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REPORT ON

ADDENDUM TO NOTICE OF INTENT:

PROPOSED INCREASE IN THE STORAGE CAPACITY OF THE FIMISTON II TAILINGS STORAGE FACILITY AT KCGM

VOLUME I – TEXT AND FIGURES

Submitted to:

Kalgoorlie Consolidated Gold Mines
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EXECUTIVE SUMMARY

Introduction

This report has been prepared as an addendum to the existing Notice of Intent and in support of a Works Approval application to increase the capacity and overall height of the Fimiston II tailings storage facility (TSF). The underlying purpose of this application is to provide the required storage capacity in Fimiston II, in conjunction with the use of Fimiston I, to accommodate the tailings production from the Fimiston mill through to the end of 2012.

It is proposed that this will be achieved by raising the perimeter embankments of the Fimiston II paddocks to a maximum height of 45 m and assumes that Fimiston I will be raised to a maximum height of 40 m. Revised tailings storage data sheets have been prepared for the Fimiston II TSF paddocks that reflect the proposed changes.

The Fimiston mill and TSFs are prescribed premises within *Schedule 1* of the *Environmental Protection Regulations 1987 (as amended)* for the processing or beneficiation of metallic and non-metallic ore. This report also represents Stage 2 of KCGM's three-staged approach to gain approval for the Life of Mine Plan for the Fimiston operations.

The Fimiston mill and associated tailings storage facilities, Fimiston I and Fimiston II, are located at Kalgoorlie, Western Australia. Ore from the Fimiston Open Pit and the Mt Charlotte underground mine is treated at the Fimiston mill. The rated throughput of the plant is 13.5 Mtpa, with projected annual tonnages to be treated remaining within the range of 12.7 Mtpa and 13.5 Mtpa at a slurry density of around 55% solids.

While the tailings split between the Fimiston I and Fimiston II TSFs may vary annually, the ratio has generally been of the order of 20% to Fimiston I and 80% to Fimiston II. Under the current proposal, the tailings will continue to be split between Fimiston I and Fimiston II. The guiding principle behind the split ratio between the two facilities is aimed at facilitating drying and consolidation of the deposited tailings, by limiting the maximum rate of rise on the TSFs to 2.7 m/year.

The Fimiston II tailings storage facility comprises the original two storage paddocks (A and B), designed by GHD and since amalgamated to form A/B Paddock, abuting C Paddock and D Paddock, designed by Golder Associates.

Fimiston II is currently classified as a ***Category 1, Significant Hazard*** tailings storage facility, with licenced maximum TSF heights of 32 m (C Paddock) and 30 m (A/B and D Paddocks). Under the present proposal to increase the storage capacity of the Fimiston II by increasing the maximum allowable height of the individual cells, this classification will be upgraded to a ***Category 1, High Hazard*** facility by virtue of the potential for severe economic loss (resulting from prolonged interuption to rail traffic in the event that an uncontrolled release of tailings from the TSF inundates the Trans-Australian Railway corridor). A quantitiative risk-based dam break study of the Fimiston II TSF proposals indicates that the probability of such an event occurring is extremely unlikely.

Outline of Project Proposal

The proposal put forward in this addendum provides for the staged construction of embankment raises of the Fimiston II TSF paddocks to the maximum final embankment heights of 45 m for A/B Paddock, 44 m for C Paddock and 42.2 m for D Paddock. This represents increases in the allowable maximum embankment heights of 15 m for A/B Paddock, 12 m for C Paddock and 12.2 m for D Paddock.

The proposed variation in the maximum crest elevations of the individual paddock perimeter embankments is necessary to limit the maximum rate of rise to 2.7 m/year (a previously verrified acceptable rate of rise) and to minimise overall embankment height increases. The currently licenced and proposed maximum heights and elevations of the individual paddock perimeter embankments are summarised below.

Paddock	Current Maximum Licenced Height (m)	Proposed Maximum Height (m)	Proposed Crest Elevation (m.RL)
A/B	30	45	390.0
C	32	44	394.5
D	30	42.2	398.2

The maximum height increases will provide storage for an estimated additional 91 Mt of tailings. This additional capacity will, in conjunction with the utilisation of Fimiston I (to a maximum height of 40 m), provide a combined capacity of approximately 105 Mt and meet the storage requirements for the Fimiston mill operations through to 2012. The estimates are based on an average dry density of 1.65 t/m^3 for the stored tailings.

The method of raising the embankments is envisaged to be similar to that currently employed on the TSF, i.e. by constructing incremental upstream lifts to the perimeter embankment using tailings excavated from the tailings beaches. Borrow excavations in the tailings beaches will generally be limited to a depth of 1 m and be restricted to a length of 200 m parallel to the adjacent embankment. The height increment of each embankment raise would be between 1.0 and 1.5 m and it would be necessary to construct up to two lift increments each year.

There is provision for incorporating benches on the outer embankment slopes, nominally at 10 m vertical intervals between successive benches and requiring a step-in distance of approximately 5.0 m to form each bench. The decant causeway and pond control walls would utilise the centreline method of construction.

The geometry of the proposed upstream raises will have a nominal crest width of 5 m, overall downstream batter slope of 1V:4H (14°) and a nominal upstream batter slope of 1V:1.5H (34°). The target dry density ratio for compaction of the placed fill will be 95% of Standard Maximum Dry Density (SMDD).

The existing gravity decants will continue to be used until the individual cells reach the current maximum licenced heights (30 m for A/B Paddock and D Paddock and 32 m for D Paddock), at which stage, pump-out decants will be constructed and the existing gravity decants and outfall pipelines will be decommissioned. Exposed sections of the gravity towers will be recovered and the remainder backfilled. The gravity outfall pipelines will be plugged with grout beneath the perimeter embankments and the remainder of the length backfilled with a tailings or tailings/cement mix to minimise the risk of pipeline or decant collapse under the additional loading that the increased maximum height of the TSF will impose on the systems.

Stability modelling has been carried out to validate the proposed increase in storage height using effective shear strength parameters for analyses carried out under static loading conditions and total shear strength parameters for analyses carried out under pseudo-static (earthquake) loading conditions. The modelling indicates that the proposed embankment profiles will have acceptable factors of safety against failure under static and maximum credible earthquake loading conditions.

Seepage modelling indicates the likely seepage resulting from the proposed increase in the maximum allowable embankment height to be of the order of 51 to 53 L/s and little different to the modelled seepage at the currently licenced height. The currently measured flow from the seepage recovery bores is about 76 L/s, which includes a component of groundwater recovery, resulting from the progressive drawing down of the water table. The seepage recovery systems will be upgraded, as required, to manage any increase in seepage or rise in groundwater level that may occur.

At the end of the operating life of the TSF, the outer embankments of the TSF will be sheeted with a layer of waste rock. A cover of topsoil will be graded into the coarse waste rock outer sheeting layer to provide a medium for plant growth. Run-off from the outer batter slopes will be intercepted and directed into armoured channels (drop structures) constructed at strategic locations along the lengths of each embankment. Benches will be engineered with a gradient into the batter slope and graded towards the run-off structures. Intermediate run-off channels will be constructed at intervals along the outer slope to take the excess flow during heavy rainfall.

Environmental Commitments

Inherent in the design philosophy is a provision to safeguard the environment from adverse impacts attributable to the TSF. It is not envisaged that the proposed increase in the maximum height of the TSF will have any direct implications with respect to the continuance of existing monitoring programmes or changes to existing environmental commitments. KCGM is developing a Groundwater Management Plan in conjunction with the regulatory authorities and the community to monitor the performance of seepage management against agreed indicators and targets. The Groundwater Management Plan covers both the Fimiston I and Fimiston II TSFs and incorporates past management practices that have been successfully applied to seepage control. The groundwater management plan and associated performance targets will be reviewed on an annual basis.

Operational audits of the TSF will continue to be carried out on an annual basis in accordance with the DoIR's *Guidelines on the Safe Design and Operating Standards for Tailings Storage*.

Following cessation of deposition into the Fimiston II TSF, the decommissioning of the facility will be carried out in accordance with KCGM's decommissioning commitments developed for the overall project.

Stakeholder Consultation

KCGM is undertaking extensive consultation with key stakeholders and the wider community for the Fimiston Operations Expansion as a whole which includes the Fimiston II TSF increase in storage capacity. In addition to this, KCGM has developed a comprehensive communication plan in line with current DoE guidelines.

In December 2004, KCGM developed and launched the "KCGM Concept Plan" which outlined the process and vision for achieving what is expected to be the final pit outline in 2017. The Concept Plan outlines the requirement for the Fimiston II increase in storage capacity. In 2004, KCGM also undertook a comprehensive Social Impact Assessment, the results of which are available on the super pit website: http://www.superpit.com.au.

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1.0 INTRODUCTION

1.1 Background and Objectives

This document presents the proposal of the proponent, KCGM Pty Ltd (KCGM), the current managers of the Fimiston gold mining and processing operations, to increase the storage capacity of the Fimiston II tailings storage facility (TSF). This proposal represents Stage 2 of KCGM's three-staged approach to gain approval for the Life of Mine Plan, which includes a five year extension to the current mine life of 2012. This proposal seeks to increase the maximum allowable height of the external perimeter embankment from the currently licensed height of 32 m to an average cell height of 44 m to enable KCGM to meet the required tailings storage capacity for its current operation. The Stage 3 proposal will detail how KCGM intends to meet tailings requirements for the proposed five year extension of the mining operation. The KCGM operations are located on the eastern boundary of the City of Kalgoorlie-Boulder in Western Australia (Figure 1).

Ore at KCGM is sourced primarily from the Fimiston Open Pit and, to an appreciably lesser extent from the Mt Charlotte underground mine. All ore is processed through the Fimiston mill. Approximately 13.1 Mtpa of tailings solids are either currently or projected to be pumped as slurry from the Fimiston mill into either the Fimiston I TSF or to the Fimiston II TSF. A general infrastructure layout plan showing the existing Fimiston I and Fimiston II TSFs is included as Figure 2.

In the 2004 review period (September 2003 to August 2004), approximately 10.8 Mt of tailings solids were discharged into the three paddocks of the Fimiston II TSF (Paddocks A/B, C and D) in the ratios of 42% : 33% : 25% respectively, and at a slurry density of about 55% solids.

The current and proposed heights and elevations are summarised in Table 1.

Table 1: Current and Proposed Embankment Elevations and Heights

	A/B Paddock	C Paddock	D Paddock
Current Crest Elevation* (m RL)	372.2	374.2	376.6
Embankment Height* (m)	27.2	23.2	20.6
Current Maximum Allowable Embankment Height (m)	30	32	30
Proposed Maximum Allowable Embankment Height (m)	45	44	42.2
Proposed Maximum Crest Elevation (m RL)	390.0	394.5	398.2

*Based on survey heights carried out in October 2004.

The maximum perimeter embankment heights currently permitted under the terms of the existing licence for A/B, C and D Paddocks are 30 m, 32 m and 30 m, respectively.

This report has been prepared as an Addendum to the original Notices of Intent (NOIs) for the Fimiston II A and B Paddocks (Gutteridge Haskins & Davey, 1991) and the Fimiston II C and D Paddocks (Golder Associates, 1994b). The report also provides technical supporting documentation for the Works Approval application to the regulatory authorities for the proposed incremental increase in the maximum permissible height of the Fimiston II TSF paddocks from the current 30 m limit (32 m for C Paddock) to the individual paddock heights ranging from 42.2 m to 45 m.

The report has been structured around the recommendations provided in the DoCEP[1] Guidelines on the Safe Design and Operating Standards for Tailings Storage (DME, 1999) and in accordance with the DoCEP publication Guidelines to Help You Get Environmental Approval for Mining Projects in Western Australia (DME, 1998) (the Guidelines). Updated tailings storage data sheets, reflecting the proposed increases in height and storage capacity, are included as Appendix A.

A copy of the Operating Licence under which the TSF is currently operating has been included as Appendix B.

The objective of this submission is as follows:

To gain approval for an increase in the maximum allowable heights of the Fimiston II TSF paddocks permitted under the operating licence to 45 m, 44 m and 42.2 m for A/B, C and D Paddocks, respectively.

1.2 TSF Classification

The Fimiston II TSF is currently classified as a Category 1, Significant Hazard tailings storage facility, with a licenced maximum TSF height of up to 32 m. Under the present proposal to increase the maximum allowable embankment height to 45 m, the classification will be revised to a Category 1, High Hazard facility. The reclassification of the hazard level is in accordance with the Guidelines and is in recognition of the potential for severe economic loss resulting from an uncontrolled release of tailings flowing across and closing the Trans-Australian Railway corridor for an extended period of time. The reclassification does not take account of the extremely low probability of such an event occurring.

[1] Department of Consumer and Employee Protection, Resources Safety Division, formerly the Department of Industry and Resources (DoIR), and prior to that the Department of Minerals and Energy (DME), Western Australia.

1.3 Ownership and Management Structure

KCGM Pty Ltd manages the assets of the Joint Venture partners, Newmont Australia Ltd and Barrick Gold of Australia Ltd. The assets include the mining and milling operations of the Fimiston Open Pit, the Fimiston Mill, the Gidji Roaster and the tailings storage facilities, Fimiston I, Fimiston II and Gidji.

1.4 Existing Facilities

All milling and most of the processing at KCGM takes place at the Fimiston production plant. Ore feed to the plant is sourced primarily from the Fimiston Open Pit with a small quantity from the Mt Charlotte underground mine. The plant comprises a crushing, semi-autogenous grinding (SAG) and ball milling circuits and flotation, thickening and carbon-in-leach (CIL) circuits.

The gold in the refractory ore from the Fimiston Open Pit is locked within a sulphide matrix. This is concentrated via flotation prior to further processing. About 65 t/hour of gold-sulphide flotation concentrate (containing about 50 g of gold per tonne) is then classified. The coarse fraction is filtered and trucked to the Gidji Roaster, situated some 18 km north of Kalgoorlie, for further processing. A portion of the coarse concentrate fraction is diverted to ultra fine grinding (UFG) at Fimiston. This is then re-combined with the “fine” concentrate (35 t/hour total), which is then leached through a concentrate-CIL circuit.

The tailings from the flotation process are combined with the Mt Charlotte ore and the resulting feed processed through the CIL circuit. The concentrate-CIL tailings are then combined with the flotation-CIL tailings and pumped to either the Fimiston I or Fimiston II TSF at a rate of about 1,500 t/hour.

The Fimiston I and Fimiston II TSFs have footprint areas of about 142 ha and 432 ha respectively.

1.5 TSF Location

The location of the KCGM Fimiston operations are shown on Figure 1. Figure 2 shows the position of the Fimiston II TSF relative to the surrounding mine infrastructure. The Fimiston II TSF is bounded along much of the north-eastern side by Bulong Road and along the western side by the Trans-Australian Railway corridor. Fimiston II occupies (or overlies in part) the following leases: M26/308, M26/451, G26/44 to 68, G26/70 to 71, G26/73 to 78 and G26/82 to 86 (Figure 2).

The Fimiston II TSF is centred approximately on MGA co-ordinates 360,750 mE and 6,597,150 mN. The area covered by the TSF has already been disturbed and there will be no further requirement for additional clearing of native vegetation. Figure 3 shows the existing layout of the Fimiston II TSF.

1.6 History

The Fimiston plant commenced operating in 1989, with the Fimiston I TSF being commissioned to receive all the tailings from the Fimiston plant. The expansion of the Fimiston plant in 1992 required the design and construction of the Fimiston II Paddocks A and B. Paddocks A and B were commissioned in 1991. The additional Paddocks C and D were commissioned in 1994 and 1995 respectively. Paddocks A and B have subsequently been amalgamated into a single operating unit (A/B Paddock).

Tailings continue to be deposited into both Fimiston I and Fimiston II. Design of the tailings pipework and return water pumping has been carried out, but has not been incorporated into this report.

It is estimated that approximately 30.5 Mt, 25.1 Mt and 19.7 Mt have been deposited into A/B, C and D Paddocks respectively; representing a combined total of 75.3 Mt of tailings solids stored in the three paddocks of the Fimiston II TSF.

1.7 TSF Expansion and Rationalisation

In combination with the proposed increase in the maximum allowable height of the Fimiston I TSF, the tailings storage capacity for the Fimiston Operations will be increased to 105 Mt.

The projected tailings output from the Fimiston Mill to the end of 2012 is summarised in Table 2.

Table 2: Projected Tailings Output to 2012

Year	Projected Tailings Output (Mt)
2005	12.71
2006	13.16
2007	13.19
2008	13.18
2009	13.19
2010	13.16
2011	13.07
2012	13.14
Total	**104.80**

The method of raising the embankments would be similar to that currently employed on the TSF, by constructing incremental lifts to the perimeter embankment using tailings excavated from the tailings beaches. The height increment of each embankment raise would be between 1.0 and 1.5 m and generally, it would be necessary to construct up to two lift increments each year.

Anticipating a potential increase in the rate of tailings discharge onto the Fimiston II TSF, Golder Associates undertook studies (Golder Associates, 2004b) to assess the likely impacts of an increased rate of rise in the level of the tailings beach to 2.7 m/year on the continued operation and integrity of Fimiston II. On the basis of the test results, the study concluded, that a rate of rise of 2.7 m/year will be acceptable. Modelling was not carried out for rates of rise in excess of 2.7 m/year. The maximum annual rate of rise of the tailings on any of the cells has accordingly been restricted to 2.7 m/year.

Stage capacity curves for Fimiston II A/B, C and D Paddocks have been included as Figures 4, 5 and 6 respectively and a stage capacity curve for Fimiston I included as Figure 7.

1.8 Assumptions

The general assumptions that are implicit in the proposed TSF height increase are as follows:

- The physical and geochemical characteristics of the tailings and slurry liquor will remain unchanged from that currently discharged to the Fimiston II TSF.
- The rate of tailings discharge to Fimiston II will not increase significantly beyond the current maximum mill output of 13.5 Mtpa.
- Additional storage capacity in Fimiston I, up to a maximum embankment height of 40 m, can be utilised.

2.0 EXISTING ENVIRONMENT

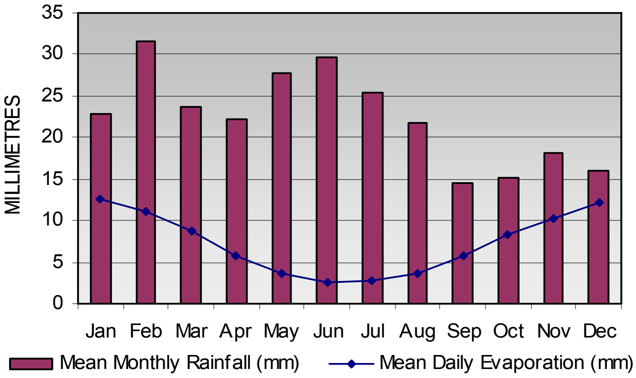
2.1 Regional Setting

The Fimiston II TSF lies to the east of the City of Kalgoorlie-Boulder on the eastern flank of the Hannan Lake watershed. The TSF is bounded to the north by Bulong Road and to the south-west by the Trans-Australian Railway easement, with the Fimiston I TSF and the Fimiston Open Pit located to the west of the easement. The Fimiston Open Pit separates the Fimiston I and II TSFs from the main areas of habitation and the commercial and industrial areas of the city. Apart from communication corridors, the infrastructure located to the east of the Fimiston Open Pit is predominantly mining related and largely under the management of KCGM.

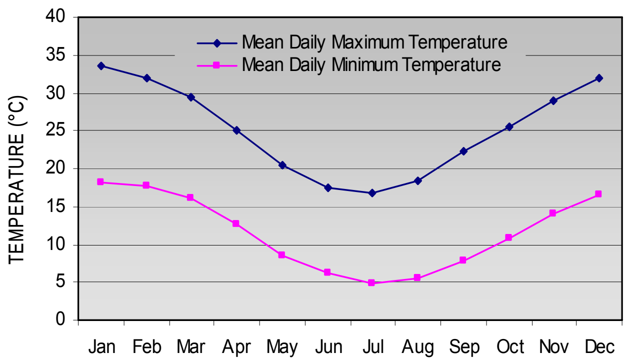
Consolidation of the mining industry has resulted in substantial areas being tidied up, aided by retreatment of the old tailings dumps, which were a feature of the area. KCGM has taken the lead in the implementation of local rehabilitation projects.

2.2 Climate

The Kalgoorlie region is characterised by hot dry summers and mild winters with mean daily temperatures ranging from a maximum of 33.6°C in January to a minimum of 4.9°C in July. The trend is shown on the accompanying plot. Rainfall in the area is influenced by the tropical monsoonal systems in summer, with occasional cyclonic storms moving through to the goldfields. Winter rainfall generally originates from broad frontal lows that move in from the south-west. The mean annual rainfall for Kalgoorlie is 268.4 mm and is distributed fairly evenly through much of the year with a noticeable decrease during the months of September through to December.



The 1:100 year 72-hour rainfall intensity for the area has been calculated at 174 mm. In February 1995, rainfall of 154 mm was recorded within a 72-hour period, exceeding the 1:50-year 72-hour event of 144 mm (1:100-year 72-hour event is 174 mm). On 14 January 2000, a rainfall of 50 mm was recorded in a 1-hour period, exceeding the 1:100-year 1-hour event of 43.1 mm.



The mean annual evaporation of 2,630 mm is almost an order of magnitude greater than the mean annual precipitation, with the mean monthly evaporation comfortably exceeding the mean annual precipitation during each month of the year.

2.3 Topography and Drainage

Hannans Lake is a large saline lake lying about 10 km to the south-east of Kalgoorlie. Fimiston II is situated on the eastern flank of the watershed to Hannans Lake. The ground surface beneath the existing TSF is generally planar and falls away to the south-west at a gradient of between 0.8 and 1%.

The original surface area occupied by Fimiston II TSF was transected by a braided system of shallow ephemeral flow paths draining to a central floodway go the west of the TSF that drains southwards to Hannans Lake. Runoff is diverted around the TSF.

Significant amounts of surface water flow through the central floodway of the catchment only after heavy rainfall events. Heavy rains associated with tropical depressions in 1992, 1995, and 1999 caused extensive flooding in the Kalgoorlie area. A system of diversion drains ensures that significant amounts of water do not pool or flow near the toe of the TSF during periods of flooding in the catchment.

2.4 Geology and Soils

Fimiston II is located within the Hannan Lake catchment area, which in turn lies within a broad synclinal trough which trends towards the south. The Fimiston II TSF is situated on the eastern side of the catchment and weathered bedrock crops out through the valley fill deposits to the east of C and D Paddocks. No outcrop has been identified on the western side of the TSF. Drilling in the vicinity of the Fimiston II TSF has indicated that the synclinal trough contains a sequence of up to 35 m of sedimentary deposits (alluvial, colluvial and lacustrine materials) overlying weathered bedrock in the area.

The soil profile is generally characteristic of the areas surrounding the Fimiston II TSF and may typically be described as follows:

- Red brown sandy or gravelly silt topsoil up to 2 m thick, overlying

- Very stiff to hard, red brown gravelly clay and clayey sandy gravel up to 12 m thick, overlying

- Pale grey-green to blue-grey clay with red-brown clay laminations and mottling with ferricrete development, overlying

- Weathered bedrock.

Basement units across the site consist of either banded sedimentary rock or massive igneous rock, which have been extensively weathered and lateritised. The basement sequence underlies the entire site, with basement “highs” occurring in two locations along the eastern and southern margin of the site.

2.5 Groundwater

The area around the Fimiston II TSF is underlain by sedimentary deposits and variably weathered bedrock. The sedimentary deposits are widespread and correlate with similar deposits around Hannan Lake and elsewhere in the Eastern Goldfields. Near the Fimiston II TSF the sedimentary deposits have a maximum thickness of 30 m and pinch out to the east and west towards bedrock ridges along the flanks of the catchment. These units typically consist of red-brown clays and gravels, and blue-grey clays and clayey gravels. The weathered bedrock mainly consists of pallid clay in the central floodway.

The most transmissive parts of the shallow stratigraphic sequence near the Fimiston II TSF are gravels between about 5 m and 15 m below the surface, and ferricrete horizons within blue-grey clays between about 10 m to 20 m beneath the surface. The underlying weathered bedrock generally has a very low transmissivity and is not an aquifer.

The groundwater system is recharged naturally after significant rainfall events that cause surface water to accumulate and flow down the floodway. Seepage from the Fimiston II TSF can permeate the subsurface formations and infiltrate down to the local water table.

Natural groundwater in the catchment is saline, with total dissolved salts concentrations in the range of 20,000 mg/L to 50,000 mg/L. This groundwater is acidic, with pH generally between 2 and 4.

2.6 Flora and Fauna

The proposal to increase the maximum permitted height of Fimiston II will not require any additional clearing of vegetation.

3.0 TAILINGS CHARACTERISATION

3.1 Physical Characteristics

3.1.1 General

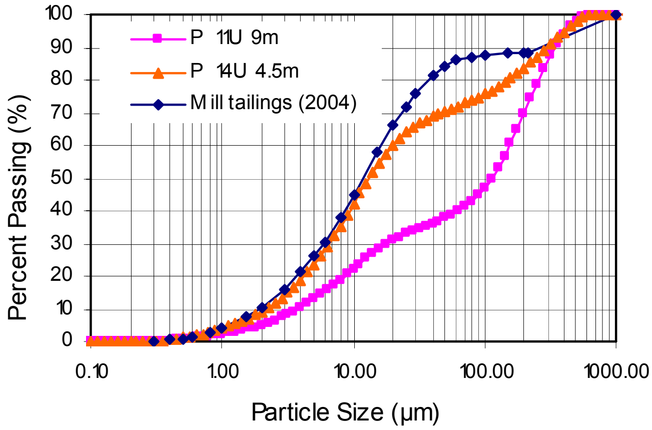
The Fimiston II TSF A/B, C and D Paddocks have been in operation since 1991, 1994 and 1995 respectively. Collated information on tailings material characteristics has been presented in the relevant technical documentation in support of Works Approvals for A/B Paddocks (Guttridge Haskins & Davey, 1991) and C and D Paddocks (Golder Associates, 1994b), as well as for the NOI addendum for increasing the height of Fimiston I (Golder Associates, 2003). Annual reviews of the operation and performance of the respective TSFs have been carried out since the commissioning of the various paddocks.

The accumulated data and associated testwork have been compiled into annual reports for submission to the regulatory authorities in compliance with licence requirements. Additional studies have been carried out in support of the application to raise the heights of Fimiston I and Fimiston II. These studies have included *in situ* piezoprobe investigations of the Fimiston II TSF (Golder Associates, 2004b) and laboratory testwork to investigate the potential to increase the rate of rise of the tailings (Golder Associates, 2004c). A summary of the more recent data is presented below and copies of relevant testwork results are included as Appendix C.

3.1.2 Particle Size Distribution

CSIRO carried out a particle size analysis of a sample of mill tailings (“whole”’ tailings) in June 2004 using the sedigraph (x-ray diffraction) method of analysis. The particle size distribution curve plotted below shows that about 86% of the material has a diameter of less than 75 µm.

Tube samples of tailings, P 11U and P 14U, were collected from the beaches on the perimeter of D and A/B Paddocks at depths of 9 m and 4.5 m below the surface, respectively. The particle size distribution curves of the two samples, plotted on the adjacent graph, indicate a ‘fines’ (minus 75 µm) contents of about 43% and 73% for P 11U and P 14U, respectively. The plots illustrate the variations that occur in the particle size distribution of the beached tailings due to the segregation and settling out of coarser particles closer to the points of discharge of the tailings slurry onto the tailings beaches.



3.1.3 Particle Density

Absolute density determinations were carried out by CSIRO using a helium pycnometer on tailings samples collected at EFCP locations P 11U and P 14U. The results are considered representative of material settling out near the perimeter of the TSF. A similar technique was used to determine the particle density of a representative sample of Fimiston mill tailings. The results are as presented in Table 3.

Table 3: Tailings Particle Density Determinations

Sample Location	Depth (m)	Absolute Density (t/m^3)
P 11U	9	2.99
P 14U	4.5	2.92
Mill Tailings	as delivered	2.86

The absolute density of 2.86 t/m3 obtained on the mill tailings sample is considered to be more representative of the average tailings than the results obtained on samples collected close to the perimeter embankments.

3.1.4 Permeability

Consolidation testwork carried out on a tube sample collected from the Fimiston I tailings storage (2003) and a sample of mill tailings (2004) indicated permeability coefficients (kv) generally within the range of 10-8 to 10-9 m/s. The hydraulic conductivity of the *in situ* tailings mass, however, would likely be influenced by the presence of shrinkage cracks and layering caused by particle segregation after discharge.

Estimates of the horizontal coefficients of permeability (kh) were derived from dissipation tests carried out at various depths within the tailings mass of Fimiston II during a programme of electric friction-cone penetrometer testing (Golder Associates, 2004c). The results indicate permeability coefficients within a range of 10-7 to 10-8 m/s. The dissipation test results lie within the same range as similar dissipation tests carried out during 2000. Results of the recent dissipation tests carried out on Fimiston II are plotted on the adjacent graph and are summarised in Table 4.

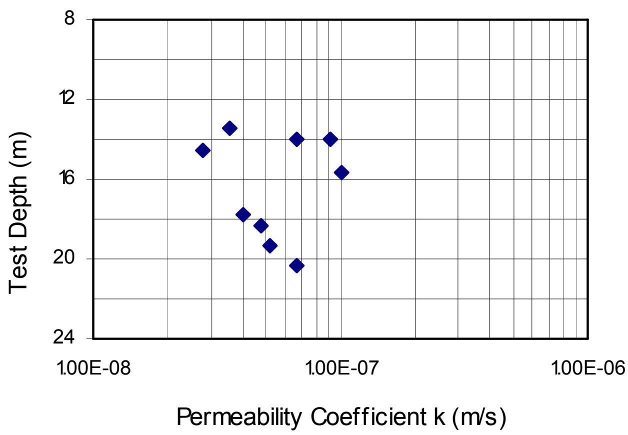


Table 4: Tailings Permeability Coefficients Derived from Pore Pressure Dissipation Tests

Location	Depth (m)	k_h (m/s)
P 9U	17.7	4.0×10^{-8}
P 11U	14.5	2.8×10^{-8}
P 11U	15.6	1.0×10^{-7}
P 13U	13.9	6.7×10^{-8}
P 13U	18.3	4.8×10^{-8}
P 13U	19.3	5.2×10^{-8}
P 14U	13.4	3.6×10^{-8}
P 15U	14.0	9.1×10^{-8}
P 15U	20.3	6.6×10^{-8}

Note: refer to Golder Associates (2004c) for locations of tests

Because of particle segregation and horizontal layering that occurs after discharge of tailings onto the tailings beaches, the permeability of beached tailings is generally anisotropic, with the horizontal coefficient of permeability being greater than the vertical coefficient of permeability.

3.1.5 Consolidation Characteristics

Indicative results of consolidation testwork are available from testwork carried out on a tube sample collected from the Fimiston I tailings beach in 2003, tested within the effective pressure range of 50 to 800 kPa, and on a representative sample of Fimiston mill tailings provided by KCGM, tested within the effective pressure range of 2 to 130 kPa.

As the tailings discharged to Fimiston I is the same as that pumped to Fimiston II and will have similar segregation characteristics, the consolidation test results on the Fimiston I tailings sample are equally applicable to the Fimiston II tailings. Results for stages of comparative loading have been extracted from the laboratory test certificates and summarised in Table 5. Copies of the test certificates are included as Appendix C.

Table 5: Summary Comparison of Consolidation Coefficients

Effective Pressure (kPa)	Void Ratio (e)	Coefficient of Volume Compressibility m_v (m^2/MN)	Coefficient of Consolidation C_v (m^2/year)	Compression Index C_c
Fimiston I Tube Sample (2003) from TSF perimeter				
50	0.565	0.219	92.9	0.013
100	0.557	0.107	98.0	0.028
Fimiston Mill Tailings Sample (2004)				
33	0.510	0.670	71.72	0.055
65	0.495	0.312	118.45	0.051
130	0.474	0.220	174.44	0.071

The results indicate slightly higher coefficients of volume compressibility and consolidation and lower void ratios for the mill tailings sample compared to the tube sample collected from the perimeter of the tailings storage cell. This can be partially explained by the process of segregation that takes place on the beach, which results in a greater proportion of the less compressible sand size tailings being deposited near the perimeter of the cell, while the fines are preferentially carried in suspension towards the supernatant pond.

The test data sheets indicate that, for the mill tailings sample, the void ratio (e) varies within the range of e ~ 0.56 - 0.47 for an effective pressure range of 2-130 kPa and e ~ 0.56-0.53 for an effective pressure range of 50-400 kPa for the sample collected near the perimeter embankment. An average void ratio of e ~ 0.53 has been used for assessing the average dry density of the tailings mass.

3.1.6 Desiccation Behaviour and Dry Density

The tailings are deposited sub-aerially in layer thicknesses generally of about 200 mm on each discharge cycle. The time between deposition cycles is maximised to allow the deposited tailings time to dry and consolidate. Moisture content and dry density determinations on undisturbed samples collected from Fimiston II during the 2003 and 2004 audit inspections are summarised in Table 6.

Table 6: Tailings Dry Density and Moisture Content Determinations

Cell/Year	Sample Location	Dry Density (t/m^3)	Moisture Content (%)	Percent Fines (%)
D (2003)	100 m off perimeter wall	1.74	27.4	-
D (2004)	at decant	1.66	35.1	95
A/B (2004)	50 m off perimeter wall	1.68	9.6	31

The dry density results presented in Table 6 were measured on push tube samples collected from the upper 200 mm of tailings beach and indicate an average dry density of about 1.7 t/m^3. The samples have not been subjected to consolidation under conditions of loading and may reasonably be considered to be at the lower end of the dry density range. If a void ratio of 0.53 is adopted, commensurate with the values obtained from the consolidation tests, and allowance made for the salt content in the tailings, an average tailings density of around 1.84 t/m^3 can be justified. In addition, beach drying tests on settled mill tailings carried out in 2004 achieved measured dry densities increasing in the range of 1.82–1.9 t/m^3 with drying up to 8 days duration.

The Fimiston II TSF has been operating since 1991 and it is uncertain to what extent the variations in ore type and weathering of the ore, consolidation of the deposited tailings and the impacts of particle segregation and packing would influence the average density of the tailings mass. A conservative value of 1.65 t/m^3 has, therefore, been adopted as the average dry density of the tailings for volume estimation purposes and represents a 10% reduction in the tailings dry density value estimated from consolidation test results.

3.1.7 Projected Rates of Rise

In anticipation of an increase in the rate of rise of the tailings beach on Fimiston II when the full tailings stream is directed into the Fimiston II TSF, Golder Associates undertook a study to evaluate the effect of an increased rate of rise on storage management (Golder Associates, 2004b). The study included a programme of laboratory testing specifically designed to emulate the cyclic deposition, settling, drying and consolidation of tailings at current and accelerated rates of rise of 2.2 m/year and 2.7 m/year respectively. The study concluded that there was unlikely to be a significant difference in the pore pressure response of the Fimiston II TSF between the current rate of rise at 2.2 m/year and the projected maximum rate of rise of ~2.7 m/year, which was based on a 20% increase in flow to Fimiston II.

The currently proposed increase in the height of Fimiston II will result in a maximum rate of rise of 2.72 m/year within the cells towards the end of operations. Stage capacity curves for Fimiston II A/B, C and D Paddocks are included as Figures 4, 5 and 6 respectively and include plots of the predicted annual rates of rise against tailings elevation based on a dry density of 1.65 t/m^3.

3.1.8 Shear Strength

During the life of the Fimiston I and II operations, consolidated undrained triaxial shear tests have been carried out periodically on Fimiston tailings samples. The results show a spread of values for the effective angle of internal friction (ϕ') of between 28° and 41° and of effective cohesion (c') of 0 to 70 kPa. The results of laboratory shear strength tests on the Fimiston mill tailings are summarised in Table 7.

