Department of Conservation
Te Papa Atawhai

Internal Report

Our ref: PAM 11 07 51 279

PERMISSIONS MINING REPORT

Access Arrangement Application

Mining Permit 51279

Escarpment Mine Proposal, Buller Coal Limited

6 May 2013

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GLOSSARY OF TERMS AND ABBREVIATIONS

Terms and Abbreviations

AA	Access Arrangement
ABA	Acid based accounting
ADP	Accidental Discovery Protocol
ARD	Acid Rock Drainage.
AMD	Acid Mine Drainage.
ANC	Acid-neutralising capacity.
Applicant	Buller Coal Limited
Asl	Above sea level
BRL	Bathurst Resources Limited
BCH	Buller Coal Holdings Limited
BDC	Buller District Council
CMA	Crown Minerals Act (1991)
CPP	Coal Processing Plant
CMS	West Coast *Tai Poutini* Conservation Management Strategy
DBEA	Denniston Biodiversity Enhancement Area
DPPA	Denniston Permanent Protection Area
ELF	Engineered Land Form. Overburden waste dump is referred to as an engineered land form in this report.
FOS	Factor of safety
EMP	Escarpment Mine Project
Flocculation	A process of contact and adhesion whereby the particles of a dispersion form larger-size clusters (or flocs).
GSK	Great spotted kiwi
HDPE	High density polyethylene
KEL	Kawitiri Energy Limited
L&M	L&M Group
LC PAF	Low capacity potential acid forming.
M	Million
Mitigate	Activities associated with reducing the impacts of the project.
MIW	Mine influenced water. This is water that is contaminated by site sediments, coal derived sediment and AMD (or a combination of).
MIW WTP	Mine influenced water treatment plant
MPA	Maximum potential acidity

NAF	Non-acid forming
NAG	Net acid generation
NAPP	Net acid producing potential
Open cast Mine	Area covered by Buller Coal Holdings Access Arrangement application.
P.	*Powelliphanta*
PAF	Potentially acid forming
Privately-owned land	Land that is not owned by Crown or a mining company (or its subsidiary).
Rehabilitation	The treatment or management of land disturbed for the purpose of establishing a safe, stable and non-polluting environment.
ROM	Run of Mine. Coal prior to being washed or blended.
TSS	Total Suspended Solids. Measure of the solid material suspended in a water sample. Suspended solids in water reduce light penetration in the water column, can clog the gills of fish and invertebrates, and are often associated with toxic contaminants because organics and metals tend to bind to particles.
The Department	Department of Conservation
S W WTP	Surface water treatment plant
tpa	Tonnes per annum.
WCRC	West Coast Regional Council
WTP	Water treatment plant

Units

Bcm	Bank cubic metre. Volume of material in situ prior to excavation.
g/m^3	A measure of the concentration of a “chemical” of interest; grams of “chemical” per cubic metre of water. Equivalent to mg/L
Ha	Hectare. 1 ha is equivalent to 10,000 m^2.
Hr	Hour
l/s	litres per second
m	Metres
T	Tonne. 1 T is equivalent to 1000 kgs.

1 EXECUTIVE SUMMARY

1 Buller Coal Limited (the Applicant) has requested that the Department of Conservation consider an application for an Access Arrangement to construct and operate an opencast coal mine in the vicinity of the historic Escarpment underground coal mine on the Denniston Plateau. The proposal is referred to as the Escarpment Mine Project, or EMP. The Applicant holds a mining permit (MP 51279) over 199.2 hectares (ha) in respect of the land they wish to mine. The application is for access to 106ha within the mining permit that would encompass the open cut mine pit and related infrastructure. The Land under application is stewardship area pursuant to section 62 of the Conservation Act 1987 and is held so that '… its natural and historic resources are protected'.

2 Coal is proposed to be mined using the open pit strip mining technique. Approximately a third of the 106ha to be mined has been underground mined previously. The area under application is estimated to contain approximately 3 million tonnes of recoverable coal. The Applicant proposes to extract up to 1 million run of mine (ROM; pre washed coal) tonnes of coal per year over five years of operation.

3 The Applicant is proposing to progressively rehabilitate disturbed areas and create a final engineered land form (ELF) consisting of raised topography roughly resembling the existing landform. The ELF would have a low risk of geotechnical failure and would provide a stable environment for rehabilitation. The open cast mine and final ELF would not be visible beyond the Denniston Plateau and immediate surrounding ranges.

4 The proposed mining activities would result in significant adverse effects on natural and historic resources, some of which could not be safeguarded against. The most significant of these effects would be the permanent loss of 106ha of unique elevated Brunner coal measure ecosystems which form the Buller coal plateaux (approximately 6500ha in total area). Brunner coal measure ecosystems consist of a range of habitats and assemblages of

species found no where else in New Zealand. The Denniston Plateau (approximately 2026ha in total area), on which the proposal is located, contains the best remaining examples of Brunner coal measure ecosystems. The neighbouring Stockton Plateau has been subject to extensive anthropogenic modification, consisting mostly of open cut coal mining. Previous mining on the Denniston Plateau was predominantly underground so the remaining habitat, including the area under application, is relatively unmodified.

5 The area of the proposed mine footprint contains a range of conservation values typical of the Denniston Plateau and also values specific to the area itself. The key values present include originally rare sandstone pavement, nationally significant wetland habitat, a range of rare and threatened plant species including some that are at risk of extinction, an outstanding assemblage of species not recorded (to date) elsewhere on the Denniston Plateau, a nationally significant assemblage of lizards, mountain beech-pink pine forest habitat, moderate numbers of a sub-population of *Powelliphanta Patrickensis* that is found only on the Denniston Plateau, several rare and threatened bird species and historic values that are an integral part of the wider Denniston historic landscape that is nationally significant.

6 The Applicant has developed a comprehensive rehabilitation plan that would represent the best techniques available. Despite this however the full recovery of all ecological values lost would not be achieved, even in the long-term. The current natural landforms would be destroyed and the soils and underlying substrate would be permanently altered. Areas of sandstone erosion pavement would be permanently lost, as would certain wetland habitat and an outstanding assemblage of plants.

7 There is however a degree of uncertainty and disagreement surrounding the long term outcomes of the proposed rehabilitation. The experts providing advice to the Department conclude that the most likely long term outcome is the establishment of vegetative successional pathways quite different to those present today. This outcome would lead to a significant loss of key flora and to a lesser degree fauna values within the footprint. The

Applicant, however, is more optimistic in regard to the long term outcomes and believes that the habitats re-established after mining would in large part reflect those existing today and that the resulting loss of values would be somewhat less, excepting sandstone pavement and certain wetland habitat.

8 The proposed mining activities would generate large volumes of potentially acid forming rock that would lead to Acid Mine Drainage (AMD). The Applicant would encapsulate potentially acid forming rock in specially designed cells within the body of the ELF in order to reduce the amount of AMD. 'Capping' would not stop all AMD however and the Applicant has prepared a comprehensive water management plan including an active water treatment plant. The active water treatment plant would operate for 35 years, after which time a passive water treatment system would be designed to deal with AMD from the ELF in perpetuity.

9 There is some uncertainty around aspects of the management of Acid Mine Drainage, mostly relating to the availability of adequate material to cap potentially acid forming rock. Should the proposed water management be wholly successful however there is likely to be an improvement in the water quality of the receiving Whareatea River catchment as the open cut mine would take out several existing sources of Acid Mine Drainage.

10 As part of the application the Applicant has suggested an area on the Denniston Plateau be put aside for permanent protection from mining activities. The Minister of Conservation has also convened a stakeholder group to look at the possibility of placing parts of the Denniston Plateau into a form of permanent protection from future mining activities. To date, however, there has been no outcome from the stakeholder group process.

