Golder Associates Pty Ltd
A.B.N. 64 006 107 857

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(PO Box 1914, West Perth, WA 6872 Australia)
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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 II – APPENDICES

Submitted to:

Kalgoorlie Consolidated Gold Mines
Fimiston Mill
Black Street
KALGOORLIE WA 6430

DISTRIBUTION:

10 Copies - Kalgoorlie Consolidated Gold Mines (+1 Electronic)
2 Copies - Golder Associates Pty Ltd

September 2005 05641089-R01

APPENDIX A

TAILINGS STORAGE DATA SHEETS

TAILINGS STORAGE DATA SHEET

Please complete a separate sheet for each tailings storage facility (TSF)

1.	PROJECT DATA		
1.1	PROJECT NAME: ***Kalgoorlie Consolidated Gold Mines***	1.2	Date: ***31 May 2005***
1.3	TSF Name: ***Fimiston II – A/B Paddock***	1.4	Commodity: ***GOLD***
1.5	Name of data provider:* ***Trevor Tyson (Senior Civil Engineer)***		Phone:* ***(08) 9022 1719***
1.6	TSF centre co-ordinates (AMG) ***6,597,100 m North*** ***359,850 m East***		
1.7:	Lease numbers: ***M26/308, M26/451, G26/44 – 68, G26/70 – 71, G26/73 – 78, G26/82 - 86***		
2.	TSF DATA		
2.1	TSF Status: Proposed ❐ Active ✓ Disused ❐ Rehabilitated ❐		
2.2	Type of TSF:[1] ***Paddock***	2.2.1	Number of cells:[2] ***1***
2.3	Hazard rating:[3] ***Significant***	2.4	TSF category:[4] ***1***
2.5	Catchment area:[5] ***116 ha***	2.6	Nearest watercourse: ***None nearby***
2.7	Date deposition started (mm/yy) ***1991***	***2.7.1***	Date deposition completed (mm/yy) ***2012 (est)***
2.8	Tailings discharge method:[6] ***Multiple Spigot***	2.8.1	Water recovery method:[7] ***Gravity to be converted to pumped decant***
2.9	Bottom of facility sealed or lined? ***No***	2.9.1	Type of seal or liner: [8] ***N/A***
2.10	Depth to original groundwater level: ***Unknown***	2.10.1	Original groundwater TDS: ***approx 50,000***
2.11	Ore process: [9] ***CIL***	2.12	Material storage rate: [10] ***4,000,000 tpa***
2.13	Impoundment volume (present) ***18 x 10^6 m^3***	2.13.1	Expected maximum ***36 x 10^6 m^3***
2.14	Mass of solids stored (present) ***30 x 10^6 tonnes***	2.14.1	Expected maximum ***60 x 10^6 tonnes***
3	ABOVE GROUND FACILITIES		
3.1	Foundation soils ***clayey sand/sandy clay***	3.1.1	Foundation rocks
3.2	Starter bund construction materials: [11] ***Surficial soils within perimeter walls***	3.2.1	Wall lifting by: Upstream ✓ Downstream ❐ Centreline ❐
3.3	Wall construction by: ***Action Earthmoving Hire***	3.3.1	Wall lifting material: [12] ***Tailings (planned)*** mechanically ✓ hydraulically ❐
3.4	Present maximum wall height agl: [13] ***26 m***	3.4.1	Expected maximum 45 ***m***
3.5	Crest length (present) ***(all embankments)*** ***4,550 m***	3.5.1	Expected maximum ***4,550 m***
3.6	Impoundment area (present) ***112 ha***	3.6.1	Expected maximum ***112 ha***
	BELOW GROUND/IN-PIT FACILITIES		
~~4.1~~	~~Initial pit depth (maximum) m~~	~~4.2~~	~~Area of pit base Ha~~
~~4.3~~	~~Thickness of tailings (present) m~~	~~4.3.1~~	~~Expected maximum m~~
~~4.4~~	~~Current surface area of tailings Ha~~	~~4.4.1~~	~~Final surface area of tailings Ha~~
5	PROPERTIES OF TAILINGS		
5.1	TDS ***70-190,000 mg/L*** / 5.2 ***pH 7.7***	5.3	Solids content ***55 – 56 %*** / 5.4 Deposited density ***1.6 – 1.7 t/m^3***
5.5	Potentially hazardous substances: [14] ***Cyanide***	5.6	WAD CN ***2-10 mg/L*** / 5.7 Total CN ***20-60 mg/L***
		5.8	Any other NPI listed substances in the TSF?[18] ***No***

***Not to be recorded in the database; for 1, 2, 3 etc see explanatory notes on the next page**

TAILINGS STORAGE DATA SHEET

Please complete a separate sheet for each tailings storage facility (TSF)

1.	PROJECT DATA		
1.1	PROJECT NAME: ***Kalgoorlie Consolidated Gold Mines***	1.2	Date: ***31 May 2005***
1.3	TSF Name: ***Fimiston II - C Paddock***	1.4	Commodity: ***GOLD***
1.5	Name of data provider:* ***Trevor Tyson (Senior Civil Engineer)***		Phone:* ***(08) 9022 1719***
1.6	TSF centre co-ordinates (AMG) ***6,596,400 m North*** ***361,100 m East***		
1.7:	Lease numbers: ***M26/308, M26/451, G26/44 – 68, G26/70 – 71, G26/73 – 78, G26/82 - 86***		
2.	TSF DATA		
2.1	TSF Status: Proposed ❒ Active ✓ Disused ❒ Rehabilitated ❒		
2.2	Type of TSF:[1] ***Paddock***	2.2.1	Number of cells:[2] ***1***
2.3	Hazard rating:[3] ***Significant***	2.4	TSF category:[4] ***1***
2.5	Catchment area:[5] ***95 ha***	2.6	Nearest watercourse: ***None nearby***
2.7	Date deposition started (mm/yy) ***1994***	***2.7.2***	Date deposition completed (mm/yy) ***2012 (est)***
2.8	Tailings discharge method:[6] ***Multiple Spigot***	2.8.1	Water recovery method:[7] ***Gravity to be converted to pumped decant***
2.9	Bottom of facility sealed or lined? ***No***	2.9.1	Type of seal or liner: [8] ***N/A***
2.10	Depth to original groundwater level: ***Unknown***	2.10.1	Original groundwater TDS: ***approx 50,000***
2.11	Ore process: [9] ***CIL***	2.12	Material storage rate: [10] ***3,500,000 tpa***
2.13	Impoundment volume (present) ***23 x*** $\boldsymbol{10^6\ m^3}$	2.13.1	Expected maximum ***34 x*** $\boldsymbol{10^6\ m^3}$
2.14	Mass of solids stored (present) ***30 x*** $\boldsymbol{10^6}$ ***tonnes***	2.14.1	Expected maximum ***56 x*** $\boldsymbol{10^6}$ ***tonnes***
3	ABOVE GROUND FACILITIES		
3.1	Foundation soils ***clayey sand/sandy clay***	3.1.1	Foundation rocks
3.2	Starter bund construction materials: [11] ***Surficial soils within perimeter walls***	3.3.1	Wall lifting by: Upstream ✓ Downstream ❒ Centreline ❒
3.4	Wall construction by: ***Action Earthmoving Hire***	3.3.2	Wall lifting material: [12] ***Tailings (planned)*** mechanically ✓ hydraulically ❒
3.4	Present maximum wall height agl: [13] ***26 m***	3.4.1	Expected maximum ***44 m***
3.5	Crest length (present) ***(all embankments)*** ***3,800 m***	3.5.1	Expected maximum ***3,800 m***
3.6	Impoundment area (present) ***95 ha***	3.6.1	Expected maximum ***95 ha***
	BELOW GROUND/IN-PIT FACILITIES		
~~4.1~~	~~Initial pit depth (maximum) m~~	~~4.2~~	~~Area of pit base Ha~~
~~4.3~~	~~Thickness of tailings (present) m~~	~~4.3.1~~	~~Expected maximum m~~
~~4.4~~	~~Current surface area of tailings Ha~~	~~4.4.1~~	~~Final surface area of tailings Ha~~
5	PROPERTIES OF TAILINGS		
5.1	TDS ***70-190,000 mg/L*** ; 5.2 ***pH 7.7***	5.4	Solids content ***55 – 56 %*** ; 5.4 Deposited density ***1.6 – 1.7 t/m***$\boldsymbol{^3}$
5.6	Potentially hazardous substances: [14] ***Cyanide***	5.6	WAD CN ***2-10 mg/L*** ; 5.7 Total CN ***20-60 mg/L***
		5.8	Any other NPI listed substances in the TSF?[18] ***No***

***Not to be recorded in the database; for 1, 2, 3 etc see explanatory notes on the next page**

TAILINGS STORAGE DATA SHEET

Please complete a separate sheet for each tailings storage facility (TSF)

1. PROJECT DATA			
1.1 PROJECT NAME: ***Kalgoorlie Consolidated Gold Mines***			1.2 Date: ***31 May 2005***
1.3 TSF Name: ***Fimiston II - D Paddock***		1.4 Commodity: ***GOLD***	
1.5 Name of data provider:* ***Trevor Tyson (Senior Civil Engineer)***			Phone:* ***(08) 9022 1719***
1.6 TSF centre co-ordinates (AMG) ***6,597,300 m North*** ***360,800 m East***			
1.7: Lease numbers: ***M26/308, M26/451, G26/44 – 68, G26/70 – 71, G26/73 – 78, G26/82 - 86***			
2. TSF DATA			
2.1 TSF Status: Proposed ❒ Active ✓ Disused ❒ Rehabilitated ❒			
2.2 Type of TSF:[1] ***Paddock***		2.2.1 Number of cells:[2] ***1***	
2.3 Hazard rating:[3] ***Significant***		2.4 TSF category:[4] ***1***	
2.5 Catchment area:[5] ***98 ha***		2.6 Nearest watercourse: ***None nearby***	
2.7 Date deposition started (mm/yy) ***1995***		***2.7.3*** Date deposition completed (mm/yy) ***2012 (est)***	
2.8 Tailings discharge method:[6] ***Multiple Spigot***		2.8.1 Water recovery method:[7] ***Gravity to be converted to pumped decant***	
2.9 Bottom of facility sealed or lined? ***No***		2.9.1 Type of seal or liner: [8] ***N/A***	
2.10 Depth to original groundwater level: ***Unknown***		2.10.1 Original groundwater TDS: ***approx 50,000***	
2.11 Ore process: [9] ***CIL***		2.12 Material storage rate: [10] ***4,000,000 tpa***	
2.13 Impoundment volume (present) ***12 x 10^6 m^3***		2.13.1 Expected maximum ***28.5 x 10^6 m^3***	
2.14 Mass of solids stored (present) ***20 x 10^6 tonnes***		2.14.1 Expected maximum ***47 x 10^6 tonnes***	
3 ABOVE GROUND FACILITIES			
3.1 Foundation soils ***clayey sand/sandy clay***		3.1.1 Foundation rocks	
3.2 Starter bund construction materials: [11] ***Surficial soils within perimeter walls***		3.4.1 Wall lifting by: Upstream ✓ Downstream ❒ Centreline ❒	
3.5 Wall construction by: ***Action Earthmoving Hire***		3.3.3 Wall lifting material: [12] ***Tailings (planned)*** mechanically ✓ hydraulically ❒	
3.4 Present maximum wall height agl: [13] ***21 m***		3.4.1 Expected maximum ***42.2 m***	
3.5 Crest length (present) ***(all embankments)*** ***3,930 m***		3.5.1 Expected maximum ***3,930 m***	
3.6 Impoundment area (present) ***98 ha***		3.6.1 Expected maximum ***98 ha***	
BELOW GROUND/IN-PIT FACILITIES			
~~4.1 Initial pit depth (maximum) m~~		~~4.2 Area of pit base Ha~~	
~~4.3 Thickness of tailings (present) m~~		~~4.3.1 Expected maximum m~~	
~~4.4 Current surface area of tailings Ha~~		~~4.4.1 Final surface area of tailings Ha~~	
5 PROPERTIES OF TAILINGS			
5.1 TDS ***70-190,000 mg/L***	5.2 ***pH 7.7***	5.5 Solids content ***55 – 56 %***	5.4 Deposited density ***1.6 – 1.7 t/m^3***
5.7 Potentially hazardous substances: [14] ***Cyanide***		5.6 WAD CN ***2-10 mg/L***	5.7 Total CN ***20-60 mg/L***
		5.8 Any other NPI listed substances in the TSF?[18] ***No***	

***Not to be recorded in the database; for 1, 2, 3 etc see explanatory notes on the next page**

EXPLANATORY NOTES
FOR COMPLETING
TAILINGS STORAGE DATA SHEET

The following notes are provided to assist the proponent to complete the tailings storage data sheet.

1. Paddock (ring-dyke), cross valley, side-hill, in-pit, depression, waste fill etc.
2. Number of cells operated using the same decant arrangement.
3. See Table 1 in the Guidelines.
4. See Figure 1 in the Guidelines.
5. Internal for paddock (ring-dyke) type, internal plus external catchment for other facilities.
6. End of pipe (fixed), end of pipe (movable), single spigot, multi-spigots, cyclone, CTD (central thickened discharge) etc.
7. Gravity feed decant, pumped central decant, floating pump, wall/side mounted pump etc.
8. Clay, synthetic etc.
9. See list below for ore process method.
10. Tonnes of solids per year.
11. Record only the main material(s) used for construction eg: sand, silt, gravel, laterite, fresh rock, weathered rock, tailings, clayey sand, clayey gravel, sandy clay, silty clay, gravelly clay, etc or any combination of these materials.
12. Any one or combination of the materials listed under item 11 above.
13. Maximum wall height above ground level (not AHD or RL).
14. Arsenic, Asbestos, Caustic soda, Copper sulphide, Cyanide, Iron sulphide, Lead, Mercury, Nickel sulphide, Sulphuric acid, Xanthates etc.
15. NPI – National Pollution Inventory. Contact Dept of Environmental Protection for information on NPI listed substances.

ORE PROCESS METHODS

The ore process methods may be recorded as follows:

Acid leaching (Atmospheric)	Flotation
Acid leaching (Pressure)	Gravity separation
Alkali leaching (Atmospheric)	Heap leaching
Alkali leaching (Pressure)	Magnetic separation
Bayer process	Ore sorters
Becher process	Pyromet
BIOX	SX/EW (Solvent extraction/Electro winning)
Crushing and screening	Vat leaching
CIL/CIP	Washing and screening

APPENDIX B

CURRENT OPERATING LICENCE

Department of Environment

Your ref:

Our ref: L137/88

Enquiries: Michelle Holmes

Direct tel: 90213243

The Manager
Kalgoorlie Consolidated Gold Mines Pty Ltd
PMB 27
Kalgoorlie WA 6430

Dear Sir/Madam

ENVIRONMENTAL PROTECTION ACT 1986 - LICENCE
Fimiston Plant and Tailings Disposal, Tnmnts M26/46, 359, 383, G26/44-78, G26/82-86
Kalgoorlie WA 6430

You are advised that your application for a licence to operate the works prescribed under the *Environmental Protection Act 1986* at the above-mentioned location has been approved subject to the attached conditions. Enclosed is your licence together with receipt number, 014067 for the prescribed fee.

If any aspect of the conditions of licence aggrieves you, you may lodge an appeal, accompanied by the $50.00 fee, with the Minister for the Environment within 21 days from the date on which this licence is issued. Members of the public may also appeal conditions. Please contact Margaret Johnston at the Appeal Convenor's Office on 9221 8711 after the closing date of appeals to check whether any appeals were received.

Under Section 58 of the *Environmental Protection Act 1986*, it is an offence to contravene a licence condition. This offence carries a penalty of up to $125,000, with a daily penalty of up to $25,000. The Department considers that a breach of this section, or any other section, of the *Environmental Protection Act 1986* to be extremely serious.

If you have any questions relating to the licence or licence conditions, please do not hesitate to contact Michelle Holmes of the Swan Goldfields Agricultural Region on 90213243.

Yours faithfully

Elizabeth Western
ACTING REGIONAL MANAGER
SWAN GOLDFIELDS AGRICULTURAL REGION
REGIONAL OPERATIONS DIVISION

Monday, 27 September 2004

Encs
Copy to: Local Government Authority: City of Kalgoorlie-Boulder

WESTERN AUSTRALIAN environment AWARDS

Swan Goldfields Agricultural Region
7 Ellam Street Victoria Park Western Australia 6100
Telephone (08) 6250 8000 Facsimile (08) 6250 8050
www.environment.wa.gov.au

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT

Environmental Protection Act 1986

LICENCE

LICENCE NUMBER: 6420/9 **FILE NUMBER: L137/88**

NAME OF OCCUPIER:

Kalgoorlie Consolidated Gold Mines Pty Ltd

ADDRESS OF OCCUPIER:

PMB 27
Kalgoorlie WA 6430

NAME AND LOCATION OF PREMISES:

Fimiston Plant and Tailings Disposal
Tnmnts M26/46, 359, 383, G26/44-78, G26/82-86
Kalgoorlie WA 6430

Environmental Protection Regulations 1987
CLASSIFICATION(S) OF PREMISES:

Category 05 - Processing or Beneficiation of Metallic and Non Metallic Ore

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COMMENCEMENT DATE OF LICENCE: Friday, 1 October 2004

EXPIRY DATE OF LICENCE: Friday, 30 September 2005

CONDITIONS OF LICENCE:
As described and attached:

DEFINITIONS
GENERAL CONDITION(S) 3
AIR POLLUTION CONTROL CONDITION(S) 2
WATER POLLUTION CONTROL CONDITION(S) 12
ATTACHMENTS 2

....
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Monday, 27 September 2004

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT

Environmental Protection Act 1986

LICENCE NUMBER: 6420/9 **FILE NUMBER: L137/88**

PREAMBLE

The following statements in this Preamble either reflect important sections of the Environmental Protection Act 1986 or provide relevant background information for the licensee. They should not be regarded as conditions of licence.

Applicability
This licence is issued to Kalgoorlie Consolidated Gold Mines Pty Ltd located east of Kalgoorlie for the operation of Fimiston processing plant, ancillary operations and associated infrastructure and tailings dam facilities on the tenements; M26/46, M26/294, M26/359, M26/383, M26/451, M26/308, G26/44-78 and G26/82-86. This is a prescribed premises within Schedule 1 of the *Environmental Protection Regulations 1987* as outlined in Table 1;

Table 1: Category under which Fimiston Plant and Tailings Disposal is prescribed.

Category number	*Category name*
05	Processing or beneficiation of metallic or non metallic ore
61	Liquid waste facility

The licence relates to the following:

- operation of the upgraded Fimiston Plant (eg. grinding and milling works, CIL 1, CIL 2, CIL 3 and gold treatment and recovery plant);
- operation of Mt Charlotte treatment works at Fimiston;
- disposal to Fimiston I tailings dams 'East' and 'West' paddocks (formerly A, B, C & D);
- disposal to Croesus tailings dams 'North' and 'South' paddocks;
- disposal to Fimiston II tailings dams 'A/B, C and D' paddocks.
- acceptance of liquid waste from ALS who undertake the analysis of material from the Fimiston Plant and return sampled materials to the Fimiston Tailings Storage Facilities as required by the Environmental Protection (Controlled Waste) Regulations 2004. This has been the practice prior to the regulations coming into effect.

Other legal requirements
The licensee should be aware that these conditions do not exempt the Premises/Licensee from other statutory obligations under the *Environmental Protection Act 1986,* or any other Acts.

Emergency, Accident or Malfunction
The licensee should inform the Director or Kalgoorlie region office as practical as possible of the identification of any discharge of waste which has occurred as a result of an emergency, accident or malfunction, or extreme weather conditions, otherwise than in accordance with any condition of this licence and has caused or is likely to cause pollution.

Alteration to Premises
Prior to making any significant alterations to the premises which may affect the air, water or noise emissions from the premises the Licensee must submit a proposal to the Director accompanied by supporting information and plans which allow the environmental impact of that change to be assessed.

General Requirements
The following statements reflect important sections of the *Environmental Protection Act 1986* and are included for the information of the licensee:

- The licensee should take all reasonable and practicable measures to prevent pollution of the environment.
- Noise emissions from operations on site are required to comply with the *Environmental Protection (Noise) Regulations 1997.*
- The licensee should take all reasonable and practicable measures to prevent or minimise the discharge of waste and the emission of noise, odours or electromagnetic radiation from the premises.
- The licensee should inform the Director at least 24 hours prior to the commencement of any planned non-standard operations, which may have the potential to cause pollution.

CONDITIONS OF LICENCE

DEFINITIONS

In these Conditions of Licence, unless inconsistent with the text or subject matter:

"Director" means Director, Environmental Management division of the Department of Environment for and on behalf of the Chief Executive Officer as delegated under Section 20 of the *Environmental Protection Act 1986*;

"Director" for the purpose of correspondence means-

Program Manager, Goldfields
Swan Goldfields Agricultural Region
Department of Environmental Protection
Viskovich House
377 Hannan Street
KALGOORLIE WA 6430

Telephone: 9021 3243
Facsimile: 9021 3529

"environmentally hazardous chemicals" means acids, cyanide, fuel, oil or other hydrocarbons in locations that are likely, if released to degrade the environment.

"operational freeboard" for a tailings storage facility means the vertical height between the lowest elevation of the perimeter embankment and the tailings beach immediately inside the embankment;

"operational freeboard" for any other liquid storage facility means the vertical height between the lowest elevation of the perimeter embankment and the surface of the liquid being stored;

"licensee" means Kalgoorlie Consolidated Gold Mines Pty Ltd - ABN: 97 009 377 619; and

"premises" means Fimiston processing plant, ancillary operations and associated infrastructure and tailings dam facilities on the tenements; M26/46, M26/294, M26/308, M26/359, M26/383, M26/451, G26/44-78 and G26/82-86.

GENERAL CONDITIONS

LICENCE LIMIT EXCEEDENCE REPORTING

G1(a) The licensee shall advise the Director in writing within 24 hours of becoming aware of an exceedence of any measurement which indicates that any discharge limit specified in these conditions of licence has been exceeded.

G1(b) The written advice required by condition G1(a) shall include:
- (i) the date, time and probable reason for the exceedance;
- (ii) an estimate of the period over which the limit was or is likely to be exceeded; and
- (iii) an estimate of the extent of the discharge over that period and indication of known or potential environmental impacts.

G1(c) The licensee shall provide a full report (unless otherwise approved by the Director) on its investigations into any exceedance reported under condition G1(a) within 7 days of that exceedance, and it shall include, but not limited to:
- (i) the date, time and reason for the exceedance;
- (ii) the period over which the exceedance occurred;
- (iii) the extent of the discharge over that period and potential or known environmental consequences;
- (iv) corrective action taken or planned to mitigate adverse environmental consequences; and
- (v) corrective action taken or planned to prevent a recurrence of the exceedance.

ANNUAL REPORT

G2 The licensee shall prepare an annual environmental report providing an overview of the monitoring data and other collected data required by any condition of this licence by 31 March each year. This report shall make reference to monthly and quarterly monitoring data and provide a summary of the key findings and recommendations. The report shall cover the previous 12 month period from 1 January to 31 December. One copy of this report shall be provided to the Director.

ACCEPTANCE OF LIQUID WASTE

G3 The licensee shall only accept liquid waste generated from ALS, in accordance with the Environmental Protection (Controlled Waste) regulations 2004.

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT

Environmental Protection Act 1986

LICENCE NUMBER: 6420/9 **FILE NUMBER: L137/88**

AIR POLLUTION CONTROL CONDITIONS

DUST - GENERAL REQUIREMENTS

A1(a) The licensee shall take all reasonable measures to prevent, so far as is practicable, visible dust crossing the boundary of the premises as a result of materials handling operations, stockpiles, open areas and transport activities.

DUST COLLECTION SYSTEMS

A1(b) The licensee shall maintain all installed dust collection or dust control systems including:

(i) coverings on conveyors, transfer points and discharge points;
(ii) skirtings; and
(iii) dust filters,

to prevent, so far as is practicable, visible dust.

PRIMARY CRUSHER - DUST CONTROL

A1(c) The licensee shall operate when necessary water sprays on the coarse ore feed point to the primary crusher(s) to prevent the generation of visible dust.

DARK SMOKE EMISSIONS – BURNING

A2 Except for emergency response training purposes, the licensee shall ensure that no rubber, rubber products, plastic or plastic products, waste oil or any other waste material are burned at any time, without prior approval from the Director.

WATER POLLUTION CONTROL CONDITIONS

LIQUID CHEMICAL STORAGE

W1(a) The licensee shall store environmentally hazardous chemicals (where the total volume of each substance stored on the premises exceeds 250 litres) are stored within low permeability (10^{-9} metres per second or less) compound(s) designed to contain not less than 110% of the volume of the largest storage vessel or inter-connected system, and at least 25% of the total volume of substances stored in the compound.

W1(b) The compound(s) described in part (a) to this condition shall:

(i) be graded or include a sump to allow recovery of liquid;

(ii) be chemically resistant to the substances stored;

(iii) include valves, pumps and meters associated with transfer operations wherever practical. Otherwise the equipment shall be adequately protected (eg. bollards) and contained in an area designed to permit recovery of chemicals released following accidents or vandalism;

(iv) be designed such that jetting from any storage vessel or fitting will be captured within the bunded area [see for example Australian Standard 1940-1993 Section 5.9.3 (g)];

(v) be designed such that chemicals which may react dangerously if they come into contact, are in separate bunds in the same compound or in different compounds; and

(vi) be controlled such that the capacity of the bund is maintained at all times (eg. regular inspection and pumping of trapped uncontaminated rain water).

W1(c) The licensee shall immediately recover, or remove and dispose of, any liquid resulting from spills or leaks of chemicals including fuel, oil or other hydrocarbons, occurring outside the low permeability compound(s), in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004.*

W1(d) The licensee shall report to the Director any spills of environmentally hazardous chemicals greater than 250L outside of the compounds within 24hours or the next working day which occurred in locations that may adversely impact on the environment.

W1(e) The licensee shall keep a record of any incident, including the loss of environmentally hazardous chemicals to the environment smaller than 250L, and provide a summary of each incident in the Annual Report.

HOLDING FACILITIES - CONTAMINATED MATTER

W2 The licensee shall manage the storage of all matter containing saline or alkaline constituents within holding facilities in a manner, which prevents pollution.

Pollution is defined in the Environmental Protection Act 1986 and includes, but is not limited to, the constituents of tailings storage facilities damaging vegetation or lowering the environmental value of surface waters or underground waters.

FREEBOARD REQUIREMENT

W3 The licensee shall maintain a minimum operational freeboard of 300 mm within all holding facilities containing saline water, alkaline or cyanide constituents. This includes but is not limited to tailings storage facilities, return water dams and raw water dams.

BUNDING OF PIPELINES

W4(a) The licensee shall ensure that all pipelines containing saline, alkaline or cyanide constituents are either buried or situated within appropriately bunded facilities. This includes but not limited to tailings delivery lines, return water lines and saline water lines.

W4(b) The licensee shall ensure that spills with saline, alkaline or cyanide constituents are retained within pipeline bunding and catch pits and do not cause pollution if spilt outside bunding.

W4(c) The licensee shall immediately recover, or remove and dispose of, any spills or leaks of pipelines containing saline, alkaline or cyanide constituents, in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004* and rehabilitate the area as needed.

W4(d) The licensee shall report to the Director within 24 hours, or the next working day any liquid spills greater than 5000L containing saline, alkaline or cyanide constituents, that escape from pipeline bunding.

W4(e) The licensee shall keep a record of any incident, including the spill of liquid containing saline, alkaline or cyanide constituents that escape from the pipeline bunding smaller than 5000L, and provide a summary of each incident in the Annual Report required by G2 of this licence.

VISUAL INSPECTIONS

W5 The licensee shall undertake visual inspections of the tailings storage facilities (TSF) at least every six hours. As a minimum, the following areas shall be inspected:

(i) tailings delivery lines;
(ii) return water lines;
(iii) tailings deposition;
(iv) ponding on the surface of the tailings storage facilities;
(v) internal embankment freeboard; and
(vi) the external wall of the TSF.

A log book shall be filled in after every inspection. The log book shall be signed by the person conducting the inspection.

STORMWATER DIVERSION AWAY FROM TAILINGS STORAGE AREAS

W6 Suitable arrangements shall be made to divert stormwater run-off away from areas adjacent to tailings storage facilities to minimise the threat of accidental loss of stored matter due to flooding or erosion.

OILY AND SOLVENT WASTEWATER TREATMENT SYSTEM

W7 The licensee shall operate a wastewater treatment system for oily and solvent wastewater such that:

(i) uncontaminated stormwater run-off is prevented from entering the oily wastewater or solvent wastewater treatment systems; and
(ii) the "first flush" of stormwater run-off from washdown pads and other areas of likely hydrocarbon and/or solvent contamination is diverted to storage facilities for subsequent treatment and disposal to the landfarm.

WASTE MANAGEMENT FROM ANCILLARY OPERATIONS

W8 The licensee shall appropriately maintain all installed, protective bunding, skimmers, silt traps, fuel and oil traps, drains and/ or sealed collection sumps around the process plant, maintenance workshops, laboratory and power generation areas to enable recovery of spillages and protection of surrounding soils and groundwater. Collected material shall be used in the process where practicable or disposed of in accordance with the Environmental Protection (Controlled Waste) Regulations 2004.

INSTALLATION OF DRAINAGE BELOW WASTE STORAGE DAM

W9 The licensee shall install and maintain drains and recovery bores near the Croesus, Fimiston I tailings complex and the Fimiston II tailings complex.

VEHICLE WASHDOWN BAYS

W10 The licensee shall ensure that vehicle washdown bays are sited on a hardstand area to allow the containment of wastewater. Appropriate bunding or trenches shall be installed to allow wastewater to be directed to an oil/water separator prior to disposal into a collection sump.

APPROVED MONITORING PROGRAMME

W11(a) The licensee shall, at the frequencies stated, take measurement of standing water levels (SWL) and take representative water samples from the monitoring sites (Attachment 1), and have them analysed for the parameters as shown in the table below.

KCGM FIMISTON 1 AND 2 TSF MONITORING REQUIREMENTS

Parameters	Sampling Frequency	Monitoring Sites					
		Eastern Borefield Production Bores					
pH and EC	Monthly	Decant 1	PB F1	PB F32	PB F59	PB F87	PB F 115
		Decant 3	PB F2	PB F33	PB F60	PB F88	PB F 116
		Fim I Nth Trench	PB F3	PB F34	PB F61	PB F89	PB F 117
		Fim II Sth Trench	PB F4	PB F35	PB F64	PB F90	PB F 118
			PB F4A	PB F36	PB F65	PB F91	PB F 119
			PB F5	PB F37	PB F66	PB F92	
			PB F6	PB F38	PB F67	PB F93	
			PB F7	PB F39	PB F68	PB F94	
			PB F8	PB F40	PB F69	PB F95	
			PB F9	PB F41	PB F70	PB F96	
			PB F10	PB F42	PB F71	PB F97	
			PB F11	PB F43	PB F72	PB F98	
			PB F12	PB F44	PB F73	PB F99	
			PB F14	PB F45	PB F74	PB F100	
			PB F16	PB F46	PB F75	PB F101	
			PB F18	PB F47	PB F76	PB F102	
			PB F20	PB F48	PB F77	PB F103	
			PB F21	PB F49	PB F78	PB F105	
			PB F22	PB F51	PB F79	PB F106	
			PB F23	PB F52	PB F80	PB F107	
			PB F24	PB F53	PB F81	PB F108	
			PB F25	PB F54	PB F82	PB F109	
			PB F26	PB F55	PB F83	PB F110	
			PB F27	PB F56	PB F84	PB F112	
			PB F28	PB F57	PB F85	PB F113	
			PB F30	PB F58	PB F86	PB F114	
TDS, CN-FREE, CN-WAD, CN-TOTAL	ANNUALLY (October)		All Eastern Borefield Production Bores				
				Decant 1			
				Decant 3			
				Fim I Nth Trench			
				Fim II Sth Trench			
SWL	Quarterly (January, April, July and October)		All Monitoring Bores				
pH and EC	Six Monthly (January and April)		MB F19	MB F26	MB F35		
			MB F20	MB F27	MB F36		
			MB F21	MB F30	MB F37		
			MB F22	MB F31	MB F65		
			MB F23	MB F32	MB F66		
TDS, CN-FREE, CN-WAD, CN-TOTAL	Annually (July)		MB F24	MB F33	TRP 2		
			MB F25	MB F34	TRE		
pH and EC	Six Monthly (March and September)		MB F5	MB F11	MB F48	MB F54	
			MB F6	MB F12	MB F49	MB F55	
			MB F7	MB F18	MB F50	MB F56	
			MB F8	MB F45	MB F51	MB F57	
TDS, CN-FREE, CN-WAD, CN-TOTAL	Annually (September)		MB F9	MB F46	MB F52	MB F68	
			MB F10	MB F47	MB F53	MB F69	
pH and EC	Six Monthly (May and November)		MB F1	MB F38	MB F60	NTD 1	
			MB F2	MB F39	MB F61	NTD 2	
			MB F3	MB F40	MB F62	NTD 3	
TDS, CN-FREE, CN-WAD, CN-TOTAL	Annually (November)		MB F4	MB F41	MB F63	NTD 4	
				MB F42	MB F64	NTD 5	
				MB F43	MB F67	NTD 6	
				MB F44			

Note - A minimum of 90% of all Production Bores around the facilities will be sampled during any quarterly period to allow for maintenance considerations.

This 90% minimum for monitoring frequencies does not include Production Bores PBF102, PBF103, PBF105, PBF106, PBF107, PBF108, PBF109, PBF110, PBF116, PBF117, PBF118 and PBF119 which are located within the TSF embankments and are often impacted by operation and maintenance of the facility. KCGM is to take all reasonable and practicable measures to maintain these bores, and will advise of their operational status within the reports required in this licence.

W11(b) The licensee shall collect and preserve all water samples in accordance with the Australian Standard 5667.1-1998.

W11(c) The licensee shall submit all water samples to a laboratory with current NATA Accreditation for the analysis specified, and analysed in accordance with the current "Standard Methods for Examination of Water and Wastewater-APHA-AWWA-WEF".

W11(d) The licensee shall provide monitoring results of the sampling programme in condition W11(a) to the Director in a report which shall be submitted by the due dates as follows:

Quarter	**Due Date**
1st Quarter January to March	Report on or before 15 May;
2nd Quarter April to June	Report on or before 15 August;
3rd Quarter July to September	Report on or before15 November;
4th Quarter October to December	Report on or before 15 February.

VEGETATION MONITORING PROGRAMME

W12(a) The licensee shall undertake a vegetation monitoring programme in the vicinity of Fimiston Tailings Storage Facilities (TSF) which shall include photographic monitoring of the vegetation along transects near Fimiston TSF (Attachment 2). The programme shall be in the following schedule:

(i) transects shall link between monitor bores or identifiable field markers (Attachment 3);
(ii) photographs shall be taken at intervals to record key vegetation features along each transect;
(iii) photographs shall be taken annually in early spring, at a fixed focal length, and away from the facility to standardise the information gained; and
(iv) a professional photographer or technician skilled in plant identification and sampling shall be engaged in this work.

W12(b) The licensee shall provide a report on the vegetation monitoring programme in the annual report required by condition G2. This report shall include a copy of the photographic record for that year and assessment of the vegetation by a suitably qualified professional.

W12(c) The licensee shall engage a suitably qualified professional to undertake further biological monitoring as instructed by the Director.

SEVERANCE

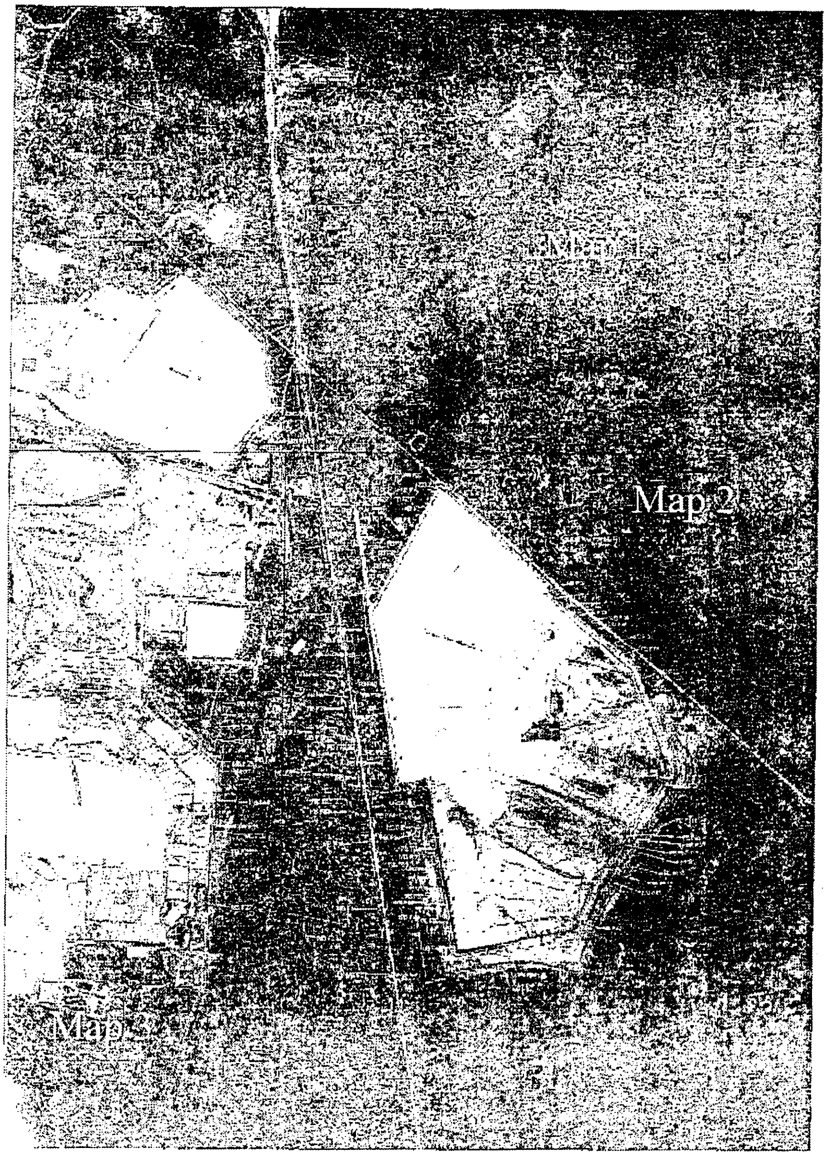
It is the intent of these licence conditions that they shall operate so that, if a condition or a part of a condition is beyond my power to impose, or is otherwise *ultra vires* or invalid, that condition or part of a condition shall be severed and the remainder of these conditions shall nevertheless be valid to the extent that they are within my power to impose and are not otherwise *ultra vires* or invalid.