Table 7: Tailings Shear Strength Parameters

Reference	Location	Sample Depth (m)	Cohesion c′ (kPa)	Angle of Internal Friction ϕ′ (degrees)
Golder*	Fimiston I E	surface	3	40.5
GHD**	Fimiston I – BH1	7.25	0	28
GHD	Fimiston I – BH3	2.3	10	41
GHD	Fimiston I – BH4	2.1	10	35
GHD	Fimiston I – BH5	1.8	70	34
GHD	Fimiston I – BH5	4.95	10	39
GHD	Sample 3	-	15	33
Golder	Fimiston II – C Paddock	surface	1	40

* Golder Associates, 1993; ** GHD, 1991

In addition to the above triaxial and direct shear test results, recent electric friction-cone penetrometer (EFCP) probing has been carried out on the Fimiston II TSF. The friction angles used as input data for stability modelling, have been estimated from the undrained shear strength results obtained from the programme of probing using the relationship developed by Lunne et al2, which produced effective friction coefficients within the range of ϕ′= 27° to 36° and are comparable with the results of the previous laboratory testwork. The effective friction angles used for stability modelling lie within this range, while effective cohesion for the tailings is assumed to be c′=0. The adopted strength parameters are discussed further under Section 6.4.

3.2 Chemical Characteristics

3.2.1 Geochemical Characterisation of Tailings Solids

Geochemical testwork was carried out on a representative sample of blended ore from the Fimiston and Mt Charlotte ores (Graeme Campbell & Associates, 1994). The study report indicated that the results indicated an in Arsenic (As), Tellurium (Tl) and Tungsten (W).

The multi-element composition of the tailings solids is reproduced in Table 8.

[2] Lunne, Robertson and Powell, *Cone Penetration Testing in Geotechnical Practice*, Table 5.6

Table 8: Multi-Element Composition and Indicated Element Enrichment for Tailings Solids

Element	Total Element Concentration (mg/kg or %)	Element	Total Element Concentration (mg/kg or %)	Element	Total Element Concentration (mg/kg or %)
Ag	0.1	Cu	24	Sb	0.2
Al	5.8%	Fe	9.8%	Se	0.4
As	28	Hg	0.18	Sn	1
B	40	K	1.4%	Sr	140
Ba	190	Mg	2.2%	Te	0.8
Be	1.4	Mn	1800	Th	1.4
Bi	< 0.1	Mo	1.0	Tl	0.4
Ca	4.6%	Na	2.5%	U	0.5
Cd	< 0.1	Ni	17	V	260
Ce	20	P	640	W	66
Co	23	Pb	10	Zn	110
Cr	20	S	0.75%		

Source: Table 4.1, Graeme Campbell & Associates, 1994

The results of acid-base analyses on the blended tailings samples from the Fimiston and Mt Charlotte tailings are summarised in Table 9.

Table 9: Acid-Base and Net-Acid Generation for Tailings Solids

Slurry pH	Slurry EC (µS/cm)	Total-S (%)	SO4-S	ANC	NAPP	NAG	NAG pH
				kg/H_2SO_4/Tonne			
8.1	95,000	0.75 (0.76)	0.06 (0.10)	210 (200)	-180	< 0.5	8.1

EC: Electrical Conductivity; ANC: Acid-Neutralisation Capacity; NAPP: Net-Acid Producing Potential; NAG: Net-Acid Generation.
Slurry pH and EC correspond measured directly on as-received tailings sample
All results expressed on an oven-dry basis (except for slurry pH, slurry EC and NAG pH)
Values in parentheses represent duplicates
Source: Table 3.1, Graeme Campbell & Associates, 1994

The geochemical study report concluded that the NAPP results indicated that the tailings were non-acid forming (NAF), a conclusion that was supported by the NAG test results.

3.2.2 Waste Liquor Characterisation

Geochemical testwork was carried out on a sample of tailings slurry water during the same study (Graeme Campbell & Associates, 1994). The results are summarised in Table 10.

Table 10: Quality of Tailings Slurry Water

Element/Parameter	Tailings Slurry Water	Element/Parameter	Tailings Slurry Water
Major Parameters		*Minor Ions*	
pH	8.6	Al	0.16
Total dissolved salts	130,000	Mn	0.02
Major Ions		Cd	< 0.05
Na	46,000	Pb	< 0.2
K	350	Cr	< 0.02
Mg	2,600	Co	< 0.1
Ca	2,500	As	< 0.01
Cl	92,000	Sb	< 0.05
SO_4	5,200	Bi	< 0.05
HCO_3	80	Se	0.0005
CO_3	20	Te	< 0.1
Nutrients		B	0.1
NO_3-N	49	Si	1.3
P	< 0.2	F	< 0.1
Cyanide Forms		Mo	< 0.05
CN_{tot}	170	Ag	< 0.05
CN_{wad}	99	Ba	< 0.1
CN_{free}	< 0.05	Sr	2.8
CNO	20	Ce	< 0.01
SCN	32	Tl	< 0.02
Cyanide-Complexing Metals		V	0.02
Fe	12	Be	< 0.01
Hg	0.042	Sn	< 0.1
Cu	*2.4*	W	< 0.1
Ni	0.12	U	< 0.01
Zn	0.90	Th	< 0.01

All values in mg/L

Source: Table 5.1, Graeme Campbell & Associates, 1994

Conclusions by Graeme Campbell & Associates (1994) are summarised as follows:

- Tailings slurry water is hypersaline.
- Ex-mill slurry water is expected to have total cyanide (CN_{tot}) concentrations within the range of 150-200 mg/L, dominated by weakly complexed forms of cyanide.
- Weakly dissociable forms of cyanide are expected to degrade rapidly to the extent that the weak acid dissociable cyanide (CN_{wad}) concentrations would be less than the 50 mg/L guideline value for protection of wildlife.

Ongoing monitoring of the CNWAD levels of the supernatant pond water have generally shown the levels to be significantly lower than this benchmark. CNWAD levels in groundwater have generally been measured at less than 0.5 mg/L.

Both joint venture owners of KCGM are signatories to the International Cyanide Management Code (International Cyanide Management Institute, May 2002).

4.0 DESIGN CONSIDERATIONS

4.1 Geotechnical Foundation Studies

4.1.1 Field Investigations

The proposal to increase the storage capacity of the Fimiston II TSF will not require an increase in the footprint of the TSF. Therefore, while electric friction-cone penetrometer testwork has recently been carried out within the tailings down to the natural soil interface, there has been no perceived advantage in carrying out additional geological or geotechnical investigations of the subsurface profile beneath the TSF or beyond the existing toes of the TSF perimeter embankment.

In 1990, a series of eight test pits were excavated across the extent of A and B Paddocks and a limited range of laboratory testwork was carried out on recovered samples. Prior to construction of C and D Paddocks in 1994, two separate investigations were carried out across the proposed footprint of C and D Paddocks, comprising a sterilisation drilling and test pitting programme of 259 drill holes to depths ranging between 20 m and 70 m and excavation of eighteen (18) test pits (STP1 to STP18), and the drilling of 9 geotechnical boreholes (BH1 to BH9) to depths generally between 10 and 15 m and excavation of 26 test pits (TP1 to TP26). Both standard penetration tests (SPTs) and permeability tests were carried out within the geotechnical holes and Perth penetrometer tests were carried out in the test pits.

Information on the drilling programmes, the interpreted geology and the laboratory testing has been extensively reported in the relevant site investigation report (Golder Associates, 1994a) and is summarised briefly below.

The sedimentary sequence above the bedrock interpreted from the drilling typically consists of the following:

- 1 to 2 m of topsoil comprising red-brown sandy or gravelly silt; overlying
- 1 to 5 m of very stiff to hard red-brown gravelly clay and clayey gravel up to 12 m thick; overlying
- 6 to 8 m of sandy clay, grading down to clayey sand and gravel; overlying
- 1 to 4 m of ferricrete developed within blue-grey clays; overlying
- In excess of 5 m of blue-grey or mauve clays; overlying
- Weathered bedrock.

The material below the loose superficial 300 mm of topsoil is generally medium dense to very dense or very stiff to hard. Calcrete occurs frequently in the topsoil unit and well developed ferricrete horizons occur within the lower clay unit.

Basement units across the site consist of either banded meta-sedimentary rock or massive igneous rock, which have been extensively weathered and lateritised. The basement sequence underlies the entire site, with basement "highs" occurring in two locations along the eastern and southern margin of the site.

Falling head permeability tests were carried out in the geotechnical boreholes under unsaturated conditions at depths of 5 m, 10 m and 15 m. The range of results are summarised in Table 11.

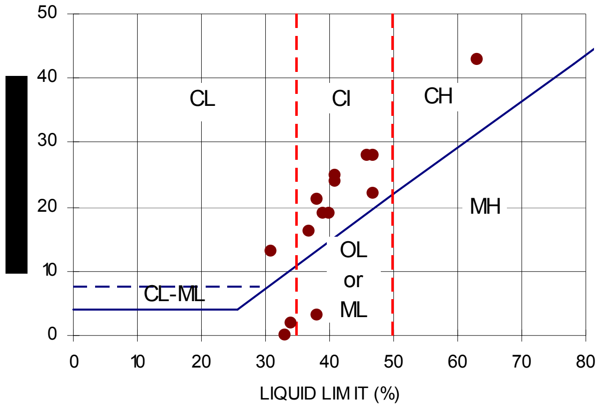
Table 11: Summary Results of Borehole Field Permeability Tests

Test Depth (m)	Permeability Range k (m/s)
5	$10^{-8} – 10^{-5}$
10	$2 \times 10^{-8} – 7 \times 10^{-5}$
15	$3 \times 10^{-8} – >10^{-5}$

Hydraulic conductivity tests carried out in nine test pits produced results in the range of 2×10^{-6} to 3×10^{-5} m/s.

4.1.2 Laboratory Testing of Foundation Materials

Particle size distribution data and Atterberg Limits are available from tests carried out on samples collected from two of the test pits excavated in 1990 for A and B Paddocks. The results, which represent a combined sample over the depth interval 0.4 to 2.8 m from test pit P3 indicated a fines content (-75 µm particle size) of 33% and plasticity index (PI) in the range of 23 – 28%. The second sample collected over a depth range of 0.6 to 2.4 m from test pit P5 indicated a fines content of 61% and PI of 36%. On the basis of the results, the samples would be classified as gravelly clayey sand (SC) and sandy clay (CH) respectively. Copies of the test certificates together with a pit location diagram are included in Appendix D.



The laboratory testing programme carried out in 1994 on samples collected from the test pits excavated across C and D Paddocks was more extensive and included particle size distribution tests, Atterberg limits, Emerson crumb dispersion tests, hydraulic conductivity and compaction tests. The adjacent plot shows that the plasticity indices of the sample fines plot above the A-line and are classified as clay. The laboratory testwork results have been tabulated and included in Appendix D.

The shear strength parameters for the foundation units of the TSF used in stability analyses have been conservatively based on an assessment of the results of the Perth penetrometer testwork carried out in the test pits. The lowest recorded value of all the tests carried out was 160 blow counts/300 mm drive. A value of 50 counts/300 mm drive corresponds to very dense sand. The inference, therefore, was that the materials were very dense to hard. Estimates of effective friction angle (ϕ') based on particle size distribution analyses, indicated values in the range of 31° to 40°. The shear strength parameters adopted for the stability modelling were as follows:

	Bulk Density (kPa)	Friction Angle (degrees)	Cohesion (kPa)
Upper Foundation Clays	22	29	25
Base Foundation Clays	22	30	40

4.2 Surface Water and Drainage

In February 1995, tropical cyclone 'Bobby' tracked inland off the coast, with the eye passing to the north-east of Kalgoorlie-Boulder. Rainfall of 154 mm was recorded within a 72-hour period, exceeding the 1:50-year 72-hour event of 144 mm (1:100-year 72-hour event is 174 mm). On 14 January 2000, a rainfall event of 50 mm was recorded in a 1-hour period, exceeding the 1:100-year 1-hour event of 43.1 mm.

The Fimiston II TSF has been largely unaffected by the heavy rains associated with these tropical depressions, which have caused extensive flooding in the Kalgoorlie area. Water management on the TSF has taken account of the extreme rainfall events by limiting the aerial extent of the supernatant water ponds that may exist on the TSF during normal operations.

4.3 Groundwater

The aquifer system underlying the Fimiston II TSF consists of the clayey sand and gravel and the underlying ferricrete horizons. The average hydraulic conductivity of the aquifer is variable. In some areas, for example within the central area to the north of the TSF, the transmissivity is large, of the order of 50 to 100 m^2/day, while in other areas, such as the central area of paddock A/B, the transmissivity is of the order of 5 m^2/day.

The stiff red-brown clay unit would generally be thought of as an aquitard. However, it is considered likely that the vertical hydraulic conductivity of this unit would change once exposed to hypersaline water from the TSF. The presence of vertical root structures would also increase the vertical hydraulic conductivity in the soil unit. The hydraulic conductivity of the red-brown clay is therefore considered to be sufficiently high to allow most seepage from the TSF to permeate through to the underlying gravel ferricrete horizon, without causing the seepage to emerge at the toes of the TSF embankments.

4.4 Existing Seepage

Seepage collection drains have been constructed around the perimeter of the TSF to intercept near-surface seepage from Fimiston II TSF. Water in the drains flows to collection ponds from where it is transferred by pumping to the main decant recovery pond.

There are more than a hundred seepage extraction wells installed around the TSF to manage seepage emanating from the facility. Approximately half of these are equipped with air well pumps while the other half are equipped with electric pumps. The water abstracted from these bores is transferred to the Fimiston Mill for re-use within the process circuit.

5.0 DESIGN PROPOSAL FOR EXPANDING FIMISTON II

5.1 General Description

The proposed increase in the storage capacity of Fimiston II will necessitate the progressive raising of the perimeter embankments encompassing the three paddocks, A/B, C and D. The external perimeter embankments to the paddocks will be raised in an upstream direction (inwards) in vertical height increments of up to 1.5 m, using tailings excavated from the adjacent beach. Similarly, the internal embankments will be raised in a series of increments, with the footprint of each incremental raise stepping onto the beach of the higher of the two adjacent cells.

The TSF cells will be operated in sequence, with tailings being actively discharged into one of the three cells at any one time, the superficial tailings on the second cell being allowed to dry and consolidate, while embankment raise construction is carried out on the third cell. The construction of the raise increments will be an ongoing activity requiring up to two raises on each cell per year, with the height of each raise increment generally being between 1.0 m and 1.5 m in height. The method of cell operation and wall raise construction will vary little from the methods currently employed on Fimiston II.

The proposed design includes provision for the construction of benches in the external perimeter embankment batter at vertical height intervals of 10 m. The actual elevation of the bench will be determined by the need to establish the necessary gradients required to direct the flow of run-off captured on the bench towards rockfill drop structures. The existing drop structures will be extended to meet the newly constructed bench. As the maximum vertical interval between benches is 10 m, there is provision for construction of two further intermediate benches before the final maximum crest elevation is reached.

A layout of the existing TSF, based on a limited survey carried out in 2004, is presented as Figure 3. The proposed final layout of the Fimiston II paddocks, at the maximum proposed heights are shown on Figure 8 and typical cross-sections of the outer embankment on Figure 9.

5.2 Design Details

The geometry of the proposed embankment raise increments will be similar to that currently employed. Based on an assessment of five surveyed cross-sections of the external slopes, the existing outer slope geometry is as follows:

- Batter slopes between intermediate benches: 1V : 2.4H to 1V:3.8H
- Average overall slope (including benches): 1V : 4H
- Vertical height intervals between benches: varies 4.6 m to 11.0 m

- Perimeter embankment crest widths: 5m and 10 m.

The proposed geometry for the remaining lifts will be as follows:

- External batters: 1V : 4H (14°)
- Internal batters of increments: 1V : 1.5H approx.
- Crest width: 5.0 m (minimum)

At closure, the outer embankment slopes will be sheeted with selected waste rock to provide erosion protection.

The height of each incremental embankment raise will depend on the rate of rise of the storage, but is not expected to exceed 1.5 m.

5.3 Construction Approach

The current method of incremental upstream embankment raising will continue to be employed. The method utilises tailings excavated from within the facility as fill for construction of the embankment lifts. Excavation is carried out using an excavator with low ground pressure tracks that progressively works its way around the perimeter of the beach immediately upstream of the raise footprint.

The excavated tailings are placed into the formation in layers not exceeding 500 mm thick. Compaction is provided by a padfoot roller. The target level for compaction of the tailings fill is a compaction ratio of 95% relative to the Standard Maximum Dry Density (SMDD) of the tailings determined in accordance with the Standard method of compaction, AS 1289.5.1.1. The target moisture content of the tailings fill is ±2% of the Optimum Moisture Content (OMC) determined on the tailings fill (as defined in Australian Standard AS 1289.5.1.1).

5.4 Decant Systems

The decant facilities currently installed on the Fimiston II cells each comprise an outer concrete tower constructed of vertically-stacked, 1.8 m nominal diameter slotted reinforced concrete pipe sections, of 1.2 m nominal length. The tower rests on a reinforced concrete slab. An external zone of selected rock is placed around the tower to retard the inflow of sediment into the tower. There is a slotted central riser pipe in the centre of the tower that is joined to a 90° swept bend which is, in turn, connected to the gravity outfall pipeline. The base of the central riser, the 90° bend and the initial section of the gravity outfall pipeline are all cast into the reinforced concrete base of the tower. The rate of water flow into the slotted central riser is controlled by collar sections that are placed over the riser pipe and lowered down the riser to lock with a lower collar section in order to blank off the slots in the central riser pipe.

The existing facilities will continue to be used until the cells reach the current maximum embankment height, at which point, pumped decant systems will be installed into each of the Fimiston II cells and commissioned prior to the decommissioning of existing gravity decant facilities. The conceptual pumped decant system will have a primary inlet tower constructed of sections of slotted reinforced concrete pipe, similar to the tower for the gravity decant facility. The slotted tower will be surrounded filter rock and there will be a piped connection between the primary tower and the pump-out sump which will be constructed of blank sections of reinforced concrete section. A schematic of the conceptual pumped decant design is shown on Figure 10.

It is expected that the decommissioning of gravity outfall pipelines will require excavating and exposing the pipelines where they exit beneath the TSF perimeter embankment, installing an inflatable packer in the pipeline at a location near the upstream toe of the embankment, fitting a blank end section to the end of the pipe with a valved grout nozzle welded into the end plate near the crown of the pipe and pumping the section full of a cement grout. Once the grout has set, the remaining pipeline can be backfilled with a cement/slurry mix. The grout valve in the end plate could be used as a drain hole during pipe backfilling and grouted up once no longer of use. The abandoned decant tower would be allowed to fill with tailings as the beach level rises.

6.0 DESIGN ANALYSES

6.1 Stability Modelling

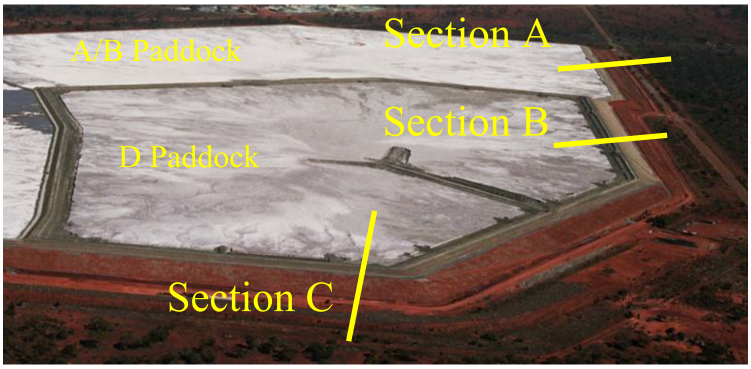
6.1.1 Overview

Stability analyses were carried out using the computer software code SLIDE. Ground survey of the five modelled sections of Fimiston II was carried out by KCGM. The cross-sections were analysed using the Morgenstern-Price method under static and pseudo-static (earthquake) conditions. Minimum acceptable factors of safety for the analyses can be found in Appendix E.

The material parameters and phreatic surface adopted for the analysis are based on interpretation of the piezoprobe results and supported by previous stability analyses (Golder Associates 2003). Parameters adopted for the effective stress analyses are supported by past laboratory results and are consistent with previous analyses (refer to Appendix E).

6.1.2 Representative Sections

Five representative sections have been subjected to stability analysis, as shown below and in plan on Figure 11. Each section has been analysed using two elevations for the perimeter wall (current and final elevations).



Approximate Locations of Sections A to C at the Fimiston II TSF

Approximate Locations of Sections D and E at the Fimiston II TSF

Figures 12 to 16 present cross-sections taken at Sections A, B, C, D and E, respectively. The Figures show the different zones of material and locations of the phreatic surface through each section. The relative positions of the piezoprobe tests, graphical output from applicable tests and the positions of the closest standpipe piezometers are also reflected on the Figures.

To represent the layered nature of the tailings, the material has been divided into eight zones based on strength. The location and thickness of each zone was estimated from examination and analysis of the piezoprobe measurements applicable to the cross-section under examination. These assumptions have been incorporated into the stability analyses and the adopted parameters are summarised in Table E2. Under final height conditions, the deposited tailings are assumed to be of medium strength (refer parameters for Tailings 3, Table E2 of Appendix E). These parameters are consistent with the interpreted strengths of the upper layers of tailings currently in the TSF.

6.1.3 Effective Stress Analyses

Effective stress stability analyses (using the computer software code SLIDE) have been carried out on the five sections, assuming static loading conditions for phreatic surfaces likely to occur under both the "operating condition" (normal operating pond size) and the "Probable Maximum Precipitation (PMP) piezometric condition" (the assumed worst case conditions). The results are presented in Table 12 below and are shown on Figures 17 to 21, for Sections A to E, respectively.

Table 12: Results of Effective Stress Slope Stability Analyses under Static Conditions

Section	Minimum Factor of Safety under Static Conditions			
	Current Height		Final Height	
	Operating	Post-PMP	Operating	Post-PMP
A	2.64	2.09	2.10	1.69
B	2.53	1.71	1.98	1.55
C	3.32	2.44	2.52	1.59
D	2.34	1.82	2.40	1.68
E	1.78	1.49	1.73	1.48

Under static loading, it is evident that there is unlikely to be slope instability as the Factors of safety exceed the minimum factor of safety of 1.5. Even under PMP conditions, the factors of safety are significantly above unity.

6.1.4 Total Stress (Undrained) Analyses

To analyse the stability of the representative sections under earthquake (dynamic) loading, it is appropriate to utilise undrained strength parameters (Appendix E, Table E2) for zones of tailings identified. The five sections have been analysed undernormal operating conditions of the supernatant pond for the static, Operating Base Earthquake (OBE) and Maximum Credible Earthquake (MCE) cases (refer Appendix E). The results of the total stress analyses are summarised in Table 13 and presented on Figures 22 to 26 for Sections A to E, respectively.

Table 13: Results of Total Stress (Undrained) Slope Stability Analyses

Section	Minimum Factor of Safety				
	Current Height		Final Height		
	OBE (0.07 g)	MCE (0.14 g)	Static	OBE (0.07 g)	MCE (0.14 g)
A	1.99	1.61	2.07	1.66	1.38
B	1.94	1.58	2.00	1.61	1.35
C	2.59	2.11	2.54	1.96	1.59
D	1.92	1.56	2.47	1.92	1.55
E	1.49	1.26	1.73	1.44	1.23

The above results indicate that slope instability at Fimiston II is unlikely to occur under current or final height conditions, even under expected MCE loading.

6.1.5 Conclusions

The results of the stability analyses of the Fimiston II embankments at the proposed final height are summarised as follows:

- Effective stress analyses under conditions of static loading (no earthquake loading) indicate a level of stability for the proposed embankments in excess of the adopted minimum factors of safety for both the normal operating condition (F0S>1.5) and under PMP conditions (FoS>1).

- Total stress (undrained) analyses under conditions of static, OBE and MCE earthquake loading and under normal pond operating conditions indicate levels of stability in excess of the minimum acceptable factors of safety FoS (static>1.5; OBE>1.2 and MCE>1.0).

- Modelling was not carried out for the situation where both the PMP and MCE occur at the same time due to the highly improbable ($1:10^{-12}$) nature of such an event.

The main conclusion derived from the modelling is that Fimiston II TSF would remain stable under the conditions modelled at the proposed maximum height of the facility.

6.2 Seepage Modelling

6.2.1 Introduction

A seepage analysis has been carried out to estimate the change in seepage rates between the current and proposed maximum allowable heights of the Fimiston II TSF embankments, as outlined in the preceding sections of this report. The following sections summarise the approach and model results. A more detailed presentation of the seepage modelling is presented in Appendix F.

6.2.2 Model Overview

The TSF covers a footprint area of approximately 388 ha, measured to the outer toes of the perimeter embankments. The perimeter embankments consist of a starter embankment, constructed of compacted clay, and numerous embankment raise increments, constructed of tailings with an outer zone of waste rock armouring. Drains and abstraction wells around the perimeter of the TSF are used to control seepage from the TSF. For modelling purposes, the lithological sequence underlying the TSF has included:

- a surficial silty sand layer;
- a clay layer; and
- a weathered bedrock layer.

The two-dimensional finite element modelling software SEEP/W version 6.16 (GEO-SLOPE, 2004) was used to simulate seepage through the TSF.

6.2.3 Conceptual Model

The model assumes a pond area equivalent to 15% of the combined beach area to compensate for the combined area of the supernatant ponds.

The conceptual seepage model developed for this analysis is shown in Figure 27. The model incorporates the heterogeneous and anisotropic conditions that exist within the deposited tailings. The estimated hydraulic parameters of the tailings adopted in the model have taken cognisance of a number of factors, including:

- particle segregation, resulting in lateral and vertical heterogeneity;
- progressive consolidation of the tailings with depth;
- existence of preferential pathways; and
- a basal layer of relatively unsegregated tailings of uniform hydraulic conductivity.

The permeability of the Fimiston II foundation soils has been shown to be higher than the permeability of the tailings, allowing water to seep through the foundation soils, resulting in the development of a groundwater mound. Figure 28 shows two possible groundwater mounding scenarios underneath a typical tailings storage facility. Recent piezometer and piezoprobe measurements at Fimiston II indicate a low groundwater mound below the Fimiston II TSF, synonymous with Scenario A on Figure 28.

Based on tailings consolidation testwork, the hydraulic conductivity is estimated to be in the order of 10^{-8} to 10^{-9} m/s (Appendix C). Permeability estimates from dissipation tests at various levels in the tailings mass in 2000 indicated hydraulic conductivities of the range of 10^{-7} to 10^{-8} m/s (Golder, 2003). In previous modelling of the nearby Fimiston I TSF, a hydraulic conductivity of ~10^{-5} m/s was adopted for the foundation geology (Golder, 2003).

The model concepts are more fully described in Appendix F.

6.2.4 Model Construction

There is significant variability in the foundation geology across the site. For seepage modelling purposes, the geological conditions at the TSF have been characterised through three regions shown as cross-sections I, II and III on Figure 29. These cross-sections represent the geology within the northern, western and south-eastern zones of the TSF, respectively. The finite element model meshes for Sections I, II and III are shown in Figures 30 to 32, respectively.

Seepage from the TSF cross-sections were modelled using "transient" simulations, as seepage conditions at the TSF are unlikely to reach "steady-state" conditions during the proposed operations. The models simulated deposition on the TSF for approximately ten years at the current maximum allowable embankment heights and about eight years at the proposed maximum allowable embankment heights.

6.2.5 Results

The results of the analyses are presented as estimates of the seepage rates at the base of the TSF for each of the three zones at current and proposed maximum embankment heights in Table 14. The seepage flux rates are shown on Figures 33 to 35 for Sections I, II and III respectively. The estimated flux rates were multiplied by the TSF perimeter of the respective zone to obtain the total rate of seepage from the TSF.

Table 14: Estimated Seepage from Fimiston II TSF

	At Current Maximum Licensed Embankment Height (L/s)	At Proposed Maximum Licensed Embankment Height (L/s)
Northern Zone	18	19
South-eastern Zone	17	18
Western Zone	16	16
Total Estimated Seepage	**51**	**53**

Modelled pore pressures within the TSF are similar to measured pore pressures, derived from piezoprobe measurements. These represent the maximum pore pressure that could prevail in the TSF at the time of the measurement. The actual pore pressures within the TSF may be lower than detected by the piezoprobe, as the probe does not necessarily allow for full pore pressure dissipation as it is advanced into the tailings. At lower tailings permeabilities, where longer periods of dissipation are required, the "measured" pore pressures are likely to be significantly higher than the actual pore pressures.

The good match between the modelled pore pressures and those measured in the upper tailings indicates that the model is well calibrated and may therefore be used for prediction purposes. At greater depths within the TSF, the modelled pore pressures do not fit the measured data as well. This is attributed to consolidation of the tailings having resulted in a decrease in permeability at depth (refer results in Appendix C), thus requiring a longer dissipation time at the piezoprobe to reflect true pore pressure conditions.

6.2.6 Conclusion

Numerical modelling indicates that there will be an insignificant increase in the seepage arising from the proposed increase in height of the Fimiston II TSF embankments. This is explained by the downward hydraulic gradient within the tailings remaining approximately constant as the embankment height increases.

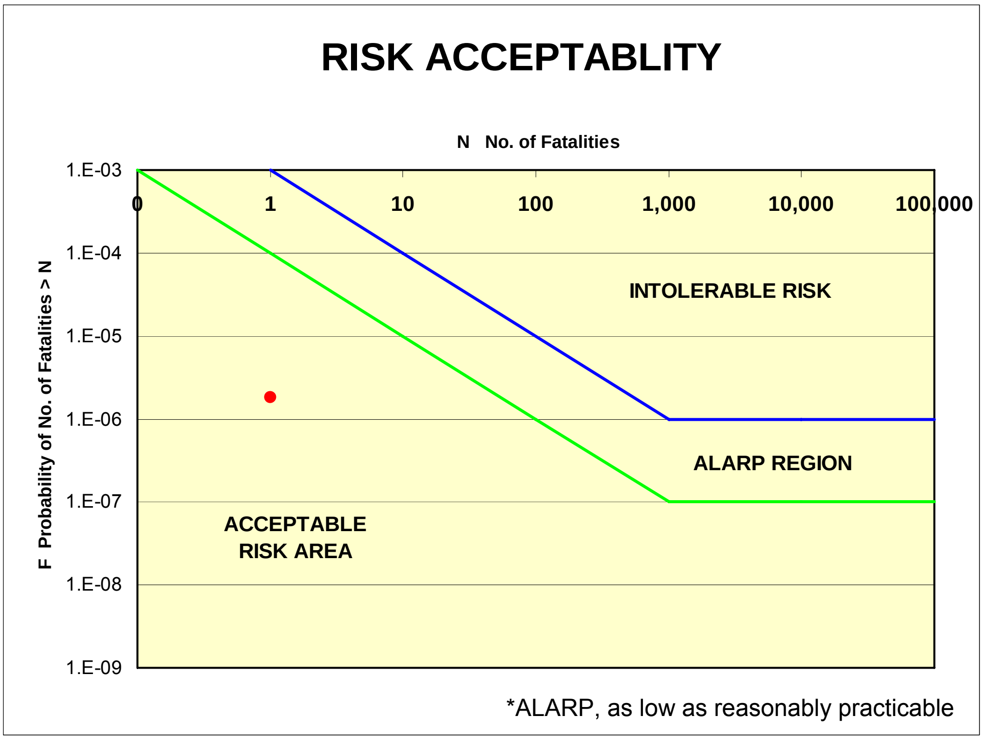
6.3 Dam Break Analysis

A flow failure of a tailings storage facility may have catastrophic consequences, including the potential for loss of human life and extensive damage to the downstream environment. As a result, the requirement for a dam break analysis has been introduced in Western Australia through the Guidelines on the Safe Design and Operating Standards for Tailings Storage (DME, 1999). The ANCOLD[3] Guidelines on Tailings Dam Design, Construction and Operation (ANCOLD, 1999) also indicate that a risk assessment of the potential for failure of "High" and "Significant" TSFs should be carried out and the DME (Queensland) has similar Technical Guidelines (DME, Queensland, 1998).

[3] Australian National Committee on Large Dams

Consistent with this recommended practice, a formal risk assessment of the Fimiston II TSF has been carried out, with a view to maintaining the risks of failure and subsequent release of tailings/water at an acceptable level throughout the life of the facility and beyond. A quantitative risk-based approach, making use of Fault and Event Trees, has been adopted as the underlying methodology for this analysis. This is considered to be a suitable technique, in that it allows for the inclusion of multiple variations and combinations of possible causes of failure resulting in a dam break, as well as allowing for a reasonable assessment of the consequences of its occurrence.

The failure pathways and summary of the Fault and Event Tree are shown on Figures 36 and 37 respectively. The details of the analysis are presented in Appendix G and the results are summarised in the F-N chart below, which is based on internationally recognised risk thresholds for large dams.



It is evident from the plot shown above that there is an acceptable level of risk associated with a dam break from the Fimiston II TSF. This is based on the estimated (and conservatively rounded up) weighted average exposure of one person at any one time, and an estimated overall probability of occurrence of a dam break of 3×10^{-6}, or about 1 in 330,000 per year of operation.

This already low risk would be further mitigated in the event that advance warning of impending failure allows the implementation of the KCGM Emergency Response Plan that provides for the shutting down of rail and road movement along the transport corridors under such circumstances.

6.4 Consolidation Modelling

A one-dimensional consolidation test was conducted on a bulk sample of tailings provided by KCGM and tested in June 2004. Sample preparation required the mixing of a representative sub-sample of the tailings and pouring the slurry into the consolidation cell and allowing the sample to settle and drain for three days before commencing the test procedure. The sample was surcharged with a 1 kPa bedding pressure for three days prior to commencing the loading cycles.

The test results (Appendix C) were entered into a consolidation spreadsheet to assess the total additional settlement that might be expected from an increase in the maximum allowable height of the TSF by up to 15 m above the current licensed height. The calculations assumed a one-dimensional column of tailings deposited instantaneously and used iterative calculations to approach a final total settlement. Estimates of the total final settlement and the increment attributed to the increase in the maximum allowable height of the TSF are summarised in Table 15.

Table 15: Estimates of Total and Incremental Consolidation of TSF Tailings

Average Height of TSF (m)	Total Consolidation (m)	Consolidation Increment for Increase in Height above 30 m (m)
30	1.54	-
42	2.19	0.64
44	2.45	0.91
45	2.52	0.98

Given the relatively long period for construction, the low position of the phreatic surface and the relatively high values for the coefficient of consolidation (cv) it is expected that much of the total settlement will be taken up during the construction and deposition stages for each raise. The resulting observed long-term settlement is expected to be negligible on the periphery of the TSF.

6.5 TSF Water Balance

The Fimiston II TSF constitutes a single component of the much broader Fimiston Plant water management system, an assessment of which is outside the scope of this document. Simple annualised water balances for the Fimiston II TSF have been estimated for the years 2005 and 2012, based on published meteorological data, flow measurement and tailings moisture and seepage estimates. The estimate is shown on Table 16.

Table 16: Simple Annual Water Balance for Fimiston II

INFLOWS			OUTFLOWS		
	2005 (ML)	**2012 (ML)**		**2005 (ML)**	**2012 (ML)**
Slurry water	8,320	8,840	Evaporation	1,480	1,190
Rainfall	830	670	Interstitial water	2,320	2,590
			Decant	3,700	3,930
Total	**9,150**	**9,510**	**Total**	**7,530**	**7,850**
			Seepage (inflow-outflow):	1,620	1,660
			Seepage rate:	51 L/s	53 L/s

The water balance estimate is based on a combined operational surface area of the cells of 310 ha in 2005 and 250 ha in 2012.

