

STORYS CREEK

PRECIPITATE DAM RELOCATION CONSTRUCTION REPORT

JUNE 2000



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Mineral Resources Tasmania : Storys Creek
precipitate dam relocation construction report /
John Miedecke and Partners Pty Ltd 2000



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1.0 INTRODUCTION

The Storys Creek/Rossarden remediation project is a cooperative project between Mineral Resources Tasmania (MRT), the Department of the Primary Industry Water and Environment (DPIWE) and the Commonwealth Department of the Environment. The aim is to design and implement a remediation strategy for the Storys Creek and Rossarden abandoned mine sites to reduce acid and heavy metal discharge into the South Esk River system.

The "Precipitate Dam" is located near the abandoned workings of the Story Creek mine near Rossarden. Leachate from the tailings materials were identified as one of the major sources of heavy metal contamination to the creek in a study commissioned by Mineral Resources Tasmania (MRT) in 1998 (John Miedecke and partners Pty Ltd (JMP) 1998).

A program of site investigations and design for the relocation of the dam to an existing disturbed site some 200m further away from the Creek was conducted in 1999 and John Miedecke and Partners Pty. Ltd prepared a report into the design of the new disposal area (JMP, 1999). In 1999 tender documents were prepared and tenders called for the relocation of the tailings materials. The work was completed in June 2000.

This work was jointly funded by the Commonwealth through Riverworks Tasmania and the State through the Rehabilitation of Mining Land Trust Fund

This report details the nature and conduct of the works.

2.0 BACKGROUND

2.1 HISTORY

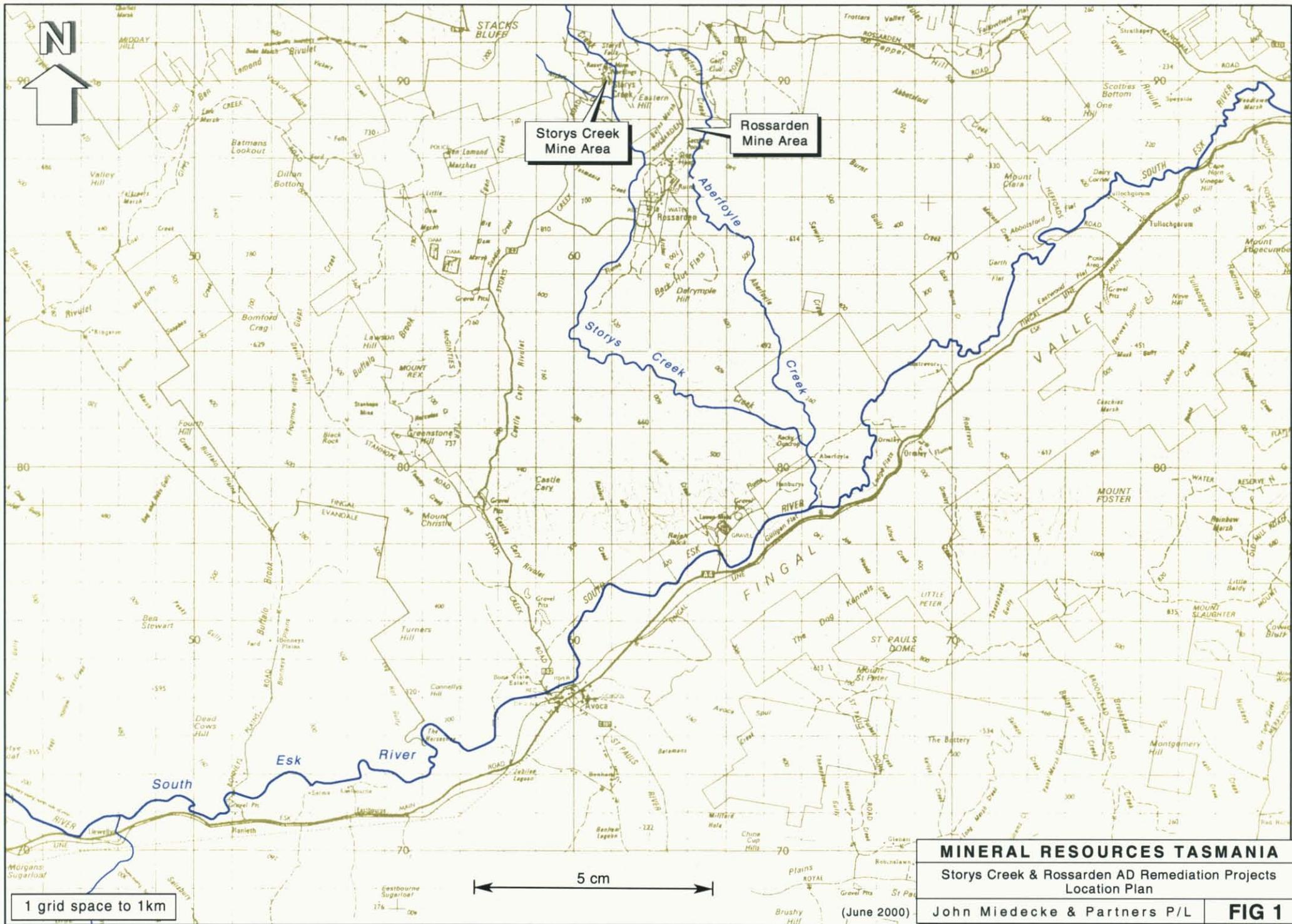
The dam, which is believed to have been operated from the 1960's to the early 1980's, contained tailings and acid mine drainage alkali treatment residues. The dam had been constructed on the eastern bank of the creek using a simple starter dam and upstream construction using coarse tailings materials. At least several overtoppings were reported resulting in spillages to the creek.

In 1994 the dam was capped with clay and the surface revegetated. This work is reported in Thompson and Brett (1994). However, monitoring of groundwater levels at two standing piezometers subsequently showed that the capping was ineffective in reducing infiltration and that water levels in the dam remain high and responded to seasonal influences. This was subsequently revealed as a design fault and the failure to install a cut off drain in the creek bed (see Section 4.2).

Investigations of the main pollutant sources in Storys Creek by John Miedecke and Partners Pty Ltd identified the dam as a major source of metal contamination in Storys Creek, and recommended the relocation of the tailings to a secure site and rehabilitation of the old dam site.

As a result, River Works funded a program of site investigations and design for the relocation of the dam to an existing disturbed site some 200m further away from the Creek.

A concrete plug to block and seal the Eastern Adit, which also contributed acid drainage and metals to Storys Creek was also investigated and designed.



**Storys Creek
Mine Area**

**Rossarden
Mine Area**

1 grid space to 1km

5 km

MINERAL RESOURCES TASMANIA

Storys Creek & Rossarden AD Remediation Projects
Location Plan

John Miedecke & Partners P/L

FIG 1

2.2 SITE INVESTIGATIONS AND DESIGN

A drilling program was conducted over the surface of the Precipitate Dam to quantify the contents and volumes to be relocated. The topography of the dam was surveyed and the drilling data (to the base of the dam) was used to estimate the contained volume.

A program of test pitting and materials testing for possible disposal sites was also carried out and materials identified which were suitable for capping the tailings materials at the disposal site. Samples of wet sediment, comprising in-situ tailings were submitted for geochemical testing. The materials were not highly acidic and rates for the application of hydrated lime to the tailings to maintain an alkaline pH and to waters to maintain a pH of approximately 8.5 were identified.

The general area of the new disposal site (known as the eastern tailings dam) was also detail surveyed by a licensed surveyor and the survey data digitised and used for the design of the disposal area.

The results of the investigations and the design are set out in the Design report dated 29 September 1998. (JMP 1999).

3.0 CONTRACT INFORMATION

3.1 CONTRACT

On the 4 August 1999, twelve civil engineering contractors were invited to submit an expression of interest to tender for the project.

They were advised a short list of six would be selected to tender.

Submissions were of a high standard and all contractors except one indicated that they would be interested in tendering for the project.

Two contractors joined forces, leaving the following ten tenderers:

- Hazell Bros Group;
- Stornaway Gravel/ Gradall Constructions;
- Shaw Contracting Pty Ltd;
- Boral Contracting;
- Civil Construction Corporation
- Brambles
- Batchelor Earthmoving Pty Ltd
- Becketts Heavy Plant Hire Pty Ltd
- Wiggins and Batchelor
- Mckenzie Contracting.

A site visit was held on 21 September 1999 and tender documents were issued to ten tenderers. Eight valid tenders were received and the details are shown in Appendix A. The tender document is a separate document (JMP 1999b).

The tenders were received and assessed by:

- Tony Hodgson Department of Roads and Transport
- Wojciech Grun MRT
- John Wilson , JMP

The three lowest tenders received were within \$10,000 of each other. After the assessment Becketts Heavy Plant Hire Pty Ltd were awarded the contract for a tender price of \$312,564.00

Contract documents were prepared and signed by the Crown and the contractor.

During the contract it was decided to alter the Scope of Works. The drainage layer beneath the topsoil was removed from the contract and funds were allocated to additional insist neutralisation and site remediation. An additional \$10,000 was provided for additional works, as set out below.

The additional works were :

- construct a temporary haul road across the creek so that approximately 2000m³ of Jig tailings could be carted and placed in the disposal area. These were used as a placed layer beneath the clay capping;
- delete approximately 50% of the clay capping on the eastern side of the new dump, so that in future the dump could be extended and the remaining 40-50,000m³ of Jig Tailings could be encapsulated in this area;
- supply and place additional crushed limestone to the Precipitate Dam and surface of the Jig Tailings on the dump, and general area;
- supply and installation of two lysimeters in the dump to monitor infiltration;
- supply and spreading of clay to a tailings dam embankment at Rossarden (and add agricultural lime).

3.2 CONTRACT ADMINISTRATION

The contract was administered under As2124-1992 standard conditions of contract, with the following personnel.

Superintendent - John Miedecke and Partners Pty Ltd

Superintendent representative- John Wilson

All surveys were conducted by G J Walkem and Co, Licensed surveyors, Launceston.

The final Contract budget after addition of the funds for extra works for the Jig Tailings etc, was \$364,556.000. This included all supervision and additional works.

The final cost was \$361,889.00. This was under budget by approximately \$2700, despite delays due to wet weather and additional time required for tailings drainage.

A final summary of costs is enclosed in Appendix B.

There were no disputes and the Contractor performed all works to a high standard to provide a very satisfactory result.

A certificate of practical completion was issued on 12 May 2000.

4.0 PRECIPITATE DAM RELOCATION WORKS

4.1 SITE WORKS AND ACCESS ROADS

The contractor commenced work in November 1999, and completed site works and access roads prior to Christmas.

These works included,

- vegetation clearing and topsoil removal from the new disposal site, access roads and the proposed clay source area;
- excavation and construction of the clay cut off trench around the disposal area;
- construction of access roads from the Precipitate Dam area and the disposal site (two access roads); and
- removal of clay capping from the surface of the Precipitate Dam and establishment of drainage and a water treatment pond.

After clearing and some excavation of the clay pit area, it was decided that insufficient clay could be won from this area and additional sources were investigated (see Section 4.3.5).

Additional sources were found to the east and west of the new impoundment area.

Two haul roads were constructed from the dam site to the new storage area, one a grade of approximately 1:7, which followed the contour and another return road which provided a more direct route.

Figure 2 shows the location of the access roads, clay sources and water treatment pond.

