FIRST DRAFT OF PART 1 5/10/82.
ALL OF THIS SUBJECT TO REVISION.

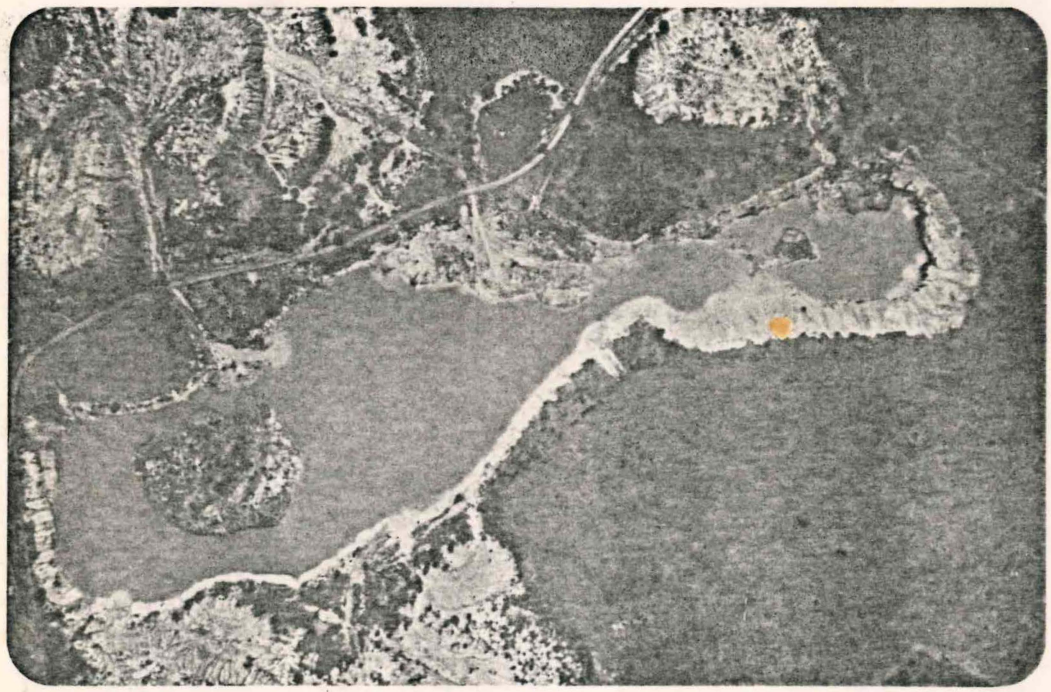
COLLIE COAL MINE

REHABILITATION REPORT

OCTOBER 1982

PART 1 PRESENT STATUS

PART 2 PRIORITIES FOR REHABILITATION



FORESTS DEPARTMENT
PRODUCTION
RECREATION
CONSERVATION
PROTECTION
WESTERN AUSTRALIA

Note:

This is the first draft of Part 1. put together on 5/10/82.

All of this is subject to revision.

Fieldwork is not yet complete.

Some points have to be checked out.

Part 2 has been started. but nothing written up to date

5/10/82.

CONTENTS

COLLIE COAL MINING REHABILITATION REPORT OCTOBER 1982

THE REASON FOR THIS REPORT

At a meeting of senior officers, convened by the Co-ordinator of Development on 8/6/82, it was agreed that the Forests Department, in liaison with the Collie Coal Mining Rehabilitation Committee would prepare a Statement of the present status of and priorities for rehabilitation of all areas affected by coal mining to date.

FORMAT OF THIS REPORT

This report is in two parts:-

Part 1.

The present status of areas affected by coal mining.

Part 2

Priorities for rehabilitation of areas affected by coal mining.

Part 1

The Present Status of areas Affected by Coal Mining as at October 1982

(1) Geology of the Collie and Wilga Basins
(Based on Reference No. 1 J.H. Lord, 1975)

1.1. The Collie Basin is situated about 160km S.S.E. of Perth and 55km east of Bunbury.
See Figure 1.
It covers about 22,800ha of a depressed area on the Darling peneplain. The elevation of the basin ranges from 180m to about 230m above sea level. The boundary of the basin is not obvious on the surface and the area consists of ridges, some covered by laterite, sandy slopes and swampy valleys.

The Wilga Basin is centred about 30km S.S.E. of Collie and has not been mined to date.

1.2. The Collie and Wilga Basins are depressions in the precambrian of the Yilgarn Block, which were filled with permian sediments and coal measures. After erosion the permian sequence was covered by late miocene deposits. The coal measures are known to outcrop only along the Collie River.

The Collie Basin has been divided into three sub-basins: Cardiff, Shotts and Muja, see Figure 1.

1.3. The Collie Basin contains three sedimentary formations. See Figure 2.. At the base is the Stockton Formation, overlain perhaps conformably by the Collie Coal Measures. Both are of Permian age and are overlain uncomformably by the Nakina Formation which are probably of late Teriary age.

(i) The Stockton Formation
This formation lies on the Precambrian floor of the basin. It consists of basal tillite overlain by deposits of sandstone, siltstone, claystone and shale with minor bands of grit and conglomerate.

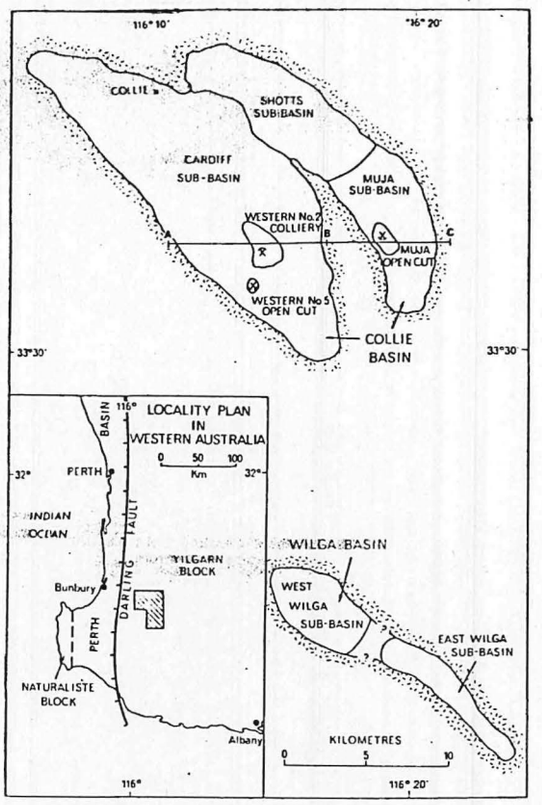


FIG. 1—Locality map, Collie and Wilga Basins.

From Reference 1: J.H. Lord (1975)

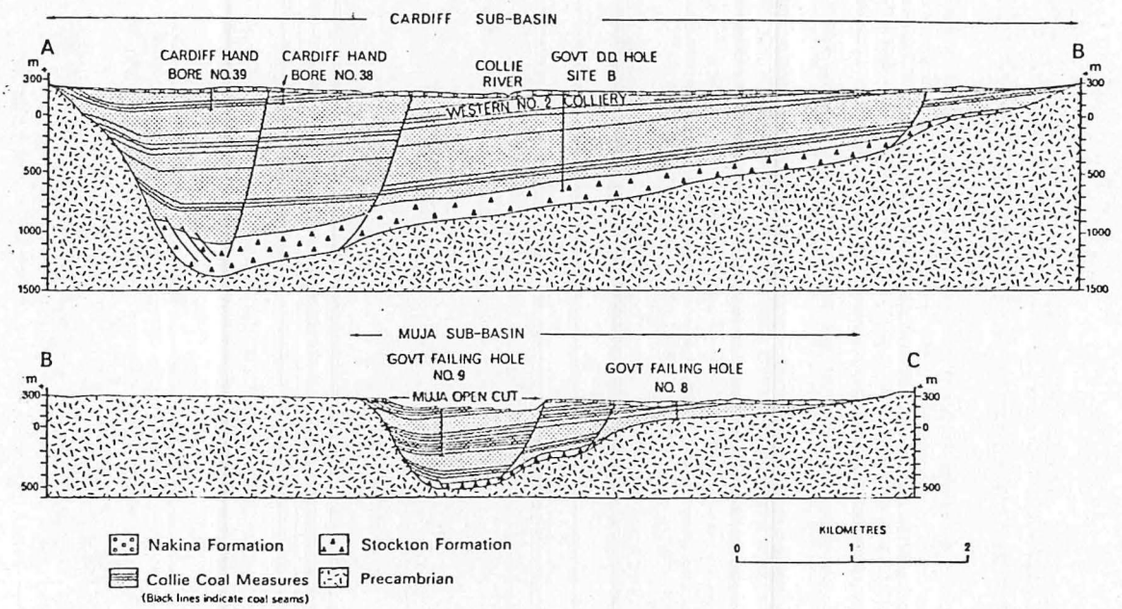


FIG. 2—Typical cross sections, Collie Basin.

From Reference 1: J.H. Lord (1975)

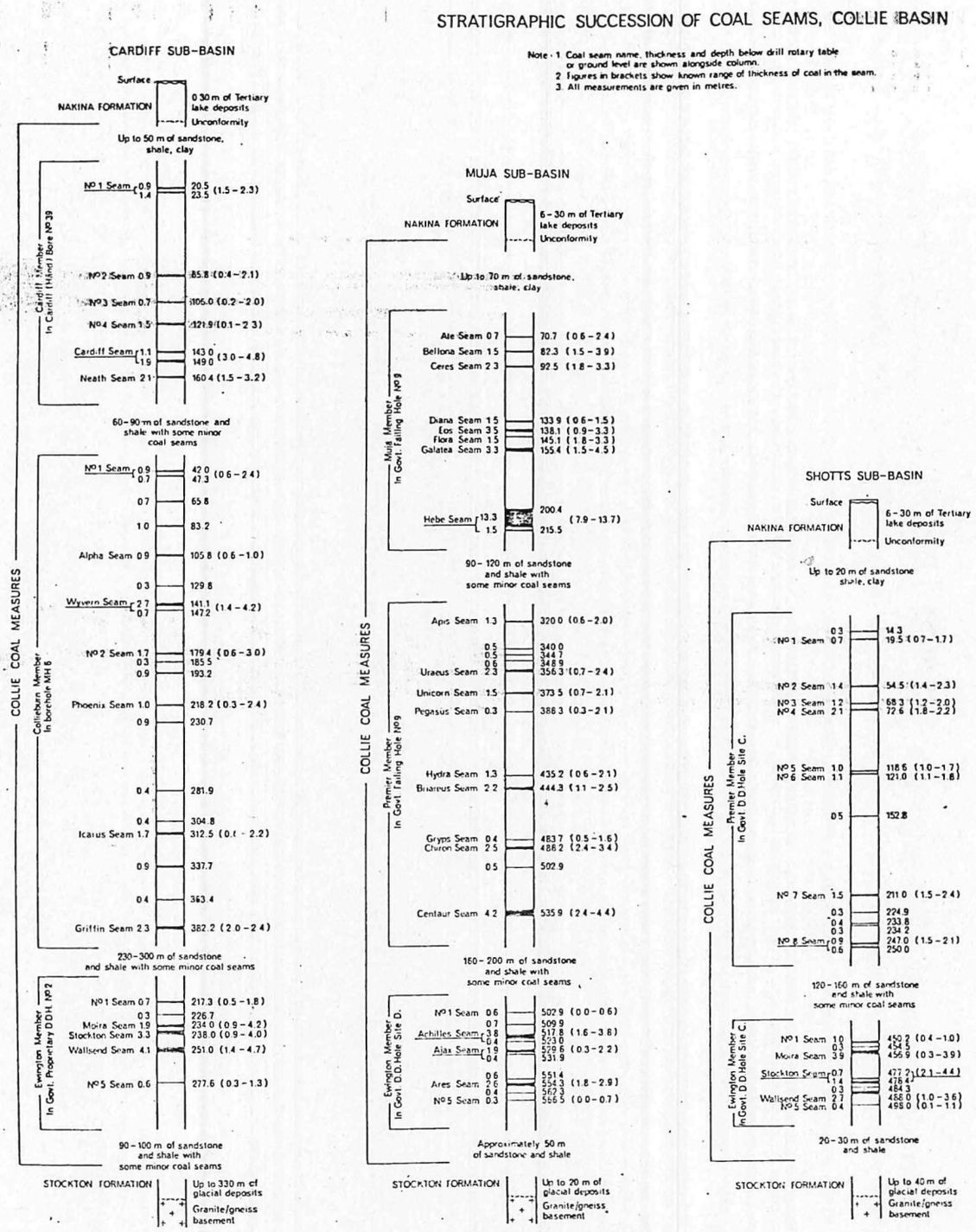


FIG. 3—Stratigraphic succession of coal seams, Collie Basin.

From Reference 1: J.H. Lord (1975)

(ii) The Collie Coal Measures

These consist of sandstone, siltstone and occasional grit or conglomerate with interspersed coal seams of varying thickness. The sediments are generally soft and clayey.
The coal seams of significant thickness tend to occur in certain sections of the stratigraphic column which are defined as members. See Figure 3.
The Ewington Member is the lowest group of coal seams and occurs in all sub-basins.
The Collieburn Member occurs in the Cardiff Sub-basin.
The Premier Member occurs only in the Shotts and Muja Sub-basins.
The Cardiff Member occurs as the top group of coal seams in the Cardiff Sub-basin.
The Muja Member occurs only in the Muja Sub-basin.

(iii) The Nakina Formation

Previously called the "Lake Beds". It rests uncomfortably on the Collie Coal Measures and consists of conglomerate, sandstone and clay. The thickness of the formation varies from 4m to 35m. On the ridges this unit is usually capped by laterite.

(2) History of Mining in the Collie Coal Basin
(Based on Reference No. 2: J.K.N. Lloyd, 1981)

2.1. To date, Collie is the only commercial coal field in Western Australia. Coal was first found in the Collie River near Allanson in 1883, but production did not commence until the railway reached Collie in 1898.

Since 1898, when the first mine opened, the west Collie at Allanson, to the end of 1981, a total of about 64.2 million tonnes of coal has been mined from twenty three underground collieries and eleven open cuts. See Figure 4 for a list of these mines and coal production from each.

2.2. Underground Mining

The bord and pillar system of underground mining has been applied to removing coal from relatively thick seams (2.3m or more) to a maximum depth below the surface of about 320m, which was in the Co-operative New Mine. Most mines have operated at considerably shallower depths.

Typically, underground mining at Collie removes only a small proportion of the coal from the seam or seams mined. Most mines have operated on only one or two seams. Usually about 35% to 40% of the seam is mined with the remainder left in pillars or blocks; in the top of the seam to support the roof and usually on the bottom of the seam also to support traffic.

See Figure 5 for a list of seams worked, depths and % removed in each mine.

2.3. Open Cut Mining

All mining was from underground until 1943, when the first opencut commenced, at Stockton. Currently about 75% of the total annual output of coal from the Collie Coal Fields is produced from open cut mines. The early open cuts operated at relatively shallow depths, typically under 30m from the surface. Future open cut mining may go much deeper.

Figure 4

Collie Mines: Dates of opening and closure and coal production to the end of 1981
(Source R.S. Ferguson, Senior Inspector of Mines, Collie)

UNDERGROUND MINES

MINE	OPENED	TONNES	CLOSED	VALUE $A
West Collie	1898	2 947	1898	2 900
Wallsend	1898	1 043 677	1912	1 033 398
Moira	1900	19 727	1901	19 636
Co-operative (Old)	1902	836 439	1917	824 402
Cardiff-Neath	1903	4 731 235	1960	12 099 764
CollieBurn	1903	513 109	1920	397 806
Westralian (Old)	1909	1 614 811	1932	2 450 738
Premier	1911	475 597	1927	694 310
Proprietary	1911	5 607 597	1955	9 948 264
Co-operative (New)	1918	4 702 739	1960	13 682 822
Griffin	1926	1 814 506	1955	3 936 219
Stockton	1927	2 750 806	1960	7 198 221
Wyvern	1943	772 000	1959	3 551 333
Phoenix	1948	180 497	1957	1 174 396
Centaur	1951	173 696	1957	1 150 309
Western No. 1	1952	341 173	1958	2 242 397
Western No. 2	1952	10 047 614	-	112 608 796
Black Diamond	1953	70 264	1956	455 576
Westralia (New)	1953	85 839	1956	562 042
Ewington	1953	498 590	1960	2 726 891
Hebe	1954	1 209 822	1965	6 230 411
Western No. 4	1958	742 190	1969	4 171 396
Western No. 6	1976	*	-	*
		38 234 875		187 162 027

* = Included with Western 2.

Stockton	1943	1 549 910	1957	6 141 461
Wallsend	1946	119 626	1948	279 292
Black Diamond	1948	344 530	1953	1 395 959
Collie burn	1950	189 832	1953	804 924
Ewington No. 1	1952	683 121	1959	4 433 420
Muja	1953	16 860 257	-	159 291 493
Western No. 3	1954	258 353	1958	1 685 927
Ewington No. 2	1960	27 174	1960	144 287
Western No. 5	1970	5 976 364	-	59 071 883
Chicken Creek	1981	7 690	-	169 183
		26 016 857		233 417 829
		64 251 732		420 579 856

Figure 5

Collie Mines: Seams worked, Depths and % of seams extracted.

