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17 May 2002

Mr Gordon Kirkby / Mr Chris Ritchie
Planning NSW
Henry Deane Building
20 Lee Street
SYDNEY NSW 2000

ASHTON COAL MINE PROJECT

Dear Gordon and Chris

We refer to the Government Agency meeting held in DMR's offices, Singleton on 7 May 2002 and our correspondence dated 8 May 2002. It was a resolution of the meeting that Whites would provide supplementary documentation supporting the options as tabled and discussed. This document entitled "Description of Proposed Diversion – Option 2" is attached.

The option represents a minor change to what was originally presented in the EIS and is a consequence of the 7 May 2002 meeting. The Option addresses the Agencies' concerns regarding the length of the diversion and the potential salinity issues. The concept has not changed and the Option only represents a reduction in length from the original proposal. It is noted that this Option 2 is the alternative that satisfied the Agency representatives that attended the above meeting.

The Option is a positive and beneficial environmental outcome that is based on the outcomes of the above meeting. It potentially lessens the environmental impacts of the Ashton Project and is perceived as win/win for the environment, for community and for mining.

The attached Option 2 document also includes Whites proposals for off-sets. We believe these off-sets should be in line with the Hunter Catchment Management Trust document entitled "Draft Hunter Catchment Blueprint Targets" particularly in terms of salinity, soil degradation, river system health and native vegetation / biodiversity. As our project has frontage to 3 major water bodies ie. Bowmans and Glennies Creeks and the Hunter River, all of which have been identified in this document for recharge / discharge off-sets, we would like to ensure that wherever possible, the off-sets proposed by Whites are contained within the project site boundaries.

This will require (as previously stated in meetings) the preparation of a Land Management Plan which can address not only the off-sets for such issues as salinity, soil degradation, river system health and native vegetation / biodiversity but also agricultural use, heritage conservation areas and the fulfilling of our requirements under DMR's integrated synoptic landscape plan.

Our understanding from the Whole of Government meeting of 7 May 2002 and Whites' meeting with Mr Sam Haddad on 10 May 2002, is that all Agencies with the exception of NPWS could draft their GTA's straight away, based on previously supplied and the attached information.

We respectfully request PlanningNSW to instruct the various Agencies to prepare and lodge their General Terms as soon as possible and that PlanningNSW move forward with the assessment of the application.

We thank you for your time in facilitating the above Government Agency meeting as we feel this has brought about this positive and beneficial environmental outcome.

Yours faithfully
WHITE MINING LIMITED

IAN CALLOW
Project Manager

Encl

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WHITE MINING LIMITED

ASHTON COAL MINE PROJECT

DESCRIPTION OF PROPOSED DIVERSION

OPTION 2

Distribution:

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1. DESCRIPTION OF PROPOSED DIVERSION FOR OPTION 2

The proposed alternative for diversion of Bowmans Creek downstream of the New England Highway bridge crossing is shown in **Figure 1**. This alternative (referred to as Option 2) has an overall length of 1.5 km and commences at the existing riffle located about 100 metres downstream of the bridge. As described in the EIS, this riffle is characterised by exposed bedrock across part of the channel bed and along the eastern bank.

The first 1400 m of the diversion proposed as Option 2, follows the same alignment as presented in the EIS as Option 1. Beyond Chainage 1400, the diversion would be re-connected to the existing Bowmans Creek channel about 150 m upstream of the Department of Land and Water Conservation's (DLWC) stream gauging station (Gauge No. 210130). The adoption of the alignment presented for Option 2 would result in a one kilometre reduction in the length of the diversion originally proposed in the EIS (i.e. Option 1). The proposed project timeline showing construction, mining, and post mining activities is included as **Attachment 1**.

An assessment of the feasibility of engineering a channel along the alignment presented for Option 2 has been undertaken. Available data from surveyed cross-sections of the existing channel indicates that the bed of the channel would need to fall 5.1 m over the length of the stream diversion. This corresponds to an average slope of about 1 (V) in 300 (H). The average slope of the existing channel between the New England Highway bridge and the Hunter River is about 1 (V) in 450 (H).

As part of the Option 2 assessment, the potential locations for drop structures that would be required along the diversion channel were determined. As outlined in the EIS and subsequent supporting documentation, there are advantages in siting drop structures at points along the diversion alignment where bedrock is predicted to occur at diversion channel bed elevation. Accordingly, the concept for the diversion proposed as Option 2 has been developed to ensure that the required drop structures coincide with bedrock outcrops along the proposed alignment.

