10. CLOSURE AND REHABILITATION

10.1 EMBANKMENT PROFILE

At the end of operation of the facility, the downstream faces of the external embankments will have a slope of 1V:3H, together with 5 m wide benches located at 10 m height intervals, yielding an overall slope profile of 1V:2.75H.

The adopted downstream profile will be inherently stable under both normal and seismic loading conditions, will provide a stable drainage system, and will allow for re-vegetation. The embankment should be rehabilitated soon after de-commissioning.

10.2 TAILINGS PROFILE

During the operation, deposition will occur from the embankment and the low point on the tailings surface will occur approximately at the decant tower. During the final stage of operation deposition will also be carried out along the northern end of the embankment in order to deposit towards the location of the final spillway. Rehabilitation of the tailings surface will commence upon termination of deposition into the facility.

10.3 REHABILITATION

The geochemical studies have concluded that the tailings are non-acid forming. In addition, the concentrations of enriched elements in the tailings are below ecological or health based levels. Regardless, the control of seepage through the facility by means of appropriate closure design will be one of the objectives of the rehabilitation process.

In addition to this objective, other aspects of the rehabilitation programme will be re-vegetation, erosion control and stormwater management. Establishing a surface cover of verdant vegetation will reduce the potential for adverse environmental impact such as dust generation and rainfall erosion, as well as improving aesthetics. To this end rehabilitation trials will be undertaken during the life of the storage to determine the most efficient method to provide an effective cap and rehabilitate the surface of the facility. The results of these trials will be used to design the most suitable cover which will be placed over the tailings surface.

After removal of the pond around the decant, drying of the tailings to a sufficient degree to facilitate trafficking is expected to take number of months. Prior to commencing the earthworks component of the rehabilitation, the tailings delivery and distribution pipework will be removed from the facility, and the top sections of the decant towers

will be removed so that the towers are below the access causeway level. Finally, the decant towers will be backfilled and sealed.

It is anticipated that a low permeability layer will be required to minimise rainfall infiltration into the tailings. In addition, a layer of mine waste approximately 0.3 m to 0.5 m thick will be placed to act as a capillary break, and this will be followed by a layer of waste and topsoil, also 0.5 m thick, to act as a growth medium. The finished surface will be shallow ripped and seeded with shrubs and grasses.

The underdrainage system will need to continue to operate for some time after completion of capping and re-vegetation to drain excess water from the tailings deposit. The quantity of water recovered from the underdrainage system will reduce with time and experience with similar facilities suggests that water recovery may continue for a period of up to a year following closure. During this time, water from the underdrainage system will be pumped to the process ponds. After the flow ceases, the underdrainage pump will be removed and the underdrainage riser backfilled and sealed as part of the rehabilitation process.

The final profile of the tailings surface will be re-shaped to slope gently from the embankment towards the final spillway and the low spot on the tailings surface will be adjacent to the spillway. The closure spillway will be constructed along the southern perimeter of the facility to allow rainfall runoff from the surface of the rehabilitated facility to flow into the surrounding natural drainage system.

11. CONSTRUCTION QUANTITIES

On the basis of the design presented, operating parameters supplied and/or assumed, construction quantities for the life of the facility has been determined. The quantities given are deemed accurate enough for an overall accuracy of ±10% - 15%.

Life of operation quantities for construction of the tailings storage facility are presented in Table 11.1. The following assumptions were made:

- Zone A will be obtained from the TSF basin.
- Zone C will be obtained from mine waste (box cut) for Stage 1 and from mine waste or local borrow for Stages 2 and 3.
- Zone D will be obtained from the TSF basin or from mine waste (box cut).
- Zone E will be selected material from mine waste (box cut).
- Zone F will be imported from a local borrow source.
- Zone G will be selected material from mine waste (box cut).

Table 11.1: Tailings Storage Facility, Bill of Quantities – Final Design

			Stage 1	Stage 2	Final	Total
ITEM	**Description**	**Unit**	**Qty**	**Qty**	**Qty**	**Qty**
1	**Preliminary and General**					
1.1	Mobilise to site (nominal 10%)	item	1	1	1	3
1.2	De-mobilise from site (nominal 10%)	item	1	1	1	3
1.3	Fixed costs while established on site (nominal 10%)	weeks	12	6	6	24
1	**TOTAL FOR PRELIMINARY AND GENERAL**					
2	***Foundation Preparation***					
2.1	Clear and grub embankment footprint	sq m	16,800	3,700	3,100	23,600
2.2	Strip topsoil (300 mm nominal) from embankment foundation and stockpile	sq m	16,800	3,700	3,100	23,600
2.3	Excavate embankment cut-off trench, haul, place and spread excavated material in Zone C	ccm	4,000	3,200	2,800	10,000
2.4	Scarify, moisture condition and compact embankment foundation (includes cut-off trench plus 5 m)	sq m	16,800	3,700	3,100	23,600
2.5	Win from borrow area, spread, moisture condition and compact Zone A material in cut-off trench	ccm	4,000	3,200	2,800	10,000
2	**TOTAL FOR FOUNDATION PREPARATION**					
3	***General Embankment Earthworks***					
3.1	Win from borrow, load, haul, spread, moisture condition and compact Zone A material in embankment zones	ccm	7,000	7,500	7,500	22,000
3.2	Win from mine waste, load, haul, spread, moisture condition and compact Zone C material in embankment	ccm	100,000	-	-	100,000
3.3	Win from borrow, load, haul, spread, moisture condition and compact Zone C material in embankment	ccm	-	14,800	35,000	49,800
3.4	Supply and install 160 mm dia class 400 slotted CPT draincoil, with tees, bends and joints inclusive for toe drain	m	190	150	130	470
3.5	Win from local borrow, haul and place Zone F sand material to upstream toe drain	ccm	70	50	50	170
3.7	Supply and install geotextile (Bidim A14 or equivalent) to upstream toe drain	sq m	570	450	390	1,410
3.8	Supply and install 1.5 mm (60 mil) smooth HDPE geomembrane to embankment upstream face	sq m	4,100	-	-	4,100
3.9	Win from local borrow, load, haul, place and compact wearing course onto embankment crest (150mm thick)	ccm	200	400	500	1,100
3.10	Win from local borrow, load, haul, and place Zone D fill as crest safety berm	ccm	100	200	300	600
3	**TOTAL FOR GENERAL EMBANKMENT EARTHWORKS**					
4	***Spillway***					
4.1	Clear vegetation from spillway area	Ha	0.15	-	-	0.15
4.2	Grub spillway area	Ha	0.15	-	-	0.15
4.3	Strip topsoil (300 mm) from spillway foundation, load and haul to stockpile	ccm	300.0	-	-	300.0
4.4	Excavate emergency spillway, load, haul and place excavated material to embankment Zone C	ccm	500	500	500	1,500
4	**TOTAL FOR SPILLWAY**					
5	***Basin Construction***					
5.1	Clear and grub basin area	sq m	36,100	16,900	18,900	71,900
5.2	Re-shape basin area along valley spine (nominal allowance)	ccm	14,800	35,000	-	49,800
5.3	Strip topsoil (150 mm nominal) and stockpile	sq m	36,100	16,900	18,900	71,900
5.4	Scarify, moisture condition and compact basin in situ materials to form basin liner	sq m	36,100	16,900	18,900	71,900
5.5	Prepare basin subgrade for HDPE lined area	sq m	25,100	5,400	5,900	36,400
5.6	Supply and install 1.5 mm HDPE liner to basin underdrainage area	sq m	25,100	5,400	5,900	36,400
5	**TOTAL FOR BASIN CONSTRUCTION**					
6	***Underdrainage System***					
6.1	Proof roll basin area	Ha	3.6	1.7	1.9	7.2
6.2	Excavate main collector drain to Zone C or designated local stockpile	ccm	-	-	-	-
6.3	Excavate surface drain for branch drains to Zone C or designated local stockpile	ccm	-	-	-	-
6.4	Win from borrow import, load, haul, place and spread Zone F drainage sand for main collector drain	ccm	600	200	-	800
6.5	Win from borrow import, load, haul, place and spread Zone F drainage sand for branch drains	ccm	70	10	-	80
6.6	Win from borrow import, load, haul, place and spread Zone F drainage sand for finger drains	ccm	1,600	540	270	2,410
6.7	Win from local borrow, haul and place Zone E erosion protection layer (150 mm thick) to main collector drain	ccm	390	100	-	490
6.9	Win from borrow, haul and place Zone E erosion protection layer to branch underdrains	ccm	-	-	-	-
6.10	Supply and install 1.5 mm (60 mil) textured HDPE geomembrane to decant tower	sq m	600	600	-	1,200
6.11	Supply and install geotextile (Bidim A14 or equivalent) to main collector drain	sq m	4,500	1,200	-	5,700
6.12	Supply and install geotextile (Bidim A14 or equivalent) to branch drains	sq m	900	100	-	1,000
6.13	Supply and install geotextile (Bidim A14 or equivalent) to finger drains	sq m	3,200	1,100	600	4,900
6.14	Supply and install 160 mm class 400 CPT draincoil to main collector drain, with filter sock, tees, bends and joints (includes connector pipes)	m	1,280	320	-	1,600
6.15	Supply and install 100 mm class 400 CPT draincoil to branch drains, with tees, bends and joints	m	330	40	-	370
6.16	Supply and install 100 mm class 400 CPT draincoil to finger drains, with tees, bends and joints	m	1,600	540	270	2,410
6	**TOTAL FOR UNDERDRAINAGE SYSTEM**					
7	***Underdrainage Collection Sump***					
7.1	Excavate underdrainage collection sump, place and spread to Zone C or designated spoil stockpile	ccm	360	-	-	360
7.2	Win from borrow import, load, haul, place and compact Zone A soil liner for underdrainage sump	ccm	90	-	-	90
7.3	Win from borrow import, load, haul and place clean gravel backfill to underdrainage sump	ccm	260	-	-	260
7.4	Supply and install geotextile (Bidim A24 or equivalent) to underdrainage sump	sq m	580	-	-	580
7.5	Supply and install 450 mm dia HDPE (SDR 11) riser pipe (slotted) including all fittings	m	7	-	-	7
7.6	Supply and install 450 mm dia HDPE (SDR 11) riser pipe (un-slotted) including all fittings	m	65	-	-	65
7.7	Supply and install solid end cap to riser pipe	No	1	-	-	1
7.8	Excavate riser pipe channel	ccm	10	-	-	10
7.9	Supply and install 1.5 mm (60 mil) smooth HDPE wear-sheets for underdrainage sump and riser pipe	sq m	780	-	-	780
7.10	Supply and install conveyor belt to support riser pipe	m	3	-	-	3
7.11	Supply and install cement stabiliser backfill to underdrainage riser excavation					
7.12	Install HDPE pipe boot (includes two steel band clamps)	No	1	-	-	1
7	**TOTAL FOR UNDERDRAINAGE SYSTEM**					
8	***Decant System***					
8.1	Spread, moisture condition and compact Zone A protective layer as base of decant causeway	ccm	180	360	0	540
8.2	Spread, moisture condition and compact Zone D decant access causeway fill	ccm	2,000	4,000	1,500	7,500
8.3	Win from stockpile, load, haul and place Zone G selected clean rockfill decant surround	ccm	550	1,100	700	2,350
8.4	Supply and install 25 MPa concrete base including formwork and reinforcement	ccm	6	6	0	12
8.5	Supply and install 1800 mm diameter slotted reinforced concrete decant tower	m	5	8	4	17
8.6	Supply and install geotextile (Bidim A24 or equivalent) to decant access causeway Zone D / rockfill transition	sq m	100	200	100	400
8.7	Win from stockpile, load, haul, place and compact wearing course to decant access causeway (150 mm thick)	ccm	30	30	30	90
8.8	Win from borrow, load, haul and place Zone D material as safety berm on decant access causeway	ccm	20	20	20	60
8	**TOTAL FOR DECANT SYSTEM**					
9	***Miscellaneous***					
9.1	Install and survey settlement pins	No.	10	10	5	25
9.2	Install piezometers	No.	5	5	5	15
9.3	Construct complete downstream monitoring bore stations	No.	5	-	-	5
9.4	Excavate diversion channel, load haul and place excavated soil to embankment Zone C	ccm	2,500	-	-	2,500
9	**TOTAL FOR MISCELLANEOUS**					

KP svr\...\PE801-139_5 Dargues Reef TSF Final Design Rev 0

12. RISKS AND OPPORTUNITIES

12.1 GENERAL

The nature of the design process is such that the tailings storage facility design is based upon a series of design parameters and assumptions which may or may not be interconnected. In general terms the facility is designed for average operating conditions, with some allowance for extreme occurrences, as determined by design and government agency guidelines. The implications of variation of design assumptions versus operational experience are potential cost savings or cost increase, depending upon the actual circumstances. As such, the approach to the final design of the tailings storage facility has been to build in flexibility to the proposed construction and operation in order to allow for variation of these parameters during operation.

Monitoring and auditing of the facilities will be carried out on a regular basis in accordance with the guidelines presented in Section 8 in order to enable comparison of design assumptions with operational performance and to facilitate amendments to the operation and/or design of future stages of the facility construction.

Potential impacts to each facility arising from variation in design assumptions are discussed in the following sections.

12.2 TAILINGS STORAGE FACILITY

The design of the tailings storage facility is based upon the primary requirement to retain a defined mass of tailings material at a specific flow rate, and with particular physical and behavioural characteristics. The facility operates within the environment and climatic region of south-eastern New South Wales, and is required to meet defined operating standards in terms of seepage control and stability. The key operating functions and impacting design variables are as follows:

- Embankment raise timing and height – dependent on tailings throughput and achieved tailings density. Tailings density is dependent in part on climatic variables.
- Embankment stability – dependent on steady state phreatic surface and effectiveness of underdrainage and toe drains.
- Seepage rates – dependent on tailings consolidation and effectiveness of basin underdrainage.
- Supernatant recovery and volume of water pumped to process plant – dependent on tailings consolidation, rainfall runoff and evaporation.

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FIGURES

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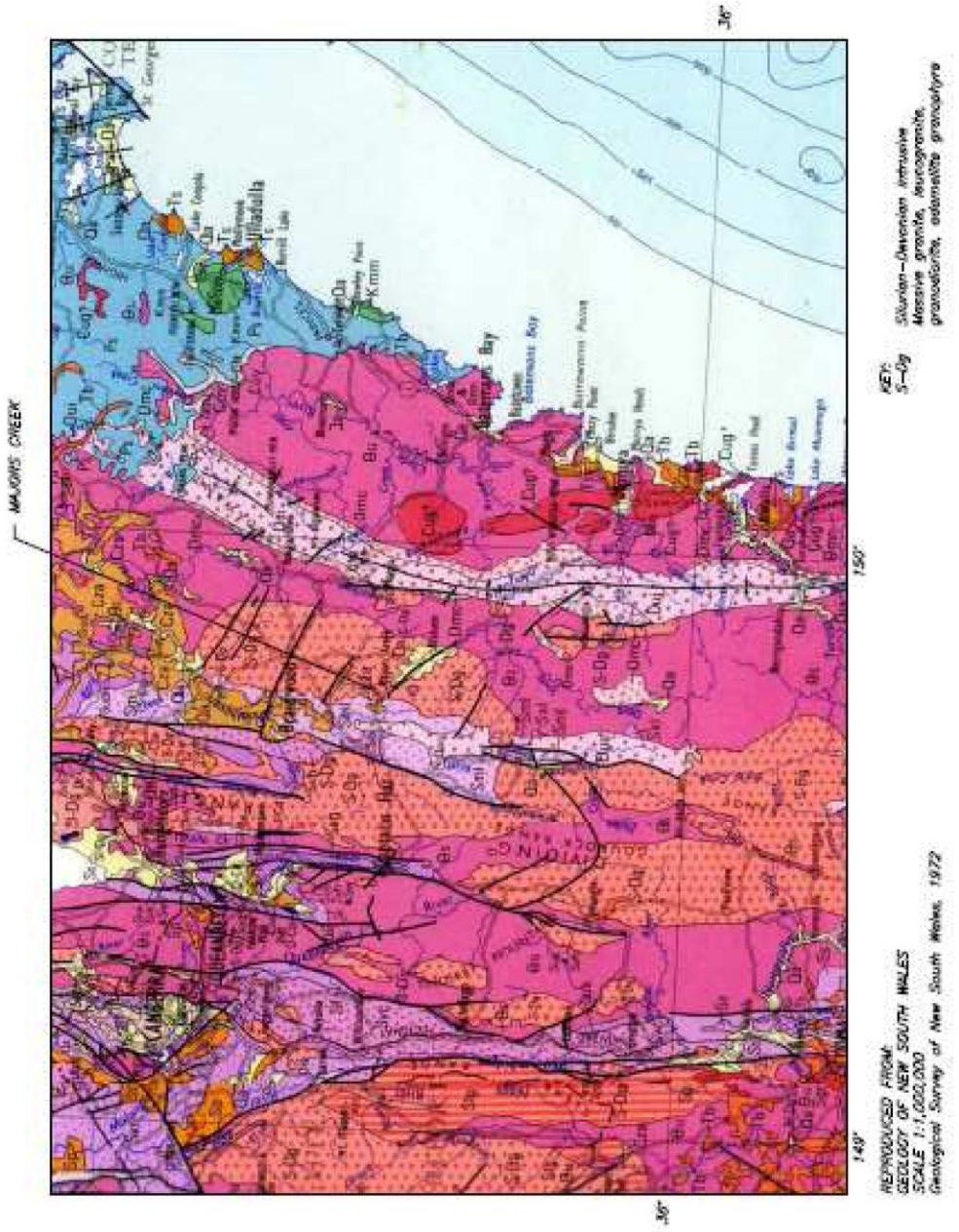

DARGUES REEF GOLD PROJECT
FINAL DESIGN
REGIONAL GEOLOGICAL MAP

Ref: PE801-00139/05
Figure 2.1

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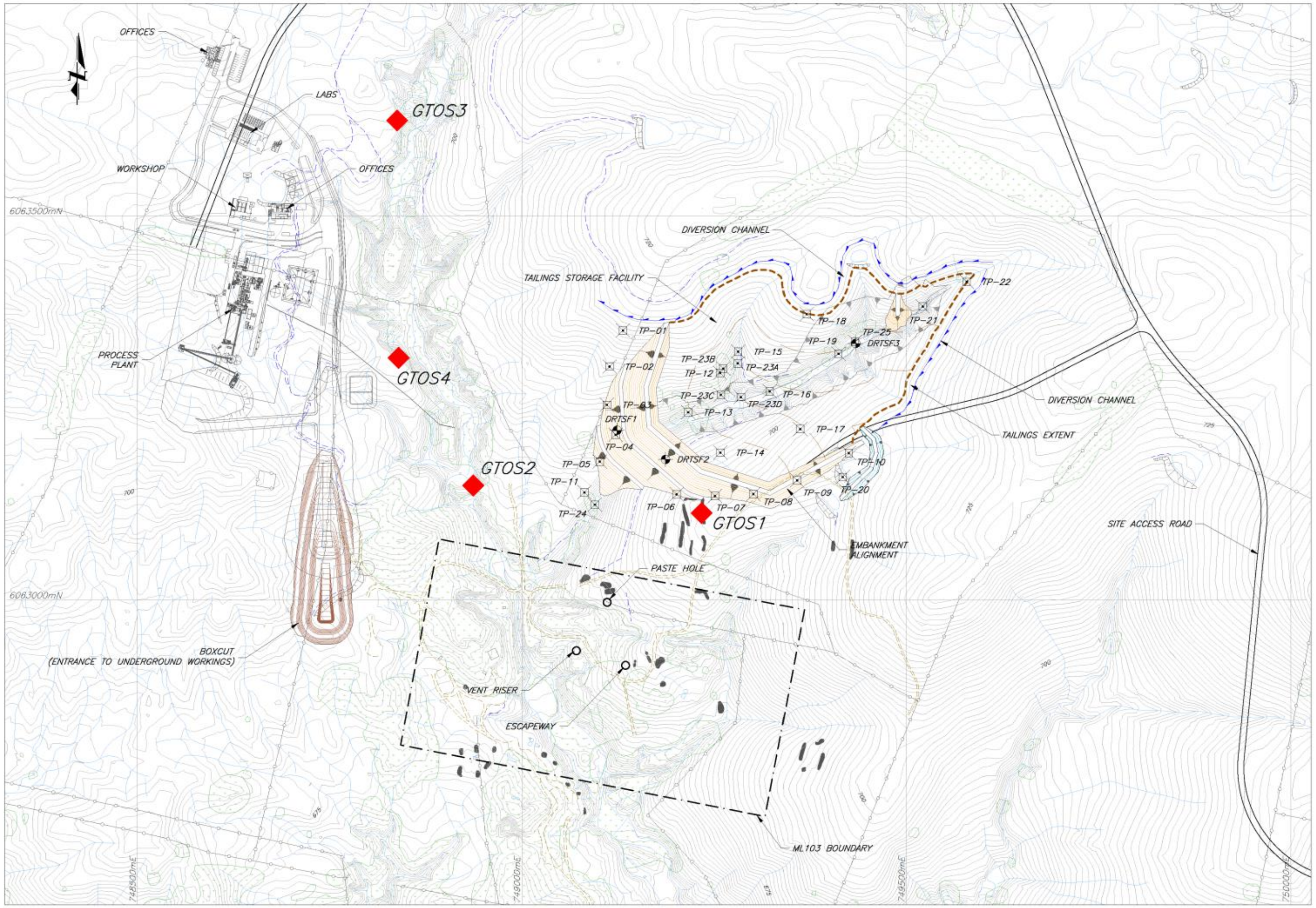