(Source: R.S. Ferguson, Senior Inspector Mines, Collie)

UNDERGROUND MINES

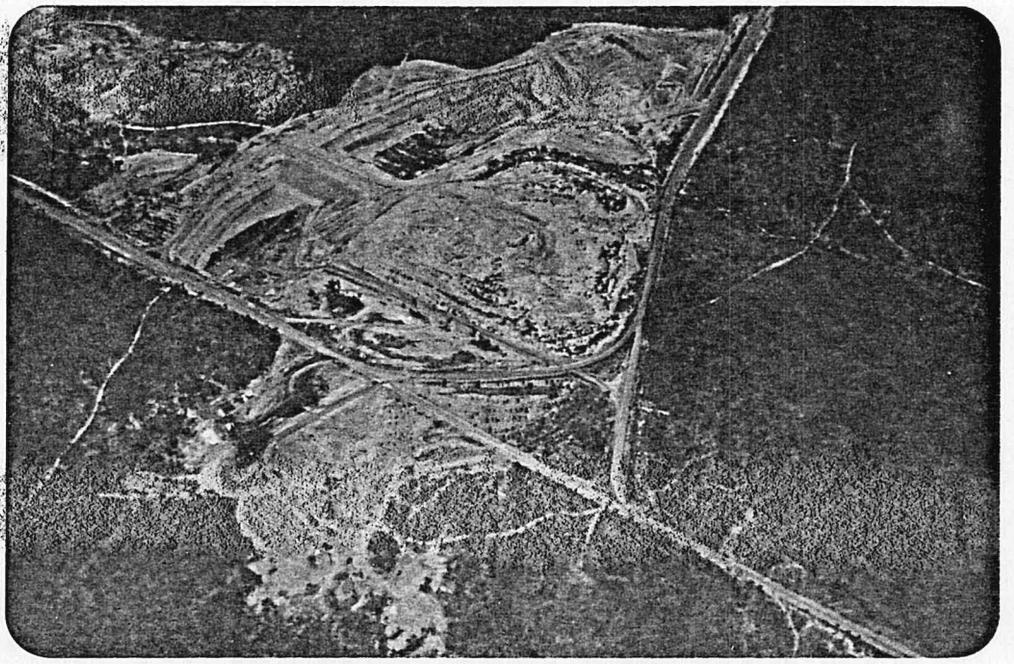
MINE	SEAMS	MEMBER	DEPTHS	% EXTRACTION
West Collie	No. 1	Ewington	10m - 50m	37%
Wallsend	Wallsend	Ewington	8.5m - 50m	42%
Moira	Moira	Ewington	10m - 40m	22%
Co-operative (Old)	Wallsend	Ewington	8m - 50m	55%
Cardiff-Neath	Cardiff,Neath	Cardiff	10m - 110m	Cardiff 35%-Neath 15%
Collieburn	No. 2	Collieburn	10m - 60m	44%
Westralian (Old)	Wallsend	Ewington	15m - 131m	34%
Premier	No. 4	Premier	15m - 152m	41%
Proprietary	Wallsend	Ewington	24m - 152m	30%
Co-operative (New)	Wallsend	Ewington	10m - 320m	28%
Griffin	Icarus	Collieburn	24m - 244m	50%
Stockton	Stockton, Wallsend	Ewington	12m - 110m	30%
Wyvern	No. 2	Collieburn	15m - 101m	32%
Phoenix	Phoenix	Collieburn	15m - 213m	37%
Centaur	Centaur	Premier	7m - 58m	37%
Western No. 1	No. 4, No. 2	Premier	10m - 33m	22%
Western No. 2	Wyvern	Collieburn	15m - 153m	40%
Black Diamond	No. 1	Ewington	10m - 38m	37%
Westralia (New)	Wallsend	Ewington	10m - 110m	33%
Ewington	Stockton, Wallsend	Ewington	10m - 81m	26%
Hebe	Hebe	Muja	15m - 198m	18%
Western No. 4	Moira,Stockton, Wallsend	Ewington	15m - 143m	47%
Western No. 6	Wyvern	Collieburn	15m - 120m	20%

OPEN CUTS

Stockton	Stockton	Ewington	12m - 20m	85%
Wallsend	Wallsend	Ewington	8.5m - 15m	85%
Black Diamond	No. 1	Ewington	10m - 20m	85%
Collieburn	No. 2	Collieburn	10m - 20m	85%
Ewington No. 1	Stockton, Wallsend	Ewington	10m - 20m	90%
Muja (Inc. Centaur)	Hebe etc.*	Muja	15m - 110m	95%
Western No. 3	Moira, Stockton, Wallsend	Ewington	10m - 20m	90%
Ewington No. 2	Stockton,Wallsend	Ewington	10m - 15m	90%
Western No. 5	Cardiff, Neath, Wyvern	Cardiff, Collieburn	10m - 50m	95%
Chicken Creek	Centaur	Premier	10m - 20m	95%

* Muja operates on Ioana, Hebe, Galatea, Flora, Eos, Diana, Ceres, Ballona, Ate. Centaur open cut adjoining Muja operated on Centaur seam.

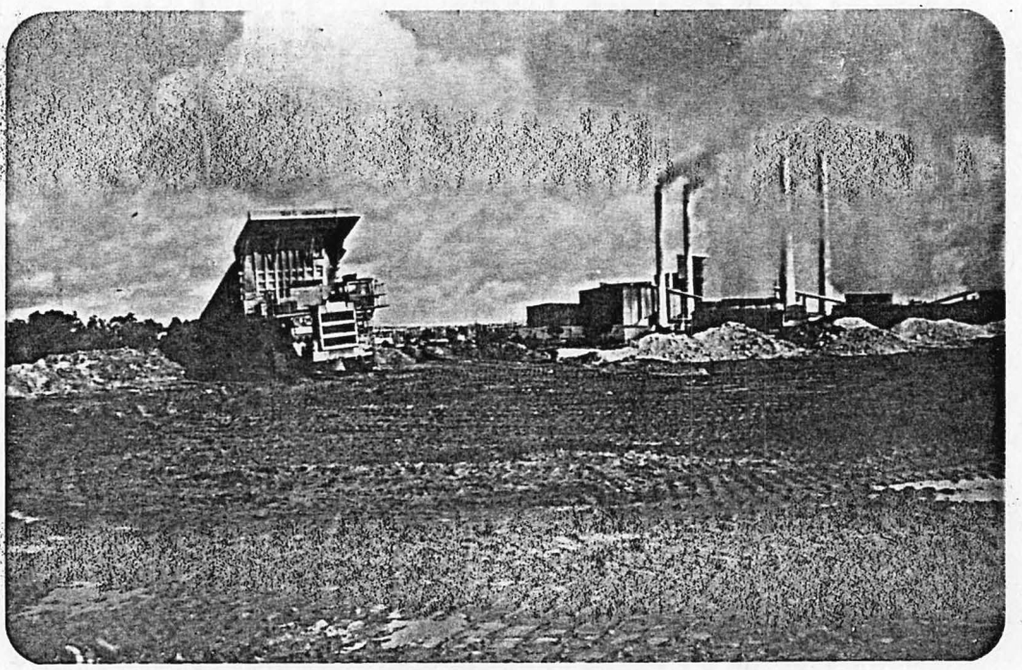
Current Coal Mining



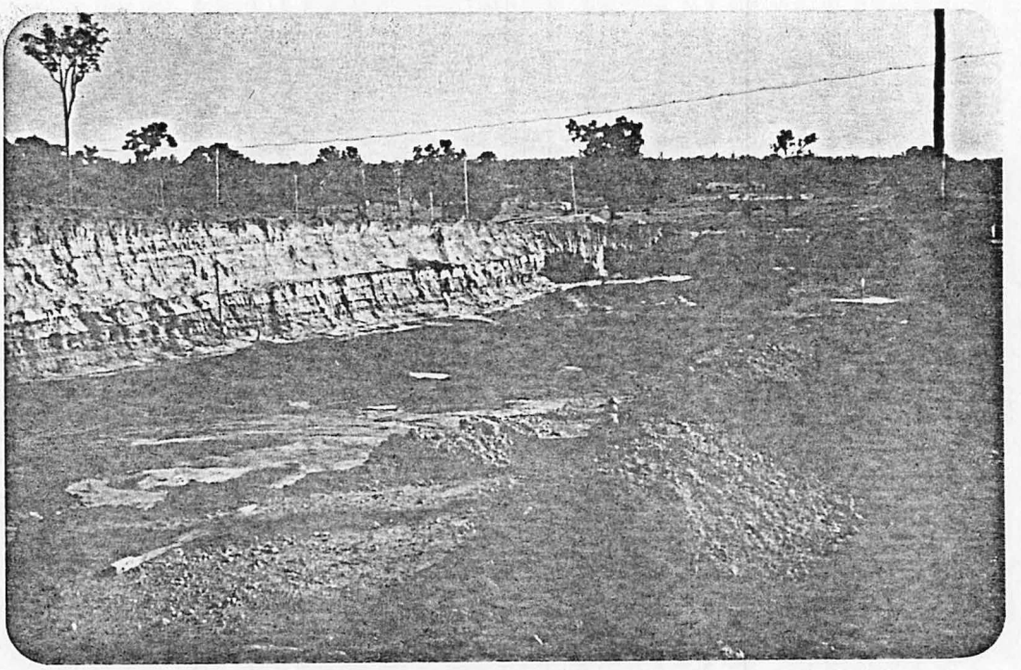
Western 5 open cut of Wyvern seam in top part of photograph with two Western 6 portals (=tunnel entrances) in the open cut. Some planting of eucalypts and scrub species P.75, P77, P80 on dumps and cleared areas.
Western 6 coal conveyer from the underground mine visible at bottom left.
Photography by I. Jacobs 3/8/1982.

Western 2 underground mine headquarters showing coal conveyers from the mine to hoppers at rail head and coal heaps.

Current Coal Mining



Muja Open Cut dump with Muja Power Station in background. Twenty Wabco 120C Haulpak 109 tonne trucks and eight Terrex 33-11B 85 tonne dump trucks are used for hauling overburden. Truck built dumps have 37 degree (approx) outslopes.



Chicken Creek Open Cut opened 1981. About 7690 tonnes of coal removed from this pit.
Mining has recently recommenced at this mine.

Muja open cut currently is at a depth of over 100m with plans to go to about 200m below the surface.

2.4. Current Coal Mining

Five mines are currently producing coal.

Three are operated by Western Collieries Limited:

Western 2 An underground Colliery working on the Wyvern Seam since 1952.

Western 6 An underground colliery, previously considered to be part of Western 2, was designated as a separate colliery on 24/5/82. Also working on the Wyvern seam. Commenced 1976.
Production to 30/6/82 about 428,000 tonnes.

Western 5 Open cut working on Cardiff and Neath seams. Commenced 1971.

Two mines are operated by Griffin Coal Mining Company Limited.

Muja Open Cut working on nine seams including the 12m thick Hebe Seam since 1953.

Chicken Creek Open Cut working on the Centaur seam. Commenced 1981.

Current production is about 3 million tonnes of coal per annum.

(3) Affects of Coal Mining on the Environment

The direct affects of coal mining in the Collie Coal Fields include the following:-

(i) Clearing for buildings including housing, mine installations, railways and roads at Mine H.Q. and adjoining areas cleared or seriously disturbed as a result of mining activity.

(ii) Overburden or waste dumps. Not usually very extensive for deep mines. Adjoining areas if vegetation killed or seriously disturbed as a result of mining activity eg. toxic waste washed from dumps.

(iii) Waste coal, inpurities with the coal or overburden dumped thinly in the forest. Mainly from deep mines.

(iv) Water areas, mainly in open cuts but some as a result of deep mining eg. Mine entrance, dams.

(v) Open cut areas not filled with water.

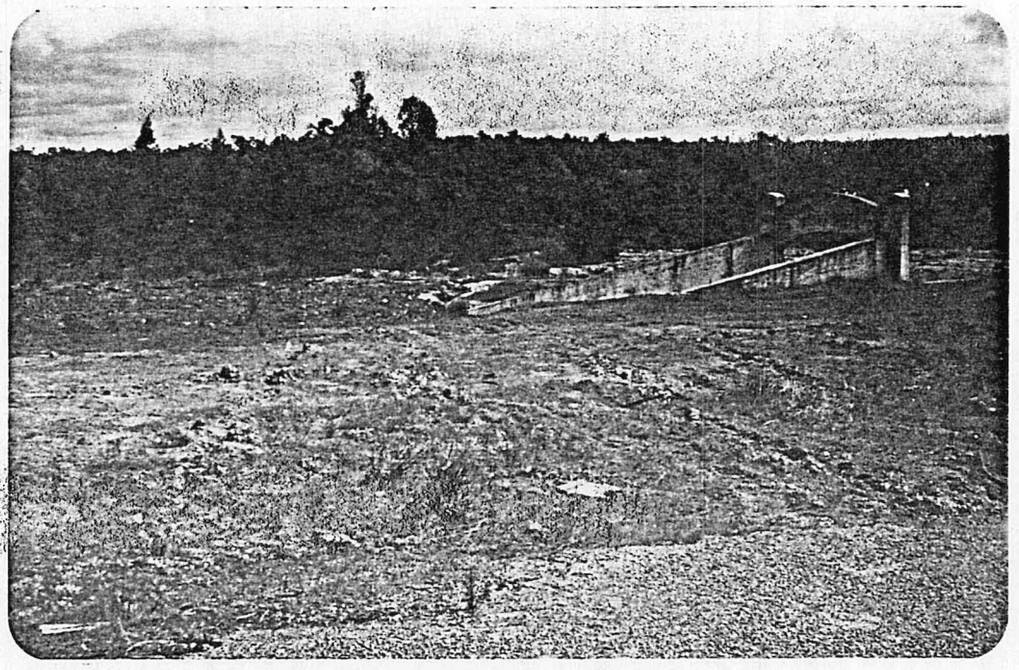
(vi) Collapses and subsidence areas. Only found in association with deep mines.

(vii) Gravel pits or sand pits etc. used during mining operations.

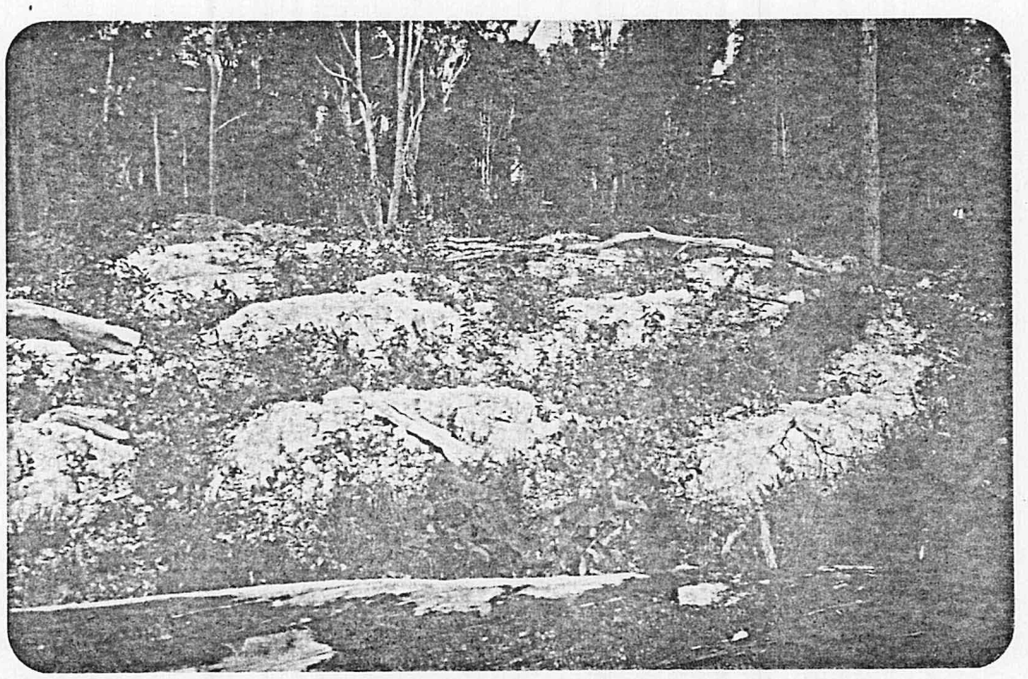
(viii) Changes to underground or surface water quantity or quality as a result of mining.

The indirect affects of coal mining would include the following:

(a) Coal railways and roads outside the immediate vicinity of the mine.
(b) S.E.C. installations eg. power stations, power lines, pipelines, coal crushing plants, bores, pumping stations etc.

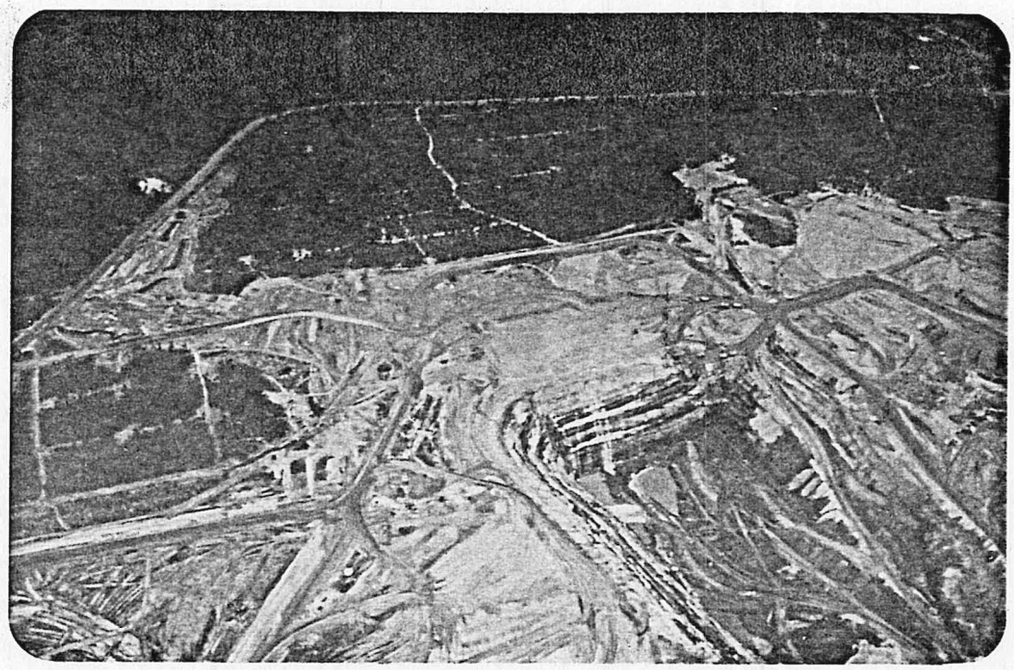


Stockton underground mine portal = tunnel entrance in cleared area at mine H.Q.
In background is eucalypt planting P76? and regeneration since mine closed in 1957. In foreground eucalypts planted P82 in ripped lines.

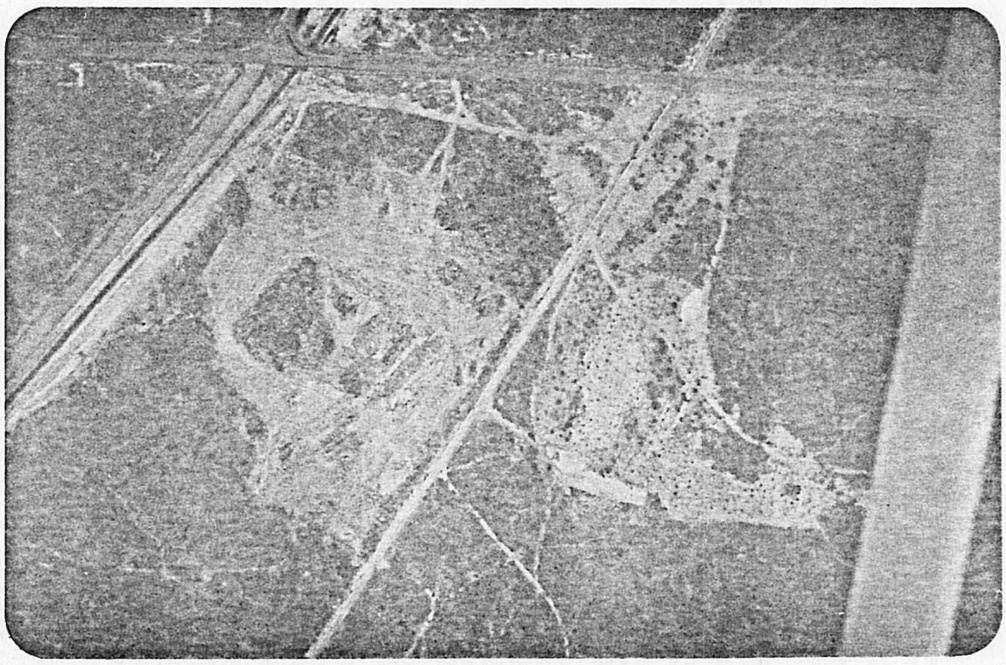


Western 1 overburden, waste coal etc. dumped thinly in the forest.
In foreground is regeneration since mine closed in 1958. Very slow growth in this acidic? waste.