The proposed bed profile for Option 2 is shown in **Figure 2**. A minimum of 11 drop structures are proposed, with the first five of these corresponding to the locations originally proposed for Option 1. In this regard, the position of the drop structure proposed at Chainage 900 (refer **Figure 1**) is considered to be important as it is likely to be the first opportunity downstream from the start of the diversion to install a drop structure within bedrock. This drop structure needs to be maintained at this location and at the specified elevation to minimise any potential for a 'head-cut' along the channel reach extending upstream to the start of the diversion. A further six drop structures are to be located over the remaining length of the diversion (refer **Figure 2**). Each of these would typically be 120 metres apart, with average bed slopes of 1 (V) in 1000 (H) between successive drops.

All drop structures would be constructed with a maximum drop of 300 mm, as detailed in the EIS. They would be constructed in accordance with the Type 'A' or Type 'B' concept designs presented within the written response to government agency comments on the EIS (refer **Figures 3** and **4**). These designs are in accordance with guidelines specified in the *'Rehabilitation Manual for Australian Streams'* (Rutherford et.al, 2000).

The levee bank originally proposed in the EIS will be re-aligned to ensure that backwater flood flows from the Hunter River do not inundate over the shallower areas of the longwall panels.

2. DIVERSION OF FLOWS INTO OLD CHANNEL POST MINING

The proposed diversion (Option 2) would be constructed prior to commencement of long-wall mining. The channel bed and banks would be vegetated with native riparian species to provide habitat along the length of the diversion. During the life of the mine, the diversion would serve as the primary avenue for the conveyance of flows. In fact, all flows up to and including the design 100 year recurrence flood would be carried by the diversion. In effect, the diversion will result in the permanent re-alignment of this section of Bowmans Creek.

Once mining of panels 4, 5 and 6 has been completed, it is proposed that the eastern bank of the channel be modified to allow a proportion of flood flows to be distributed to the existing Bowmans Creek channel. This will enable "freshes" to revitalise the chain of ponds that will remain along the old Bowmans Creek channel after subsidence has occurred.

It is envisaged that the modification to the eastern bank would involve excavation of a 50 m length of the levee/bank immediately downstream of the first drop structure. These works would be undertaken to create a side-flow spillway that would allow a proportion of the flow at the peak of the flood to "peel-off" and travel overland toward the chain of ponds. It is proposed that the side-flow spillway be constructed with a spillway crest elevation corresponding to the peak flood level in the 2 year recurrence event. Therefore, floodwaters at the peak of floods rarer than the 2 year event would be distributed along the old Bowmans Creek channel. As the distribution of flow to the old Bowmans Creek channel will only occur at the peak of minor to major floods, the water entering the chain of ponds that will remain in this area post mining, will be of relatively low salinity.

2.1. SUBSIDENCE

Both the proposed diversion and the majority of the existing Bowmans Creek channel downstream from the re-connection point, are outside the theoretical limit of subsidence. Only the bend in Bowmans Creek just south of the large oxbow (refer **Figure 1**) would experience subsidence. Approximately 600 metres of the existing creek would potentially be impacted by subsidence. If all four seams are mined, modeling shows that the channel could experience subsidence of up to 0.9 m.

The zone of subsidence would start about 120 metres downstream from the point of re-connection of the diversion to the original creek, and would slowly increase over the next 300 metres of the channel. Subsidence would then decrease to zero over the next 300 m of the channel.

The maximum predicted cumulative subsidence is detailed in **Table 1**.

TABLE 1

Coal Seam	Depth Beneath Creek Bed (metres)	Length of Creek over which Subsidence may occur (metres)	Max. Predicted Cumulative Subsidence (metres)
Pikes Gully	167	295	0.15
Upper Liddell	195	350	0.3
Upper Lower Liddell	229	430	0.55
Lower Barrett	263	600	0.9

Subsidence of this magnitude along this reach of the existing Bowmans Creek channel, is not considered to present an issue for channel stability. Available data indicates that bedrock is located at the upstream and downstream ends of the reach. Hence, bed controls exist and the potential for bed movement is restricted to the 500 metres between these points.

All surface cracking will be contained within the longwall panel (refer **Figure 5**). No surface cracking is expected to occur along the creek alignment.

As the depth of mining exceeds 150 metres, connective cracking is not expected to occur even under the worst case scenario of extensive geological structure. Exploration drilling has not identified any such structure within the area of the underground mine.

3. COMMENTS ON FISH PASSAGE/ECOLOGY

The Option 2 diversion is required to achieve a 5.1 m drop in elevation over a channel length of 1.5 km. This compares to the Option 1 diversion which provided a 5.8 m drop over 2.4 km. Fish passage via the Rutherford et. al (2000) design parameters can be achieved by the use of 11 drop structures, as shown in **Figures 1** and **2**.

The spacing of these drop structures is based on maximizing the use of predicted bedrock outcrops to anchor the drop structures. The minimum spacing between drop structures is 120 m, but could be refined during detailed design when additional data on bedrock elevation is available.

