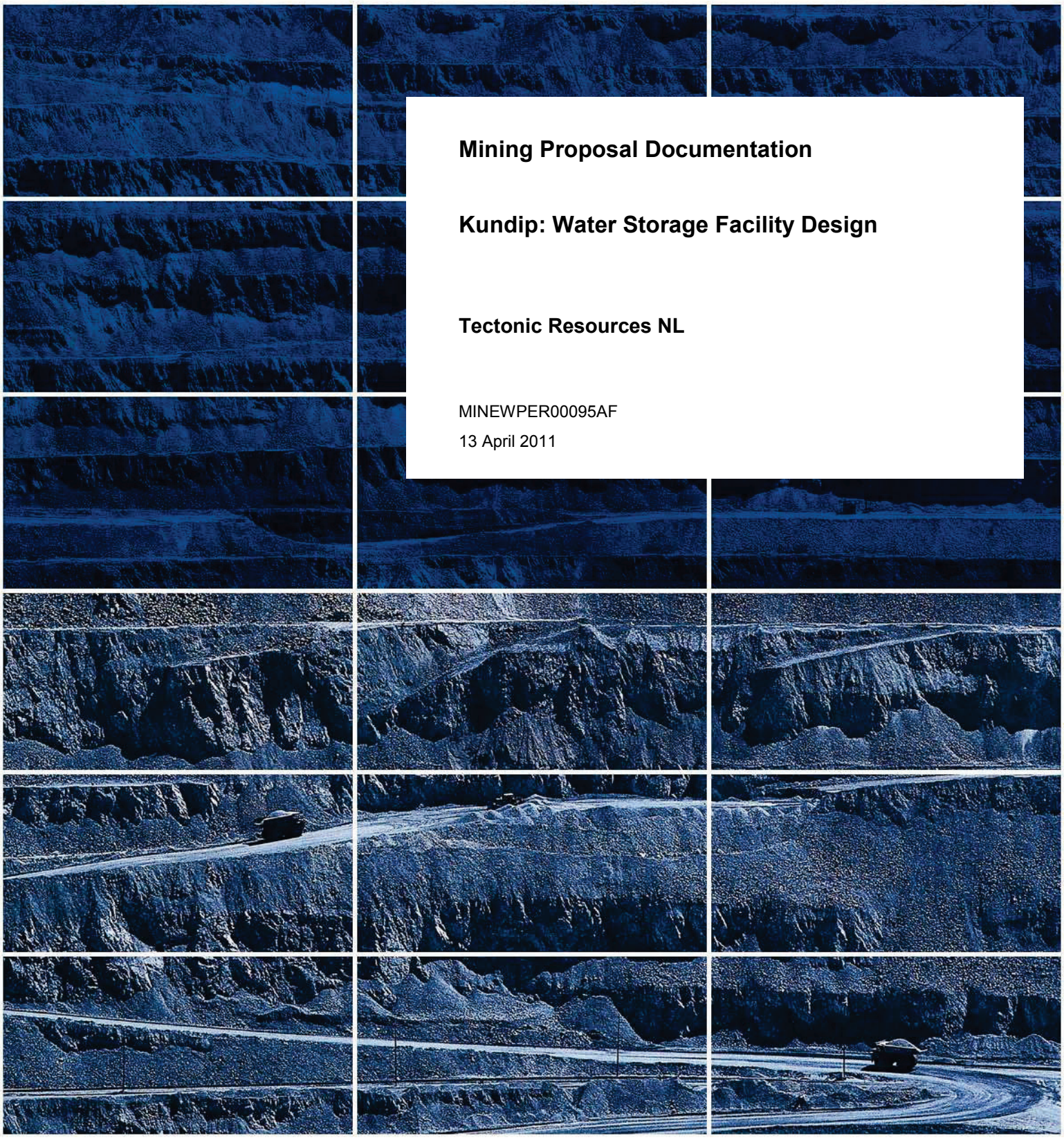
coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE



Mining Proposal Documentation

Kundip: Water Storage Facility Design

Tectonic Resources NL

MINEWPER00095AF

13 April 2011

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

13 April 2011

Tectonic Resources NL
Unit 46
328 Albany Highway
Victoria Park, WA, 6100

Attention: Mr Jason Stirbinskis

Dear Sir

RE: Kundip: Water Storage Facility Design Report

Please find attached two copies of our design report.

Should you have any queries, please don't hesitate to contact this office.

For and on behalf of Coffey Mining Pty Ltd

Reviewed By
Principal Civil / Geotechnical Engineer

Attachment: Kundip: Water Storage Facility – Design report

MINEWPER00095AF

Coffey Mining Pty Ltd ABN 52 065 481 209
1162 Hay Street, West Perth WA 6005 Australia
PO Box 1671, West Perth WA 6872 Australia
T (+61) (8) 9324 8800 F (+61) (8) 9324 8877 coffey.com

DOCUMENT INFORMATION

Author(s):	Fanie Van der Linde	Senior Civil / Geotechnical Engineer	(TMIEAust)
	Christopher Hogg	Principal Civil / Geotechnical Engineer	(MIEAust)

Date: 13 April 2011

Project Number: MINEWPER00095AF

Version / Status: Rev 0 / Final

Path & File Name: F:\MINE\Projects\Tectonic Resources\MINEWPER00095AF_Surface Water Hydrology-Kundip & Trilogy\Report\CMWPr_095AF_Kundip_WSF_Apr2011_final.docx

Print Date: Wednesday, 15 June 2011

Copies:	Tectonic Resources NL	(2)
	Coffey Mining – Perth	(1)

Document Change Control

Version	Description (section(s) amended)	Author(s)	Date

Document Review and Sign Off

Fanie Van der Linde
Senior Civil / Geotechnical Engineer

Reviewed By
Principal Civil / Geotechnical Engineer

Table of Contents

List of Tables

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Tectonic Resources NL propose to construct a water storage facility, the Kundip Water Storage Facility (KWSF), as part of the development and mining at the Kundip deposit.

It is planned to develop and mine new gold and polymetallic ore deposits, at Kundip and Trilogy, 16 and 27kms southeast of Ravensthorpe, respectively. The extraction of these ores will necessitate the construction of a new processing plant and as a by product the production of a tailings slurry that will require containment and storage. Separate Mining Proposal documents present details of the overall project and tailings storage facility.

The Kundip Development is located in hilly terrain with numerous ridges and valleys. The Flag Pit will straddle a valley with an associated ephemeral creek that flows after rainfall events. The development of this pit will require the damming of two sub catchments of a creek system, with associated diversion channels and a spillway to cope with excess water. The primary purpose of the dams will be flood control to prevent inundation of the Flag Pit. A secondary purpose of the dams constructed, will be to act as water storage facilities for the mine. Several dam alignments were assessed. The site selected has been assessed as having the lowest risk in that the spillway overflow will direct water away from the pit.

The design concept incorporates two (2) containment embankments constructed using clayey material sourced from either the spillway excavation or pre-strip material from the Flag Pit (or other pits that are initially developed), a compacted base (mine waste liner) will be placed on the 'floor' of the facility will assist in limiting water depths and seepage. It is planned to place a mine waste buttress on the downstream face of the valley embankments to assist with stability, as the two dams are located immediately upstream of the Flag Pit. For Dam 1 (sub-catchment 7a) with an embankment crest level at RL 152m, the maximum embankment height can be expected to be 7m. With a spillway outflow invert level at RL 151m, ie maximum operating water level at RL 151m. It can be expected that the water will cover an area of 1.7ha. Mine waste will be used to backfill some of the valley area to RL 149.

The tributary creek (Dam 2 of sub-catchment 7b) will have an embankment crest at RL 157m, having a nominal embankment height of 4m. The valley will be compacted with mine waste to RL 155m giving a free water depth of 1m behind the dam due to the construction of an outflow channel of 1.5m width and having an invert at RL 156m. Collected water will be discharged into Dam 1. The KWSF will be constructed in a single stage to its full height. The combined dams (two) and associated spillway and channels are expected to disturb an area of approximately 5ha.

The following hazard rating has been assigned to the two facilities. A rating of Significant, Category 2 has been assigned, based on classification criteria outlined in Table 1 and Figure 1 of the Department of Industry and Resources (DoIR)[1], (formerly the DME) (1999) document titled '*Guidelines on the Safe Design and Operating Standards for Tailings Storage*'. The significant classification has been adopted based on the clause "*No loss of life expected, but the possibility is recognised*", as the volume of water being stored in each facility is less than 10,000m³.

A geotechnical investigation of the site undertaken in March 2004[3] indicates that it is suitable for construction of a water storage. Sandy clay materials suitable for use in embankments and 'floor' liners are locally available, especially as part of the pit pre-stripping operations.

Tectonic Resources NL make the following commitments in respect to the KWSF:

i) The facility will be constructed in accordance with the drawings and specifications developed for this project. The construction will be monitored by a geotechnical specialist. Following completion of construction, a report will be compiled detailing the construction and the report will be submitted to the DMP.

ii) An appropriately designed and sized spillway will be constructed to pass peak flow events and discharge them on the downstream side away from the Flag Pit.

iii) An adequate 'operational' freeboard of 1.0m will be maintained to partially contain the design storm event, average recurrence interval (ARI) of a 1 in 100 year event, during the operation of the KWSF. The operational freeboard includes an allowance for wave action when the facility is full.

iv) Piezometers adjacent to the facility will be utilised to monitor water levels and water quality. Base line water levels and samples will be taken prior to 'start up'. Water levels will be read on a monthly basis while routine water samples will be taken on a three (3) monthly basis, from the monitoring bores, to check water quality.

v) Rehabilitation/decommissioning plans will be produced by Tectonic Resources NL and submitted to the DMP near the end of the life of the facility.

1 INTRODUCTION

This document presents the details required, by the Department of Mines and Petroleum[1], (DMP) (formerly DoIR) Western Australia, for a Mining Proposal (MP) for the construction of a water storage facility, the Kundip Water Storage Facility (KWSF), as part of mining operations at the Kundip deposit.

It is planned to develop and mine new gold and polymetallic ore deposits, at Kundip and Trilogy, located 16kms and 27 ms southeast of Ravensthorpe, respectively. The extraction of these ores will necessitate the construction of a new processing plant and as a by product the production of a tailings slurry that will require containment and storage. Separate Mining Proposal documents present details of the overall project and tailings storage facility.

The topography of the area comprises numerous ridges and valleys. The development of the Flag Pit will entail pit development across a valley such that the natural flow of the ephemeral creek will be interrupted. To protect the pit development from water ingress that may occur due to the small creek systems it will be necessary to construct two containment dams and diversion channels. The main dam (Dam 1 on sub-catchment 7a) will have a storage capacity of approximate 8,000m³. The tributary dam (Dam 2 on sub-catchment 7b) will have an storage approximate capacity of 7,000m³. The proposed concept is presented on Figure 4.

1.1 Classification

Details contained in this report were compiled in general accordance with the requirements of the DMP[1, 2] documents ,*'Guidelines on the Safe Design and Operating Standards for Tailings Storage'*, dated May 1999 and *'Mining Environmental Management Guidelines. Mining Proposals in Western Australia'*, dated February 2006, as appropriate.

The facility has been assigned a hazard rating based on the above guidelines. A rating of Significant, Category 2 has been assigned, based on classification criteria outlined in Table 1 and Figure 1 of the DMP[1], (1999) document titled '*Guidelines on the Safe Design and Operating Standards for Tailings Storage'*. The significant classification has been adopted based on the clause *"No loss of life expected, but the possibility is recognised"*. The storages will have a capacity of less than 10,000m³ and as such any inflow would be to a relatively shallow depth. As well the pit access haul road is located on the south western side of the pit, which is on the opposite side to any possible inflow from the dams.

1.2 Figures and Appendices

A storage data sheet and explanatory notes are attached as Figures 1 and 2. A Tenement Location Plan is attached as Figure 3. The design concept is presented as Figure 4 (also refer to drawing in Appendix D), which shows the location of the embankments, diversion channel and spillway in relation to the proposed infrastructure and in particular the pit layouts. Embankment cross sectional details for Dams 1 and 2 are presented on Figure 5 (also refer to drawing in Appendix D). A catchment plan is presented as Figure 6.

The results of the embankment stability analyses are presented in Appendix A. Selected extracts from the geotechnical assessment[3], undertaken by Soil & Rock Engineering, are presented in Appendix B. A construction scope of works (earthworks specification) is presented in Appendix C, while design drawings are presented in Appendix D. Construction drawings are yet to be produced.

1.3 Location

The main KWSF will be located approximately 150m north of the Flag Pit. The pit and water dams are located solely on Mining Lease M74/51. For the purpose of dams are two fold:

- To intercept water and redirect it around the pit, and
- Provide a water storage facility for the mine the expected capacity of Dam 1 is 8,000m³.

The two dams, diversion channel and spillway are expected to occupy (disturb) an area of approximately 5ha. It is intended that all construction will be undertaken as part of the initial earthworks programme. The approximate centre of the KWSF is on coordinates 6,269,600m north and 240,250m east.

1.4 Ownership

The Kundip Lease is 100% owned by the publicly listed company Tectonic Resources NL.

1.5 Existing Facilities

There are no existing operating structures at Kundip, although construction activities are planned for the development of this site. The present land use at the site is natural bush and geological exploration. The Kundip mining centre has historically been affiliated with mining since 1901. The area that will be occupied by the water storage facility on sub-catchment 7a is partially disturbed by an existing dam. The area occupied by the dam on sub-catchment 7b comprises natural vegetation.

2 SITE SELECTION

2.1 Background

The development of the Flag Pit requires that a diversion dam be constructed in the valley immediately upstream of the pit.

A site located at the existing farm dam embankment has been identified to be suitable. At this location the spillway would need to be a partially contour diversion channel which would have to be located on the western side of the Flag Pit. With this option water would be directed into the same valley system on the south western side of the pit.

A geotechnical investigation[3] of the area was undertaken in order to confirm site suitability. The investigation revealed the surficial soils at the site to comprise clay gravels and cobbles of colluvial origins overlying rock. The Geotechnical Investigation Report is contained within the Trilogy Water Dam Notice of Intent document[3] as Attachment 1 of that report. Selected extracts from that report that relate to the Kundip Site are included in this report in Appendix B.

2.2 Climate

The following climatic data has been used in the design:

- Average annual rainfall is approximately 425mm, 'Wettest' recorded annual rainfall is 734.5mm (Ravensthorpe 1951).
- According to Technical Report No.65, 2nd Edition March 1988 by the Department of Agriculture average annual evaporation in the Ravensthorpe area is estimated at 1,987mm/year and net evaporation from dams in the same area is 1,644mm/year.
- Rainfall intensity estimation for Ravensthorpe 1 in 100 year ARI 72 hr storm event (180mm).

2.3 Landform and Soils

The natural terrain in the valley areas near the Flag Pit are relatively steep. The ground in the KWSF area slopes to the south at a grade of approximately 1:30, with valley side slopes ranging up to 1:80. A description of the soils in the Kundip area is presented in Outback Ecology's topsoil report[4] dated August 2004, we understand that a copy of this report will be included in the Kundip Mining Proposal report.

2.4 Geology of Flag and Try Again Pit Areas

The Flag - Try Again deposits are an east west series of southerly dipping structures with a strike length of approximately 800m and are located on the southern border of the Kundip mining field between 8,700N and 9,000N and 4,800E and 5,700E based on the local mine grid.

The Central and Eastern Flag and Try Again deposits are hosted by dacitic lavas, tuffs and agglomerates whereas the Western Flag deposit is contained within granite. The contact between the two major host rock types is defined on sections 5,040E, 5,060E and 5,080E and it appears to strike approximately NW-SE and dip to the south at approximately 45° with the granite overlying the dacite. There is no clear evidence as to whether the contact is intrusive or faulted. Towards the western end of the Western Flag mineralisation the host rocks are a mixture of granite and dacite.

Shallow Proterozoic course grained sediments and conglomerates unconformably overlie the Western Flag mineralisation and based on limited drill information and surface exposures, the unconformity must sub-crop immediately south of the main zone of Flag mineralisation. Based on the interpretation of drilling results, the unconformity is fairly irregular with local topographical variations of approximately 20 metres, however the strike is approximately east west and it dips to the south at approximately 15°.

The lithology of the weathered profile at Try Again is difficult to interpret and although no Proterozoic sediments are currently interpreted, it is possible that much of the unmineralised saprolitic clays overlying the ore zones are Proterozoic in age.

2.4.1 Oxidation Profile

The oxidation profile varies substantially along the length of the structures depending on the nature of the host rock and the surface topography. At the granite hosted Western Flag structure which also is located in a relative topographic low the top of fresh rock is as shallow as 25m and rarely deeper than 40m. The BOCO is mostly very shallow and rarely more than 5m deep.

At the Central Flag deposit the base of oxidation is typically at 45m-50m below the surface. Although this is at a slightly lower RL than for Western Flag the difference is because of the higher topography at Central Flag.

The base of oxidation at Try Again is typically at approximately 60m below surface and this greater depth is also largely due to it occurring higher in the topography.

The KWSF would be located on ground conditions similar to those described for the western end of the ore body ie that described for the Flag deposit.

2.5 Hydrogeology

A hydrogeological assessment of the area was undertaken by Rockwater, the results of their assessment are presented in their Hydrogeological Report[6], dated March 2004, we understand that a copy of this report will be included in the Kundip Mining Proposal report. In summary their report concluded the area has only 'minor local aquifers' with the Archean volcanic rock having low permeability. Fractures and joints are moderately permeable.

