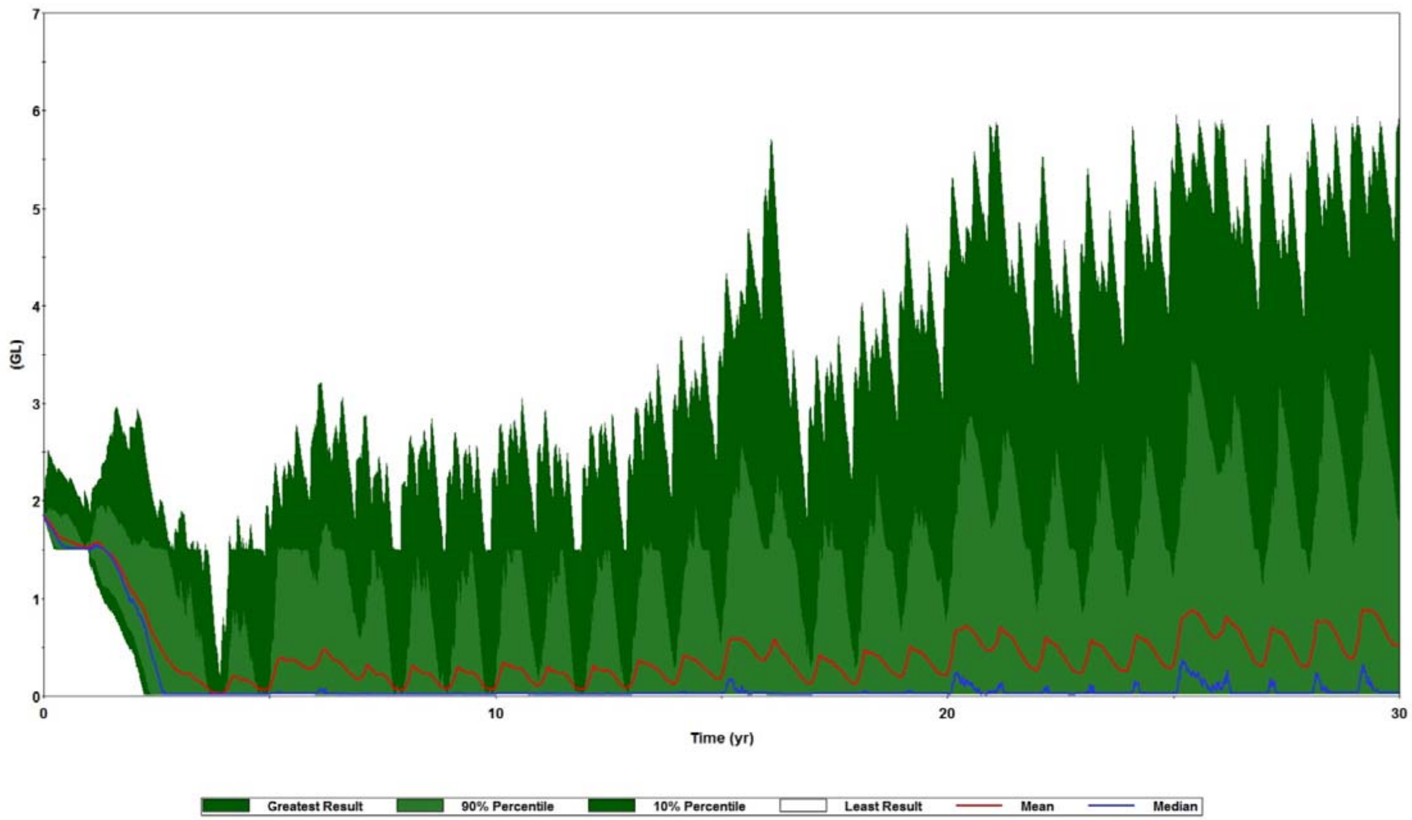


Figure 3-1 Storage Probability History Plot - MWD 1

3 Water Management System Basis of Design

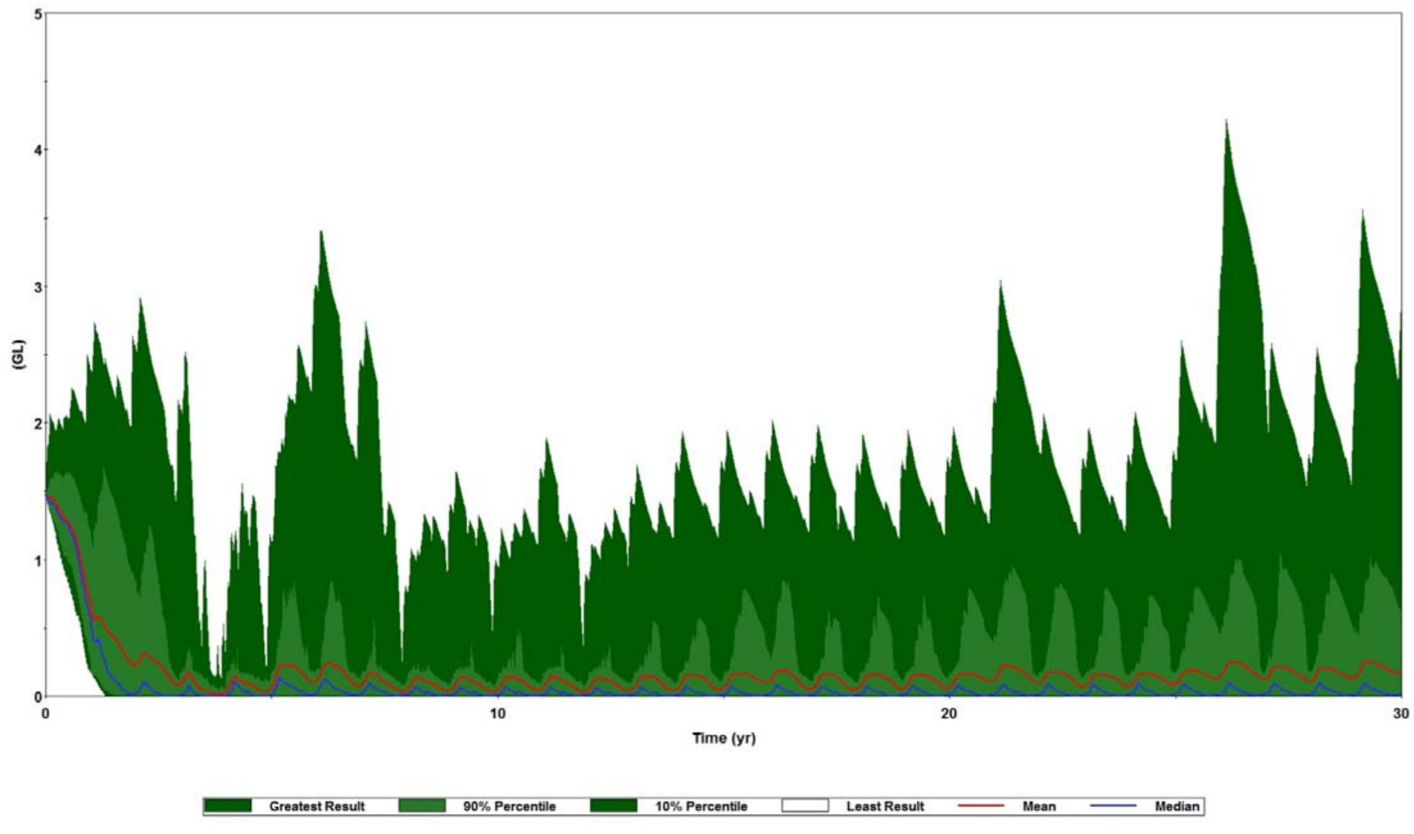


Figure 3-2 Storage Probability History Plot - MWD 2

3 Water Management System Basis of Design

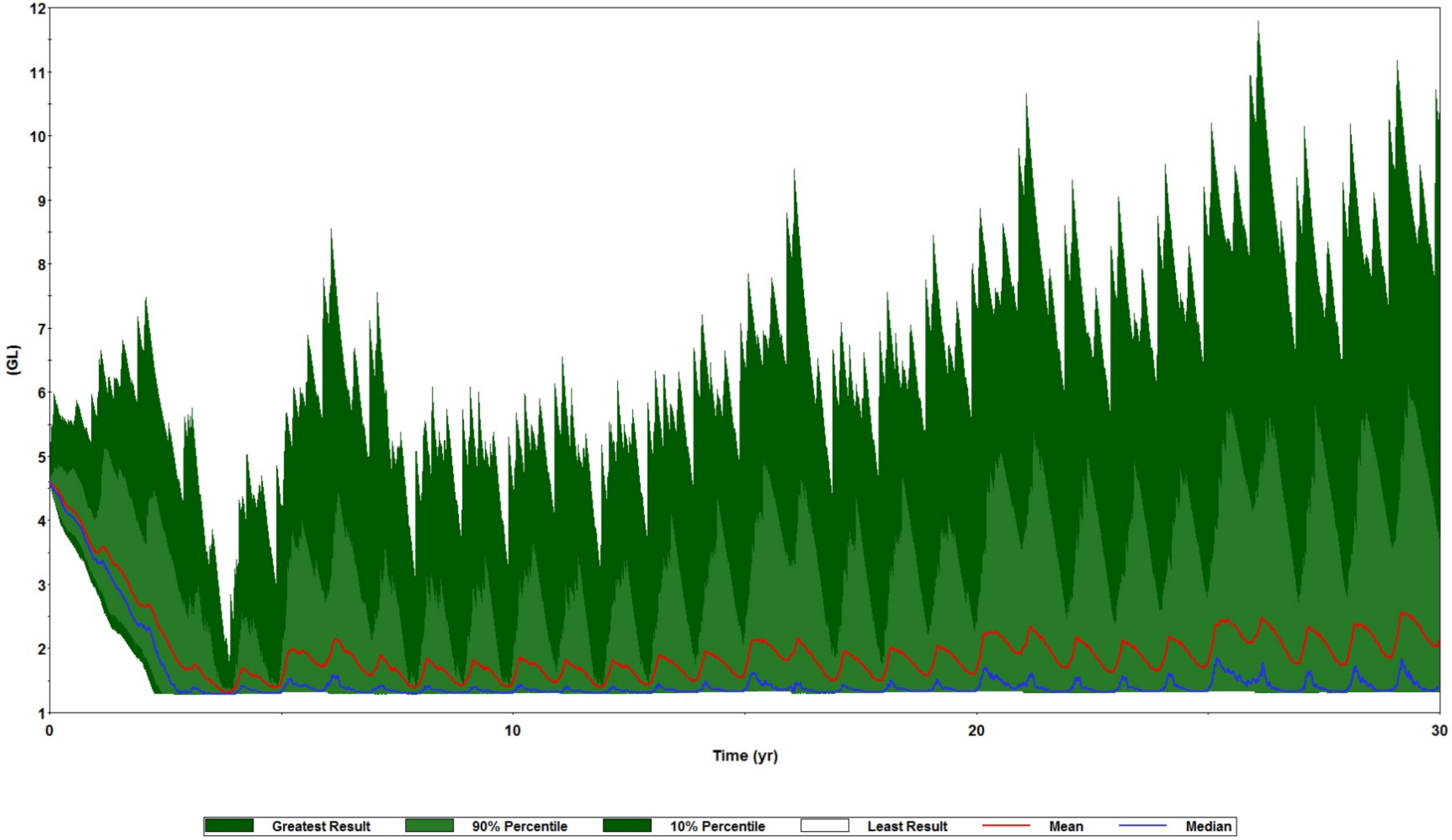


Figure 3-3 Whole of Site Water Volume Probability History Plot

3.4 Mine Water Management Strategy

The strategy for the management of mine affected water (MAW) generated onsite will be as follows:

- MAW from the three underground mines, central open-cut pit dewatering dam and spoil dam 4, and pumped transfers from the two groundwater dewatering dams will be collected in MWD1 which will be the primary storage for MAW.
- MAW from TLO/product stockpile and CMIA dams, northern open-cut pit dewatering dam and spoil dam 3, will be collected in MWD2;
- Excess MAW from MWD 1 will be transferred to MWD 2. As the volume of water in MWD 1 is reduced, water will be pumped from MWD2 back into MWD 1 to ensure continuity of supply for mine water demands;
- MAW will, as far as practical, be transferred into either MWD as soon as it is received at the various collection points. This will ensure that the capacity to contain future inflows is always maximised.
- MAW will be reused on site wherever possible to minimise the reliance on external water supplies. MWD1 will be the primary supply point of water to the CHPP (via the Process Water Decant Dam (PWDD) and underground mines;
- A raw water dam will be constructed to supply potable requirements and to satisfy demands which cannot be met by the onsite inventory of MAW;
- Controlled releases are not required to prevent overflows from the system for events less than 1:100 AEP.

3.4.1 Identified Sources of Mine Affected Water

The various aspects of mine operations expected to produce mine affected water are as follows:

- **Groundwater Dewatering –** dewatering of the underground mines is required in order to sustain operations. This water is either extracted via the proposed borefield or via the underground mines. Water extracted from the underground mines as part of the mine 'water make' also includes the unused portion of the water demand required to sustain the mining operations (shearer, cooling, dust suppression etc.). All groundwater will be pumped into collection dams and then transferred to the MWDs;
- **Open-cut pit dewatering –** dewatering of the open-cut pits is required to sustain mining operations. Water may enter the open-cut pits as either runoff or direct rainfall. It is assumed that the operation of the proposed borefield will ensure that groundwater seepage into the pits is reduced to a negligible level. All water pumped from the open-cut pits is considered to be mine affected and will be pumped into collection dams and then transferred to the MWDs;
- **Spoil runoff -** surface runoff from all active (un-rehabilitated) spoil and overburden dumps will be diverted and contained within a series of spoil dams and from there transferred into one of the MWDs;
- **Process area runoff –** surface runoff associated with the following areas is assumed to be mine affected and will be contained at each respective source and transferred to the MWDs:
  - — ROM pads and dump;
  - — Train load out/product stock pile; and
  - — Central mine industrial area and immediate haul roads

- **Tailings decant water –** decant from the TSF's is considered to be mine affected. Decant water, as a priority, will be reused within the CHPP/tailings pumping system, however, during significant rainfall events, decant water may need to be transferred to MWD 2 for subsequent reuse.

3.4.2 Key Mine Water Management System Components

The key components of the mine WMS which have been designed (concept only) to manage the sources of MAW are summarised in Table 3-10 are discussed in sections 3.4.2.1. to 3.4.2.9.

3.4.2.1 Mine water dams

Two large mine water dams (MWDs) will provide the storage required to contain the estimated volume of MAW generated over the LOM. Water will be transferred into either MWD following localised containment and collection in one of the various minor dams around the site. Transfer to either MWD is generally based on the proximity of each collection dam to either MWD. Supply of MAW to various Project water demands will also be from the MWDs. Water may be transferred directly between MWD 1 and 2 as required for supply and/or containment demands.

Both mine water dams will be constructed as valley fill storages and will therefore have an upstream, undisturbed reporting catchment. Runoff from these catchments is considered to be clean (not mine affected) however once flows enter the storage they will be considered mine affected due to mixing with the MAW already present. In order to reduce this contribution of clean runoff into each dam the catchment reporting to MWD 1 has been reduced through the use of a diversion drain. This reduction in the external catchment also significantly reduces the DSA volume required allowing for a more efficient use of the available storage volume. The use of catchment diversion drains would not provide a significant reduction in catchment area for MWD 2 due to the relatively steep catchment.

3.4.2.2 Spoil Runoff System

Runoff from the spoil and overburden dumps is considered to be mine-affected and therefore unsuitable for discharge to the receiving environment. The spoil runoff system collects all stormwater runoff originating from each spoil/overburden dumps and diverts it, by gravity flow, into one of four spoil dams. Pumped inflow of spoil runoff is not considered practical due to the high degree of variability in both catchment size (over the LOM) and rainfall depth. Potentially clean runoff originating outside of the spoil/overburden dumps will be passively diverted around the spoil runoff system by way of catch drains and diversion channels as required to reduce the total volume of water requiring containment.

3 Water Management System Basis of Design

Table 3-9 Summary of Key Mine WMS Components

WMS Component	WMS Infrastructure	Purpose
Mine water dams	• MWD 1; and • MWD 2.	• Primary storages for MAW; and • Supply point for distribution of MAW to Project consumptive demands;
Spoil runoff system	• Spoil dam 1; • Spoil dam 2; • Spoil dam 3; and • Spoil dam 4.	• Passive diversion of all clean runoff around all spoil and overburden dumps; • Containment of mine affected runoff from all spoil and overburden dumps; • Diversion of all mine affected runoff into one of four spoil dams; and • Transfer of all MAW into one of the large MWDs for subsequent reuse.
Groundwater collection system	• Adit/ROM pad dam south; • Adit/ROM pad dam central; • Adit/ROM pad dam north; • Borefield dam 1; and • Borefield dam 2.	• Collection of all underground mine water make (groundwater and unconsumed process water); • Pumped transfer into associated adit pit dams (one per underground mine); • Transfer into MWD 1 for subsequent reuse; • Aggregation of all flows from the various bores and transfer into one of two borefield dams; and • Transfer into MWD 1 for subsequent reuse.
Open-cut pit dewatering system	• Central open-cut pit dewater dam; and • Northern open-cut pit dewater dam.	• Passive diversion of all clean runoff around the open-cut pits; • Containment of all mine affected runoff within the open-cut pits; • Transfer of MAW from in-pit collection points to open-cut pit dewatering dams; and • Transfer of MAW from dewatering dams into one of the MWDs for subsequent reuse.
Process area runoff system	• Adit/ROM pad dam south; • Adit/ROM pad dam central; • Adit/ROM pad dam north; • ROM dump dam; • TLO/product stockpile dam; and • CMIA dam/overflow basin.	• Passive diversion of all clean runoff around the various process areas; • Containment and diversion into collection dams of all mine affected runoff originating from each process area; and • Transfer of all MAW into one of the large MWDs for subsequent reuse.
CHPP and TSFs system	• Process water and decant dam.	• Primary supply dam for CHPP process water (process and tailings); and • Receipt of tailings decant water from both TSF 1 and 2.
Raw water system	• Raw water pipeline; and • Raw water dam	• Distribution of external raw water from water provider to Project site; • Storage of externally sourced raw water prior to distribution to points of demand.
Transfer systems	• Pump and pipe transfer network	• Transfer of all Project waters from points of collection to points of storage and from points of storage to all points of demand.

3 Water Management System Basis of Design

Open-Cut Pit Dewatering System

All water in the open-cut pit dewatering system is considered to be mine affected. Water enters each pit either directly as rainfall or runoff into each pit originating from pit ramps, temporary spoil dumps and other disturbed areas inside the pit shell. It has been assumed that groundwater seepage into each pit will be negligible due to operation of the proposed borefield.

In-pit drainage infrastructure will direct flows to a common location from where pit dewatering to an associated pit dewatering dam outside of the pit will occur. Each pit dewatering dam will be constructed as a turkeys nest arrangement and all pit dewatering inflows will be pumped.

Process Area Runoff System

Runoff from several operational areas and facilities is expected to generate MAW. These areas are as follows:

- All ROM pads and ROM dump;
- TLO/product stock pile; and
- Central MIA

Runoff from each underground mine ROM pad will be contained in each respective adit/ROM pad dam and runoff from the ROM dump area will also be directed into the ROM dump dam. Mine affected runoff from the product stockpile pad be collected in the TLO/product stockpile dam.

Within the CMIA there is a relatively high density of potential sources of mine affected runoff (haul roads, heavy vehicle set down areas, hardstand etc.) however they are interspersed with potentially clean, undisturbed areas. Due to the difficulties associated with maintaining separation of mine affected and clean runoff originating from the remaining undisturbed areas in the CMIA all runoff originating within the CMIA has been assumed to be mine affected. All CMIA runoff will therefore be considered MAW and directed into the CMIA dam.

Due to space considerations it will not be possible to locate a single dam in the CMIA with the required storage capacity. Consequently a secondary overflow basin will be located in the CMIA to receive overflows from the CMIA dam as required and then pump back into the CMIA dam when levels in the CMIA dam have been drawn down. The storage capacity given in Table 3-8 for the CMIA dam represents the combined capacity of the CMIA dam and overflow basin. The relative sizes of the CMIA dam and overflow basin will be determined during detailed design.

CHPP and TSF Process Water System

The Coal Handling and Preparation Plant (CHPP) presents a significant demand for water and as such is the largest individual demand on Project water resources. Water for CHPP and TSF process water system (referred to as the process water system) will be preferentially sourced from stored inventories of MAW with makeup water supplied from the raw water dam in the event that insufficient MAW is available or additional conditioning (such as dilution) is required. Key infrastructure in the CHPP and TSF process water system consists of TSF 1 (out-of-pit storage), TSF 2 (in-pit storage in the northern open-cut pit) and the combined process water and decant dam (PWDD). Makeup supply of raw water will be provided by direct connection to the CHPP and not via the PWDD.

3 Water Management System Basis of Design

Raw Water System

The raw water system serves to provide both makeup water supply in the event that insufficient MAW is available to meet the Projects consumptive demands and to supply water for demands for which use of MAW is unsuitable. Raw water is supplied to the Project via an external raw water pipeline to the raw water dam (RWD) and from there is reticulated around the site as required. Project demands for raw water include feed water for the WTP for the production of potable water and process demands (process and equipment wash down) at each MIA and the LIA as well as make-up supply to all demands that are normally provided by MAW (CHPP process water, haul road dust suppression, underground mine process water etc.).

Water Transfer Systems

The water transfer system (WTS) provides the mechanical means with which to move water from points of collection to points of storage and from points of storage to point of demand. It consists of series of pumps, pipes and storages (such as tanks) governed by a set of rules that determine when, where and how much water is moved around the system.

3 Water Management System Basis of Design

Table 3-10 Summary of Key Mine WMS Components

WMS Component	WMS Infrastructure	Purpose
Mine water dams	• MWD 1; and • MWD 2.	• Primary storages for MAW; and • Supply point for distribution of MAW to Project consumptive demands;
Spoil runoff system	• Spoil dam 1; • Spoil dam 2; • Spoil dam 3; and • Spoil dam 4.	• Passive diversion of all clean runoff around all spoil and overburden dumps; • Containment of mine affected runoff from all spoil and overburden dumps; • Diversion of all mine affected runoff into one of four spoil dams; and • Transfer of all MAW into one of the large MWDs for subsequent reuse.
Groundwater collection system	• Adit/ROM pad dam south; • Adit/ROM pad dam central; • Adit/ROM pad dam north; • Borefield dam 1; and • Borefield dam 2.	• Collection of all underground mine water make (groundwater and unconsumed process water); • Pumped transfer into associated adit pit dams (one per underground mine); • Transfer into MWD 1 for subsequent reuse; • Aggregation of all flows from the various bores and transfer into one of two borefield dams; and • Transfer into MWD 1 for subsequent reuse.
Open-cut pit dewatering system	• Central open-cut pit dewater dam; and • Northern open-cut pit dewater dam.	• Passive diversion of all clean runoff around the open-cut pits; • Containment of all mine affected runoff within the open-cut pits; • Transfer of MAW from in-pit collection points to open-cut pit dewatering dams; and • Transfer of MAW from dewatering dams into one of the MWDs for subsequent reuse.
Process area runoff system	• Adit/ROM pad dam south; • Adit/ROM pad dam central; • Adit/ROM pad dam north; • ROM dump dam; • TLO/product stockpile dam; and • CMIA dam/overflow basin.	• Passive diversion of all clean runoff around the various process areas; • Containment and diversion into collection dams of all mine affected runoff originating from each process area; and • Transfer of all MAW into one of the large MWDs for subsequent reuse.
CHPP and TSFs system	• Process water and decant dam.	• Primary supply dam for CHPP process water (process and tailings); and • Receipt of tailings decant water from both TSF 1 and 2.
Raw water system	• Raw water pipeline; and • Raw water dam	• Distribution of external raw water from water provider to Project site; • Storage of externally sourced raw water prior to distribution to points of demand.
Transfer systems	• Pump and pipe transfer network	• Transfer of all Project waters from points of collection to points of storage and from points of storage to all points of demand.

3.4.3 Operating Rules

The operating rules which have been been applied in the mine water management strategy to the proposed Kevin's Corner WMS areas summarised in Table 3-11 . The specific trigger values for transfers are provided in Table 3-8. The schematics for the key WMS processes of storage overflow, water collection and aggregation, water demand and supply and water redistribution and dewatering are shown in Appendix B.

Table 3-11 WMS Operational Rules

	Source	Destination	Trigger	Comment
Collection and Aggregation.	Adit/ROM pad dams	MWD 1	Whenever water available in source dams and available capacity in MWD 1.	To ensure containment capacity in source dams maintained.
	Borefield dams	MWD 1	Whenever water available in source dams and available capacity in MWD 1.	To ensure containment capacity in source dams maintained.
	Spoil dam 1	Spoil dam 2	Whenever water available in source dam and available capacity in spoil dam 2.	To ensure containment capacity in source dam maintained.
	Spoil dam 2	Spoil dam 3	Whenever water available in source dam and available capacity in spoil dam 3.	To ensure containment capacity in source dam maintained.
	Spoil dam 3	MWD 2	Whenever water available in source dam and available capacity in MWD 2.	To ensure containment capacity in source dam maintained.
	Spoil dam 4	MWD 1	Whenever water available in source dam and available capacity MWD 1.	To ensure containment capacity in source dam maintained.
	Open-cut pit sumps	Pit dewater dams	Whenever water available in pit sumps and available capacity in destination dams.	To ensure pit availability is maintained.
	Pit dewater dams	MWD 1 (from central open-cut pit dewater dam) MWD 2 (from northern open-cut pit dewater dam)	Whenever water available in source dams and available capacity MWD 1 or 2.	To ensure pit dewatering capability is not compromised.
	TLO/Product stockpile dam	MWD 2	Whenever water available in source dam and available capacity MWD 2.	To ensure containment capacity in source dam maintained.
	CMIA dam	MWD 2	Whenever water available in CMIA dam and available capacity MWD 2.	To ensure containment capacity in source dam maintained.
	CMIA dam	MWD 1	Whenever additional dewatering capacity required for CMIA dam.	To ensure containment capacity in source dam maintained.
	TSF 1/2	PWDD	Whenever water available TSFs and available capacity in PWDD	To ensure continued optimisation of tailings deposition.
Redistribution	MWD 1	MWD 2	When MWD 1 has excess water.	To ensure MWD 1 retains sufficient capacity to contain future inflows.
	MWD 2	MWD 1	When MWD 1 requires additional water.	The ensure MWD 1 can meet supply obligations
	PWDD	MWD 2	When TSF decant pumping exceeds CHPP demand and PWDD has excess water.	To ensure continued TSF decant pumping.
Supply	MWD 1	Underground mines	As per demand and whenever MWD1 has water available	Supply to meet mine operational water demands.
	MWD 1	PWDD	Whenever water available in MWD 1 and PWDD has available capacity.	To ensure CHPP has sufficient supply of process water.

3 Water Management System Basis of Design

Source	Destination	Trigger	Comment
MWD 1/2	Water fill points	As per demand and whenever MWDs have water available	For haul road dust suppression.
RWD	CHPP	Whenever insufficient MAW available from PWDD.	Make up water supply.
RWD	Underground mines	Whenever insufficient MAW available from MWD 1.	Make up water supply.
RWD	All other demand/supply points	As per demand.	
RWD	Water fill points	Whenever insufficient MAW available from MWDs.	Make up water supply.

3.5 Mine Water Management System Design Details

The mine plan layout and concept designs for the water management system storages are provided in Appendix C.

3.5.1 Mine Water Dam 1 (MWD1)

Purpose

Mine water dam 1 will be the primary mine water storage for mine affected water on site and will:

- Receive all groundwater pumped via the adit pit dams and borefield dams.
- Receive pumped transfers of mine affected water from all catchment dams (including spoil dam 4, ROM pad, and southern opencut pit dewatering).
- Provide mine affected water to the process water dam for CHPP process water consumption.
- Provide a water supply for use within each underground mine

Location

Mine water dam 1 (MWD 1) will be located to the north west of the outlet of the Little Sandy and Rocky Creek Diversion as shown in Figure 3-4. The proposed dam location is bounded by the coordinates presented in Table 3-12.

Table 3-12 Location Coordinates for MWD 1

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitude (GDA94)
MWD 1	439422	7450127	146.408652	-23.056282
	439422	7448448	146.408586	-23.071451
	442167	7448448	146.435383	-23.071549
	442167	7450127	146.435446	-23.056380

3 Water Management System Basis of Design

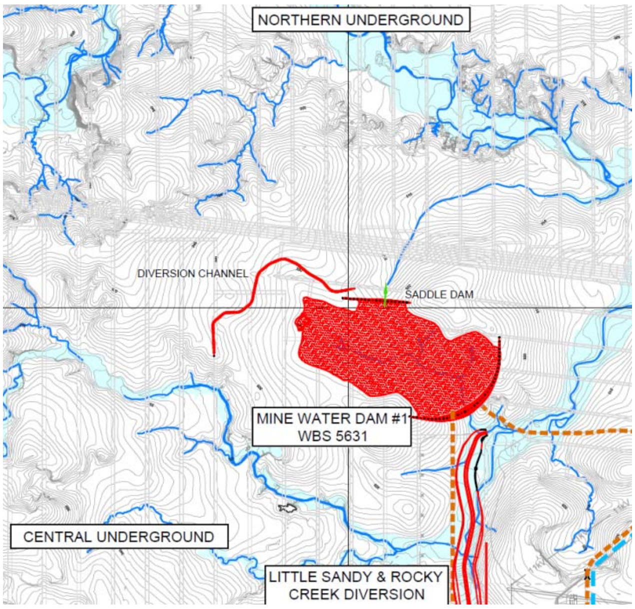


Figure 3-4 Locality Plan of Mine Water Dam 1

Design Concept

MWD 1 will be constructed as a valley fill dam. A diversion channel will be constructed to minimise the size of the catchment area reporting to the dam. Water will be impounded within the dam by two embankments, a main embankment and a saddle dam. The preliminary hazard classification has identified this dam as a high hazard. Accordingly the dam concept design provides for a design storage allowance for a 1 in 100 AEP three month wet season. In addition a spillway which is sufficient to convey a 1:100,000 AEP event would be constructed within the saddle dam with overflows being directed to Well Creek. Controlled releases would be made via outlet works near the main embankment and releases would occur into Middle Creek.

Design Criteria

- Storage Volume
  - Total Volume: 9.3GL
  - DSA Volume: 3.5GL to contain 1:100 AEP 3 month wet season (100% of requirement)
  - Mine Water Storage Available on November 1st: 5.8GL
  - Contained Critical Storm Volume: 4.9GL
  - MRL of 323.2m AHD to be displayed, monitoring and reported as required.
- Diversion Channel
  - Longitudinal grade of 0.5%
  - 2m top and toe widths with 1 in 3 batters.
  - Location dependent on extent of excessive storage minimisation required.
- Main Embankment
  - Crest elevation of 327.0m AHD
  - Chimney filter and blanket drain to be installed.

   - Conceptual top and toe base width of 2m with riprap over riprip bedding for erosion prevention
   - Flood protection armouring and rip rap to be installed for possible flood encroachment
   - 1 in3 batter slopes

- Saddle Dam and Spillway
   - Saddle Dam and Spillway to be trafficable
   - Spillway to be constructed on the Saddle Dam:
   - Spillway to allow passage of 1:100,000 AEP critical storm event
   - Spillway invert level: 324.0m AHD, dam crest at 327.0m AHD
   - Spillway base width of 5m subject to flood routing and detailed design
   - Conceptual spillway batter slopes of 1 in 6 to ensure traffic passage
   - Reinforced concrete cut-off wall to be fitted
   - Buried Gabion baskets to be fitted
   - Riprap over riprip bedding for erosion prevention
   - 1 in 3 batter slopes

- Other Civil Design Criteria
   - No subsidence to occur during the design life of the dam.
   - Dam is to be lined to prevent groundwater interaction.

3.5.2 Mine Water Dam 2

Purpose

Mine water dam 2 will perform several functions within the mine water management system which include:

- Secondary storage of mine affected water on the mine site
- Receive pumped transfers from Spoil Dam 3, the northern opencut dewatering dam, and the TLO and CHPP dams,
- Receive excess mine affected water pumped from the process water dam when large inflows from TSF1 or TSF2 exceed the capacity of the process water dam.
- Receive pumped transfers from Mine Water Dam 1, when maximum operating level of Mine Water Dam 1 is exceeded.
- Provide pump transfers to mine Water Dam 1 when required, to enable Mine Water Dam 1 to meet its supply obligations.
- Provide supply to water fill point 2.

Location

Mine water dam 2 (MWD 2) will be constructed to the south east of the Light Industrial Area as shown in Figure 3-5. The proposed dam location is bounded by the co-ordinates presented in Table 3-13.

Table 3-13 Location Coordinates for MWD 2

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitide (GDA94)
MWD 2	451263	7448486	146.524189	-23.071502
	451263	7446986	146.524141	-23.085049

3 Water Management System Basis of Design

	452865	7446986	146.539781	-23.085096
	452865	7448486	146.539827	-23.071549

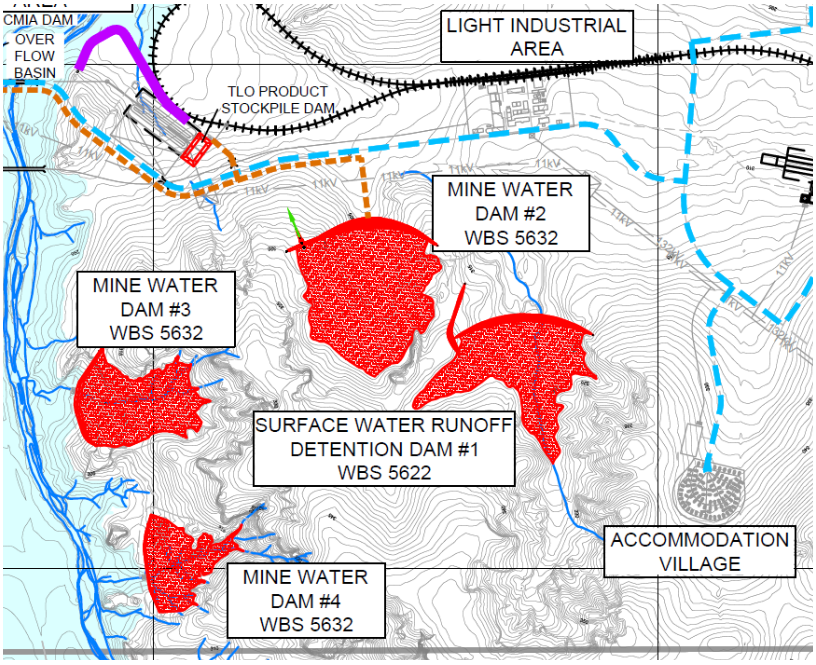


Figure 3-5 Mine Water Dam Locality Plan

Design Concept

MWD 2 will be constructed as a valley fill dam. Water will be impounded within the dam by a single main embankment. The preliminary hazard classification has identified this dam as a high hazard. Accordingly the dam concept design provides for a design storage allowance for a 1 in 100 AEP three month wet season. In addition a spillway which is sufficient to convey a 1:100,000 AEP event would be constructed toward the western end of the main embankment with overflows being diverted via a roadside drainage channel into Sandy Creek. Controlled releases would be made via outlet works near the main embankment and releases would occur into Sandy Creek.

Design Criteria

- Storage Volume
  - Total Volume: 7.4GL
  - DSA Volume: 2.1GL to contain 1:100 AEP 3 month wet season (100% of requirement)
  - Mine Water Available Storage on November 1st: 5.3GL
  - Contained Critical Storm Volume: 2.1GL
  - MRL of 316.3m AHD to be displayed, monitoring and reported as required
- Main Embankment
  - Crest elevation of 319.0m AHD
  - 1 in 3 batter slopes
  - Chimney filter and blanket drain to be installed.
  - Riprap over riprip bedding for erosion prevention

3 Water Management System Basis of Design

  - Reinforced concrete cut-off wall to be fitted
- Spillway
  - Spillway to allow passage of 1:100,000 AEP critical storm event
  - Uncontrolled (spillway) release point on western side of dam
  - Invert level: 317.0m AHD
  - Spillway base width of 5m subject to flood routing and detailed design
  - Conceptual Spillway batter slopes of 1 in 6 to ensure traffic passage
- Other Civil Design Criteria
  - Dam is to be lined to prevent groundwater interaction.

3.5.3 Mine Water Dam 3

Purpose

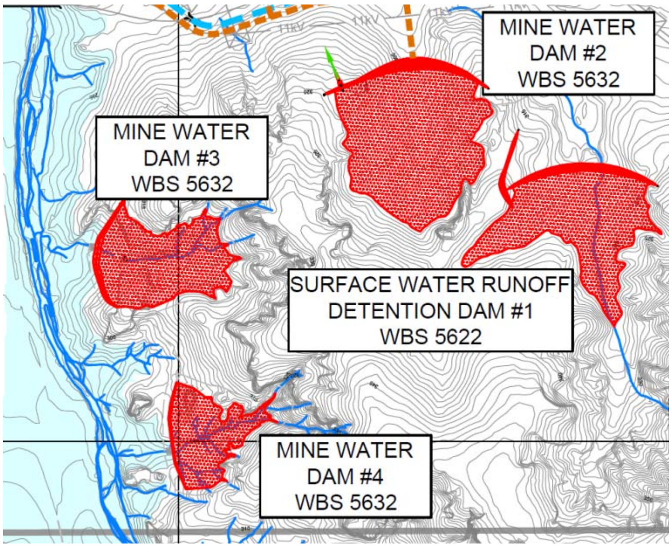
Mine Water Dam 3 is to be constructed as an auxillary storage in the event that the insufficient storage is available within MWD1 and MWD2 to manage the groundwater dewatering rates predicted prior to the commencement of mining operations. It is therefore a contingency storage.

Location

The proposed Mine Water Dam 3 (MWD 3) is located to the south west of MWD2 and on the eastern side of Sandy Creek, as shown in Figure 3-6. The proposed dam location is bounded by the co-ordinates presented in Table 3-14.

Table 3-14 Location Coordinates for MWD 3

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitide (GDA94)
MWD 3	449201	7447049	146.504007	-23.084418
	449201	7446117	146.503976	-23.092839
	450480	7446117	146.516464	-23.092878
	450480	7447049	146.516494	-23.084456



3 Water Management System Basis of Design

Figure 3-6 Mine Water Dam 3 Locality Plan

Design Concept

MWD 3 would be constructed as a valley fill dam. Water would be impounded within the dam by a main embankment and a saddle dam. The preliminary hazard classification for this dam would be a high hazard. Accordingly the dam concept design provides for a design storage allowance for a 1 in 100 AEP three month wet season. In addition a spillway which is sufficient to convey a 1:100,000 AEP event would be constructed on the main embankment with overflows occuring into Sandy Creek. Controlled releases would be made via outlet works near the main embankment and releases would occur into Sandy Creek.

Design Criteria

- Storage Volume
  - Total Volume: 2.55GL
  - DSA Volume: 1.6GL to contain 1:100 AEP 3month wet season (100% of requirement)
  - Mine Water Avalaible Storage on November 1st: 0.95GL
  - Contained Critical Storm Volume: 1.47GL
  - MRL of 306.7m AHD to be displayed, monitoring and reported as required
- Main Embankment, Saddle Dam and Spillway
  - Main embankment and saddle dam crest at 311.9m AHD
  - 1 in 3 batter slopes
  - Chimney filter and blanket drain to be installed.
  - Flood protection armouring and rip rap to be installed for possible flood encroachment
  - Reinforced concrete cut-off wall to be fitted
  - Spillway to be constructed on main embankment to allow passage of 1:100,000 AEP critical storm event
  - Spillway invert level: 308.0m AHD
  - Spillway base width of 5m subject to flood routing and detailed design
  - Conceptual Spillway batter slopes of 1 in 6 to ensure traffic passage
- Other Civil Design Criteria
  - Dam is to be lined to prevent groundwater interaction.

3.5.4 Mine Water Dam 4

Purpose

Mine Water Dam 4 is to be constructed as an auxillary storage in the event that the insufficient storage is available within MWD1, MWD2 and MWD 3 to manage the groundwater dewatering rates predicted prior to the commencement of mining operations. It is therefore a contingency storage.

Location

Mine Water Dam 4 (MWD 4) is proposed to be constructed to the south on MWD3 as shown in . The proposed dam location is bounded by the co-ordinates presented in Figure 3-7.

3 Water Management System Basis of Design

Table 3-15 Location Coordinates for MWD 4

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitide (GDA94)
MWD 4	449785	7445457	146.509653	-23.098815
	449785	7444489	146.509621	-23.107560
	450792	7444489	146.519461	-23.107590
	450792	7445457	146.519493	-23.098845

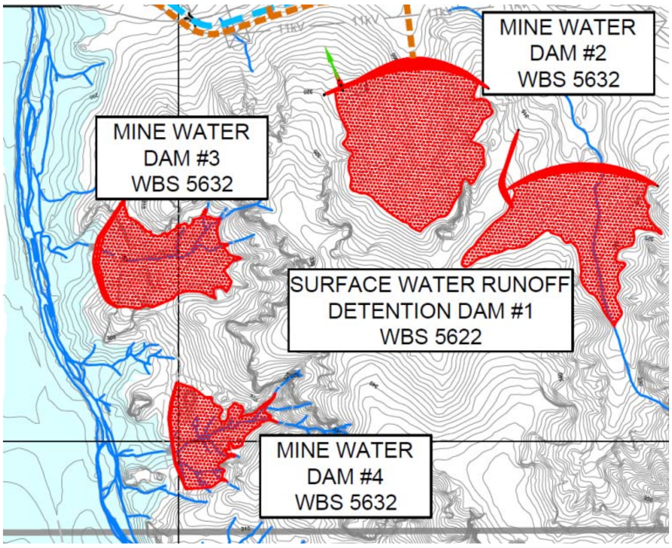


Figure 3-7 Mine Water Dam 4 Locality Plan

Design Concept

MWD 4 would be constructed as a valley fill dam. Water would be impounded within the dam by a main embankment and a saddle dam. The preliminary hazard classification for this dam would be a high hazard. Accordingly the dam concept design provides for a design storage allowance for a 1 in 100 AEP three month wet season. In addition a spillway which is sufficient to convey a 1:100,000 AEP event would be constructed on the main embankment with overflows occuring into Sandy Creek. Controlled releases would be made via outlet works near the main embankment and releases would occur into Sandy Creek.

Design Criteria

- Storage Volume
  - Total Volume: 2.83GL
  - DSA Volume: 0.6GL to contain 1:100 AEP 3month wet season (100% of requirement)
  - Mine Water Available Storage on November 1st: 0.23GL
  - Contained Critical Storm Volume: 1.2GL
  - MRL of 305.1m AHD to be displayed, monitoring and reported as required
- Main Embankment, Saddle Dam and Spillway Criteria
  - Main embankment and saddle dam crest at 308 m AHD
  - 1 in 3 batter slopes

  - Chimney filter and blanket drain to be installed.
  - Flood protection armouring and rip rap to be installed for possible flood encroachment
  - Reinforced concrete cut-off wall to be fitted
  - Spillway to be constructed on main embankment to allow passage of 1:100,000 AEP critical storm event
  - Spillway invert level: 306.0m AHD
  - Spillway base width of: 5m subject to flood routing and detailed design
  - Conceptual Spillway batter slopes of 1 in 6 to ensure traffic passage
- Other Civil Design Criteria
  - Dam is to be lined to prevent groundwater interaction.

3.5.5 Raw Water Dam

Purpose:

The purpose of the raw water dam is to:

- To provide a source of raw water for mine consumptive demands for which mine affected water is unsuitable (potable, process and equipment wash down etc.)
- To provide make-up water supply for mine consumptive demands (CHPP process water, haul road dust suppression and underground mining operations), in the event that insufficient mine affected water is available.

Location

The Raw Water Dam (RWD) is planned to be constructed approximately 5km to the north of the proposed airport, as shown on Figure 3-8.

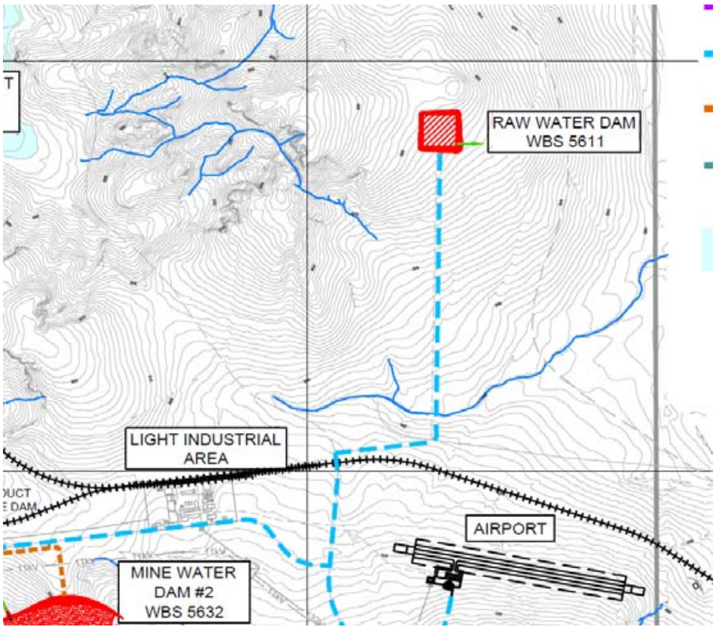


Figure 3-8 RWD Locality Plan

3 Water Management System Basis of Design

Design Concept

The raw water dam is to be constructed as a ring dyke (turkey's nest dam) type embankment structure where the catchment area to the dam is the free draining surface within the dam from the crest (i.e. no external contributing catchment). The dam embankment will consist of an engineered embankment structure that has been designed according to dam engineering practice and signed off by a RPEQ dam's practitioner.

Design Criteria

- Storage Volume
  - Total storage volume of 1500ML
- Embankment
  - Dam Crest Elevation of 326.5m AHD
  - Chimney filter and finger drains recommended for piping risk assessment
  - Embankment to be trafficable
  - 1 in 3 embankment batter slopes
- Spillway
  - Spillway elevation of 325.5m AHD
  - Spillway designed to convey 1:10,000 AEP
  - Spillway to be fitted with stilling basin
- Other Design Criteria
  - Dam to be lined with HDPE geomembrane over compacted clay

3.5.6 Minor Dams

Purpose

There are fourteen minor dams within the water management systems each of which serve different mine water collection systems on site. These systems include, Spoil Runoff System, the Groundwater Collection System, the Open-cut Pit Dewatering System, the Process Area Runoff System and the CMIA Water Management System.

Spoil Runoff System

The spoil runoff system will collect all mine affected stormwater runoff originating from each spoil/overburden dumps and divert it, by gravity flow, into one of four spoil dams. Potentially clean runoff originating outside of the spoil/overburden dumps will be passively diverted around the spoil runoff system by diversion drains. Four minor dams comprise the Spoil Runoff System:

- Spoil Dam 1
- Spoil Dam 2
- Spoil Dam 3
- Spoil Dam 4

Groundwater Collection System

3 Water Management System Basis of Design

Groundwater from either the borefield or the underground mines is considered to be mine affected and will be pumped into either one of two Borefield Dams or one of three dual function ROM/Adit Pad Dams (one per underground mine). Each of these dams are minor dams.

Dewatering System for Open-Cut Pits

Two pit dewatering dams will be constructed. Each pit dewatering dam will be constructed as a turkeys nest arrangement and all pit dewatering inflows will be pumped into them.

Process Area Runoff System

Runoff from several operational areas and facilities is expected to generate MAW. These areas are as follows:

- All ROM pads and ROM dump;
- TLO/product stock pile; and
- Central MIA

In addition to collection of runoff with the three ROM/Adit pad dam already mentioned process area runoff will be collected in the following:

- ROM Dump Dam
- TLO/Product Stockpile Dam

CMIA Water Management System

Mine affected runoff within the CMIA will be captured within the CMIA Dam. The CMIA Dam will be able to transfer to either MWD 1 or 2.

Location

Minor dams are located across the proposed mine site. The proposed minor dam locations are bounded by the co-ordinates presented in Table 3-16.

3 Water Management System Basis of Design

Table 3-16 Location Coordinates for Minor Dams

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitude (GDA94)
Spoil Dam 1	448886	7455281	146.501204	-23.010048
	448666	7455281	146.499058	-23.010041
	448666	7455701	146.499072	-23.006247
	448886	7455701	146.501218	-23.006254
Spoil Dam 2	447236	7451548	146.484975	-23.043716
	447636	7451548	146.488880	-23.043729
	447636	7451348	146.488873	-23.045536
	447236	7451348	146.484968	-23.045523
Spoil Dam 3	445521	7452778	146.468280	-23.032550
	445941	7452778	146.472379	-23.032564
	445941	7452558	146.472371	-23.034551
	445521	7452558	146.468272	-23.034538
Spoil Dam 4	448016	7445482	146.492383	-23.098535
	448185	7445482	146.494033	-23.098541
	448185	7445849	146.494046	-23.095225
	448016	7445849	146.492395	-23.095220
Borefield dam 1	441194	7445455	146.425769	-23.098551
	441194	7445235	146.425760	-23.100538
	441337	7445235	146.427156	-23.100543
	441337	7445455	146.427165	-23.098556
Borefield dam 2	441194	7443188	146.425681	-23.119028
	441194	7442968	146.425673	-23.121016
	441337	7442968	146.427070	-23.121021
	441337	7443188	146.427078	-23.119033
Adit/ROM dam south	442586	7439508	146.439137	-23.152318
	442755	7439508	146.440788	-23.152324
	442755	7439875	146.440802	-23.149009
	442586	7439875	146.439151	-23.149003
Adit/ROM dam central	442436	7445271	146.437889	-23.100257
	442802	7445271	146.441463	-23.100269
	442802	7445442	146.441469	-23.098725
	442436	7445442	146.437895	-23.098712
Adit/ROM dam north	447226	7450197	146.484831	-23.055920
	446906	7450197	146.481708	-23.055910
	446906	7450370	146.481714	-23.054347
	447226	7450370	146.484837	-23.054357
ROM dump dam	447494	7449617	146.487428	-23.061167
	447274	7449617	146.485280	-23.061160

3 Water Management System Basis of Design

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Longitude (GD94)	Latitude (GDA94)
	447274	7449474	146.485275	-23.062452
	447494	7449474	146.487423	-23.062459
TLO dam	450599	7449226	146.517726	-23.064795
	450407	7448970	146.515843	-23.067101
	450268	7449074	146.514489	-23.066158
	450460	7449331	146.516372	-23.063842
Raw water dam	456854	7453872	146.578919	-23.023001
	456291	7453872	146.573424	-23.022987
	456291	7454420	146.573440	-23.018036
	456854	7454420	146.578934	-23.018051
CMIA dam & overflow basin	448417	7449947	146.496449	-23.058215
	448299	7450316	146.495309	-23.054879
	447930	7450515	146.491714	-23.053069
	447722	7450543	146.489685	-23.052810
	447712	7450411	146.489583	-23.054002
	448215	7450274	146.494488	-23.055255
	448239	7449933	146.494711	-23.058336
Process water and decant dam	446313	7451972	146.475981	-23.039857
	445993	7451972	146.472858	-23.039846
	445993	7452145	146.472864	-23.038284
	446313	7452145	146.475987	-23.038294
Pit dewatering dam north	446266	7452304	146.475534	-23.036856
	445946	7452304	146.472411	-23.036846
	445946	7452477	146.472417	-23.035283
	446266	7452477	146.475540	-23.035294
Pit dewatering dam south	444815	7447249	146.461190	-23.082471
	445181	7447249	146.464764	-23.082483
	445181	7447420	146.464770	-23.080938
	444815	7447420	146.461197	-23.080926

Design Criteria

The generic design criteria which have been applied to each minor dam are as follows:

- Rectangular trapezoidal configuration;
- 3:1 (H:V) batter slopes;
- 0.5m freeboard (storages up to 50ML), 1m freeboard for storages over 50ML; and
- 5m max water depth (storages up to 50ML), 7m for storages over 50ML.

The specific design criteria for each minor dam are provided in Table 3-17.

3 Water Management System Basis of Design

Table 3-17 Design criteria for Minor Dams

Dam	Configuration	Inflows	Hazard Category	Allocation of DSA		Overflow destination
				% Applied directly to storage	% Applied to pits or other	
Spoil Dam 1	Void	gravity	High	20	80	Northern open-cut pit/TSF 2
Spoil Dam 2	Void	gravity	High	20	80	Northern open-cut pit/TSF 2
Spoil Dam 3	Void	gravity	High	20	80	Northern open-cut pit/TSF 2
Spoil Dam 4	Void	gravity	High	20	80	Central open-cut pit
Borefield dam 1	Turkeys nest	Pumped borefield dewatering	High	100	0	Little sandy/Rocky Creek diversion
Borefield dam 2	Turkeys nest	Pumped borefield dewatering	High	100	0	Little sandy/Rocky Creek diversion
Adit/ROM dam south	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	High	100	0	Sandy Creek
Adit/ROM dam central	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	Significant	20	80	Central open-cut pit
Adit/ROM dam north	Void	Gravity (ROM pad runoff) and pumped (underground mine dewatering)	Significant	20	80	CMIA dam
ROM dump dam	Void	Gravity	Significant	20	80	CMIA dam
TLO dam	Void	Gravity	Significant	20	80	Behind stockpile levee
CMIA dam & overflow basin	Void	Gravity	Significant	20	80	Overflow basin/CMIA
Process water and decant dam	Turkeys nest	Pumped	High	100	0	Northern open-cut pit/TSF2
Pit dewatering dam north	Turkeys nest	Pumped	High	100	0	Northern open-cut pit/TSF 2
Pit dewatering dam south	Turkeys nest	Pumped	High	100	0	Central open-cut pit

3.5.7 Tailings Storage Facility 1

Purpose

Tailings Storage Facility 1 will store tailings generated from the mine during the first five years of operation.