The bed profile for the diversion should be compared with the two natural steep graded sections in the existing creek line located between XS1 and XS2, and between XS11 and XS12 (refer to **Figure 2**). In these areas, fish are required to climb 2.5 m over 200 m via a series of short riffle-pond sections. That is, the Option 2 diversion will have an average gradient one quarter that of the two natural steeply graded sections of the existing creek, with riffle-pond segments similar to or better than these creek sections.

Table 2 shows the changes in the proportions of creek to be diverted and/or remediated as chain of pond habitat post-mining.

TABLE 2 COMPARISON OF CREEK HABITAT LENGTHS (KM)

Condition	Upstream Section	Diversion Creek	Excised Section	Chain of Ponds	Downstream Section	Total Creek
Pre-mining	-	0	0	0	-	5.9
During mining	0.1	1.5	2.6	0	3.2	4.8
Post-mining	0.1	1.5	0	2.6	3.2	7.4

Pre-mining creek length is 5.9 km. During mining the creek length is 4.8 km (a net loss of 1.1 km). Post mining and following rehabilitation of the excised section of creek (into chain-of-ponds creek habitat with flood flow plus upstream groundwater recharge), overall creek length will be 7.4 km. That is, there will be a net gain of 2.5 km of stream habitat, thus achieving the NSW Fisheries' Guideline goal of 2 for 1 habitat compensation.

4. ASSESSMENT OF SALINITY IMPACTS

4.1 PRE-MINING (EXISTING)

- Under natural conditions there is an upward hydraulic gradient under the Bowmans Creek valley and alluvium, due to the regional groundwater flow system, which is primarily controlled by topography and permeability distribution;
- The coal measures rock mass has negligible primary or inter-granular porosity and permeability, but has a secondary or fracture permeability and porosity due to the presence of joints and fissures;
- The permeability of the coal measures rock mass depends on the frequency and aperture width of joints and fissures;
- Extensive data from the Hunter Valley shows that the permeability is naturally higher near the surface due to stress relief from erosional unloading and weathering, and decreases with depth in an exponential manner as shown in Figure F3 and F4 (Appendix H of EIS);
- Comparison of the hydraulic head in the coal measures with the water table in the alluvium indicates an upward hydraulic gradient exists; and
- The estimated natural upward leakage from the coal measures into the alluvium is in the range 0.004 to 0.022 ML/day.

4.2 MINING AND GROUNDWATER RECOVERY PERIOD

- During underground mining below the alluvium, the hydraulic head in the coal seam and in the fracture zone above the seam will be approximately at atmospheric pressure, so the upward gradient will be reversed in this zone and this will propagate upwards through the intact rock mass eventually causing a downward vertical gradient from the alluvium to the mine;
- All groundwater intercepted by the underground mine workings will be utilised within the site water management system.
- These conditions will continue until the water levels or hydraulic heads in the goaf return to close to their pre-mining levels, which is estimated to be between 30 and 50 years based on the recovery model.
- During the mining and recovery period (18 + 30-50 years) there is estimated to be a net reduction in salinity load to the alluvial groundwater, Bowmans Creek and the Hunter River of approximately 15 – 150 kg/day.
- The groundwater levels will be monitored during mining to determine if any groundwater fracture connection occurs between the alluvium and the mine and any subsequent annealing of the fractures.

4.3 POST MINING AFTER GROUNDWATER RECOVERY

- After groundwater levels in the coal measures recover to approximately the pre-mining level, the potential for upward seepage of saline water from the coal measures to the alluvium will be re-established;
- Subsidence induced fracturing may locally increase upward seepage to the alluvium over the shallowest northern end of the longwall panels 4, 5, and 6 where there is a moderate to high risk of connection between the mine goaf and ground surface (i.e. where the total cover thickness is less than 150 m);
- In the southern areas where the cover thickness exceeds 150 m the risk of subsidence induced fracture connection is low. Moreover, the alluvial flats under most of the southern areas are underlain by silty clay sediments and the basal sandy gravel aquifer is absent;
- The increase in salinity load to the alluvium for the worst case estimate was calculated by assuming that the permeability of the rock mass increases up to two orders of magnitude under the area of greatest risk of fracture connection at the northern end of longwall panels 4, 5 and 6;
- This worst case estimate assumes no annealing or sealing of the cracks, no dilution of groundwater by flood flows and no benefit gained by deep-rooted, salt tolerant, riparian vegetation.
- The impacts of the worst case estimate of the increase in salinity on the Hunter River as presented in Appendix H, Section 8.0 of the EIS (ie. 14 stem), were estimated by assuming the upper end in the range of the estimated additional salinity load (150 - 1500kg/day) was added directly to the river:
- The impacts of the worst case estimate of increase in salinity on Bowmans Creek (70us/cm–300us/cm) as presented in Appendix H, Section 8.0 of the EIS (70us/cm-300us/cm) was estimated by assessing the lower end of the range of the estimated additional salinity load (150-1500kg/day) was added directly to the creek. The upper end of the range was not used because monitoring the impact of the old Foybrook-Haceldone Mine on Bowmans Creek indicated the long-term increase in salinity ranged up to 300us/cm. However, it is noted that even the addition of 1500kg/day only increases the base flow salinity in Bowmans Creek about 700us/cm (ie. from 1400us/cm to 2100us/cm), which is within the observed range of low flow salinities in Bowmans Creek (Figure 10, Appendix O).