The water table is at approximately 40m depth except where perched water levels were encountered due to the presence of clay horizons. The water table grades to the south Water quality is in the range 22,000mg/L to 38,000mg/L.

2.6 Hydrological Characteristics

2.6.1 Surface Water

An assessment of the surface hydrology has been undertaken by Coffey Mining Pty Ltd[5], we understand a copy of this document will be included in the Kundip Mining Proposal report. The report also included an assessment of the catchment areas affected by the construction of the water dam and its associated diversion dam. Information provided in the report outlines peak flows and channel dimension to cope with high rainfall events. A copy of the catchment plan is included as Figure 5.

2.6.2 Design Floods

The KWSF will be formed by the construction of an embankment that will dam a small valley. The KWSF will thus capture runoff directly from this catchment, nominated as sub-catchment 7a. The peak flow prediction for this catchment is 2.6m³/sec. The KWSF will also receive diverted water from the adjacent valley by way of a diversion channel, being sub-catchment 7b. Peak flow prediction for this sub-catchment is 3m³/sec.

The storage will be operated such that an adequate 'operational' freeboard of 1.0m is provided to contain any possible surge from the design rainfall event of a 1 in 100 year storm event. The combined peak inflow into the Dam 1 basin has been estimated at 6.6m³/sec, by Coffey Mining, ie flow from sub-catchments 7a and 7b, plus additional runoff into sides of channels.

2.6.3 Hydraulic Analyses

The KWSF spillway has been sized based on hydrological assessment undertaken by Coffey Mining[5]. The spillway has been located on the western side of the pit, such that any discharge will enter the valley on the south western side - downstream of Flag Pit. The spillway has been design to pass a peak flow of 6.6m³/sec. The spillway invert will at RL 151m or 1m below the adjacent embankment crest level of RL 152m.

Based on an advised peak flow of 6.6m³/sec, a spillway overflow channel width of 12m with an invert grade of 1:500 has been determined. At this sizing, the peak flow event can be expected to be passed having a flow depth of 0.9m. If the spillway was flowing at 1m depth just equal with the embankment crest a flow of 8.9m³/sec could be expected, ie 35% more than the peak flow expectation.

3 WATER STORAGE FACILITY STRUCTURE

The embankment profile adopted comprises a compacted clayey zone sourced from either the spillway excavation or as apart of the pre-stripping operations of the Flag Pit. The upstream face will be covered with rocky mine waste to act as a wave dissipater to assist in reducing erosion. On the downstream side traffic compacted rocky mine waste will be placed to half the embankment height to provide a downstream buttress.

3.1 Drawings

The following drawings are provided in Appendix D:

- Drawing No. MWP/095AF/01 Rev A Kundip Water storage Facility - Layout Plan
- Drawing No. MWP/095AF/02 Rev A Kundip Water Storage Facility - Sections & Details

3.2 Construction Method

A technical specification / earthworks scope of works document for construction of the embankment earthworks and compacted clay liner on the floor of the facility is presented in Appendix C. Design drawings are presented in Appendix D, construction drawings will be produced following approval.

3.3 Area

The total area occupied by the development, comprising the water storage structures, diversion channels and spillway is estimated at 5ha as outlined in Table 1.

Table 1
Estimates of Areas

Description	Area
Area occupied by Dam 1	5,200m²
Surface Area at RL 154m behind Dam 1	23,300m²
Spillway Area	6,100m²
Area occupied by Dam 2	3,000m²
Surface Area at RL 157m behind Dam 2	10,500m²
Diversion channel Dam 2 to Dam 1	1,000m²
Total	**49,100m² (5ha)**

3.4 Depth

The embankment will be constructed to its full height during the Stage 1 works. With a crest level at RL 152m Dam 1 will have a maximum height of 7m while Dam 2 will have a height of 5m with a crest at RL 157m.

The spillway with an invert at RL 151m is expected to have a cut depth of 2m, rock may be encountered as part of this excavation.

3.4.1 Capacity

The storage capacity of Dam 1 to RL 151m, which is the level of spillway invert, is estimated at 8,000m³. The total storage capacity of the dam to RL 152m is estimated at 35,000m³, at this level the spillway would be flowing at 1m depth.

The storage capacity of Dam 2 to RL 156m, which is the level of outflow diversion channel, is estimated at 7,000m³. The actual storage volume is small, as the valley area will be backfilled with mine waste to limit the storage capacity behind this dam.

3.5 Wall Angles

The batter slopes adopted in the embankment design are 1:3 (vertical:horizontal) for both the upstream and downstream batter slopes. The crest has been designed with a 5m width and a downstream buttress of 6m wide at RL 155m for Dam 2 and 10m wide at RL 149m for Dam 1. The slope geometry in respect to stability has been checked by conducting stability analyses of the embankment design concept.

Based on the above geometry and the crest levels outlined above, Table 2 summarises the expected embankment construction volumes.

Table 2
Anticipated Construction Volumes

	Compacted Clayey Fill	Upstream Rock Protection	Downstream Mine Waste Buttress	Cutoff Trench	Mine Waste Valley Backfill
Dam 1	8,100m³	1,000m³	1,700m³	2,000m³	6,500m³
Dam 2	4,000m³	600m³	1,000m³	700m³	2,500m³

Based on the volumes outlined above material for construction will be sourced from both the spillway excavation and pre-stripping operations. The results of the stability assessments undertaken for the embankment profile outlined above are presented in Appendix A.

The volume of material to be excavated for the spillway with a base 12m wide is estimated at 9000m³.

3.6 Liners

The base of both dams will be covered with mine waste to varying depths. The top layer will be compacted as per the embankment materials. Where deemed necessary, a clay liner, with a target permeability of 10^{-8} m/sec to 10^{-7} m/sec will be constructed over the floor of the facility to a distance of 100m from the dam toe. A clay liner will also be placed over any areas of exposed rock that may be present in the valley floor. The actual permeability of the clay liner will be dependent on the materials sourced as part of the earthworks.

4 GEOTECHNICAL INVESTIGATIONS

The geotechnical investigation for the project involved a site reconnaissance, excavation of testpits and laboratory testwork. Extracts from the geotechnical investigation report[3] pertinent to the Kundip site are provided in Appendix B.

5 INSTRUMENTATION

It is proposed that new piezometers will be established around the facility and located by the Project Hydrogeologist in order to target geological structures/shears, if the existing bores are not located in suitable locations. Water samples will be taken every three (3) months from the monitoring bores to check water quality. Water levels however will be read on a monthly basis.

It is also planned to install two embankment piezometers to allow the phreatic surface within the embankment profile to be monitored. Water levels in these piezometers will also be read on a monthly basis.

6 REHABILITATION

The KWSF will be a temporary facility, the facility will be decommissioned at the end of the mine life. Rehabilitation/decommissioning plans will be produced by Tectonic Resources NL and submitted to the DMP near the end of the life of the facility.

7 REFERENCES

1. Department of Industry and Resources (DoIR), (1999) document titled '*Guidelines on the Safe Design and Operating Standards for Tailings Storage'*.

2. Department of Industry and Resources (DoIR), (2006) document titled *'Mining Environmental Management Guidelines.Mining Proposals in Western Australia'*.

3. Soil & Rock Engineering report titled *"Trilogy Water Storage Facility Notice of Intent Phillips River Project"* reference PS5720.03-AF wsfnoi Rev) dated 11 January 2005.

4. Outback Ecology report titled *"Phillips River Gold Project Tectonic Resources NL – Kundip and Trilogy Projects, Topsoil Characterisation at Kundip and Trilogy and recommendations for rehabilitation"* dated August 2004.

5. Coffey Mining Pty Ltd report titled *"Phillips River Gold Project, Kundip: Surface Hydrology Assessment",* dated February 2011.

6. Rockwater Pty Ltd report titled *"Kundip Copper & Gold Project Hydrogeological Investigation and Monitoring Bore Completion Report"* reference 253.1/04/002, dated March 2004.

Figures

TAILINGS STORAGE DATA SHEET
KUNDIP WATER STORAGE FACILITIES

Please answer all questions, with separate sheets for cells of different ages.		Coffey Mining Job No.:	PS5720.06
		Ref No.:	PS5720.06-AB Kundip WSF noi Rev 2.doc

1 PROJECT DATA

1.1	Project Name:	Phillips River Project	1.2	Date:	July 2005
1.3	TSF name:	KWSF – Dam 1 and Dam 2	1.4	Commodity:	Gold
1.5	Name of data provider:	* Kim Bennett	1.6	Phone:	* 9388 3872
1.7	TSF centre co-ordinates (GDA94):	6,269,600m North		240,250m East	
1.8	Lease numbers:	M74/51			

2. TSF DATA

2.1	TSF Status:	Proposed ☒ Current ☐ Disused ☐ Rehabilitated ☐			
2.2	Type of TSF:1	Valley	2.2.1	Number of cells:[2]	Two separate dams
2.3	Hazard rating:3	Significant	2.4	TSF category:[4]	2
2.5	Catchment area:5	59ha (catchment 7a JDA)	2.6	Nearest watercourse:	Steere River
2.7	Date deposition started (mm/yy):	N/A	2.7.1	Date deposition completed (mm/yy):	N/A
2.8	Tailings discharge method:6	N/A	2.8.1	Water recovery method:[7]	N/A
2.9	Bottom of facility sealed or lined?:	Yes	2.9.1	Type of seal or liner:[8]	Compacted Clay
2.10	Depth to original groundwater level:	40m	2.10.1	Original groundwater TDS:	30,000mg/L
2.11	Ore process:9	N/A	2.12	Material storage rate:[10]	variable m³/day
2.13	Impoundment volume (present):	0 x 10^6m³	2.13.1	Expected maximum:	Dam 1 - 8,000m³ Dam 2 - 7,000m³
2.14	Mass of solids stored (present):	0 x 10^6t	2.14.1	Expected maximum:	N/A

3. ABOVE GROUND FACILITIES

3.1	Foundation soils:	Sandy clay	3.1.1	Foundation rocks:	schists and mafics
3.2	Starter bund construction materials:[11]	Sandy clay	3.2.1	Wall lifting by:[12]	N/A
3.3	Wall construction by:	Mechanically ☐ Hydraulically ☐	3.3.1	Wall lifting material:[13]	N/A
3.4	Present maximum wall height agl:[14]	0m	3.4.1	Expected maximum:	7m
3.5	Crest length (present):	0m	3.5.1	Expected maximum:	250m
3.6	Impoundment area (present):	0ha	3.6.1	Expected maximum:	59.2ha

4. 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	4.3.4	Expected maximum:	m
4.4	Current surface area of tailings:	ha	4.5	Final surface area of tailings:	ha

5. PROPERTIES OF TAILINGS

5.1	TDS:	20,000mg/L	5.2	pH:	7
5.3	Solids content:	0	5.4	Deposited density:	N/A
5.5	WAD CN:	N/A	5.6	Total CN:	N/A
5.7	Potentially hazardous substances:[15]				
5.8	Any other NPI listed substances in the TSF?[16]	Not reportable			

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

FIGURE 1

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 decant, floating 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: clay, 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. Wall lifting method during the reporting period, if raised.
13. If the wall has been raised during the reporting period, the wall lifting material used. Is it tailings or any other (or combination of) material(s) listed under item 11 above.
14. Maximum wall height above the ground level (not AHD or RL).
15. Arsenic, Asbestos, Caustic soda, Copper sulphide, Cyanide, Iron sulphide, Lead, Mercury, Nickel sulphide, Sulphuric acid, Xanthates etc.
16. 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:

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

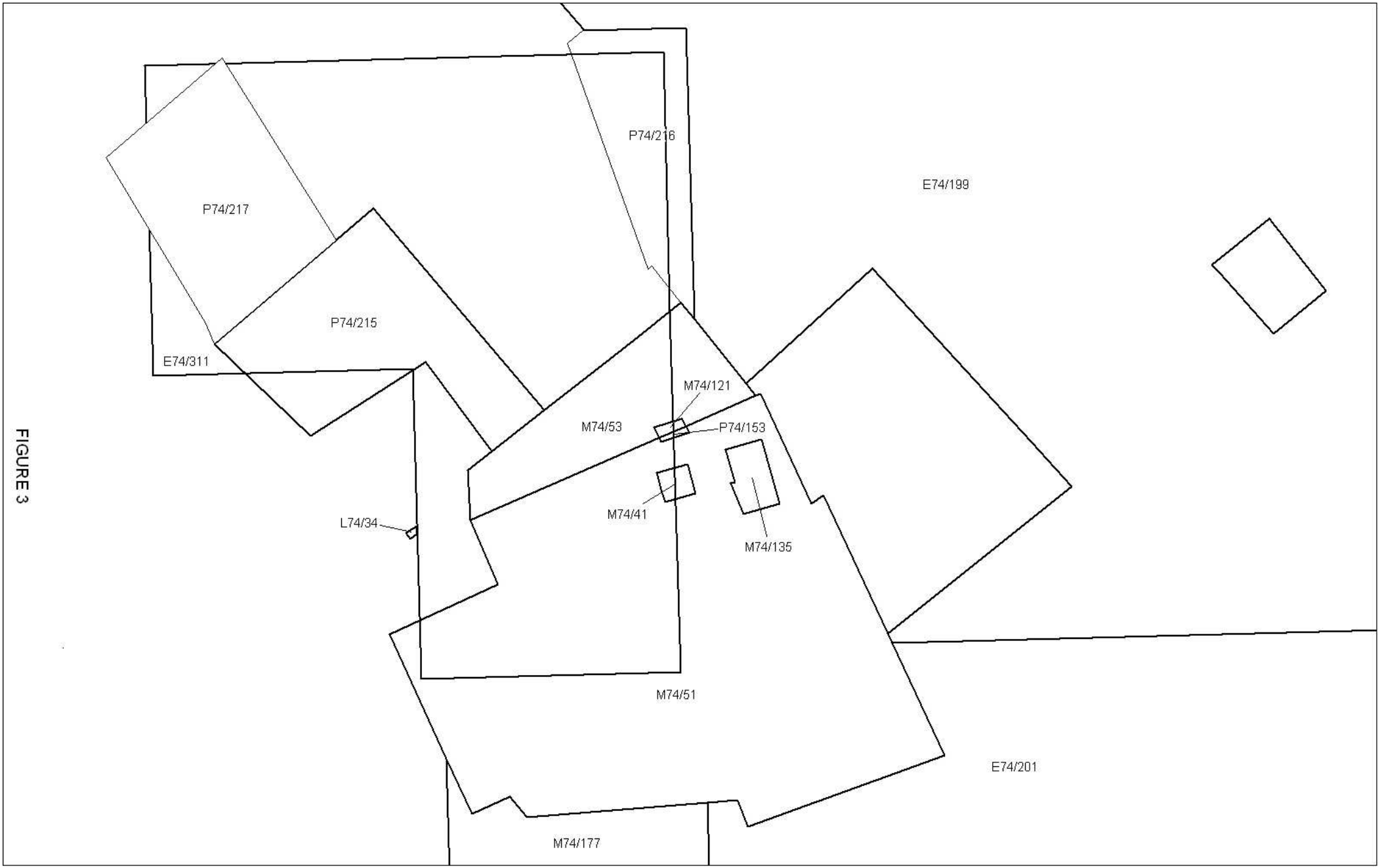
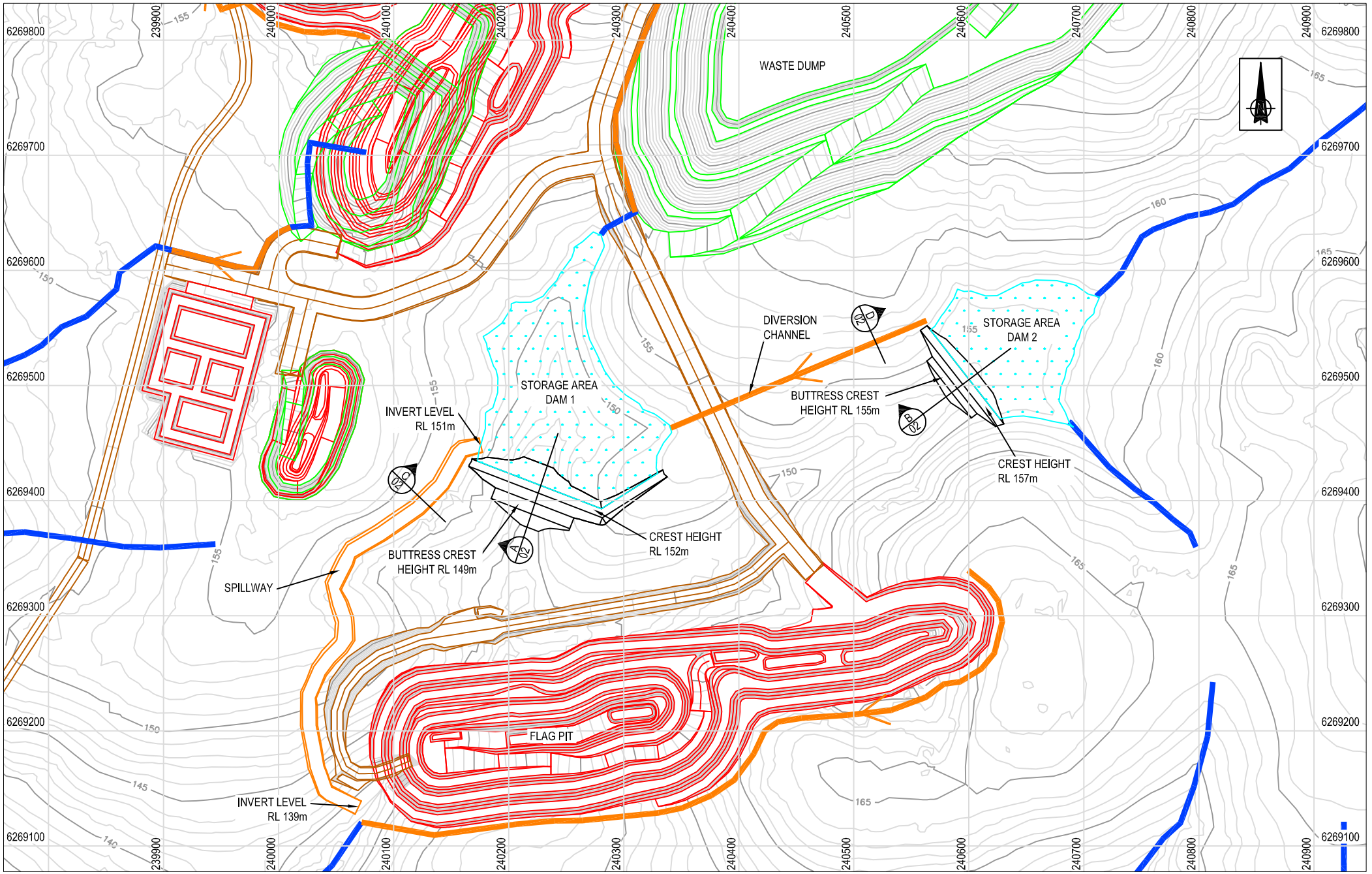