LEGEND:
- BOREHOLE LOCATION (KNIGHT PIESOLD, MAY 2010)
- TEST PIT LOCATION (KNIGHT PIESOLD, MAY 2010)
- HERITAGE SITE

BOREHOLE LOCATIONS

BH No.	EASTING	NORTHING
DRTSF1	749124	6063221
DRTSF2	749187	6063183
DRTSF3	749434	6063334

TEST PIT LOCATIONS

TP No.	EASTING	NORTHING
TP-01	749132	6063351
TP-02	749114	6063304
TP-03	749111	6063254
TP-04	749122	6063215
TP-05	749101	6063180
TP-06	749201	6063137
TP-07	749251	6063135
TP-08	749301	6063138
TP-09	749358	6063156
TP-10	749425	6063191
TP-11	749081	6063140
TP-12	749258	6063296
TP-13	749216	6063244
TP-14	749258	6063192
TP-15	749281	6063323
TP-16	749323	6063272
TP-17	749362	6063222
TP-18	749370	6063372
TP-19	749412	6063320
TP-20	749417	6063160
TP-21	749521	6063382
TP-22	749578	6063414
TP-23A	749281	6063308
TP-23B	749262	6063301
TP-23C	749259	6063267
TP-23D	749285	6063264
TP-24	749095	6063124
TP-25	749433	6063336

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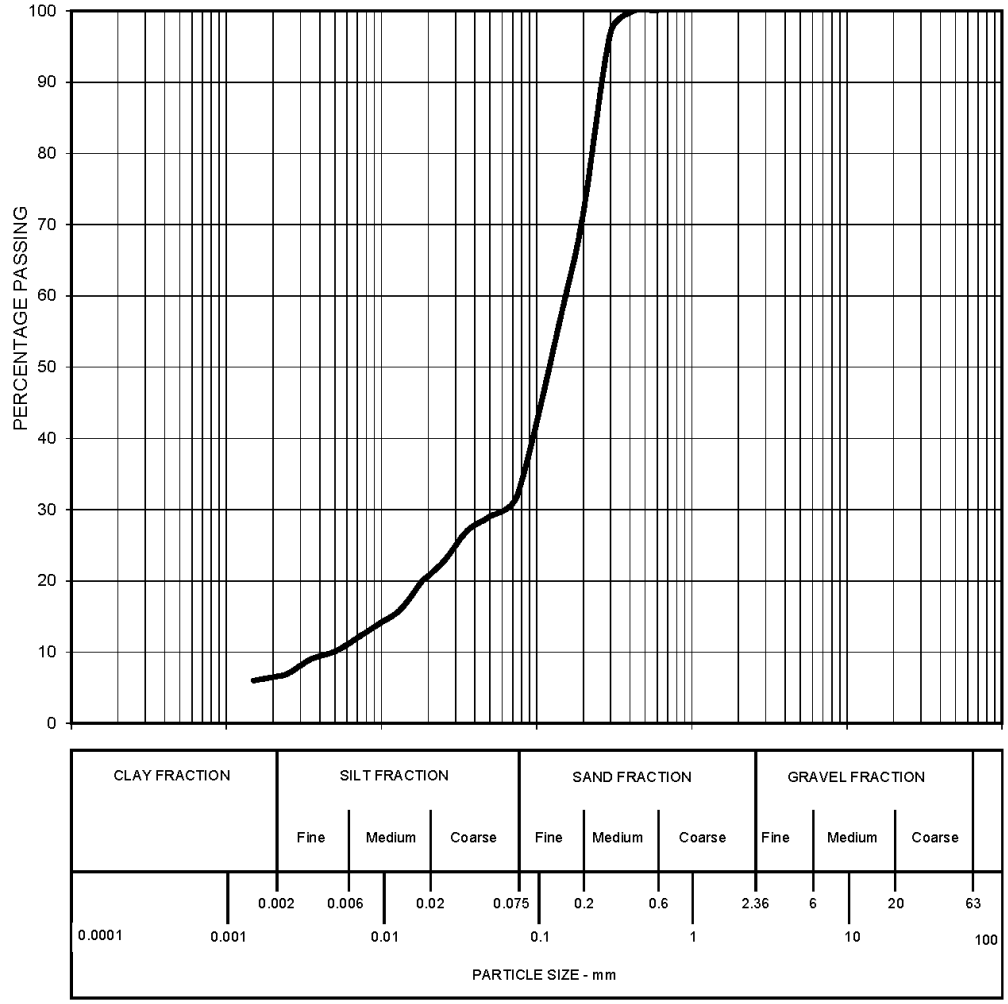
DARGUES REEF GOLD PROJECT
FINAL DESIGN
SITE INVESTIGATION LOCATIONS

Ref: PE801-00139/05
Figure 3.1
Rev: 0

PE801-00139 SUMMARY PLOTS.xlsm

PARTICLE SIZE DISTRIBUTION



SYMBOL	SOIL DESCRIPTION	LIQUID LIMIT	PLASTICITY INDEX	SPECIFIC GRAVITY
———	COMBINED	27	NP	2.71

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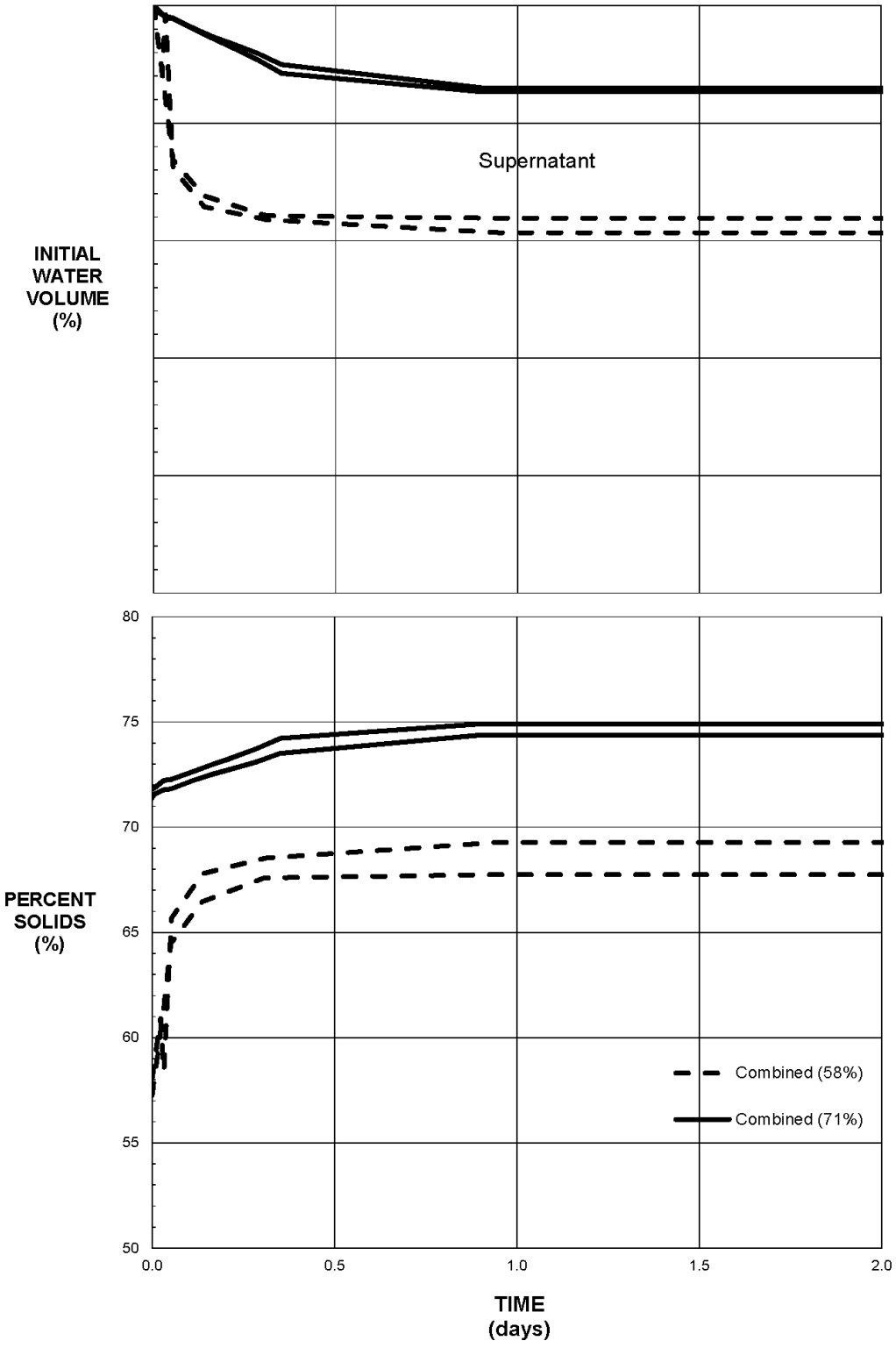
DARGUES REEF GOLD PROJECT
PARTICLE SIZE DISTRIBUTION CURVE
COMBINED TAILINGS SAMPLE

Ref: PE801-00139/5
Figure 4.1

PE801-00139 SUMMARY PLOTS.xlsm



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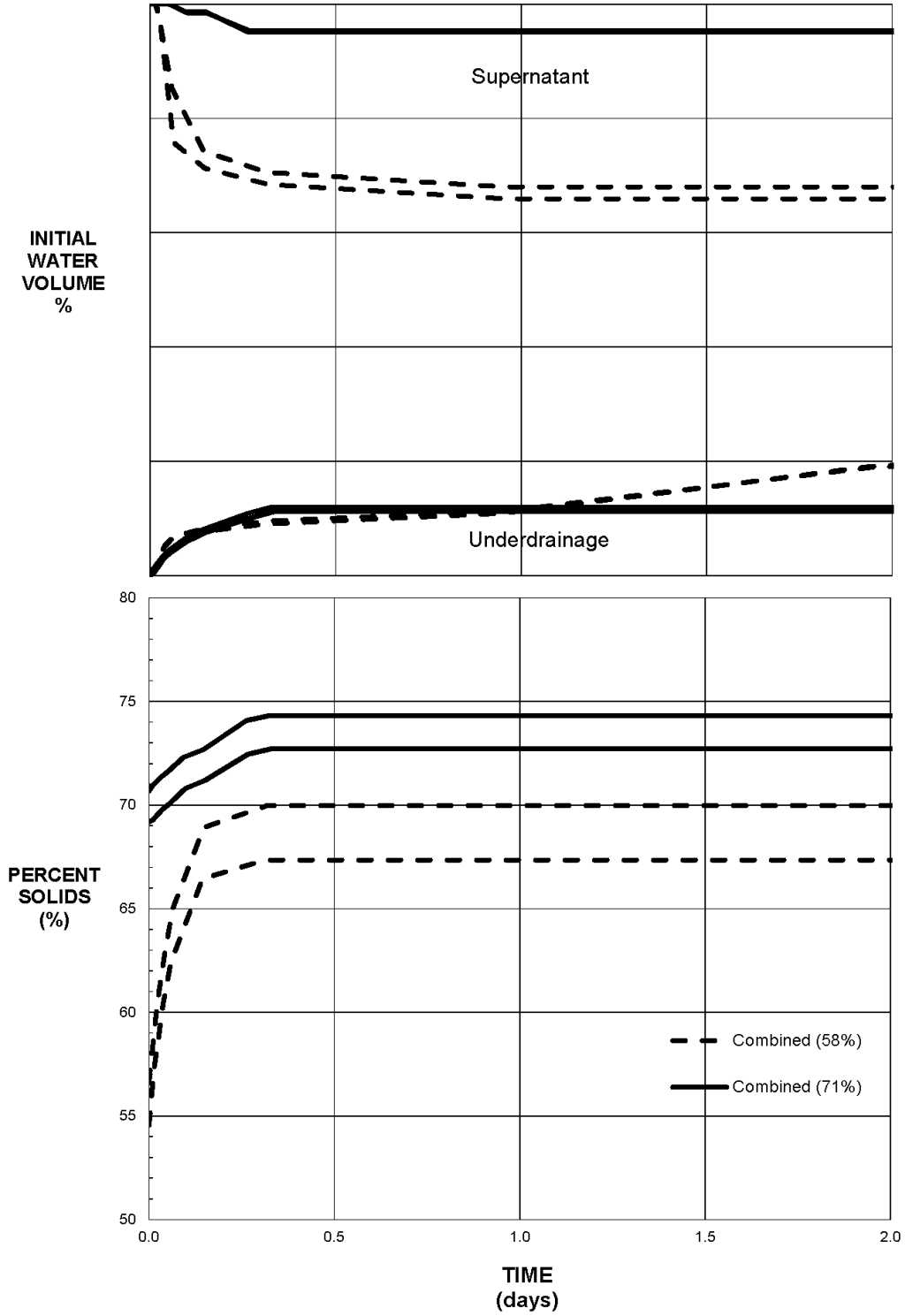
DARGUES REEF GOLD PROJECT
UNDRAINED SETTLING TESTS
COMBINED TAILINGS SAMPLE

Ref: PE801-00139/5
Figure 4.2

PE801-00139 SUMMARY PLOTS.xlsm



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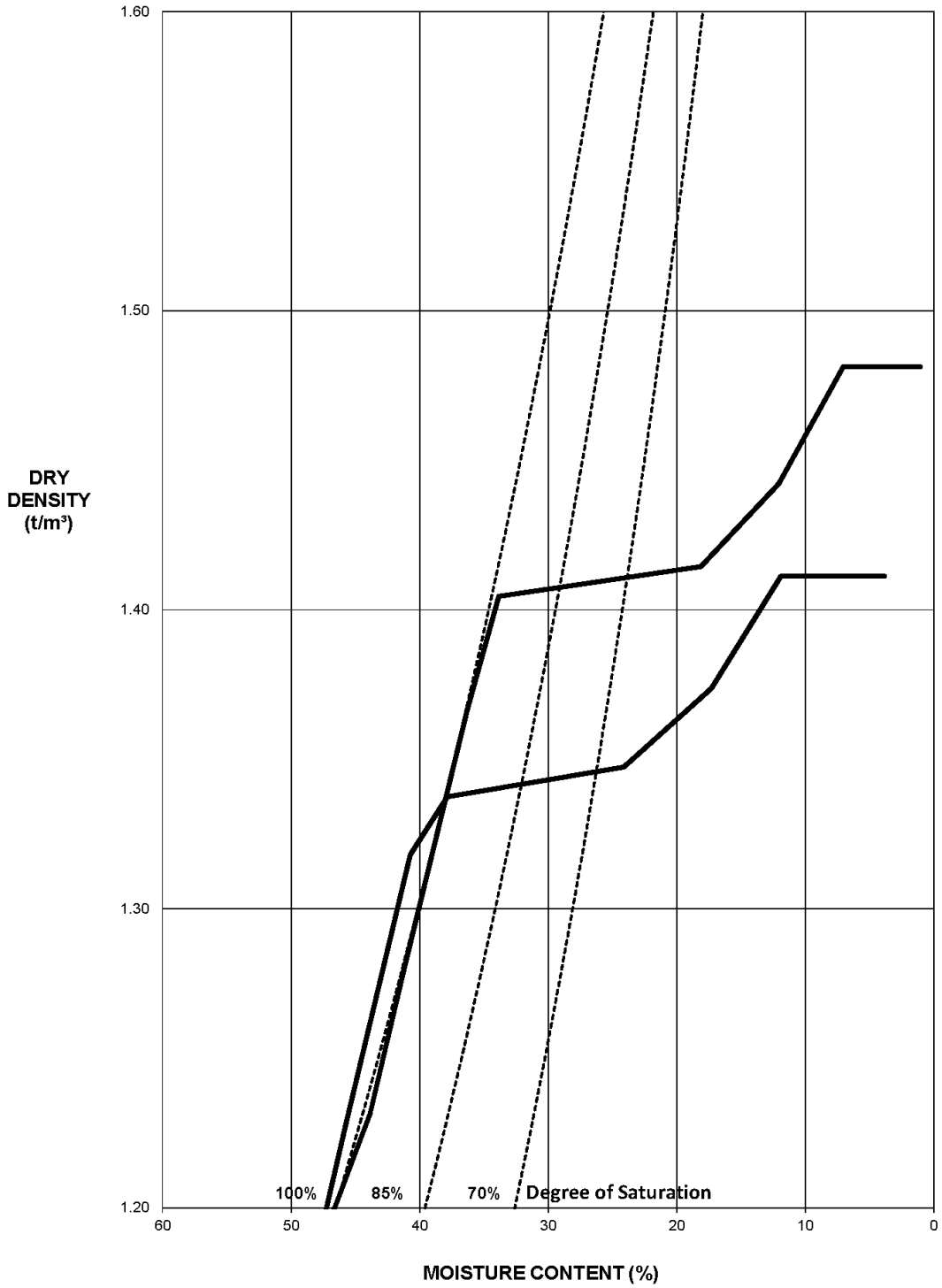
DARGUES REEF GOLD PROJECT
DRAINED SEDIMENTATION TESTS
COMBINED TAILINGS SAMPLE

Ref: PE801-00139/5
Figure 4.3

PE801-00139 Combined 58% Tailings Testing 20100817 dean 300810.xlsm



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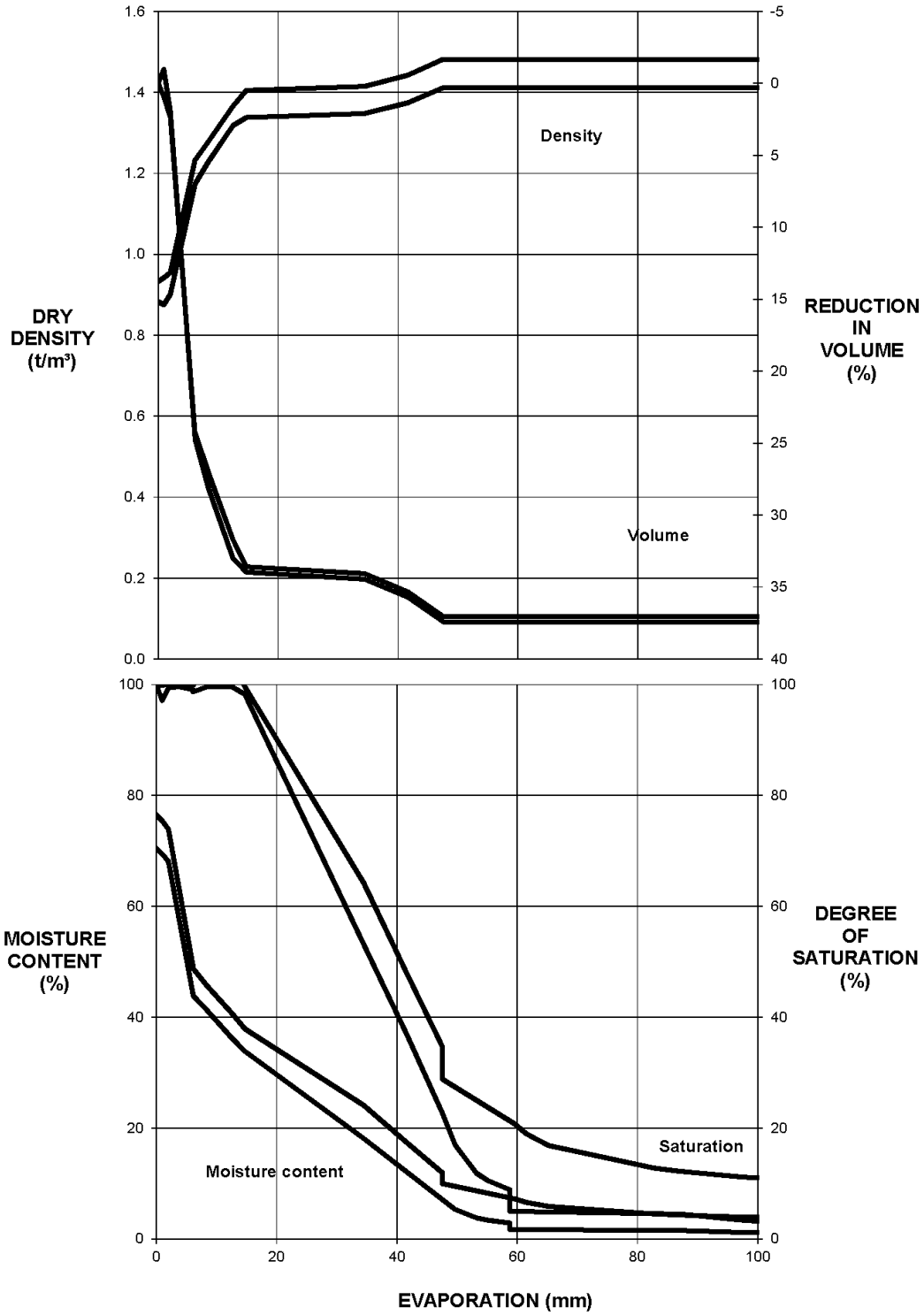
DARGUES REEF GOLD PROJECT
AIR DRYING TESTS - MOISTURE vs DRY DENSITY
COMBINED TAILINGS