4.4 PROPOSED OPTION TO REDUCE SALINITY IN THE HUNTER RIVER

- It is proposed to off-set the additional seepage load from the coal measures by:
  - ⇨ Promoting additional recharge of low salinity water to the alluvium during high flows in Bowmans Creek.
  - ⇨ Off-setting by committing to revegetation with suitable deep-rooting native species in local recharge/discharge areas in the lower part of the Bowmans Creek catchment;
- Additional recharge of the Bowmans Creek alluvium post mining, will be promoted by diverting some of the higher, low salinity flows down through the chain of ponds, to "freshen" the ponds and simulate natural recharge events in the alluvium. This will be accomplished by modifying the diversion to provide a "spill-over" section for part of the higher flows (> 2 year recurrence floods);
- The subsidence depressions (chain of ponds) will be rehabilitated so as to encourage recharge of the alluvium;
- The downstream flood protection bund will be removed so groundwater discharging from the alluvium can re-join Bowmans Creek. This groundwater will be similar in quality to the natural groundwater due to the off-setting affects of the additional low salinity recharge and the passage of the higher salinity low flows through the diversion;
- Off-set plantings and other off-setting measures will be developed in conjunction with Whites and the DLWC, to compensate for the estimated additional salinity load by planting deep-rooted native vegetation in both the local recharge zone (i.e. low sloping land with no woody vegetation located within 500 m of identified saline areas – as shown on DLWC's Salinity Map of Bowmans Creek Catchment) and in identified discharge zones.