Affects of coal mining on the environment



Muja open cut showing the mine with some areas of water, overburden dumps and roads.
Photo taken by I. Jacobs 3/8/1982. In the background is the road to Chicken Creek.



Gravel pits between Western 2 and Western 5. Planted by Western Collieries P75 with eucalypts. Photo taken by I. Jacobs 3/8/82.

(c) Dieback or other diseases spread by mining operations in the forest or farmlands.

(4) Rehabilitation Work To Date

Since 1898, twenty three underground collieries have produced coal from the Collie Coalfield. However, there has been virtually no rehabilitation of abandoned colliery sites by coal mining companies.

Since 1943, eleven open cuts have operated.
Up until 1975 there had been virtually no rehabilitation of open cut mines by coal mining companies. At Western 5, over 100ha. of dump sides, tops and gravel pits have been treated in various ways by topsoiling, scarifying and seeding and planting with native species, with varying success.

Since about 1966 the Forests Department has done some planting of trees on abandoned minesites.

Since about 1961 the Mines Department has done remedial works, mainly to remove safety hazards at abandoned underground collieries. This work has cost over $70,000 to March 1982 and included warning signs (collapses and hot ashes), fencing off areas, burying carbonaceous material, sealing off mine entrances and filling in collapses. The great majority of this work has occurred since 1974 and usually the Forests Department has planted trees on the treated areas.

For a summary of the remedial and rehabilitation work known to have been carried out to date see Figure 6.

(5) Present Rehabilitation Status of each Mine

An assessment has been made of the area affected by mining operations at all of the thirty three underground and eleven open cut mines operated since 1898 including the five currently operating mines.

At each mine the area apparently originally affected has been assessed as has the amount of natural regeneration and remedial/rehabilitation.

These assessments, which were done in July to September 1982, have been recorded on the 1:5,000 scale 2 metre contoured orthophotomaps produced by the Lands Department in about 1979. Some recent information has been transferred on to the 1979 orthophotomaps from 1982 aerial photography. See Figure 7 for an example of this assessment.

Field work was done by Senior Divisional Forests Officer G. Heberle. These results are preliminary only and much more work would be required to locate all areas affected by mining.
About half a day was spent at each mine. Probably nearly all of the obvious affects of mining have been located but more work would be required to locate affects not readily visible on the 1979 orthophotomaps such as areas originally affected and collapses subsidence areas and thinly dumped overburden and waste.

Assessment results for each mine follow.

Known remedial and rehabilitation work at Coal Mines

1. West Collie NIL

2. Westralia New NIL

3 & 4 Black Diamond Underground & Open Cut

1969 Signs "Danger Hot Ashes" Mines Dept.
1974 D6 dozer work $1000 Mines Dept. about 2 ha
1979 D7 dozer work $1485 Mines Dept. about 2 ha
1966 Eucalypt planting Forests Dept. about 0.5ha
1966? Pine planting Forests Dept. about 0.5ha
1975? Eucalypt planting Forests Dept. about 2.5ha

5. Moira

1978 D7 dozer work $1445 Mines Dept. about 1 ha

6 & 7 Co-operative Old & New

1967 Signs "Danger collapsed ground" Mines Dept.
1974-75 Cat 824 work $3616 Mines Dept. about 1 ha
1977-79 Erection of fence $4417 Mines Dept.
1981 D7 dozer and scraper work $8152 Mines Dept. about 1.5ha
1982 D7 dozer and scraper work $8378 Mines Dept. about 1.5ha
1980? Eucalypt planting Forests Dept. about 1 ha
1982 Eucalypt planting Forests Dept. about 2 ha

8. Westralia Old

1973 Signs "Danger collapsed ground" Mines Dept.
1978 D7 dozer and scraper work $12791 Mines Dept. about 1.5ha
1979 D7 dozer & Scraper work $2871 Mines Dept. about 0.3ha
1980 D7 dozer and scraper work $7046 Mines Dept. about 0.8ha
1980? Eucalypt planting Forests Dept. about 2.5ha

9 & 10 Wallsend

1961 Erection of fence $200 Mines Dept.
1977-80 Area filled by shire about 2.6ha
1977 D7 dozer & scraper work $2540 Mines Dept. about 1 ha

11. Proprietary

1966 Old shafts filled in $161 Mines Dept.
1977 D7 dozer work $4824 Mines Dept. about 1.3ha
1977 Eucalypt planting Forests Dept. about 1.3ha

12 & 13 Stockton

1976 D85 dozer & scraper work $7998 Mines Dept. about 3 ha
1976, 1977, 1978 Eucalypt planting Forests Dept. about 7 ha
1982 Eucalypt planting Forests Dept. about 1.6ha

14,15,16 Griffin, Wyvern & Phoenix

1974 Signs "Danger Hot Ashes" Mines Dept.
1978 D7 dozer work $3262 Mines Dept. about 2 ha
1978? Eucalypt planting Forests Dept. about 2.5ha

17 & 18 Collieburn

1976 D6 dozer work $2000 Mines Dept. about 1.5ha
1966 Eucalypt planting Forests Dept. about 0.6ha
1971 Eucalypt planting Forests Dept. about 0.5ha
1973 Eucalypt planting Forests Dept. about 3.5ha
1973? Pine planting Forests Dept.? about 0.3ha

Figure 6 continued

19 & 20 Western 3 & 4

1966? Eucalypt planting Forests Dept. about 7.2ha
1976 Eucalypt planting Forests Dept. about 0.4ha

21. Boulder Tunnel NIL

22. Cardiff-Neath

1966 Signs "Danger Hot Ashes" Mines Dept.
1971 Eucalypt planting Forests Dept. about 0.3ha
1977 Large collapse filled in by Western Collieries 1.5ha
1978 Eucalypt planting Forests Dept. 1.5ha

23. Western 2

1975 Gravel pits prepared and planted by Western Collieries about 5.5ha
1977 Gravel pits prepared and planted by Western Collieries about 5ha
1982 Preparation and planting Western Collieries about 0.8ha

24 & 25 Western 5 & 6

1975-82 Dumps and gravel pits prepared and planted Western Collieries about 89ha

26,27,28 Ewington

1977 Eucalypt and pine planting by Griffin about 10.9ha

29 Premier NIL

30 Western 1 NIL

31 Muja

1971? Eucalypt planting Forests Dept. south of Muja about 1.6ha
1966-71 Eucalypt planting Muja H.Q. by Griffin about 1.1ha

32 & 33 Hebe Centaur

34 Chicken Creek

1981 Dump grassed by Griffin about 3.7ha

TOTALS

Mines Dept. remedial work $72186 about 20.4 ha
Forests Dept. planting about 37.3ha
Western Collieries planting about 100.3ha
Griffin planting about 15.7ha (includes 3.7 ha of grass)
Shire work at Wallsend about 2.6ha.

COLLIE COAL MINING REHABILITATION

REPORT OF OCTOBER 1982

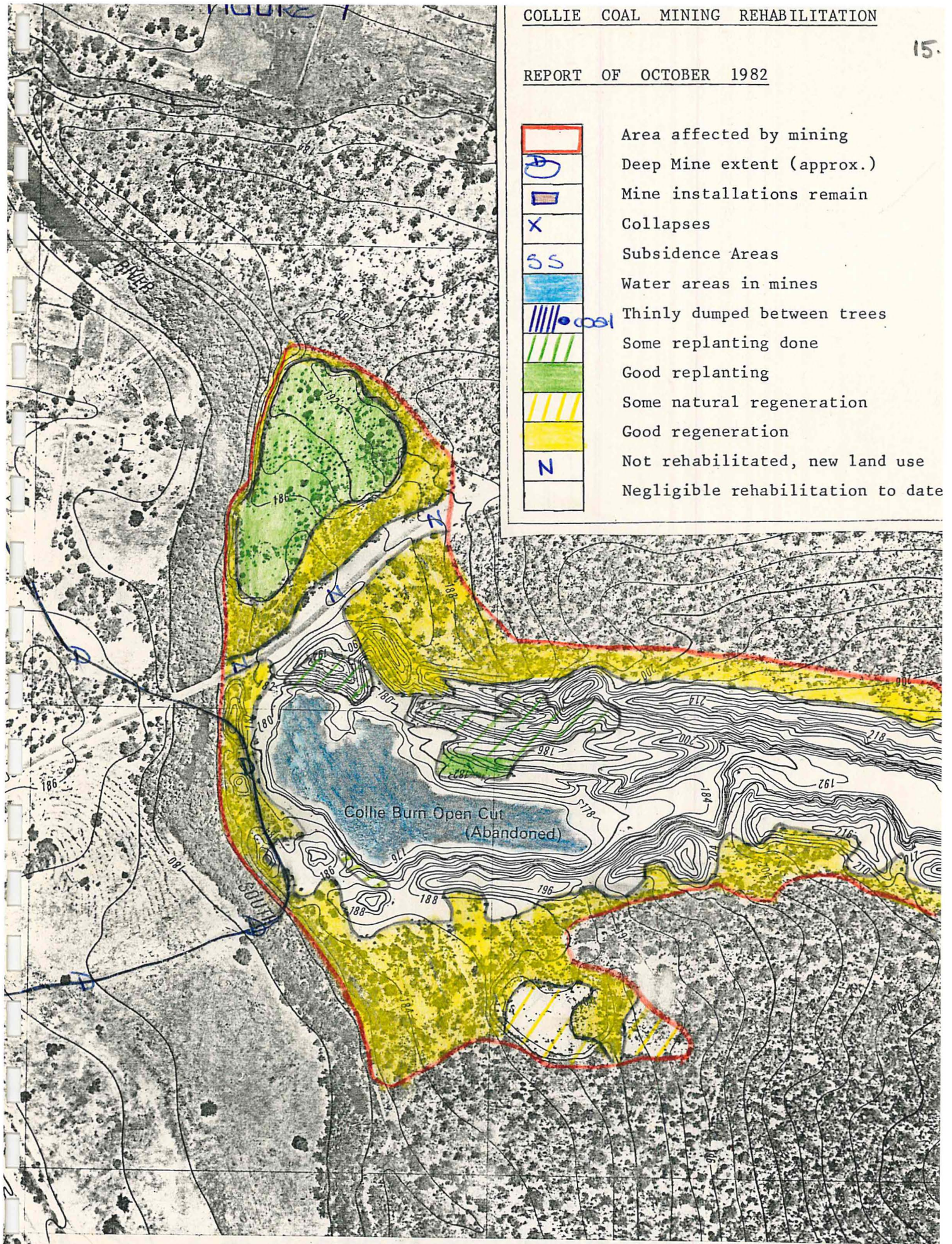


Figure 7

Example of 1:5,000 scale orthophotomap of mined area showing assessment data.

1. West Collie Underground Mine

2. Westralia New Underground Mine

3. Black Diamond Underground Mine

4. Black Diamond Open Cut

These four mines are considered together because they are in the same area with some overlap of affects on the environment, see Map A.

The West Collie mine was the first mine in the coalfield and operated by a syndicate. The other three mines were operated by Amalgamated Collieries at time of closure.

All of these mines are in the Cardiff Sub Basin and located at Allanson or just south-west of Allanson.

Mine Details

	West Collie	Westralia New	Black Diamond Underground	Black Diamond Open Cut
Opened	1898	1953	1953	1948
Closed	1898	1956	1956	1953
Coal Mined	2947t	85839	70264	344530
Seams mined	No. 1	Wallsend	No. 1	No. 1
Member	Ewington	Ewington	Ewington	Ewington
Depth of cover	40m-50m	10m-110m	10m-38m	10m-20m
% extracted	37%	33%	37%	85%

NOTE:
(1) All of the data in this and similar tables for the other mines supplied by R.S. Ferguson, Senior Inspector of Coal Mines, Mines Department, Collie. Some of the data is estimated only.
(2) Coal mined is in tonnes.
(3) Depth of cover is the range of depths of mining from the surface.
(4) Percent extracted is the estimated proportion of the seam removed during mining. The remainder either remains in the mine or was waste coal.

Rehabilitation status of these four mines

Estimated area originally affected	44.8ha
Rehabilitated to some extent	18.3ha
Not rehabilitated	25.9ha (includes 7.8ha of water)
Remainder is covered by a S.E.C. line	0.6ha

Affected area

Mainly adjoining Black Diamond open cut. Predominantly dumps, the open cuts (now filled with water) and forest disturbed by mining.

Regeneration/rehabilitation

Mostly recovery of disturbed forest or regeneration on dumps.
About 4ha? of remedial dozer work by Mines Department 1974-79.
About 3.5ha of eucalypt and pine planting by Forests Department P66-P75.

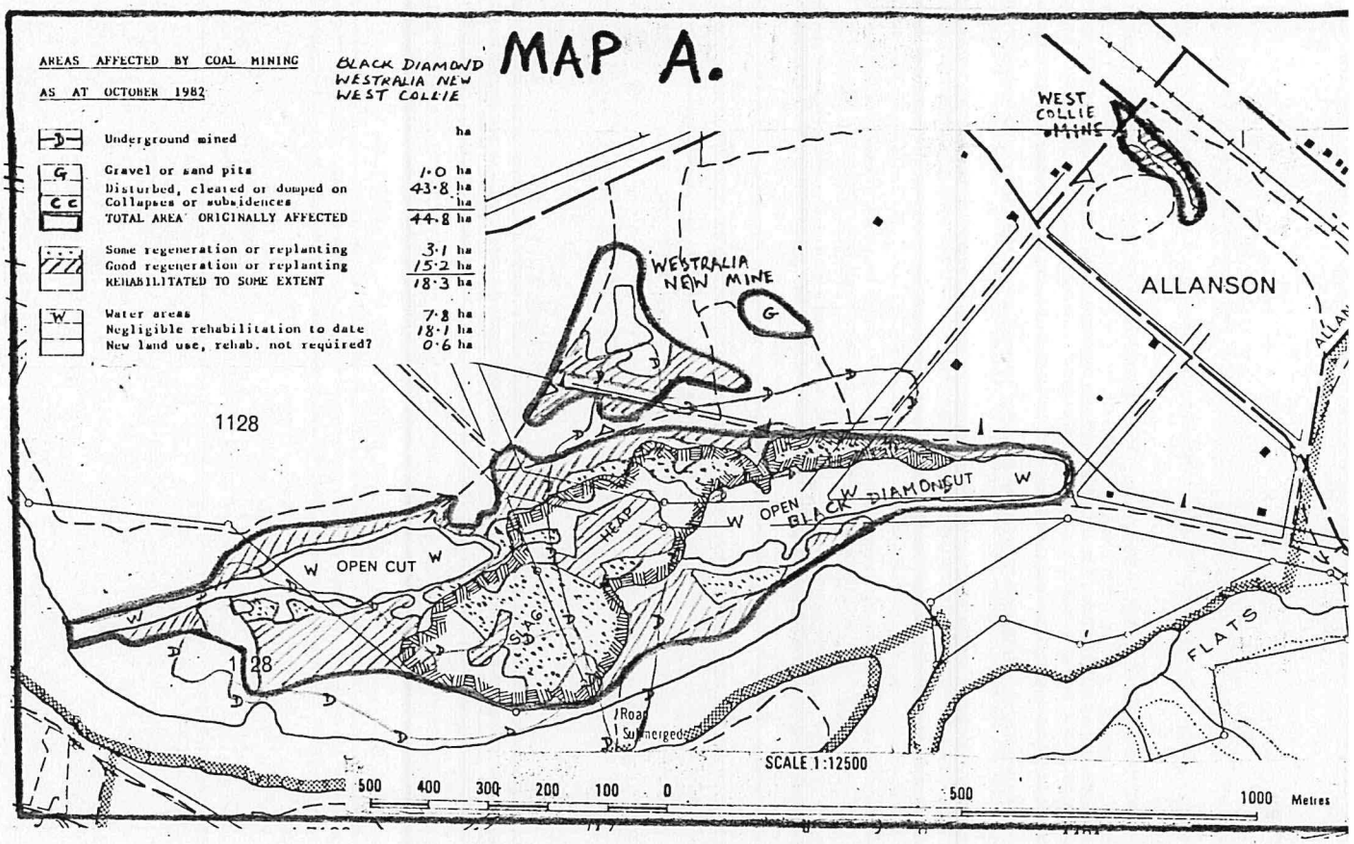
MAP A.

AREAS AFFECTED BY COAL MINING

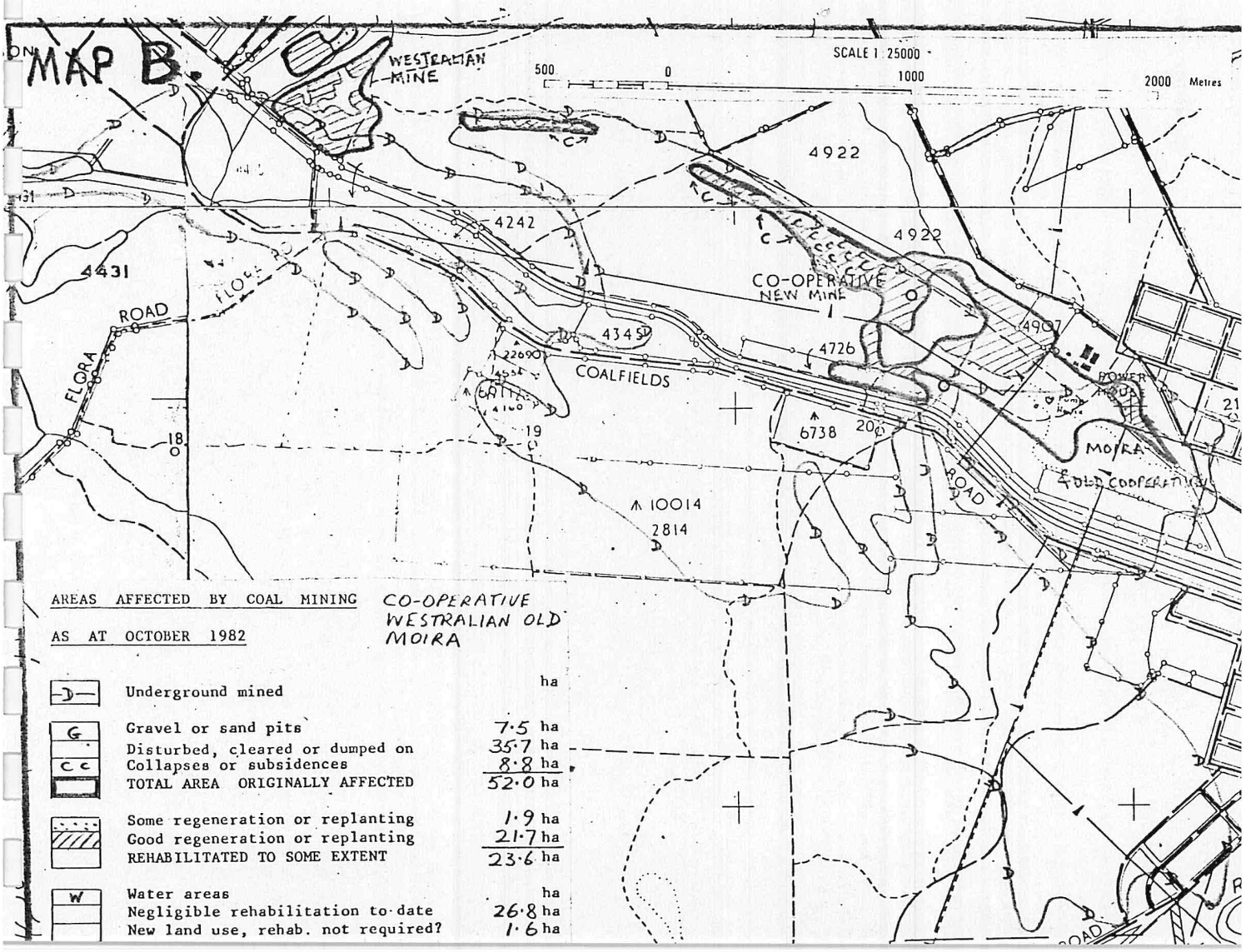
AS AT OCTOBER 1982

BLACK DIAMOND
WESTRALIA NEW
WEST COLLIE

	ha
Underground mined	
Gravel or sand pits	1·0 ha
Disturbed, cleared or dumped on	43·8 ha
Collapses or subsidences	ha
TOTAL AREA ORIGINALLY AFFECTED	44·8 ha
Some regeneration or replanting	3·1 ha
Good regeneration or replanting	15·2 ha
REHABILITATED TO SOME EXTENT	18·3 ha
Water areas	7·8 ha
Negligible rehabilitation to date	18·1 ha
New land use, rehab. not required?	0·6 ha



MAP B.