Ref: PE801-00139/5
Figure 4.4

PE801-00139 Combined 58% Tailings Testing 20100817 dean 300810.xlsm



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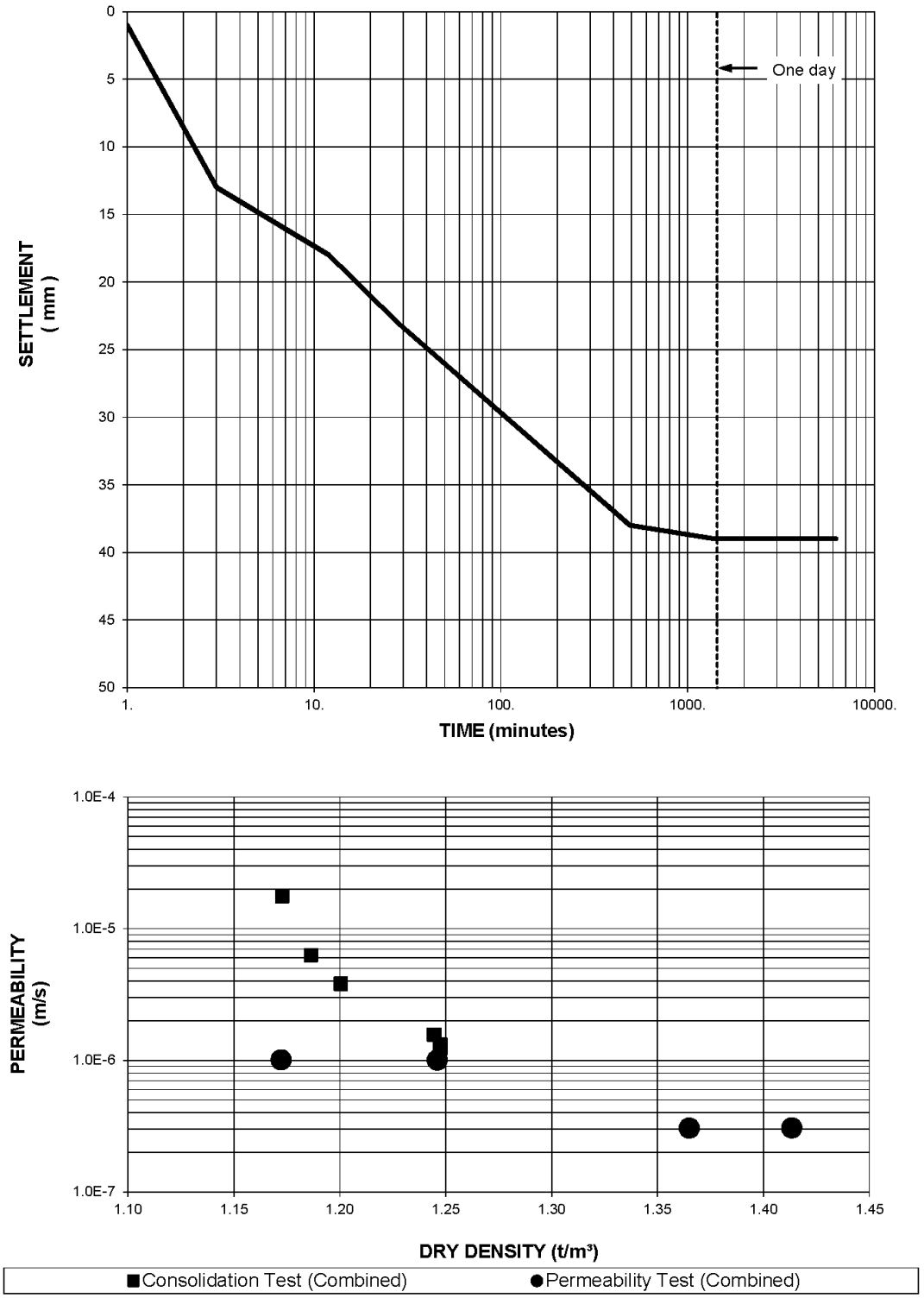
DARGUES REEF GOLD PROJECT
AIR DRYING TESTS - EVAPORATION
COMBINED TAILINGS

Ref: PE801-00139/5
Figure 4.5

PE801-00139 SUMMARY PLOTS.xlsm



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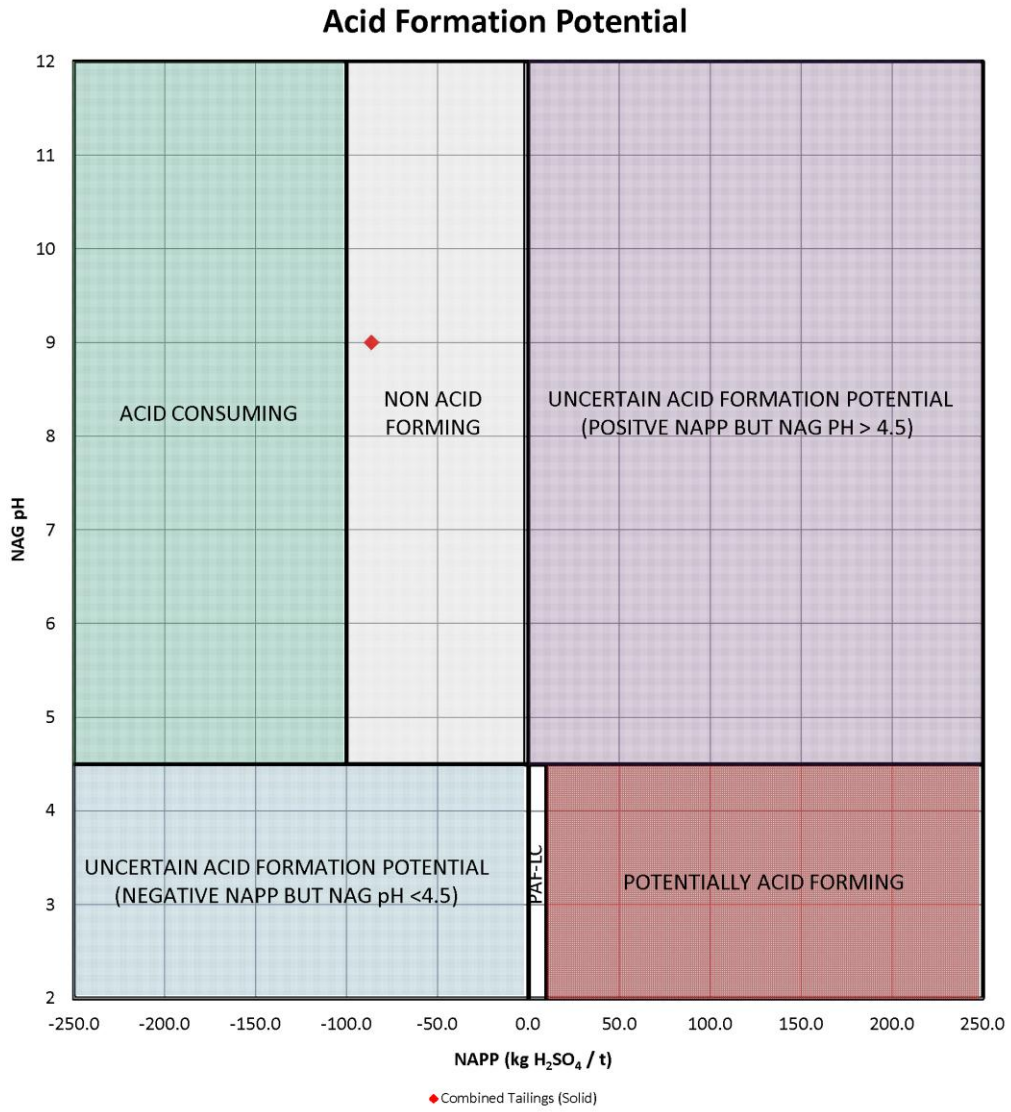
DARGUES REEF GOLD PROJECT
CONSOLIDATION
COMBINED TAILINGS SAMPLE

Ref: PE801-00139/5
Figure 4.6

PE801-00139 Tailings Solids Geochemistry Results - final Figure 4.7



Acid Formation Potential	NAPP (kg H_2SO_4 / t)	NAG pH
Potential Acid Forming (PAF)	>10	<4.5
Potential Acid Forming - Low Capacity (PAF - LC)	0 to 10	<4.5
Non Acid Forming (NAF)	Negative	≥4.5
Acid Consuming (AC)	Less than - 100	≥4.5
Uncertain	Positve	≥4.5
	Negative	<4.5

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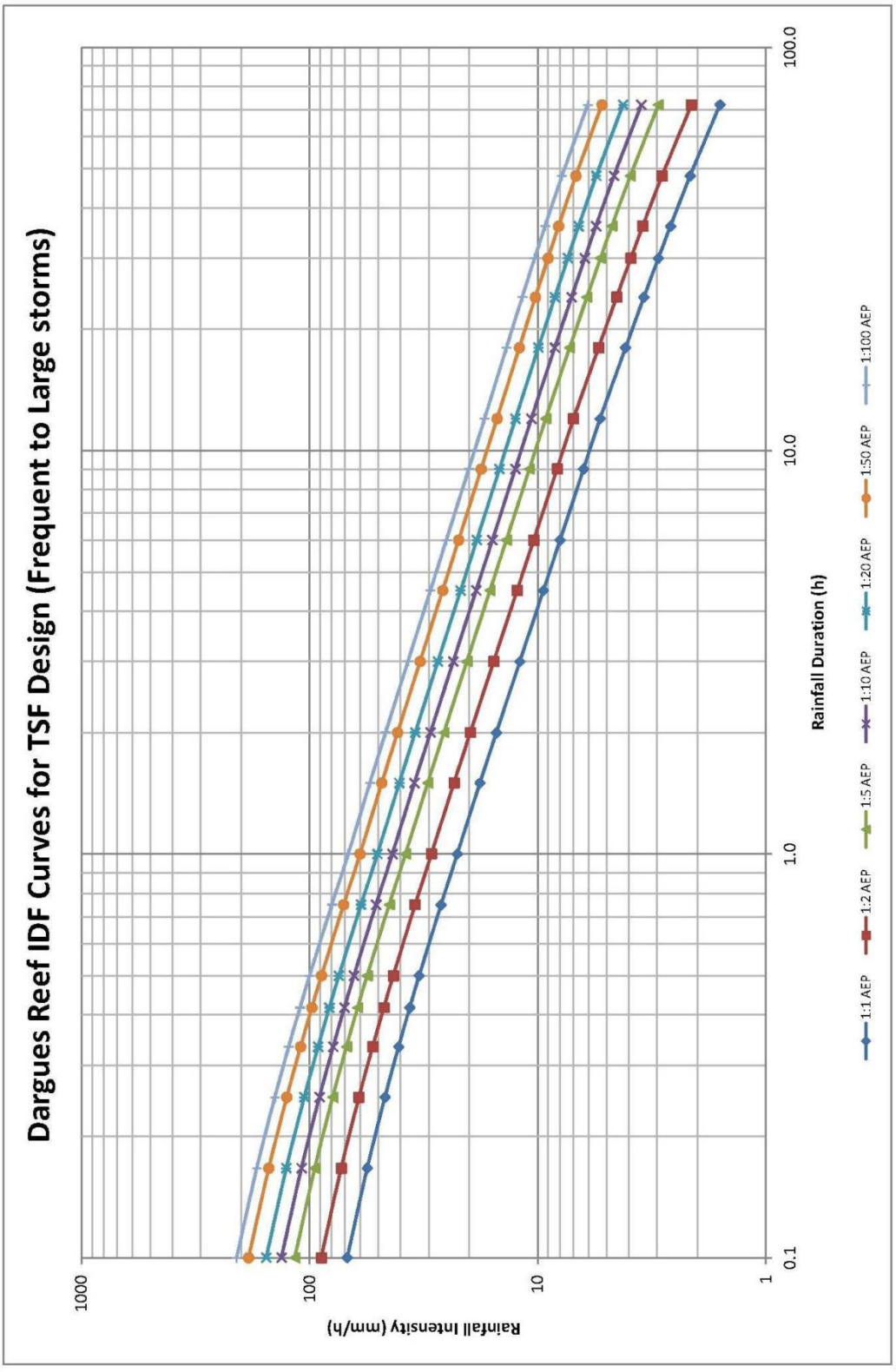
DARGUES REEF GOLD PROJECT
FINAL DESIGN
TAILINGS ACID FORMATION POTENTIAL