The estimated slurry water inflow is based on a slurry density of 55% solids by mass, with 80% of the average annual Fimiston Mill tailings solids output going to Fimiston II and the remaining 20% to Fimiston I. The inflows are based on projected production from the Fimiston Mill of 12.71 Mt and 13.14 Mt for 2005 and 2012, respectively (refer to Table 2). The effect of salinity on the unit weight of water has been ignored.

Rainfall (268.4 mm per annum) and evaporation (2,630 mm per annum) are based on the average annual figures for Kalgoorlie-Boulder. Estimation of evaporation losses off the beaches has been based on the following:

- Combined area of ponded water on the TSF of 6% having an evaporation coefficient of 0.7.

- Wet beach comprising 15% of the overall beach area, having an evaporation coefficient of 0.4.

- Balance of beach area being largely dry with an evaporation coefficient of 0.1.

The moisture content of the Fimiston II tailings at saturation is estimated to be approximately 30%. Under the conditions of drying and consolidation, the average moisture content of the tailings in the storage is assumed to be less than 30% (23% in 2005, increasing to 25% in 2012 as a consequence of the higher rate of rise not affording as great an opportunity for drainage or consolidation).

The amount of seepage is deduced from the difference between inflows and the identified outflows. The seepage rates shown in Table 16 correlate well with the estimated seepage rates obtained from the seepage modelling described under Section 6.2.

6.6 Water Management and Freeboard

Hydrological analyses have been carried out to assess the storm carrying capacity of the Fimiston TSFs. Rainfall depths for rare and extreme storm events (i.e. with probability of exceedance of less than 1:100) are typically estimated using methods based on the transposition and maximisation of recorded storm events. These design methods have been formalised by the Institution of Engineers, Australia, in Australian Rainfall and Runoff (AR&R). Table 17 summarises the results of the analyses.

DoCEP requires a total freeboard of 500 mm above the normal operating surface level of the supernatant water plus a 1 in 100 year, 72-hour rainfall event. Included in this is a sub-minimum requirement for a 300 mm operational (wall) freeboard. ANCOLD[4] recommends a freeboard requirement for "High Hazard" operating dams capable of retaining a probable maximum flood (PMF), superimposed on the highest pond level in a normal year.

Hydrological analyses to provide estimates of the probable maximum precipitation (PMP) for a variety of recurrence intervals have accordingly been carried out in this study. The annual exceedance probability (AEP) for the PMP was set at 1:1,000,000 in accordance with AR&R. guidelines (Institute of Engineers, Australia, 2001). Previously estimated rainfall depths for a variety of AEPs are presented in Table 17 below.

Table 17: Rainfall Depths for 72-hour Duration Storm Events at KCGM

Event AEP	Rainfall Depths (mm)
1:50	144
1:100	174
1:2,000	374
1:50,000	932
1:1,000,000 (PMP)	1,574

[4] *Guidelines on Tailings Dam Design, Construction and Operation*, ANCOLD, October 1999.

The runoff volume resulting from the rainfall events was estimated using the Rational Method, i.e.

$$Q=CIA$$

Where:

- Q = Flow, or in this case volume accumulated over duration of event (m^3);
- C = Runoff Coefficient (a runoff coefficient of 1.0 was used, assuming that all of the rainfall reported as runoff and there were no losses due to deep infiltration, evaporation etc);
- I = Rainfall Intensity, or in this case rainfall depth; and
- A = Catchment Area, area bounded by outer crest of tailings embankment (ha).

To supplement the above analyses, PMP estimates for several durations were made using formulae from the Generalised Tropical Storm Method (GTSM)5.

The PMF (probable maximum flood) can be estimated for an infinite number of recurrence intervals of the PMP, e.g. the 6-hour PMP, the 24-hour PMP, the 48-hour PMP, etc. Hydrological analyses to provide estimates of the PMP for a variety of recurrence intervals have therefore been carried out in this study. The calculated values were increased by 10% to provide conservative estimates of the PMP. Table 18 summarises the rainfall events and depths.

Table 18: Rainfall Depths for PMP Events at the Fimiston TSFs

Event Duration	Rainfall Depth (mm)	Average Rainfall Intensity (mm/hr)
6-hour	650	123
12-hour	710	69
24-hour	1,000	42
48-hour	1,323	28
72-hour	1,571*	22

* the small difference between this value and that in Table 16 is attributed to the specific latitude/longitude of Fimiston II, compared to KCGM property as a whole.

As detailed topographic and bathymetric data were not available for this study due to the limited access to the tailings beaches, storage-area-elevation relationships were developed using a representative beach slope from recent survey data. Beach contours were produced for the Fimiston II TSF basin for the anticipated configuration at closure. Basin geometry produced in this way agreed well with that witnessed during the most recent operational audit inspections in September 2004.

[5] Kalgoorlie lies within the Generalised Southeast Australia Method (GSAM) area as defined in AR&R. However, given that it is subject to tropical storms the more conservative GTSM method was used.

Beach contours were developed at 0.25 m intervals using AutoCAD and the area bounded by each of the contours was determined. The pond volumes relating to those contours were calculated using the average end area method. It was conservatively assumed in the hydrological analyses that the pre-existing operating pond occupied the maximum surface area allowed under KCGM's own operational criteria (maximum pond surface area of 15% of basin area with target pond surface area of 10% of basin area) and that the decant facility did not operate at all during rainfall events. Estimates of the rainfall depths for 72-hour, 1 in 100 and 1 in 1,000 AEP events were extracted from previous analysis.

The results are reflected in Table 19, which presents the estimated pond elevations following occurrence of a PMP with varying AEP.

Table 19: Summary Results of Hydrological Analyses – Fimiston II

Rainfall Event	Rainfall Depth (mm)	Pond Elevations (m RL)			Remaining Freeboard (m)		
		Paddock			Paddock		
		A/B	C	D	A/B	C	D
Max. Operating Pond	-	387.18	392.22	396.13	2.82	2.28	2.07
72-hour, 1 in 100 year	174	387.85	392.79	396.66	2.15	1.71	1.54
72-hour, 1 in 1,000 year	320	388.28	393.07	397.02	1.72	1.43	1.18
6-hour PMP	650	388.80	393.56	397.50	1.20	0.94	0.70
12-hour PMP	710	388.83	393.75	397.53	1.17	0.75	0.67
24-hour PMP	1000	389.09	394.02	397.79	0.91	0.48	0.41
36-hour PMP	1161	389.50	394.21	397.94	0.50	0.29	0.26
48-hour PMP	1323	389.53	394.25	398.20	0.47	0.25	0.00
72-hour PMP	1571	389.74	Overtops	Overtops	0.26	-	-

The results of the hydrological analysis therefore indicate that the Fimiston II TSF will be capable of retaining at least the 48-hour PMP throughout all stages of operation without overtopping. Given that the PMP in Kalgoorlie is only likely to arise from a large cyclonic event, which is unlikely to persist for longer than 12 hours (i.e. the 12-hour duration for the PMP is probably the most appropriate selection), the likelihood of the Fimiston II TSF overtopping is considered to be negligible.

7.0 OPERATING PROCEDURES

7.1 Tailings Deposition Strategy

The primary objective adopted in the development of a future deposition strategy has been to minimise the increases in embankment heights on Fimiston II, whilst simultaneously:

- providing the required storage capacity within Fimiston I and Fimiston II; and

- distributing the tailings between Fimiston I and the three paddocks of Fimiston II, maintaining a rate of rise below 2.7 m/year.

It is intended that the three Fimiston II paddocks will continue to be operated as separate cells. Embankment raises will continue to be carried out in an upstream direction towards the higher of the adjacent paddocks, using tailings borrowed from the beaches. However, the height differential between the individual paddocks (Table 1) will increase as a result of satisfying the above objective.

The tailings deposition will continue to follow existing procedures as follows:

- The tailings slurry is split into separate streams at the Fimiston mill and pumped to either Fimiston I or Fimiston II via a network of HDPE delivery pipes.

- HDPE pipelines located around the perimeter of the cells distribute the tailings to the active areas of tailings discharge onto the cells.

- Tailings is discharged into the paddocks from multiple spigots tapped into the distribution pipelines, located on the perimeter embankments and pond control walls.

- Tailings is generally deposited into two of the available four storage paddocks at any one time (three cells on Fimiston II and the Fimiston I TSF) so that two of the four paddocks are in a drying cycle at any one time, preliminary to construction of embankment raises on the two drying cells.

- Deposition is rotated through the available paddocks in accordance with the tailings deposition and embankment raise construction schedules.

- The area of active discharge onto each active paddock is systematically and cyclically rotated around the cell by progressively opening and closing the spigots in the distribution pipeline located on the cell perimeter for the purpose of maintaining a uniform beach and controlling the location of the supernatant water pond around the decant facility.

- A tailings layer thickness of approximately 200 mm will be deposited during each discharge rotation around a cell.

- Return water flowing into the decant will be regulated through the placement or removal of collars around the central slotted risers in the centre of the gravity decant towers or by regulation of the pumps that will be installed into the pumped decant towers once the height of the cells exceed the original maximum design heights.

Modelling of the tailings distribution between Fimiston I and the three paddocks of Fimiston II has been carried out. The approximate split in tailings tonnage into each of the Fimiston II cells arrived at through the modelling is summarised on Table 20 together with the estimated annual rates of rise. The model assumed no deposition into Fimiston I in year 2005. Stage/capacity curves for the various cells are included as Figures 4 to 7.

Table 20: Modelled Tailings Split Between Cells

Year	Cell A/B		Cell C		Cell D		Fimiston I
	Split (%)	RoR (m/year)	Split (%)	RoR (m/year)	Split (%)	RoR (m/year)	Split (%)
2005	35	2.36	31	2.54	34	2.70	0
2006	23	1.65	30	2.60	32	2.70	15
2007	28	2.02	26	2.36	31	2.70	15
2008	30	2.22	26	2.44	29	2.70	15
2009	30	2.26	27	2.65	28	2.70	15
2010	30	2.32	27	2.66	27	2.70	16
2011	30	2.40	24	2.40	26	2.70	20
2012	32	2.58	23	2.42	25	2.70	20

In essence, similar practices to those that have been developed over the years to manage the Fimiston TSFs will be applied to the three cells of the Fimiston II TSF and the tailings split between the cells will be fine-tuned to achieve the most favourable management outcomes with respect to TSF performance. The storage responses with respect to tailings deposition, beach formation and water management are not expected to vary to any significant degree from currently observed and monitored responses.

7.2 Supernatant Pond Management

The active area of tailings discharge into each cell will be progressively cycled around the TSF with a primary purpose of maintaining the location of the supernatant water centred on the decant tower in each cell of the facility. KCGM's internal procedures require that the areal extent of each supernatant pond does not exceed the current target limit of 15% of the area of the respective cell. This will be achieved by controlling the flow of water back to the plant and maximising off-takes following periods of high rainfall on the TSF.

The gravity decant facility in each cell will be managed in line with current operational procedures until the currently licenced maximum embankment height is achieved. Once the current maximum height of perimeter embankment is achieved, the gravity decant systems will be replaced by pumped decant systems and the existing gravity outfall pipelines and towers will be plugged and backfilled as a safety precaution against failure of the pipelines. This has been incorporated into the risk-based dam break study.

Wing walls of appropriate length and alignment will be constructed at the decant end of the causeways to extend the supernatant water flow path to the decant as required. This will further assist in controlling pond location and facilitate removal of clear water from the surface of the TSF.

Figure 38 shows the DoCEP freeboard requirements as outlined in Section 6.6. The current proposal assumes that these minimum freeboard requirements, as well as the ANCOLD guidelines will be maintained on the TSF.

7.3 Seepage Management

KCGM has been actively managing seepage from the Fimiston II TSF since the early 1990s by monitoring groundwater levels and quality, and recovering seepage by means of production bores and trenches. These groundwater monitoring and production facilities are part of KCGM's Eastern Borefield.

The Eastern Borefield has been developed progressively since mid-1993, and by December 2004 consisted of 109 production bores and 5 trenches. At the Fimiston II TSF there are 52 production bores located around the toe of the embankment, and another 12 bores on berms on the embankment. The remaining production bores are located to the west of the Fimiston II TSF. There are currently 68 groundwater monitor bores within the Eastern Borefield.

All of the production and monitor bores in the Eastern Borefield are completed in the shallow alluvial/colluvial formations and have maximum depths of around 25 m.

KCGM's approach to managing seepage from the Fimiston II TSF is focused on maintaining the water table at sufficient depths to minimise adverse impacts on vegetation. The medium term objective of groundwater management has been to draw down the water table to 6 m below ground surface. The longer term objective is to maintain the post-closure groundwater level at a depth of 6 m or greater without the need for active management.

KCGM is developing a Groundwater Management Plan to oversee all planning and management activities associated with controlling groundwater around the Fimiston II TSF and the nearby Fimiston I TSF. This plan will also include the management of seepage. The plan will incorporate past management practices which have been successfully applied and will reinforce the benchmark objectives. Both the plan and associated performance targets are to be reviewed annually.

The Groundwater Management Plan recognises that the beneficial use of natural groundwater in the area has not been impacted by seepage from the Fimiston TSFs, and that the natural vegetation in the area is the principal environmental value requiring protection from the effects of the Fimiston TSFs. The Groundwater Management Plan and associated performance targets are therefore primarily concerned with ensuring the ongoing protection of natural vegetation in the area. Meeting this performance target also ensures the protection of other natural and man made assets in the area, including the prevention of soil salinisation, and the protection of the Trans-Australian Railway line and Bulong Road.

The monitoring and management of groundwater levels in the vicinity of the Fimiston II TSF will continue for some time after tailings deposition ceases. This will facilitate the groundwater level decline to a point where it no longer poses any risk to the natural vegetation and ongoing pumping is no longer required.

8.0 MONITORING REQUIREMENTS

8.1 Groundwater Monitoring

KCGM monitors groundwater in the vicinity of the Fimiston II TSF in accordance with the requirements of the DoE licence for operation of the Fimiston Mill and the Water and Rivers Commission (WRC) licence for operation of the Eastern Borefield. The groundwater monitoring programme has been developed in consultation with these government departments, and provides KCGM with sufficient information for managing groundwater issues arising from the operation of their tailings storage facilities located to the east of the Fimiston Mill. KCGM reports on the results of the groundwater monitoring programme annually as required by the DoE and WRC.

The groundwater monitoring programme for the Fimiston II TSF currently requires the following information to the collected and recorded by KCGM:

- Record on a monthly basis the cumulative volumes of groundwater pumped from each production bore, and from the trench along the southern flank of Fimiston II.

- Collect samples every month from all active groundwater production facilities and analyse these samples in the field for pH and electrical conductivity (EC).

- Collect samples from the production bores and trenches annually, and submit these samples for laboratory analysis of pH, EC, total dissolved salts (TDS) concentration, and cyanide concentrations (total, free, and WAD).

- Measure and record groundwater levels in the monitor bores on a quarterly basis.

- Collect samples from the monitor bores every six months and analyse these samples in the field for pH and EC.

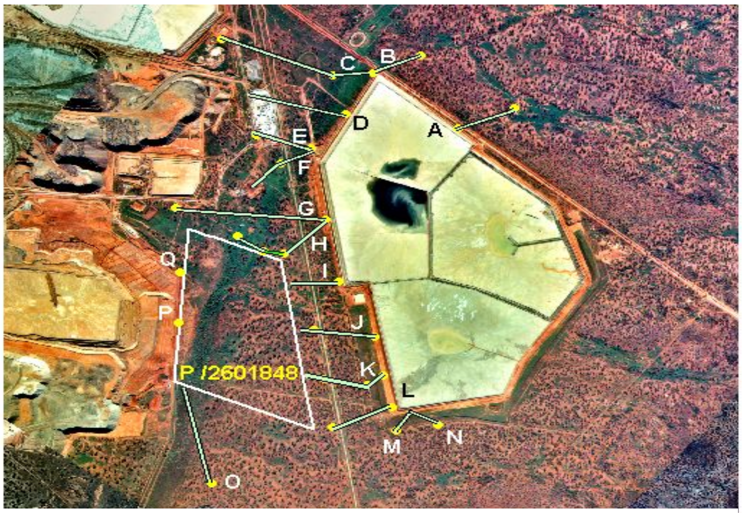
- Collect samples from the monitor bores annually, and submit these samples for laboratory analysis of pH, EC, TDS, and cyanide concentrations (total, free, and WAD).

- Collect samples from a group of ten production bores every three years, and submit these samples to a laboratory for major component analysis.

The Groundwater Management Plan will include a requirement for an annual review of the groundwater monitoring programme, as well as monitoring procedures.

8.2 Vegetation Monitoring

To confirm that the groundwater management plan is protecting the environmental value of the area (i.e. vegetation) KCGM will undertake a photographic vegetation monitoring programme using a professional photographer around the Fimiston I and Fimiston II tailings storage facilities (TSF's). This is in accordance with the Department of Environmental (DoE) licence condition W13-14 for the Fimiston Plant and Tailings Disposal (L137/88).



Locations of Vegetation Transects Around Fimiston II

The photographic monitoring programme will be carried out with reference to a total of 17 transects in the vicinity of the Fimiston TSFs (as shown below). These were established in 1999 and include 32 photo-points.

8.3 Freeboard

A programme to monitor freeboard on a monthly basis has been implemented and will be continued to confirm that available freeboard on the storage complies with the DoCEP minimum requirements outlined in Section 6.6 and illustrated in Figure 38.

8.4 Inspections

Apart from the water and vegetation monitoring programmes detailed in Sections 8.1 and 8.2, regular inspections of the TSF will be carried out in accordance with current schedules. These include the following.

8.4.1 6-Hourly Inspections

- Pipeline integrity checks.
- Embankment integrity.

- Seepage from embankments.
- Visual check of tailings level versus embankment crest.
- Spigot discharge location and operation.
- Flow into decant and fines entrainment.
- Fauna or flora mortality.
- Evidence of dusting.

8.4.2 Daily Monitoring

- Location of decant pond (daily).
- Condition of access ramps (daily).
- Tailings solids to TSF cells in tonnes.
- Water to TSF cells in tonnes or cubic metres.
- Water return to plant in tonnes or cubic metres.

8.4.3 Monthly or Greater

- Piezometer pore pressures (monthly).
- Decant water analysis (monthly).
- Pond area, wall and beach freeboard (monthly).
- Operational review by qualified engineer (annually).
- Comprehensive basun survey (biennially).
- Silt removal from return water pond (as required).
- Photographic monitoring programme of vegetation.

The inspections should be documented and faulty equipment repaired or replaced. The annual operational review of the TSF should include a review of the accumulated data and provide an annual assessment of TSF performance.

9.0 EMERGENCY ACTION PLAN

9.1 General

KCGM has an Operating Manual for the Fimiston TSFs operations. The manual outlines the procedural responses in the event of a systems failure.

9.2 Pipeline Breakage and Spillage

The tailings delivery pipelines are contained either between bunds or within a trench. Scour pits have been established at critical locations in the event that it necessary to drain down the pipeline.

TSF perimeter embankments are designed with a safety bund on the downstream crest margin and a 2% fall towards the upstream crest margin so that spilled liquor will be contained and flow into the storage.

Pipelines are equipped with leak detection equipment that will signal a line failure to the operational personnel at the Fimiston Mill. The leak detection system, coupled with regular visual inspections of the slurry and return water pipelines provides early detection of a pipeline failure and allows a prompt response. In the event of a failure being detected in the delivery pipeline between the Fimiston Mill and the TSF, the following actions would be carried out:

- Redirect slurry to an alternative pipeline where possible and shut down the failed pipeline until the nature of the failure can be determined and remedial work carried out.
- Take steps to contain spill and minimise lateral damage.
- Clean up spillage.

Where a failure occurs in the tailings distribution pipeline on the embankment crest, the following actions would be carried out:

- Isolate the section of pipeline where the failure has occurred.
- Determine the cause of the failure and take remedial steps to effect repairs to the failed section of pipeline.
- Clean up any spillage that has occurred.

9.3 Decant Gravity Outfall Pipeline Collapse

Should inspections indicate that the integrity of the decant gravity pipeline may have been compromised, the following actions would be taken:

- Divert tailings discharge from the affected paddock to an alternative paddock until the status of the pipeline can be determined.
- Curtail decant outflows via the gravity decant and review the need to remove supernatant water from the cell.
- Assess the short term risk, preferably carried out by a qualified engineer, and implement appropriate measures to arrest further degradation of the system.
- Have qualified engineers investigate and determine the nature of the problem and the implications for continued tailings operations on the cell.

Depending on the findings of the investigations, the appropriate decision would be taken to either remediate and recommission the system or to decommission the system and bring forward the installation of a pumped decant system.

9.4 Embankment Erosion, Sloughing and Settlement

Should visual inspection reveal local embankment erosion, sloughing and/or settlement, the following actions should be carried out, preferably by a qualified Engineer:

- Assess the short term risk immediately and adopt appropriate measures to address the problem.
- Implement short term remediation designs immediately, while longer term solutions and actions are developed.
- Monitor the longer term actions, once implemented, to limit risk.

9.5 Seepage to Groundwater and Environment

The Fimiston II TSF incorporates an internal toe drain, an external seepage interception trench and arrays of piezometers to monitor changes in the phreatic surface within the TSF embankment and at the toe. KCGM is in the process of establishing a groundwater management system to control the groundwater around the TSF. In order to prevent lateral impacts from rising water levels, the following actions are routinely carried out:

- The existing monitoring system is measured regularly for changes in the groundwater conditions.

- If a rising trend in the water levels is identified the existing extraction system would be reviewed and appropriately adjusted to control the groundwater level in accordance with the Groundwater Management Plan.

9.6 Large Scale Embankment Failure

If a large scale embankment failure were to occur, the following course of action would be followed:

- The likelihood of tailings release or freeboard reduction would be assessed and, if either is considered likely, deposition would be stopped or redirected to an alternative TSF.

- The free water on the TSF would be drawn down as necessary.

- Remedial action, such as buttressing of the slope, would be implemented to stabilise the slope prior to repairing the damage to the crest.

- Any tailings released from the TSF would be cleaned up.

9.7 Reportable Incidents

Apart from the requirements under section 78 and 79 of the *Mine Safety and Inspection Act, 1994*, the DoCEP is to be informed of all incidents associated with the TSF, defined as follows:

- Any fauna death on or in the vicinity of the TSF.

- Any uncontrolled release of tailings and/or liquor (including pipe breaks, overtopping events or similar) outside the containment bunds.

- Any major seepage occurrence (e.g. a discernible impact on vegetation, soil contamination).

- Any defects in the structure of the TSF (e.g. cracking, slumping of walls, significant erosion, daylighting phreatic surfaces, decant collapse).

Should any of the above incidents occur, the relevant authorities will be notified.

10.0 ENVIRONMENTAL IMPACT ASSESSMENT

10.1 General

The proposal presented in this report seeks to increase the storage capacity of the Fimiston II TSF. Consequently, while the proposal will prolong the active life of the Fimiston II TSF, it will limit the transfer of potential impacts that may arise from tailings deposition to alternative locations.

10.2 Land Clearing

The proposal contained in this document to increase the storage capacity of the Fimiston II TSF by increasing the allowable maximum elevation of the perimeter embankments does not require that further ground clearing be carried out. For the purposes of the capacity increase, the current footprint of the TSF will remain unchanged.

10.3 Water Use and Management

There will be no change to the existing water usage. KCGM will continue to maximise return of water from the TSF for reuse in the process circuit. The management of water on the TSF will continue as previously, with the only change being a move to establishing pumped decant systems on the TSF once the cells reach the current licenced height. The reason for this change is to allow decommissioning and plugging of the existing gravity decant outfall pipelines. The change to pumped decant systems will not have any environmental significance.

10.4 Seepage

The proposal to expand the capacity of Fimiston II provides for an increase in the height of the existing cells of the Fimiston II TSF by approximately 15 m above the present maximum licenced height of 30 m (32 m for Cell C). There is not expected to be any significant change in either the average rate of tailings deposition or the physical characteristics of the tailings, including the hydraulic conductivity of the deposited tailings. Under normal operating conditions, the surface area of the supernatant pond in each cell will generally not exceed the target operating pond size equivalent to 15% of the beach area of the active cells. Modelling under these conditions indicates that any increase in the rate of seepage from the TSF into the underlying natural formations in response to the increased static head will likely be minor.

KCGM has established groundwater production facilities to control mounding of the water table caused by the Fimiston II TSF operation and to intercept part of the seepage from the TSF. These bores form part of KCGM's Eastern Borefield, which is licensed by the Water and Rivers Commission. KCGM conducts a monitoring and reporting program in accordance with the conditions of the licence. As part of the Groundwater Management Plan, KCGM installs additional production bores in the borefield on a "needs" basis, where monitoring indicates further drawdown of the water table is required. This management plan would be followed by KCGM during the extended operating life of the Fimiston II TSF.

10.5 Flora and Fauna

The proposal to increase the maximum allowable height of the Fimiston II TSF will not require any increase in the footprint area of the TSF and will therefore not require that further land is cleared.

The Groundwater Management Plan recognises that the beneficial use of natural groundwater in the area has not been impacted by seepage from the Fimiston TSFs, and that the natural vegetation in the area is the principal environmental value requiring protection from the effects of the Fimiston TSFs. The groundwater management plan and associated performance targets are therefore primarily concerned with ensuring the ongoing protection of natural vegetation in the area. Meeting this performance target also ensures the protection of other natural and man made assets in the area, including the prevention of soil salinisation, and the protection of the Trans-Australian Railway line and Bulong Road.

The health of the vegetation surrounding Fimiston II will be monitored in accordance with the programme outlines in Section 8.2.

10.6 Waste Products

There will be no significant variation in the chemical nature of the tailings product resulting from the proposed increased in the maximum allowable height of the Fimiston II TSF. The waste products discharged to the TSF are contained within the TSF apart from the seepage discussed above and the management practices currently in place will be maintained throughout the extended life of the TSF.

10.7 Greenhouse Gas Emissions

The proposal to increase the capacity of the Fimiston II TSF will not result in an increase in tailings output to the TSF. Therefore, there is unlikely to be an increase in the level of any gas emissions from the TSF as a result of the proposal. The proposal will result in the active life of the TSF being prolonged, but does not influence the available resource to be processed through the Fimiston mill and therefore has no impact on the net balance of gas emissions from the Fimiston mill tailings.

10.8 Dangerous Goods and Hazardous Substances

The proposal will not result in a variation in the handling, transport or storage of any hazardous substances.

10.9 Dust

During operation of the Fimiston II TSF, much of the surface of the tailings cells will remain moist, inhibiting the lift off of dust from the tailings surface. The use of hypsersaline water also results in the formation of a salt crust that reduces the potential for dust generation.

On cessation of operations, a cover of selected material will be placed over the upper surface to inhibit dust generation from the TSF.

10.10 Noise

There will be no increase in noise levels as a result of the proposed increase in the capacity of the Fimiston II TSF.

10.11 Rehabilitation

Rehabilitation procedures for decommissioning of waste dumps and tailings storages are detailed in the Environmental Procedures prepared by the KCGM Safety and Environmental Department. Introduction of vegetation to the upper surface of the encapsulated facility would be in line with KCGM guidelines and would reflect commitments current at the time of the decommissioning.

KCGM has commenced progressive rehabilitation on the Fimiston II TSF and will continue as areas of the TSF become available, the short term benefits of which will be to reduce dust levels and improve the visual surroundings, while in the longer term to reduce the amount of rehabilitation work to be done at project closure.

The plant seed selection for rehabilitation will be based on the results of natural ecosystem research, which is carried out by KCGM in the region. The aim of the seeding will be to establish plant communities that will be viable in the long-term.

10.12 Post-Mining Landuse

The post-mining land use will be determined through the development of KCGM's Mine Closure Plan. The mine Closure Plan will be developed in conjunction with the community and regulatory authorities well prior to the expected closure of the KCGM operation. Proposals for post-mining land use will be in accordance with the existing framework of the KCGM Environmental Policy for the Fimiston operations.

11.0 SOCIAL IMPACTS

11.1 Heritage

The proposal to increase the maximum allowable height of the TSF will not require an expansion of the footprint area of the Fimiston II TSF and, therefore, there will be no additional impact on heritage sites.

11.2 Aboriginal Sites

The proposal to increase the maximum allowable height of the TSF will not require an expansion of the footprint area of the Fimiston II TSF and, therefore, there will be no additional impact on aboriginal sites.

Two finds including glass scatter and scarred trees are located between 500 to 800 mfrom the Fimiston II TSF. KCGM will ensure that these sites are managed in accordance with the provisions of the *Aboriginal Heritage Act 1972*.

11.3 Stakeholder Consultation

KCGM is undertaking extensive consultation with key stakeholders and the wider community for the Fimiston Operations Expansion as a whole which includes the Stage 2 expansion in storage capacity of the Fimiston II TSF. KCGM has also developed a comprehensive communication plan in line with current DoE guidelines. The KCGM Concept Plan is included in Appendix H.

11.3.1 Consultative Framework

KCGM utilises a number of ongoing mechanisms that facilitate stakeholder consultation, and effectively capture community feedback. These are outlined in Table 21.

Table 21: Mechanisms for Stakeholder Consultation

TOOLS	DESCRIPTION
Public Inquiry Line	KCGM has a 24 hour, 7 day a week Public Inquiry Line (PIL) which is available to record stakeholders' queries and track responses.
Community Reference Group	A self-selected group of local community members and invited guests from the DoE and DoIR. Meets monthly to discuss current KCGM planning and feedback from the community.
Super Pit Website	KCGM publishes all project plans and reports on the Super Pit website which also has a feedback mechanism direct to the PR Coordinator. Web, phone and personal feedback is incorporated into PIL reporting.
The Dirt (Internal Newsletter)	A bi-monthly employee/contractor newsletter which is also posted on the Super Pit website. Major issues are captured and reported both internally and externally.
News & Views	Public Quarterly publication distributed to all Kalgoorlie-Boulder households (13,000 copies)
Presentations	"What's Down the Track" graphically illustrates the current vision for KCGM's future, including the proposed final pit shell. This presentation has been also updated for targeted audience issues.
Direct Letter Drops	KCGM has a round of near neighbour routes for blast notification, which can also be utilised for direct communications. This is in addition to identified target stakeholder groups.
Super Pit Shop Front	The KCGM Super Pit Shop operates as a public shopfront for queries on future approvals (open 9am-5pm Monday to Friday).
Information Sessions	With the opening of a public shopfront, KCGM has the opportunity to conduct information sessions as needed on issues as, and if, they arise.
Surveys	KCGM sponsored a poll telephone survey of the local community to discover any environmental concerns with the operation. Web based surveys are utilised to get opinion from employees and key stakeholder groups on an as needs basis. Door to door or postal surveys are conducted on an as needs basis. Surveys at displays or open days may be conducted.

11.3.2 Stakeholder Consultation Undertaken

In December 2004, KCGM developed and launched the "KCGM Concept Plan" which outlined the process and vision for achieving what is expected to be the final pit outline in 2017. The Concept Plan outlines the requirement for the Fimiston II height increase. In 2004, KCGM also undertook a comprehensive Social Impact Assessment, the results of which are available on the super pit website: http://www.superpit.com.au.

To date KCGM has completed the following consultation regarding project approvals:

- Presentation at the Mine Expo "What's Down the Track" Forum – Oct 04.
- Attitudinal Phone Survey on KCGM - Dec 04.

- Release of the KCGM Concept Plan - Dec 04.
  - With approximately 600 downloads from the KCGM website.
- Key stakeholder interviews with SEZ near neighbours Mar/Apr 05.
- Mail out to project near neighbours (approx 350) – Mar 05.
  - 23 completed questionnaires received to date (12 neutral, 8 negative, 3 positive). Many responses relate to the existing operation.
- Project Definition Document Released - Apr 05.
  - With approximately 1,200 downloads from the KCGM website.
- KCGM Approvals Displays and Information
  - Australian Gold Council National Mine Open Day at KCGM - Apr 05.
  - Australian Miners and Prospectors Hall of Fame Open Day - May 05.
- "News & Views" Newsletter to Kalgoorlie-Boulder households (approx 10,000)
  - Issue 1 – Fimiston TSFs Article – Dec 04.
  - Issue 2 – Approvals Article – June 05.
- The Dirt Newsletter Issue 18 Approvals Update – July 05.
- Discussion at quarterly Community Reference Group meetings

KCGM has also coordinated with the local media as a means of consultation to the wider community on the future plans. Media reporting that has been undertaken includes:

- Kalgoorlie Miner "KCGM looks to go under Super Pit" - 22 Oct 04
- 6KG Radio Interview "Concept Plans available at Super Pit Shop" - 23 Dec 04
- Kalgoorlie Miner "Super Pit Plans to 2017" - 4 Jan 05
- 6KG Radio Interview "Concept Plans available at Super Pit Shop" - 13 Jan 05
- Golden Mail "KCGM Releases Concept Plan" - 14 Jan 05

- Kalgoorlie Miner “Kaltails an Option : KCGM” – 6 May 05
- Kalgoorlie Miner Special Mining Feature “KCGM From Strength to Strength” – 14 May 05

Specific consultation for this project included:

- A draft Notice of Intent was made available to key stakeholders for a 2.5 week review period.
  - Advertised in the Kalgoorlie Miner on 10 Aug 05.
  - Available via the KCGM web site (approx 400 downloads of related documentation including 218 downloads of the main report).
  - Available for review at the DoE and Local Library with 9 hard copies distributed via the DoE Kalgoorlie Office.
  - Invitation for feedback emailed to the KCGM Community Reference Group.
  - KCGM employees and contractors invited to provide feedback.
  - Neighbouring businesses were also notified via email and invited to provide feedback.

On 18 August, KCGM received a written request for a number of documents including those referenced in the draft Fimiston II TSF NOI. KCGM has made available a number of internal reports relating to the Fimiston II NOI. The reports were available for review until 2 September 2005 at the Super Pit Shop at 2 Burt Street Boulder.

As outlined in KCGM’s response, copies of all internal reports are not provided to external parties. However, attempts have been made to provide access to relevant information, allowing interested parties with specific needs to view documentation on-site.

KCGM reserves the right to decline access to some information if it contains financial or technical information that they believe provides them with a commercial or business advantage. In addition to this, KCGM reserves the right to decline requests for reports, particularly those of a historical nature, that are costly or time consuming to research. Interested parties with specific needs are encouraged to contact KCGM and discuss the specific circumstances that may warrant access to view these reports.

Other than the above request, KCGM has received feedback from two neighbouring businesses. Clarifications regarding the following areas were requested and have been discussed directly with the companies to ensure that adequate information is provided:

- Groundwater monitoring bore location;
- Commercial agreement; and
- Access and land management.

The consultation process was initated prior to project commencement and will continue throughout the life of the project with key stakeholders. The KCGM Public Inquiry Line is available 24 hrs, 7 days, and additional feedback regarding this project will be acted upon should the need arise during the Project.

11.4 Social Environment

The current proposal will have little impact on the social environment other than to extend the operating life of the Fimiston II TSF. The disposal of tailings is integral to the ongoing operations of the Fimiston Project, which plays an important role in the economic well-being of the City of Kalgoorlie-Boulder. The operations have been continuous since 1893 and remain an important link to the social and economic success of the City. In fostering this relationship with the local community, KCGM adheres to the following principles:

- Considers all cultural, social and heritage issues when planning activities.
- Considers buying local first.
- Communicates openly with both employees and the community.
- Listens to community concerns and expectations and acts on the information to improve operations.
- Contributes positively to the community through local sponsorship, support and participation.
- Encourages employees, through training, to continually improve community relations.

11.5 Workforce and Induction Training

Prior to entering onto the Fimiston project area KCGM personnel, consultants and contractors are required to undergo both general and specific inductions appropriate to the individuals' area of work, in accordance with corporate and regulatory occupation, health, safety and environmental policies. Personal protective equipment is issued to all personnel appropriate to the individuals place of work. KCGM undertakes training of personnel to equip them with the knowledge to safely carry out the tasks to which they are assigned.