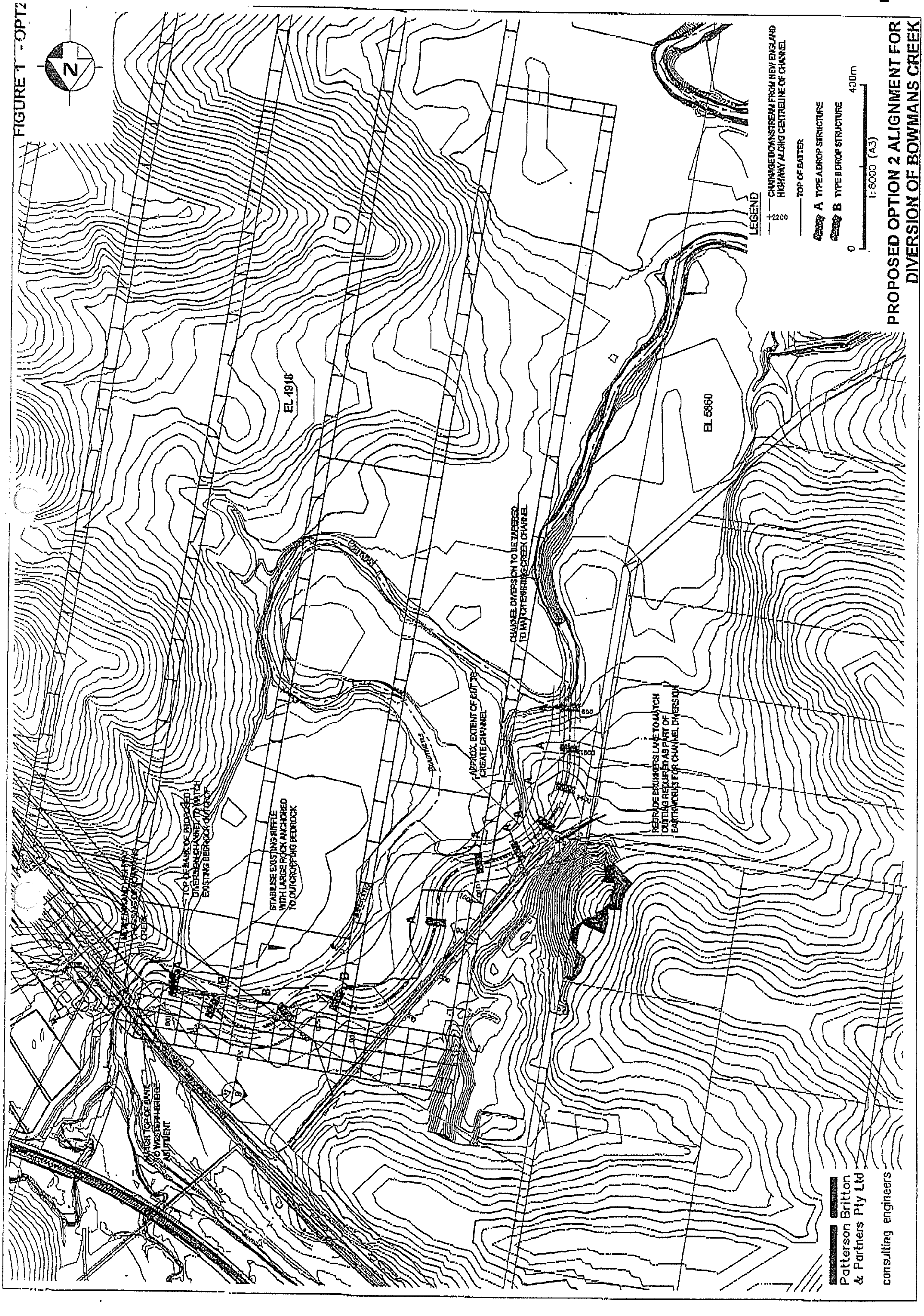
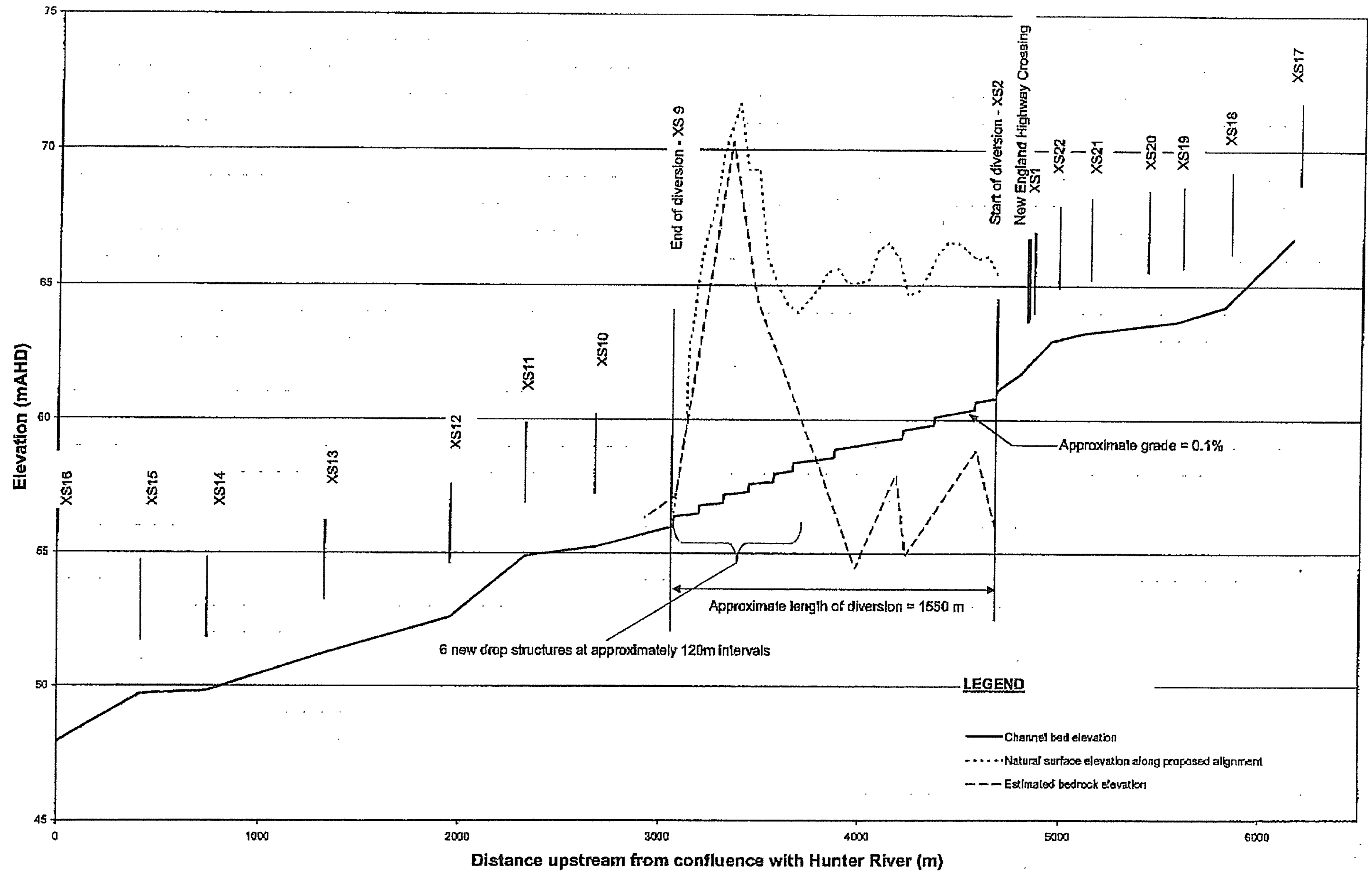