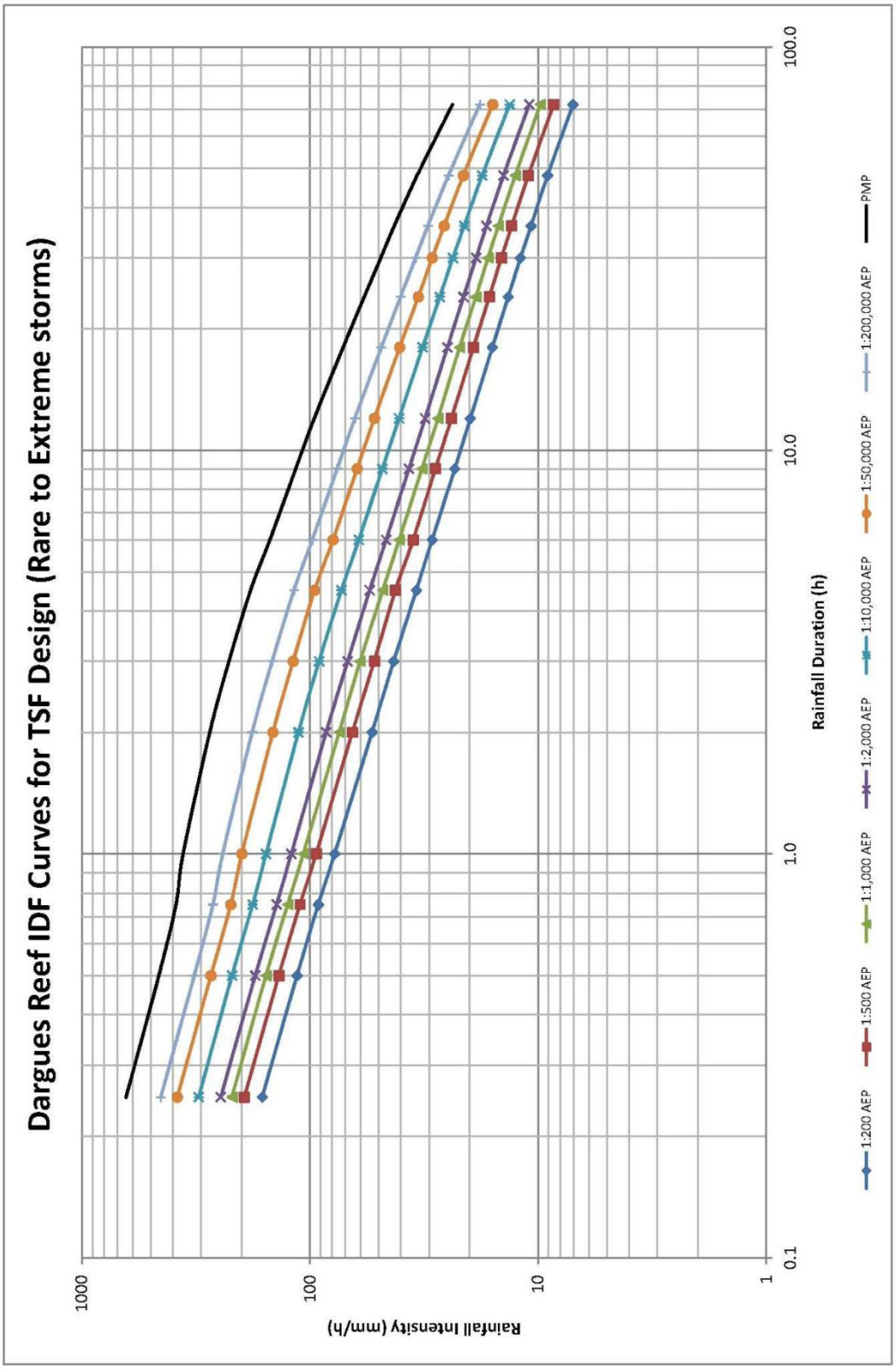
Ref: PE801-00139/05
Figure 4.7



DARGUES REEF GOLD PROJECT
RAINFALL INTENSITY DURATION FREQUENCY DATA
FREQUENT TO LARGE STORMS

Ref: PE801-00139/05
Figure 5.1

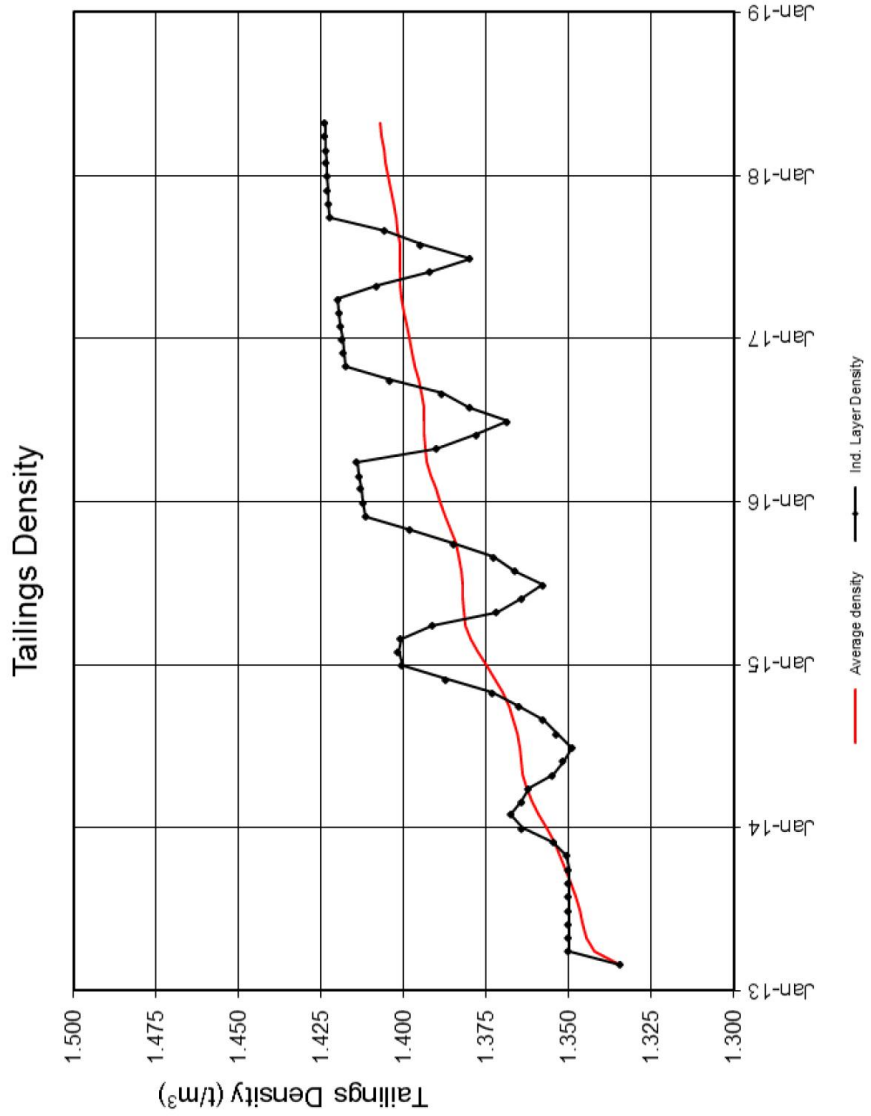
Knight Piésold CONSULTING



DARGUES REEF GOLD PROJECT
RAINFALL INTENSITY DURATION FREQUENCY DATA
BASE TO EXTREME STORMS

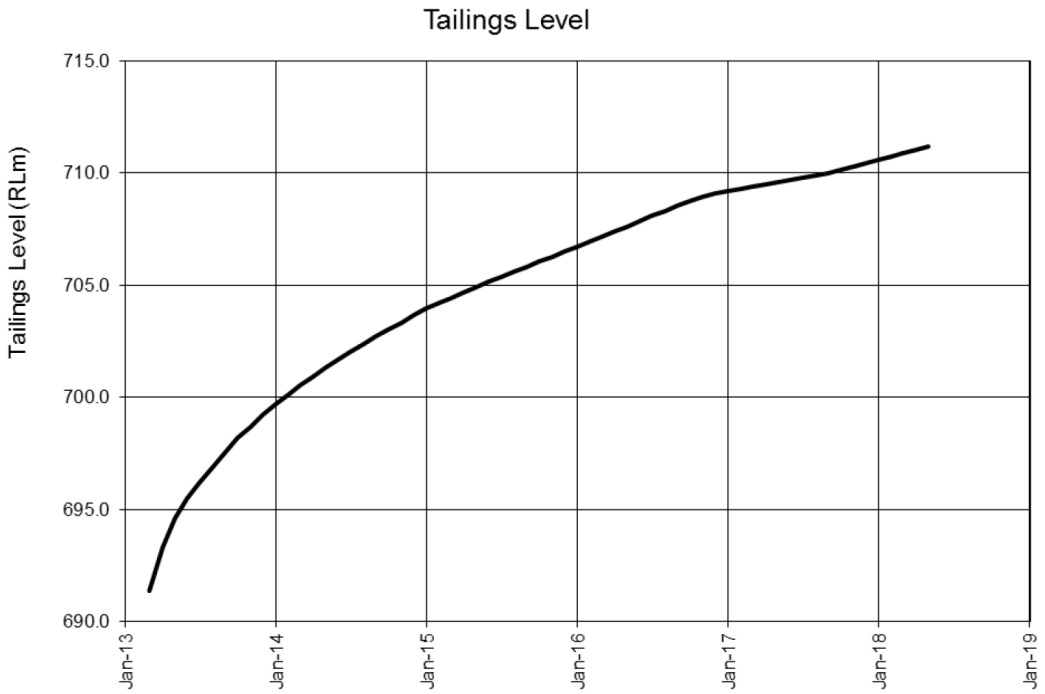
Ref: PE801-00139/05
Figure 5.2

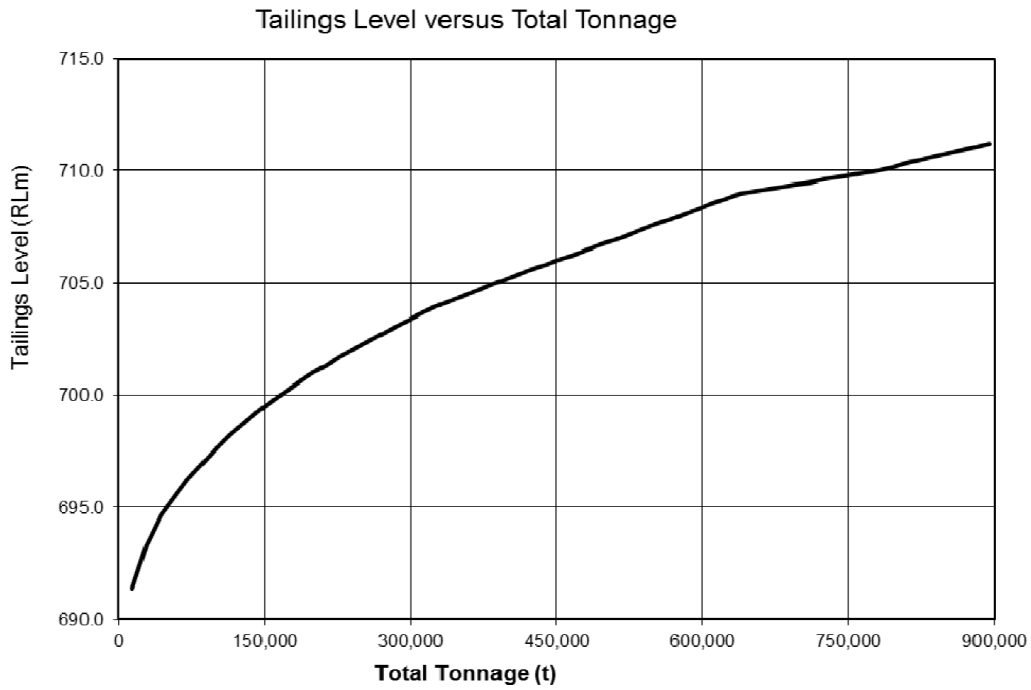
Knight Piésold CONSULTING



DARGUES REEF GOLD PROJECT
TSF WATER BALANCE
TAILINGS DENSITY

PE801-00139/05
Figure 5.3





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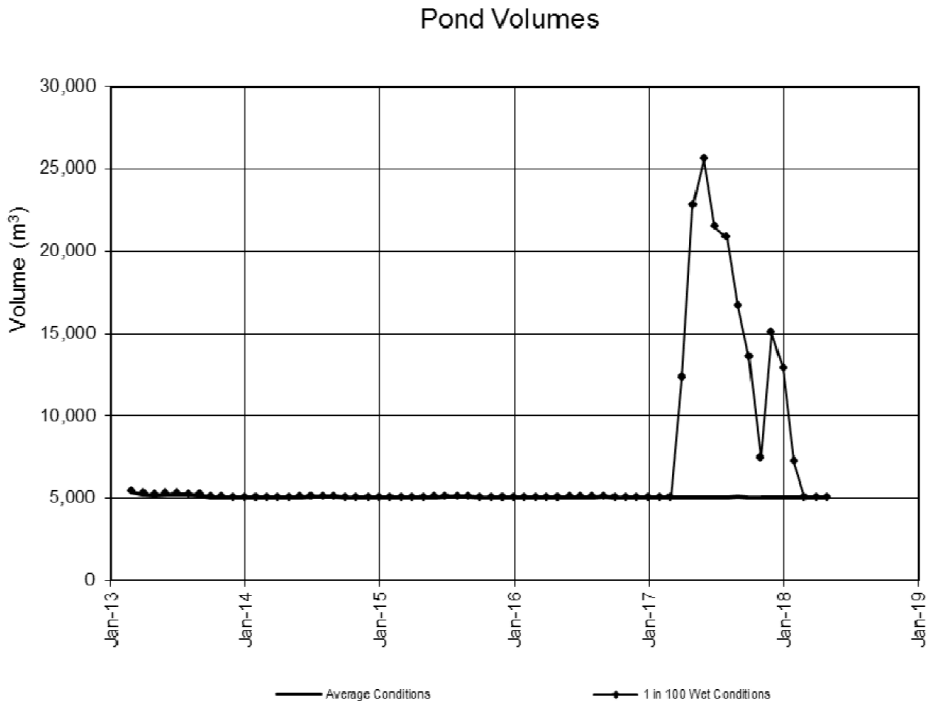
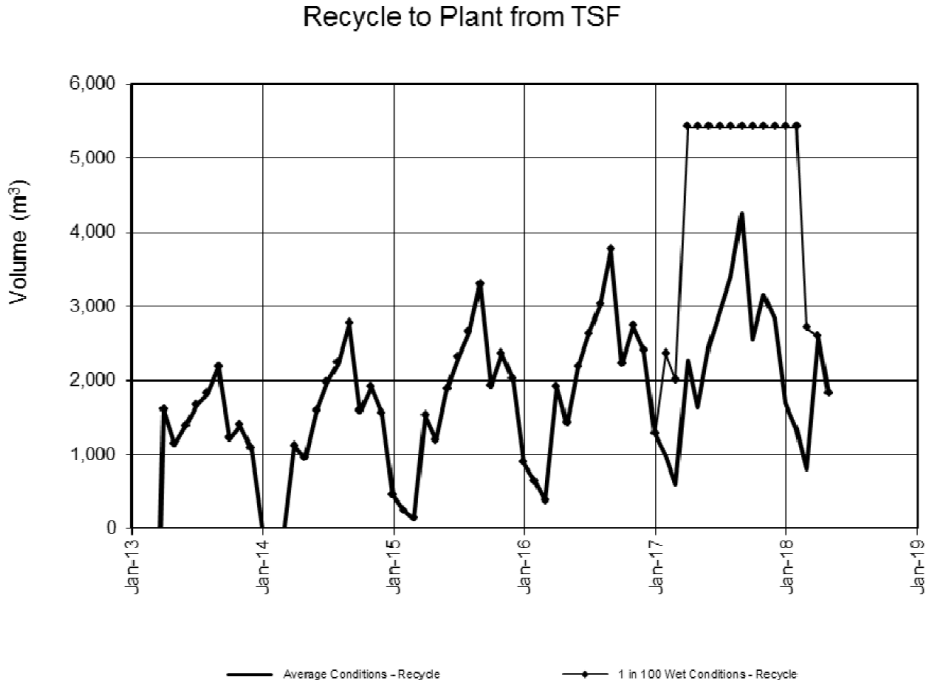
DARGUES REEF GOLD PROJECT
TSF WATER BALANCE
TAILINGS LEVELS AND RATE OF RISE

PE801-00139/05
Figure 5.4





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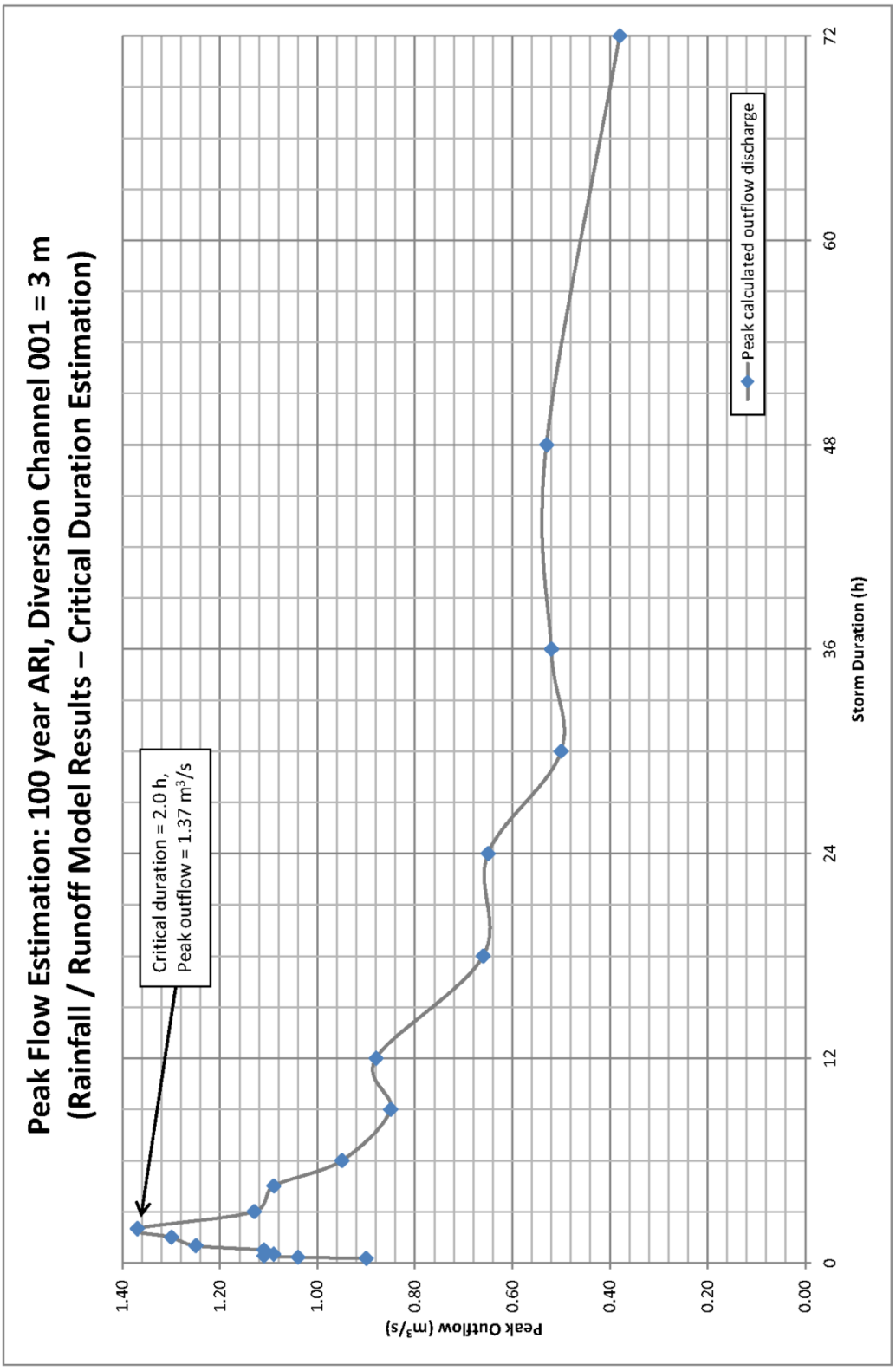
DARGUES REEF GOLD PROJECT
TSF WATER BALANCE
POND VOLUMES AND TSF RECYCLE

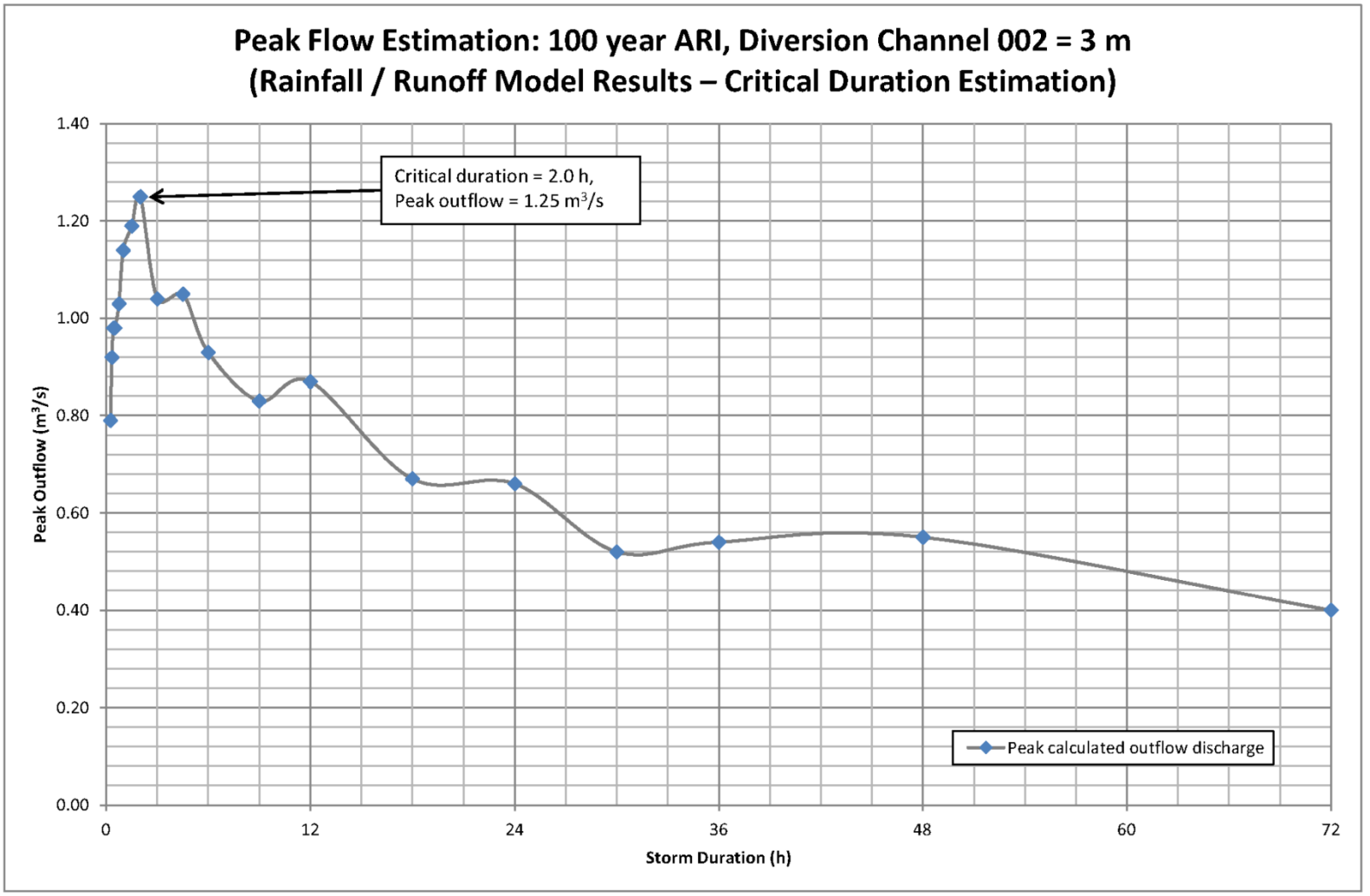
PE801-00139/05
Figure 5.5



DARGUES REEF GOLD PROJECT
TSF DIVERSION CHANNEL 001
PEAK RUNOFF AND CRITICAL DURATION RESULTS

Ref: PE801-00139/05
Figure 5.6

Knight Piésold CONSULTING



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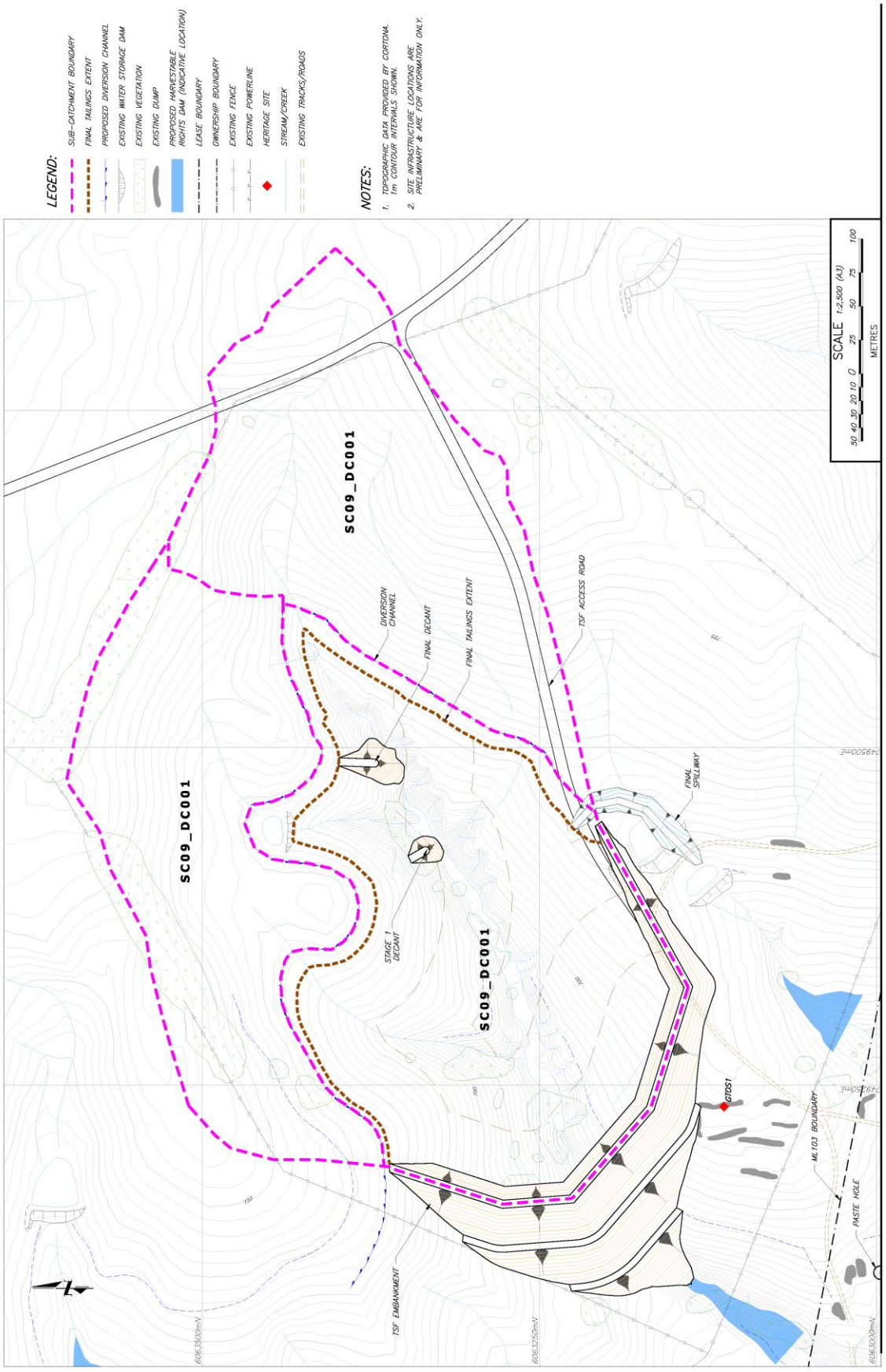
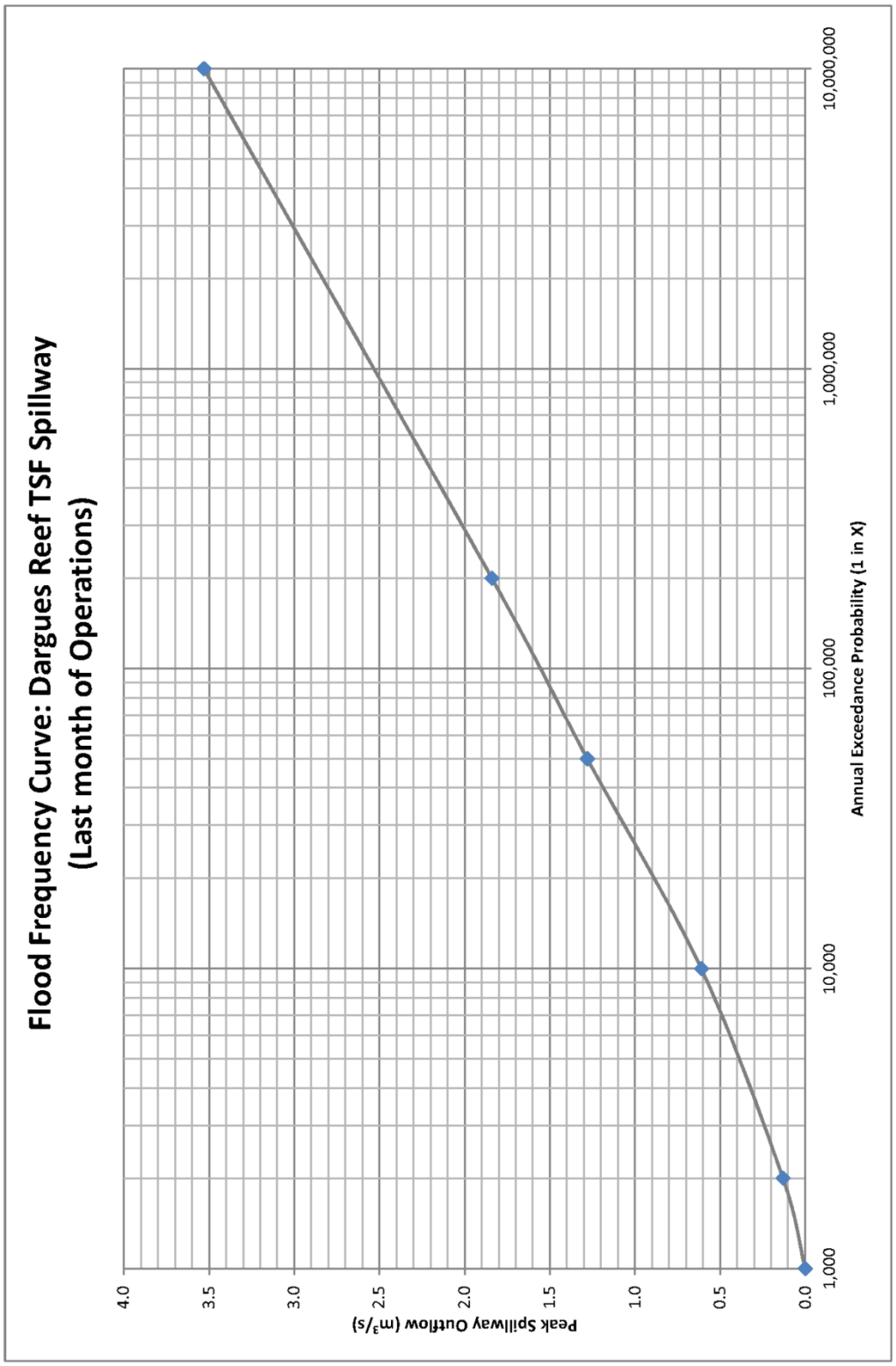
DARGUES REEF GOLD PROJECT
TSF DIVERSION CHANNEL 002
PEAK RUNOFF AND CRITICAL DURATION RESULTS