12.0 COMMITMENTS BY KCGM

It is not expected that the current proposal will require a change to the existing project commitments, which cover occupational health and safety, environment and rehabilitation requirements and community consultation. KCGM have a project wide approach to these issues and the Fimiston II TSF forms one part of the overall management plan.

Issues relating to seepage will be addressed in accordance with KCGM's Groundwater Management Plan to meet environmental commitments.

Closure of the TSF will be undertaken in accordance with KCGMs site wide Closure Plan, which is in the process of being developed.

13.0 IMPORTANT INFORMATION

Your attention is drawn to the document - "Important Information About Your Geotechnical Engineering Report", which is included in Appendix I of this report. This document has been prepared by the ASFE *(Professional Firms Practicing in the Geosciences)*, of which Golder Associates is a member. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the groundworks for this project. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

GOLDER ASSOCIATES PTY LTD

Roger Gavshon
Senior Tailings Engineer

David Williams
Manager, Mine Waste Services

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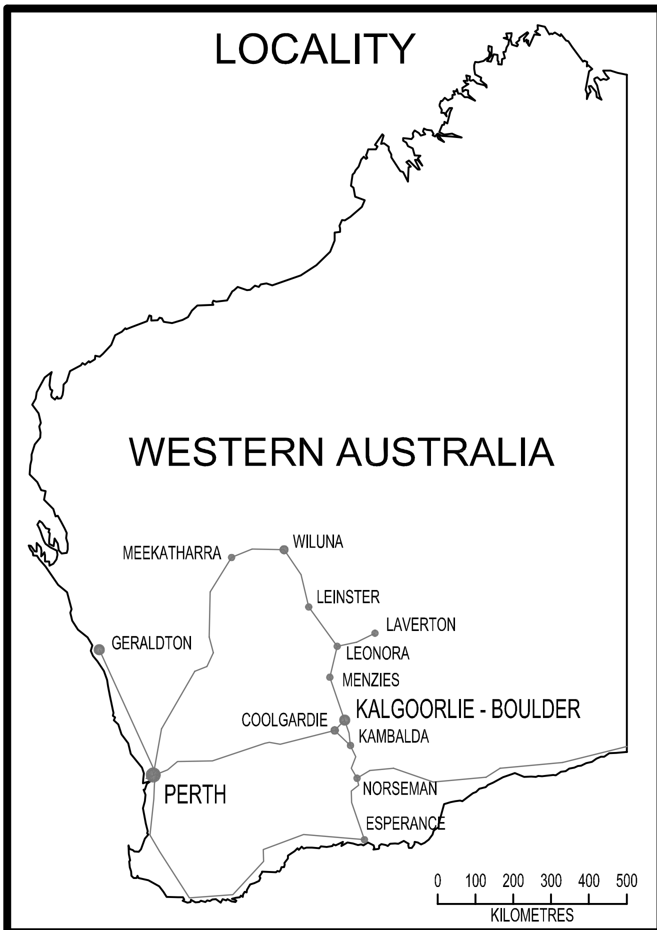

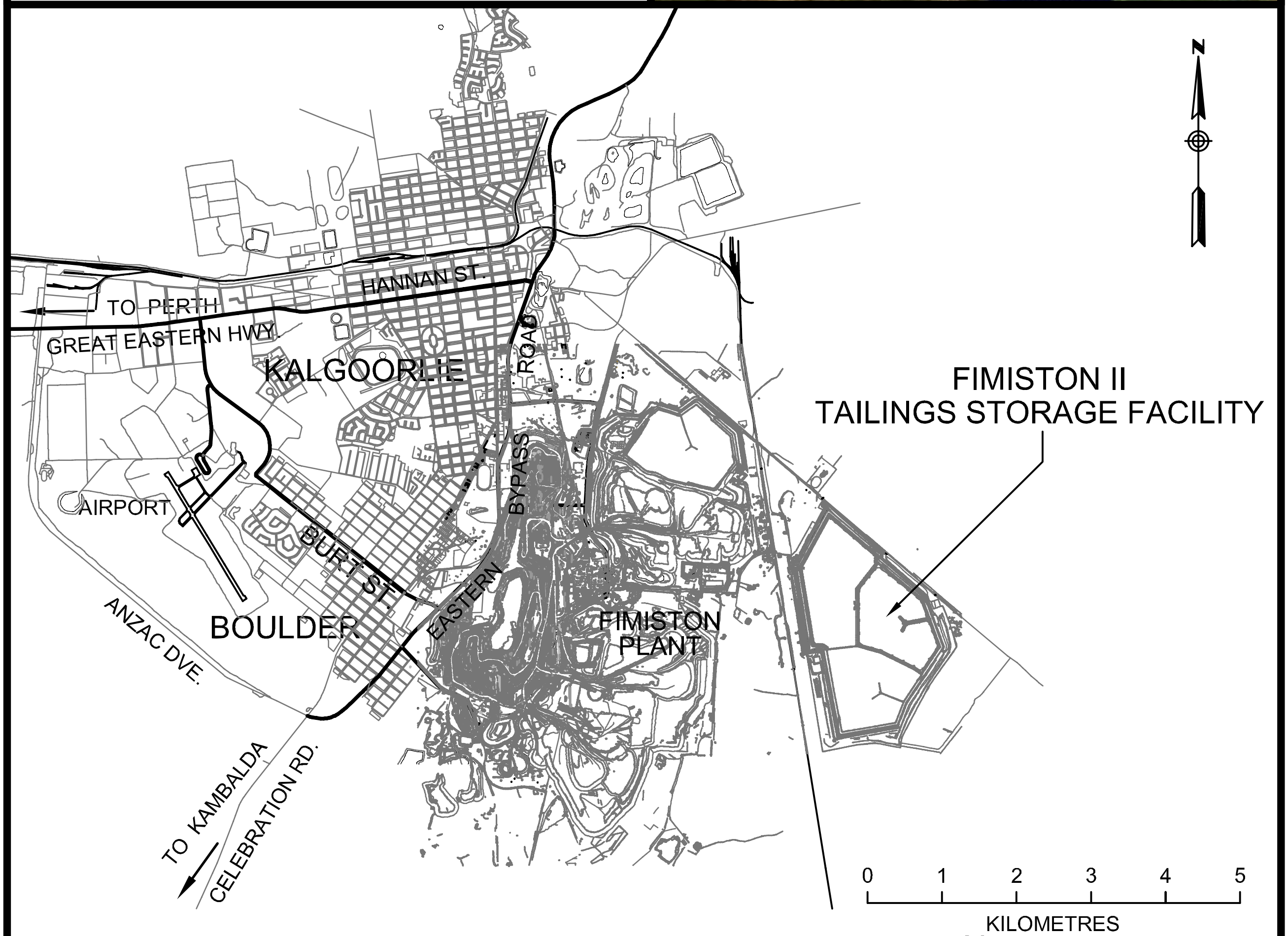

SOURCE: KALGOORLIE CONSOLIDATED GOLD MINES

Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN TJP	DATE Sept. 2005	TITLE PROJECT LOCATION PLAN	
	CHECKED	DATE Sept. 2005		
	SCALE As Shown	A4	PROJECT No 05641089-R01	FIGURE 1

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DATE:Apr 05 PLOT SCALE:1:1

LEGEND:

(dash-dot line)	APPROXIMATE LEASE BOUNDARIES
P26/1969	LEASE NUMBER

1:20000 — 400 200 0 400 800 m

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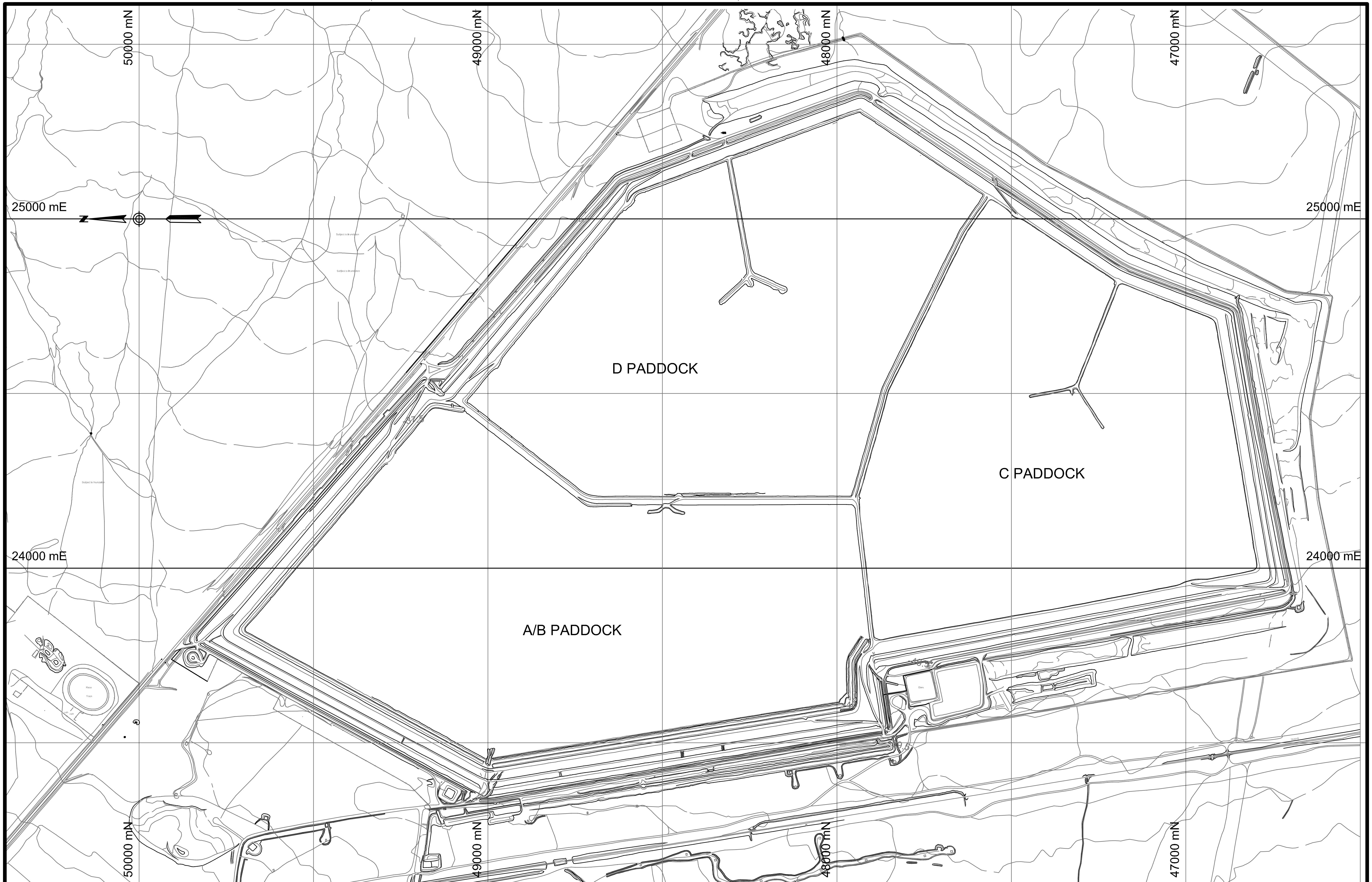
CLIENT KCGM		PROJECT FIMISTON II - ADDENDUM TO NOI	
DRAWN TJP	DATE Sept. 2005	TITLE FIMISTON MILL AND INFRASTRUCTURE LAYOUT PLAN	
CHECKED	DATE Sept. 2005		
SCALE 1:20,000	A3	PROJECT No 05641089-R01	FIGURE 2

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\CAD\FIGURES\05641089_R01_F02.dwg
DATE:Apr 05 PLOT SCALE:1:1



1:10000
0 200 400 m
200 100

Golder Associates

CLIENT	KCGM	PROJECT	FIMISTON II - ADDENDUM TO NOI
DRAWN TJP	DATE Sept. 2005	TITLE	EXISTING FIMISTON II TSF LAYOUT
CHECKED	DATE Sept. 2005		
SCALE 1:10,000	A3	PROJECT No 05641089-R01	FIGURE 3

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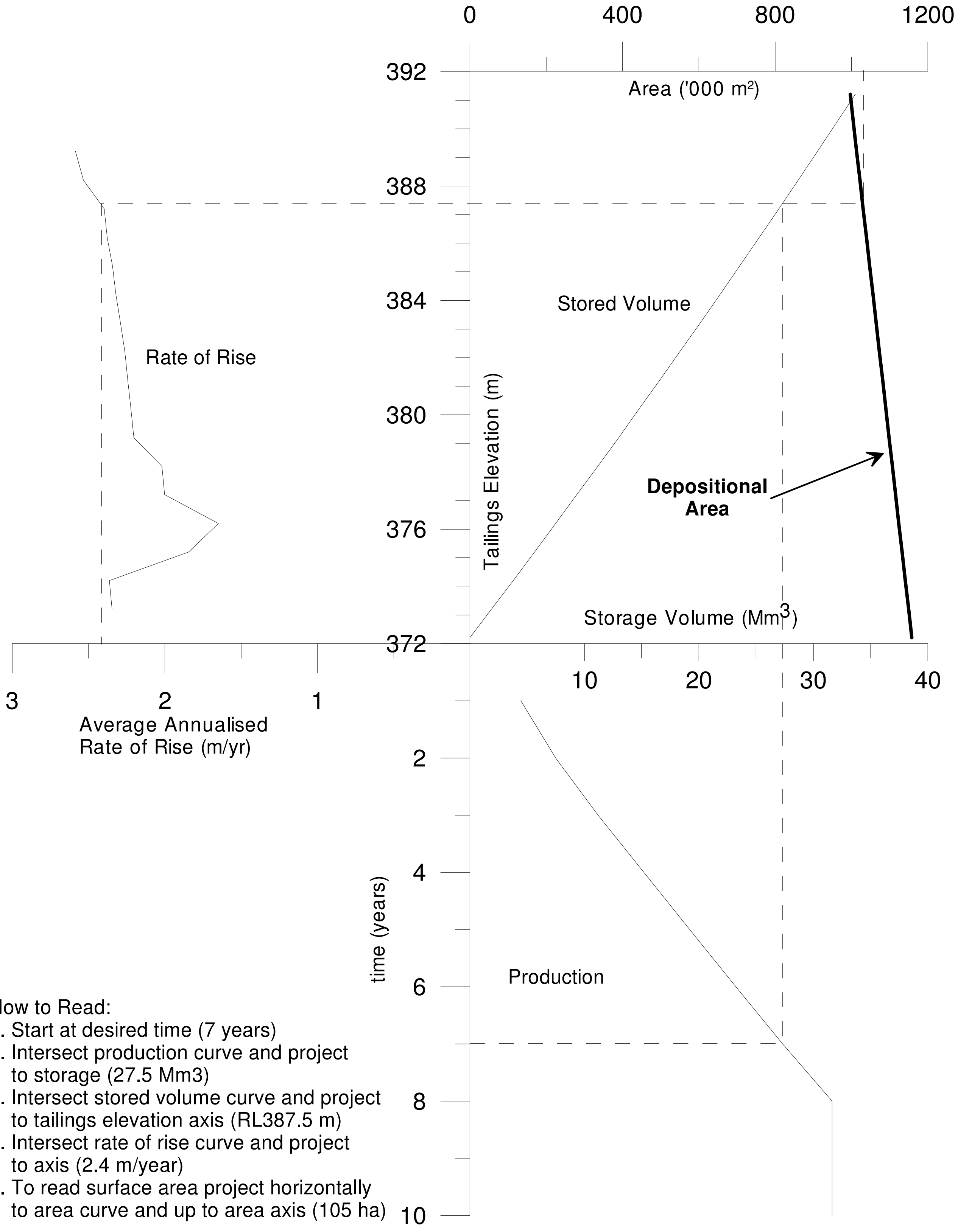

How to Read:
1. Start at desired time (7 years)
2. Intersect production curve and project to storage (27.5 Mm3)
3. Intersect stored volume curve and project to tailings elevation axis (RL387.5 m)
4. Intersect rate of rise curve and project to axis (2.4 m/year)
5. To read surface area project horizontally to area curve and up to area axis (105 ha)

AB Paddock Minimum Elevation = RL345 m

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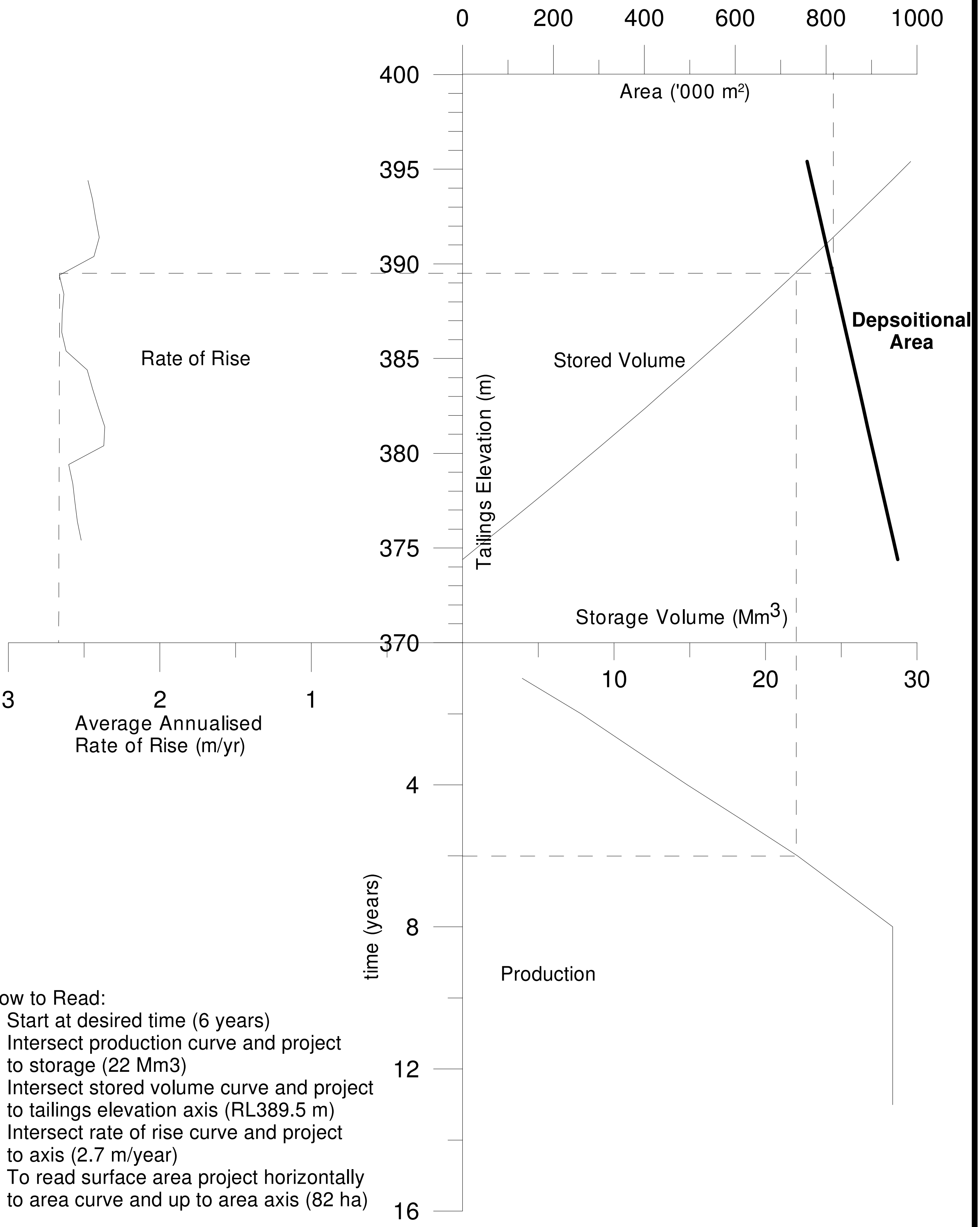
CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
DRAWN PJC	DATE Sep. 2005	TITLE Stage Capacity Curve AB Paddock	
CHECKED DAW	DATE Sep. 2005		
SCALE AS SHOWN	A4	PROJECT No 05641089-R01	Figure 4

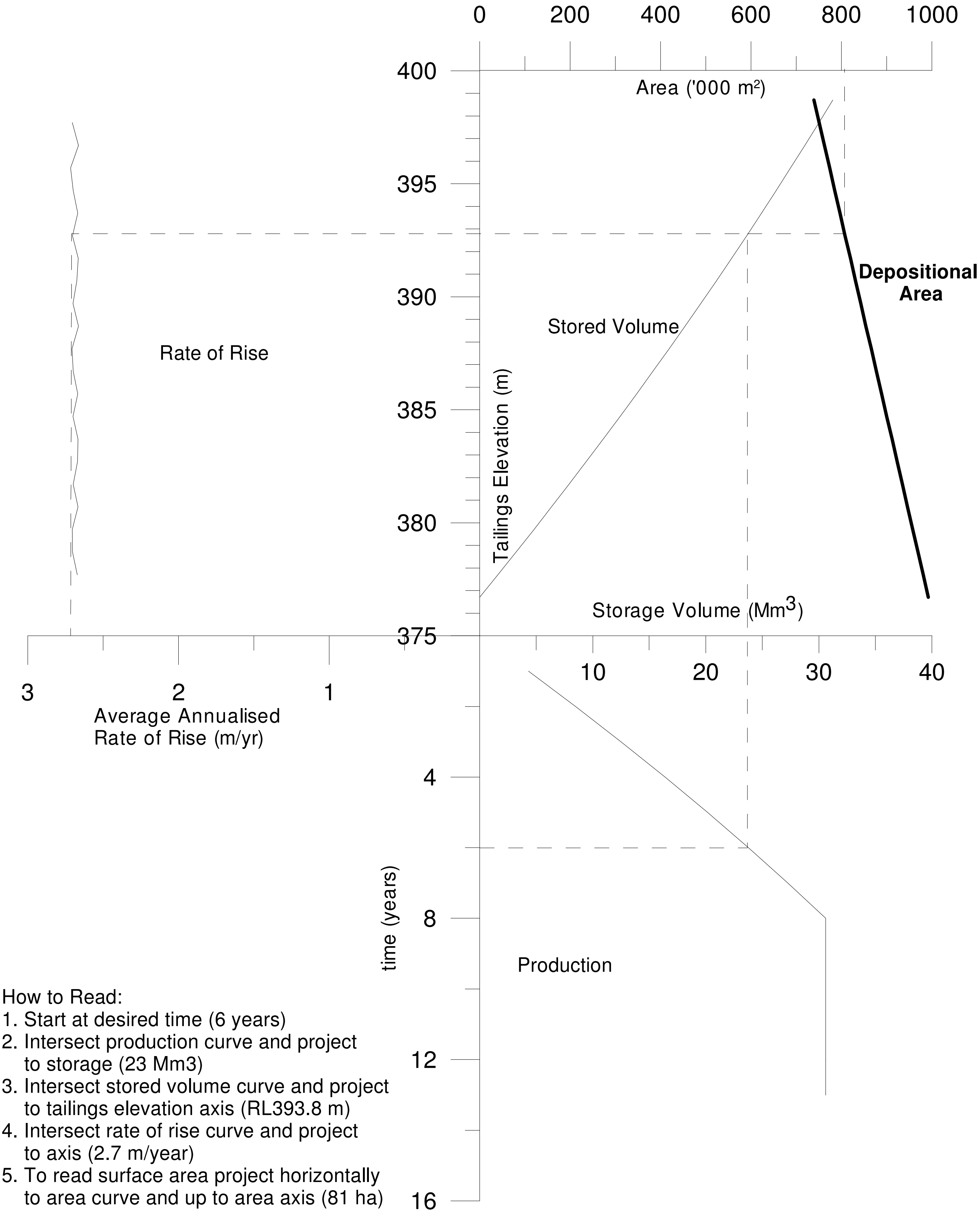


How to Read:

1. Start at desired time (6 years)
2. Intersect production curve and project to storage (22 Mm3)
3. Intersect stored volume curve and project to tailings elevation axis (RL389.5 m)
4. Intersect rate of rise curve and project to axis (2.7 m/year)
5. To read surface area project horizontally to area curve and up to area axis (82 ha)

C Paddock Minimum Elevation = RL350.5 m

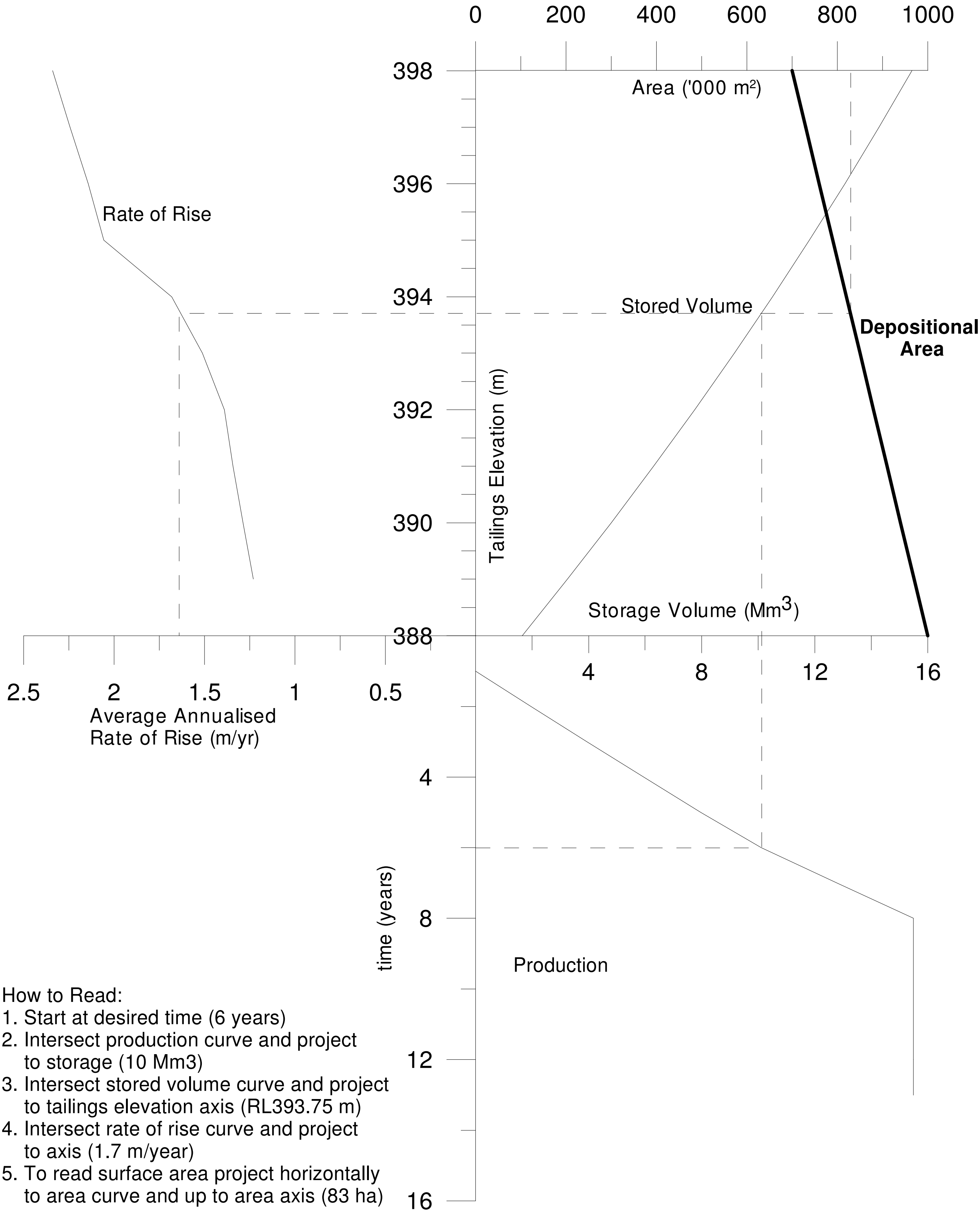
Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI
	DRAWN PJC	DATE Sep. 2005	TITLE Stage Capacity Curve C Paddock
	CHECKED DAW	DATE Sep. 2005	
	SCALE AS SHOWN	A4	PROJECT No 05641089-R01 — Figure 5



How to Read:
1. Start at desired time (6 years)
2. Intersect production curve and project to storage (23 Mm3)
3. Intersect stored volume curve and project to tailings elevation axis (RL393.8 m)
4. Intersect rate of rise curve and project to axis (2.7 m/year)
5. To read surface area project horizontally to area curve and up to area axis (81 ha)

D Paddock Minimum Elevation = RL356 m

Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN PJC	DATE Sep. 2005	TITLE Stage Capacity Curve D Paddock	
	CHECKED DAW	DATE Sep. 2005		
	SCALE AS SHOWN	A4	PROJECT No 05641089-R01	Figure 6



How to Read:
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2. Intersect production curve and project to storage (10 Mm3)
3. Intersect stored volume curve and project to tailings elevation axis (RL393.75 m)
4. Intersect rate of rise curve and project to axis (1.7 m/year)
5. To read surface area project horizontally to area curve and up to area axis (83 ha)

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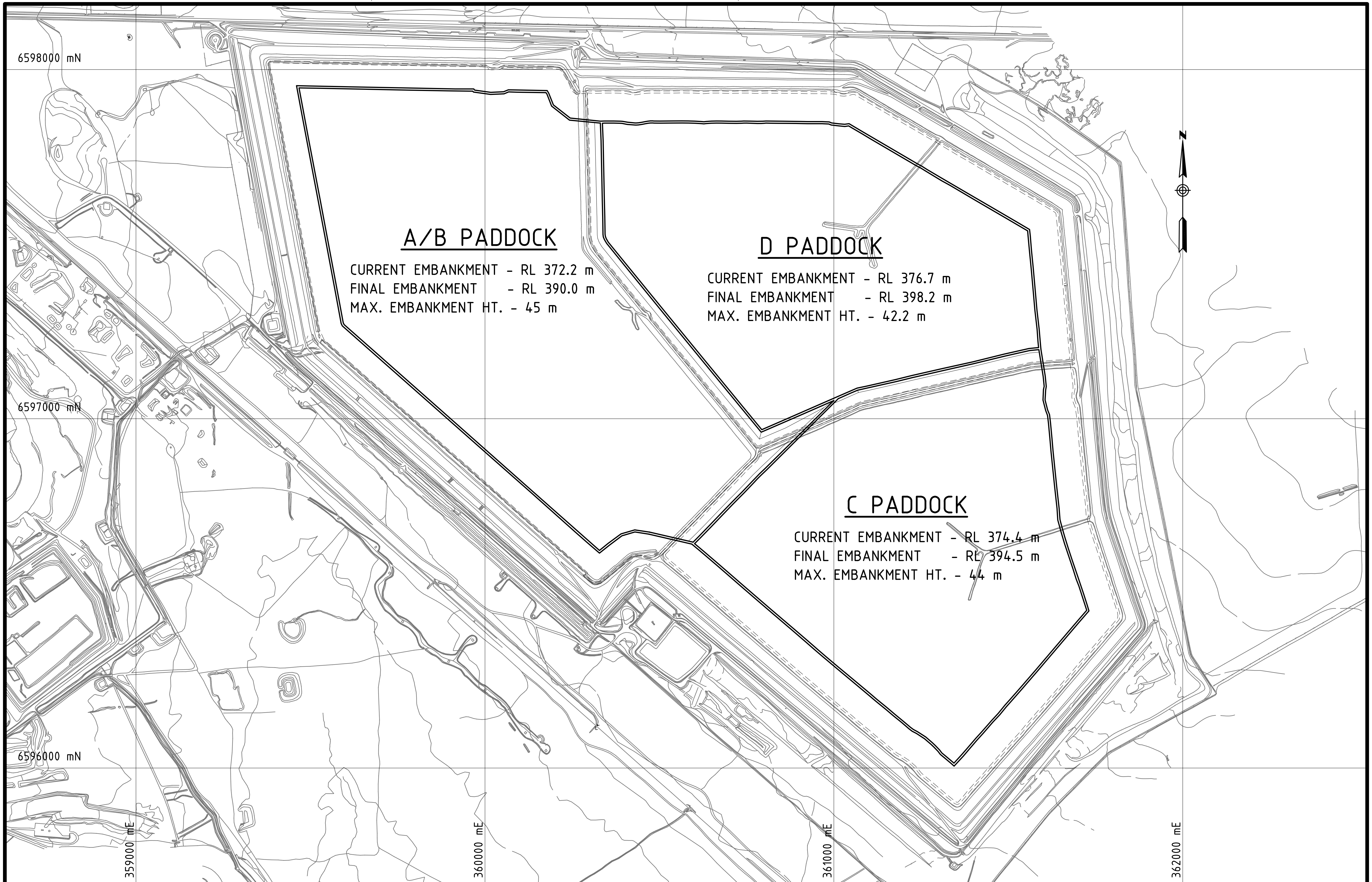
CLIENT KCGM			PROJECT Fimiston II - Addendum to NOI	
DRAWN PJC	DATE Sep. 2005		TITLE Stage Capacity Curve Fimiston I	
CHECKED DAW	DATE Sep. 2005			
SCALE AS SHOWN		A4	PROJECT No 05641089-R01	Figure 7



LEGEND:

- CURRENT EMBANKMENT CONFIGURATION
- FINAL EMBANKMENT CONFIGURATION
- INTERNAL EMBANKMENT TOE

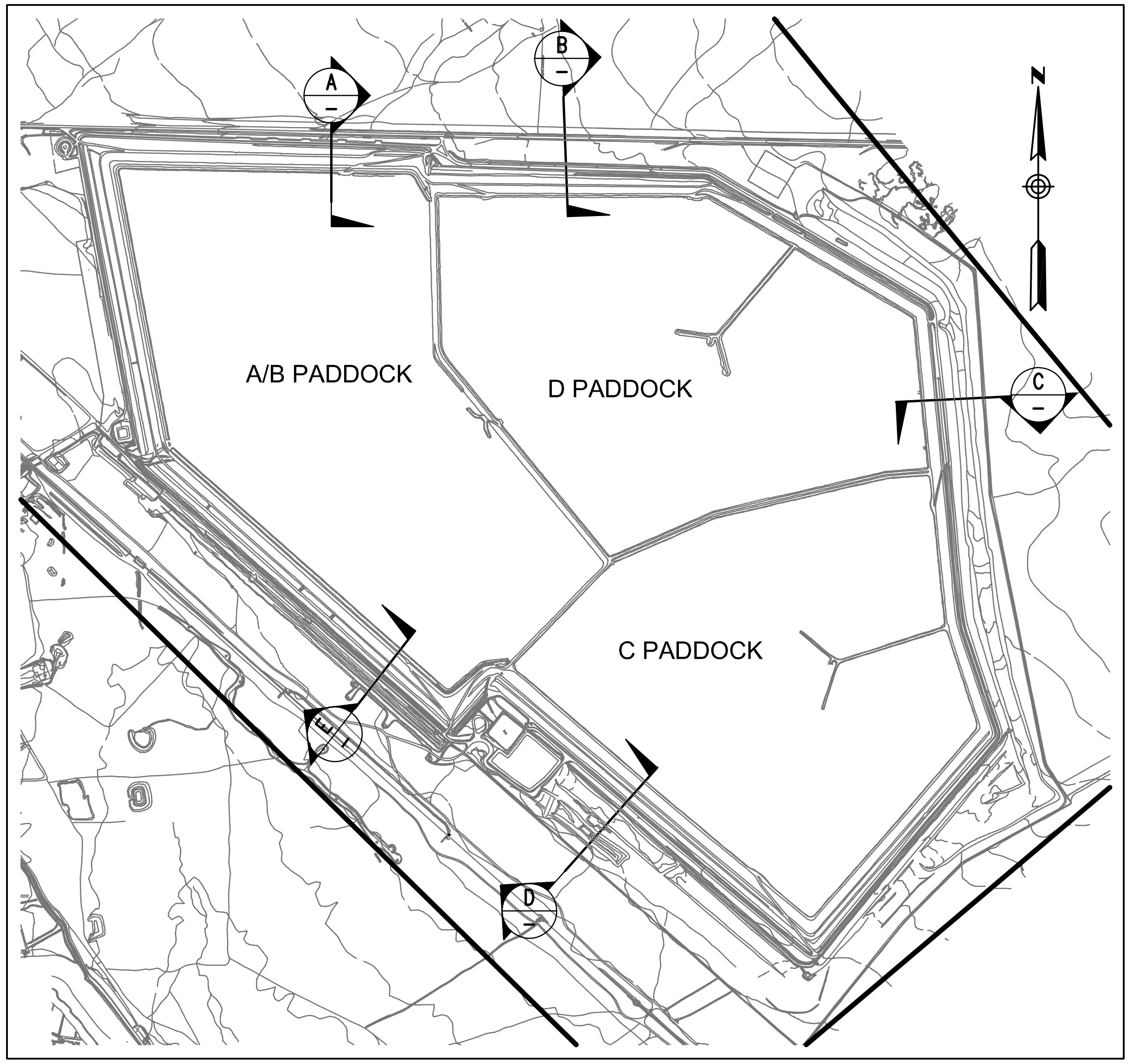
MAP PROJECTION - MGA 94

DATUM GDA 94, ZONE 51

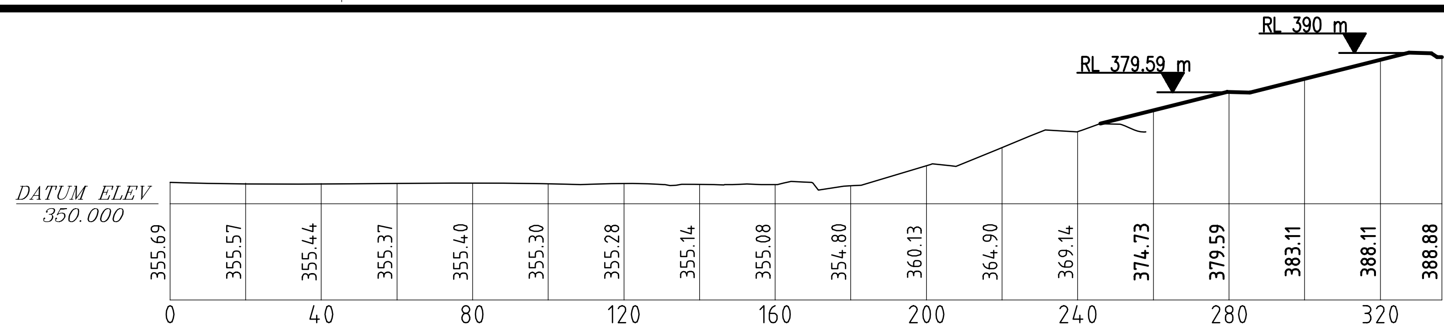
Golder Associates

CLIENT KCGM		PROJECT FIMISTON II - ADDENDUM TO NOI	
DRAWN TJP	DATE Sept. 2005	TITLE FIMISTON II TSF LAYOUT AT PROPOSED MAXIMUM HEIGHT	
CHECKED	DATE Sept. 2005		
SCALE 1:10,000	A3	PROJECT No 05641089-R01	FIGURE 8

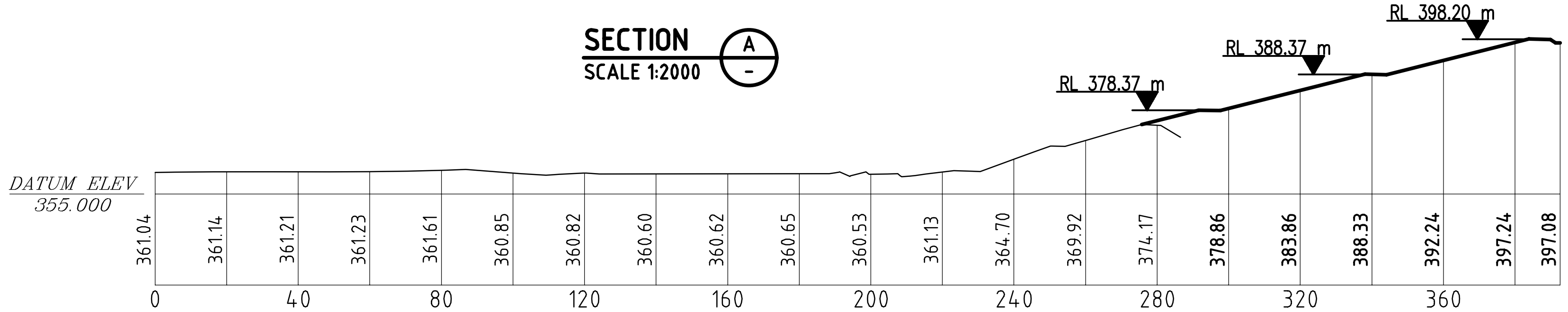
J:\Jobs405\MINING\05641089 -KCGM_ Fim II and Kaltails NOI\CAD\FIGURES\05641089_TM01_F01.dwg
30 Oct 2000 1:1



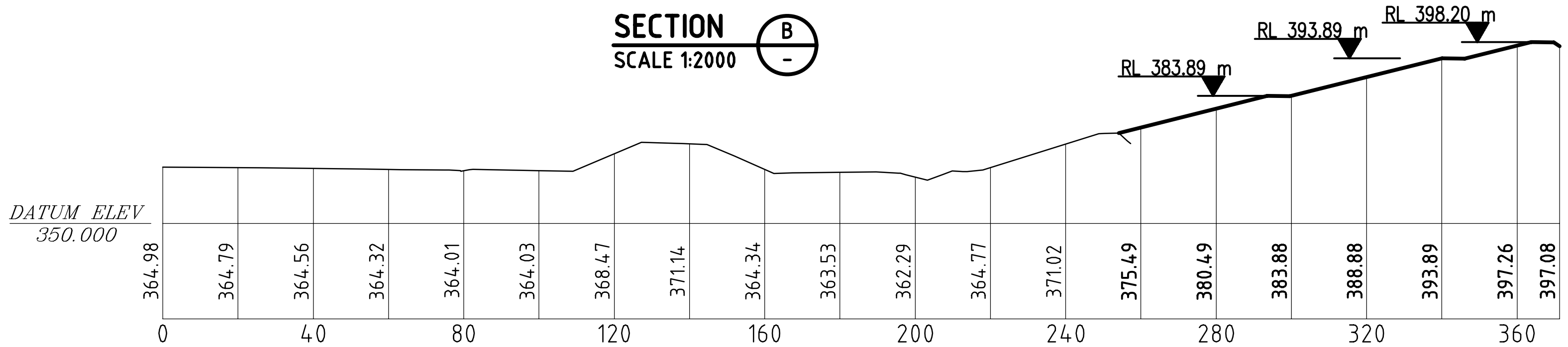
PLAN
Scale 1:20,000



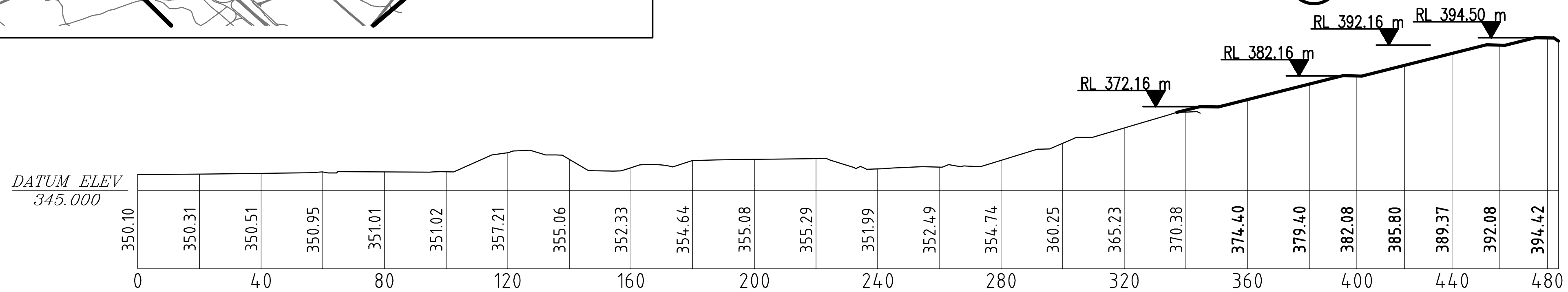
SECTION A
SCALE 1:2000



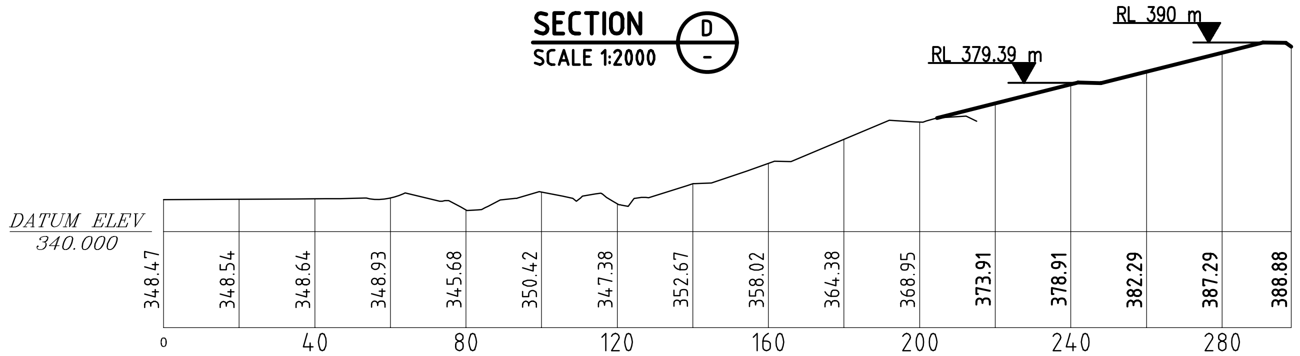
SECTION B
SCALE 1:2000



SECTION C
SCALE 1:2000

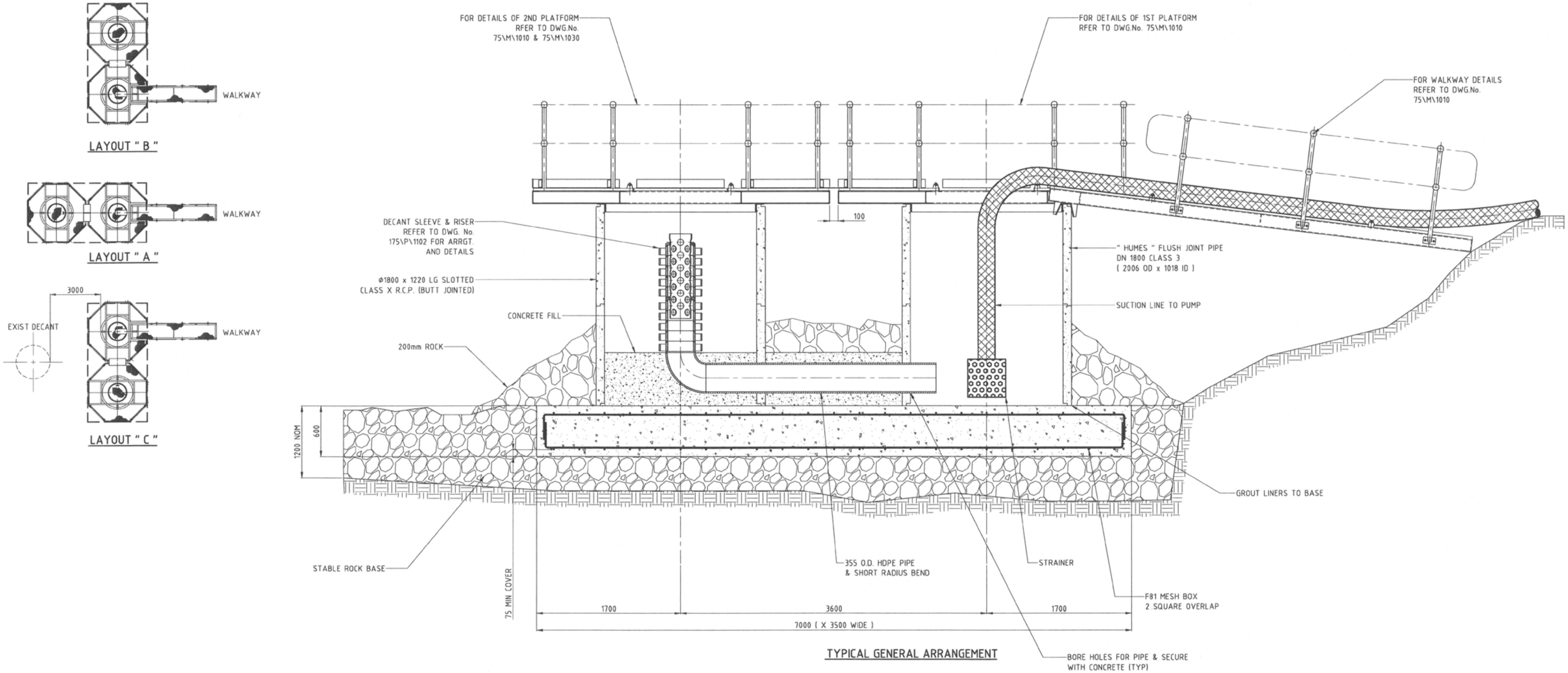


SECTION D
SCALE 1:2000



SECTION E
SCALE 1:2000

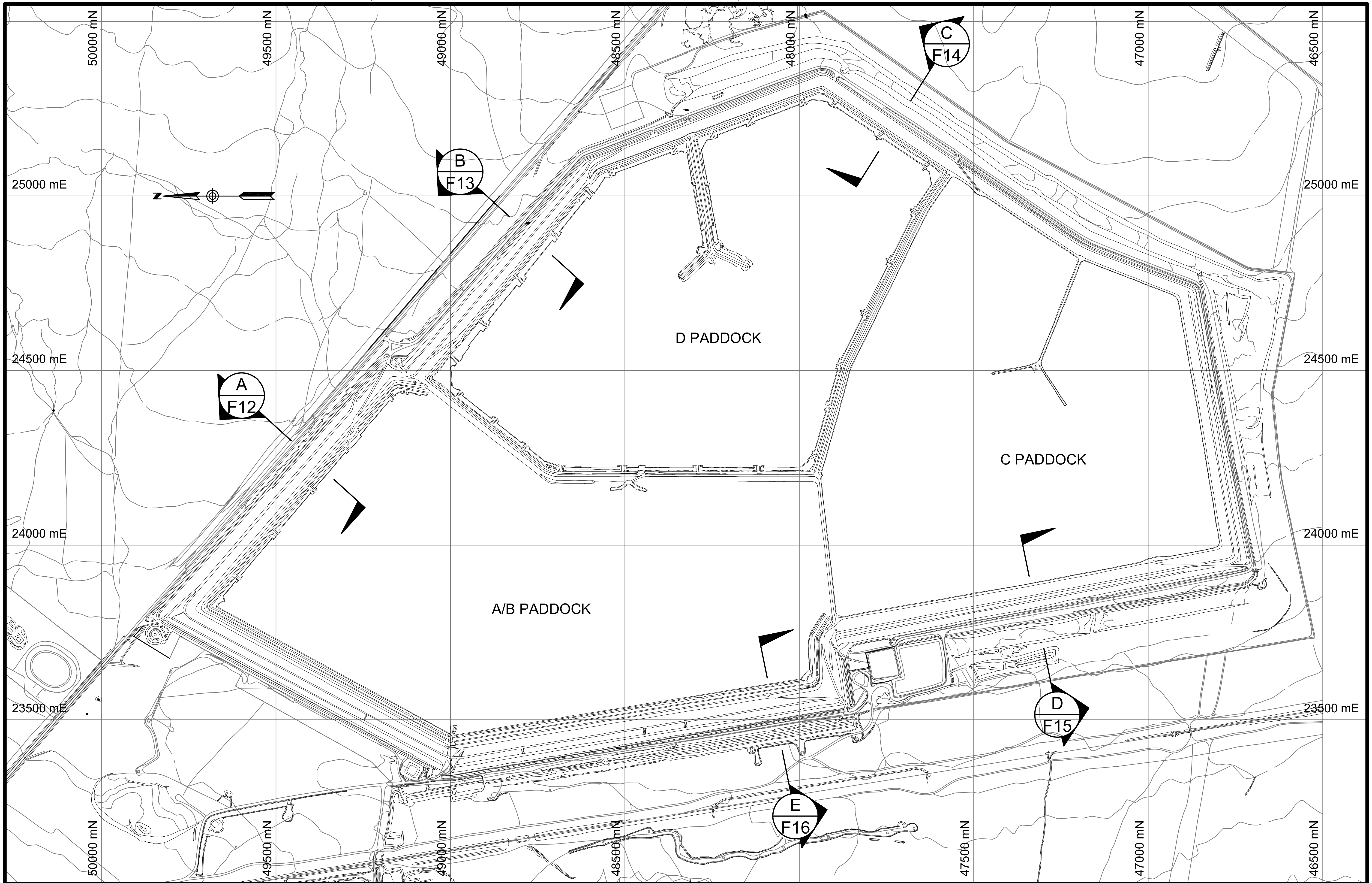
Golder Associates	CLIENT KCGM		PROJECT FIMISTON II - ADDENDUM TO NOI
	DRAWN DFH	DATE Sept. 2005	TITLE FIMISTON II TYPICAL CROSS SECTIONS AT PROPOSED MAXIMUM HEIGHT
	CHECKED	DATE Sept. 2005	
	SCALE AS SHOWN	A3	PROJECT No 05641089-R01 · FIGURE 9



NOTE : IMAGE FROM KCGM Pty Ltd

Golder Associates	CLIENT: KCGM		PROJECT: FIMISTON II - ADDENDUM TO NOI	
	DRAWN: DFH	DATE: Sept. 2005	TITLE: CONCEPTUAL PUMPED DECANT SYSTEM	
	CHECKED: [signature]	DATE: Sept. 2005		
	SCALE: AS SHOWN	A3	PROJECT No: 05641089-R01	FIGURE 10

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\CAD\FIGURES\05641089_R01_F10.dwg DATE: 01-07-2005 PLOT SCALE 1:1



1:10000

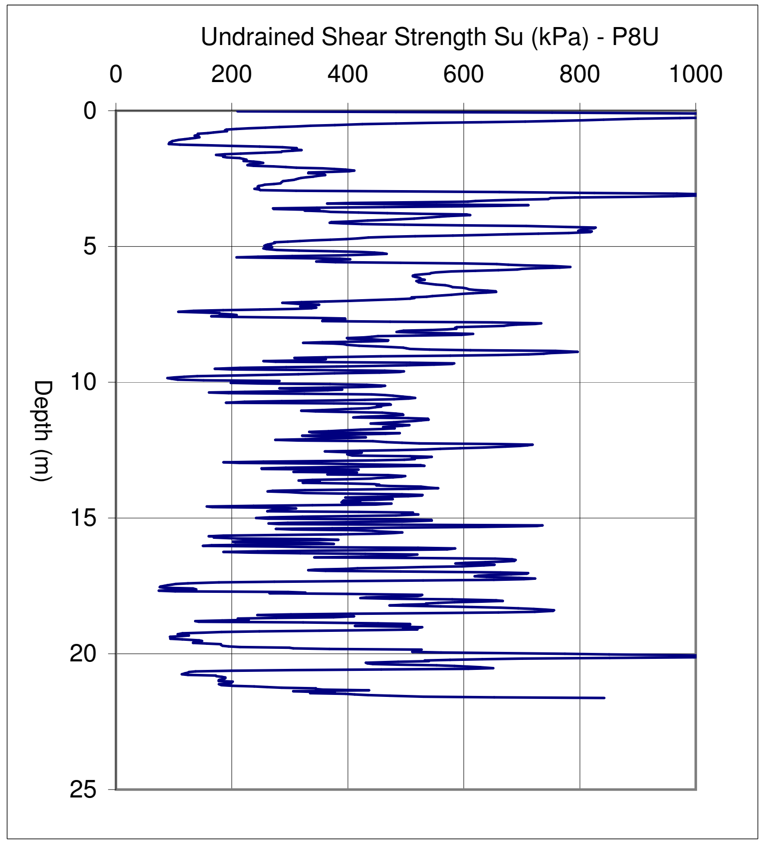
0 200 400 m

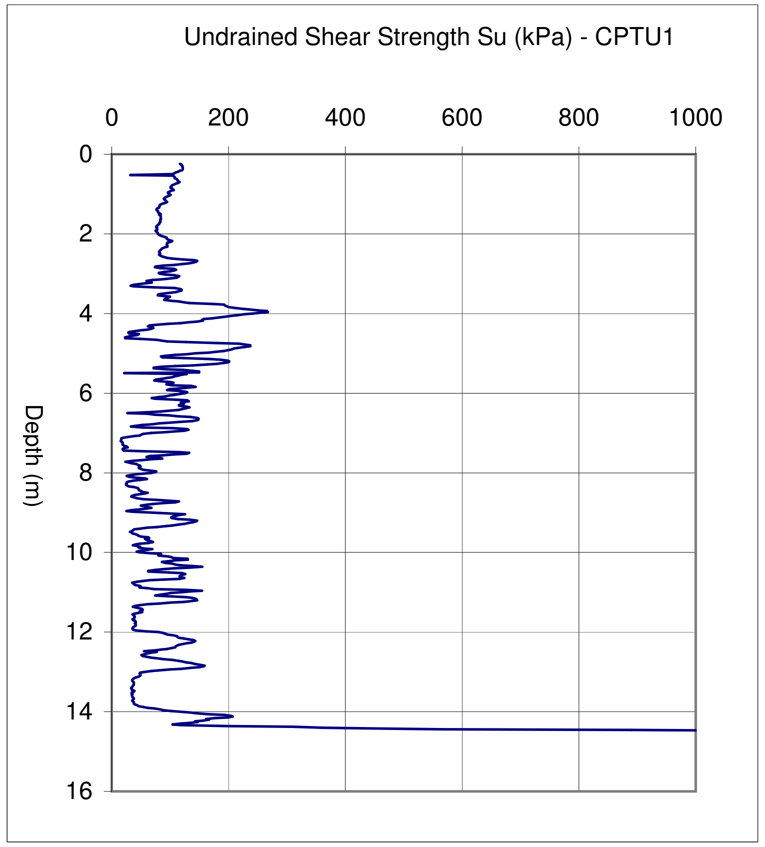
200 100

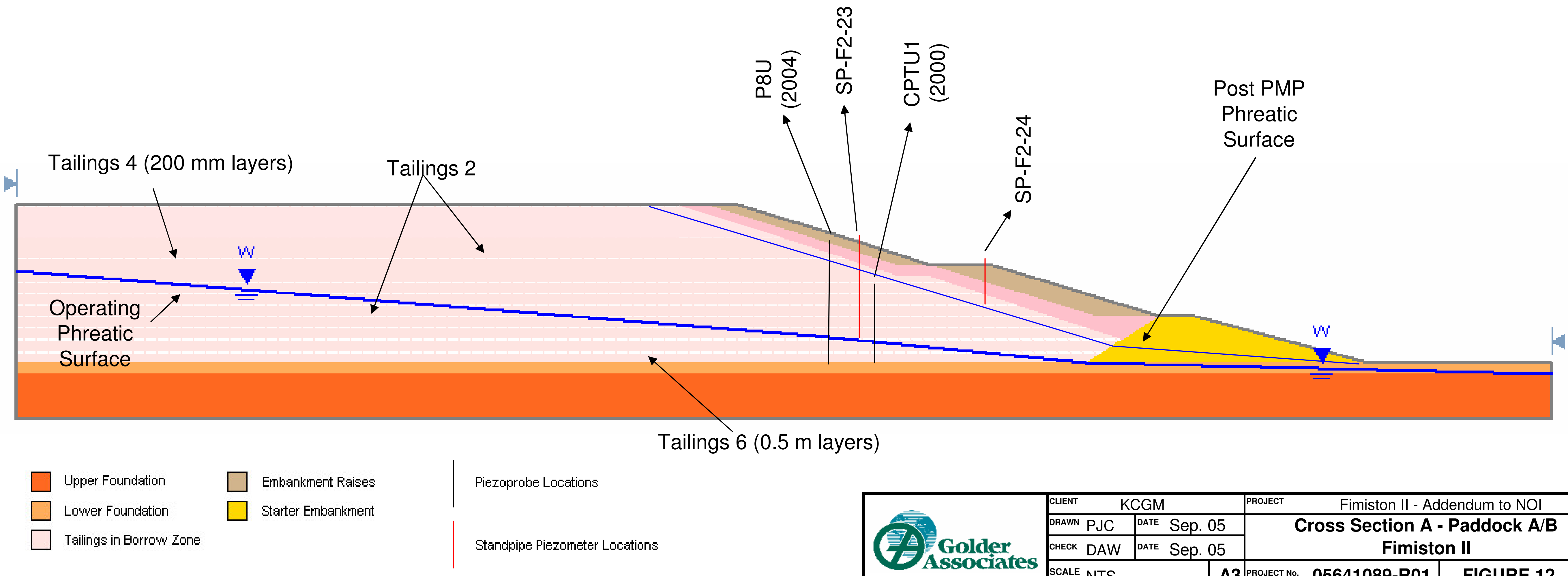
CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
DRAWN TJP	DATE Sept. 2005	TITLE STABILITY ANALYSES SECTION LOCATION PLAN	
CHECKED	DATE Sept. 2005		
SCALE 1:10,000	A3	PROJECT No 05641089-R01	FIGURE 11

Golder Associates

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\CAD\FIGURES\05641089_R01_F11.dwg
DATE:Jul. 05 PLOT SCALE: 1:1



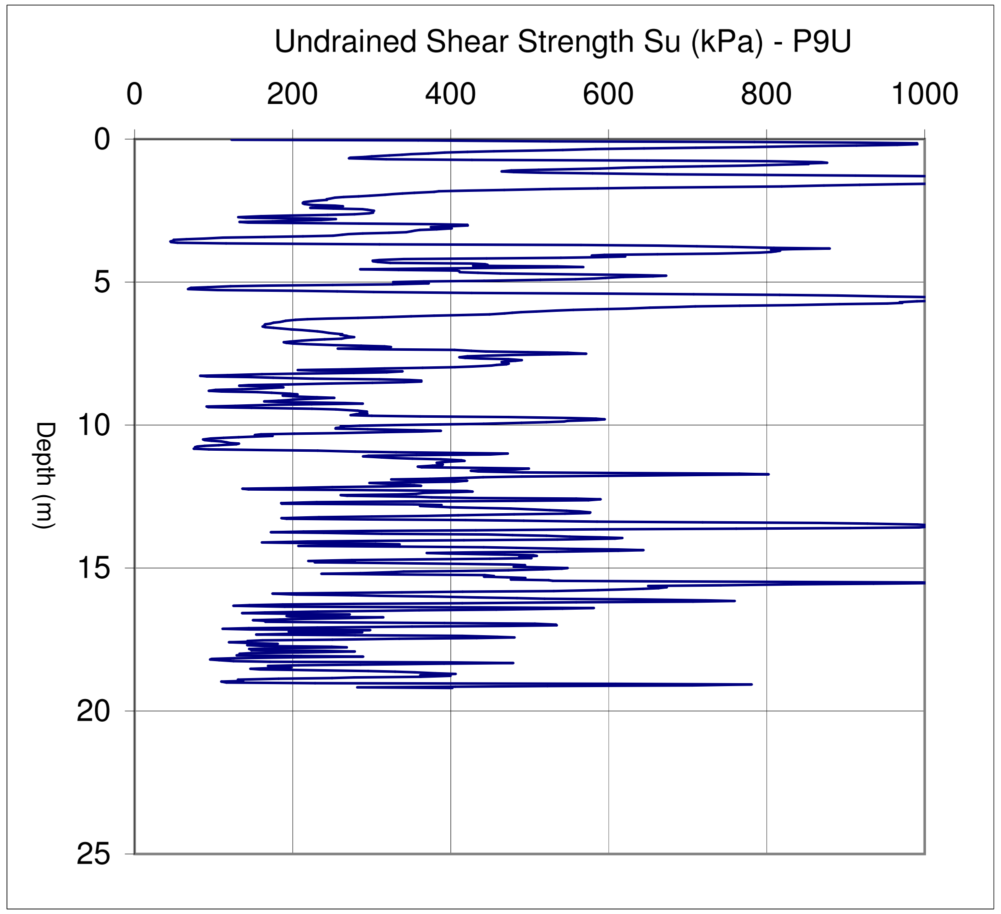


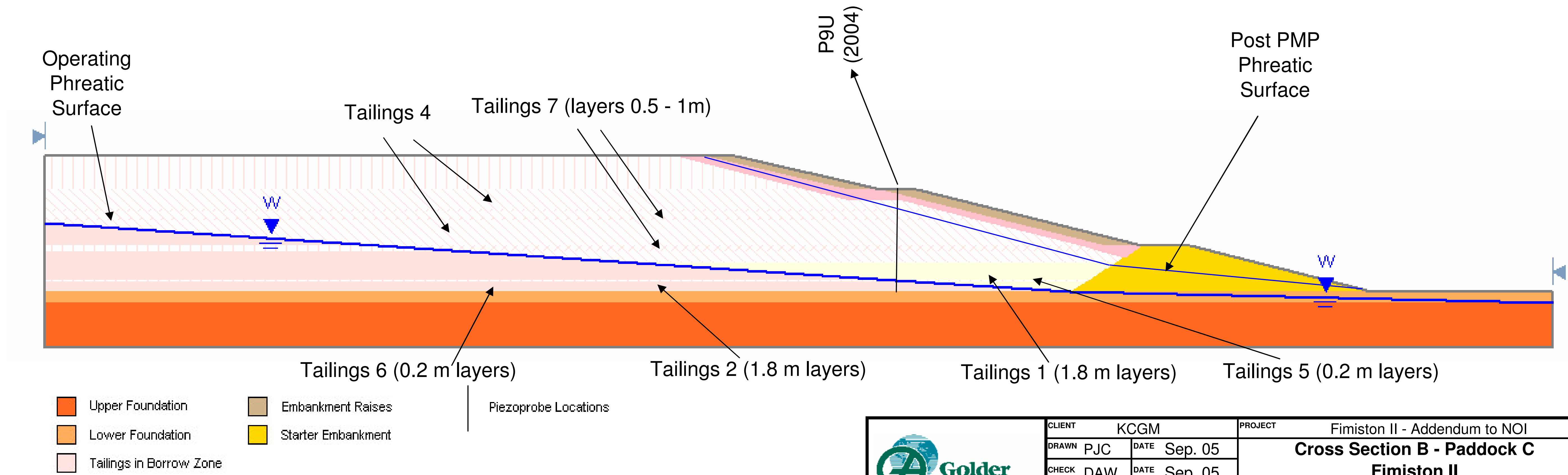


Golder Associates

CLIENT KCGM			PROJECT Fimiston II - Addendum to NOI	
DRAWN PJC	DATE Sep. 05		**Cross Section A - Paddock A/B Fimiston II**	
CHECK DAW	DATE Sep. 05			
SCALE NTS		A3	PROJECT No. **05641089-R01**	**FIGURE 12**

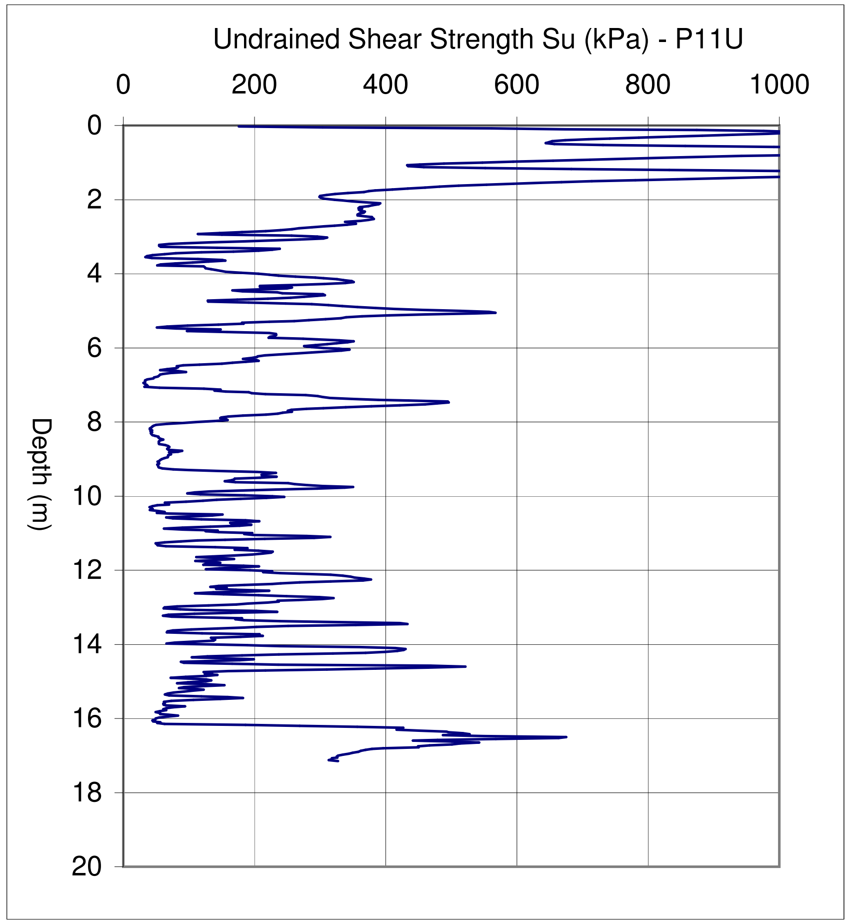
J:\Jobs404\MINING\04641304 - KCGM TSF Audit & Piezoprobe\Piezoprobe Work\Stability Analyses\Fimiston 2\Section Figure.xls