....
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Monday, 27 September 2004

27/04 '04 TUE 11:30 FAX 61 9 362 0500 W&R COMM SWAN REGION 003

Attachment 1, Lic 6420/7



Attachment – 2, L137/88, Lic # 6420/8

Fimiston Tailings Storage Facilities- Vegetation Transects

<u>The following table is a key for bores and key features on vegetation transects</u>

(Photopoints along transects were chosen to coincide, where possible, with groundwater monitoring bores. The direction of the photographs is bracketed and in italics next to the groundwater bore number. Multiple photographs at one point are separated by a semicolon. Where a monitor bore is not present the AMG coordinates are given)

Transect number	Origin (bore)	Sequence of bores
A	NTD 1 *(n)*	MB F1 *(n;s)*
B	NTD 2 *(w)*	MB F4 *(n;s)*
C	NTD 2 *(nw)*	MB F6 *(e;w)* MB F5 *(se)*
D	NTD 3 *(w)*	AMG (358537:6597384) *(e)*
E	NTD 4 *(nw)*	AMG (358684:6597023) *(e)*
F	NTD 4 *(sw)*	MB F32 *(e;w)* NEVES DAM *(e;w)*
G	NTD 5 *(sw)*	MB F24 *(e)*
H	NTD 5 *(sw)*	MB F19 *(sw;ne)* MB F33 *(w;e)* MB F31 *(w;e)*
I	NTD 6 *(sw)*	MB F54 *(w;e)*
J	MB F51 *(sw)*	MB F55 *(sw;ne)*
K	MB F50 *(sw)*	MB F56 *(sw;ne)*
L	MB F48 *(sw)*	MB F57 *(sw;ne)*
M	MB F46 *(sw)*	MB F47 *(n;s;e;w)*
N	MB F46 *(e)*	MB F45 *(n;s;e;w)*
O	MB F30 *(n;s;e;w)*	
P	MB F26 *(e)*	
Q	MB F25 *(e)*	

APPENDIX C

TAILINGS TESTWORK
LABORATORY TEST CERTIFICATES

Analysis Report

CSIRO
Division of Minerals

Particle Analysis Service

Client	: Golder Associates P/L	PAS ID No.	: P45240-244
Sample	: 5 KCGM Kalgoorlie samples	Report No.	: R 048454
Analysis	: Absolute density by ASTM D4892 - '89, 'Helium Pycnometry'	Date	: 13/10/2004

The results of the analyses are as follows:

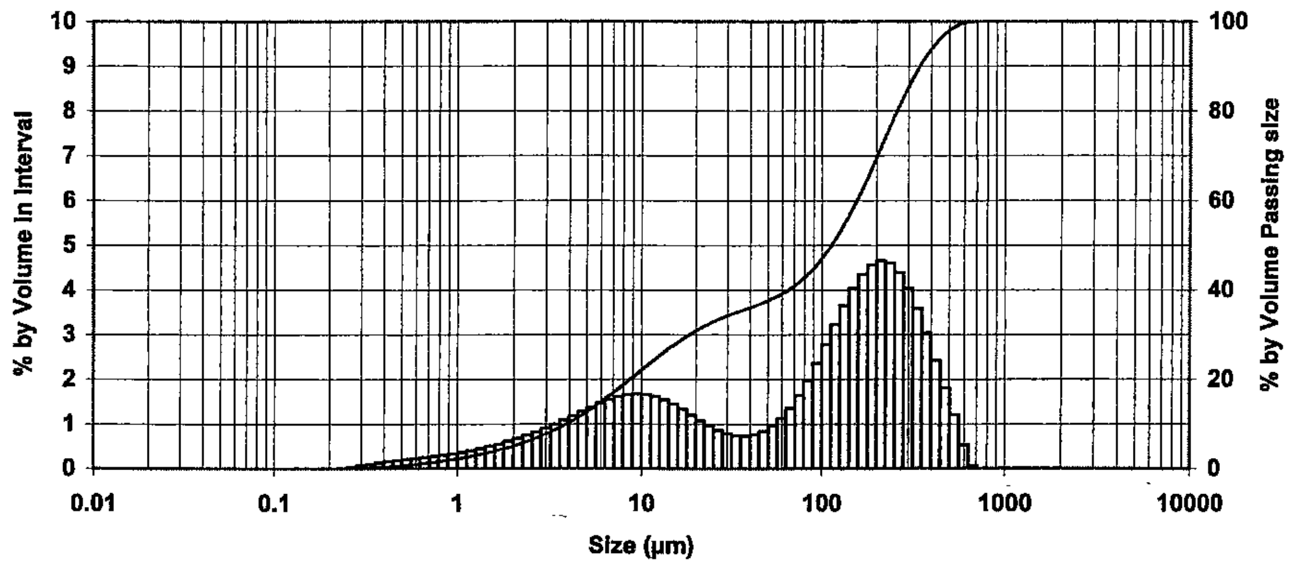
Sample	PAS ID #	Absolute density (g/cc)
P 5U 7m # 9025	P45240	2.946 ± 0.011
P 11U 9m # 9026	P45241	2.991 ± 0.005
P 14U 4.5m # 9027	P45242	2.921 ± 0.004
P 17U 5m # 9028	P45243	2.918 ± 0.005
P 22U 9.5m # 9029	P45244	3.518 ± 0.005

Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Sample Name:	KCGM Kalgoorlie - P 11U 9m # 9026		
Batch No:	R048454		
PAS ID No:	P45241		
Dispersant:	Water	**SOP Name:**	
Additives:	10 millilitres sodium hexametaphosphate	**Analysis Model:**	General purpose
Sonication:	20 mins ultrasonics	**Result units:**	Volume

Concentration:	0.0411 % vol	**Vol. Weighted Mean D[4,3]:**	142.256 µm	**d(0.1):**	3.865 µm
Obscuration:	31.72 %	**Surface Weighted Mean D[3,2]:**	9.241 µm	**d(0.5):**	113.194 µm
Weighted Residual:	0.666 %	**Specific Surface Area:**	0.649 m^2/cc	**P80:**	258.919 µm
				d(0.9):	344.556 µm



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0.020	0.00	0.142	0.00	1.002	2.22	7.096	17.17	50.238	37.66	355.656	90.93
0.022	0.00	0.159	0.00	1.125	2.58	7.962	18.78	56.368	38.61	399.052	93.97
0.025	0.00	0.178	0.00	1.262	2.98	8.934	20.43	63.246	39.73	447.744	96.39
0.028	0.00	0.200	0.00	1.416	3.42	10.024	22.11	70.963	41.08	502.377	98.20
0.032	0.00	0.224	0.00	1.589	3.92	11.247	23.77	79.621	42.72	563.677	99.41
0.036	0.00	0.252	0.00	1.783	4.47	12.619	25.39	89.337	44.69	632.456	99.94
0.040	0.00	0.283	0.02	2.000	5.08	14.159	26.93	100.237	47.05	709.627	100.00
0.045	0.00	0.317	0.09	2.244	5.76	15.887	28.38	112.468	49.83	796.214	100.00
0.050	0.00	0.356	0.19	2.518	6.51	17.825	29.71	126.191	53.05	893.367	100.00
0.056	0.00	0.399	0.31	2.825	7.33	20.000	30.91	141.589	56.69	1002.374	100.00
0.063	0.00	0.448	0.47	3.170	8.23	22.440	31.99	158.866	60.73	1124.683	100.00
0.071	0.00	0.502	0.65	3.557	9.23	25.179	32.95	178.250	65.08	1261.915	100.00
0.080	0.00	0.564	0.85	3.991	10.31	28.251	33.81	200.000	69.65	1415.892	100.00
0.089	0.00	0.632	1.08	4.477	11.49	31.698	34.59	224.404	74.31	1588.656	100.00
0.100	0.00	0.710	1.33	5.024	12.78	35.566	35.33	251.785	78.91	1782.502	100.00
0.112	0.00	0.796	1.60	5.637	14.15	39.905	36.06	282.508	83.30	2000.000	100.00
0.126	0.00	0.893	1.89	6.325	15.62	44.774	36.82	316.979	87.35		

Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Sample Name: KCGM Kalgoorlie - P 14U 4.5m # 9027

Batch No: R048454

PAS ID No: P45242

Dispersant: Water

Additives: 10 millilitres sodium hexametaphosphate

Sonication: 20 mins ultrasonics

SOP Name:

Analysis Model: General purpose

Result units: Volume

Concentration: 0.0248 % vol

Obscuration: 33.72 %

Weighted Residual: 0.89 %

Vol. Weighted Mean D[4,3]: 81.604 µm

Surface Weighted Mean D[3,2]: 5.184 µm

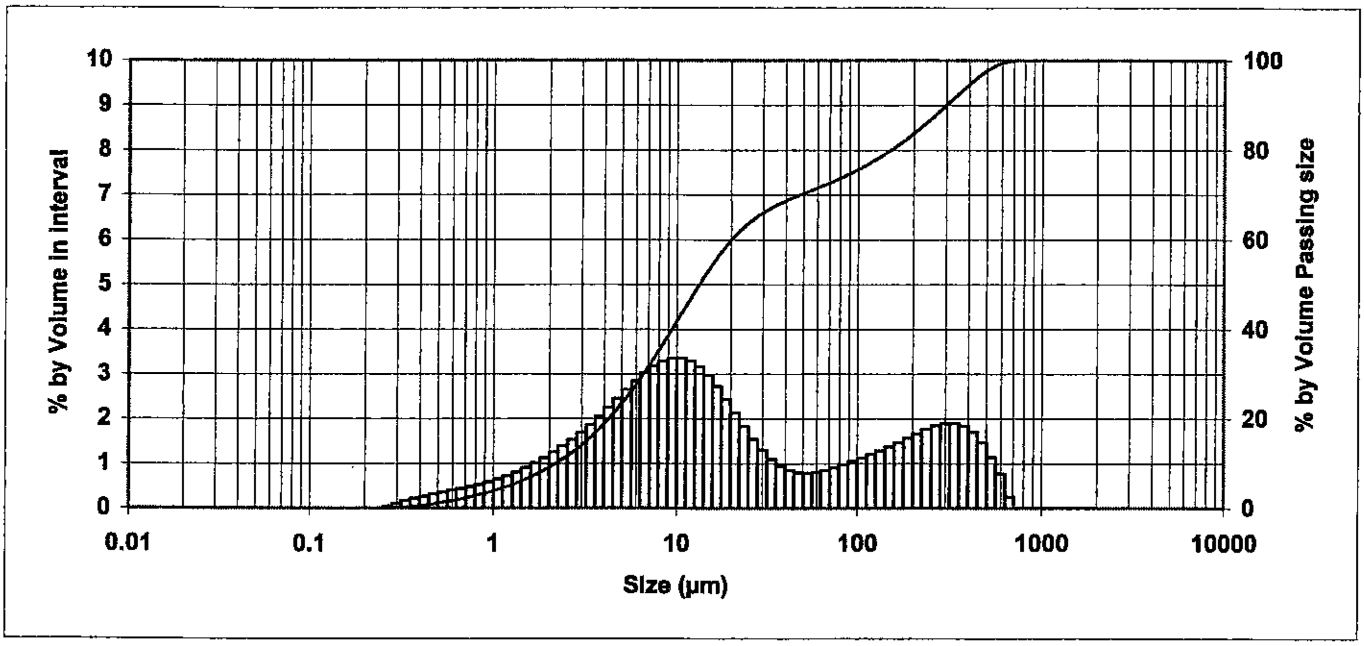
Specific Surface Area: 1.16 m^2/cc

d(0.1): 2.174 µm

d(0.5): 13.271 µm

P80: 149.792 µm

d(0.9): 299.721 µm



Size (µm)	Vol Under %
0.020	0.00
0.022	0.00
0.025	0.00
0.028	0.00
0.032	0.00
0.036	0.00
0.040	0.00
0.045	0.00
0.050	0.00
0.056	0.00
0.063	0.00
0.071	0.00
0.080	0.00
0.089	0.00
0.100	0.00
0.112	0.00
0.126	0.00

Size (µm)	Vol Under %
0.142	0.00
0.159	0.00
0.178	0.00
0.200	0.00
0.224	0.00
0.252	0.00
0.283	0.04
0.317	0.15
0.356	0.31
0.399	0.53
0.448	0.80
0.502	1.11
0.564	1.47
0.632	1.87
0.710	2.30
0.796	2.78
0.893	3.30

Size (µm)	Vol Under %
1.002	3.89
1.125	4.53
1.262	5.25
1.416	6.06
1.589	6.97
1.783	7.98
2.000	9.11
2.244	10.36
2.518	11.75
2.825	13.28
3.170	14.98
3.557	16.84
3.991	18.90
4.477	21.14
5.024	23.59
5.637	26.24
6.325	29.09

Size (µm)	Vol Under %
7.096	32.11
7.962	35.28
8.934	38.57
10.024	41.93
11.247	45.29
12.619	48.59
14.159	51.76
15.887	54.73
17.825	57.45
20.000	59.88
22.440	62.01
25.179	63.84
28.251	65.39
31.698	66.69
35.566	67.79
39.905	68.74
44.774	69.58

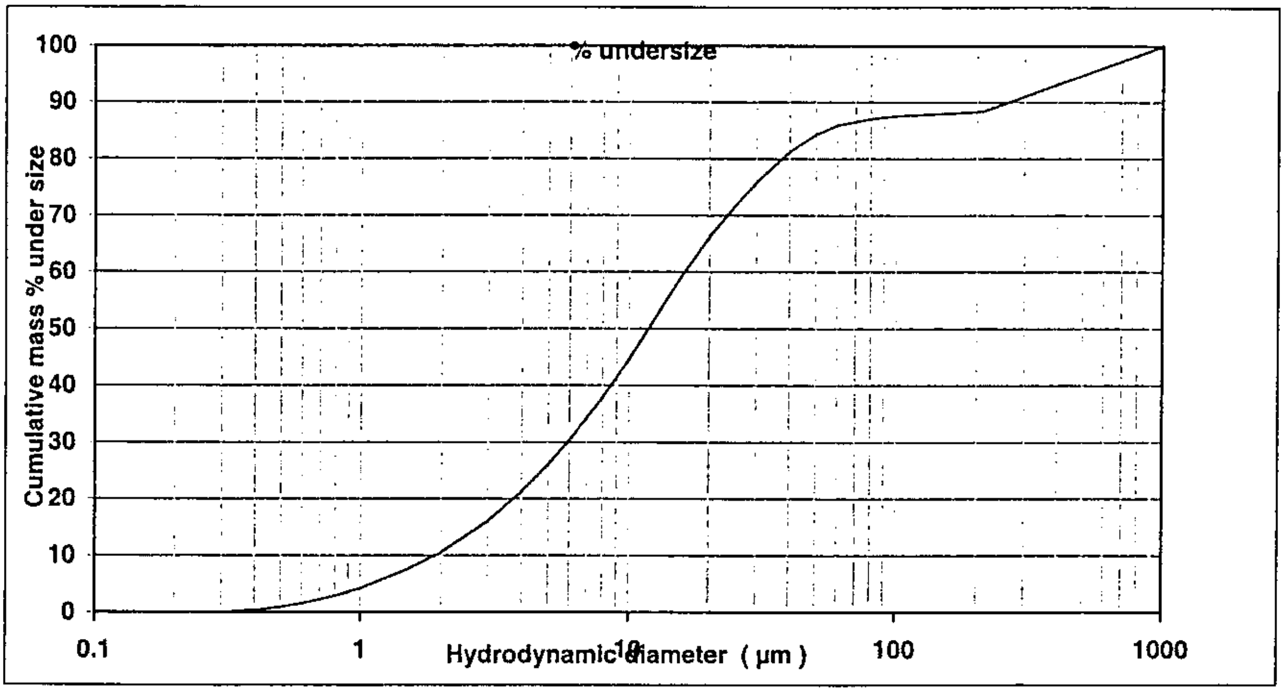
Size (µm)	Vol Under %
50.238	70.38
56.368	71.16
63.246	71.96
70.963	72.80
79.621	73.71
89.337	74.68
100.237	75.73
112.468	76.85
126.191	78.06
141.589	79.34
158.866	80.71
178.250	82.18
200.000	83.75
224.404	85.42
251.785	87.18
282.508	89.03
316.979	90.93

Size (µm)	Vol Under %
355.656	92.83
399.052	94.67
447.744	96.37
502.377	97.84
563.677	98.98
632.456	99.75
709.627	100.00
796.214	100.00
893.367	100.00
1002.374	100.00
1124.683	100.00
1261.915	100.00
1415.892	100.00
1588.656	100.00
1782.502	100.00
2000.000	100.00

Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Client:	Golder Associates		
Sample name:	Job # 04641175Fimistion11TSF#8761		
Report No:	R048266		
PAS ID No:	P44035		
Analysis:	X-ray sedimentation by Sedigraph 5100	**Analysis temp.:**	35.5 ºC
Dispersant:	Water	**Sonication:**	10 min
Additives:	10mL sodium hexametaphosphate	**Concentration:**	10 % w/w
Sample density:	2.861 g/cm^3 (as measured)	**Reynolds No:**	18.81
Liquid density:	0.994 g/cm^3	**Critical diameter:**	52.00 µm
Liquid viscosity:	0.715 cp		



Max size (µm)	Min size (µm)	In %
1000.00	212.00	11.51
212.00	200.00	0.20
200.00	150.00	0.31
150.00	100.00	0.41
100.00	80.00	0.51
80.00	60.00	1.12
60.00	50.00	1.63
50.00	40.00	3.07
40.00	30.00	5.42

Max size (µm)	Min size (µm)	In %
30.00	25.00	3.99
25.00	20.00	5.62
20.00	15.00	8.48
15.00	10.00	13.08
10.00	8.00	6.74
8.00	6.00	7.66
6.00	5.00	4.29
5.00	4.00	4.70
4.00	3.00	5.21

Max size (µm)	Min size (µm)	In %
3.00	2.00	5.52
2.00	1.50	2.96
1.50	1.00	3.37
1.00	0.80	1.33
0.80	0.60	1.33
0.60	0.50	0.61
0.50	0.40	0.51
0.40	0.30	0.41
0.30	0.00	0.00

Derived diameters	Size (µm)
d (0.9)	260.0
d (0.5)	#NAME?
d (0.1)	#NAME?

NOTE : The sample was wet screened at 212µm.

Golder Associates
Perth Laboratory
192 Lord Street
East Perth 6000
Phone (08) 9328 8950

TEST REPORT No. 74/04

Consolidation Test Summary on Settled Tailings

Client: KCGM
Project: Fimiston II TSF
Location: Kalgoorlie

Job No: 04641119
Lab No: #8761
Date Tested: 6-15/6/04

Material Description: Tailings

Results Summary

Effective Pressure (kPa)	Percent Settlement (%)	Void Ratio (e)	Coefficient of Volume Compressibility mv (m^2 / MN)	Coefficient of Consolidation Cv (m^2 / year)	Compression Index (Cc)	Permeability k (m sec^{-1})
1	0.0	0.569	-	-	-	-
2	0.4	0.563	3.643	3.56	0.019	4.0×10^{-9}
4	1.1	0.552	3.435	8.52	0.036	9.1×10^{-9}
8	1.9	0.540	1.980	21.68	0.042	1.3×10^{-8}
16	2.7	0.527	1.045	35.29	0.043	1.1×10^{-8}
33	3.8	0.510	0.670	71.72	0.055	1.5×10^{-8}
65	4.7	0.495	0.312	118.45	0.051	1.1×10^{-8}
130	6.1	0.474	0.220	174.44	0.071	1.2×10^{-8}

Measured Particle Density = 2.86 g/cm^3

Test Conditions	**Initial**	**Final**
Moisture Content (%):	26.4	18.1
Dry Density (t/m^3):	1.82	1.94
Void Ratio (e):	0.57	0.47
% Saturation:	100	100

Notes on Sample Preparation:

(1) A representative sample of tailings was poured into the consolidation cell & allowed to settle & drain for three days.

(2) A bedding pressure of 1 kPa was then placed on the sample for three days prior to commencement of loading cycles.

Test Method AS1289
6.6.1 - Consolidation Test

Sampling Procedure: Tested as received

Approved Signatory: [signature] A. Mangano

Date: 22/6/04 (Laboratory Manager)

Golder Associates
Perth Laboratory
192 Lord Street
Perth, 6000
Phone (08) 9328 8950

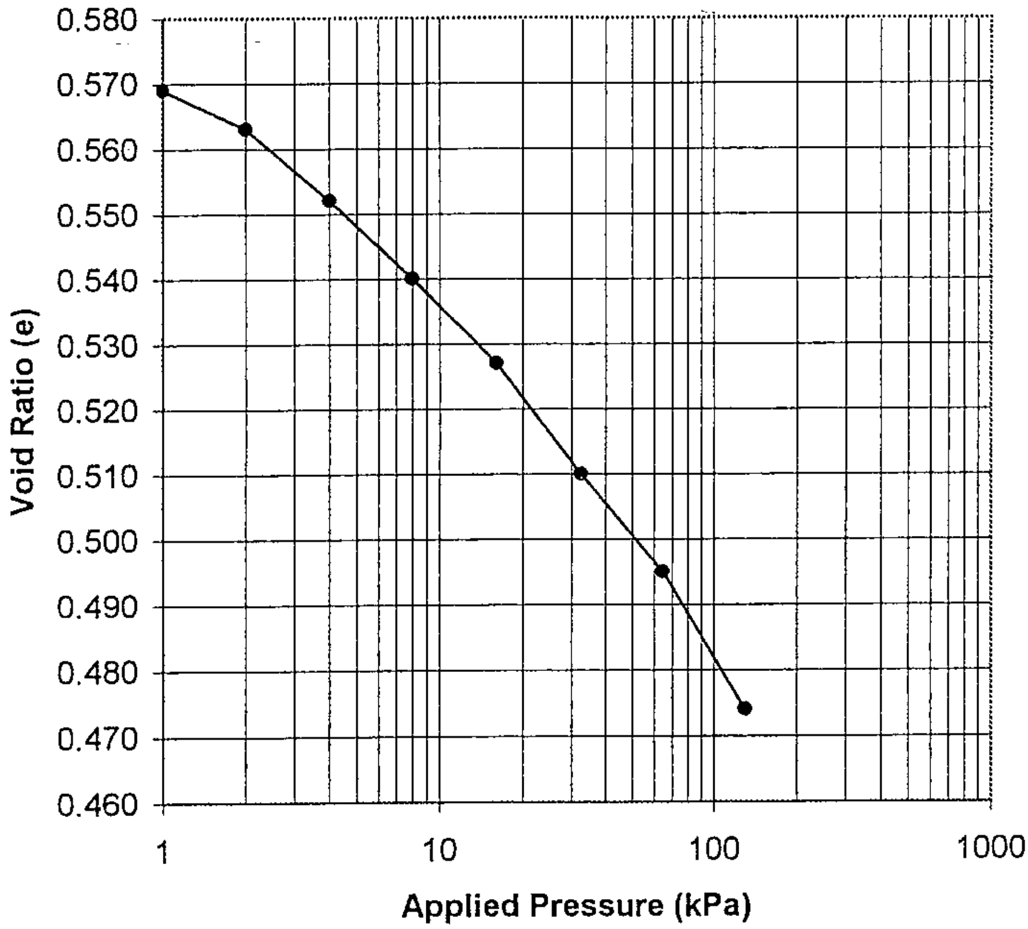
Golder Associates

TEST REPORT No. 74/04

Consolidation Test on Settled Tailings

Client: KCGM	Job No: 04641119
Project: Fimiston II TSF	Lab No: #8761
Location: Kalgoorlie	Date Tested: 6-15/6/04

e log P



Material Description: Tailings

Test Methods AS1289
6.6.1 Consolidation Test
Sampling Procedure: Tested as received

Approved Signatory: A. Mangano Date: 22/6/04
(Laboratory Manager)

Golder Associates
Perth Laboratory
192 Lord Street
East Perth 6000
Phone (08) 9328 8950

Golder Associates

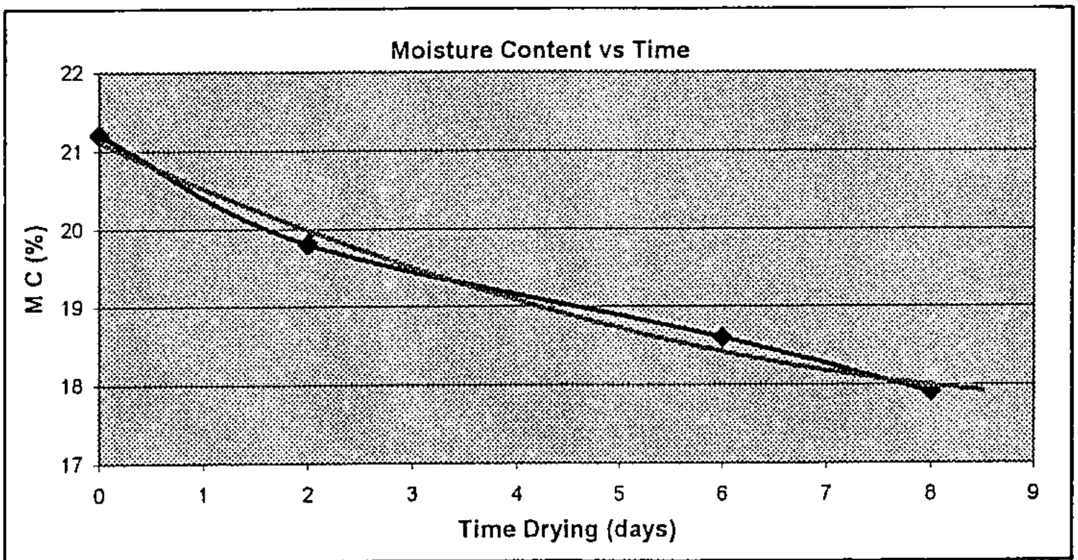
TEST REPORT No. 74/04

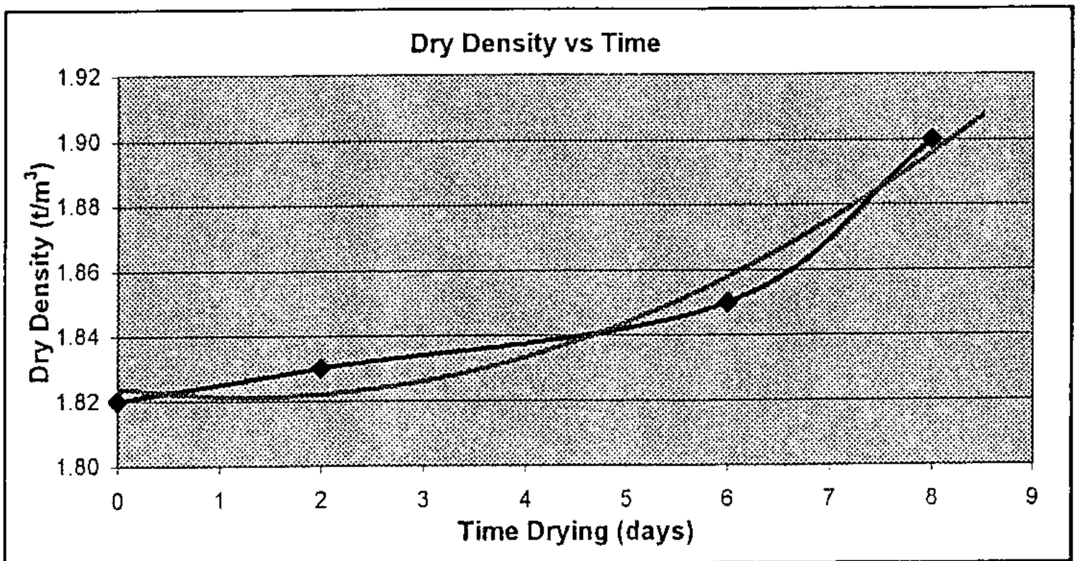
Beach Drying Test On Settled Tailings

Client: KCGM
Project: Fimiston II TSF
Location: Kalgoorlie

Job No: 04641119
Lab No: #8761
Date Tested: 10-18/6/04

Date	Day	Moisture Content (%)	Dry Density (t/m^3)
10/06/2004	0	21.2	1.82
12/06/2004	2	19.8	1.83
16/06/2004	6	18.6	1.85
18/06/2004	8	17.9	1.90





Approved Signatory: A.Mangano

Date: 22/6/04 (Laboratory Manager)

Golder Associates
Perth Laboratory
182 Lord Street
East Perth 6000
Phone (08) 9427 7600

Golder Associates

TEST REPORT No. 46/03

Consolidation Test Summary

Client: KCGM
Project: Fimiston 1 TSF
Location: Kalgoorlie

Job No: 03641063
Lab No: #8001
Date Tested: 28-30/3/03

Sample Location: Tube A

Material Description: Beached Tailings

Results Summary

Effective Pressure (kPa)	Percent Settlement (%)	Void Ratio (e)	Coefficient of Volume Compressibility mv (m^2 / MN)	Coefficient of Consolidation Cv (m^2 / year)	Compression Index (Cc)	Permeability k (m sec^{-1})
3	0.0	0.582	-	-	-	-
50	1.0	0.565	0.219	92.9	0.013	6.4×10^{-9}
100	1.6	0.557	0.107	98.0	0.028	3.3×10^{-9}
200	2.4	0.544	0.082	83.6	0.042	2.2×10^{-9}
400	3.4	0.527	0.056	92.2	0.057	1.6×10^{-9}
800	5.1	0.502	0.042	93.5	0.085	1.3×10^{-9}

Assumed Particle Density = 2.79 g/cm^3

Test Conditions	Initial	Final
Moisture Content (%):	20.1	17.8
Dry Density (t/m^3):	1.76	1.86
Void Ratio (e):	0.58	0.50
% Saturation:	97	99

The test specimen was extruded from a thin walled tube sample

Test Method AS1289
6.6.1 - Consolidation Test

Sampling Procedure: Tested as received

Approved Signatory: ____________________ **Date:** ____________

A. Mangano **(Laboratory Manager)**

Golder Associates
Perth Laboratory
182 Lord Street
Perth, 6000
Phone (08) 9427 7600

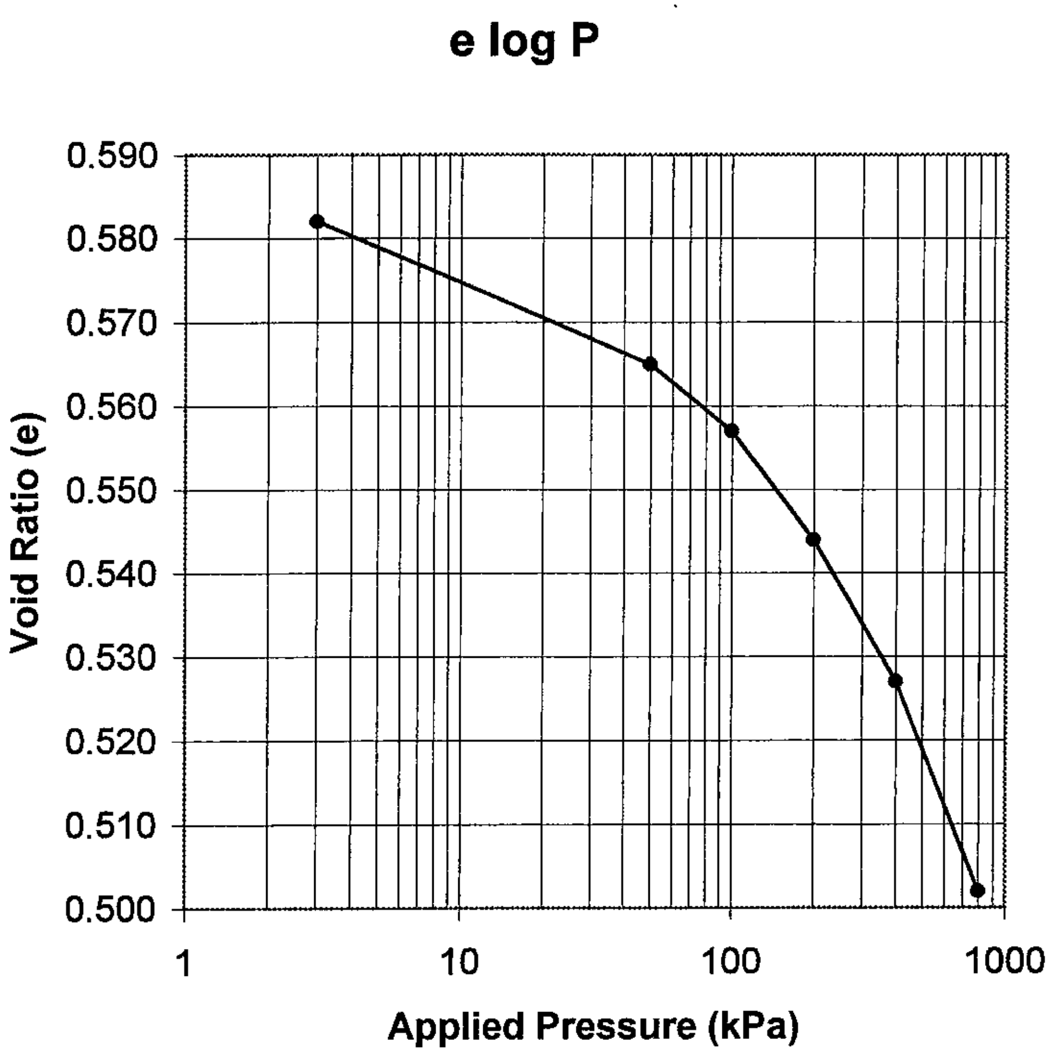
Golder Associates

TEST REPORT No. 46/03

Consolidation Test - e Log P Graph

Client: KCGM
Project: Fimiston 1 TSF
Location: Kalgoorlie

Job No: 03641063
Lab No: #8001
Date Tested: 28-30/3/03



Sample Location: Tube A
Material Description: Beached Tailings

Test Methods AS1289
6.6.1 Consolidation Test
Sampling Procedure: Tested as received

Approved Signatory: ______________________ **Date:** ______________

A. Mangano **(Laboratory Manager)**

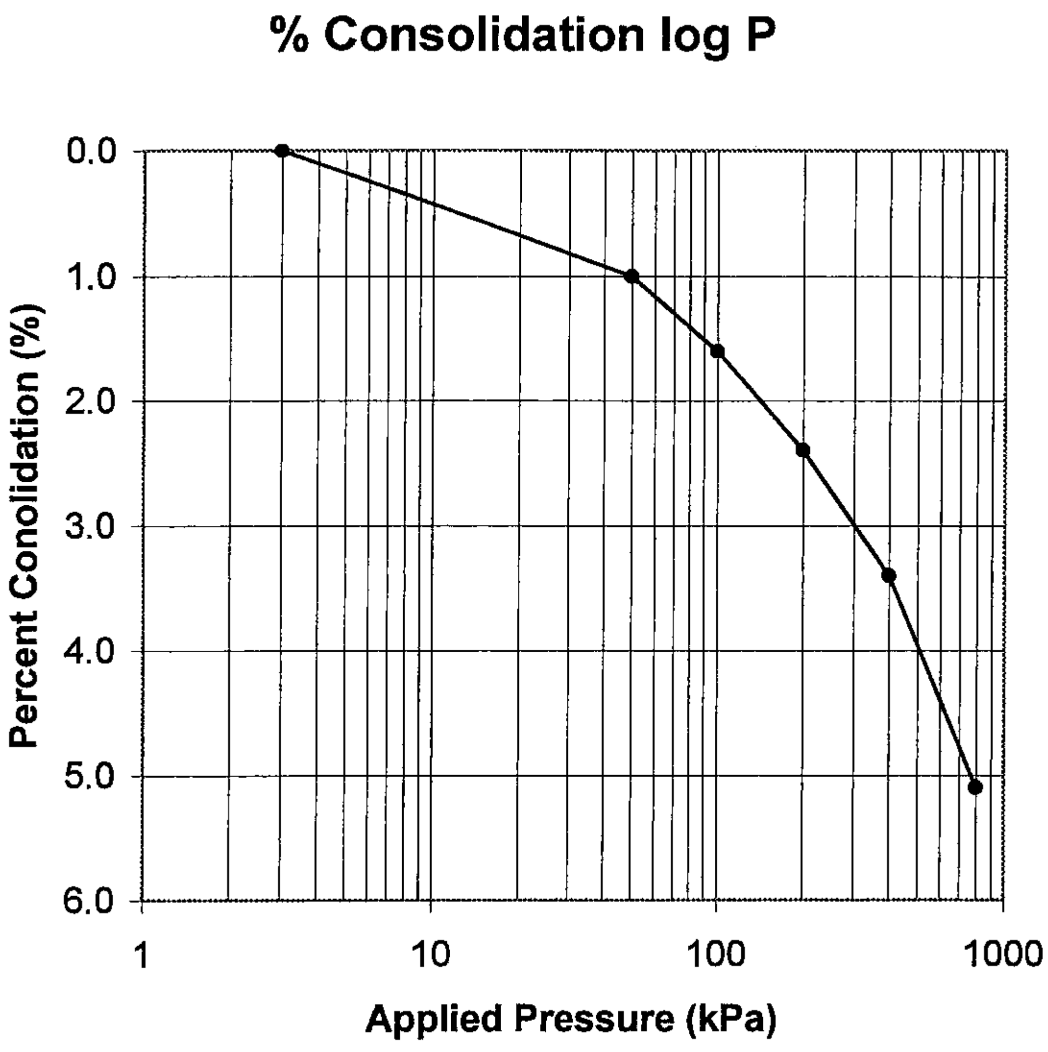
Golder Associates
Perth Laboratory
182 Lord Street
Perth, 6000
Phone (08) 9427 7600

TEST REPORT No. 46/03

Consolidation Test - % Consolidation Log P Graph

Client: KCGM
Project: Fimiston 1 TSF
Location: Kalgoorlie

Job No: 03641063
Lab No: #8001
Date Tested: 28-30/3/03



Sample Location: Tube A
Material Description: Beached Tailings

Test Methods AS1289
6.6.1 Consolidation Test
Sampling Procedure: Tested as received