Ref: PE801-00139/05
Figure 5.7

Knight Piésold CONSULTING

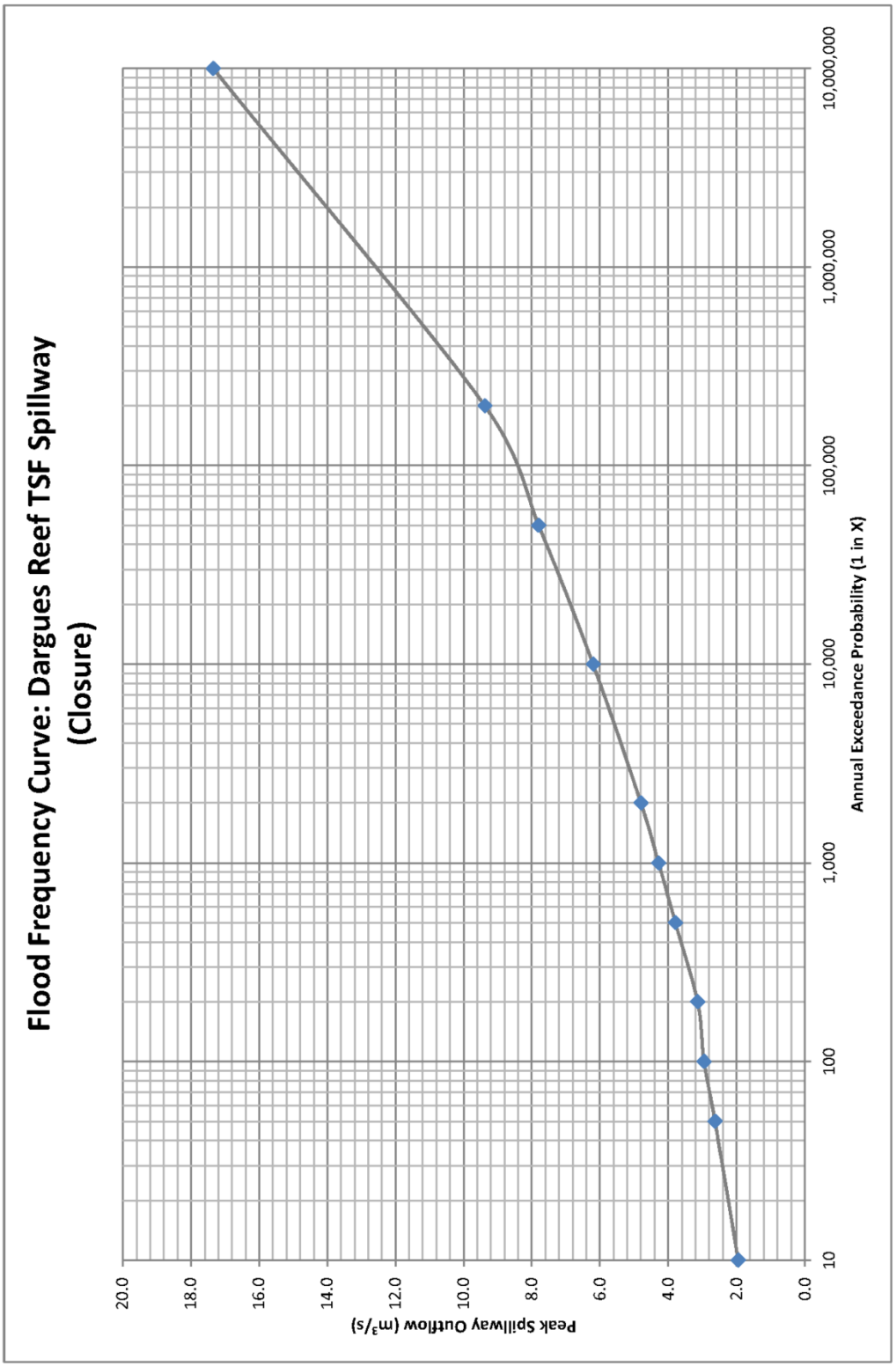

LEGEND:
SUB-CATCHMENT BOUNDARY
FINAL TAILINGS EXTENT
PROPOSED DIVERSION CHANNEL
EXISTING WATER STORAGE DAM
EXISTING VEGETATION
EXISTING DUMP
PROPOSED HARVESTABLE RIGHTS DAM (INDICATIVE LOCATION)
LEASE BOUNDARY
OWNERSHIP BOUNDARY
EXISTING FENCE
EXISTING POWERLINE
HERITAGE SITE
STREAM/CREEK
EXISTING TRACKS/ROADS
NOTES:
1. TOPOGRAPHIC DATA PROVIDED BY CORTONA. 1m CONTOUR INTERVALS SHOWN.
2. SITE INFRASTRUCTURE LOCATIONS ARE PRELIMINARY & ARE FOR INFORMATION ONLY.
SC09_DC001
SC09_DC001
SC09_DC001
DIVERSION CHANNEL
FINAL DECANT
FINAL TAILINGS EXTENT
TSF ACCESS ROAD
FINAL SPILLWAY
STAGE 1 DECANT
TSF EMBANKMENT
GTDS1
ML10.3 BOUNDARY
PASTE HOLE
SCALE 1:2,500 (A3)
50 40 30 20 10 0 25 50 75 100
METRES
DARGUES REEF GOLD PROJECT
SPILLWAY SIZING
SUB-CATCHMENT DELINEATION MAP
Ref: PE801-00139/05
Figure 6.1
Rev: 0
Knight Piésold CONSULTING



DARGUES REEF GOLD PROJECT
TSF SPILLWAY FLOOD FREQUENCY CURVE
LAST MONTH OF OPERATIONS

Ref: PE801-00139/05
Figure 6.2

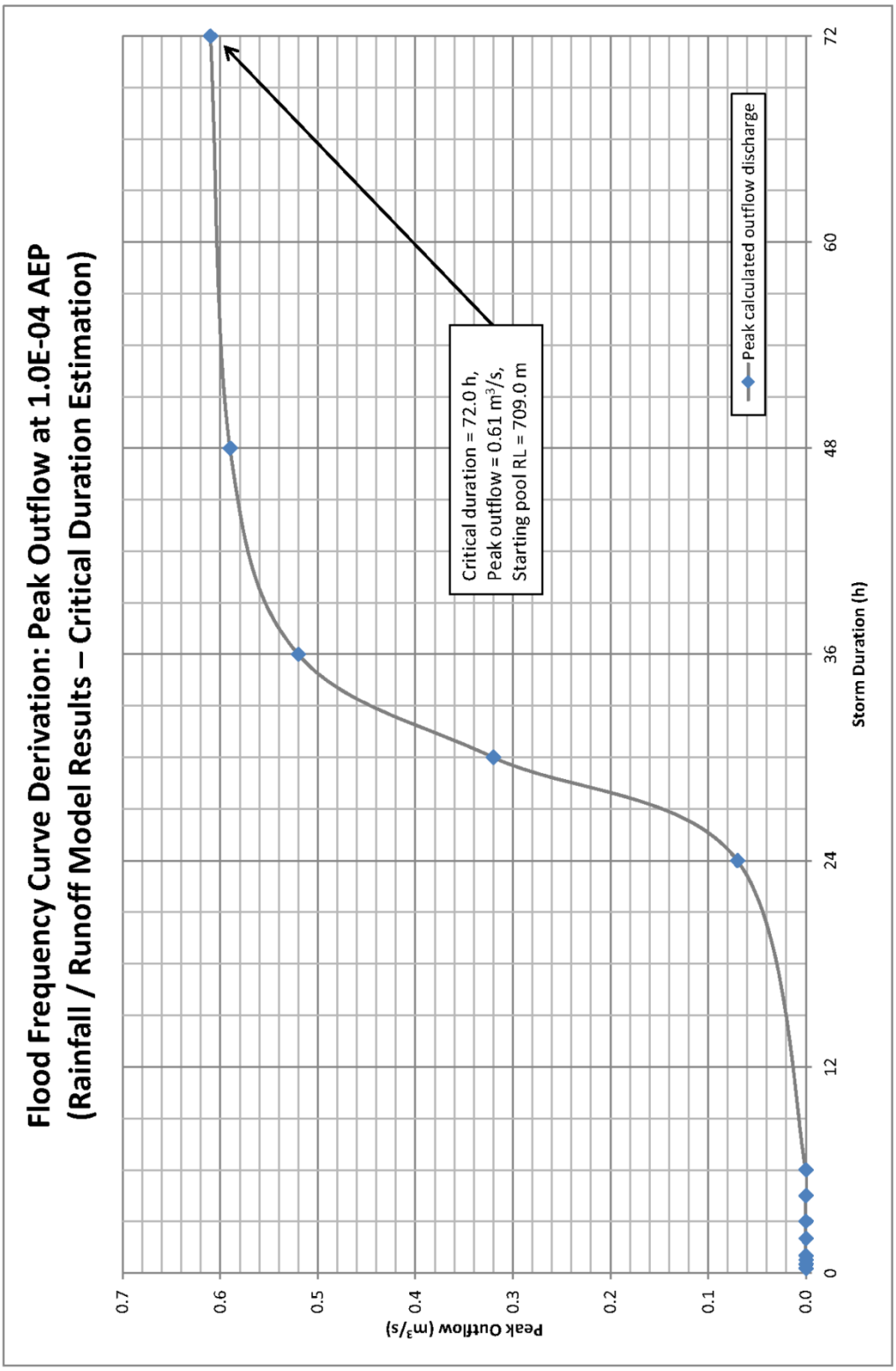
Knight Piésold CONSULTING



Ref: PE801-00139/05
Figure 6.3

DARGUES REEF GOLD PROJECT
TSF SPILLWAY FLOOD FREQUENCY CURVE
CLOSURE

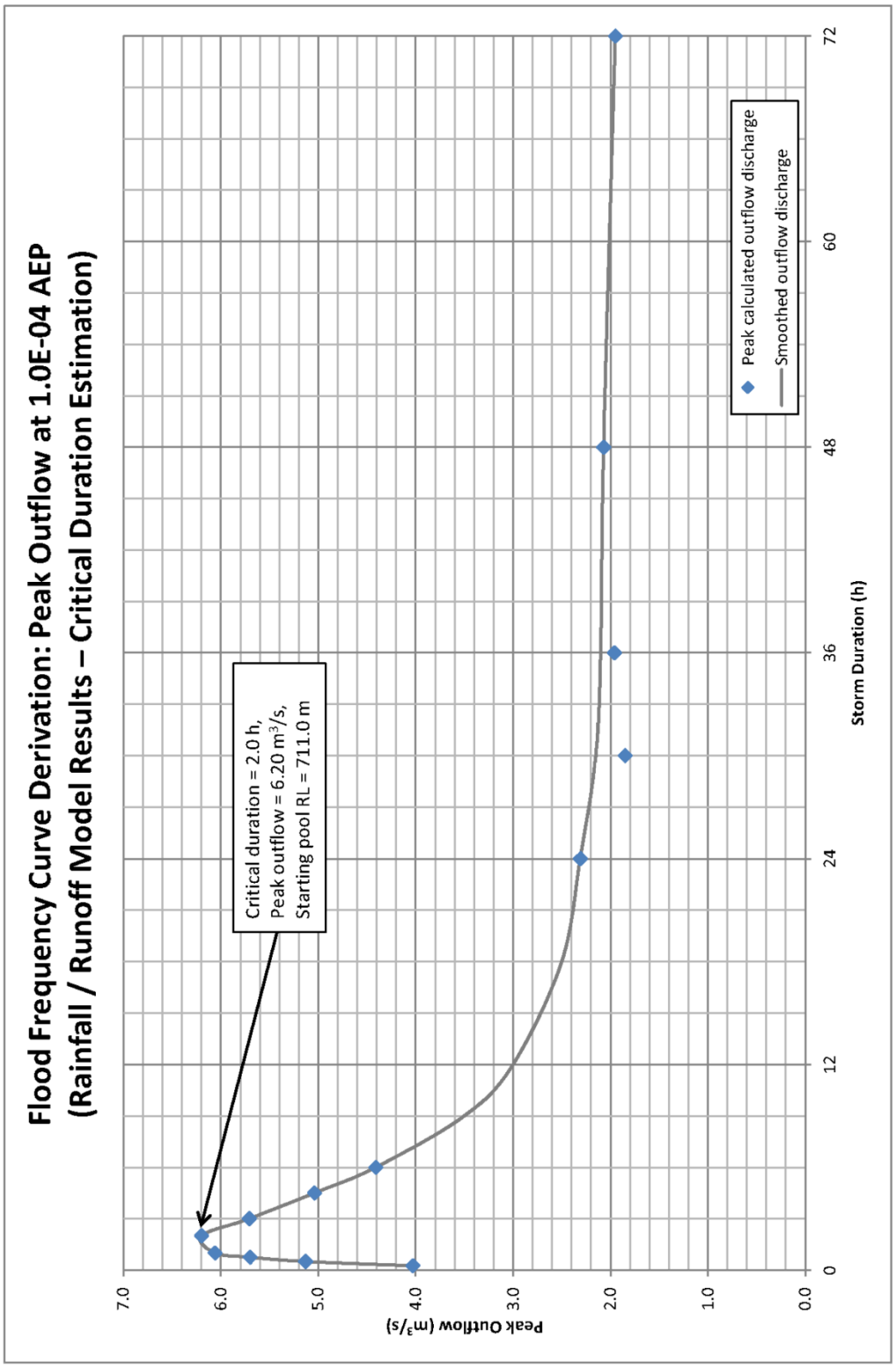
Knight Piésold CONSULTING



DARGUES REEF GOLD PROJECT
TSF SPILLWAY CRITICAL DURATION AT 1:10,000 AEP
LAST MONTH OF OPERATIONS

Knight Piésold CONSULTING

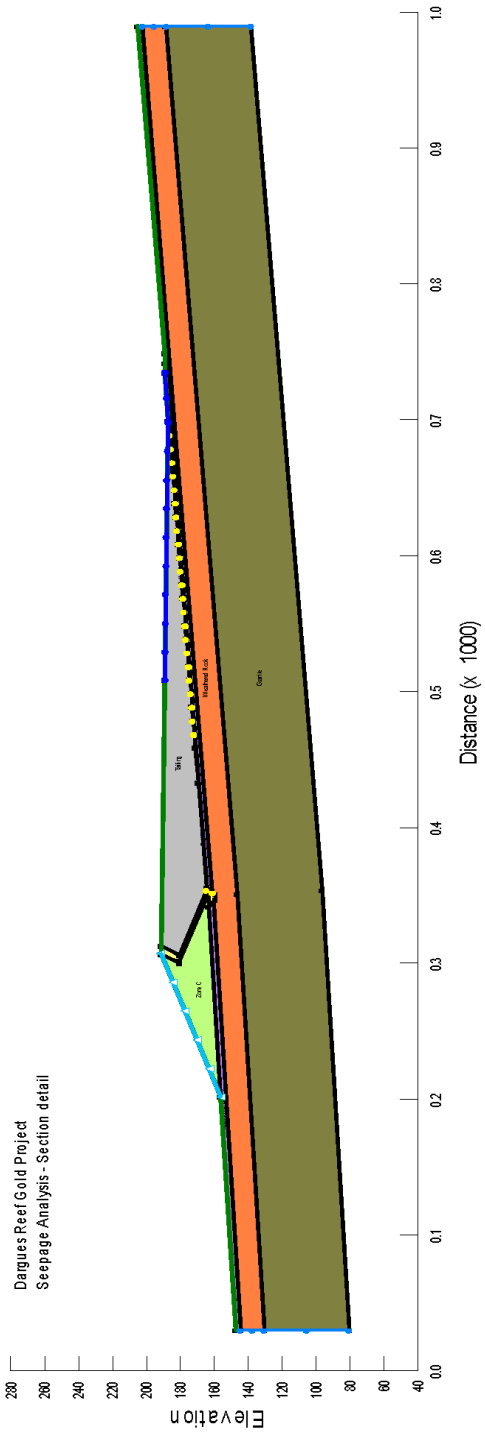
Ref: PE801-00139/05
Figure 6.4



Knight Piésold CONSULTING

DARGUES REEF GOLD PROJECT
TSF SPILLWAY CRITICAL DURATION AT 1:10,000 AEP
CLOSURE

Ref: PE801-00139/05
Figure 6.5



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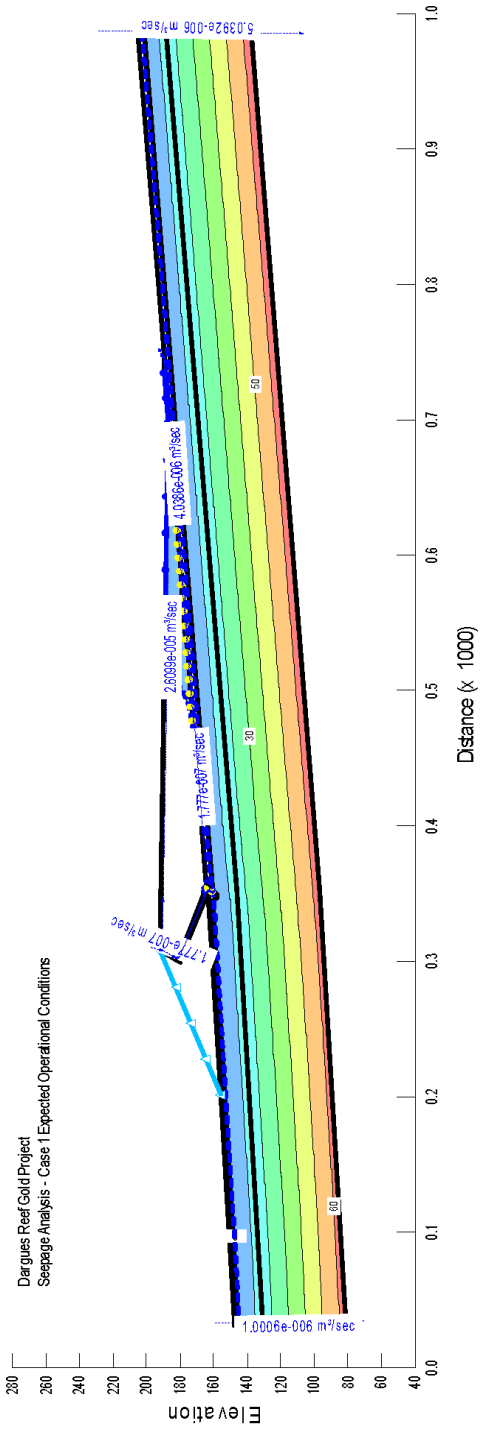
DARGUES REEF GOLD PROJECT
SEEPAGE ANALYSIS MODEL
SECTION DETAIL

Ref: PE801-00139/05
FIGURE 6.6



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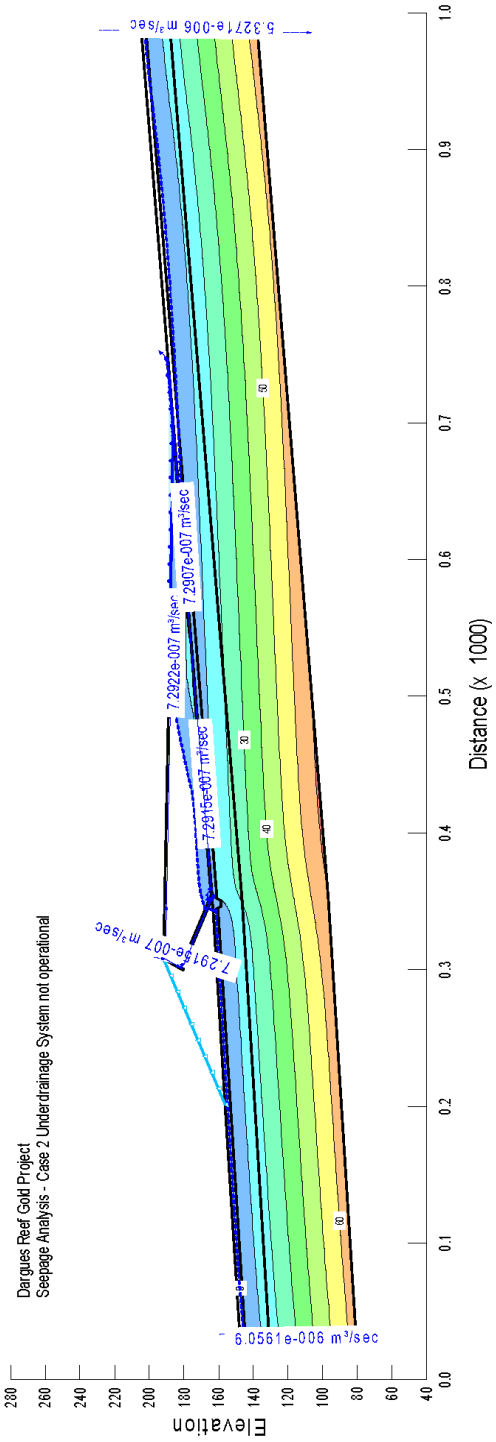
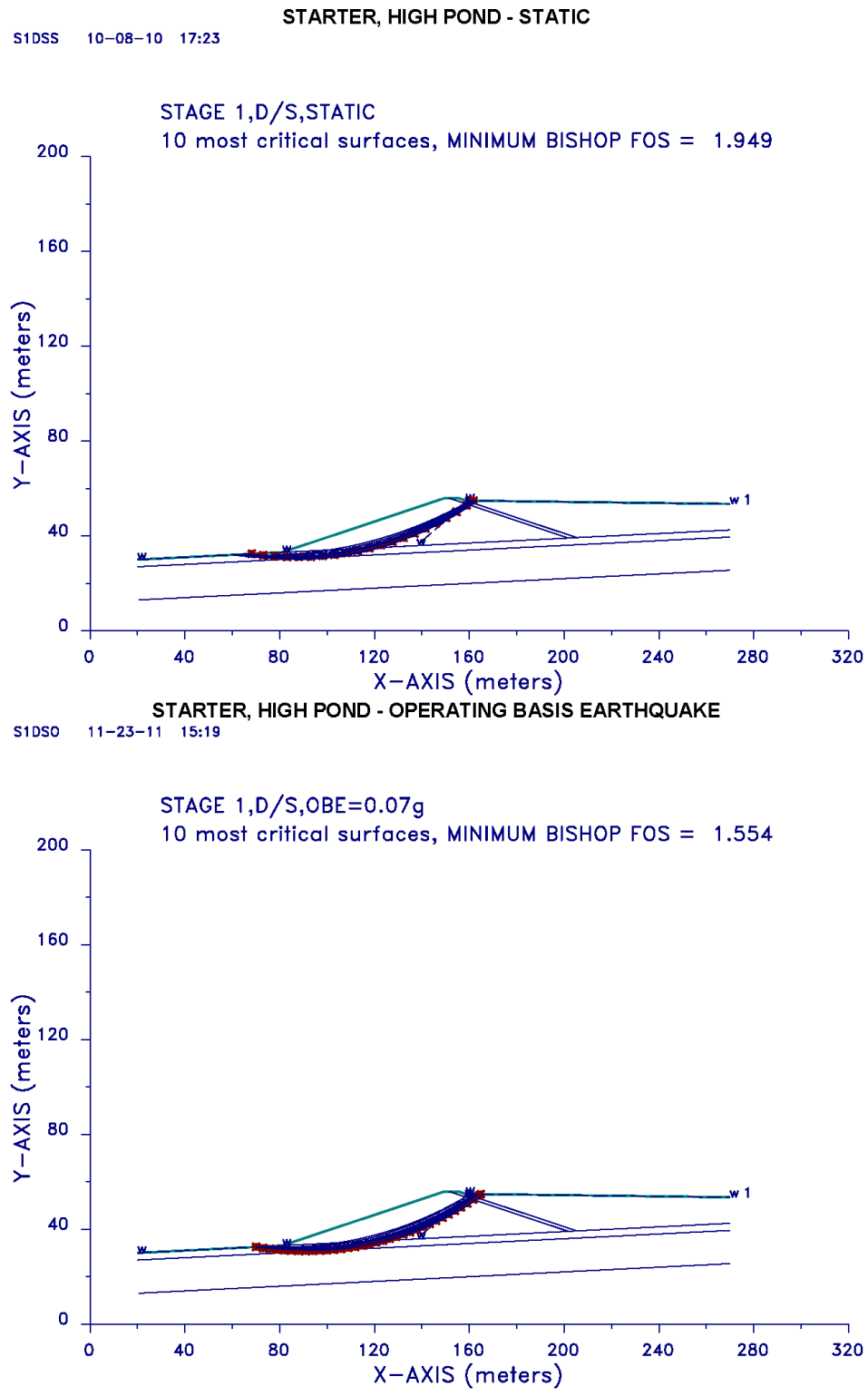
DARGUES REEF GOLD PROJECT
SEEPAGE ANALYSIS MODEL
EXPECTED OPERATIONAL CONDITIONS