Location

Tailings Storage Facility 1 (TSF 1) will be constructed to the north of the Northern Opencut Pit, as shown on Figure 3-9 . The proposed Tailings Storage Facility location is bounded by the co-ordinates presented in Table 3-18.

Table 3-18 Location Coordinates for TSF-1

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Long	Lat
TSF-1	446006	7454693	146.473080	-23.015268
	447486	7455598	146.487554	-23.007141
	448060	7454659	146.493123	-23.015641
	446580	7453755	146.478649	-23.023760

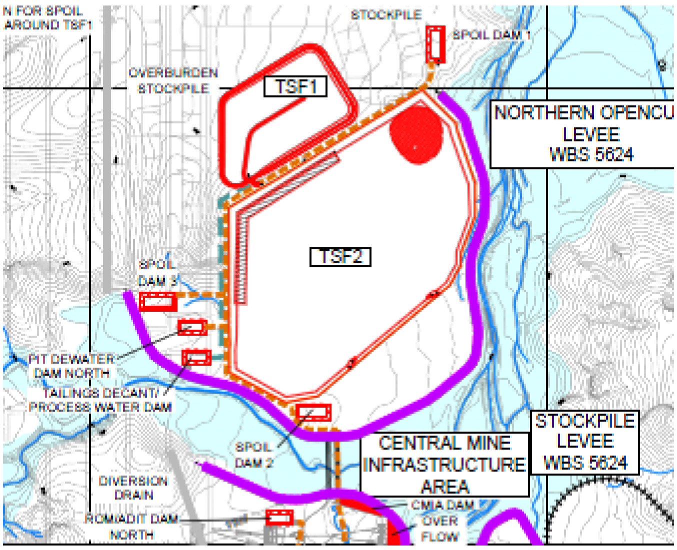


Figure 3-9 Tailings Storage Facility 1 & 2 Locality Plan

Design Concept

Tailings Storage Facility 1 is to be constructed as a ring dyke (turkey's nest dam) type embankment structure where the catchment area to the dam is the free draining surface within the dam from the crest (i.e. no external contributing catchment). The dam embankment will consist of an engineered embankment structure that has been designed according to dam engineering practice and signed off by a RPEQ dam's practitioner. Tailings would report to TSF-1 in a slurry form containing approximately 20% solids and excess water would be recycled from TSF-1 using a decant system for reuse at the CHPP. The decant water return from TSF-1 provides a significant water input into the process water system which would also be augmented by direct rainfall onto TSF-1

Design Criteria

- Sizing of TSF-1 capacity to accommodate the first 5 years of tailings production plus stormwater plus freeboard.
- TSF-1 embankment to be a single earthen fill structure. No raising options will be considered.
- Tailings production based on 4.7% of ROM.
- Cumulative ROM for years 0 through 5 approximately 80Mt.
- Deposited tailings will have an in-place dry density of 0.8 tonne/m^3.
- Tailings slurry at 20% solids by weight.
- Seepage cut-off to bedrock recommended.
- Erosion control recommended on downstream batter for flood protection.
- Spillway is required for high hazard dam (1:100,000 AEP).

Changes from SEIS Layout

The SEIS layout for TSF-1 was a rectangular 4-cell configuration that required an embankment raise after Year 3 of operation. This would have been difficult to achieve given the production rate would yield a rate of rise of roughly 2m per annum. The current concept relies on a single stage construction of the embankment thus eliminating the need for supporting an embankment raise on soft tailings. Tailings placed according to the current concept would drain and dry over time allowing for placement of a permanent cover and rehabilitation works.

3.5.8 Tailings Storage Facility 2

Purpose

Tailings Storage Facility 2 will store tailings generated from the mine from year six of operation until the end of the mine life.

Location

Tailings Storage Facility 2 (TSF 2) is planned to infill the Northern Opencut Pit, as shown on Figure 3-9. The proposed Tailings Storage Facility location is bounded by the co-ordinates presented in Table 3-19.

Table 3-19 Location Coordinates for TSF-2

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Long	Lat
TSF-2	446494	7453699	146.477808	-23.024263
	448634	7455007	146.498736	-23.012515
	449012	7454635	146.502413	-23.015887
	449227	7453965	146.504489	-23.021946
	449226	7453595	146.504467	-23.025288
	448944	7452834	146.501689	-23.032153
	447494	7451613	146.487496	-23.043137
	447134	7451542	146.483980	-23.043767
	446502	7451878	146.477823	-23.040712

Design Concept

Tailings Storage Facility 2 is to be constructed within the void formed by the northern open-cut pit. Tailings would report to TSF-2 in a slurry form containing approximately 20% solids (previously 30%) and excess water would be recycled from TSF-2 using a decant system for reuse at the CHPP. The decant water return from TSF-2 provides a significant water input into the process water system which would also be augmented by direct rainfall onto TSF-2.

Design Criteria

- TSF-2 location is limited to footprint area depicted in Drawing SK021 (Appendix C).
- Northern Open-cut Pit to have capacity to accommodate the Years 6 through 30 volume of tailings production plus stormwater plus freeboard.
- Tailings production based on 4.7% of ROM.
- Deposited tailings will have an in-place dry density of 0.8 tonne/m^3.
- Tailings slurry at 20% solids by weight.

Changes from SEIS Layout

The TSF-2 conceptual design contains three key changes from the SEIS layout. These are:

1. The addition of an earthen bund covering a portion of the pit slope nearest to the underground workings. This feature limits the risk of inrush of water and tailings to the underground workings.
2. The decant pond is positioned toward the north-east corner of the pit (from Year 6) via drainage channels. This feature keeps the decant pond distant to the underground working while a tailings beach develops along the western pit slopes.
3. Tailings discharge spigots are located along the top of the pit only. Additional discharge points are located along the eastern and western pit walls to migrate the pond toward a south-central position by Year 30.

3.6 Flood Protection System Basis of Design

3.6.1 Flood model and flood assessment

A flood assessment of the Sandy Creek catchment was undertaken to determine the flood risk to the Project and to estimate the impacts of the proposed creek diversions and flood protection levees on the upstream and downstream environment and landholders. The flood assessment was carried out using a combination of desktop, field and computational investigations. The analysis has also included examination of previous studies and relevant reports, aerial photographs, and topographic data. The assimilated data was used to assess the potential risks and impacts to the watercourses.

Two scenarios were considered for the assessment:

- **Existing case** where no mine development has taken place and the existing watercourses are unaffected by the Project.
- **Developed case** – The developed case assessed during the flood assessment represents the mine development at year 30 of the mine life.

3 Water Management System Basis of Design

Hydrologic modelling

Hydrologic modelling was undertaken to determine catchment runoff for a range of flood events for the existing and developed cases.

Existing Case

The methodology adopted to model existing case hydrology included:

1. Review of catchment characteristics and climate to guide overall understanding of flood hydrology
2. Catchment delineation
    a. Large scale Sandy Creek – including tributaries subdivided into relatively uniform size sub-catchments for rainfall runoff modelling
    b. Smaller scale tributary catchments to Sandy Creek in the mine lease area to allow better sub-catchment resolution for rainfall runoff modelling of the smaller streams
3. Regional Flood-frequency Analysis
    a. Stream gauge data review and data selection
    b. Stream gauge peak flood frequency analysis
    c. Review of flood frequency results
    d. Tranposition to the Sandy Creek catchment with non-linear catchment scaling
4. Rainfall runoff routing modelling (RORB software)
    a. RORB model setup for Sandy Creek catchment
    b. RORB model setup for smaller tributaries within mine lease
    c. Preparation of design rainfall storm inputs for the RORB model
        i. AUSIFD and BOM – Point rainfall for Kevin’s Corner; applicable to both catchment models
        ii. CRC-FORGE – rainfall depths and intensities for 1:5 to 1:2,000 AEPs based on catchment area
        iii. Probable maximum precipitation (PMP) – PMP rainfall depths from GSDM and GTSMR methods based on catchment area
    d. Review and assumptions for rainfall losses
    e. Determining RORB model routing parameters (Kc and m)
    f. RORB Model simulations and reviews of results
5. Validation of RORB results and input parameter checks
    a. Review of Weeks equation for Kc parameter estimation from recent studies
    b. Independent Andrews Curves methodology for Kc parameter estimation
    c. ACARP peak flow estimation equations for comparison
    d. Queensland QRT-OLS peak flow estimation
6. Cross-comparison review of the methods and recommendations for adopted hydrology results for the Kevin’s Corner Project.

Developed Case

The methodology utilized for the proposed conditions hydrology for the creeks through the Kevin’s Corner Project area was consistent with the adopted methods and recommendations of the baseline hydrologic study; however, changes were made to account for:

7. Modifications to catchment boundaries to incorporate the proposed flood protection measures and diversion
8. To account for voids left by open-cut mining operations.

3 Water Management System Basis of Design

Hydraulic Modelling

The Hydrologic Engineering Centre River Analysis System (HEC- RAS) version 4.1.0 was utilized for the hydraulic modelling of frequent flood events (1:2 to 1:50 AEP). HEC-RAS was determined to be an appropriate model for the frequent flood events where the majority of flow is generally confined within defined channels or is conveyed in one direction.

To model the infrequent, extreme flood events, (1:100 AEP to PMF), TUFLOW was utilised. TUFLOW is a one-dimensional (1D) and two-dimensional (2D) flood and tide simulation software package, suitable for modelling braided channel systems or river systems with 2D interactions. It is a widely used and accepted flood modelling software package in Australia.

The purpose of the hydraulic analysis was to quantify key hydraulic parameters for a range of flood events, and to determine the relative impacts associated with the planned diversion and flood protection levees. Hydraulic parameters of interest to characterise the river flood hydraulics are channel flood velocity, shear stress, stream power, and depth of flow. These parameters are further described as follows:

- Flow ***velocity*** (the speed of flow along the river) is commonly used for initial assessments of the potential for erosion.
- The bed ***shear stress*** represents the force between the river flow and resistance to flow provided by the bed and banks of the river channel. Shear stress is commonly used to determine the potential for sediment movement.
- ***Stream power*** provides the most reliable indicator of the potential sedimentation and erosion within the river channel based on the energy dissipation rate of flow along the river. It is a measure of the rate of work done by the river flow and is calculated as the product of shear stress and velocity.

Design Flood Estimates

Estimates of design peak flood flows were required to assess the existing flooding in the Sandy Creek watershed and the impacts of the planned mine infrastructure, flood protection measures, and Little Sandy and Rocky Creek diversion.

The flood estimates for the frequent events, 1:2 AEP to 1:50 AEP, were estimated by transposition of an annual-series flood frequency analysis of observed floods at the Native Companion Creek stream gauging station (GS12305A) to the Sandy Creek catchment. The Native Companion Creek gauge is located approximately 60 km to the south east of the planned Project site.

For the larger more extreme events, 1:100 AEP to PMF, an alternative method of estimating the design peak flood flows (and hydrographs) utilising rainfall-runoff routing methods was applied.

The purpose of modelling a range of flood events from the 1:100 AEP flood event to the PMF was to quantify key hydraulic parameters, in particular maximum flood level. These flood levels were then used comparison to the proposed (developed) condition with mine levees in place to protect the mine infrastructure and estimate any impacts to areas outside the mine lease boundary.

3.6.2 Design Criteria for Flood Immunity

The proposed flood protection works and creek diversions have been designed on the basis of providing flood immunity for the 1:1000 AEP event to allow mining activities to proceed with unimpeded access to coal reserves that would have otherwise been inaccessible due to the risk of flooding. The detailed design of the levees will be undertaken by an RPEQ. The concept design is based on the following criteria;

- External and internal embankment batters proposed as 3H:1V, to be confirmed following specific assessment of the structure;
- Erosion protection will be provided on the batter slopes and will be designed for the 1:1000 AEP flood inundation and will consider stream velocities;
- Seepage cutoffs and key trenches are recommended for piping risk;
- Flood protection for the 1:1000 AEP storm event plus 1.0 metre freeboard from regional flooding only;
- Control, separation, containment and required outlet works for clean runoff behind each levee has been assumed to be both feasible and practical.

3.7 Flood Protection System Components

The flood protection system proposed for the Kevin's Corner mine comprises three main components:

- Levees
  - Southern Open-Cut Levee
  - Northern Open-Cut Levee
  - Product Stockpile Levee
  - Temporary Diversion Levee
- Diversion
  - Little Sandy and Rocky Creek Diversion
- Flow Attenuation
  - Surface Water Runoff Detention Dam

The design basis for each of the components of the flood protection system is discussed below. The mine plan layout and concept designs for the flood protection infrastructure are provided in Appendix C.

3.7.1 Southern Open-Cut Levee

Purpose

To provide regional flood immunity (1:1000 AEP storm event plus 1.0m freeboard) to the Southern Open-Cut pit and CMIA from Sandy and Well Creeks.

Location

The Southern Open-Cut Levee extends for approximately 12km along the southern and eastern boundary of the southern open-cut pit as shown on Figure 3.10. The proposed levee location is bounded by the co-ordinates presented in Table 3-20 .

3 Water Management System Basis of Design

Table 3-20 Location Coordinates for Southern Open-Cut Levee

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Long	Lat
Southern Open-Cut Levee	442827	7443391	146.441638	-23.117248
	442849	7444205	146.441880	-23.109902
	448333	7444227	146.495437	-23.109880
	448320	7448660	146.495455	-23.069841
	448451	7450008	146.496782	-23.057667
	448145	7450424	146.493814	-23.053902
	447754	7450557	146.489997	-23.052681
	447176	7450493	146.484354	-23.053240
	446669	7450666	146.479413	-23.051664
	446147	7450895	146.474327	-23.049578

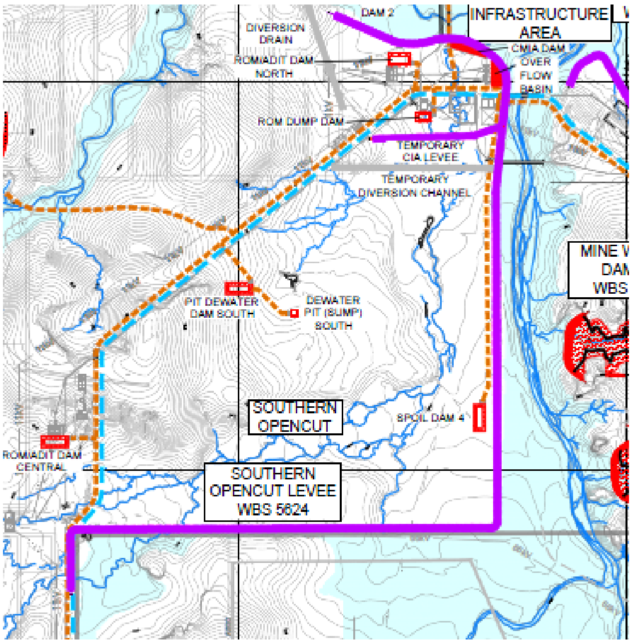


Figure 3-10 Southern Open-Cut Levee Locality

Design Concept and Relevant Design Criteria

- The construction of the Southern Open-Cut levee will take place in stages and is based on the following design criteria:1:1000 AEP flood levels plus 1.0 m freeboard
- Batter slopes of 3H:1V with a 6 m crest width
- Crest slope of 2% to channel side of the levee;
- Cutoff trench bottom width of 5 m
- Levee design above the underground workings should be performed after subsidence of the underground workings.

3.7.2 Northern Open-Cut Levee

Purpose

To provide regional flood immunity (1:1000 AEP storm event plus 1.0m freeboard) to the Northern Open-Cut pit from Sandy and Well Creeks.

Location

The Northern Open-Cut Levee runs along the Eastern, Southern and Western boundaries of the Northern Open-Cut pit as shown in Figure 3-11 . The proposed levee location is bounded by the co-ordinates presented in Table 3-21.

Table 3-21 Location Coordinates for Northern Open-Cut

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Long	Lat
Northern Open-Cut Levee	445378	7452810	146.466888	-23.032258
	445662	7452133	146.469630	-23.038382
	446055	7451859	146.473461	-23.040872
	446581	7451717	146.478589	-23.042170
	447071	7451397	146.483364	-23.045077
	447319	7451206	146.485778	-23.046807
	447801	7451187	146.490477	-23.047000
	448637	7451550	146.498646	-23.043745
	449238	7452187	146.504534	-23.038011
	449167	7453030	146.503872	-23.030391
	449325	7453767	146.505437	-23.023738
	449084	7454688	146.503112	-23.015407
	448766	7455006	146.500023	-23.012527

3 Water Management System Basis of Design

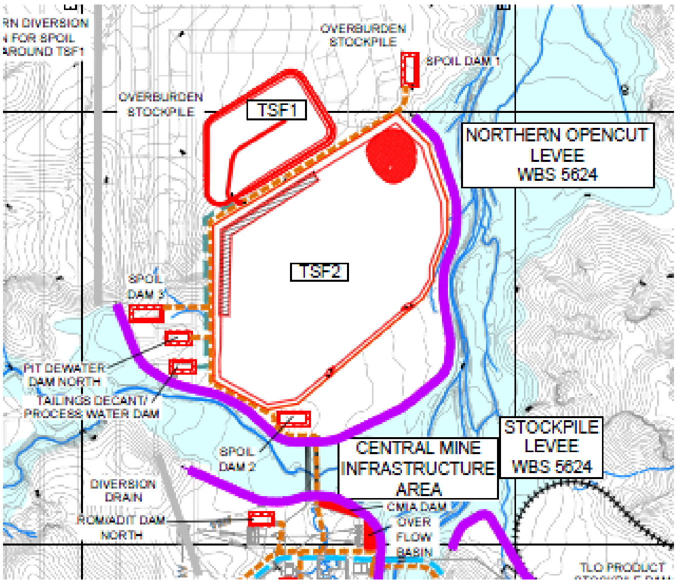


Figure 3-11 Northern Open-Cut Levee Locality Plan

Design Concept and Relevant Design Criteria

The Northern Open-Cut levee will be required to be in place prior to any pre-development works associated with the Northern Open-Cut pit. The design criteria are based on the the following:

- 1:1000 AEP flood levels plus 1.0 m freeboard;
- Batter slopes of 3H:1V with a 6 m crest width;
- Crest slope of 2% to channel side of the levee;
- Cutoff trench bottom width of 5 m

3.7.3 Product Stockpile Levee

Purpose

To provide regional flood immunity (1:1000 AEP storm event plus 1.0m freeboard) to the product stockpile from Sandy Creek.

Location

The Product Stockpile Levee is to be constructed to the northwest of the product stockpile and the to east of the rail loop as shown on Figure 3-12 . The proposed levee location is bounded by the co-ordinates presented in Table 3-22.

Table 3-22 Location Coordinates for Product Stockpile Levee

Structure	Easting MGA Zone 55	Northing MGA Zone 55	Long	Lat
Stockpile Levee	449254	7449923	146.504616	-23.058461
	449368	7450183	146.505745	-23.056108
	449664	7450339	146.508634	-23.054717
	450106	7449655	146.512924	-23.060902
	450361	7449417	146.515409	-23.063059

3 Water Management System Basis of Design

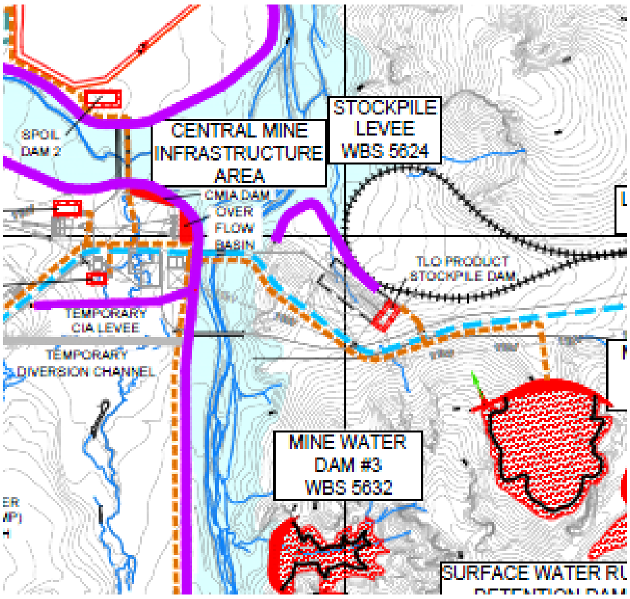


Figure 3-12 Product Stockpile Levee Locality Plan

Design Concept and Relevant Design Criteria

The levee is required to be in place prior to commencement of product stockpiling and train loading operations. The design criteria for the Product Stockpile levee are based on the following:

- 1:1000 AEP flood levels plus 1.0 m freeboard;
- Batter slopes of 3H:1V with a 6 m crest width;
- Crest slope of 2% to channel side of the levee;
- Cutoff trench bottom width of 5 m;

3.7.4 Temporary Diversion Levee

Purpose

The purpose of the infrastructure is to provide regional flood immunity (1:1000 AEP storm event plus 1.0m freeboard) to the CMIA prior to closure of the Southern Open-Cut pit levee.

Location

The Temporary Diversion levee is situated to the south of the ROM Dump Dam, along the southern boundary of the CMIA as shown on Figure 3-13.

3 Water Management System Basis of Design

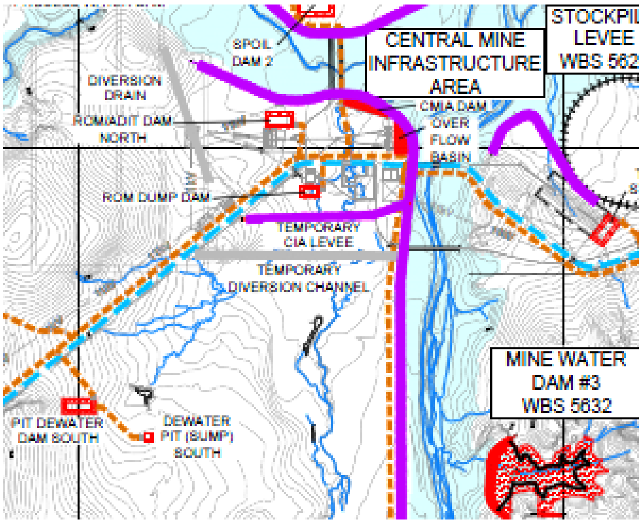


Figure 3-13 Temporary Diversion Levee Locality Plan

Design Concept and Relevant Design Criteria

The Temporary Diversion levee will be constructed along the southern boundary of the CMIA to provide flood protection until the Southern Open-Cut levee is completed and open-cut operations at the central open-cut commence. The design criteria for the temporary diversion levee are based on the following:

- 1:1000 AEP flood levels plus 1.0 m freeboard;
- Batter slopes of 3H:1V with a 6 m crest width;
- Crest slope of 2% to channel side of the levee;
- Cutoff trench bottom width of 5 m.

3.7.5 Little Sandy Creek/Rocky Creek Diversion

Purpose

The purpose of the infrastructure is to divert flows from Little Sandy and Rocky Creeks into Middle Creek west of the southern open-cut pit and CMIA. The combined effect of both the CMIA/southern open-cut pit levee and Little Sandy and Rock Creek diversion will be to allow for the continued operation of both the southern open-cut pit and CMIA up to the proposed design event.

Location

Little Sandy and Rocky Creek diversion is located to the south of MWD1 and extends south to Borefield Dam 2 as shown in Figure 3-14. The proposed diversion location is bounded by the co-ordinates presented in Table 3-23.

3 Water Management System Basis of Design

Table 3-23 Location Coordinates for Little Sandy Creek/ Rocky Creek Diversion

Structure	Easting MGA Zone 55 (GDA 94)	Northing MGA Zone 55(GDA94)	Long	Lat
Little Sandy/Rocky Creek Diversion	441207	7448447	146.426013	-23.071526
	441207	7443422	146.425820	-23.116914
	442288	7443422	146.436377	-23.116952
	442288	7448447	146.436566	-23.071564

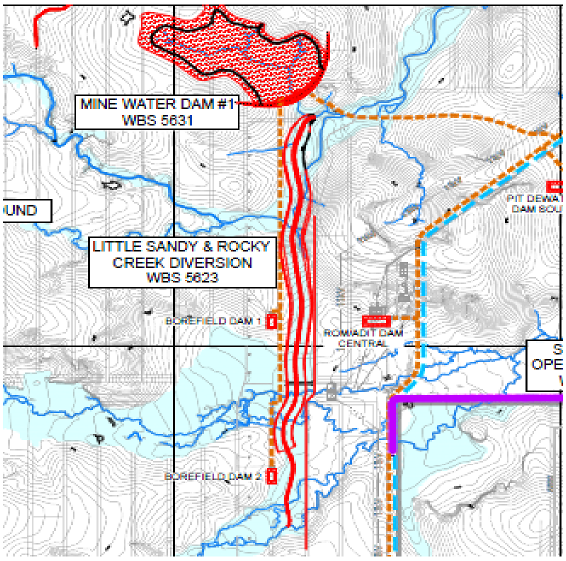


Figure 3-14 Little Sandy Creek/Rocky Creek Diversion Locality Plan

Design Concept (e.g. overview statement) and Relevant Design Criteria

The combined impact of both the diversion and levees is to create a significant internally draining catchment both in the CMIA and also around the central open-cut pit area. Both of these issues are to be addressed as the subject of additional studies. The creek diversion structure should be constructed prior to any other infrastructure to reduce surface water flows to the CIA and Southern Open-Cut levee.

The design criteria for the Little Sandy Creek and Rocky Creek Diversion is based on the following;

- Diversion channel and associated levee will be designed to pass the 1:1000 AEP storm event plus 1.0 m freeboard;
- The diversion cross section will be trapezoidal and constrained within the width of a single longwall panel. The cross section will be characterised by a floodplain and low flow channel sections, where the low flow channel depth will be 2 m and the bottom width will vary such that the section will be capable of containing the bank full discharge AEP (~1:10 AEP) of the diverted watercourse(s) upstream;
- The longitudinal slope of the diversion will be relatively small, as such, sediment accumulation within the low flow channel is likely to occur and has been considered within the aforementioned low flow channel capacity design;
- A low flow channel with internal batters of 4H:1V;
- Diversion channel with internal batters of 4H:1V except at adjacent levees locations, which will have batters of 3H:1V;

3 Water Management System Basis of Design

- Channel meanders such that aquatic growth and habitat is promoted;
- Pertinent hydraulic criteria for stable and acceptable design, as per ACARP guidelines, in combination with the pertinent hydraulic parameters of the existing (i.e. before diversion) watercourses.

Diversion Levee

- Batter slopes of 3H:1V with a 6 m crest width;
- Crest slope of 2% to channel side of the levee;
- Cutoff trench bottom width of 5 m

3.7.6 Surface Water Runoff Detention Dam

Purpose

The purpose of the infrastructure is to attenuate catchment runoff resulting from the 1:1000 AEP storm event thus provide protection for downstream Project infrastructure including the main Project access road to the CMIA as well as the train load out and product stockpile area.

Location

The Surface Water Runoff Detention Dam is planned to be constructed to the east of MWD2 as shown in Figure 3-15.

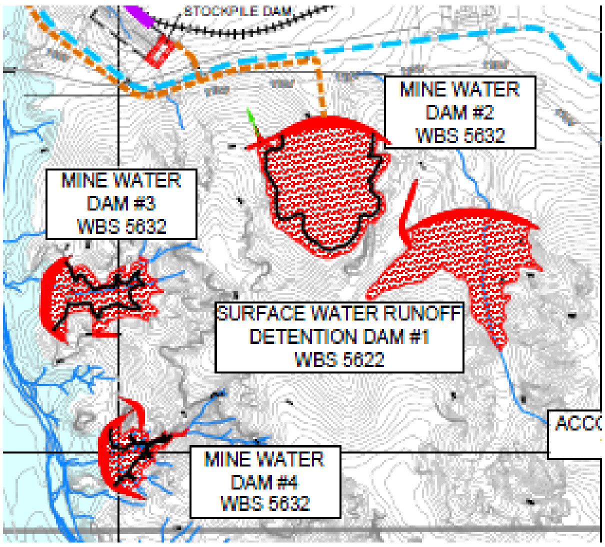


Figure 3-15 Surface Water Runoff Detention Dam Locality Plan

Design Concept (e.g. overview statement) and Relevant Design Criteria

The concept design for the Surface Water Runoff Detention Dam is based on the following:

- Dam will be designed in accordance with the 30 year life of the mine.

3 Water Management System Basis of Design

- A 1.5 m diameter outlet orifice will be provided such that reservoir drawdown can be achieved in less than 72-hours for the 1:1000 AEP storm event and the downstream infrastructure flood immunity is not exceeded;
- Spillway crest placed such that the 1:1000 AEP runoff volume can be stored without overflow;
- The spillway crest will be constructed of concrete for erosion protection and capable of passing the 10,000 AEP storm event;
- Embankment crest width will have a minimum 6m total width including safety bunds; the minimum width between the safety bunds is 4m.
- Embankment crest slope of 2% to internal batter with gaps in the safety berms to allow for runoff.
- Embankment external and internal batters of 3H:1V.

Operation and Maintenance

4.1 Operation and Maintenance Plan

An operational plan will be implemented for each regulated structure in accordance with the requirements of the Environmental Authority. This would be developed as an operational and maintenance plan during the detailed design phase of the Project. Operation of a regulated structure is to be prohibited unless the following is submitted to the Administering Authority:

- one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with the conditions;
- a set of as-constructed drawings and specifications;
- certification of as-constructed drawings and technical specifications;
- one paper copy of the certified system design plan, where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system.

The Environmental Authority requires compliance with the following items during the operational phase of the development:

- *In the event of early signs of loss of structural or hydraulic integrity, the holder of this Environmental Authority must immediately take action to prevent or minimise any actual or potential environmental harm, and report in writing any findings and actions taken to the Administering Authority within 28 days of that event*;
- *The holder (of the EA) must take reasonable and practicable control measures to prevent the causing of harm to persons, livestock or wildlife through the construction and operation of a regulated structure. Reasonable and practicable control measures may include, but are not limited to:*
    a. *the secure use of fencing, bunding or screening; and*
    b. *escape arrangements for trapped livestock and fauna;*
- *The holder must notify the Administering Authority as soon as practicable, but within 48 hours, of the level in any regulated structure reaching the mandatory reporting level (MRL) and must act to prevent or minimise any actual or potential environmental harm; and*
- *The holder must notify the Administering Authority as soon as practicable, but within 48 hours, of the level in any regulated structure reaching the mandatory reporting level (MRL) and must act to prevent or minimise any actual or potential environmental harm*.

The operational and maintenance plan is to include provisions for inspections of regulated and key infrastructure in accordance with Section 4.2 of this report.

4.2 Inspections

Routine inspections will be carried out of each regulated and key infrastructure to identify and report safety, environmental and maintenance concerns. Each regulated structure will be inspected every calendar year by a suitably qualified and experienced person. At each annual inspection, the condition and adequacy of each regulated structure will be assessed for safety and against the necessary structural, geotechnical and hydraulic performance criteria, including assessment:

- against the most recent hazard assessment report and design plan (or system design plan);
- against recommendations contained in previous annual inspections reports;
- against recognised safety deficiency indicators;
- for changes in circumstances potentially leading to a change in hazard category;
- for conformance with the conditions of this authority;

4 Operation and Maintenance

- for conformance with the ‘as constructed’ drawings;
- for the adequacy of the available storage in each regulated structure, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the structure (or network of linked containment systems); and
- for evidence of conformance with current operational plan.

HGPL will immediately act upon recommendations arising from the annual inspection on condition and adequacy of each regulated structure. At each annual inspection, where a mandatory reporting level is required, the MRL will be determined and marked on each regulated structure.

A final assessment of the adequacy of available storage in each regulated structure will be based on water levels observed within the month of October and result in an estimate of the level as of 1 November. On 1 November of each year, HGPL will ensure that storage capacity is available in each regulated structure (or network of linked containment systems with a shared DSA volume), to meet the Design Storage Allowance (DSA) volume for the structure (or network of linked containment systems). HGPL will, as soon as possible and within forty-eight hours of becoming aware that the regulated structure (or network of linked containment systems) will not have the available storage to meet the Design Storage Areas volume on 1 November of any year:

- notify the Administering Authority; and
- act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

HGPL will assess the performance of each regulated structure (or linked containment system) over the preceding November to May period based on actual observations of the available storage in each regulated structure or linked containment system taken prior to 1 July of each year. HGPL will take action to modify its water management or linked containment system so as to ensure that the regulated structure or linked containment system will perform in accordance with the requirements of this authority, for the subsequent November to May period.

For each annual inspection, two (2) copies of a report certified by a suitably qualified and experienced person and in accordance with the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (DEHP, Feb 2012) will be provided to the Administering Authority by 1 December. The report will detail the adequacy of recommended actions to ensure the integrity of each regulated structure. HGPL will, within one week of receipt of the annual inspection report, consider the report and its recommendations; and as soon as possible, but within one month of receipt of the annual inspection report, formulate and implement actions to ensure that each regulated structure safely performs its intended functions. A copy of the annual inspection report will be provided to the Administering Authority upon request and within ten business days..

Decommissioning and Rehabilitation

5.1 Regulatory Compliance

5.1.1 Queensland Legislation and Guidelines

The Queensland Department of Environment and Heritage Protection (DEHP) requires land disturbed by mining to be rehabilitated to achieve stable and beneficial agreed uses. The three mandatory rehabilitation requirements stipulated by DEHP include landform stability, beneficial use and protection of water quality. These elements are further defined as:

- Stable landform – includes both erosional and geotechnical stability. Erosional stability is typically achieved through the appropriate placement spoil to an agreed final landform design, followed by adequate topsoiling, revegetation and surface water management. Geotechnical stability is typically achieved through the correct design of low wall and high wall slopes and batters and the correct placement of spoil materials during the mine life.
- Beneficial use – refers to the final land use being beneficial to the community from an ecological and/or agricultural perspective. It may include sustainable native bush land or grazing with no ongoing liability to the community.
- Preservation of downstream water quality – existing and future use of the downstream water is not to be compromised. Silts, salts and acids are not to be released from spoil or voids to groundwater or surface water.

The progressive and final rehabilitation strategies and methods outlined for disturbed areas comply with the rehabilitation goals and objectives of the EPA Guideline 18: Rehabilitation requirements for mining projects. More specifically, they provide intergenerational equity, protection of biodiversity and maintenance of essential ecological processes.

5.2 Post Closure Monitoring and Environmental Management

Following closure of the mine the environmental monitoring program established for the operations phase of the Project will be maintained until decommissioning and rehabilitation works have been completed. Notwithstanding this, there may be the need to establish additional monitoring sites depending on the nature of the decommissioning works and also in response to finding possible sources of environmental pollutants.

5.3 Decommissioning Works and Rehabilitation.

A decommissioning and rehabilitation strategy will be developed for the site at closure by suitably qualified (Class 1) demolition specialists. This would include engaging structural engineers, appropriate technical experts and the application of relevant standards and guidelines. A detailed investigation of all structures would be completed to determine the appropriate techniques, equipment required, and the sequence for decommissioning and removal. Post-mining, rehabilitation of the Project site will return a stable landform capable of uses similar to those prior to disturbance. To achieve this, the nominated post-mine land use for the site is a mix of bushland and low density cattle grazing land. This will link remnant native vegetation where possible and will aim to return some conservation values. Furher detail on the decommission and rehabilitation strategy is provided in section W 3.8 of the EMP (Appendix T1 of the SEIS).

5.3.1 Dams and Surface Water Features

All sedimentation dams which assist in the management of surface water flow from the final rehabilitated surface will be retained following mine closure. The other dams will be decommissioned or removed, and where possible the original drainage paths will be re-established.

Creek diversions established during the construction and/or operations phase of the Project are assumed to be stable by the time of decommissioning and closure of the mine and will be left in place.

5.3.2 Tailings Storage Facility Decommissioning

External embankment slopes

The proposed concept of rehabilitation of the external slopes of the above-ground Tailings Storage Facility (TSF-1) embankments is to establish naturally occurring halophytic vegetation without need of cultivation or irrigation. This will be achieved by developing a select fill layer on the outer face of the embankments and covering with a layer of approximately 0.2 m of topsoil. The external slopes will be designed to allow access for any future planting and maintenance and to comply with regulatory requirements. Rock armouring will also be considered if required to prevent excessive slope erosion.

Surface capping – TSF-1

The TSF-1 is conceived as a single-cell facility with a target design life of five years. As such, progressive rehabilitation will not be required. Rehabilitation will commence per applicable regulatory guidelines once sufficient drying of the tailings surface is achieved. A closure strategy will be developed in consultation with the State regulators. Key objectives of the closure strategy will include:

- Providing a stable landform;
- Providing a landform surface that is resistant to erosion;
- Providing a surface cover that minimises the risk of infiltration, promotes shedding of surface water and promotes growth of vegetation; and
- Minimises the risk of environmental harm from seepage.

Surface capping – TSF-2

The Northern Open-cut Pit will be decommissioned as per applicable regulatory guidelines. A closure strategy will be developed in consultation with the State regulators. Key objectives of the closure strategy will include:

- Providing a stable landform;
- Providing a landform surface that is resistant to erosion;
- Providing a surface cover that minimises the risk of infiltration, promotes shedding of surface water and promotes growth of vegetation; and
- Minimises the risk of environmental harm from seepage

The operational performance of the in-pit tailings and decant water management will have a significant influence on the final strength and consolidation properties of the in-pit tailings materials. Strategies to be considered to address these issues during development of rehabilitation plans for the in-pit disposal area will include:

5 Decommissioning and Rehabilitation

1. Strategic placement of overburden onto tailings to allow pore pressures to dissipate and limit the risk of instability of the final landform.
2. Undertake measures to promote drainage of the tailings under the overburden materials to increase rate of settlement within the tailings. Drainage control measures within the tailings would aim to reduce the period required to achieve successful rehabilitation of the landform.
3. Design the landform surface to promote sheet flow of surface water to eliminate the need for engineered drainage structures across the final landform surface.
4. On-going monitoring and maintenance of the final landform to assess the rate of ongoing tailings subsidence and to maintain the surface integrity of the landform surface.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

A

Appendix A Water Balance Model Input Data and Additional Results

URS

Table Appendix A-1 Assumed Dynamic Mine Plan Catchment Areas

Mine Year	Open cut north	Open cut South	Spoil dam 1	Spoil dam 2	Spoil dam 3	Spoil dam 4	TSF 1	TSF 2
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	113.8	0.0	45.9	40.2	57.4	0.0	232.0	0.0
2	180.1	0.0	72.6	63.6	90.8	0.0	232.0	0.0
3	246.5	0.0	99.4	87.0	124.3	0.0	232.0	0.0
4	312.8	0.0	126.1	110.4	157.8	0.0	232.0	0.0
5	379.2	125.9	152.9	133.9	191.2	125.9	232.0	379.2
6	0.0	146.0	152.9	133.9	191.2	146.0	185.6	379.2
7	0.0	166.2	152.9	133.9	191.2	166.2	139.2	379.2
8	0.0	186.3	152.9	133.9	191.2	186.3	92.8	379.2
9	0.0	206.5	152.9	133.9	191.2	206.5	46.4	379.2
10	0.0	226.6	152.9	133.9	191.2	226.6	0.0	379.2
11	0.0	246.7	152.9	133.9	191.2	246.7	0.0	379.2
12	0.0	266.9	152.9	133.9	191.2	266.9	0.0	379.2
13	0.0	287.0	152.9	133.9	191.2	287.0	0.0	379.2
14	0.0	307.2	152.9	133.9	191.2	307.2	0.0	379.2
15	0.0	327.3	152.9	133.9	191.2	327.3	0.0	379.2
16	0.0	347.4	152.9	133.9	191.2	347.4	0.0	379.2
17	0.0	367.6	152.9	133.9	191.2	367.6	0.0	379.2
18	0.0	387.7	152.9	133.9	191.2	387.7	0.0	379.2
19	0.0	407.9	152.9	133.9	191.2	407.9	0.0	379.2
20	0.0	428.0	152.9	133.9	191.2	428.0	0.0	379.2
21	0.0	448.2	152.9	133.9	191.2	448.2	0.0	379.2
22	0.0	468.3	152.9	133.9	191.2	468.3	0.0	379.2
23	0.0	488.4	152.9	133.9	191.2	488.4	0.0	379.2
24	0.0	508.6	152.9	133.9	191.2	508.6	0.0	379.2
25	0.0	528.7	152.9	133.9	191.2	528.7	0.0	379.2
26	0.0	548.9	152.9	133.9	191.2	548.9	0.0	379.2
27	0.0	569.0	152.9	133.9	191.2	569.0	0.0	379.2
28	0.0	589.1	152.9	133.9	191.2	589.1	0.0	379.2
29	0.0	609.3	152.9	133.9	191.2	609.3	0.0	379.2
30	0.0	629.4	152.9	133.9	191.2	629.4	0.0	379.2

Table Appendix A-2 Other Mine Catchments

Mine Year	MWD 1	MWD 2	Adit/ROM dam north	Adit/ROM dam central	Adit/ROM dam south	ROM Dump dam	MCIA dam	TLO/Product stockpile dam
0	514.0	303.0	0.0	0.0	0.0	0.0	0.0	0.0
1	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
2	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
3	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
4	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
5	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
6	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
7	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
8	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
9	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
10	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
11	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
12	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
13	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
14	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
15	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
16	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
17	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
18	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
19	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
20	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
21	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
22	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
23	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
24	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
25	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
26	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
27	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
28	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
29	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3
30	514.0	303.0	2.6	2.6	2.6	2.6	196.3	22.3

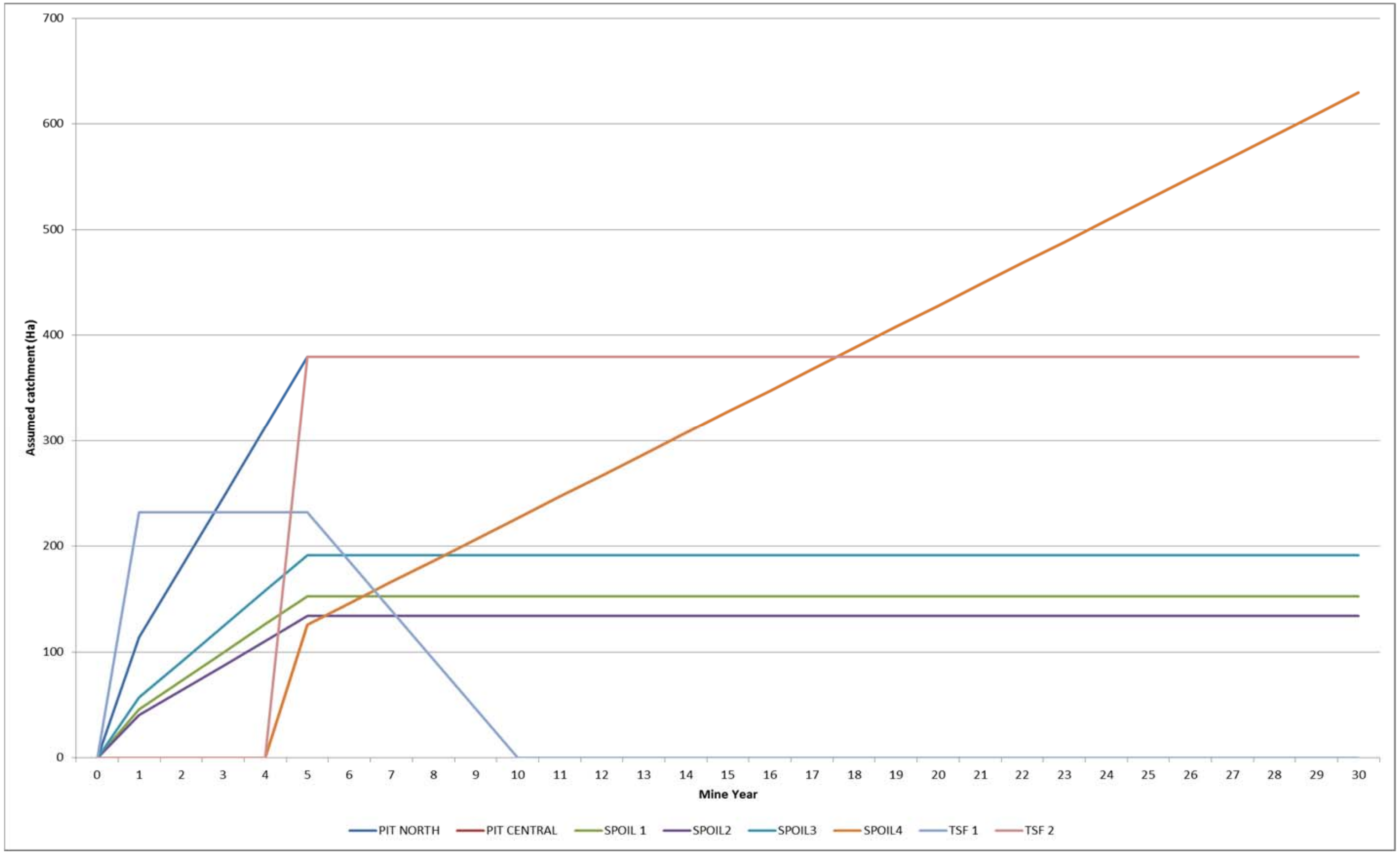


Chart Appendix A-1 Changes to Mine Plan Catchments over Life of Mine

Table Appendix A-3 Estimated Groundwater Inflows

Mine Year	Estimated Groundwater Inflows (GL/yr.)		
	Base (scenario 1)	Low (scenario 2)	High (scenario 3)
0	0.00	0.00	0.00
1	2.06	1.79	2.86
2	1.23	1.24	1.72
3	2.10	1.14	2.56
4	2.64	1.28	3.19
5	4.14	1.67	4.89
6	2.78	0.91	3.14
7	2.71	0.83	3.03
8	3.74	1.16	4.08
9	3.24	0.96	3.65
10	4.57	1.18	4.93
11	2.83	1.43	3.52
12	3.48	1.37	4.13
13	4.18	1.56	5.04
14	4.41	1.66	5.38
15	5.93	2.08	6.96
16	3.18	1.24	3.99
17	3.72	1.34	4.57
18	4.42	1.47	5.32
19	4.36	1.56	5.28
20	6.10	1.78	7.07
21	4.08	1.41	5.06
22	4.06	1.26	4.99
23	4.26	1.36	5.31
24	4.49	1.42	5.53
25	6.36	1.69	7.25
26	3.72	1.67	4.86
27	3.91	1.97	5.09
28	4.53	1.92	5.94
29	4.54	2.03	6.05
30	5.01	1.00	5.46
Totals	**116.8**	**43.4**	**140.8**

Table Appendix A-4 Life of Mine Water Balance Statistics

Scenario 3 (High GW Inflows)	**10th Percentile**	**50th Percentile**	**90th Percentile**
Direct Rainfall[1] (GL)	17.06	19.92	24.17
Total Runoff (GL)	30.80	44.52	49.05
Raw Water (GL)	69.06	72.93	88.55
Groundwater (GL)	135.35	135.35	135.35
Total Inputs (GL)	269.64	272.68	281.42
Total Evaporation (GL)	31.13	33.97	40.71
Water Demand (GL)	241.12	241.45	241.76
External Overflows (GL)	0.00	0.00	0.00
Total Outputs (GL)	272.89	275.52	282.24
Initial WSWV (GL)	4.59	4.59	4.59
Final WSWV (GL)	1.32	1.39	3.77
Net Change (GL)	-3.27	-3.20	-0.82
Balance (GL)	-0.04	-0.04	-0.03

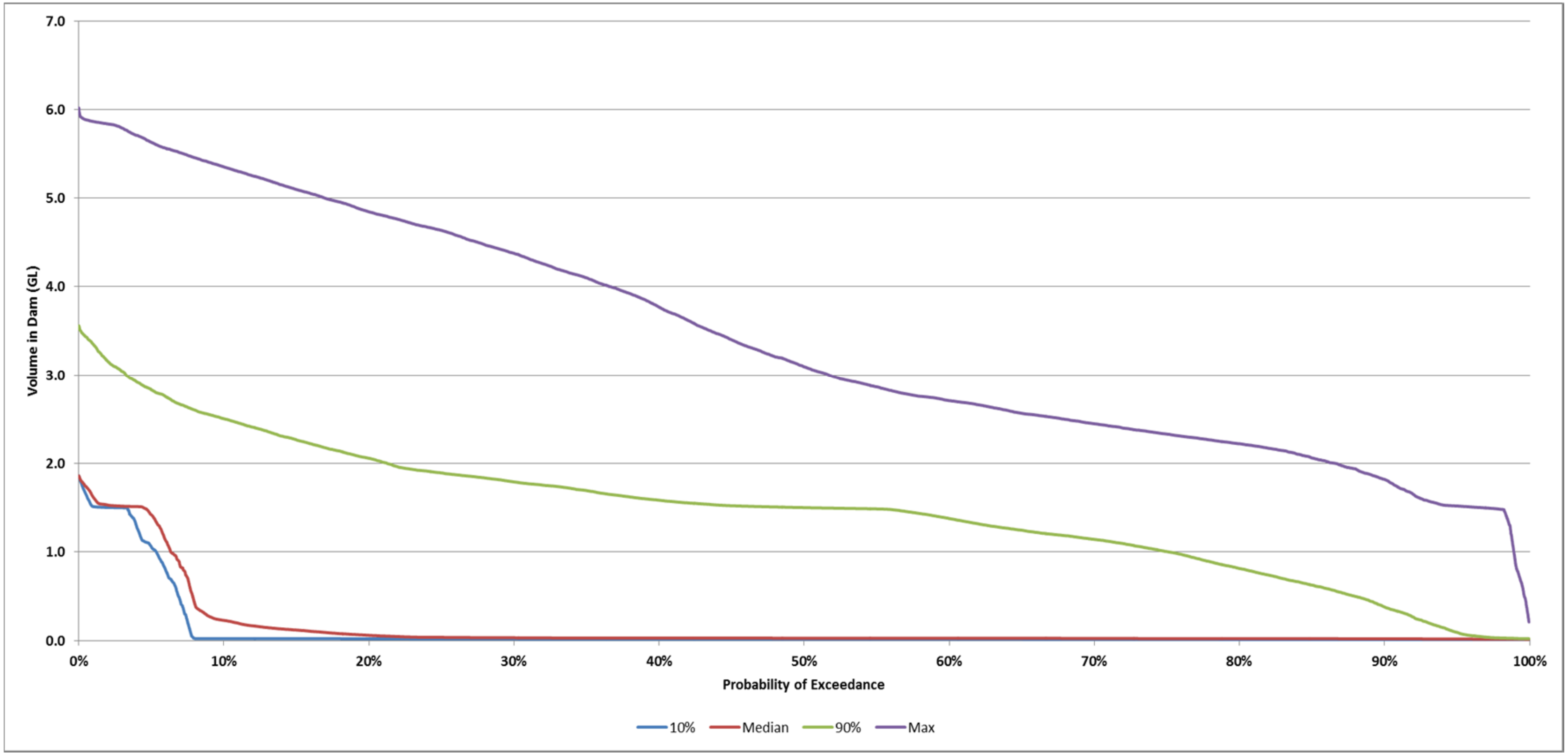


Figure Appendix A-1 Exceedance Probability Plot - MWD 1

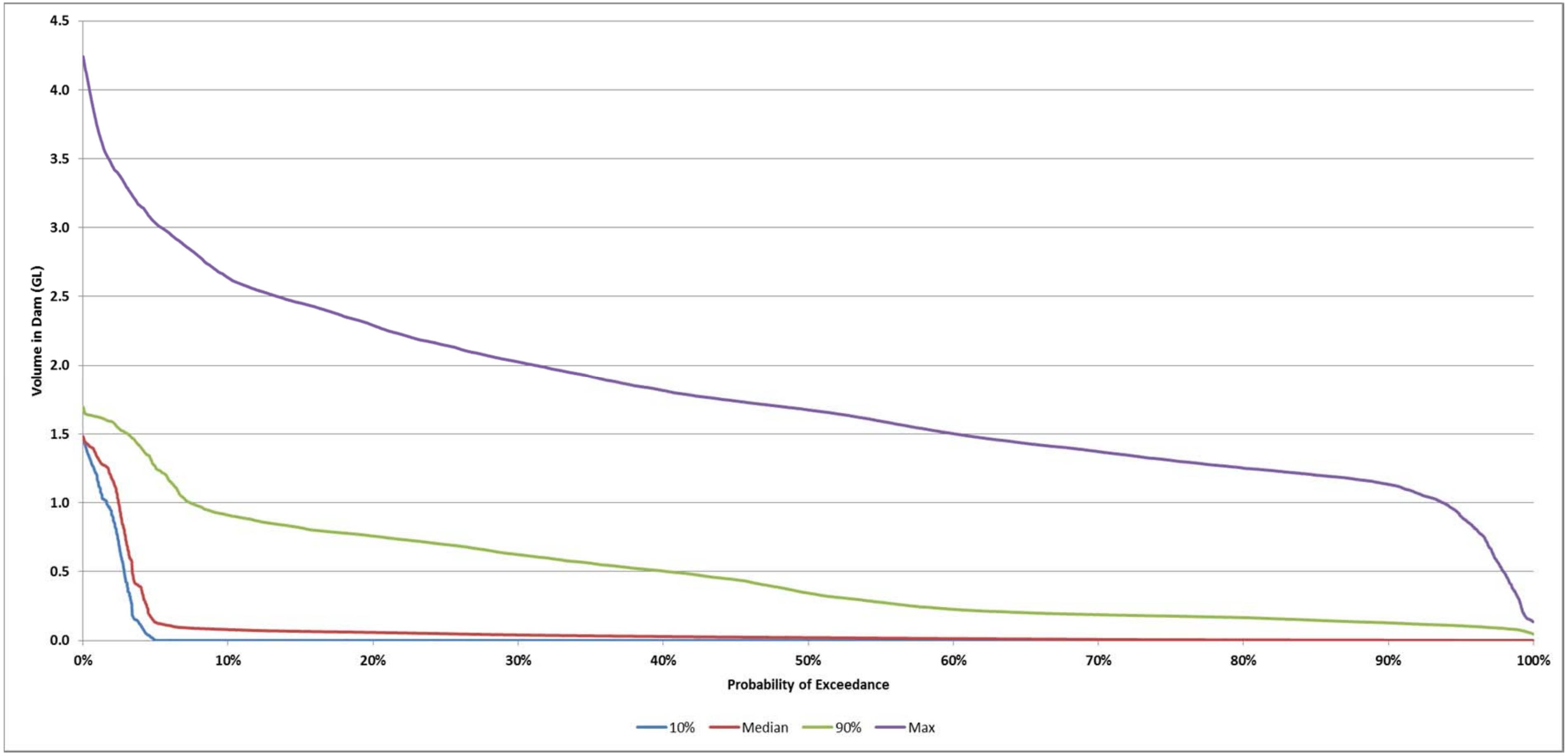
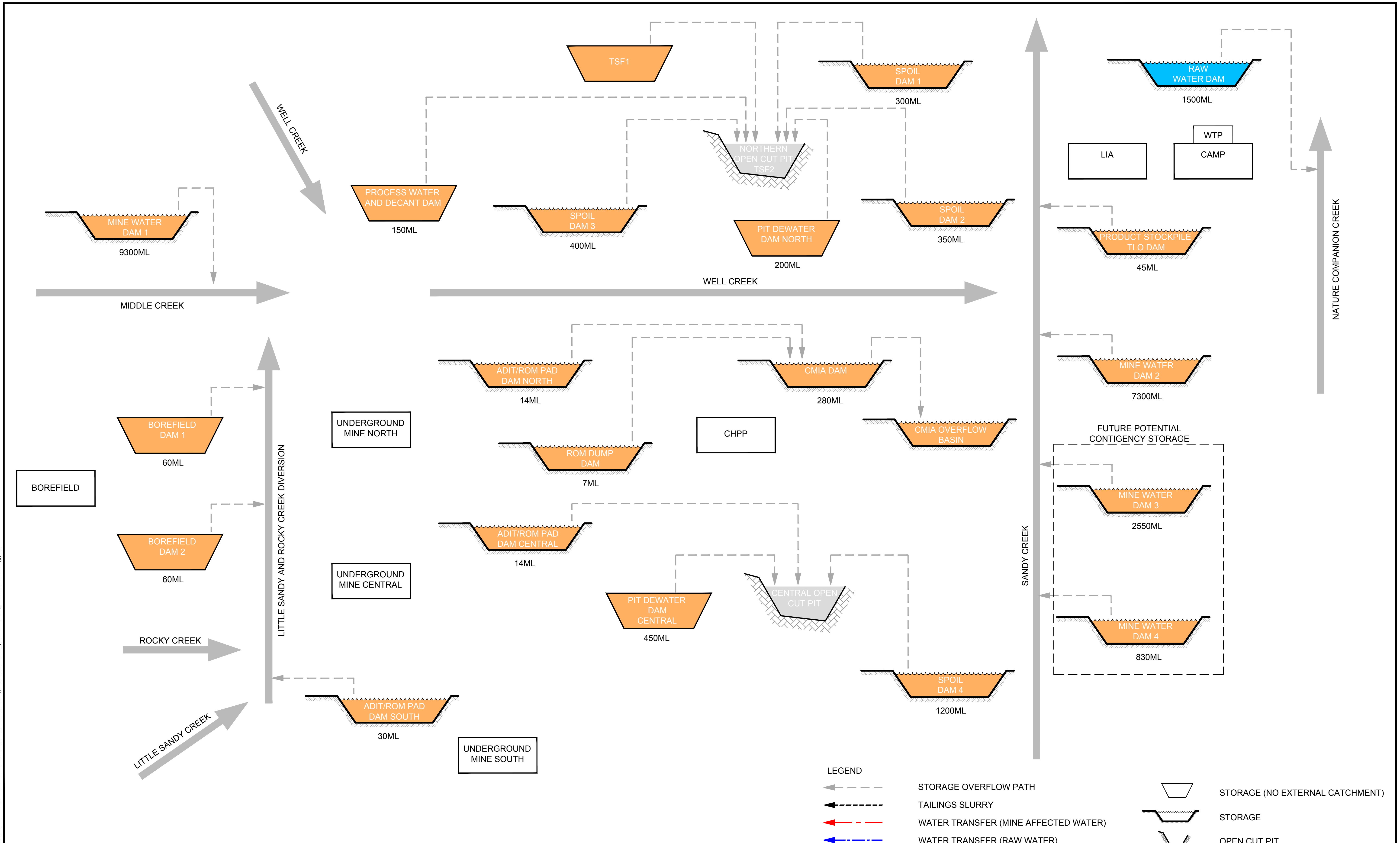


Figure Appendix A-2 Exceedance Probability Plot - MWD 2

B

Appendix B Water Balance Model Schematics



NOTE:
STORAGE CAPACITIES BASED ON PRELIMINARY WATER BALANCE. NO CONSIDERATION GIVEN FOR DSA VOLUMES.