4.2 PRECIPITATE DAM RELOCATION

Following DPIWE advice, the contract specified that work on the actual relocation of tailings could not commence before 4 January 2000

The relocation of the Precipitate dam and contents was commenced on January 10 after several days delay causing by flooding of the South Esk river at Avoca.

The Precipitate Dam was a storage impounded by an embankment which adjoined Storys Creek. Figure 3 shows a plan of the dam.

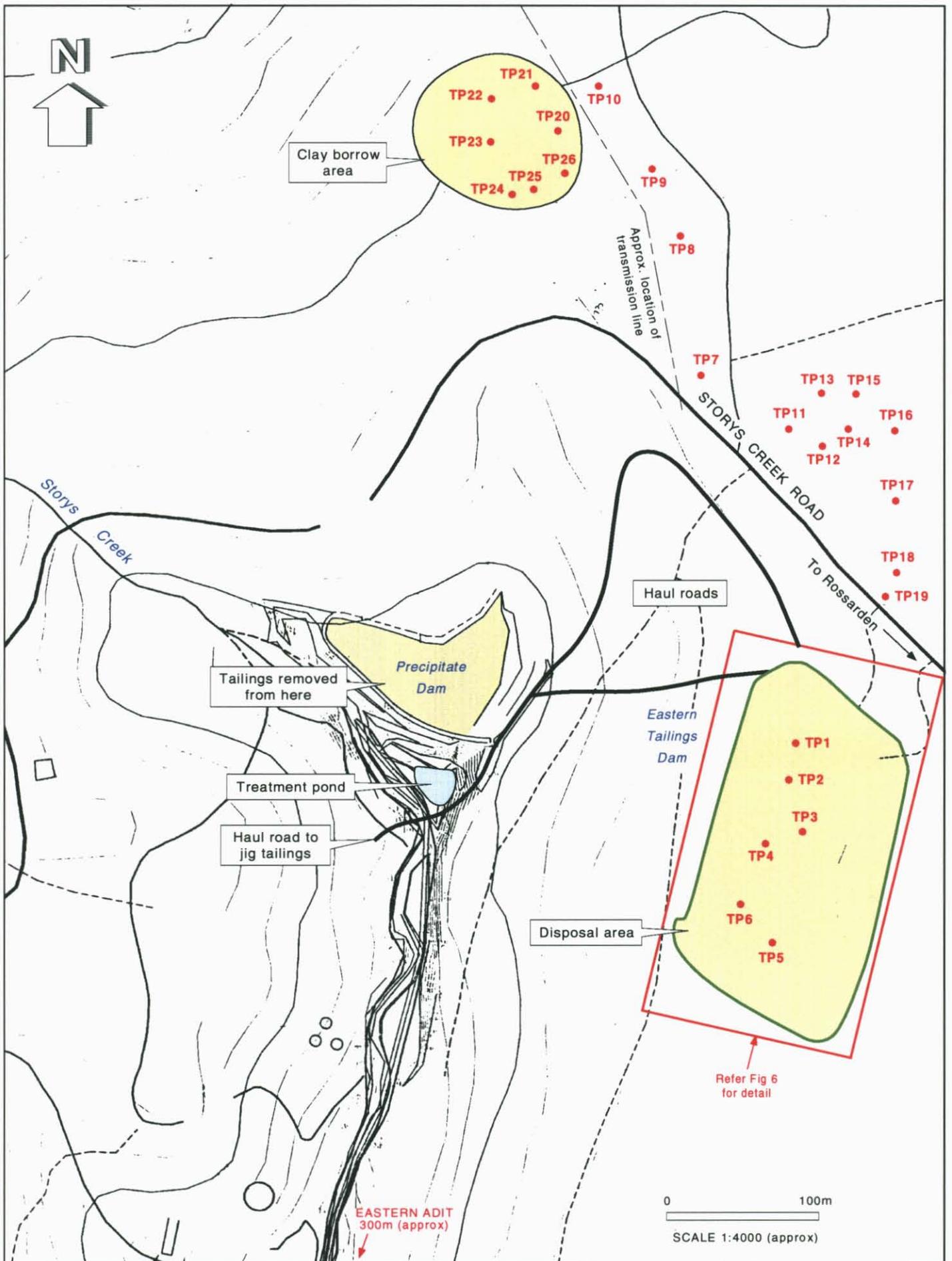
The estimate of the volumes was 64,000m³.

The existing clay cap was removed by excavator but was of variable depth and contaminated with tailings and could not be salvaged. Some materials were used for access roads.

The dam contents were removed by a 40 tonne excavator and Caterpillar 40 tonne capacity dump trucks.

The contractor had few problems in completing the contract. The major problem area was draining the tailings sufficiently to allow machinery access. Drainage channels were excavated through the tailings and the materials progressively drained and allowed to consolidate.

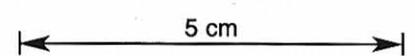
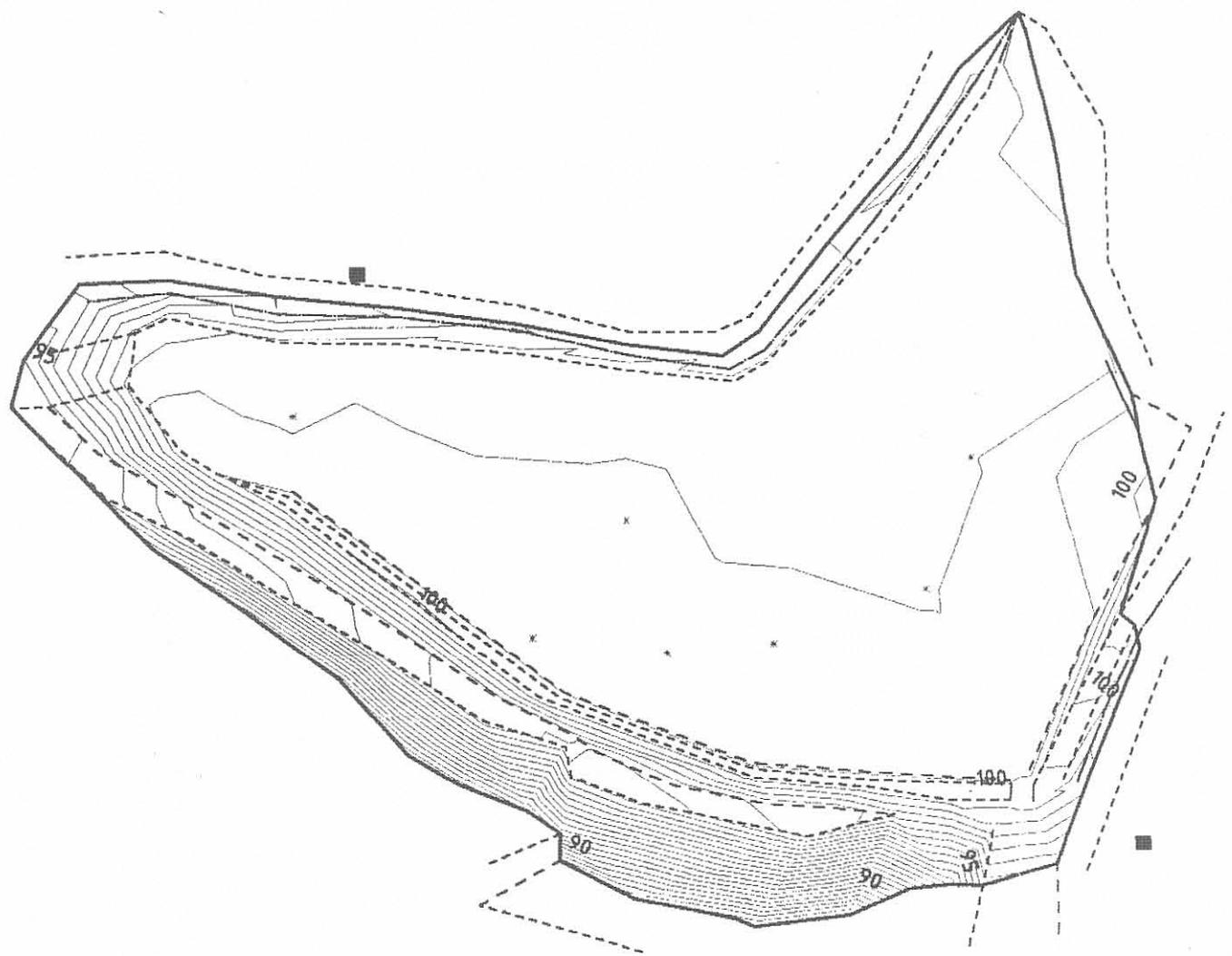
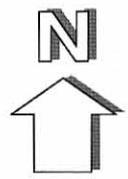
After removal of the coarser materials near the wall and the NW of the storage, a zone of fine saturated tailings required a period for consolidation to allow machinery access. Removal of tailings was suspended for four weeks in February and March.



● TP1 Approximate location of test pit

MINERAL RESOURCES TASMANIA	
Storys Creek & Rossarden AD Remediation Projects Storys Creek Area Plan	
John Miedecke & Partners P/L	FIG 2

(June 2000)



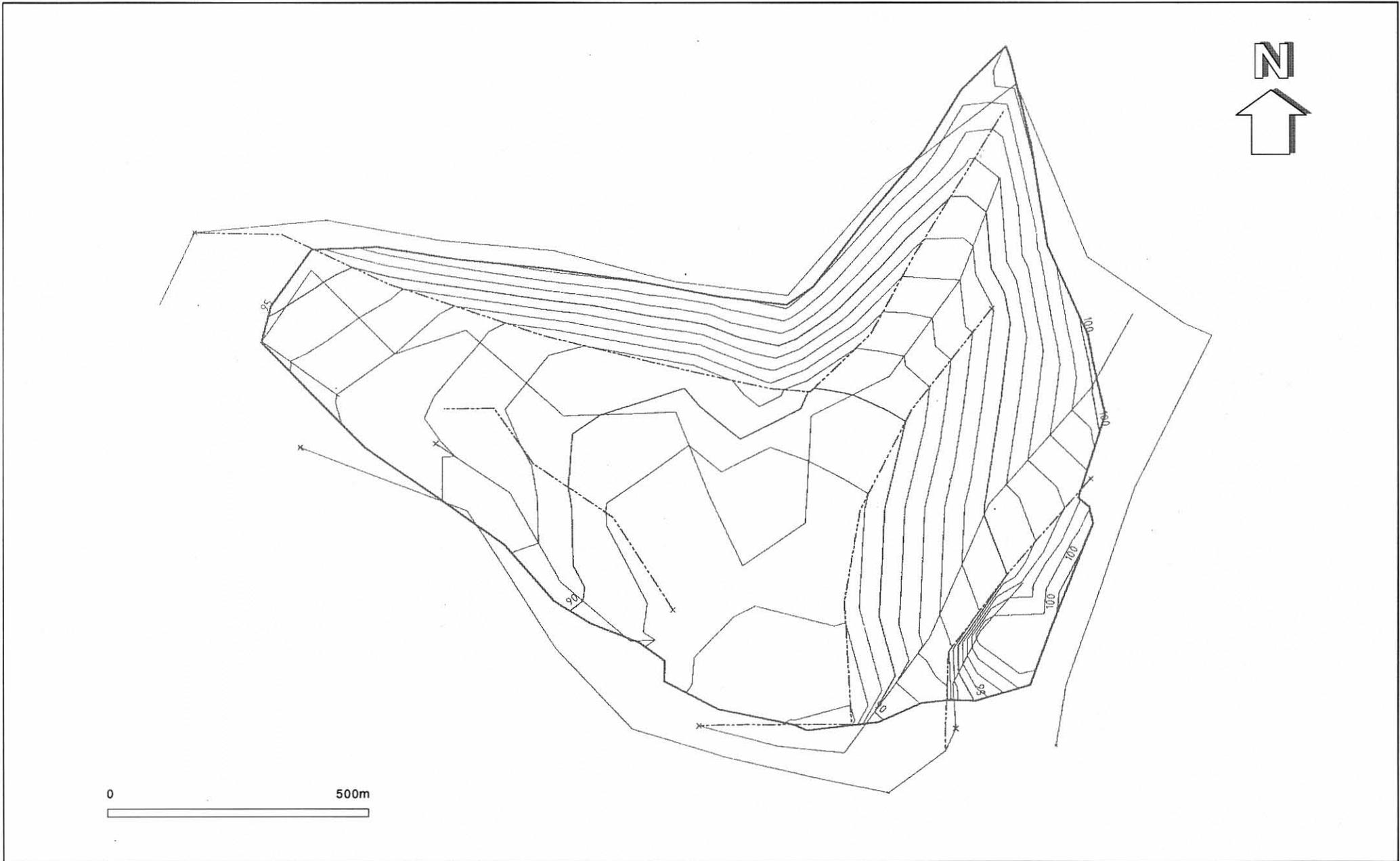
MINERAL RESOURCES TASMANIA

Storys Creek & Rossarden AD Remediation Projects
Precipitate Dam Plan - Prior to Removal