11 The Environment Court recently issued an interim decision in which it found that it was 'likely' resource consents could be granted for the EMP. It should be noted that the Court was considering an earlier version of the mine footprint which covers a larger area than the subject of this application. The Court took into account economic considerations, but still found the matter finely balanced. The Court identified significant ecological values on the site, and found that in some respects permanent losses would occur, and that in other respects, rehabilitation could take as long as 500 years.

12 Overall the Department believes that there would be significant and in some cases irreversible losses of conservation value should the proposal proceed. The Applicant agrees that some of the values present would be permanently lost but disagrees as to the level of residual loss after all proposed mitigation and rehabilitation is taken into account.

13 To address the residual loss the Applicant is proposing a substantial compensation package. The package would include the funding of biodiversity enhancement work (pest and predator control) over approximately 25,000ha in the Heaphy River catchment for 35 years, biodiversity enhancement work (pest and predator control) over approximately 4,500ha on and surrounding the Denniston Plateau and enhancement and improvement of three historic sites/assets on the Denniston Plateau. Overall, the proposed compensation would have significant benefits for conservation values, particularly within the Heaphy River catchment and for the values of the three historic sites.

14 In conclusion the Department considers that the proposal is inconsistent with regard to the Objectives of the Conservation Act, the Purposes for which the land is held, and relevant Management Plans (being the West Coast *Tai Poutini* Conservation Management Strategy). In considering this application the Minister must have regard to all the matters set out in section 61(2) of the Crown Minerals Act 1991. These include the above legislation and policy, safeguards against any potential adverse effects and such other matters as the Minister considers relevant. Safeguards in this case include all proposed mitigation and rehabilitation, and conditions that would be imposed through any Access

Arrangement document including requisite bonds and insurances. Other matters include the proposed compensation package, the Environment Court's interim decision, and any finalised outcome that would place part of the Denniston Plateau under permanent protection from mining.

15 In discussing all of the above and other relevant issues this report aims to provide the Minister with the necessary information required to make an informed decision on the application at hand. No recommendation regarding a decision is made in the body of this report. However, several options will be provided in a ministerial briefing to accompany this report that may be useful to the Minister in arriving at a decision, having given appropriate regard to all the matters set out in Section 61(2) of the Crown Minerals Act 1991.

2 PROPOSAL

16 The Applicant has requested that the Department consider an application for an Access Arrangement (AA) to construct and operate an opencast coal mine within MP 51279 on the Denniston Plateau. The permit, held by the Applicant, covers 199.2 hectares (ha) of the land. The proposed open cast mine (pit) and associated infrastructure would cover an area of 106ha within the mining permit. The scope of this report covers the assessment of the AA application for the proposed open cast mine under the Crown Mineral Act (1991).

17 There is also a Concession application directly related to the proposed mine. The Concession would be for the use of the Denniston Mt Rochfort Road as a haul road for trucks transporting coal from the mine. This is not a matter on which the decision-maker is required to make a decision contemporaneously with determining this application, but has been included to give a complete overview of the proposal.

18 The area under proposal is estimated to contain approximately 3 million tonnes of recoverable coal. The Applicant proposes to extract between 500,000 – 1,000,000 ROM tonnes of coal per year and according to projections the life of the proposed mine is estimated to be just over five years.

19 Coal is proposed to be mined using the open pit strip mining technique. An initial box cut would be made to gain access to the coal seam and the initial overburden from this cut would be stored outside the pit in an ex pit dump. Once access has been made to the coal seam and sufficient coal has been extracted to allow space to mine, then the overburden would be backfilled into the pit as mining progresses. Progressively backfilling the pit with overburden creates a raised land form referred to as an engineered land form (ELF) in this report.

20 The proposed main mining, processing and transportation steps in sequential order are described as follows:

(i) The overburden would be drilled and blasted and then excavated with hydraulic excavators. The coal would then be loaded into large mining trucks. Overburden would be backfilled into the pit as mining proceeds.

(ii) The ROM coal would be transported from the pit to the Coal Processing Plant (CPP) located within the mine footprint

(iii) The CPP would wash ash and rock from the coal using dense medium gravity separation techniques.

(iv) The washed coal (product coal) would then be conveyed from the CPP onto a product stockpile and the washed ash and rock (rejects) is conveyed onto a rejects stockpile. The rejects material would be back loaded to the opencast mine

(v) The product coal would then be loaded on to trucks for transport to port (Westport and/or Lyttleton) for export or coastal shipping and then export via another port in New Zealand.

21 The AA application is for a period of 9 years with a proposed expiry date of 23 June 2022. This would allow for any potential delays in the commencement of mining or delays within mining operations and to allow rehabilitation works at the site to be completed. Should the AA application be approved there is a possibility that additional work may be required after this period to achieve rehabilitation closure criteria. Likewise active water treatment would be required beyond this date. The Applicant would be obligated to undertake the requisite rehabilitation and water treatment. This is not considered an issue by the Department because there would be the possibility of extending the term of the AA (subject to an extension of term to the Minerals Permit) to allow for ongoing rehabilitation and water management. Or alternatively the Applicant could seek a Concession under the Conservation Act 1987 for the same purpose.

22 The Applicant has applied for a concession and an AA to allow their EMP to be constructed and operated. The Concession would be for operating the haul road between the mine and the Denniston Road. Wildlife Act Authorities would also be required from the Department for activities within the permit area. Resource Consents are also required under the Resource Management Act (1991; RMA) to allow the EMP to be constructed and operate. The Applicant was granted resource consents in October 2011, however, this decision was appealed to the Environment Court by West Coast Environmental Network Incorporated and Royal Forest and Bird Society of New Zealand Incorporated. The appeal hearing was held from late October to early December 2012. An interim decision was released by the Environment Court on 27 March 2013. In that interim decision the Court indicated that it considers [resource] consent for the EMP can be achieved, but it is 'finely balanced', and proposed conditions require further work.

3 SCOPE OF REPORT

23 This report covers the AA application for the EMP open cast mine under the Crown Mineral Act (1991). The AA application relates to the opencast mine (excavated pit) and any mining and exploration activities within the mining permit. It excludes auxiliary mining activities outside of the mining permit such as coal processing and transport activities. These auxiliary activities would be covered under Concession applications where required or are located on private land and are not subject to the Department's review or require the Minister's approval. Section 8, Description of Applicants Proposal, provides a general overview of all proposed mining activities relating to the EMP. These auxiliary mining activities are described to give the reader a better understanding of how the opencast mine operates and how the open cast mine design interrelates to the auxiliary mining activities. All other sections of this report relate only to the open cast mine.

24 Table 1 below shows how the various mine elements would be considered by the Department's various statutory processes.

Table 1: Mine elements and appropriate Department statutory processes

Mine Component	**Relevant Application**
Mine pit, coal extraction and pit boundaries (open cast mine)	AA
Ex Pit dump	AA
Final engineered land form footprint (ELF)	AA
Peripheral benching around the open cast mine	AA
Coal Processing Plant and Amenities Area	AA
Coal handling facility	n/a private land
Access road onto site (Whareatea Mine Road)	Concession
Haul Roads	Concession
Power reticulation	n/a at this stage

4 BACKGROUND

25 In December 2008 the Department received an application from L&M Coal Limited (L&M) for the EMP. The Department noted several matters that required further information before processing of the application could continue. During this time, L&M also investigated options for removing the coal from the site.

26 In October 2010 L&M applied to Crown Minerals and were granted an 8.8 hectare extension on the western boundary of their mining permit to incorporate a portion of the peripheral benching into the proposed open cast mine area.

27 In late 2010 Buller Coal Holdings Limited (BCH) purchased L&M and in doing so took over the AA application as the Permit holder for MP 51279. They supplied additional information for the AA application and also applied for the two concession applications in October 2010. However, the Concession applications for the CPP and related infrastructure were put 'on hold' at the request of the applicant in late 2011. BCH concurrently applied to the West Coast Regional Council and Buller District Council for resource and land use consents which were publicly notified in October 2010. The Department made submissions on these resource consents stating it did not wish to be heard as the effects on public conservation land could be considered under the Department's own processes.