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Project Title: KEVINS CORNER CONCEPT WMS SCHEMATIC

Drawing Title: STORAGE OVERFLOW PATHS - FOR DISCUSSION ONLY

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Date: - | Date: 13.02.12 | Date: - | Date: -

Drawing: SK005

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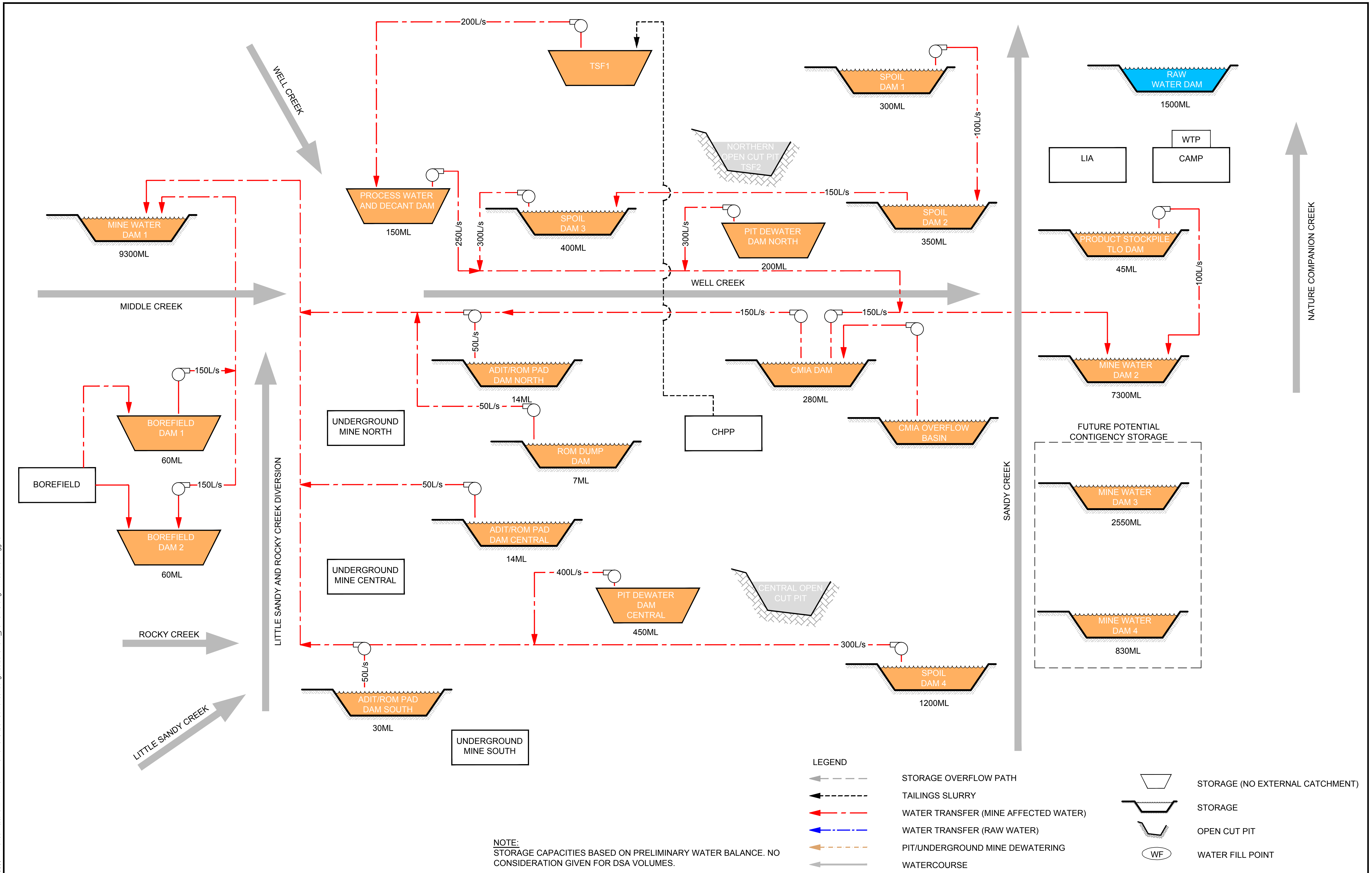

NOTE:
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Drawing: SK006
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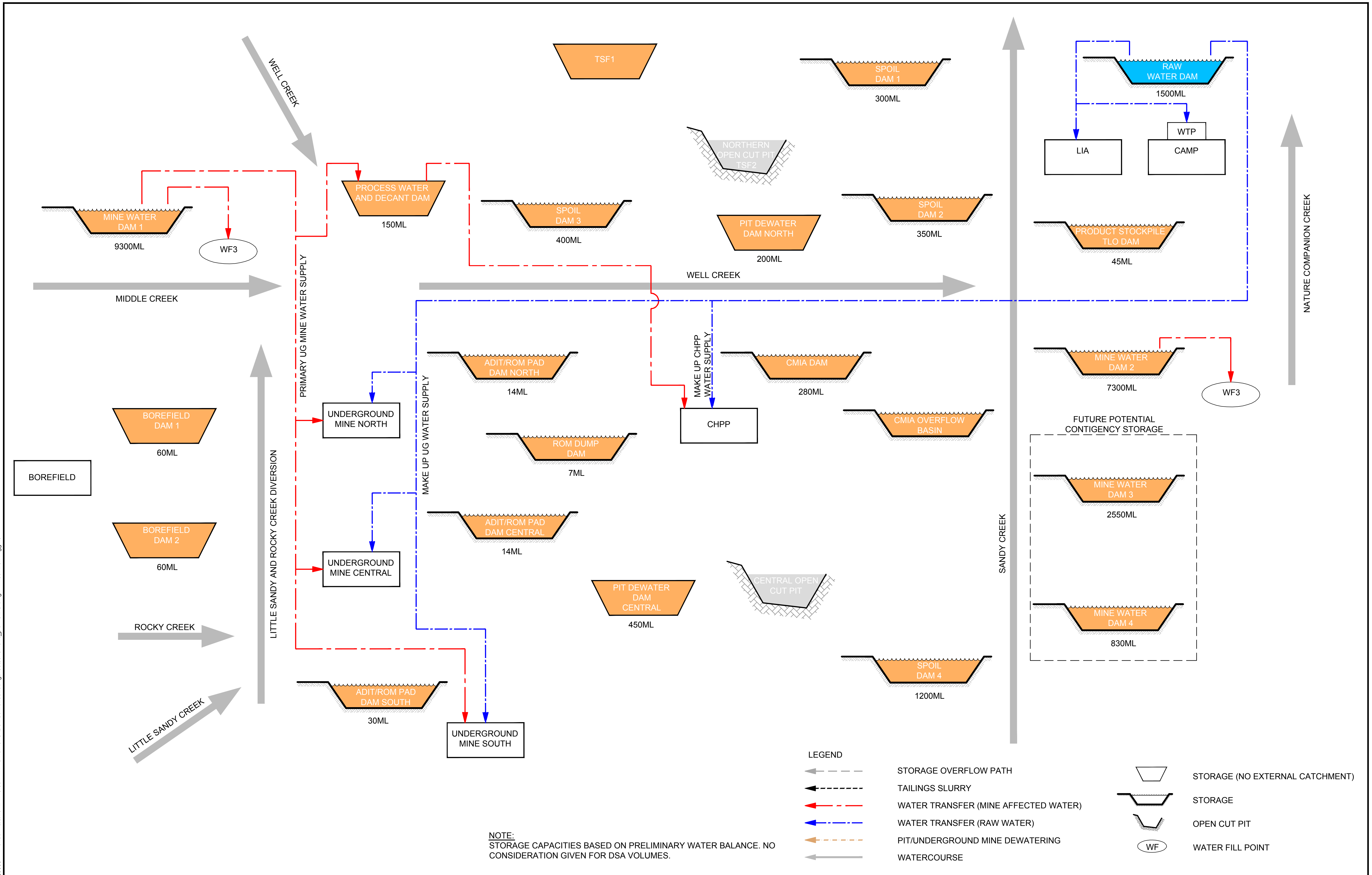

Rev	Drawn	Design	Date	REVISION RECORD

Client: CLIENT LOGO

Project Title: KEVINS CORNER CONCEPT WMS SCHEMATIC

Drawing Title: WATER DEMAND FLOW PATHS - FOR DISCUSSION ONLY

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Drawing: SK007

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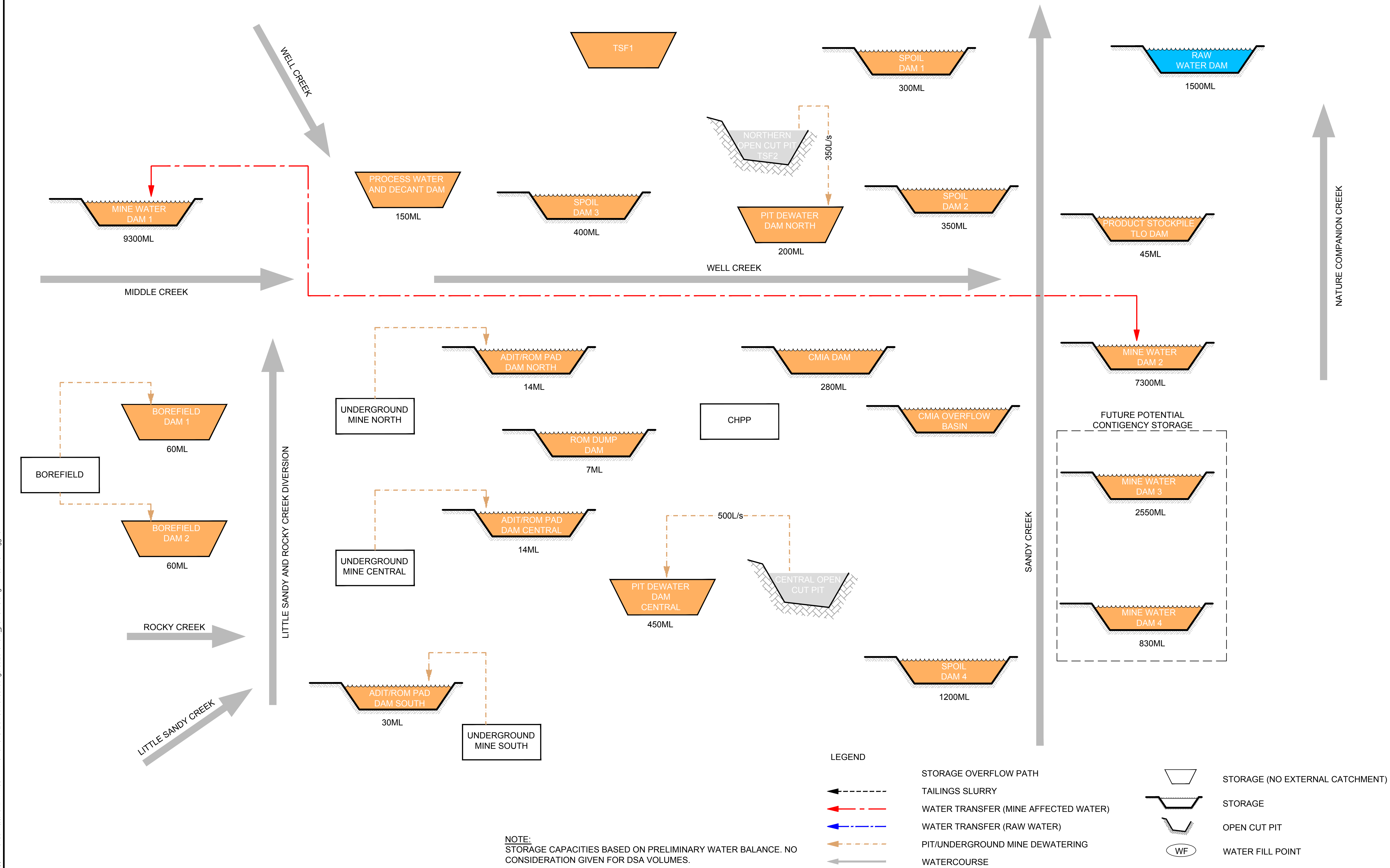

NOTE:
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Drawing: SK008
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Appendix C Conceptual Design Drawings

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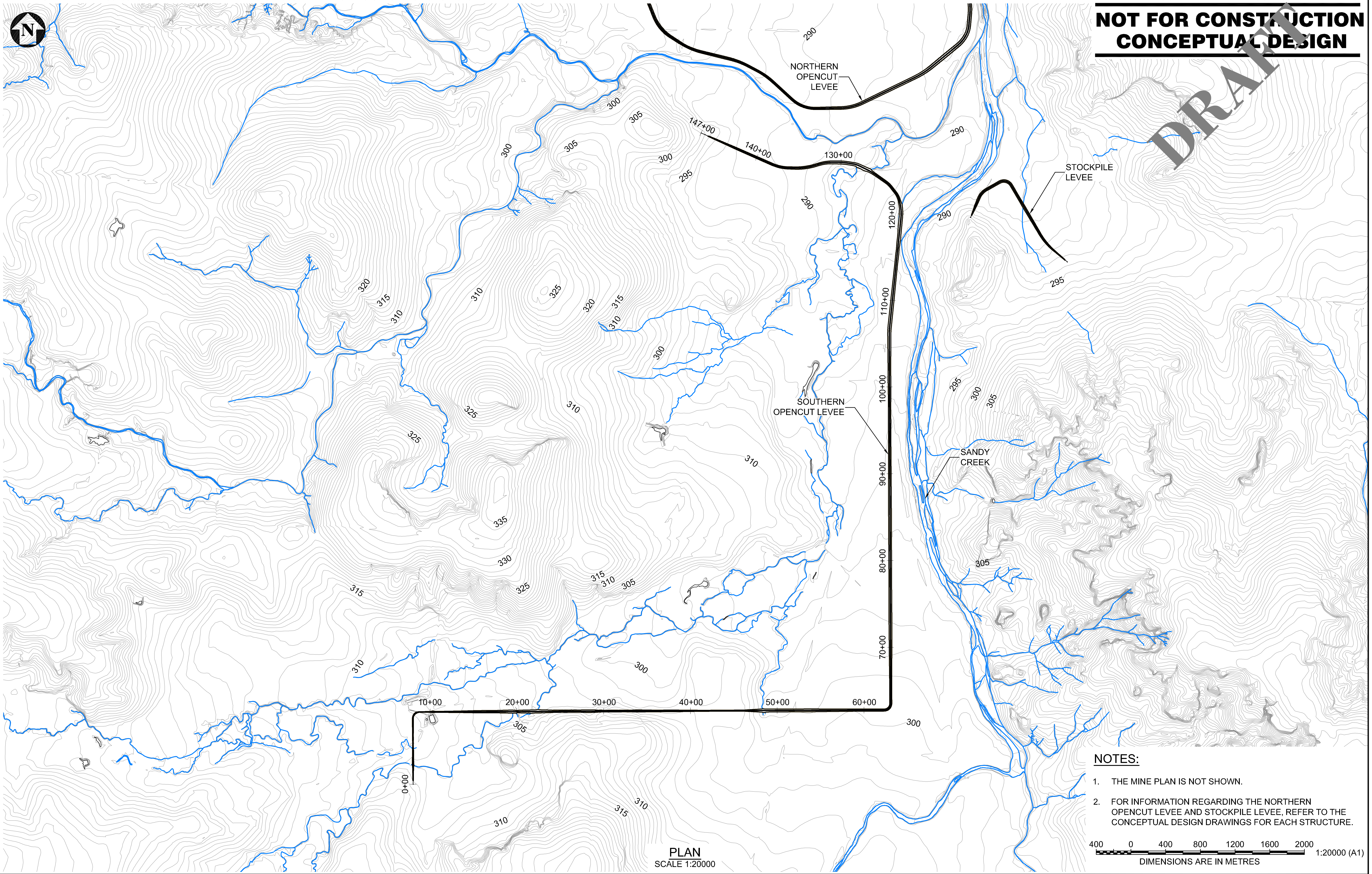

NOTES:

1. THE MINE PLAN IS NOT SHOWN.
2. FOR INFORMATION REGARDING THE NORTHERN OPENCUT LEVEE AND STOCKPILE LEVEE, REFER TO THE CONCEPTUAL DESIGN DRAWINGS FOR EACH STRUCTURE.

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DIMENSIONS ARE IN METRES

PLAN
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Rev	Drawn	Design	Date	REVISION RECORD
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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

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Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
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Approved By: - Date: -

Drawing: 42626954-LEV01-001
42626954-LEV 01-001.dwg REV. A

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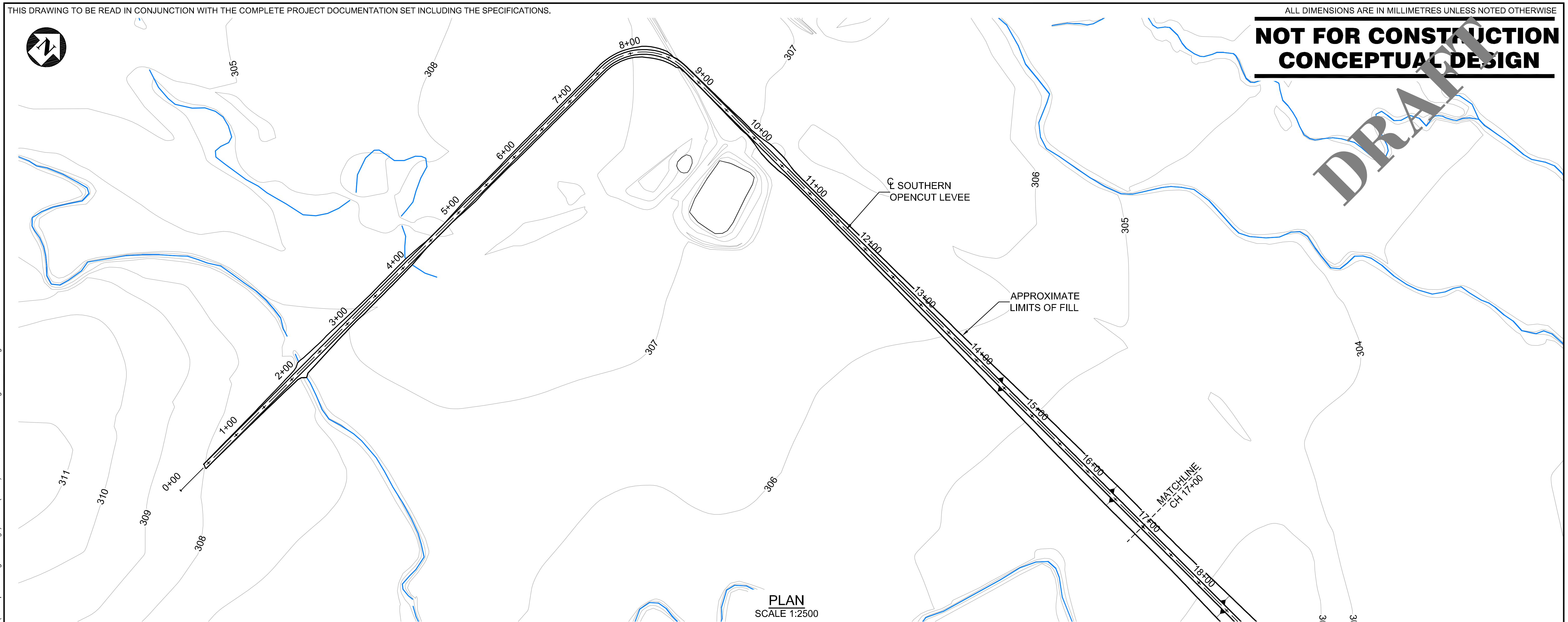

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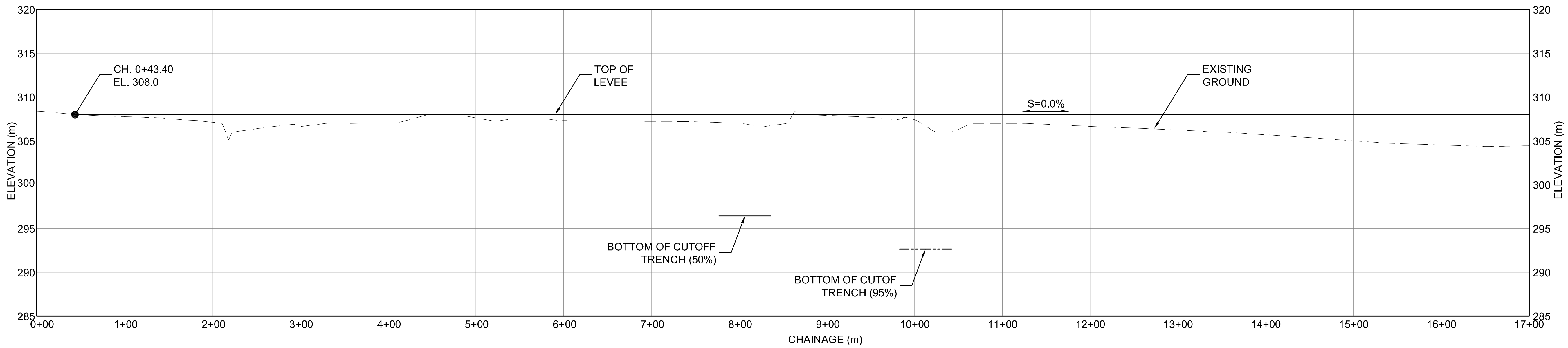

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Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 0+00 - CH. 17+00

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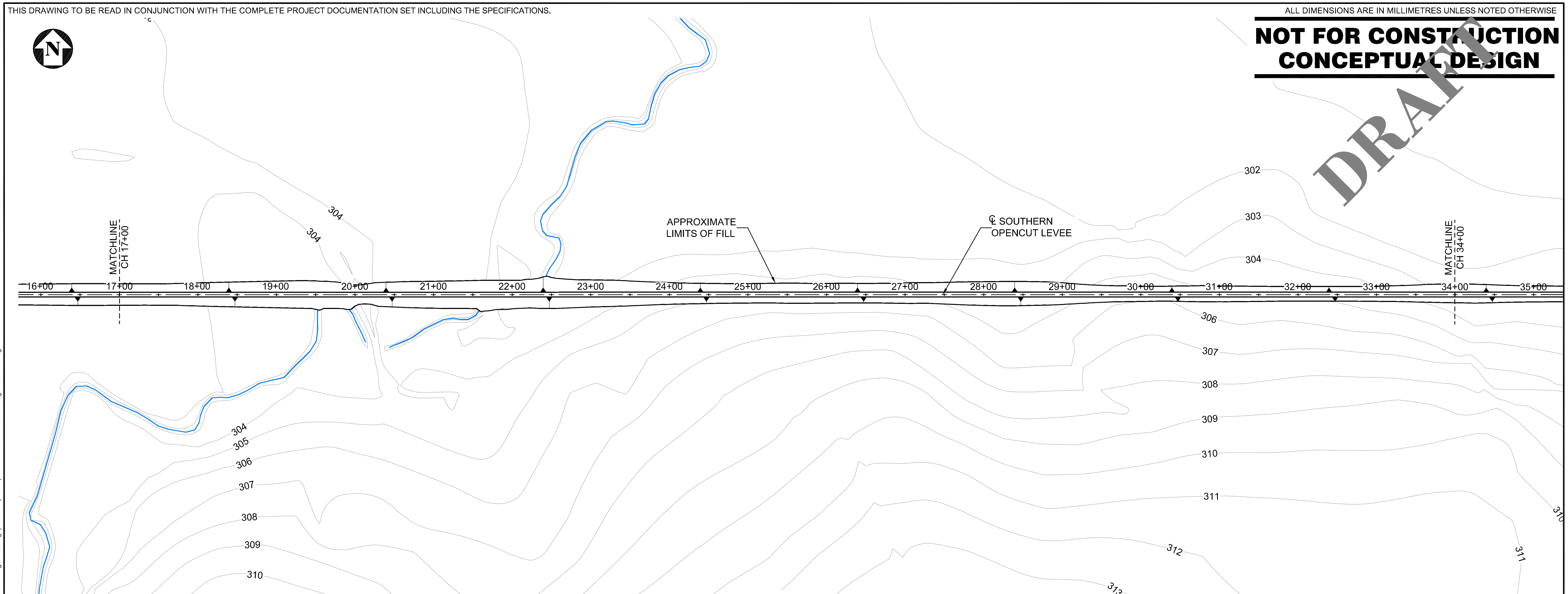

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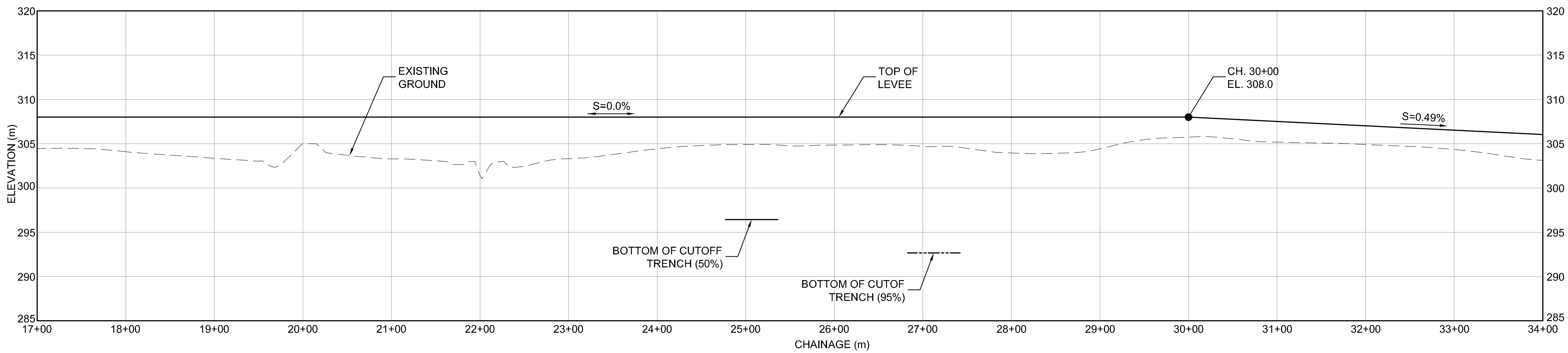

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Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 17+00 - CH. 34+00

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Date: 02/07/12

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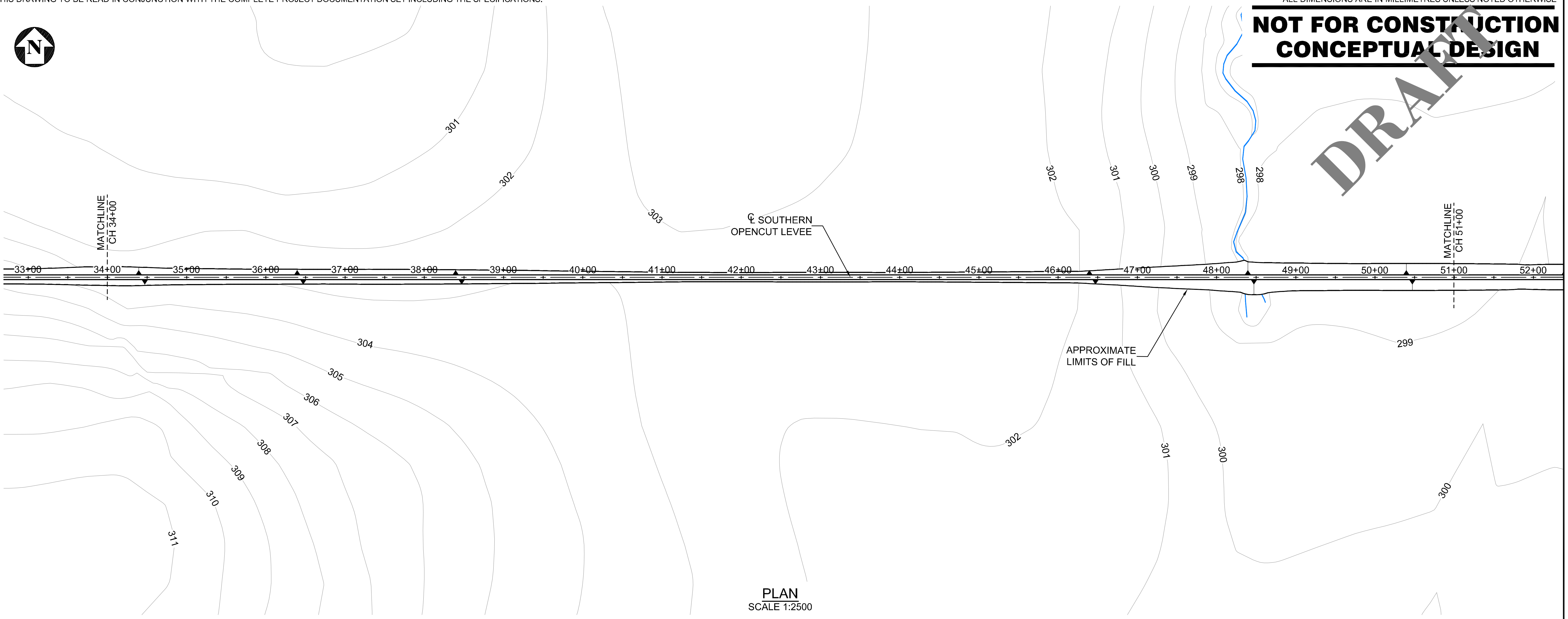

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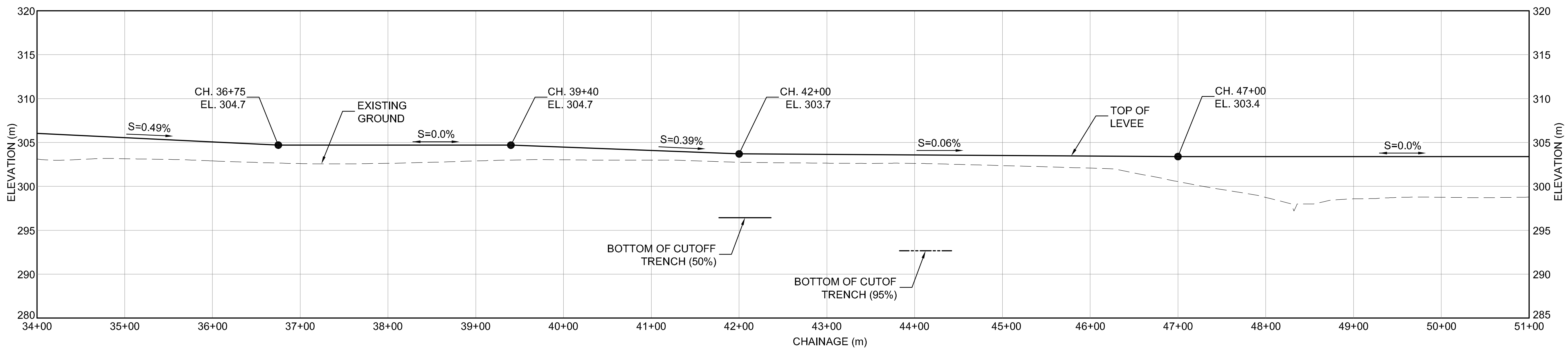

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Datum: GDA94 ZONE 55

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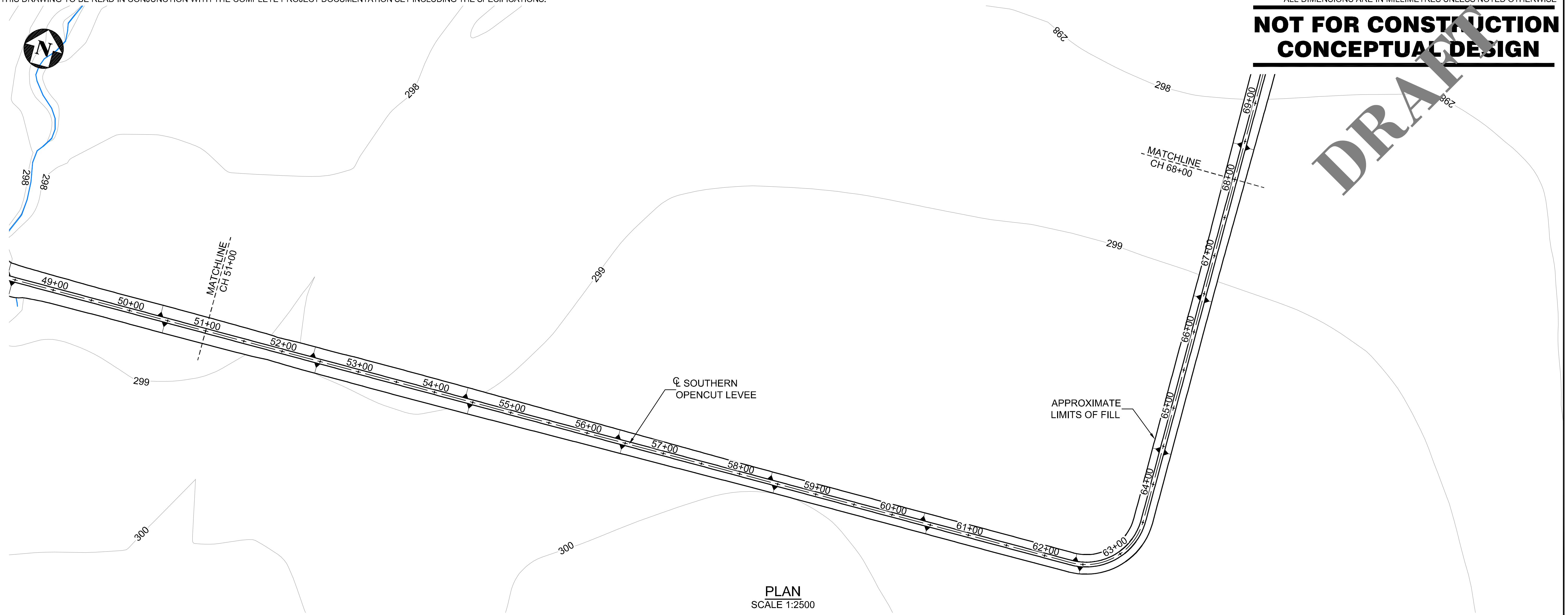

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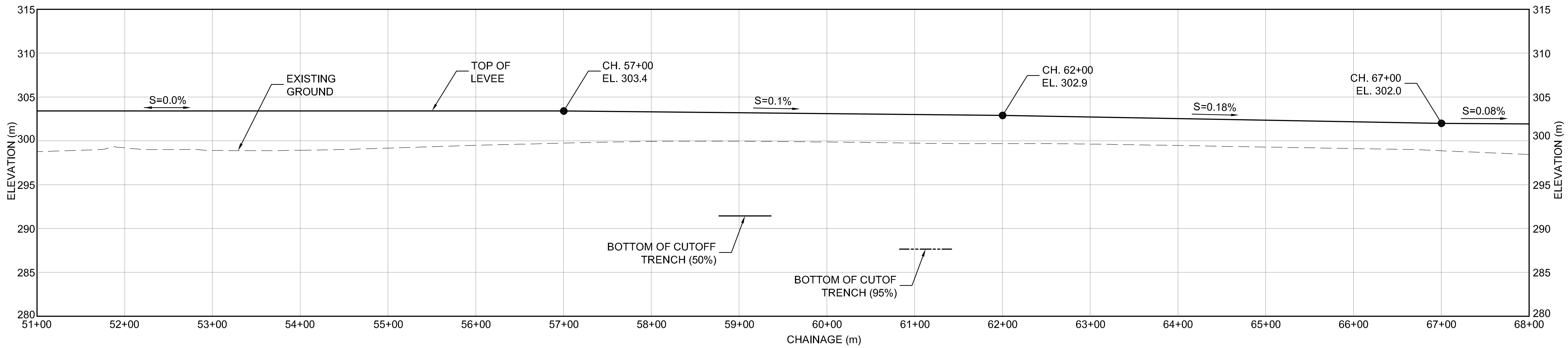

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Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 51+00 - 68+00

Datum: GDA94 ZONE 55

Date: 02/07/12

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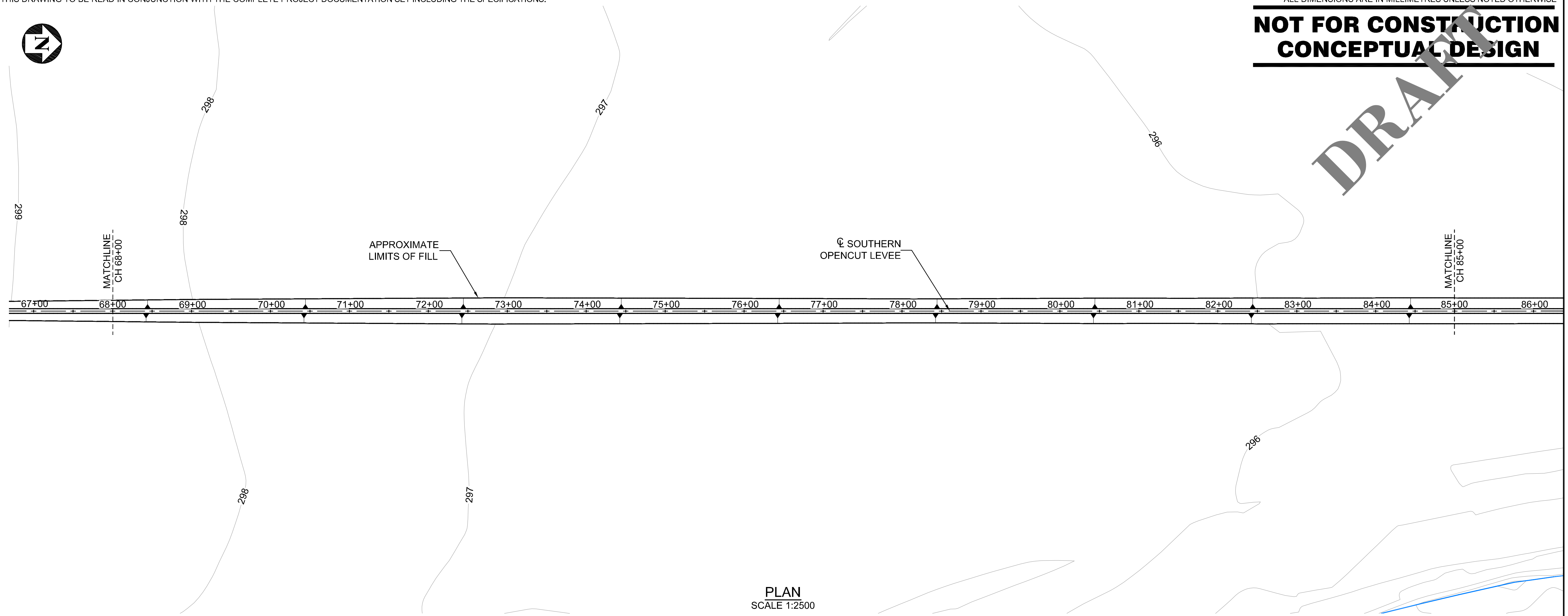
CONCEPTUAL DESIGN

DRAFT



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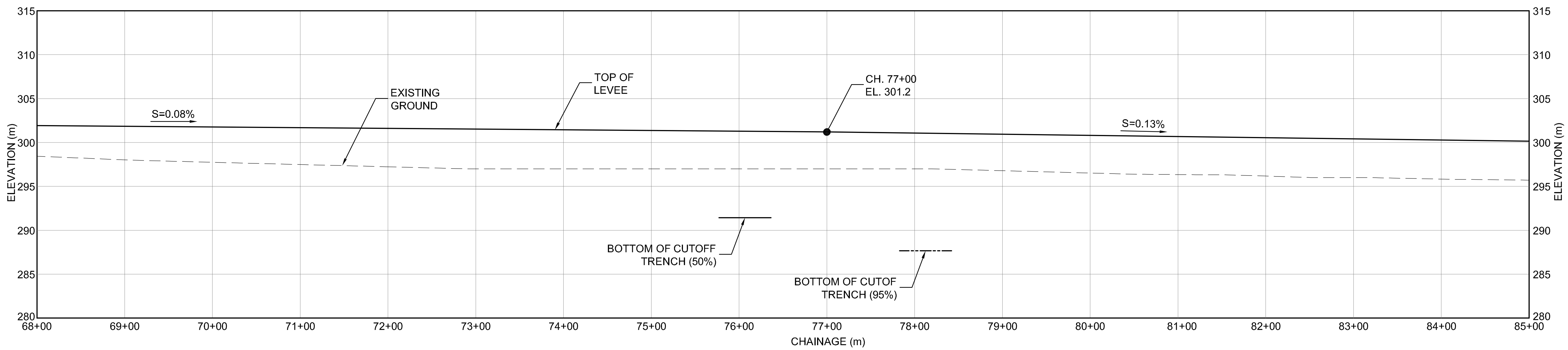


PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE
PLAN AND PROFILE
CH. 68+00 - CH. 85+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV01-006

42626954-LEV 01-002.dwg

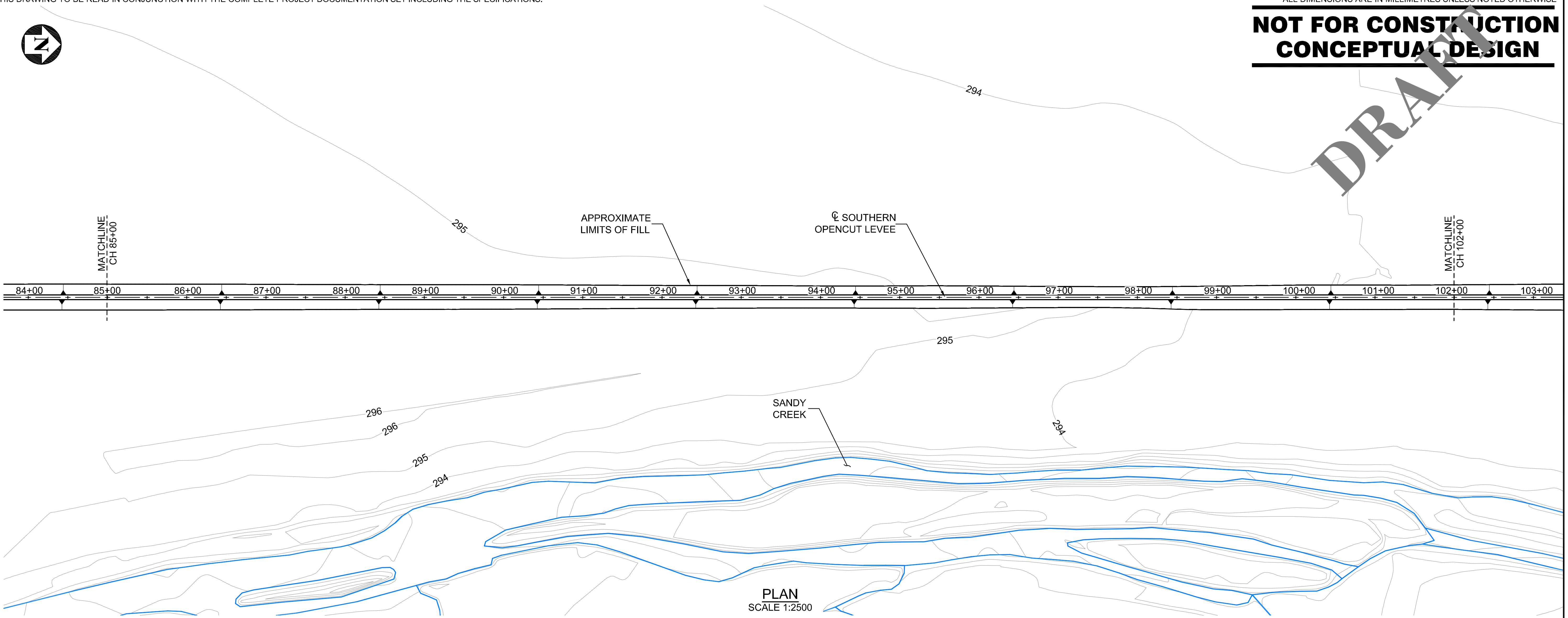
REV. A

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



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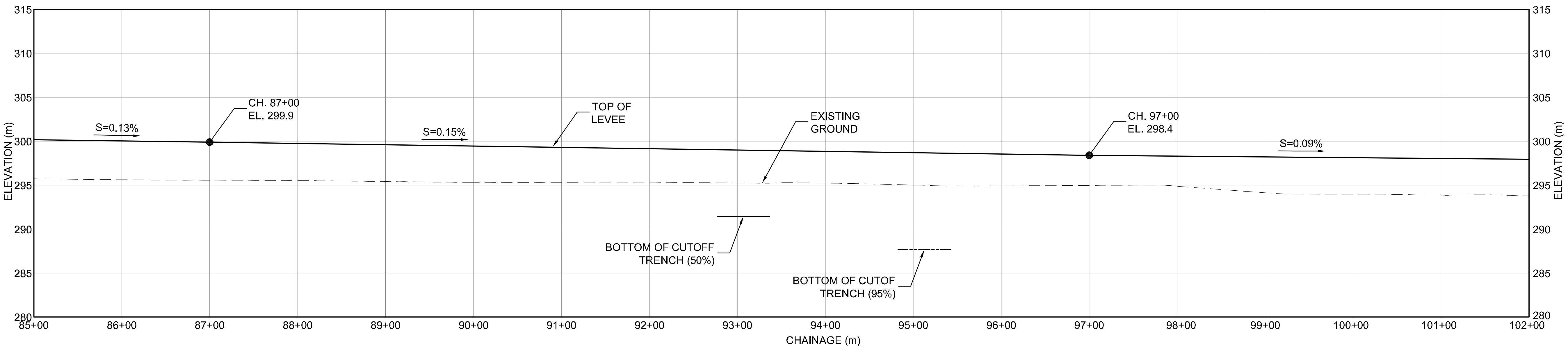


PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 85+00 - 102+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Date: 02/07/12
Drawn By: CW | Date: 02/07/12
Checked By: - | Date: -
Approved By: - | Date: -

Drawing: 42626954-LEV01-007

42626954-LEV 01-002.dwg

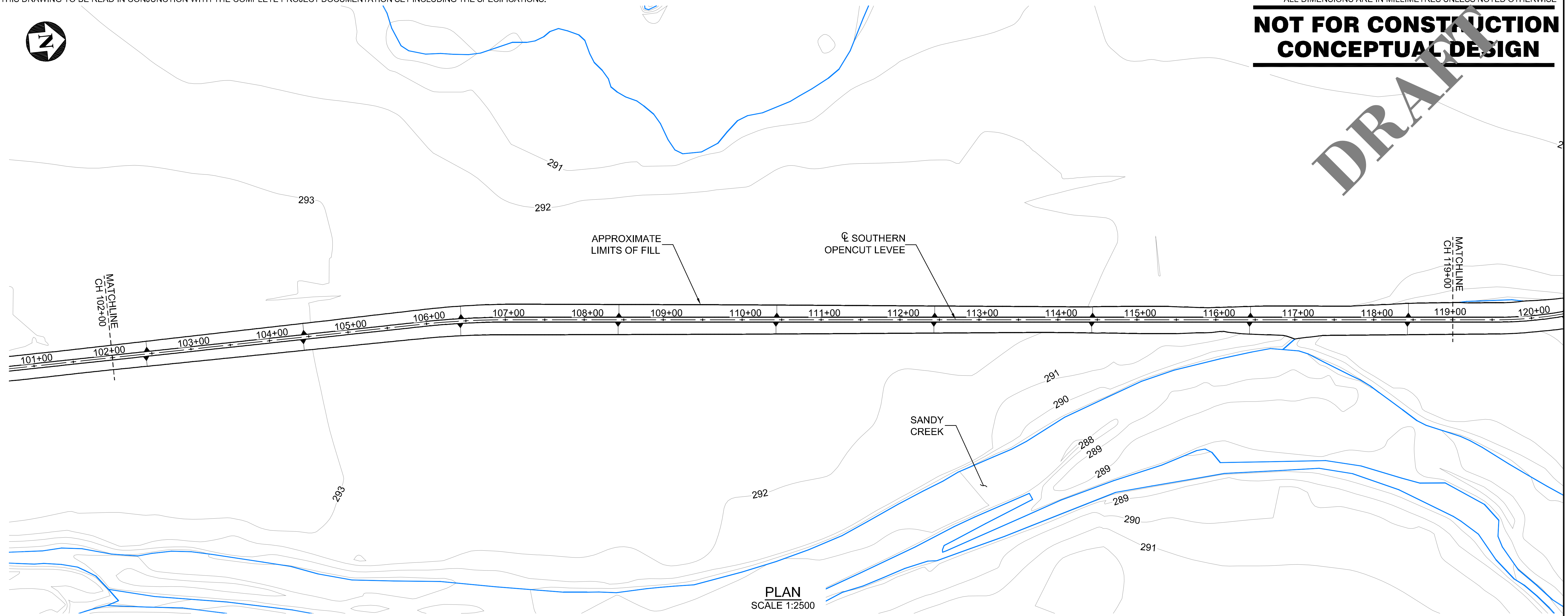
REV. A

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



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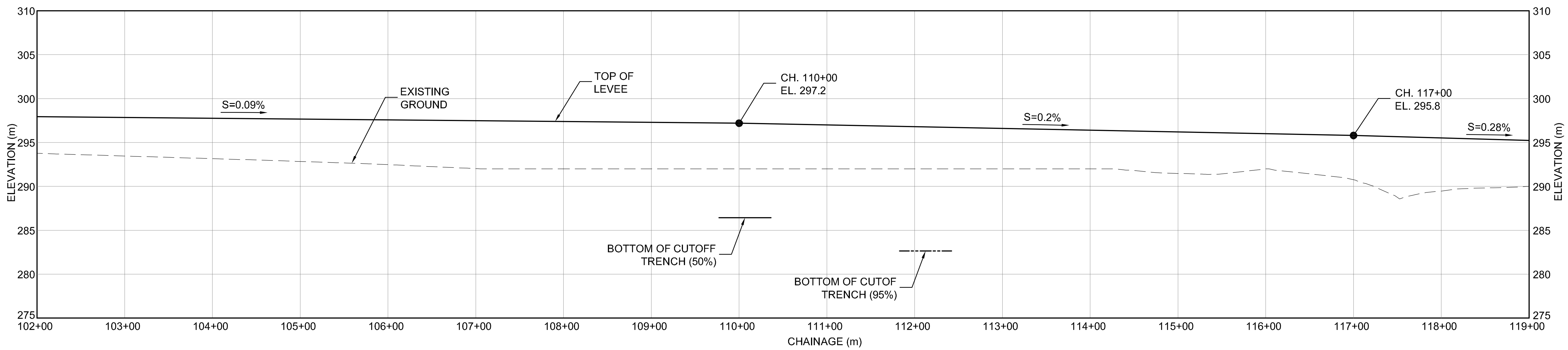

PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

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DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE
PLAN AND PROFILE
CH. 102+00 - 119+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV01-008

42626954-LEV 01-002.dwg

REV. A

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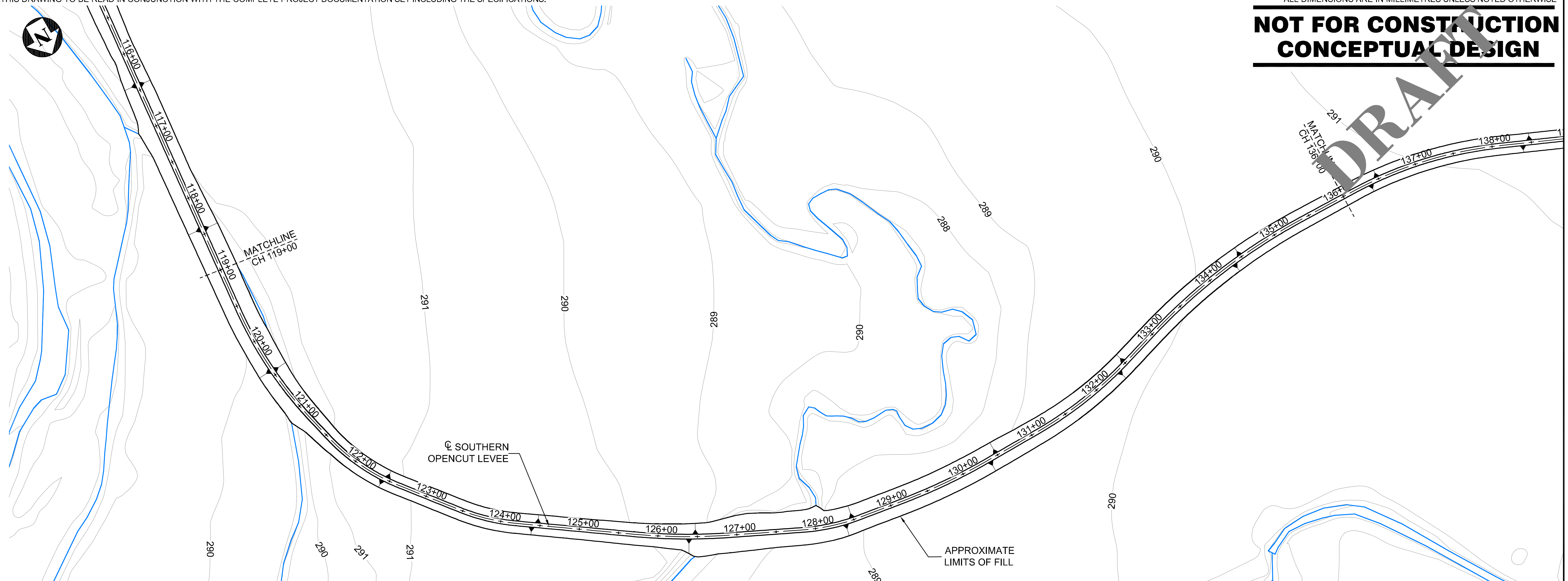
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



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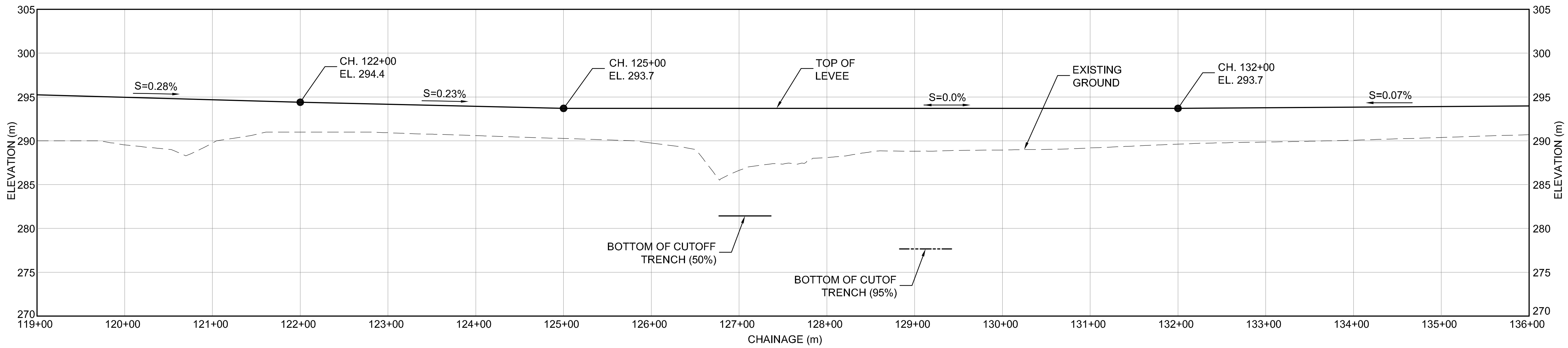
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

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DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client:
HANCOCK GALILEE PTY LTD

Project Title:
HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title:
SOUTHERN OPENCUT LEVEE
PLAN AND PROFILE
CH. 119+00 - 136+00

Datum: GDA94 ZONE 55
Date: 02/07/12
Status: DRAFT

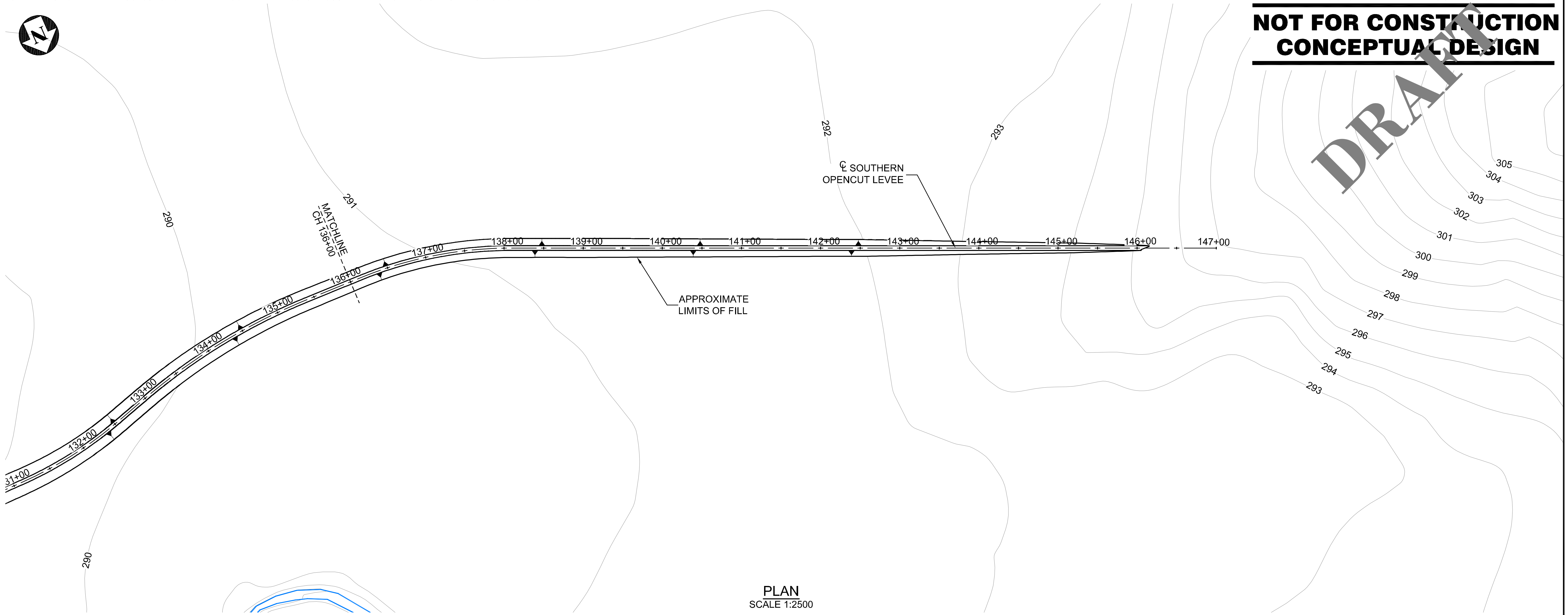
URS
PROJECT MANAGER:
Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -
Drawing: 42626954-LEV01-009
42626954-LEV 01-002.dwg
REV. A

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



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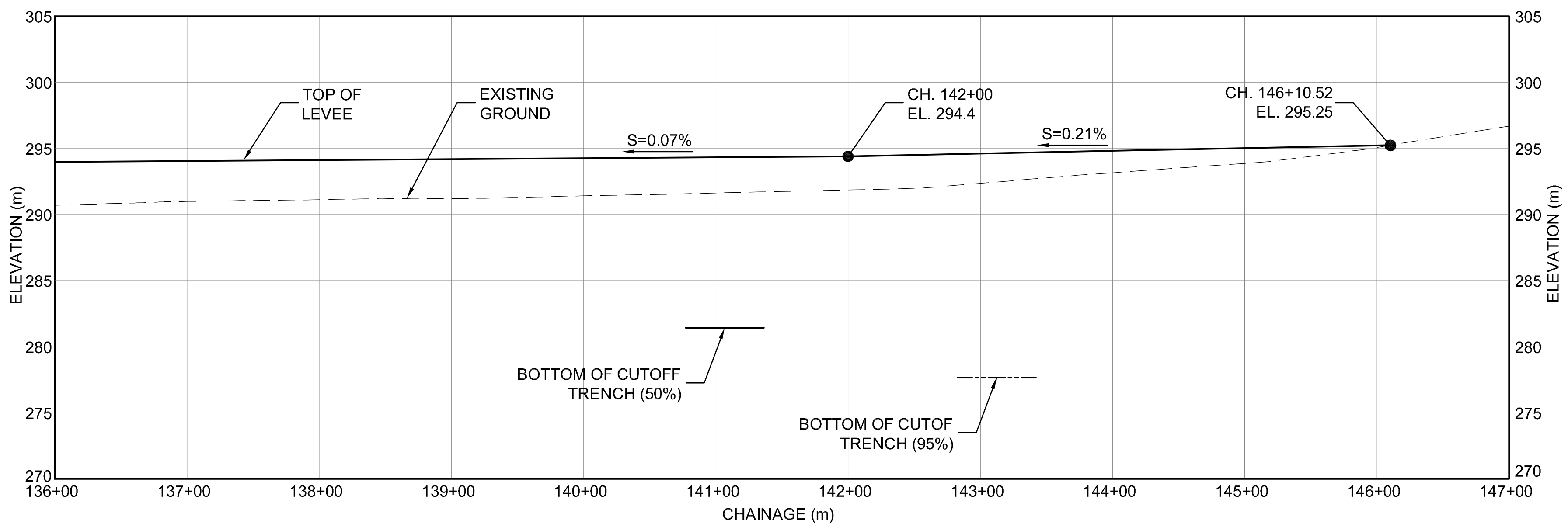

PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

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DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 136+00 - 147+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-LEV01-010

42626954-LEV 01-002.dwg

REV. A

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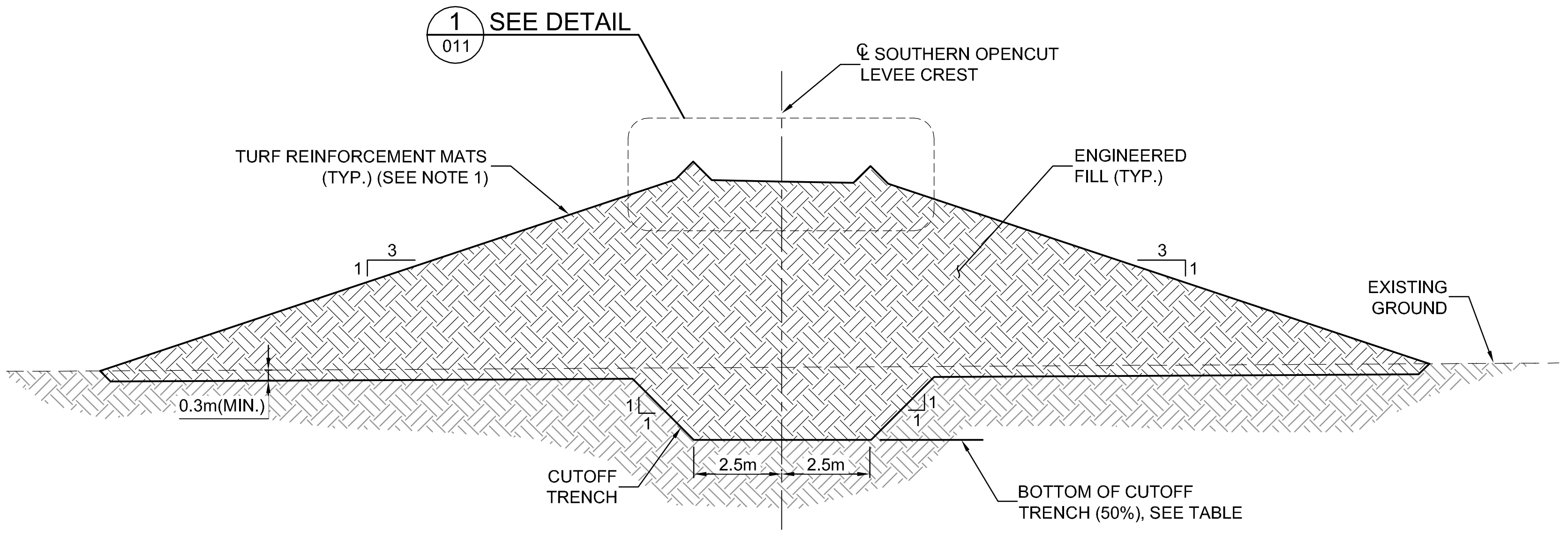
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

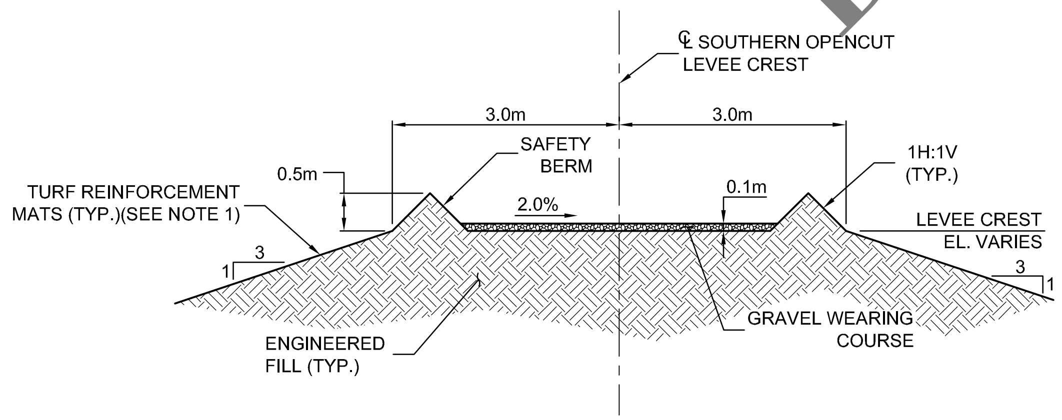
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

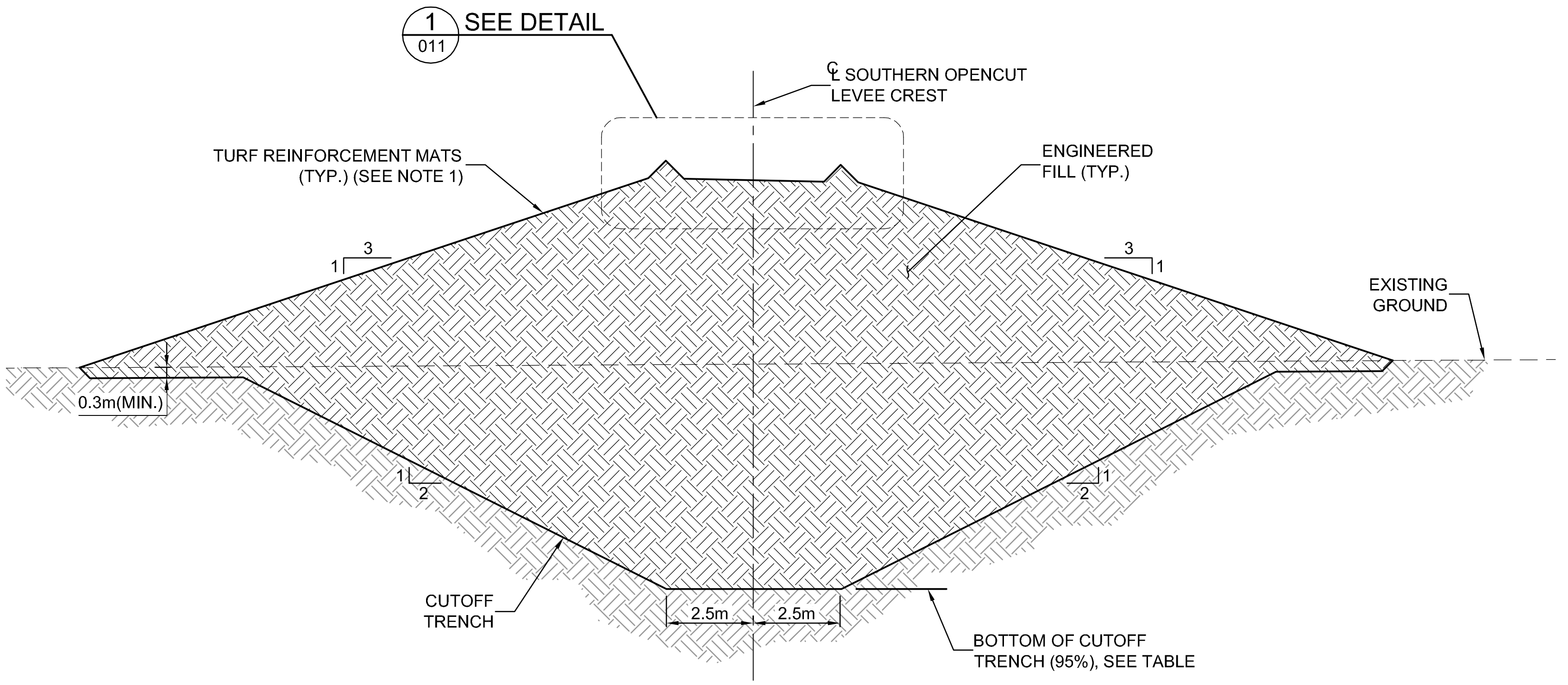
DRAFT



TYPICAL LEVEE SECTION
(50% CONFIDENCE LEVEL)
SCALE 1:100



TYPICAL LEVEE CREST DETAIL 1/011
SCALE 1:50



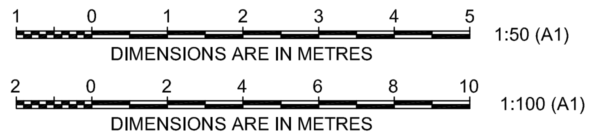
TYPICAL LEVEE SECTION
(95% CONFIDENCE LEVEL)
SCALE 1:100

SOUTHERN OPENCUT LEVEE
CUTOFF TRENCH DEPTH TABLE

CHAINAGE	ELEV. (m) (50%)	ELEV. (m) (95%)
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0

NOTES:

1. TURF REINFORCEMENT MATS ARE TO BE PLACED ON ALL EXPOSED EMBANKMENT SURFACES.



Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SOUTHERN OPENCUT LEVEE TYPICAL SECTIONS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV01-011

42626954-LEV 01-002.dwg

REV. A

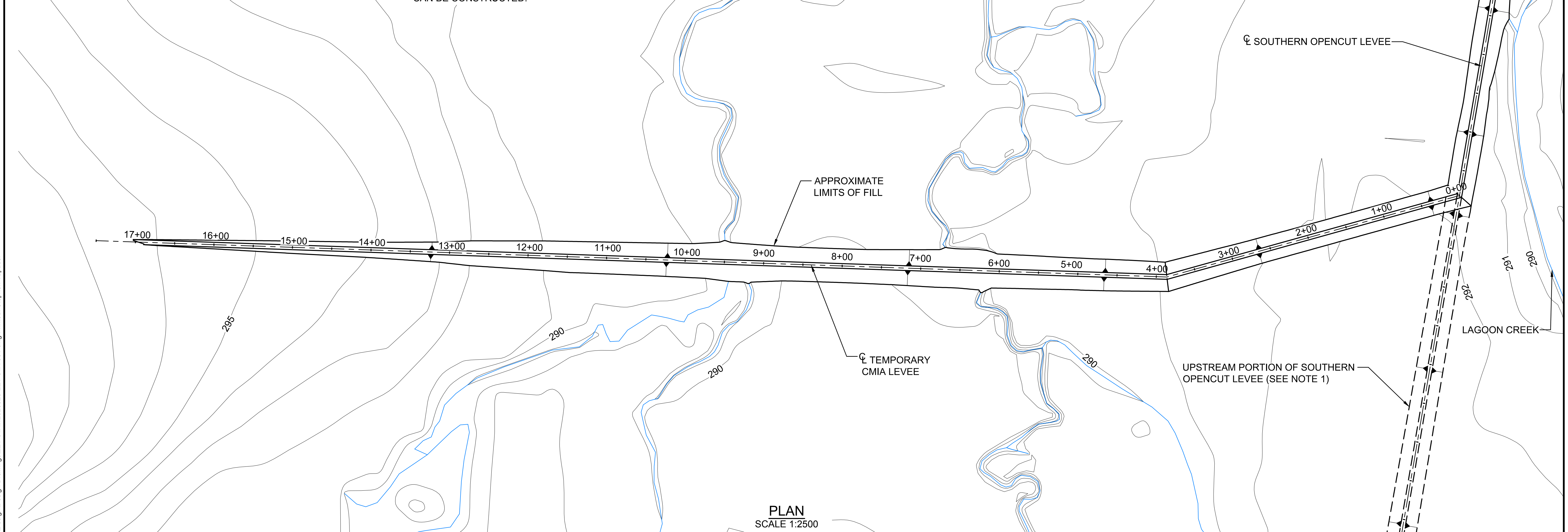
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

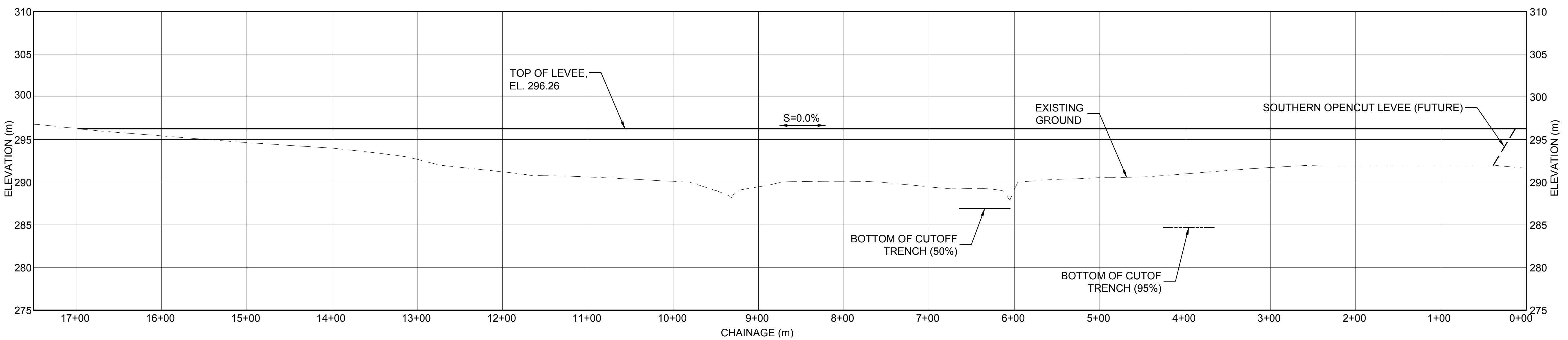
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

NOTES:

1. THE TEMPORARY CMIA LEVEE WILL BE CONSTRUCTED FIRST TO ALLOW FOR PROTECTION OF THE CMIA UNTIL THE SOUTHERN OPENCUT LEVEE CAN BE CONSTRUCTED.



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: TEMPORARY CMIA LEVEE PLAN AND PROFILE CH. 0+00 - CH. 18+00

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

Drawing: 42626920-LEV01A-001

42626920-LEV 01A-001.dwg

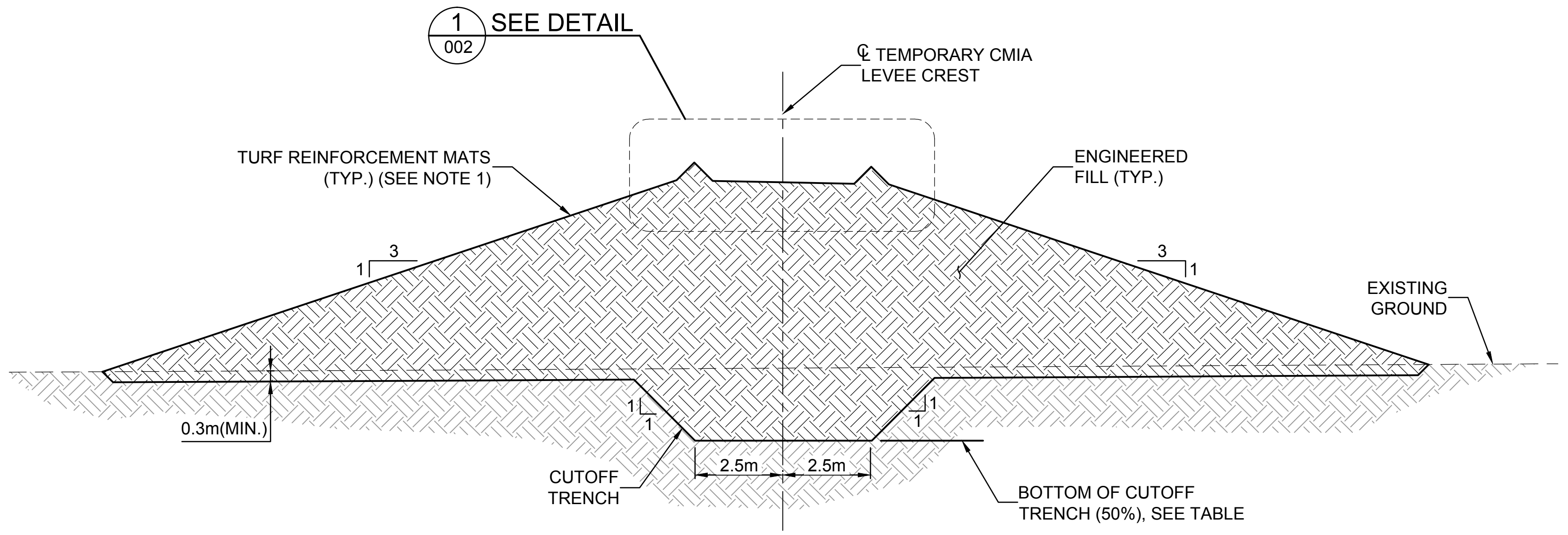
REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

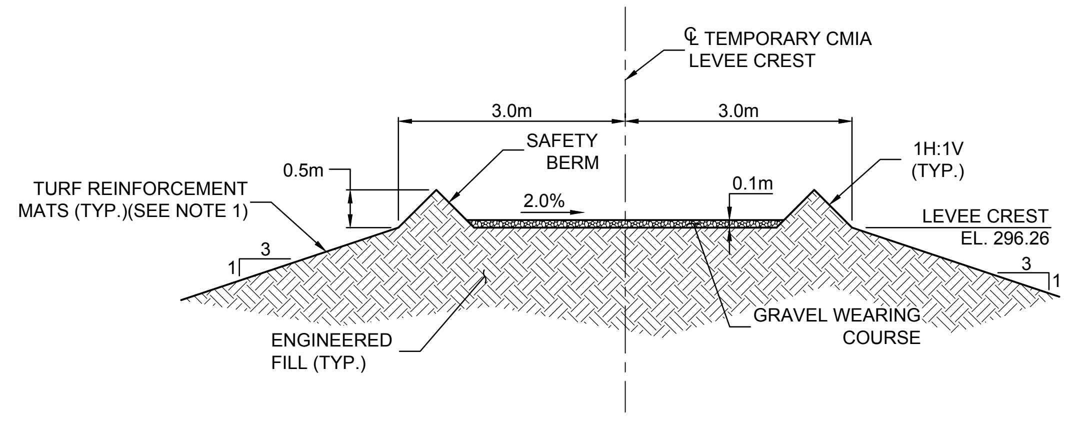
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

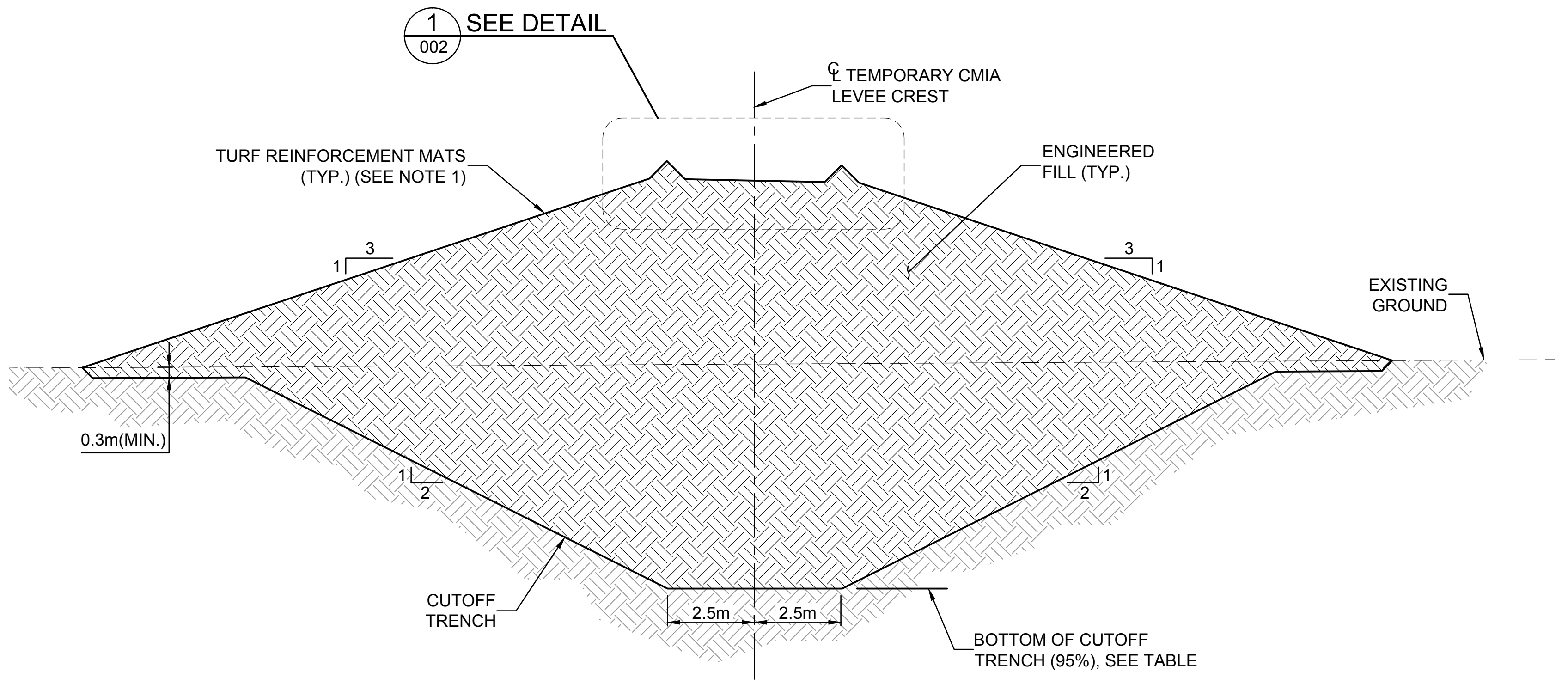
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



TYPICAL LEVEE SECTION
(50% CONFIDENCE LEVEL)
SCALE 1:100



TYPICAL LEVEE CREST DETAIL 1/002
SCALE 1:50



TYPICAL LEVEE SECTION
(95% CONFIDENCE LEVEL)
SCALE 1:100

TEMPORARY CMIA LEVEE
CUTOFF TRENCH DEPTH TABLE

CHAINAGE	ELEV. (m) (50%)	ELEV. (m) (95%)
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0

NOTES:

1. TURF REINFORCEMENT MATS ARE TO BE PLACED ON ALL EXPOSED EMBANKMENT SURFACES.
2. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

1 0 1 2 3 4 5 — 1:50 (A1)
DIMENSIONS ARE IN METRES

2 0 2 4 6 8 10 — 1:100 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: TEMPORARY CMIA LEVEE
LEVEE SECTIONS AND DETAILS

Datum: GDA94 ZONE 55
Date: 04/09/12
Status: DRAFT

URS
PROJECT MANAGER:
Designed By: CW
Date: 02/07/12
Drawn By: CW
Date: 02/07/12
Checked By: -
Date: -
Approved By: -
Date: -
Drawing: 42626920-LEV01A-002
42626920-LEV 01A-001.dwg
REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

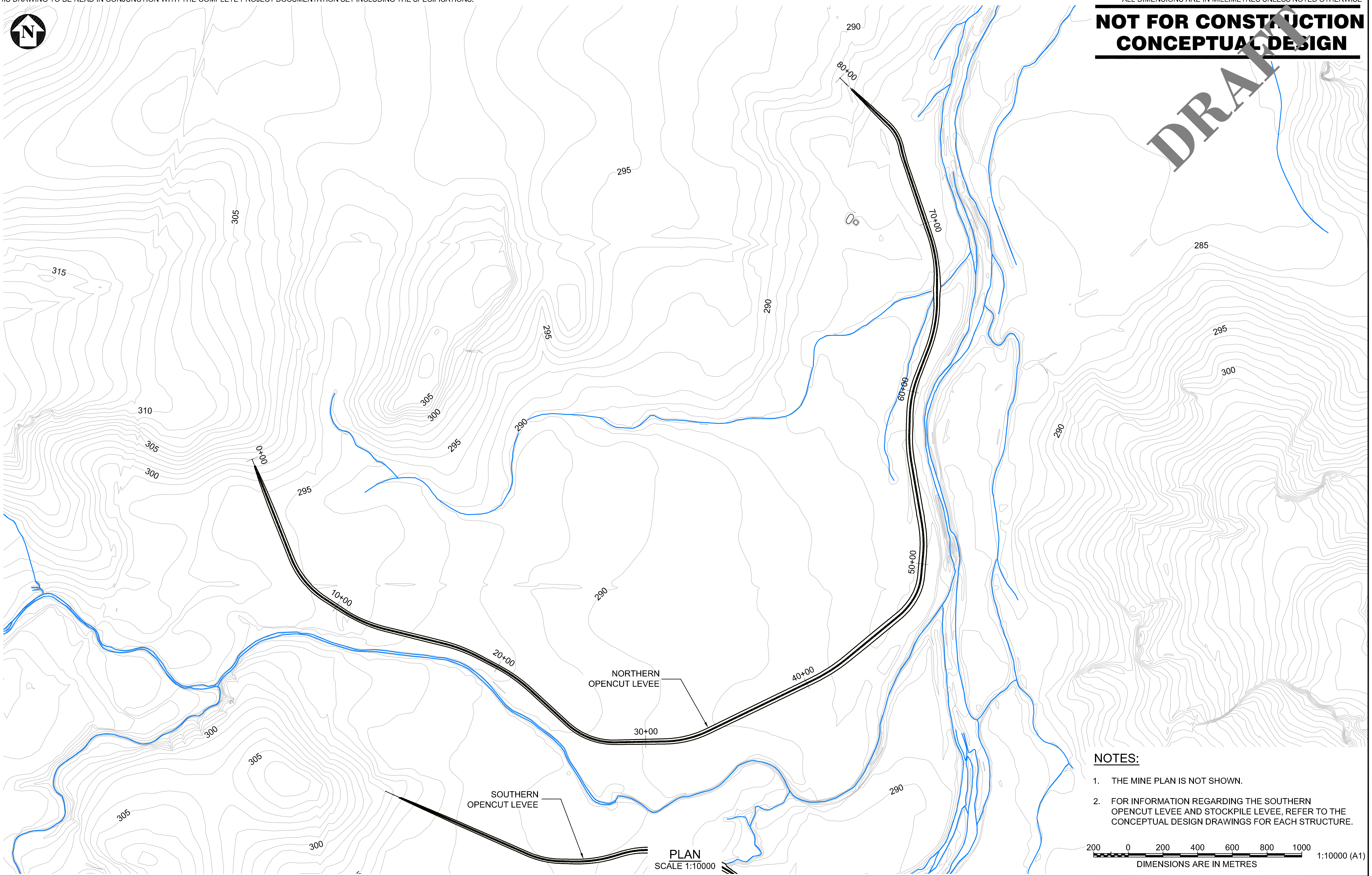
Plotted: 14/9/2012 11:58:28 AM File Name: J:\Jobs\42626920\5 Works\23 Basis Of Design - SEIS Concept\5 Works\Design\Design Drawings\LEV 01A\42626920-LEV 01A-001.dwg Printed: Stephen Tapuosi

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:10000

NOTES:

1. THE MINE PLAN IS NOT SHOWN.
2. FOR INFORMATION REGARDING THE SOUTHERN OPENCUT LEVEE AND STOCKPILE LEVEE, REFER TO THE CONCEPTUAL DESIGN DRAWINGS FOR EACH STRUCTURE.

200 0 200 400 600 800 1000 — 1:10000 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-LEV02-001
42626954-LEV 02-001.dwg
REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

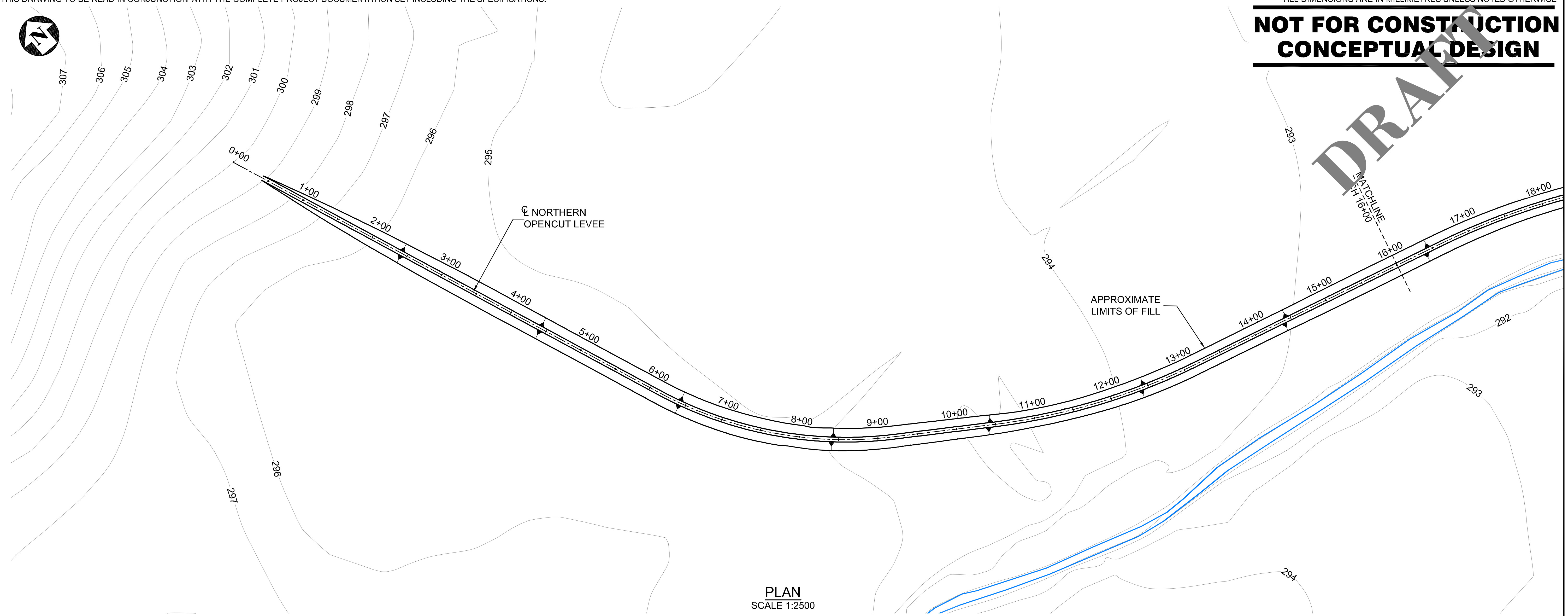
Plotted: 29/6/2012 4:30:53 PM File Name: U:\JOBS\42626954\HANCOCK - (Kevin's Corner WMEP)\10.Reports\02. (Conceptual Design Drawings)\LEV 02 (NOCL)\42626954-LEV 02-001.dwg Printed: Craig Wiltshire

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

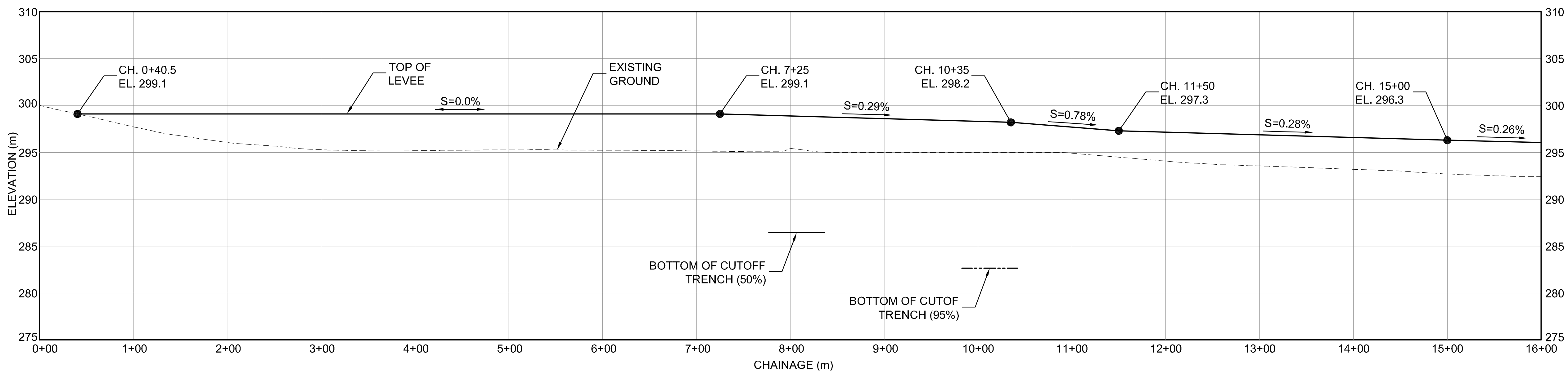
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 0+00 - CH. 16+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW
Date: 02/07/12

Drawn By: CW
Date: 02/07/12

Checked By: -
Date: -

Approved By: -
Date: -

Drawing: 42626954-LEV02-002

42626954-LEV 02-002.dwg

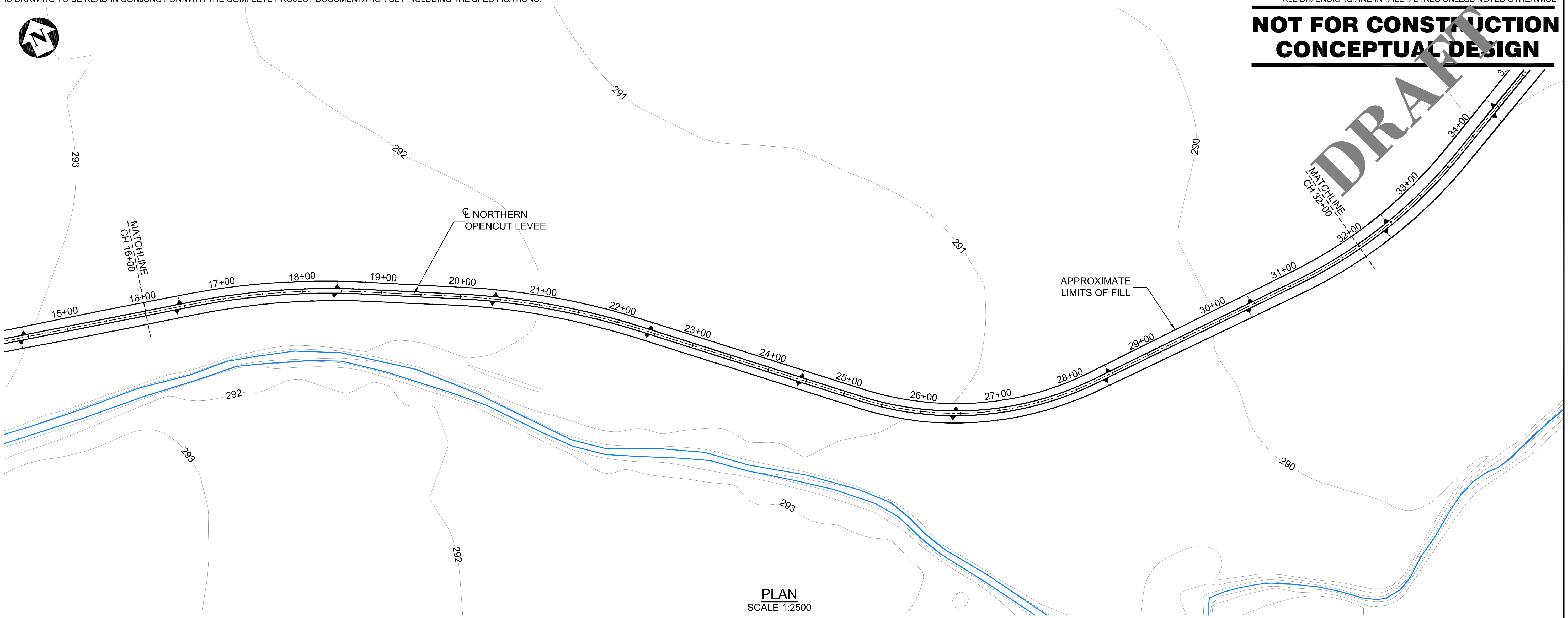
REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

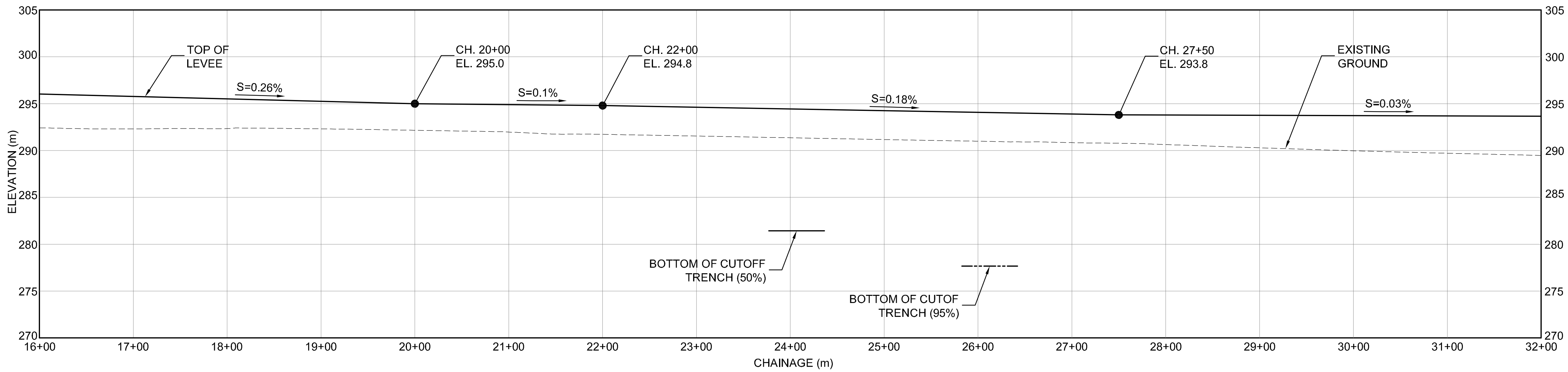
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 16+00 - CH. 32+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV02-003

42626954-LEV 02-002.dwg

REV. A

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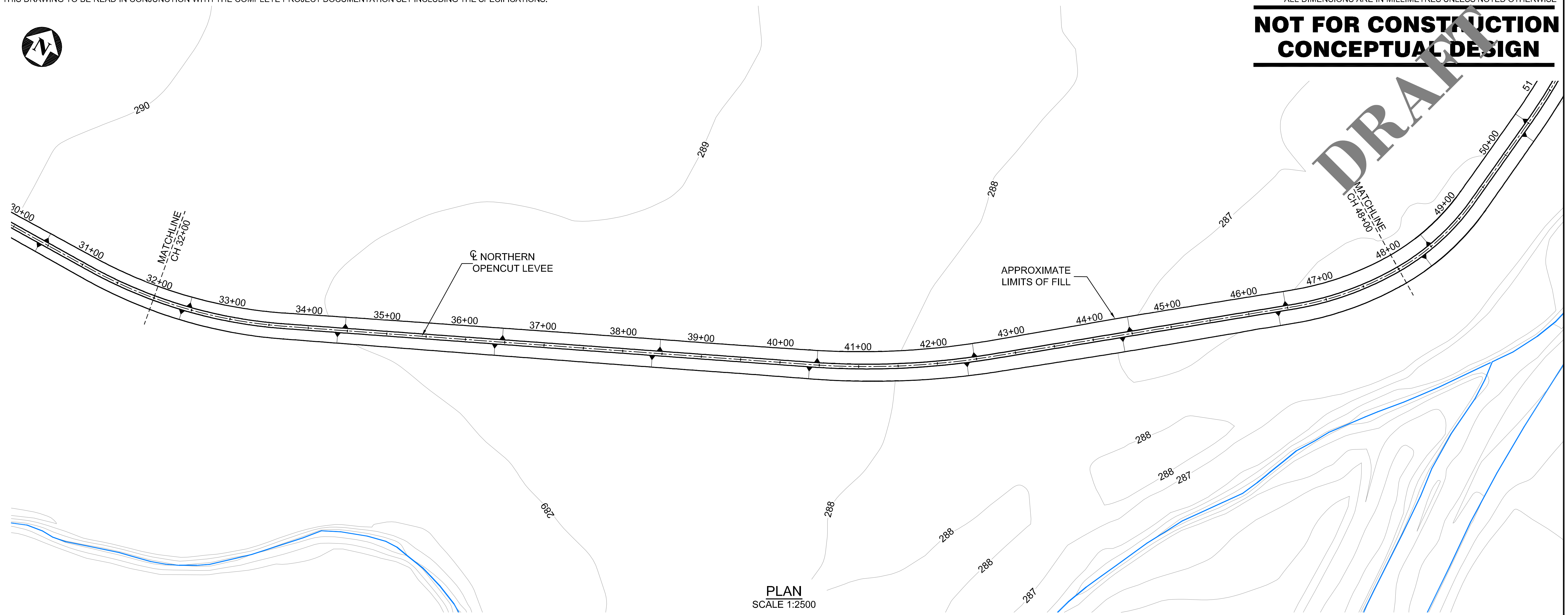
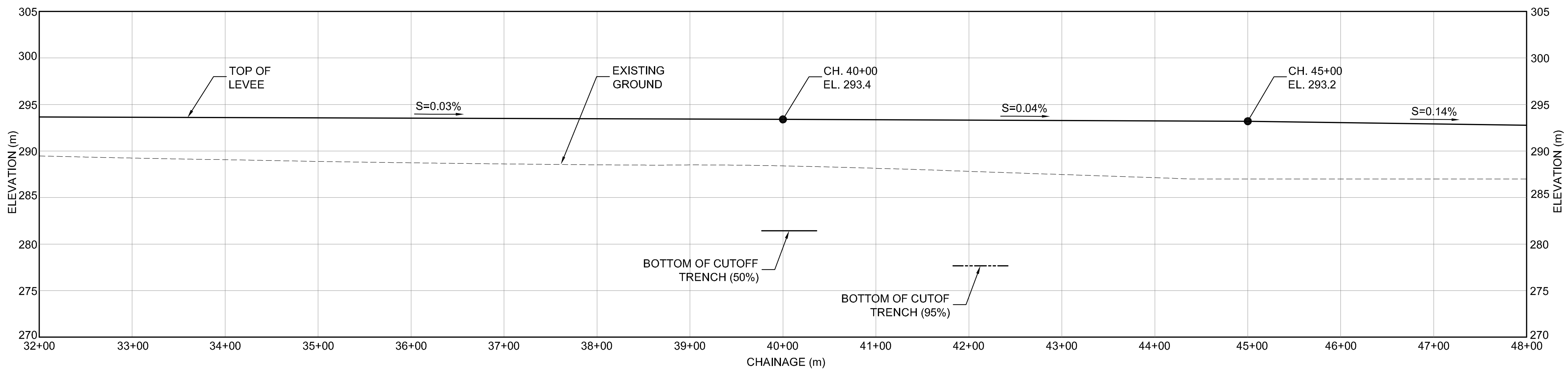
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE
PLAN AND PROFILE
CH. 32+00 - CH. 48+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-LEV02-004