John Miedecke & Partners P/L

FIG 3

(June 2000)



0 500m

5 cm

MINERAL RESOURCES TASMANIA
Storys Creek & Rossarden AD Remediation Projects
Precipitate Dam Plan - After Tailings Removal
John Miedecke & Partners P/L **FIG 4**

(June 2000)

The balance of the materials was removed by mid April 2000.

The base of the dam consisted of dolerite boulders of alluvial origin. These were found to be mixed with tailings materials and removal of further materials was ceased under the contract.

A topographic survey was carried out of the finished levels and the total volume removed calculated at 66,339 m³. This compared well with the estimate of 64,000m³. The as constructed surface after removal of the tailings is shown in Figure 4.

A continual seepage was noted in the NE corner of the storage along the alignment of the creek (see photographs). This explains the failure of the previous works attempts to cap the tailings and reduce infiltration. A cut off trench should have been constructed to intercept subsurface flows down the creek and this may have been effective in reducing water inflows.

The base of the dam was subsequently further cleaned by the use of a small excavator, as part of additional works separate to the main contract. An additional 60m³ of tailings materials was stockpiled and removed to the new dump after allowing for draining and consolidation

The base of the dam was subsequently flooded with the creation of two wetlands developed by the building of two low embankments (as additional works separate to the contract), and anoxic limestone drain. This provided for the flooding of the tailings materials remaining to stop oxidation and acid generation. The original creek alignment was re-established.

The balance of the area was capped with approximately 300mm of clay imported from the disposal site area.

A total of approximately 55 tonnes of agricultural lime was spread over the area and the slopes.

A small anoxic drain was partially constructed in the seepage from the creek. This could not be completed because weather conditions and creek flow prevented the placement of plastic and organic materials. This is planned to be completed in the summer of 2000.

Figure 5 shows the base of the dam and the constructed wetlands and anoxic limestone drain.

4.3 DISPOSAL SITE

4.3.1 Description

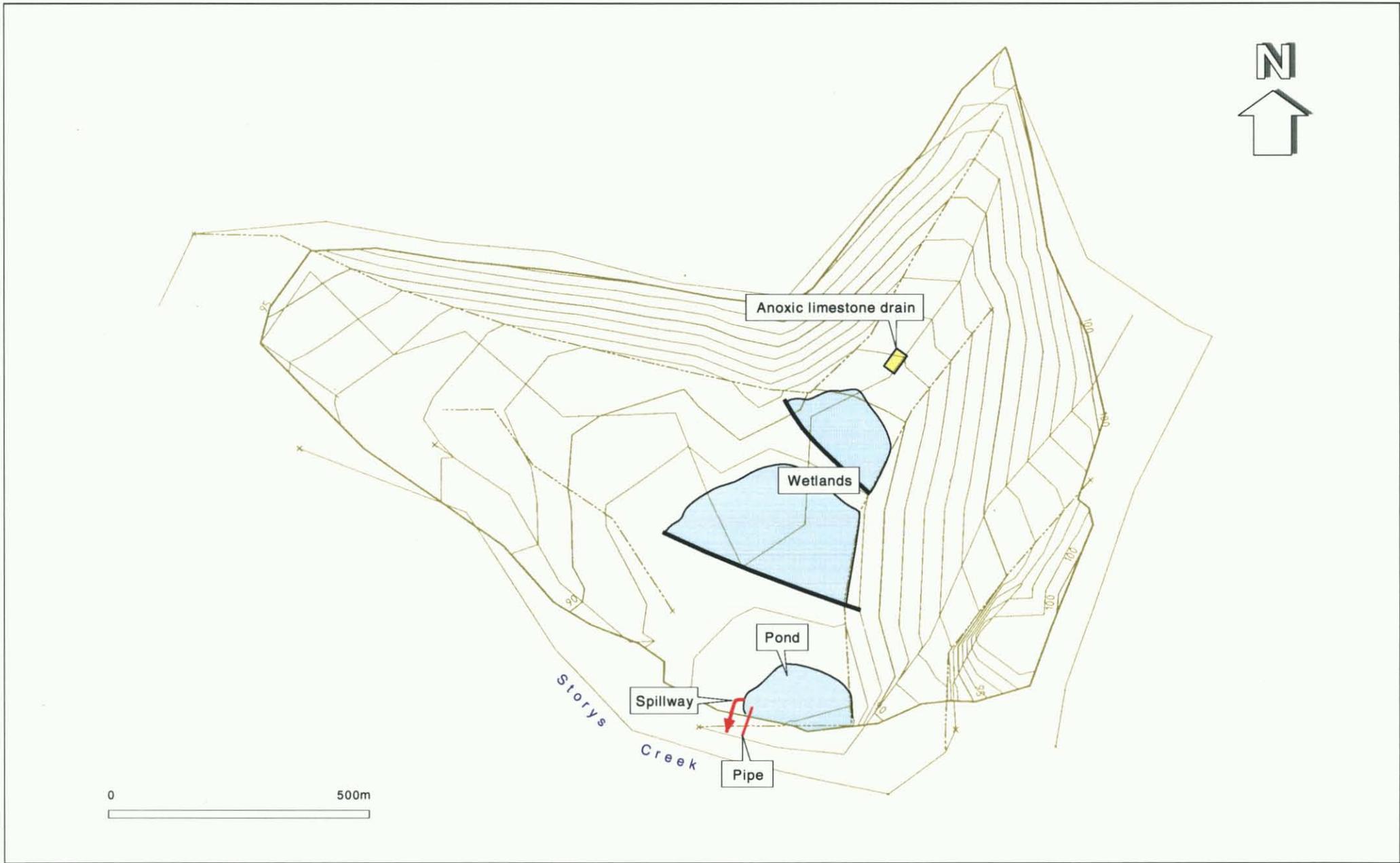
The area selected for the relocated tailings, was an existing disturbed area adjoining the Storys Creek road and known as the Eastern tailings dam (Figure 2).

A detail survey prior to works is shown in Figure 6.

The site occupied an area of approximately 2.3 ha. The topsoil and subsoil has been previously removed and formed an embankment around the site. These materials were suitable for return and reuse as a growth medium.

4.3.2 Design

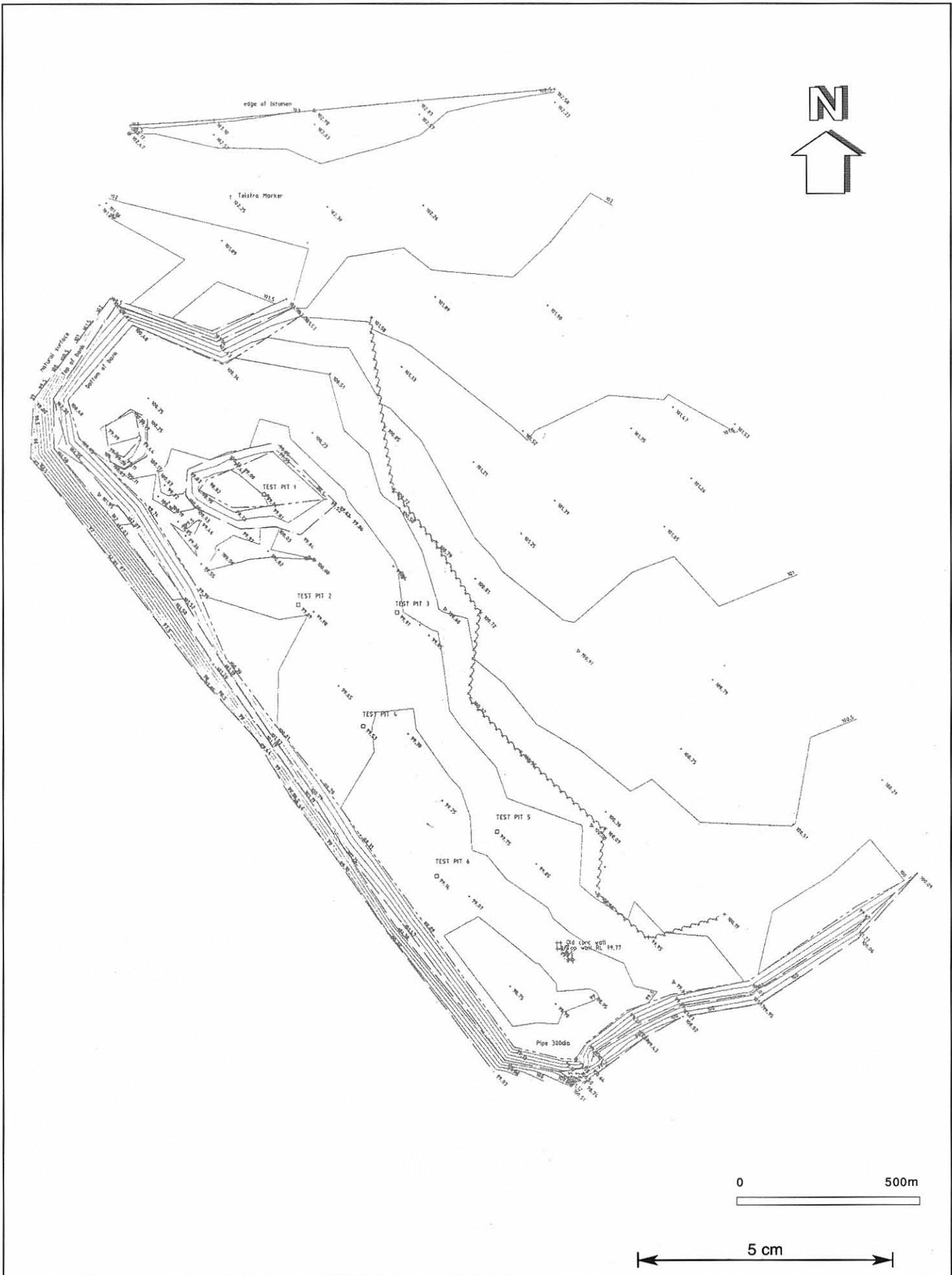
The design was as a mound with side slopes consisting of between 1:4 and 1:6 side slopes, with a surface area of approximately 2.3 hectares. Figures 7 and 8 show the design plan and sections of the proposed storage. The slopes graded into