AREAS AFFECTED BY COAL MINING

AS AT OCTOBER 1982

CO-OPERATIVE
WESTRALIAN OLD
MOIRA

	ha
Underground mined	
Gravel or sand pits	7·5 ha
Disturbed, cleared or dumped on	35·7 ha
Collapses or subsidences	8·8 ha
TOTAL AREA ORIGINALLY AFFECTED	52·0 ha
Some regeneration or replanting	1·9 ha
Good regeneration or replanting	21·7 ha
REHABILITATED TO SOME EXTENT	23·6 ha
Water areas	ha
Negligible rehabilitation to date	26·8 ha
New land use, rehab. not required?	1·6 ha

West Collie, Westralia New, Black Diamond

West Collie underground mine is at top right corner adjoining Allanson oval. New Westralia underground mine and gravel pits etc. is above the S.E.C. line at top centre. Black Diamond open cut is just north of the Collie River. Some planting of pines and eucalypts and some regeneration on dumps.
Photo taken by I. Jacobs 3/8/82.

Black Diamond dumps dozed by Mines Department and planted with eucalypts about P75.
Moderate to poor survival and growth.

5. Moira Underground Mine

6. Co-operative Old Underground Mine

7. Co-operative New Underground Mine

8. Westralian (Old) Underground Mine

These four mines are considered together because they are in the same area with some overlap of affects on the environment, See Map B

Moira Mine was operated by a syndicate. The other three mines were operated by Amalgamated Collieries at time of closure.

All of these mines are in the Cardiff Sub Basin and located between Allanson and Collie.

Mine Details:

	Moira	Co-operative Old	Co-operative New	Westralian Old
Opened	1900	1902	1918	1909
Closed	1901	1917	1960	1932
Coal mined	19727t	836439	4702739	1614811
Seams mined	Moira	Wallsend	Wallsend	Wallsend
Member	Ewington	Ewington	Ewington	Ewington
Depth of cover	10m-40m	8m-50m	10m-320m	15m-131m
% extracted	22%	55%	28%	34%

Rehabilitation status of these four mines:

Estimated area originally affected	52.0ha
Rehabilitated to some extent	23.6ha
Not rehabilitated	26.8ha (no water)
Remainder is covered by a S.E.C. line	1.6ha

Affected area

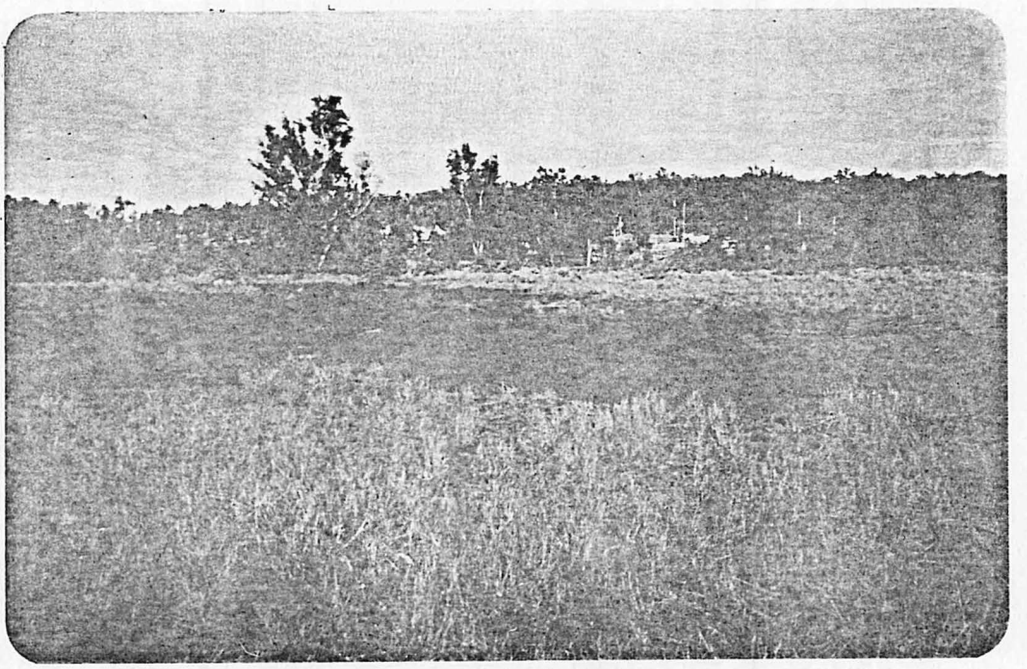
Mainly cleared areas or gravel pits near mine head quarters. Significant areas of collapse/subsidences at Co-operative New Mine.

Regeneration/rehabilitation

Mostly recovery of disturbed forest.
About 7.6ha of remedial dozer work by Mines Department 1974-82.
About 5.5ha of eucalypt planting by Forests Department P80-P82.

Co-operative, Westralian (Old) Underground Mines

Westralian underground mine headquarters area dozed by Mines Department and planted P80? by Forests Department with Eucalyptus globulus. Fair to good survival and growth.



Co-operative (Old) underground mine headquarters cleared area with carbonaceous waste (black) left on ground.

9. Wallsend Underground Mine

10. Wallsend Open Cut

11. Proprietary Underground Mine

These three mines are considered together because they are in the same area with some overlaps of affects on the environment, see Map C.

All three mines were operated by Amalgamated Collieries at time of closure.

All of these mines are in the Cardiff Sub-Basin and located in Collie or just east of Collie.

Mine Details

	Wallsend Underground	Wallsend Open Cut	Proprietary
Opened	1898	1946	1911
Closed	1912	1948	1955
Coal mined	1 043 677 t	119 626 t	5 607 597
Seams mined	Wallsend	Wallsend	Wallsend
Member	Ewington	Ewington	Ewington
Depth of cover	8.5m - 50m	8.5m - 15m	24m - 152m
% of seam extracted	42%	85%	30%

Rehabilitation status of these three mines

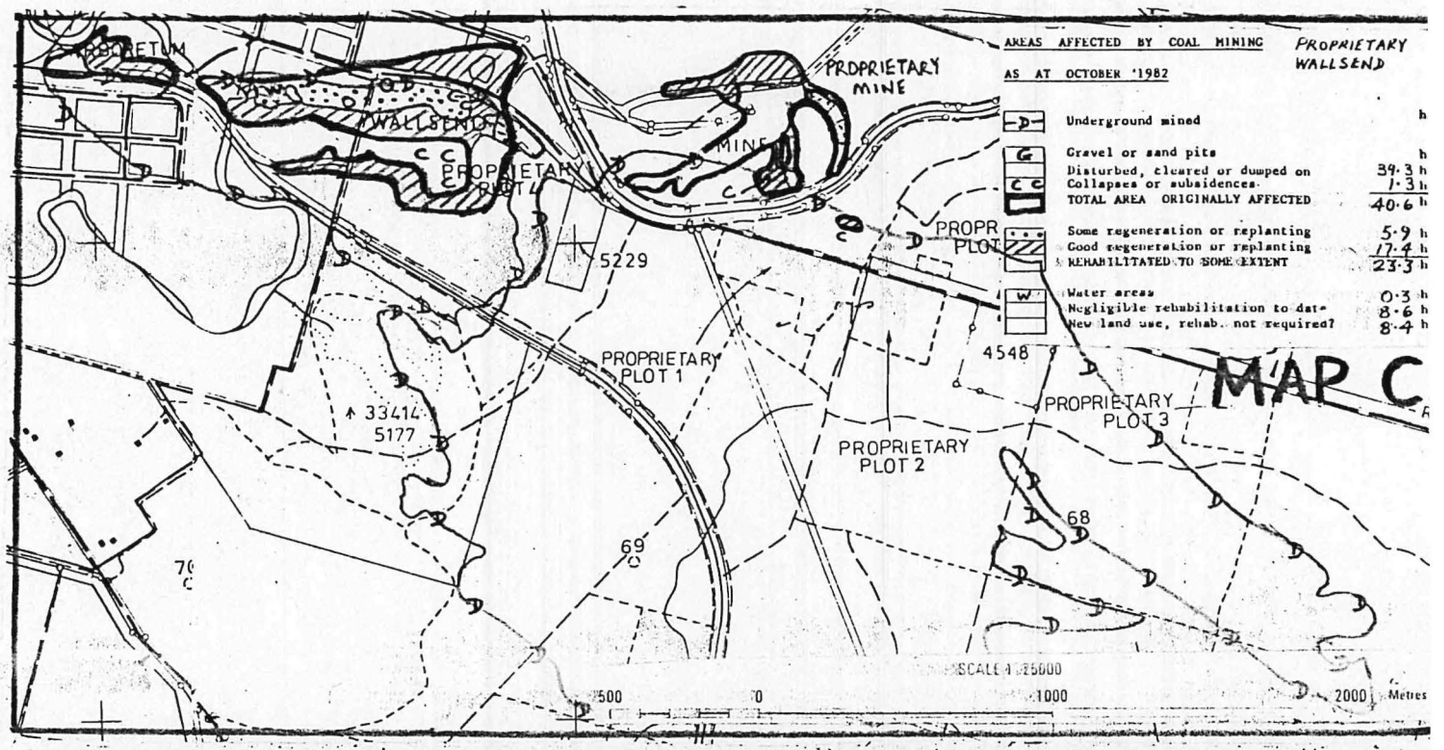
Estimated area originally affected	40.6ha
Rehabilitated to some extent	23.3ha
Not rehabilitated	8.9ha (includes 0.3ha of water)
Remainder is now Bunnings Sawmill	8.4ha

Affected Area

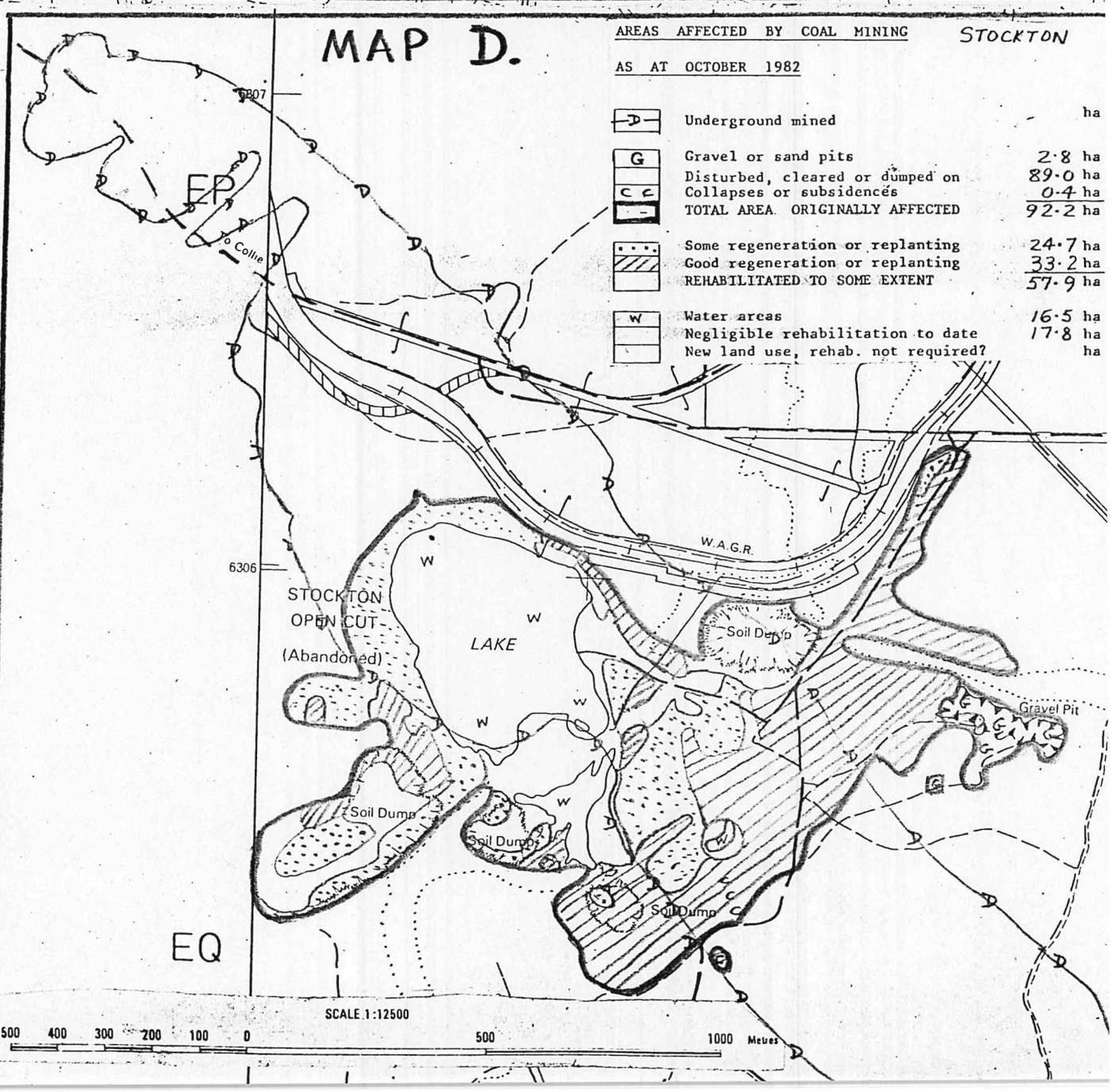
Mainly at Wallsend open cut. Predominantly dumps, disturbed forest and the open cut. Some clearing adjoining deep mine headquarters.
Collapses from Wallsend underground mine.

Regeneration/rehabilitation

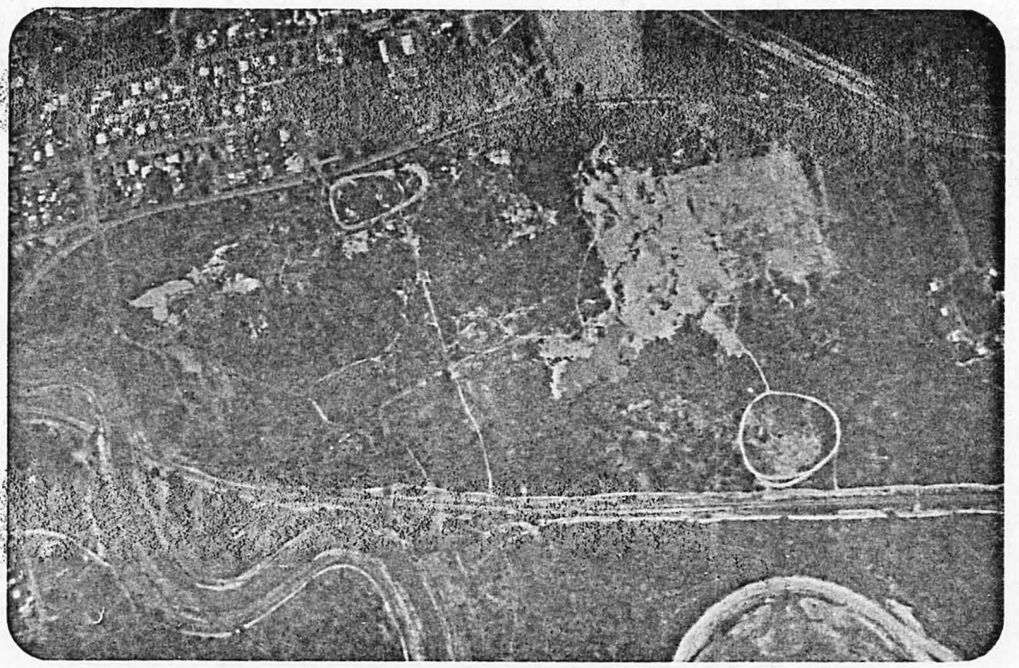
Mostly recovery of disturbed forest.
Significant regeneration in and adjoining open cut.
About 4.9ha of remedial dozer work and filling in by Mines Dept. and Shire.
About 1.3ha of eucalypt planting by Forests Department P77.