FIGURE 1 - OPT2
N
EL 4918
EL 5960
CHANNEL DIVERSION TO BE TAPERED TO MATCH EXISTING CREEK CHANNEL
APPROX. EXTENT OF CUT TO CREATE CHANNEL
REGRADE BOWMANS LANE TO MATCH CUTTING REQUIRED AS PART OF EARTHWORKS FOR CHANNEL DIVERSION
STABILISE EXISTING RIFFLE WITH LARGE ROCK ANCHORED TO OUTCROPPING BEDROCK
LEGEND
CHAINAGE DOWNSTREAM FROM NEW ENGLAND HIGHWAY ALONG CENTRELINE OF CHANNEL
TOP OF BATTER
A TYPE A DROP STRUCTURE
B TYPE B DROP STRUCTURE
0
400m
1:8000 (A3)
PROPOSED OPTION 2 ALIGNMENT FOR DIVERSION OF BOWMANS CREEK
Patterson Britton & Partners Pty Ltd
consulting engineers

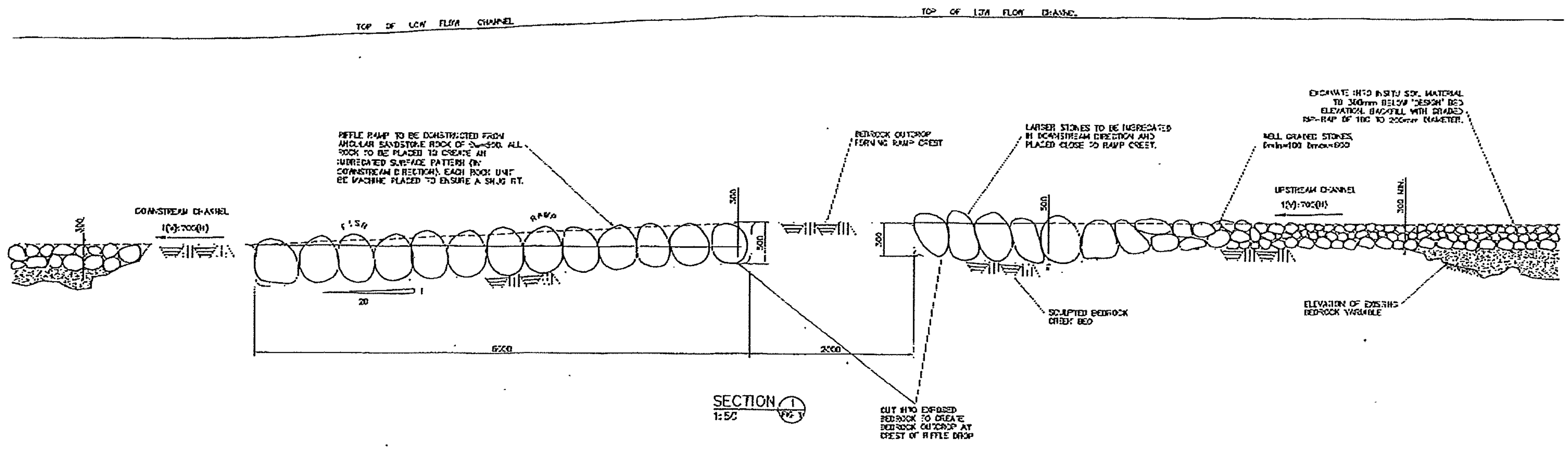
FIGURE 2



Patterson Britton & Partners Pty Ltd Option 2 Profile.xls

CHANNEL BED ELEVATION FOR BOWMANS CREEK DIVERSION - OPTION 2

FIGURE



SECTION 1
1:50

NOTES

1. UPSTREAM AND DOWNSTREAM CHANNEL GRADES APPLY TO THIS SECTION ONLY. GRADES VARY AT OTHER LOCATIONS.
2. BEDROCK SURFACE TO BE EXCAVATED TO PROVIDE RELATIVELY UNIFORM LONGITUDINAL SLOPE ALONG DIVERSION ALIGNMENT.
3. RIFFLE MATERIAL TO EXTEND ACROSS LOW FLOW CHANNEL OF DIVERSION AND TO BE "KEYED-INTO" CHANNEL BANKS.
4. RIFFLE CREST TO BE CONSTRUCTED WITH A SMALL DEPRESSION IN THE CENTRE OF THE CHANNEL TO CONCENTRATE LOW FLOWS.