Approved Signatory: ______________________ **Date:** ____________

A. Mangano **(Laboratory Manager)**

Golder Associates
Perth Laboratory
182 Lord Street
Perth, 6000
Phone (08) 9427 7600

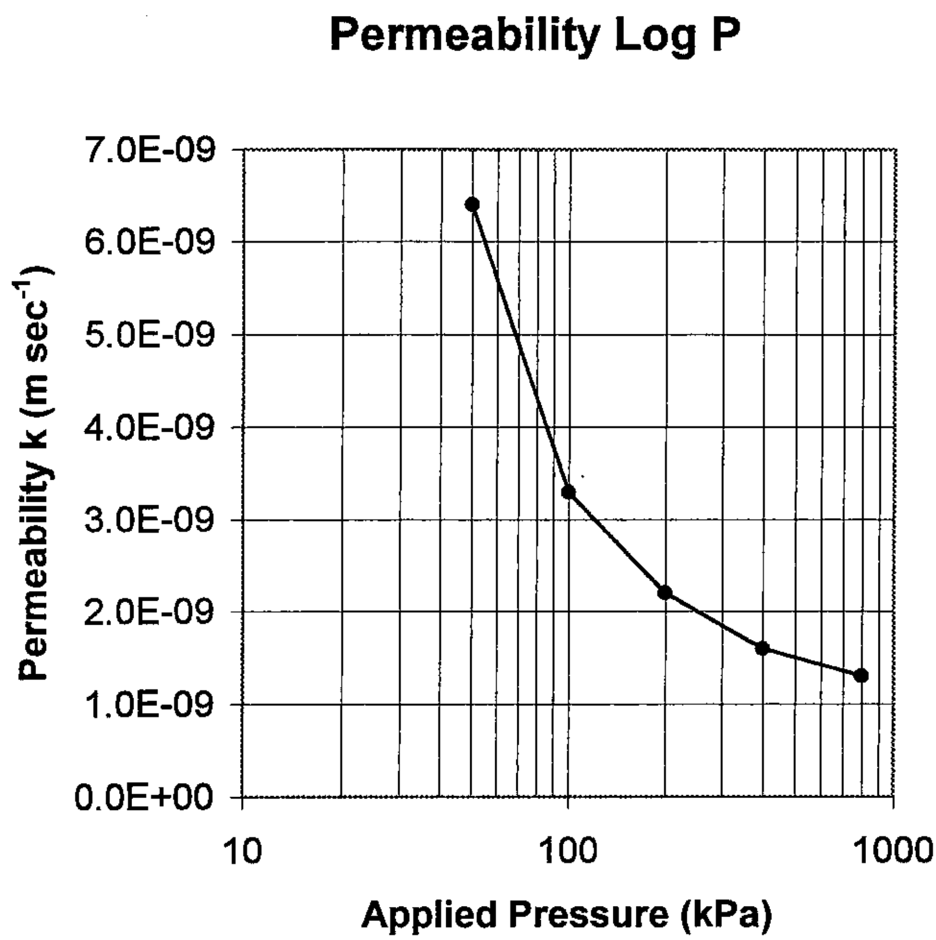
Golder Associates

TEST REPORT No. 46/03

Consolidation Test - Permeability log P Graph

Client: KCGM
Project: Fimiston 1 TSF
Location: Kalgoorlie

Report No: 03641063
Job No: #8001
Lab No: 28-30/3/03



Sample Location: Tube A
Material Description: Beached Tailings

Test Methods AS1289
6.6.1 Consolidation Test
Sampling Procedure: Tested as received

Approved Signatory: ______________________ **Date**: ______________
A. Mangano **(Laboratory Manager)**

CSIRO

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Tel: +61 8 9334 8000
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www.minerals.csiro.au

TONY

JOB No
GOLDER ASSOCIATES PTY LTD
REC'D 29 OCT 2002
DATE: BY:

PARTICLE ANALYSIS SERVICE

ANALYSIS REPORT

Analyst: [signature]

Phan Tuan Khanh

Report Authorised: P. J Austin

Peter J Austin
Manager

Date: 29.10.02

Report Number: R027270 (12) pages including cover

Golder Associates
Perth Laboratory
182 Lord Street
Perth, 6000
Phone (08) 9427 7600

Golder Associates

TEST REPORT

Density and Moisture Content on Tube Samples

Client: KCGM
Project: Annual TSF Audit
Location: Fimiston

Report No: 124/02
Job No: 02640199
Date Tested: 10/9/02

Material Description:		Tailings	
Laboratory Number:	#7547	#7548	#7549
Sample Location:	1-West (North Wall)	2 - A/B (Cell Wall)	2 - A/B (Cell Decant)
Density Details (Tube Specimen)			
Moisture Content (%):	12.2	12.6	34.6
Dry Density (t/m^3):	1.69	1.81	1.46

Test Methods
AS1289 2.1.1 Moisture Content
Density carried out by direct measurement

Sampling Procedure: Tested as received

Approved Signatory: A. Mangano **Date:** 2/10/02
(Laboratory Manager)

Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Sample Name : 02640 199 - Fimiston I West - Nth Wall # 7547

Batch No : R027270

PAS ID No : P39223

Dispersant : Water

Additives : 10 millilitres Sodium hexametaphosphate

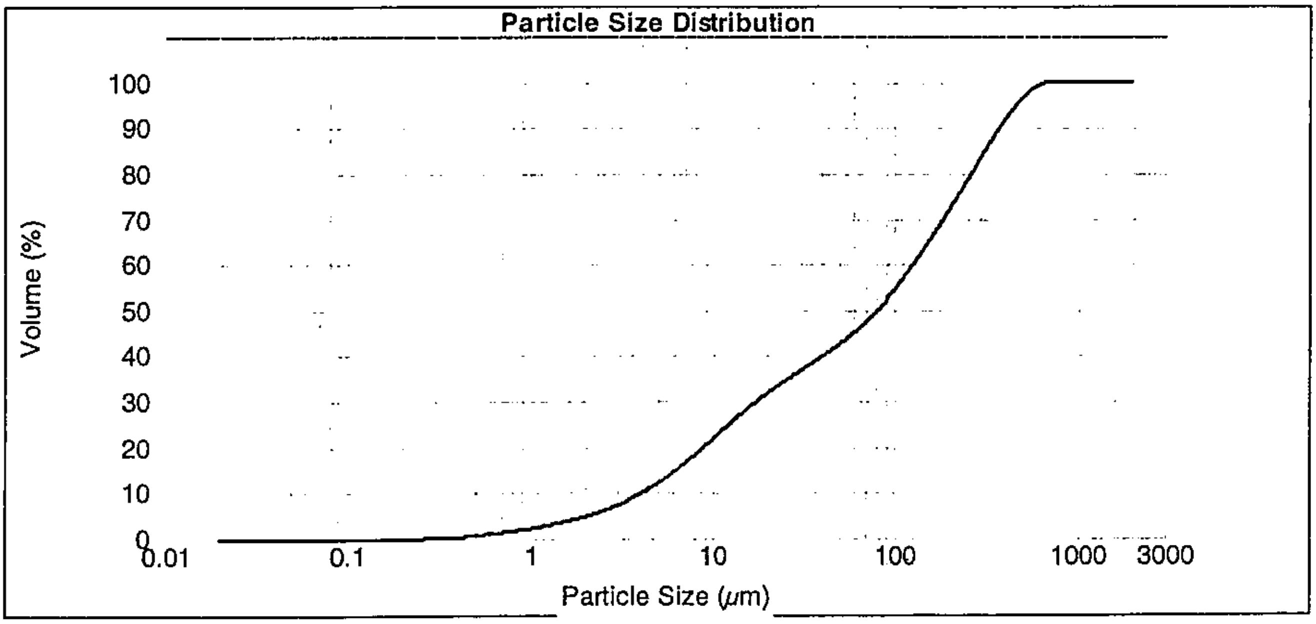
Sonication : 20 minutes in ultrasonic bath

SOP Name :

Analysis model : General purpose

Result units : Volume

Concentration :	0.0379 %Vol	**Vol. Weighted Mean D[4,3] :**	138.9...	µm	**d(0.1) :**	4.118	µm
Obscuration :	29.34 %	**Surface Weighted Mean D[3,2] :**	9.332	µm	**d(0.5) :**	80.665	µm
Weighted Residual :	1.768 %	**Specific Surface Area :**	0.643	m²/cc	**d(0.8) :**	265.005	µm



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.142	0.00	1.002	2.19	7.096	16.42	50.238	42.59	355.656	88.50
0.022	0.00	0.159	0.00	1.125	2.53	7.962	18.07	56.368	44.16	399.052	91.54
0.025	0.00	0.178	0.00	1.262	2.91	8.934	19.79	63.246	45.87	447.744	94.29
0.028	0.00	0.200	0.00	1.416	3.33	10.024	21.56	70.963	47.73	502.377	96.64
0.032	0.00	0.224	0.00	1.589	3.79	11.247	23.36	79.621	49.76	563.677	98.45
0.036	0.00	0.252	0.00	1.783	4.30	12.619	25.15	89.337	51.95	632.456	99.63
0.040	0.00	0.283	0.02	2.000	4.86	14.159	26.92	100.237	54.31	709.627	100.00
0.045	0.00	0.317	0.09	2.244	5.48	15.887	28.62	112.468	56.84	796.214	100.00
0.050	0.00	0.356	0.18	2.518	6.16	17.825	30.25	126.191	59.52	893.367	100.00
0.056	0.00	0.399	0.31	2.825	6.92	20.000	31.79	141.589	62.36	1002.374	100.00
0.063	0.00	0.448	0.46	3.170	7.75	22.440	33.25	158.866	65.35	1124.683	100.00
0.071	0.00	0.502	0.64	3.557	8.68	25.179	34.62	178.250	68.49	1261.915	100.00
0.080	0.00	0.564	0.85	3.991	9.70	28.251	35.94	200.000	71.74	1415.892	100.00
0.089	0.00	0.632	1.07	4.477	10.83	31.698	37.22	224.404	75.08	1588.656	100.00
0.100	0.00	0.710	1.32	5.024	12.07	35.566	38.49	251.785	78.48	1782.502	100.00
0.112	0.00	0.796	1.58	5.637	13.41	39.905	39.78	282.508	81.89	2000.000	100.00
0.126	0.00	0.893	1.87	6.325	14.87	44.774	41.14	316.979	85.25		

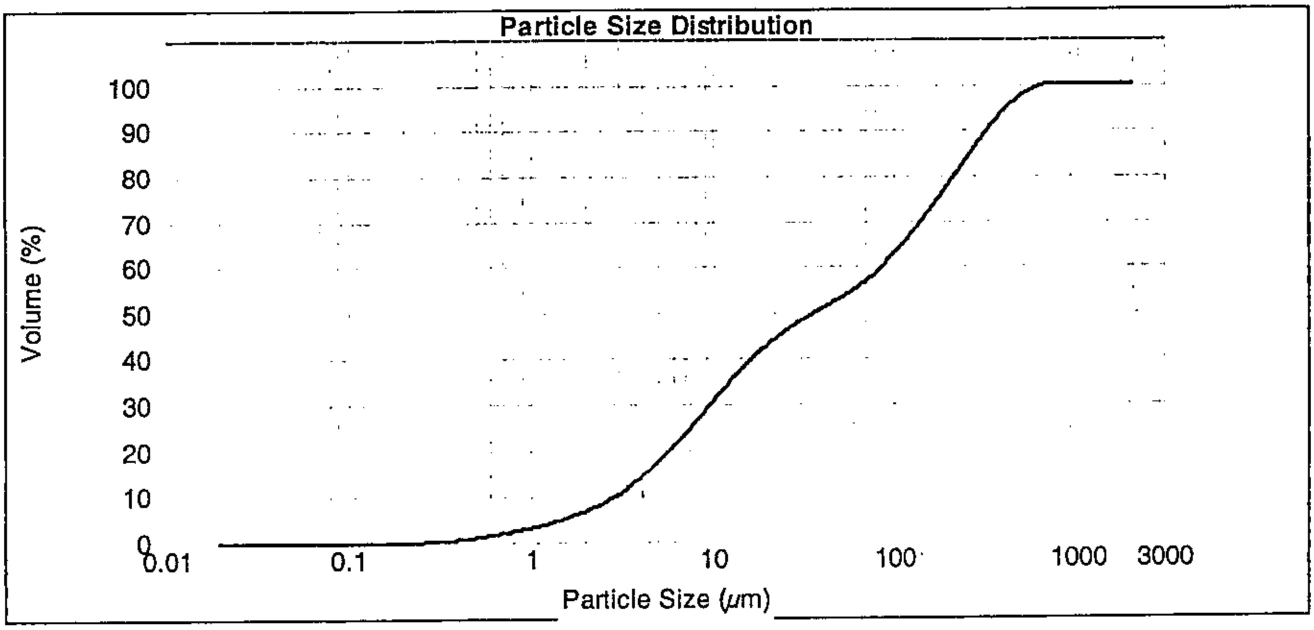
Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Sample Name :	02640 199 - Fimiston II A/B - Cell Wall # 7548			
Batch No :	R027270			
PAS ID No :	P39224			

Dispersant :	Water	**SOP Name :**	
Additives :	10 millilitres Sodium hexametaphosphate	**Analysis model :**	General purpose
Sonication :	20 minutes in ultrasonic bath	**Result units :**	Volume

Concentration :	0.0273 %Vol	**Vol. Weighted Mean D[4,3] :**	111.062 µm	d(0.1) :	2.890 µm
Obscuration :	29.04 %	**Surface Weighted Mean D[3,2] :**	6.841 µm	d(0.5) :	37.302 µm
Weighted Residual :	2.055 %	**Specific Surface Area :**	0.877 m²/cc	d(0.8) :	217.341 µm



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.142	0.00	1.002	3.07	7.096	23.42	50.238	52.90	355.656	91.98
0.022	0.00	0.159	0.00	1.125	3.55	7.962	25.69	56.368	54.15	399.052	94.25
0.025	0.00	0.178	0.00	1.262	4.07	8.934	28.03	63.246	55.50	447.744	96.18
0.028	0.00	0.200	0.00	1.416	4.65	10.024	30.38	70.963	57.00	502.377	97.74
0.032	0.00	0.224	0.00	1.589	5.30	11.247	32.73	79.621	58.65	563.677	98.89
0.036	0.00	0.252	0.00	1.783	6.01	12.619	35.02	89.337	60.47	632.456	99.71
0.040	0.00	0.283	0.03	2.000	6.81	14.159	37.22	100.237	62.47	709.627	100.00
0.045	0.00	0.317	0.12	2.244	7.69	15.887	39.28	112.468	64.64	796.214	100.00
0.050	0.00	0.356	0.26	2.518	8.67	17.825	41.19	126.191	66.98	893.367	100.00
0.056	0.00	0.399	0.44	2.825	9.77	20.000	42.93	141.589	69.49	1002.374	100.00
0.063	0.00	0.448	0.66	3.170	10.99	22.440	44.51	158.866	72.16	1124.683	100.00
0.071	0.00	0.502	0.91	3.557	12.33	25.179	45.94	178.250	74.96	1261.915	100.00
0.080	0.00	0.564	1.20	3.991	13.83	28.251	47.23	200.000	77.87	1415.892	100.00
0.089	0.00	0.632	1.51	4.477	15.47	31.698	48.42	224.404	80.82	1588.656	100.00
0.100	0.00	0.710	1.86	5.024	17.25	35.566	49.55	251.785	83.79	1782.502	100.00
0.112	0.00	0.796	2.23	5.637	19.18	39.905	50.64	282.508	86.68	2000.000	100.00
0.126	0.00	0.893	2.63	6.325	21.24	44.774	51.75	316.979	89.44		

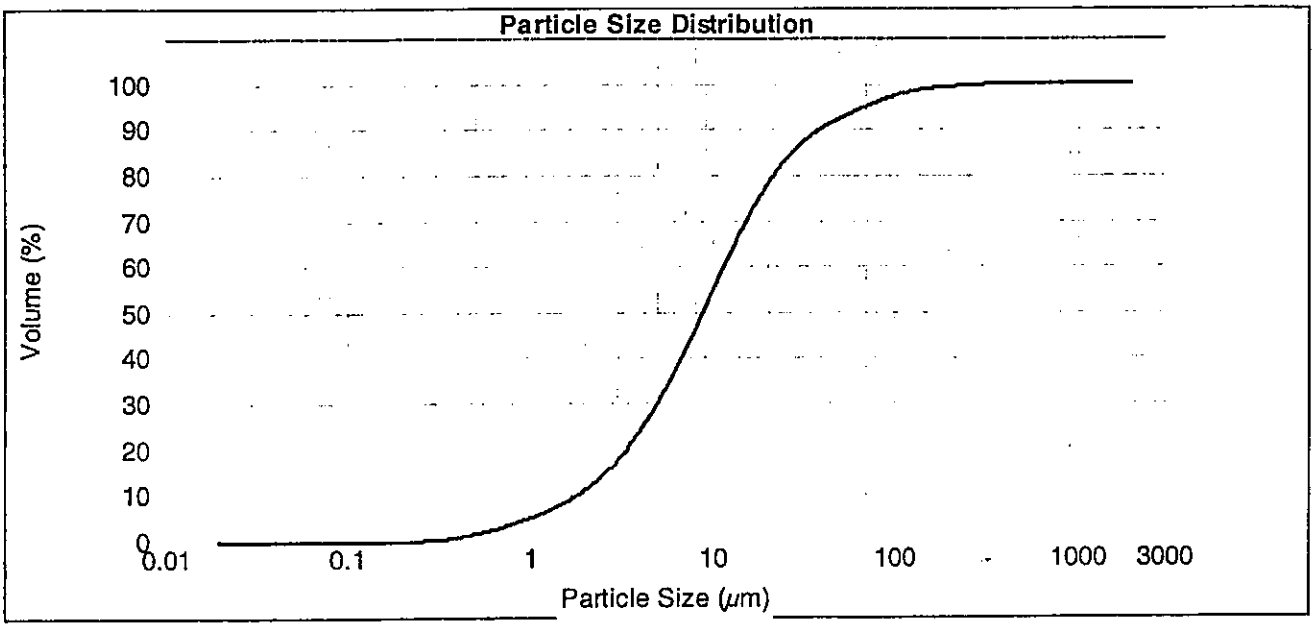
Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Sample Name :	02640 199 - Fimiston II A/B - Cell Decant # 7549
Batch No :	R027270
PAS ID No :	P39225

Dispersant :	Water	**SOP Name :**	
Additives :	10 millilitres Sodium hexametaphosphate	**Analysis model :**	General purpose
Sonication :	20 minutes in ultrasonic bath	**Result units :**	Volume

Concentration :	0.0130 %Vol	**Vol. Weighted Mean D[4,3] :**	18.503 µm	**d(0.1) :**	1.819 µm
Obscuration :	23.71 %	**Surface Weighted Mean D[3,2] :**	4.118 µm	**d(0.5) :**	9.008 µm
Weighted Residual :	0.544 %	**Specific Surface Area :**	1.46 m²/cc	**d(0.8) :**	21.938 µm



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.142	0.00	1.002	4.87	7.096	41.11	50.238	92.32	355.656	99.96
0.022	0.00	0.159	0.00	1.125	5.65	7.962	45.33	56.368	93.31	399.052	100.00
0.025	0.00	0.178	0.00	1.262	6.52	8.934	49.68	63.246	94.23	447.744	100.00
0.028	0.00	0.200	0.00	1.416	7.48	10.024	54.10	70.963	95.08	502.377	100.00
0.032	0.00	0.224	0.00	1.589	8.56	11.247	58.51	79.621	95.87	563.677	100.00
0.036	0.00	0.252	0.00	1.783	9.77	12.619	62.82	89.337	96.58	632.456	100.00
0.040	0.00	0.283	0.05	2.000	11.13	14.159	66.96	100.237	97.21	709.627	100.00
0.045	0.00	0.317	0.17	2.244	12.66	15.887	70.85	112.468	97.75	796.214	100.00
0.050	0.00	0.356	0.38	2.518	14.37	17.825	74.43	126.191	98.20	893.367	100.00
0.056	0.00	0.399	0.66	2.825	16.29	20.000	77.67	141.589	98.56	1002.374	100.00
0.063	0.00	0.448	1.00	3.170	18.44	22.440	80.54	158.866	98.84	1124.683	100.00
0.071	0.00	0.502	1.40	3.557	20.85	25.179	83.04	178.250	99.07	1261.915	100.00
0.080	0.00	0.564	1.86	3.991	23.53	28.251	85.21	200.000	99.25	1415.892	100.00
0.089	0.00	0.632	2.36	4.477	26.49	31.698	87.06	224.404	99.42	1588.656	100.00
0.100	0.00	0.710	2.91	5.024	29.75	35.566	88.65	251.785	99.58	1782.502	100.00
0.112	0.00	0.796	3.51	5.637	33.28	39.905	90.03	282.508	99.72	2000.000	100.00
0.126	0.00	0.893	4.16	6.325	37.08	44.774	91.24	316.979	99.85		

Golder Associates
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Perth, 6000
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TEST REPORT

Insitu Density and Moisture Content

Client: KCGM
Project: 2001 TSF Audit
Location: Kalgoorlie

Report No: 141/01
Job No: 01640226
Date Tested: 10/9/01

Laboratory Number:	#6830	#6831	#6832	#6835
Sample Location:	" A" Fim 1 West (Decant)	" B" Fim 1 West (Wall)	" D" D Paddock (Wall)	" D" D Paddock (Decant)
Sample Type:	Tube	Tube	Tube	Tube
Visual Description:	Tailings	Tailings	Tailings	Tailings
Moisture Content (%):	**38.2**	**8.0**	**30.9**	**44.5**
Tube Density (t/m^3):	**1.37**	**1.63**	**1.79**	**1.31**

Test Methods
Insitu Tube Density By Direct Measurement
AS1289.2.1.1 Moisture Content

Sampling Procedure: Tested as received

Approved Signatory: A. Mangano (A. Mangano) **Date:** 25/9/01

T:\LAB\ATTFINES.XLS
Golder Form No: LAB 07/99
Version 2 Revised: 18/1/01

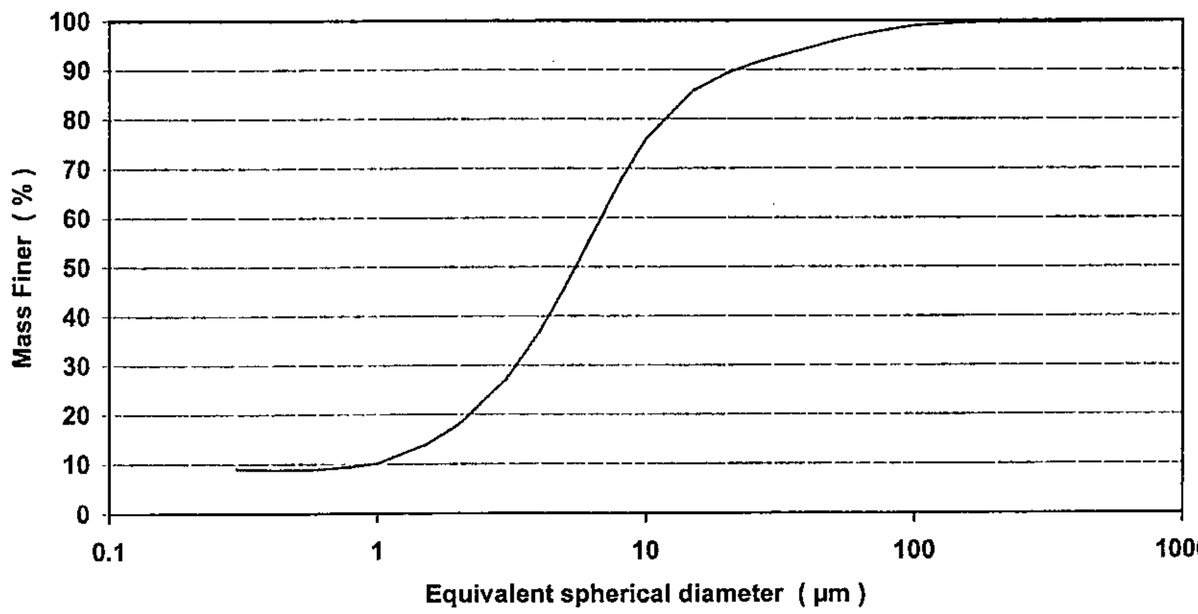
Analysis Report

CSIRO
Division of Minerals
Particle Analysis Service

Client:	Golder Associates
Sample name:	Tube A (#6830)
Report No:	R016676
PAS ID No:	P36828

Analysis:	X-ray sedimentation by Sedigraph 5100	**Analysis temp.:**	35.5 °C
Dispersant:	Water	**Sonication:**	20 min
Additives:	10mL sodium hexametaphosphate	**Concentration:**	10 % w/w

Sample density:	2.791	g/cm^3 (as measured by ASTM D4892 - '89,'Helium Pycnometry')	**Reynolds No:**	6.41
Liquid density:	0.994	g/cm^3	**Critical diameter:**	52.67 µm
Liquid viscosity:	0.715	cp		



Max size (µm)	Min size (µm)	In %
2000.00	150.00	0.50
150.00	100.00	0.55
100.00	80.00	0.80
80.00	60.00	1.30
60.00	50.00	1.10
50.00	40.00	1.50
40.00	30.00	1.80
30.00	25.00	1.50
25.00	20.00	1.80

Max size (µm)	Min size (µm)	In %
20.00	15.00	1.30
15.00	10.00	1.90
10.00	8.00	3.50
8.00	6.00	9.70
6.00	5.00	8.50
5.00	4.00	13.10
4.00	3.00	8.20
3.00	2.00	9.20
2.00	1.50	9.70

Max size (µm)	Min size (µm)	In %
1.50	1.00	9.30
1.00	0.80	4.20
0.80	0.60	3.70
0.60	0.50	0.70
0.50	0.40	0.50
0.40	0.30	0.10
0.30	0.00	8.85

Derived diameters	Size (µm)
d (0.9)	20.43
d (0.5)	5.37
d (0.1)	0.81

NOTE : *Data from 2000 µm to 150 µm by wet screening*

24/09/2001

APPENDIX D

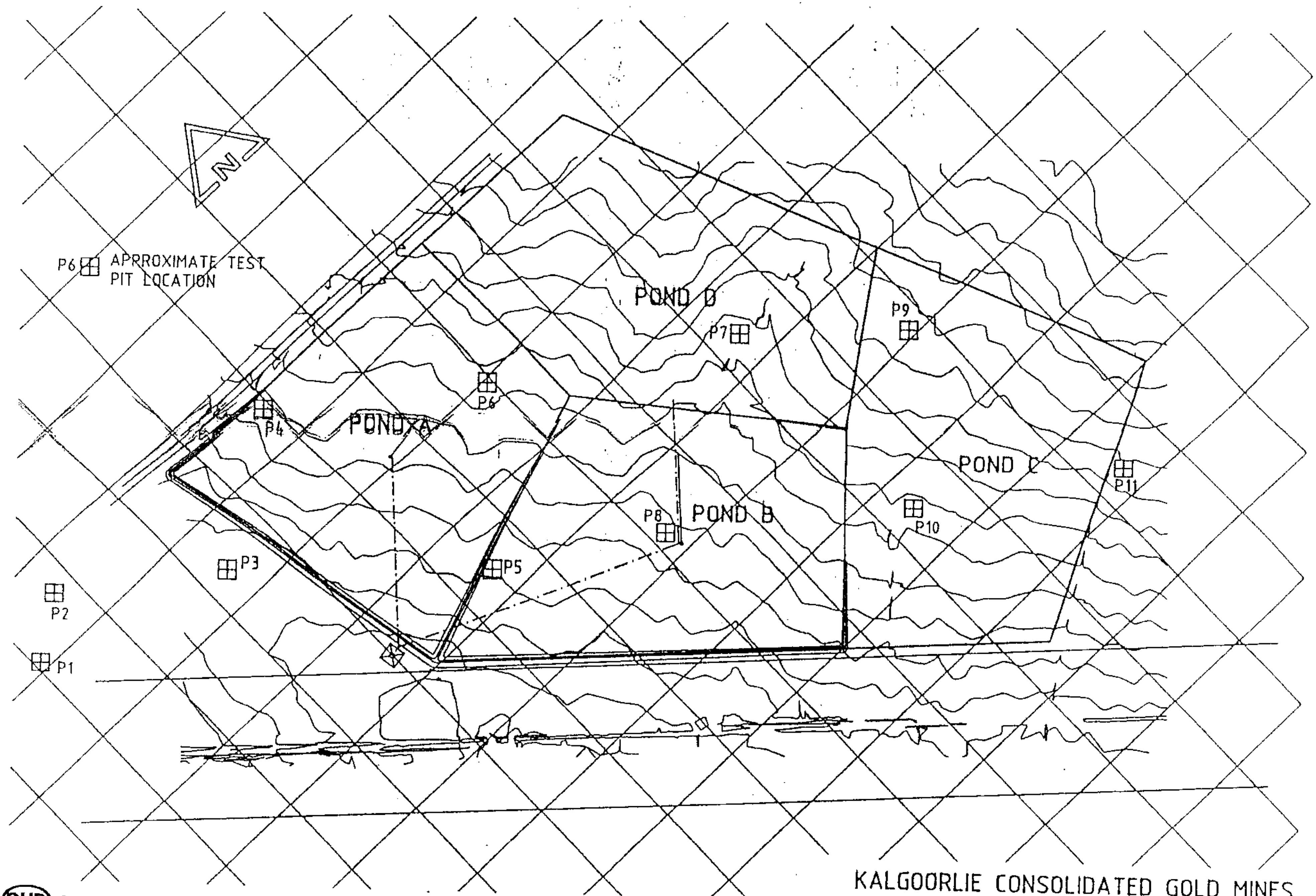
SITE INVESTIGATION OF FOUNDATION SOILS
TABULATED RESULTS AND
LABORATORY TEST CERTIFICATES

TABLE D1 : LABORATORY TEST RESULTS

Test Pit No.	Depth (m)	Unified Soils Classification	Grading			Atterberg Limits			Emerson Crumb No.	Hydraulic Conductivity (m/s)
			Fines (< 75 µm)	Sand (2.35 mm - 75 µm)	Gravel (>235 mm)	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)		
TP4	0.5	SC	49	38	13	38	21	9	4	
TP4	1.4	CH	53	33	14	63	43	15	2	
TP6	0.6	SC	46	36	18	40	19	10	4	2.1×10^{-8}
TP6	1.1	SC	47	29	24	46	28	13	4	
TP10	0.5	CL	56	41	3	39	19	10	4	
TP10	1.3	SC	40	37	23	41	24	12	4	
TP12	0.5	GM-SM	12	44	44	non-plastic			8	
TP12	1	GM	12	43	45	38	3	5	4	
TP16	1.2	SC	41	35	24	41	25	10	4	
TP18	0.4	SC	32	42	26	37	16	8	4	
TP18	0.9	GP	4	32	64	non-plastic			8	
TP18	1.5	GC	13	31	56	47	22	7	8	
TP19	1	GP-GM	6	42	52	non-plastic			8	
TP20	0.8	SM	10	54	36	non-plastic			4	
TP21	0.7	GM	9	33	58	34	2	3	8	
TP21	1.6	SM	19	42	39	33	0	3	8	
TP18 1.9m + TP20 1.5m		GC	28	30	42	31	13	7	2	9.0×10^{-8}
TP20 0.2m + TP21 0.2m		SC	34	43	23	47	28	12	4	1.4×10^{-9}

Note: Unified Soils Classifications have been revised on the basis of the laboratory test results

Tabulated results based on Table E1 of Golder Associates Report No.94640090, dated October 1994



GHD 3870-01-00

KALGOORLIE CONSOLIDATED GOLD MINES
FIMISTON
TEST PIT SITES
FIGURE 2

CLIENT: GUTTERIDGE HASKINS & DAVEY PTY LTD

PROJECT: SUBMITTED SAMPLE

SHEET No.: 2 OF: 8

JOB No.: S6096

DATE TESTED: 24/12/90

PARTICLE SIZE DISTRIBUTION TEST RESULT

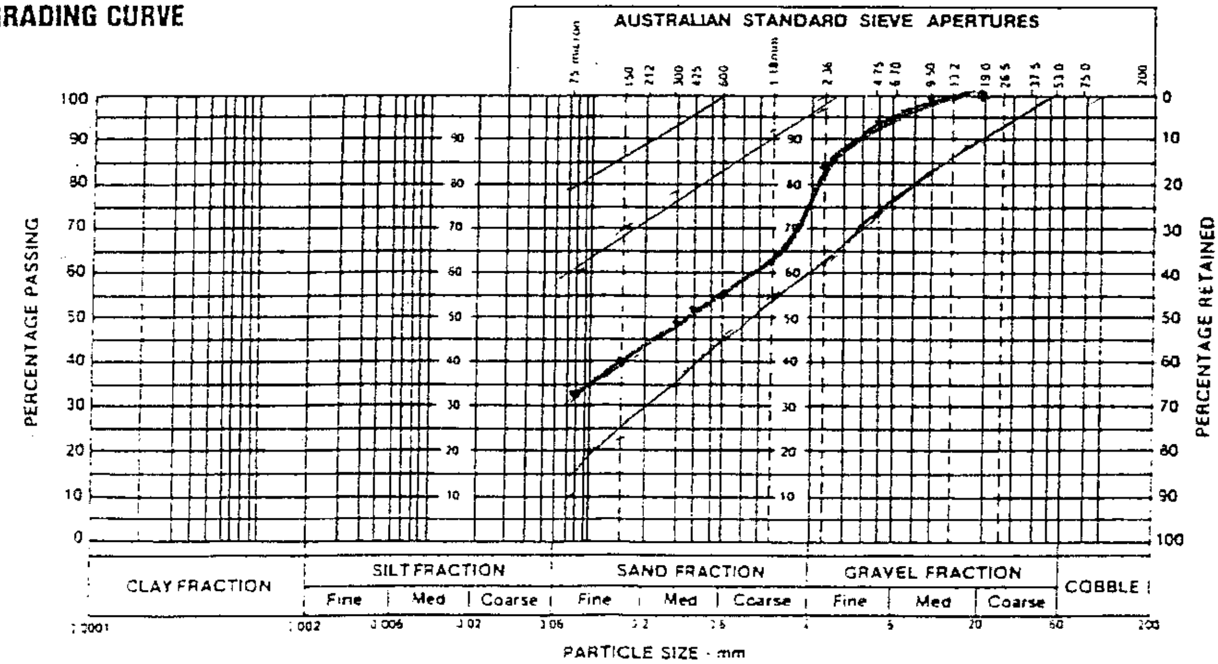
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
** Refer Remarks	–	–

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
75.0mm	–	1.18mm	67				
37.5mm	–	600 micron	55				
19.0mm	100	425 micron	51				
9.5mm	99	300 micron	48				
4.75mm	94	150 micron	40				
2.36mm	84	75 micron	33				

GRADING CURVE



REMARKS: ** P3 0.4 - 1.0m / P3 1.0 - 1.8m / P3 1.8 - 2.8m COMBINED

TESTED BY: AD CHECKED BY: RK DATE: 31/12/90

* Denotes use of Rock Colour Chart

CLIENT: GUTTERIDGE HASKINS & DAVEY PTY LTD

PROJECT: SUBMITTED SAMPLE

SHEET No.: 3 OF: 8

JOB No.: S6096

DATE TESTED: 24/12/90

PARTICLE SIZE DISTRIBUTION TEST RESULT

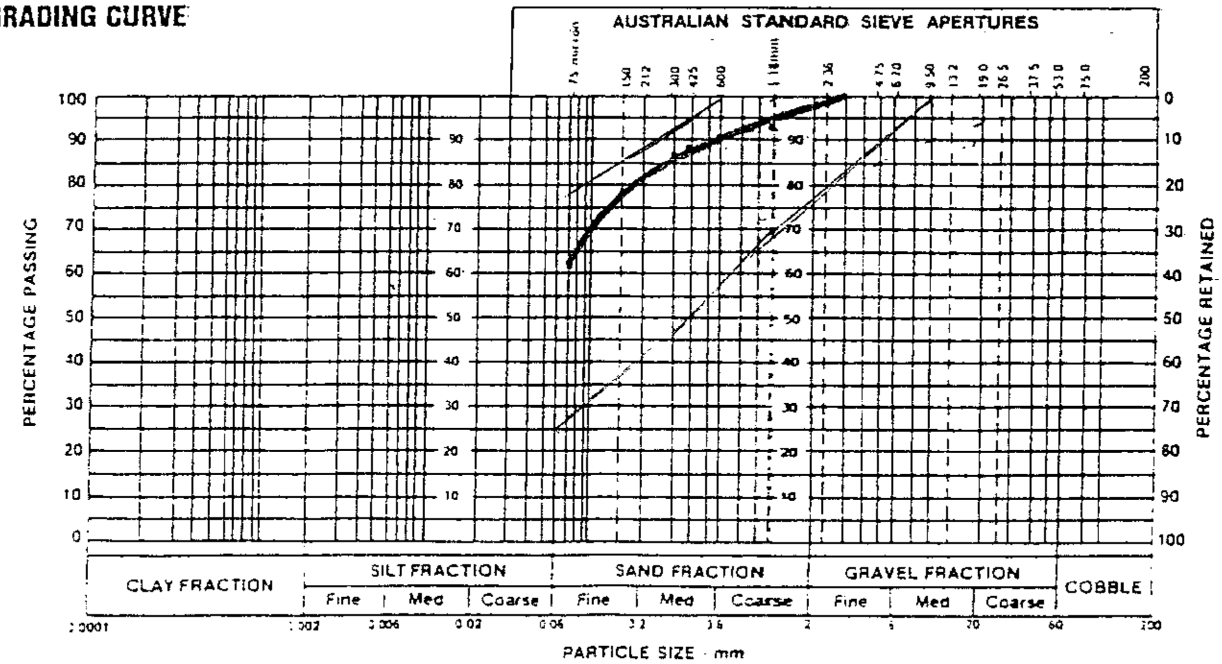
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
P5 0.6 - 2.4 m	sandy CLAY minor gravel	CH

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
75.0mm	–	1.18mm	93				
37.5mm	–	600 micron	90				
19.0mm	–	425 micron	88				
9.5mm	100	300 micron	86				
4.75mm	100	150 micron	78				
2.36mm	98	75 micron	61				

GRADING CURVE



TESTED BY: AD CHECKED BY: RK DATE: 31/12/90

* Denotes use of Rock Colour Chart

CLIENT: GUTTERIDGE HASKINS & DAVEY PTY. LTD.