P74/216
E74/199
P74/217
P74/215
E74/311
M74/121
M74/53
P74/153
M74/41
M74/135
L74/34
M74/51
E74/201
M74/177

FIGURE 3



notes:

rev no	revision note	date	approved
A	ISSUED FOR CLIENT REVIEW	24.02.2011	CH

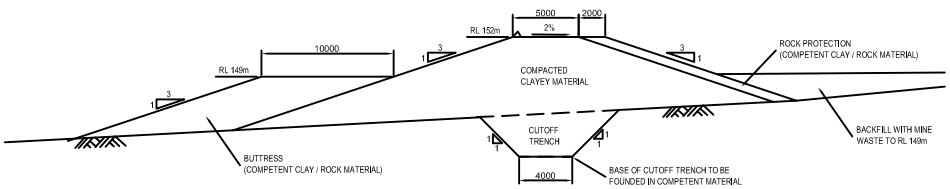
Drawn:	FVDL
Approved:	CH
Date:	24.02.2011
Scale:	1:1500
Original size:	A1

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

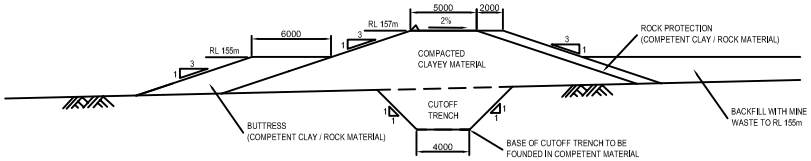
Client:	TECTONIC RESOURCES NL
Project:	KUNDIP WATER STORAGE FACILITY
Title:	LAYOUT PLAN
Project no:	MWP00005AF
Dwg no:	MWP/005AF/01
Rev:	A

REF:
DWG: P:\MINE\Projects\Tectonic Resources\MINEWPER00005AF_Surface Water Hydrology\Audit & Triage\Figures\MWP_005AF_01 Rev A.dwg

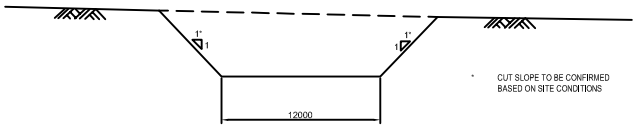
NOTE:
1. THE DEPTH OF FOUNDATION PREPARATION AND THE DEPTH OF CUTOFF TRENCH ARE TO BE CONFIRMED ON SITE AFTER INSPECTION BY THE SUPERINTENDENT



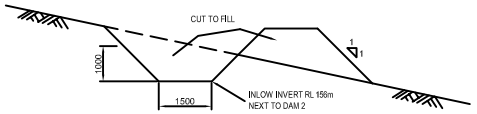
A 01 TYPICAL EMBANKMENT CROSS SECTION
DAM 1 (CATCHMENT 7A)
SCALE 1:1000



B 01 TYPICAL EMBANKMENT CROSS SECTION
DAM 2 (CATCHMENT 7B)
SCALE 1:1000



C 01 TYPICAL CROSS SECTION
SPILLWAY
SCALE 1:1000



D 01 TYPICAL CROSS SECTION
DIVERSION CHANNEL
N.T.S.

notes:

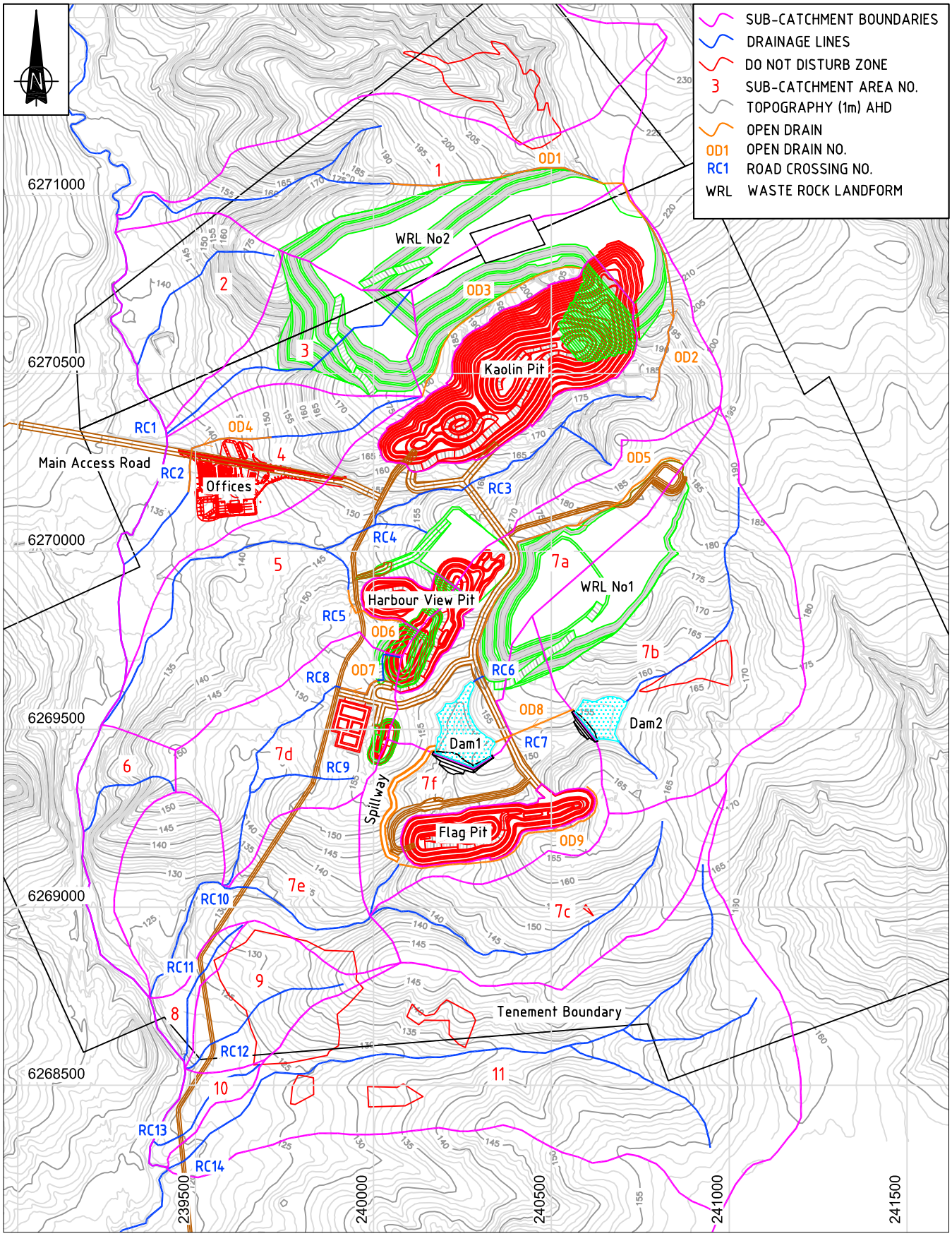
rev no	revision note	date	approved
A	ISSUED FOR CLIENT REVIEW	24.02.2011	CH

Drawn:	FVDL
Approved:	CH
Date:	24.02.2011
Scale:	AS NOTED
Original size:	

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

Client: TECTONIC RESOURCES NL
Project: KUNDIP WATER STORAGE FACILITY
Title: SECTIONS AND DETAILS
Project no: MWP00005AF
Dwg no: MWP/005AF/02
Rev: A

REF:
DWG: P:\MINE\Projects\Tectonic Resources\MINEWPER00005AF_Surface Water Hydrology\Audit & Triage\Figures\MWP_005AF_02 Rev A.dwg



REF:
DWG: F:\MINE\Projects\Tectonic Resources\MINEWPER00095AF_Surface Water Hydrology-Kundip & Trilogy\Figures\Kundip_Figure 5.dwg

Drawn:	FVDL
Approved:	CH
Date:	2011-02-18
Scale:	1:15000
Original size:	

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

Client:	TECTONIC RESOURCES NL		
Project:	SURFACE WATER HYDROLOGY - KUNDIP		
Title:	SURFACE WATER CONTROL TREATMENTS		
Project no:	MWP00095AF	Fig no: 5	Rev: A

Appendix A

Stability Analysis

TECTONIC RESOURCES NL

EMBANKMENT STABILITY ANALYSIS

KUNDIP WATER STORAGE

PS5720-AC-Stability

7 July 2005

TABLE OF CONTENTS

1. INTRODUCTION

This report presents the results of the stability analyses undertaken as part of the design review of the embankments to be constructed for the Kundip Water Storage Facility 1 (KWSF or Dam 1) located at Tectonic Resources Philips River project near Ravensthorpe. The review was undertaken as part of the design process and assessment of the KWSF and includes details obtained from the fieldwork undertaken in 2004 the laboratory testing programme and parameters used for the Trilogy Water Storage Facility. The assessment is also applicable to the smaller Dam 2. The embankments will be constructed to their full height as part of the initial construction programme.

2. EMBANKMENT DETAILS

The design concept assessed for the embankment construction comprises:

- Embankment crest at RL 155.0m.
- Embankment height varying from 0m to 7m in height
- Embankment crest 5m wide.
- Crest crossfall of 2% sloped into the storage.
- Downstream (outer) batter slope at 1:3 (horizontal:vertical) or 18.40.
- Downstream buttress minimum of 6m wide, constructed to RL 151m.
- Upstream (inner) batter slope 1:3 (horizontal:vertical) or 18.40.
- Along the embankment alignment a centrally located cutoff trench excavated below natural ground level to intersect competent material.
- Embankment strength parameters based on Trilogy values and assumed values.

3. STABILITY ANALYSES

3.1 General

This section provides details of the stability assessments undertaken for the design concept outlined, comprising a containment embankment of maximum 7m in height. The embankment will vary in height due to the sloping nature of the ground in the valley.

The stability analyses were undertaken using recent (2004) site investigation data and assessment of laboratory test results of materials sourced from the area. The phreatic surfaces used in the embankment analyses are assumed levels and represent in some cases a ‘worst’ case scenario within the embankment profile.

An acceleration coefficient of 0.08g was adopted in the earthquake loading cases, based on Figure 2.3(f) of AS1170.4-1993, Minimum Design Loads on Structures, Part 4: Earthquake Loads. The acceleration coefficient is approximately a 1 in 500 year event. No reductions in material parameters were assumed during an earthquake event.

3.2 Method of Analysis

The slope stability analyses of the embankment construction have been carried out using a computer model which analyses the stability of potential circular slip planes within the mass of the embankment by the Bishop's method. The analyses were performed using Slope/W version 6.16, which is part of the Geo-Slope suite of programmes.

The embankment material strength parameters, that were selected are assumed values, but were based on laboratory testing of materials obtained during the geotechnical investigations. Table 1, summarises the design parameters that have been utilised in the slope stability models for each of the separate embankment components.

TABLE 1 SUMMARY OF MATERIAL PARAMETERS

Material	Effective Stress Parameters
(i) Upstream Layer of Mine Waste	
Cohesion (c)	5 kPa
Angle of internal friction (ϕ)	15^o
Bulk density (γ)	16
(ii) Compacted Embankment Material	
Cohesion (c)	5 kPa
Angle of internal friction (ϕ)	20^o
Bulk density (γ)	18
(iii) Downstream Traffic Compacted Mine Waste	
Cohesion (c)	5 kPa
Angle of internal friction (ϕ)	15^o
Bulk density (γ)	16
(iv) Foundation Material	
Cohesion (c)	10 kPa
Angle of internal friction (ϕ)	30^o
Bulk density (γ)	18

The parameters used for items (i), (ii) and (iii) were selected based on classification laboratory test results and values selected for Trilogy. All values are thus assumed parameters and are considered to be conservative.

3.3 Cases Analysed

A total of fourteen (14) stability cases were examined for varying operational considerations. The cases examined included upstream and downstream failure modes, normal operating condition, earthquake loading and rapid water draw down cases. Tables 2 and 3 outline the different cases that were examined

TABLE 2 STABILITY CASES ANALYSED –DOWNSTREAM FAILURE MODE

Case	Remarks
Case 1 – downstream failure	As initially constructed, no water present
Case 2 – downstream failure	As per case 1 but subjected to an earthquake loading of 0.08g
Case 3 – downstream failure	Normal operating conditions 7m of water against embankment
Case 4 – downstream failure	As per case 3 but subject to an earthquake loading of 0.08g
Case 5 – downstream failure	Sudden draw down of water level
Case 6 – downstream failure	As per case 5 but subject to an earthquake loading of 0.08g
Case 7 – downstream failure	As per case 1, BUT no downstream buttress
Case 8 – downstream failure	As per case 7 but subject to an earthquake loading of 0.08g

TABLE 3 STABILITY CASES ANALYSED – UPSTREAM FAILURE MODE

Case	Remarks
Case 9 – upstream failure	As initially constructed, no water present
Case 10 – upstream failure	As per case 9 but subjected to an earthquake loading of 0.08g
Case 11 – upstream failure	Normal operating conditions 7m of water against embankment
Case 12 – upstream failure	As per case 11 but subject to an earthquake loading of 0.08g
Case 13 – upstream failure	Sudden draw down of water level
Case 14 – upstream failure	As per case 13 but subject to an earthquake loading of 0.08g

3.4 Results of Embankment Stability Analyses – Downstream Failures

Downstream embankment failure assessments are covered by cases 1 to 8. Upstream embankment failure assessments are covered by cases 9 to 14. The results of the stability analyses, for each case, are summarised and presented in Tables 4 and 5 with the plots presented in Attachment A.

3.4.1 Case 1 – Full Height Construction – Normal Loading

Case 1 analysed a potential slope failure in a downstream direction under normal loading, for an embankment crest at RL515m immediately after construction with no water present. The stability plot infers that the lowest factor of safety is associated with a relatively shallow batter failure through the main embankment profile. A factor of safety of 2.05 was obtained, results are summarised in Table 4.

3.4.2 Case 2 – Full Height Construction – Earthquake Loading

Case 2 analysed a potential slope failure based on the Case 1 profile, as noted above, however an earthquake loading of 0.08g was applied horizontally. A relatively shallow batter failure surface was calculated to have a lowest Factor of Safety of 1.59, results are summarised in Table 4.

3.4.3 Case 3 – Storage Full of Water – Normal Loading

Case 3 analysed a potential slope failure similar to Case 1 but with water present to RL 154m. A high phreatic surface within the embankment profile was assumed, it was assumed it exited at the downstream toe, a factor of safety of 1.59 was obtained.

3.4.4 Case 4 – Storage Full of Water – Earthquake Loading

Case 4 analysed a potential slope failure similar to Case 3, as noted above, however an earthquake loading of 0.08g was applied horizontally. A deeper seated failure surface was calculated to have the lowest Factor of Safety of 1.23.

3.4.5 Case 5 – Rapid Water Drawdown – Normal Loading

Case 5 analysed the impact of rapid water drawdown with minimal to no pore pressure dissipation within the embankment. This would only occur if the stored water was removed rapidly from the storage over several days/weeks, such that internal embankment pore pressures could not adjust. A factor of safety of 1.59 was obtained.

3.4.6 Case 6 – Rapid Water Drawdown – Earthquake Loading

Case 6 analysed a potential slope failure similar to Case 5, as noted above, however an earthquake loading of 0.08g was applied horizontally. A low factor of safety of 1.23 was obtained.

3.4.7 Case 7 – Full Height Construction, no downstream buttress – Normal Loading

Case 7 analysed a potential slope failure in a downstream direction under normal loading, for an embankment crest at RL515m immediately after construction but without the downstream buttress. No water was present. The stability plot infers that the lowest factor of safety is associated with a relatively shallow batter failure through the main embankment profile. A factor of safety of 1.75 was obtained as compared with case 1 where a value of 2.05 was obtained with a downstream buttress.