42626954-LEV 02-002.dwg

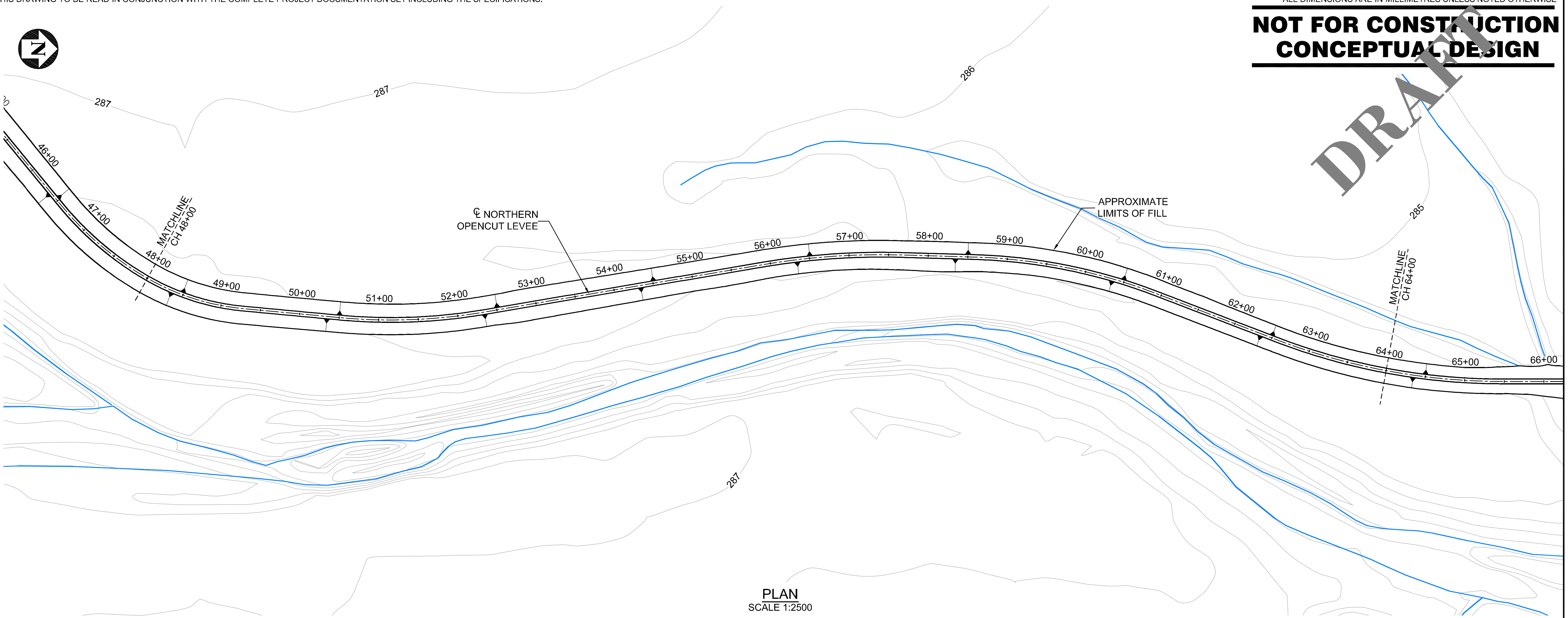
REV. A

Plotted: 26/6/2012 1:54:40 PM File Name: U:\JOBS\42626954\HANCOCK - (Kevin's Corner WMEP)\10.Reports\02. (Conceptual Design Drawings)\LEV 02 (NOC)\42626954-LEV 02-002.dwg Printed: Ben Higgins

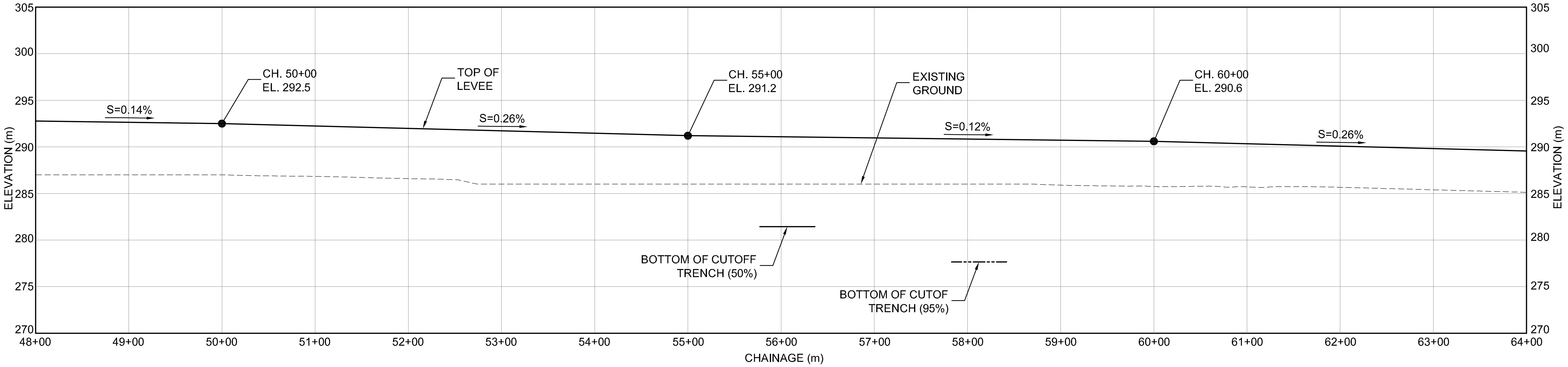
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE PLAN AND PROFILE CH. 48+00 - 64+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-LEV02-005
42626954-LEV 02-002.dwg
REV. A

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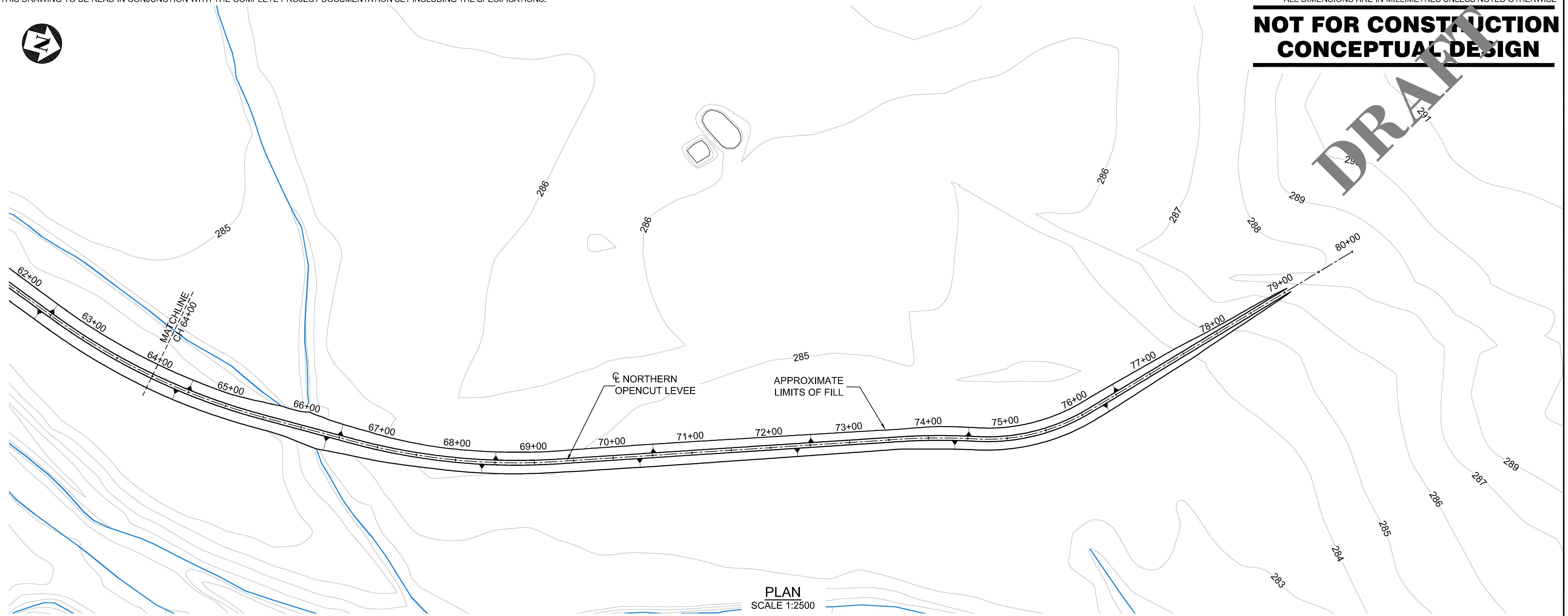
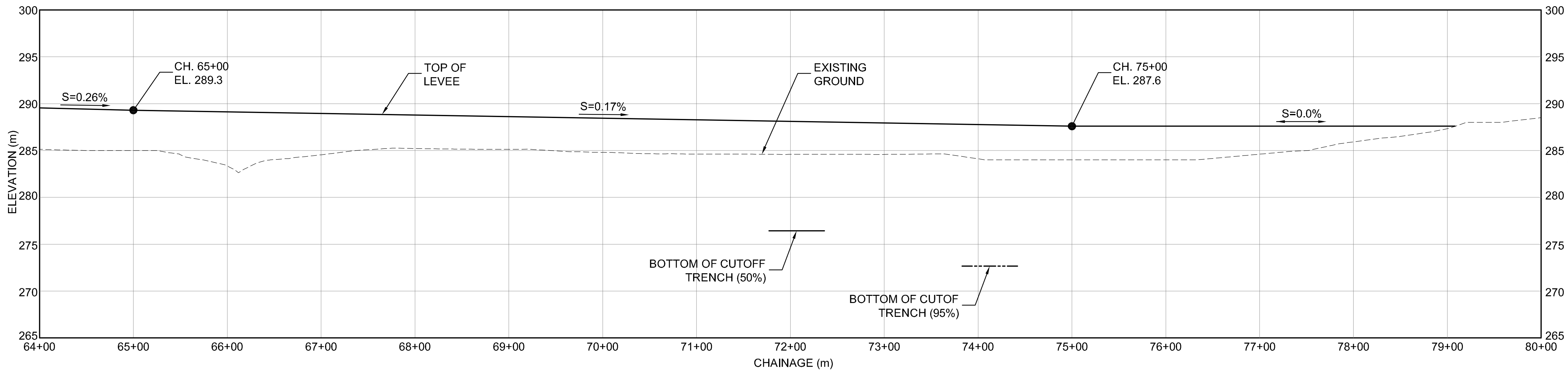
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE
PLAN AND PROFILE
CH. 64+00 - CH. 80+00

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV02-006

42626954-LEV 02-002.dwg

REV. A

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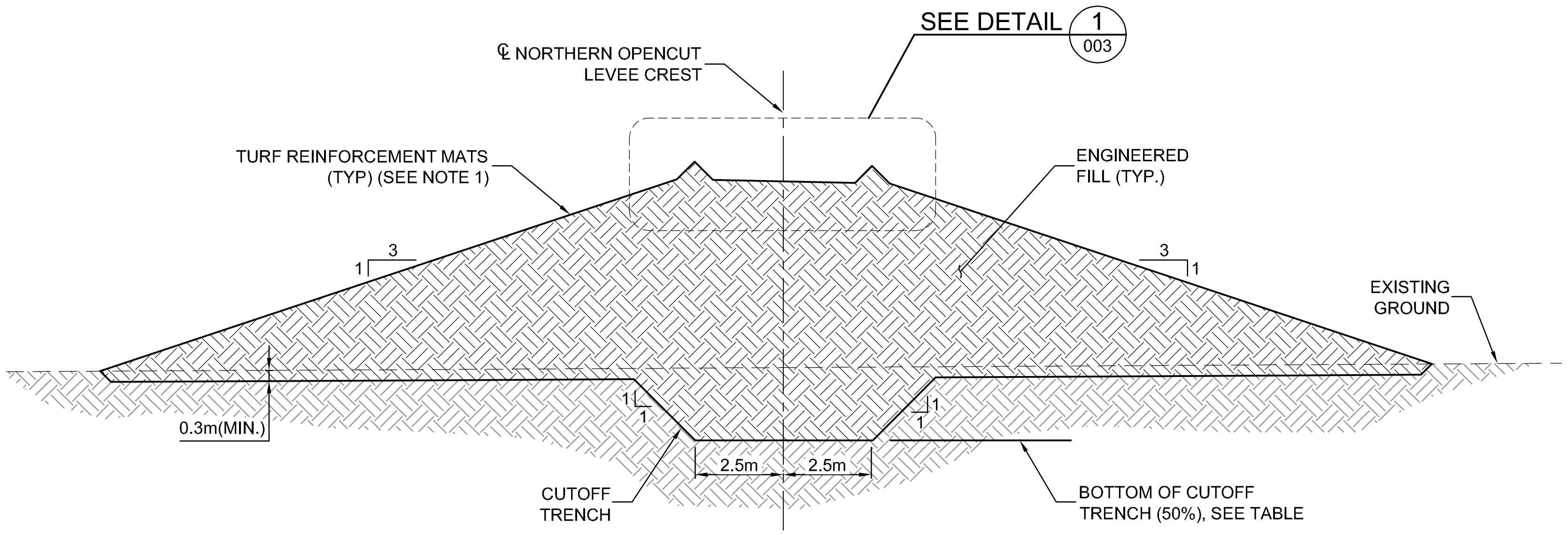
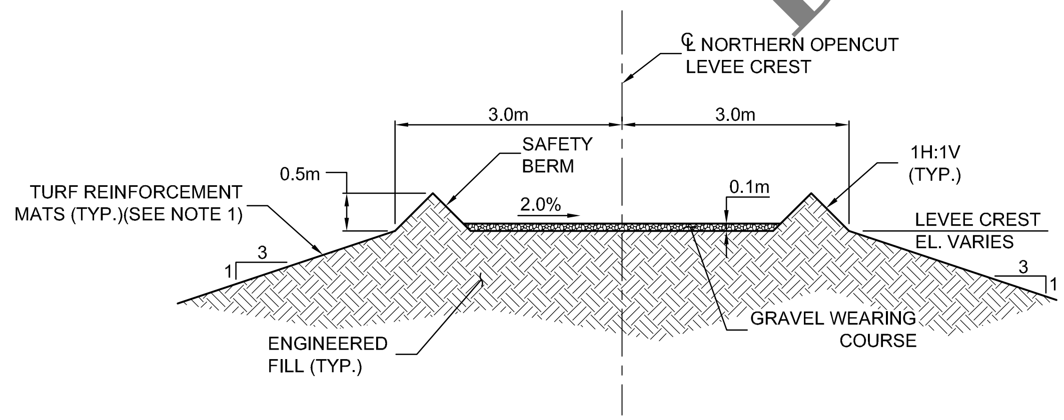
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

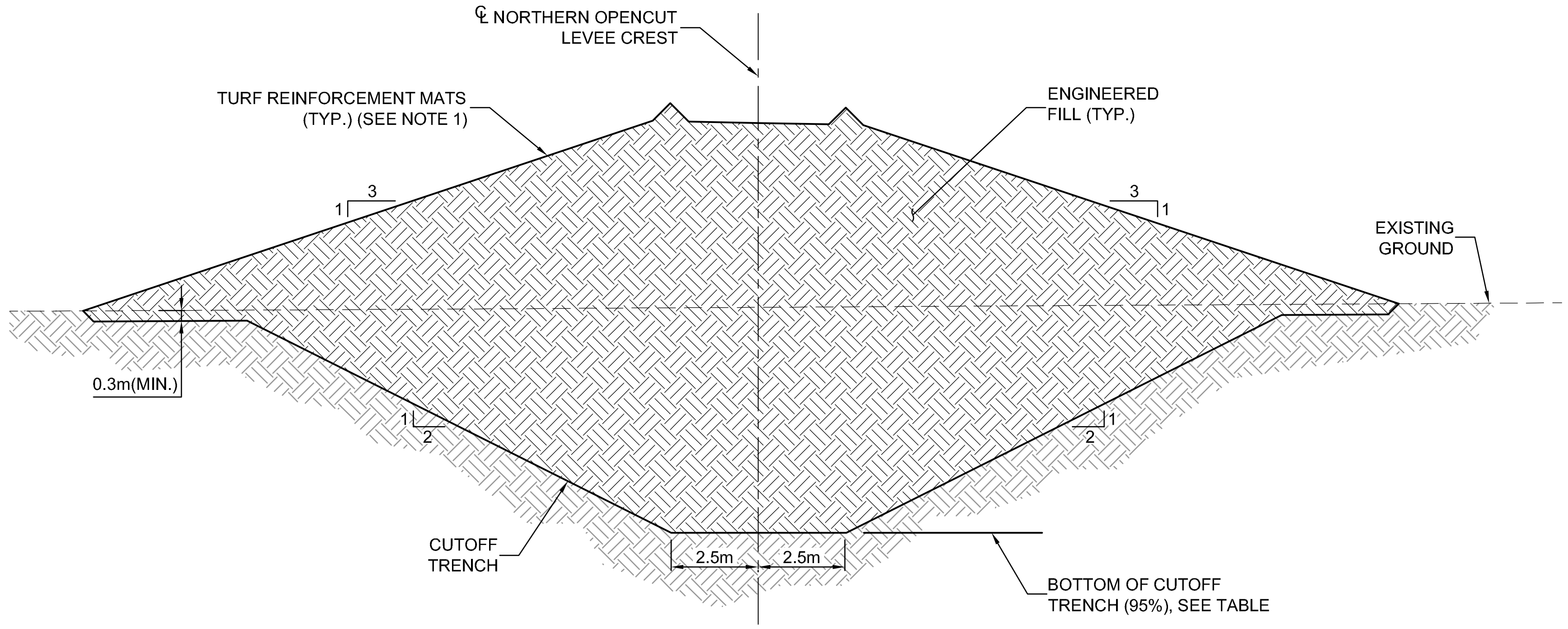
DRAFT



TYPICAL LEVEE SECTION
(50% CONFIDENCE LEVEL)
SCALE 1:100



TYPICAL LEVEE CREST DETAIL 1 011
SCALE 1:50



TYPICAL LEVEE SECTION
(95% CONFIDENCE LEVEL)
SCALE 1:100

NORTHERN OPENCUT LEVEE
CUTOFF TRENCH DEPTH TABLE

CHAINAGE	ELEV. (m) (50%)	ELEV. (m) (95%)
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0

NOTES:

1. ALL EMBANKMENT FACES SHALL BE SEEDED AND COVERED WITH TURF REINFORCEMENT MATS (TRMS).

1 0 1 2 3 4 5 1:50 (A1)
DIMENSIONS ARE IN METRES
2 0 2 4 6 8 10 1:100 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: NORTHERN OPENCUT LEVEE
TYPICAL SECTIONS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-LEV02-007
42626954-LEV 02-002.dwg
REV. A

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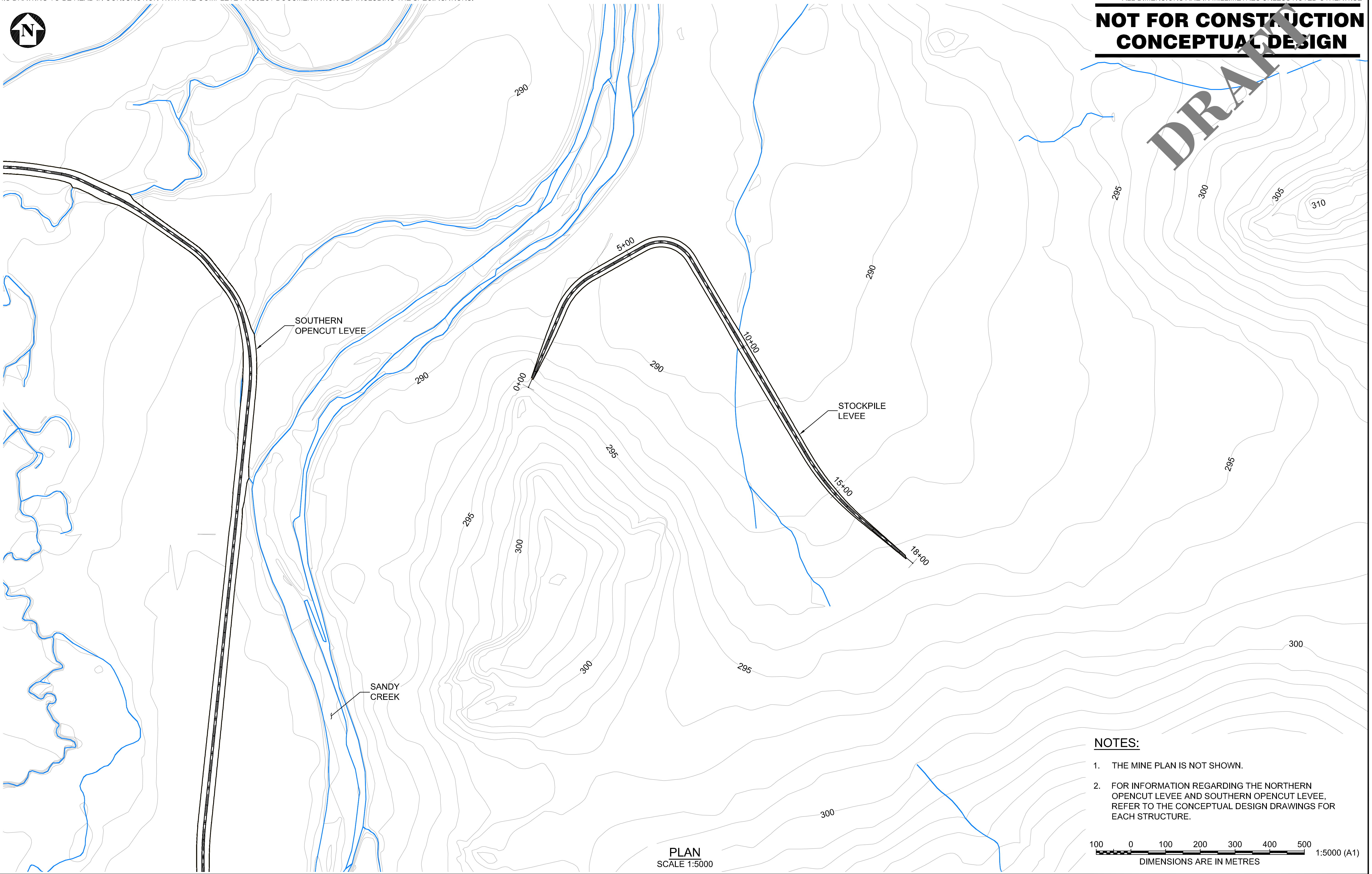
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



NOTES:

1. THE MINE PLAN IS NOT SHOWN.
2. FOR INFORMATION REGARDING THE NORTHERN OPENCUT LEVEE AND SOUTHERN OPENCUT LEVEE, REFER TO THE CONCEPTUAL DESIGN DRAWINGS FOR EACH STRUCTURE.

100 0 100 200 300 400 500 1:5000 (A1)
DIMENSIONS ARE IN METRES

PLAN
SCALE 1:5000

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: STOCKPILE LEVEE GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-LEV03-001

42626954-LEV 03-001.dwg

REV. A

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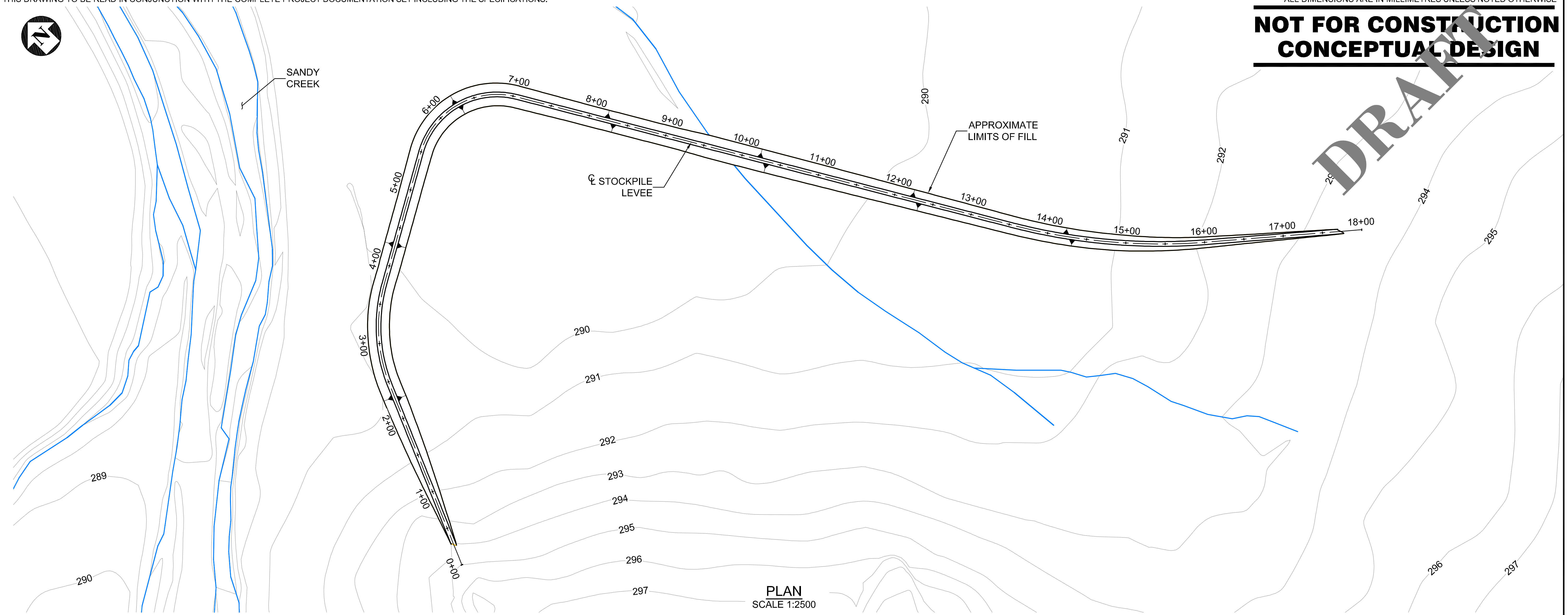
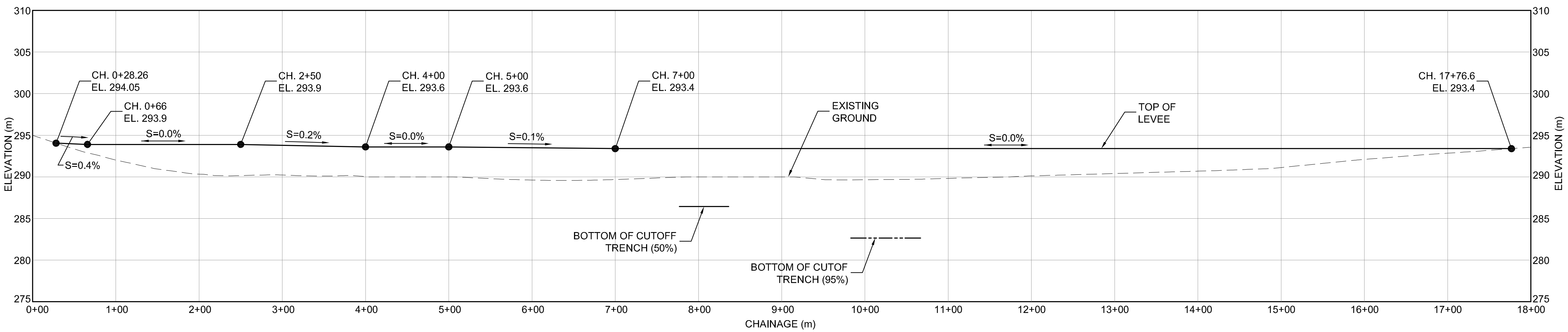
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: STOCKPILE LEVEE PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Drawn By: CW Checked By: - Approved By: -

Drawing: 42626954-LEV03-002

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Date: 02/07/12 Date: 02/07/12 Date: - Date: -

42626954-LEV 03-002.dwg REV. A

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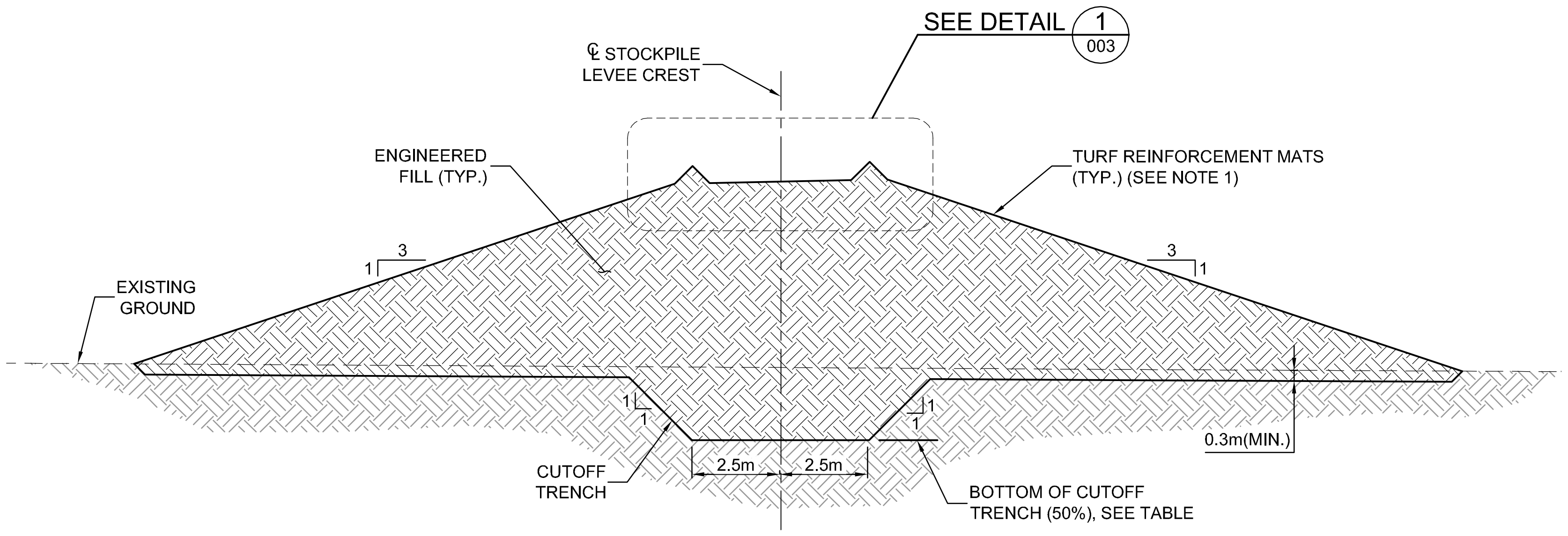
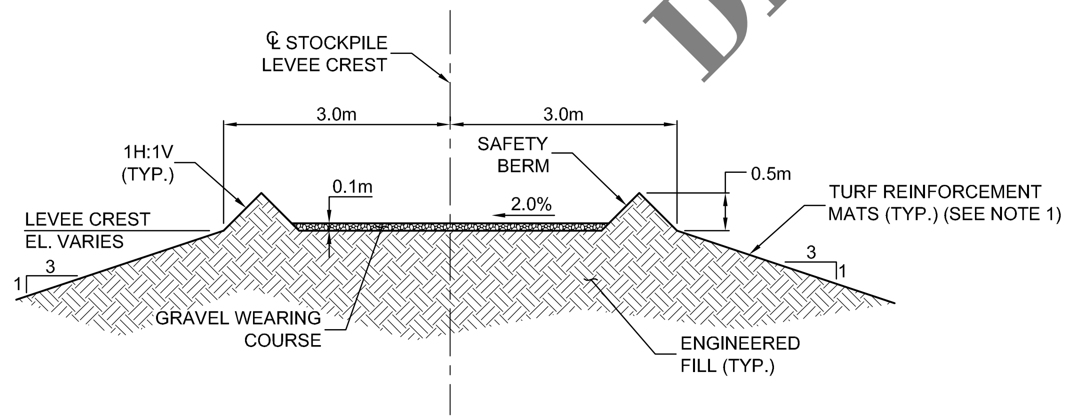
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

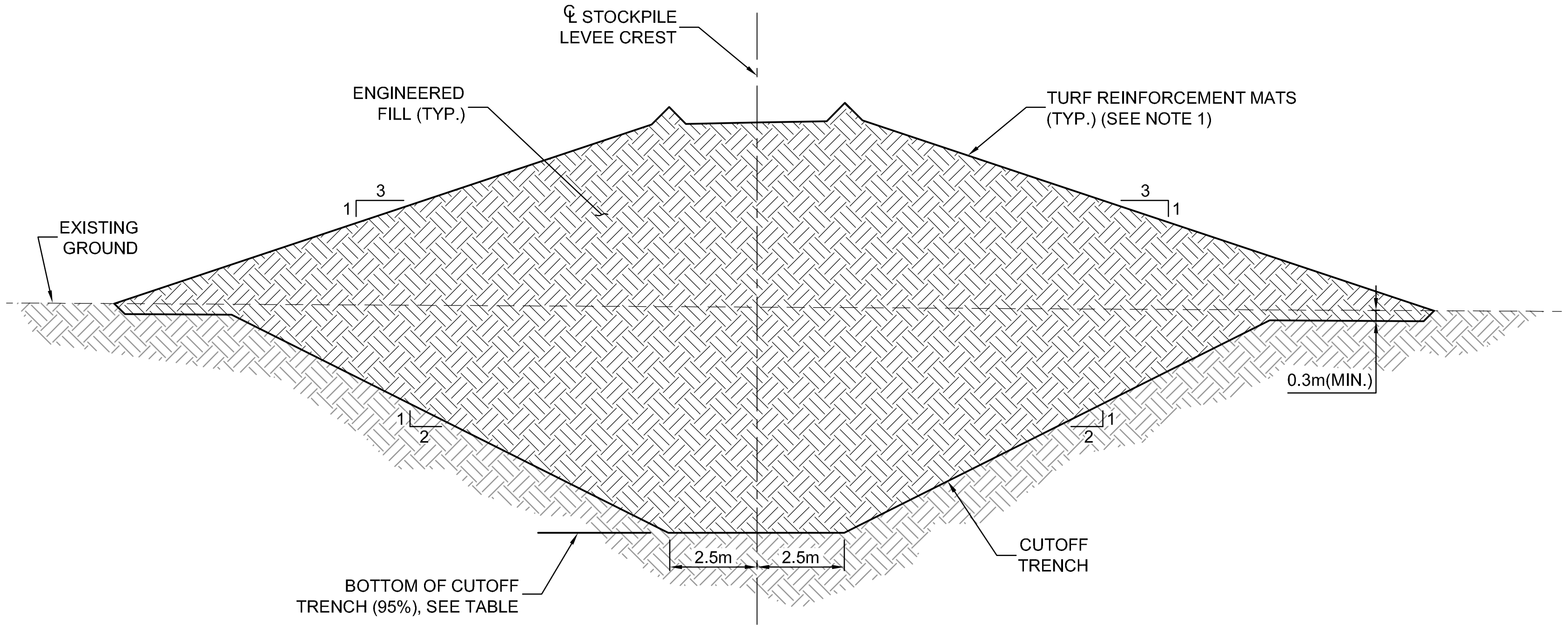
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



TYPICAL LEVEE SECTION
(50% CONFIDENCE LEVEL)
SCALE 1:100



TYPICAL LEVEE CREST DETAIL 1 003
SCALE 1:50



TYPICAL LEVEE SECTION
(95% CONFIDENCE LEVEL)
SCALE 1:100

STOCKPILE LEVEE
CUTOFF TRENCH DEPTH TABLE

CHAINAGE	ELEV. (m) (50%)	ELEV. (m) (95%)
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0
X+XX	000.0	000.0

NOTES:

1. TURF REINFORCEMENT MATS ARE TO BE PLACED ON ALL EXPOSED EMBANKMENT SURFACES.

1 0 1 2 3 4 5 1:50 (A1)
DIMENSIONS ARE IN METRES

2 0 2 4 6 8 10 1:100 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: STOCKPILE LEVEE TYPICAL SECTIONS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-LEV03-003
42626954-LEV 03-002.dwg
REV. A

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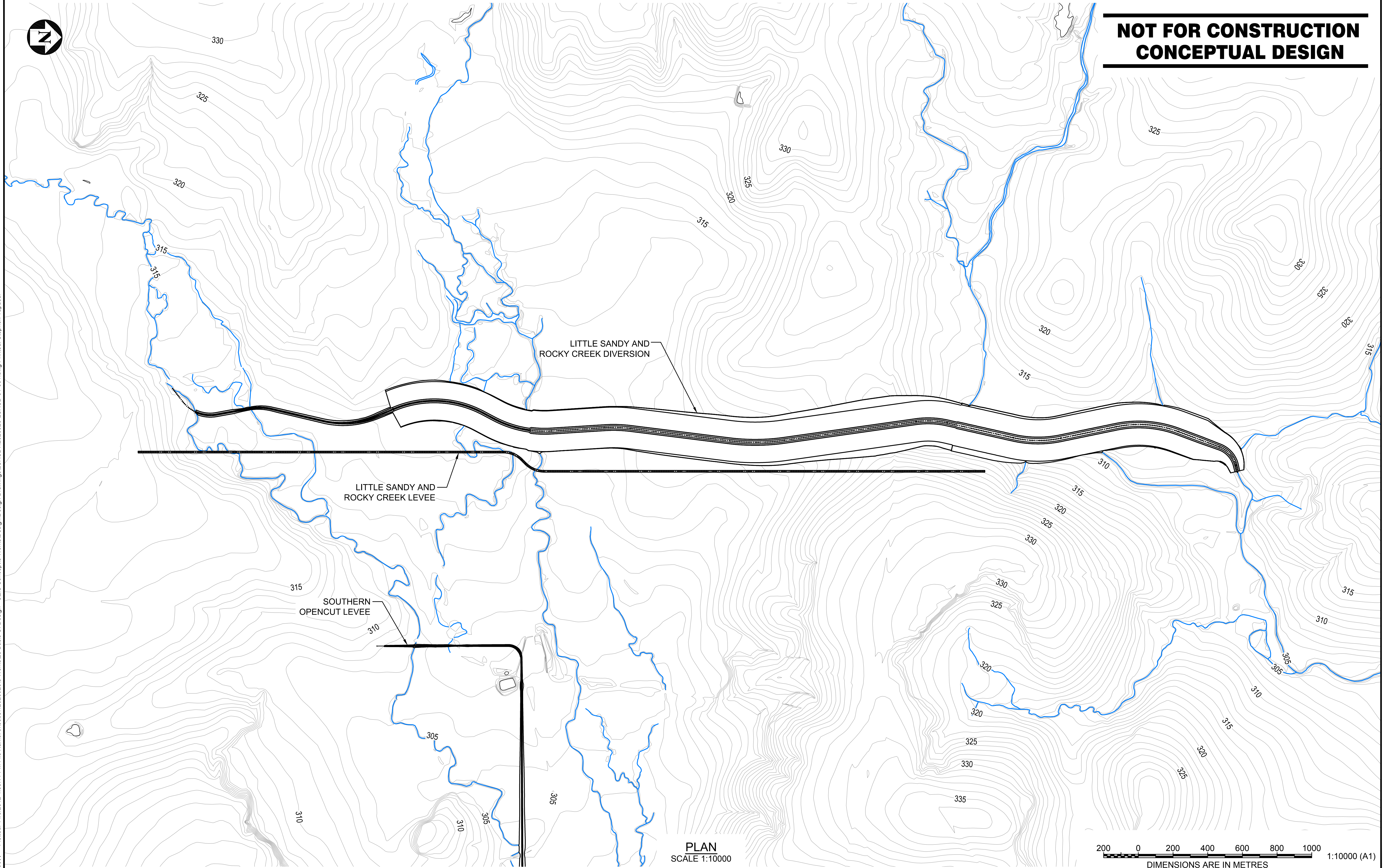
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



PLAN
SCALE 1:10000

200 0 200 400 600 800 1000
1:10000 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH			CONCEPTUAL DESIGN

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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: LITTLE SANDY &
ROCKY CREEK DIVERSION
GENERAL ARRANGEMENT

Datum: GDA94
ZONE 55

Date: 14/09/12

Status: DRAFT

URS

PROJECT MANAGER:

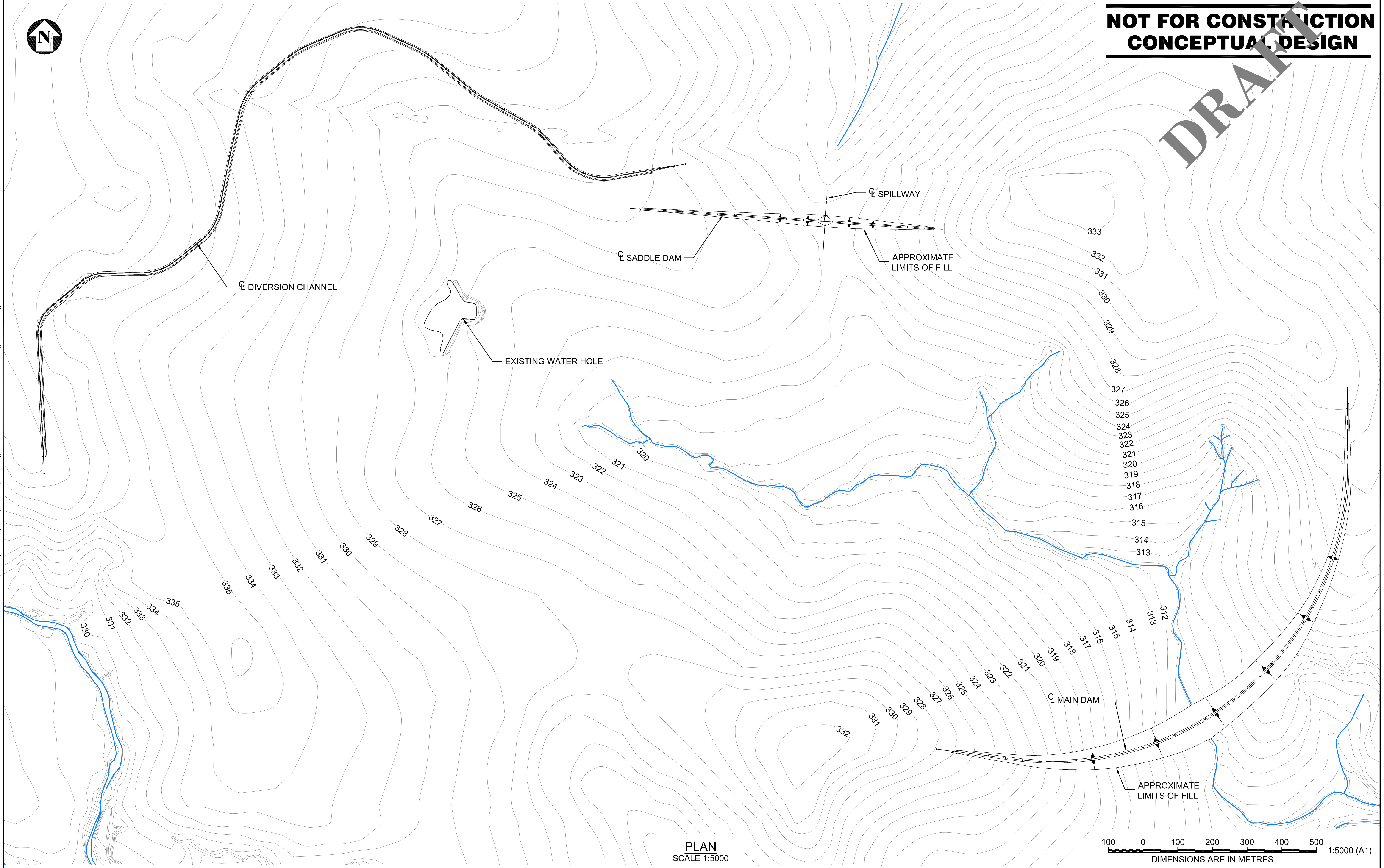
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: - Date: -
Drawn By: - Date: -
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626920-LSRCD-001
42626920-LSRCD 01-001.dwg
REV. A

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE



PLAN
SCALE 1:5000

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01 GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

Drawing: 42626954-MWD01-001

42626954-MWD 01-001.dwg

REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

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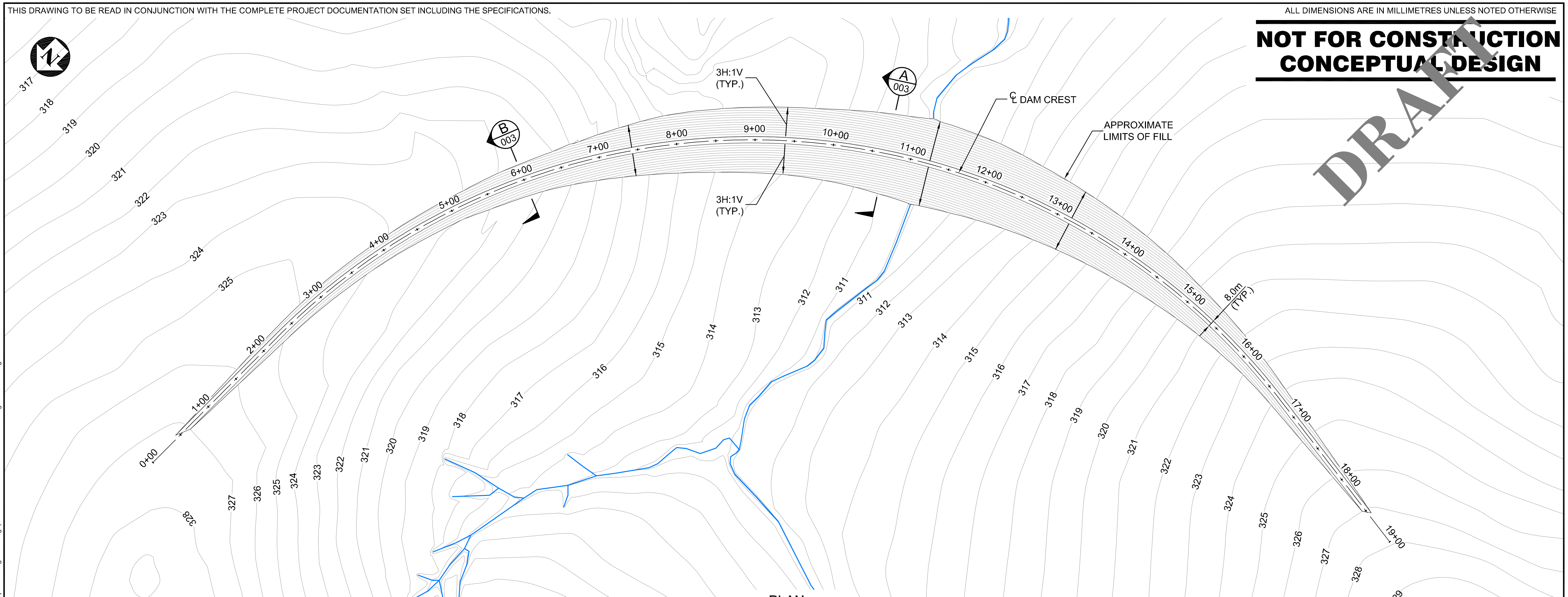
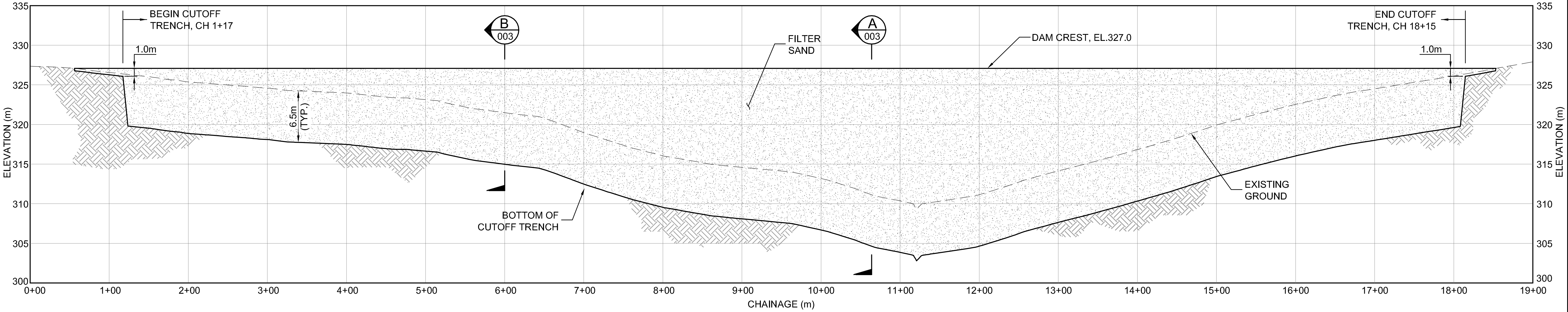
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

1:250 (A1)
DIMENSIONS ARE IN METRES

1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01
MAIN DAM
PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

Drawing: 42626954-MWD01-002

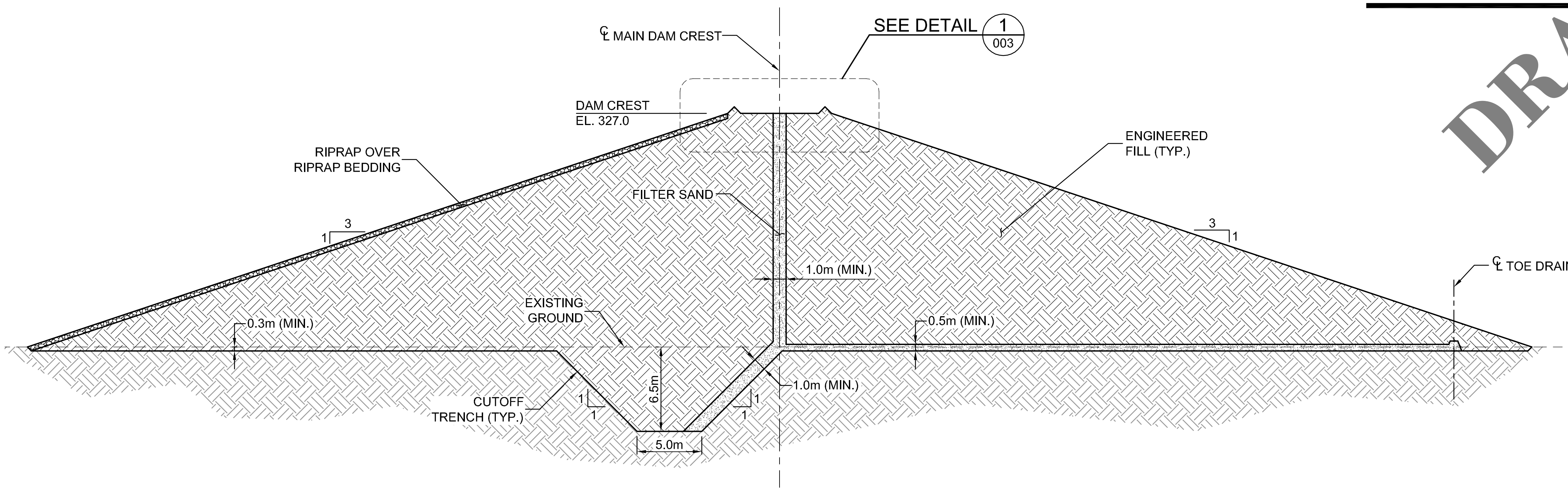
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

42626954-MWD 01-002.dwg REV. A

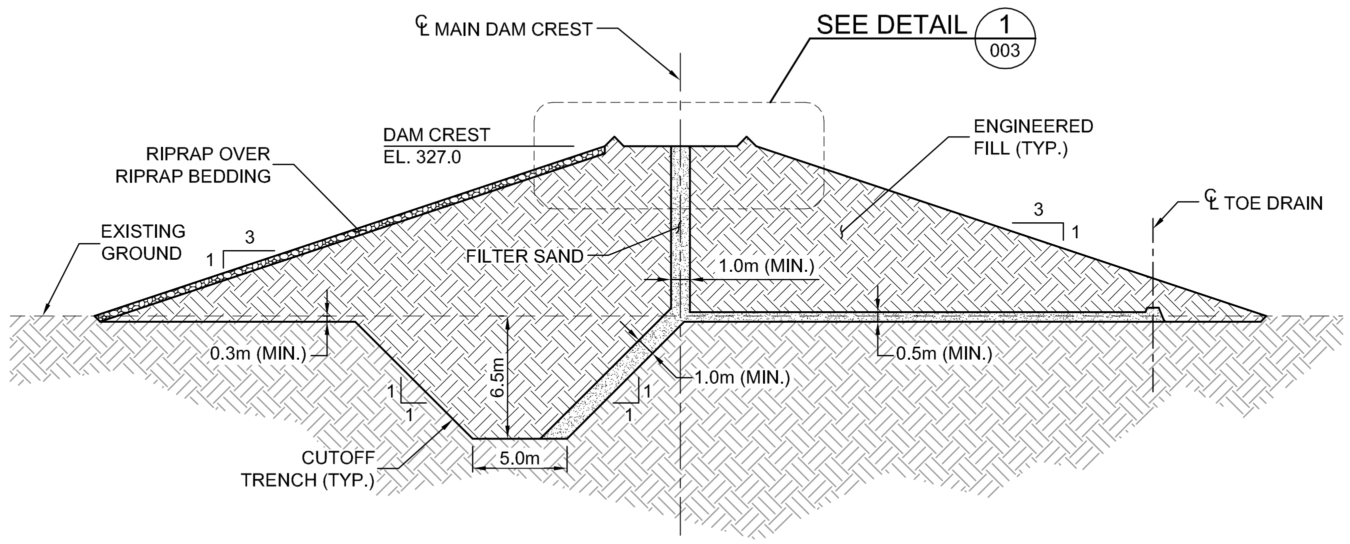
THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