28 In March 2011 BCH changed their name to Buller Coal Limited (BCL).

29 BCL's parent company Bathurst Resources Limited (BRL) has a wider strategy for mineral resource extraction across the Brunner Coal Measures (Bohannon 2012, Appendix 2.5) that includes the operative Cascade Coal Mine (MP 41455), Coalbrookdale permits (MP 41274 and MP41456) and extensive exploration programmes within EP40628 and EP40591 (that cover a large part of the Brunner Coal Measure area).

30 The entire Denniston Plateau itself is subject to minerals privileges (see Figure 2) comprising:

- A Coal Mining Licence held by Solid Energy New Zealand Limited (SENZ).
- Two exploration permits, EP40628 (held by the Applicant) and EP40591 (held by Rochfort Coal Limited, subsidiary of BRL), (with existing AAs) for coal.
- Mining Permits, MP 41274 and MP 41332, (with existing AAs) for underground coal mining, previously held by Robert Griffiths and now held by the Applicant.
- A Mining Permit (with existing AA) for an opencast coal mine held by Cascade Coal Limited, now a subsidiary of BRL, located on the eastern flanks of the plateau.
- An Exploration Permit (with existing AA) for coal previously held by Rochfort Coal Limited and now held by the Applicant.

31 Therefore, with the exception of the Solid Energy Coal Mining Licence area, subsidiary companies of Bathurst Resources Limited hold minerals tenements over the remainder of the Denniston Plateau.

5 INFORMATION SOURCES

32 This report refers to and integrates information from the Access Arrangement application and from expert reviews of the application provided by Department experts, or contracted experts. The Application itself has been varied and added to several times since the original application in 2008, with the latest revised application being submitted to the Department in March 2013. This iterative application process has led to a number of different 'suites' of information being submitted to the Department. As a result it has also resulted in several 'suites' of technical reports by Department experts related to each iteration. The Applicant also submitted a range of information from the Environment Court proceedings (in the form

of briefs of evidence) in support of the application. This information was submitted in June 2012. Forest and Bird also provided the Department with information from the Environment Court proceedings relating to the EMP in the form of briefs of evidence. This information was provided in October 2012.

33 All in all there is a substantive body of information relating to the application. To aid the reader in understanding how this information has been handled and integrated into this report the key groups of information are discussed below:

Application and supporting information

34 As noted above a revised application for the EMP was submitted to the Department in March 2013. This revision proposed a smaller footprint and detailed various changes to the proposed mine plan, mitigation, and offer of compensation. While the Applicant has made comment that this is the only relevant information to be considered, a comprehensive assessment of the wider ecology of the Denniston Plateau and significance assessments has required reference to information provided in earlier iterations of the application. In such cases Department experts have referred to information relating to earlier iterations of the application where the conclusions are still considered relevant.

Environment Court briefs of evidence

35 The briefs of evidence from the Applicant have, at the Applicant's request, been treated as part of the information supporting the application and reviewed by Department experts in this light. Some of the information within the briefs of evidence relates to matters beyond the scope of the Access arrangement applicant, for example a coal processing plant located outside of the Minerals Permit boundary. In these situations this information has been disregarded.

36 In seeking advice from its experts the Department advised that they should review the application and any other relevant information they felt necessary to complete a robust assessment. The briefs of evidence supplied by the Applicant and Forest and Bird have

been treated by Department experts in this way and assessed and referred to in their advice where appropriate.

Department expert reviews

37 Where possible this report has referred to the latest 'suite' of Department technical reports in its assessment of the application. However, in some cases Department experts have relied on earlier information relating to previous iterations of the application where the core issues and/or conclusions are still considered relevant and valid. An example of the use of earlier advice are significance assessments of the existing ecosystem, i.e. revisions to the application have not altered the existing values of the ecosystems currently present on the Denniston Plateau.

6 COMMENTS FROM THE APPLICANT

38 The Applicant was supplied a copy of the draft report in order to allow it to comment on the content of the report and the conclusions made by the Department in assessing the application. The comments provided by the Applicant are substantive. Due to the volume of commentary the Department has not included all comments in the body of this report but has attempted to address the key comments below, and in some instances referred to them more specifically where appropriate in the body of the report.

39 The Applicant's full comments are attached as Appendix 8 for reference.

40 The Applicant believes that some of the conclusions made by Department experts in relation to the application are incorrect, or do not reflect a balanced view of all the relevant information, particularly for the advice regarding the outcomes of the proposed rehabilitation and snails. The Applicant also feels that Department experts have taken an overly conservative approach to the assessment of potential effects and that this is

reflected in the body of this report and subsequently the conclusions made. To address this concern the Applicant requested that the report be revised to reflect a more balanced view that includes discussion of the Applicant's expert views.

41 When requesting expert's to provide advice on the application the Department made it clear that they were to seek all relevant information they felt necessary to undertake an expert peer review. In this way each Department expert has reviewed and summarised a range of information relating to the application (including Environment Court briefs of evidence provided by both the Applicant and Forest and Bird, information contained in the application, and any other information, to the extent considered relevant) and provided their professional expert advice. Given this assessment process the conclusions reflected in this report are a summary of the expert advice provided to the Department that has assessed the relevant information.

42 The Department acknowledges that in some cases the opinions of its experts vary from those of the Applicant's experts and [to a lesser degree] the Environment Court's interim decision, but also points out that in many cases the views are very similar. The explanation and reasoning behind the conclusions made by each expert are contained within their respective advice. If the reader wishes to understand any difference in opinion between experts in detail it is recommended that they consult the relevant Department advice for further clarification.

43 The Department does not think it appropriate to explain all the differences in opinions between all experts throughout the body of this report. That would be impractical. In some cases a note relating to the Applicant's comments on key issues have been included (these are italicised for clarity). On the most part, however, this report has relied on Department experts to synthesise the relevant information and provide their professional advice.

44 The Department also stands by the conclusions made in this report. It also supports the advice provided by its experts unless specifically noted otherwise. The Applicant suggests that the Department has taken an overly conservative approach to the assessment of potential effects and that, in comparison to their experts and the Environment Court's Interim Decision, this had led to incorrect assumptions and conclusions. Again the Department acknowledges that there are in some cases differing opinions, particularly around the outcomes for rehabilitation and effectiveness of pest control mitigation on the plateau. However, the Department does not accept that the conclusions reached by its experts are necessarily wrong just because they do not align with the Applicant expert's views. In many cases it is simply that the Department expert's feel that the Applicant's experts have taken an overly optimistic approach. As a responsible land manager for conservation purposes on behalf of the Crown the Department considers that it has accorded the proposed activities and potential adverse effects an appropriate level of caution. This is particularly so in light of the significant values present within the footprint and the uncertainty surrounding several key issues that the Applicant does acknowledge exist, whether that be large, small or otherwise. Again it is suggested that the reader consult the relevant expert advice for further clarification and reasoning.

45 The Applicant also believes that the Department has placed insufficient weight on the findings of the Environment Court's interim decision relating to the resource consent application for the EMP. The interim decision and how the Environment Court findings have been considered in detail and are discussed in Section 24.2. In summary the Department does not agree with the Applicant's view on this issue.

46 For the same reasons explained above the Applicant believes the analysis of the policies in the West Coast *Tai Poutini* Conservation Management Strategy is incorrect. The Applicant believes that the Department has applied a worst case scenario approach in its assessment. The analysis reflects the overall conclusions made by Department experts in the assessment of the application. As above, just because the conclusions are not the same as the Applicant's experts does not necessarily render them incorrect. The

Department stands by its assessment of the policies of the West Coast *Tai Poutini* Conservation Management Strategy.