3.4.8 Case 8 – Full Height Construction, no downstream buttress – Earthquake Loading

Case 8 analysed a potential slope failure based on the Case 7 profile, as noted above, however an earthquake loading of 0.08g was applied horizontally. A relatively shallow batter failure surface was calculated to have a lowest Factor of Safety of 1.38, results are summarised in Table 4.

3.5 Results of Embankment Stability Analyses Upstream Failures

Upstream embankment failure assessments are covered by cases 9 to 14. Downstream embankment failure assessments are covered by cases 1 to 8. The results of the stability analyses, for each case, are summarised and presented in Tables 4 and 5 with the plots presented in Attachment A.

3.5.1 Case 9 – Full Height Construction – Normal Loading

Case 9 analysed a potential slope failure in the upstream direction under normal loading, for an embankment crest at RL515m immediately after construction with no water present. The stability plot infers that the lowest factor of safety is associated with a shallow batter failure through the main embankment profile. A factor of safety of 1.74 was obtained, results are summarised in Table 4.

3.5.2 Case 10 – Full Height Construction – Earthquake Loading

Case 10 analysed a potential slope failure based on the Case 9 profile, as noted above, however an earthquake loading of 0.08g was applied horizontally. A shallow batter failure surface was calculated to have a lowest Factor of Safety of 1.37, results are summarised in Table 4.

3.5.3 Case 11 – Storage Full of Water – Normal Loading

Case 11 analysed a potential slope failure similar to Case 9 but with water present to RL 154m. A high phreatic surface within the embankment profile was assumed, it was assumed it exited at the downstream toe. A factor of safety of 2.06 was obtained having a deeper seated failure mode.

3.5.4 Case 12 – Storage Full of Water – Earthquake Loading

Case 12 analysed a potential slope failure similar to Case 11, as noted above, however an earthquake loading of 0.08g was applied horizontally. A deeper seated failure surface was calculated to have the lowest factor of safety of 1.36.

3.5.5 Case 13 – Rapid Water Drawdown – Normal Loading

Case 13 analysed the impact of rapid water drawdown with minimal to no pore pressure dissipation within the embankment profile. This would only occur if the stored water was removed rapidly from the storage over several days/weeks, such that internal embankment pore pressures could not adjust. A low factor of safety of 1.04 was obtained suggesting the embankment has only a marginal factor of safety.

3.5.6 Case 14 – Rapid Water Drawdown – Earthquake Loading

Case 14 analysed a potential slope failure similar to Case 13, however an earthquake loading of 0.08g was applied horizontally. A low factor of safety of 0.81 was obtained indicating the embankment would fail under the combination of these two conditions, which are considered to have a low probability of occurring.

4. SUMMARY OF STABILITY RESULTS

The results of the slope stability analyses undertaken for the cases analysed are given in Table 4.

TABLE 4 SUMMARY OF STABILITY ANALYSES RESULTS

Case Number	Factor of Safety	Comment	Recommended Minimum Factors of Safety for each Case
Case 1	2.05	Downstream direction	1.50
Case 2	1.59	Downstream direction	1.20
Case 3	1.59	Downstream direction	1.50
Case 4	1.23	Downstream direction	1.20
Case 5	1.59	Downstream direction	1.30
Case 6	1.23	Downstream direction	1.15
Case 7	1.75	Downstream direction	1.50
Case 8	1.38	Downstream direction	1.20
Case 9	1.74	Upstream direction	1.50
Case 10	1.37	Upstream direction	1.20
Case 11	2.06	Upstream direction	1.50
Case 12	1.36	Upstream direction	1.20
Case 13	**1.04**	Upstream direction	1.30
Case 14	**0.81**	Upstream direction	1.15

The slope stability analyses indicate that for the strength parameters assumed and the operating conditions analysed that the embankment profile that has been adopted based on the design review have adequate factors against failure EXCEPT where rapid water drawdown condition may occur. And the factors obtained do not exceed (are less than) the recommended minimum factors of safety outlined in NAVFAC DM-7.1 1982.

The stability analyses indicate that the embankment is stable under normal operating conditions (no water present against the embankments) and earthquake loading for the cases examined. The facility should be operated such that water level movements are controlled by ensuring that large water level falls do not occur.

These events are considered to have a low probability of occurring. The analysis also confirms that the downstream buttress should be incorporated into the design as it increases stability especially as the dam will be located upstream of the Flag Pit.