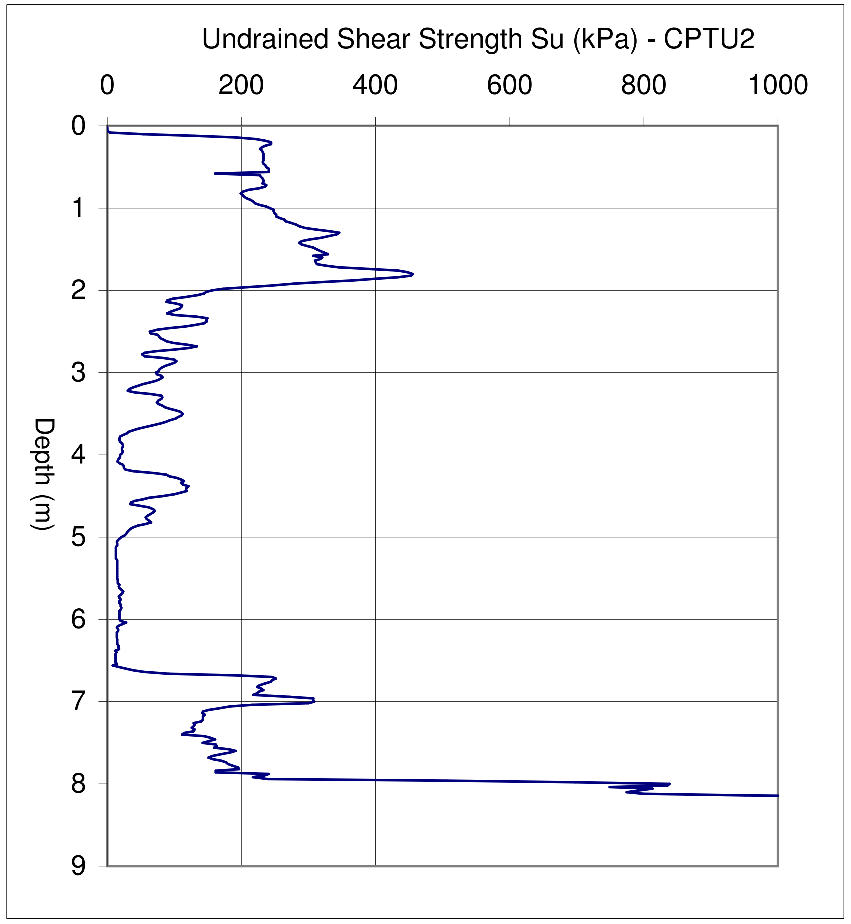


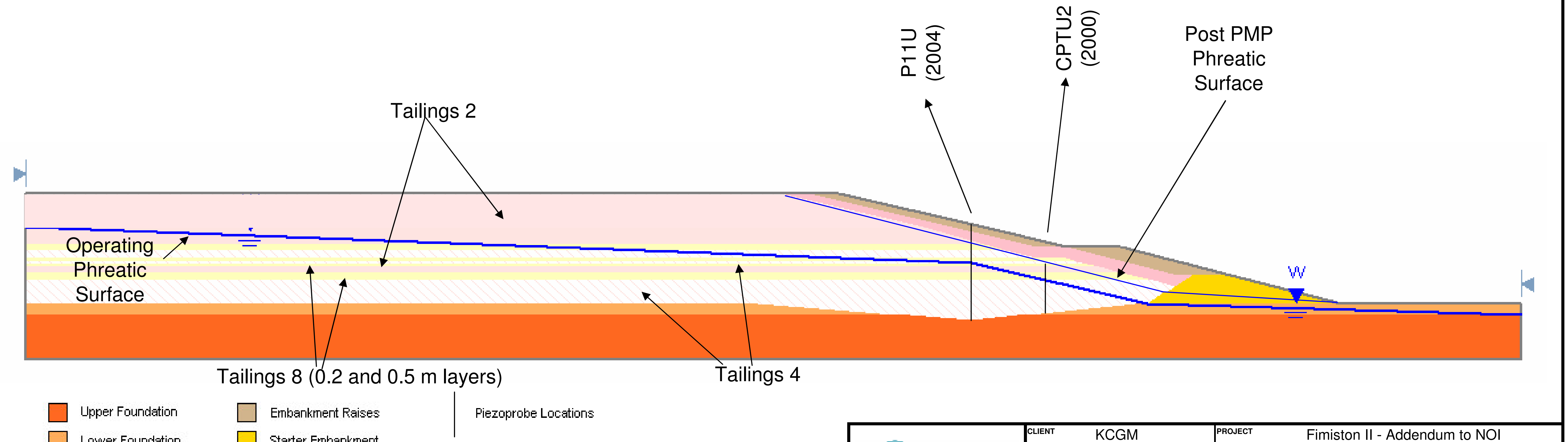


Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	Cross Section B - Paddock C	
	CHECK DAW	DATE Sep. 05	Fimiston II	
	SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE 13

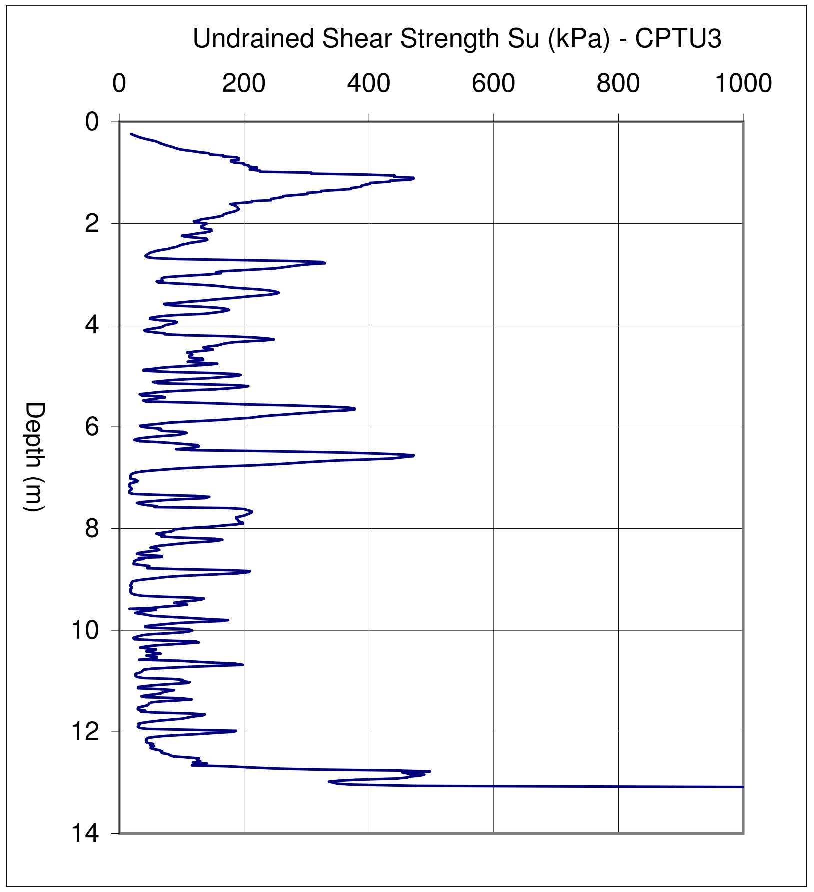
J:\Jobs404\MINING\04641304 - KCGM TSF Audit & Piezoprobe\Piezoprobe Work\Stability Analyses\Fimiston 2\Section Figure.xls

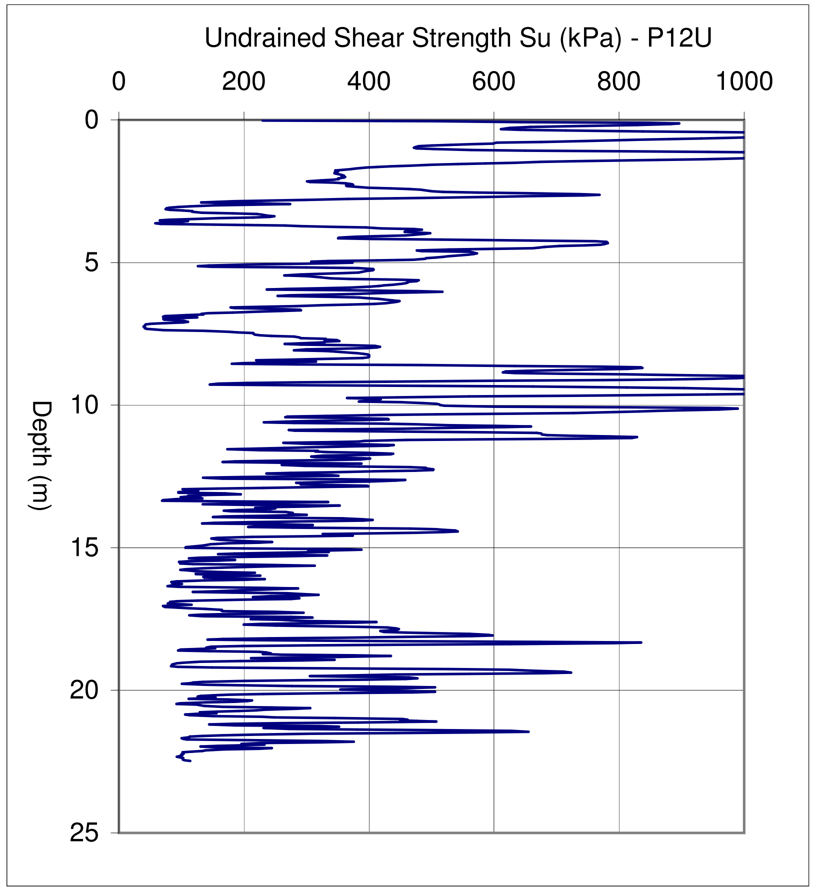


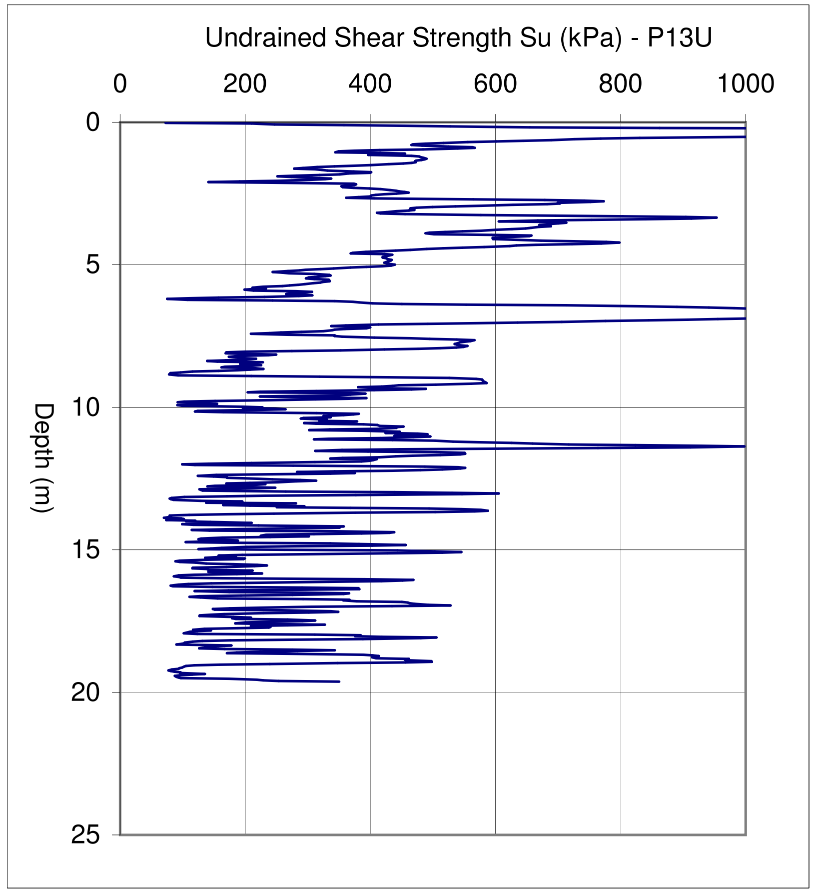


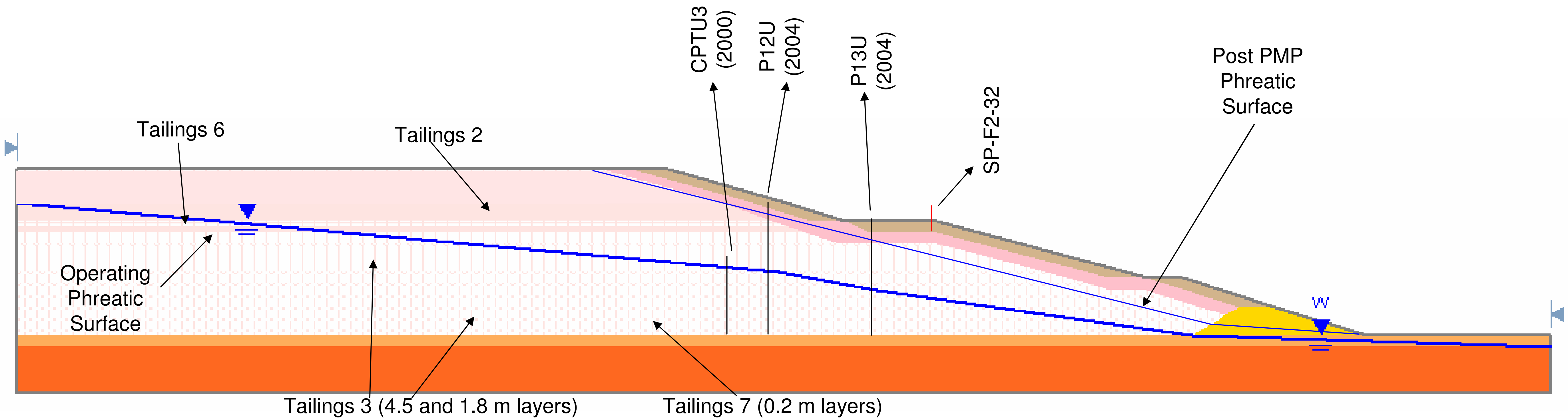


Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	Cross Section C - Paddock D	
	CHECK DAW	DATE Sep. 05	Fimiston II	
	SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE 14







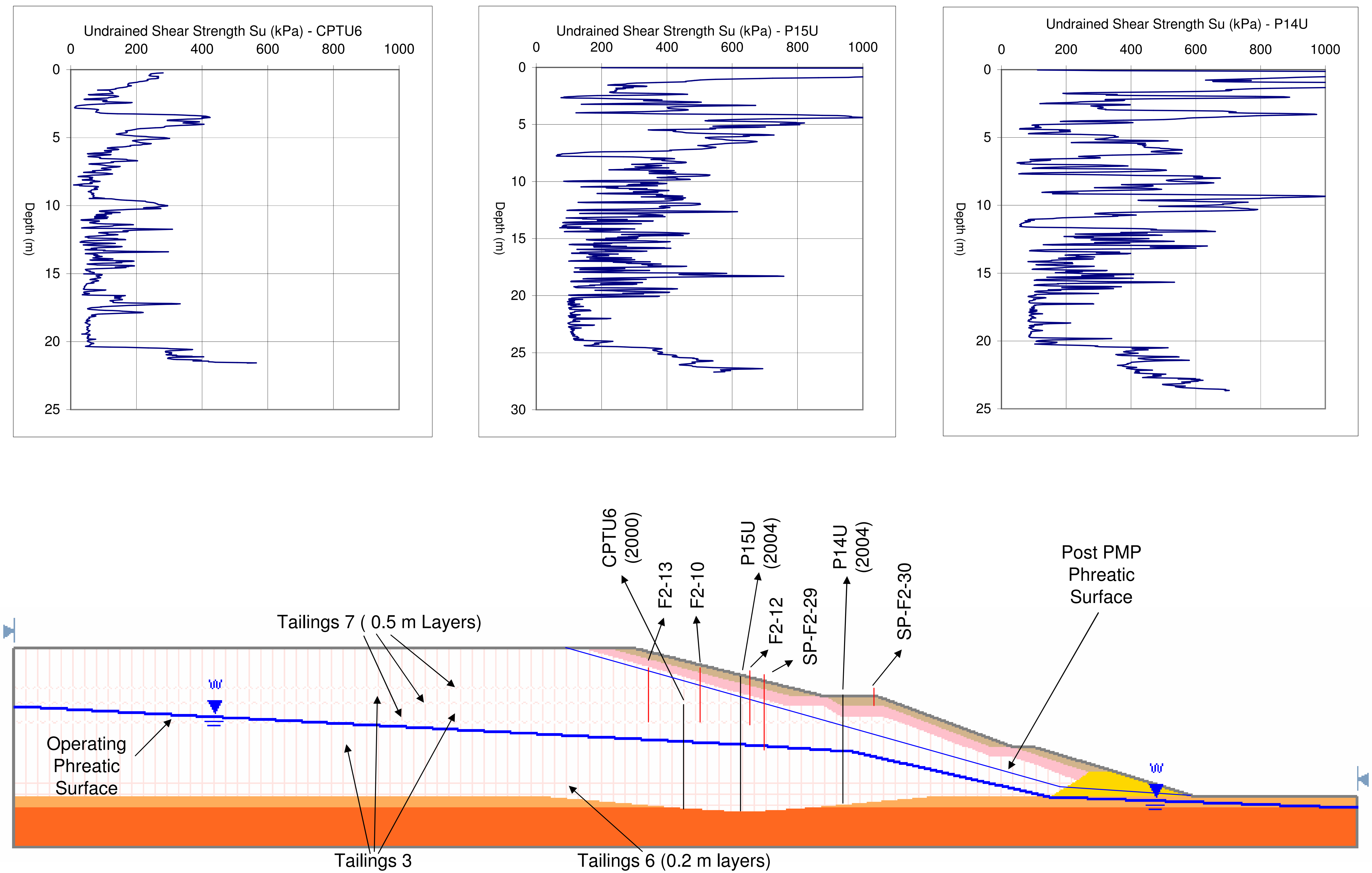


Upper Foundation
Lower Foundation
Tailings in Borrow Zone
Embankment Raises
Starter Embankment
Piezoprobe Locations
Standpipe Piezometer Locations

Golder Associates

CLIENT	KCGM			PROJECT	Fimiston II - Addendum to NOI
DRAWN	PJC	DATE	Sep. 05	Cross Section D - Paddock C	
CHECK	DAW	DATE	Sep. 05	Fimiston II	
SCALE	NTS		A3	PROJECT No. 05641089-R01	FIGURE 15

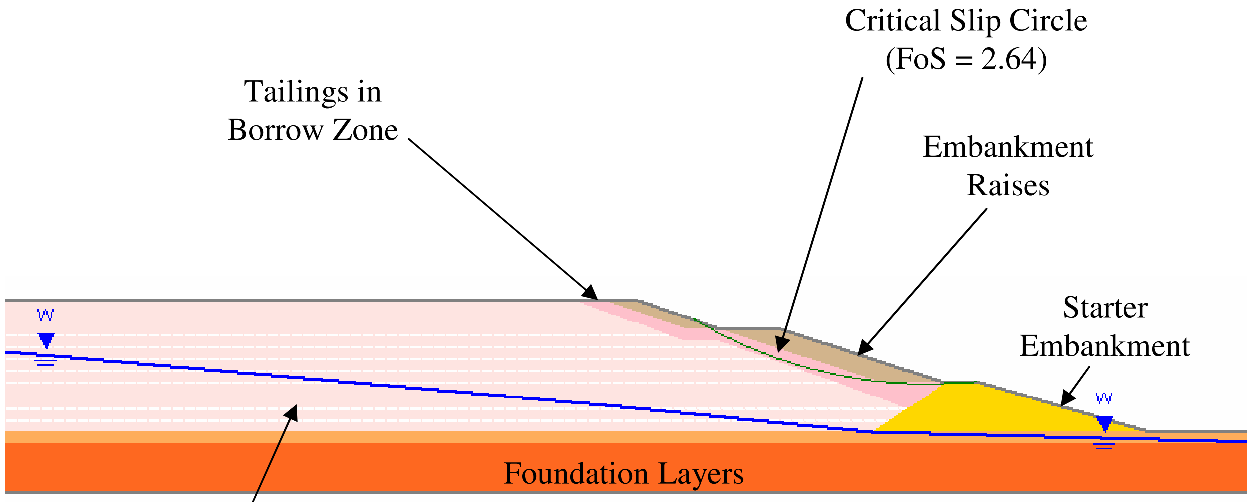
J:\Jobs404\MINING\04641304 - KCGM TSF Audit & Piezoprobe\Piezoprobe Work\Stability Analyses\Fimiston 2\Section Figure.xls



Upper Foundation
Lower Foundation
Tailings in Borrow Zone
Embankment Raises
Starter Embankment
Piezoprobe Locations
Standpipe Piezometer Locations

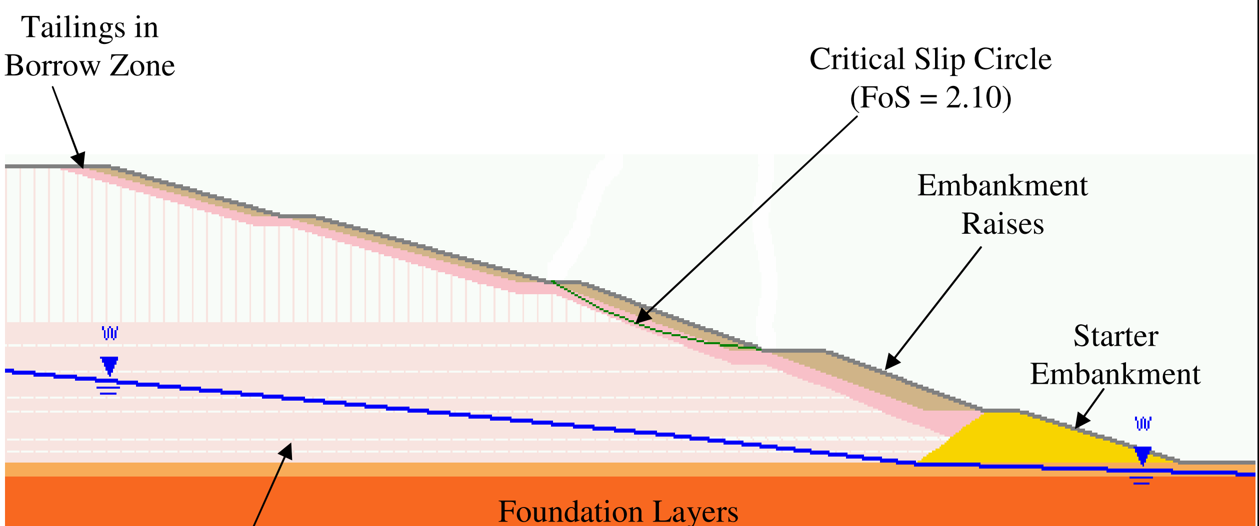
Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	**Cross Section E - Paddock A/B**	
	CHECK DAW	DATE Sep. 05	**Fimiston II**	
	SCALE NTS	**A3**	PROJECT No. **05641089-R01**	**FIGURE 16**

J:\Jobs404\MINING\04641304 - KCGM TSF Audit & Piezoprobe\Piezoprobe Work\Stability Analyses\Fimiston 2\Section Figure.xls



Section A at Current Height

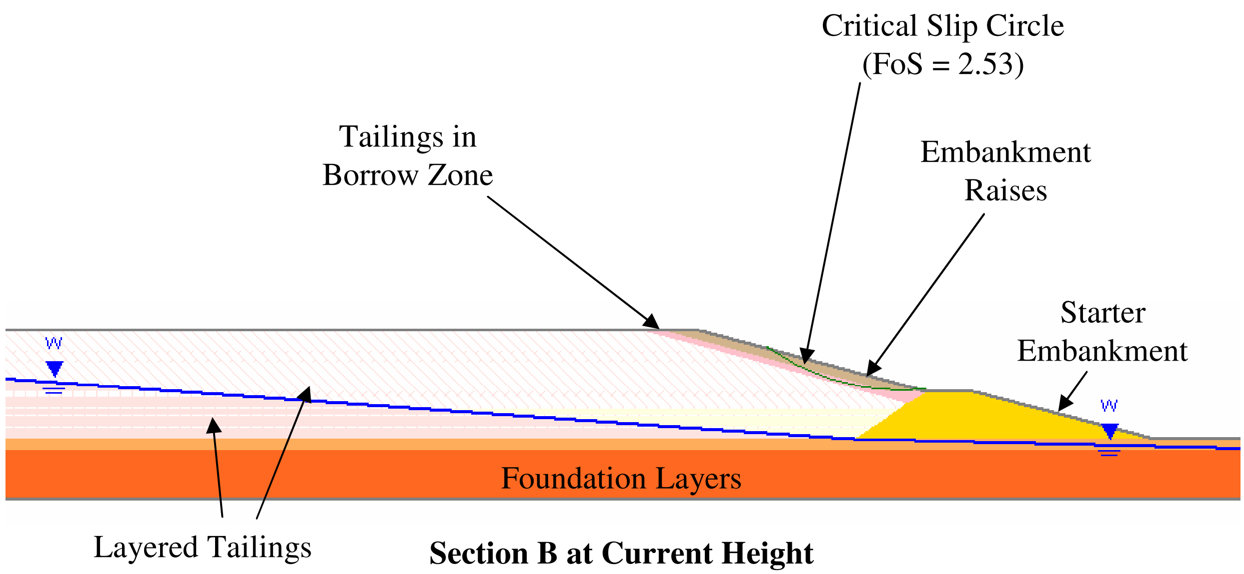
(A/B Paddock)



Section A at Final Height

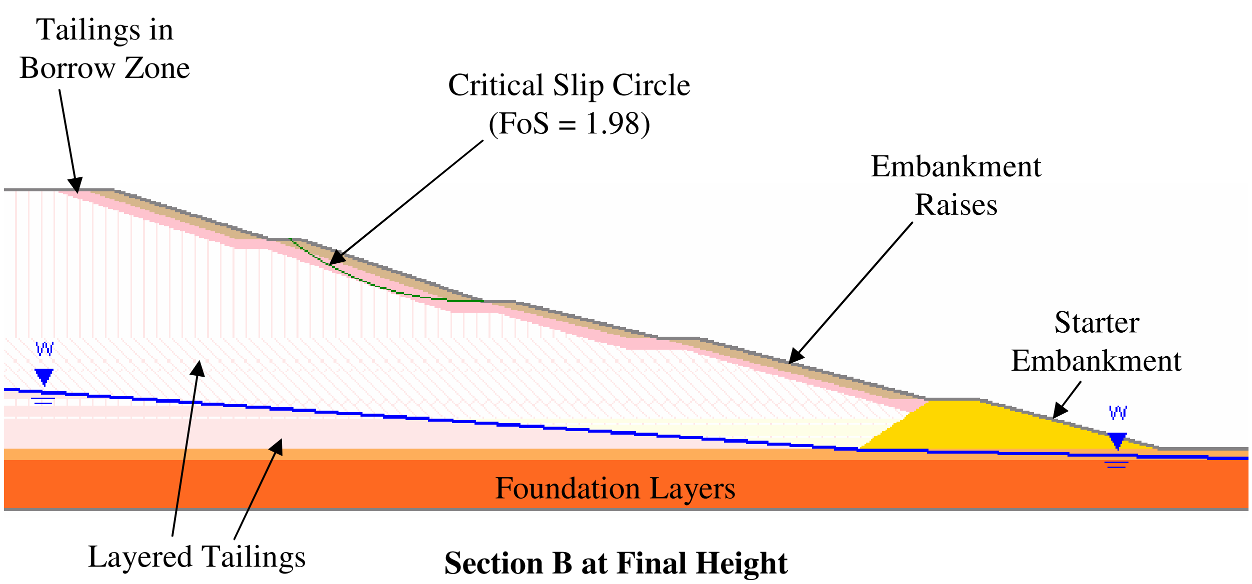
(A/B Paddock)

Golder Associates				
CLIENT KCGM			PROJECT Fimiston II – Addendum to NOI	
DRAWN PJC	DATE Sep. 05		TITLE **Effective Stress Stability Analyses Section A – Fimiston II**	
CHECKED	DATE Sep. 05			
SCALE Not To Scale		A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 17**



Section B at Current Height

(D Paddock)

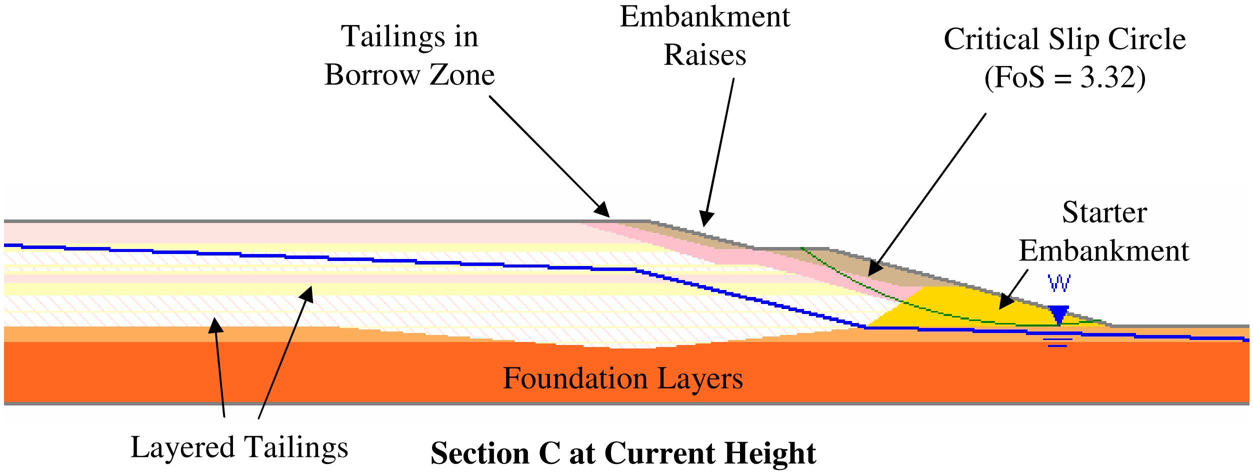


Section B at Final Height

(D Paddock)

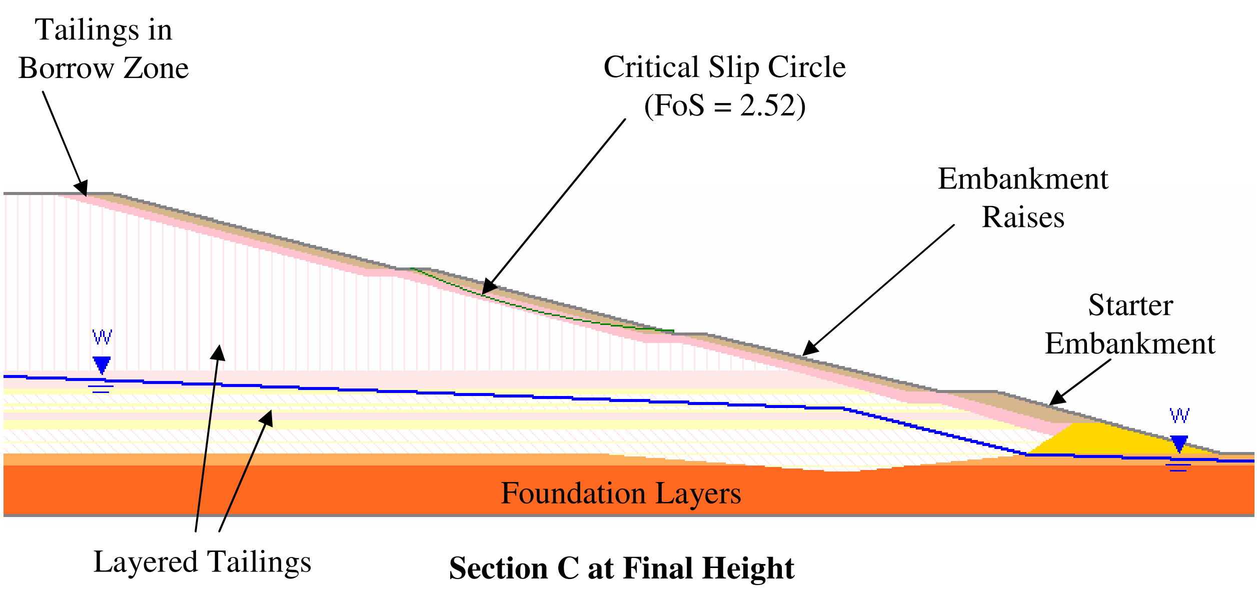
Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Effective Stress Stability Analyses Section B – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 18**

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\Stability Analyses\Fimiston 2\stability figures – report.ppt



Section C at Current Height

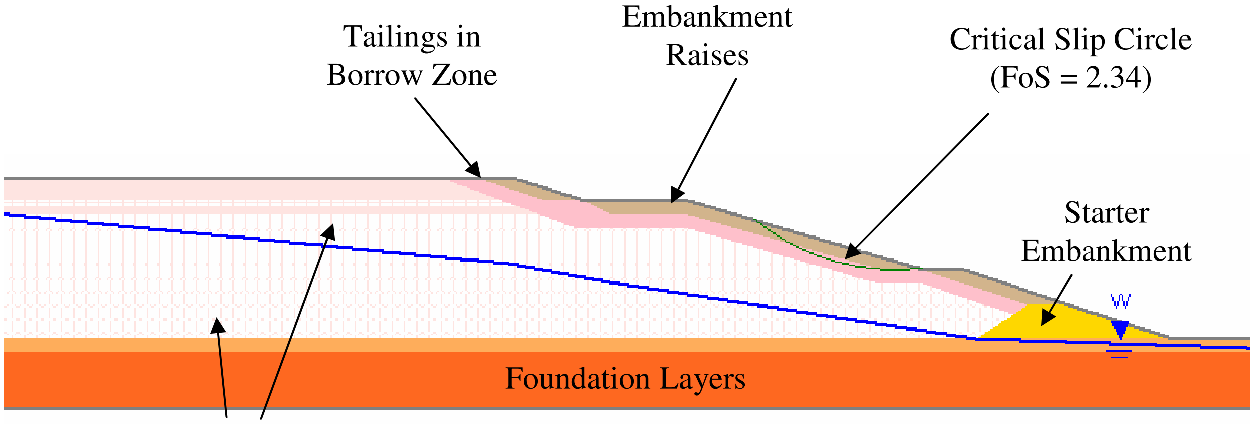
(D Paddock)



Section C at Final Height

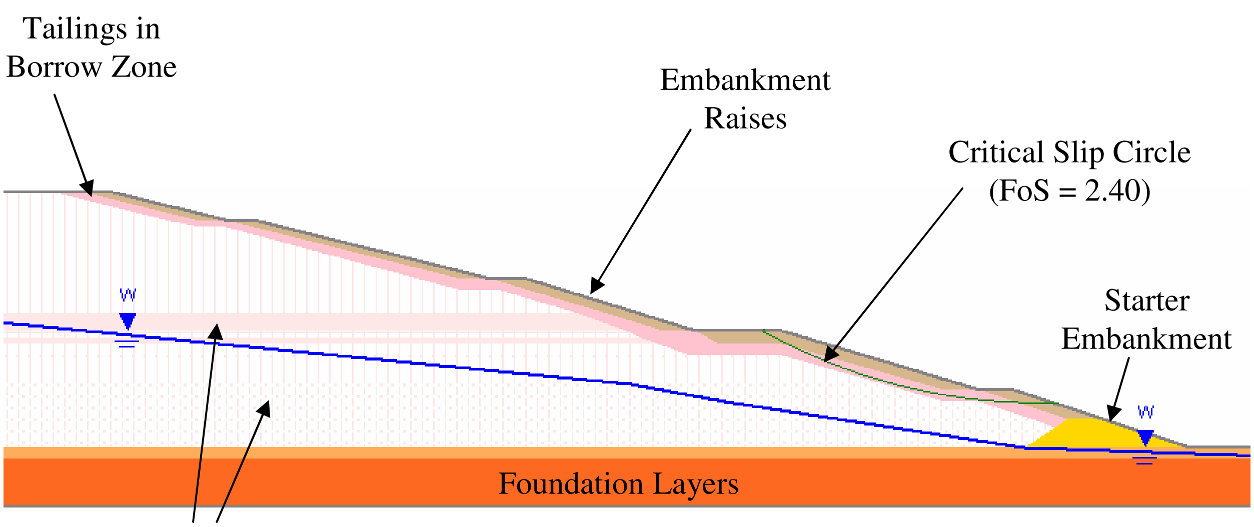
(D Paddock)

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Effective Stress Stability Analyses Section C – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 19**



Section D at Current Height

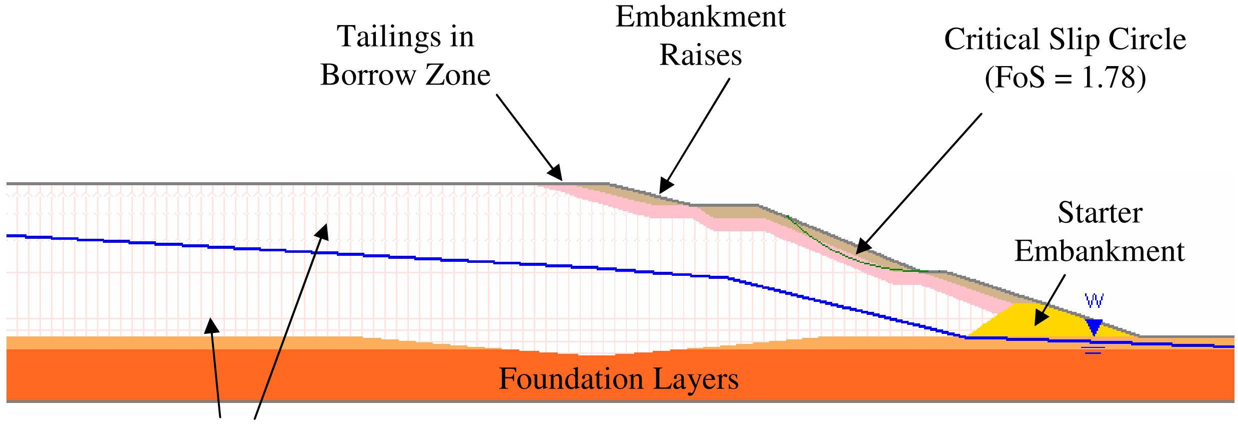
(C Paddock)