PROJECT: SUBMITTED SAMPLE

SHEET No.: 4 OF: 8

JOB No.: S6096

DATE TESTED: 24/12/90

PARTICLE SIZE DISTRIBUTION TEST RESULT

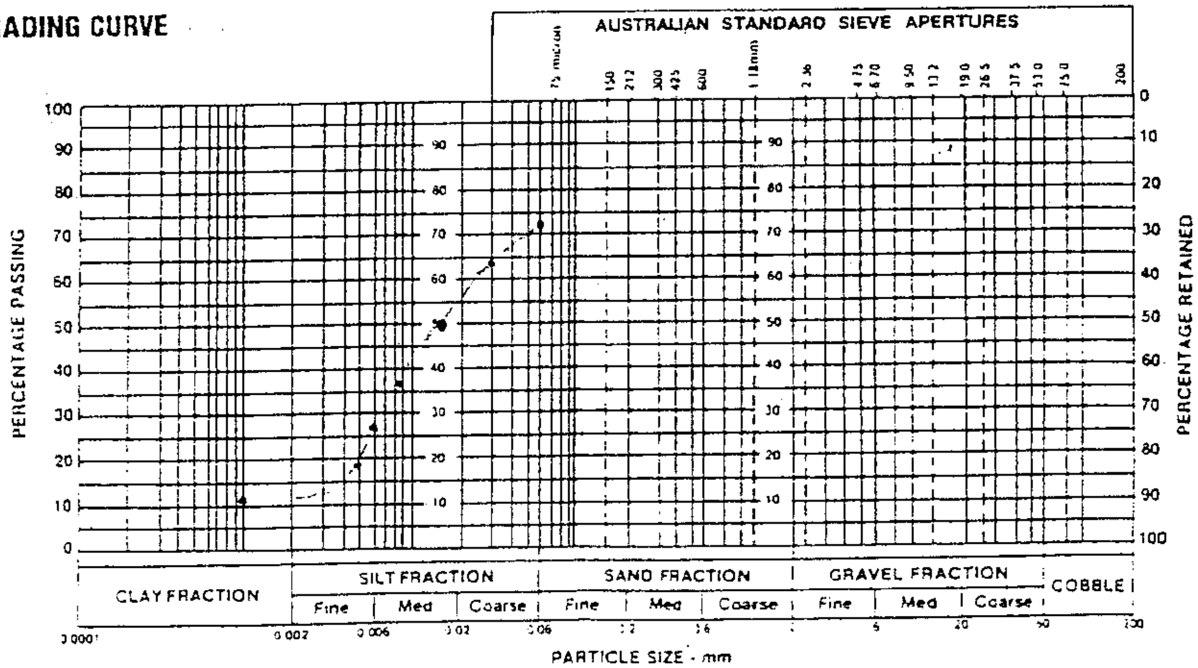
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
DAM 'D' NE CORNER	-	-

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.3

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
200 mm	-	2.36mm	-	75micron	-	12 micron	44
75.0mm	-	1.18mm	-	60 micron	72	9 micron	36
37.5mm	-	600micron	-	43 micron	68	6 micron	27
19.0mm	-	425micron	-	31 micron	64	5 micron	18
9.5mm	-	300micron	-	23 micron	57	1 micron	11
4.75mm	-	150micron	-	16 micron	50		

GRADING CURVE



TESTED BY: KM CHECKED BY: DW DATE: 28/12/90

* Denotes use of Rock Colour Chart

CLIENT: GUTTERIDGE HASKINS & DAVEY PTY. LTD.

PROJECT: SUBMITTED SAMPLE

SHEET No.: 5 OF: 8

JOB No.: S6096

DATE TESTED: 24/12/90

PARTICLE SIZE DISTRIBUTION TEST RESULT

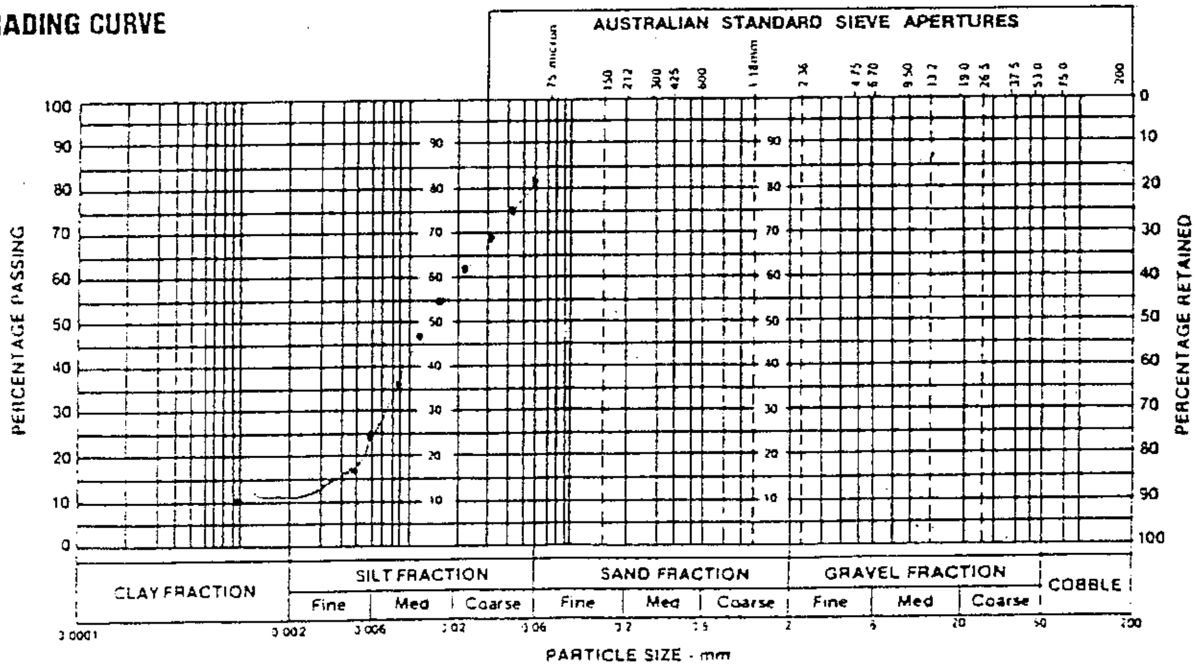
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
DAM 'B' NR DECAT 200m EAST	-	-

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.3

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
200 mm	-	2.36mm	-	75micron	-	12 micron	47
75.0mm	-	1.18mm	-	58 micron	81	9 micron	36
37.5mm	-	600micron	-	42 micron	75	6 micron	25
19.0mm	-	425micron	-	31 micron	69	5 micron	17
9.5mm	-	300micron	-	22 micron	62	1 micron	10
4.75mm	-	150micron	-	16 micron	55		

GRADING CURVE



TESTED BY: KM CHECKED BY: DW DATE: 28/12/90

* Denotes use of Rock Colour Chart

SRC 85/5

CLIENT:	GUTTERIDGE HASKINS & DAVEY PTY. LTD.	SHEET No.:	6 OF: 8
PROJECT:	SUBMITTED SAMPLE	JOB No.:	S6096
		DATE TESTED:	24/12/90

PARTICLE SIZE DISTRIBUTION TEST RESULT

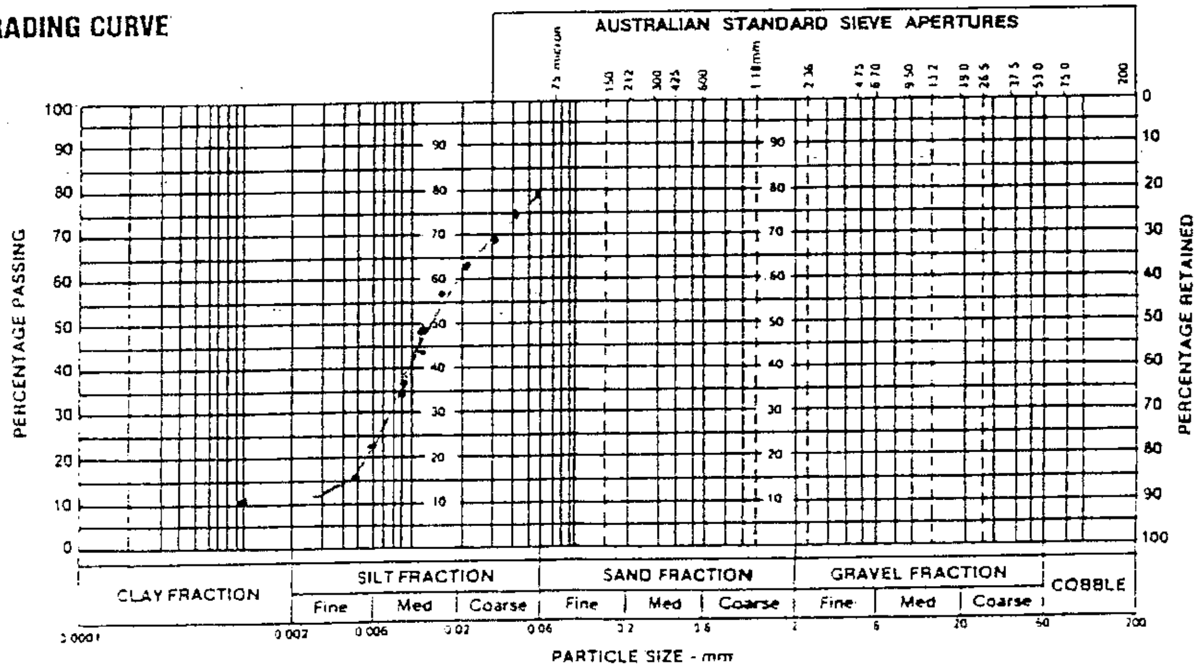
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
DAM 'B' NE CORNER 100m (MID POINT)	–	–

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.3

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
200 mm	–	2.36mm	–	75micron	–	12 micron	49
75.0mm	–	1.18mm	–	58 micron	79	9 micron	35
37.5mm	–	600micron	–	42 micron	75	6 micron	23
19.0mm	–	425micron	–	31 micron	69	5 micron	17
9.5mm	–	300micron	–	22 micron	63	1 micron	11
4.75mm	–	150micron	–	16 micron	56		

GRADING CURVE



TESTED BY: KM CHECKED BY: DW DATE: 28/12/90

* Denotes use of Rock Colour Chart

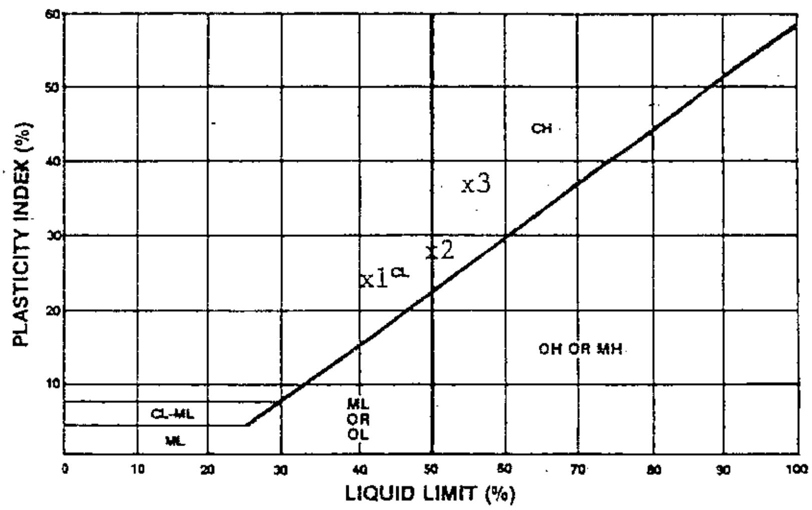
CLIENT:	GUTTERIDGE HASKINS & DAVEY PTY LTD	SHEET No.:	7 OF: 8
PROJECT:	SUBMITTED SAMPLE	JOB No.:	S6096
		DATE TESTED:	31/12/90

PLASTIC PROPERTIES - SUMMARY OF TEST RESULTS

LIMITS, INDEX, SHRINKAGE:- (AS 1289 C.1.1 C1.2 C2.1 C3.1 C4.1)

TEST NUMBER	1	2	3		
SAMPLE IDENTIFICATION	**	**	**		
DEPTH (m)	**	**	**		
LIQUID LIMIT (%)	41	50	55		
PLASTIC LIMIT (%)	18	22	19		
PLASTICITY INDEX (%)	23	28	36		
LINEAR SHRINKAGE (%)	11.5	12.0	15.0		
PASSING 425 MICRON SIEVE OF TOTAL SAMPLE (%)	-	-	-		

PLASTICITY CHART (A.S. 1726)



History of Samples: Cool Oven Dried

Method of Preparation: Dry Sieved

Method of Test One Point ☐

Standard ☒

Length of Linear Shrinkage Mould (mm) 250

Nature of Shrinkage

Test No: 1 Cracked
Test No: 2 Normal
Test No: 3 Curling

VISUAL CLASSIFICATION OF TOTAL SAMPLE:- (AS 1726)

TEST No.	DESCRIPTION	SYMBOL	REMARKS **
1	-	-	P3 0.4 - 1.0 m
2	-	-	P3 1.8 - 2.8 m
3	sandy CLAY minor gravel	CH	P5 0.6 - 2.4 m

TESTED BY: RK CHECKED BY: RK DATE: 31/12/90

* Denotes use of Rock Colour Chart

CLIENT:	GUTTERIDGE HASKINS & DAVEY PTY LTD	SHEET No.:	8 OF: 8
PROJECT:	SUBMITTED SAMPLE	JOB No.:	S6096
		DATE TESTED:	21/12/90

MOISTURE CONTENT DETERMINATION SUMMARY

Tested in accordance with the Australian Standard AS 1289 B1.1.

SAMPLE IDENTIFICATION	MOISTURE CONTENT (%)
Dam 'B' NE Corner 100m (midpoint)	28.6
Dam 'B' NR Decat 200m East	26.2
'D' Dam NE Corner	23.3

TESTED BY: KM CHECKED BY: RK DATE: 31/12/90

* Denotes use of Rock Colour Chart

APPENDIX E

STABILITY MODELLING

E STABILITY MODELLING

E1 Approach

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. Superficial slips on the outer slope of less than 1 m depth were ignored in the study.

The following minimum factors of safety (FoS), which are based on requirements set down by ANCOLD (ANCOLD, 1999), have been adopted for the Fimiston II TSF:

- Steady state under static loading: FoS = 1.5
- Earthquake or pseudo-static (OBE[1]): FoS = 1.2
- Maximum credible earthquake (MCE[2]): FoS = 1.0

As a probable maximum precipitation (PMP) event represents an extreme (1:1,000,000) event it has been considered appropriate to adopt a minimum factor of safety (FoS) of 1.0 for post-probable maximum precipitation (post-PMP) conditions under static loading.

E2 Peak Earthquake Loadings

Based on site specific probabilistic assessment (Golder Associates, 2004a) of a catalogue of crustal earthquakes from 1954 to 2004, in a subset extending 600 km east, west, north and south from the Fimiston II site. In addition, seismic data from the Mt Charlotte mine and the Fimiston Open Pit seismic monitoring system from 1994 to 2004 were considered separately. The most critical results from the seismic study in terms of anticipated ground accelerations are summarised in Table E1.

[1] Operating Base Earthquake (OBE)
[2] Maximum Credible Earthquake (MCE)

Table E1: Peak Earthquake Loadings for Fimiston TSFs

Return Period (years)	Peak Ground Acceleration (PGA)	Corresponding Earthquake Magnitude (M_L)
50	0.05g	1.1
100	0.06g	1.3
200	0.10g	1.6
475*	0.08g	1.9
1,000	0.14g	2.3
	0.28g	3.2

NOTE: A 475 year return period corresponds to a 10% likelihood of exceedence in 50 years

The seismic study indicates that earthquake magnitudes of up to 7.3 are possible. However, the peak ground accelerations associated with these events are significantly less than those given in Table E1.

The selection of an appropriate acceleration coefficient for use in pseudo-static limit equilibrium analyses of embankments such as at the Fimiston TSFs normally recognises that the slope is not rigid and that the peak acceleration due to earthquake loading only lasts for a very short period of time. Several recognised authorities in this field have recommended that an appropriate pseudo-static coefficient should correspond to between one half and one third of the peak maximum anticipated ground acceleration[3]. The analyses presented in the NOI addendum report have therefore used reasonably conservative acceleration coefficients of 0.5 × PGA.

Assuming a “High” hazard rating applies to both Fimiston I and Fimiston II, the design earthquake for the TSF according to ANCOLD should be 1:1,000 years. Accordingly, the corresponding horizontal acceleration for the operating base earthquake (OBE) is estimated at 0.5 × 0.14 g = 0.07 g and the horizontal acceleration for the maximum credible earthquake (MCE) is 0.5 × 0.28 g = 0.14 g.

E3 Probable Maximum Precipitation (PMP)

Conservatively, the “PMP phreatic surface” has been assumed to initiate at a distance of 10 m from the upstream crest of the perimeter embankments. The occurrence of the PMP may not immediately result in creating a fully saturated condition in the underlying tailings. Nevertheless, such a phreatic surface has been assumed to develop for the purpose of analysing the slope stability under the “PMP piezometric condition”.

[3] Kramer, SL (1996) *Geotechnical Earthquake Engineering* University of Washington, Prentice-Hall Inc, pp436-7.

E4 Material Parameters

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 2003a). Parameters adopted for the effective stress analyses are supported by past laboratory results and are consistent with previous analyses.

One issue to resolve when interpreting and assigning engineering parameters to tailings material is the classification of the material into either free draining material (granular) or a slow draining material (clayey). It is generally accepted that it is appropriate to utilise effective stress parameters for free draining materials. There is, however, some uncertainty in estimating the excess pore pressures under dynamic (earthquake) loading. Using total stress (undrained) strength parameters eliminates the need to estimate these excess pore pressures.

Based on the results of the piezoprobe test interpretations (Golder Associates, 2004c) and the difficulty in estimating excess pore pressure under dynamic conditions, it is judged that undrained or total stress parameters are likely to give a more realistic representation of the stability of the Fimiston II TSF under dynamic loading. Nevertheless, effective stress parameters are likely to provide a more representative result under static conditions.

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.

Table E2: Parameters used in Fimiston II Slope Stability Analyses

Material	Unit Weight (γ_m) (kN/m^3)	Friction Angle (ϕ') (degrees)	Cohesion (c') (kPa)	Undrained Shear Strength (s_u) (kPa)
Tailings 1	20	36	0	500
Tailings 2	20	35	0	400
Tailings 3	20	33	0	250
Tailings 4	20	31	0	200
Tailings 5	20	30	0	150
Tailings 6	20	29	0	100
Tailings 7	20	28	0	80
Tailings 8	20	27	0	50
Tailings in Borrow	20	30	0	-
Embankment Raises	19	35	7	-
Starter Embankment	19	30	17	-
Upper Foundation	22	29	25	-
Lower Foundation	22	30	40	-
Rock Cover	20	38	0	-

E5 Results

The results are presented in Tables E3 and E4 and are shown on Figures 17 to 26 of the main report for Sections A to E, respectively.

Table E3: 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	2.54	1.59
D	2.34	1.82	2.47	1.67
E	1.78	1.49	1.91	1.48

Table E4: 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.

APPENDIX F

SEEPAGE ANALYSIS

F SEEPAGE MODELLING

F1 Introduction

This Appendix presents the seepage analysis carried out to estimate the change in seepage rates between the current and proposed maximum allowable height of the embankments.

Since the deposition of tailings to Fimiston II began in 1991, the embankments have been raised in staged increments to near the current maximum allowable height. Staged construction of future embankment raises to the proposed maximum allowable height is expected to take place until about 2012.

F2 Foundation soils

The general geology in the project area is represented by an alluvial/colluvial/lacustrine sequence overlying weathered bedrock. Outcrops of bedrock occur to the east of the C and D Paddocks of the TSF.

The reported geological sequence at the TSF generally comprises:

1. 1 to 2 m layer of surficial sand, silt, clay or gravel;
2. 1 to 5 m layer of very stiff red-brown clay;
3. 6 to 8 m layer of sandy clay, grading down to clayey sand and gravel;
4. 1 to 4 m layer of ferricrete developed within blue-grey clays;
5. >5 m layer of blue-grey or mauve clays;
6. Weathered bedrock (mostly a clayey sequence).

For modelling purposes, the lithological sequence was represented by three hydrostratigraphic units:

1. Surficial silty sand layer
2. Clay layer
3. Weathered bedrock layer

F3 Conceptual Model

The Fimiston II TSF covers an area of 388 ha. It comprises three cells (A/B Paddock, C Paddock and D Paddock). There is a starter embankment at the toe of the facility and a drain at the base of the starter embankments, which were formed from compacted clay. Drains and abstraction wells around the perimeter of the TSF are used to control seepage emanating from the TSF.

Tailings deposition is rotated through each of the cells. Deposition occurs on each of the cells for several months each year. During tailings deposition, a decant pond is maintained at the centre of the cell. The maximum area of the pond is ~15% of the surface area of the TSF cell, but is normally operated with a significantly smaller area.

The TSF beach areas typically comprise a “wet beach” zone, situated around the pond and downstream of current or recently completed slurry discharge positions, and a “dry beach”, comprising partially saturated tailings. The wet beach typically represents about 30% of the total beach area. Most seepage from the TSF occurs from the pond and wet beach areas. Almost no seepage occurs from the dry beach areas because most of the water is held interstitially in the tailings.

The conceptual seepage model is shown in Figure 27 of the main report. From a hydrogeological perspective, the TSF is a complex system, and is heterogeneous and highly anisotropic. The hydraulic parameters of the tailings depend on the following factors:

1. Tailings are deposited in layers of coarse-grained and fine-grained tailings, thus the tailings are strongly anisotropic (horizontal permeability much higher than vertical permeability).

2. Particle segregation: Coarse-grained particles settle out of the slurry closer to the discharge point and fine-grained particles are generally transported to the centres of the respective cells. Tailings permeability therefore decreases towards the centre of the cell.

3. Consolidation: As the height of the TSF increases, the tailings near the base of the TSF become more consolidated. Thus, the permeability of the tailings decreases towards the base of the TSF.

4. Preferential pathways occur throughout the TSF comprising desiccation cracks, zones of higher permeability and other features. The average permeability of the *in situ* tailings could therefore be higher than what is measured on a small sample in the laboratory.

5. The initial layer of tailings deposition in the TSF, however, experienced less segregation of particles due to the influence of the ground contours and a rapid rate of rise. Thus, for the initial tailings layers, the permeability at the discharge point is similar to that in the centre of the TSF.

The flow behaviour through the TSF is also strongly influenced by the underlying foundation soils and groundwater conditions. As a general principle, if the permeability of the foundation soils is higher than the permeability of the tailings, water will seep through the foundation soils and into the groundwater. This is the case at Fimiston II TSF.

Because of seepage from the tailings, a groundwater mound will typically develop underneath the TSF. This groundwater mound underneath or within the TSF could affect seepage in the TSF. Figure 28 of the main report shows two possible groundwater mounding scenarios underneath a typical tailings storage facility.

In Scenario A, a groundwater mound has reached the base of the TSF (low mound). The groundwater level is at or close to ground surface. There is a high downward gradient in the TSF because of the high head difference between the pond level and the groundwater level, thus seepage flow is predominantly downward. A phreatic surface has developed within the TSF because of infiltration from the pond and wet beach. This water is perched on top of lower permeability tailings layers at the base of the TSF and has spread laterally because of the high anisotropy (horizontal permeability higher than vertical permeability).

In Scenario B, a groundwater mound has developed within the TSF and the groundwater level is at or close to pond level (thus the aquifer is ‘artesian’). There is a low downward hydraulic gradient in the TSF because of the small head difference between the pond level and the groundwater level, thus seepage flow is predominantly horizontal. The groundwater mound forms, in effect, a hydraulic barrier, which limits seepage from the TSF. A phreatic surface has developed within the TSF because of infiltration from the pond and wet beach. This water is perched on top of groundwater mound and has spread laterally because of the high anisotropy and predominant horizontal hydraulic gradient.

Accumulated evidence from the Fimiston II TSF monitoring data indicates that there is a low groundwater mound below the TSF, supporting Scenario A as a closer representation of the field conditions. The evidence includes:

1. piezoprobe data, which indicate a pore pressure of close to zero in the foundation soils below the TSF, thus the groundwater level in the foundation soils is at or slightly higher than ground level; and

2. readings from the vibrating wire and standpipe piezometers within the TSF, which indicate a phreatic surface (if present) is located at depths near to the base of the facility.

F4 Hydrogeological Parameters

Based on the consolidation tests of the tailings at the TSF, the hydraulic conductivity is estimated to be in the order of 10^{-8} to 10^{-9} m/s (refer to Appendix C). Permeability estimates from dissipation tests at various levels in the tailings mass in 2000 indicated hydraulic conductivities in the range of 10^{-7} to 10^{-8} m/s (Golder Associates, 2003).

F5 Model Construction

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

The TSF was divided into three regions, each characterised by unique foundation geology. Cross-sections I, II and III, located on Figure 29 of the main report, represented the geology at the northern, western and south-eastern zones of the Fimiston II TSF respectively. Each model cross-section incorporates five layers and three zones, including the low permeability undifferentiated tailings at the base of the TSF.

The model meshes of the cross-sections are shown in Figures 30 to 32. The finite element mesh comprised between 2,238 and 5,396 elements, ranging in size from 1 m × 3 m at the starter embankment to 13 m × 14 m at the other regions in the model area. The surface elevation is based on surveyed cross-sectional diagrams of the site and data is presented in Table F1.

Table F1: Current and Proposed Embankment Elevations and Heights

	Section I	**Section II**	**Section III**
Location	A/B Paddock	C Paddock	D Paddock
Approximate ground surface (m RL)	345	351	356
Embankment Height (m) at October 2004	27.2	23.2	20.6
Current Maximum Allowable Embankment Height (m)	30	32	30
Proposed Maximum Allowable Embankment Height (m)	45	44	42

In each case, the area modelled extends from the approximate centre of the TSF decant pond to a similar distance away from the perimeter embankment. A nominal allowance of 150 m below the ground surface was incorporated in the model to eliminate boundary effects.

Seepage from the TSF cross-sections was modelled using “transient” simulations, as seepage conditions at the TSF are not likely to have reached a “steady-state”. The models were simulated for the durations of deposition of approximately ten years for the current maximum allowable embankment heights and subsequent period of about eight years for the proposed maximum allowable embankment heights.

F6 Boundary Conditions

Pressure head boundaries with a value of 2 m were placed along the approximate area of the decant pond at the top of the TSF. This represented a 2 m deep pond at the TSF surface. The wet beach surrounding the pond was represented by pressure head boundaries with a value of 0 m.

Constant head boundaries were placed along the side of the model away from the TSF to simulate the approximate regional groundwater depth of 14 m. Seepage face review boundaries were placed along the surface of the perimeter embankments and at the underdrains to allow the model to permit seepage at these locations.

F7 Model Calibration

F7.1 General

Calibration of a model entails adjusting model input parameters in an attempt to match field conditions to acceptable criteria. The seepage model was calibrated to steady-state and transient-state conditions.

For the transient simulations, the seepage model was calibrated to current seepage rates through the TSF. Current seepage rates were estimated from recorded groundwater recovery rates and the water balance model for the Fimiston II TSF, and are estimated to lie between 50 and 60 L/s.

Approximately 76 L/s of water is currently being recovered from abstraction wells from the TSF (personal communication: KCGM personnel). The pumped water includes both seepage from the TSF, as well as groundwater abstraction. It is not possible to ascertain the proportion of water from each source.

The seepage model was also calibrated to hydraulic heads observed from piezometers located on the dry beach area of the TSF, screened within the tailings, and piezometers situated along the perimeter of the TSF, screened within the clay hydro-stratigraphical unit. Because of limited access, however, there are no piezometers situated in the centre of the TSF, nor directly below the TSF.

The vertical permeability of the tailings have been estimated based on back-calculations from the consolidation tests, which are contained in Appendix C (beached tailings). The results show that the vertical permeability of the tailings is $\sim 6 \times 10^{-9}$ m/s and decreases with increasing pressure (and increasing depth). At 400 kPa pressure (40 m depth) the permeability of the tailings is $\sim 1 \times 10^{-9}$ m/s. *In situ* permeabilities could be up to one order of magnitude higher than has been estimated from the consolidation tests because of the presence of preferential pathways in the tailings, arising from desiccation cracks, sandy lenses within the tailings and other features.

In 2004, Golder carried out a piezoprobe investigation on the Fimiston Tailings Storage Facilities (Golder, 2004). As part of this investigation, Golder carried out pore-pressure dissipation tests and estimated the horizontal permeability of the tailings. The dissipation test results indicate a horizontal permeability ranging between 1.0×10^{-7} m/s and 2.8×10^{-8} m/s with a geometrical mean value of 6.0×10^{-8} m/s.

The vertical and horizontal permeability estimates, based on the consolidation and dissipation test results, indicate a K_v:K_h anisotropy of between 1:1 and 1:10. However, comparison of the piezoprobe results (measuring K_h) and the oedometer results (measuring K_v) suggests that it is possible for the vertical to horizontal anisotropy be up to 1:100 in the lower tailings layers.

During the piezoprobe investigation carried out in 2004, the hydrostatic pore pressure distribution was measured at various locations through the TSF. These measurements provide pressure head profiles throughout the tailings and into the foundation soils, against which the seepage model has been calibrated.

In general, the pressure head profiles indicate that the phreatic surface is situated between 0 and 10 m above the base of the TSF. Generally, the pressure head gradient was lower than hydrostatic, which indicates downward flow of seepage water within the TSF.

For almost all the pressure head profiles, the pore pressure at the base of the TSF was 0 m. These pressure head values were probably recorded within the foundation soils below the TSF (which is evident by the change in friction ratio, tip resistance and undrained shear strength). This indicates that the groundwater level is situated at, or below, the ground surface underlying the TSF.

In summary, the seepage model has been calibrated to a series of criteria which were measured from various *in situ* tests, laboratory tests and water level data. The model calibration criteria are summarised in Table F2.

Table F2: Model Calibration Criteria

Parameter	Value	Comments & Reference
Seepage rates from TSF	Between 50 and 60 L/s	Based on the water balance model for the TSF and seepage recovery rates provided by KCGM
Piezometers situated at edge and within TSF	Water level between 1 and 10 m above base of TSF and remaining constant	Monitoring data provided by KCGM
Piezometers situated around the TSF	Between 0 and 6 m below ground level	Monitoring data provided by KCGM
Pressure head at base of TSF	0 m	Piezoprobe data (Golder 2004c)

Parameter	Value	Comments & Reference
Permeability of tailings	Between 1×10^{-7} m/s and 1×10^{-9} m/s	Dissipation tests (Golder 2004c & Appendix C of this report)
Anisotropy of tailings (K_v:K_h) due to layers of fine-grained and coarse-grained tailings	Between 1:1 and more than 1:10	Dissipation tests and consolidation tests (Golder 2004c & Appendix C)
Permeability of tailings decreases with depth due to consolidation and decreases towards centre of TSF because of particle size differentiation		Consolidation tests (Appendix C of this report and experience-based judgement)

F7.2 Model Calibration Runs

A series of model runs were compiled and executed as part of the calibration of the seepage model and this is described below:

Group Run 1

This modelling run was based on the permeability values estimated from the consolidation and dissipation tests. The seepage model comprised three zones within the TSF, with decreasing permeability towards the centre of the TSF (because fine grained tailings are situated at the centre of the TSF) and a decreasing permeability towards the bottom of the tailings (because of consolidation).

The model predicted a groundwater mound developing underneath the tailings. This modelled groundwater mound extends into the tailings, thus causing an increased pressure head at the base of the tailings. The modelled mound also changed the hydraulic gradient in the tailings – there is a very small modelled downward gradient. The groundwater mound acts as a hydraulic barrier to downward flow, which limits seepage from the TSF.

It is our opinion that this modelling run does not represent actual flow behaviour in the TSF because a number of calibration criteria are not met. In particular the modelled seepage rates are much lower than measured and pressure heads at the base of the TSF are much higher than measured.

Group Run 2

This calibration group comprised four separate modelling runs, in which the permeability of the tailings was gradually increased until the modelled seepage rates matched the seepage rates estimated from the water balance. The number of zones remained the same (three), but the number of horizontal layers modelled was reduced to only one.

As with Group Run 1, the model predicted a groundwater mound developing underneath the tailings. This modelled groundwater mound extends into the tailings, thus causing an increased pressure head at the base of the tailings. The modelled mound also changed the hydraulic gradient in the tailings – there is a very small modelled downward gradient. The groundwater mound acts as a hydraulic barrier to downward flow, which limits seepage from the TSF.

We have judged that this modelling run also does not represent actual flow behaviour in the TSF because a number of calibration criteria are not met. In particular the pressure heads at the base of the TSF are much higher than measured and the adopted permeability of the tailings are much higher than measured from both the consolidation and dissipation tests.

Group Run 3

For this calibration group run, the conceptual model was revised through the following changes to the seepage model:

- A low permeability tailings layer (2m) was introduced at the base of the TSF which represents the initial deposition of un-segregated tailings on the ground surface. It has been assumed that, during the initial deposition of tailings, the tailings did not segregate into coarse and fine grained tailings.

- The number of tailings zones was reduced to one, comprising two material types, namely, a low permeability un-segregated tailings at the base of the TSF and the remainder comprising segregated tailings.

- The permeability of the tailings was similar to the initial values.

- The permeability of the clay layer underneath the TSF was increased from 1×10^{-8} to 5×10^{-7} m/s

The lower permeability undifferentiated tailings layer reduced the seepage into the groundwater, while the higher permeability clay layer increased the horizontal groundwater flow velocity. These two factors resulted in a reduction of the extent of groundwater mound developing underneath the TSF.

The model predicted less extensive groundwater mounding underneath the tailings compared to previous modelling runs, with the mound reaching the ground level underneath the TSF. The hydraulic gradient in the TSF is predominantly downwards with a value slightly higher than one. In contrast to previous models, the groundwater mound does *not* act as a hydraulic barrier to downward flow.

The tailings water is perched on top of the low permeability undifferentiated tailings at the base of the TSF and spreads towards the outside of the TSF.

For this modelling run, all of the model calibration criteria have been met within acceptable criteria. However, we could not find any evidence of a sharp transition of permeability between the lower undifferentiated tailings and the remaining segregated tailings in the monitoring data, as suggested by the model. Thus we could not justify the conceptual model assumed for Group Run 3.

Group Run 4

For this calibration group run, five layers and three zones were reincorporated into the seepage model, similar to Group Run 1. However, the low permeability undifferentiated tailings was retained at the base of the TSF. Thus, there is a gradual decrease of permeability towards the base of the TSF, caused by consolidation of the tailings. There is also a gradual decrease of permeability towards the centre of the TSF because of segregation, except for Layer 1, at the base of the TSF, where little segregation took place.

The lower permeability un-segregated tailings layer reduced the seepage from the TSF into the groundwater while the higher permeability clay layer within the foundation soils increased the horizontal groundwater flow velocity. These two factors resulted in a reduction of the extent of groundwater mound developing underneath the TSF.

Approximately 70 modelling runs were carried out for Group Run 4 and for each modelling run the parameters of the tailings were adjusted until it matched the model calibration criteria.

The following boundaries were set for Group Run 4:

1. A pressure head boundary of 2 m (representing a 2 m deep pond) along 10% of the TSF surface.

2. A pressure head boundary of 0 m on the "wet beach" of the TSF representing water infiltrating the wet beach area.

3. A seepage boundary along the drain (to allow seepage through the drain of the TSF).

4. A constant head boundary of 336 m at a distance of ~700 m from the toe of the TSF representing the regional groundwater level.

The comparison of the model results with the model criteria is summarised in Table F3 below.

Table F3: Comparison of Group Run 4 Model Results

Parameter	Criteria	Model Value
Seepage rates from TSF	Between 50 and 60 L/s	51 L/s
Piezometers situated at edge and within TSF	Water level between 1 and 10 m above base of TSF and remaining constant	Water level between 1 and 8 m above base of TSF and remaining constant
Piezometers situated around the TSF	Between 0 and 6 m below ground level	Between 6 and 13 m below ground level
Pressure head at base of TSF	0 m	Between 0 and 2 m

The groundwater mound underneath the tailings predicted by the model is similar to that of Group Run 3. The hydraulic gradient in the TSF is predominantly downwards with a value slightly higher than one. As with Group Run 3, the groundwater mound does *not* act as a hydraulic barrier to downward flow. The tailings water is perched in the TSF and spreads towards the outside of the TSF because of the relatively higher horizontal permeability of the tailings.

For this modelling run, all of the model calibration criteria have been met within acceptable limits and the modelling assumption could be justified. We have judged that **this modelling run reasonably represents actual flow conditions in the TSF and can therefore be used for prediction of seepage rates at the Fimiston II TSF**.

F8 Input Parameters

The hydraulic properties adopted in the numerical models are shown in Table F4, and are within the expected range of permeability for these materials (Golder 2004c and Appendix C).