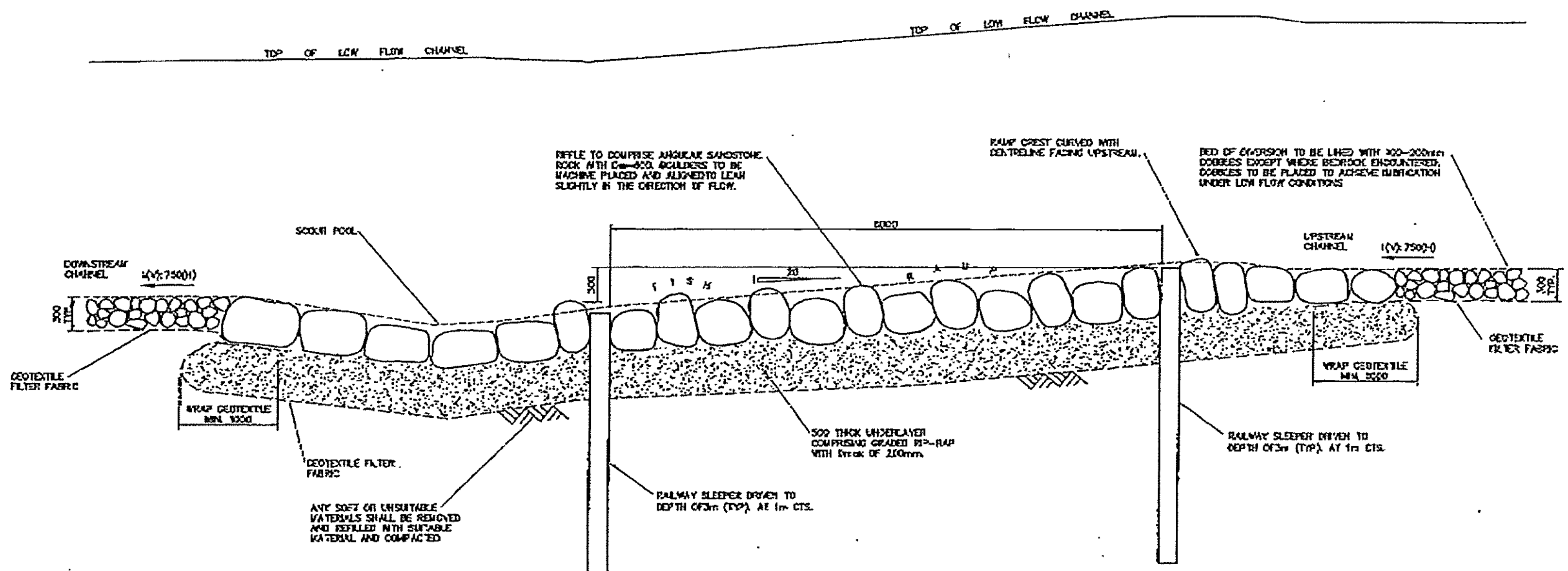
0 500 1000 1500 2000 2500mm
1:50 (A3)

Patterson Britton & Partners Pty Ltd

consulting engineers

TYPICAL DETAILS OF 'TYPE A' DROP STRUCTURE

FIGURE



SECTION 2 / FIG 1
1:50

NOTES

1. UPSTREAM AND DOWNSTREAM CHANNEL GRADES APPLY TO THIS SECTION ONLY. GRADES VARY AT OTHER LOCATIONS.
2. BEDROCK SURFACE TO BE EXCAVATED TO PROVIDE RELATIVELY UNIFORM LONGITUDINAL SLOPE ALONG DIVERSION ALIGNMENT
3. RIFFLE MATERIAL TO EXTEND ACROSS LOW FLOW CHANNEL OF DIVERSION AND TO BE "KEYED INTO" CHANNEL BANKS.
4. RIFFLE CREST TO BE CONSTRUCTED WITH A SMALL DEPRESSION IN THE CENTRE OF THE CHANNEL TO CONCENTRATE LOW FLOWS.