47 The Applicant expresses concerns that some of the Department expert advice uses incorrect area assessments, i.e. previously proposed mine footprints. In some cases Department expert advice refers to earlier expert advice relating to previous iterations of the application. However, these are not in regard to quantitative calculations but rather where more general assessments of value and significance are made and still considered valid. As discussed above there have been several iterations of the application and this approach was taken to avoid unnecessary re-assessment and inefficient use of time and resources. The Department has sought to ensure that all area and quantitative assessments used in this report are based on the revised 106 ha mine footprint.

48 Within its comments the Applicant seeks that the Department "ensure alignment between the compensation package already offered to the Court and the compensation package offered to the Department". The compensation package is discussed in detail later in this report in Section 24.5. The Department has sought a constructive approach to the proposed compensation by the Applicant and where possible has sought to provide a mechanism/approach to accommodate the proposed compensation funding should the access arrangement application be granted.

49 The Applicant has alleged that three of the Department's reviewers have perceived or actual bias against BCL, on the basis that that they are either affiliated with Forest and Bird, or were called by Forest and Bird to give expert evidence in the Environment Court in its appeal against grant of resource consents for the Escarpment Mine.

50 While the Department accepts that BCL may perceive bias, the role of an expert witness in the Environment Court is to assist the Court on matters within the witnesses' expertise, not to act as an advocate for any particular party. Accordingly the Department does not accept that the report reviewers who also gave evidence in the Environment Court can be

said to have any particular bias by virtue of the fact that they gave evidence at the request of Forest and Bird. In relation to the third person (who was secretary for the West Coast branch of Forest and Bird), her involvement in providing advice in relation to the access arrangement application largely ceased when BCL originally raised its concern.

51 The Applicant suggested that for the sake of clarity an additional paragraph explaining all the various information sources used in the assessment of the application be added to the report. This has been added and is included as Section 6 above.

52 The Applicant believes that the Department is incorrect in its consideration of the Sullivans Coal Mining License and believes that it should not be part of the cumulative assessment of potential effects on the Denniston Plateau. The Department's consideration of this issue is discussed in more detail in Section 24.1

7 LOCATION AND LAND STATUS

53 The land subject to MP 51279 is contained within the Mount Rochfort Conservation Area – Conservation Unit K29001; approximately 13 kilometers to the east of Westport, and four kilometres to the south of Denniston. Mount Rochfort Conservation Area is held as stewardship area pursuant to section 62 of the Conservation Act 1987. The land comprising the stewardship area was the result of several allocations between 1987 and 1990, and comprises approximately 7546 hectares.

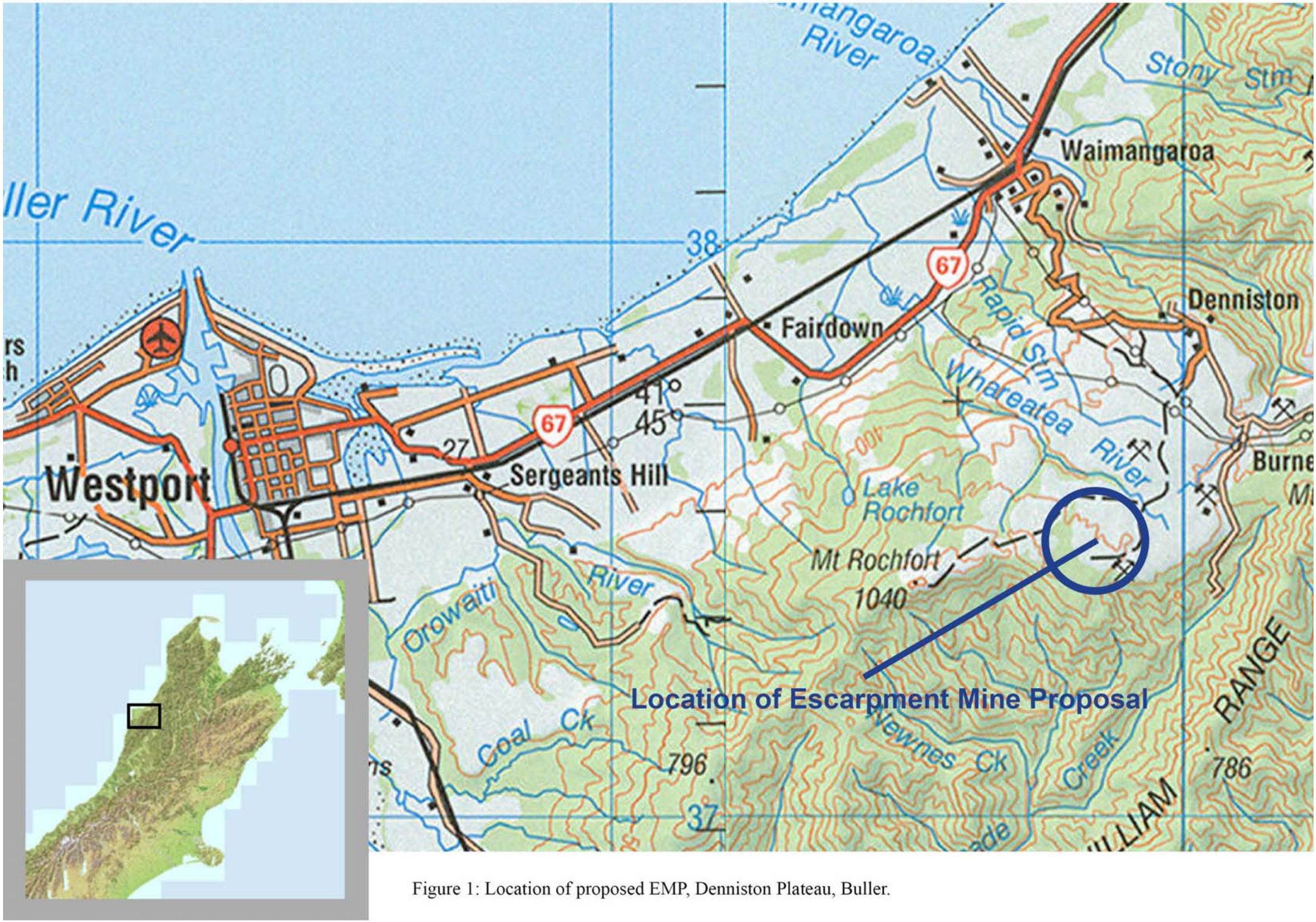

Figure 1: Location of proposed EMP, Denniston Plateau, Buller.