AREAS AFFECTED BY COAL MINING
AS AT OCTOBER '1982
PROPRIETARY WALLSEND
Underground mined
Gravel or sand pits
Disturbed, cleared or dumped on 39·3 h
Collapses or subsidences 1·3 h
TOTAL AREA ORIGINALLY AFFECTED 40·6 h
Some regeneration or replanting 5·9 h
Good regeneration or replanting 17·4 h
REHABILITATED TO SOME EXTENT 23·3 h
Water areas 0·3 h
Negligible rehabilitation to date 8·6 h
New land use, rehab. not required? 8·4 h
PROPRIETARY MINE
PROPRIETARY PLOT 4
PROPR PLOT
PROPRIETARY PLOT 1
PROPRIETARY PLOT 2
PROPRIETARY PLOT 3
5229
4548
33414
5177
68
69
SCALE 1:25000
500 0 1000 2000 Metres

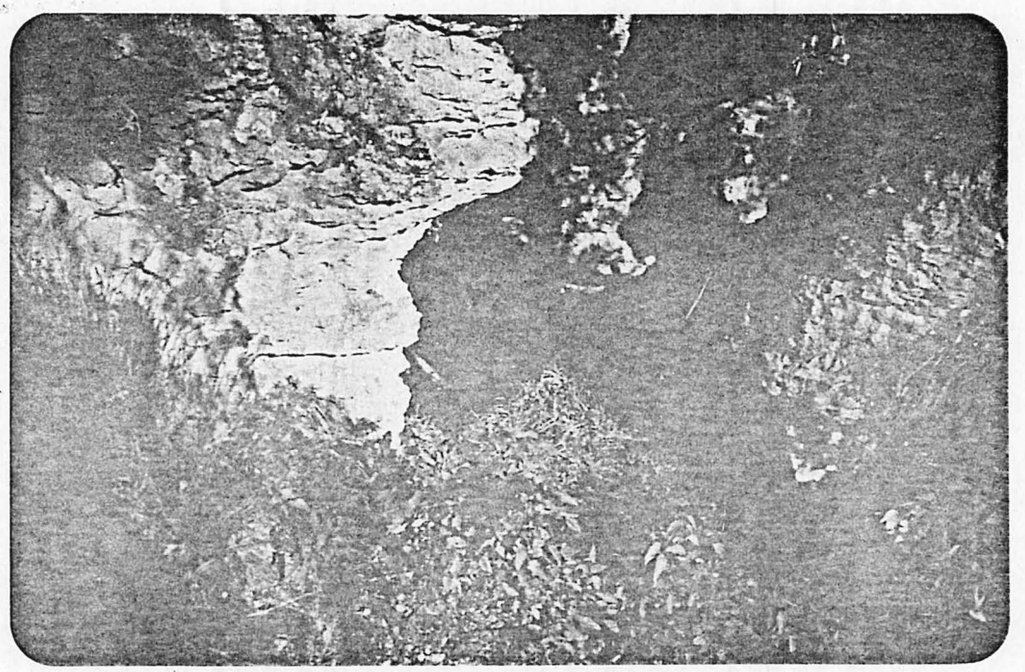
MAP D.


AREAS AFFECTED BY COAL MINING
AS AT OCTOBER 1982
STOCKTON
Underground mined ha
Gravel or sand pits 2·8 ha
Disturbed, cleared or dumped on 89·0 ha
Collapses or subsidences 0·4 ha
TOTAL AREA ORIGINALLY AFFECTED 92·2 ha
Some regeneration or replanting 24·7 ha
Good regeneration or replanting 33·2 ha
REHABILITATED TO SOME EXTENT 57·9 ha
Water areas 16·5 ha
Negligible rehabilitation to date 17·8 ha
New land use, rehab. not required? ha
6307
EP
To Collie
W.A.G.R.
6306
STOCKTON OPEN CUT (Abandoned)
LAKE
Soil Dump
Gravel Pit
Soil Dump
Soil Dumps
Soil Dump
EQ
SCALE 1:12500
500 400 300 200 100 0 500 1000 Metres

Wallsend



Wallsend open cut between Coalfields Road and Collie River. Just north of Railway line to Darkan. Water area in open cut left centre. Moderate to good regeneration in the open cut and adjoining dumps. Most of the white area right centre in Collie rubbish dump. Photographed by I. Jacobs 3/8/82.



Wallsend underground mine tunnel entrance with water in it. Left open because of possibilities as a tourist mine. Located in the eastern part of Collie townsite. Mine closed 1912.

12. Stockton. Underground Mine

13. Stockton Open Cut.

These two mines are considered together because they are in the same area with some overlap of affects on the environment, see Map D.

Both mines were operated by Amalgamated Collieries at time of closure. Stockton was the first open cut in the coalfields.

Both mines are in the Cardiff Sub-Basin and located about 8km east of Collie.

Mine details:

	Stockton Underground	Stockton Open Cut
Opened	1927	1943
Closed	1960	1957
Coal mined	2 750 806 t	1 549 910 t
Seams mined	Stockton, Wallsend	Stockton
Member	Ewington	Ewington
Depth of cover	12m to 100m	12m to 20m
% of seam extracted	30%	85%

Rehabilitation status of these two mines:

Estimated area originally affected	92.2ha
Rehabilitated to some extent	57.9ha
Not rehabilitated	34.3ha (includes 16.5 ha of water)

Affected area

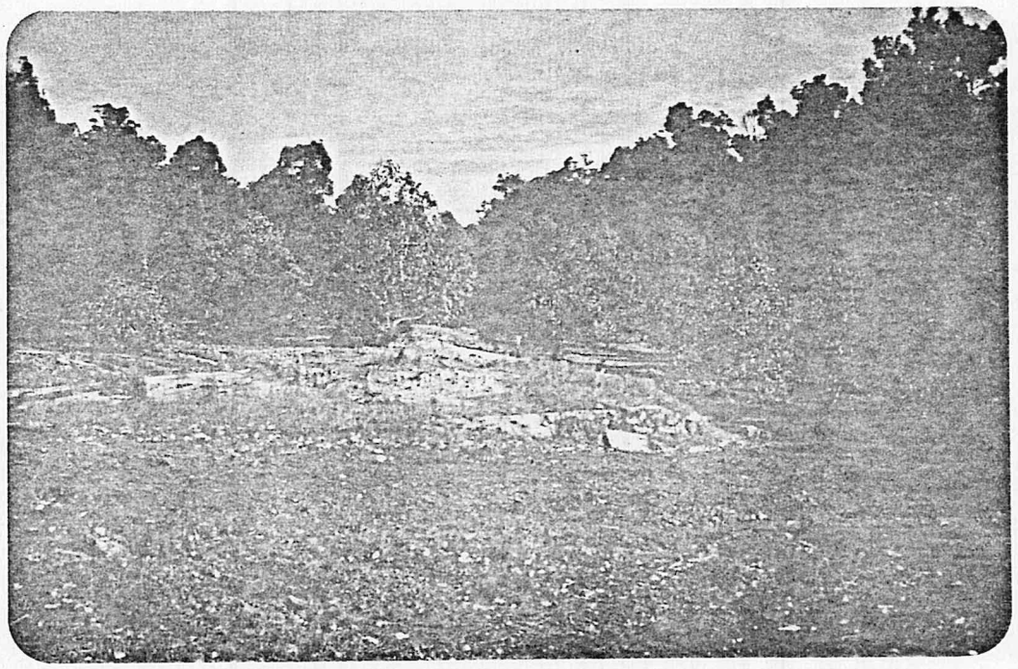
Mainly the open cut area (now filled with water), adjoining forest disturbed by mining and dumps.
Significant areas of thinly dumped overburden in the forest.

Regeneration/rehabilitation

Mostly recovery of disturbed forest. Some regeneration on dumps. About 3ha of remedial dozer work by Mines Department 1976.

About 8.6ha of eucalypt planting by Forests Department P76-P82.

Stockton Some good regeneration of scrub and tree species on overburden dump and sides and disturbed area since mine abandonned in 1957.



Griffin Eucalypts planted 1978? after dozer work by Mines Department at mine headquarters. Some concrete installations in foreground.

14. Griffin Underground Mine

15. Wyvern Underground Mine

16. Phoenix Underground Mine

These three mines are considered together because they are in the same area with some overlap of affects on the environment, see Map E.

All three mines were operated by Griffin Coal Mining Company. They are in the Cardiff Sub-Basin and located 3km south west of Collie, south of the Collie River.

Mine details:

	Griffin	Wyvern	Phoenix
Opened	1926	1943	1948
Closed	1955	1959	1957
Coal mined	1 814 506 t	772 000 t	180 497 t
Seams mined	Icarus*	No. 2*	Phoenix*
Member	Collieburn	Collieburn	Collieburn
Depth of cover	24m - 244m	15m - 101m	15m - 213m
% of seam extracted	50%	32%	37%

* After reference to Mr. W. Hilly of Western Collieries

Rehabilitation status of these three mines:

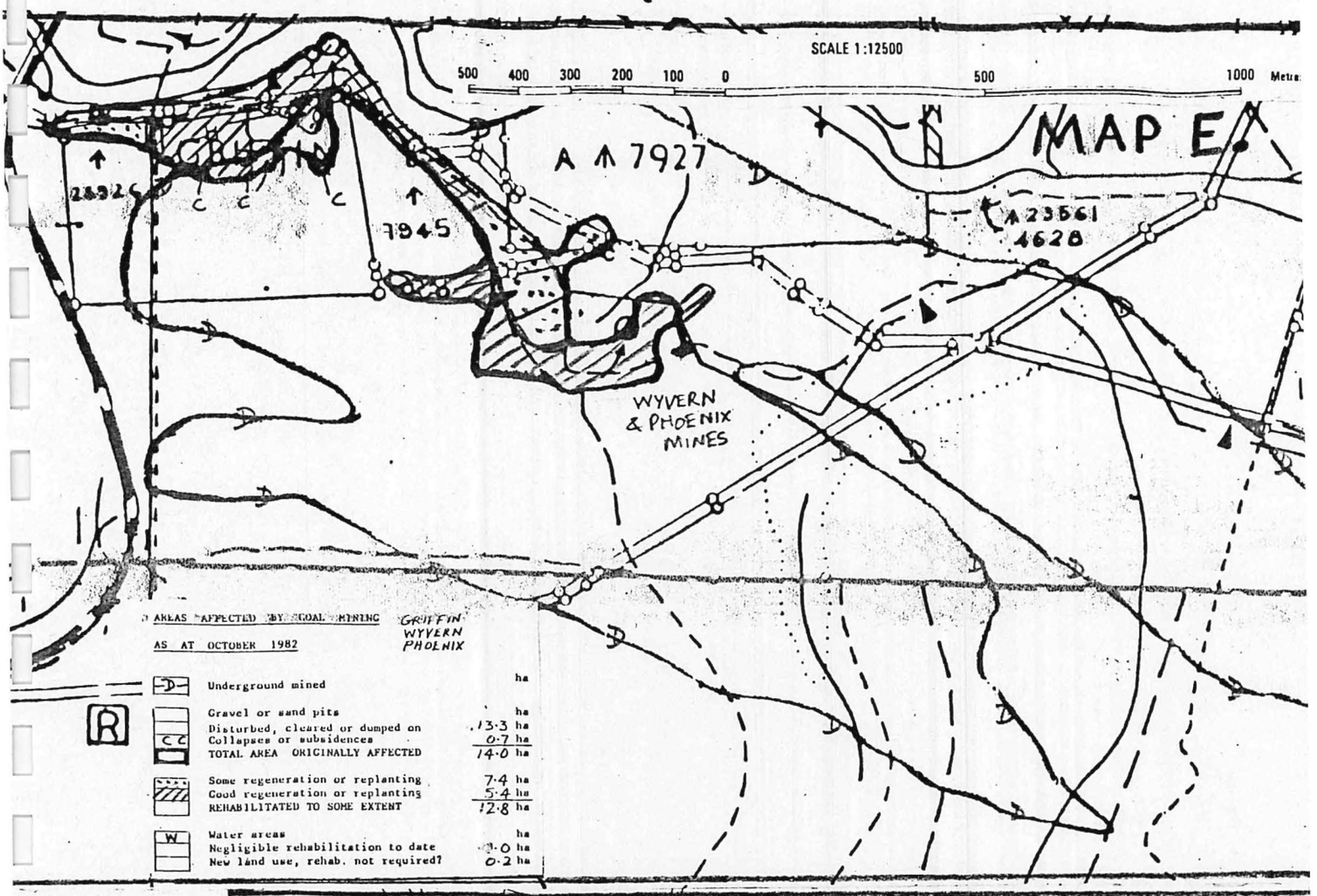
Estimated area originally affected	14.0ha
Rehabilitated to some extent	12.8ha
Not rehabilitated	1.0ha (no water)
Remainder is covered by a S.E.C. line	0.2ha

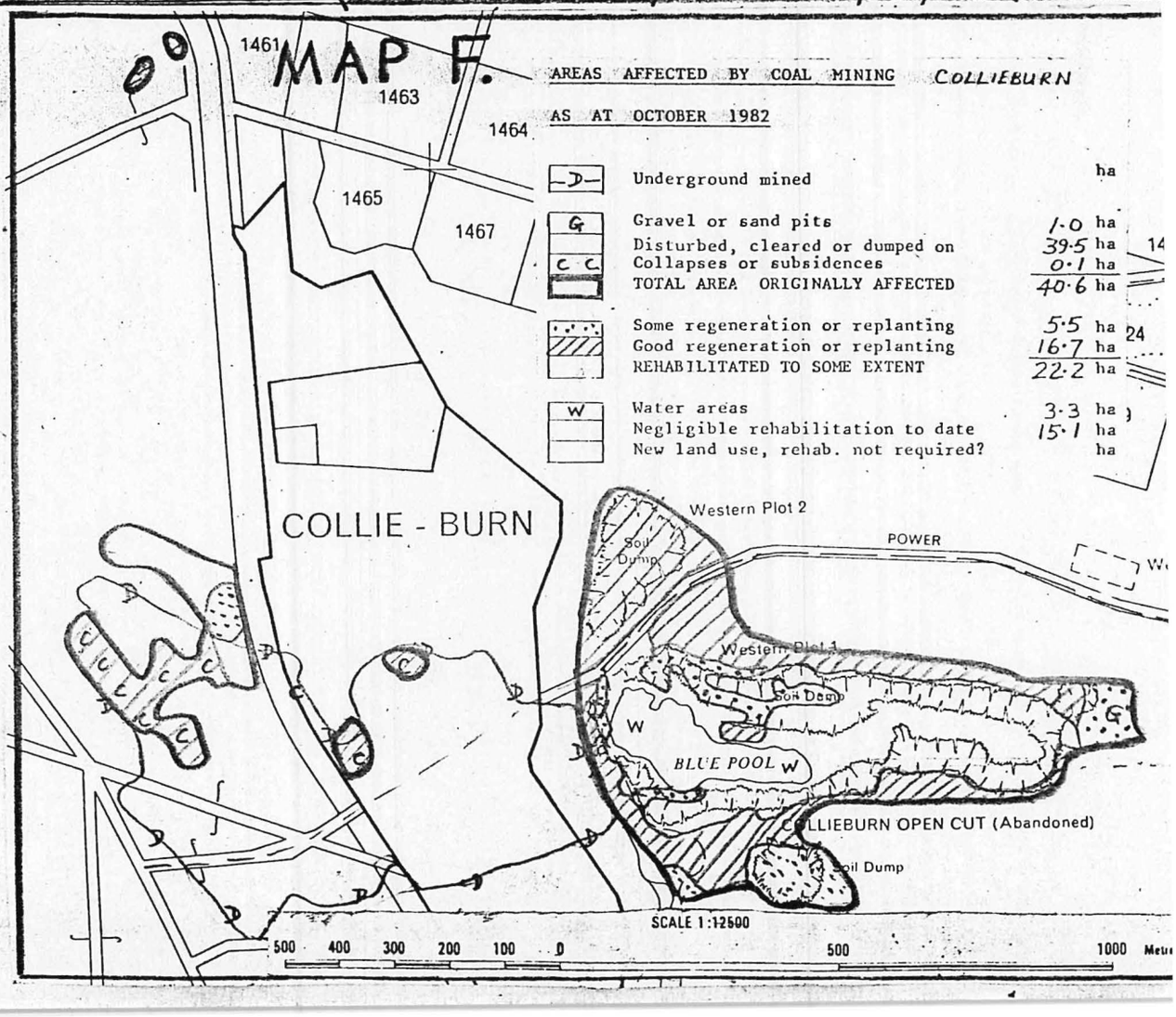
Affected area

Mainly disturbed forest and clearing adjoining mine headquarters. Some collapses.

Regeneration/rehabilitation

Mostly recovery of disturbed forest.
About 2ha of remedial dozer work by Mines Department 1978.
About 2.5ha of eucalypt planting by Forests Department 1978.


SCALE 1:12500
500 400 300 200 100 0 500 1000 Metres
MAP E
A 7927
A 23561
4628
1945
WYVERN & PHOENIX MINES
AREAS AFFECTED BY COAL MINING
AS AT OCTOBER 1982
GRIFFIN WYVERN PHOENIX
Underground mined ha
Gravel or sand pits ha
Disturbed, cleared or dumped on 13·3 ha
Collapses or subsidences 0·7 ha
TOTAL AREA ORIGINALLY AFFECTED 14·0 ha
Some regeneration or replanting 7·4 ha
Good regeneration or replanting 5·4 ha
REHABILITATED TO SOME EXTENT 12·8 ha
Water areas ha
Negligible rehabilitation to date 1·0 ha
New land use, rehab. not required? 0·2 ha


MAP F.
1461
1463
1464
1465
1467
AREAS AFFECTED BY COAL MINING COLLIEBURN
AS AT OCTOBER 1982
Underground mined ha
Gravel or sand pits 1·0 ha
Disturbed, cleared or dumped on 39·5 ha
Collapses or subsidences 0·1 ha
TOTAL AREA ORIGINALLY AFFECTED 40·6 ha
Some regeneration or replanting 5·5 ha
Good regeneration or replanting 16·7 ha
REHABILITATED TO SOME EXTENT 22·2 ha
Water areas 3·3 ha
Negligible rehabilitation to date 15·1 ha
New land use, rehab. not required? ha
COLLIE - BURN
Western Plot 2
Soil Dump
POWER
Western Plot 1
Soil Dump
W
BLUE POOL W
COLLIEBURN OPEN CUT (Abandoned)
Soil Dump
SCALE 1:12500
500 400 300 200 100 0 500 1000 Metres

17. Collieburn Underground Mine

18. Collieburn Open Cut

These two mines are considered together because they are in the same area. However there is probably no overlap of their effects on the environment, see Map F.

The underground mine was operated by Scottish Collieries and the open cut by Western Collieries.

Both mines are in the Cardiff Sub-Basin and located at Collieburn which is 6km south-east of Collie.