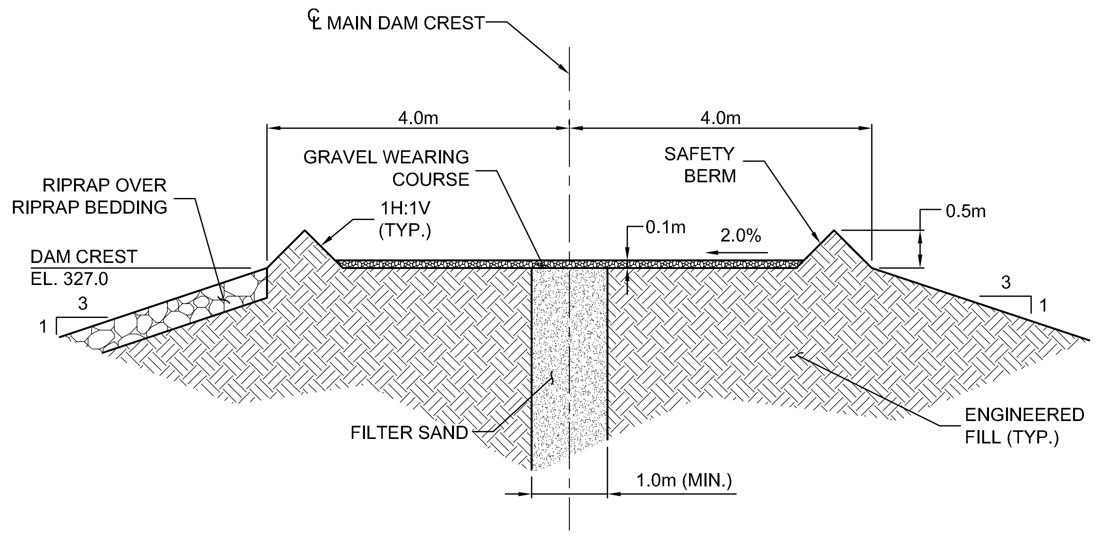
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



TYPICAL MAIN DAM EMBANKMENT SECTION A 002
SCALE 1:200



TYPICAL MAIN DAM EMBANKMENT SECTION B 002
SCALE 1:200



TYPICAL MAIN DAM CREST DETAIL 1 003
SCALE 1:50

1 0 1 2 3 4 5 1:50 (A1)
DIMENSIONS ARE IN METRES

4 0 4 8 12 16 20 1:200 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01
MAIN DAM
SECTIONS AND DETAILS

Datum: GDA94 ZONE 55
Date: 02/07/12
Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD01-003
42626954-MWD 01-002.dwg
REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

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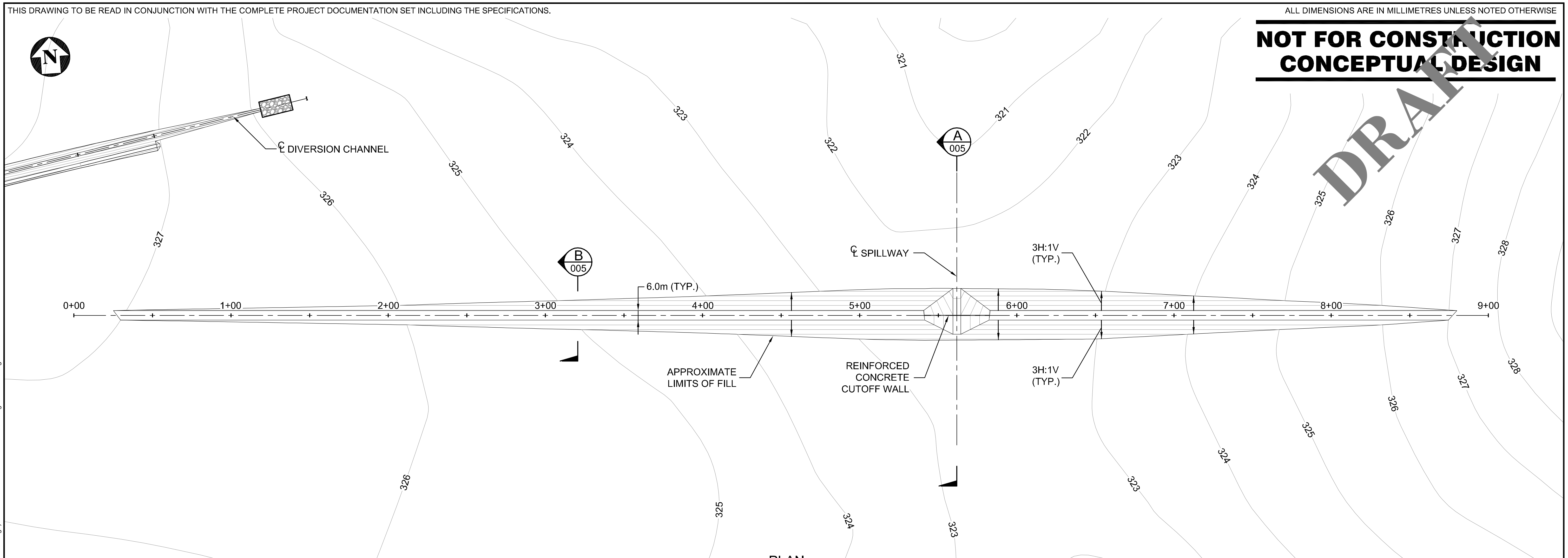
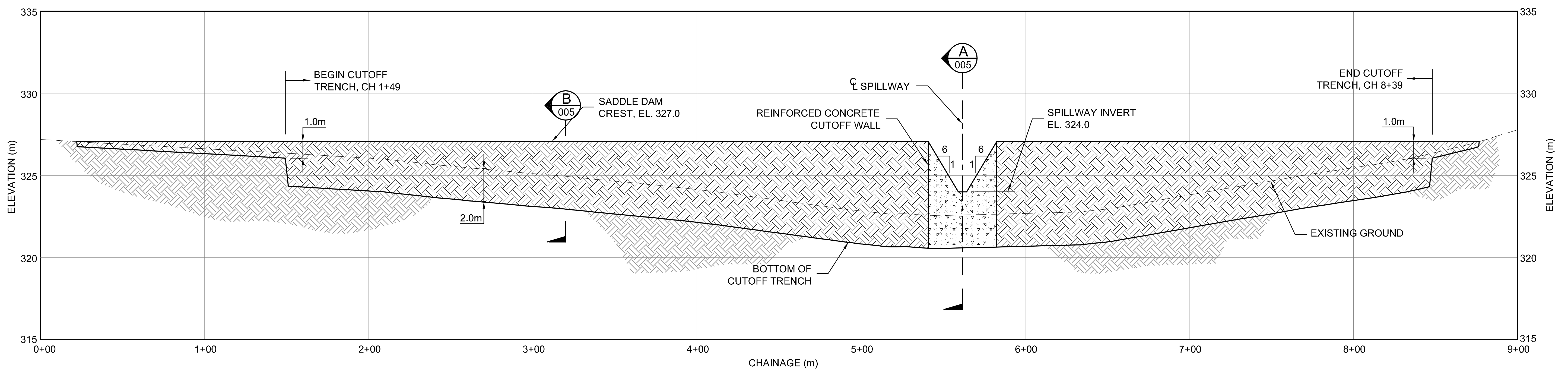
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:1250



PROFILE
HORIZONTAL SCALE 1:1250
VERTICAL SCALE 1:125

1:125 (A1) DIMENSIONS ARE IN METRES

1:1250 (A1) DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01 SADDLE DAM PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-MWD01-004

42626954-MWD 01-002.dwg

REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

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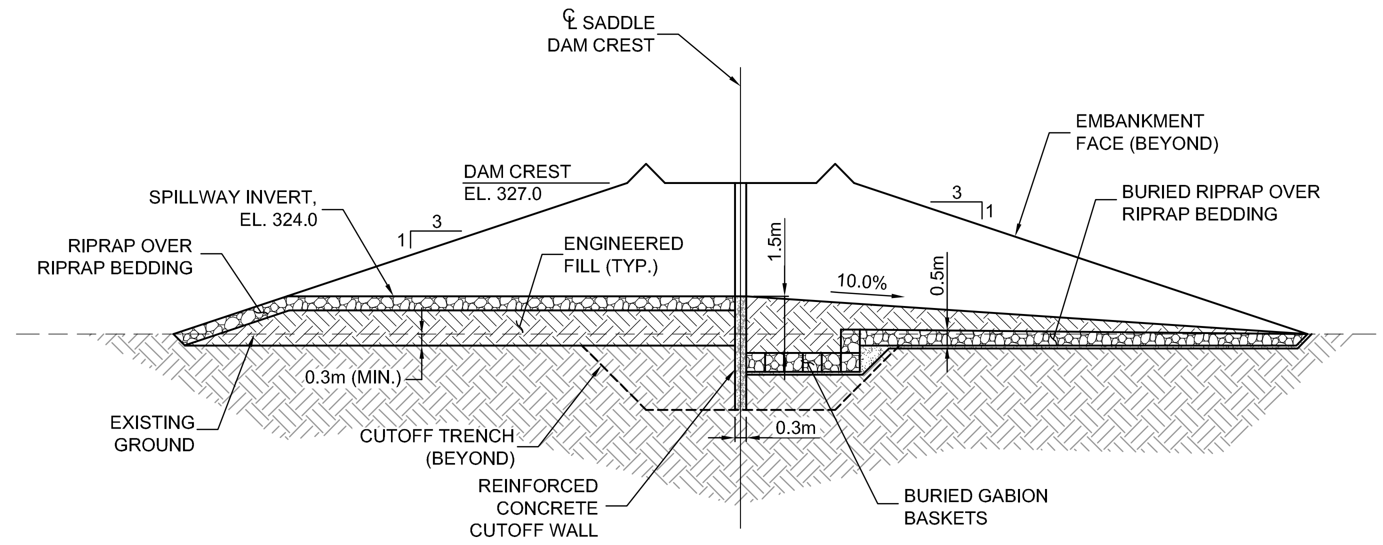
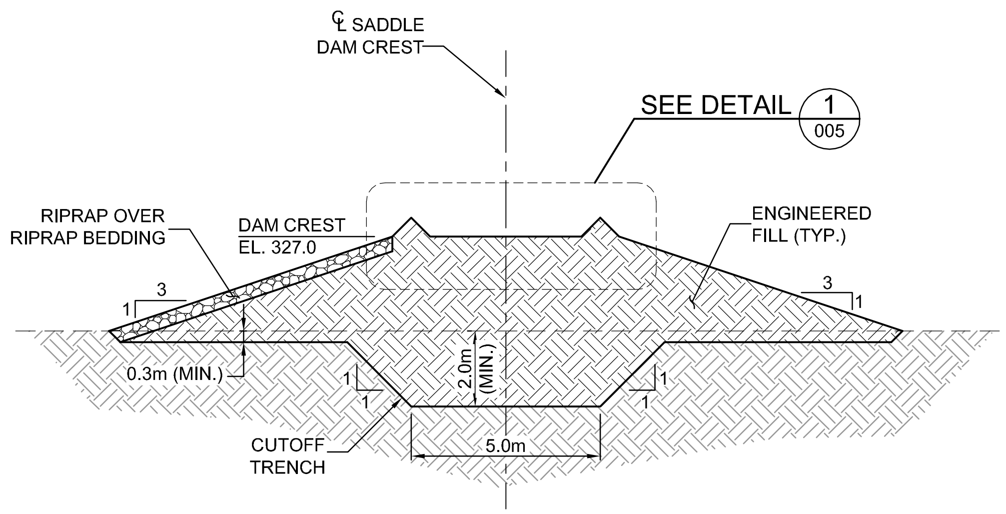
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

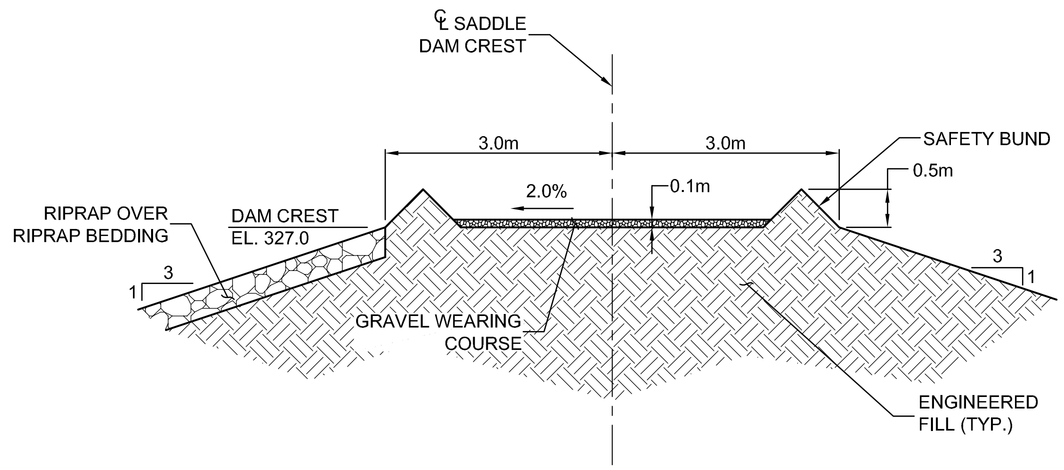
DRAFT



SADDLE DAM SPILLWAY SECTION A/004
SCALE 1:100



TYPICAL SADDLE DAM SECTION B/004
SCALE 1:100



TYPICAL SADDLE DAM CREST DETAIL 1/005
SCALE 1:50

1 0 1 2 3 4 5 — 1:50 (A1)
DIMENSIONS ARE IN METRES

2 0 2 4 6 8 10 — 1:100 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01
SADDLE DAM
SECTIONS AND DETAILS

Datum: GDA94 ZONE 55
Date: 02/07/12
Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-MWD01-005
42626954-MWD 01-002.dwg
REV. A

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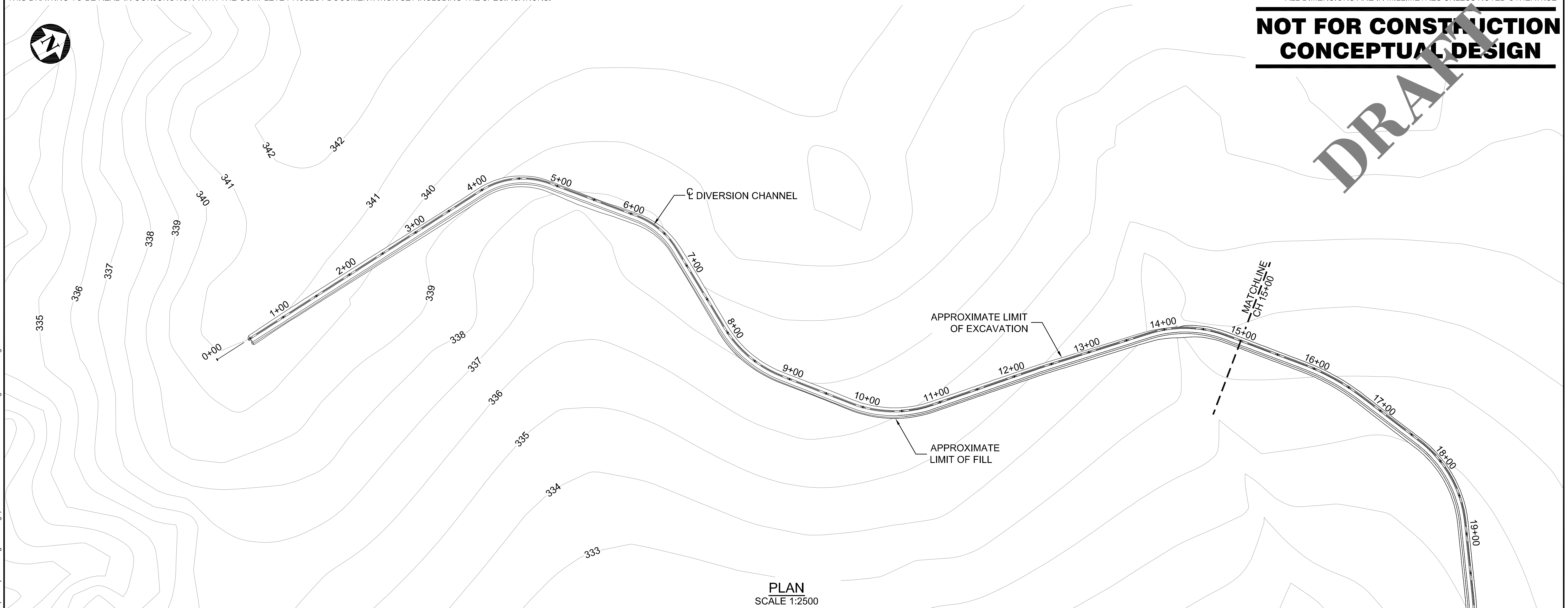
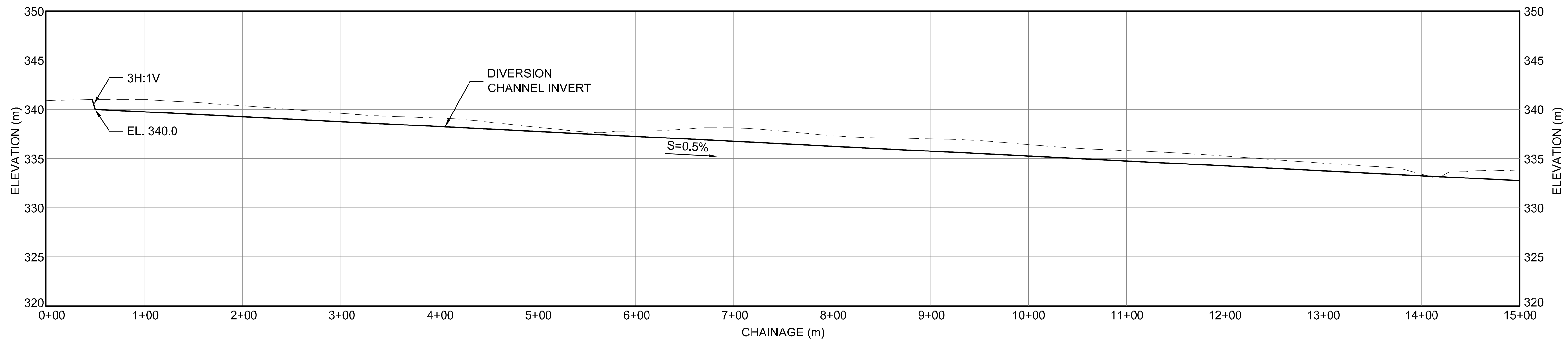
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01 DIVERSION CHANNEL PLAN AND PROFILE (1 OF 2)

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD01-006
42626954-MWD 01-002.dwg
REV. A

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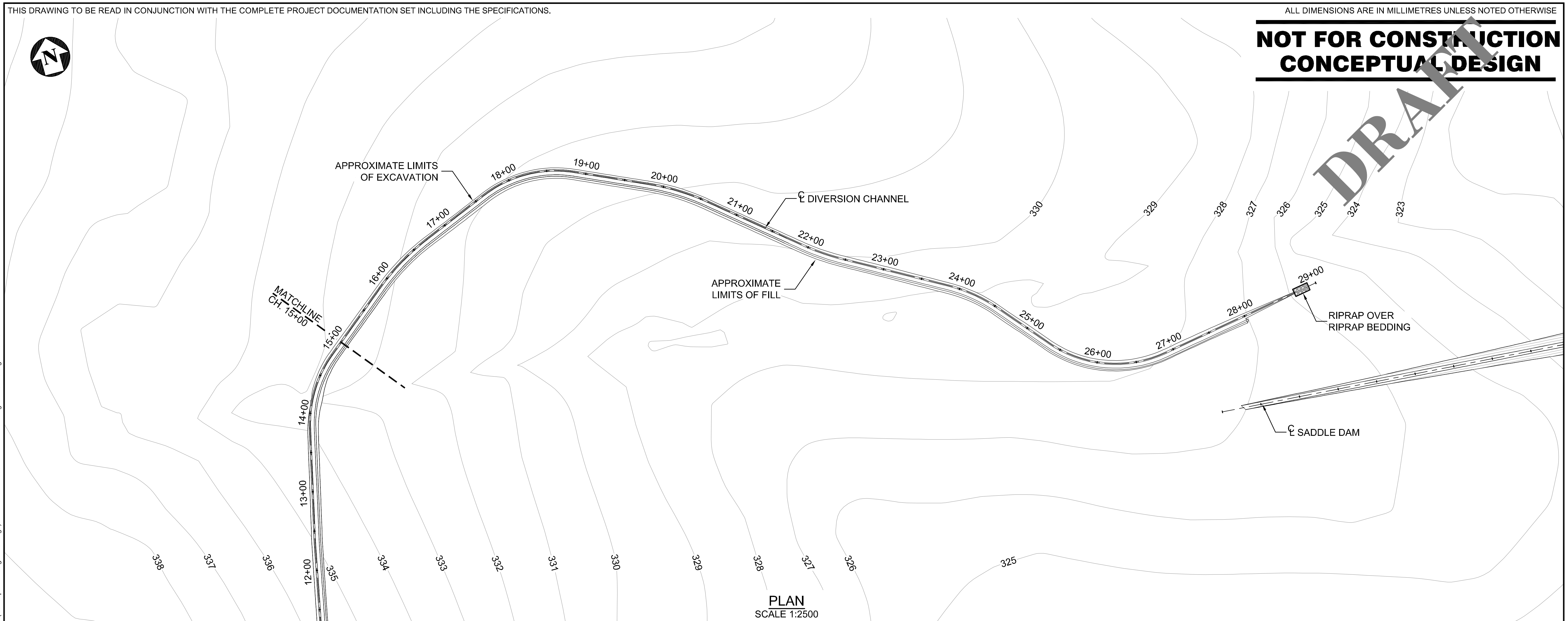
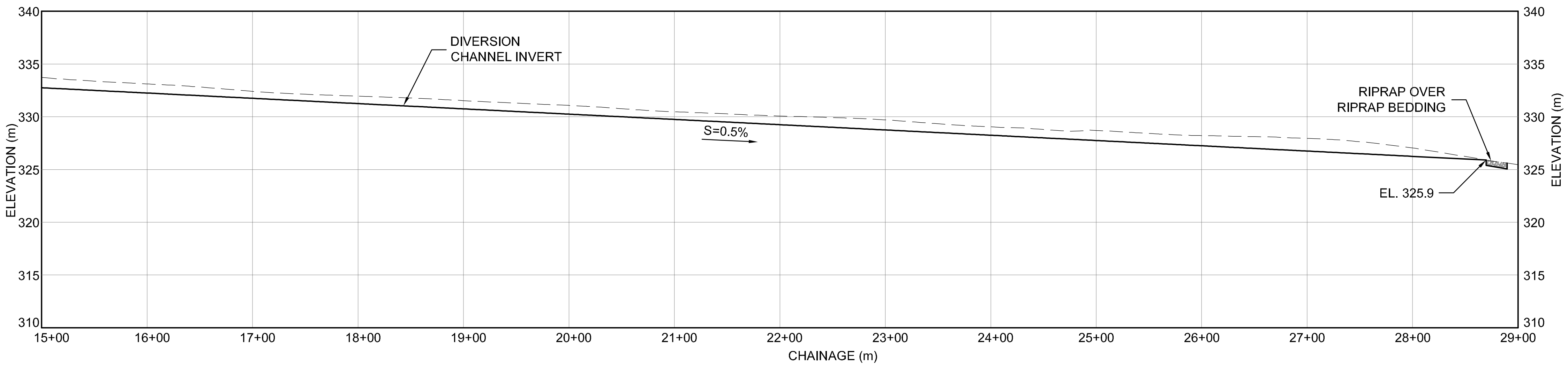
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01 DIVERSION CHANNEL PLAN AND PROFILE (2 OF 2)

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD01-007
42626954-MWD 01-002.dwg
REV. A

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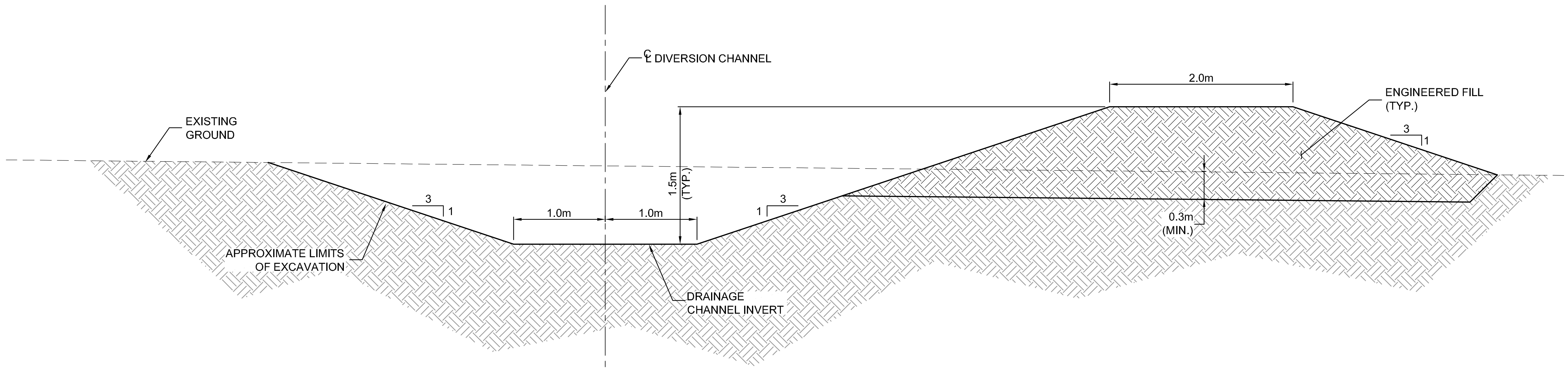
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



DIVERSION CHANNEL TYPICAL SECTION
SCALE 1:25

0.5 0 0.5 1.0 1.5 2.0 2.5 1:25 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 01
DIVERSION CHANNEL
SECTIONS AND DETAILS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD01-008
42626954-MWD 01-002.dwg REV. A

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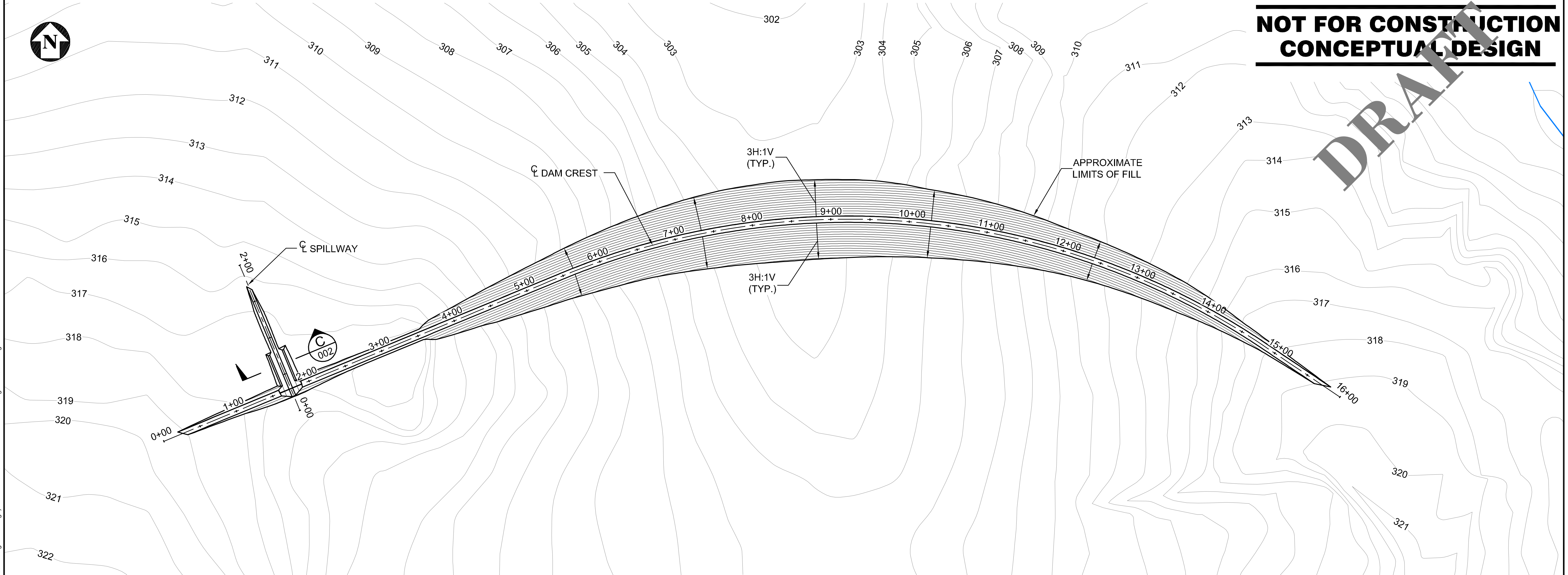
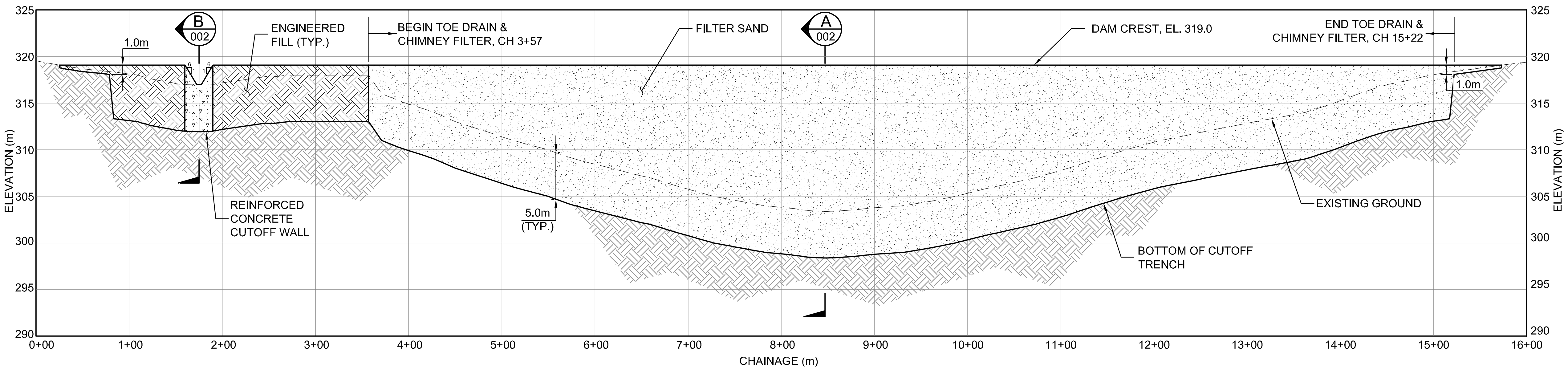
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 02 PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD02-001
42626954-MWD 02-001.dwg
REV. A

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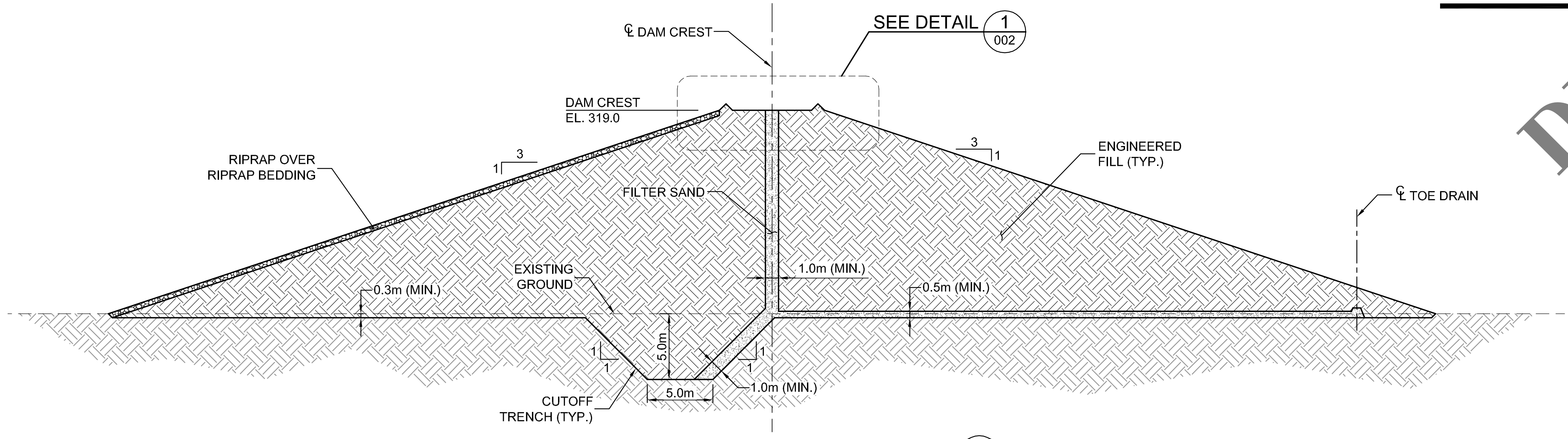
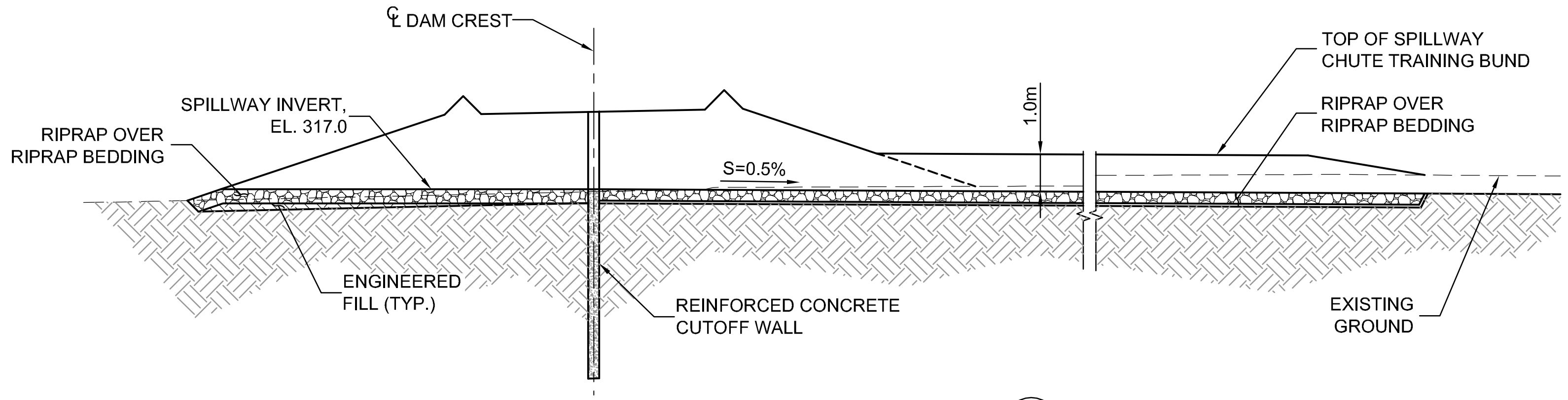
CONCEPTUAL DESIGN

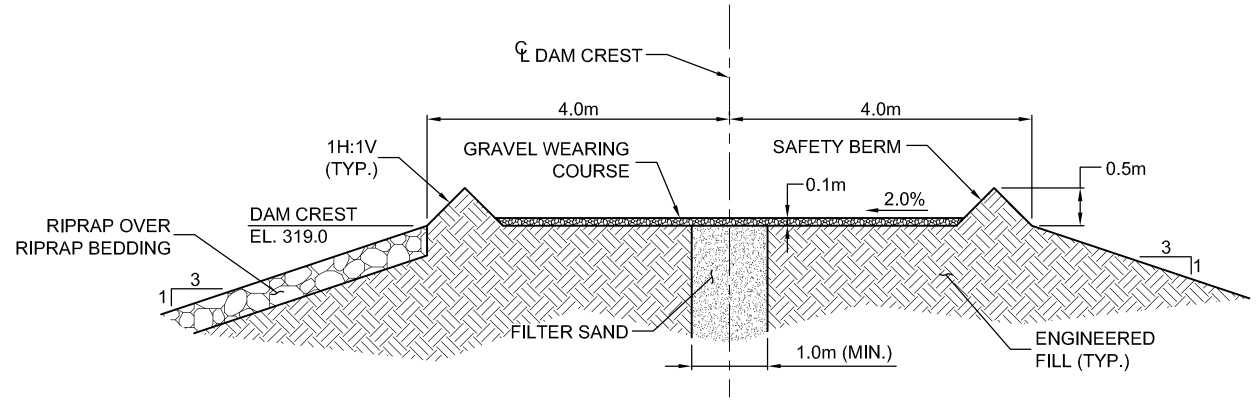
DRAFT



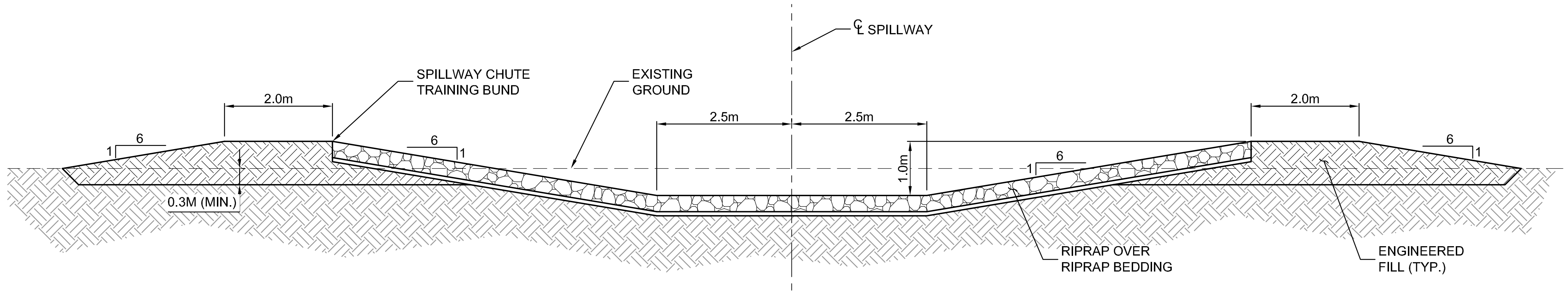
TYPICAL DAM EMBANKMENT SECTION A / 001
SCALE 1:200



SPILLWAY LONG SECTION B / 001
SCALE 1:100



TYPICAL DAM CREST DETAIL 1 / 002
SCALE 1:50



SPILLWAY CHUTE SECTION C / 001
SCALE 1:50

1:50 (A1) — DIMENSIONS ARE IN METRES (1 0 1 2 3 4 5)

1:100 (A1) — DIMENSIONS ARE IN METRES (2 0 2 4 6 8 10)

1:200 (A1) — DIMENSIONS ARE IN METRES (4 0 4 8 12 16 20)

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 02 SECTIONS AND DETAILS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-MWD02-002
42626954-MWD 02-001.dwg
REV. A

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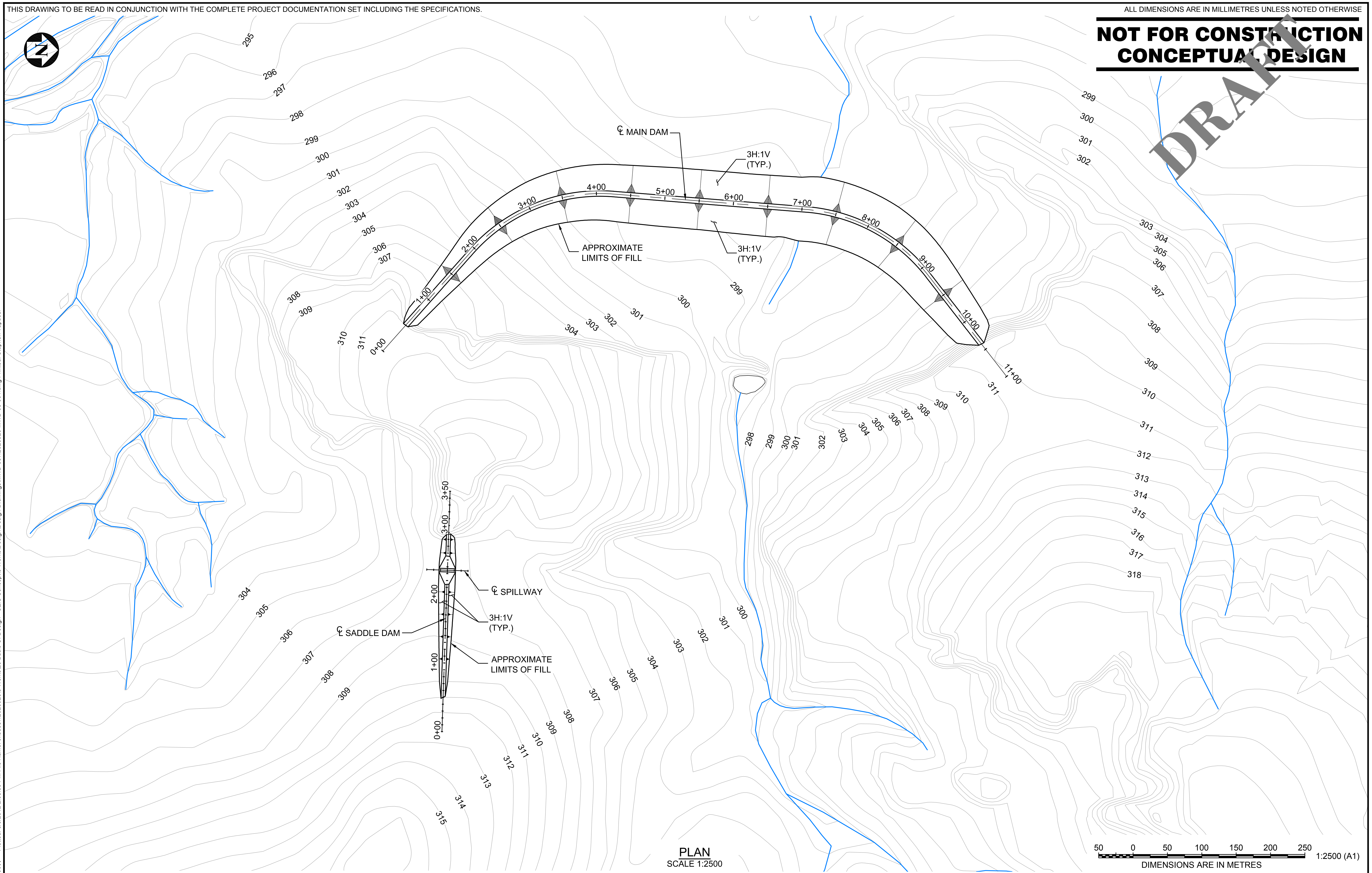
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 03 GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

Drawing: 42626920-MWD03-001

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

42626920-MWD 03-001.dwg REV. A

Plotted: 6/9/2012 2:33:39 PM File Name: J:\Jobs\42626920\5 Works\23 Basis Of Design - SEIS Concept\5 Works\Design\Design Drawings\MWD 03\42626920-MWD 03-001.dwg Printed: Stephen Tapuosi

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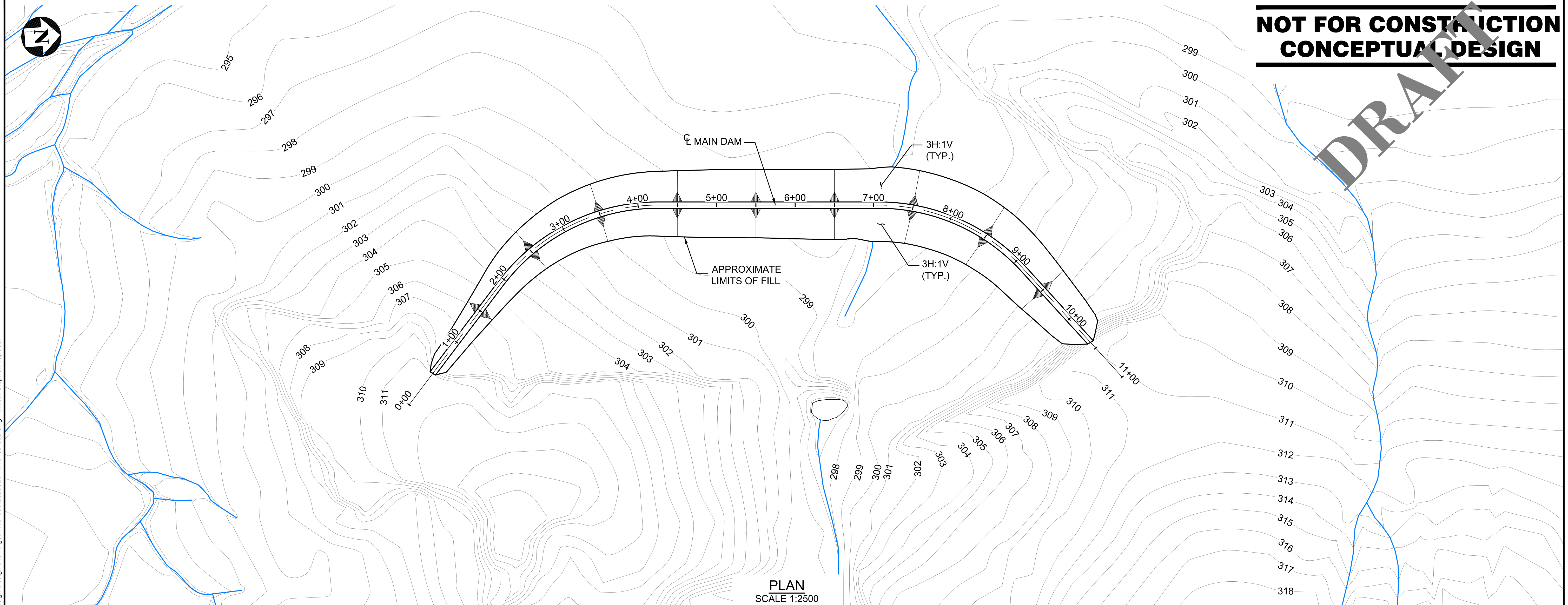
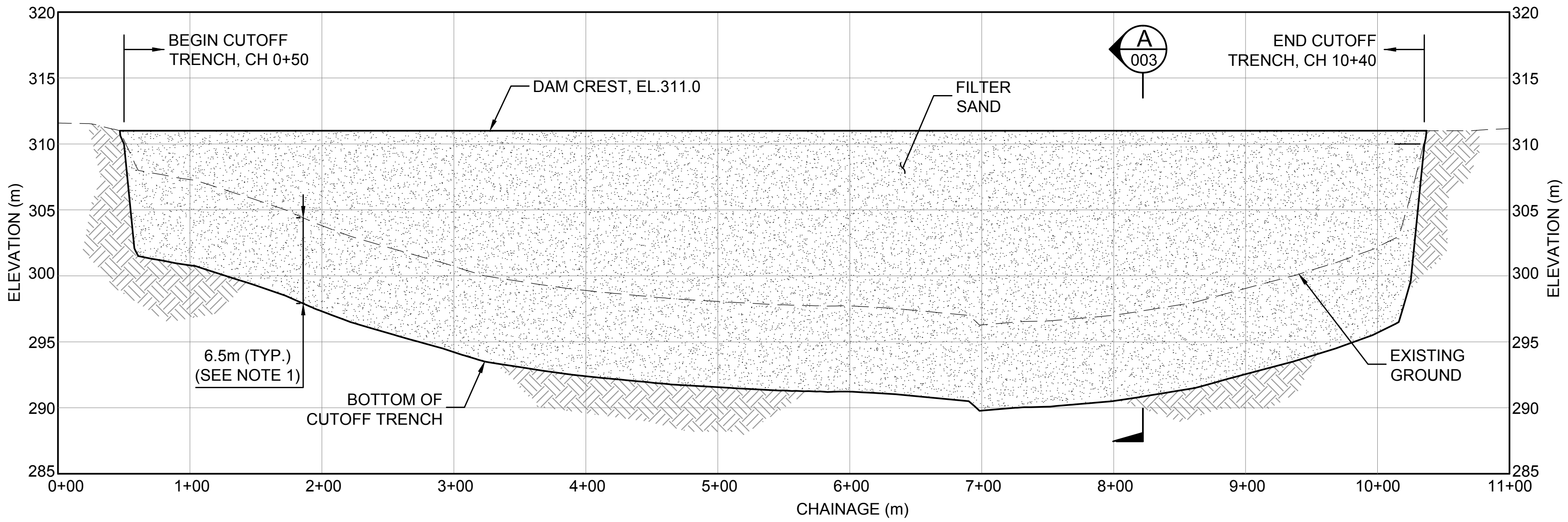
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

1:250 (A1)
DIMENSIONS ARE IN METRES

1:2500 (A1)
DIMENSIONS ARE IN METRES

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 03
MAIN DAM
PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Drawing: 42626920-MWD03-002

42626920-MWD 03-002.dwg

REV. A

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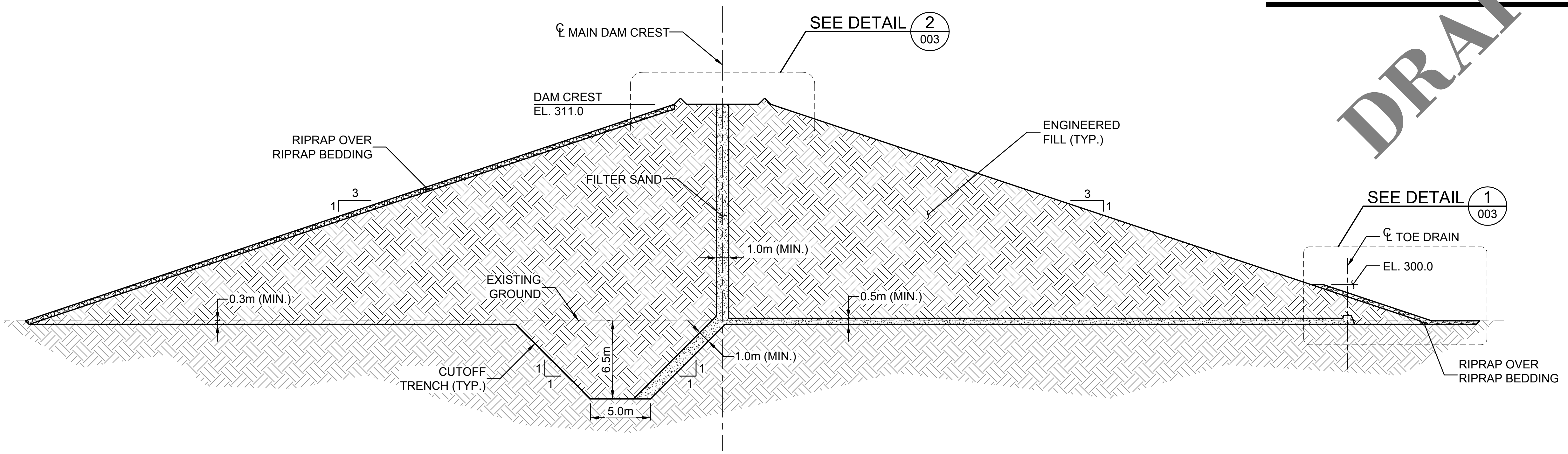
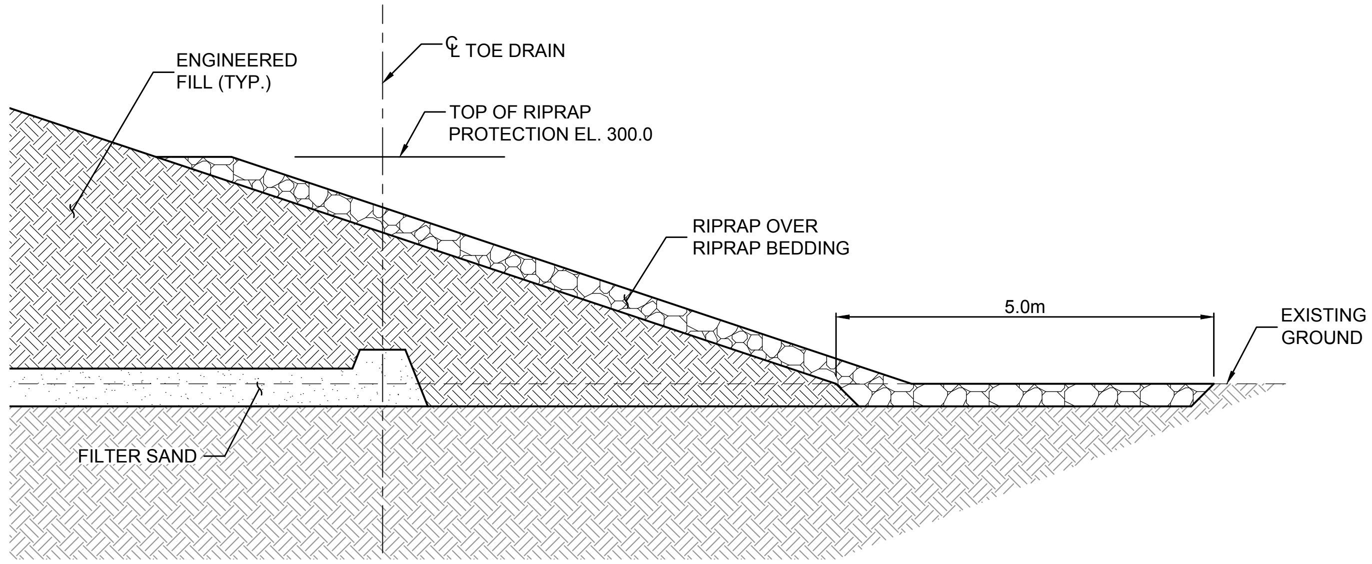
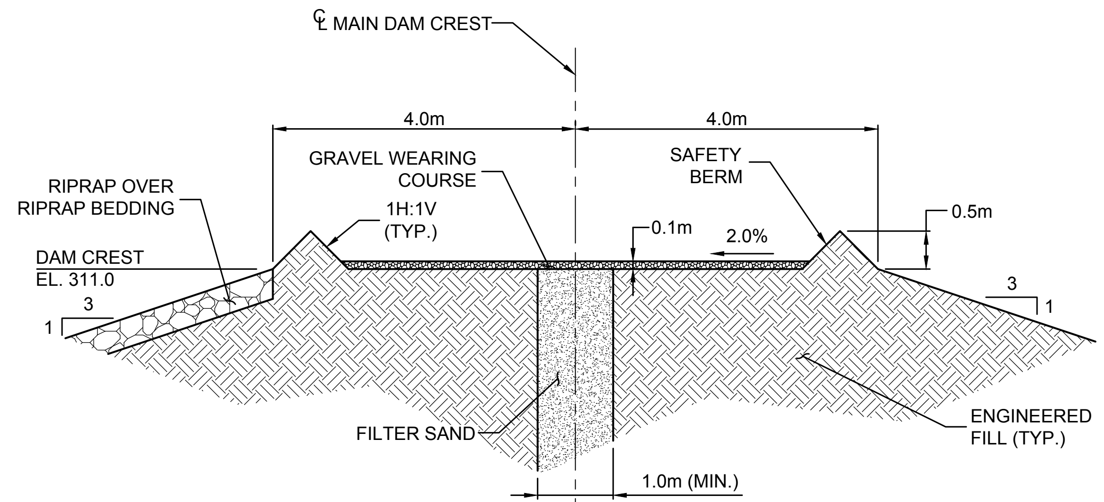
CONCEPTUAL DESIGN



TYPICAL MAIN DAM EMBANKMENT SECTION A 002
SCALE 1:200



TYPICAL TOE PROTECTION DETAIL 1 003
SCALE 1:50



TYPICAL MAIN DAM CREST DETAIL 2 003
SCALE 1:50

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

1 0 1 2 3 4 5 — 1:50 (A1)
DIMENSIONS ARE IN METRES

4 0 4 8 12 16 20 — 1:200 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 03 MAIN DAM SECTIONS AND DETAILS

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626954-MWD03-003
42626920-MWD 03-002.dwg
REV. A

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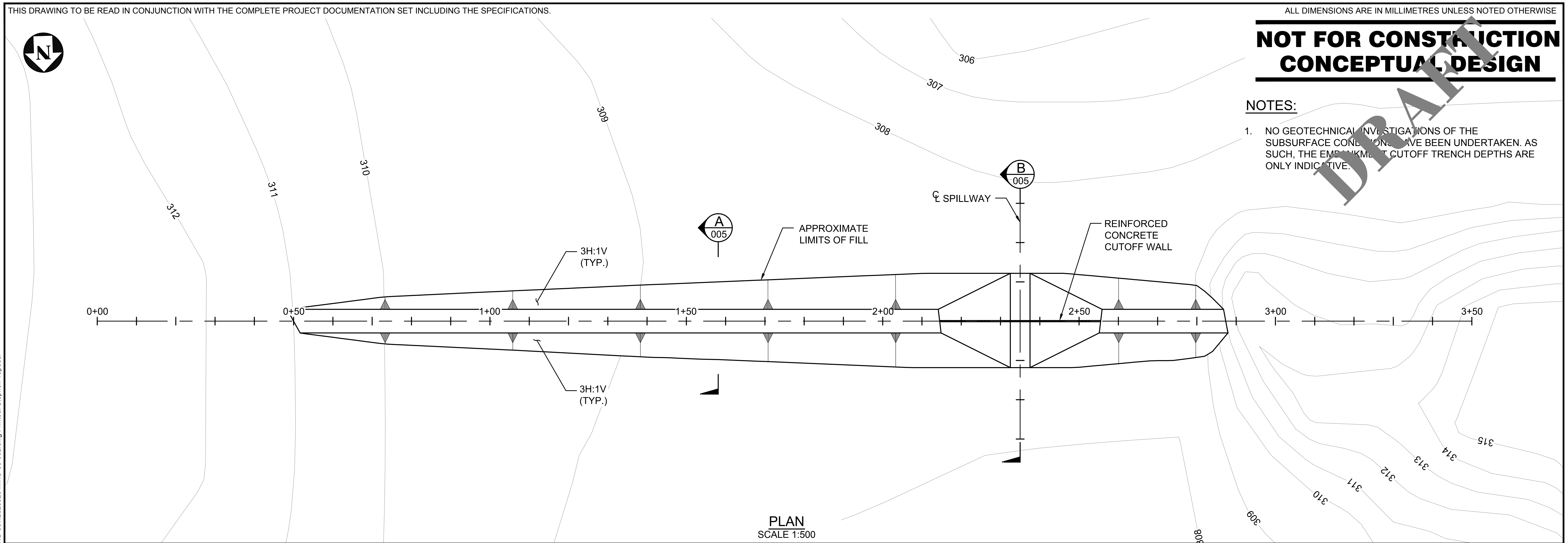
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

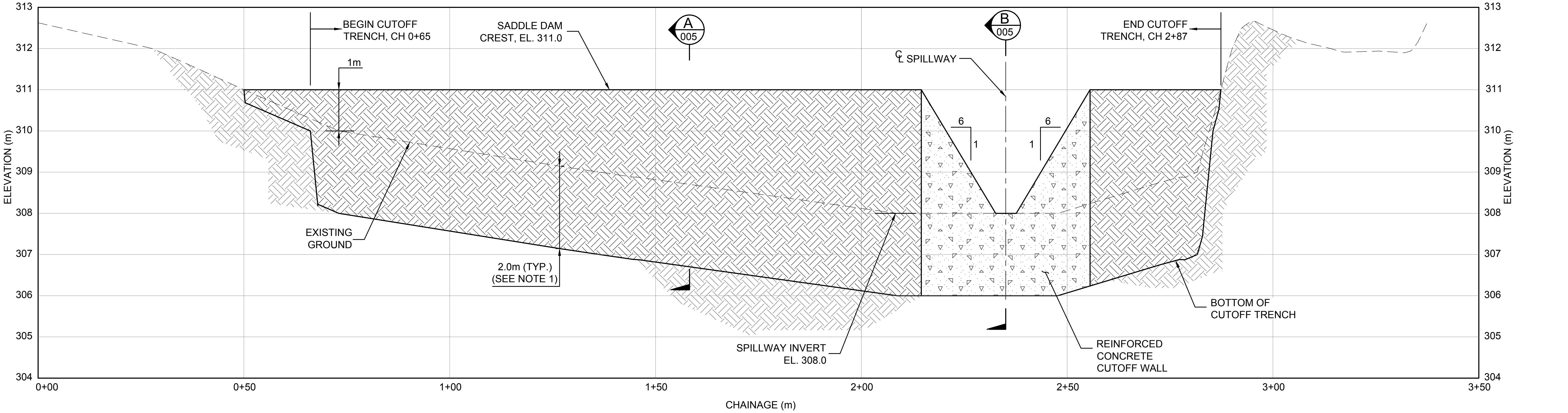
DRAFT

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.