Section D at Final Height

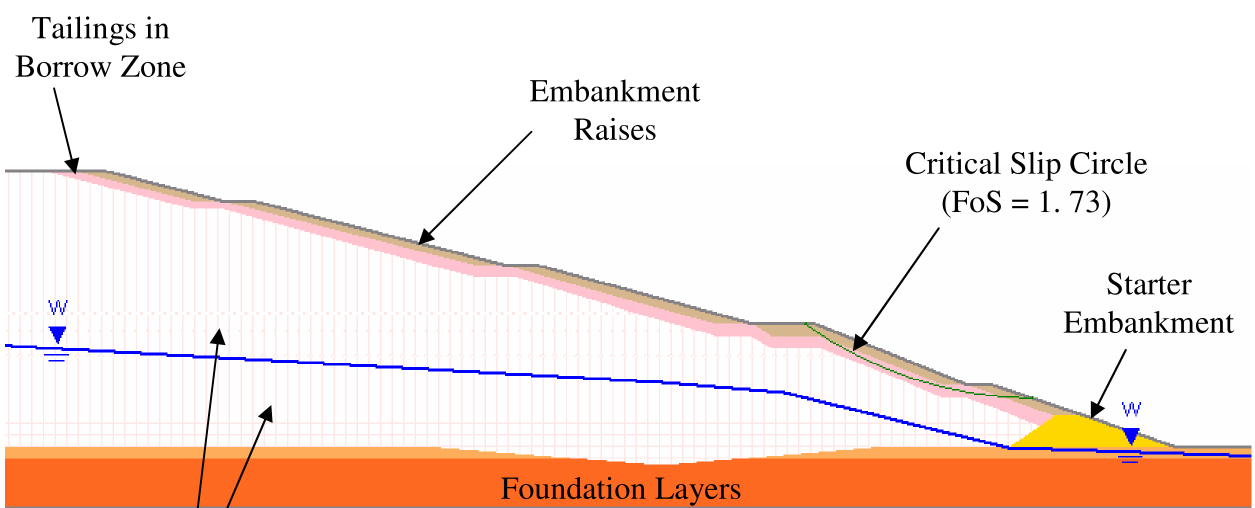
(C Paddock)

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Effective Stress Stability Analyses Section D – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 20**



Section E at Current Height

(A/B Paddock)

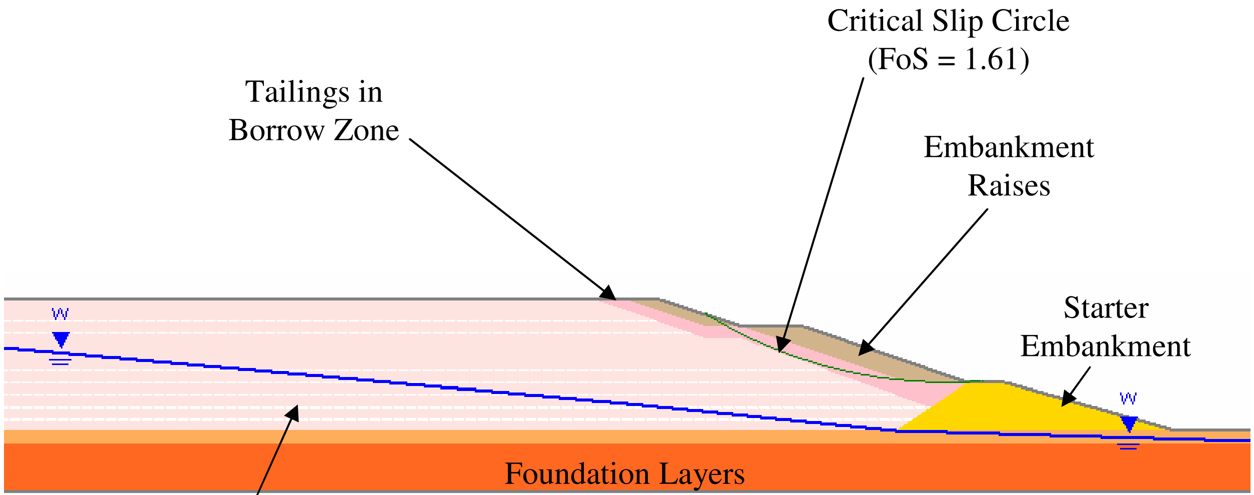


Section E at Final Height

(A/B Paddock)

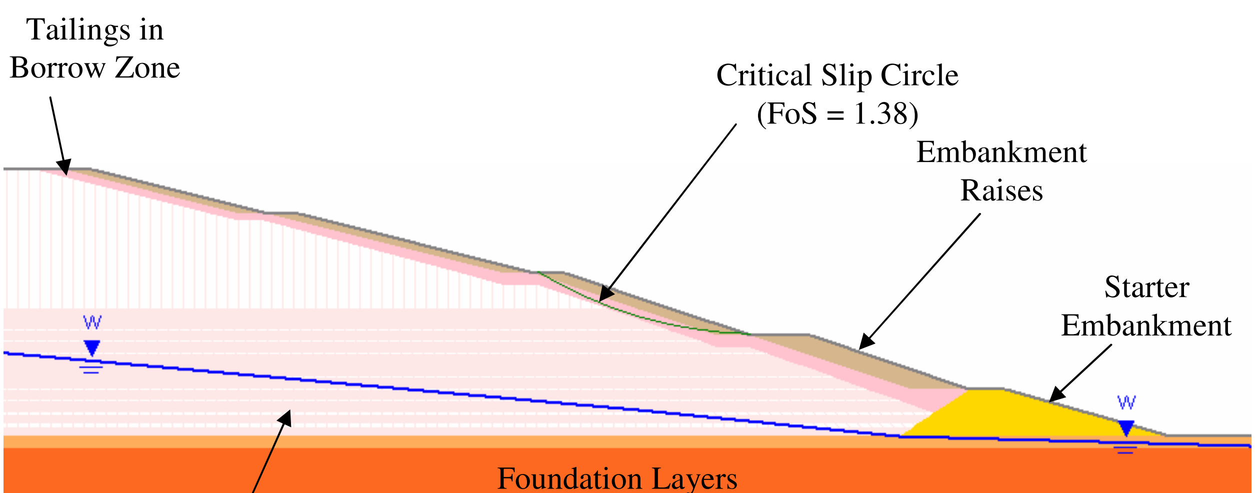
Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Effective Stress Stability Analyses Section E – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 21**

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\Stability Analyses\Fimiston 2\stability figures – report.ppt



Section A at Current Height

(A/B Paddock)

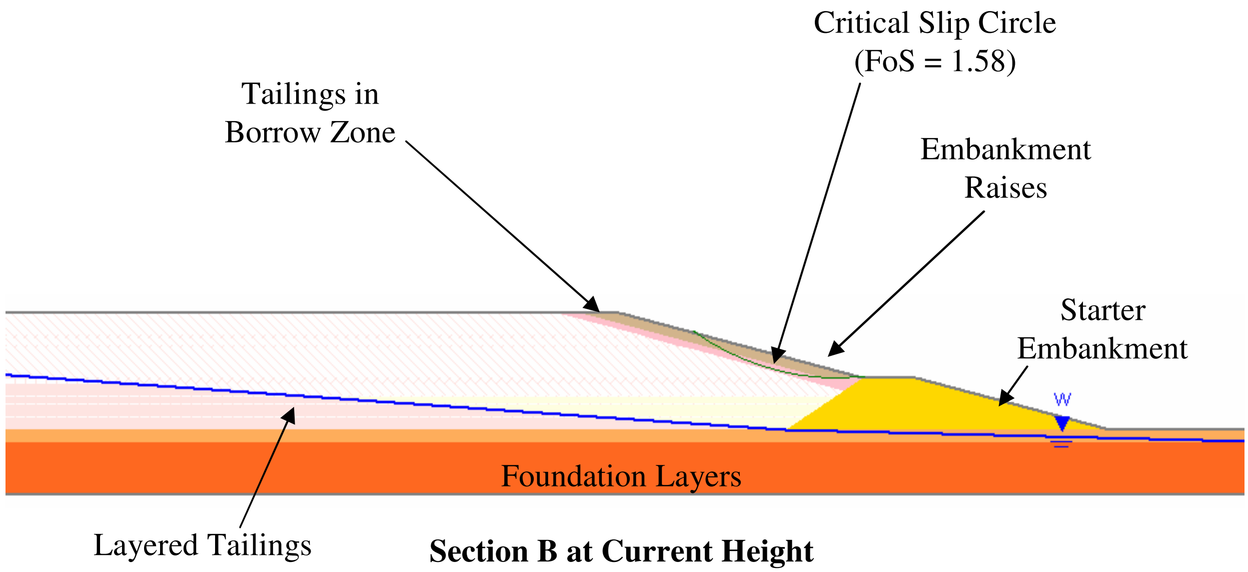


Section A at Final Height

(A/B Paddock)

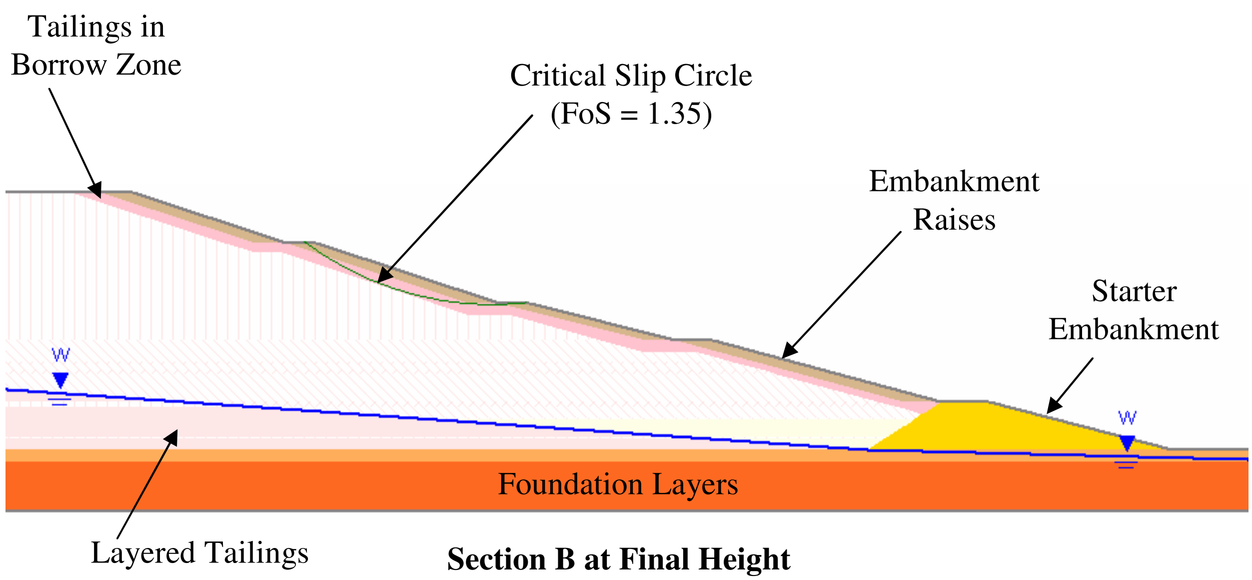
Note: The above Critical Slip Circles refer to an earthquake loading of 0.14g.

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Total Stress Stability Analyses Section A – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 22**



Section B at Current Height

(D Paddock)

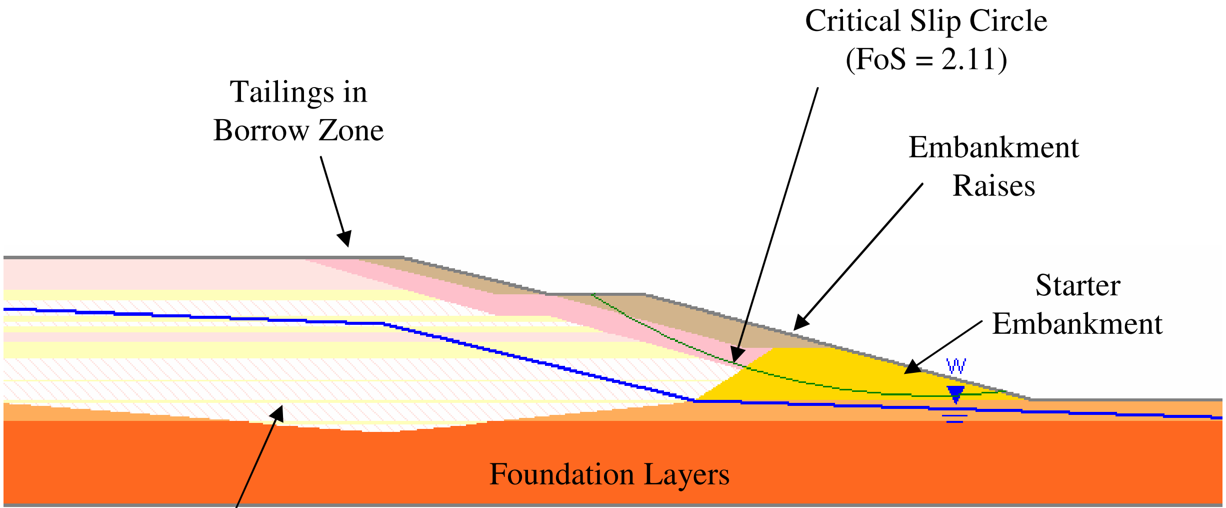


Section B at Final Height

(D Paddock)

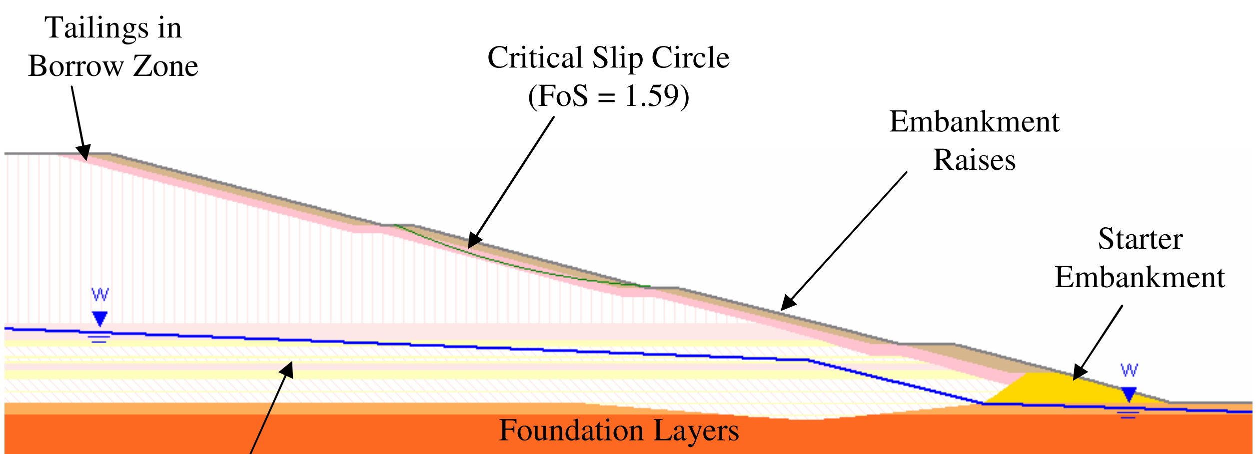
Note: The above Critical Slip Circles refer to an earthquake loading of 0.14g.

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Total Stress Stability Analyses Section B – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 23**



Section C at Current Height

(D Paddock)

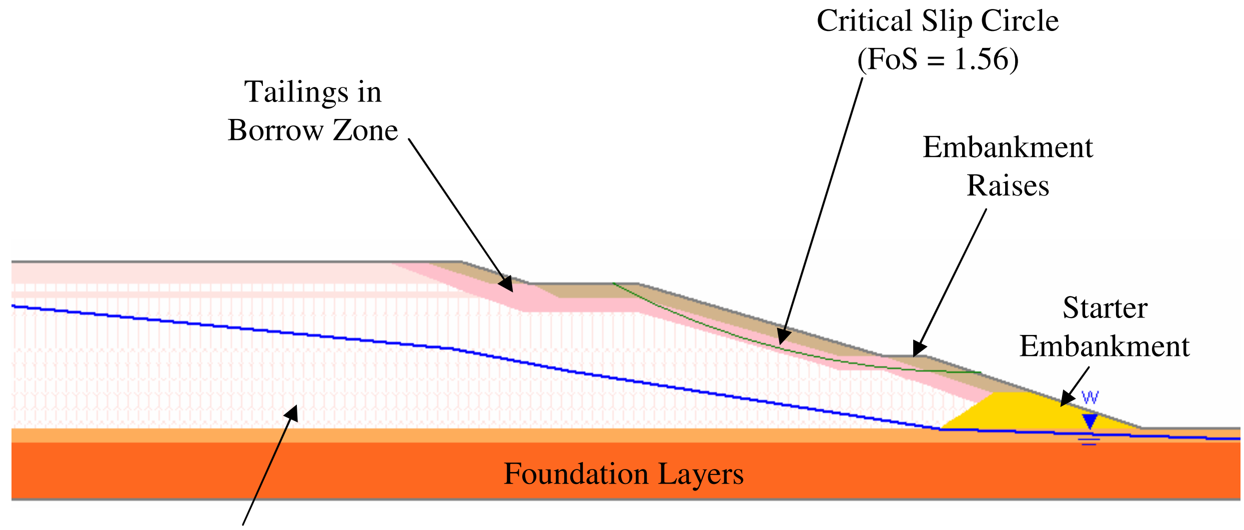


Section C at Final Height

(D Paddock)

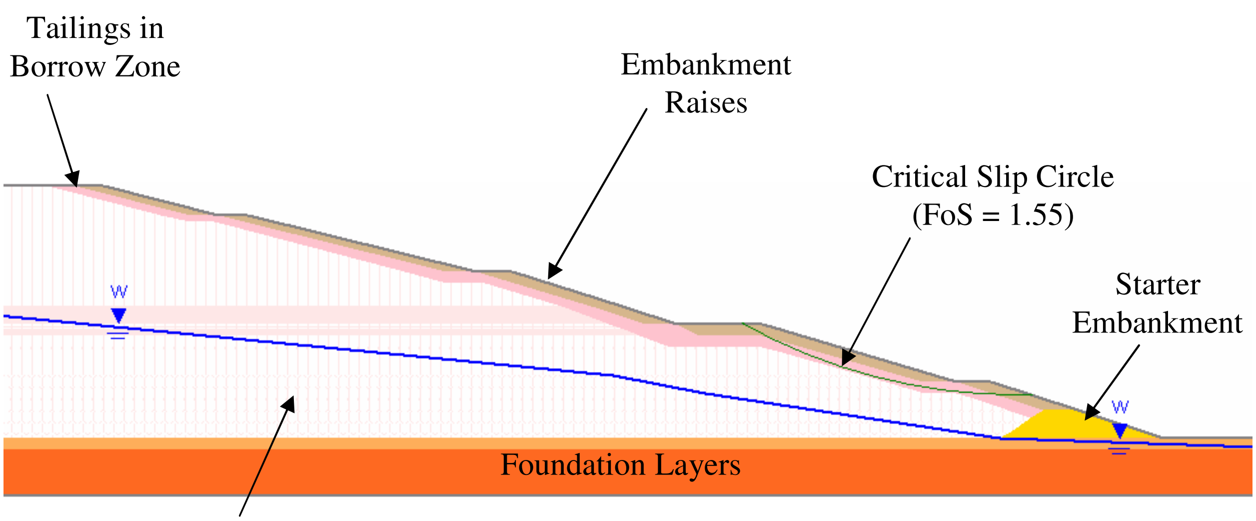
Note: The above Critical Slip Circles refer to an earthquake loading of 0.14g.

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Total Stress Stability Analyses Section C – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	**A4**	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 24**



Section D at Current Height

(C Paddock)



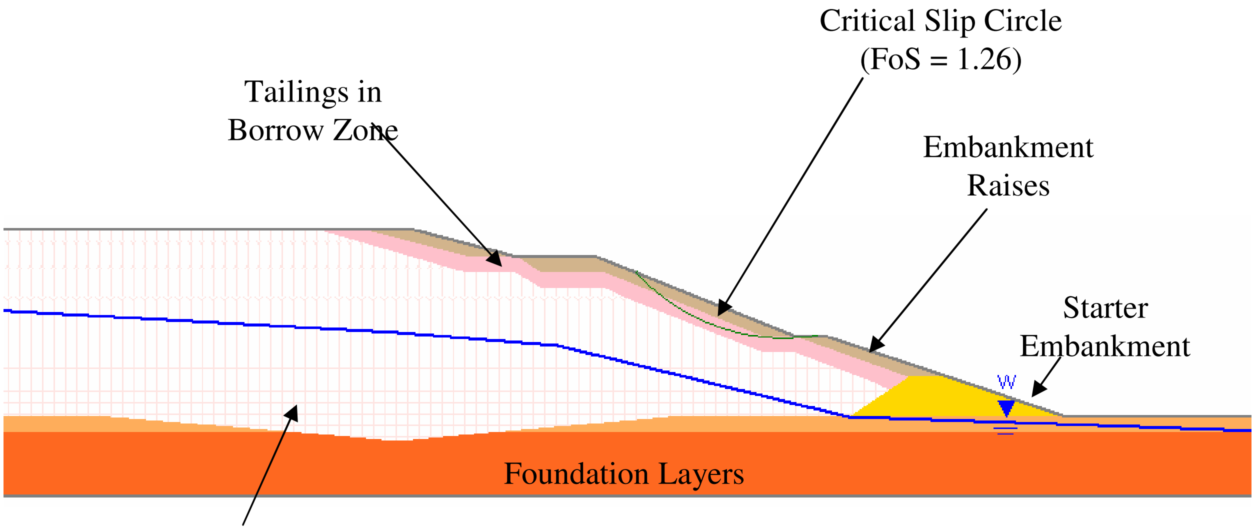
Section D at Final Height

(C Paddock)

Note: The above Critical Slip Circles refer to an earthquake loading of 0.14g.

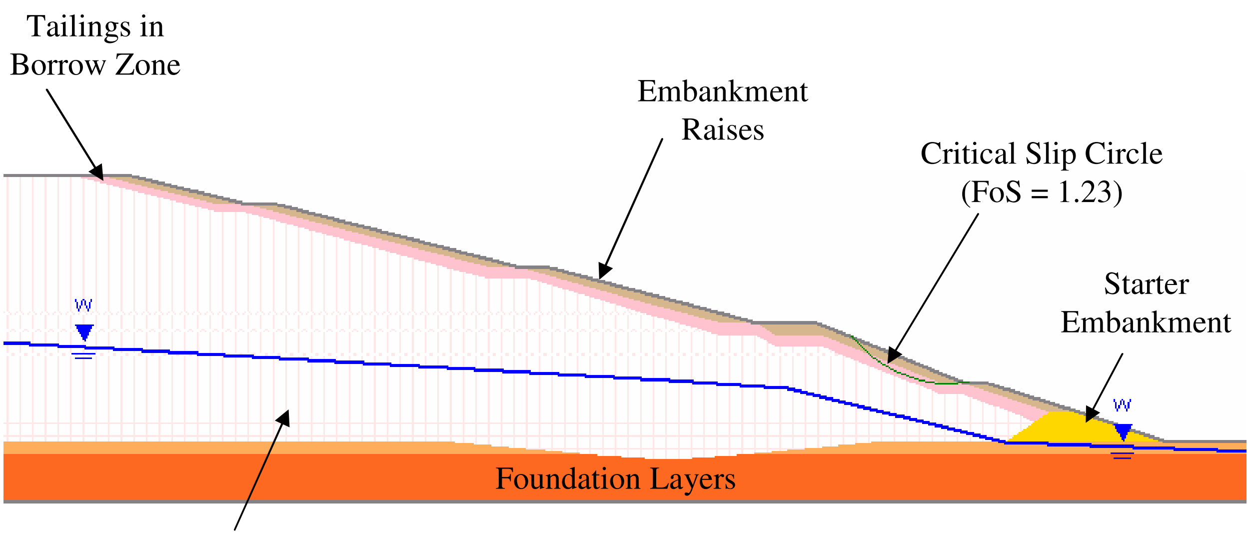
Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Total Stress Stability Analyses Section D – Fimiston II**	
	CHECKED [signature]	DATE Sep. 05		
	SCALE Not To Scale	**A4**	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 25**

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\Stability Analyses\Fimiston 2\stability figures – report.ppt



Section E at Current Height

(A/B Paddock)

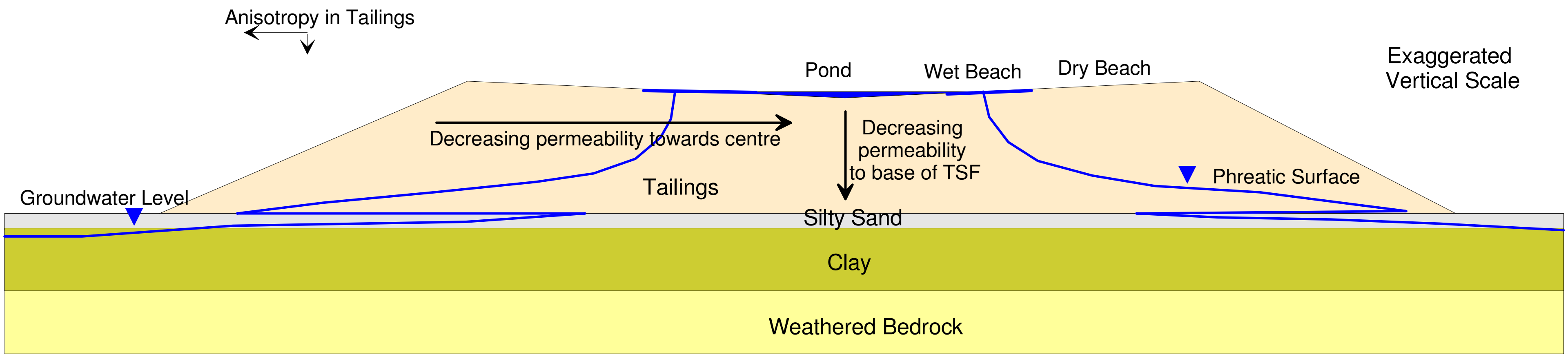


Section E at Final Height

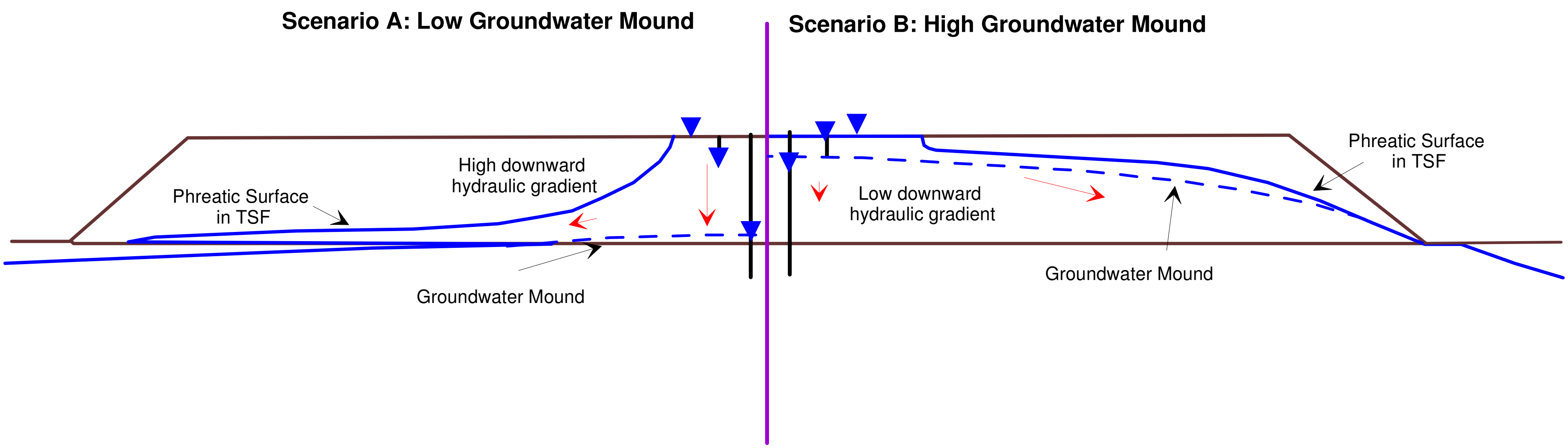
(A/B Paddock)

Note: The above Critical Slip Circles refer to an earthquake loading of 0.14g.

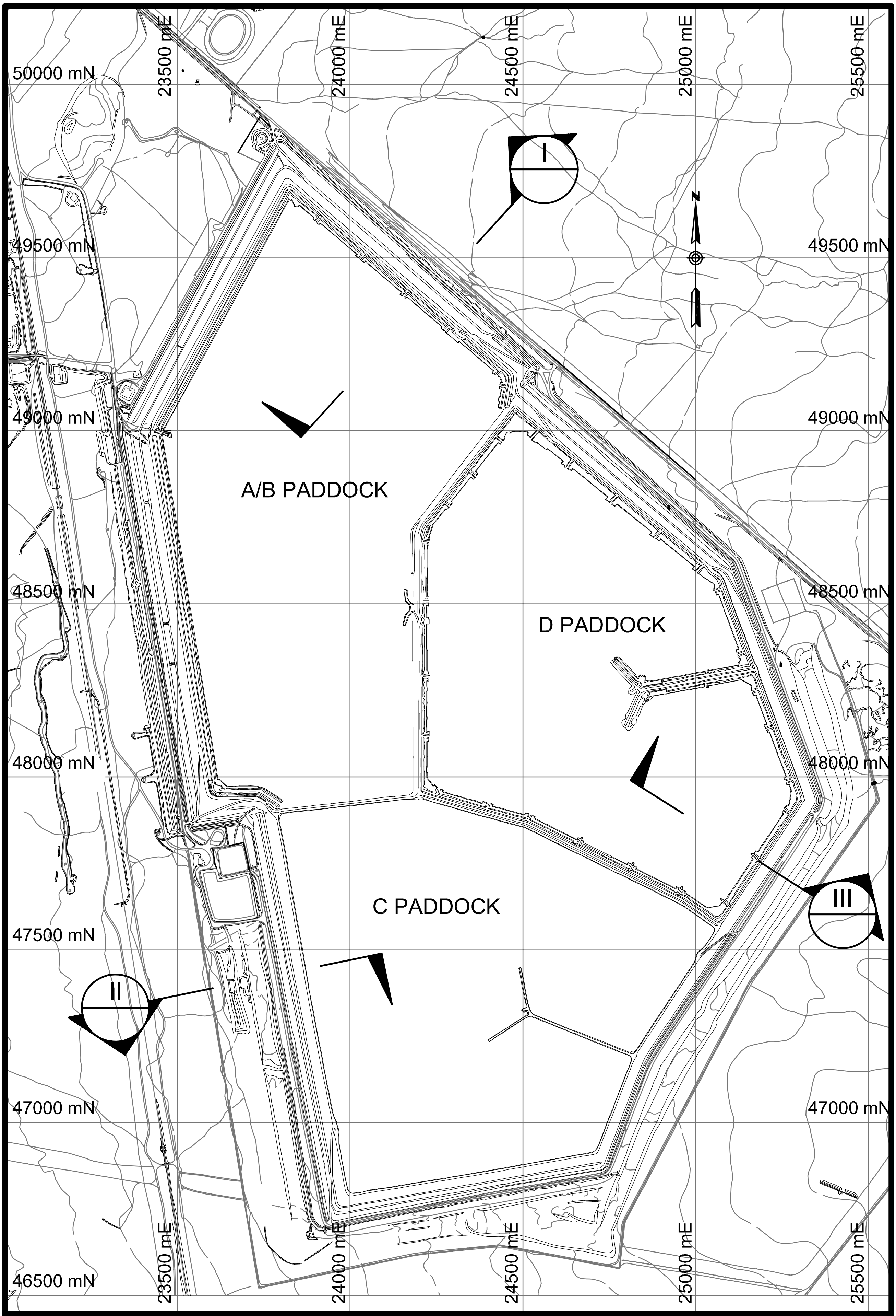
Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN PJC	DATE Sep. 05	TITLE **Total Stress Stability Analyses Section E – Fimiston II**	
	CHECKED	DATE Sep. 05		
	SCALE Not To Scale	A4	PROJECT No **05641089-R01**	FIGURE No. **FIGURE 26**



Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN MZW	DATE Sep. 05	TITLE **CONCEPTUAL HYDROGEOLOGICAL MODEL**	
	CHECKED	DATE Sep. 05		
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01**	FIGURE No. **27**



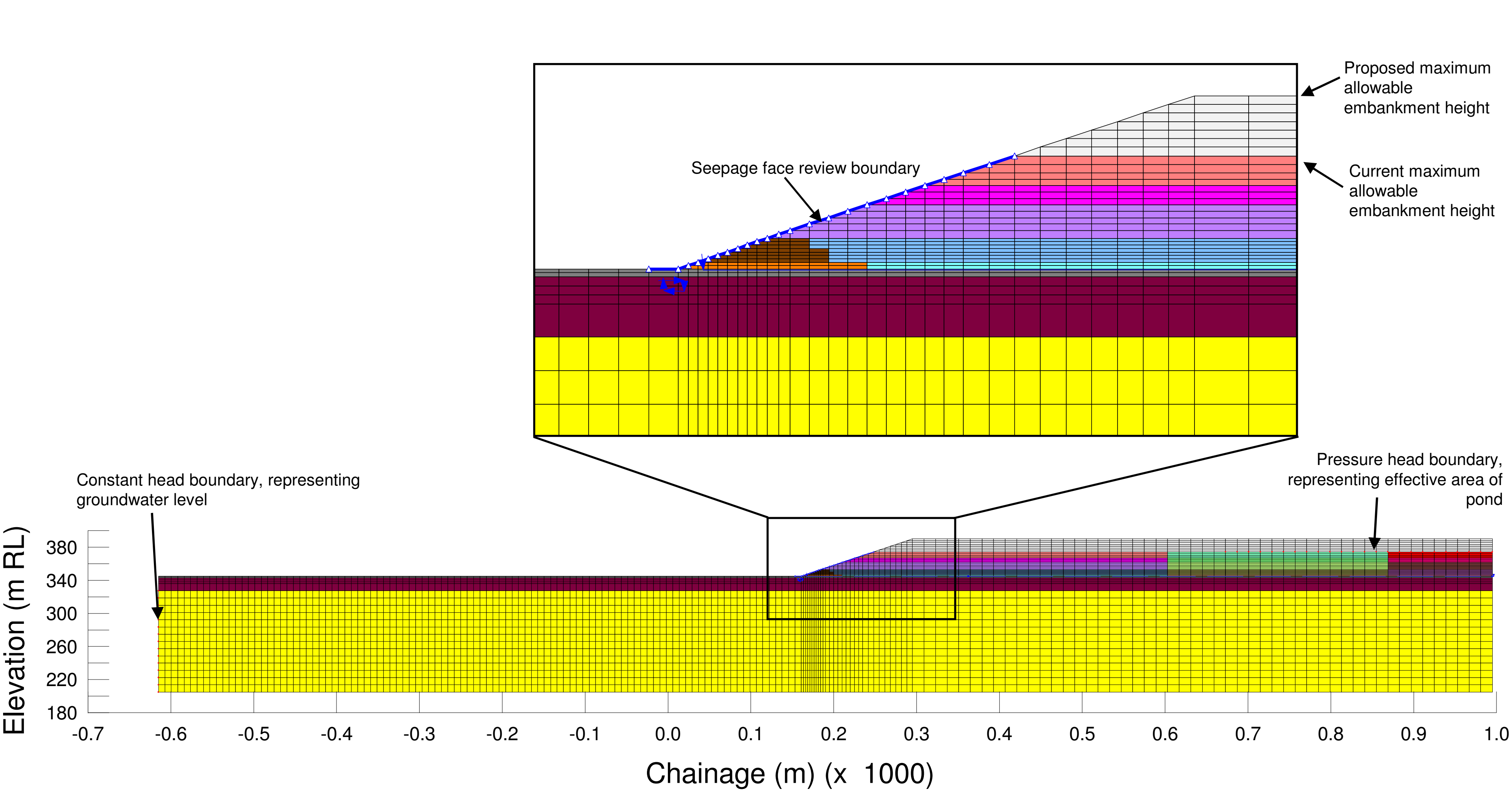
Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN MZW	DATE Sep. 05	TITLE **COMPARISON BETWEEN A HIGH AND LOW GROUNDWATER MOUND BELOW TSF**	
	CHECKED	DATE Sep. 05		
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01**	FIGURE No. **28**