Mine Details:

	Collieburn Underground	Collie burn Open Cut
Opened	1903	1950
Closed	1920	1953
Coal mined	513 109 t	189 832 t
Seams mined	No. 2	No. 2
Member	Collieburn	Collieburn
Depth of cover	10m - 60m	10m - 20m
% of seam extracted	44%	85%

Rehabilitation status of these two mines

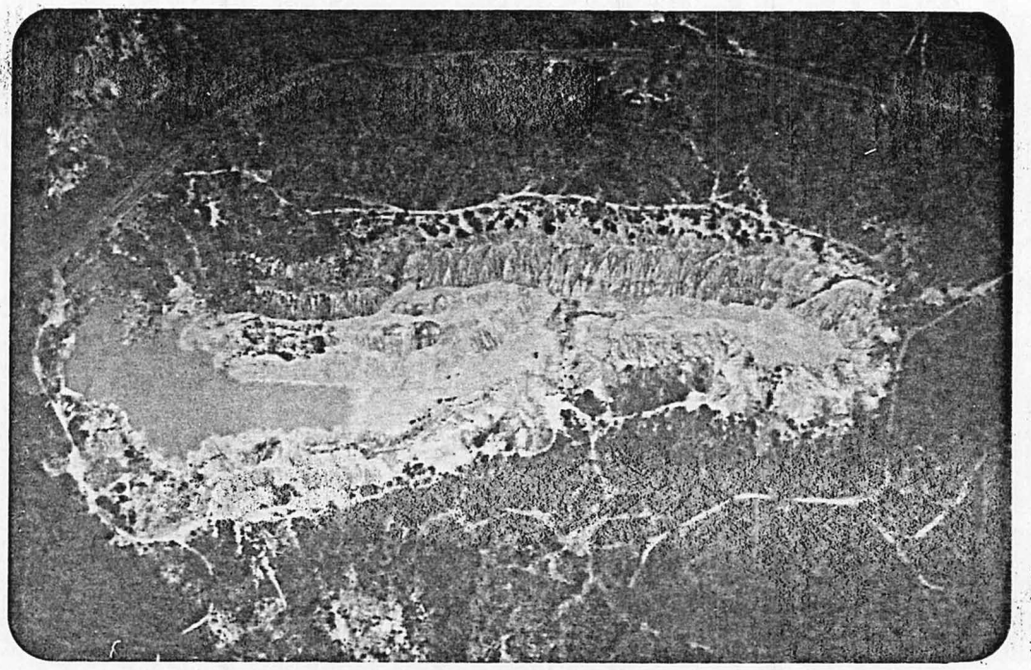
Estimated area originally affected	40.6ha
Rehabilitated to some extend	22.2ha
Not rehabilitated	18.4ha (includes 3.3ha of water)

Affected area

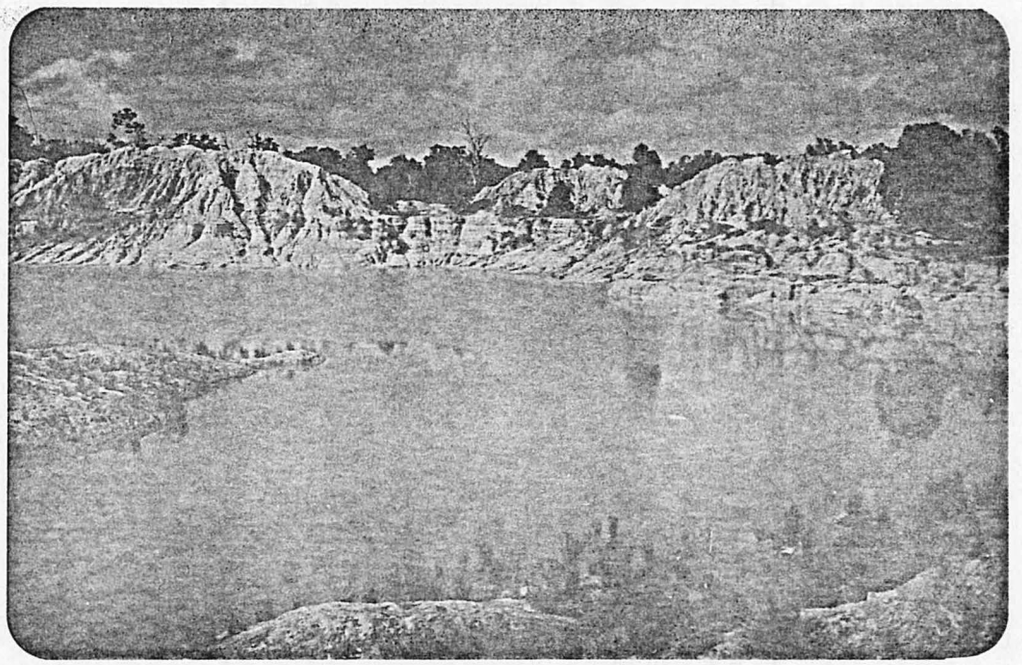
Mainly dumps and mined area at the open cut.
Also disturbed forest adjoining dumps and clearing at underground mine headquarters.

Regeneration/rehabilitation

Mainly recovery of disturbed forest.
About 1.5ha of remedial dozer work by Mines Department. About 4.9ha of eucalypt and pine planting by Forests Department on dumps plus the areas dozed by the Mines Department.



Collieburn open cut showing Blue Pool centre left. Some planting on dumps north of Blue Pool of eucalypts and pines P1966-1973? Negligible regeneration on dumps to right of Blue Pool. Some regeneration at foot of dumps. Dump area at top left planted 1973? with eucalupts with good results. Photo taken by I. Jacobs 3/8/82.



Collieburn Blue Pool showing some regeneration of reeds etc. in foreground but negligible regeneration on dumps in background.

19. Western 3 Open Cut

20. Western 4 Underground Mine

These two mines are considered together because they are in the same area with some overlap of affects on the environment, See Map G.

Both mines were operated by Western Collieries and are in the Cardiff Sub-Basin, and located about 12km E.S.E. from Collie.

Mine Details:

	Western 3 Open Cut	Western 4 Underground
Opened	1954	1958
Closed	1958	1969
Coal mined	1 685 927 t	742 190 t
Seams mined	Moira, Stocktin, Wallsend	Moira, Stockton, Wallsend
Member	Ewington	Ewington
Depth of cover	10m - 20m	15m - 143m
% of seams extracted	90%	47%

Rehabilitated status of these two mines

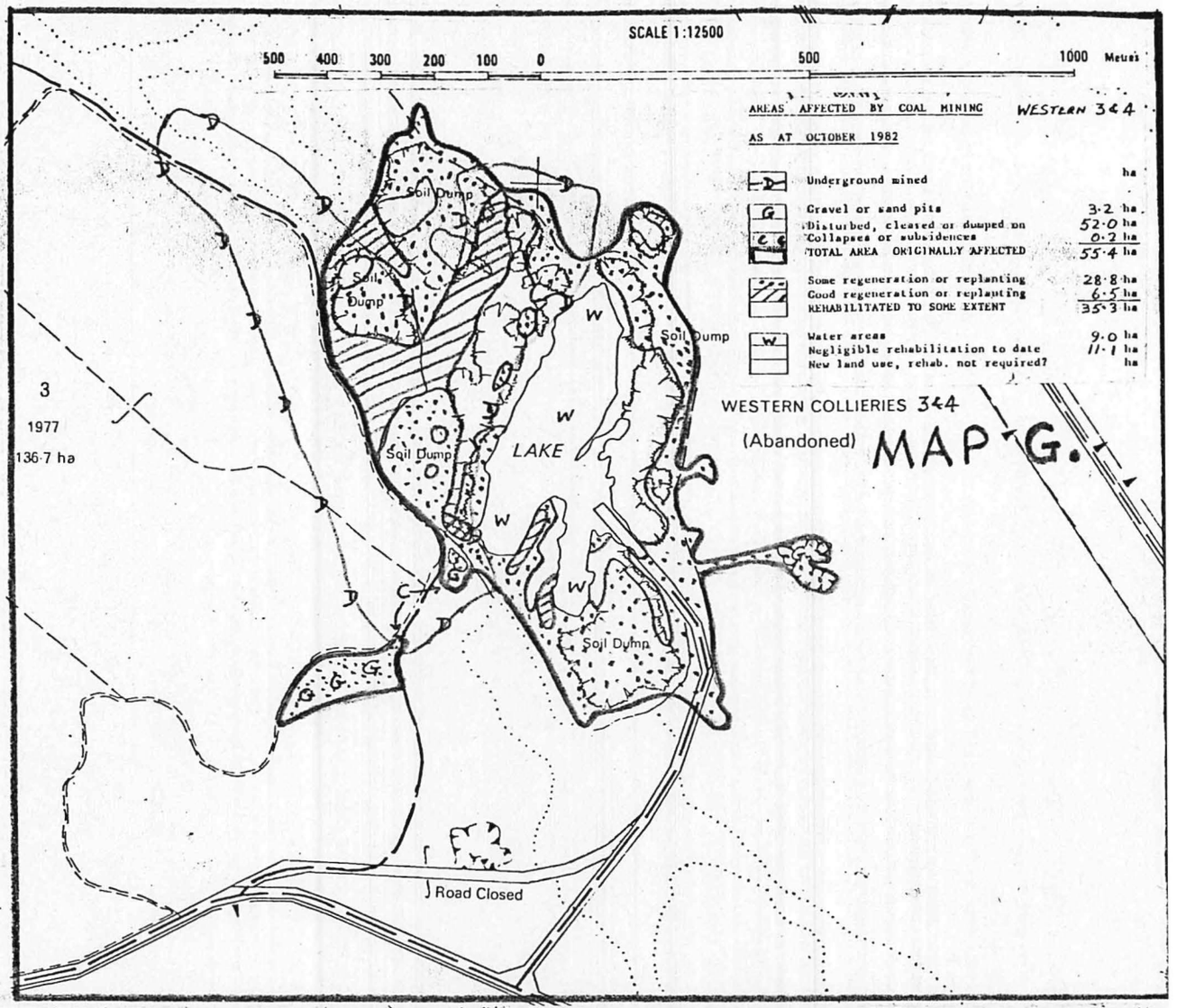
Estimated area originally affected	55.4ha
Rehabilitated to some extent	35.3ha
Not rehabilitated	20.1ha (includes 9.0ha of water)

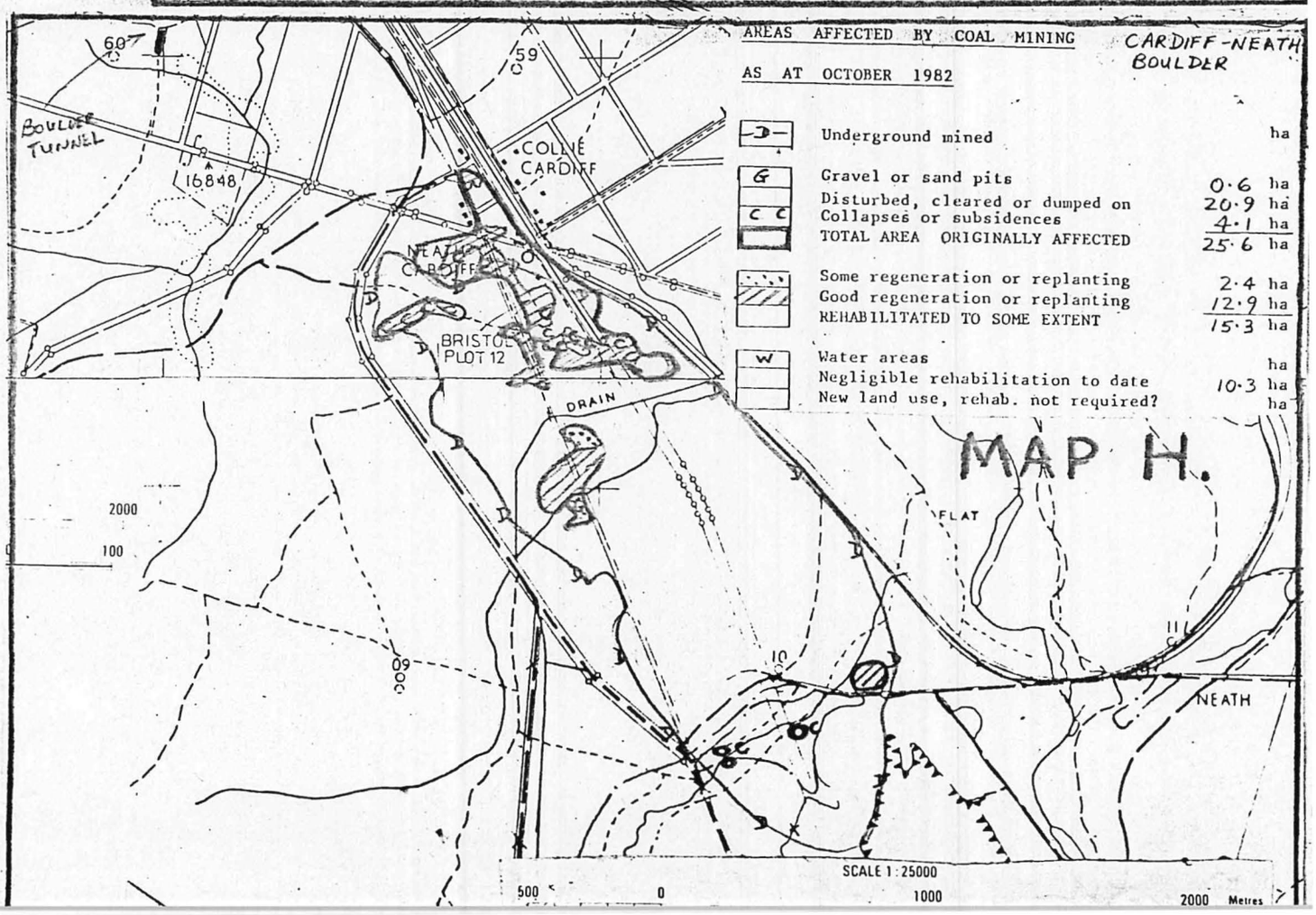
Affected area

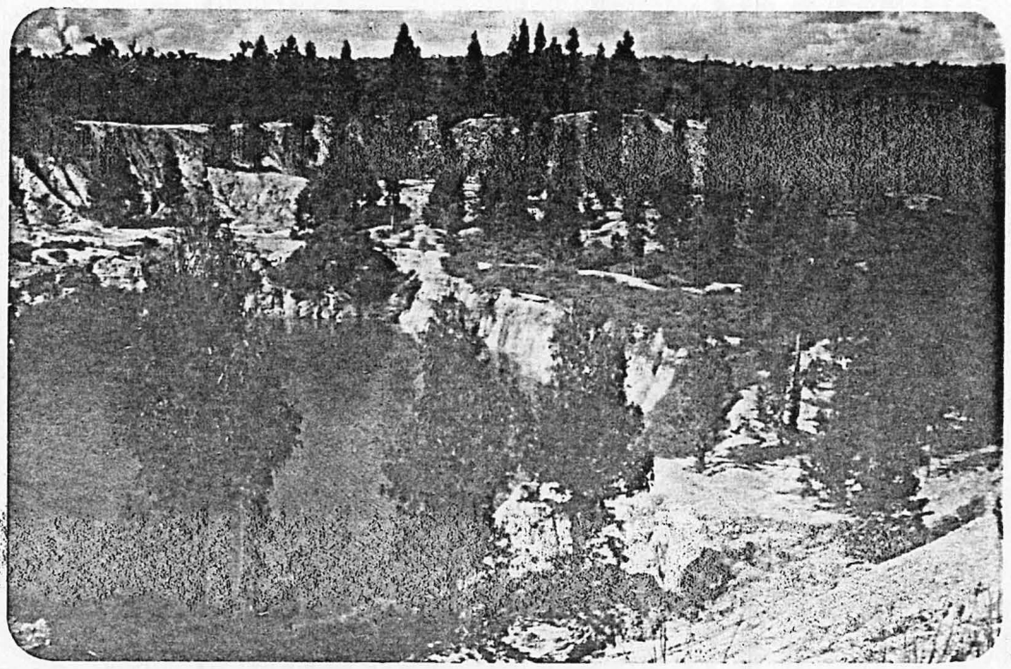
Mainly dumps and mined area at the open cut.
Adjoining forest areas disturbed by minine operations.
Some gravel pits.

Regeneration/rehabilitation

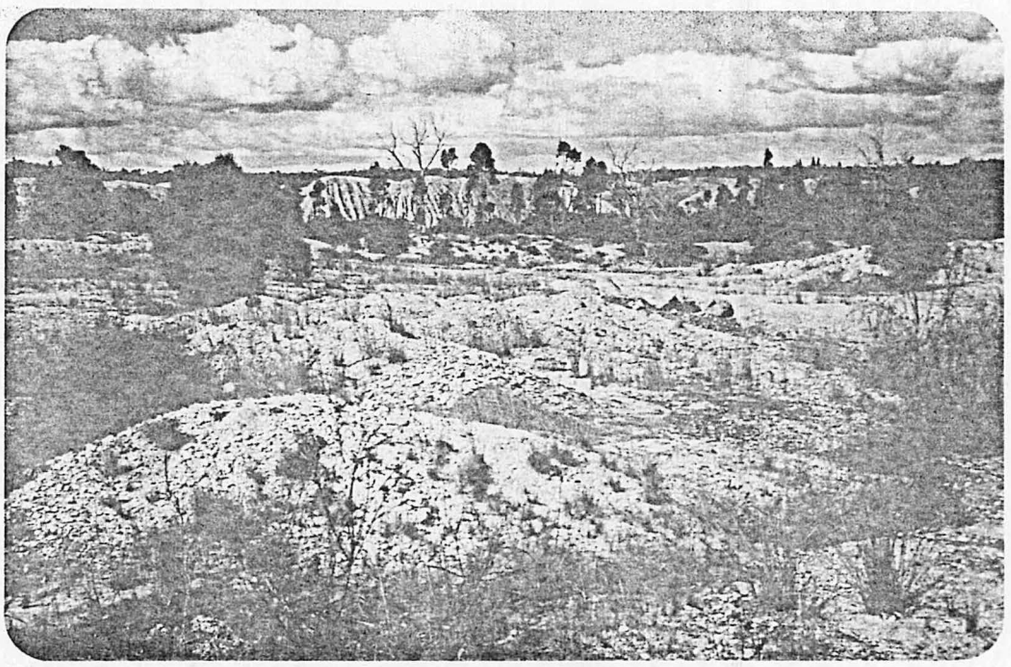
Mainly recovery of disturbed forest.
Some regeneration on dumps. Significant areas planted.
About 7.6ha of eucalypt planting by the Forests Department.


SCALE 1:12500
500 400 300 200 100 0 500 1000 Metres
AREAS AFFECTED BY COAL MINING
AS AT OCTOBER 1982
WESTERN 344
Underground mined ha
Gravel or sand pits 3·2 ha
Disturbed, cleared or dumped on 52·0 ha
Collapses or subsidences 0·2 ha
TOTAL AREA ORIGINALLY AFFECTED 55·4 ha
Some regeneration or replanting 28·8 ha
Good regeneration or replanting 6·5 ha
REHABILITATED TO SOME EXTENT 35·3 ha
Water areas 9·0 ha
Negligible rehabilitation to date 11·1 ha
New land use, rehab. not required? ha
3
1977
136·7 ha
Soil Dump
Soil Dump
Soil Dump
Soil Dump
Soil Dump
LAKE
Road Closed
WESTERN COLLIERIES 344
(Abandoned)
MAP G.


AREAS AFFECTED BY COAL MINING
AS AT OCTOBER 1982
CARDIFF-NEATH BOULDER
Underground mined ha
Gravel or sand pits 0·6 ha
Disturbed, cleared or dumped on 20·9 ha
Collapses or subsidences 4·1 ha
TOTAL AREA ORIGINALLY AFFECTED 25·6 ha
Some regeneration or replanting 2·4 ha
Good regeneration or replanting 12·9 ha
REHABILITATED TO SOME EXTENT 15·3 ha
Water areas ha
Negligible rehabilitation to date 10·3 ha
New land use, rehab. not required? ha
60
59
BOULDER TUNNEL
16848
COLLIE CARDIFF
NEATH CARDIFF
BRISTOL PLOT 12
DRAIN
FLAT
NEATH
MAP H.
2000
100
SCALE 1:25000
500 0 1000 2000 Metres



Western 3 open cut and dumps showing eucalypt planting P1966? (E. globulus?) on some dumps. Some regeneration of scrub.



Western 3 northwest dumps showing reasonable to good regeneration of scrub species and some tree species on parts of the flat dumps in the foreground. Negligible regeneration on the steep dumps in the background but some planting, see photo above.