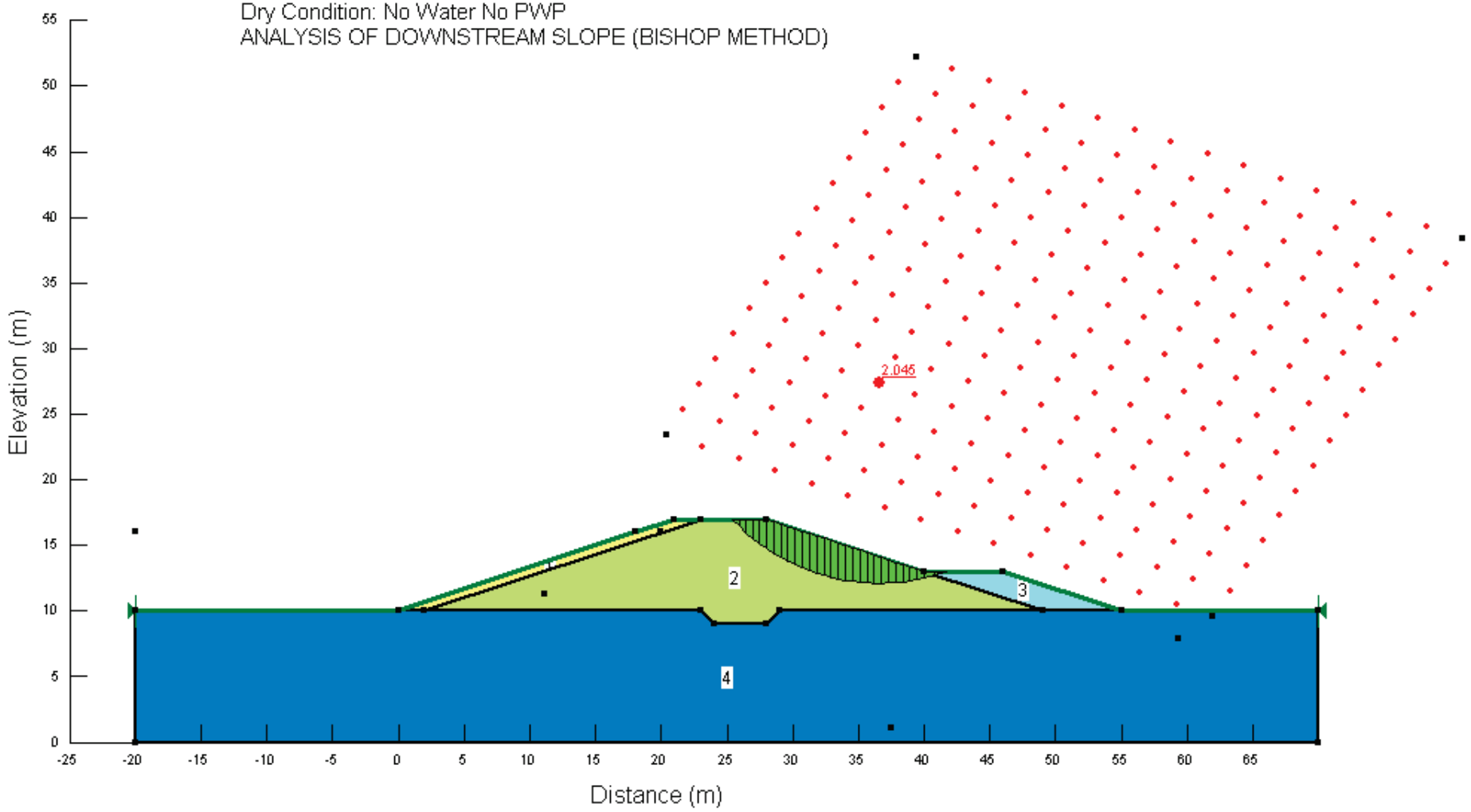
* * * *

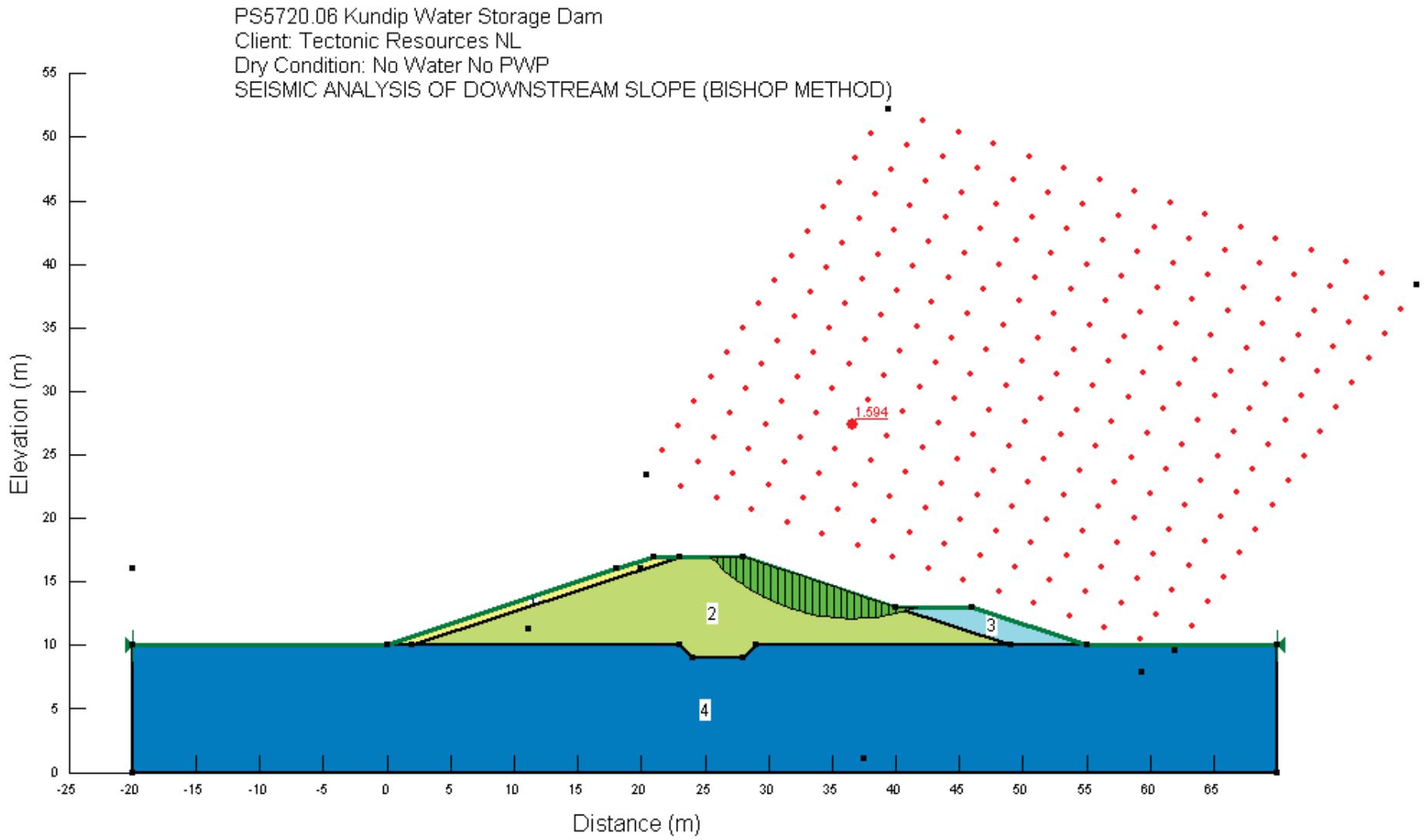
ATTACHMENT A

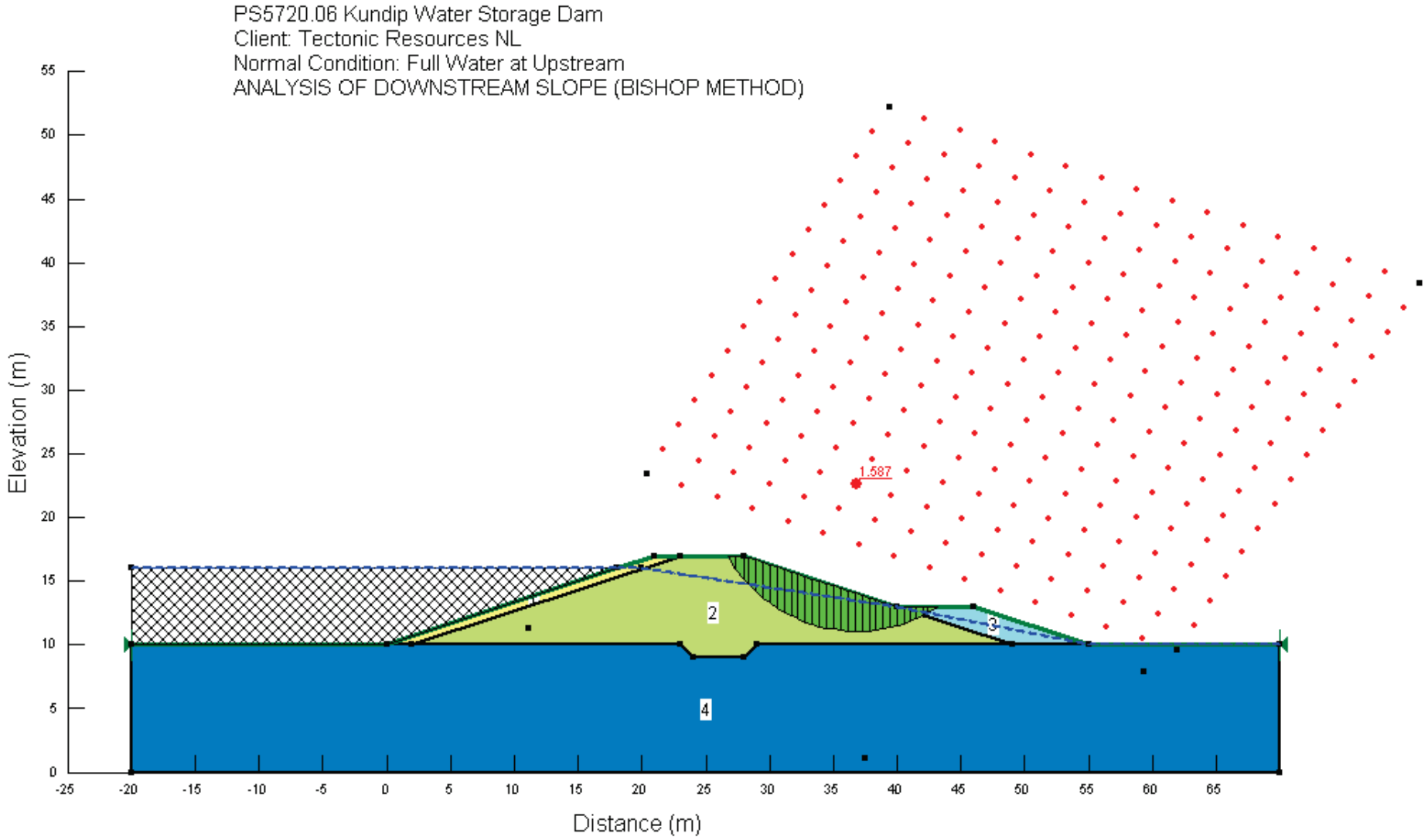
STABILITY PRINTOUTS

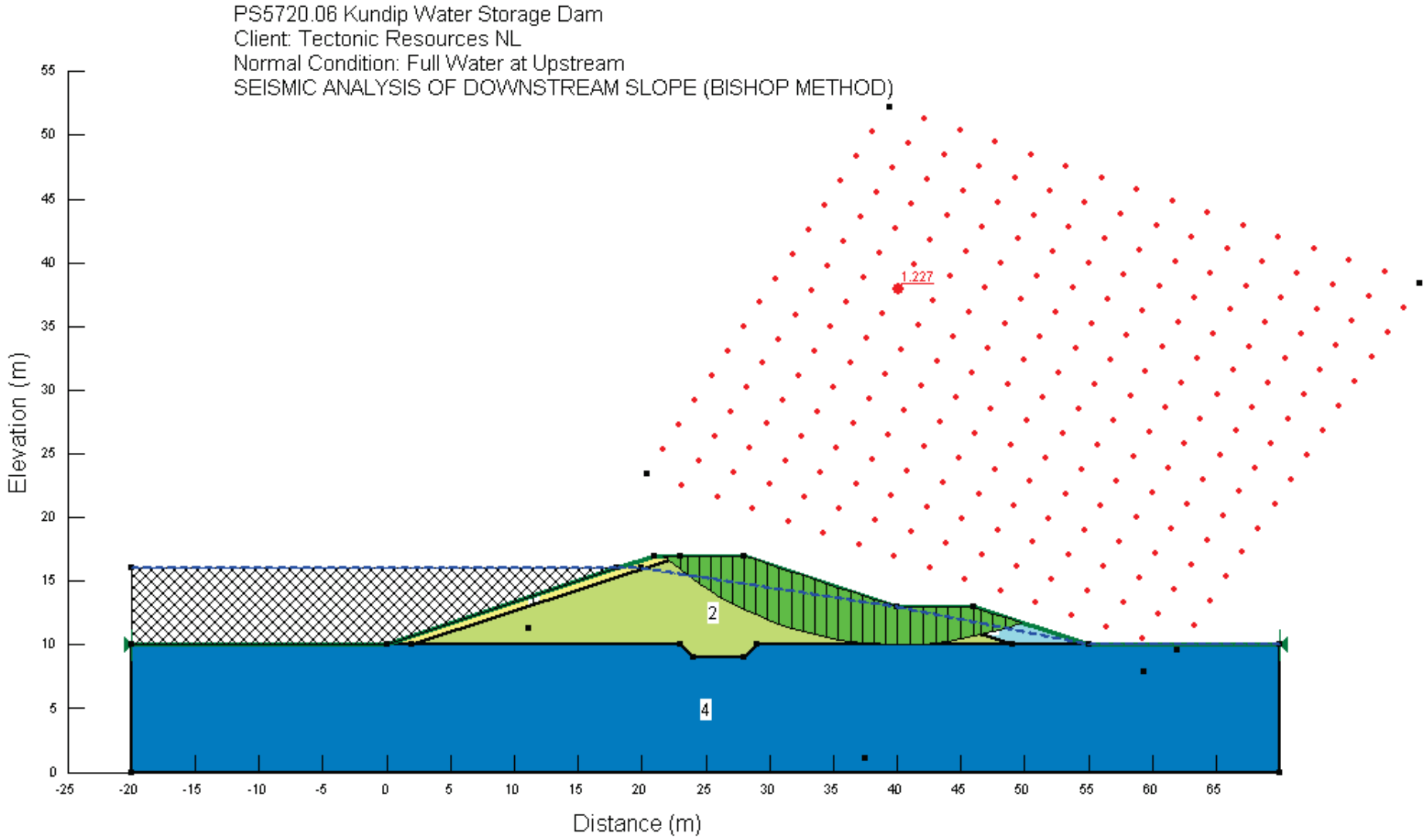
Cases 1 to 12

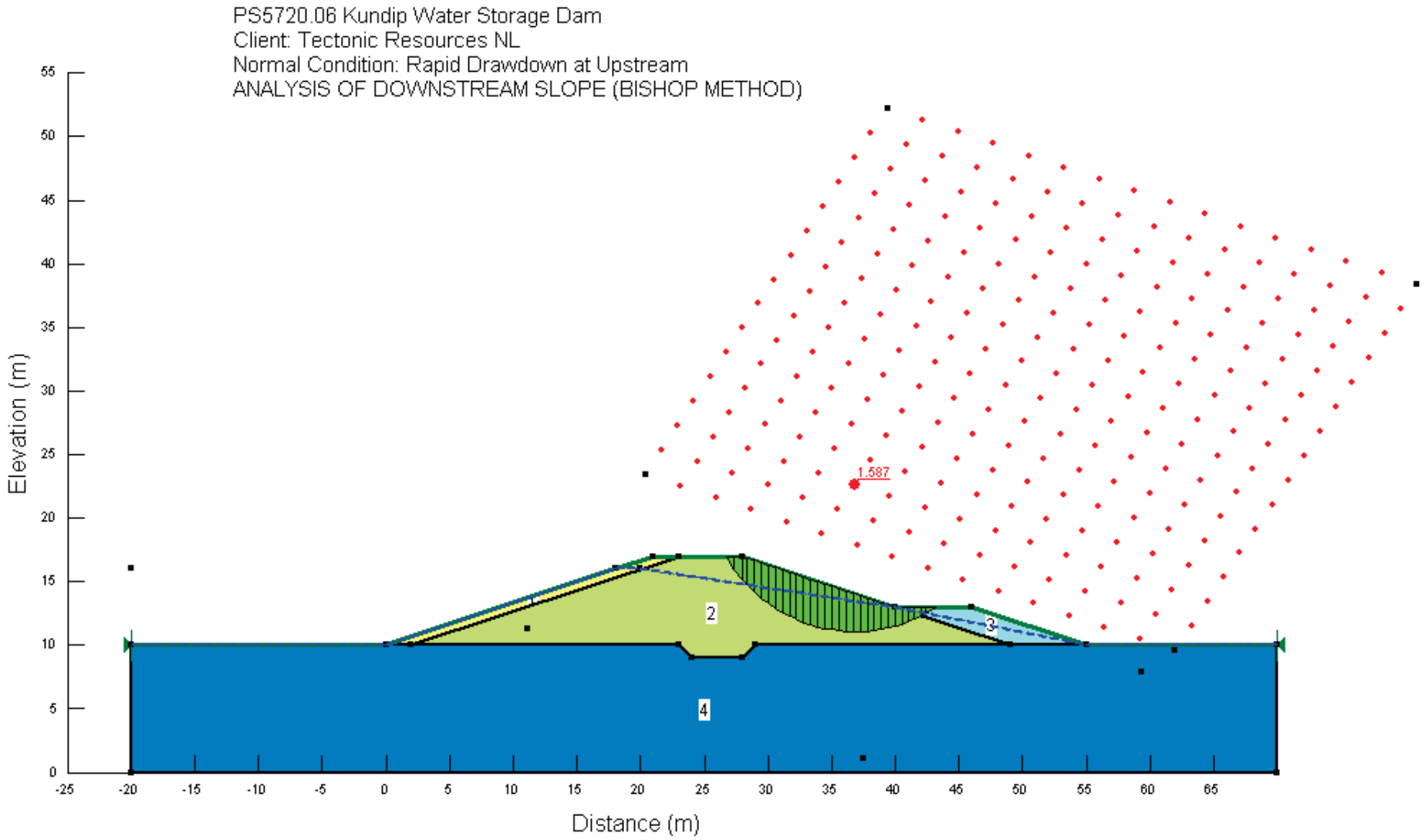
PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Dry Condition: No Water No PWP
ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)

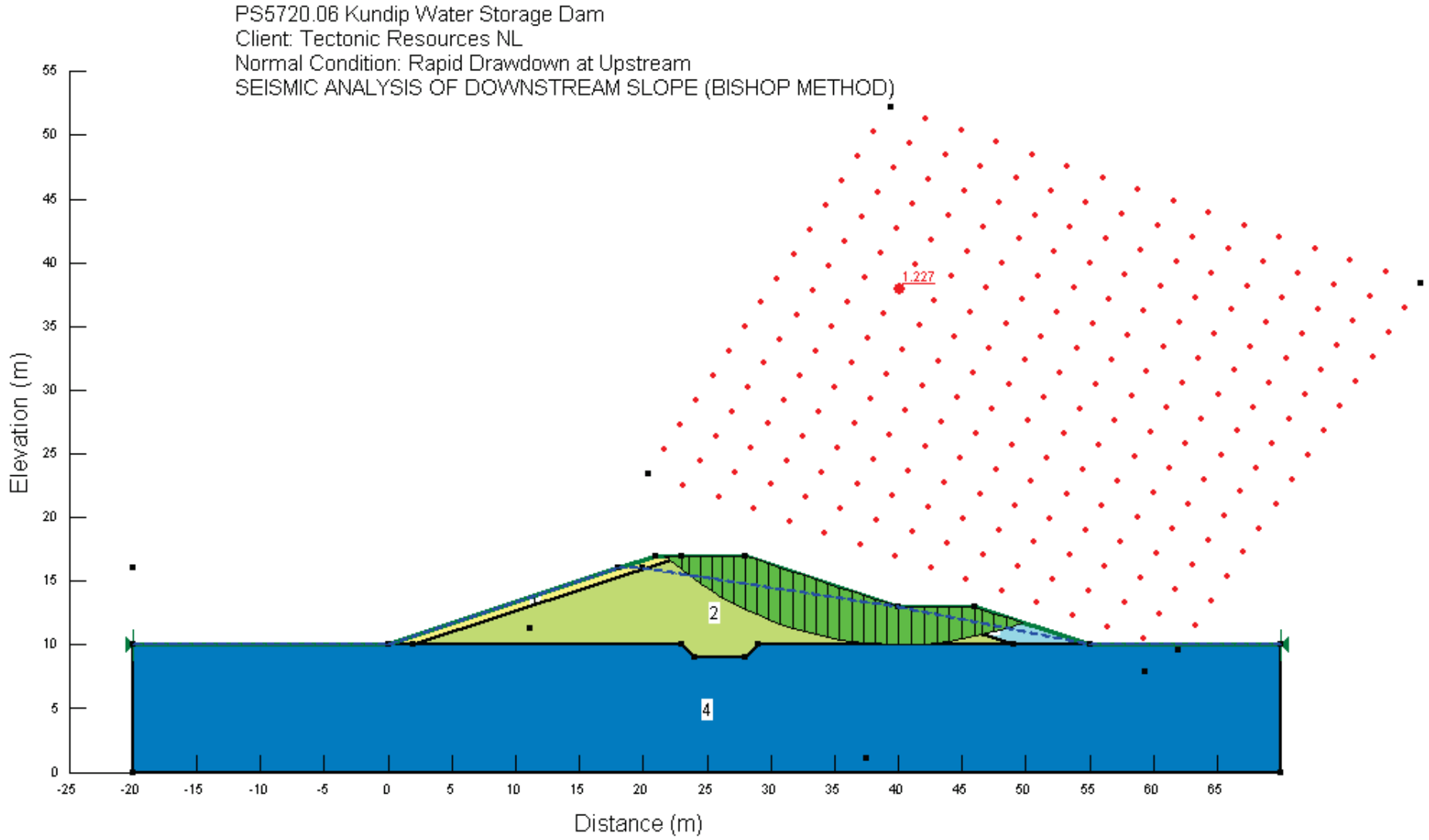


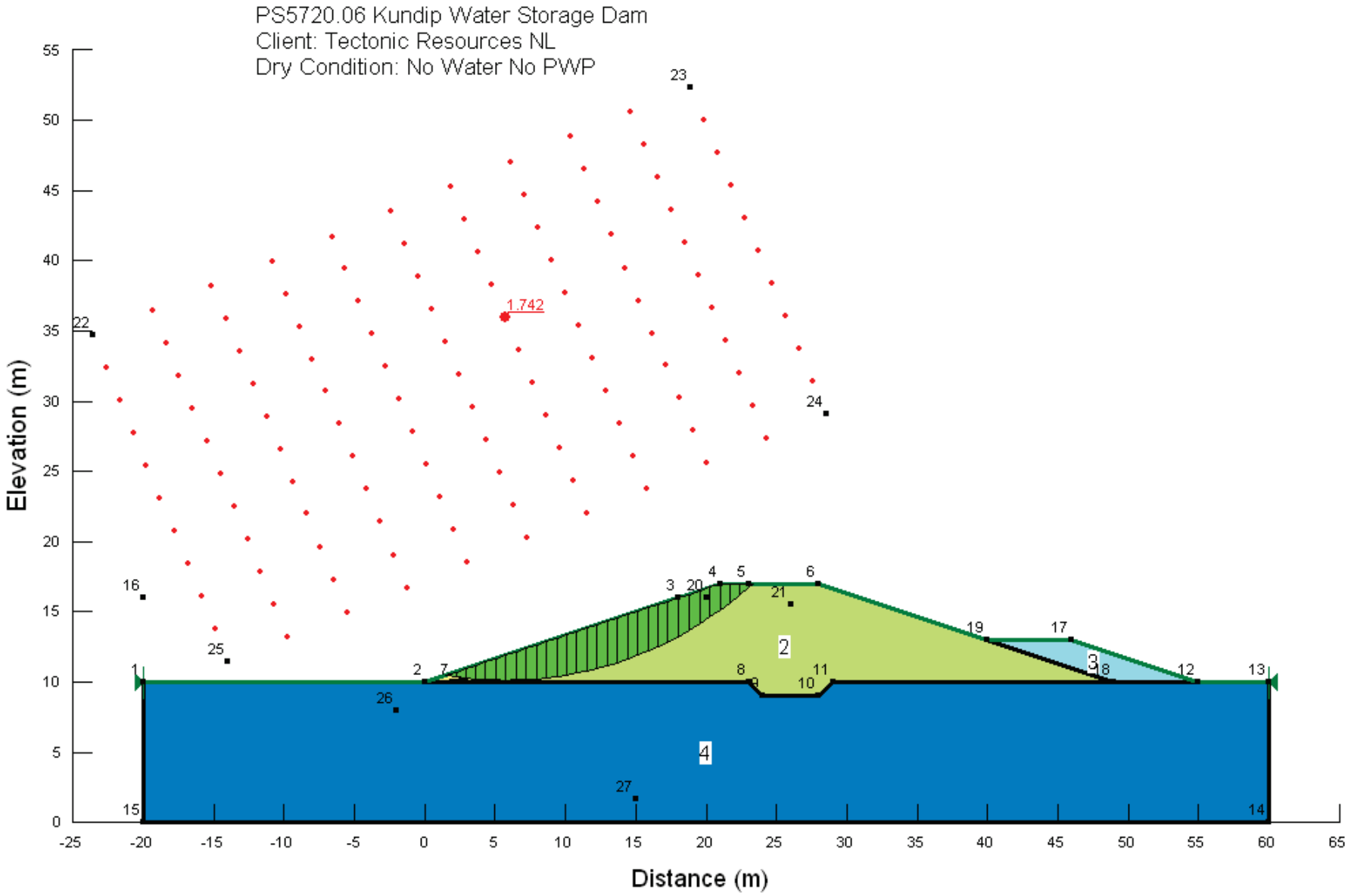

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Dry Condition: No Water No PWP
SEISMIC ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)
Elevation (m)
Distance (m)
1.594
2
3
4
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65

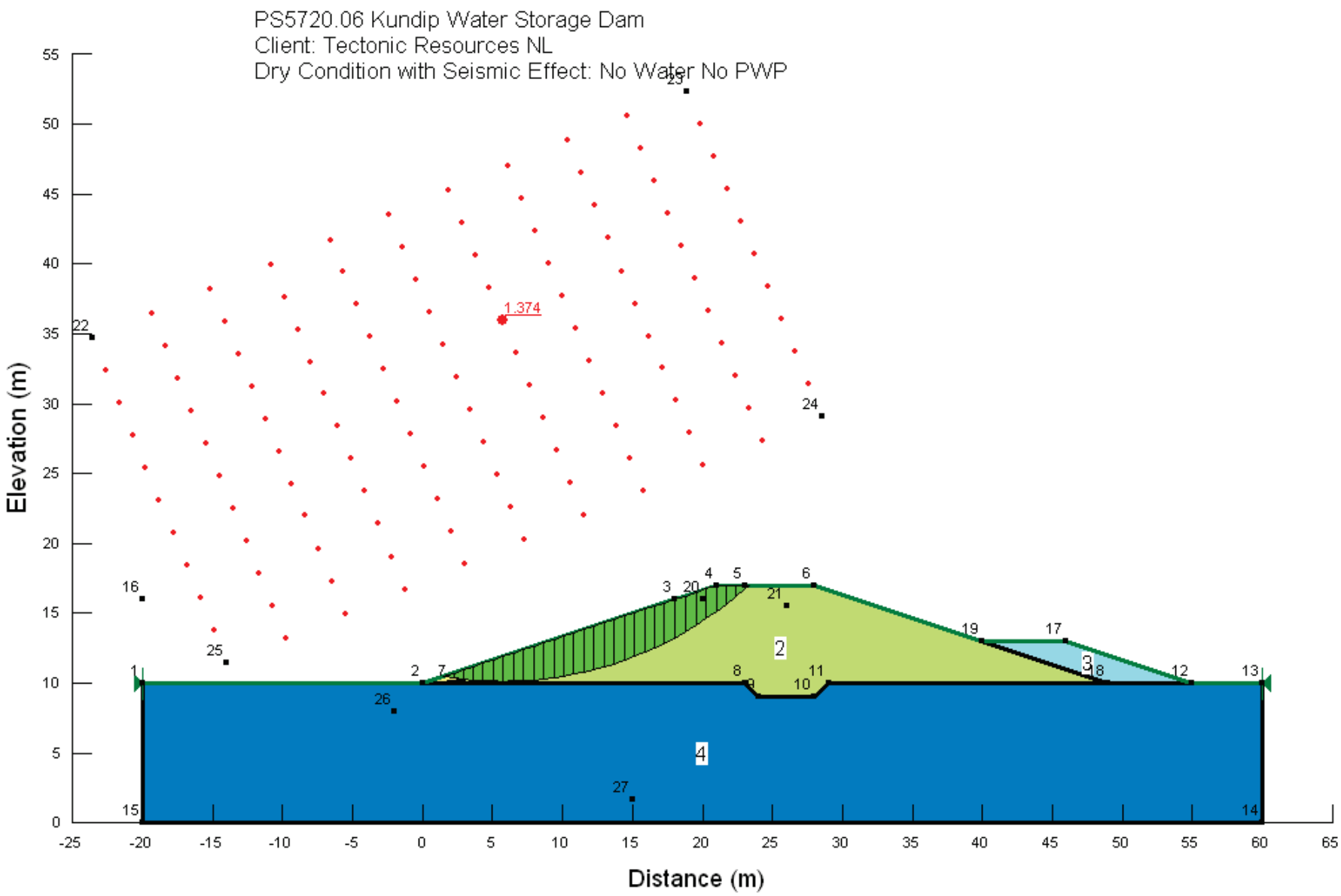

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition: Full Water at Upstream
ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)
Elevation (m)
Distance (m)
1.587
2
3
4
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65