Table F4: Initial and Calibrated Hydraulic Parameters

Parameter	Porosity	Initial Value		Calibrated Value	
		K_v (m/s)	K_v:K_h	K_v (m/s)	K_v:K_h
Layer 1, Zone 1 (2 m)	50%	1×10^{-9}	1:1	1.3×10^{-9}	1:1.5
Layer 2, Zone 1 (7 m)	50%	2×10^{-9}	1:1	4×10^{-9}	1:10
Layer 3, Zone 1 (7 m)	50%	3×10^{-9}	1:1	6×10^{-9}	1:10
Layer 4, Zone 1 (7 m)	50%	4×10^{-9}	1:1	8×10^{-9}	1:10
Layer 5, Zone 1 (4.5 m)	50%	5×10^{-9}	1:1	1×10^{-8}	1:10
Layer 1, Zone 2 (2 m)	50%	1×10^{-8}	1:2	1.3×10^{-9}	1:4
Layer 2, Zone 2 (7 m)	50%	2×10^{-8}	1:2	2×10^{-8}	1:10
Layer 3, Zone 2 (7 m)	50%	3×10^{-8}	1:2	3×10^{-8}	1:10
Layer 4, Zone 2 (7 m)	50%	4×10^{-8}	1:2	4×10^{-8}	1:10
Layer 5, Zone 2 (7 m)	50%	5×10^{-8}	1:2	5×10^{-8}	1:10

Parameter	Porosity	Initial Value		Calibrated Value	
		K_v (m/s)	K_v:K_h	K_v (m/s)	K_v:K_h
Layer 1, Zone 3 (2 m)	50%	1×10^{-7}	1:10	1.3×10^{-9}	1:8
Layer 2, Zone 3 (7 m)	50%	2×10^{-7}	1:10	3×10^{-8}	1:20
Layer 3, Zone 3 (7 m)	50%	3×10^{-7}	1:10	3.5×10^{-8}	1:20
Layer 4, Zone 3 (7 m)	50%	4×10^{-8}	1:10	4×10^{-8}	1:20
Layer 5, Zone 3 (7 m)	50%	5×10^{-7}	1:10	4.5×10^{-8}	1:20
Silty Sand (2 m)	41%	1×10^{-6}	1:2	1×10^{-6}	1:5
Clay (16 m)	51%	1×10^{-8}	1:2	5×10^{-7}	1:5
Weathered Bedrock	5%	1×10^{-6}	1:2	1×10^{-6}	1:5
Drain	35%	1×10^{-4}	1:1	1×10^{-4}	1:1
Starter embankment	41%	1×10^{-8}	1:1	1×10^{-8}	1:1

F9 Results

The results of the analyses are presented as estimates of the seepage rates at the base of the TSF. The estimates of unit seepage rates for each of the three zones of the TSF were based on the three cross-sections described previously (refer Figure 29). The estimated fluxes were multiplied by the length of perimeter of the TSF facility applicable to each of the three zones.

The phreatic surfaces and total head contours of the three modelled cross-sections are shown in Figures 33 to 35. The estimated seepage rates from the TSF at current and proposed maximum embankment heights are shown in Table F5.

Table F5: Estimated Seepage from Fimiston II TSF

Zone of 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**

F10 Conclusion

It is estimated that the proposed increase in embankment height of the Fimiston II TSF will result in modelled seepage of the order of 51 to 53 L/s and little different to the seepage at the currently licenced height due to the downward hydraulic gradient within the tailings remaining approximately constant as the embankment height increases.

APPENDIX G

DAM BREAK ANALYSIS

G DAM BREAK ANALYSIS

G1 Introduction

The interaction and inter-dependency of the many possible causes of a "dam break" of one or more of the three Paddocks on the Fimiston II TSF (referred to as A/B, C and D – Figure 36) have complicated this assessment. It is very rare for a failure of any TSF to occur as a result of a single event. Failure of The Fimiston II TSF is only likely to be a result of an unfortunate combination of events that may not have been readily foreseeable prior to the occurrence of failure. In many documented cases of flow failures, the mechanisms of failure have arisen from complex combinations of conditions that could not have been easily predicted by the designers or operators prior to failure. It has therefore been important to carry out this study in a manner that allows for the consideration of a wide variety of contributions to a possible dam break and subsequent flow failure of the TSF.

A quantitative risk-based approach, making use of Fault and Event Trees, has been adopted as the underlying methodology for this study. 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. This study has drawn upon Golder Associates' knowledge of the site, as well as information obtained from KCGM.

G2 Objectives

The objectives of this study were to provide the following:

- An indication of the possible mechanisms of TSF failure that could lead to a breach of the facility, resulting in the subsequent release of water and/or liquefied tailings to the downstream environment.

- An indication of the route and geometry of a flow of water and liquefied residue following a breach of an outer wall of one or more Paddock.

- An estimation of the risks of inundation downstream of the breach.

- A defensible analysis that satisfies the requirements of the local authorities and other interested parties and forms part of an emergency action plan to be incorporated into the TSF Operating Manual.

G3 Study Scope and Limitations

To address the above objectives the study scope covers identification and assessment of the potential failure of Paddocks A/B, C and D that could precipitate a dam break and release of significant volumes of liquefied tailings and/or water to the downstream environment. The study has excluded consideration of failures that would only result in relatively minor consequences.

The risk-based dam break assessments have been carried out using qualitative and quantitative methods, as broadly referenced in Australian Standard AS 3931:1998, and following the recommended protocol by Williams (1998).

G4 Method Adopted

G4.1 Step 1 – Qualitative Assessment

The initial step in this study involved a qualitative assessment of potential "pathways" of dam breaks that could conceivably result in release of significant volumes of material to the downstream environment. These pathways are schematically illustrated on Figure 36 and are described below.

- **Pathway 1** – breach of the south-western embankment of C Paddock, resulting in release of tailings and/or water directly on to the Trans-Australian Railway.

- **Pathway 2** – breach of the south-western embankment of A/B Paddock, resulting in release of tailings and/or water directly on to the Trans-Australian Railway.

- **Pathway 3** – breach of the northern embankment of A/B Paddock, resulting in release of tailings and/or water directly on to the Bulong Road.

- **Pathway 4** – breach of the northern embankment of D Paddock, resulting in release of tailings and/or water directly on to the Bulong Road.

- **Pathway 5** – breach of the eastern embankment of D Paddock, resulting in release of tailings and/or water that may impact on the Trans-Australian Railway.

Having identified the pathways of potential failures from the TSF, the next step involved the identification of mechanisms of possible failures. Such mechanisms include some, or all, of the following for each pathway:

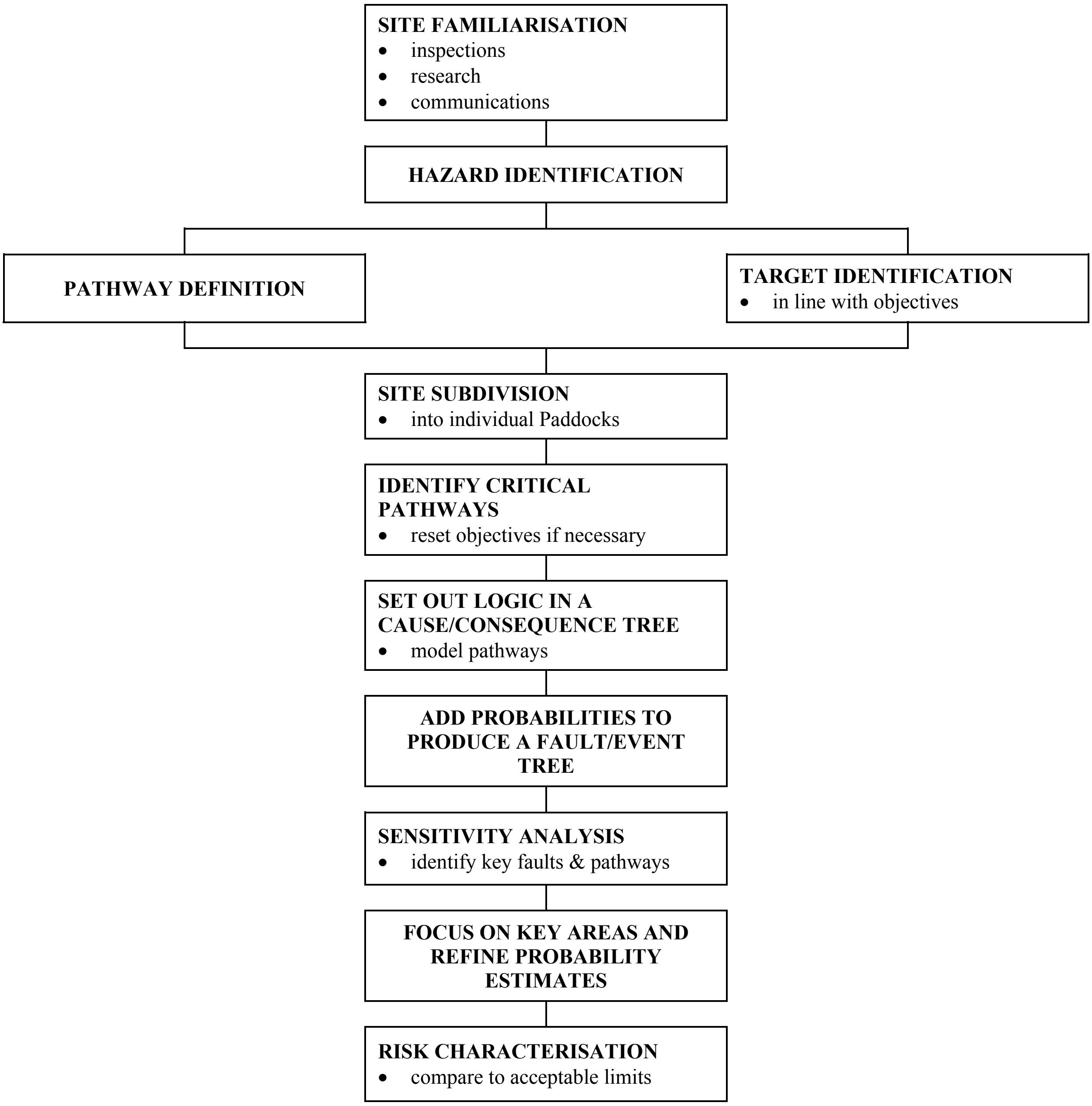
- Overtopping of a perimeter embankment.

- Slope failure of the outer embankment (under static and earthquake conditions).

- Piping erosion failure through the embankment.
- Progressive sloughing due to seepage.
- Erosion of the outer embankment due to pipe breakage.
- Progressive wind/rainfall erosion of outer embankment.

G4.2 Step 2 – Quantitative Assessment

The flow chart below summarises the procedure that was followed in the quantitative risk assessment process.



The components of the above flow chart are discussed below.

Site Familiarisation

Members of the dam break study team have had a long association with the Fimiston II TSF and are familiar with the site. No specific site visit was required for this study. Additional work involved collation of available data, examination of aerial photographs of potential areas of impact, dialogue with personnel associated with the TSF and research into cases of a similar nature.

Hazard Identification

The above work facilitated the identification of potential hazards associated with the TSF (note: a "hazard" represents anything that can "do harm" – in this study, potential to cause or contribute to a flow failure).

Target Identification/Pathway Definition

These two activities were carried out in parallel. Having identified the hazards on the TSF, it was necessary to define the pathways that discharges may follow to reach the defined target(s). The targets were defined as users of the "Trans-Australian Railway" and the "Bulong Road". However, it was recognised that personnel working on or near to the TSF are also targets.

Site Subdivision

Due to the complex nature of the site and the high variability of hazard distribution across the TSF, it was logical to subdivide the TSF into the three Paddocks and further into zones of similar character (i.e. each potential failure mechanism on each applicable embankment). This procedure simplified the subsequent steps in the risk assessment.

Identify Critical Pathways

To avoid proceeding with an unnecessarily long, time consuming and inherently expensive process, only those pathways identified in the qualitative assessment were pursued further in the risk assessment.

Develop Cause/Consequence Tree

The logic of each pathway was modelled by means of "cause" and "consequence" trees. Potential causes that lead to the defined "top cause" were identified and logically related by means of "AND" gates or "OR" gates, depending upon whether they are statistically dependent on, or independent of, each other. The cause trees were extended into consequence trees, in which the likely consequences of occurrence of the top cause are modelled. At this stage no probabilities were added, with only words and symbols used to establish the pathway models.

Develop Fault/Event Tree

Having established a number of cause/consequence trees that model the potential pathways from the hazards to the target, probabilities were assigned to the cause/consequence trees. The probabilities were assigned on the basis of professional judgement and limited simple calculations, where appropriate. The inclusion of probabilities (or numbers) in the cause/consequence trees convert them to so-called "fault/event" trees. A **fault tree** models the system faults (or failure events) that lead to initiation of the "top fault" (embankment failure leading to release of residue and/or water from the TSF). An **event tree** models the possible consequences of occurrence of the top fault, leading to a pre-defined "target".

Sensitivity Analysis

Many of the probabilities that were initially assigned to the fault/event trees have an inherent high degree of uncertainty. It was therefore necessary to carry out a sensitivity analysis on the trees to identify those faults that have a significant impact upon the end result (i.e. to ascertain the "key areas" of the fault/event trees). The identified key faults and events were then varied within reasonable limits to measure their relative impacts on the overall result.

Focus on Key Areas and Refine Probabilities

Only those areas revealed by the sensitivity analysis as having a significant impact on the end result were focused upon. After varying the appropriate assigned values within reasonable limits and providing additional consideration to the final values selected, it is judged that there is a sufficiently high confidence in the reported magnitude of the overall risks.

Risk Characterisation

An assessment of the overall risks has been made by adopting the same judgment used to assign probabilities to the individual faults in the fault trees. It will be incumbent on KCGM to ascertain whether the level of risk associated with the occurrence of a dam break is acceptable or not.

G5 Fault/Event Analysis

G5.1 Introduction

The quantitative analysis draws upon a *fault/event analysis* to systematically combine all potential faults in the system and evaluate the possible consequences of failure. Such an approach is very disciplined and also allows for incorporation of human interactions and physical phenomena. The technique is also flexible and powerful.

The approach that was followed involved the identification of system faults that could potentially result in a “dam break” and the consequential release of liquefied residue and/or water. The consideration of the interaction of two or more failure events that could combine to result in a flow failure is particularly relevant, and hence the technique draws upon:

- a *fault tree* to represent the potential combination of possible *causes* of a failure; and
- an *event tree* to represent the *consequences* of failure.

G5.2 Development of Cause/Consequence and Fault/Event Trees

For a dam break study a “fault” (or “failure event”) is defined as any possible contributory cause of a failure of the TSF, such that there could be a concomitant release of tailings and/or water from the facility in sufficient quantity to induce a flow failure. An “event” is defined as any consequence of such a flow failure.

Faults are combined in the *fault tree* using AND gates and OR gates as follows:

- “AND” gates are used where two or more faults are statistically dependent upon each other.
- “OR” gates are used where two or more faults are statistically independent of each other.

Probabilities of faults in the fault tree are calculated according to the formulae:

- For OR gates: $P_t = 1 - (1 - P_1) \times (1 - P_2) \times ...... \times (1 - P_n)$
- For AND gates: $P_t = P_1 \times P_2 \times .... \times P_n$

where P_1 , P_2 etc,are contributory components to P_t.

The *event tree* is developed as a series of questions that progressively eliminate consequences of lesser significance, culminating in the identification of the *top event*. This may be defined as, “*discharge impacts on users of the Bulong Road or Trans-Australian Railway*”.

Probabilities (value between 0 and 1) are assigned to an affirmative answer to each question in the event tree, the probability of a negative answer (P_{no}) being calculated as $1 - P_{yes}$.

Probabilities in the fault/event tree are assigned through professional judgement, augmented where necessary by calculations. A guide used in the assignment of probabilities to the lowermost faults in the fault tree is as follows:

1e-6 (1 in 1 million)	➢	*Almost impossible or negligible (no published information on a similar case exists)*
1e-5 (1 in 100,000)	➢	*Highly improbable (published information exists, but in a slightly different context)*
1e-4 (1 in 10,000)	➢	*Very Unlikely (it has happened elsewhere, but some time ago)*
1e-3 (1 in 1,000)	➢	*Unlikely (recorded recently elsewhere)*
1e-2 (1 in 100)	➢	*Possible (could have occurred already without intervention)*
0.1 (1 in 10)	➢	*Highly probable (a previous incident of a similar nature has occurred already)*
0.2 – 0.5 (1 in 5 to 1 in 2)	➢	*Uncertain (nearly equal chance of occurring to that of not occurring)*
0.5 - 0.9 (>1 in 2)	➢	*Nearly certain (one or more incidents of a similar nature have occurred recently)*
1 (or 0.999)	➢	*Certain (or as near to, as makes no significant difference)*

G5.3 Fimiston II Fault/Event Trees

The overall fault/event tree is presented in Figure 37. This figure indicates how a release downstream of the TSF could potentially occur for each pathway, following a release of solids/water due to structural damage or overtopping. The probabilities assigned to each of the consequences have been based on the likely volume of material to be released and the available capacity of the downstream facilities.

The fault trees and the justification for value that were assigned to the faults for each individual pathway are presented in pages G10 to G17 and Figures G1 to G16. The values assigned to the faults are applicable to the condition of the facilities between late 2004 and closure (2012).

G6 Results

The results of the probabilistic dam break analysis of Fimiston II are shown on the overall fault/event tree (Figure 37), and are summarised in Table G1 below:

Table G1: Summary of Results of Probabilistic Dam Break Analysis

Pathway	Annual Probability of Occurring*		
	Due to Structural Failure	Due to Overtopping	Overall
1	7.63×10^{-7} or about 1 in 1.3 million	2.78×10^{-10} (i.e. negligible)	7.63×10^{-7} or about 1 in 1.3 million
2	8.81×10^{-7} or about 1 in 1.1 million	7.52×10^{-10} (i.e. negligible)	8.81×10^{-7} or about 1 in 1.1 million
3	8.61×10^{-7} or about 1 in 1.1 million	7.28×10^{-10} (i.e. negligible)	8.62×10^{-7} or about 1 in 1.1 million
4	2.67×10^{-7} or about 1 in 3.7 million	6.83×10^{-10} (i.e. negligible)	2.68×10^{-7} or about 1 in 3.7 million
5	2.67×10^{-7} or about 1 in 3.7 million	6.83×10^{-10} (i.e. negligible)	2.68×10^{-7} or about 1 in 3.7 million
Combined	3.04×10^{-6} or about 1 in 330,000	3.12×10^{-9} (i.e. negligible)	3.04×10^{-6} or about 1 in 330,000

Note: * – Probability of occurring at least once in any one calendar year during remaining operational life

It is evident from the results of the analysis that there is an annual probability of about 1 in 330,000 for a release of material from Fimiston II. Using the guide adopted in the assignment of probabilities to the lowermost faults in the fault trees the risk is judged to be “highly improbable” to “almost impossible”.

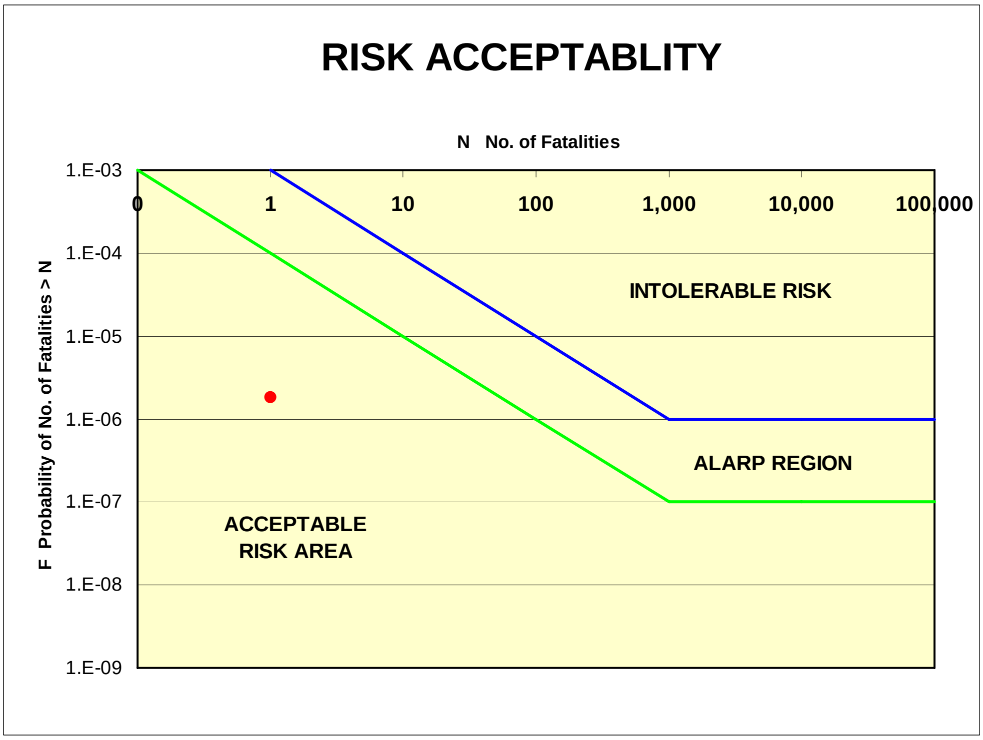
The risk of loss of life or injury, in the event that material is released from Fimiston II, is estimated to be approximately 1 in 550,000. This risk is lower than the risk of dam break occurring but, as with the probability of release of material from Fimiston II, the risk of loss of life or injury occurring due to dam break is judged to be “highly improbable” to “almost impossible”.

The approach to estimating this risk is presented in Table G2 below:

Table G2: Probability of Consequences

Flow Path	Paddock	Emb	Failure Type	Risk of Release Due to Failure	Probability of Occurrence	Shift	Location	Likelihood of Contact	Employees Exposed	% of Time	Product	Members of Public Exposed	% of Time	Product	Risk of Loss of Life or Injury
1	C	SW Main	Structural	7.6259E-07	7.63E-07	Day	Passenger Train	1	0	0.06%	0.0	200	0.06%	0.1	8.39E-08
							Goods Train	1	0	1.50%	0.0	4	1.50%	0.1	4.58E-08
							Bulong Rd	1	30	0.10%	0.0	150	0.10%	0.2	1.37E-07
							On TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
							Around TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	1.91E-09
			Overtopping	2.7825E-10		Night	Passenger Train	1	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	1	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	1	14	1%	0.1	10	1%	0.1	1.83E-07
							On TSF	0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
							Around TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	1.53E-09
2	AB	SW Main	Structural	8.8051E-07	8.81E-07	Day	Passenger Train	1	0	0.06%	0.0	200	0.06%	0.1	9.69E-08
							Goods Train	1	0	1.50%	0.0	4	1.50%	0.1	5.29E-08
							Bulong Rd	1	30	0.10%	0.0	150	0.10%	0.2	1.59E-07
							On TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
							Around TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	2.20E-09
			Overtopping	7.503E-10		Night	Passenger Train	1	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	1	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	1	14	1%	0.1	10	1%	0.1	2.12E-07
							On TSF	0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
							Around TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	1.76E-09
3	AB	N Main	Structural	8.6089E-07	8.62E-07	Day	Passenger Train	0.001	0	0.06%	0.0	200	0.06%	0.1	9.48E-11
							Goods Train	0.001	0	1.50%	0.0	4	1.50%	0.1	5.17E-11
							Bulong Rd	1	30	0.10%	0.0	150	0.10%	0.2	1.55E-07
							On TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
							Around TSF	0.2	5	0.50%	0.0	0	0.50%	0.0	4.31E-09
			Overtopping	7.2799E-10		Night	Passenger Train	0.001	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	0.001	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	1	14	1%	0.1	10	1%	0.1	2.07E-07
							On TSF	0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
							Around TSF	0.2	2	0.50%	0.0	2	0.50%	0.0	3.45E-09
4	D	N Main	Structural	2.6713E-07	2.68E-07	Day	Passenger Train	0.001	0	0.06%	0.0	200	0.06%	0.1	2.95E-11
							Goods Train	0.001	0	1.50%	0.0	4	1.50%	0.1	1.61E-11
							Bulong Rd	1	30	0.10%	0.0	150	0.10%	0.2	4.82E-08
							On TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
							Around TSF	0.2	5	0.50%	0.0	0	0.50%	0.0	1.34E-09
			Overtopping	6.8302E-10		Night	Passenger Train	0.001	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	0.001	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	1	14	1%	0.1	10	1%	0.1	6.43E-08
							On TSF	0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
							Around TSF	0.2	2	0.50%	0.0	2	0.50%	0.0	1.07E-09
5	D	E Main	Structural	2.6713E-07	2.68E-07	Day	Passenger Train	1	0	0.06%	0.0	200	0.06%	0.1	2.95E-08
							Goods Train	1	0	1.50%	0.0	4	1.50%	0.1	1.61E-08
							Bulong Rd	1	30	0.10%	0.0	150	0.10%	0.2	4.82E-08
							On TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
							Around TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	6.70E-10
			Overtopping	6.8302E-10		Night	Passenger Train	1	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	1	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	1	14	1%	0.1	10	1%	0.1	6.43E-08
							On TSF	0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
							Around TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	5.36E-10
D to C	D & C	Division Wall	Structural	4.1345E-07	4.20E-07	Day	Passenger Train	0	0	0.06%	0.0	200	0.06%	0.1	0.00E+00
							Goods Train	0	0	1.50%	0.0	4	1.50%	0.1	0.00E+00
							Bulong Rd	0	30	0.10%	0.0	150	0.10%	0.2	0.00E+00
							On TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	1.05E-09
							Around TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
			Overtopping	6.6912E-09		Night	Passenger Train	0	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	0	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	0	14	1%	0.1	10	1%	0.1	0.00E+00
							On TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	8.40E-10
							Around TSF	0.0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
C to AB	C & AB	Division Wall	Structural	3.9582E-05	3.96E-05	Day	Passenger Train	0	0	0.06%	0.0	200	0.06%	0.1	0.00E+00
							Goods Train	0	0	1.50%	0.0	4	1.50%	0.1	0.00E+00
							Bulong Rd	0	30	0.10%	0.0	150	0.10%	0.2	0.00E+00
							On TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	9.90E-08
							Around TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
			Overtopping	6.7114E-09		Night	Passenger Train	0	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	0	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	0	14	1%	0.1	10	1%	0.1	0.00E+00
							On TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	7.92E-08
							Around TSF	0.0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
D to AB	D & AB	Division Wall	Structural	7.5163E-07	8.19E-07	Day	Passenger Train	0	0	0.06%	0.0	200	0.06%	0.1	0.00E+00
							Goods Train	0	0	1.50%	0.0	4	1.50%	0.1	0.00E+00
							Bulong Rd	0	30	0.10%	0.0	150	0.10%	0.2	0.00E+00
							On TSF	0.1	5	0.50%	0.0	0	0.50%	0.0	2.05E-09
							Around TSF	0	5	0.50%	0.0	0	0.50%	0.0	0.00E+00
			Overtopping	6.701E-08		Night	Passenger Train	0	0	0.06%	0.0	0	0.06%	0.0	0.00E+00
							Goods Train	0	0	1.50%	0.0	0	1.50%	0.0	0.00E+00
							Bulong Rd	0	14	0.10%	0.0	10	0.10%	0.0	0.00E+00
							On TSF	0.1	2	0.50%	0.0	2	0.50%	0.0	1.64E-09
							Around TSF	0.0	2	0.50%	0.0	2	0.50%	0.0	0.00E+00
									Weighted Averages		0.02			0.00	1.81E-06
											Total of	1	persons exposed		

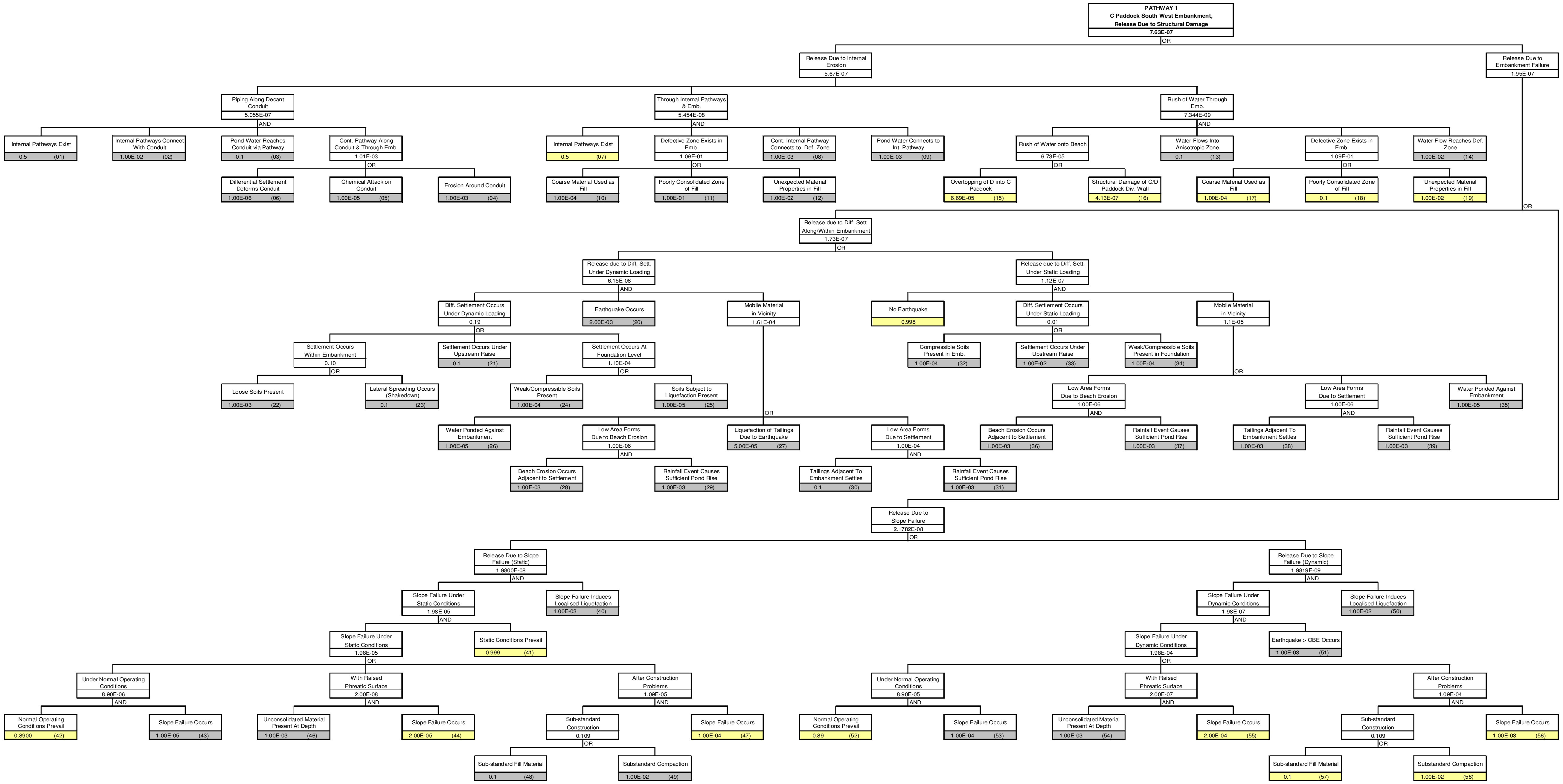
The results are summarised in the F-N chart below, which is based on internationally recognised risk thresholds for large dams.



G8 Conclusions

This study has demonstrated through a quantitative fault/event analysis that, throughout the remaining operational life of Fimiston II, the likelihood of release of water and/or solids to the downstream environment due to a breach of the TSF is estimated to be about 1 in 330,000 per annum. It is evident from the F-N 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.

PATHWAY 1			
REF No.	DESCRIPTION	ASSIGNED VALUE	JUSTIFICATION
Release Due to Piping Along Conduit			
(01)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area
(02)	Internal Pathways Connect With Conduit	1.00E-02	It is possible that the pathways have connected with conduit
(03)	Pond Water Reaches Conduit via Pathway	0.1	It is possible for water to flow through pathways and reach conduit
(04)	Erosion Around Conduit	1.00E-03	Difficult to detect but has been known to occur in other TSFs
(05)	Chemical Attack on Conduit	1.00E-05	Highly improbable as chemical attack would have been considered during installation
(06)	Differential Settlement Deforms Conduit	1.00E-06	Almost impossible due to geology of foundation
Release Through Internal Pathways and Embankment			
(07)	Internal Piping Exists	-	Has been observed in TSFs previously operating in area
(08)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(09)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(10)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(11)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(12)	Unexpected Material Properties in Fill	1.00E-02	Unlikely
Release Due to Rush of Water Through Embankment			
(13)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(14)	Water Flow Reaches Def. Zone	0.01	Possible that water flow reaches defective zone
(15)	Overtopping of D Paddock into C Paddock	-	Linked to Overtopping of D Paddock into C Paddock
(16)	Structural Damage of C/D Paddock Div. Wall	-	Linked to Structural Damage of C/D Division Wall
(17)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(18)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(19)	Unexpected Material Properties in Fill	-	Unlikely
Differential Settlement (Dynamic)			
(20)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(21)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(22)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(23)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(24)	Weak/Compressible Soils Present	1.00E-04	Highly unlikely
(25)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials In The Vicinity (Dynamic)			
(26)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(27)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(28)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(29)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(30)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(32)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(33)	Settlement Occurs Under Upstream Raise	1.00E-02	Possible, but less likely than on A/B paddock embankment walls
(34)	Weak/Compressible Soils Present in Foundation	1.00E-04	Highly unlikely
Mobile Materials In The Vicinity (Static)			
(35)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(36)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(37)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(38)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(39)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(40)	Slope Failure Induces Localised Static Liquefaction	1.00E-03	Unlikely that liquefaction occurs along C emb. Wall
(41)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(42)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(43)	Slope Failure Occurs (Under Static Conditions)	1.00E-05	Highly improbable, walls have been designed & constructed with sufficient factor of safety
(44)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(45)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location.
(46)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(47)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(48)	Sub-standard Fill Material	0.1	Highly Probable
(49)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(50)	Slope Failure Induces Localised Static Liquefaction	1.00E-02	Ten times more likely to occur under dynamic conditions
(51)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event.
(52)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(53)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions.
(54)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(55)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(56)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(57)	Sub-standard Fill Material	-	? Check reports for standard of fill materials
(58)	Substandard Compaction	-	? Check reports for standard of compaction
Sudden Inflow Exceeds Capacity			
(59)	Subsequent Rainfall	2.50E-05	1:40,000 year rainfall will result in overtopping if freeboard in D Paddock is reduced by 0.2 m
(60)	C/D Division Wall Release Due to Struc. Damage	-	(48)
(61)	C/D Division Wall Release Due to Overtopping	-	(49)
Reduced Freeboard and Subsequent Rainfall			
(62)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(63)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(64)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(65)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(66)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(67)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(68)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(69)	Due to Shrinkage/Dessication	1.00E-03	True ONLY if: Seasonal cracks have been observed in embankment
(70)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(71)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(72)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(73)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(74)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(75)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(76)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(77)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(78)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(79)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(80)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Crest Too Low (Due to Settlement of Embankment)			
(81)	No Action Taken	1.00E-04	Very unlikely that depression of crest is not noticed or remediated
(82)	Settlement of Embankment	1.00E-06	Almost impossible



Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI
	DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 1
	CHECK	DATE Sep. 05	RELEASE DUE TO STRUCTURAL FAILURE
	SCALE NTS	A3	PROJECT No. 05641089-R01 — FIGURE G1

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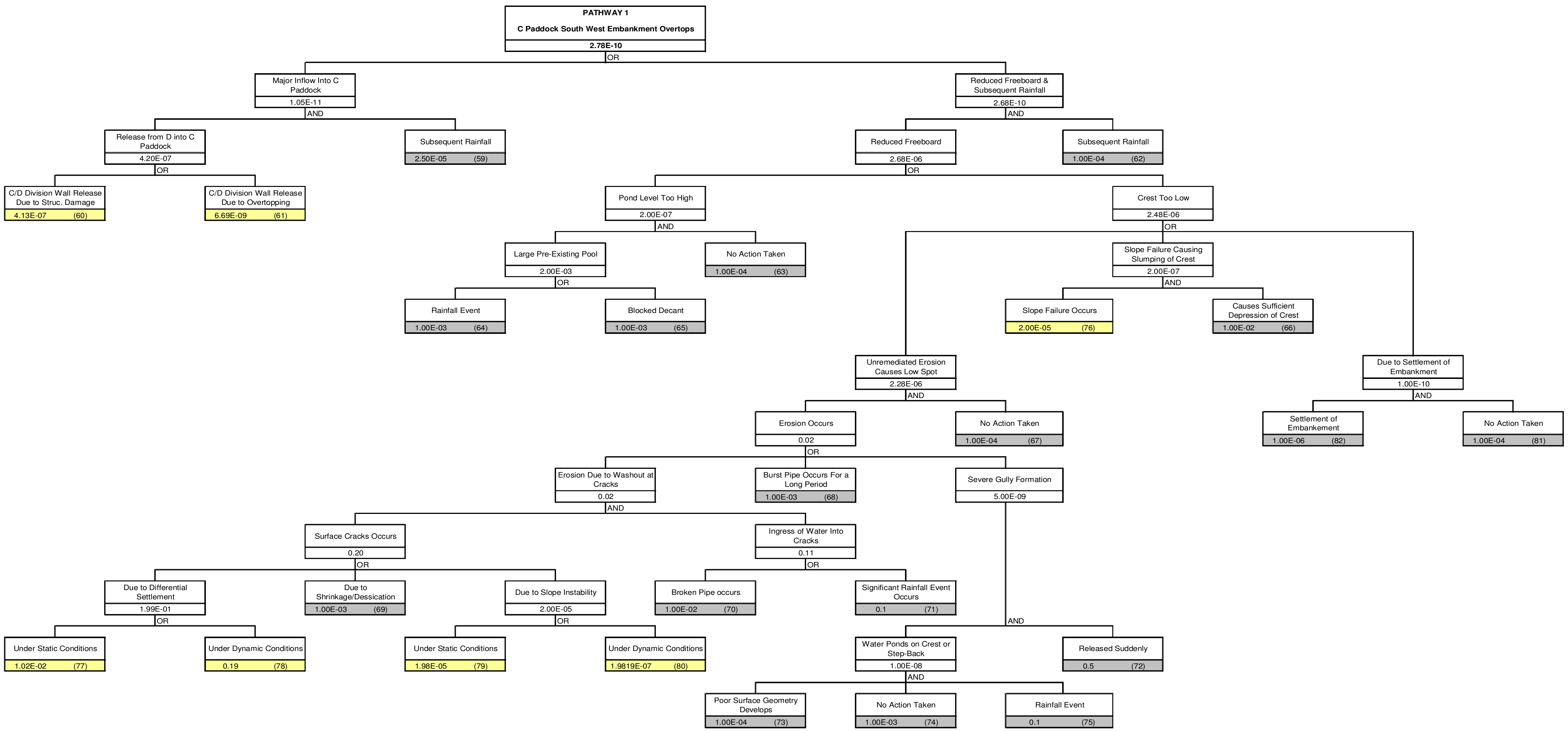