21. Boulder Tunnel

22. Cardiff-Neath

These two mines are considered together because they are in the same general area, See MapH.

The Boulder Tunnel was excavated in 1900 by a syndicate. No commercial quanitities of coal were removed. It has been assessed because it had some affects on the environment. Cardiff-Neath was operated by Amalgamated Collieries at closure.

Both mines are located in the Cardiff Sub-Basin. Collie Cardiff is about 8km south east of Collie and the Cardiff-Neath mine is about 2km southeast of Collie-Cardiff.

Mine details:

	Boulder Tunnel	Cardiff-Neath
Opened	1900	1903
Closed	1900	1960
Coal mined	-	4 731 235 t
Seams mined	-	Cardiff and Neath
Member	-	Cardiff
Depth of cover	0m - 7m	10m - 110m
% of seams extracted	-	Cardiff 35% Neath 15%

Rehabilitation status of these two mines

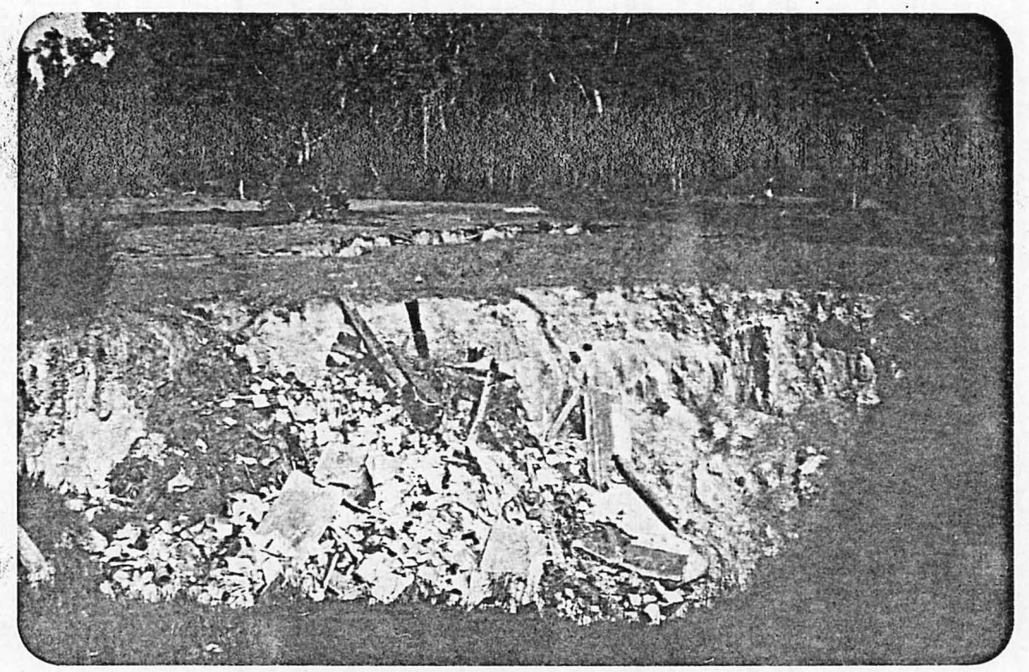
Estimated area originally affected	25.6ha
Rehabilitated to some extent	15.3ha (no water)
Not rehabilitated	10.3ha

Affected area

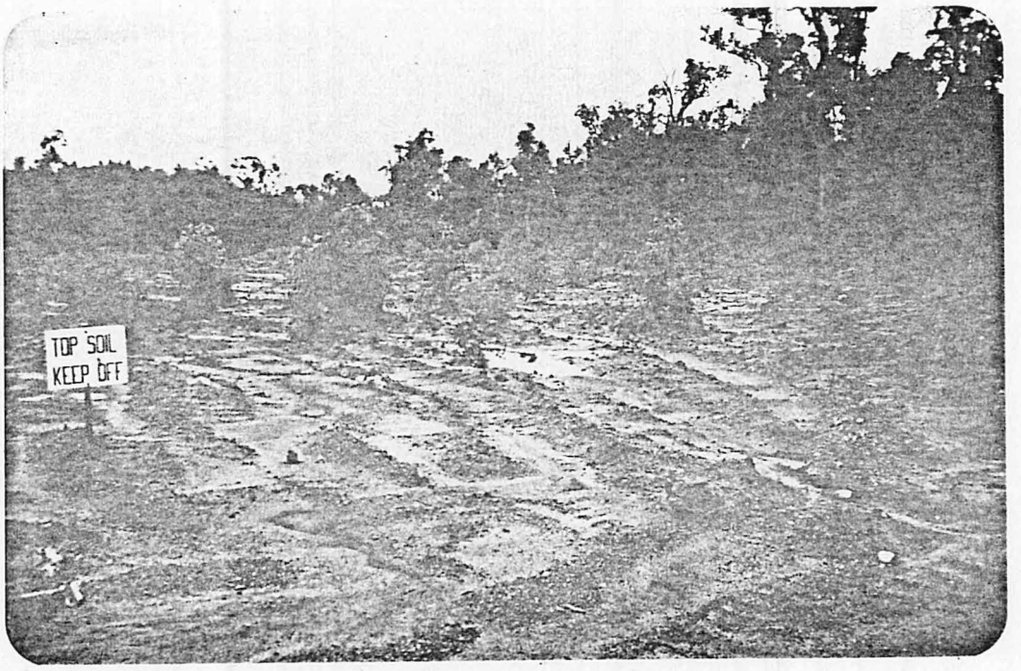
Mainly areas of clearing or disturbed forest neat Cardiff-Neath Mine headquarters. Significant areas affected by collapsing and some dumping of mine wastes in the forest.

Regeneration/rehabilitation

Mainly recovery of disturbed forest ad Cardiff-Neath. One large collapse (1.5ha) adjoining Western 5 filled in by Western Collieries and planted by Forests Dept. An additional 0.3ha of eucalypt planting by Forests Dept. at mine headquarters.



Cardiff-Neath Numerous collapses in sandy soil south of mine headquarters.
This is one of the larger collapses and has been used as a rubbish dump.



Cardiff-Neath Large collapse (1.5ha) northwest of Western 5 filled with overburden from Western 5, topsoiled and planted P78.

23. Western 2 Underground Mine

This mine is operated by Western Collieries.
It is in the Cardiff Sub-Basin and located about 11km south-east of Collie. See Map I.

Mine details:

Opened	1952
Closed	Still operating
Coal mined	10 047 614 tonnes to 31/12/1981 (includes about 400 000 tonnes from Western 6)
Seam mined	Wyvern
Member	Collieburn
Depth of cover	15m - 153m to date
% of seam extracted	40% to date

Rehabilitation status of this Mine

Estimated area affected	29.0ha
Rehabilitated to some extent	10.0ha
Not rehabilitated	19.0ha

Affected area

Mainly clearings at mine headquarters or for gravel pits.

Regeneration/rehabilitation

Mainly preparation work and replanting of gravel pits by Western Collieries.

MAP I.

AREAS AFFECTED BY COAL MINING WESTERN 2

AS AT OCTOBER 1982

		ha
D	Underground mined	
G	Gravel or sand pits	7·3 ha
C	Disturbed, cleared or dumped on	21·7 ha
C	Collapses or subsidences	ha
	TOTAL AREA ORIGINALLY AFFECTED	29·0 ha
	Some regeneration or replanting	10·0 ha
	Good regeneration or replanting	ha
	REHABILITATED TO SOME EXTENT	10·0 ha
W	Water areas	ha
	Negligible rehabilitation to date	19·0 ha
	New land use, rehab. not required?	ha

BRANCH

Entry?

ROAD

59

58

57

3

2T

15074

2994

COLLIE CARDIFF

WESTERN 2

STOL

DT 12

SCALE 1:25000

500 0 1000 2000 Metres

PIPE LINE

NEATH ROAD

10

11

2T

4

PO

WESTERN COAL

WESTERN No 6 MINE

1909

1908

4357

AREAS AFFECTED BY COAL MINING WESTERN 5 & 6

AS AT OCTOBER 1982

		ha
D	Underground mined	
G	Gravel or sand pits	12·0 ha
C	Disturbed, cleared or dumped on	570·0 ha
C	Collapses or subsidences	ha
	TOTAL AREA ORIGINALLY AFFECTED	582·0 ha
	Some regeneration or replanting	67·6 ha
	Good regeneration or replanting	51·2 ha
	REHABILITATED TO SOME EXTENT	118·8 ha
W	Water areas	4·4 ha
	Negligible rehabilitation to date	458·8 ha
	New land use, rehab. not required?	ha

SCALE 1:25000

500 0 1000 2000 Metres

MAP J.

24. Western 5 Open Cut

25. Western 6 Underground Mine

The two mines are considered together because they are in the same general area, See Map J.

Both mines are operated by Western Collieries. Both are on the Cardiff Sub-Basin and located about 14km south weast of Collie.

Mine Details

	Western 5 Open Cut	Western 6 Underground
Opened	1970	1976
Closed	Still operating	Still operating
Coal mined	5 976 364 tonnes*	about 400 000 tonnes*
Seams mined	Cardiff,Neath, (Wyvern)	Wyvern
Member	Cardiff,(Collieburn)	Collieburn
Depth of cover	10m - 50m *	15m - 120m *
% of seams extracted	95%	20%*

* As at 31/12/1981

Western 6 was previously considered as part of Western 2. It was designated as a separate colliery on 25.5.1982.

Rehabilitation status of these two mines

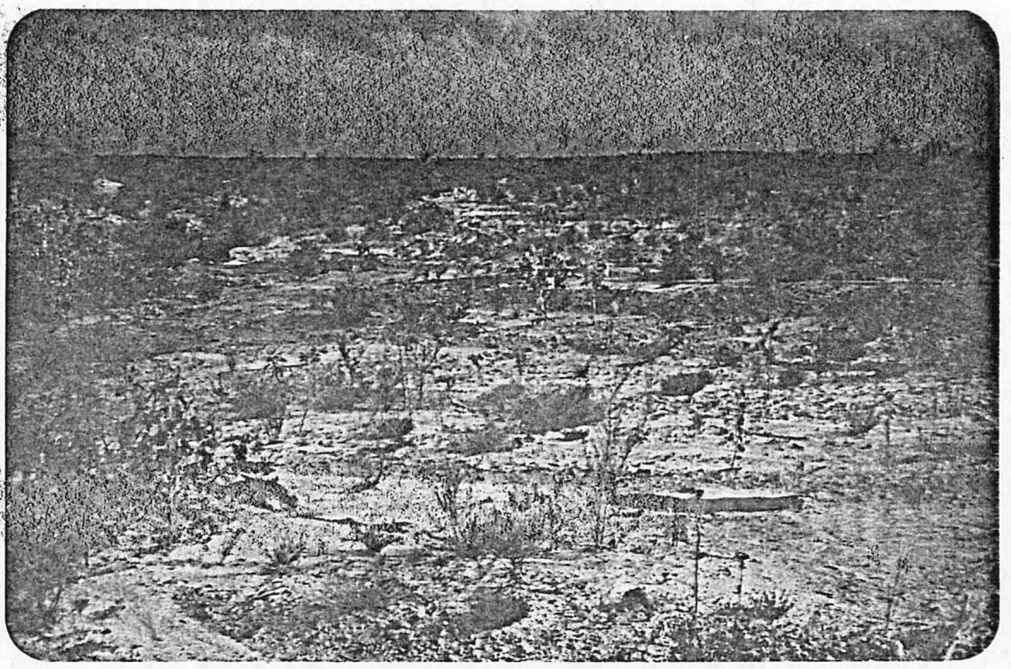
Estimated area affected	582.0ha
Rehabilitated to some extent	118.8ha
Not rehabilitated	458.8ha (includes 4.4ha of water)

Affected area

Mainly the open cut area and dumps. Some gravel pits and disturbed forest adjoining the mines.

Regeneration/rehabilitation

Mainly replanting of dumps and gravel pits.
Some natural regeneration on dumps.
About 89ha of planting by Western Collieries 1975-82.



Western 5 Top of dump seeded with scrub species and planted with eucalypts P80?

Western 5 steep side of dump with some regeneration of natural species on it.

26. Ewington Underground Mine

27. Ewington Open Cut No. 1

28. Ewington Open Cut No. 2

These three mines are considered together because they are in the same area with some overlap of affects on the environment, see Map K.

These mines were operated by Amalgamated Collieries. They are in the Shotts Sub-Basin and located about 6km E.N. E. of Collie.

Mine Details:

	Ewington Underground	Ewington Open Cut No. 1	Ewington Open Cut No.2
Opened	1953	1952	1960
Closed	1960	1959	1960
Coal mined	498 590 t	683 121 t	27 174 t
Seams mined	Stockton,Wallsend	Stockton,Wallsend	Stockton,Wallsend
Member	Ewington	Ewington	Ewington
Depth of cover	10m - 81m	10m - 20m	10m - 15m
% of seam extracted	26%	90%	90%

Rehabilitation status of these three mines:

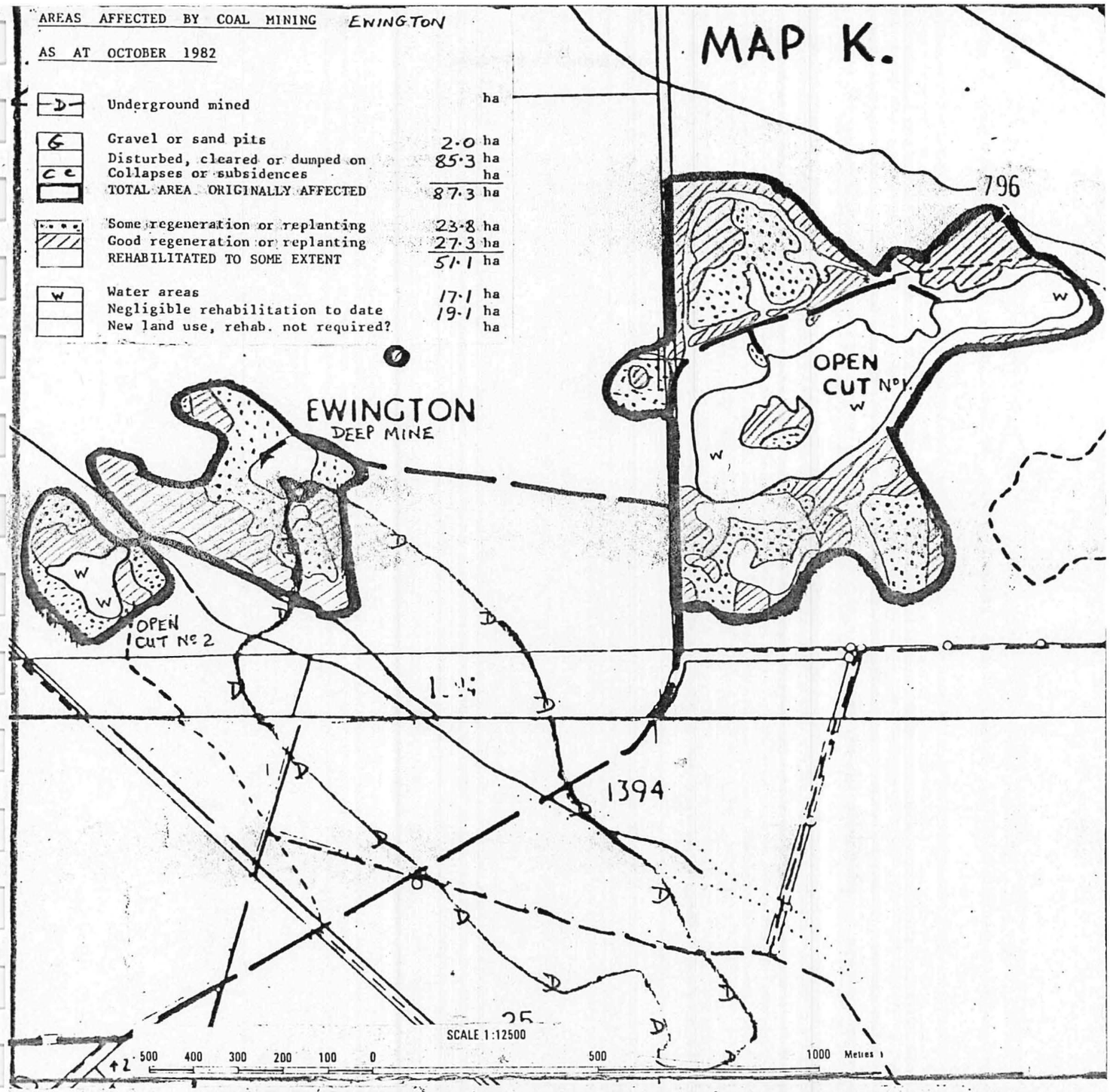
Estimated area originally affected 87.3ha
Rehabilitated to some extent 51.1ha
Not rehabilitated 36.2ha (includes 17.1ha of water)

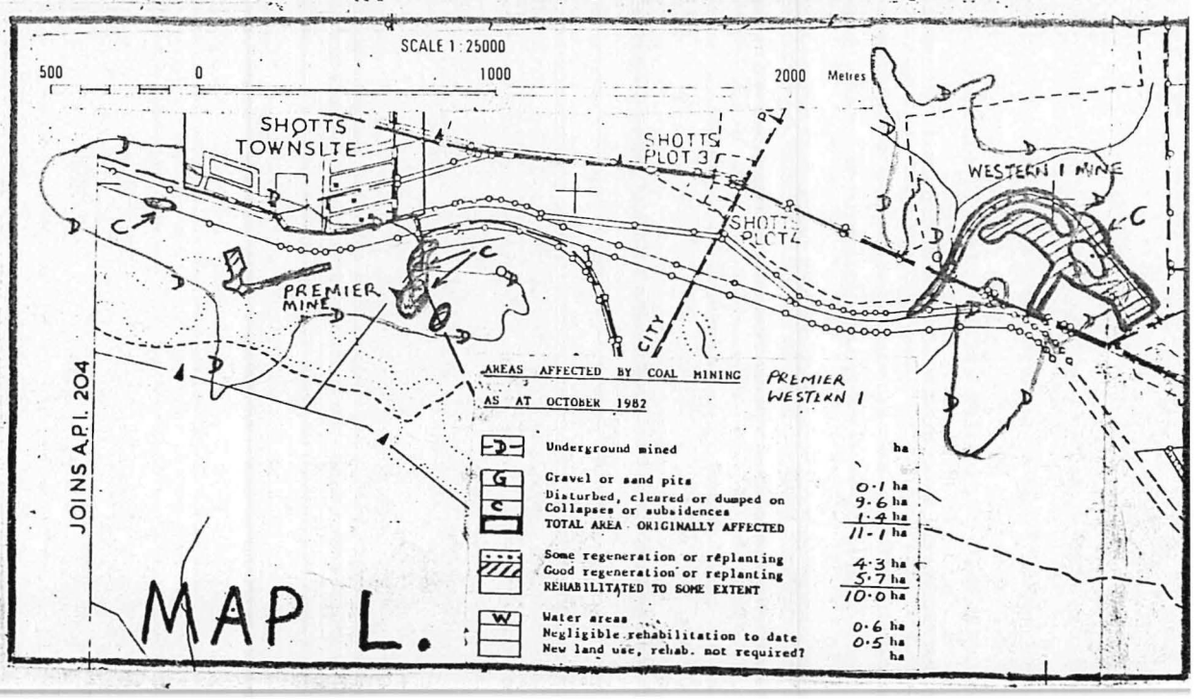
Affected area

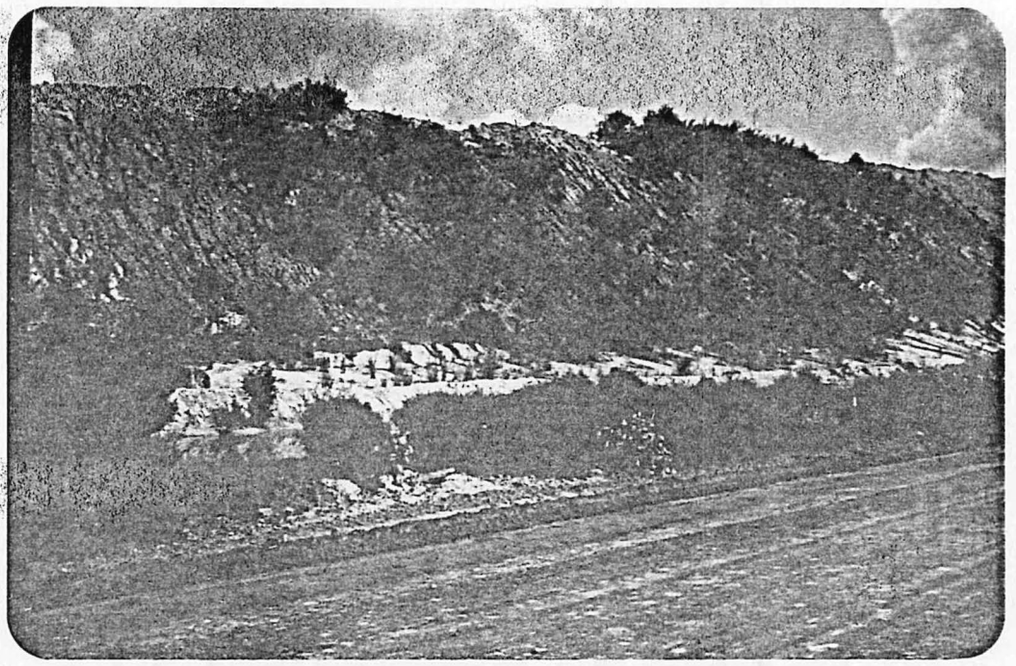
Mainly the open cuts and dumps. Also cleared or disturbed forest and the underground mine headquarters.