Ref: PE801-00139/05
FIGURE 6.7



DARGUES REEF GOLD PROJECT
SEEPAGE ANALYSIS MODEL
UNDERDRAINAGE SYSTEM NOT OPERATIONAL

Ref: PE801-00139/05
FIGURE 6.8



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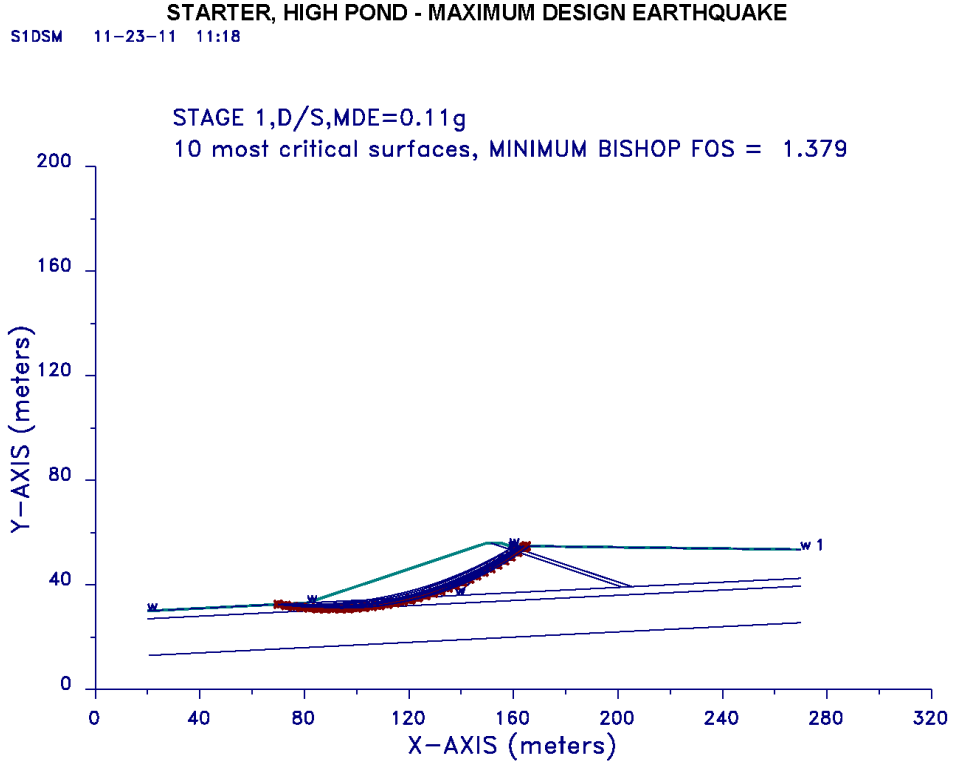
DARGUES REEF GOLD PROJECT
STABILITY ANALYSIS
STARTER, HIGH POND, DOWNSTREAM FAILURE

PE801-00139/05
Figure 6.9

STARTER, HIGH POND - MAXIMUM DESIGN EARTHQUAKE



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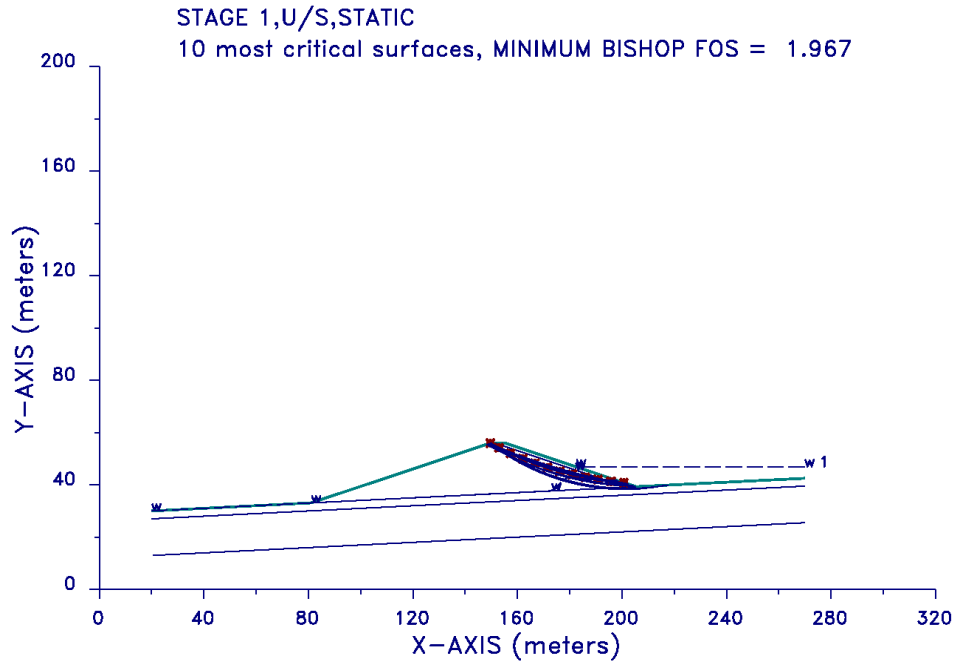
DARGUES REEF GOLD PROJECT
STABILITY ANALYSIS
STARTER, HIGH POND, DOWNSTREAM FAILURE

PE801-00139/05
Figure 6.10

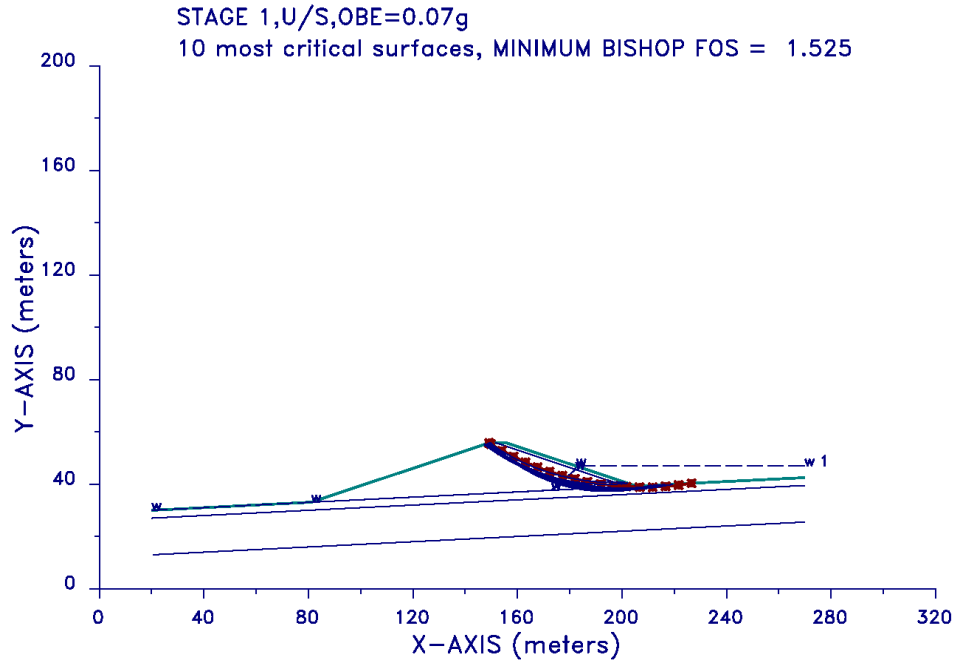
STARTER, INTERMEDIATE POND - STATIC

S1USS 10-08-10 17:41



STARTER, INTERMEDIATE POND - OPERATING BASIS EARTHQUAKE

S1USO 11-23-11 12:03



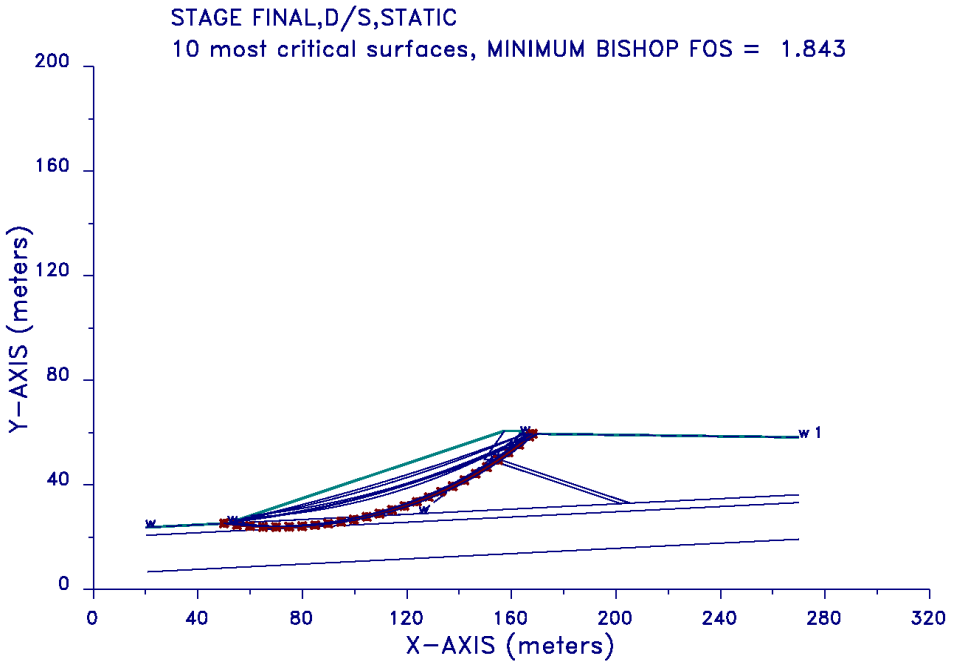
Knight Piésold CONSULTING

DARGUES REEF GOLD PROJECT
STABILITY ANALYSIS
STARTER, INTERMEDIATE POND, UPSTREAM FAILURE

PE801-00139/05
Figure 6.11

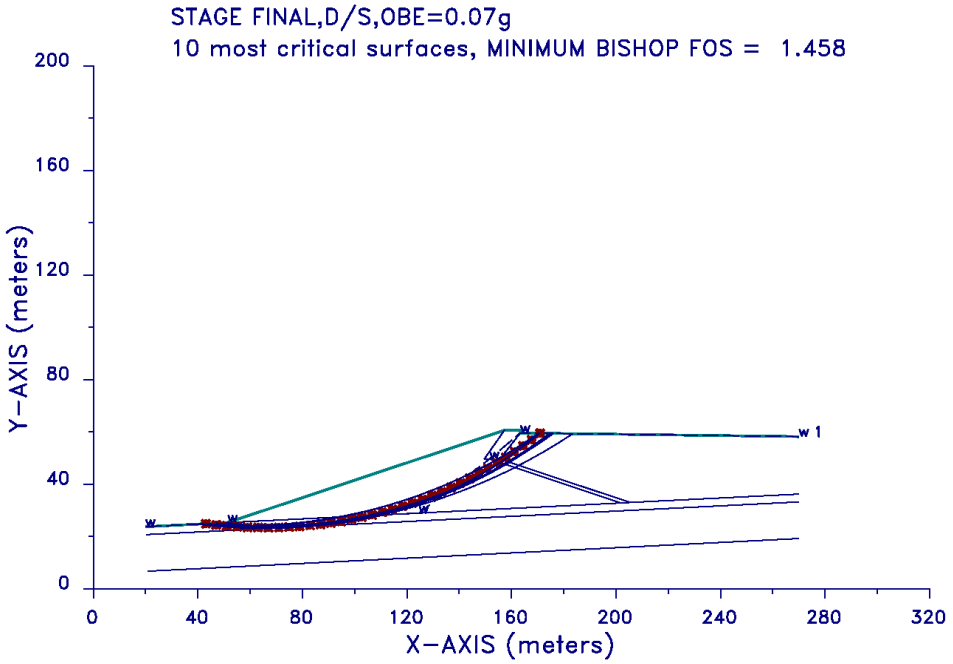
STAGE FINAL, HIGH POND - STATIC

SFDSS 10-08-10 16:59



STAGE FINAL, HIGH POND - OPERATING BASIS EARTHQUAKE

SFDSO 11-23-11 14:28



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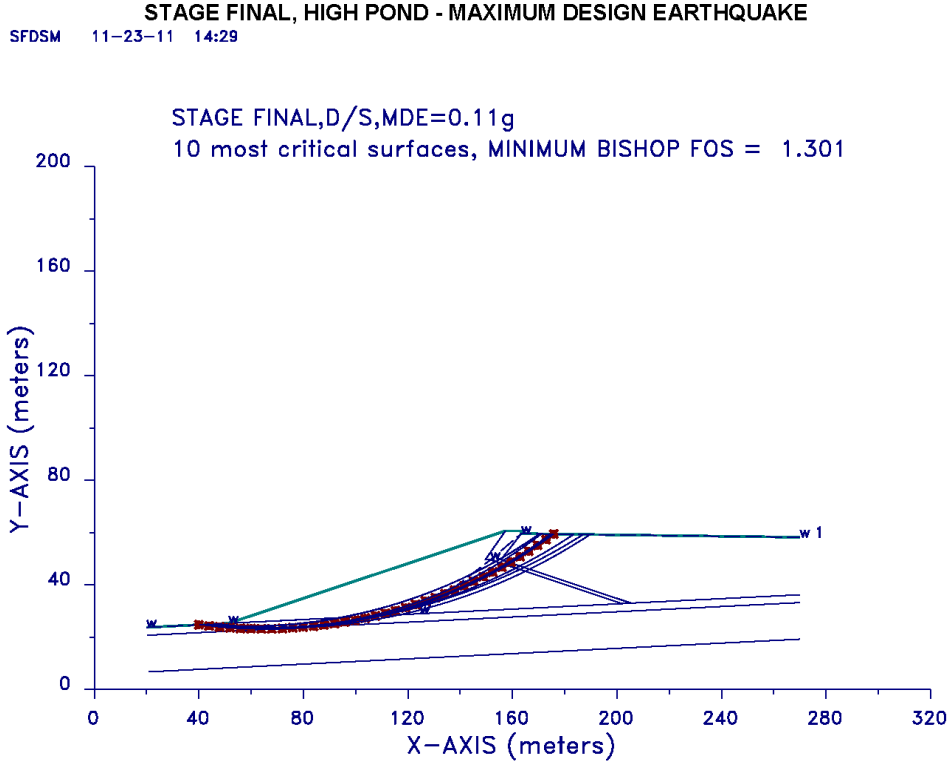
DARGUES REEF GOLD PROJECT
STABILITY ANALYSIS
STAGE FINAL, HIGH POND, DOWNSTREAM FAILURE

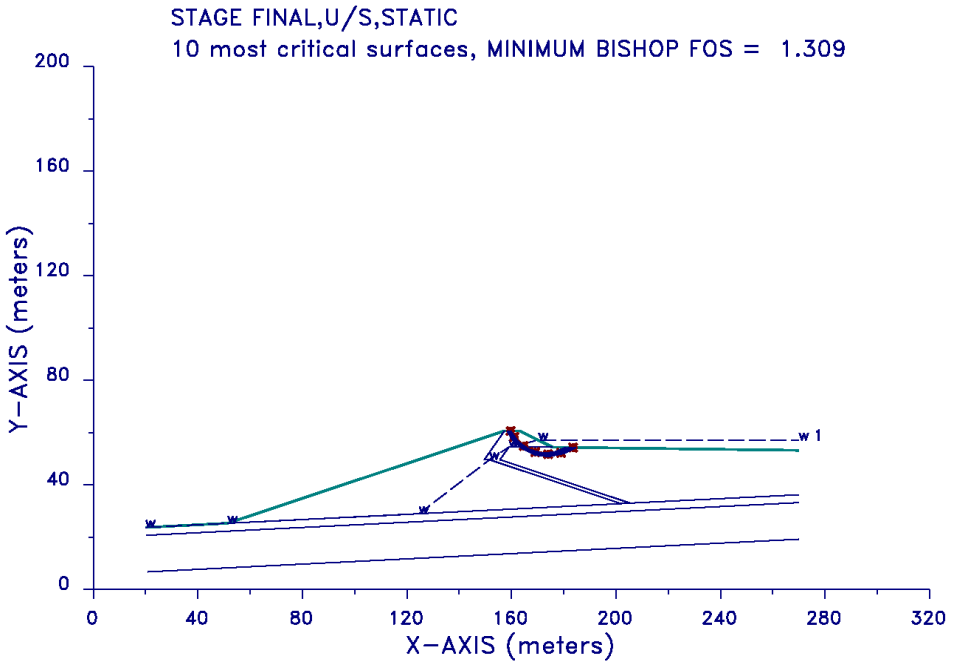
PE801-00139/05
Figure 6.12

STAGE FINAL, HIGH POND - MAXIMUM DESIGN EARTHQUAKE



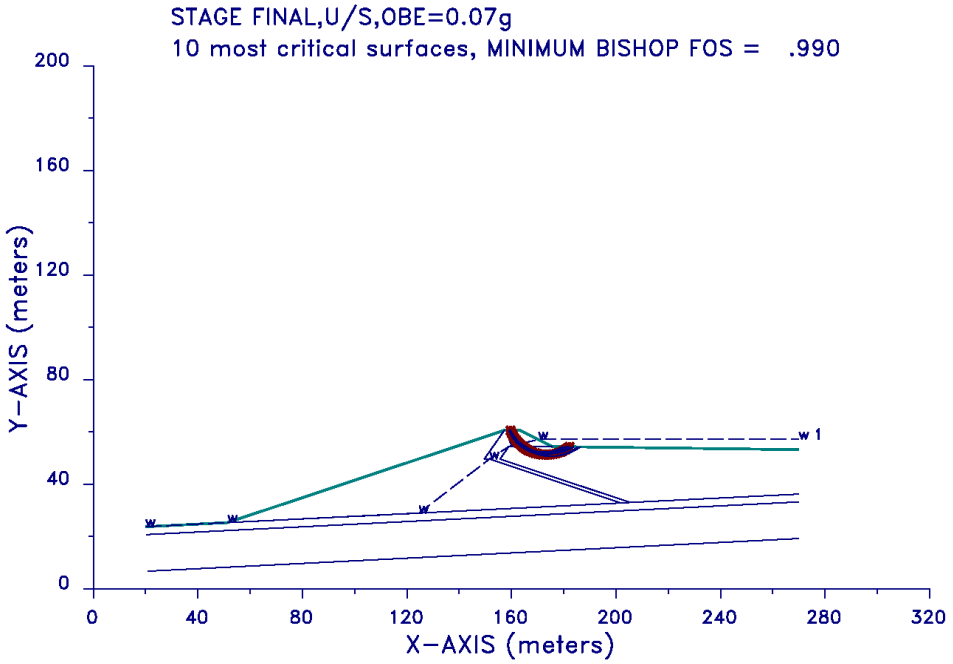
STAGE FINAL, INTERMEDIATE POND - STATIC

SFUSS 10-08-10 16:27



STAGE FINAL, INTERMEDIATE POND - OPERATING BASIS EARTHQUAKE

SFUSO 11-23-11 15:00



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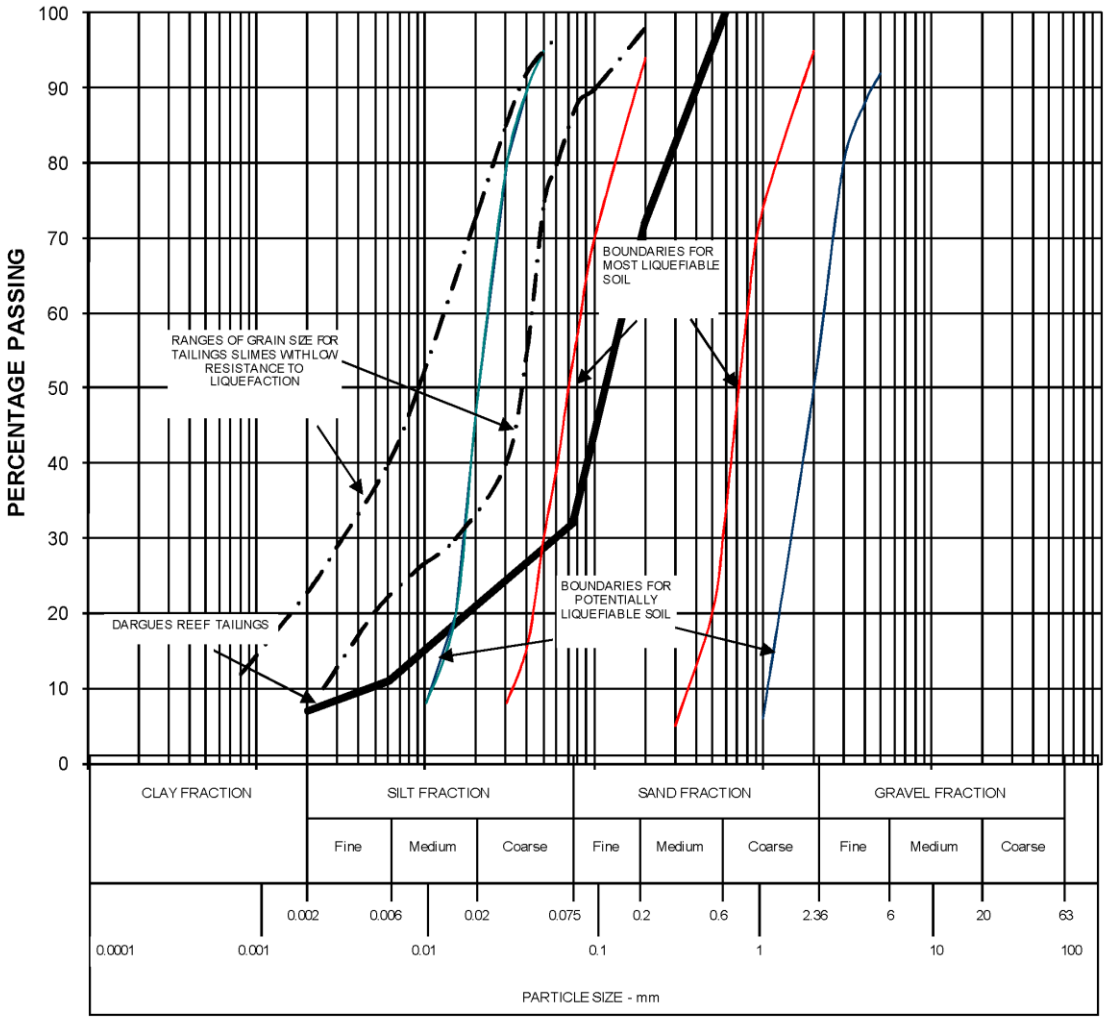
DARGUES REEF GOLD PROJECT
STABILITY ANALYSIS
STAGE FINAL, INTERMEDIATE POND, UPSTREAM FAILURE