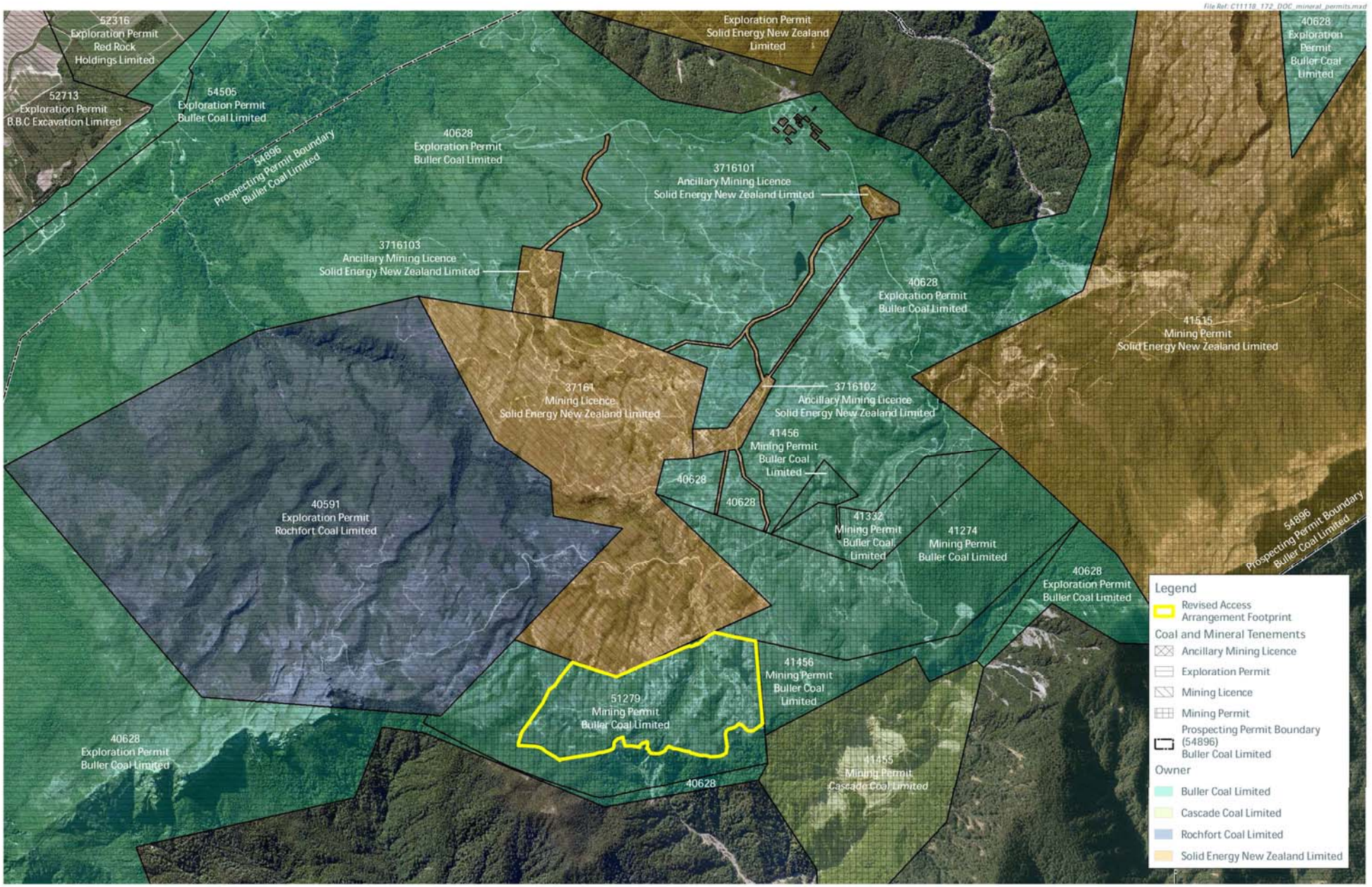

Figure 2: Coal and mineral tenements on the Denniston plateau.

8 ESCARPMENT MINE PROPOSAL

54 This section does not distinguish between the Concessions and AA applications and is an overview of the proposed mine development.

8.1 Infrastructure

55 The EMP mine footprint and proposed mine plans showing the sequence of mining is shown on the plans in Appendix two of BCL (2013) (Attached as Appendix 1.3 of this report). Figure 3 shows the geographic locations of the proposed mine infrastructure at year 5 (final year) including the following main components:

- General infrastructure block
- Extent of Engineered Land Form (ELF) and rehabilitated surfaces
- Water Treatment Plant (WTP)
- Coal Processing Plant (CPP)
- Access road
- Mine Influenced Water (MIW) surge pump
- Flood channel
- Sedimentation ponds

56 Infrastructure within the mine would include a mine site office, crib rooms for workers, coal processing plant and a vehicle and plant workshop. These structures would be located near the active water treatment plant within the mine pit itself. Access to the pit would be via the existing Denniston Road and Whareatea Mine Road from Denniston. Power would be supplied by 'Gen Sets' for the initial period until permanent supply options are considered. Telecommunication services and internet requirements would be provided through mobile and wireless servicing.

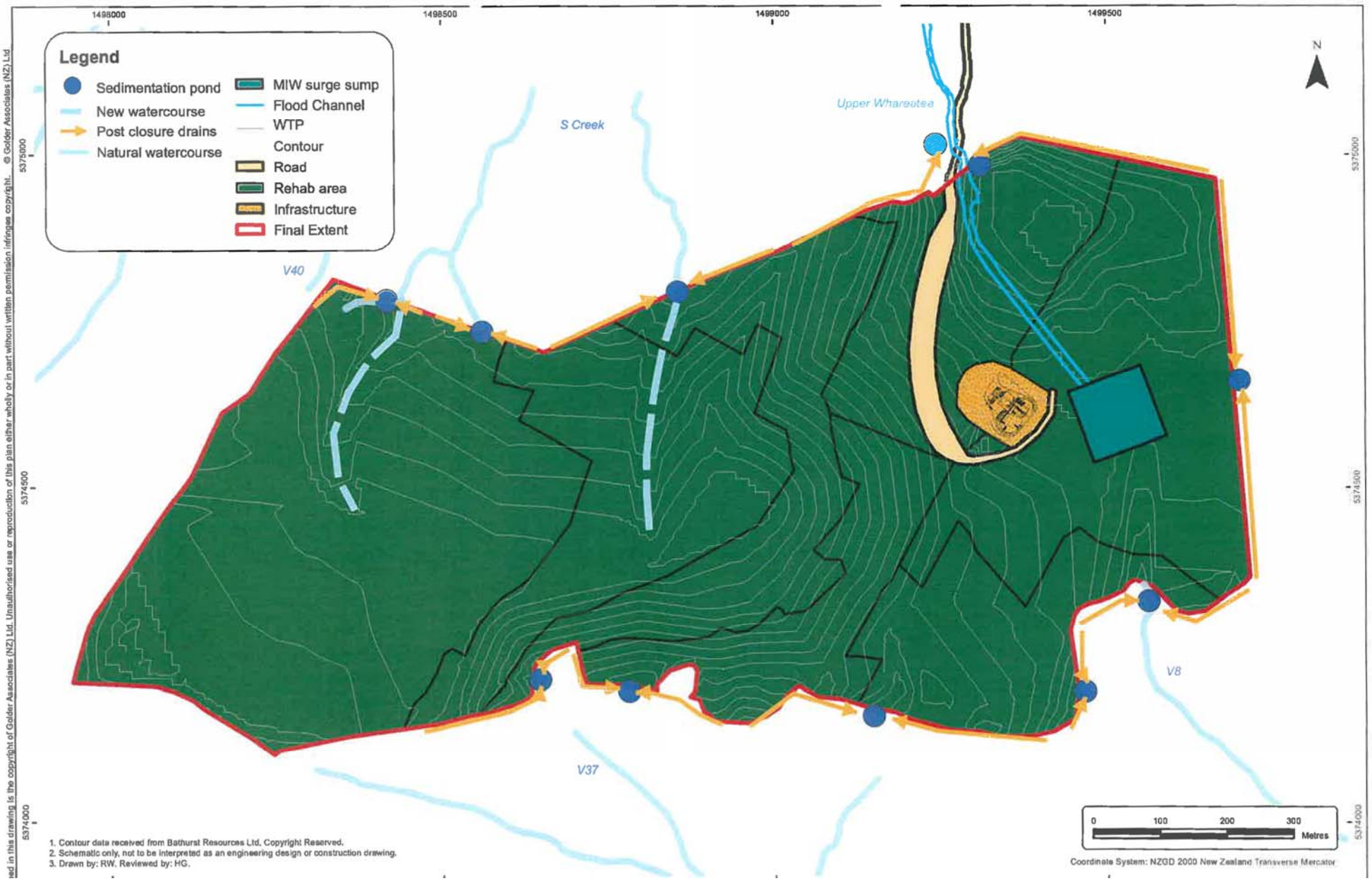

Figure 3: Location of main infrastructure

8.2 Mining method

57 It is intended to develop the mine to extract coal at a rate of between 500,000 – 1,000,000 tonnes per annum from an open pit strip mine. The area would be mined in two sections; Escarpment block and Brasil block. Three stages of mining are proposed:

- Stage 1 would involve mining two strips of the block, commencing at the barren valley and progressing in an Eastern direction, with backfill into the barren valley.
- Stage 2 would involve mining the Escarpment block, commencing at the barren valley and progressing in a Western direction, with backfill placed in the barren valley and into the pit once there is sufficient room.
- Stage 3 is the continuation of mining the Brasil block in a South-North direction, with backfill being placed in the pit. The last coal would be extracted from under the proposed surge pond and the main access to the pit.