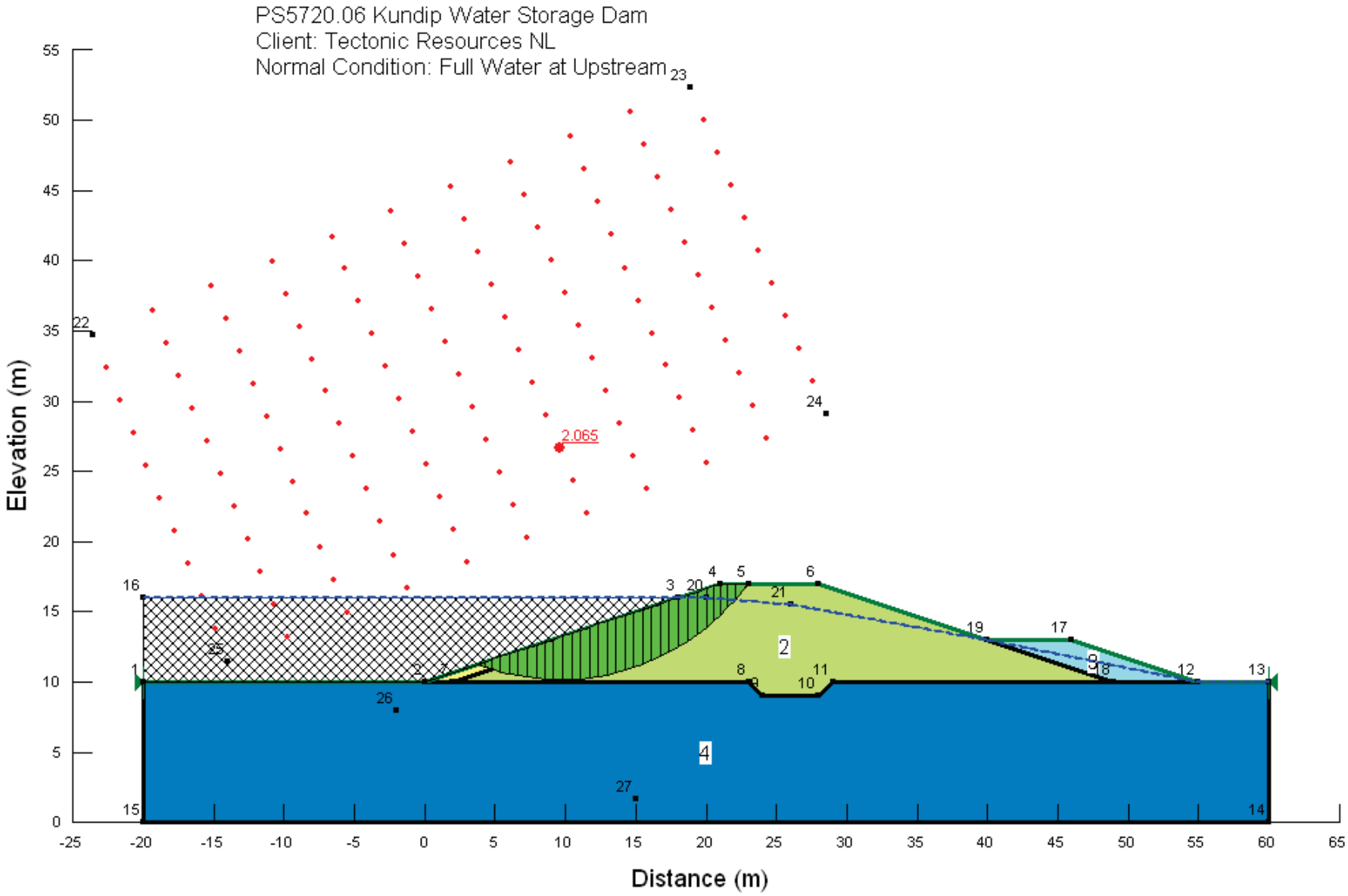

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition: Full Water at Upstream
SEISMIC ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)
1.227
2
4
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65

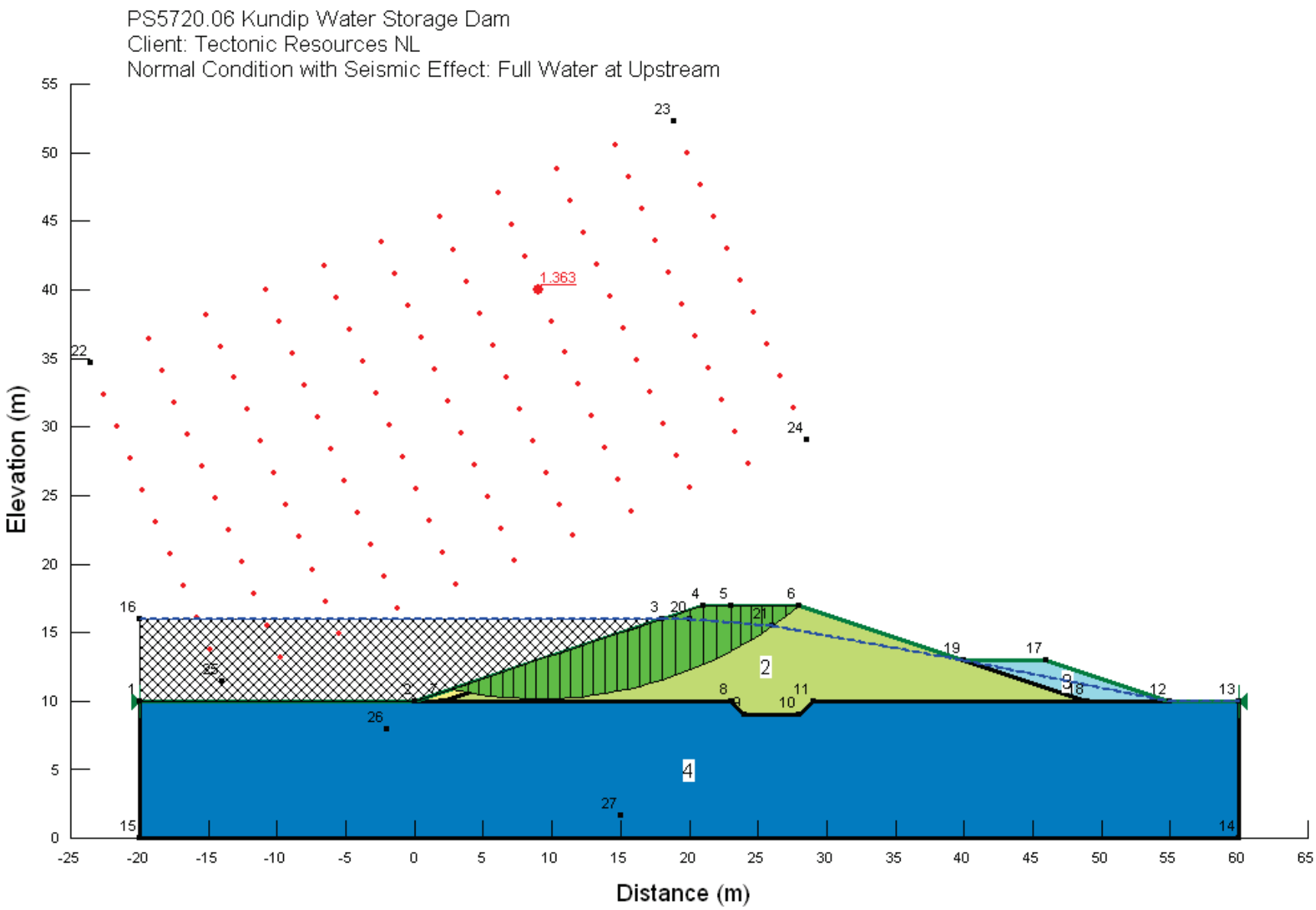

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition: Rapid Drawdown at Upstream
ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)
Elevation (m)
Distance (m)
1.587
2
3
4
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65

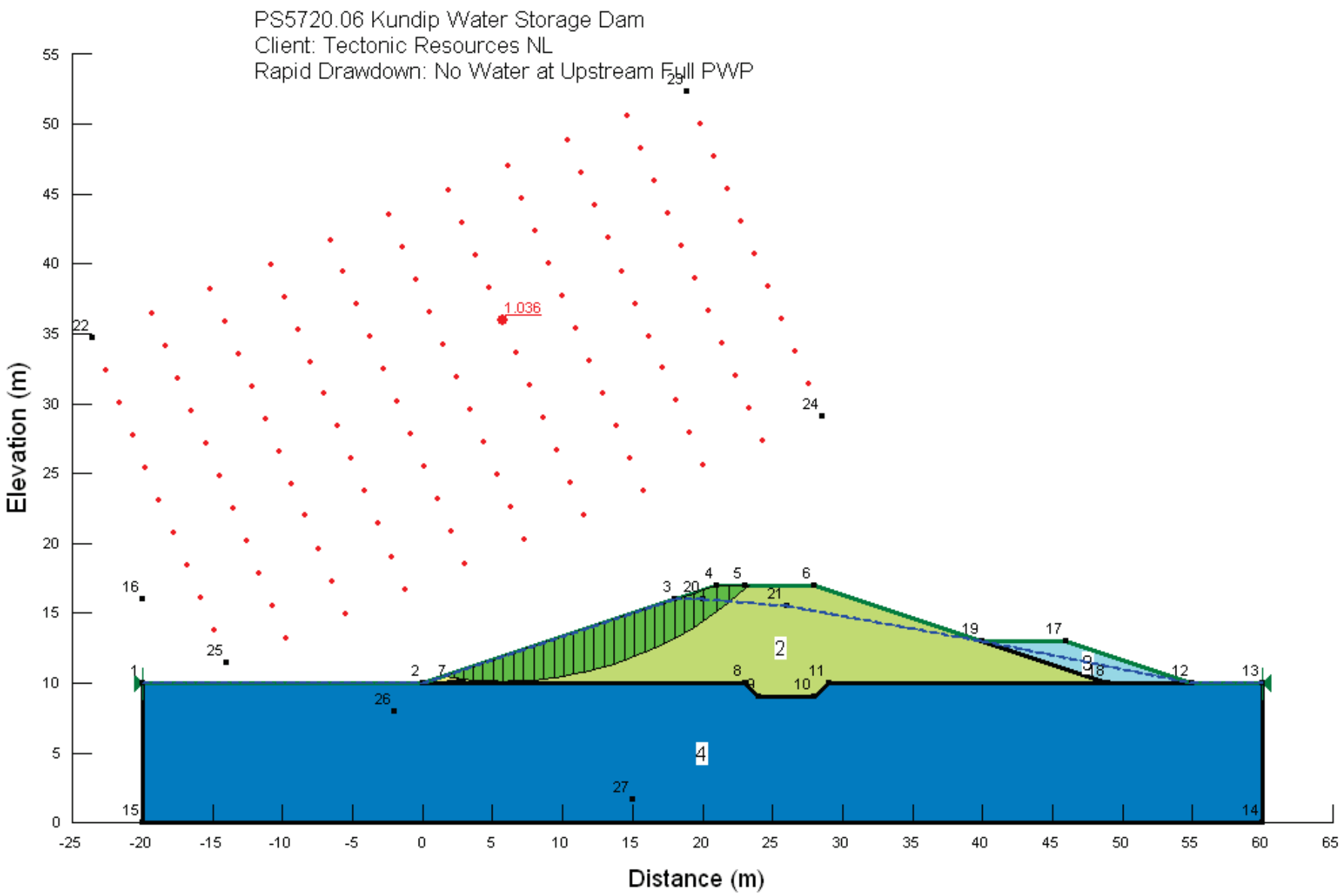

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition: Rapid Drawdown at Upstream
SEISMIC ANALYSIS OF DOWNSTREAM SLOPE (BISHOP METHOD)
1.227
2
4
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65

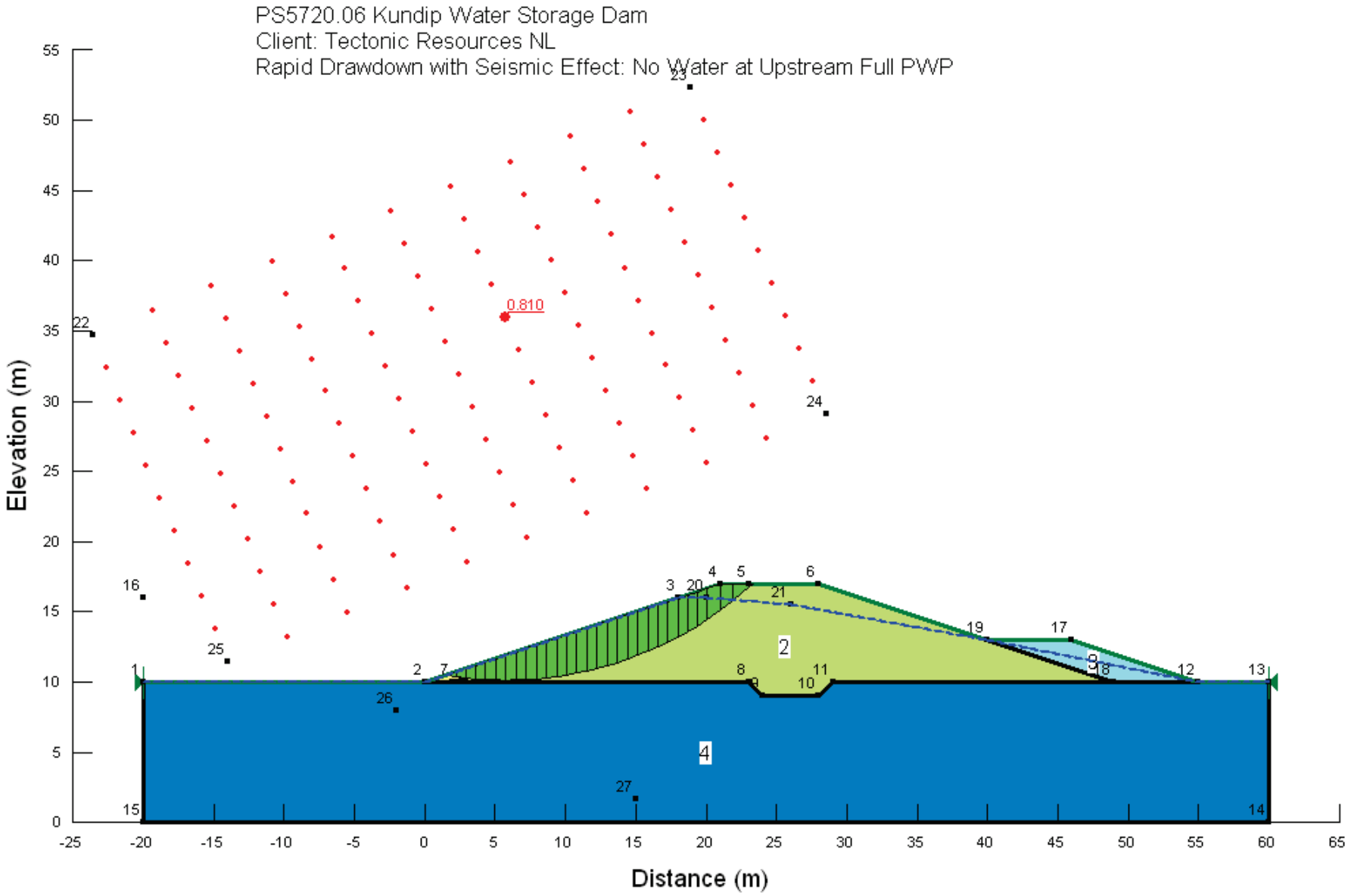

PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Dry Condition: No Water No PWP
1.742
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27


PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Dry Condition with Seismic Effect: No Water No PWP
1.374
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27


PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition: Full Water at Upstream
Elevation (m)
Distance (m)
2.065
1
2
3
4


PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Normal Condition with Seismic Effect: Full Water at Upstream
Elevation (m)
Distance (m)
1.363
2
4


PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Rapid Drawdown: No Water at Upstream Full PWP
1.036
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
24
25
26
27
29


PS5720.06 Kundip Water Storage Dam
Client: Tectonic Resources NL
Rapid Drawdown with Seismic Effect: No Water at Upstream Full PWP
0.810
Elevation (m)
Distance (m)
55
50
45
40
35
30
25
20
15
10
5
0
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

Appendix B

Extracts from December 2004
Soil & Rock Engineering
Geotechnical Investigation Report

[redacted]

TRILOGY
WATER STORAGE FACILITY
GEOTECHNICAL ASSESSMENT
PHILLIPS RIVER PROJECT

Report prepared for:

TECTONIC RESOURCES NL
SUITE 4
100 HAY STREET
SUBIACO WA 6902

Report prepared by:

SOIL & ROCK ENGINEERING
(A Division of Coffey Geosciences Pty Ltd)
PO BOX 1530
OSBORNE PARK WA 6916

Our ref: **PS5720.03-AG WSF Geotech Rev 0**
Date: **28 February, 2011**

Project no: PS5720/03 28 February, 2011
Our ref: PS5720.03-AG WSF Geotech Rev 0

PROJECT: TRILOGY AND KUNDIP WATER STORAGE FACILITIES

CLIENT: TECTONIC RESOURCES NL

LOCATION: RAV 8 MINE

SUBJECT: GEOTECHNICAL ASSESSMENT

1.0 INTRODUCTION

This report presents the results of a geotechnical assessment carried out for the proposed water storage facilities (WSF) at the Trilogy and Kundip Mine Sites for Tectonic Resources NL.

The purpose of the geotechnical investigation is to report on:

(i) Soil, rock and groundwater conditions within the foundation zone for the containment embankment and adjacent reservoir area.

(ii) Suitable geotechnical parameters for embankment design.