PE801-00139/05
Figure 6.14



Knight Piésold CONSULTING

DARGUES REEF GOLD PROJECT
LIQUEFACTION ASSESSMENT
PARTICLE SIZE ENVELOPE FOR POTENTIALLY LIQUEFIABLE TAILINGS

PE801-00139/5
Figure 6.15

DRAWINGS

Knight Piésold CONSULTING

DARGUES REEF GOLD PROJECT TAILINGS STORAGE FACILITY

FINAL DESIGN
DECEMBER, 2011

Prepared for:

CORTONA RESOURCES LIMITED

Prepared by:

Knight Piésold CONSULTING

A.B.N. 67 001 040 419
A.C.N. 001 040 419

Knight Piésold Pty. Ltd.
Level 1, 184 Adelaide Terrace
EAST PERTH, WA 6004
AUSTRALIA

FINAL DESIGN

INDEX OF DRAWINGS		
TITLE	REV.	DRAWING No.
TITLE PAGE	P1	PE801-00139-000
INDEX, COMMON LEGEND & LOCATION MAP	P1	PE801-00139-001
SITE GENERAL ARRANGEMENT	P1	PE801-00139-005
GENERAL ARRANGEMENT	P1	PE801-00139-010
EMBANKMENT SECTIONS & DETAILS	P1	PE801-00139-012
UNDERDRAINAGE LAYOUT	P1	PE801-00139-015
UNDERDRAINAGE SECTIONS & DETAILS (1 OF 2)	P1	PE801-00139-017
UNDERDRAINAGE SECTIONS & DETAILS (2 OF 2)	P1	PE801-00139-019
UNDERDRAINAGE COLLECTION SUMP	P1	PE801-00139-020
DECANT SYSTEM SECTIONS & DETAILS	P1	PE801-00139-022
SPIGOT CLAMP DETAILS	P1	PE801-00139-025
MONITORING INSTRUMENTATION DETAILS	P1	PE801-00139-028
SPILLWAY PLAN, SECTIONS & DETAILS	P0	PE801-00139-030
SURFACE WATER DIVERSION CHANNELS DETAILS	P0	PE801-00138-032
TAILINGS & DECANT RETURN PIPELINE TRENCH DETAILS	P0	PE801-00139-035

COMMON LEGEND

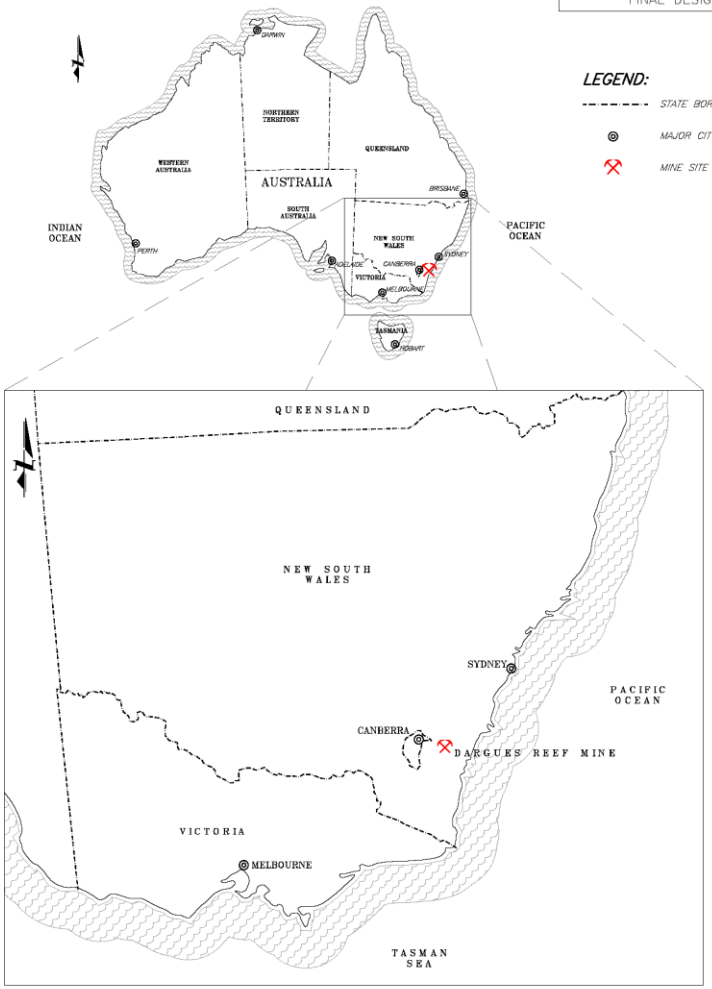
- EXISTING GROUND SURFACE OR BOTTOM OF EXCAVATION
- GROUNDWATER TABLE CONTOURS SLOPE
- 260 EXISTING GRADE ELEVATION (IN METRES)
- BATTER SLOPE
- 2:1 2 HORIZONTAL TO 1 VERTICAL SLOPE
- SECTION OR DETAIL NUMBER (PE801-00139 / 210)
- DRAWING NO. WHERE SECTION IS SHOWN OR CALLED OUT

ABBREVIATIONS

C.M.	CONSTRUCTION MANAGER	SCH.	SCHEDULE
LCRS	LEACHATE COLLECTION AND REMOVAL SYSTEM	NTS	NOT TO SCALE
RCP	REINFORCED CONCRETE PIPE	REQ'D	REQUIRED
VLDPE	VERY LOW DENSITY POLYETHYLENE	TYP.	TYPICAL
HDPE	HIGH DENSITY POLYETHYLENE	NOM.	NOMINAL
PVC	POLYVINYL CHLORIDE	LOM	LIFE OF MINE
CPT	CORRUGATED POLYETHYLENE TUBING	MH	MANHOLE
SMDD	STANDARD MAXIMUM DRY DENSITY	℄	CENTRE LINE
OMC	OPTIMUM MOISTURE CONTENT	R.L.	REDUCED LEVEL
SDR	STANDARD DIMENSIONAL RATIO	ELEV.	ELEVATION
BOP	BOTTOM OF PIPE	S.O.L.	SETTING OUT LINE
PC	POINT OF CURVATURE	SOP	SETTING OUT POINT
PT	POINT OF TANGENT	DIA., ø	DIAMETER
PI	POINT OF INTERSECTION	ID	INSIDE DIAMETER
I.L.	INVERT LEVEL	OD	OUTSIDE DIAMETER
		BOP	BOTTOM OF PIPE

GENERAL NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. ALL COORDINATES STATED IN GDA94 ZONE 55 GRID DATUM.
3. ALL ELEVATIONS IN METRES, RELATIVE TO MEAN SEA LEVEL.
4. DRAWINGS ARE NOT TO BE SCALED.
5. DRAWINGS TO BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS.



LOCATION MAP
SCALE : N.T.S.

ORIGINAL STAMPED IN RED

Knight Piésold CONSULTING
Knight Piésold Pty Ltd
A.C.N. 001 040 419 A.B.N. 67 001 040 419
P.O. BOX 1710, Hornsby, N.S.W. 1635
Level 1, 184 Adelaide Terrace, East Perth, W.A. 6004
Level 1, 17 Gordella Street, South Brisbane, QLD, 4101
CONSULT AUSTRALIA Member Firm

Designed	LL	09/10
Drawn	AZ	10/10
Design Check	RSS	12/11
Drawing Check	RSS	12/11
Approved	12/11	12/11

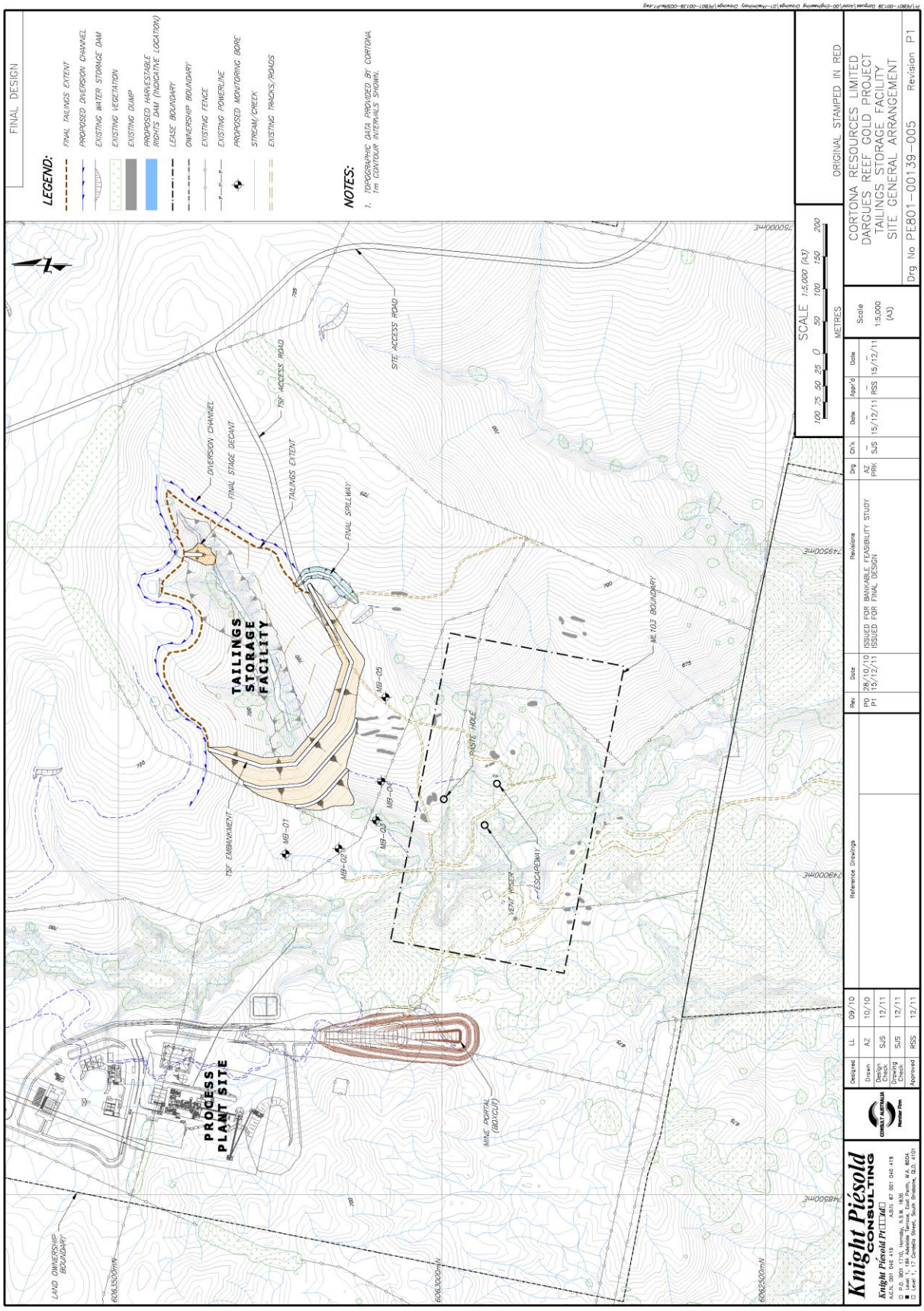
Reference Drawings

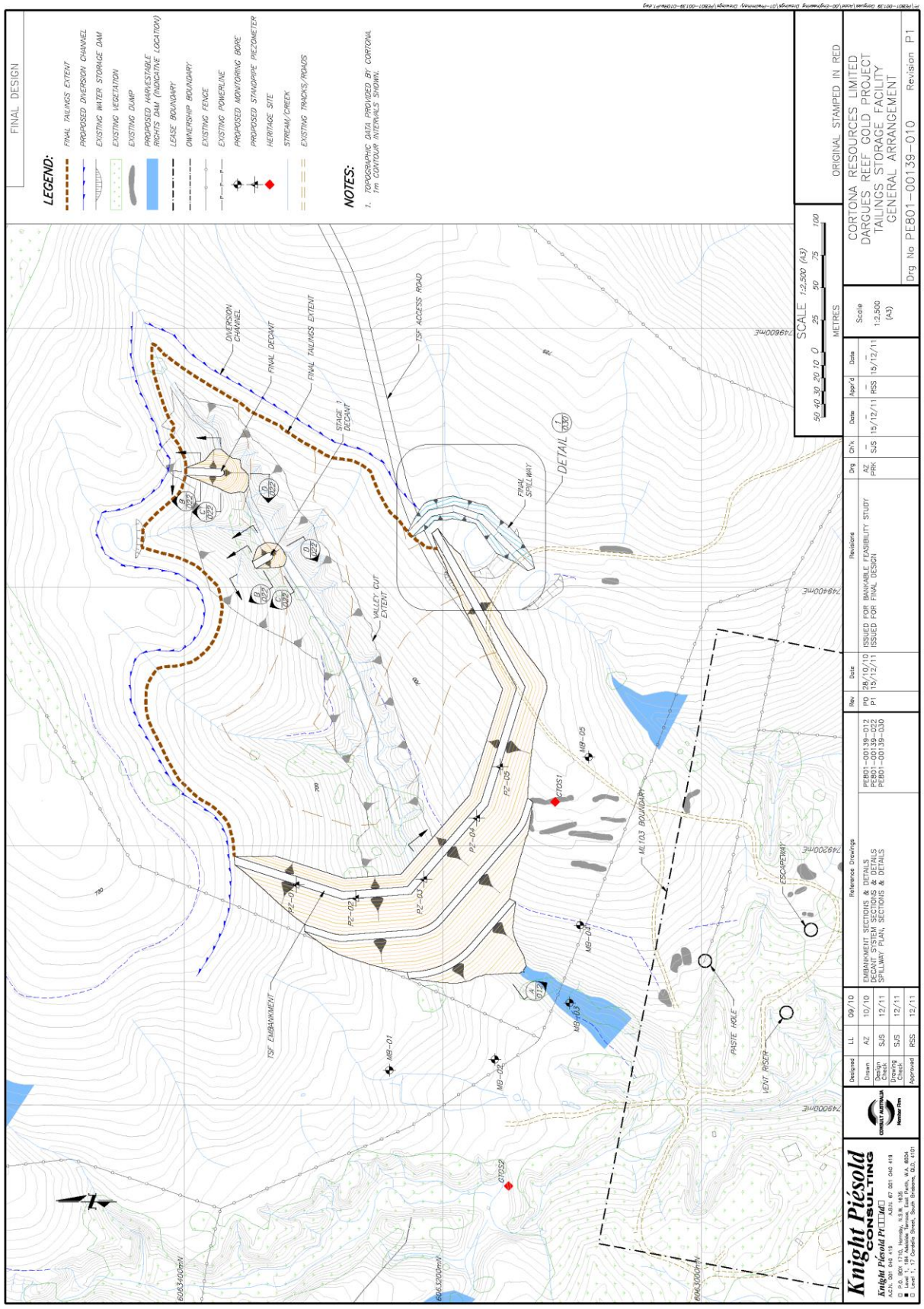
Rev	Date	Revisions	Drg	Ch'k	Date	Appr'd	Date
P0	28/10/10	ISSUED FOR BANKABLE FEASIBILITY STUDY	AZ	–	–	–	–
P1	15/12/11	ISSUED FOR FINAL DESIGN	AZ	SJS	15/12/11	RSS	15/12/11

Scale: AS SHOWN (A3)

CORTONA RESOURCES LIMITED
DARGUES REEF GOLD PROJECT
TAILINGS STORAGE FACILITY
INDEX, COMMON LEGEND & LOCATION MAP

Drg No PE801-00139-001 Revision P1


FINAL DESIGN
LEGEND:
FINAL TAILINGS EXTENT
PROPOSED DIVERSION CHANNEL
EXISTING WATER STORAGE DAM
EXISTING VEGETATION
EXISTING DUMP
PROPOSED HARVESTABLE RIGHTS DAM (INDICATIVE LOCATION)
LEASE BOUNDARY
OWNERSHIP BOUNDARY
EXISTING FENCE
EXISTING POWERLINE
PROPOSED MONITORING BORE
STREAM/CREEK
EXISTING TRACKS/ROADS
NOTES:
1. TOPOGRAPHIC DATA PROVIDED BY CORTONA. 1m CONTOUR INTERVALS SHOWN.
ORIGINAL STAMPED IN RED
SCALE 1:5,000 (A1)
METRES
CORTONA RESOURCES LIMITED
DARGUES REEF GOLD PROJECT
TAILINGS STORAGE FACILITY
SITE GENERAL ARRANGEMENT
Drg No PE801-001.39-005 Revision P1
TAILINGS STORAGE FACILITY
PROCESS PLANT SITE
DIVERSION CHANNEL
FINAL STAGE DECANT
TAILINGS EXTENT
FINAL SPILLWAY
TSF ACCESS ROAD
SITE ACCESS ROAD
TSF EMBANKMENT
MB-01
MB-02
MB-03
MB-04
MB-05
PASTE HOLE
VENT RISER
ESCAPEWAY
MINE PORTAL (BOXCUT)
ML103 BOUNDARY
LAND OWNERSHIP BOUNDARY
Knight Piésold CONSULTING
Knight Piésold PTY LTD
Designed LL 09/10
Drawn AZ 10/10
Design Check SJS 12/11
Drawing Check SJS 12/11
Approved RSS 12/11
Rev Date Revisions Drg Ch'k Date Appr'd Date
P0 28/10/10 ISSUED FOR BANKABLE FEASIBILITY STUDY AZ SJS 15/12/11 RSS 15/12/11
P1 15/12/11 ISSUED FOR FINAL DESIGN PRK
Reference Drawings
Scale 1:5,000 (A3)