PLAN
SCALE 1:500



PROFILE
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50

1 0 1 2 3 4 5 — 1:50 (A1)
DIMENSIONS ARE IN METRES

10 0 10 20 30 40 50 — 1:500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 03 SADDLE DAM PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12

Drawn By: CW — Date: 02/07/12

Checked By: - — Date: -

Approved By: - — Date: -

Drawing: 42626920-MWD03-004

42626920-MWD 03-002.dwg

REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

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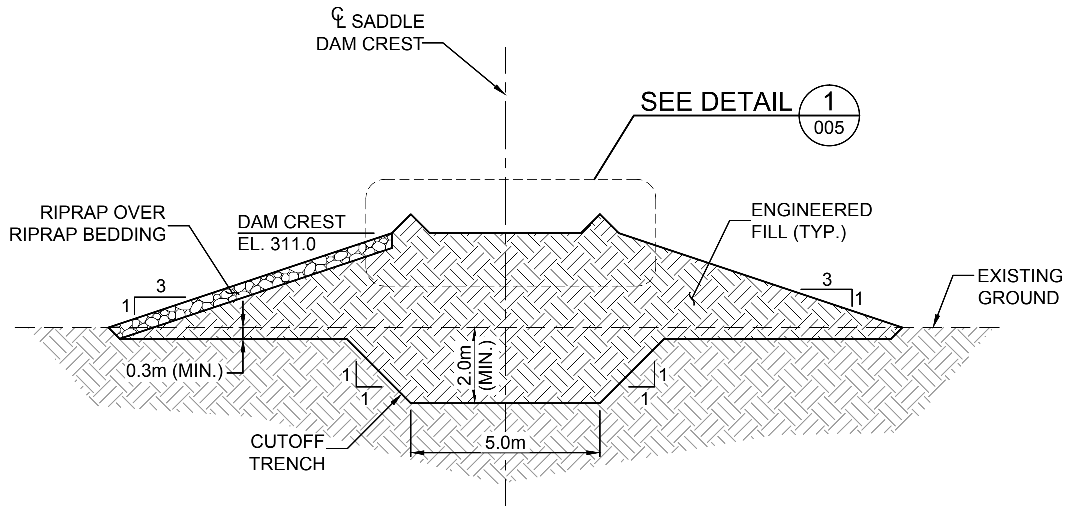
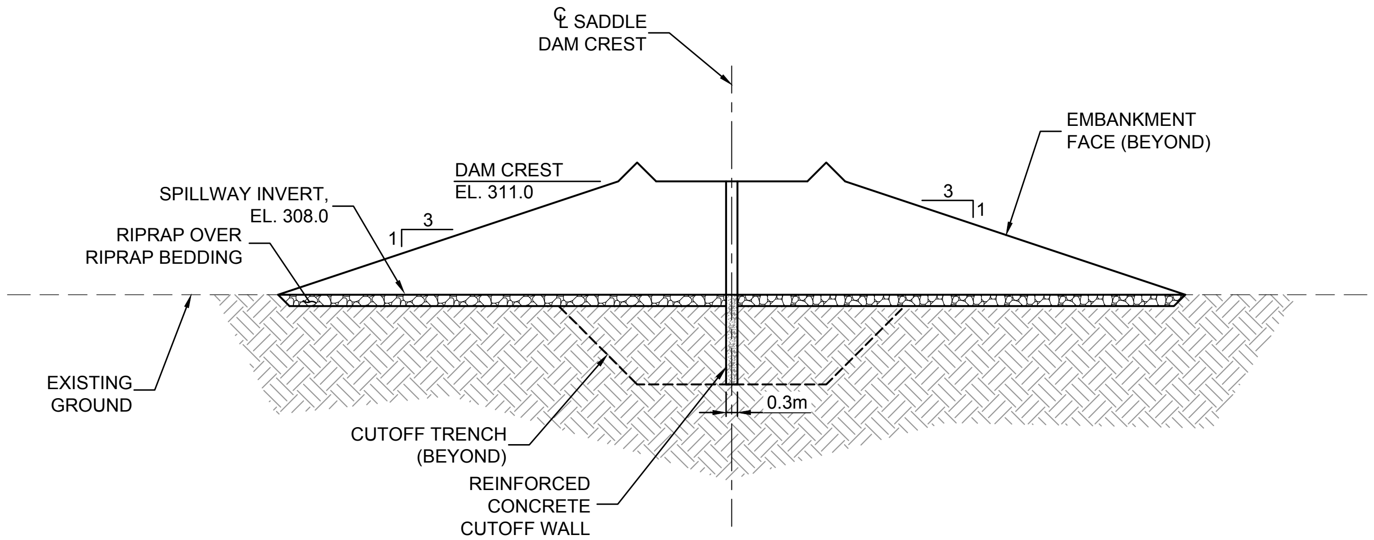
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

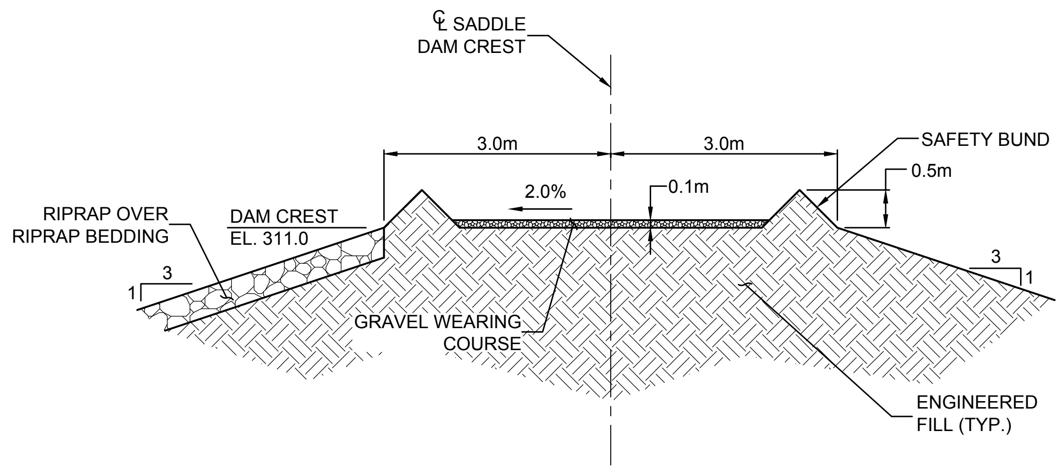
DRAFT



TYPICAL SADDLE DAM SECTION A 004
SCALE 1:100



SADDLE DAM SPILLWAY SECTION B 004
SCALE 1:100



TYPICAL SADDLE DAM CREST DETAIL 1 005
SCALE 1:50

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

1 0 1 2 3 4 5 1:50 (A1)
DIMENSIONS ARE IN METRES
2 0 2 4 6 8 10 1:100 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	30/08/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 03
SADDLE DAM
SECTIONS AND DETAILS

Datum: GDA94 ZONE 55
Date: 04/09/12
Status: DRAFT

URS
PROJECT MANAGER:
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 30/08/12
Drawn By: CW Date: 30/08/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626920-MWD03-005
42626920-MWD 03-002.dwg REV. A

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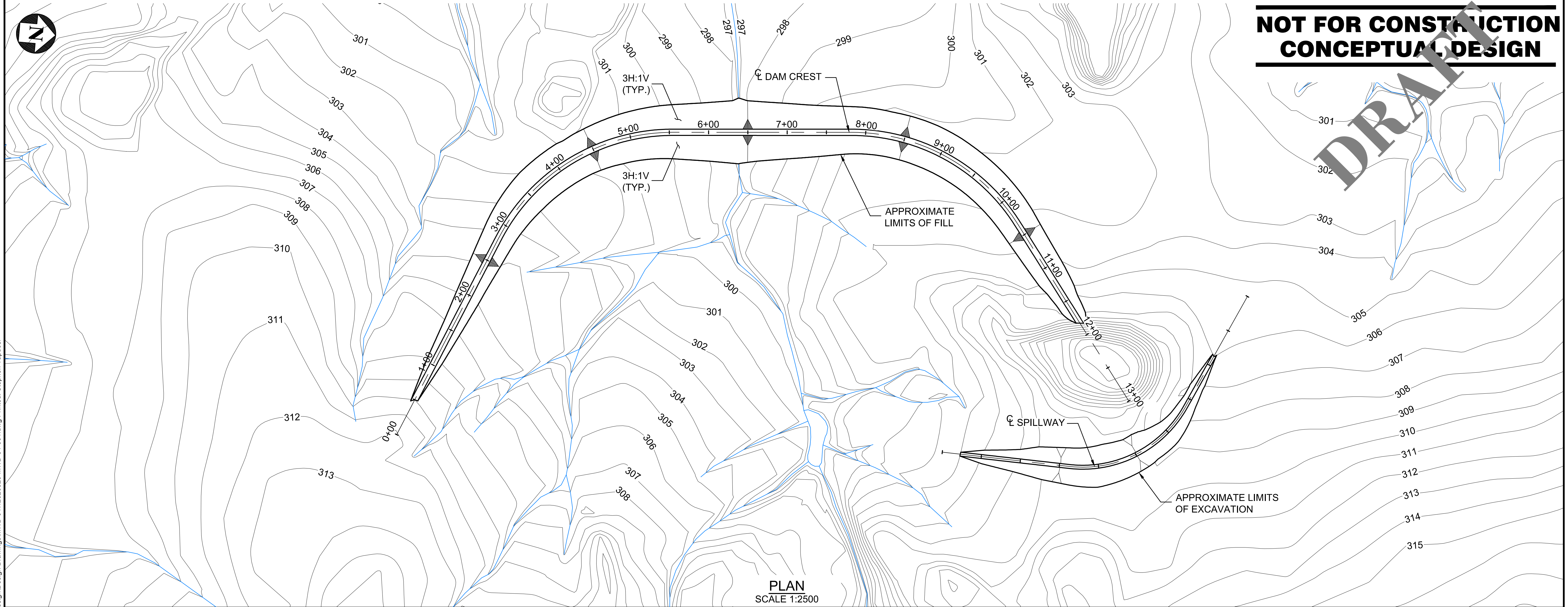
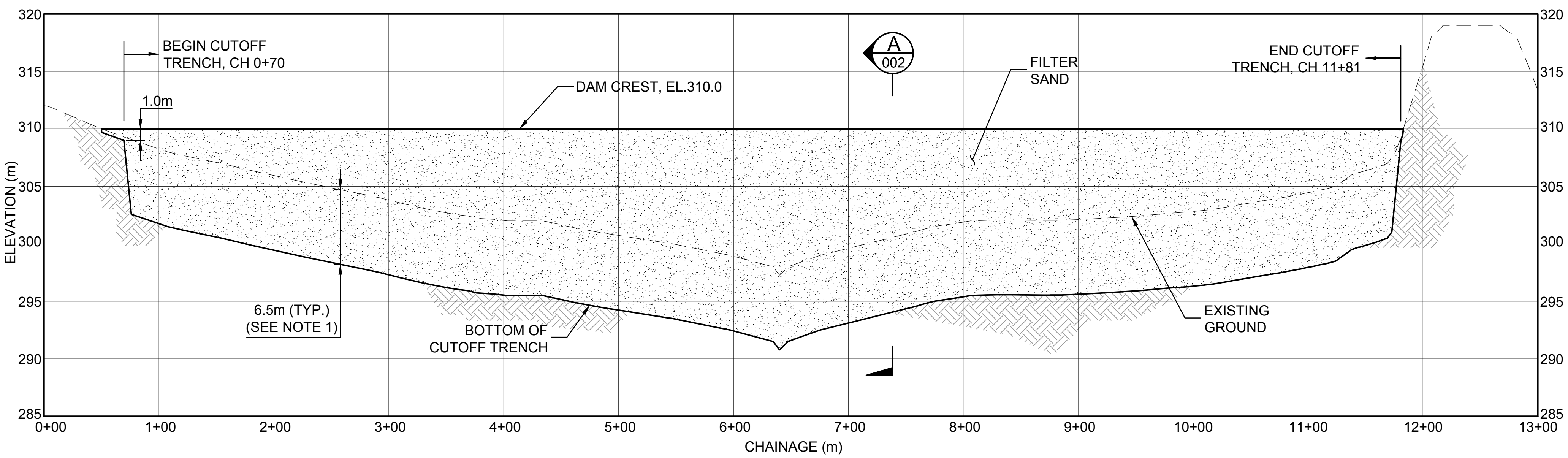
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



PLAN
SCALE 1:2500



PROFILE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

1:250 (A1) DIMENSIONS ARE IN METRES

1:2500 (A1) DIMENSIONS ARE IN METRES

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 04 PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS
PROJECT MANAGER:
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626920-MWD04-001
42626920-MWD 04-001.dwg REV. A

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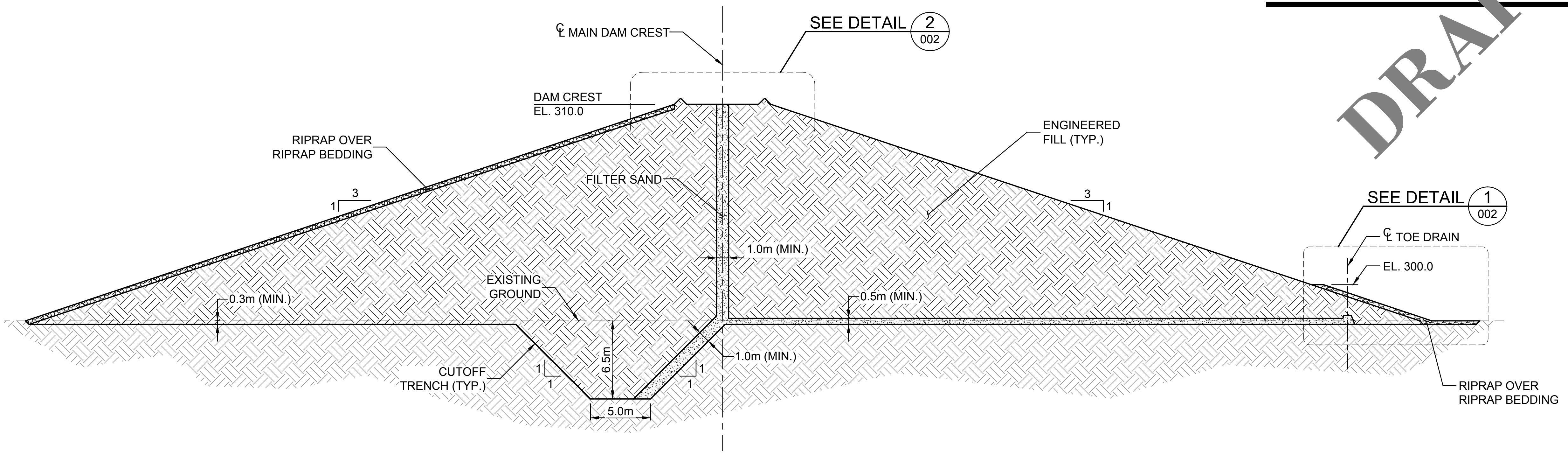
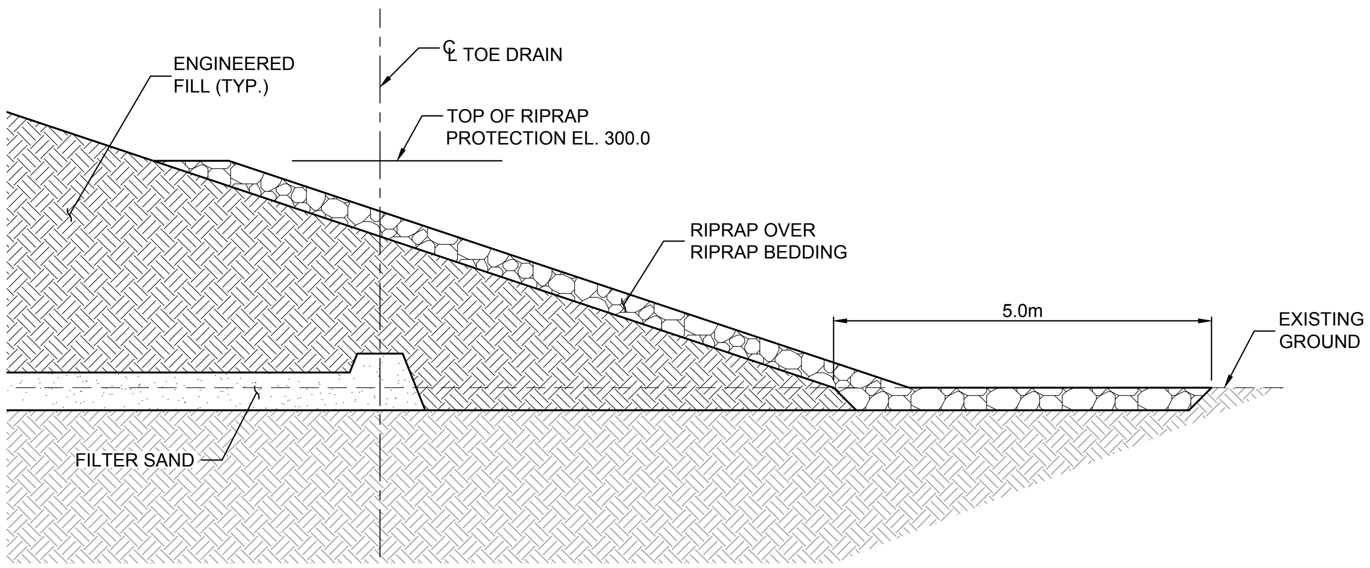
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

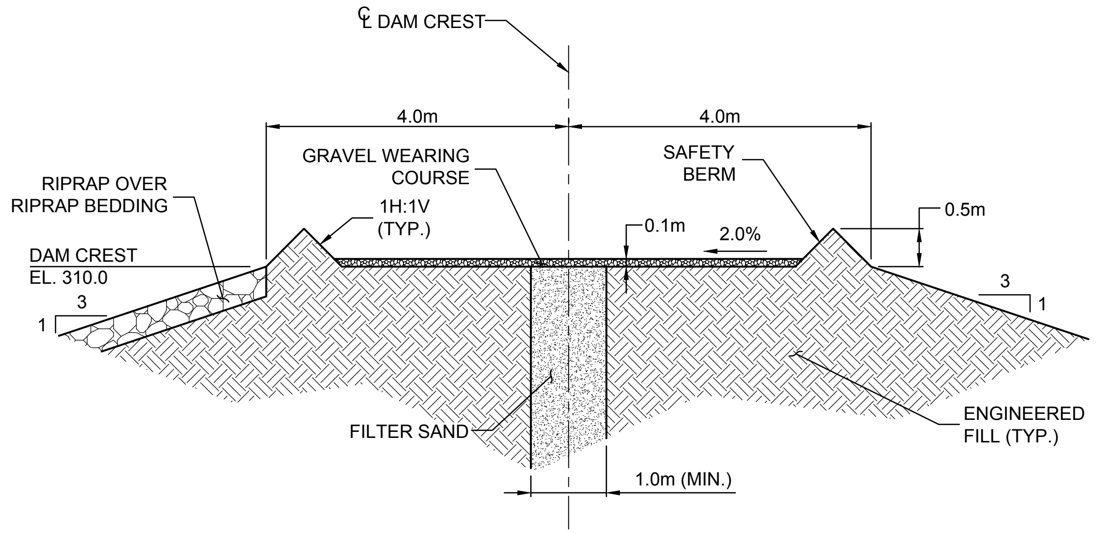
DRAFT



TYPICAL DAM EMBANKMENT SECTION A 001
SCALE 1:200



TYPICAL TOE PROTECTION DETAIL 1 002
SCALE 1:50



TYPICAL DAM CREST DETAIL 2 002
SCALE 1:50

NOTES:

1. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

1 0 1 2 3 4 5 — 1:50 (A1) — DIMENSIONS ARE IN METRES

2 0 2 4 6 8 10 — 1:100 (A1) — DIMENSIONS ARE IN METRES

4 0 4 8 12 16 20 — 1:200 (A1) — DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 04 SECTIONS AND DETAILS

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626920-MWD04-002

42626920-MWD 04-001.dwg

REV. A

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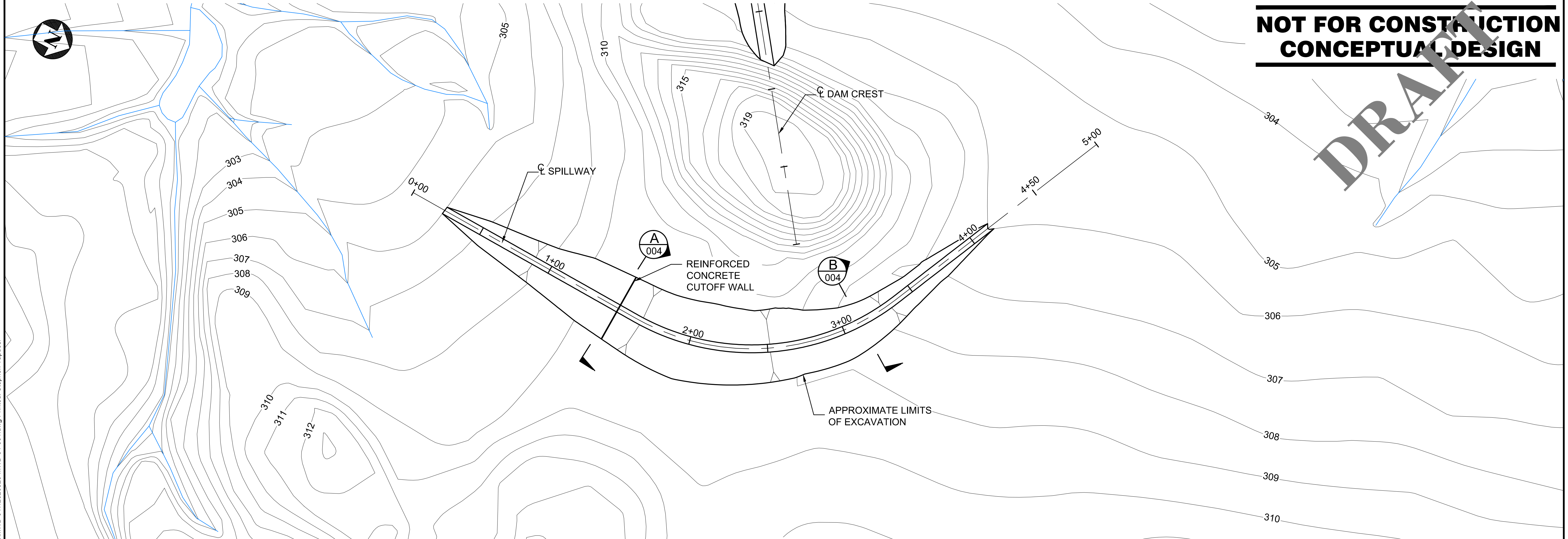
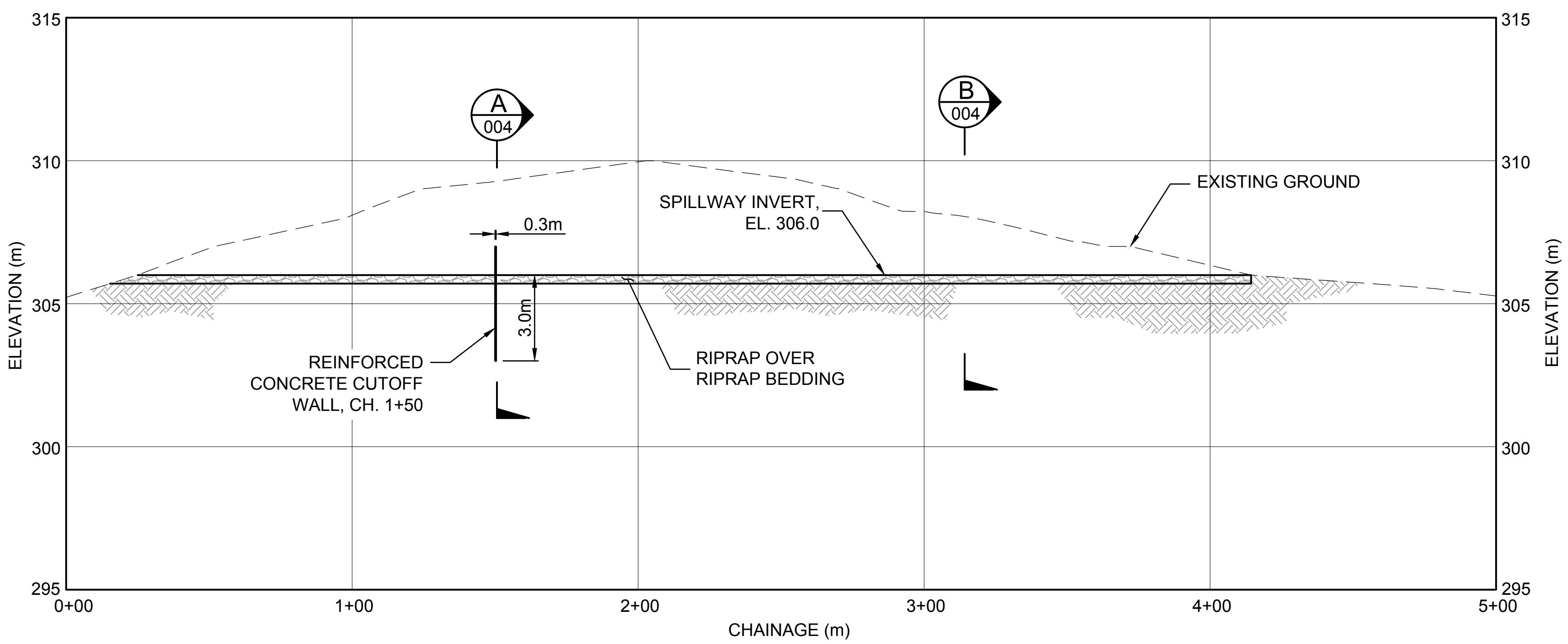
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:1250



PROFILE
HORIZONTAL SCALE 1:1250
VERTICAL SCALE 1:125

2.5 0 2.5 5.0 7.5 10.0 12.5 1:125 (A1)
DIMENSIONS ARE IN METRES

25 0 25 50 75 100 125 1:1250 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 04
SPILLWAY
PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 04/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW | Drawn By: CW | Checked By: - | Approved By: -

Date: 02/07/12 | Date: 02/07/12 | Date: - | Date: -

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Drawing: 42626920-MWD04-003

42626920-MWD 04-001.dwg

REV. A

Plotted: 6/9/2012 2:27:32 PM File Name: J:\Jobs\42626920\5 Works\23 Basis Of Design - SEIS Concept\5 Works\Design\Design Drawings\MWD 04\42626920-MWD 04-001.dwg Printed: Stephen Tapuosi

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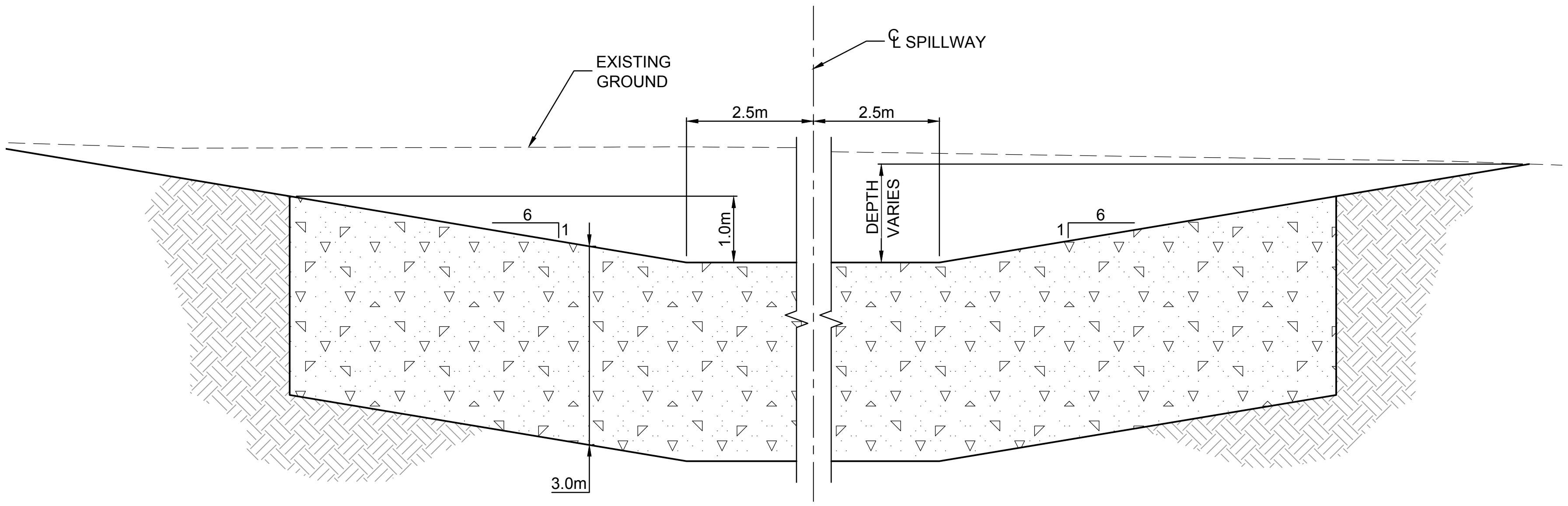
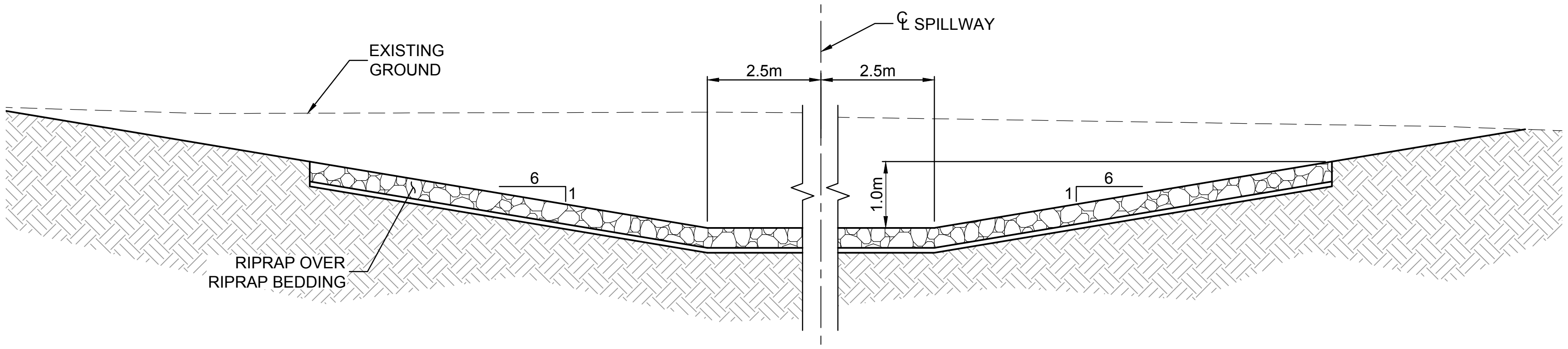
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



SPILLWAY CONCRETE CUTOFF WALL SECTION (A / 003)
SCALE 1:50



TYPICAL SPILLWAY CHUTE SECTION (B / 003)
SCALE 1:50

1 0 1 2 3 4 5 1:50 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: MINE WATER DAM 04
SPILLWAY
SECTIONS AND DETAILS

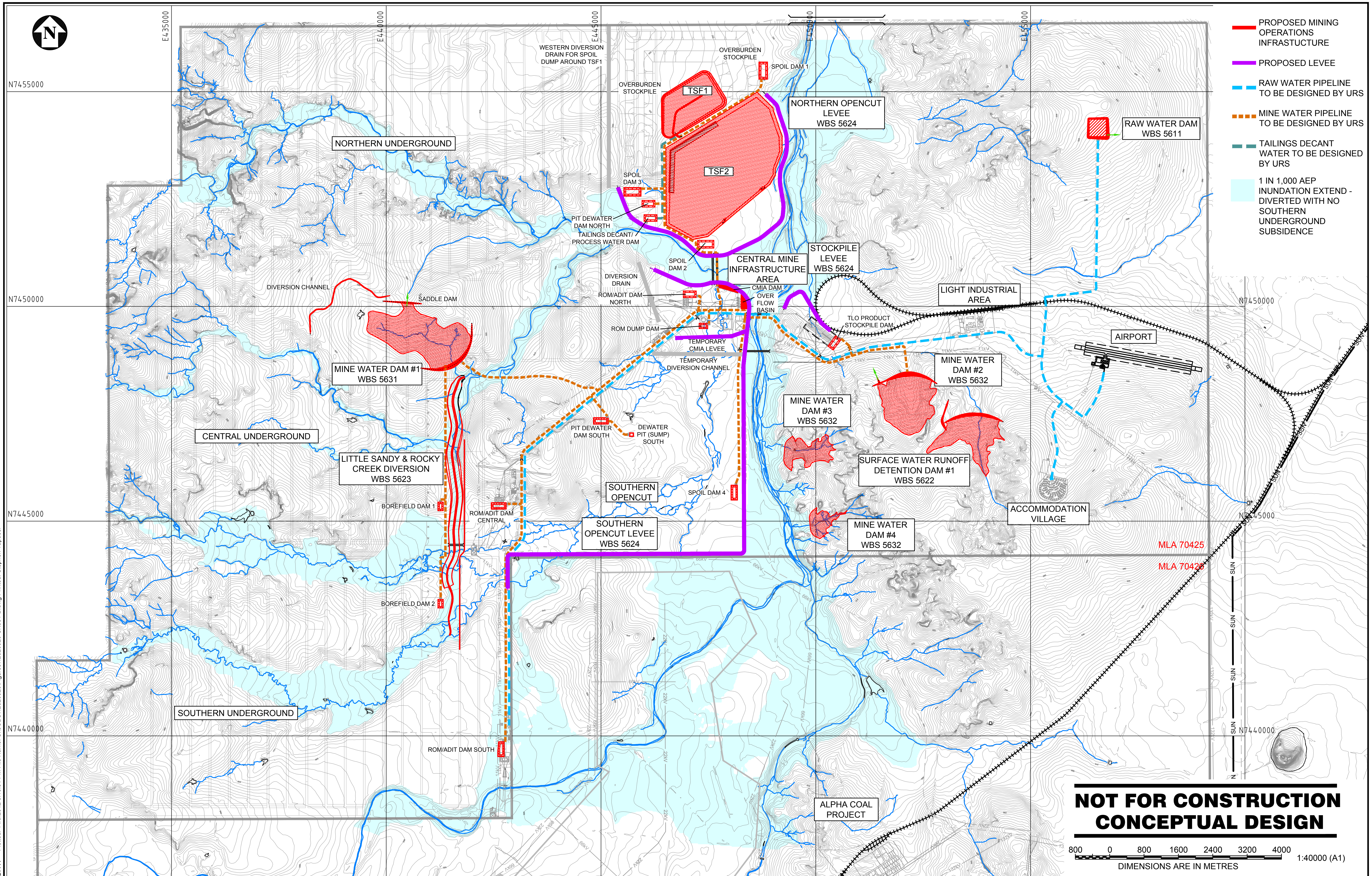
Datum: GDA94 ZONE 55
Date: 04/09/12
Status: DRAFT

URS

PROJECT MANAGER:
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
Drawn By: CW Date: 02/07/12
Checked By: - Date: -
Approved By: - Date: -

Drawing: 42626920-MWD04-004
42626920-MWD 04-001.dwg REV. A



Rev	Drawn	Design	Date	REVISION RECORD
B	STT		14/09/12	BASIS OF DESIGN REPORT
A	STT		17/08/12	DRAFT ISSUE

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK - KEVIN'S CORNER WMEP

Drawing Title: MINE PLAN FOR SEIS SUBMISSION SEPTEMBER 2012

Datum: MGA ZONE 55 (GDA 94)

Date: 29/05/2012

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: - Drawn By: - Checked By: - Approved By: -

Date: - Date: - Date: - Date: -

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Drawing: 42626920-SK001

42626920-SK001-B.dwg

REV. B

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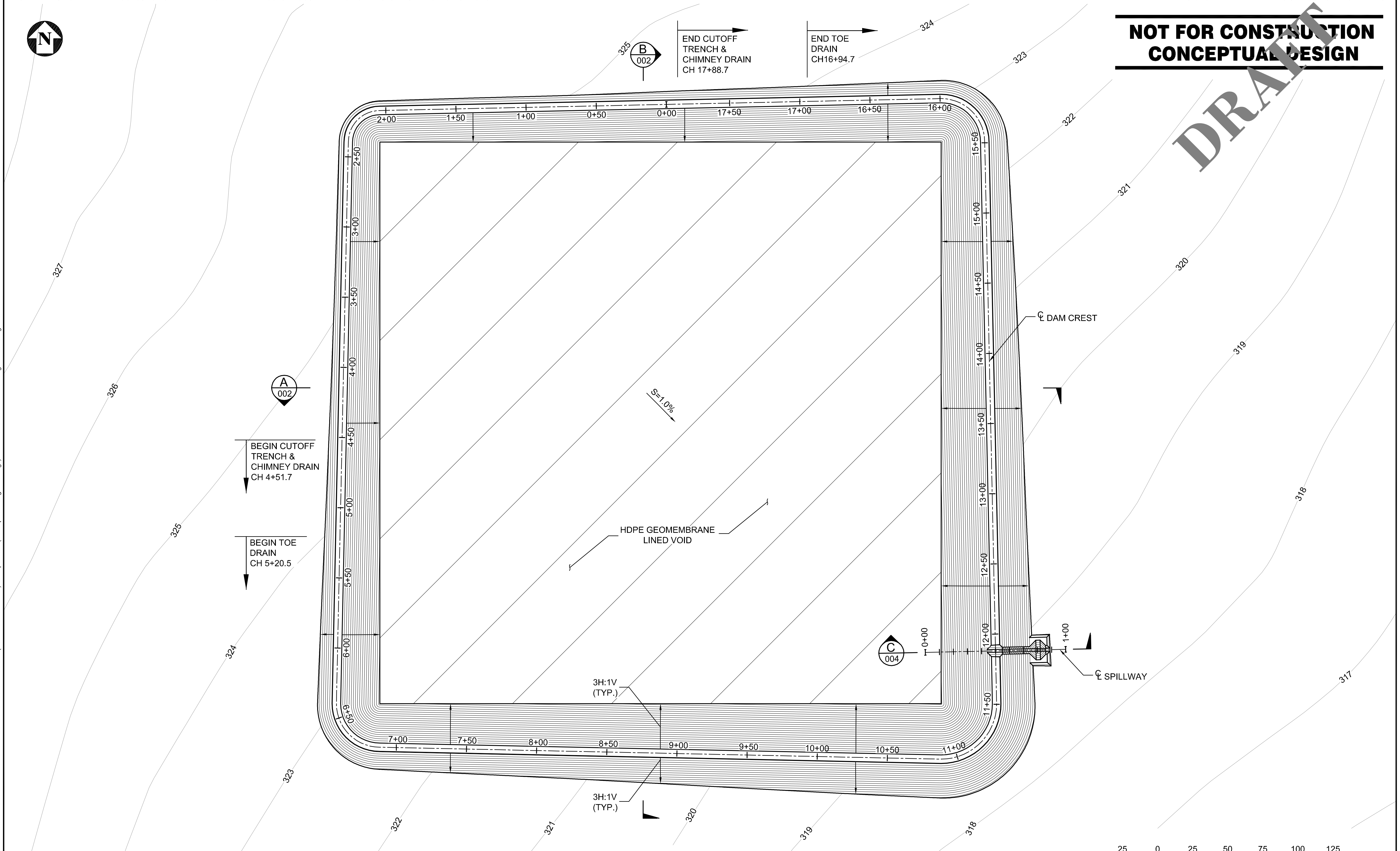
CONCEPTUAL DESIGN

DRAFT



PLAN
SCALE 1:1250

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	02/07/12	CONCEPTUAL DESIGN

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Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: RAW WATER DAM GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: BH Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-RWD-001

42626954-RWD 01.dwg

REV. A

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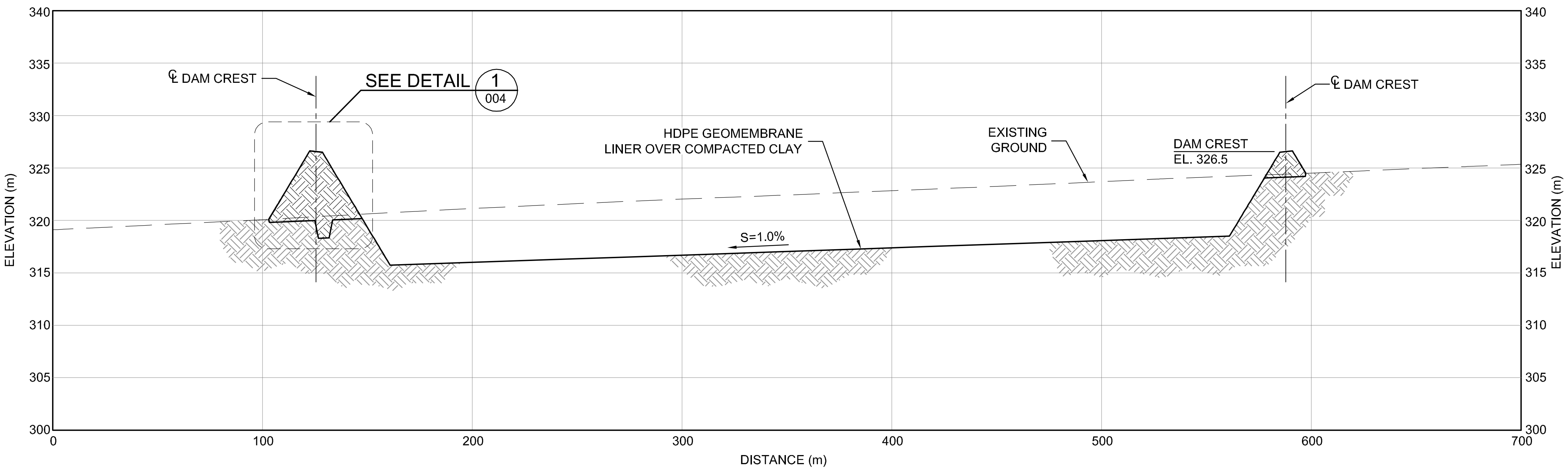
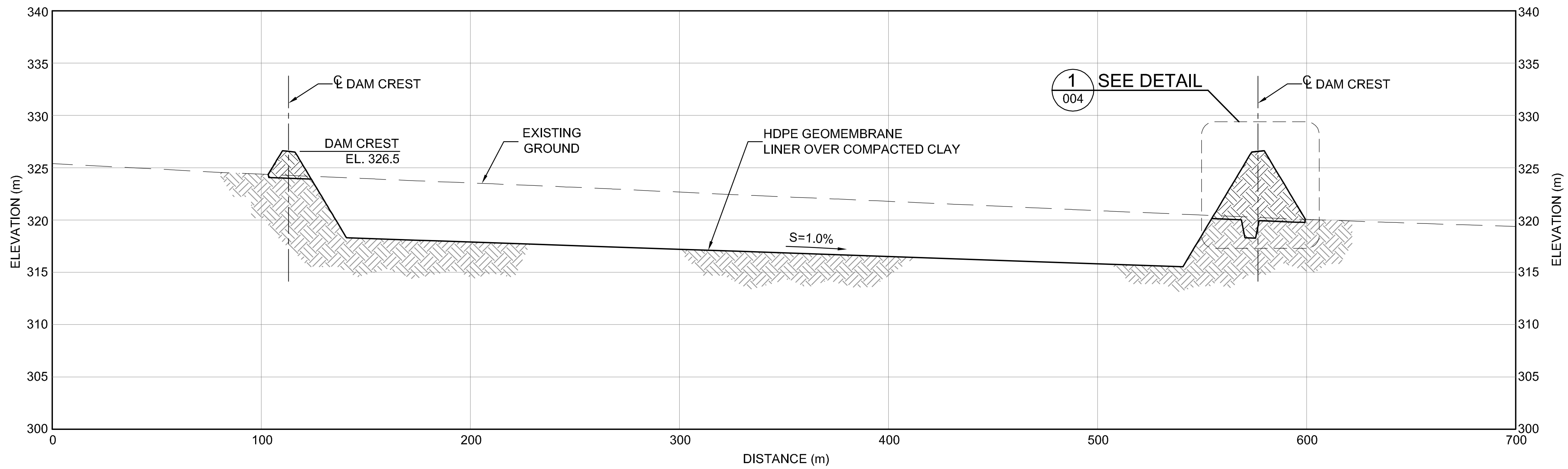
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



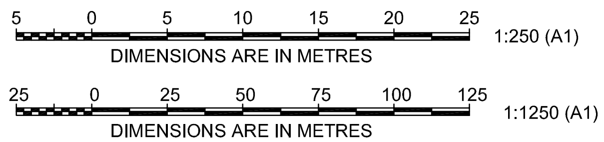
TYPICAL EMBANKMENT SECTION A 001
HORIZONTAL SCALE 1:1250
VERTICAL SCALE 1:250



TYPICAL EMBANKMENT SECTION B 001
HORIZONTAL SCALE 1:1250
VERTICAL SCALE 1:250

NOTES:

1. SAFETY BUNDS ON DAM CREST NOT SHOWN.
2. COMPACTED CLAY LAYER NOT SHOWN.
3. ALL EMBANKMENT FACES SHALL BE SEEDED AND COVERED WITH TURF REINFORCEMENT MATS (TRMS).



Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL
KEVIN'S CORNER - WMEP

Drawing Title: RAW WATER DAM
SECTIONS AND DETAILS
(1 OF 3)

Datum: GDA94
ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12

Drawn By: BH Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-RWD-002

42626954-RWD 01.dwg

REV. A

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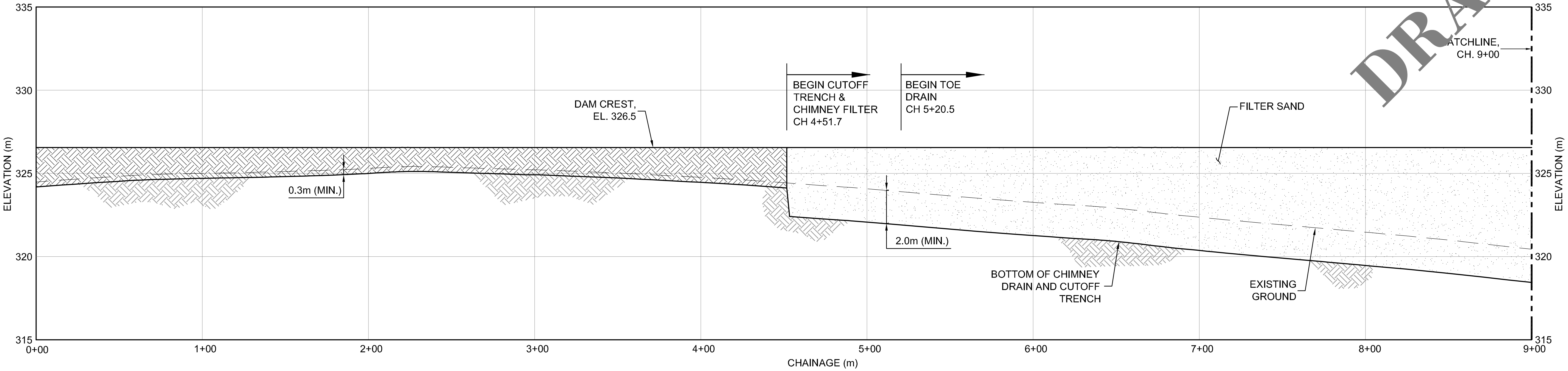
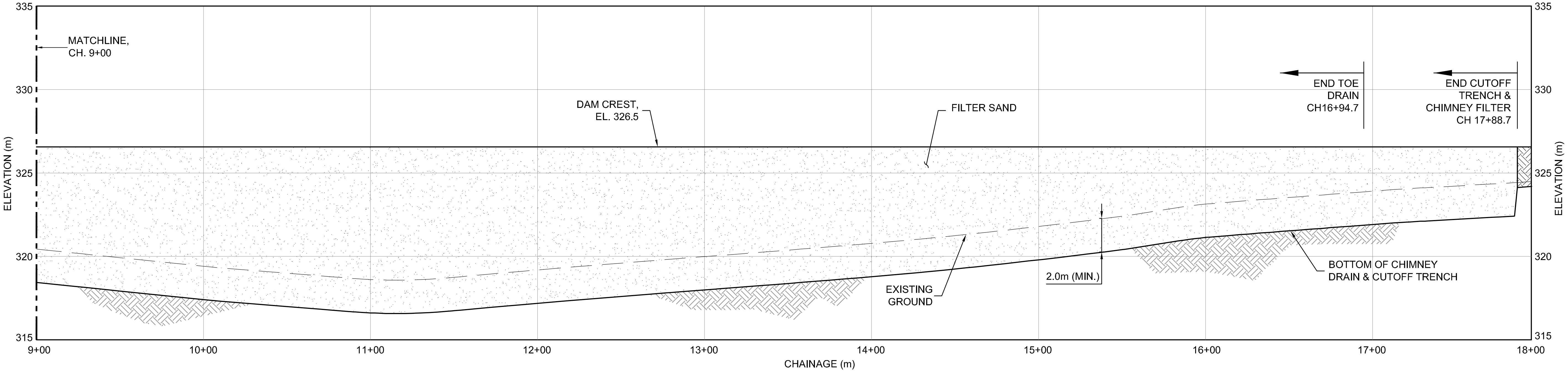
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



CHIMNEY FILTER PROFILE
HORIZONTAL SCALE 1:1250 (A1)
VERTICAL SCALE :1:125 (A1)



CHIMNEY FILTER PROFILE
HORIZONTAL SCALE 1:1250 (A1)
VERTICAL SCALE :1:125 (A1)

2.5 0 2.5 5.0 7.5 10.0 12.5 — 1:125 (A1)
DIMENSIONS ARE IN METRES

25 0 25 50 75 100 125 — 1:1250 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: RAW WATER DAM SECTIONS AND DETAILS (2 OF 3)

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: BH — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-RWD-003
42626954-RWD 01.dwg
REV. A

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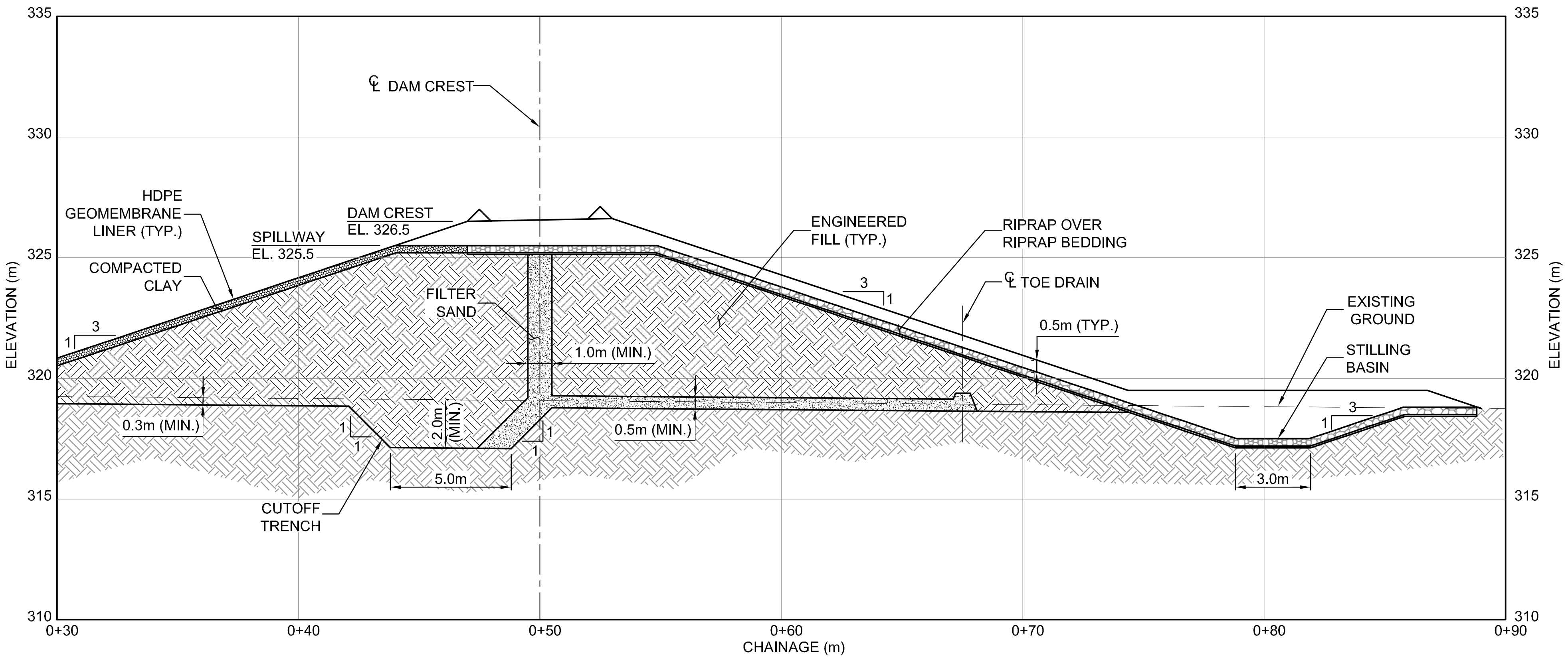
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

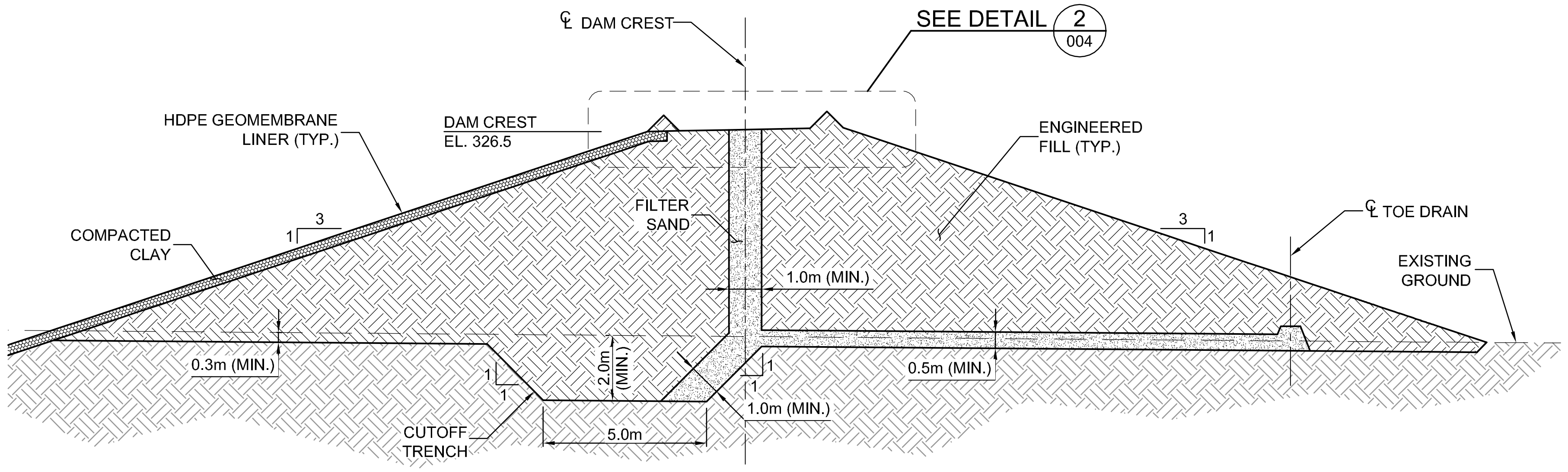
DRAFT



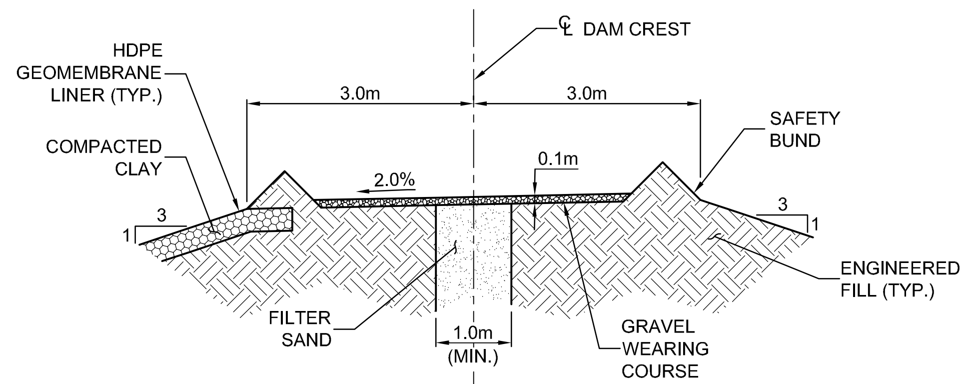
SPILLWAY LONG SECTION C / 001
SCALE 1:125

NOTES:

1. SAFETY BUNDS ON DAM CREST NOT SHOWN.
2. COMPACTED CLAY LAYER NOT SHOWN.
3. ALL EMBANKMENT FACES SHALL BE SEEDED AND COVERED WITH TURF REINFORCEMENT MATS (TRMS).



TYPICAL EMBANKMENT DETAIL 1 / 002
SCALE 1:100



TYPICAL DAM CREST DETAIL 2 / 004
SCALE 1:50

1:50 (A1) — DIMENSIONS ARE IN METRES
1:100 (A1) — DIMENSIONS ARE IN METRES
1:125 (A1) — DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: RAW WATER DAM SECTIONS AND DETAILS (3 OF 3)

Datum: GDA94 ZONE 55
Date: 02/07/12
Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: BH — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-RWD-004
42626954-RWD 01.dwg
REV. A

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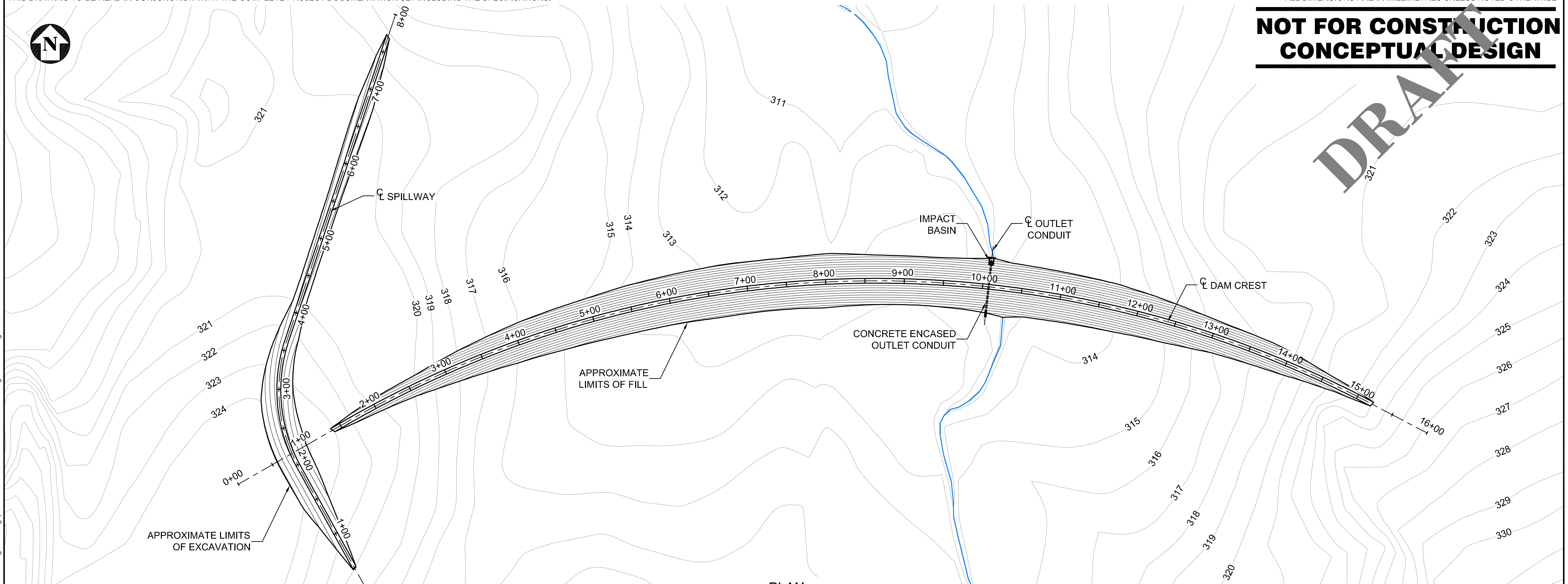
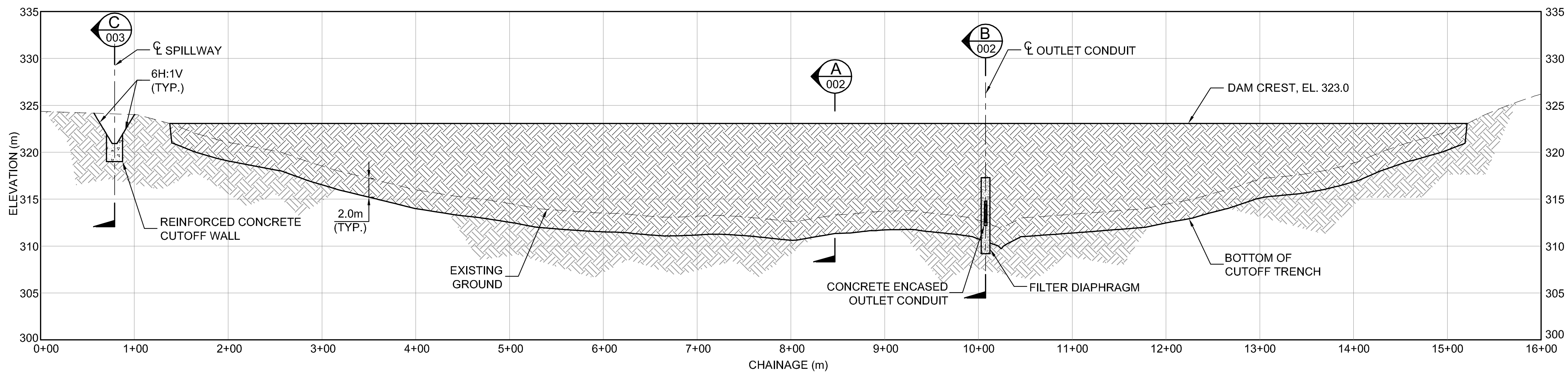
CONCEPTUAL DESIGN

DRAFT



PLAN

SCALE 1:2500



PROFILE

HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250

5 0 5 10 15 20 25 1:250 (A1)
DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 1:2500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SURFACE WATER RUNOFF DETENTION DAM PLAN AND PROFILE

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW	Drawn By: CW	Checked By: -	Approved By: -
Date: 02/07/12	Date: 02/07/12	Date: -	Date: -

Drawing: 42626954-SWRDD-001

42626954-SWRDD 01-001.dwg

REV. A

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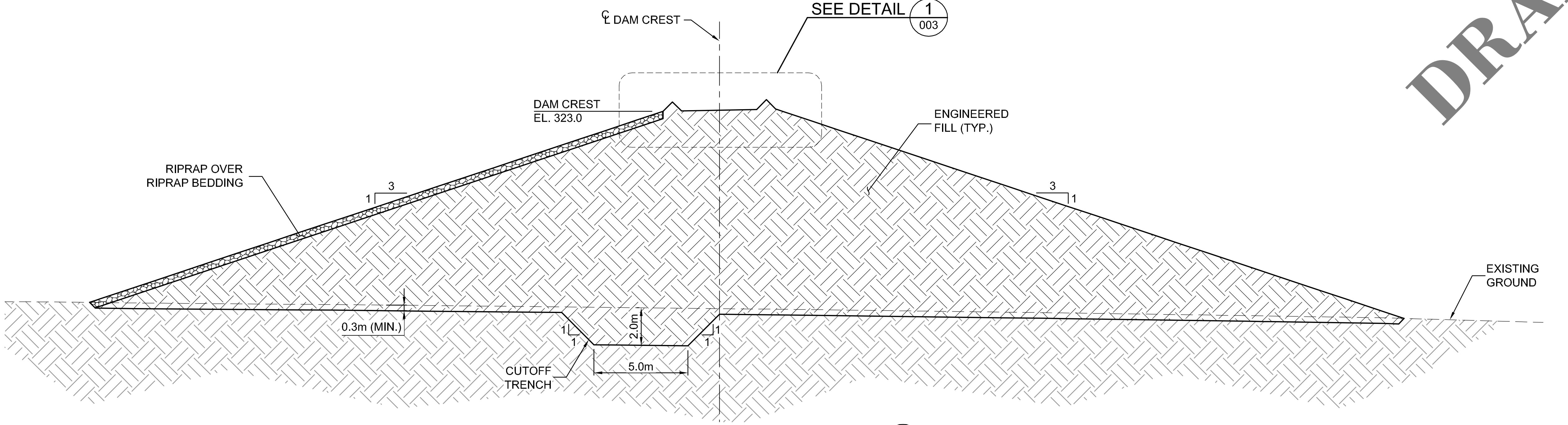
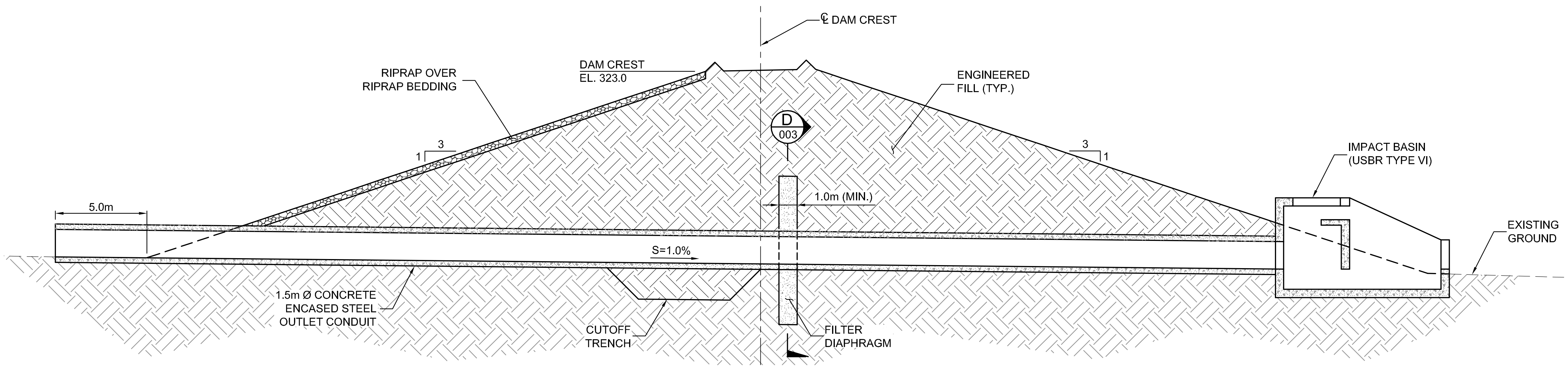
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN

DRAFT



TYPICAL DAM EMBANKMENT SECTION A 001
SCALE 1:125



OUTLET CONDUIT LONG SECTION B 001
SCALE 1:125

NOTES:

1. CONCRETE REINFORCEMENT NOT SHOWN.

2.5 0 2.5 5.0 7.5 10.0 12.5 1:125 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SURFACE WATER RUNOFF DETENTION DAM SECTIONS AND DETAILS (1 OF 2)

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12

Drawn By: CW Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626954-SWRDD-002

42626954-SWRDD 01-001.dwg

REV. A

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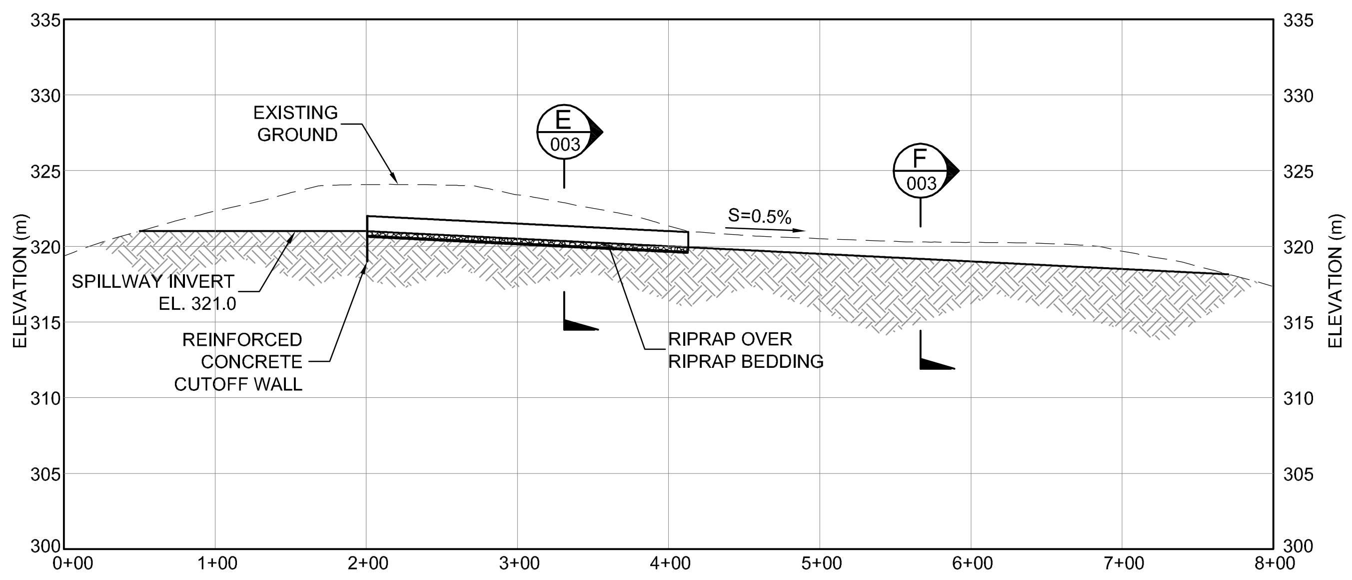
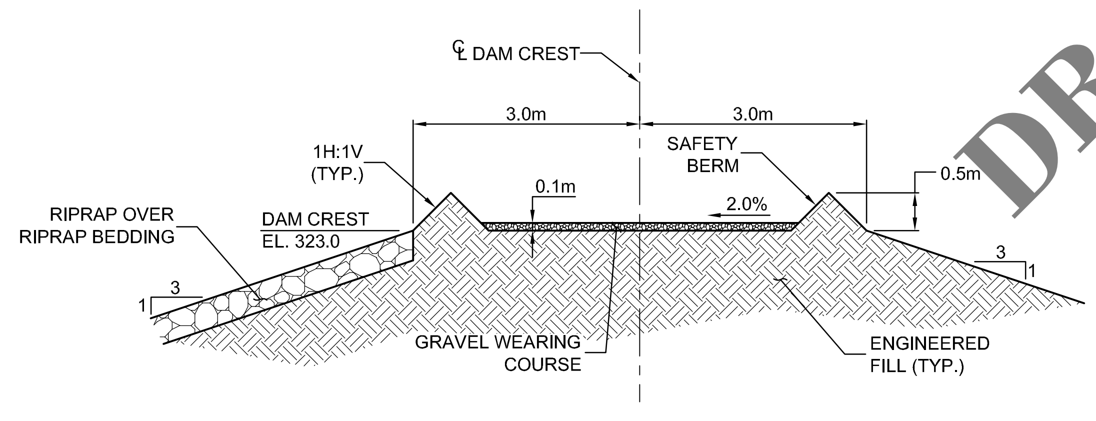
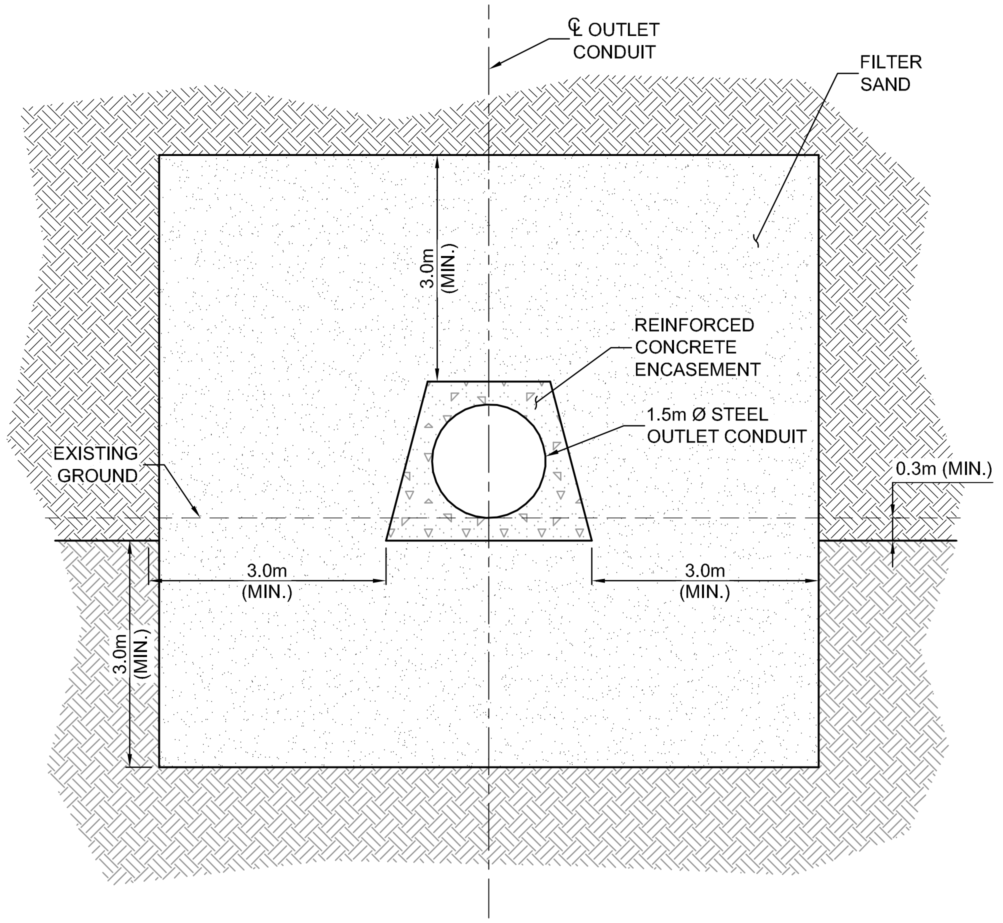
NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



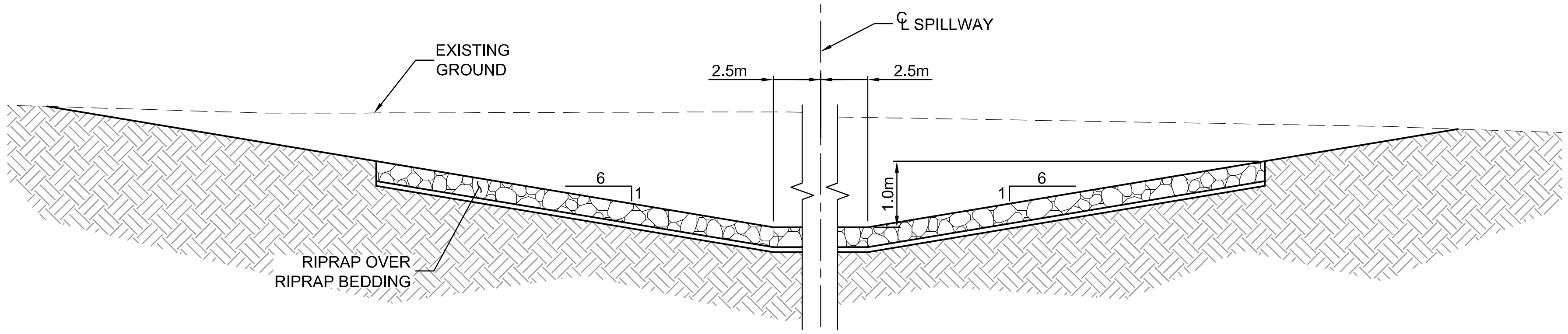
SPILLWAY CHUTE LONG SECTION (C / 001)
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:250



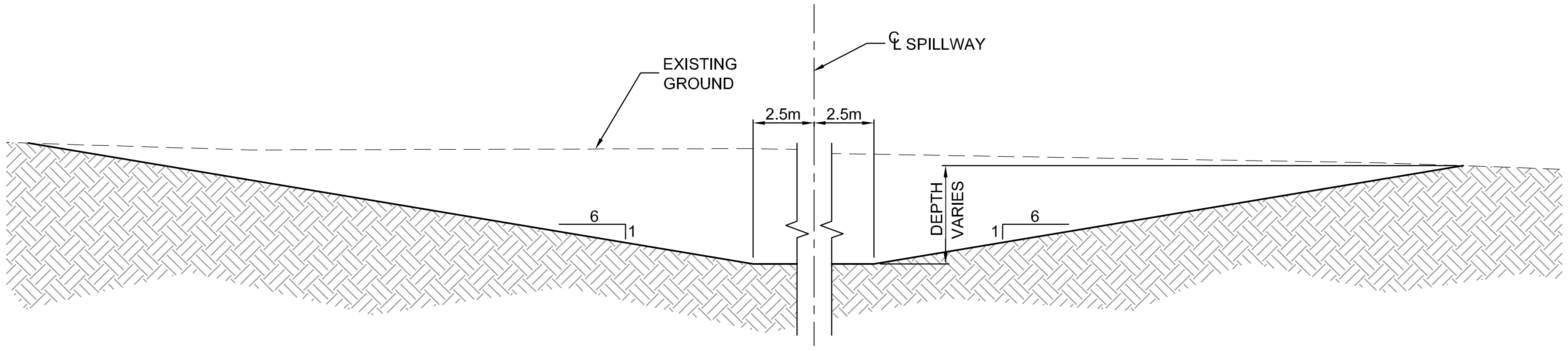
TYPICAL DAM CREST DETAIL (1 / 002)
SCALE 1:50



FILTER DIAPHRAGM SECTION (D / 002)
SCALE 1:50



TYPICAL SPILLWAY CHUTE SECTION (E / 003)
SCALE 1:50



TYPICAL SPILLWAY CHUTE SECTION (F / 003)
SCALE 1:50

NOTES:

1. CONCRETE REINFORCEMENT NOT SHOWN.

1 0 1 2 3 4 5 — 1:50 (A1) — DIMENSIONS ARE IN METRES

5 0 5 10 15 20 25 — 1:250 (A1) — DIMENSIONS ARE IN METRES

50 0 50 100 150 200 250 — 1:2500 (A1) — DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	CW	CW	02/07/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: SURFACE WATER RUNOFF DETENTION DAM SECTIONS AND DETAILS (2 OF 2)

Datum: GDA94 ZONE 55

Date: 02/07/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW — Date: 02/07/12
Drawn By: CW — Date: 02/07/12
Checked By: - — Date: -
Approved By: - — Date: -

Drawing: 42626954-SWRDD-003

42626954-SWRDD 01-001.dwg

REV. A

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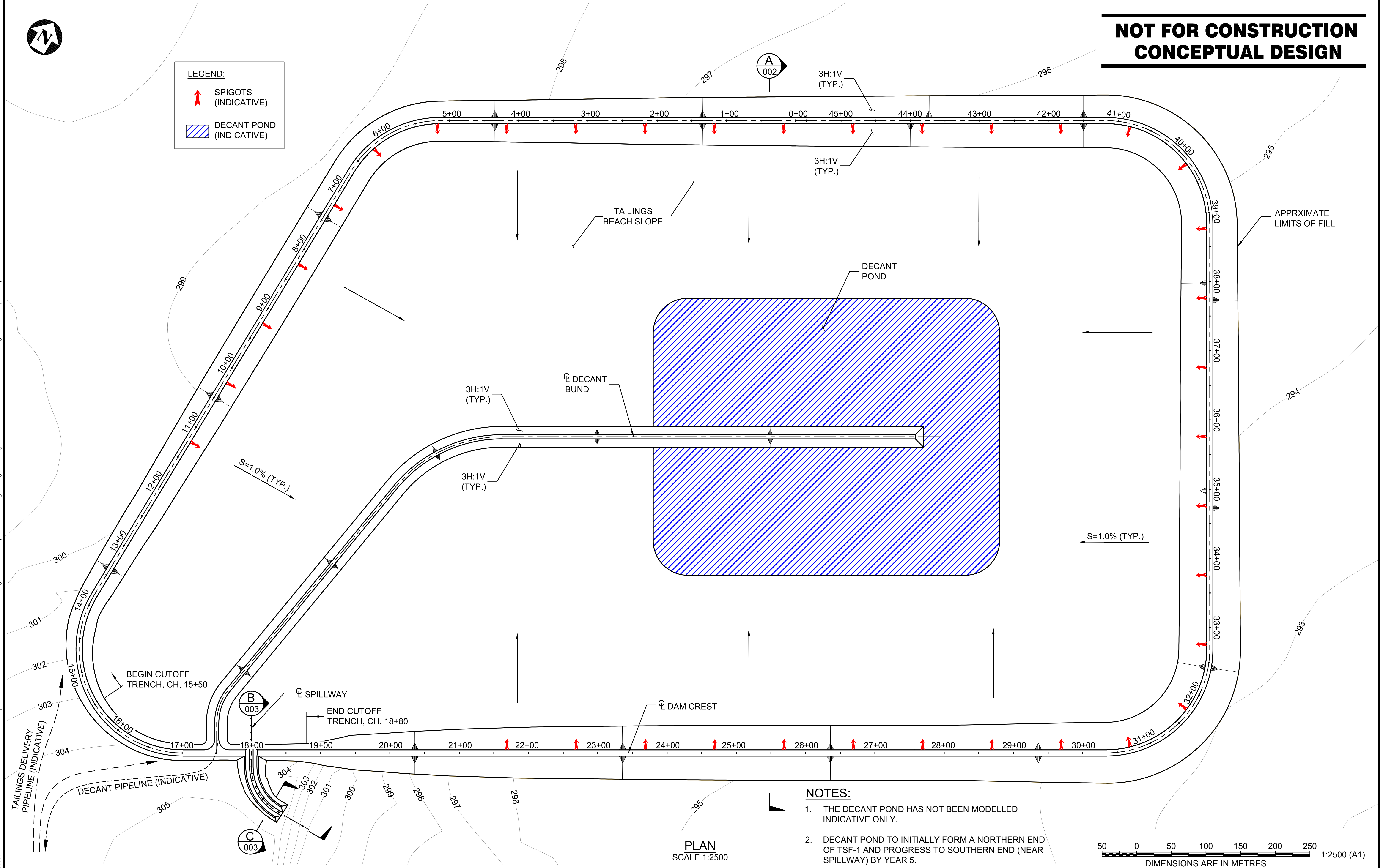
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE

NOT FOR CONSTRUCTION
CONCEPTUAL DESIGN



NOTES:

1. THE DECANT POND HAS NOT BEEN MODELLED - INDICATIVE ONLY.
2. DECANT POND TO INITIALLY FORM A NORTHERN END OF TSF-1 AND PROGRESS TO SOUTHERN END (NEAR SPILLWAY) BY YEAR 5.

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	07/09/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: TAILINGS STORAGE FACILITY 1 GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 07/09/12

Status: DRAFT

URS

PROJECT MANAGER:

Designed By: CW Date: 02/07/12

Drawn By: BH Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626920-TSF01-001

42626920-TSF 01-001.dwg

REV. A

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Plotted: 12/9/2012 3:06:27 PM File Name: \\brb-fs\jobs\42626920\5 Works\23 Basis Of Design - SEIS Concept\5 Works\Design\Design Drawings\TSF 01-02\42626920-TSF 01-001.dwg Printed: Stephen Tapuosi

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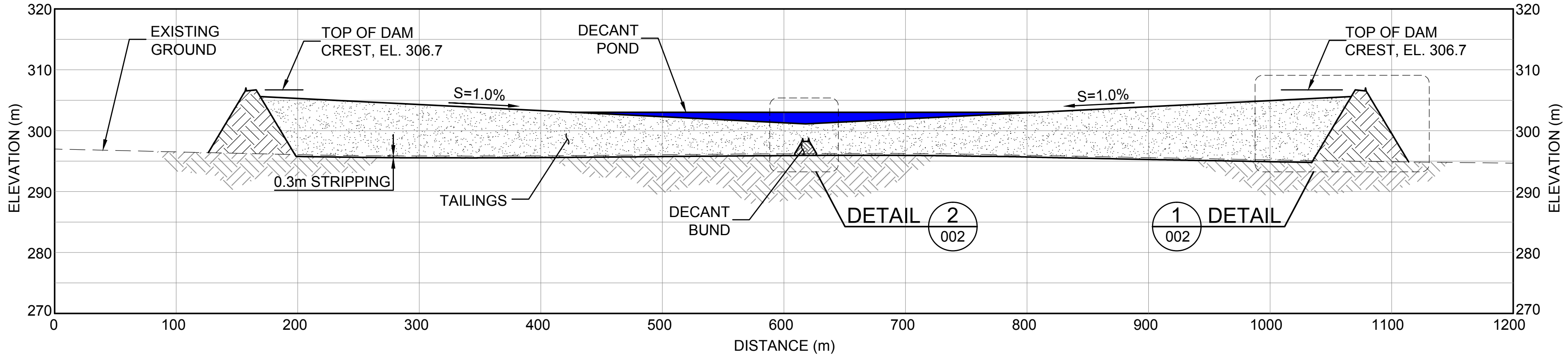
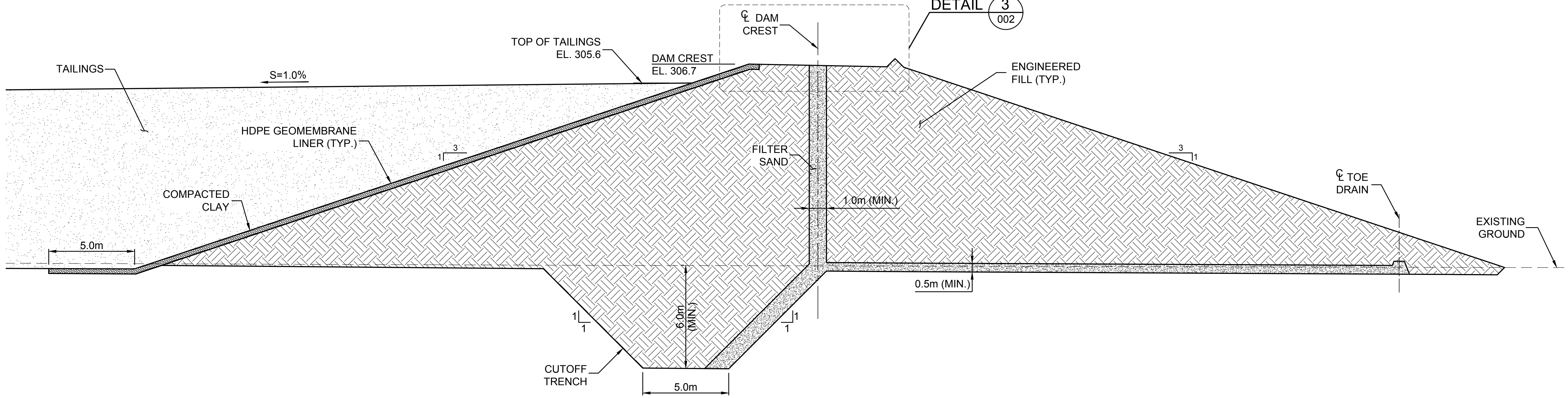


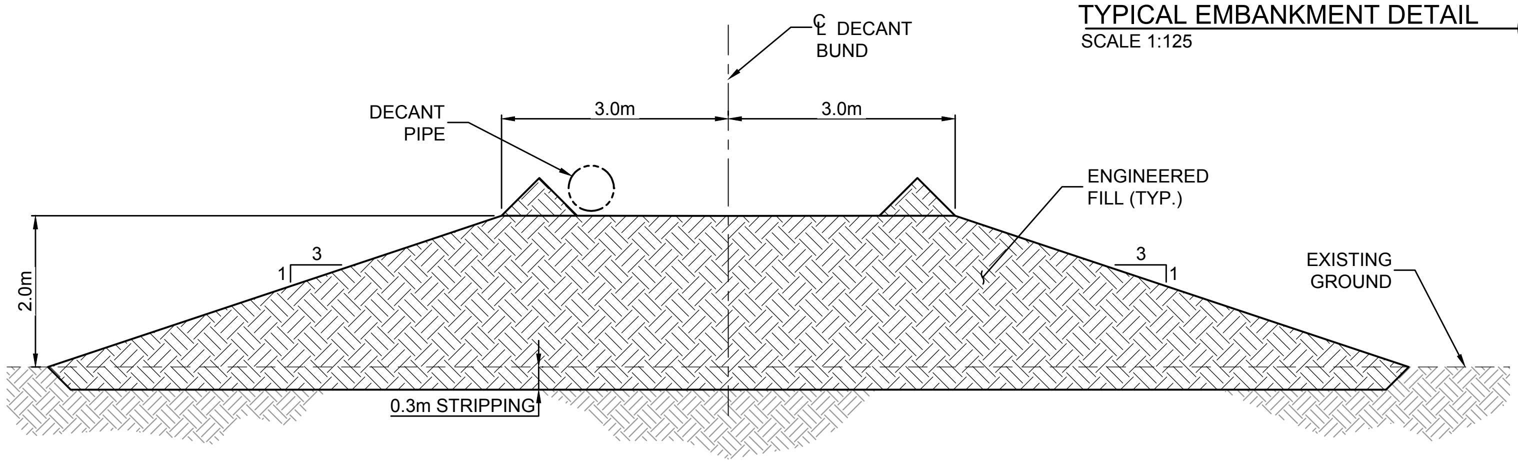
TYPICAL EMBANKMENT SECTION A 001
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:500

NOTES:

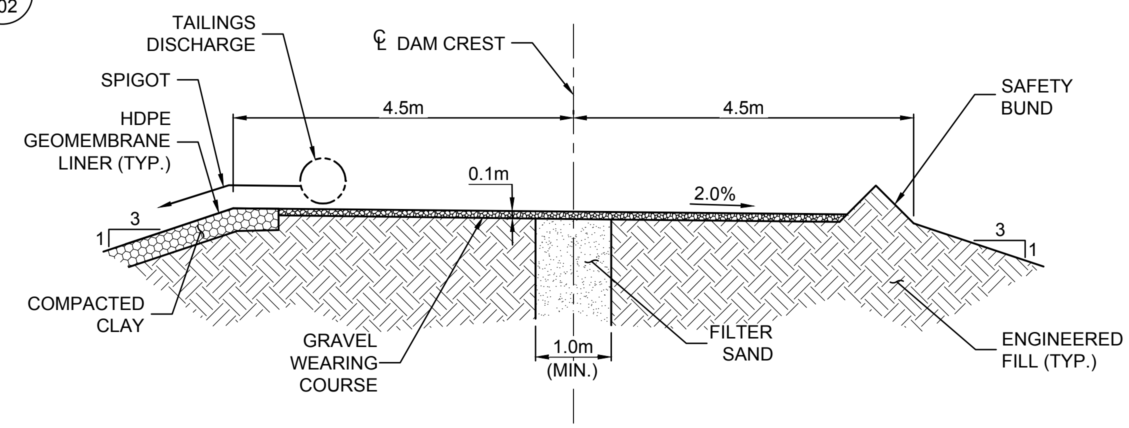
1. DOWNSTREAM EMBANKMENT FACES SHALL BE SEEDED AND COVERED WITH TURF REINFORCEMENT MATS (TRMS).
2. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.
3. TAILINGS AND DECANT PIPE SIZES ARE NOT CALCULATED.



TYPICAL EMBANKMENT DETAIL 1 002
SCALE 1:125



TYPICAL DECANT BUND DETAIL 2 002
SCALE 1:50



TYPICAL DAM CREST DETAIL 3 002
SCALE 1:50

1:50 (A1) — DIMENSIONS ARE IN METRES
1:125 (A1) — DIMENSIONS ARE IN METRES
1:500 (A1) — DIMENSIONS ARE IN METRES
1:2500 (A1) — DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	07/09/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: TAILINGS STORAGE FACILITY 1 SECTIONS AND DETAILS (1 OF 2)

Datum: GDA94 ZONE 55

Date: 07/09/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12

Drawn By: BH Date: 02/07/12

Checked By: - Date: -

Approved By: - Date: -

Drawing: 42626920-TSF01-002

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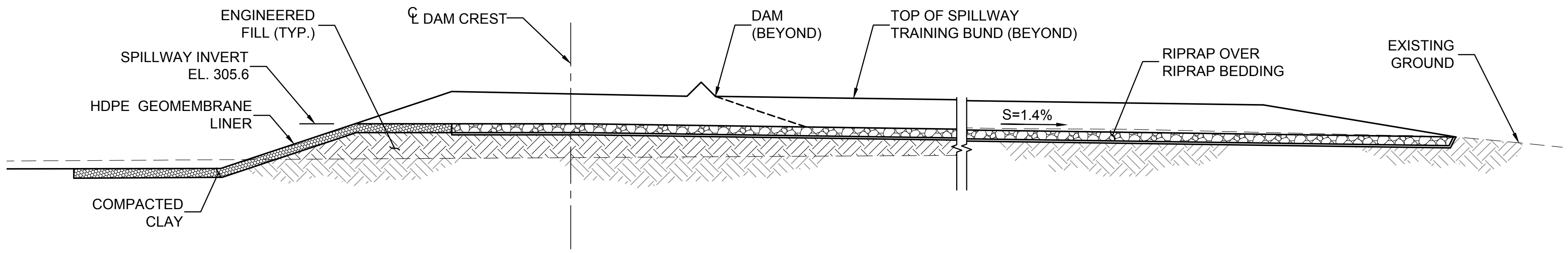
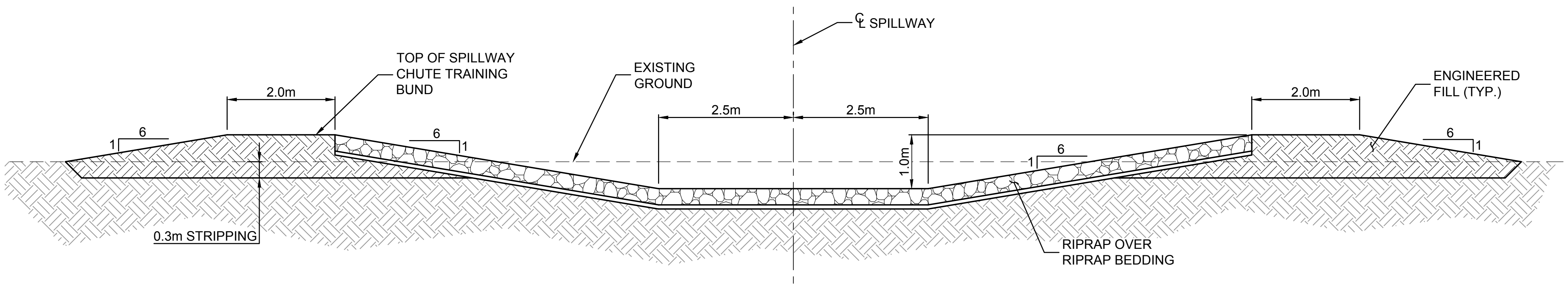


SPILLWAY LONG SECTION B / 001
SCALE 1:500



SPILLWAY CHUTE SECTION C / 001
SCALE 1:50

NOTES:

1. SAFETY BUNDS ON DAM CREST NOT SHOWN.
2. EXTERNAL EMBANKMENT FACES SHALL BE SEEDED AND COVERED WITH TURF REINFORCEMENT MATS (TRMS).
3. NO GEOTECHNICAL INVESTIGATIONS OF THE SUBSURFACE CONDITIONS HAVE BEEN UNDERTAKEN. AS SUCH, THE EMBANKMENT CUTOFF TRENCH DEPTHS ARE ONLY INDICATIVE.

1 0 1 2 3 4 5 — 1:50 (A1)
DIMENSIONS ARE IN METRES

10 0 10 20 30 40 50 — 1:500 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	07/09/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: TAILINGS STORAGE FACILITY 1 SECTIONS AND DETAILS (2 OF 2)

Datum: GDA94 ZONE 55

Date: 07/09/12

Status: DRAFT

URS

PROJECT MANAGER:

URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12

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Drawing: 42626920-TSF01-003

42626920-TSF 01-001.dwg

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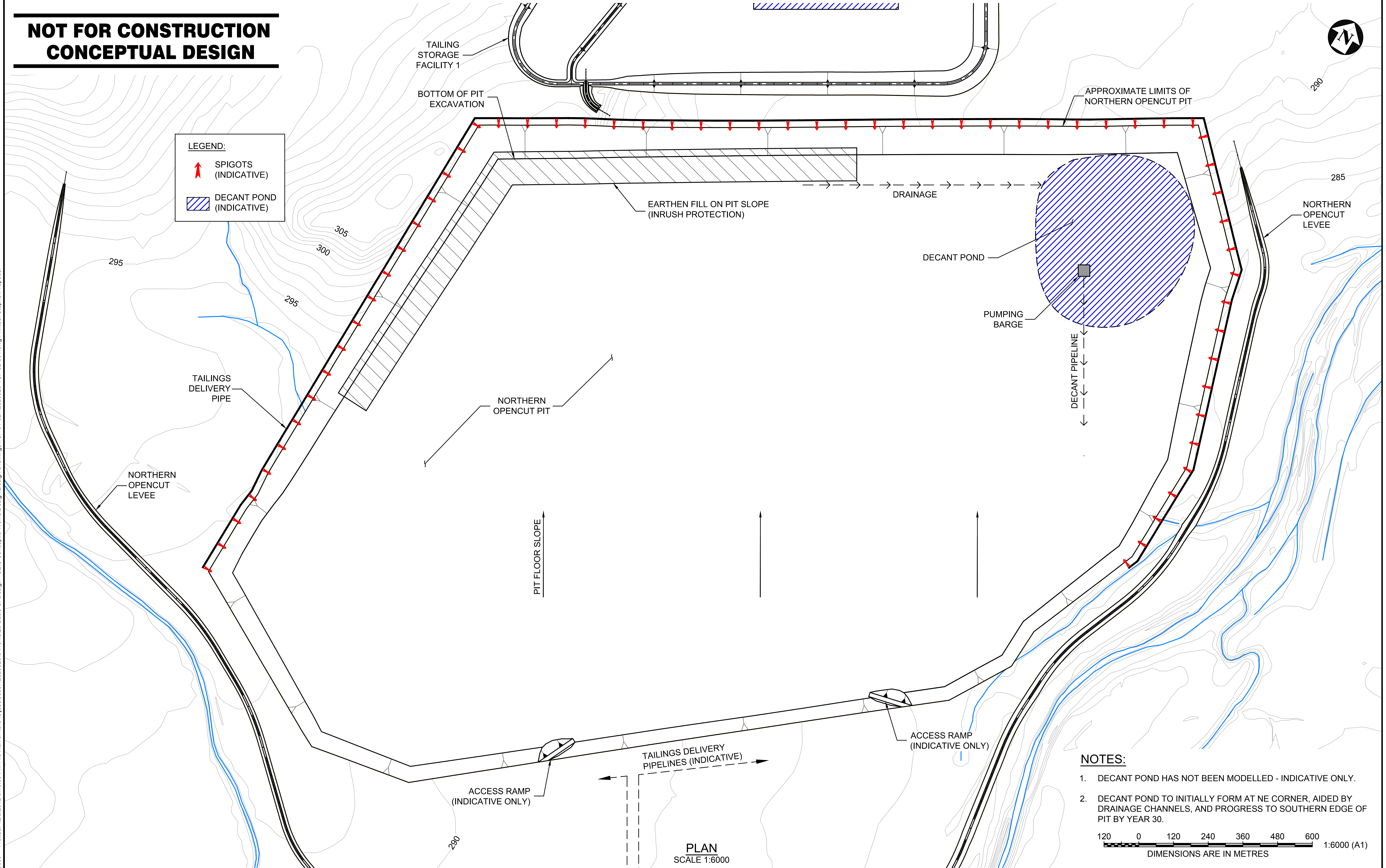

PLAN
SCALE 1:6000

NOTES:

1. DECANT POND HAS NOT BEEN MODELLED - INDICATIVE ONLY.
2. DECANT POND TO INITIALLY FORM AT NE CORNER, AIDED BY DRAINAGE CHANNELS, AND PROGRESS TO SOUTHERN EDGE OF PIT BY YEAR 30.

120 0 120 240 360 480 600 1:6000 (A1)
DIMENSIONS ARE IN METRES

Rev	Drawn	Design	Date	REVISION RECORD
A	BH	CW	07/09/12	CONCEPTUAL DESIGN

Client: HANCOCK GALILEE PTY LTD

Project Title: HANCOCK COAL KEVIN'S CORNER - WMEP

Drawing Title: TAILINGS STORAGE FACILITY 2 GENERAL ARRANGEMENT

Datum: GDA94 ZONE 55

Date: 07/09/12

Status: DRAFT

URS

PROJECT MANAGER:
URS Australia Pty. Ltd. PO BOX 302, Brisbane Queensland 4000 Tel: +61 7 3243 2111 Fax: +61 7 3243 2199

Designed By: CW Date: 02/07/12
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Drawing: 42626920-TSF02-001
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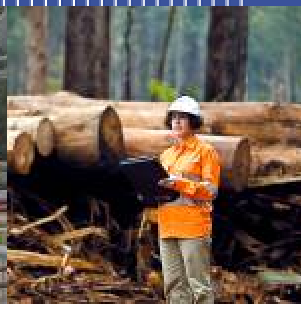

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