58 BCL (2013), section 2, provides a description of the proposed mining operation and schedule.

59 Key considerations/elements for mine development are:

- Rehabilitation would be progressive, utilise 'best practice' techniques and be subject to a comprehensive Rehabilitation Management Plan
- The potential for Acid Mine Drainage would be a key consideration for overburden and water management strategies
- Surface water flows would be managed to divert clean water and capture dirty water separately to reduce treatment requirements.
- Dirty water would be collected from a sump within the pit, and pumped to a settling pond/water management structure for treatment before being discharged.
- A minimum 10 metre buffer would be maintained between the escarpment edge above Cascade Creek and mine operations to protect natural resources of the adjacent area and catchment.

- The mine footprint would be kept as confined as reasonably possible, and overburden would be backfilled into the pit as mining proceeds.
- Pit wall and sump slope stability would be maintained to allow uninterrupted mine production;
- The mine closure plan would be developed and meet the requirements of the Department and Councils.

8.3 Mining equipment

60 It is proposed to use a mining contractor to carry out all mining operations on site. Typical equipment likely to be used is shown in the Table One.

Table 2: Mining Equipment likely to be used

Type	Weight (t)	Capacity	Number
Excavator	180 – 200	12.0 m^3 bucket	3 to 4
Front End Loader	95	11.5m^3 bucket	2
Dump Haul Truck	160	90t rated payload	15
Blast Hole Drill		Up to 140 mm diameter	2
Bulldozer	50 to 65	306 kW	3 to 4
Grader	17.6	149 kW	1 to 2

External Pit Wall Benching

61 Benching around most of the area proposed to be mined would all be within the permit boundary.

Open Cut and Backfill

62 Mining would be by open cut methods. Based on exploration drilling, the maximum depth of overburden would be 75.6 metres at an average of 50 metres. Rock types comprise of very coarse quartzose sandstones and mudstone, which are likely to be strong to moderately strong.

63 The rock strength means the overburden would require drilling and blasting prior to excavation, with hydraulic excavators used to load large mining trucks for transport to backfill sites.

64 Standard mine equipment specified and sized to suit the physical conditions of the site and the proposed production rate would be used. Drilling, loading and hauling operations would be carried out on a 24 hour, 7 day per week basis. Explosive charging and blasting would be carried out on a day shift only.

65 It is envisaged that a 5 metre working bench height would be maintained with blasted material excavated in two discrete flitches, each nominally 2.5 metres in height for efficiency and simplicity during loading operations.

66 The final pit wall is likely to have an overall pit slope in the order of 45°; comprising 15 metre high benches with 63° batter slopes (2V:1H) and 7.5 – 10 metre berms.

67 BCL (2013), Appendix 2, contains sequential plans of the mine development. Initial access to the open cast mine for coal haulage would be via an access road along the Whareatea Mine Road. Two higher level access roads would need to be constructed to access overburden benches in the initial excavation. All other roads would be within the pit walls.

Overburden Management

68 Pre-stripping would be undertaken ahead of the advancing mine face, with adequate stripping to ensure uninterrupted production.

69 For overburden storage, an initial stockpile would be required until sufficient volume becomes available for placement within the pit excavation. The initial stockpile would be positioned in the valley between the Brasil and Escarpment blocks. The coal has been eroded from this area and the valley would provide initial space to store the

overburden material. The capacity of this stockpile would be sufficient to accommodate the initial development cuts. This initial stockpile would form part of the final ELF and would require an underground drainage system to capture AMD.

70 Once sufficient volume is available, all overburden would be backfilled within the confines of the excavation. This material would be trucked directly from the overburden benches, dumped over the active overburden dump face and compacted by the passage of the haul trucks.

71 The surface of the ELF would be progressively rehabilitated to protect against erosion, mitigate against the production of acid mine drainage, to re-instate pre-existing stream flows and provide suitable habitat for flora and fauna.

Production Schedule

72 An indicative mine production schedule has been developed for preliminary planning purposes. The intent is to extract the full reserve of approximately 3 million tonnes (Mt) of coal, at an extraction rate of up to 1,000,000 million tonnes per annum (Mtpa). The schedule would require stripping a total of 35 million bank cubic metres (Mbcm) of overburden at an average strip ratio of 12:1 (bcm: tonnes).

8.4 Water management

Water Supply

73 Potable water supply would be from rain run-off from within the mine pit. A storage reservoir would be required for freshwater pumped from the Waimangaroa River to accommodate variable flow and therefore abstraction rates from that source.

74 The Coal Brookdale Mine (within MP 41274 and adjacent to proposed EMP) has resource consent to abstract water from Lake Brasil which is also proposed to be used as part of the mine's water treatment system. The Applicant has recently purchased the Coal Brookdale Mine and proposes to use an alternative water source for the Coal Brookdale Mine.

75 The Kawitiri Energy Limited (KEL) hydro project has a water permit in respect of water from the Whareatea River. The mine would reduce the availability of water from that catchment for the KEL operation, and therefore it is proposed that additional water would be supplied to KEL from the proposed freshwater reservoir and from Lake Brazil. The Applicant has signed an agreement with KEL to supply water to the KEL hydro project.

Surface Water Flows and Clean Water Management

76 Clean water and contaminated water would be separated to reduce treatment requirements, and to maintain water flows into the north and south catchments to the fullest extent possible. Surface water flowing north from the mine footprint would be progressively disrupted as a result of stripping and mining. However, water flows would be restored as the mine and ELF is progressively rehabilitated. The disruption of the water flow would be minimised to the maximum extent practicable. Hydraulic barriers would be placed to isolate the mine footprint prior to stripping. During operation, on the north and west sides of the mine, clean water would be intercepted and directed into existing catchments. Following mining, flows would be rehabilitated as part of the mine restoration process.

Contaminated Water Management

77 A water treatment plant would be used to treat contaminated water during mining as follows:

(i) Mine Influenced Water Treatment Plant (MW WTP) to treat groundwater and storm water runoff collected within the open cast mine (typically referred to as black water in the mining industry).

78 The MW WTP would include a large surge sump that would be located in the lowest part of the open cast mine. The water would be pumped from this sump to a water treatment system. The treatment system proposes to provide secondary treatment 95% of the time, based on a proposed 95th percentile Resource Consent limit. The design of M/W WTPs are usually dictated by discharge quality conditions imposed under any Resource Consent and/or AA. In this case the Applicant has begun the design of the plant based on predicted limits and has provided the following description:

79 The purpose of the MIW WTP is to treat acid mine drainage (AMD) influenced mine water generated by the Escarpment Mine Project. Due to the acidic nature of the mine influenced water (MIW) and the AMD, the MIW WTP will provide correction of the pH by the addition of alkaline reagent(s) (ultra fine lime and caustic). A three stage treatment process is proposed, and will incorporate the following treatment process; (1) Neutralisation – in which the pH of the MIW is raised to approximately pH 6.5, in doing so a majority of the dissolved aluminium and iron will precipitate out. (2) Chelation Treatment – that addition of a heavy metal chelating agent (MetalsorbTM or similar) is applied to precipitate a significant portion of the residual trace elements not removed in the first stage. (3) Sedimentation – separation of the metal precipitates flocs from the clear supernatant via a set of lamella clarifiers.

Coal Processing Plant Discharge

80 Discharges from the Coal Processing Plant would be directed straight to the surge pond and then onto the Mine Influenced Water Treatment Plant. It is therefore a closed system with no untreated discharges.

Domestic and Industrial Waste Processing and By-product Disposal

81 Domestic and industrial waste would be stored in “skip” bins on site and removed by contractor for appropriate disposal off-site. Organic waste would be stored in sealed

containers to reduce the potential for scavenging and contamination by rodents or other wildlife. Effluent would be stored in holding tanks for off-site disposal.