Golder Associates

CLIENT: KCGM			PROJECT: Fimiston II - Addendum to NOI	
DRAWN: TJP	DATE: Sept. 2005		TITLE: SEEPAGE ANALYSES SECTION LOCATION PLAN	
CHECKED:	DATE: Sept. 2005			
SCALE: 1:15,000		A4	PROJECT No: 05641089-R01	FIGURE 29

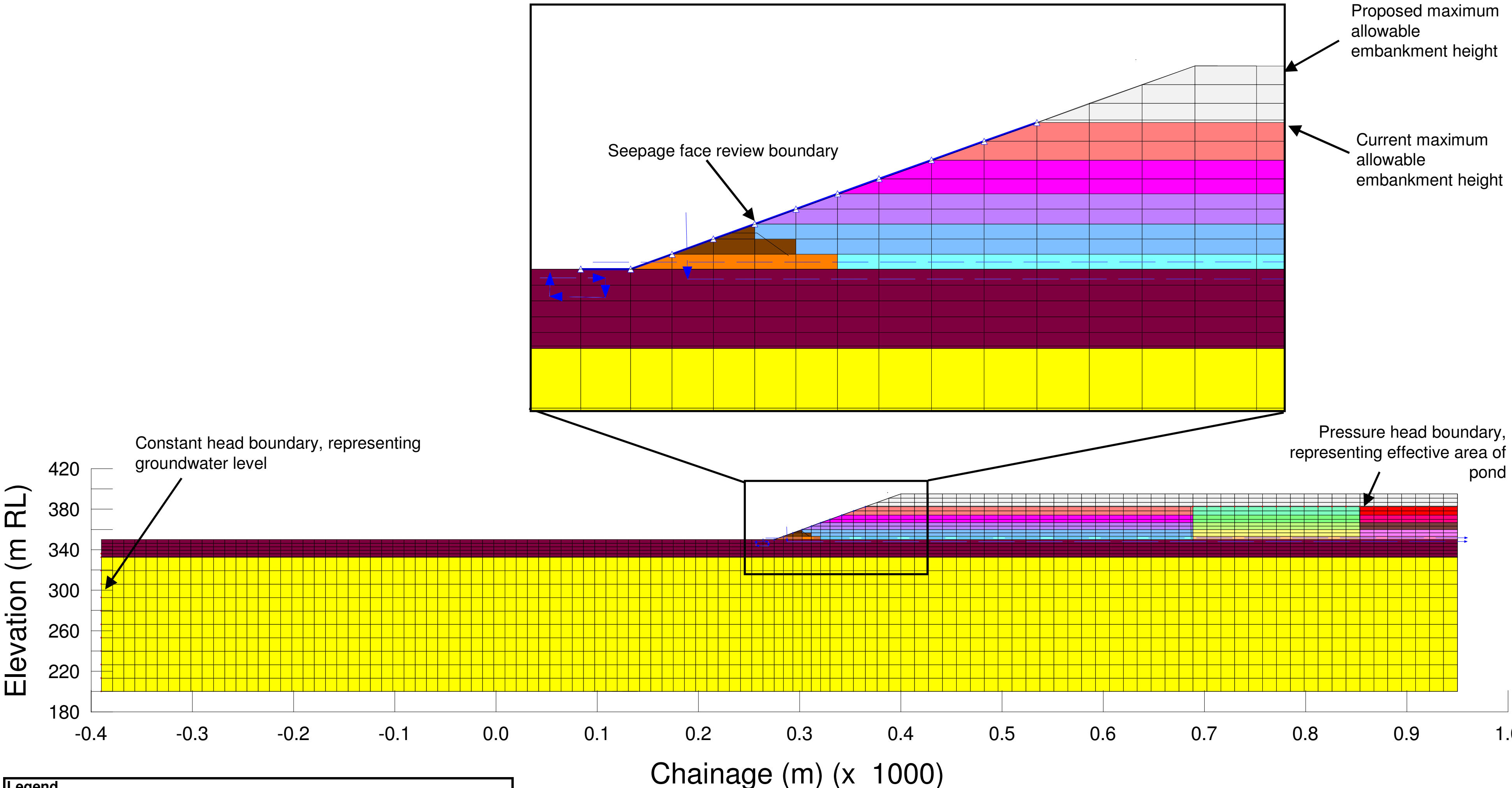
FILELOCATION:J:\JOBS405\MINING\05641089 -KCGM_FIM II AND KALTAILS NOI\CAD\FIGURES\05641089_R01_F29.DWG
DATE:29-04-05 PLOTSCALE:1:1



Legend

	Tailings (Layer 1, Zone 1)		Tailings (Layer 1, Zone 3)
	Tailings (Layer 2, Zone 1)		Tailings (Layer 2, Zone 3)
	Tailings (Layer 3, Zone 1)		Tailings (Layer 3, Zone 3)
	Tailings (Layer 4, Zone 1)		Tailings (Layer 4, Zone 3)
	Tailings (Layer 5, Zone 1)		Tailings (Layer 5, Zone 3)
	Tailings (Layer 1, Zone 2)		Silty sand
	Tailings (Layer 2, Zone 2)		Clay
	Tailings (Layer 3, Zone 2)		Weathered bedrock
	Tailings (Layer 4, Zone 2)		Starter embankment
	Tailings (Layer 5, Zone 2)		Drain

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI
	DRAWN MZW	DATE Sep. 05	TITLE **FINITE ELEMENT MESH - SECTION I, PADDOCK A/B**
	CHECKED [signature]	DATE Sep. 05	
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01** FIGURE No. **30**



Legend

	Tailings (Layer 1, Zone 1)		Tailings (Layer 1, Zone 3)
	Tailings (Layer 2, Zone 1)		Tailings (Layer 2, Zone 3)
	Tailings (Layer 3, Zone 1)		Tailings (Layer 3, Zone 3)
	Tailings (Layer 4, Zone 1)		Tailings (Layer 4, Zone 3)
	Tailings (Layer 5, Zone 1)		Tailings (Layer 5, Zone 3)
	Tailings (Layer 1, Zone 2)		Silty sand
	Tailings (Layer 2, Zone 2)		Clay
	Tailings (Layer 3, Zone 2)		Weathered bedrock
	Tailings (Layer 4, Zone 2)		Starter embankment
	Tailings (Layer 5, Zone 2)		Drain

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI
	DRAWN MZW	DATE Sep. 05	TITLE **FINITE ELEMENT MESH - SECTION II, PADDOCK C**
	CHECKED	DATE Sep. 05	
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01** FIGURE No. **31**

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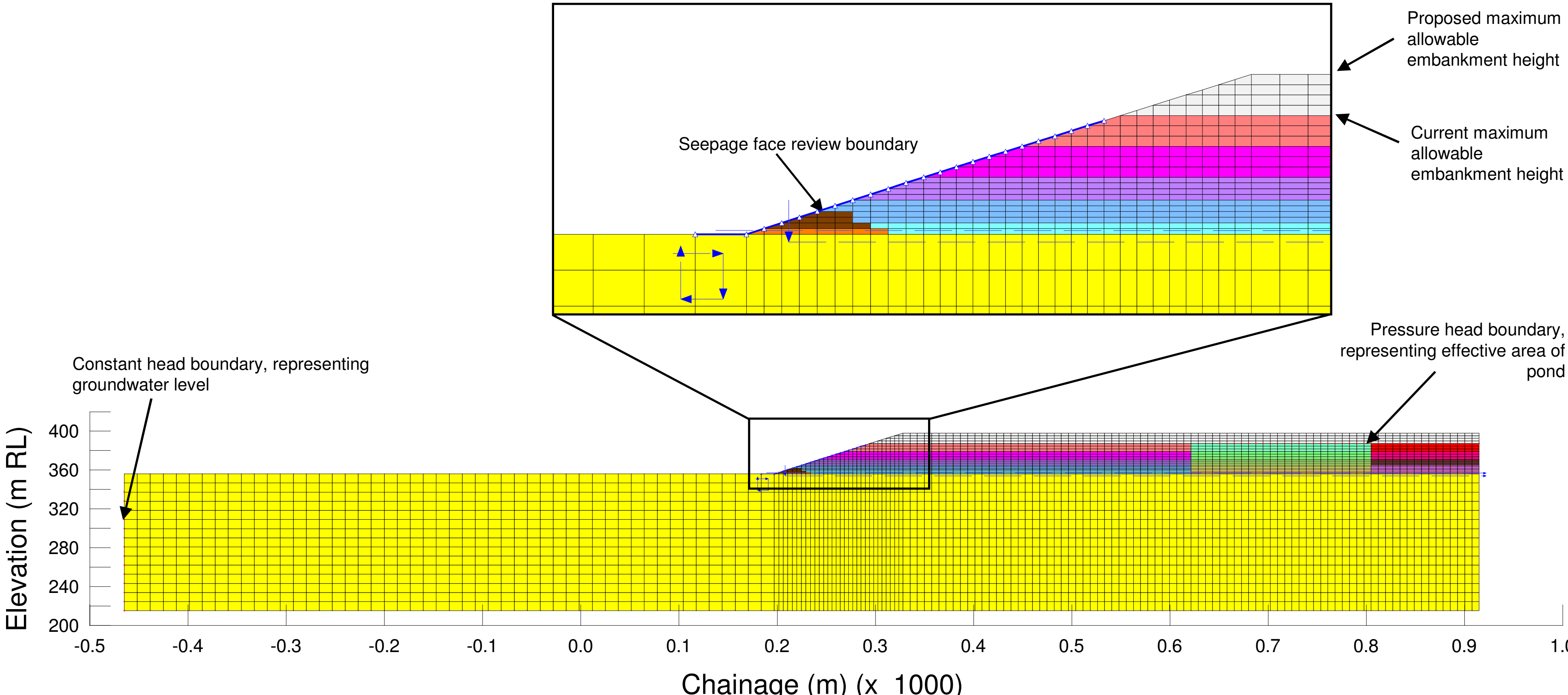

Legend

Tailings (Layer 1, Zone 1)	Tailings (Layer 1, Zone 3)
Tailings (Layer 2, Zone 1)	Tailings (Layer 2, Zone 3)
Tailings (Layer 3, Zone 1)	Tailings (Layer 3, Zone 3)
Tailings (Layer 4, Zone 1)	Tailings (Layer 4, Zone 3)
Tailings (Layer 5, Zone 1)	Tailings (Layer 5, Zone 3)
Tailings (Layer 1, Zone 2)	Silty sand
Tailings (Layer 2, Zone 2)	Clay
Tailings (Layer 3, Zone 2)	Weathered bedrock
Tailings (Layer 4, Zone 2)	Starter embankment
Tailings (Layer 5, Zone 2)	Drain

Golder Associates

CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
DRAWN MZW	DATE Sep. 05	TITLE **FINITE ELEMENT MESH - SECTION III, PADDOCK D**	
CHECKED	DATE Sep. 05		
SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01**	FIGURE No. **32**

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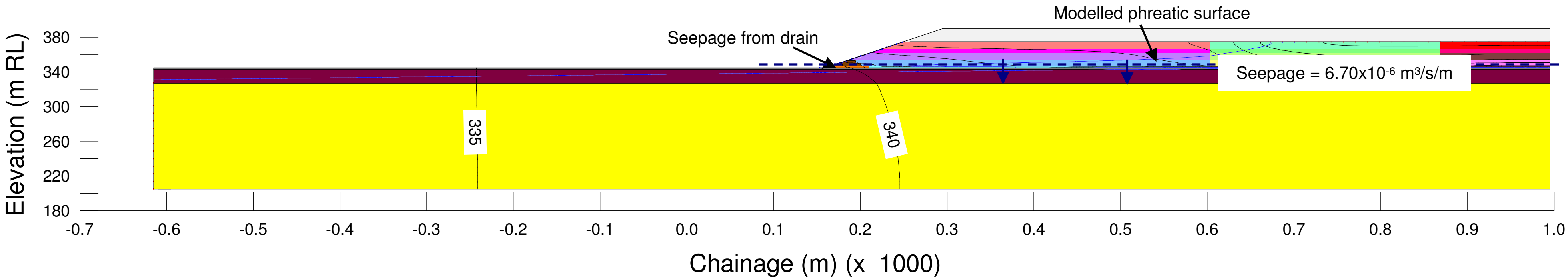
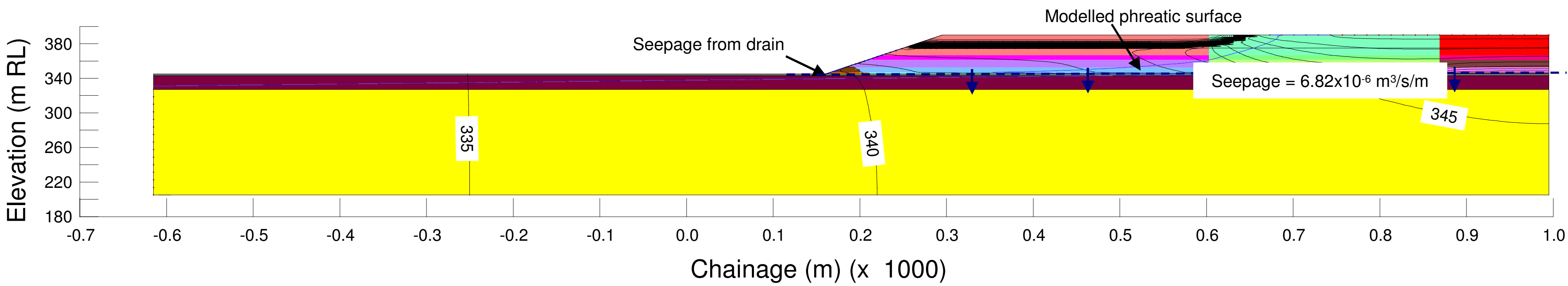
Current Maximum Allowable Embankment Height



Proposed Maximum Allowable Embankment Height



Seepages shown apply for 1 m wide strip of embankment

Legend

	Tailings (Layer 1, Zone 1)		Tailings (Layer 1, Zone 3)
	Tailings (Layer 2, Zone 1)		Tailings (Layer 2, Zone 3)
	Tailings (Layer 3, Zone 1)		Tailings (Layer 3, Zone 3)
	Tailings (Layer 4, Zone 1)		Tailings (Layer 4, Zone 3)
	Tailings (Layer 5, Zone 1)		Tailings (Layer 5, Zone 3)
	Tailings (Layer 1, Zone 2)		Silty sand
	Tailings (Layer 2, Zone 2)		Clay
	Tailings (Layer 3, Zone 2)		Weathered bedrock
	Tailings (Layer 4, Zone 2)		Starter embankment
	Tailings (Layer 5, Zone 2)		Drain

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN MZW	DATE Sep. 05	TITLE **TOTAL HEAD CONTOURS - SECTION I, PADDOCK A/B**	
	CHECKED	DATE Sep. 05		
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01**	FIGURE No. **33**

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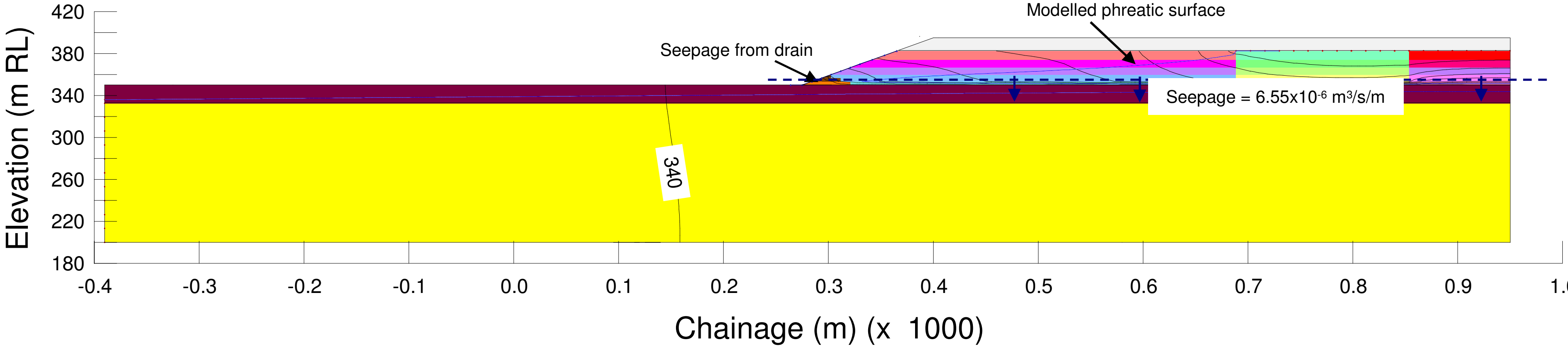
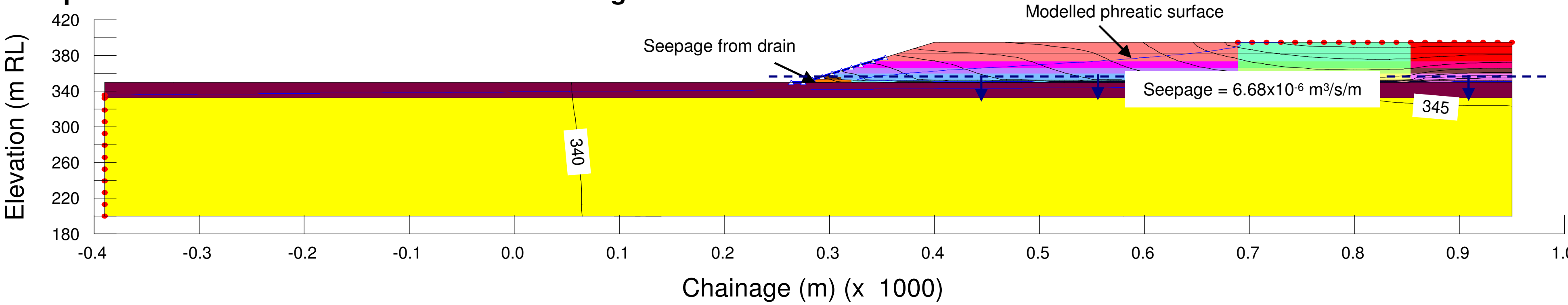
Current Maximum Allowable Embankment Height



Proposed Maximum Allowable Embankment Height



Seepages shown apply for 1 m wide strip of embankment

Legend

Tailings (Layer 1, Zone 1)	Tailings (Layer 1, Zone 3)
Tailings (Layer 2, Zone 1)	Tailings (Layer 2, Zone 3)
Tailings (Layer 3, Zone 1)	Tailings (Layer 3, Zone 3)
Tailings (Layer 4, Zone 1)	Tailings (Layer 4, Zone 3)
Tailings (Layer 5, Zone 1)	Tailings (Layer 5, Zone 3)
Tailings (Layer 1, Zone 2)	Silty sand
Tailings (Layer 2, Zone 2)	Clay
Tailings (Layer 3, Zone 2)	Weathered bedrock
Tailings (Layer 4, Zone 2)	Starter embankment
Tailings (Layer 5, Zone 2)	Drain

Golder Associates

CLIENT	KCGM	PROJECT	Fimiston II – Addendum to NOI
DRAWN MZW	DATE Sep. 05	TITLE	TOTAL HEAD CONTOURS - SECTION II, PADDOCK C
CHECKED	DATE Sep. 05		
SCALE NOT TO SCALE	A4	PROJECT No 05641089-R01	FIGURE No. 34

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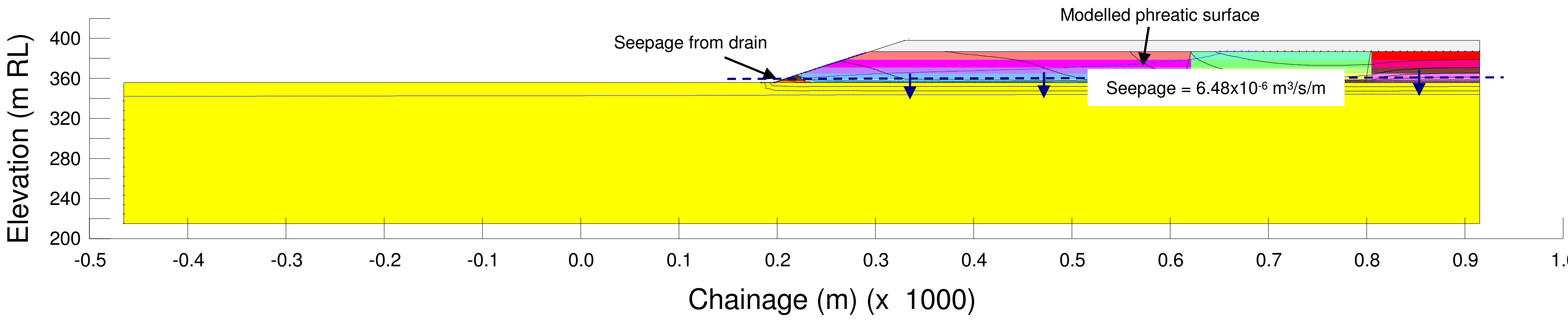
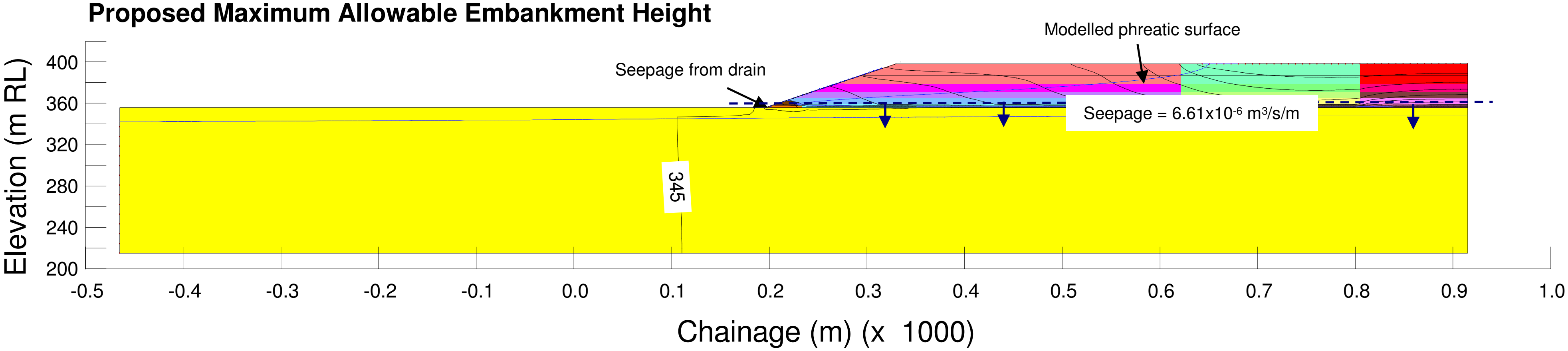
Current Maximum Allowable Embankment Height



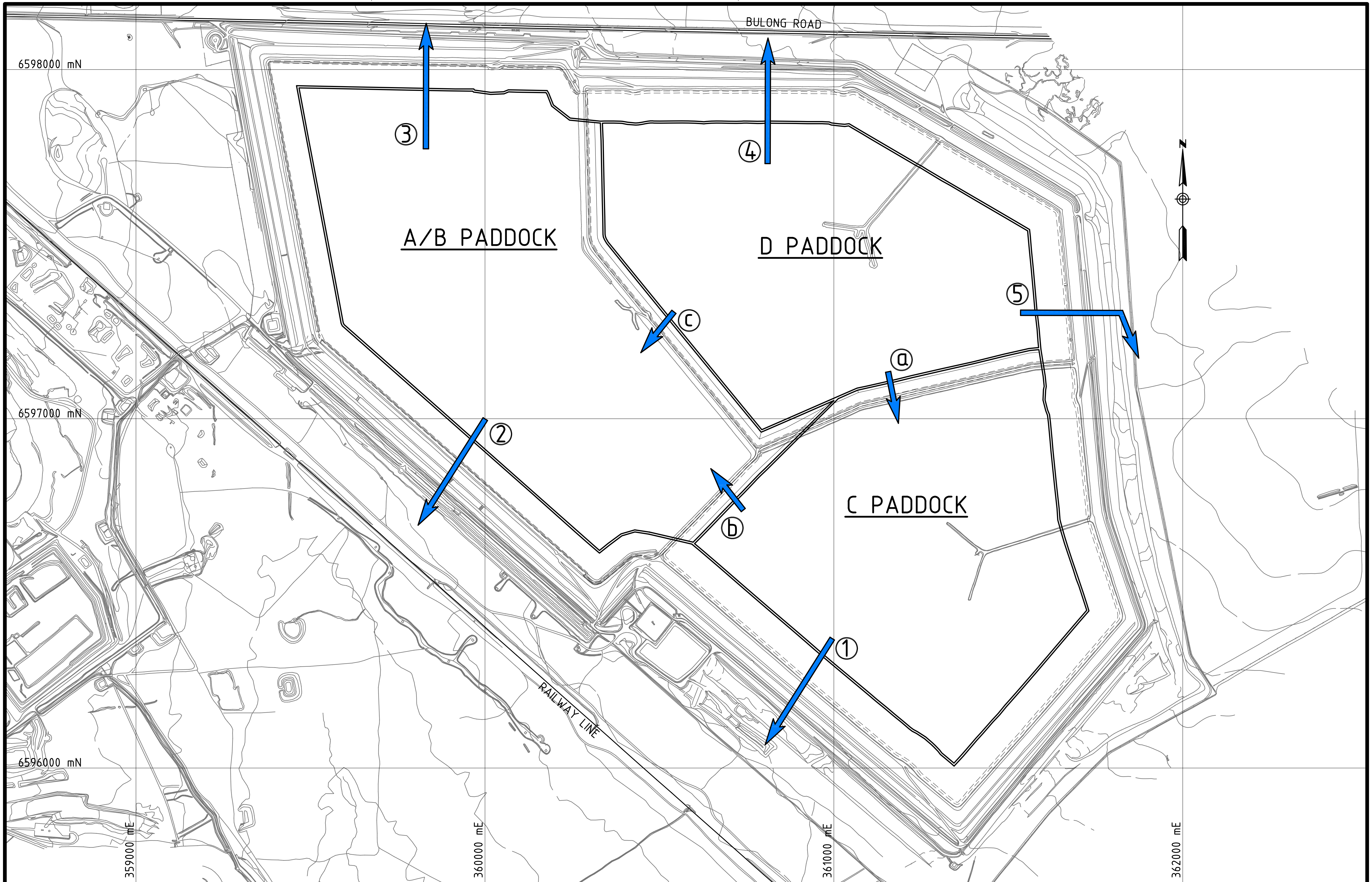
Proposed Maximum Allowable Embankment Height



Seepages shown apply for 1 m wide strip of embankment

Legend			
	Tailings (Layer 1, Zone 1)		Tailings (Layer 1, Zone 3)
	Tailings (Layer 2, Zone 1)		Tailings (Layer 2, Zone 3)
	Tailings (Layer 3, Zone 1)		Tailings (Layer 3, Zone 3)
	Tailings (Layer 4, Zone 1)		Tailings (Layer 4, Zone 3)
	Tailings (Layer 5, Zone 1)		Tailings (Layer 5, Zone 3)
	Tailings (Layer 1, Zone 2)		Silty sand
	Tailings (Layer 2, Zone 2)		Clay
	Tailings (Layer 3, Zone 2)		Weathered bedrock
	Tailings (Layer 4, Zone 2)		Starter embankment
	Tailings (Layer 5, Zone 2)		Drain

Golder Associates	CLIENT KCGM		PROJECT Fimiston II – Addendum to NOI	
	DRAWN MZW	DATE Sep. 05	TITLE **TOTAL HEAD CONTOURS - SECTION III, PADDOCK D**	
	CHECKED	DATE Sep. 05		
	SCALE NOT TO SCALE	A4	PROJECT No **05641089-R01**	FIGURE No. **35**



LEGEND:

FLOW PATHS

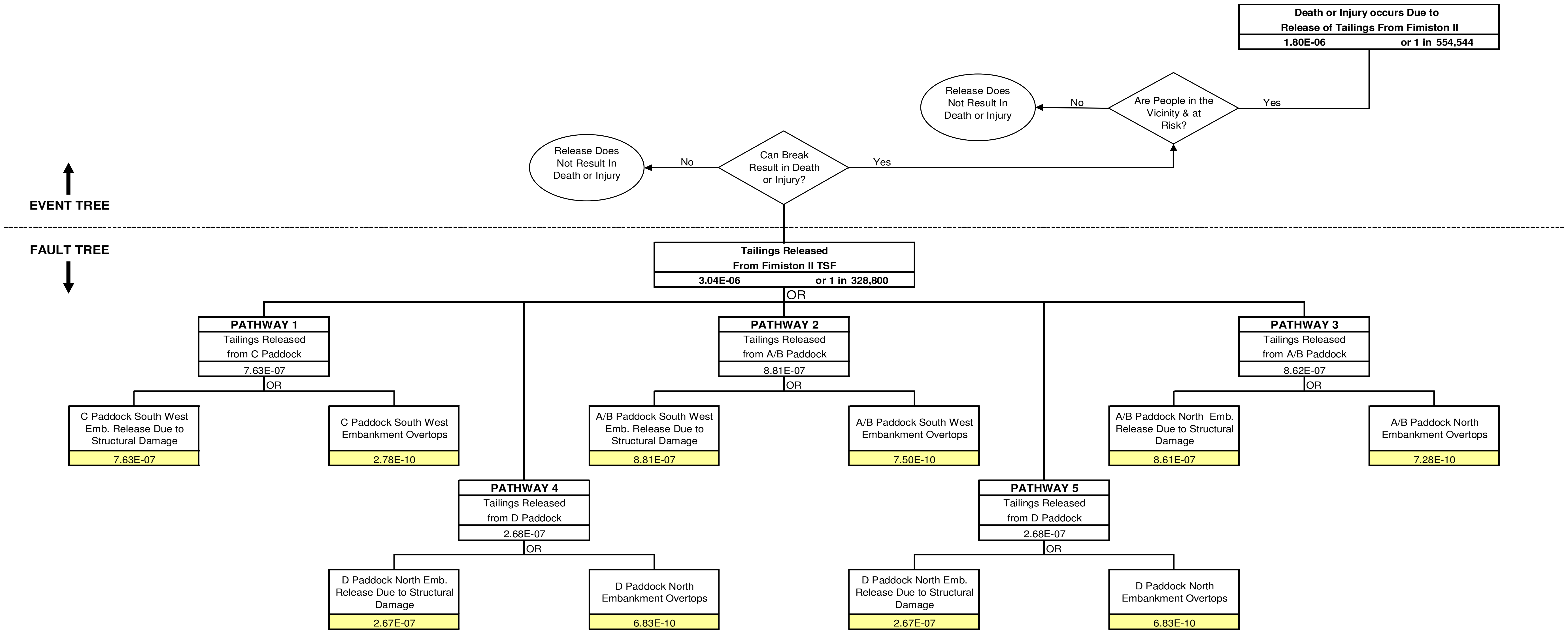
MAP PROJECTION - MGA 94

DATUM GDA 94, ZONE 51

Golder Associates

CLIENT: KCGM		PROJECT: FIMISTON II - ADDENDUM TO NOI	
DRAWN: TJP	DATE: Sept. 2005	TITLE: FAILURE PATHWAYS	
CHECKED:	DATE: Sept. 2005		
SCALE: 1:10,000	A3	PROJECT No: 05641089-R01	FIGURE 36

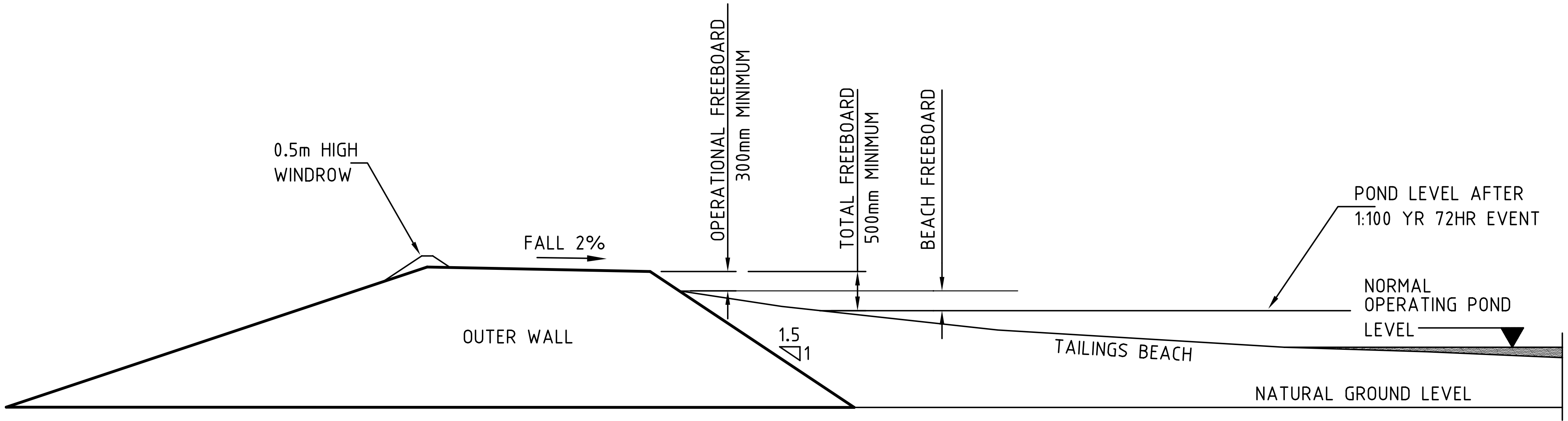
J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\CAD\FIGURES\05641089_R01_F36.dwg
30 Oct 2000 1:1



Golder Associates

CLIENT KCGM			PROJECT Fimiston II - Addendum to NOI	
DRAWN MN	DATE Sep. 05		Summary Fault and Event Tree	
CHECK	DATE Sep. 05			
SCALE NTS		A3	PROJECT No. 05641089-R01	FIGURE 37

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\Dam Break\Fault + Event Tree\Figures.xls



Golder Associates	CLIENT KCGM		PROJECT FIMISTON II - ADDENDUM TO NOI	
	DRAWN DFH	DATE Sept. 2005	TITLE DoIR MINIMUM FREEBOARD REQUIREMENTS	
	CHECKED	DATE Sept. 2005		
	SCALE AS SHOWN	A3	PROJECT No 05641089-R01	FIGURE 38

J:\Jobs405\MINING\05641089 -KCGM_Fim II and Kaltails NOI\CAD\FIGURES\05641089_R01_F38.dwg DATE: 01-07-2005 PLOT SCALE 1:1