(iii) Seepage characteristics of the reservoir area.

(iv) Stability assessment of the embankment geometry.

(v) Construction considerations pertinent to the proposed development, including suitability of materials for fill, compaction control and groundwater control during construction.

The study was commissioned by Tectonic Resources NL owner of the Trilogy and Kundip Projects via Purchase Order R08448.

This report is prepared and is to be read subject to the terms and conditions contained in our proposal which was accepted on 16 January 2004. Our advice is based on the information stated and on the assumptions expressed herein. Should that information or the assumptions be incorrect then Soil & Rock Engineering, a division of Coffey Geosciences Pty Ltd shall accept no liability in respect of the advice whether under law of contract, tort or otherwise.

2.0 INFORMATION SUPPLIED

The following information was supplied by the client:

(i) A contour plan of the area around the Trilogy Pit.
(ii) A copy of the report by Rockwater Pty Ltd entitled, *'Trilogy Gold and Base Metal Project Hydrogeological Investigation: Results of Exploratory Drilling, Construction of a Test Production Bore, Test Pumping and Numerical Modelling',* dated March 2004.

(iii) A copy of the report by Rockwater Pty Ltd entitled, *'Kundip Copper & Gold Project Hydrogeological Investigation: and Monitoring Bore Completion Report',* dated March 2004.

Based on this information and discussion with the client we understand the proposed development will comprise water storage facilities to accommodate mine dewatering from the Trilogy Pit. Hydrogeology studies indicate a likely dewatering rate of 250m^3/day to 37m below ground level and a likely dewatering rate of 2,500m^3/day to lower the groundwater to 100m below ground level.

The water storage facilities at the Kundip Pit will be relatively small as the hydrogeological studies indicated most bores were dry, the maximum flow being approximately 60m^3/day from one bore. Requirements for mine water for dust suppression and other uses may exceed the available supply of water from dewatering activities.

3.0 SITE CONDITIONS

The Trilogy site is located on grazing land approximately 27km south of Ravensthorpe and 23km north of Hopetoun. Kundip is located approximately 16kms southwest of the Ravensthorpe and 34km north of Hopetoun.

At the time of the investigation fieldwork, 16 March 2004, site features at Trilogy comprised cleared land with a gentle fall to the south estimated at 1 in 100.

At the time of the investigation fieldwork, 16 March 2004, site features at Kundip comprised a clearing within a drainage line which had previously been used as a water storage dam as part of the previous mining operations. The valley with a gently fall to the southwest estimated at 1 in 80, with the valley sides, which were covered in trees and shrubs having slopes estimated at 1 in 30. It is understood that given the small size of water storage required that the site assessed may not be the final site for the Kundip water storage and that a compacted clay liner or HDPE lined storage may be considered.

The site is located near Ravensthorpe, Western Australia which, according to AS1170.4-1993, has an acceleration coefficient of 0.08.

4.0 DESCRIPTION OF FIELDWORK

4.1 General

Fieldwork was carried out under the supervision of a Principal Geotechnical Engineer from Soil & Rock Engineering on 16 March 2004. The requirements of Australian Standard AS 1726-1993 were used as a guide for the investigations.

4.2 Test Pitting

A total of 10 test pits were excavated by a JCB 3CX backhoe at the Trilogy Site to depths varying from 2.8m to 3.3m below the existing ground surface at the approximate locations shown on Figure 1.

A total of 3 test pits were excavated by a JCB 3CX backhoe at the Kundip Site to depths varying from 1.0m to 2.7m below the existing ground surface.

Disturbed samples of representative soil types were taken from testpit locations at Trilogy for laboratory examination and testing.

The records of the test pit logs from the Trilogy Site showing the detailed descriptions of the major strata intersected, the depths at which the samples were taken and insitu tests carried out and the results of these tests are presented in Appendix A. The Method of Soil Classification and Notes and Abbreviations on the Logs precede the logs as Figures A1 and A2.

No testpit logs are provided for the Kundip site as the actual final position of the water storage dam had not been chosen at the time of the investigation. A description of the materials encountered is provided in Section 6.0.

5.0 DESCRIPTION OF LABORATORY TESTING

Laboratory testing was carried out in accordance with the general requirements of the latest edition of AS 1289. Where a test was not covered by an Australian standard, a local or International standard was adopted and noted on the laboratory test certificate. The testing was carried out by, Coffey Geosciences Soil Laboratory, a NATA registered Testing Authority.

The extent of testing carried out to provide the geotechnical parameters required for this study is presented in Table 1.

Table 1 Laboratory Testing

Type of Test	Number
Particle size distribution	5
Atterberg limits	5
Linear shrinkage	5

Test certificates for the above mentioned tests are attached in Appendix B.

6.0 RESULTS OF INVESTIGATION

6.1 Geological Setting

The site of the Trilogy WSF is located over a shallow surface covered of sandy clay / clayey sand in an area of phyllitic schist and carbonaceous shale (with minor quartzite) of the Proterozoic Mount Barren Beds. These sediments unconformably overlie the Archaean succession of the southern part of the Yilgarn Block.

The Kundip area is characterised by a very shallow colluvial (clay, gravel and cobble mix) overlying steeply dipping mafic to intermediate volcanic rocks of Archaean age with some mafic schists.

6.2 Ground Conditions

6.2.1 Trilogy WSF

The ground conditions intersected by the testpits can be generalised according to the following subsurface sequence:

TOPSOIL .... loose, grey silty sand, fine to medium grained with gravels and organic material (grass cover and root zone) extending to depths of between 0.05m to 0.2m overlying.

SANDY CLAY (CI) .... very stiff to hard, orange / brown / yellow, moisture content less than the plastic limit, medium plasticity, extending to depths of 3.0m, overlying.

PHYLLITE	....	very low strength, extremely weathered, light grey to reddish yellow to the terminal depth of the pit, where encountered.

It should be noted that Testpit 8 encountered silty sand beneath the topsoil, clayey gravel and gravely sandy clay over a ferruginous cemented sand/gravel hardpan at 2.0m depth, which extended to 2.7m

For a detailed description of the ground conditions investigated, the reader is referred to the logs presented in Appendix A. There are always some variations in subsurface conditions across the site which cannot be fully defined by investigation. It is therefore unlikely that the measurements and values obtained from sampling and testing undertaken as part of this investigation of the Trilogy Site will represent the extremes of conditions which exist within the site.

The site shows some variability between the testpits. After topsoil removal and prior to commencement of construction further investigation of near surface areas by ripping watering and compaction is required to more fully delineate the extent of the clayey gravel similar to that encountered in Testpit 8. Compaction of 500mm of clay over these areas will be required.

6.2.2 Kundip

All 3 testpits excavated at Kundip encountered a mixture of clay gravel and cobbles (colluvial materials) over rock, with the depth of colluvial materials varying from 1.0m to 2.7m. It is therefore unlikely that the measurements and values obtained from sampling and testing undertaken as part of this investigation of the Kundip Site will represent the extremes of conditions which exist within the site.

6.3 Groundwater

No groundwater was encountered during the testpit excavations at Trilogy or Kundip.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 General

Based on the above results of this study, the following conclusions have been determined and recommendations have been provided. It should be noted that the ground encountered by the testpits represent the ground conditions at the location where the tests have been undertaken and as such are an extremely small proportion of the site to be developed. Accordingly, variations to the ground conditions are likely and allowance should be made for variability in the design and construction budgets.

Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, ground conditions including groundwater levels can change in a limited time or due to seasonal fluctuations. For example fill could be added to a site or surface materials removed from a site which will therefore change the thickness of surface materials and depth to the underlying materials. The potential for change in ground conditions should be recognised particularly if this report is used after a protracted delay.

7.2 Geotechnical Parameters for Embankment Design

7.2.1 Trilogy WSF

The design concept for the Trilogy WSF (TWSF) incorporates perimeter embankments constructed with sandy clay sourced from the surface of the Trilogy Pit or within the facility and a compacted clay liner on the 'floor' of the facility.

Stage 1 of the facility will have a maximum evaporation area of 7.3ha and the perimeter embankments will have a maximum height of 4m. The TWSF will be constructed in stages with cells added to cater for the expected increase in dewatering flows. The facility could have an ultimate area of approximately 80ha.

Based on the low embankment height batter slopes adopted in the design are 1:2 (vertical:horizontal) upstream and 1:2.75 (vertical:horizontal) downstream. The slope geometry has been checked by conducting stability analyses of the embankment design concept, ref to Section 7.3.

7.2.2 Kundip WSF

The proposed Kundip WSF is a relatively small sized turkeys nest dam with a capacity of approximately 2,500m^3. It will be constructed from completely weathered overburden materials such as schist or similar, compacted to achieve a low permeability. No stability or seepage assessment has been made of this structure since at this stage the facility will be in cut, i.e. below the natural ground level, with minimal perimeter embankment works and it may be located upstream of and adjacent to mine waste dumps. Further assessment of this structure is required once its final location is determined.

7.3 Stability Analyses Trilogy WSF

7.3.1 Method of Stability Analysis

Stability analyses of the design concept (refer to the Notice of Intent document) have been carried out using a computer model which analyses the stability of potential circular slip planes within the mass of the water storage embankment by the Bishop's method. The computer programme "SlopeW" was used for this purpose.

7.3.2 Material Input Parameters

The design parameters adopted in the stability analyses for each of the different material types are summarised on the plots presented in Appendix C. These parameters have been assumed based on classification testing.

The following cases have been considered as part of the stability analyses of the design concept presented in this Notice of Intent: END

Appendix C

Scope of Works Document

TECTONIC RESOURCES NL

CONSTRUCTION OF WATER STORAGES

SCOPE OF WORKS

KUNDIP

MWP_095AF-SOW

25 February 2011

TABLE OF CONTENTS

1. GENERAL

1.1 Introduction

This Scope of Work covers the construction of the containment embankments for Dam 1, Dam 2 and the excavation of a diversion channel and spillway as required as part of the development of the Kundip Gold project and is to be read in conjunction with the drawings.

The works mainly involve clearing, excavation and bulk earthworks to construct the perimeter embankments and form the spillway.

The Scope of Work shall comprise the provision of all material, construction plant, equipment, labour, supervision, tools, services, warehousing if required, testing equipment, and each and every item of expense necessary for the construction, acceptance testing and preparing of "as built" drawings and documents for work shown in the drawings schedules and Specifications forming part of the Contract for the Construction of the perimeter embankments at the Kundip Mine.

All works shall be constructed complete and operational except as specifically excluded and shall include all necessary auxiliary works, accessories and the incorporation of all miscellaneous material, minor parts and other such items, whether or not the items are specified, where it is clearly the intent of the Contract that they should be supplied or where they are obviously required and necessary to complete and commission the work.

1.2 Design Drawings

The following drawings have been prepared as design drawings:

Title	Drawing No.	Rev
Kundip Water Storage Facility Layout Plan	Drawing No. MWP_095AF_01	A
Kundip Water Storage Facility Sections and Details	Drawing No. MWP_095AF_02	A

Copies of these two drawings are included in this Mining Proposal document, refer to Appendix F.

1.3 Contract Drawings

The following drawings complete this Scope of Work:

Title	Drawing No.	Rev
Kundip Water Storage Facility Layout Plan	Drawing No. MWP_095AF_03	A
Kundip Water Storage Facility Sections and Details	Drawing No. MWP_095AF_04	A

These two drawings are not included in the Mining Proposal as they are yet to be prepared and are awaiting project approval.

1.4 Code of Practice

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and carry out all the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall he performed strictly in accordance with the following Specifications, Drawings and other documents, which by this reference forms part of this Contract, unless expressly noted otherwise.

AS 1289 Methods of testing soils for engineering purposes.

AS 1726 Geotechnical site investigations.

AS 3798 Guidelines on earthworks for commercial and residential developments.

The Works shall be carried out to comply with the latest revision of the Drawings, Codes and Standards specified, or where no standards are specified, to Australian Standards, or to the appropriate British or other recognised Standards.

Before making any change in any work under the Contract to comply with any revisions to the relevant codes and standards, the Contractor shall give to the Principal written notice specifying the reason therefore and requesting his direction thereon. The Principal shall decide whether a change is necessary and issue an order accordingly under the provisions of the General Conditions of Contract.

1.5 Site Inspection

The Contractor shall inspect the site and must allow for the following factors in their price:

(i) The nature and requirements of the work to be done.

(ii) All conditions on and adjacent to the site.

(iii) Access to the site.

(iv) The types of soil and vegetation present on the site.

(v) The expected or known water table.

(vi) The nearest sources of suitable fill material which complies with this Specification.

(vii) The source of water for construction purposes.

(viii) Water control measures.

1.6 Safety

The Contractor shall:

(i) Carry out the works in a safe manner.

(ii) Conform to all relevant Acts or Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons and property on or about the site.

1.7 Site Location and Description

The site is approximately 4 hectares in total area and is located within valley areas north of the proposed Flag Pit. Two embankments (dams) will be constructed to dam two creek tributaries of the Steere River. The creeks are ephemeral and flow after heavy rainfall events. A diversion channel and bund is to be formed such that can be discharged from Dam 2 into Dam 1. A spillway will be excavated through the western ridge near Dam 1.

2. DESCRIPTION OF WORK - SPECIFIC

The Scope of Work shall include, but is not necessarily limited to the following:

2.1 General

The Contractor shall:

- Attend a Site Induction of approximately one (1) hours' duration before the commencement of works if they have not already attended one in the last six (6) months.
- Carry out all works indicated or implied in the Drawings or in the Specification.
- Supply all labour, plant and materials (except those indicated as being supplied by the Principal) necessary for completion of the works.
- Maintain all works as required by the Contract documents and for the period stated therein.

All construction shall be to the minimum lines and grades shown on the drawings or as required by the Owners Representative as work progresses.

During the progress of the works, the Owners Representative may find it necessary to revise the lines, levels and grades of any part of the works because of the conditions revealed by the works.

The Contractor shall accept reasonable delays due to inspection and checking of any part of the works to determine grades and levels.

2.2 Survey

The Contractor shall:

- Perform all ground surveys using conventional and agreed surveying techniques.
- Survey and setting out of the works based on the datum points provided by the Owners Representative.
- Be responsible for the protection of all permanent and temporary beacons or bench marks.
- Be wholly responsible for the setting out of his works in accordance with the terms of the specification. Although the Owners Representative will cause such setting out to be checked from time to time, such checking will not relieve the Contractor of full responsibility for the accuracy of such setting out.
- Carry out surveys prior to the commencement of the item of work and at the completion of the item of work.
- Carry out a post construction survey by licensed surveyor of the works to verify that the works were constructed within the specified tolerances and submit to the Owners Representative.
- Submit their survey data and calculations to the Owners Representative.
- Ensure initial and/or final surveys are undertaken and approved by the Owners Representative prior to the removal or placement of any material, especially where such action will destroy or cover the surface just surveyed. All survey checks or quantity measurements must be supplied to the Owners Representative, suitable time must be given to the Owners Representative to allow such calculations to be checked and approved prior to the works being covered or removed.

The Owners Representative may undertake his own survey of any item, either in conjunction with the Contractor, or separately. The Contractor and Owners Representative shall agree on the results of measurement surveys that are carried out prior to any works being covered up or within seven (7) days of a survey being undertaken. Should agreement not be reached, the difference shall be documented such that the matter can be later decided without disruption to the Contractor's programme.

The maximum permissible horizontal deviation from the finished lines or zone boundaries shall be -0m to +0.5m.

Vertical deviation shall be -0m to +0.2m, provided no abrupt changes in slope or level are present on any finished surface.

Measurement for payment of all embankment fill material shall be made for the compacted material, measured in place and only to the lines and grades required.

Clearing and Establishment Works

The Contractor shall, as appropriate:

- Remove all vegetable matter and scrub from the area of the proposed water storages (two), the alignment of the diversion channel and from the spillway alignment. The area to be cleared for the embankment imprint shall extend approximately 5m past the downstream toe of the embankments. Place vegetation into heaps as approved by the Owners Representative.
- Remove all solid obstructions, tree stumps, roots and logs from beneath the footprint of the embankments.
- Clear the agreed routes of any haul roads of vegetation. Place vegetation into heaps as approved by the Owners Representative.
- Remove topsoil, to a depth advised by the environment department (nominally 100mm) from the area of the proposed water storages (two), the alignment of the diversion channel and from the spillway alignment. The area to be cleared for the embankment imprint shall extend approximately 5m past the downstream toe of the embankments. Place topsoil into heaps as approved by the Owners Representative. Stockpiles shall have a maximum height of 2.0m and side slopes of 1 (vertical) to 1.5 (horizontal), or as directed by the Owners Representative.
- Clear the agreed routes of any haul roads of topsoil. Place topsoil into heaps as approved by the Owners Representative.
- Form up, lay base course as is necessary and do all things necessary to form and maintain haul roads linking the mine waste dumps / borrow areas to the site and other haul roads necessary for the works and which are approved by the Owners Representative.
- Keep all haul roads sprayed and wetted to totally prevent the generation of airborne dust during the course of road construction and usage.
- Prepare a quality assurance and quality control programme to cover all aspects of work included within this Construction Specification for the Principals approval.
- Provide all things necessary to implement the approved QA/QC programme.

2.3 Foundation Preparation

The Contractor shall, as appropriate:

- In the embankment footprint area ensure an adequate depth of topsoil has been removed.