82 A fuelling bay including bulk fuel storage would be established and would be appropriately protected to reduce the potential for uncontrolled spillage or fire. Waste fuels and oils would be placed in appropriate containers, sealed and stored in a concrete floored area, and bunded with an appropriate sump. Waste containers would be removed from site by a licensed contractor for off-site disposal.

83 Coarse reject material and fines from the CPP (rejects) would be disposed of within the ELF along with NAF material. Sludge from the MW WTP would be disposed of in specially designed cells within the ELF.

8.5 Transport

Road Upgrades

84 Parts of the existing road between the proposed mine and Denniston Road would be widened to allow for the hauling of coal. This haul road development is the subject of a Concession application currently being considered by the Department.

Power

85 Power would be supplied by 'Gen Sets' for the initial period until permanent supply options are considered. Telecommunication services and internet requirements would be provided through mobile and wireless servicing.

Stockpiling and Rail Load-out (Located on Private Land)

86 Coal stockpiling would be at a coal handling facility on private land near Fairdown. A spur rail-line for rail wagon loading would be constructed parallel to the main railway

line. Coal would be loaded from the stockpile by front end loaders and placed directly into rail wagons for transport to the market.

87 The Applicant has indicated that coal would be trucked or trained to Port Westport where the Applicant is currently upgrading facilities to accommodate their needs. Some of the coal may also be trained to Port Lyttleton in Canterbury.

9 PROPOSED REHABILITATION

Context for the following discussion

88 The rehabilitation being proposed by the Applicant is a key aspect of the EMP in terms of ecological outcomes and the potential loss of conservation values. It is also a very complex aspect due to the unique nature of the ecosystem on the Denniston Plateau, the largely untested nature of the proposed rehabilitation techniques and the very long time it would take before any outcomes could be accurately assessed with any certainty (it could be centuries before outcomes become apparent). As such, a lot of discussion (below) has been dedicated to it to ensure it is explored appropriately.

89 The Applicant is proposing to rehabilitate the site and is suggesting, in summary, that although they can not restore and replicate the existing ecosystem exactly, they can recreate something very close to it over parts of the site, and promote the establishment of other less similar ecosystems over the remainder. There is little disagreement that the Applicant could promote the establishment of some form of functioning ecosystem at the site over a long time period following rehabilitation. The Department does, however, disagree with the Applicant's view on how different from the existing ecosystem the rehabilitated ecosystem is likely to be. This difference of opinion is important in the overall assessment of the scale of the loss of conservation values should the EMP go ahead. It should be noted that all experts consulted in respect of this topic (both Department and Applicant) agree that there is a degree of crystal ball gazing involved in the analysis and that predicting long term outcomes is

challenging. It is challenging because there are no examples of similar rehabilitation of a substantive duration to refer to, and because the Denniston Plateau supports a unique ecosystem with a very particular set of ecological circumstances.

9.1 Information sources

90 The Applicant has provided several documents outlining and in support of the proposed rehabilitation for the EMP. These include:

Access Arrangement - Amendment to the Original Application, the reviewed AA application submitted 14 March 2013 (Appendix 1.1 of this report)

Updated Concept Rehabilitation Plan, Appendix 10 of *Access Arrangement - Amendment to the Original Application*, the revised AA application submitted 14 March 2013 (Appendix 1.13 of this report)

Kingsbury, M. 2011. *Draft Concept Rehabilitation Plan For Buller Coal Limited Escarpment Mine Project.* Buller Coal Ltd (submitted as additional information submitted 5 May 2011) (Appendix 2.1 of this report)

Statement of evidence of Michael Francis Kingsbury, dated June 2012, submitted as additional information June 2012) (Appendix 2.2 of this report)

Statement of evidence of Dr Craig William Ross, dated 18 June 2012, submitted as additional information June 2012 (Appendix 2.13 of this report)

Ross, C. 2010. *Soils and Indicative Rehabilitation, Escarpment Mine Project, Denniston Plateau*, *Buller.* Landcare Research (submitted as part of the original application)

Ross, C. 2013. *Addressing the Question of Rehabilitated Soils on the Denniston Plateau Escarpment Area Drying Out.* Landcare Research (submitted as part of the revised application, March 2013)

Boyer, S. Wratten, S. 2012. *Earthworm community assessment on the Denniston Plateau*. Report for Buller Coal Ltd, June 2012, submitted as additional information June 2012

91 These documents have been reviewed by Department experts and documented in:

Gruner, I. 2010*. L&M Mt Rochfort Conservation Area Proposed Rehabilitation*. Department of Conservation internal report (Appendix 3.1 of this report)

Gruner, I. 2011. *Technical Support Assessment of Supplementary Rehabilitation Information provided by Buller Coal Ltd*. Department of Conservation internal report (Appendix 3.19 of this report)

Gruner, I. 2012. *Assessment of additional information provided by Buller Coal Ltd in relation to their Access Arrangement application for the Escarpment Mine Project – Additional information on rehabilitation*. Department of Conservation internal report (Appendix 3.7 of this report)

Gruner, I. 2013*. Buller Coal revised Escarpment Mine proposal*. Department of Conservation internal report (Appendix 3.17 of this report)

92 The proposed rehabilitation is also commented on by many of the Department reviewers for this application. However, the advice provided by Dr Gruner forms the basis for the Department's overall assessment of the proposed rehabilitation. The opinions and conclusions expressed in Gruner (2013) reflect the overall opinion of the Department on the likely long term outcomes for the site and are the culmination of considerable research, analysis, consultation (with experts from within the Department and also with those involved in the Environment Court proceedings) and careful consideration of the issue.

9.2 Proposed rehabilitation goal and strategies

93 The Applicant states that the goal of the proposed rehabilitation is:

"to create an environmental condition that is compatible with the natural landscape, and from which a stable indigenous ecosystem will develop in the long term that is compatible with the intended post-mining land use" (Kingsbury, 2012, para 13; Appendix 2.2 of this report)

94 The Applicant qualifies this goal by explaining that:

"The programme does not seek to replicate the current physical indigenous environment (that is, restoration) but will provide conditions that permit natural processes to reproduce, as closely as possible, the ecosystems that currently exist. Therefore the objectives of the rehabilitation programme are to:

- produce a stable and erosion resistant, congruent landform;
- manage runoff to prevent erosion, to maintain water quality and to link into existing drainage patterns;

- create a stable, self-sustaining, productive and diverse indigenous vegetative cover; and
- encourage appropriate faunal assemblages to re-colonise rehabilitated surfaces." (Kingsbury, 2012, para 14)

95 To achieve the above goal and objectives the Applicant proposes to undertake a 'progressive approach to rehabilitation'. A progressive approach would involve disturbed areas being rehabilitated as soon as practicable as the mine developed. The Applicant has provided a detailed overview of the approach using the following strategies:

- Vegetation direct transfer (VDT)
- Vegetation Indirect Transfer (VIT)
- Soiling
- Transplanting
- Planting
- Hydroseeding
- Slash and mulch utilisation
- Pavement and boulder field creation; and
- Reconstruction of stream habitat

96 The key aspects of the approach are summarised below. It is not practical to describe the approach in all its detail here. For more detail and explanation refer to Kingsbury (2012) para 21 – 81 and Revised Application, Section 7, attached as Appendix 1.1.