5 cm

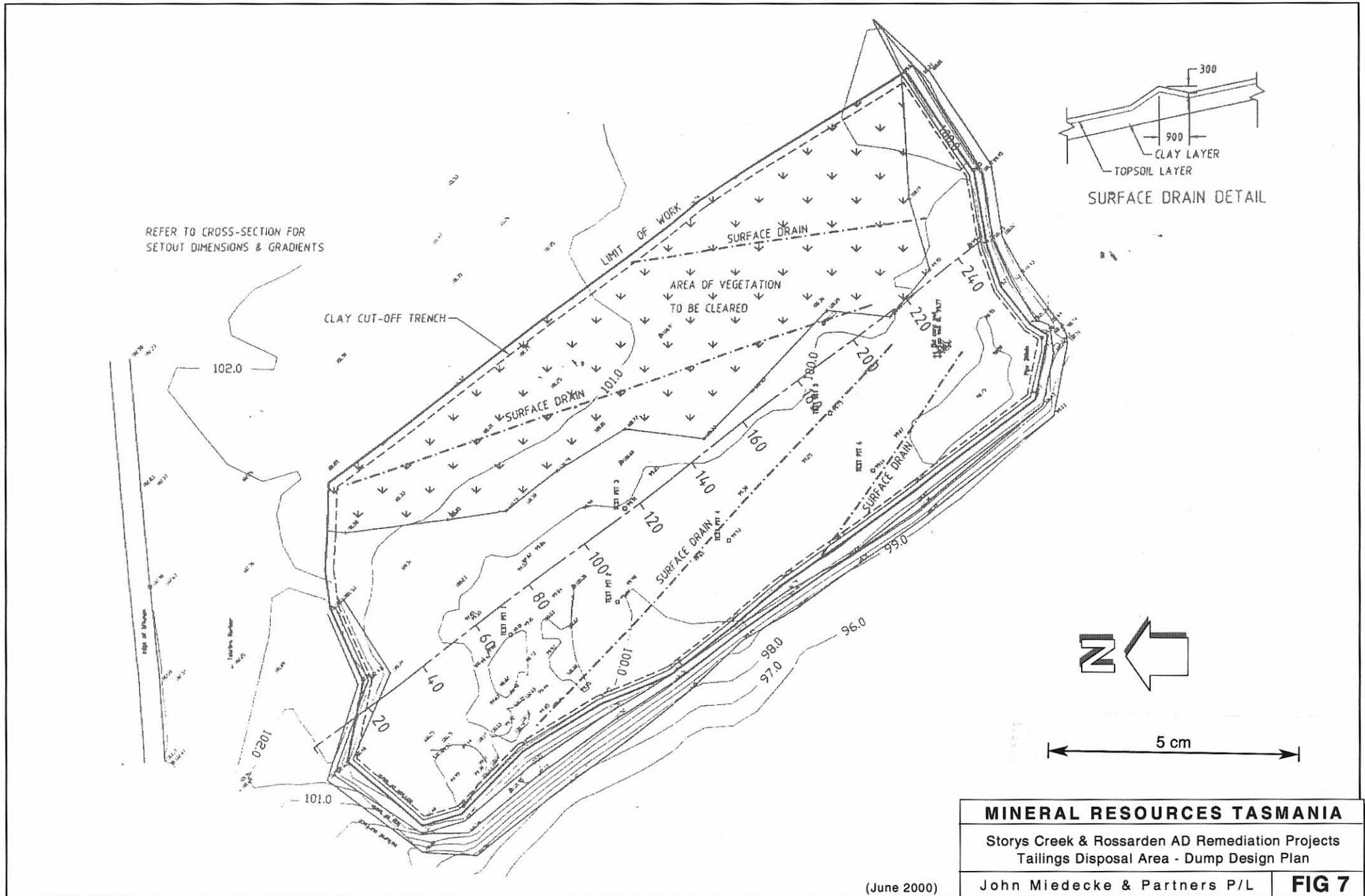
MINERAL RESOURCES TASMANIA	
Storys Creek & Rossarden AD Remediation Projects Precipitate Dam - Wetlands and Ponds	
John Miedecke & Partners P/L	FIG 5

(June 2000)



MINERAL RESOURCES TASMANIA	
Stories Creek & Rossarden AD Remediation Projects Tailings Disposal Area - Prior to Construction	
John Miedecke & Partners P/L	FIG 6

(June 2000)



REFER TO CROSS-SECTION FOR SETOUT DIMENSIONS & GRADIENTS

CLAY CUT-OFF TRENCH

LIMIT OF WORK

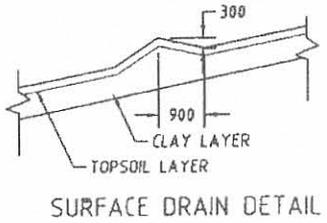
SURFACE DRAIN

AREA OF VEGETATION TO BE CLEARED

SURFACE DRAIN

SURFACE DRAIN

SURFACE DRAIN



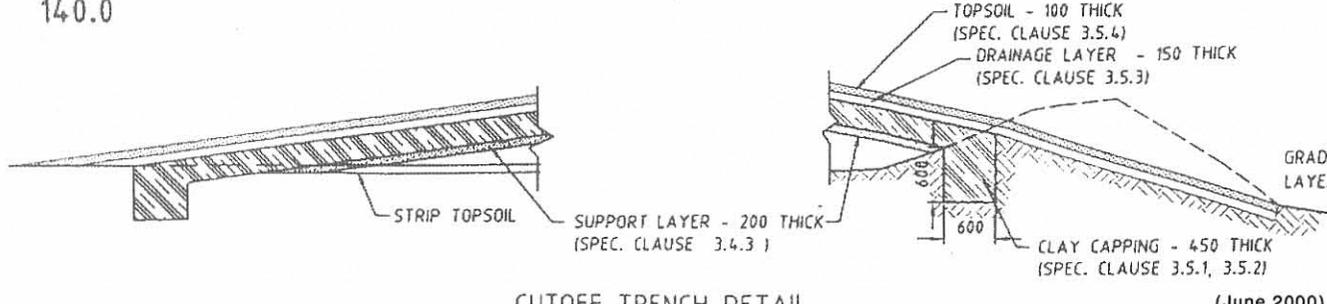
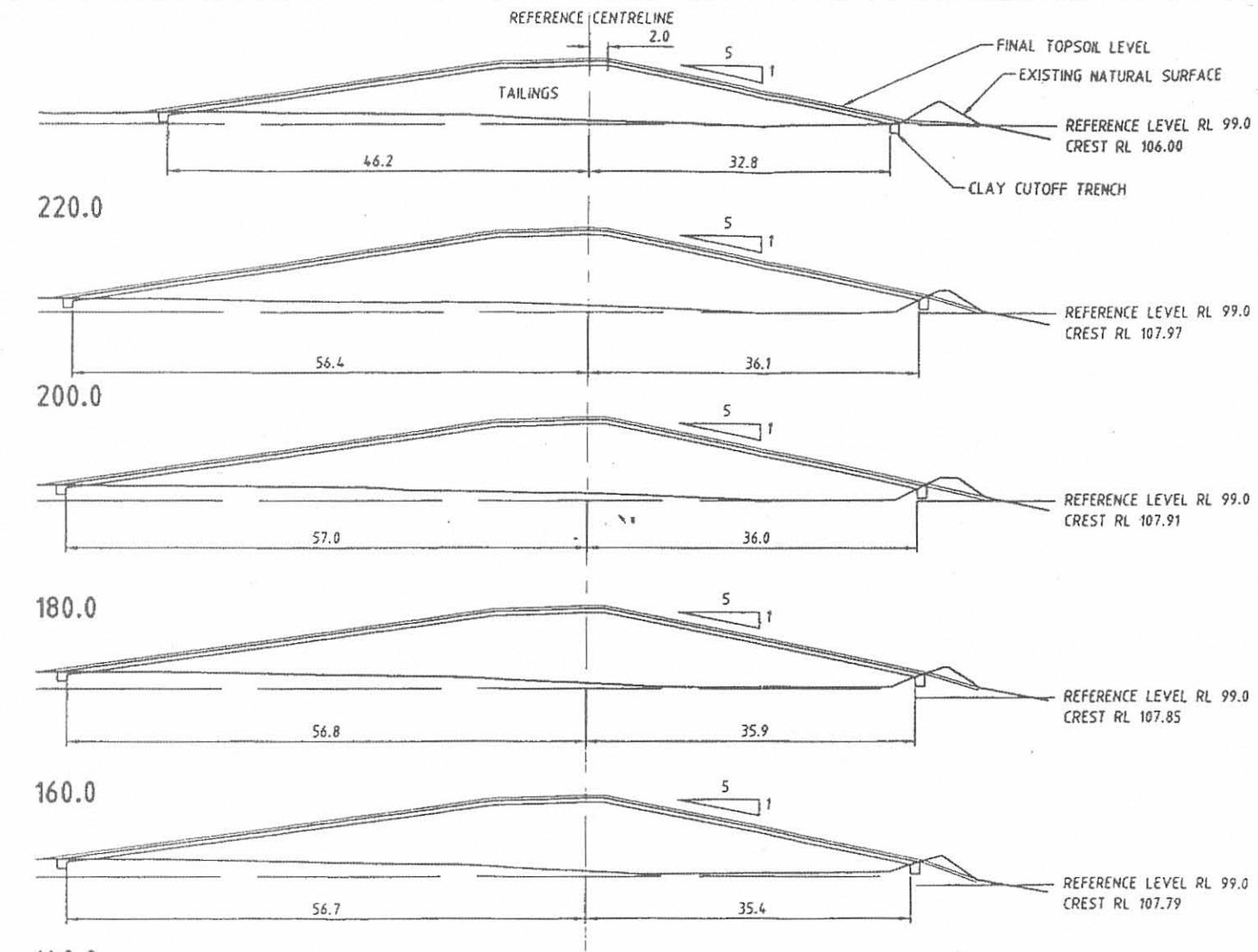
SURFACE DRAIN DETAIL



5 cm

MINERAL RESOURCES TASMANIA	
Storrs Creek & Rossarden AD Remediation Projects Tailings Disposal Area - Dump Design Plan	
John Miedecke & Partners P/L	FIG 7

(June 2000)



5 cm

(June 2000)

the surrounding topography.

The dump was essentially constructed in accordance with the design. The clay capping was not placed on the eastern side of the dump to allow for the possible disposal of jig tailings in the near future.

4.3.3 Site Preparation

Most of the area was disturbed, with only a small area to the east towards the Storys creek road requiring clearing.

This area was cleared of all vegetation (after recovery of any recoverable timber) and topsoils stripped and stockpiled at the boundary of the site. The cleared area was also found to have significant clay pockets and these were also stockpiled separately.

The boundaries of the storage was excavated through the existing tailings (on the western side into basement material to form a key and leachate barrier. This excavation was backfilled with clay (see Figures 7 and 8).

4.3.4 Relocated Tailings Placement

The Precipitate dam tailings materials were transported from the precipitate dam and deposited in piles to allow the materials to drain and consolidate. The piles were then dozed flat to form a layer and the next layer of tailings then dumped on this surface (see photographs). A D8 and D7 dozer was used for this work.

Each layer was treated with hydrated lime at a rate of 80 gm per m³, using a tractor and lime spreader.