0 500 1000 1500 2000 2500mm
1:50 (A3)

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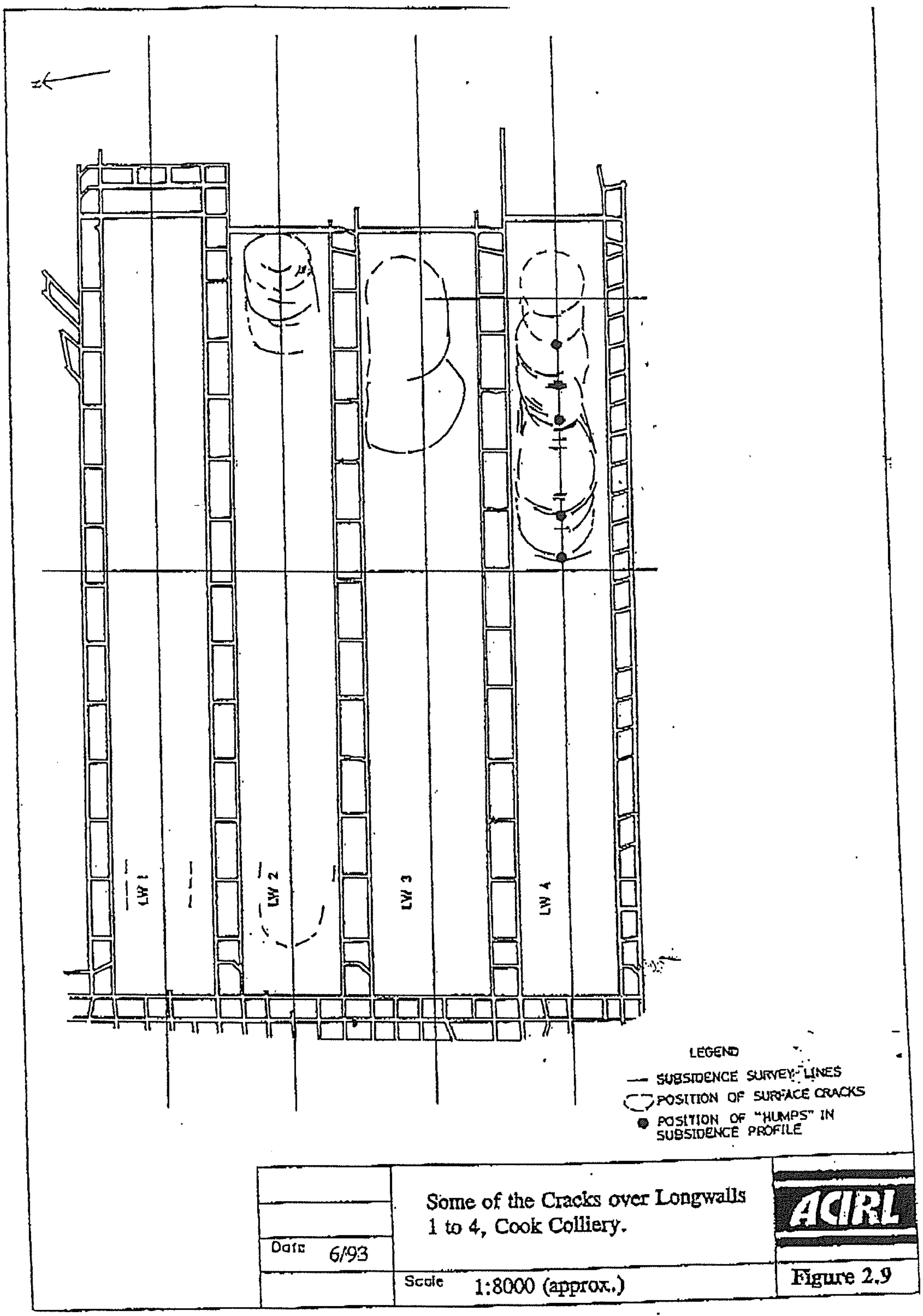
TYPICAL SECTION OF 'TYPE B' DROP STRUCTURE

3353/DROP-STRUCTURE/FIGBP2.DWG



CRACKING OVER COOK COLLIERY, QUEENSLAND (from ACARP Report 1311)

WML Figure 5
15/5/02.

ATTACHMENT 1 – PROJECT TIMELINES

Description of Activities			Years from Project Commencement
Commencement of Open Cut Mine			0
Commencement of UG Mine gate road development			2
Commencement of UG Mine longwall operations			3.5
Construct creek diversion			3 – 4
Ecology established/divert creek/establish swales			6
Mining under oxbow:	-	Pikes Gully seam	6.2 – 7.6
	-	ULD seam	7.6 – 9.2
	-	ULLD seam	11.7 – 13.3
	-	LB seam	15.8 – 17.4
Reconnect previous creek alignment			17.5
Monitor groundwater creek alignment/rehabilitate previous creek alignment			17.5 – 20
Complete Mining			20
Mine rehabilitation and sealing			20 – 21