CLIENT	KCGM			PROJECT	Fimiston II - Addendum to NOI
DRAWN	MN	DATE	Sep. 05	FAULT TREE, PATHWAY 1	
CHECK	[signature]	DATE	Sep. 05	RELEASE DUE TO OVERTOPPING	
SCALE	NTS		A3	PROJECT No. 05641089-R01	FIGURE G2

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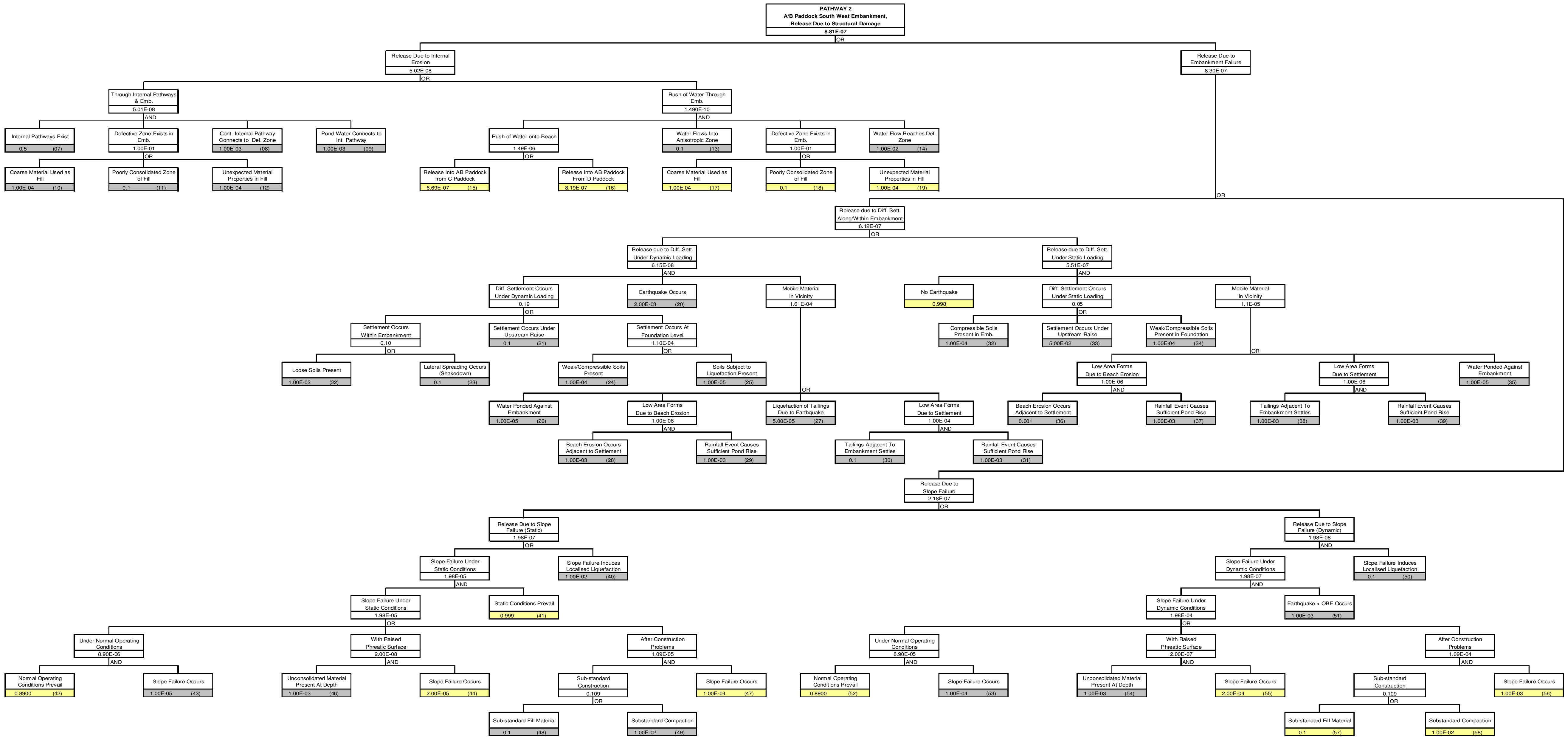
PATHWAY 2			
REF No.	**DESCRIPTION**	**ASSIGNED VALUE**	**JUSTIFICATION**
Release Due to Piping Along Conduit			
(01)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area.
(02)	Internal Pathways Connect With Conduit	0.01	It is possible that the pathways have connected with conduit.
(03)	Pond Water Reaches Conduit via Pathway	0.01	It is possible for water to flow through pathways and reach conduit
(04)	Erosion Around Conduit	0.01	Difficult to detect but has been known to occur in other TSFs.
(05)	Chemical Attack on Conduit	1.00E-05	Highly improbable as chemical attack would have been considered during installation.
(06)	Differential Settlement Deforms Conduit	1.00E-06	Almost impossible due to geology of foundation
Release Through Internal Pathways and Embankment			
(07)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area.
(08)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(09)	Pond Water Connects to Int. Pathway	0.001	Water will flow through a pathway if it is continuous between pond and defective zone
(10)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(11)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(12)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Release Due to Rush of Water Through Embankment			
(13)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(14)	Water Flow Reaches Def. Zone	0.01	Possible that water flow reaches defective zone
(15)	Overtopping of D Paddock into C Paddock	(link)	Linked to Overtopping of D Paddock into C Paddock
(16)	Structural Damage of C/D Paddock Div. Wall	(link)	Linked to Structural Damage of C/D Division Wall
(17)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(18)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(19)	Unexpected Material Properties in Fill	-	Very unlikely
Differential Settlement (Dynamic)			
(20)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(21)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(22)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(23)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(24)	Weak/Compressible Soils Present	1.00E-04	Highly unlikely
(25)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials In The Vicinity (Dynamic)			
(26)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(27)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(28)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(29)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(30)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(32)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(33)	Settlement Occurs Under Upstream Raise	5.00E-02	Compressible soils have been observed here in the past
(34)	Weak/Compressible Soils Present in Foundation	1.00E-04	Highly unlikely
Mobile Materials In The Vicinity (Static)			
(35)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(36)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(37)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(38)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(39)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(40)	Slope Failure Induces Localised Static Liquefaction	1.00E-02	It is possible for liquefaction to occur along A/B emb. Wall
(41)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(42)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(43)	Slope Failure Occurs (Under Static Conditions)	1.00E-05	Highly improbable, walls have been designed & constructed with sufficient factor of safety
(44)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(45)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location.
(46)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(47)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(48)	Sub-standard Fill Material	0.1	Highly Probable
(49)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(50)	Slope Failure Induces Localised Static Liquefaction	0.1	Highly probable under dynamic conditions
(51)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(52)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(53)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions
(54)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(55)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(56)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(57)	Sub-standard Fill Material	-	(48)
(58)	Substandard Compaction	-	(49)
Sudden Inflow Exceeds Capacity			
(59)	Subsequent Rainfall	3.33E-05	1:30,000 year rainfall will result in overtopping if freeboard in D Paddock is reduced by 0.48 m
(60)	Release from D into AB Paddock	-	Calculated in "C Paddock Overtops Through AB/C Paddock Division Wall"
(61)	Release from C into AB Paddock	-	Calculated in "C Paddock Overtops Through AB/C Paddock Division Wall"
Reduced Freeboard and Subsequent Rainfall			
(62)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(63)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(64)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(65)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(66)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(67)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(68)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(69)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(70)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(71)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(72)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(73)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(74)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(75)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(76)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(77)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(78)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(79)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(80)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Crest Too Low (Due to Settlement of Embankment)			
(81)	No Action Taken	1.00E-04	Very unlikely that depression of crest is not noticed or remediated
(82)	Settlement of Embankment	1.00E-06	Almost impossible



Golder Associates

CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 2	
CHECK	DATE Sep. 05	RELEASE DUE TO STRUCTURAL FAILURE	
SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G3

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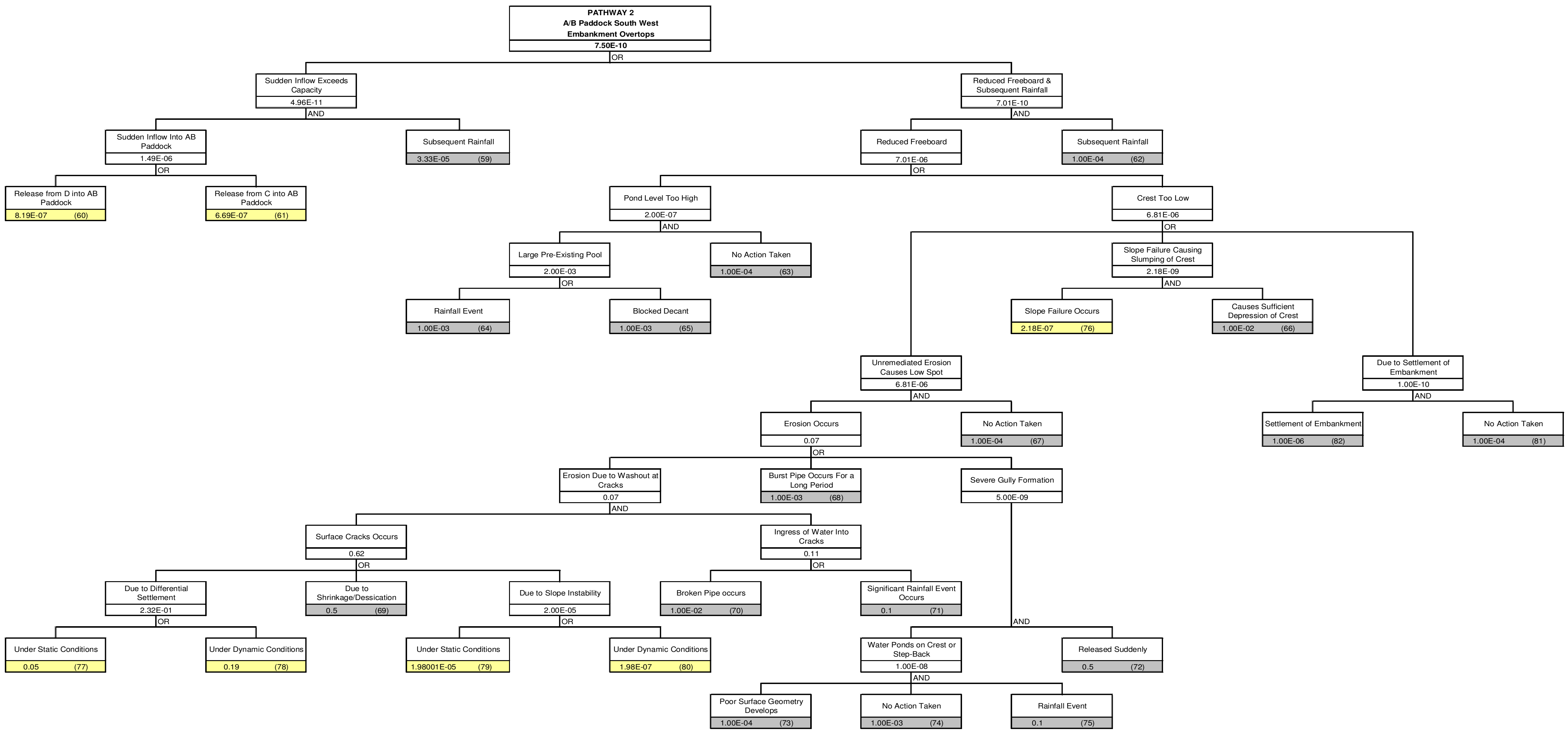

Golder Associates	CLIENT	KCGM			PROJECT	Fimiston II - Addendum to NOI
	DRAWN	MN	DATE	Sep. 05	FAULT TREE, PATHWAY 2 RELEASE DUE TO OVERTOPPING	
	CHECK	[signature]	DATE	Sep. 05		
	SCALE	NTS	A3		PROJECT No. 05641089-R01	FIGURE G4

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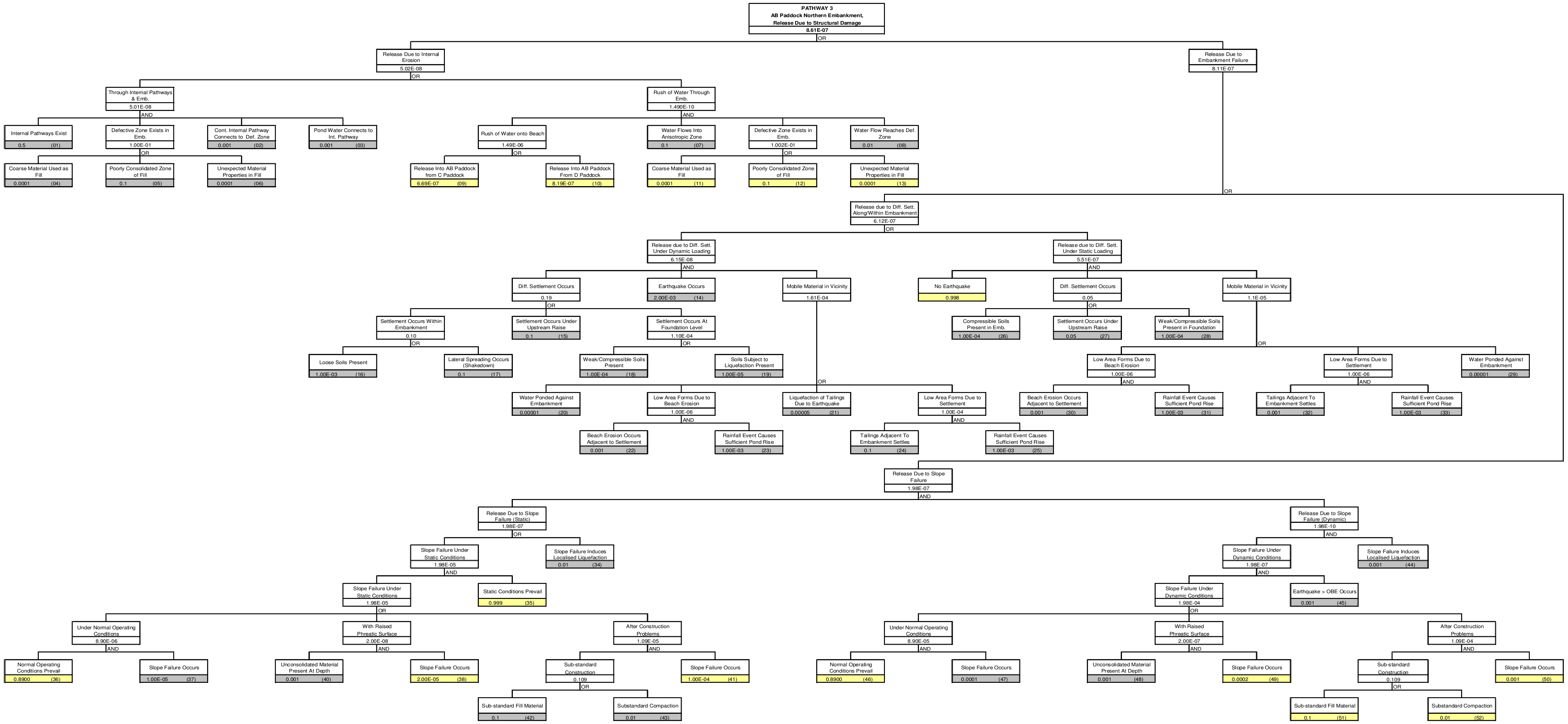
PATHWAY 3			
REF No.	DESCRIPTION	ASSIGNED VALUE	JUSTIFICATION
Release Through Internal Pathways and Embankment			
(01)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Release Due to Rush of Water Through Embankment			
(07)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(08)	Water Flow Reaches Def. Zone	1.00E-02	Possible that water flow reaches defective zone
(09)	Overtopping of D Paddock into C Paddock	-	Linked to Overtopping of D Paddock into C Paddock
(10)	Structural Damage of C/D Paddock Div. Wall	-	Linked to Structural Damage of C/D Division Wall
(11)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(12)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(13)	Unexpected Material Properties in Fill	-	Very unlikely
Piping Due to Coarse Material			
(14)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(15)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(16)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(17)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(18)	Weak/Compressible Soils Present	1.00E-04	Highly unlikely
(19)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Piping Due to Coarse Material			
(20)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(21)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(22)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(23)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(24)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(25)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Piping Due to Coarse Material			
(26)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(27)	Settlement Occurs Under Upstream Raise	5.00E-02	Compressible soils have been observed here in the past
(28)	Weak/Compressible Soils Present in Foundation	1.00E-04	Highly unlikely
Piping Due to Coarse Material			
(29)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(30)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(32)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(33)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Piping Due to Coarse Material			
(34)	Slope Failure Induces Localised Static Liquefaction	1.00E-02	It is possible for liquefaction to occur along A/B emb. Wall
(35)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(36)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(37)	Slope Failure Occurs (Under Static Conditions)	1.00E-05	Highly improbable, walls have been designed & constructed with sufficient factor of safety
(38)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(39)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(40)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(41)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(42)	Sub-standard Fill Material	0.1	Highly Probable
(43)	Substandard Compaction	1.00E-02	Possible
Piping Due to Coarse Material			
(44)	Slope Failure Induces Localised Static Liquefaction	0.1	Highly probable under dynamic conditions
(45)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(46)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(47)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions
(48)	Unconsolidated Material Present At Depth	1.00E-03	Unlikely to occur due based on previous observations
(49)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(50)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(51)	Sub-standard Fill Material	-	(42)
(52)	Substandard Compaction	-	(43)
Sudden Inflow Exceeds Capacity			
(53)	Subsequent Rainfall	3.33E-05	1:30,000 year rainfall will result in overtopping if freeboard in D Paddock is reduced by 0.48 m
(54)	Release from D into AB Paddock	-	Calculated from "C Paddock Overtops Through AB/C Paddock Division Wall"
(55)	Release from C into AB Paddock	-	Calculated from "C Paddock Overtops Through AB/C Paddock Division Wall"
Reduced Freeboard and Subsequent Rainfall			
(56)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Piping Due to Coarse Material			
(57)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(58)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(59)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Piping Due to Coarse Material			
(60)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Piping Due to Coarse Material			
(61)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(62)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(63)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(64)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(65)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(66)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(67)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(68)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(69)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(70)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(71)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(72)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(73)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(74)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Crest Too Low (Due to Settlement of Embankment)			
(75)	No Action Taken	1.00E-04	Very unlikely that depression of crest is not noticed or remediated
(76)	Settlement of Embankment	1.00E-06	Almost impossible



Golder Associates

CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 3	
CHECK [signature]	DATE Sep. 05	RELEASE DUE TO STRUCTURAL FAILURE	
SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G5

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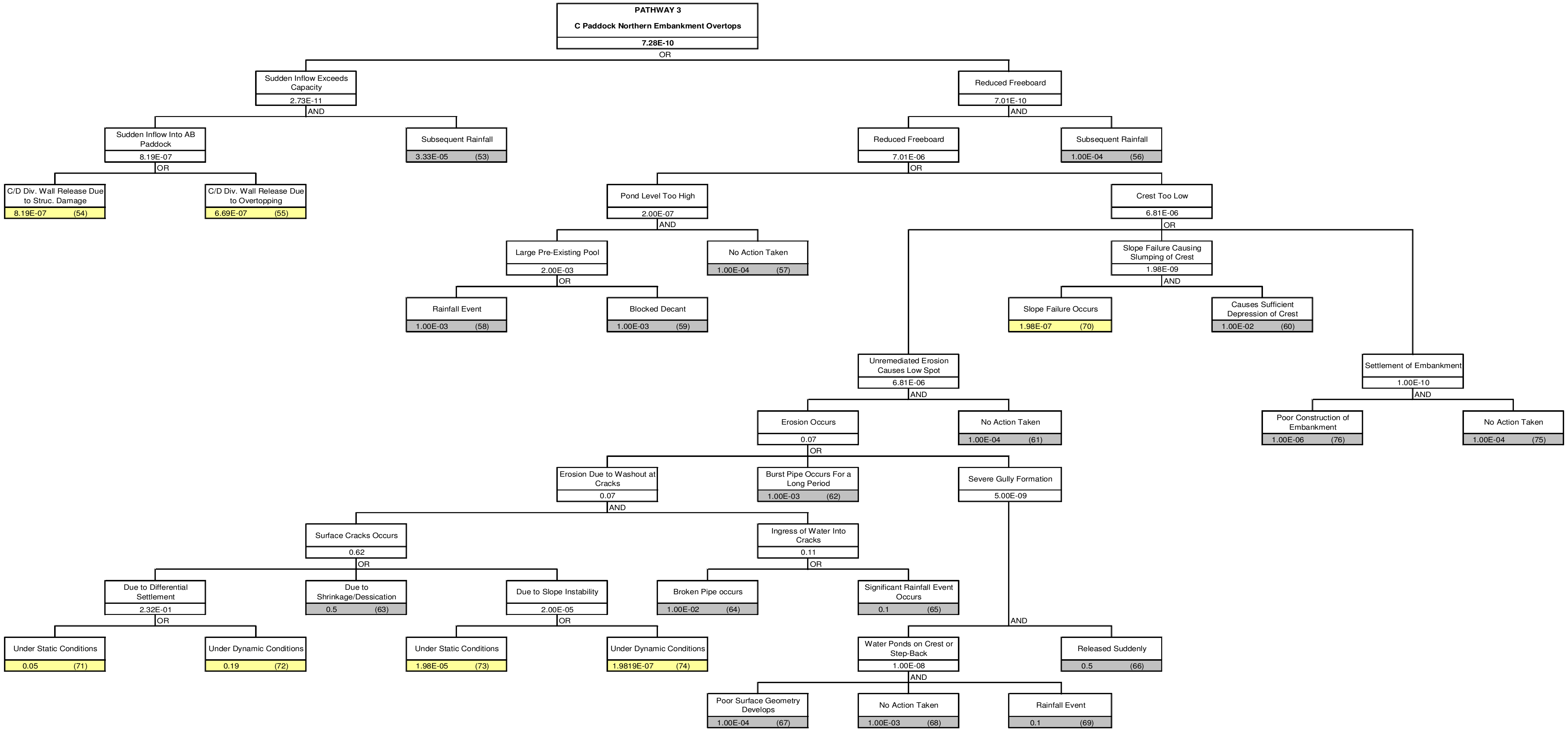

Golder Associates

CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 3
CHECK [signature]	DATE Sep. 05	RELEASE DUE TO OVERTOPPING
SCALE NTS	A3	PROJECT No. 05641089-R01 — FIGURE G6

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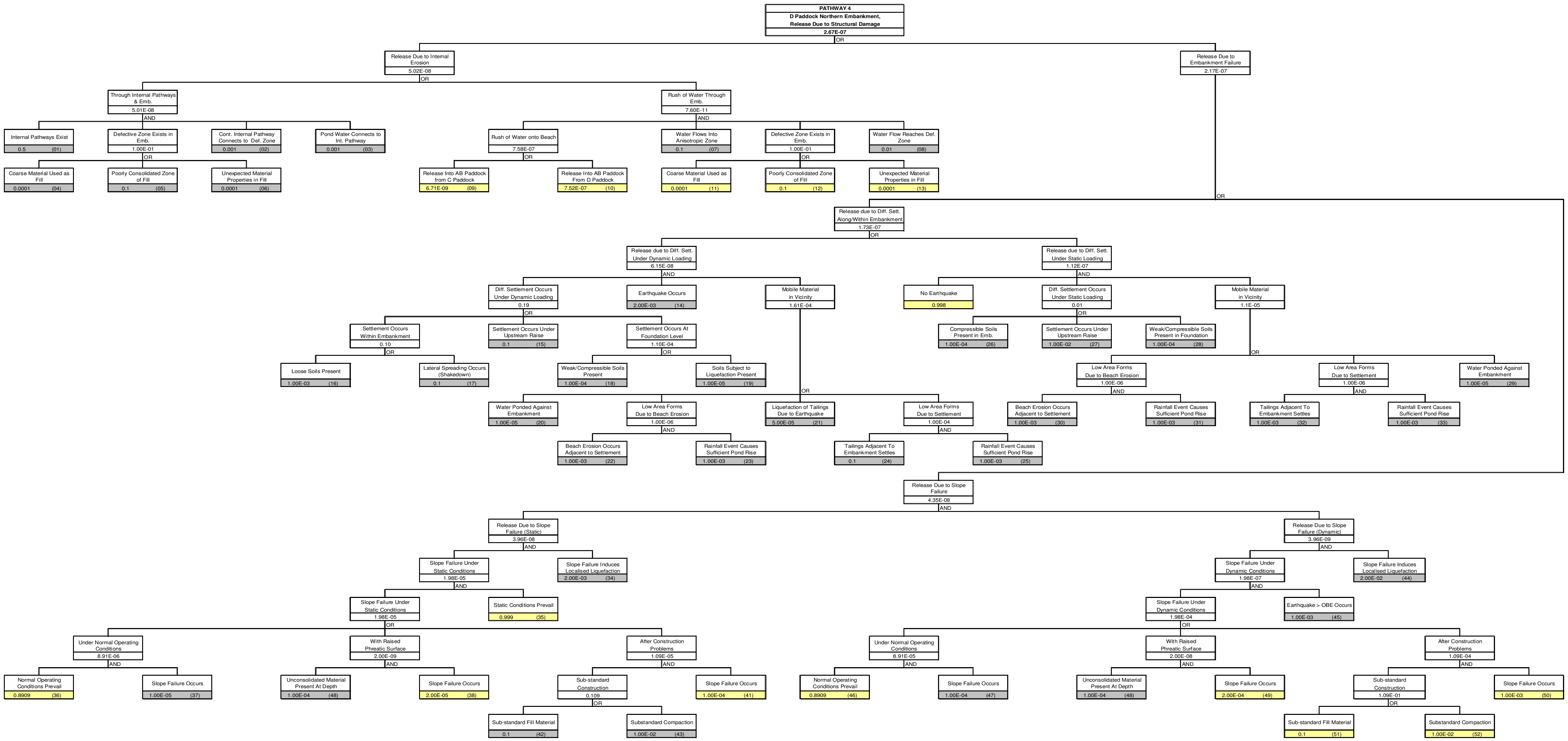
PATHWAY 4			
REF No.	DESCRIPTION	ASSIGNED VALUE	JUSTIFICATION
Release Through Internal Pathways and Embankment			
(01)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Release Due to Rush of Water Through Embankment			
(07)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(08)	Water Flow Reaches Def. Zone	1.00E-02	Possible that water flow reaches defective zone
(09)	Overtopping of D Paddock into C Paddock	-	Linked to Overtopping of D Paddock into C Paddock
(10)	Structural Damage of C/D Paddock Div. Wall	-	Linked to Structural Damage of C/D Division Wall
(11)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(12)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(13)	Unexpected Material Properties in Fill	-	Very unlikely
Differential Settlement (Dynamic)			
(14)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(15)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(16)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(17)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(18)	Weak/Compressible Soils Present	1.00E-04	Highly unlikely
(19)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials In The Vicinity (Dynamic)			
(20)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(21)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(22)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(23)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(24)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(25)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(26)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(27)	Settlement Occurs Under Upstream Raise	1.00E-02	Possible, but less likely than on A/B paddock embankment walls
(28)	Weak/Compressible Soils Present in Foundation	1.00E-04	Very unlikely
Mobile Materials In The Vicinity (Static)			
(29)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(30)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(32)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(33)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(34)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Unlikely to occur, but slightly more likely to occur than along C paddock emb. Wall
(35)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(36)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(37)	Slope Failure Occurs (Under Static Conditions)	1.00E-05	Highly improbable, walls have been designed & constructed with sufficient factor of safety
(38)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(39)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(40)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(41)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(42)	Sub-standard Fill Material	0.1	Highly Probable
(43)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(44)	Slope Failure Induces Localised Static Liquefaction	2.00E-02	10 times more likely to occur under dynamic conditions
(45)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(46)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(47)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions
(48)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(49)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(50)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(51)	Sub-standard Fill Material	-	(42)
(52)	Substandard Compaction	-	(43)
Reduced Freeboard and Subsequent Rainfall			
(53)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(54)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(55)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(56)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(57)	Causes Depression of Crest (Slope Failure)	0.01	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(58)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(59)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(60)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(61)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(62)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(63)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(64)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(65)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(66)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(67)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(68)	Under Static Conditions	-	Calculated in Structural Damage fault tree
(69)	Under Dynamic Conditions	-	Calculated in Structural Damage fault tree
(70)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(71)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(72)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(73)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Crest Too Low (Due to Settlement of Embankment)			
(74)	No Action Taken	1.00E-04	Very unlikely that depression of crest is not noticed or remediated
(75)	Settlement of Embankment	1.00E-06	Almost impossible



Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 4 RELEASE DUE TO STRUCTURAL FAILURE	
	CHECK [signature]	DATE Sep. 05		
	SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G7

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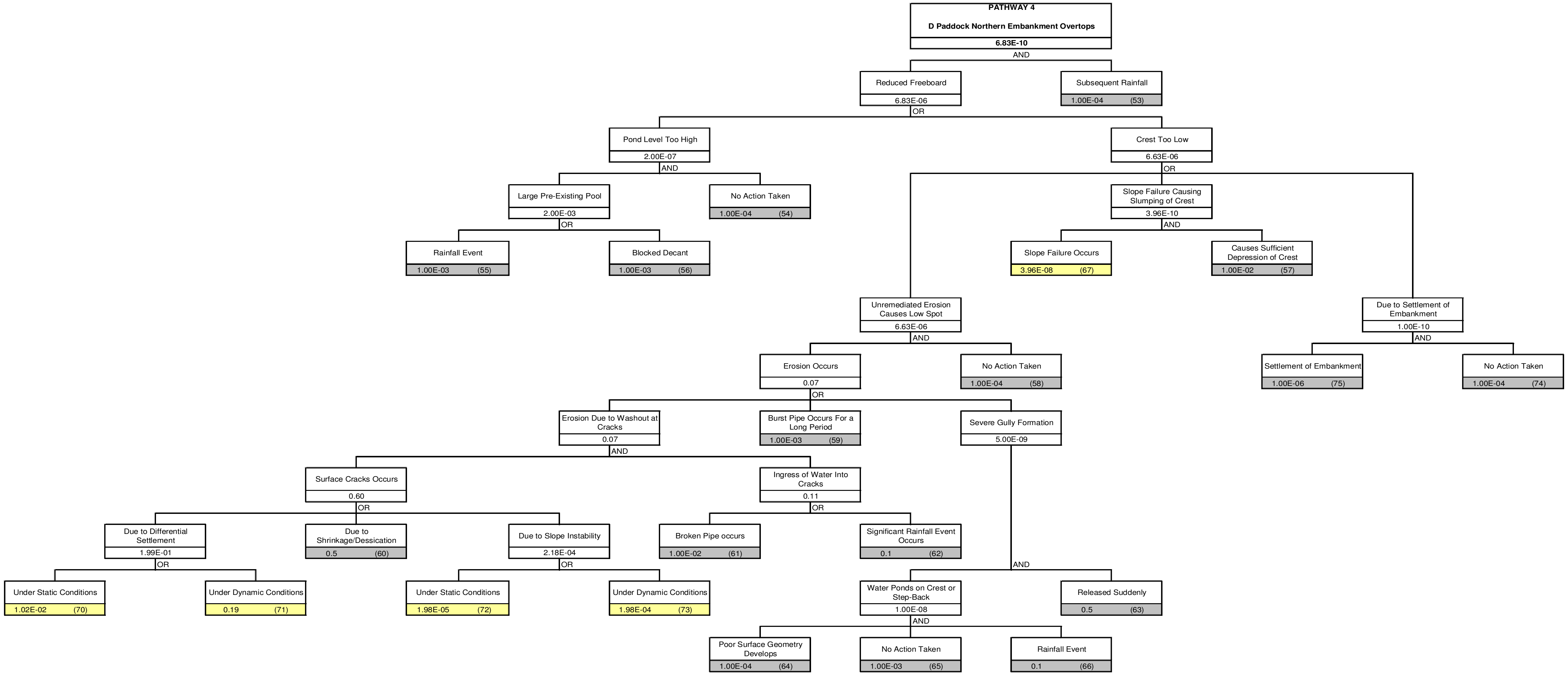

Golder Associates

CLIENT KCGM			PROJECT Fimiston II - Addendum to NOI		
DRAWN MN	DATE Sep. 05		FAULT TREE, PATHWAY 4 RELEASE DUE TO OVERTOPPING		
CHECK	DATE Sep. 05				
SCALE NTS		A3	PROJECT No. 05641089-R01		FIGURE G8

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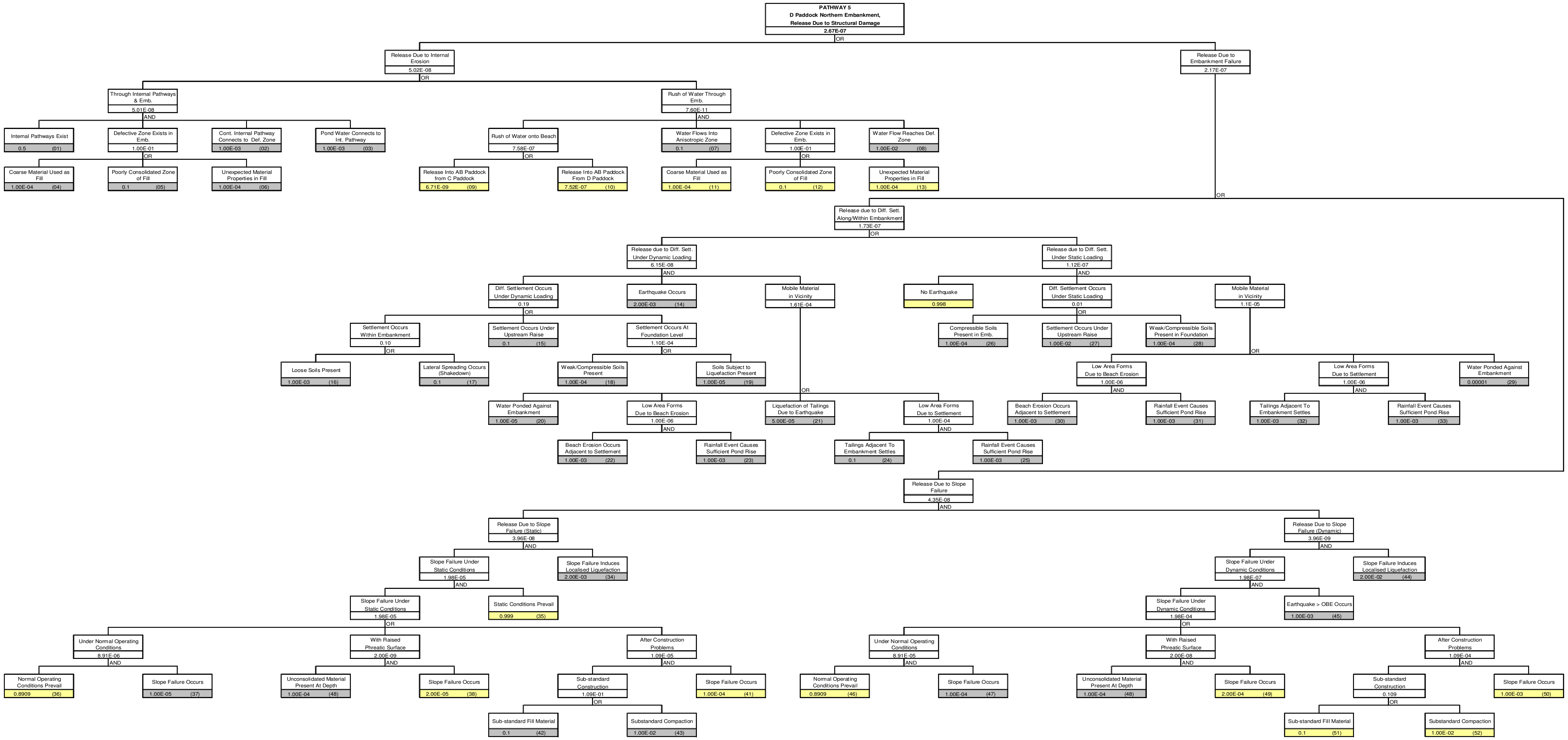
PATHWAY 5			
REF No.	DESCRIPTION	ASSIGNED VALUE	JUSTIFICATION
Release Through Internal Pathways and Embankment			
(01)	Internal Pathways Exist	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Release Due to Rush of Water Through Embankment			
(07)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(08)	Water Flow Reaches Def. Zone	1.00E-02	Possible that water flow reaches defective zone
(09)	Overtopping of D Paddock into C Paddock	-	Linked to Overtopping of D Paddock into C Paddock
(10)	Structural Damage of C/D Paddock Div. Wall	-	Linked to Structural Damage of C/D Division Wall
(11)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(12)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(13)	Unexpected Material Properties in Fill	-	Very unlikely
Differential Settlement (Dynamic)			
(14)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(15)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(16)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(17)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(18)	Weak/Compressible Soils Present	1.00E-04	Highly unlikely
(19)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials In The Vicinity (Dynamic)			
(20)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(21)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(22)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(23)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(24)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(25)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(26)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(27)	Settlement Occurs Under Upstream Raise	1.00E-02	Possible, but less likely than on A/B paddock embankment walls
(28)	Weak/Compressible Soils Present in Foundation	1.00E-04	Very unlikely
Mobile Materials In The Vicinity (Static)			
(29)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(30)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(32)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(33)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(34)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Unlikely to occur, but slightly more likely to occur than along C paddock emb. Wall
(35)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(36)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(37)	Slope Failure Occurs (Under Static Conditions)	1.00E-05	Highly improbable, walls have been designed & constructed with sufficient factor of safety
(38)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(39)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(40)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(41)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(42)	Sub-standard Fill Material	0.1	Highly Probable
(43)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(44)	Slope Failure Induces Localised Static Liquefaction	2.00E-02	10 times more likely to occur under dynamic conditions
(45)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(46)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(47)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions
(48)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(49)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(50)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(51)	Sub-standard Fill Material	-	(42)
(52)	Substandard Compaction	-	(43)
Reduced Freeboard and Subsequent Rainfall			
(53)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(54)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(55)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(56)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(57)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(58)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(59)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(60)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(61)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(62)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(63)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(64)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(65)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(66)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(67)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(68)	Under Static Conditions	-	Calculated in Structural Damage fault tree
(69)	Under Dynamic Conditions	-	Calculated in Structural Damage fault tree
(70)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(71)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(72)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(73)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Crest Too Low (Due to Settlement of Embankment)			
(74)	No Action Taken	1.00E-04	Very unlikely that depression of crest is not noticed or remediated
(75)	Settlement of Embankment	1.00E-06	Almost impossible