Approximately 2000m³ of jig tailings were placed on the surface of the tailings over the eastern side of the dump, as a variation to the contract and as a trial for possible future Jig Tailings removal. These materials averaged approximately 200mm in depth and formed a layer beneath the clay capping.

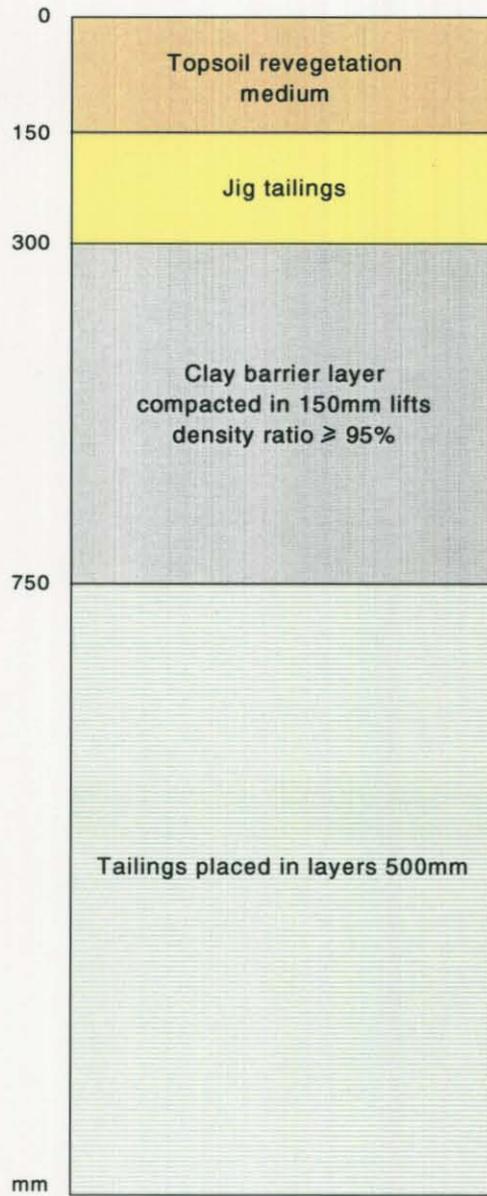
50 tonnes of agricultural lime (crushed limestone) was applied to the surface of the jig tailings prior to placement of the clay cap. This rate was equivalent to 10kg/tonne, which was sufficient to balance the acidity within the jig tails.

4.3.5 Clay Capping

The cover design provided for a 150mm of topsoil/ growth medium, a 150mm of sands/gravel drainage layer and 450mm of compacted clay over 200mm of gravel/sands track rolled as a cover of the tailings. The cover was to be keyed into bedrock on all sides.

After a review of the tender prices, the sand/gravel drainage layer was omitted and substituted with the funding of additional crushed limestone alkalinity materials beneath the clay cap. It was reasoned that any additional infiltration would be more than effectively remediated by increasing the residual alkalinity.

The clay source was to have been in an area adjoining the transmission line, adjacent to the previous borrow area (see Figure 2). However, further investigations showed that this area had only relatively shallow clay zones. Clay lenses were found between the HEC transmission line adjoining the disposal site and the site itself. This area was subsequently cleared and topsoils and clays removed and directly placed on the tailings surface. Figure 9 shows the cover over the tailings, as constructed.



MINERAL RESOURCES TASMANIA

Storys Creek & Rossarden AD Remediation Projects
Precipitate Dam Relocation - Cover as Constructed

John Miedecke & Partners P/L

FIG 9

(June 2000)

4.3.6 Clay Compaction

The clay capping was placed in layers to a minimum 95% compaction and keyed into bedrock through the underlying tailings materials. A compaction test section was constructed and tested by BFP Consultants using a nuclear densometer.

The trial showed that a dry density ratio of 102% was achieved with 6 passes with a vibratory roller and this was specified. The contract specified a 95% standard compaction at OMC.

BFP also conducted periodic inspections and compaction tests (see Appendix B).

These results are summarized in Table 1. BFP had some difficulty in conducting compaction test at every site visit due to the presence of stones and rock particles in the clay. However, sufficient tests were conducted to provide assurance that sufficient compaction was achieved and BFP expressed satisfaction with the standard of work. No test failed the standard.

TABLE 1 COMPACTION TESTS

Date	Location	Results Dry Density ratio
8/5	Embankment trial	97, 102, 99, 94.5
15/5	Near Peg 1	98.5
15/5	Near Peg 2	100.5
19/5	West , south side	96.5
19/5	SE corner	100
19/5	West , south side	96.5

4.3.7 Topsoil and Drainage

The final topsoil layer was placed with a dozer using materials from the area to the west. A drainage berm was established to control drainage and directed to natural surface. Vegetation previously cleared and stockpiled was also placed on the storage surface prior to revegetation (see Figure 10).

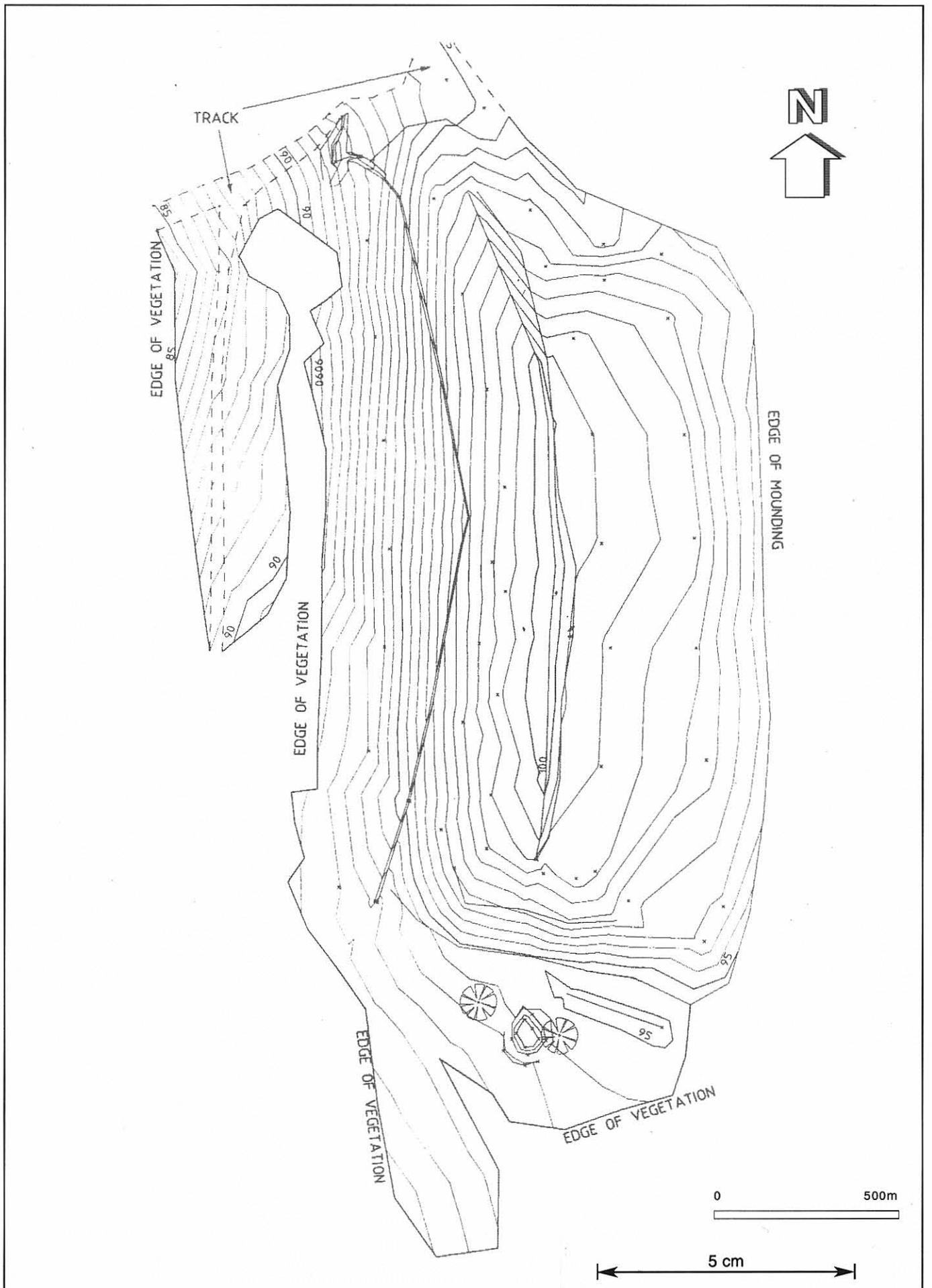
4.3.8 Haul Roads

All haul roads were scraped clean of tailing materials and left in place for future use. Approximately 5 tonnes of crushed limestone was spread over the haul road to prevent remaining tailings oxidation.

4.4 ADDITIONAL WORKS

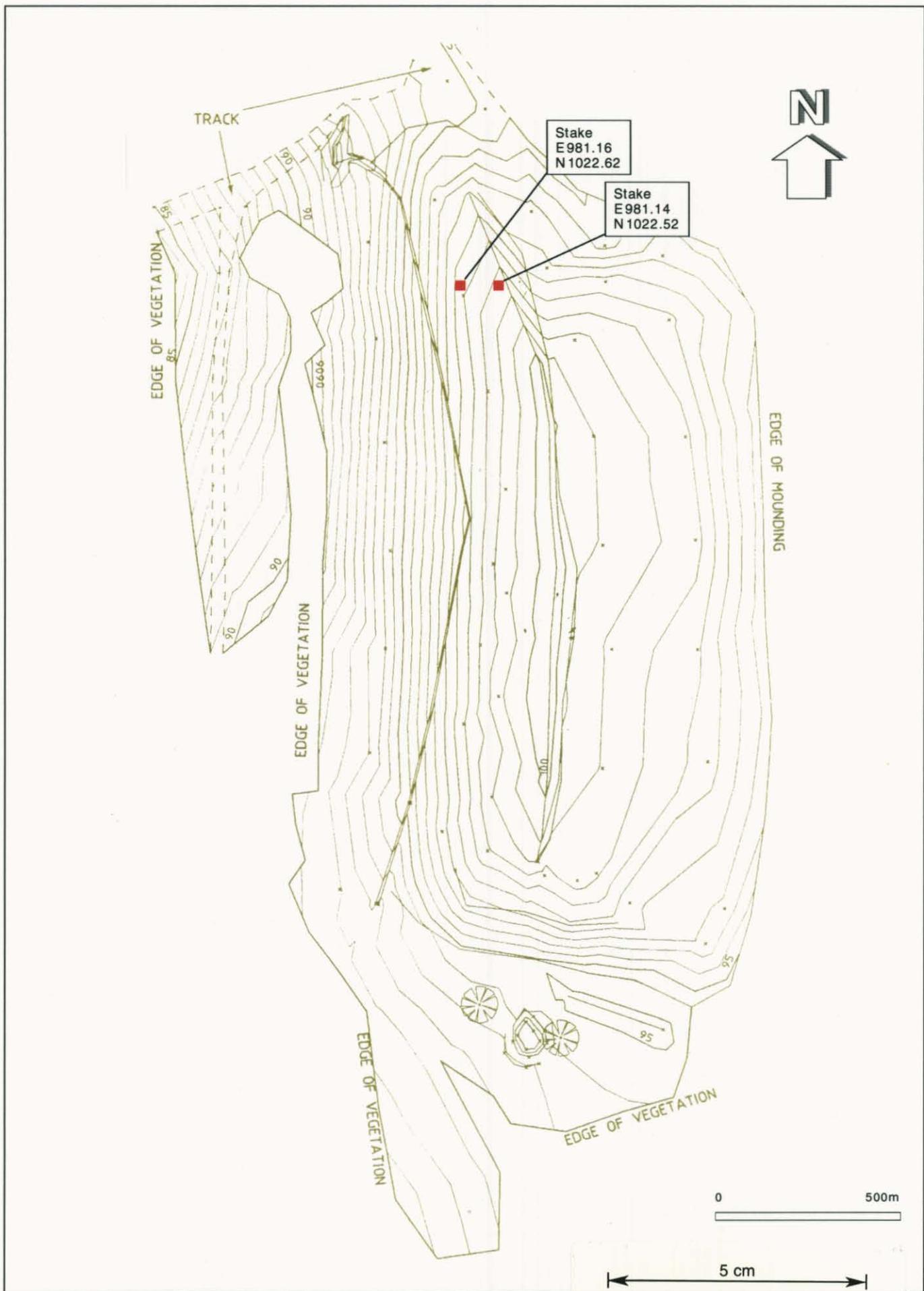
Additional works were completed as a variation to the contract. These consisted of the establishment of a crossing over Storys Creek to provide access to the Jig tailings on the western side, and the removal and relocation of approximately 2000m³ of jig tailings to the top of the new dump. This work was conducted as a trial for possible future relocation of these materials.