Regeneration/rehabilitation

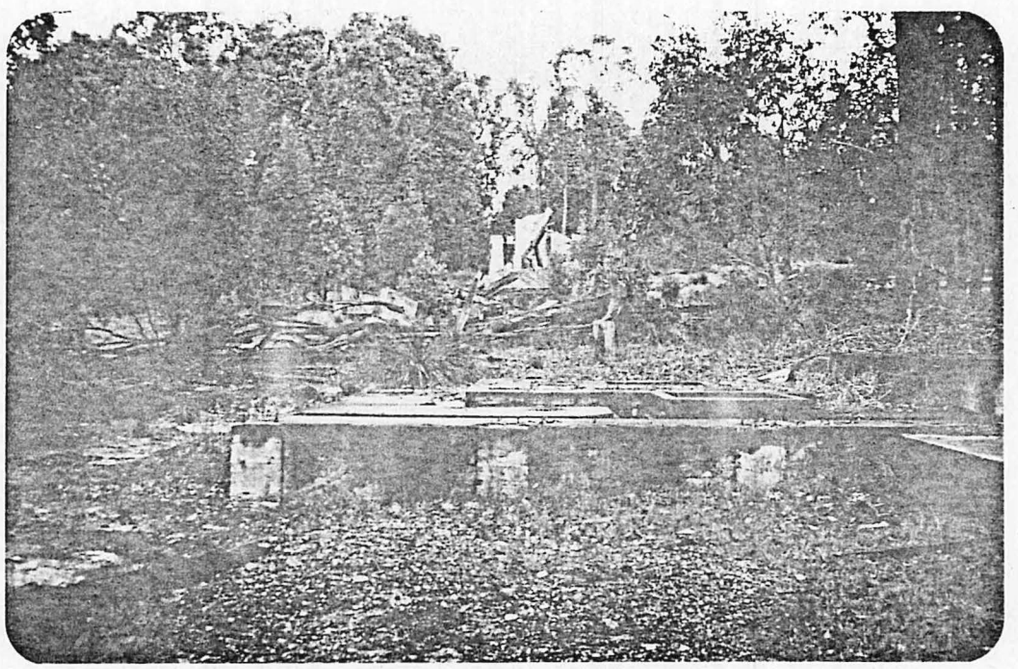
Mainly regeneration on dumps or recovery of disturbed forest. Some planting at Ewington No. 1 open cut. About 10.9ha of pine and eucalypt planting by Griffin 1977.


AREAS AFFECTED BY COAL MINING EWINGTON
AS AT OCTOBER 1982
D Underground mined ha
G Gravel or sand pits 2·0 ha
C Disturbed, cleared or dumped on 85·3 ha
Collapses or subsidences ha
TOTAL AREA ORIGINALLY AFFECTED 87·3 ha
Some regeneration or replanting 23·8 ha
Good regeneration or replanting 27·3 ha
REHABILITATED TO SOME EXTENT 51·1 ha
W Water areas 17·1 ha
Negligible rehabilitation to date 19·1 ha
New land use, rehab. not required? ha
MAP K.
796
OPEN CUT No1.
W
EWINGTON DEEP MINE
OPEN CUT No 2
1394
SCALE 1:12500
500 400 300 200 100 0 500 1000 Metres


SCALE 1:25000
500 0 1000 2000 Metres
SHOTTS TOWNSITE
SHOTTS PLOT 3
SHOTTS PLOT 2
WESTERN 1 MINE
PREMIER MINE
CITY
JOINS A.P.L. 204
AREAS AFFECTED BY COAL MINING PREMIER WESTERN 1
AS AT OCTOBER 1982
D Underground mined ha
G Gravel or sand pits 0·1 ha
C Disturbed, cleared or dumped on 9·6 ha
Collapses or subsidences 1·4 ha
TOTAL AREA ORIGINALLY AFFECTED 11·1 ha
Some regeneration or replanting 4·3 ha
Good regeneration or replanting 5·7 ha
REHABILITATED TO SOME EXTENT 10·0 ha
W Water areas 0·6 ha
Negligible rehabilitation to date 0·5 ha
New land use, rehab. not required? ha
MAP L.



Western 5 steep dump seeded with acacia 1981?
Some of the top soil (and seed) washed off by heavy rains summer 1981/82



Western 1 Old mine installations at mine headquarters. Some regeneration since mine closed in 1958.

29. Premier Underground Mine

30. Western No. 1 Underground Mine

These two mines are considered together because they are in the same general area, See Map L.

Premier was operated by Amalgamated Collieries and Western 1 by Western Collieries.

They are both in the Shotts Sub-Basin with Premier at Shotts, 11km east of Collie and Western 1 about 3km east of Shotts.

Mine Details:

	Premier	Western No. 1
Opened	1911	1952
Closed	1927	1958
Coal mined	475 597 tonnes	341 173 tonnes
Seams mined	No. 4	No. 4 some No. 2
Member	Premier	Premier
Depth of cover	15m - 152m	10m to 33m
% of seams extracted	41%	22%

Rehabilitation status of these two mines

Estimated area originally affected 11.1ha
Rehabilitated to some extent 10.0ha
Not rehabilitated 1.1ha (included 0.6ha of water)

Affected area

Mainly disturbed forest or clearing near mine headquarters. Some collapsed areas, especially at Premier.

Regeneration/rehabilitation

All recovery of disturbed forest or regeneration of cleared areas. No planting.

31. Muja Open Cut (including Centaur Open Cut)

32. Hebe underground Mine

33. Centaur Underground Mine

34. Chicken Creek Open Cut

These four mines are considered together because they are in the same area with some overlap of affects on the environment, see Map M.

All four mines are operated by Griffin Coal Mining Company. Hebe and Centaur have closed.

All four mines are in the Muja Sub-Basin.
Muja Open Cut is about 18km south weast of Collie.
Chicken Creek open Cut is about 4km north of Muja Headquarters and Centaur underground mine about 2km south of Muja H.Q.
Centaur Open Cut is immediately east of Muja Open Cut. Hebe deep mine is inside the Muja Open Cut.

Mine Details:

	Muja * Open Cut	Hebe Underground	Centaur Underground	Chicken Creek
Opened	1953	1954	1951	1981
Closed	Still operating	1965	1957	Still operating
Coal mined	16 860 257 *	1 209 822	173 696	7 690 *
Seams mined	Hebe etc*	Hebe	Centaur	Centaur
Member	Muja	Muja	Premier	Premier
Depth of cover	15m - 110m*	15m - 198M	7m - 58m	10m - 20m *
% extracted	95%	18%	37%	95%

Muja open cut includes Centaur Open Cut which operated on the Centaur seam. Muja operates on the following seams. : Ioana, Hebe, Galatea, Flora, Eos, Diana, Ceres, Bellona, Ate. Production and depths of cover as at 31/12/81.

Rehabilitation status of these four mines

Estimated area affected	683.9ha
Rehabilitated to some extent	30.2ha
Not rehabilitated	653.7ha (includes 5.2ha of water)

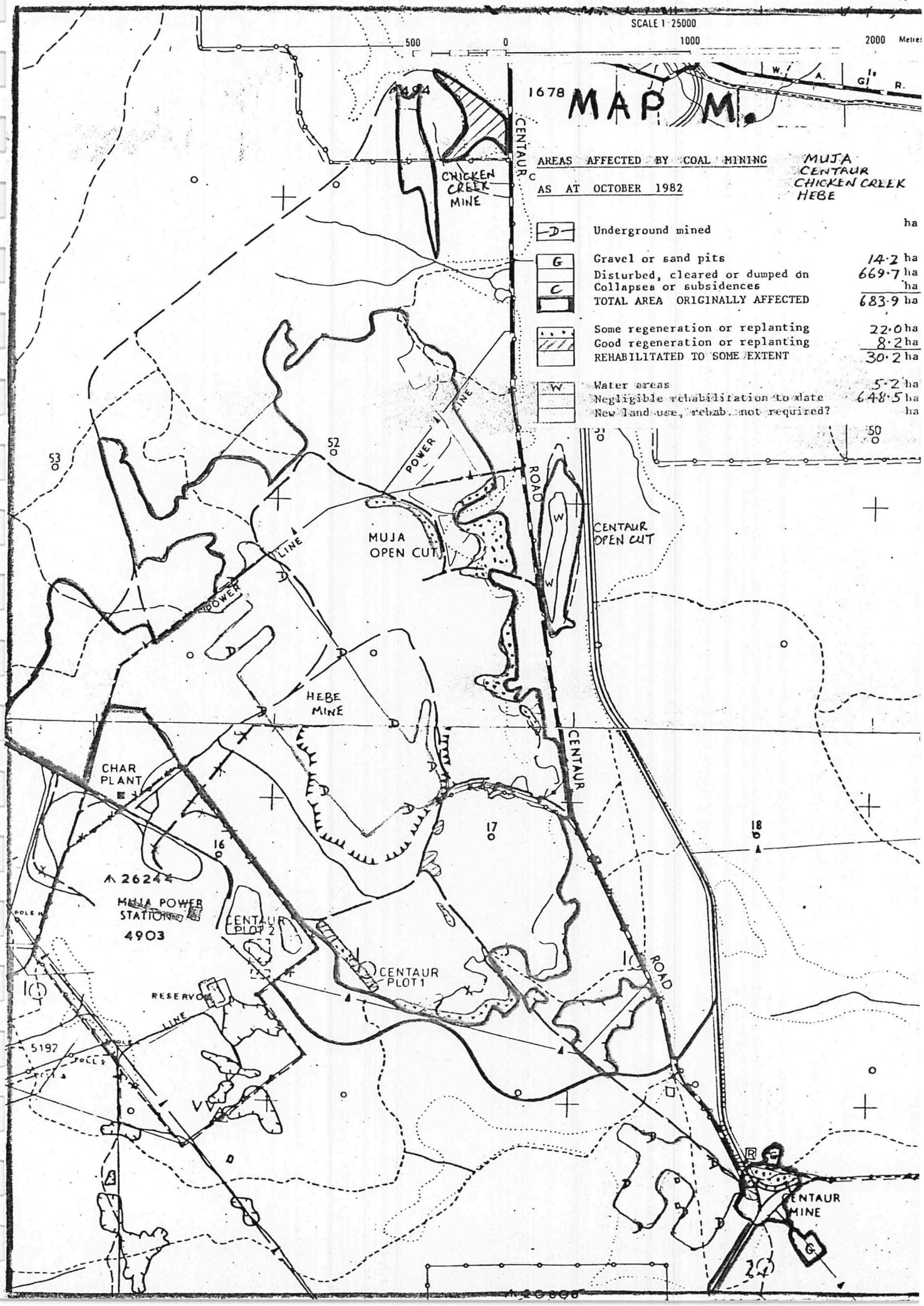
Affected area

Consists mainly of open cut areas and dumps.

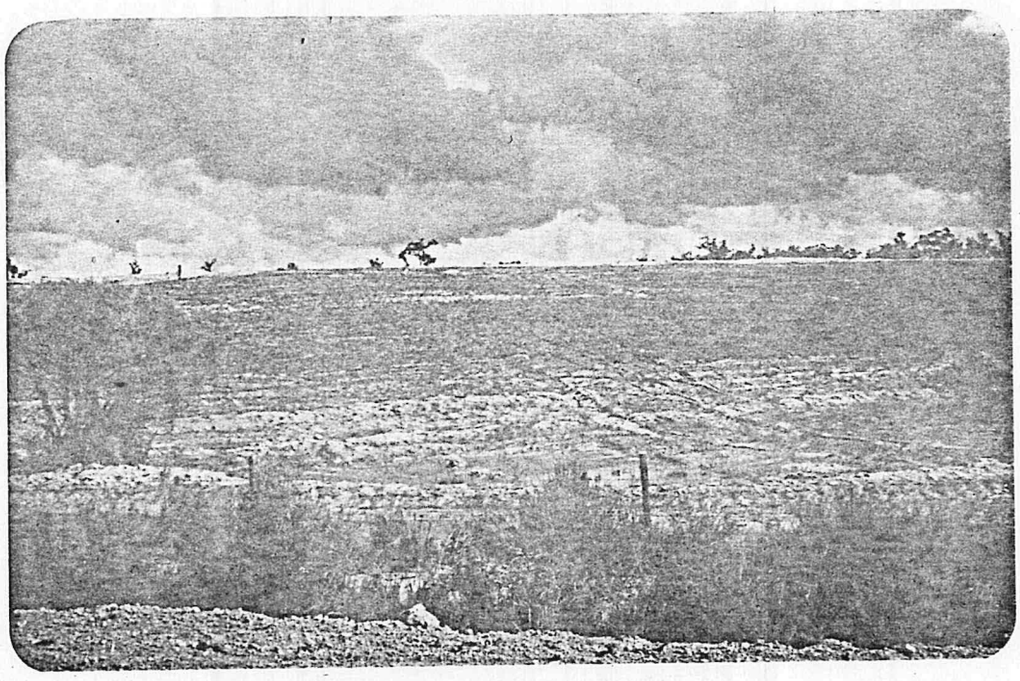
Regeneration/rehabilitation

Consists mainly of regeneration on dumps or recovery of disturbed forest.

About 2.7ha planted at Muja and about 3.7ha of dumps at Chicken Creek planted with pasture.


SCALE 1:25000
500 0 1000 2000 Metres
1678 MAP M.
AREAS AFFECTED BY COAL MINING
AS AT OCTOBER 1982
MUJA
CENTAUR
CHICKEN CREEK
HEBE
ha
Underground mined
Gravel or sand pits 14·2 ha
Disturbed, cleared or dumped on 669·7 ha
Collapses or subsidences ha
TOTAL AREA ORIGINALLY AFFECTED 683·9 ha
Some regeneration or replanting 22·0 ha
Good regeneration or replanting 8·2 ha
REHABILITATED TO SOME EXTENT 30·2 ha
Water areas 5·2 ha
Negligible rehabilitation to date 648·5 ha
New land use, rehab. not required? ha
CHICKEN CREEK MINE
CENTAUR
MUJA OPEN CUT
CENTAUR OPEN CUT
POWER LINE
ROAD
HEBE MINE
CHAR PLANT
MUJA POWER STATION
4903
CENTAUR PLOT 2
CENTAUR PLOT 1
RESERVOIR
5197
CENTAUR MINE

Centaur underground mine headquarters showing coal conveyer to hoppers at railway siding. Tunnel entrance is further to right.
Mine closed 1957 but installations appear to be intact.



Chicken Creek open cut dumps at about 10 degree slopes planted with pasture species 1982.

6. Summary of affected areas and rehabilitation on the coalfield.

Estimated areas affected by coal mining operations and areas regenerated/ rehabilitated to date in each of the thirteen areas discussed above are as follows:-

Map No.	Mine(s)	Area affected by mining ha.	Rehabilitated to some extent ha.	Not rehabilitated ha. *
A	Black Diamond area	44.8	18.3	25.9
B	Co-operative area	52.0	23.6	26.8
C	Wallsend area	40.6	23.3	8.9
D	Stockton	92.2	57.9	34.3
E	Griffin area	14.0	12.8	1.0
F	Collieburn	40.6	22.2	18.4
G	Western 3 & 4	55.4	35.3	20.1
H	Cardiff-Neath	25.6	15.3	10.3
I	Western 2	29.0	10.0	19.0
J	Western 5 & 6	582.0	118.8	463.2
K	Ewington	87.3	51.1	36.2
L	Premier & Western 1	11.1	10.0	1.1
M	Muja area	683.9	30.2	653.7
	TOTALS:	1758.5ha	428.8ha	1318.9ha

* Some additional areas may not require rehabilitation at this time.

7. Further assessment work required

(i) Collapses, subsidence areas

If it is considered necessary to have an accurate map showing the locations of all collapses and subsidence areas then a lot more fieldwork will be required eg. parallel survey lines at close spacing.

Preliminary to any more fieldwork should be a study of underground mine plans and mine contours compared to surface contours as most collapses occur in shallow workings (eg. near the subcrop) or where there has been a high precentage extraction or more than one seam mined.

(ii) Areas of thinly dumped overburden

Where overburden and waste coal has been dumped thinly near mines it often will not show up on air photos or contour plans. If it is necessary to locate all such areas then a lot more fieldwork will be required eg. parallel survey lines at close spacing.

(iii) Recent mining impact

Assessments of areas affected in the current study were done using the 1979 orthophotomaps and February 1982 1:50,000 scale air photos.

New photography at about 1:25,000 scale of current mines would enable the current situation to be assessed.