Golder Associates	CLIENT KCGM			PROJECT Fimiston II - Addendum to NOI	
	DRAWN MN	DATE Sep. 05		**FAULT TREE, PATHWAY 5 RELEASE DUE TO STRUCTURAL FAILURE**	
	CHECK	DATE Sep. 05			
	SCALE NTS		**A3**	PROJECT No. **05641089-R01**	**FIGURE G9**

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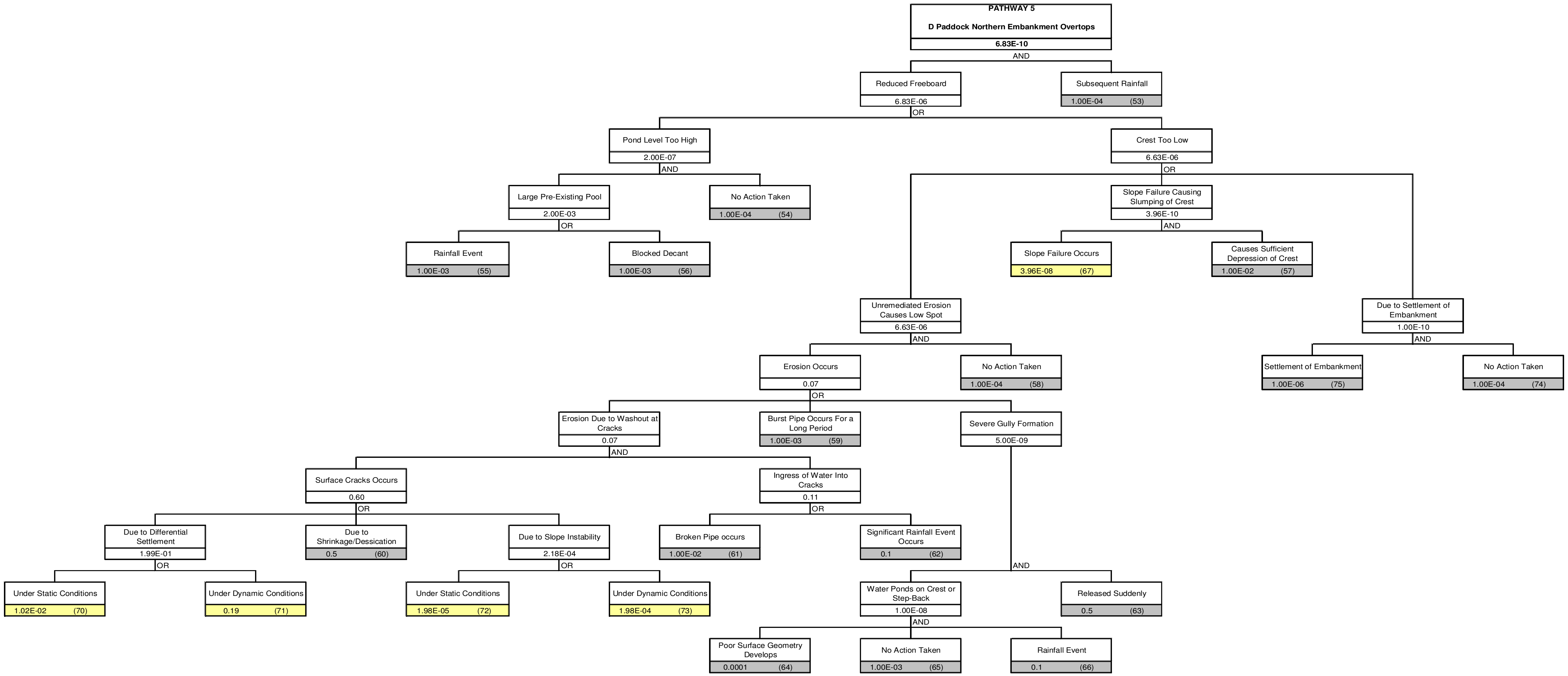
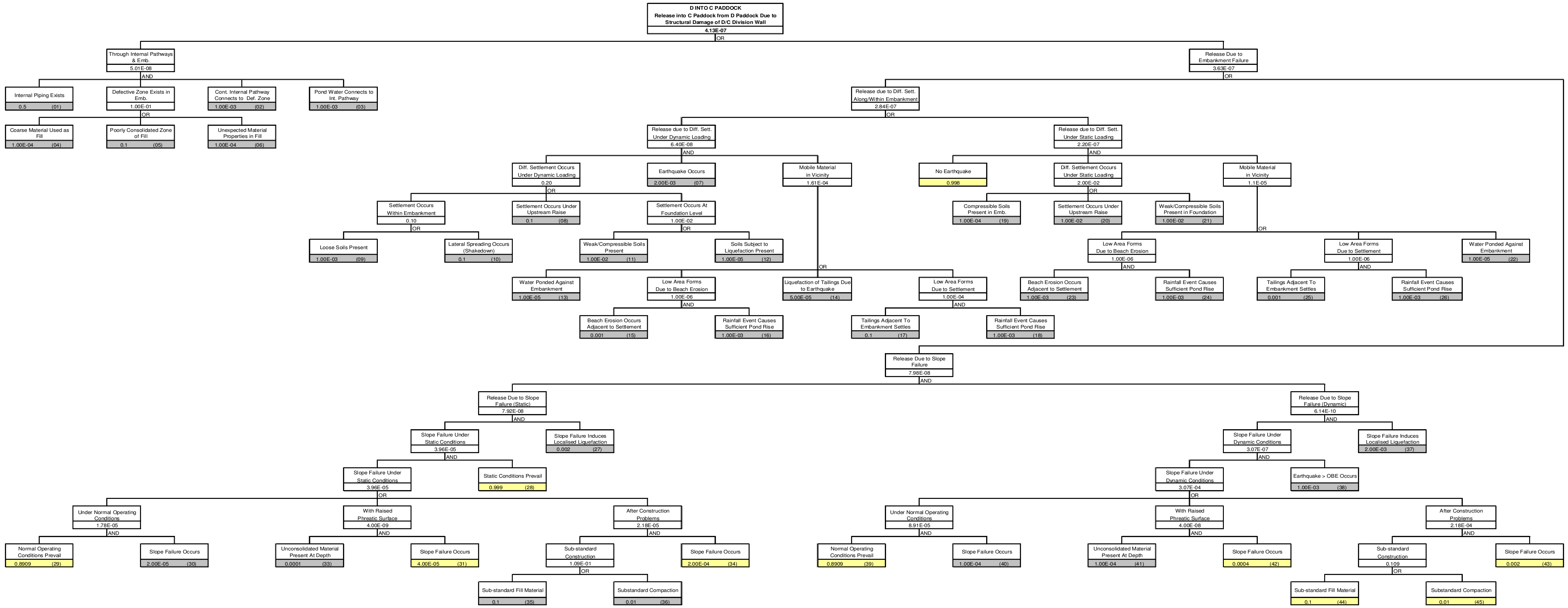


Golder Associates

CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY 5 RELEASE DUE TO OVERTOPPING	
CHECK	DATE Sep. 05		
SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G10

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

D INTO C PADDOCK			
REF No.	DESCRIPTION	ASSIGNED VALUE	JUSTIFICATION
Release Through Internal Pathways and Embankment			
(01)	Internal Piping Exists	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Differential Settlement (Dynamic)			
(07)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(08)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(09)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(10)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(11)	Weak/Compressible Soils Present	1.00E-02	Possible, since zones of compressible soils have been observed here in the past
(12)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials in the Vicinity (Dynamic)			
(13)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(14)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(15)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(16)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(17)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(18)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(19)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(20)	Settlement Occurs Under Upstream Raise	1.00E-02	Possible, but less likely than on A/B paddock embankment walls
(21)	Weak/Compressible Soils Present in Foundation	1.00E-02	Possible, since zones of compressible soils have been observed here in the past
Mobile Materials in the Vicinity (Static)			
(22)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(23)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(24)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(25)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(26)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(27)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Unlikely to occur, but slightly more likely to occur than along C paddock emb. Wall
(28)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(29)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(30)	Slope Failure Occurs (Under Static Conditions)	2.00E-05	Twice as likely to occur as on outer wall
(31)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems
(32)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(33)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(34)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(35)	Sub-standard Fill Material	0.1	Highly Probable
(36)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(37)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Unlikely to occur, but slightly more likely to occur than along C paddock emb. Wall
(38)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(39)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(40)	Slope Failure Occurs (Under Dynamic Conditions)	1.00E-04	More likely to occur under dynamic conditions
(41)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(42)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(43)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(44)	Sub-standard Fill Material	-	(35)
(45)	Substandard Compaction	-	(36)
Reduced Freeboard and Subsequent Rainfall			
(46)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(47)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(48)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(49)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(50)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(51)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(52)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(53)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(54)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(55)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(56)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(57)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(58)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(59)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(60)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(61)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(62)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(63)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(64)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Settlement of Divider Wall Occurs			
(65)	Earthquake Event	2.00E-04	1:5000 year earthquake event
(66)	Lateral Spreading of Base	0.1	Highly probable following large earthquake event
(67)	Settlement Occurs Under Upstream Raise (Static)	1.00E-05	Highly improbable to occur without an earthquake
(68)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(69)	Settlement Occurs Under Upstream Raise (Dynamic)	0.1	Highly probable following large earthquake event
(70)	Compressible Soils Present in Div. Wall	1.00E-05	Highly unlikely given the construction material used (check construction material)
(71)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(72)	Loose Soils Present in Embankment	1.00E-05	Very low likelihood of soils liquefying (check if this is true)



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CLIENT	KCGM			PROJECT	Fimiston II - Addendum to NOI
DRAWN	MN	DATE	Sep. 05	FAULT TREE, PATHWAY A RELEASE DUE TO STRUCTURAL FAILURE	
CHECK	[signature]	DATE	Sep. 05		
SCALE	NTS		A3	PROJECT No. 05641089-R01	FIGURE G11

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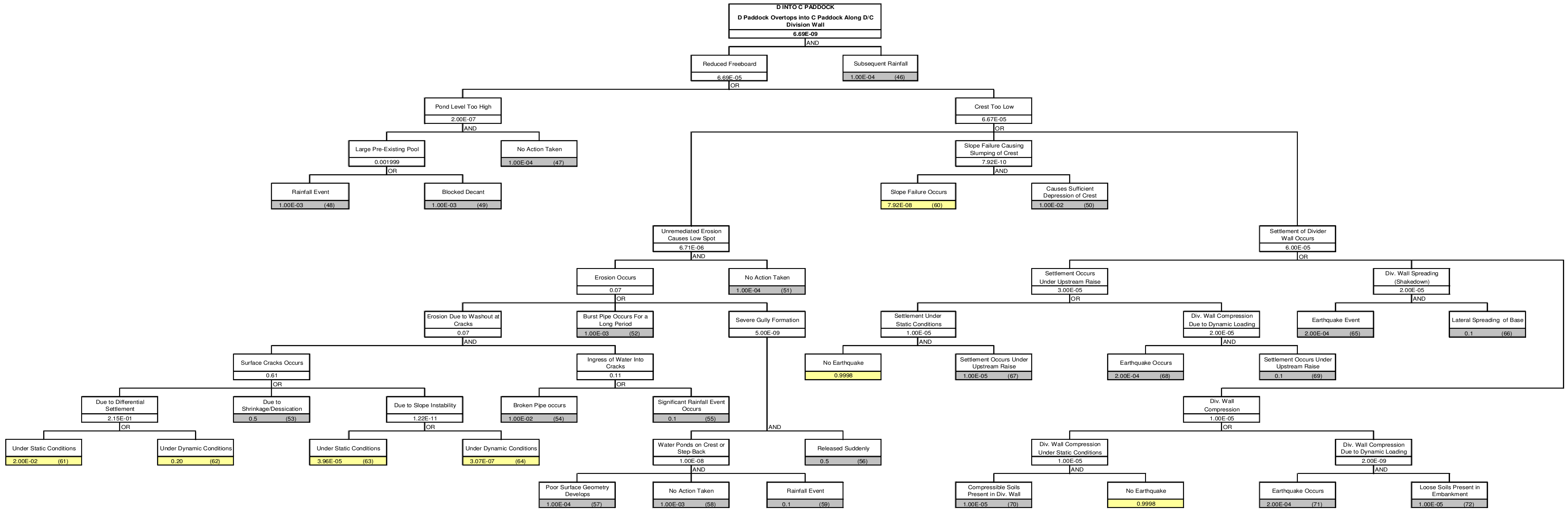

Golder Associates	CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI	
	DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY A RELEASE DUE TO OVERTOPPING	
	CHECK	DATE Sep. 05		
	SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G12

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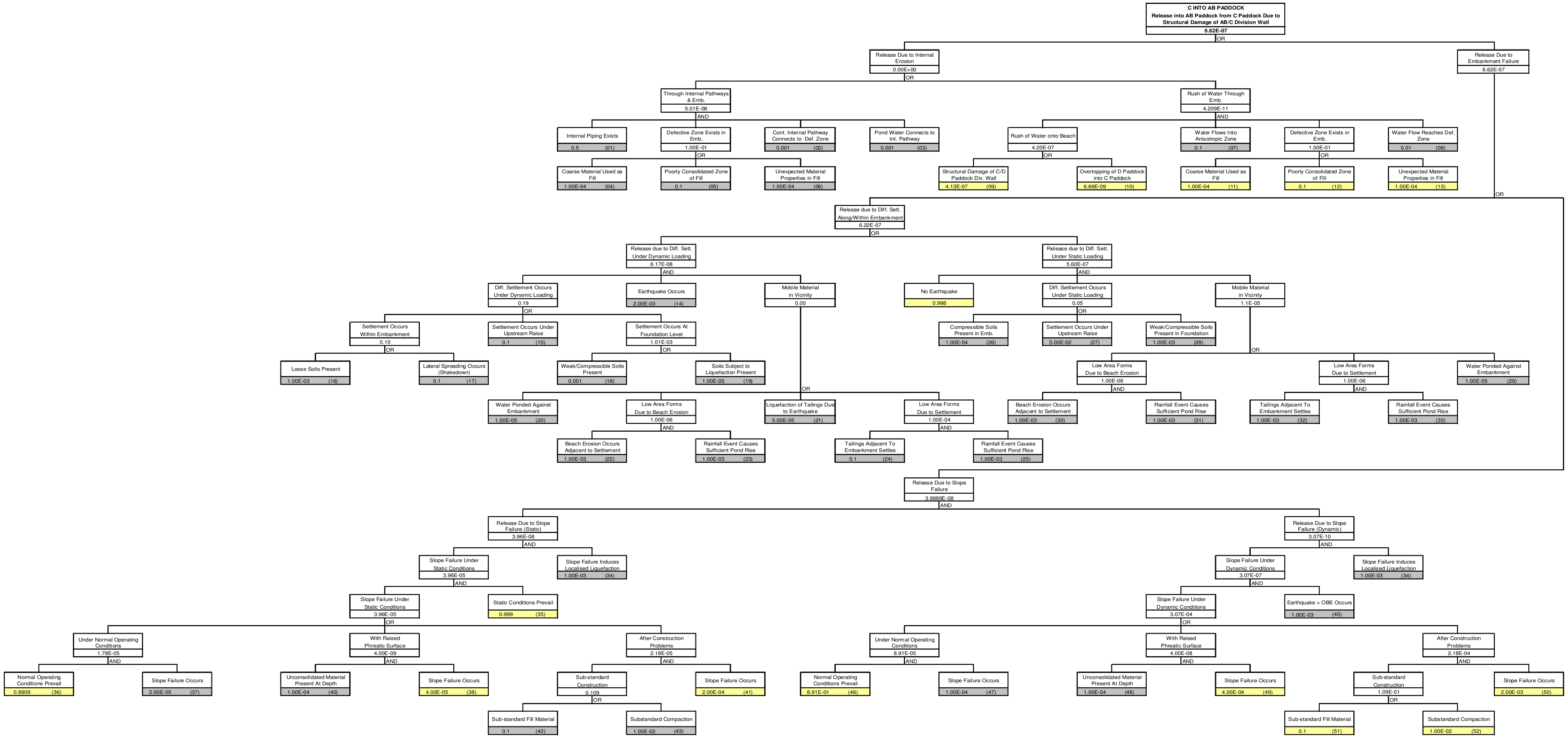
C INTO AB PADDOCK			
REF No.	**DESCRIPTION**	**ASSIGNED VALUE**	**JUSTIFICATION**
Release Through Internal Pathways and Embankment			
(01)	Internal Piping Exists	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	1.00E-03	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Release Due to Rush of Water Through Embankment			
(07)	Water Flows Into Anisotropic Zone	0.1	Highly probable that water will flow into anisotropic zone
(08)	Water Flow Reaches Def. Zone	1.00E-02	Possible that water flow reaches defective zone
(09)	Structural Damage of C/D Paddock Div. Wall	-	Linked to Structural Damage of C/D Division Wall
(10)	Overtopping of D Paddock into C Paddock	-	Linked to Overtopping of D Paddock into C Paddock
(11)	Coarse Material Used as Fill	-	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(12)	Poorly Consolidated Zone of Fill	-	High probable that a poorly consolidated zone of fill exists at some location
(13)	Unexpected Material Properties in Fill	-	Very unlikely
Differential Settlement (Dynamic)			
(14)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(15)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(16)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(17)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(18)	Weak/Compressible Soils Present	1.00E-03	Unlikely on this wall
(19)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials in the Vicinity (Dynamic)			
(20)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(21)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(22)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(23)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(24)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(25)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(26)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(27)	Settlement Occurs Under Upstream Raise	5.00E-02	Compressible soils have been observed here in the past
(28)	Weak/Compressible Soils Present in Foundation	1.00E-03	Unlikely on this wall
Mobile Materials in the Vicinity (Static)			
(29)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(30)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(31)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(32)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(33)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(34)	Slope Failure Induces Localised Static Liquefaction	1.00E-03	Unlikely that liquefaction occurs along C emb. Wall
(35)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(36)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(37)	Slope Failure Occurs	2.00E-05	Twice as likely to occur as on outer wall
(38)	Slope Failure Occurs	-	Assumed to be twice as likely after previous construction problems
(39)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(40)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(41)	Slope Failure Occurs	-	Assumed to be 10x more likely after previous construction problems
(42)	Sub-standard Fill Material	0.1	Highly Probable
(43)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(44)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Ten times more likely to occur under dynamic conditions
(45)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event.
(46)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(47)	Slope Failure Occurs	1.00E-04	More likely to occur under dynamic conditions
(48)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(49)	Slope Failure Occurs	-	Assumed to be 10x as likely to occur in the event of an earthquake
(50)	Slope Failure Occurs	-	Assumed to be 10x as likely to occur in the event of an earthquake
(51)	Sub-standard Fill Material	-	(42)
(52)	Substandard Compaction	-	(43)
Sudden Inflow Exceeds Capacity			
(53)	Subsequent Rainfall	2.50E-05	1:40,000 year rainfall will result in overtopping if freeboard in D Paddock is reduced by 0.2 m
(54)	Release Due to Structural Damage	-	Calculated in Paddock C overtops into AB
(55)	Release Due to Overtopping	-	Calculated in Paddock C overtops into AB
Reduced Freeboard and Subsequent Rainfall			
(56)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(57)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(58)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(59)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(60)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(61)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(62)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(63)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(64)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(65)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(66)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(67)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(68)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(69)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(70)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(71)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(72)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(73)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(74)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Settlement of Divider Wall Occurs			
(75)	Earthquake Event	2.00E-04	1:5000 year earthquake event
(76)	Lateral Spreading of Base	0.1	Highly probable following large earthquake event
(77)	Settlement Occurs Under Upstream Raise (Static)	1.00E-05	Highly improbable to occur without an earthquake
(78)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(79)	Settlement Occurs Under Upstream Raise (Dynamic)	0.1	Highly probable following large earthquake event
(80)	Compressible Soils Present in Div. Wall	1.00E-05	Highly unlikely given the construction material used (check construction material)
(81)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(82)	Loose Soils Present in Embankment	1.00E-05	Very low likelihood of soils liquefying (check if this is true)



Golder Associates

CLIENT KCGM		PROJECT Fimiston II - Addendum to NOI		
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY B		
CHECK [signature]	DATE Sep. 05	RELEASE DUE TO STRUCTURAL FAILURE		
SCALE NTS	A3	PROJECT No. 05641089-R01		FIGURE G13

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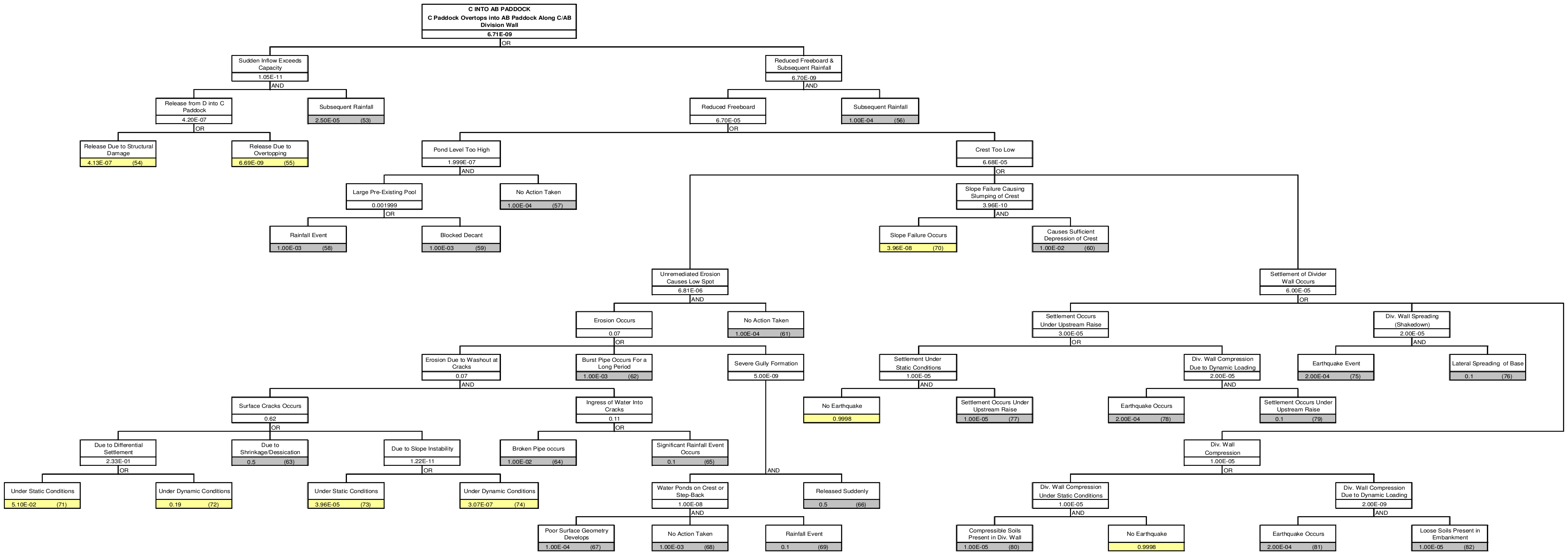

Golder Associates

CLIENT	KCGM		PROJECT	Fimiston II - Addendum to NOI	
DRAWN	MN	DATE Sep. 05	FAULT TREE, PATHWAY B		
CHECK		DATE Sep. 05	RELEASE DUE TO OVERTOPPING		
SCALE	NTS	A3	PROJECT No.	05641089-R01	FIGURE G14

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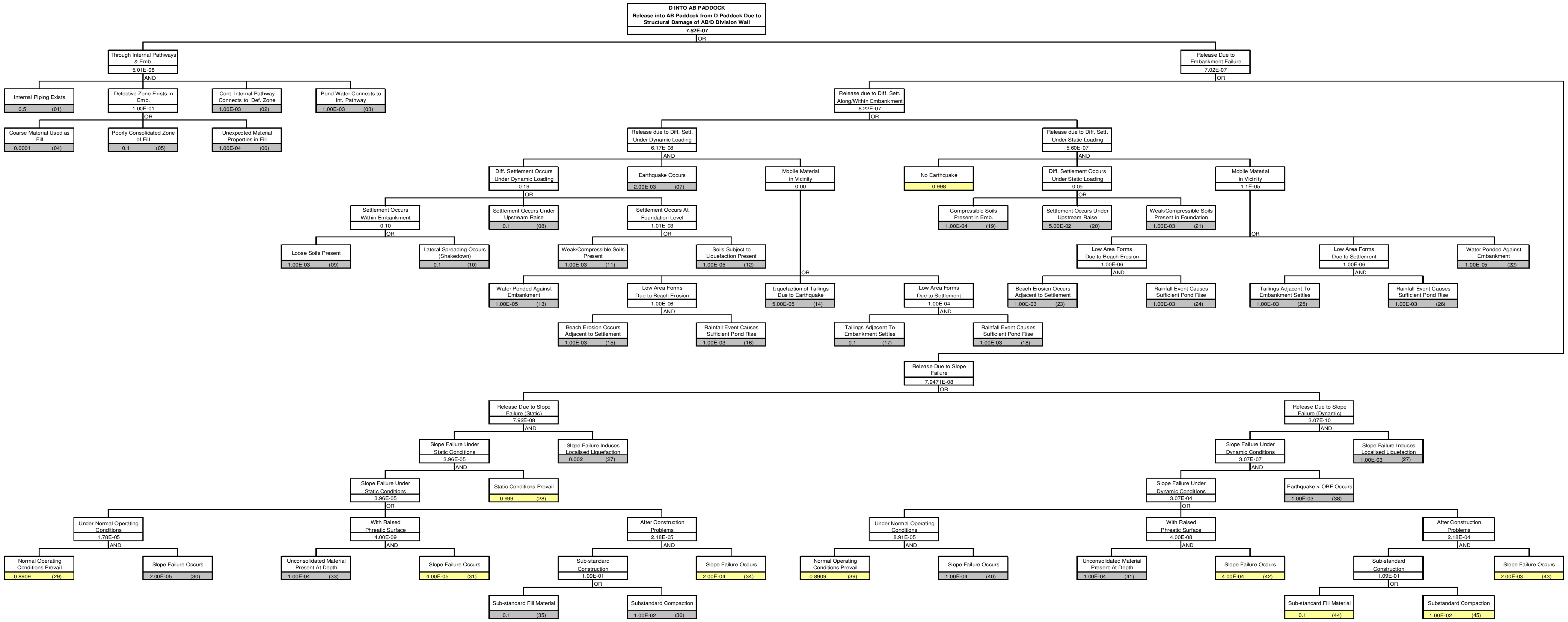
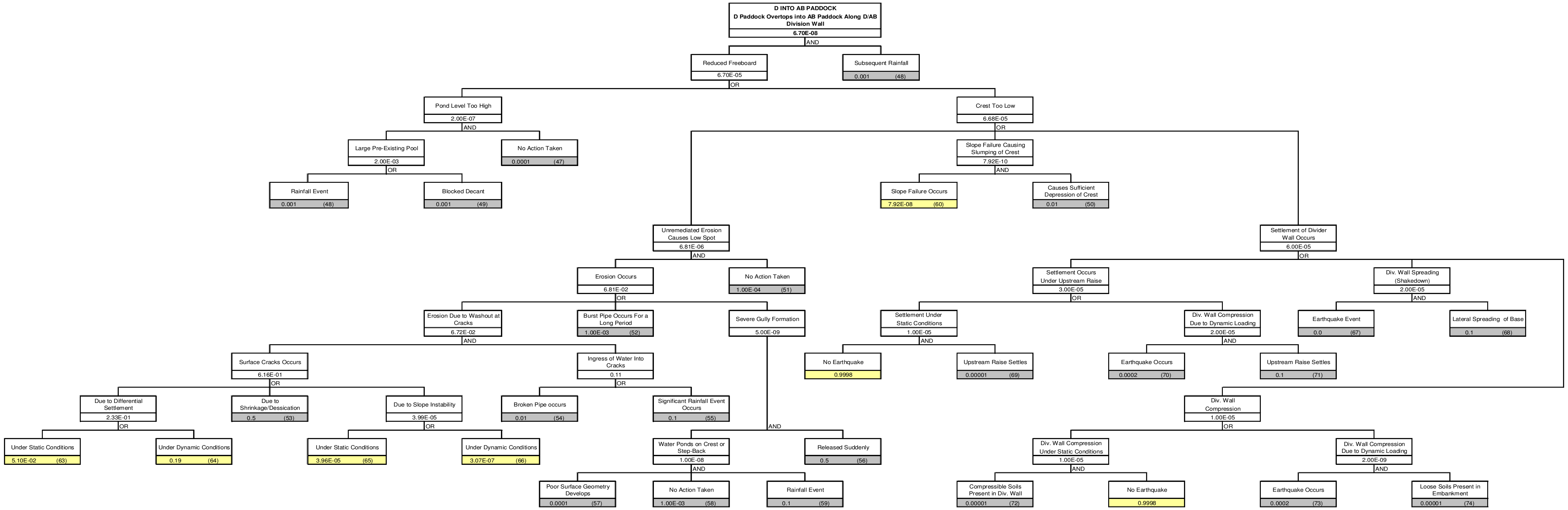
D INTO AB PADDOCK			
REF No.	**DESCRIPTION**	**ASSIGNED VALUE**	**JUSTIFICATION**
Release Through Internal Pathways and Embankment			
(01)	Internal Piping Exists	0.5	Has been observed in TSFs previously operating in area
(02)	Cont. Internal Pathway Connects to Def. Zone	1.00E-03	Unlikely, but has been recorded at other TSFs
(03)	Pond Water Connects to Int. Pathway	0.001	Water will flow through a pathway if it is continuous between pond and defective zone
(04)	Coarse Material Used as Fill	1.00E-04	Very unlikely as 50% of tailings near emb. are <0.075mm in size
(05)	Poorly Consolidated Zone of Fill	0.1	High probable that a poorly consolidated zone of fill exists at some location
(06)	Unexpected Material Properties in Fill	1.00E-04	Very unlikely
Differential Settlement (Dynamic)			
(07)	Earthquake Occurs	2.00E-03	Operating Base Earthquake = 1:500 year change of occuring
(08)	Settlement Occurs Under Upstream Raise	0.1	Highly probable following large earthquake event
(09)	Loose Soils Present	1.00E-03	Unlikely, given monitoring regime during construction
(10)	Lateral Spreading Occurs (Shakedown)	0.1	Highly probable following large earthquake event
(11)	Weak/Compressible Soils Present	1.00E-03	Unlikely on this wall
(12)	Soils Subject to Liquefaction Present	1.00E-05	Very low likelihood of soils liquefying
Mobile Materials in the Vicinity (Dynamic)			
(13)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(14)	Liquefaction of Tailings Due to Earthquake	5.00E-05	Based on previous reports, it is very unlikely to highly improbable that it occurs
(15)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(16)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(17)	Tailings Adjacent To Embankment Settles	0.1	Highly probable following earthquake event
(18)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Differential Settlement (Static)			
(19)	Compressible Soils Present in Emb.	1.00E-04	Very unlikely
(20)	Settlement Occurs Under Upstream Raise	5.00E-02	Compressible soils have been observed here in the past
(21)	Weak/Compressible Soils Present in Foundation	1.00E-03	Unlikely on this wall
Mobile Materials in the Vicinity (Static)			
(22)	Water Ponded Against Embankment	1.00E-05	Highly improbable due to maintenance record. (check history of water reaching emb)
(23)	Beach Erosion Occurs Adjacent to Settlement	1.00E-03	Unlikely to occur
(24)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
(25)	Tailings Adjacent To Embankment Settles	1.00E-03	Unlikely
(26)	Rainfall Event Causes Sufficient Pond Rise	1.00E-03	1:1000 year rainfall event required
Slope Failure (Static)			
(27)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Unlikely to occur, but slightly more likely to occur than along C paddock emb. Wall
(28)	Static Conditions Prevail	-	1 - p(Earthquake Occurs)
(29)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(30)	Slope Failure Occurs (Under Static Conditions)	2.00E-05	Twice as likely to occur as on outer wall
(31)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be twice as likely after previous construction problems.
(32)	Issue not Addressed	0.1	Will be difficult to remedy slope failure due to poor soil conditions around failure location
(33)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(34)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x more likely after previous construction problems
(35)	Sub-standard Fill Material	0.1	Highly Probable
(36)	Substandard Compaction	1.00E-02	Possible
Slope Failure (Dynamic)			
(37)	Slope Failure Induces Localised Static Liquefaction	2.00E-03	Ten times more likely to occur under dynamic conditions
(38)	Earthquake > OBE Occurs	1.00E-03	1:100 year earthquake event
(39)	Expected Conditions Prevail	-	1 - [p(Pond Level Too High) + p(Sub-Standard Construction)]
(40)	Slope Failure Occurs (Under Dynamic Conditions)	0.0001	More likely to occur under dynamic conditions
(41)	Unconsolidated Material Present At Depth	1.00E-04	Very unlikely to occur on D paddock wall
(42)	Slope Failure Occurs (With Raised Phreatic Surface)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(43)	Slope Failure Occurs (After Construction Problems)	-	Assumed to be 10x as likely to occur in the event of an earthquake
(44)	Sub-standard Fill Material	0.1	(35)
(45)	Substandard Compaction	1.00E-02	(36)
Reduced Freeboard and Subsequent Rainfall			
(46)	Subsequent Rainfall	1.00E-04	Reduced freeboard only, no sudden inflow - requires 1:10,000 year rainfall to overtop
Pond Level Too High			
(47)	No Action Taken	1.00E-04	Very unlikely that high pond levels are not addressed
(48)	Rainfall Event	1.00E-03	1:1000 year rainfall event required
(49)	Blocked Decant	1.00E-03	Unlikely to occur, but blockages are possible
Crest Too Low (Slope Failure)			
(50)	Causes Depression of Crest (Slope Failure)	1.00E-02	Possible since slope failure is likely to occur near crest due to location of phreatic surface
Crest Too Low (Unremediated Erosion Causes Low Spot)			
(51)	No Action Taken	1.00E-04	Very unlikely that no immediate action is taken after erosion occurs
(52)	Burst Pipe Occurs For a Long Period	1.00E-03	Unlikely to occur, but has happened before in C paddock
(53)	Due to Shrinkage/Dessication	0.5	True ONLY if: Seasonal cracks have been observed in embankment
(54)	Broken Pipe occurs	1.00E-02	True ONLY if: Some history of problems with seepage return pipes
(55)	Significant Rainfall Event Occurs	0.1	True ONLY if: 1:10 year event required to enable washout to occur
(56)	Released Suddenly (Pond Water)	0.5	Nearly certain to break out once formed
(57)	Poor Surface Geometry Develops	1.00E-04	Very unlikely since surface geometry is constantly monitored
(58)	No Action Taken	1.00E-03	Unlikely that poor surface conditions are not remediated
(59)	Rainfall Event	0.1	1:10 year event required to cause sizeable volume to pond
(60)	Slope Failure Occurs	-	Calculated in Structural Damage fault tree
(63)	Under Static Conditions (Due to Differential Settlement)	-	Calculated in Structural Damage fault tree
(64)	Under Dynamic Conditions (Due to Diff. Settlement)	-	Calculated in Structural Damage fault tree
(65)	Under Static Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
(66)	Under Dynamic Conditions (Due to Instability)	-	Calculated in Structural Damage fault tree
Settlement of Divider Wall Occurs			
(67)	Earthquake Event	2.00E-04	1:5000 year earthquake event
(68)	Lateral Spreading of Base	0.1	Highly probable following large earthquake event
(69)	Settlement Occurs Under Upstream Raise (Static)	1.00E-05	Highly improbable to occur without an earthquake
(70)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(71)	Settlement Occurs Under Upstream Raise (Dynamic)	0.1	Highly probable following large earthquake event
(72)	Compressible Soils Present in Div. Wall	1.00E-05	Highly unlikely given the construction material used (check construction material)
(73)	Earthquake Occurs	2.00E-04	1:5000 year earthquake event
(74)	Loose Soils Present in Embankment	1.00E-05	Very low likelihood of soils liquefying (check if this is true)



Golder Associates

CLIENT	KCGM	PROJECT	Fimiston II - Addendum to NOI
DRAWN MN	DATE Sep. 05	FAULT TREE, PATHWAY C	
CHECK	DATE Sep. 05	RELEASE DUE TO STRUCTURAL FAILURE	
SCALE NTS	A3	PROJECT No. 05641089-R01	FIGURE G15

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	MN	DATE Sep. 05	FAULT TREE, PATHWAY C RELEASE DUE TO OVERTOPPING		
CHECK		DATE Sep. 05			
SCALE	NTS	A3	PROJECT No.	05641089-R01	FIGURE G16

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APPENDIX H

COMMUNITY CONSULTATION INFORMATION

KCGM Concept PLAN

Sharing our vision for the future

December 2004

Contents

KCGM

KCGM

Dear Neighbour,

KCGM has recently released its Concept Plan which outlines our vision for the future of the Super Pit until 2017, we have enclosed a copy for your information.

Initially the project will involve the realignment of the environmental noise bund to ensure that our neighbours are shielded from subsequent mining activity.

We are also looking at an opportunity to offer the Loopline Railway room on the bund for their train offering views of the City and Super Pit.

Part of this plan is a westerly extension of the Super Pit which will allow for both the widening and deepening of the open pit. This cutback is around 30 hectares and contained within the existing KCGM perimeter fence constructed after the Bypass Road realignment in 2003.

KCGM would particularly like to draw your attention to the pages in the Concept Plan titled "How will this affect me?" and "What other issues are there?". If you have any comments or questions raised, we would be pleased to supply you with more detailed information.

This letter is to also help us establish how you would like to be involved in the approvals process, and your preferred way for KCGM to get in contact with you. We understand that every one is busy, and we would like to minimise intrusion on your valuable time. If you could fill in the form and send it back in the replied paid envelope, it would be much appreciated.

We now have a Super Pit Shop in Boulder (2 Burt Street) which is staffed by our PR team, they are available to personally take your query or they can be contacted on 9093 3488, or you can call our general Public Inquiry Line on 9022 1100. The Concept Plan enclosed, outlines even more ways for you to contact us.