Clay was carted from the clay borrow area and placed on the embankment of the Rossarden tailings dam.



MINERAL RESOURCES TASMANIA	
Storrs Creek & Rossarden AD Remediation Projects Tailings Disposal Area - As Constructed	
John Miedecke & Partners P/L	FIG 10

(June 2000)



■ Lysimeter Locations

MINERAL RESOURCES TASMANIA
 Storys Creek & Rossarden AD Remediation Projects
 Lysimeter Locations
 John Miedecke & Partners P/L **FIG 11**

(June 2000)

Two lysimeters were installed at the northern end of the dump. These consisted of two HDPE water troughs, filled at the bottom with sand and then buried in the tailings material. The lysimeters are drained by pipes to two containers placed in the base of a large tree. It is proposed that the quantity of leachate will be monitored to establish infiltration through the cover (Figure 11 shows the location).

4.5 REHABILITATION

4.5.1 Existing Precipitate Dam Site

Clays were spread over the majority of the base of the dam. These were sourced from the new storage area. 50 tonnes of crushed limestone was spread over the accessible areas by a MAN fertiliser spreader. Lime was also hand spread on the steeper sections.

The area was fertilised with 350 kg of 14:16:11 fertilizer and an additional 7 tonnes of crushed limestone spread with the seed and fertilizer. 5000 native grasses (*Poa* sp) were planted and 2.8 kg of native seed mix applied (see Table 2 for the seed mix). The wetlands had approximately 25 m³ of wetland species and clays applied from the Rossarden drain area.

Table 2 Native Seed Mix

Species	% of mix
Acacia dealbata	30
Acacia verticillata	10
Acacia terminalis	5
Acacia verniciflua	5
Cassinia aculeata	20
Leptospermum scoparium	15
Poa labillardiere	5
Mixed Eucalypts	10

All seed was collected in the Mathinna, Rossarden and Storsy Creek area.

4.5.2 Disposal Area

All vegetation was removed from areas to be disturbed and topsoils/subsoils stockpiled. This included the additional borrow area.

The existing wall materials were pushed over the placed tailings and topsoils placed over the surface, with some vegetation replaced as a seed source and protection. Drainage was directed to the natural surface using a contour bank. The site was prior to seeding and planting by cultivating with a tractor.

The area was fertilized with 900 kg of 14:16:11 fertilizer and an additional 15 tonnes of crushed limestone spread the truck spreader. 15,000 native grasses (*Poa* sp) were planted and 7.2 kg of native seed mix applied (see Table 2 for the seed mix).

4.5.3 Other Areas

The clay borrow areas were rehabilitated by ripping and subsoil/ topsoil replacement. The area was fertilized with 250 kg of 14:16:11 fertilizer and an additional 3.5 tonnes of crushed limestone spread with the truck spreader. 4000 native grasses (*Poa* sp) were planted and 2.0 kg of native seed mix applied (see Table 2 for the seed mix).

4.7 OCCUPATIONAL HEALTH AND SAFETY

The work was completed with no lost time accidents or injury.

In November 1990, a fire was started by unknown persons on the northern side of Storys Creek Road with a northerly wind blowing towards the work site. The fire was extinguished with the assistance of Forestry Tasmania personnel.

4.8 ENVIRONMENTAL MANAGEMENT

The tender documents had specific sections dealing with the site environmental management. A specific site meeting was held with the contractors management staff to fully brief the contractor on environmental requirements and procedures

Waters enclosed within the existing precipitate dam were acid and with elevated metals. A system of drains was installed to direct clean runoff from upslope of the Precipitate Dam direct to Storys Creek.

Drainage from the tailings within the dam was contained within a bund wall and all drainage was directed to a settling/treatment dam of a capacity of approximately 300m³. This dam was located in the creek draining the dam area and located near the junction with Storys Creek.

The dam was treated with hydrated lime to maintain the pH in the waters to pH 8 prior to release. It was found that seepage from the dam was sufficient to cope with inflow volumes and prevent overflows.

A remnant of the existing wall on the southern embankment which included the concrete spillway, was left as a reminder of historic mining practices, at Forestry Tasmanias archaeologists request.

5.0 PLUGGING OF EASTERN ADIT

The contract for the blocking of the adit with a concrete plug 2 m in length (approximately 4m³) at a location some 30m from the entrance, was awarded to R.J and S.M Miller for a sum of \$5750.00.

The walls and base were scaled, high pressure washed and treated with slush cement prior to pouring the plug. A pvc pipe was provided through the plug to allow drainage during construction.

The work was completed in February 2000. After capping of the pipe, the plug developed several leaks at the edges of the plug and the contractor drained the adit and grouted the leaks in the plug. After refilling, several small leaks in another location and the procedure was repeated before final capping. The leaks were attributed to minor movement in the formwork after placement of concrete.

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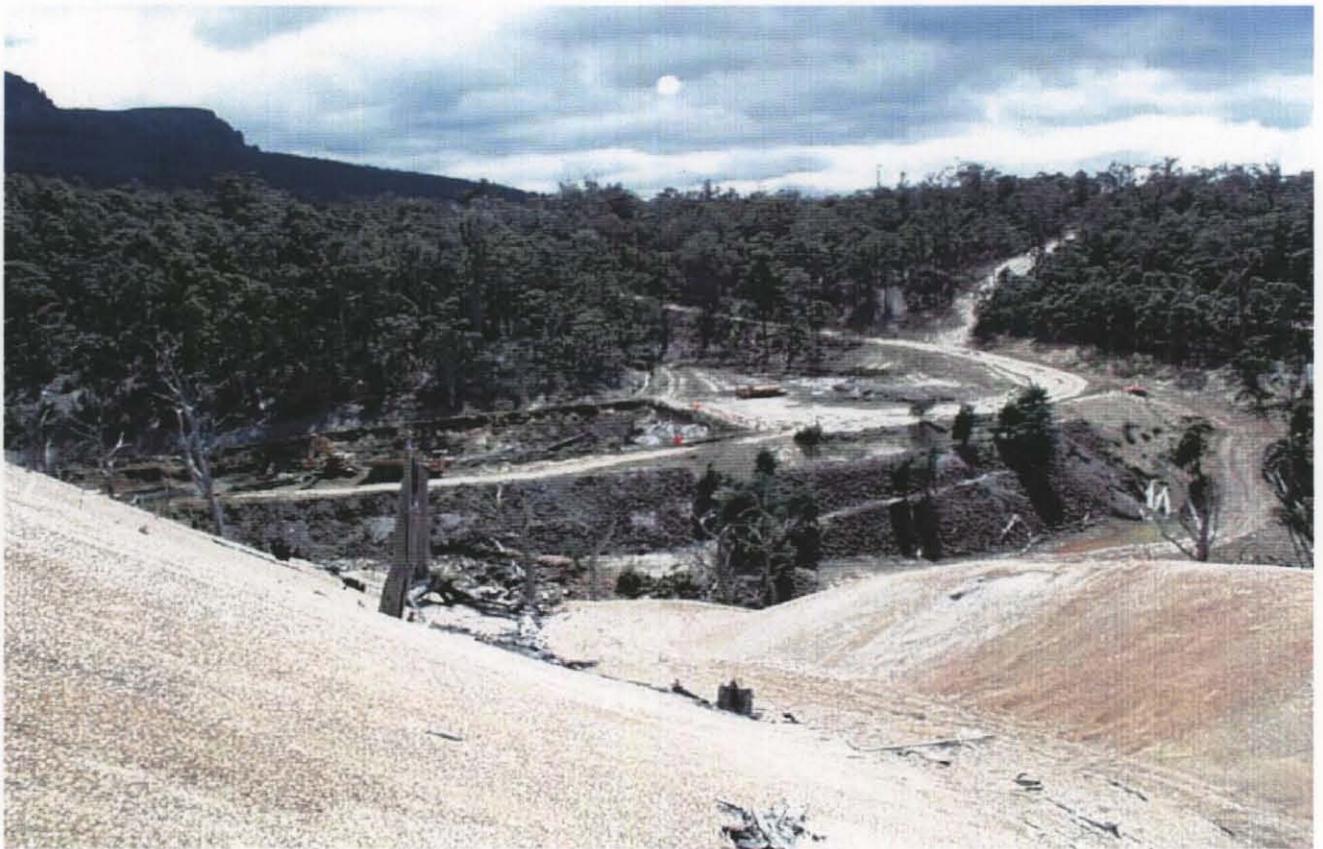
Miedecke 2000. Storys Creek/Rossarden Acid Drainage Remediation Study – Final Report John Miedecke and Partners, June 2000.

Thompson and Brett 1994. Storys Creek Precipitate Dam. Report on Rehabilitation. Thompson and Brett Pty Ltd May 1994.