FINAL DESIGN
LEGEND:
FINAL TAILINGS EXTENT
PROPOSED DIVERSION CHANNEL
EXISTING WATER STORAGE DAM
EXISTING VEGETATION
EXISTING DUMP
PROPOSED HARVESTABLE RIGHTS DAM (INDICATIVE LOCATION)
LEASE BOUNDARY
OWNERSHIP BOUNDARY
EXISTING FENCE
EXISTING POWERLINE
PROPOSED MONITORING BORE
PROPOSED STANDPIPE PIEZOMETER
HERITAGE SITE
STREAM/CREEK
EXISTING TRACKS/ROADS
NOTES:
1. TOPOGRAPHIC DATA PROVIDED BY CORTONA 1m CONTOUR INTERVALS SHOWN.
SCALE 1:2,500 (A3)
METRES
ORIGINAL STAMPED IN RED
CORTONA RESOURCES LIMITED
DARGUES REEF GOLD PROJECT
TAILINGS STORAGE FACILITY
GENERAL ARRANGEMENT
Drg No PE801-00139-010 Revision P1
Scale 1:2,500 (A3)
Knight Piésold CONSULTING
Knight Piésold Pty Ltd
Designed LL 09/10
Drawn AZ 10/10
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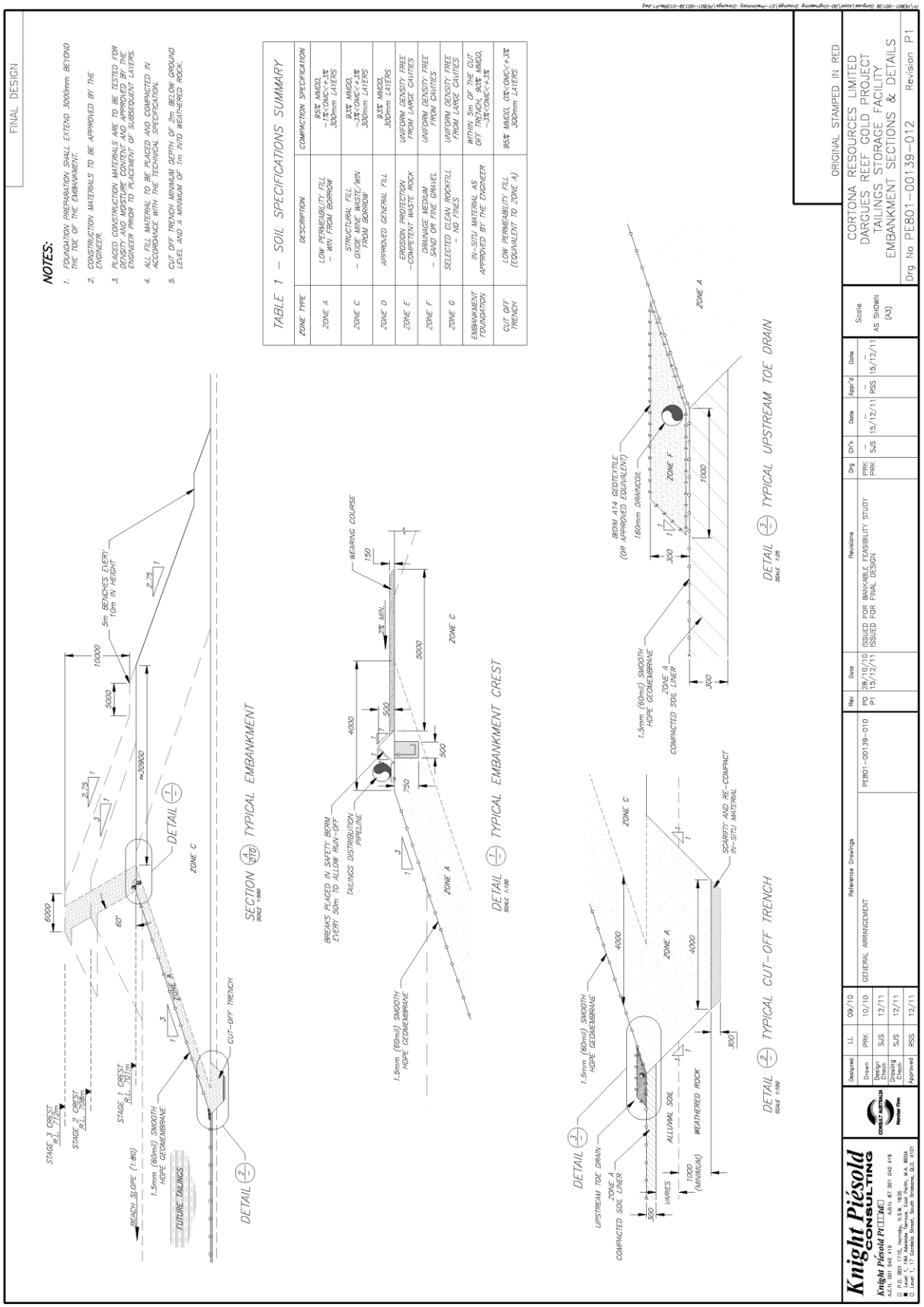
Approved RSS 12/11
Rev. Date Revisions Drg Ch'k Date Appr'd Date
P0 28/10/10 ISSUED FOR BANKABLE FEASIBILITY STUDY AZ – – – –
P1 15/12/11 ISSUED FOR FINAL DESIGN PRK SJS 15/12/11 RSS 15/12/11
Reference Drawings
EMBANKMENT SECTIONS & DETAILS PE801-00139-012
DECANT SYSTEM SECTIONS & DETAILS PE801-00139-022
SPILLWAY PLAN, SECTIONS & DETAILS PE801-00139-030
DIVERSION CHANNEL
FINAL DECANT
FINAL TAILINGS EXTENT
TSF ACCESS ROAD
STAGE 1 DECANT
FINAL SPILLWAY
DETAIL 1 (010)
VALLEY CUT EXTENT
TSF EMBANKMENT
MB-01
MB-02
MB-03
MB-04
MB-05
PZ-01
PZ-02
PZ-03
PZ-04
PZ-05
GTOS1
GTOS2
ML103 BOUNDARY
ESCARPMENT
PASTE HOLE
VENT RISER
7496000mE
7494000mE
7492000mE
6063400mN
6063200mN
6063000mN


FINAL DESIGN
NOTES:
1. FOUNDATION PREPARATION SHALL EXTEND 3000mm BEYOND THE TOE OF THE EMBANKMENT.
2. CONSTRUCTION MATERIALS TO BE APPROVED BY THE ENGINEER.
3. PLACED CONSTRUCTION MATERIALS ARE TO BE TESTED FOR DENSITY AND MOISTURE CONTENT AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF SUBSEQUENT LAYERS.
4. ALL FILL MATERIAL TO BE PLACED AND COMPACTED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
5. CUT OFF TRENCH MINIMUM DEPTH OF 2m BELOW GROUND LEVEL AND A MINIMUM OF 1m INTO WEATHERED ROCK.
TABLE 1 – SOIL SPECIFICATIONS SUMMARY
ZONE TYPE
DESCRIPTION
COMPACTION SPECIFICATION
ZONE A
LOW PERMEABILITY FILL – WN FROM BORROW
95% MMDD, -3% TO OMC+3% 300mm LAYERS
ZONE C
STRUCTURAL FILL – OXIDE MINE WASTE/WN FROM BORROW
93% MMDD, -3% TO OMC+3% 300mm LAYERS
ZONE D
APPROVED GENERAL FILL
93% MMDD, 300mm LAYERS
ZONE E
EROSION PROTECTION –COMPETENT WASTE ROCK
UNIFORM DENSITY FREE FROM LARGE CAVITIES
ZONE F
DRAINAGE MEDIUM – SAND OR FINE GRAVEL
UNIFORM DENSITY FREE FROM CAVITIES
ZONE G
SELECTED CLEAN ROCKFILL – NO FINES
UNIFORM DENSITY FREE FROM LARGE CAVITIES
EMBANKMENT FOUNDATION
IN-SITU MATERIAL AS APPROVED BY THE ENGINEER
WITHIN 5m OF THE CUT OFF TRENCH, 90% MMDD, -3% TO OMC+3%
CUT OFF TRENCH
LOW PERMEABILITY FILL (EQUIVALENT TO ZONE A)
95% MMDD, 0% TO OMC+3% 300mm LAYERS
SECTION A/D10 TYPICAL EMBANKMENT
SCALE 1:500
DETAIL 1 TYPICAL EMBANKMENT CREST
SCALE 1:100
DETAIL 2 TYPICAL CUT-OFF TRENCH
SCALE 1:100
DETAIL 3 TYPICAL UPSTREAM TOE DRAIN
SCALE 1:25
ORIGINAL STAMPED IN RED
Knight Piésold CONSULTING
Knight Piésold PTY LTD
ACN 001 445 419
ABN 47 001 045 419
P.O. BOX 1710, Hornsby, N.S.W. 1630
Level 1, 158 Jukskei Terrace, East Perth, W.A. 6004
Level 1, 17 Dominick Street, North Brisbane, Q.L.D. 4101
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GENERAL ARRANGEMENT
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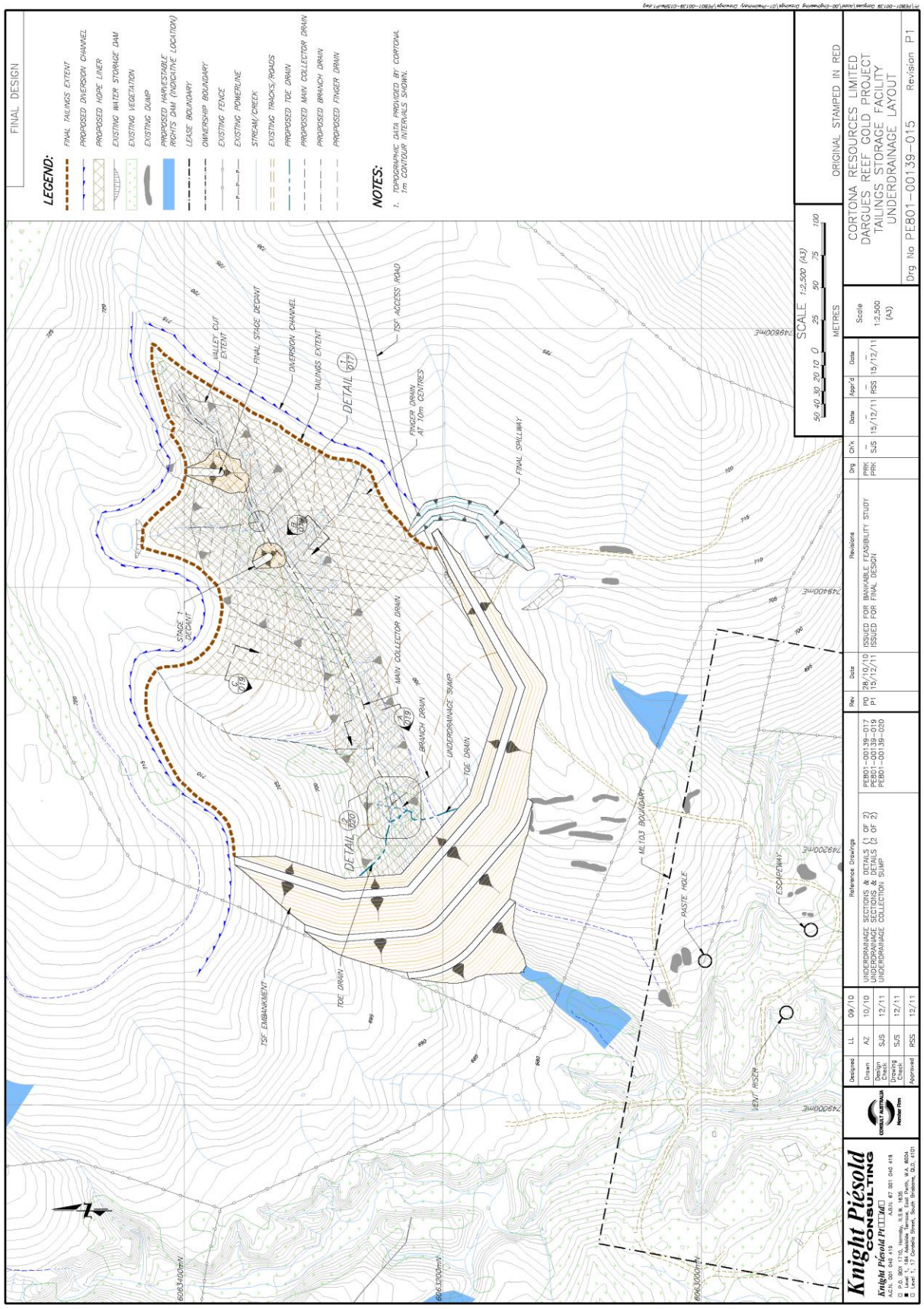
Scale
AS SHOWN (A3)
CORTONA RESOURCES LIMITED
DARGUES REEF GOLD PROJECT
TAILINGS STORAGE FACILITY
EMBANKMENT SECTIONS & DETAILS
Drg No PE801-00139-012 Revision P1


FINAL DESIGN
LEGEND:
FINAL TAILINGS EXTENT
PROPOSED DIVERSION CHANNEL
PROPOSED HDPE LINER
EXISTING WATER STORAGE DAM
EXISTING VEGETATION
EXISTING DUMP
PROPOSED HARVESTABLE RIGHTS DAM (INDICATIVE LOCATION)
LEASE BOUNDARY
OWNERSHIP BOUNDARY
EXISTING FENCE
EXISTING POWERLINE
STREAM/CREEK
EXISTING TRACKS/ROADS
PROPOSED TOE DRAIN
PROPOSED MAIN COLLECTOR DRAIN
PROPOSED BRANCH DRAIN
PROPOSED FINGER DRAIN
NOTES:
1. TOPOGRAPHIC DATA PROVIDED BY CORTONA.
1m CONTOUR INTERVALS SHOWN.
SCALE 1:2,500 (A3)
METRES
ORIGINAL STAMPED IN RED
CORTONA RESOURCES LIMITED
DARGUES REEF GOLD PROJECT
TAILINGS STORAGE FACILITY
UNDERDRAINAGE LAYOUT
Drg No PE801-00139-015 Revision P1
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Knight Piésold PTY LTD
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UNDERDRAINAGE SECTIONS & DETAILS (1 OF 2) PE801-00139-017
UNDERDRAINAGE SECTIONS & DETAILS (2 OF 2) PE801-00139-019
UNDERDRAINAGE COLLECTION SUMP PE801-00139-020
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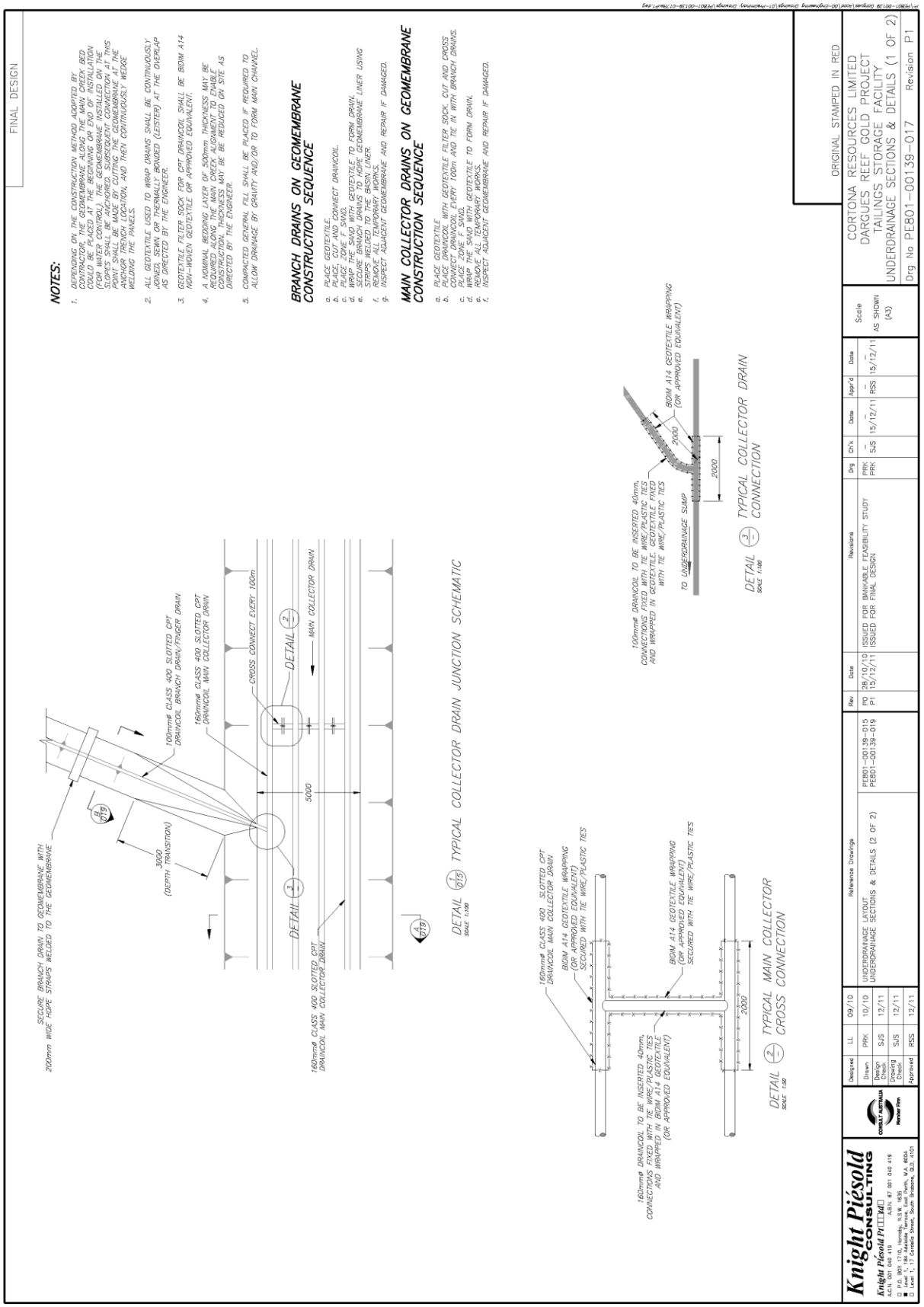
Scale 1:2,500 (A3)
DETAIL 1/617
DETAIL 2/650
DETAIL 1/719
TSF ACCESS ROAD
FINGER DRAIN At 10m CENTRES
FINAL SPILLWAY
VALLEY CUT EXTENT
FINAL STAGE DECANT
DIVERSION CHANNEL
TAILINGS EXTENT
STAGE 1 DECANT
MAIN COLLECTOR DRAIN
BRANCH DRAIN
UNDERDRAINAGE SUMP
TOE DRAIN
TSF EMBANKMENT
ML103 BOUNDARY
PASTE HOLE
ESCAPEWAY
VENT ROSE
7498000mE
7494000mE
7492000mE
6063400mN
6063200mN
6063000mN


FINAL DESIGN
NOTES:
1. DEPENDING ON THE CONSTRUCTION METHOD ADOPTED BY CONTRACTOR THE GEOMEMBRANE ALONG THE KEY TRENCH BED COULD BE PLACED AT THE BEGINNING OR END OF INSTALLATION (FOR WATER CONTROL). THE GEOMEMBRANE INSTALLED ON THE SLOPES SHALL BE ANCHORED. SUBSEQUENT CONNECTION AT THIS POINT SHALL BE MADE BY CUTTING THE GEOMEMBRANE AT THE ANCHOR TRENCH LOCATION, AND THEN CONTINUOUSLY WEDGE WELDING THE PANELS.
2. ALL GEOTEXTILE USED TO WRAP DRAINS SHALL BE CONTINUOUSLY JOINED EITHER BY THERMALLY BONDED (LESTER) AT THE OVERLAP AS DIRECTED BY THE ENGINEER.
3. GEOTEXTILE FILTER SOCK FOR CPT DRAINCOIL SHALL BE BIDIM A14 NON-WOVEN GEOTEXTILE OR APPROVED EQUIVALENT.
4. A NOMINAL BEDDING LAYER OF 500mm THICKNESS MAY BE REQUIRED ALONG THE MAIN CREEK ALIGNMENT TO ENABLE CONSTRUCTION. THICKNESS MAY BE REDUCED ON SITE AS DIRECTED BY THE ENGINEER.
5. COMPACTED GENERAL FILL SHALL BE PLACED IF REQUIRED TO ALLOW DRAINAGE BY GRAVITY AND/OR TO FORM MAIN CHANNEL.
BRANCH DRAINS ON GEOMEMBRANE
CONSTRUCTION SEQUENCE
a. PLACE GEOTEXTILE.
b. PLACE, CUT AND CONNECT DRAINCOIL.
c. PLACE ZONE F SAND.
d. WRAP THE SAND WITH GEOTEXTILE TO FORM DRAIN.
e. STEPS BEHIND DRAINS TO PROTECT GEOMEMBRANE LINER USING SAND BAGS PLACED TO FORM BASIN USE.
f. REMOVE ALL TEMPORARY WORKS.
g. INSPECT ADJACENT GEOMEMBRANE AND REPAIR IF DAMAGED.
MAIN COLLECTOR DRAINS ON GEOMEMBRANE
CONSTRUCTION SEQUENCE
a. PLACE GEOTEXTILE
b. PLACE DRAINCOIL WITH GEOTEXTILE FILTER SOCK, CUT AND CROSS CONNECT DRAINCOIL EVERY 100m AND TIE IN WITH BRANCH DRAINS.
c. PLACE ZONE F SAND.
d. WRAP THE SAND WITH GEOTEXTILE TO FORM DRAIN.
e. REMOVE ALL TEMPORARY WORKS.
f. INSPECT ADJACENT GEOMEMBRANE AND REPAIR IF DAMAGED.
SECURE BRANCH DRAIN TO GEOMEMBRANE WITH 200mm WIDE HDPE STRAPS WELDED TO THE GEOMEMBRANE
100mmø CLASS 400 SLOTTED CPT DRAINCOIL BRANCH DRAIN/FINGER DRAIN
160mmø CLASS 400 SLOTTED CPT DRAINCOIL MAIN COLLECTOR DRAIN
CROSS CONNECT EVERY 100m
3000 (DEPTH TRANSITION)
DETAIL 2
DETAIL 3
MAIN COLLECTOR DRAIN
5000
160mmø CLASS 400 SLOTTED CPT DRAINCOIL MAIN COLLECTOR DRAIN
DETAIL 1 SCALE 1:100 TYPICAL COLLECTOR DRAIN JUNCTION SCHEMATIC
160mmø CLASS 400 SLOTTED CPT DRAINCOIL MAIN COLLECTOR DRAIN
BIDIM A14 GEOTEXTILE WRAPPING (OR APPROVED EQUIVALENT) SECURED WITH TIE WIRE/PLASTIC TIES
160mmø DRAINCOIL TO BE INSERTED 40mm, CONNECTIONS FIXED WITH TIE WIRE/PLASTIC TIES AND WRAPPED IN BIDIM A14 GEOTEXTILE (OR APPROVED EQUIVALENT)
BIDIM A14 GEOTEXTILE WRAPPING (OR APPROVED EQUIVALENT) SECURED WITH TIE WIRE/PLASTIC TIES
2000
DETAIL 2 SCALE 1:100 TYPICAL MAIN COLLECTOR CROSS CONNECTION
100mmø DRAINCOIL TO BE INSERTED 40mm, CONNECTIONS FIXED WITH TIE WIRE/PLASTIC TIES AND WRAPPED IN GEOTEXTILE. GEOTEXTILE FIXED WITH TIE WIRE/PLASTIC TIES
TO UNDERDRAINAGE SUMP
BIDIM A14 GEOTEXTILE WRAPPING (OR APPROVED EQUIVALENT)
2000
2000
DETAIL 3 SCALE 1:100 TYPICAL COLLECTOR DRAIN CONNECTION
ORIGINAL STAMPED IN RED
Knight Piésold CONSULTING
Knight Piésold Pty Ltd
A.C.N. 001 045 419
P.O. BOX 1710, Hornsby, N.S.W. 1635
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UNDERDRAINAGE SECTIONS & DETAILS (2 OF 2) PE801-00139-019
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UNDERDRAINAGE SECTIONS & DETAILS (1 OF 2)
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