Thanks for taking the time to read this correspondence, we hope to be able to work together with you to ensure that we continue to be a proud part of the Kalgoorlie-Boulder community.

Yours Sincerely

Cobb Johnstone
General Manager

KCGM

ABN 97 009 377 619

Fimiston Operations Extension

Project Definition Document

Greening the Golden Mile

Prepared by: KCGM
Date: April 2005

Distribution:	KCGM Internal
	Project Approvals Co-ordination Unit
	Department of Environment
	Department of Industry and Resources
	KCGM Website – www.superpit.com.au
	KCGM External Stakeholders

KCGM Fimiston Operations Extension Project Definition Document

KCGM
KALGOORLIE CONSOLIDATED GOLD MINES PTY LTD

Private Mail Bag 27
Kalgoorlie
Western Australia 6433
T +618 9022 1100
F +618 9022 1119
ABN 97 009 377 619
www.superpit.com.au

29 April 2005

YOUR FEEDBACK IS INVITED

In the near future, KCGM will be seeking approval to extend the Fimiston operations to enable mining to continue for an additional five years until 2017. This will include the expansion of the Fimiston Open Pit, Waste Rock Dumps and Tailings Storage Facilities.

A Project Definition Document (PDD) has been prepared which describes this project, examines the social, economic and environmental considerations and proposed management to ensure that any potential impacts of this expansion on the nearby community or environment are effectively managed.

We encourage the community to take an interest in this vital project, which will play an important part in the economic future of Kalgoorlie-Boulder and as always, your comments are encouraged and welcomed.

How Can I See the Project Definition Document?

Copies of the PDD plan are available for review at the:

- KCGM website - www.superpit.com.au
- Super Pit Shop at 2 Burt Street, Boulder

A printed or CD version is also available upon request from the Super Pit Shop at 2 Burt Street, Boulder or contact us via the Public Inquiry Line on 9022 1100.

Why Provide Feedback?

Feedback is an important way for you to provide information, express your opinions and put forward any suggestions for an alternative course of action. It is an opportunity for you to indicate any suggestions you may have to improve the proposed project. All feedback received by KCGM will be acknowledged and any feedback may be quoted in full or in part in reports.

What Should be Included in Feedback?

You may agree or disagree with, or comment on the general issues discussed in the PDD. It helps if you give reasons for your conclusions. Your feedback may make an important contribution by suggesting a better way to implement the project.

Please remember to include:

- your name,
- address,
- date; and
- contact number.

Public Inquiry Line	Accounts	Employee Relations	Open Pits	Fimiston Mill	Gidji Roaster	Supply
T 9022 1100	T 9022 1162	T 9022 1184	T 9022 1800	T 9022 1484	T 9022 1602	T 9022 1358
F 9022 1190	F 9022 1119	F 9022 1189	F 9022 1865	F 9022 1411	F 9022 1610	F 9022 1378

KCGM

How Can I Provide Feedback?

There are a number of avenues for you to respond, and we encourage you to participate in the way you would feel most comfortable.

Public Inquiry Line and Email

The KCGM Public Inquiry Line is available 7 days a week, 24 hours a day. Your query will be responded to personally by a KCGM representative. Please phone 9022 1100 or email pil@kalgold.com.au

Super Pit Website

The Super Pit website is a great information resource, and it is also another way to pass your comments back to KCGM. Visit us at www.superpit.com.au

Super Pit Shop

Come in and visit our public relations team. You will be provided with the most up to date information, and if our PR team can't answer your specific questions, they can arrange for you to speak to the most appropriate KCGM people for your query.

2 Burt Street, Boulder WA 6433
Phone: 9093 3488
Fax: 9093 2488

Letter

KCGM Approvals Coordinator
Private Mail Bag 27
Kalgoorlie WA 6433

Community Reference Group

You may feel more comfortable talking with one of our Community Reference Group Members, who can get in touch with KCGM on your behalf (anonymously if you prefer). Contact details of the KCGM CRG members are below (they're expecting your call!).

Guy Brownlee 9021 3888
Murray Joyce 9021 4262
Peter Lilly 9088 6001
James Murphy 9021 8128
Kylie Sharp 0418 930 434
Kathleen Bentley 0418 947 679
Ashley Johns 0419 941 068
Brian Kane 9080 5836
Amanda Lovitt 0403 284 013
Anne Petz 0407 990 019
Kevin Smallhorn 9021 2420

Please feel free to contact us at any stage to discuss any queries you may have about this PDD or any other aspect our operations at the Super Pit Shop at 2 Burt Street, Boulder or via the Public Inquiry Line on 9022 1100.

Yours Sincerely
Kalgoorlie Consolidated Gold Mines Pty Ltd

COBB JOHNSTONE
GENERAL MANAGER

KCGM looks to go under Super Pit

AN UNDERGROUND operation at the Super Pit could go ahead if its operators find an economic way to extract gold from under the open pit.

Kalgoorlie Consolidated Gold Mines general manager Cobb Johnstone said going underground was just one of the ways that the mine life could be extended.

Mr Johnstone made the comment following his presentation on the future of the operation at the Goldfields Mining Expo.

He said the current approvals the company had would take the operation through to 2012.

"The first thing we're looking at is a cutback to the west which would take us through to 2017," Mr Johnstone said.

"We need to explore and better understand what is below the open pit."

But he said drilling from the surface was very expensive, so more research was needed to determine whether it was economically viable to go underground.

Mr Johnstone said the company was also looking outside its current leases with a view to creating joint ventures with other explorers or acquiring new tenements.

He said the management's focus had shifted towards extending the operation's life, rather than solely concentrating on the day-to-day operations.

Kalgoorlie Miner 22 October 2004

Super Pit plans extend to 2017

By Kevin Andrusiak

SUPER Pit operator Kalgoorlie Consolidated Gold Mines has revealed its vision for the massive mine on Kalgoorlie-Boulder's doorstep, saying it is looking for approval for five vital projects to keep the mine going to 2017.

The projects include a realignment of the noise bund, an expansion of the pit on the western wall – known as the Golden Pike cutback – more waste rock dumps, a lift in the Fimiston I and Fimiston II tailings dumps and the recommission of the disused Kaltails as a third dump.

The first step, according to the concept plan, is to build the bund which will then allow the company to seek approval for the Golden Pike cutback.

The cutback, if approved, would mean the pit could be widened and deepened to a depth of about 670m, extending the life of the Super Pit by five years. KCGM said the cutback would be entirely contained in the area west of the Bypass Road.

"The surface extent of the Golden Pike Cutback is about 30 hectares and would be contained within the existing KCGM perimeter fence constructed after the completion of the Bypass Road realignment in 2003," it said.

But it will be the lifting of the three tailings dumps which will provide the most debate.

KCGM pressured the State Government in April last year that if it could not get approval for the Fimiston I raise it would have to close down Mt Charlotte underground mine and sack a number of workers.

Although it is still without approval for the raise, KCGM closed Mt Charlotte in August because of poor ore grades.

The company said a big part of the getting approval for the projects relied on public consultation, an area it was found lacking in a recent independent assesment called for by pit co owner Newmont Mining.

"For most people there will be no obvious effect, it is simply business as usual at the Super Pit," the company said. "The most obvious part of the project to the people of Kalgoorlie-Boulder will be the environmental noise bund which will be constructed to shield our closes neighbours from any ongoing mining activity."

KCGM will also be pushing for a reduction in the 400m minimum limit for the safety exclusion zone.

KCGM general manager Cobb Johnstone said in the concept plan his company played a big part in the city's economy and management was looking at ways to extend the mine life beyond 2017.

"In 2004 alone we contributed more than $255 million dollars into the local economy through wages and Kalgoorlie-Boulder-based suppliers," Mr Johnstone said.

"It is KCGM management's role to not only oversee the running of Australia's largest gold mine, but to look to further opportunities to ensure that our organisation continues to play a central role in our city's economy for many years to come.

"It's part of keeping up with our commitment to consider, communicate and contribute."

KCGM CONCEPT PLAN FACTS

IT IS a public document which may be changed to reflect the shaping of Super Pit future.

- The plan outlines what will be the final Super Pit shape in 2017.
- The Super Pit covers the Golden Mile, Australia's richest piece of dirt.
- KCGM's current approvals will take the mine life up to 2012.
- Approvals for five projects are seen as vital for extending the mine's life to 2017.
- KCGM has been operating on the doorstep of Kalgoorlie-Boulder since 1989.
- The company is investigating if it is possible to reduce the 400m Safety Exclusion Zone.
- The Super Pit Lookout will have to be moved but no timeframe is given when.
- KCGM will look at underground mining beneath the Super Pit after 2017.
- It is also exploring joint ventures and acquisition of new tenements with small players.

Kalgoorlie Miner 04 January 2005

Report outlines miner's plan to extend Fimiston project

Kaltails an option: KCGM

By Alana Buckley-Carr

RECOMMISSIONING the Kaltails storage facility would be more environmentally friendly than building a new tailings dump at the Super Pit, according to operator Kalgoorlie Consolidated Gold Mines.

The call, from general manager Cobb Johnstone follows the release of the company's Fimiston Extension Project Definition Document. The report details the company's plan to extend mining to 2017.

Submissions have been invited on the document, which also outlines the impact the Fimiston extension could have on the surrounding areas.

"It will have minimal impact on Kalgoorlie-Boulder. I don't think it will affect a huge number of people," Mr Johnstone said.

"(But) it is important to us and to Kalgoorlie that we find ways to extend the mine life."

As part of the extension, KCGM will seek approval for the westerly expansion of the Fimiston Open Pit, also known as the Golden Pike Cutback.

"To ensure the continued economic viability of the operation, it is important that mining of the Golden Pike Cutback commences no later than 2007," the report said.

The report also details a time line the company expects approvals to be granted by, with the environmental noise bund approval expected in October, Fimiston II tailings dam height increase in December while by September next year, the company expects approval for the Golden Pike cutback, northern waste dumps and Kaltails or the proposed Fimiston III tailings dam.

While Mr Johnstone said the current delay in obtaining approvals was a concern, the Government had set up a special unit and was using KCGM as a project to check the approvals process.

Kalgoorlie-Boulder Community and Industry Reference Group chairman Tom Cole said while he had not seen the report yet, it would be discussed by the group at its next meeting.

He said if anything arose from the report, the group would make a submission.

Kalgoorlie Miner 06 May 2005

News

Golden Mail 14 January 2005

KCGM releases concept plan

LOCAL MINING

MINING giant KCGM has released a detailed concept plan - a public document which spells out the company's plans for the future, including the final 2017 Super Pit outline.

KCGM plays a massive economic role in Kalgoorlie-Boulder and in 2004 alone, contributed more than $255 million into the local economy through wages and locally-based suppliers.

Its current approvals will take operations up to 2012.

However, three months ago, general manager Cobb Johnstone revealed what the company believes will be the final 2017 Super Pit outline.

Several major projects have been earmarked to ensure it reaches its 2017 mine life potential.

Those projects include:

Realigning the noise bund;

Expanding the pit on the western wall (the Golden Pike Cutback);

Build more waste rock dumps;

Lift the Fimiston 1 and Fimiston 2 Tailing Storage Facilities, or TSF's, by 10 metres;

Recommission a disused TSF as a third facility.

Built from waste rock, the noise bund covers about 25 hectares to provide its closest neighbours with a shield from subsequent mining.

The Golden Pike Cutback would involve widening and deepening the pit to about 670 metres.

It would subsequently extend the life of the Fimiston open pit by five years - taking it to 2017.

The Super Pit moves about 89 million tonnes of material each year, although only 14 million tonnes is treatable ore.

The remaining waste is used to establish the distinctive rock dumps featured among the Goldfields landscape.

In order to access ore on the cutback, and to get further down into the pit, more waste rock will be removed.

As a consequence, more waste dumps will be built.

That waste material will be relocated in the eastern, northern and southern sides of the operation - as well as internally with the final pit.

KCGM is seeking approval to extend the waste rock dump southwards behind the recent environmental noise bund extension.

However, northern waste dumps are also required for the rock produced from the Golden Pike Cutback and a deeper Super Pit.

KCGM also requires additional tailings storage capacity at Fimiston to meet processing requirements for the current 2012 mine life and the projected 2017 requirements.

The two existing Fimiston facilities store the tailings generated from crushing, grinding and leaching about 14 million tonnes of ore per year - of which 850,000 ounces of gold is recovered.

The majority of the tailings go to Fimiston 2.

If the Golden Pike Cutback is approved, a third TSF facility would be required.

A proposal to recommission the old Kaltails TSF with a height increase has been put forward.

That option would reduce the need to clear additional land for a new facility, with another advantage being that a level of infrastructure - including access roads and decant ponds - is already in place.

In working towards the various goals, KCGM has already been in discussions with the relevant government departments and the local council regarding the plans.

KCGM's public relations team are now working out of a new office at 2 Burt Street, Boulder and are available to answer questions from the public.

HELPFUL: KCGM public relations officer Jessica Ciantar, administration officer Bev Earnshaw and public relations coordinator Danielle van Kampen at the new Super Pit Shop in Burt Street.

Golden Mail 14 January 2005

KCGM from strength to strength

It was a huge year for KCGM in 2004, with gold shipped coming in at 906,338ozs, we easily broke the previous benchmark of 851,265ozs set seven years ago in 1997. There were more record breaking figures in production with 888,486ozs produced in 2004, this also surpassed the previous high set in 2003 with 872,196ozs. This was all done with cash costs under $A400/oz, which coupled with high production levels, flowed on to result in a very strong financial performance.

A review of the KCGM's economic contribution provides an even better feel for the impact of its operations. In 2004 it accounted for more than 17% of gold sales in Western Australia, generating export revenue of $482 million, royalties of $12.1 million (other taxes of $4.6 million) and contributed around $255 million dollars in local salaries and to locally-based suppliers.

However, 2005 is a crucial year for KCGM in another important area, as they embark on an extensive round of approvals to ensure the ongoing viability of the Super Pit. Currently KCGM has approvals to mine only until 2012, and they will be seeking approval for a westerly extension of the Super Pit to allow for the continued operation of the mine. The proposed western extension, called the "Golden Pike Cutback" will allow for both widening and deepening of the pit to a depth of around 670 metres and will extend the life of the Fimiston Open Pit by five years to 2017.

In December 2004, KCGM developed and launched the "KCGM Concept Plan" which essentially outlined the process and vision for achieving what could be the final pit outline in 2017. They have now just made available the Project Definition Document (the PDD), which includes more technical details on how they intend, with approval, to tackle the expansion of the Super Pit. This is available for download from www.superpit.com.au.

The PDD touches on number of proposals, such as the possibility of the Loopline Railway running along a KCGM noise bund to enhance the train tourism experience. The Loopline Society has already been the recipient of a $1M donation from KCGM towards its relocation. KCGM is committed to realising the re-establishment of the Loopline Railway to ensure ongoing tourism development, and the continuation of an important part of Kalgoorlie-Boulder heritage.

An important tourism asset that has already been provided to the Kalgoorlie-Boulder community is the Super Pit Lookout, and it is acknowledged as the number one tourist destination in the goldfields area. The Super Pit Lookout has always existed as part of the Super Pit development, although it has undergone a number of location shifts - the last being its move from Outram Street, to its present location off the Bypass Road. It is planned that the final lookout location on the realigned noise bund will provide an impressive tourism legacy for the City of Kalgoorlie-Boulder.

Anther community project in the pipeline is the rehabilitation of Mt Gleddon (Nanny Goat Hill), a site of indigenous heritage significance on KCGM leases. A partnership project with the Kalgoorlie-Boulder Urban Landcare Group, Conservation Volunteers Australia, and the Department of Indigenous Affairs is in development with the support of the local indigenous community, business and council. It is anticipated that the rehabilitated walk trail will provide an additional recreational feature for Kalgoorlie-Boulder. The Mt Gleddon project will result in the beautification of a significant landmark, and the preservation of indigenous heritage.

All in all, 2005 is shaping up as huge year for KCGM, and the Kalgoorlie-Boulder and wider community is encouraged to participate in its approval process. You are invited to provide comments back to the company through its Public Inquiry Line 9022 1100, online at www.superpit.com.au, at the new Super Pit Shop (2 Burt Street Boulder) or through one of their local Community Reference Group members.

MAY 2005 THE BOOM BEGINS 39

Kalgoorlie Miner Special Mining Feature 14 May 2005

THE FUTURE OF THE SUPER PIT

THE KALGOORLIE-BOULDER SUPER PIT IS AUSTRALIA'S LARGEST GOLD MINE, AND IN 2004 PRODUCED NEARLY 900,000OZS OF THIS UNIVERSALLY PRECIOUS METAL.

At the same time as hitting an all time record production rate, KCGM was also planning for the future.

In October 2004, KCGM General Manager Cobb Johnstone unveiled what we believe will be the final Super Pit outline in 2017.

To support the conceptual outline of the final pit design and to encourage community comments, we released the KCGM Concept Plan in December 2004.

To take our vision to the next level, KCGM has prepared a Project Definition Document (PDD) which contains more technical detail, and has taken into account comments from the community.

The PDD is available for download from our website www.superpit.com.au or in hard copy format from our Super Pit Shop at 2 Burt Street Boulder. You can also request a copy of the PDD from our Public Inquiry Line on 9022 1100.

We encourage the community to take an interest in this vital project, which will play an important part in the economic future of Kalgoorlie-Boulder.

As always, your comments are encouraged and welcomed.

KCGM

Proud to be part of the Kalgoorlie-Boulder community.

WASTE DUMPS REQUIRED
WASTE DUMPS REQUIRED
APPROVED WASTE DUMPS
LOOPLINE RESERVE
REALIGNED NOISE BUND
KCGM OPERATIONS
GOLDEN PIKE CUTBACK
ENVIRONMENTAL NOISE BUND
SOUTHERN WASTE DUMP
APPROVED WASTE DUMPS

40 A CELEBRATION OF MINING MAY 2005

Kalgoorlie Miner Special Mining Feature 14 May 2005

Issue1 December 2004 KCGM NEWS & VIEWS

Fimiston Tailings Storage Facilities

Introduction

Our management of these facilities has been the subject of an independent expert review (the Thompson Brett Report), which has subsequently been widely reported in the media. In this edition of News & Views we'd like to explain to you how our tailings facilities work, and more importantly, why we are confident we are managing them responsibly. The disposal of tailings is a very important part of our operations, and our ability to get timely approvals for these facilities is of critical importance to the ongoing future of our operations. KCGM put in an application to raise the Fimiston I Facility July 2003, and at this stage we are still waiting for approval.

At the heart of the issue is whether KCGM is affecting the 'Beneficial Use' (see explanation) of the groundwater in the area. The groundwater surrounding KCGM, and Kalgoorlie, is hyper saline (about the same salinity as sea water) and as such is not able to be used for any other purpose other than mining. This is why water for domestic use is piped in from Perth. KCGM acknowledges that in the past there have been some groundwater issues in the form of a rising water table, however there has been progressive management of this issue since 1993, and we can confidently say that in at least the last five years there has been no significant impact either to the environment or to other users of adjacent mining leases.

What are TSFs?

KCGM operates two tailings storage facilities (TSFs) called Fimiston I (~110 ha) and Fimiston II (~350 ha) for its Fimiston operations. All the material that is treated in our milling circuit is crushed and ground to a very small size prior to having the gold extracted. Once the gold has been extracted this material is known as tailings. The TSFs store all the tailings generated from the crushing, grinding and leaching of about 14 million tonnes of ore per year to recover some 850,000 ounces of gold. Fimiston I takes about 20% of the tailings with the majority going to Fimiston II.

What are tailings?

The mud-like tailings contains very fine particles of waste rock and the very (or hyper) saline water, sourced from local groundwater. The tailings also carries very small amounts of cyanide. However the main compound in the tailings (which is referred to in the Thompson Brett Report) is salt.

How do TSFs work?

Tailings are discharged on to the storage facilities from smaller pipe outlets 'spigots' which are evenly spaced on the main pipe, which encircles the upper perimeter of the TSF. The tailings flow toward the centre of the storage facility and are then progressively dried out.

On the surface of the tailings, the cyanide rapidly breaks down in sunlight. A great proportion of the water carried in the tailings to the TSFs drains off the surface once the tailings settles and is reused in our processing plant. After much of the cyanide has been oxidised by sunlight, some of the water does seep down into the TSF. Some water remains held in the TSF structure, about 20% continues to drain down and is recovered through pumps and bores, while approximately 10% eventually makes its way into the hyper saline groundwater beneath.

Several things help to manage this process:

- sunlight breaks down most of the cyanide on the top of the TSFs
- tailings water is also lost by evaporation from the top of the TSF
- clear water is pumped back to the mill for reuse
- some water is trapped in the tailings itself
- the remainder seeps into the ground below

'SOME TERMS'

What's a Water Table?

The water table is the depth below ground surface at which all of the microscopic spaces between the soil and rock particles are filled with water not air. The groundwater levels or water table beneath can be imagined as a line connecting up all the depths measured from the bore holes monitored in the area. This water table generally follows the fall of the ground surface and the drainage path. The height to which the groundwater rises up into the bore tells us how deep the water table is. Seepage down to the water table will cause it to rise and the pumping bores are used to hold this rise in check.

What is Beneficial Use?

This term "Beneficial Use" is a measure of water quality which takes into account current and future users or environments. In other parts of Australia the 'Beneficial Use' of the groundwater and surface water nearby have a high value to current users (say water for livestock) or dependent streams, lakes, wildlife, or vegetation. Around the Fimiston TSFs the groundwater ranges upward from sea water quality to hyper saline.

It is important to know that there is no usable water resource near these TSFs. Essentially we are gathering hyper saline water from an extensive network of bores, and returning some of that salt water back into the ground.

Why don't you line the TSFs?

The fact that the TSFs are not on a plastic lined base is a good thing in the Goldfields environment. When finally closing an unlined TSF such as ours, water will both evaporate, stay stored to some extent in the tailings or slowly seep out of it while being controlled by pumping bores and monitoring water table levels. After a few years when the TSF is dry, this can be stopped and no further management of the water is needed. Many of these decommissioned TSFs exist around Kalgoorlie.

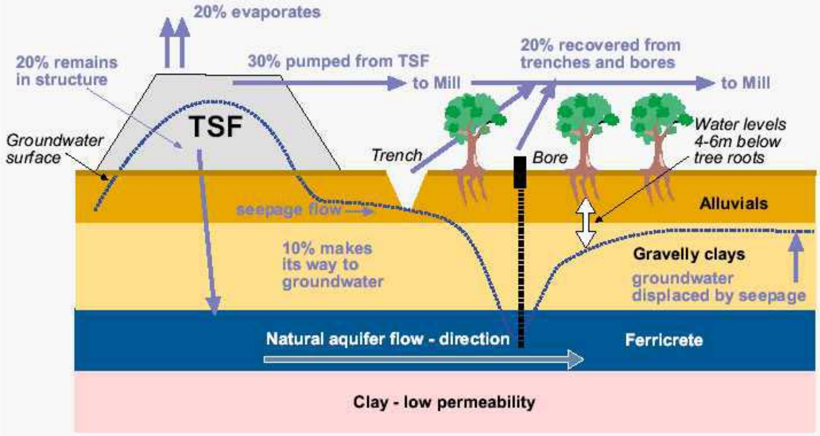
In a lined system, any seepage from rainfall after closure will seep down and hit the liner. From there it will have to be pumped away or treated. It also requires ongoing maintenance to ensure that the moisture content of the tailings does not increase to a point that weakens its structure if the water is not continually pumped away. This is not the case with an unlined TSF.

KCGM

"News & Views" Newsletter Issue 1 December 2004

OUR NEWS Your Views

Where Does Tailings H_2O Go?



CONCEPTUAL MODEL OF HYDROGEOLOGY NOT TO SCALE % APPROXIMATE

Where do we get the water for processing from?

The water comes from a variety of bore fields, including the TSF seepage recovery bores, through a network covering some 200km around Kalgoorlie. Much of that water can be up to 5 times more saline (salty) than sea water which contains about 35 grams of salt per litre.

What effect do the TSFs have on groundwater?

Seepage into the ground below beneath the TSFs does change the salinity and this is detectable to within a few hundred meters of the TSFs (remembering that the water we use from the area is already hyper saline). However this does not change the usefulness (what the Department of Environment calls the 'Beneficial Use') of the groundwater to mining. There are only trace amounts of cyanide in that groundwater and it is not a danger to wildlife or people.

Seepage can create a pressure wave that can push other groundwater around it outwards. This can be detected by water level rises in monitor bores up to a kilometre or so away. Much of this water 'mound' is displaced groundwater, and not actual seepage.

Our experience with other tailings facilities tells us that the groundwater 'mound' will diminish after we close, and the water table will decline to the residual levels that existed before KCGM and all other previous mining companies operated in the area. In essence there is no water resource out in the area.

How do you manage the TSFs?

KCGM undertakes detailed inspections and checks of operational tailings storage facilities and related pipeline infrastructure. These include three hourly checks by operators, daily checks by supervisors, weekly inspections by supervisors and monthly system inspections by engineers. In addition KCGM reports the results of our environmental and geotechnical monitoring to the Department of Environment and the Department of Industry & Resources.

How do you manage the environment around the TSFs?

KCGM has about 200 bores around its TSFs to manage groundwater. The bores are PVC pipes installed in drill holes only down to about 25 metres below ground level. KCGM pumps groundwater from some of these bores to keep the water table level deeper than a range of 4-6 metres below the surface, as agreed with the Department of Environment.

This ensures that the water table is kept deeper than the tree root zone by pumping water from these bores, which in turn ensures the tree root zone is protected and that vegetation in the area is not affected.

There are no streams or lakes anywhere near these facilities, and this groundwater does not contribute to any surface water systems.

MORE INFORMATION

Where can I get more information?

If you would like more information on TSFs, or indeed any other aspect of our operation, then we would encourage you to contact our Public Inquiry Line on 9022 1100 with your query. You can also visit us at our website www.superpit.com.au to download both the independent review, the Thompson Brett Report, and our response to this report.

We Welcome Your Comments

This newsletter will become a regular feature of KCGM's communication with our local community and will include input from the Community Reference Group. We encourage you to feedback your comments on the results of the Social Impact Assessment and related targets to us. Please feel free to phone our Public Inquiry Line on 9022 1100 (manned 7 days a week, 24 hours a day) or email pil@kalgold.com.au for further input, clarification on the results or additional information.

KALGOORLIE CONSOLIDATED GOLD MINES
Private Mailbag 27
Kalgoorlie WA 6433

KCGM

"News & Views" Newsletter Issue 1 December 2004

OUR NEWS *Your Views*

The KCGM Concept Plan

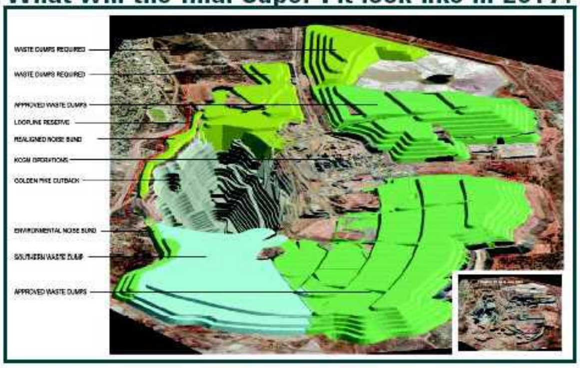
KCGM's current approvals will only take our operations up to 2012, however in October 2004 General Manager Cobb Johnstone revealed what KCGM believes will be the final Super Pit outline in 2017.

These plans have not been approved, and we are still working on the detailed environmental and engineering aspects. However, we would encourage you to consider this Concept Plan for our future and provide us with your thoughts.

Put simply, we would like to undertake the following major projects to ensure our mine reaches its 2017 mine life potential:

- Realign the noise bund
- Expand the pit on the western wall (the 'Golden Pike' Cutback)
- Build more waste rock dumps
- Lift the Fimiston II Tailings Storage Facility (TSF)
- Either re-commission a disused TSF (Kaltails) as a third TSF facility or build a new TSF facility.

What will the final Super Pit look like in 2017?



Telephone Survey

KCGM commissioned an independent telephone survey by Patterson's Market Research in December 2005 to see how we were travelling on a number of issues. KCGM was pleased to see that our results were **mostly improved**, or comparable to a similar survey that we conducted in 1999 (a comparison of results is available in the full survey).

- 502 residents
- Conducted 9-18 Dec 2004
- Sample drawn from electronic White Pages

In an unprompted response, **31% nominated KCGM as an organisation that is important to the future prosperity** of Kalgoorlie-Boulder.

A full version of the survey has been placed on our website, however here are some of the significant findings...

- **93% agree** we are "important to the economic future of Kalgoorlie".
- **78% agree** that we take care to ensure "the environmental impact of its operations are minimised" (7% disagree).
- **76% agree** we are "a good employer" (5% disagree).
- **71% agree** that we have "improved communication with the community in recent times" (11% disagree).
- **68% agree** that we are "a well managed organisation" (7% disagree).
- **67% agree** that we are "open in our dealings with the community" (15% disagree).
- **63% agree** that we "have a good environmental record" (13% disagree).
- **49% agree** that we "deal fairly with the Aboriginal community" (7% disagree).
- 72% rate out **rehabilitation efforts as good** (7% poor)
- 8 out of 10 (79%) regard **air quality** as being **acceptable**
- 83% regard **blasting** as being **hardly worth a mention**, 17% regard it as being at least a "minor irritation"
- 8 out of 10 adults living in Kalgoorlie-Boulder rate the work that KCGM has done in managing its responsibilities of operating the mine with due regard to the concerns of the people of the region as being **"well done"**.

An interesting point the survey uncovered regarding the last 'News and Views' was the low readership of the newsletter due to the distribution method. This has prompted us to have the newsletter delivered direct to your postbox via Australia Post, to give you every opportunity to learn about what we are doing and to have your say.

MORE **INFORMATION**

This newsletter is a regular feature of KCGM's communication with our local community. If you require more information on any topic raised, or would like to simply let us know what you thought of this edition of "News & Views" please contact our Super Pit Shop on 9093 3488, or our Public Inquiry line on 9022 1100 (manned 7 days a week 24 hours a day) or email pil@kalgold.com.au

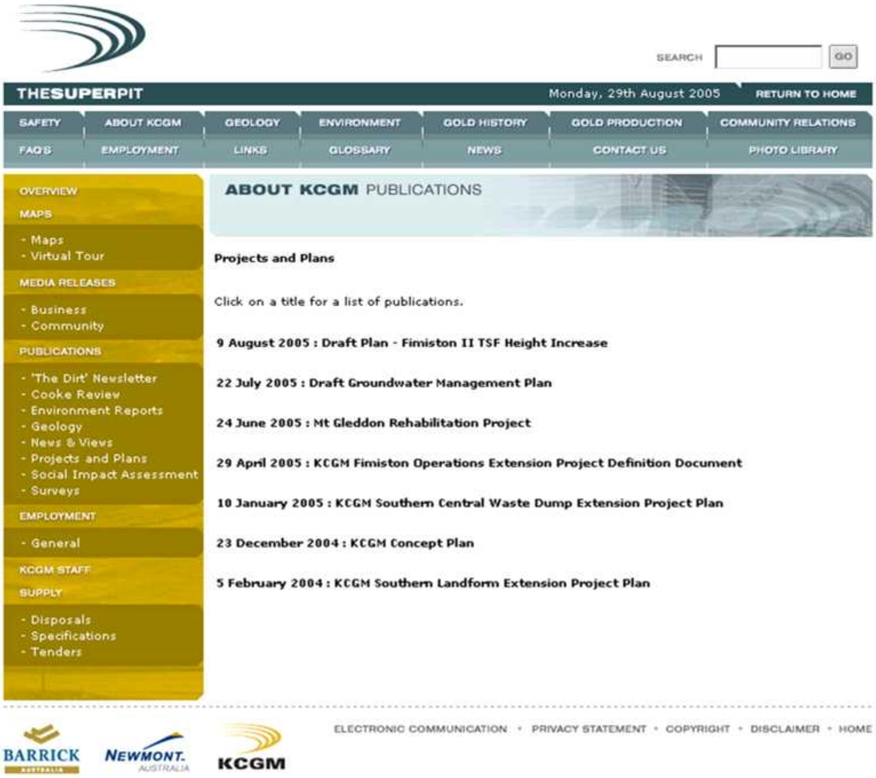
The Super Pit Shop is located at 2 Burt Street Boulder, and our PR staff welcome your direct inquiries.

If you missed out on the first issue of News & Views, and would like a copy, please contact our PR Office on 9093 3488 or visit the team at the Super Pit Shop, 2 Burt Street Boulder. It's also available online at www.superpit.com.au

KALGOORLIE CONSOLIDATED GOLD MINES
Private Mailbag 27
Kalgoorlie WA 6433

KCGM

"News & Views" Newsletter Issue 2 June 2005



THESUPERPIT

SEARCH GO

Monday, 29th August 2005 RETURN TO HOME

SAFETY | ABOUT KCGM | GEOLOGY | ENVIRONMENT | GOLD HISTORY | GOLD PRODUCTION | COMMUNITY RELATIONS

FAQ'S | EMPLOYMENT | LINKS | GLOSSARY | NEWS | CONTACT US | PHOTO LIBRARY

OVERVIEW
MAPS
- Maps
- Virtual Tour
MEDIA RELEASES
- Business
- Community
PUBLICATIONS
- 'The Dirt' Newsletter
- Cooke Review
- Environment Reports
- Geology
- News & Views
- Projects and Plans
- Social Impact Assessment
- Surveys
EMPLOYMENT
- General
KCGM STAFF
SUPPLY
- Disposals
- Specifications
- Tenders

ABOUT KCGM PUBLICATIONS

Projects and Plans

Click on a title for a list of publications.

9 August 2005 : Draft Plan - Fimiston II TSF Height Increase

22 July 2005 : Draft Groundwater Management Plan

24 June 2005 : Mt Gleddon Rehabilitation Project

29 April 2005 : KCGM Fimiston Operations Extension Project Definition Document

10 January 2005 : KCGM Southern Central Waste Dump Extension Project Plan

23 December 2004 : KCGM Concept Plan

5 February 2004 : KCGM Southern Landform Extension Project Plan

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BARRICK AUSTRALIA NEWMONT AUSTRALIA KCGM

KCGM Website - www.superpit.com.au

Approvals Update

With KCGM's next lot of approvals well under way, I caught up with Senior Environmental Officer Michelle Birch to see how things are coming along.

2005 is a crucial year for KCGM, as we've embarked on an extensive round of approvals to ensure the ongoing viability of the Super Pit. Currently KCGM has approvals to mine only until 2012, and we are seeking approval for a westerly extension of the Super Pit to allow for the continued operation of the mine. The proposed western extension, called the "Golden Pike Cutback" will allow for both widening and deepening of the pit to a depth of around 670 metres and will extend the life of the Fimiston Open Pit by five years to 2017.

Michelle Birch explaining the finer points of the KCGM Concept Plan to an interested member of the public at the Gold Week Mine Open Day.

In December 2004, KCGM developed and launched the "KCGM Concept Plan" which essentially outlined the process and vision for achieving what could be the final pit outline in 2017. In order to get the KCGM Concept Plan out into the wider community, it's been made available not only on the Super Pit Website but in the Super Pit Shop, 2 Burt Street, Boulder.

In addition the Concept Plan also made an appearance at the KCGM Fair Stand, Gold Week Mine Open Day (held at the Super Pit Lookout) and the KCGM stand at the Hall of Fame Open Day. These events provided the public with the opportunity to view and ask questions directly regarding the plan.

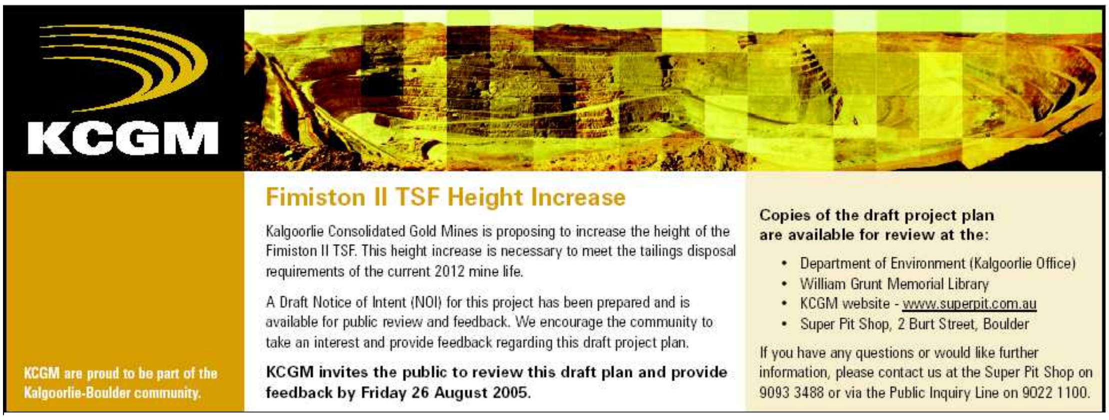
Then in May we made available the Project Definition Document (the PDD), which includes more technical details on how we intend, with approval, to tackle the expansion of the Super Pit.

The PDD touches on number of proposals, such as the possibility of the Loopline Railway running along a KCGM noise bund to enhance the train tourism experience. The Loopline Society has already been the recipient of a $1M donation from KCGM towards its relocation. KCGM is committed to realising the re-establishment of the Loopline Railway to ensure ongoing tourism development, and the continuation of an important part of Kalgoorlie-Boulder heritage.

All in all, 2005 is turning out to be a huge year for KCGM and we're encouraging Kalgoorlie-Boulder and wider community to participate in our approval process. If you'd like to make a comment or would like further information on anything related to our approvals process contact Public Relations on 90933 488 or visit the Super Pit Shop, 2 Burt St Boulder.

KCGM Newsletter "The Dirt" Issue 18 July 2005

Yours Sincerely
Kalgoorlie Consolidated Gold Mines Pty Ltd



Kalgoorlie Miner Advertisement 10 August 2005

KCGM Super Pit Shop

APPENDIX I

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfil the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you* – should apply the report for any purpose or project except the one originally contemplated.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include : the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was :

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical change that can erode the reliability of an existing geotechnical engineering report include those that affect :

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *Geotechnical Engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by : the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalise their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for* *the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognise that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognise that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labelled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognise their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE member geotechnical engineer for more information.

ASFE PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES
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