PHOTOGRAPHS



Dec 1999 Precipitate Dam - Drainage channel commenced



Jan. 2000. Precipitate Dam - Tailings removal commenced



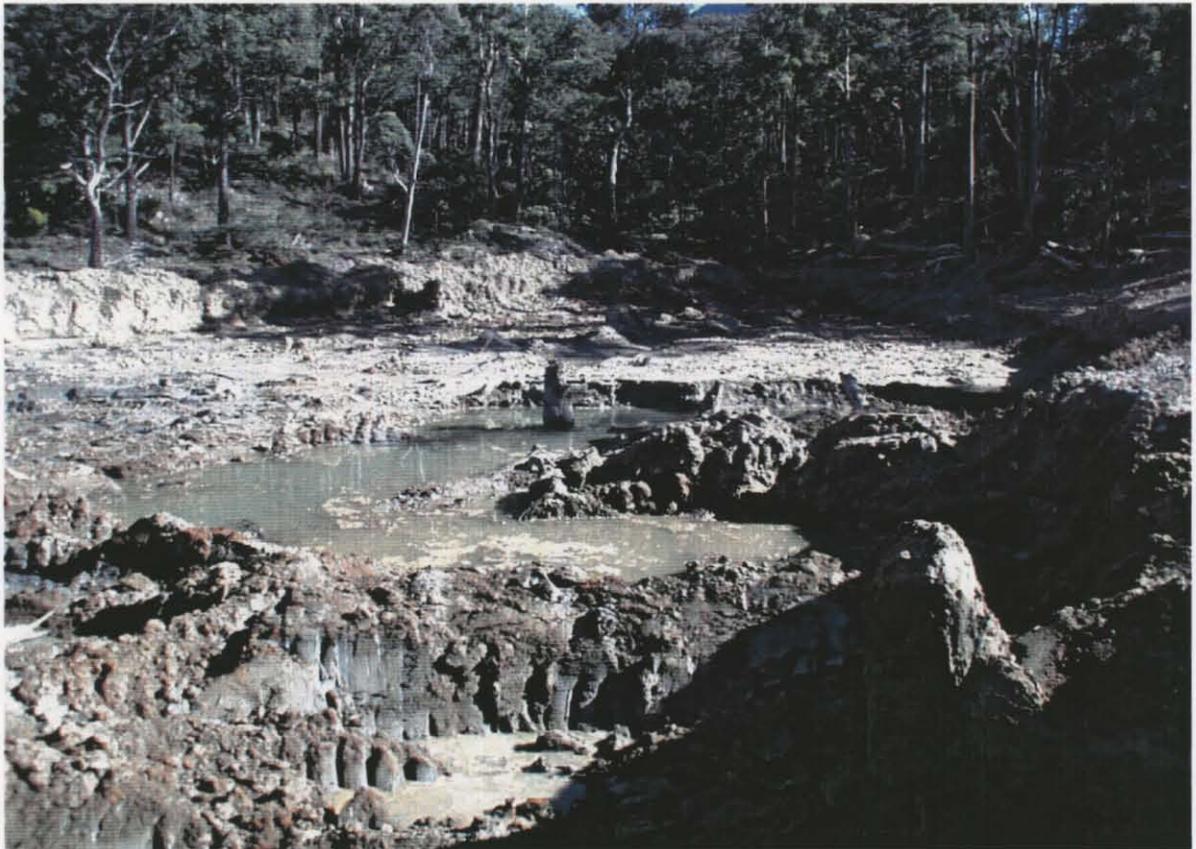
Feb. 2000. Precipitate Dam - Tailings removal underway. Tailings allowed to consolidate



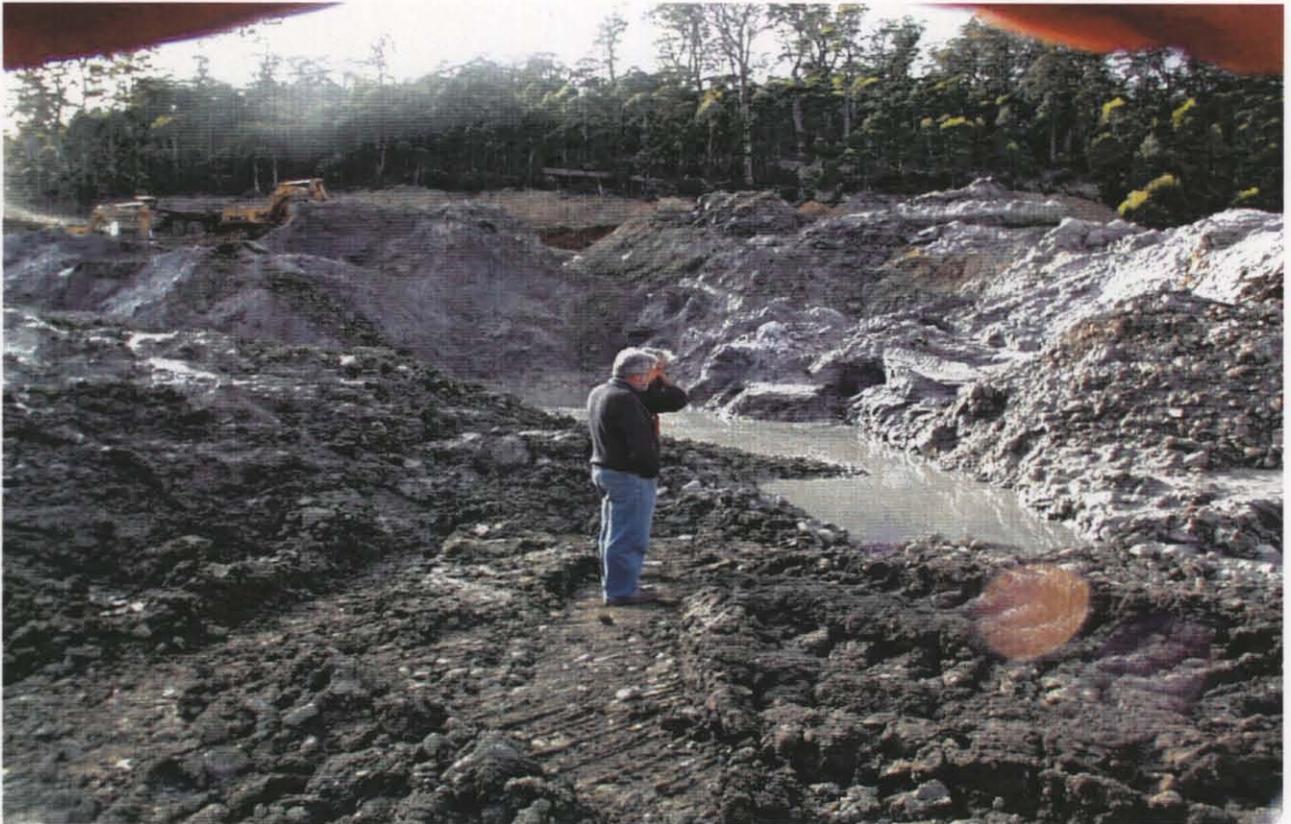
April 2000. Precipitate Dam - completed tailings removal



Jan 2000. Precipitate Dam - seepage in NE area near creek inflow. A cutoff drain may have prevented this saturating the tailings.



Feb 2000. Precipitate Dam - seepage and saturated tailings. This required cessation of work and drainage.



April 2000. Precipitate Dam - tailings drainage



April 2000. Precipitate Dam - tailings removal



April 2000. Disposal Area - tailings materials



April 2000. Disposal Area - Lysimeter locations note jig tailings



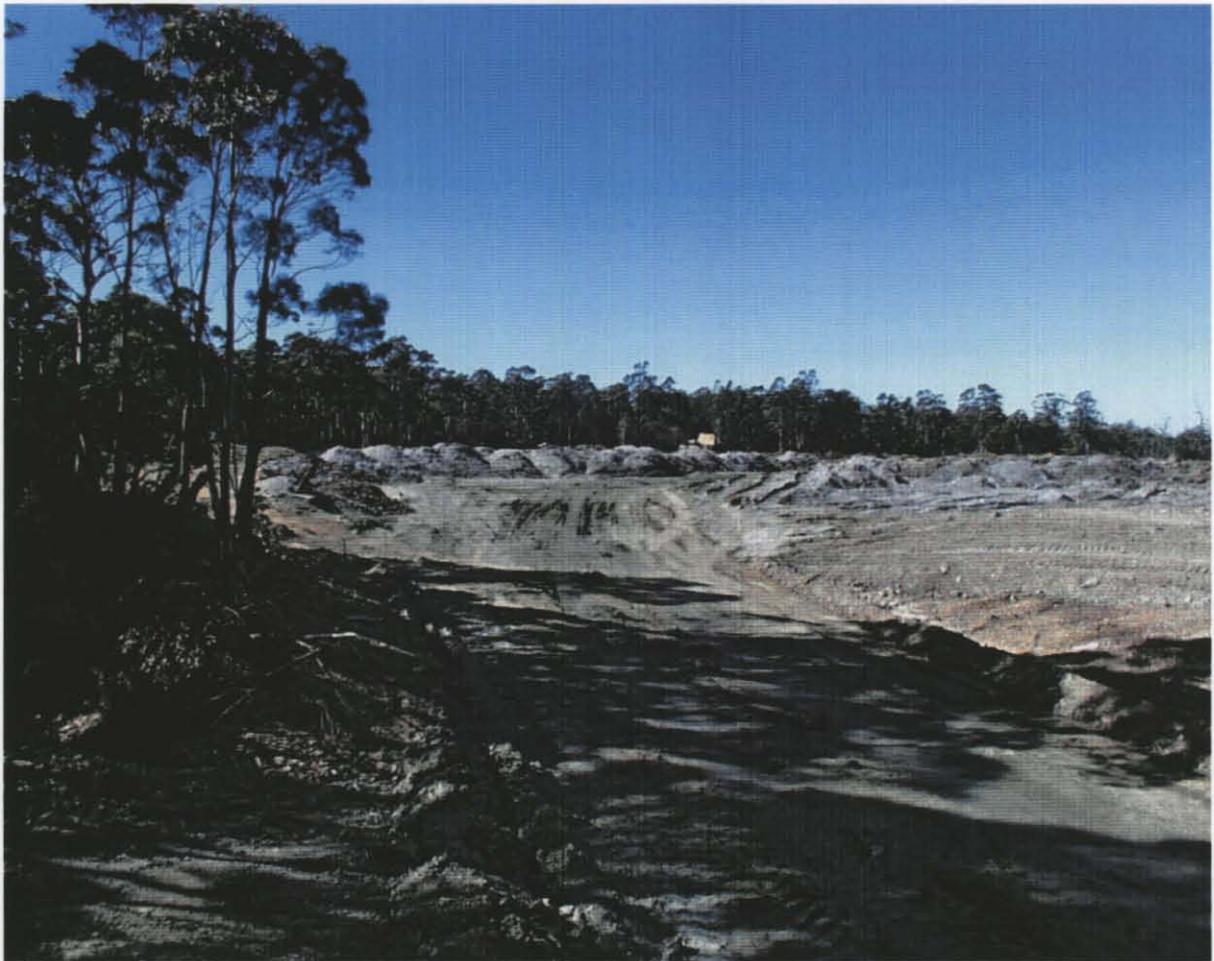
Dec 2000. Disposal Site - site preparation commencing



Dec 2000. Disposal Site - Clay Cut off construction



Dec 2000. Disposal Site



February 2000. Disposal Site -



May 2000. Disposal Site - Shaping of clay cap



May 2000. Disposal Site - Compaction of clay cap



May 2000. Precipitate Dam - Wetland construction



May 2000. Eastern Adit Concrete Plug

APPENDICES

Appendix A

Contract Financial Summary etc

Appendix B

BFP Consultants Compaction Test results

MINERAL RESOURCES TASMANIA
 STORYS CREEK REHABILITATION
 PRECIPITATE DAM RELOCATION
 CONTRACT No 800

1.1.1 SCHEDULE OF RATES

CONTRACTOR	TENDER	SE	CARE	332	332	333	342	343	344	347	35	35	3525	353	354	38
BECKETTS	312,546-00	12000	5000	0-56	2-50	7500	4-00	3-00	2750	3300	4-00	4-00	4000	4-00	3-00	4000
HAZELL BROS	322,314-90	9427	18579	0-34	2-38	8206	3-81	2-73	1287	8855	4-26	31-76	2530	3-82	4-78	6952
BATCHELOR EARTHMOVING	322,636-00	25555	2200	0-34	1-76	4204	1-86	3-70	1640	2860	1-20	11-00	2000	1-85	3-10	4950
STORNOWAY CIVIL	368,639-91	15835	3689	0-46	1-85	3577	3-29	3-54	4025	9290	5-24	9-73	3130	4-76	4-40	5590
CCC	385,517-07	16269	11638	0-70	3-09	7924	4-65	3-53	5586	5472	5-16	4-65	4315	4-86	4-11	6364
BORAL	596,889-20	10945	5500	2-40	13-70	12745	2-25	5-20	19750	3750	9-15	13-75	5000	8-30	9-30	10945
MCKENZIE CONTRACTING	629,644-76	27920	4900	0-85	3-65	12140	8-10	6-20	2875	2375	9-66	9-66	7600	6-40	6-40	9940
BRAMBLES	681,298-10	63520	5800	0-88	1-00	48400	10-00	6-20	10500	6030	6-50	16-40	1400	9-50	4-80	6960