- In the embankment footprint area remove a further 300mm of material (unless rock is encountered) to expose competent material. Further material may be removed at the direction of the Owners Representative until competent material is exposed.
- The approved exposed embankment foundation shall be tyned, moisture conditioned and compact using a minimum of six passes of a CA301D vibratory roller or the approved equivalent. Any areas of exposed foundation that experience heave or 'distress' will be treated as directed by the Owners Representative.
- Excavate a cutoff trench under the centreline of the embankments (extending up the abutments as directed) by excavating a further 1.5m (nominally 1.9m bgl) into competent material unless rock is encountered or as directed by the Owners Representative. Side batters shall have a minimum slope of 1:1.
- The Contractor shall make due allowance to keep the work area dry by installing pumps or intersection drains.
- Blasting in the storage area is not anticipated. No blasting or excavation into or through any competent rock shall be undertaken unless approval has been received from the Owners Representative.
- All areas to receive fill shall be left in a clean and suitable condition to allow an uninterrupted placement of fill. No fill shall be placed in the cutoff until the base of all excavations has been inspected and approved by the Owners Representative.

2.4 Earthworks

The Contractor shall:

- Construct the embankments using approved mine waste material sourced from the mining operations or waste dumps or from the spillway excavation
- Suitable clayey material shall comprise clayey/silty mine waste or spillway material, free of organic matter and other deleterious material, with a fines content in excess of 15% and a maximum size of 250mm. The material shall have a minimum plasticity index of 5% (max 30%).
- Suitable rocky material, for the upstream zone and downstream buttress, shall comprise competent mine waste or competent spillway material, free of organic matter and other deleterious material, with a fines content in excess of 10%, but with gravel size material in excess of 30% and a maximum rock size of 500mm.
- Ensure all materials shall be stockpiled, transported and placed in such a manner as to minimise segregation.
- Adjust the moisture content of the embankment materials, approved for use in the embankment construction (clayey/silty waste). Moisture condition the material to within the range of -2%, +2% of the optimum moisture content as determined from laboratory test 5.1.1 of AS1289 (1993). The clayey mine waste materials shall be cured to ensure the moisture is thoroughly mixed and evenly spread through all materials proposed for embankment construction. Rocky waste to be within the range of -3%, +3% of the optimum moisture content.
- The Contractor shall make their own arrangements for the recovery and hauling of water for construction purposes.
- The Contractor shall make due allowance to keep the work area dry by installing pumps or intersection drains due to the fact the work area is in a valley.
- Where no mine waste has been placed into the upstream areas of Dams 1 and 2, place and compact a 500mm thick layer of clayey mine waste over the cleared area for a distance of

100m upstream from the embankments (two dams) and up the valley sides to a height 2m below the crest level. The material shall be prepared and compacted as outlined previously.

- Place all clayey fill material comprising in homogeneous horizontal layers not exceeding 300mm loose lift thickness. Each lift shall be compacted by a minimum of 6 passes of a Dynapac CA301PD Vibratory Roller or approved equivalent. Placement should be continuous. If a break in fill placement allows the exposed surface to dry, it should be lightly tyned, watered and compacted prior to fill placement recommencing. No oversize rock is to be placed into the embankments. Largest size should be 250mm. The drawings outline the grades and lines to which the embankments are to be constructed.
- Each layer shall be compacted to achieve a density ratio greater than 95% of the maximum dry density - standard compaction as determined from laboratory test AS 1289.5.1.1. The actual number of passes of a Dynapac CA301PD or an approved equivalent to achieve a density greater than 95% standard compaction (AS 1289.5.1.1) shall be determined on site using roller trials.
- Place all rocky fill material comprising in homogeneous horizontal layers not exceeding 500mm loose lift thickness. Each lift shall be compacted by a minimum of 6 passes of a Dynapac CA301PD Vibratory Roller or approved equivalent. Placement should be continuous. If a break in fill placement allows the exposed surface to dry, it should be lightly tyned, watered and compacted prior to fill placement recommencing. No oversize rock is to be placed into the embankments. Largest size should be 500mm. The drawings outline the grades and lines to which the embankments are to be constructed.

  Each layer shall be compacted to achieve a density ratio greater than 95% of the maximum dry density - standard compaction as determined from laboratory test AS 1289.5.2.1.
- The crests of the completed external embankments shall be graded to the inside (upstream) of the storage at a 2% crossfall. A windrow of not less than 400mm height shall be left on the outside of the crest of all external embankments.
- Carry out testing to comply with the Specification and QA/QC procedures.
- Allow for keeping water from the works during construction by shaping finished surfaces with a fall towards the storage.
- Allow for maintaining the borrow areas free of large accumulations of water.
- Place mine waste into the upstream areas of Dam1 and dam as indicated on the drawings. Run of mine waste shall be placed or spread in 1m layers and watered to assist with compaction. Compaction of these materials shall be by traffic compaction of mine equipment.
- The top surface shall be shaped to fall away from the dam wall and be watered and roller compacted.

2.5 Diversion Channel

The Contractor shall:

- Form the contour diversion channel and bunding as outlined in the drawings.
- Ensure the alignment has been accurately surveyed and vegetation and topsoil has been removed.
- The channel invert shall be to a regular grade, with no sudden changes in grade. Excavated material where deemed suitable by the Owners representative shall be used to construct the adjacent bund.

- Prior to material placement to form the bund the foundation shall be inspected, watered, tyned, proof rolled and passed prior to material is place. Any areas containing loose materials shall be removed and reformed as directed by the Owners Representative.
- The materials used for bund construction shall be conditioned, compacted and tested as outlined for the clayey materials.

2.6 Spillway

The Contractor shall:

- Form the spillway to the lines and levels outlined in the drawings.
- Ensure the alignment has been accurately surveyed.
- The channel invert shall be excavated to a regular grade, with no sudden changes in grade. Excavated material where deemed suitable by the Owners Representative shall be used to construct the dam 1 embankment.
- The materials used for construction shall be conditioned, compacted and tested as outlined for other Dam 1 clayey materials.
- Hard ripping may be required to attain the required grades.

2.7 Completion

The Contractor shall:

- Clean up all rubbish, remove all plant and supply materials, trim all banks neatly, spread all excavated material not specified to be removed from the site and leave the site in a clean and tidy condition.

2.8 Construction Sequence

The Contractor shall liaise with the Principal to agree a sequence for the works.

2.9 Limits of the Contract

The limits of the Contract are as shown on the Drawings.

3. EXCLUSIONS

The following works will be performed by others:

- Establishment of a construction water supply. The contractor shall however make their own arrangements for the recovery and transport of water.

4. PRINCIPAL SUPPLIED ITEMS

4.1 Survey

The Principal will provide co-ordinates and levels of survey marks within the vicinity if the works area. The Contractor shall set out all lines and levels using the survey marks provided.

4.2 Materials

The Principal will supply mine waste for construction of the embankments from a designated source.

4.3 Water

Water will be made available to the Contractor at no charge. Supply will be from a designated source (to be determined). Access to the source will not be exclusive to the Contractor. The Contractor shall determine the type and suitability of the water supplies for use in this Contract.

The Contractor shall make his own arrangements for loading and hauling.

5. QUALITY CONTROL AND QUALITY ASSURANCE

The required quality standards for implementation of this Scope of Work are the AS/NZS ISO 9001:2000 Standard Series and the Contractor shall comply with the requirements of these standards.

The Contractor shall provide not later than seven (7) days after Award of Contract fully documented details of the Quality systems and procedures to be utilised together with reference details for implementation of the stated system and procedures on previous similar projects.

6. INSPECTION AND TESTING

6.1 Inspection Requirements

The Owners Representative will be entitled, at all times to inspect, examine and test the materials and workmanship be provided under the Contract. Such inspection, examination or testing, if made, shall not release the Contractor from any obligation under the Contract.

The Contractor shall co-operate with and provide full opportunity to the Owners Representative to monitor regularly the progress of the Works of the Contractor and his subcontractors to the detailed extent necessary to satisfy progress relative to the Construction Program.

All pertinent information to enable the Owners Representative to determine the adequacy of the advance planning for material procurement, machine and manpower resources to meet the Construction Program shall be made freely available to the Owners Representative.

These requirements shall be incorporated in orders placed with Subcontractors.

6.2 Testing

Compliance tests shall be carried out by a qualified technician from a NATA registered laboratory employed by the Principal.

Compliance tests shall be carried out to such a degree as to satisfy the Owners Representative that the criteria on moisture content and compaction are met.

Compliance testing for compaction shall be at the rate of not less than 1 field density test per layer per material type per 2,500m^2.

The Contractor shall, at his own expense, rework or replace materials which do not meet the compaction requirements.

7. PERMITS, LICENCES AND APPROVALS

Further to the General Conditions of Contract, the Principal will obtain Department of Industry and Resources and Department of Environment and Water Approval.

All other necessary permits, licenses and approvals shall be obtained by the Contractor.

8. SUBSTITUTIONS

The Contractor shall:

- Not substitute any alternative to the equipment and materials included in the Works without the prior written consent of the Principal.
- Make diligent efforts to utilise the specified Materials to be incorporated into the Works but where the Contractor considers there are commercial or other advantages to be derived by the Principal, the Contractor may submit a proposal for a substitute material for approval by the Principal prior to commencement of the work. Such proposal for substitution shall be in writing and state reasons for and (if applicable) advantages of the substitute material. The Principal shall determine whether the substitute material will be permitted and such determination shall be binding and conclusive upon the Contractor. Approval of a substitution will be given as a variation under of the General Conditions of Contract incorporating any adjustment to the Contract Sum.

9. SHIPMENT (GENERAL)

The Contractor shall be responsible for transporting the Plant and Equipment to the site and shall maintain full responsibility for loading, unloading, handling, site storage and insurance of the Plant and Equipment during transportation.

Notice of dispatch shall be sent by the Contractor to the Principal at the time of dispatch of all consignments of Plant. Such notice shall contain the method and date of dispatch and date of arrival on site.

10. DATA REQUIREMENTS

The Contractor shall submit the following data in addition to the data requirements detailed elsewhere in this Specification to the Principal as part of the Work.

The Contractor shall show the reference Contract Number and identifying item numbers, if applicable, on all data submitted.

10.1 As-built Drawings

Further to the General Conditions of Contract, the Contractor shall supply as built drawings, in electronic and hard copy format, within 14 days of the issue of a Certificate of Practical Completion.

11. CONSTRUCTION PROGRAMME

The Contractor shall provide a construction programme and indicate the following milestone dates.

Contract Award

Notice to Proceed with the Work

Start and completion dates for each part of the works

Principal Completion Date

Final Completion Date

12. ESTIMATE OF QUANTITIES

A preliminary estimate of quantities has been provided to allow material requirements to be gauged for embankment construction. The figures have not been calculated by a Quantity Surveyor and are provided for convenience only.

* * * * *

Appendix D

Drawings

WASTE DUMP

DIVERSION CHANNEL

STORAGE AREA DAM 1

STORAGE AREA DAM 2

INVERT LEVEL RL 151m

BUTTRESS CREST HEIGHT RL 155m

CREST HEIGHT RL 157m

BUTTRESS CREST HEIGHT RL 149m

CREST HEIGHT RL 152m

SPILLWAY

FLAG PIT

INVERT LEVEL RL 139m

D 02

C 02

B 02

A 02

N

239900 240000 240100 240200 240300 240400 240500 240600 240700 240800 240900

6269800 6269700 6269600 6269500 6269400 6269300 6269200 6269100

155 150 160 165 145 140

notes:

rev no	revision note	date	approved
A	ISSUED FOR CLIENT REVIEW	24.02.2011	CH

Drawn:	FVDL
Approved:	CH
Date:	24.02.2011
Scale:	1:1500
Original size:	A1

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

Client: TECTONIC RESOURCES NL

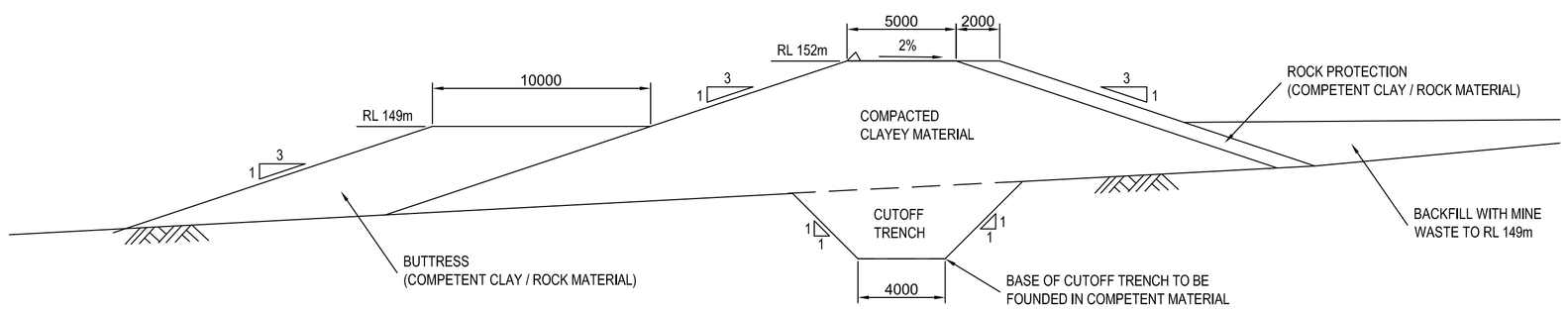
Project: KUNDIP WATER STORAGE FACILITY

Title: LAYOUT PLAN

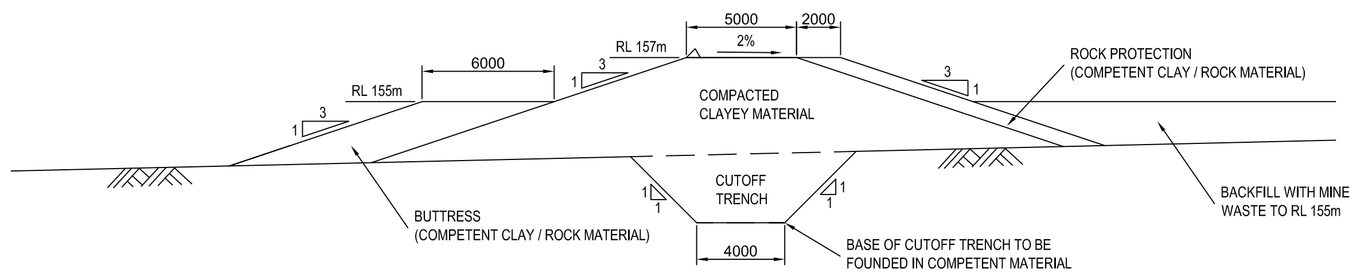
Project no: MWP00095AF Dwg no: MWP/095AF/01 Rev: A

REF:
DWG: F:\MINE\Projects\Tectonic Resources\MINEWPER00095AF_Surface Water Hydrology+Kundip & Trilogy\Figures\MWP_095AF_01 Rev A.dwg

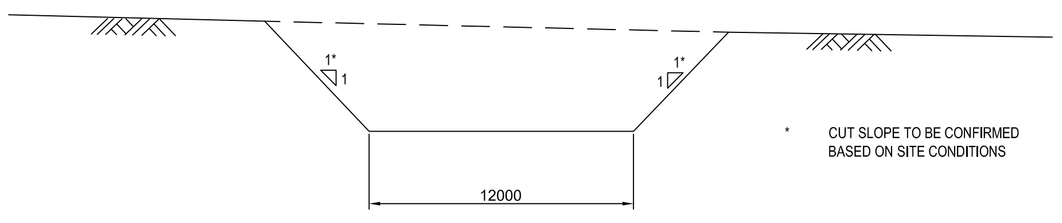
NOTE:
1. THE DEPTH OF FOUNDATION PREPARATION AND THE DEPTH OF CUTOFF TRENCH ARE TO BE CONFIRMED ON SITE AFTER INSPECTION BY THE SUPERINTENDENT



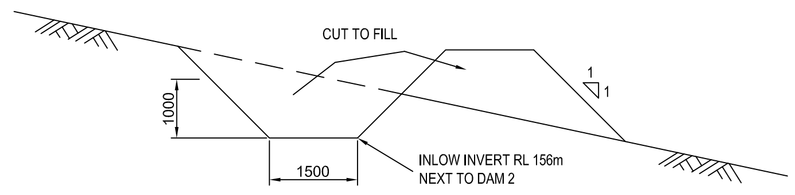
A 01 TYPICAL EMBANKMENT CROSS SECTION
DAM 1 (CATCHMENT 7A)
SCALE 1:1000



B 01 TYPICAL EMBANKMENT CROSS SECTION
DAM 2 (CATCHMENT 7B)
SCALE 1:1000



C 01 TYPICAL CROSS SECTION
SPILLWAY
SCALE 1:1000



D 01 TYPICAL CROSS SECTION
DIVERSION CHANNEL
N.T.S.

notes:

rev no	revision note	date	approved
A	ISSUED FOR CLIENT REVIEW	24.02.2011	CH

Drawn:	FVDL
Approved:	CH
Date:	24.02.2011
Scale:	AS NOTED
Original size:	

coffey mining
SPECIALISTS FROM BOARDROOM TO MINE FACE

Client: TECTONIC RESOURCES NL
Project: KUNDIP WATER STORAGE FACILITY
Title: SECTIONS AND DETAILS
Project no: MWP00095AF
Dwg no: MWP/095AF/02
Rev: A

REF:
DWG: F:\MINE\Projects\Tectonic Resources\MINEWPER00095AF_Surface Water Hydrology-Kundip & Tallegy\Figures\MWP_095AF_02 Rev A.dwg