1.1.2 SCHEDULE OF HOURLY HIRE RATES

CONTRACTOR	D8	20TE	30TE	40TE	LOAD	25TT	30TT	40TT	10TR	10TR	GRA	WT	FMA	LAB	COM	D6	65TE
BECKETTS	150	85	-	120	85	-	-	130	60	60	85	650	50	35	120	100	
HAZELL BROS	155	90	115	130	75	95	95	135	70	70	85	500	40	35			
BATCHELOR EARTHMOVING	140	100	120	140	95	95	120	150	95	95	95	400	40	30			220
STORNOWAY CIVIL	110	85	112	-	90	90	-	-	70	70	85	500	35	28			
CCC	180	110	155	180	88	115	145	170	90	85	100	696	57-60	39-60			
BORAL	135	90	105	-	80	65	-	-	95	80	90	550	45	38		115	
MCKENZIE CONTRACTING	-	85	120	130	75	80	110	-	65	65	75	550	45	33		115	
BRAMBLES	154	82	91	126	85	83	-	-	55	55	85	500	35	30			

1.1.2 SCHEDULE OF HOURLY STANDBY RATES

CONTRACTOR	D8	20TE	30TE	40TE	LOAD	25TT	30TT	40TT	10TR	10TR	GRA	WT	FMA	LAB	COM	D6	65TE
BECKETTS	40	40	-	40	40	-	-	40	25	25	40	-	50	35	40	40	
HAZELL BROS	155	90	115	130	75	95	95	135	70	70	85	500	40	35			
BATCHELOR EARTHMOVING	120	80	100	120	75	75	100	120	75	75	75	-	-	-			180
STORNOWAY CIVIL	65	50	72	-	65	72	-	-	55	55	68	400	35	28			
CCC	100	45	65	75	48	50	60	95	45	45	45	350	57-60	39-60			
BORAL	70	60	65	-	60	45	-	-	60	50	55	400	30	30		70	
MCKENZIE CONTRACTING	-	45	60	65	38	40	60	-	30	30	35	100	25	22		65	
BRAMBLES	40	40	40	40	40	40	-	-	40	40	40	330	35	30			

JOHN MIEDECKE AND PARTNERS PTY LTD
 JOHN WILSON PROJECT MANAGER

JOHN MIEDECKE AND PARTNERS PTY LTD

DATE: 9 JUNE 2000
PRINCIPAL: MINERAL RESOURCES TASMANIA
PROJECT: STORYS CREEK PRECIPITATE DAM RELOCATION
CONTRACT: No 800

FINANCIAL SUMMARY AT THE END OF THE CONTRACT

JUNE 2000

1.0	CONTRACT AND CONSULTANTS BUDGET		
	BECKETTS CONTRACT	312,586-00	
	CONCRETE ADIT BUDGET	5,000-00	
	REHABILITATION BUDGET	15,000-00	
	JOHN MIEDECKE AND PARTNERS	18,970-00	
	ADDITIONAL FUNDS	10,000-00	
	CLAY TO ROSSARDEN	3,000-00	
	TOTAL BUDGET		364,556-00
2.0	SUMMARY OF BECKETT'S CONTRACT		
	CONTRACT SUM	312,586-00	
	LESS PROVISIONAL SUMS	6,750-00	
	NET CONTRACT SUM	305,836-00	
	TOTAL SUM OF VARIATIONS	1,319-00 CR	
	FINAL CONTRACT SUM		304,817-00
3.0	CONC PLUG TO ADIT		
	RJ AND SM MILLER		5,750-00
4.0	REHABILITATION		
	LAND MANAGEMENT AND REHABILITATION SERVICES		14,352-00
5.0	JOHN MIEDECKE AND PARTNERS		
	CONTRACT SUM	18,970-00	
	SURVEY PC FROM BECKETTS	6,000-00	
	LIME TO JIG TAILS EAST DAM	3,000-00	
	SURVEY JIG TAILS	2,000-00	
	MONITORING EQUIPMANT	1,000-00	
	ROSSARDEN MACHINE HIRE	1,000-00	
	CREATE WETLAND PONDS	3,000-00	
	JMP ADDITIONAL FEES	2,000-00	
	ADJUSTED CONTRACT SUM		36,970-00
6.0	FINAL COST		\$361,889-00

JOHN MIEDECKE AND PARTNERS PTY LTD 41 TASMA STREET NORTH HOBART TAS 7000

DISTRIBUTED TO:

MINERAL RESOURCES TASMANIA
JOHN MIEDECKE AND PARTNERS PTY LTD

JOHN MIEDECKE AND PARTNERS PTY LTD

DATE: 14 JUNE 2000
 PRINCIPAL: MINERAL RESOURCES TASMANIA
 PROJECT: STORYS CREEK PRECIPITATE DAM RELOCATION
 CONTRACT: No 800
 CONTRACTOR: BECKETTS HEAVY PLANT HIRE PTY LTD

BECKETTS CONTRACT FINAL SUMMARY

SPEC CLAUSE	DESCRIPTION	TENDER PRICE	ACTUAL COST
-	SITE ESTABLISHMENT	12,000-00	11,250-00
3.2	CARE OF THE WORKS	5,000-00	5,000-00
3.3.2	PREPARE DAM SITE	5,000-00	5,000-00
3.3.2	RESHAPE DAM WALL	5,040-00	5,040-00
3.3.3	HAUL ROADS	7,500-00	7,500-00
3.4.1	SURVEY	6,000-00	-
3.4.2	EX CLAY CAPPING	8,000-00	8,000-00
3.4.3	RELOCATE TAILINGS	192,000-00	202,185-00
3.4.4	COLLECTION DAMS	2,000-00	2,000-00
3.4.4	LIME DOSING	750-00	750-00
3.4.7	LIME TO TAILINGS	3,300-00	3,300-00
3.5	CLAY CAPPING	38,024-00	23,765-00
3.5	CLAY CAPPING TOE	960-00	960-00
3.5.2.5	TESTING CLAY	4,000-00	4,000-00
3.5.3	DRAINAGE LAYER	12,676-00	-
3.5.4	TOP SOIL LAYER	6,336-00	3,168-00
3.8	DEMOBILISATION	4,000-00	4,000-00
	TOTAL CONTRACT SUM	312,586-00	
	NET CONTRACT SUM	305,836-00	
	VARIATIONS		
		304,817-00	
	FINAL CONTRACT SUM		

JOHN MIEDECKE AND PARTNERS PTY LTD 41 TASMA STREET NORTH HOBART TAS 7000

COMPACTION ASSESSMENT

Field Density by Nuclear Densometer

BFP

Consultants Pty Ltd

material testing laboratories

369A Bass Highway Prospect Vale

ACN 073 692 270

client	BECKETTS HEAVY PLANT HIRE	job number	26322
project	Precipitate Dam Relocation	certificate number	322/AC
location	Storeys Creek		

FEATURE: Capping, Tailings

field density test procedure AS1289 5.8.1 & 2.1.1

test No	L00/301/	1	2	3
Location		West Bank, south side		South east corner
Date Tested		19/5/00		
depth from F.S.L.	m	Not Measured		
measurement depth	mm	200		
field dry density	t/m ³	1.87	1.85	1.90
field moisture content (adjusted)	%	12.8	13.0	18.5

Laboratory Compaction AS 1289 5.1.1 Standard Compaction

test number	1	2	3
maximum dry density (adjusted)	t/m ³ 1.94	1.93	1.90
optimum moisture content (adjusted)	% 11.6	12.9	15.3
percent retained on 19 mm sieve	16	16	0

compaction parameters procedAS 1289 5.4.1

moisture variation (+wet, -dry of OMC)	%	+1.2	+0.1	+3.2
dry density ratio	%	96.5	96	100

specification requirements	95% Standard Compaction
----------------------------	-------------------------

material description #1&2 Brown Clayey Gravel #3 Grey silty clay some sand & fine gravel	remarks ;
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1289 5.8.1 8/97



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acc no 2034

Approved Signatory date of issue
 M. A. Maundrill

COMPACTION ASSESSMENT

Field Density by Nuclear Densometer

BFP

Consultants Pty Ltd

material testing laboratories

369A Bass Highway Prospect Vale

ACN 073 692 270

client	BECKETTS HEAVY PLANT HIRE	job number	26322
project	Precipitate Dam Relocation	certificate number	322/AA
location	Storeys Creek		

FEATURE: Embankment Compaction Trial

field density test procedure AS1289 5.8.1 & 2.1.1

test No	L00/268/	1	2	3	4
		4 Passes	6 Passes	8 Passes	10 Passes
Date Tested		8/5/00			
depth from F.S.L.	m	Not Measured			
measurement depth	mm	200			
field dry density	t/m ³	1.94	2.05	1.93	1.82
field moisture content (adjusted)	%	10.4	9.8	8.0	7.7

Laboratory Compaction AS 1289 5.1.1 Standard Compaction

test number	1	2	3	4
maximum dry density (adjusted)	2.00	2.01	1.95	1.93
optimum moisture content (adjusted)	11.6	12.2	11.1	12.5
percent retained on 19 mm sieve	18	18	18	17

compaction parameters proceduAS 1289 5.4.1

moisture variation (+wet, -dry of OMC)	%	-1.1	-2.4	-3.1	-4.8
dry density ratio	%	97	102	99	94.5

specification requirements	95% Standard Compaction
----------------------------	-------------------------

material description	remarks
Brown Clayey Gravel	



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1289 5.8.1 8/97

9/6/00
 Approved Signatory date of issue
 M. A. Maundrill

COMPACTION ASSESSMENT

Field Density by Nuclear Densometer

BFP

Consultants Pty Ltd

material testing laboratories

369A Bass Highway Prospect Vale

ACN 073 692 270

client	BECKETTS HEAVY PLANT HIRE	job number	26322
project	Precipitate Dam Relocation	certificate number	322/AB
location	Storeys Creek		

FEATURE: Capping

field density test procedure AS1289 5.8.1 & 2.1.1

test No	L00/290/	1	2	
Location		Near Peg No 1	Near Peg No 2	
Date Tested		15/5/00		
depth from F.S.L.	m	Not Measured		
measurement depth	mm	100		
field dry density	t/m ³	1.84	1.95	
field moisture content (adjusted)	%	14.5	10.8	

Laboratory Compaction AS 1289 5.1.1 Standard Compaction

test number	1	2	
maximum dry density (adjusted)	t/m ³	1.87	1.94
optimum moisture content (adjusted)	%	13.0	11.9
percent retained on 19 mm sieve		19	16

compaction parameters proceduAS 1289 5.4.1

moisture variation (+ wet, - dry of OMC)	%	+1.5	-1.1	
dry density ratio	%	98.5	100.5	

specification requirements	95% Standard Compaction
----------------------------	-------------------------

material description	remarks
Brown Clayey Gravel	

1289 5.8.1 8/97



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Approved Signatory 9/6/00
 M. A. Maundrill date of issue

acc no 2034