97 In summary the rehabilitation would include:

- Contouring of the ELF to aid long term habitat recovery of ecosystems and maintain existing drainage patterns
- VDT of vegetation on the ELF where possible. Limitations include areas of >30 degrees slope (too steep for VDT to be undertaken) and plant dieback of 60-80% on slopes from 20 -30 degrees
- Respreading of stockpiled topsoil and slash (after initial cut)
- Direct planting of areas unable to be "VDT'd" or "VIT'd" and to cover the shortfall of area after VDT
- Spreading of slash and hydroseeding on steep slopes (>30 degrees)
- Reconstruction of streams by re-establishing stream beds with suitable substrate and boulders and reinstating drainage patterns
- Construction of 'boulder fields' to try and replicate sandstone pavement habitat

98 The revised application (BCL 2013) suggests that:

99 For rehabilitation of currently vegetated areas:

- An estimated 30ha of vegetated area would be stripped and stockpiled during an initial cut
- An estimated 56ha of existing vegetation could be VDT'd including VIT. This would be made up of 19ha of 'pakihi', 20ha of manuka scrub and 17ha of 'forest', and equate to 67% of existing vegetation at the site.
- An estimated 28ha of final ELF would be covered by planting

100 For rehabilitation of sandstone pavement:

- None of the 20ha of existing sandstone pavement could be successfully re-created

- Boulder fields would be created to emulate (but not restore) existing sandstone pavement and would constitute 22ha of the final ELF.

101 For streams and Lake Brasil:

- An estimated 1.3km out of a total of 1.4km of streams would be 'reconstructed' to be sympathetic for species such as koura and macroinvertebrate communities
- Lake Brasil would not be rehabilitated and/or restored

9.3 Review of proposed rehabilitation and ecological outcomes and discussion

Summary

102 The proposed methods follow best practice in mine rehabilitation and would lead to the best achievable outcome.

103 Even the best case outcome for rehabilitated vegetation would not fully restore the existing ecosystems or remedy the effects of the proposal

104 Vegetation on the ELF would take decades and in some cases centuries to fully rehabilitate

105 There would be an increase in exotic weeds throughout the site post mining, becoming a permanent component of low growing and open vegetation types, including coal measures 'pakihi'.

106 There are a range of uncertainties around various aspects of the proposed rehabilitation that suggest the Applicant may be overly optimistic about some of the outcomes, particularly for VDT

107 The below discussion is from Gruner (2013) and provides an overview of the Department's analysis of the likely long term outcomes of the proposed rehabilitation (see Gruner (2013) for list of references):

Rehabilitation objectives

1. The applicant acknowledges with the rehabilitation objectives that a re-creation of the unique ecosystems currently present at the site is impossible. The overall goal is stated in relatively broad terms as creating "an environmental condition that is compatible with the natural landscape, and from which a stable indigenous ecosystem will develop in the long term that is compatible with the intended post-mining land use" (BCL 2013, p.21). The proposed rehabilitation "does not seek to replicate the current physical indigenous environment (that is restoration)", but aims to "provide conditions that permit natural processes to reproduce, as closely as possible, the ecosystems that currently exist" (Kingsbury 2012, pt.14). To what degree this would be achievable and how similar the newly created ecosystems would be to the natural systems is further discussed below.

Rehabilitation methods

2. The rehabilitation methods outlined by Buller Coal (2013) and Kingsbury (2011, 2012) follow best practice in mine rehabilitation. The full range of available techniques is listed, and the stated intention is to use these in an adaptive and flexible manner with emphasis on those that are likely to achieve best results, in particular Vegetation Direct Transfer (VDT). This strategy and the methods align with the stated objectives, and, if applied as proposed, would provide the best possible outcomes achievable with land rehabilitation.

Rehabilitation outcomes

Best case scenario

3. In the best case scenario, i.e. if all the proposed strategies and techniques were implemented to the proposed standard and proved successful, rehabilitation of the mine area would lead to the following outcomes:

4. The engineered landform would blend into the surrounding landscape at a large scale and from the distance, but it would not display the small scale topographical diversity currently present (BCL 2013). Steep slopes, vertical and overhanging rock outcrops and areas of flat sandstone pavement typical of the Denniston Plateau landscape would not be re-created.

5. The natural geology of the area would be destroyed. The solid basement rock would be replaced by broken rock up to 1m in diameter (Kingsbury 2012). Potentially acid forming material in the bottom of the proposed pit would be capped by a low permeability layer to limit formation of acid mine drainage. The low permeability layer would be protected by a 1-5m thick layer of broken non-acid forming rock. Soils and vegetation would be placed onto this layer.

6. At the surface, a fifth of the area (22ha, 21%) would be left as exposed rock (boulderfields, see below), a quarter (28ha, 26%) would be soiled and planted with either forest or scrub species, and about half (56ha, 53%) would be covered in vegetation transferred using VDT (Buller Coal 2013).

7. Because of the harsh environmental conditions on the Denniston Plateau, development of rehabilitated vegetation would be extremely slow. While low growing 'pakihi' vegetation (sensu Kingsbury 2012) may develop a dense vegetative cover over a few years, scrub vegetation would take decades to develop, in particular in planted areas. Establishment of forest, comparable in stature and structure to the current forests in the area, would require centuries (> 500 years, Overmars 2012).

8. In the best case scenario, the vegetation cover in the rehabilitated area would eventually broadly resemble vegetation types in adjacent areas, and the total extent of forest, scrub and 'pakihi' vegetation would approximately match their pre-mining extent.

9. Native plant communities would differ from the current communities, in particular in planted scrub and forest areas, as species would be selected to produce "a vegetation cover (of any sort) established for soil protection purposes" (Kingsbury 2012, pt.38). Easily propagated, fast growing species with abundant seed production and good rooting characteristics would be favoured for planting (Kingsbury 2012). Because of this and the more uniform environment in the artificial landform, planted areas would have lower diversity and be more uniform than current vegetation.

10. The area would not display the fine scale mosaic of vegetation types and habitats currently present and typical of the Denniston Plateau (Tonkin & Taylor 2013). The rehabilitation concept plan (Buller Coal 2013 (Appendix 10, Sheet 11e)) illustrates this loss of fine scale pattern when compared to the intricate mosaic formed by the existing vegetation (Buller Coal 2013, (Appendix 10, Sheet 11)).

11. The loss of fine scale topographical diversity would lead to a permanent loss of biological diversity in the area, as certain habitats, such as steep gullies and rock overhangs would no longer be present.

12. Similarly, the loss of fine scale vegetation and habitat patterns would likely lead to a loss of biological diversity. Loss of these patterns means a reduction in the extent of ecotones, i.e. the transition zones between vegetation or habitat types, and a reduction in the diversity of habitats available at a small scale. This represents a fundamental change in habitat characteristics and would lead to the decline of species that require diversity of habitat at a small scale for their persistence. For example, the land snail *Powelliphanta augusta* on the nearby Stockton Plateau was found to prefer ecotones

between vegetation types over large expanses of individual communities (Walker et al. 2008).

13. Areas of sandstone erosion pavements and their associated ecosystem would be permanently lost (Kingsbury 2012, Tonkin & Taylor 2013).

14. Boulderfields, i.e. exposed overburden with boulders up to 0.3m in diameter, would be present as a new habitat. The area currently does not contain any boulderfields (Kingsbury 2012, Tonkin & Taylor 2013).

15. The vegetation would have an exotic (weed) component throughout, contrasting with the present, largely weed-free state (Overmars 2012). Weeds are currently mainly confined to small areas around past disturbance (total c.5.5ha; Tonkin & Taylor 2013, Kingsbury 2012). The Escarpment Mine project would turn the entire footprint into a disturbance site and weed invasion throughout and into adjacent areas would be impossible to prevent (Kingsbury 2012, Rodgers et al. 2011a). Rehabilitation of a lowland pakihi in North Westland, using VDT, resulted in an increase in the proportion of exotic species from initially 3% to 30-40% in 4 years (Ross et al. 2000b in Rodgers et al. 2011a).

16. While the rehabilitation plan includes a pest plant control programme, it would be impossible to eradicate all likely invasives. In particular, gorse (*Ulex europaeus*), montbretia (*Crocosmia x crocosmiiflora*) and rushes (*Juncus squarrosus, J. bulbosus*) would likely pose an ongoing problem (Kingsbury 2012).

17. The use of exotic (or non-local) grasses for erosion control would further increase the exotic component in the vegetation. Even though their use in rehabilitation is intended to be restricted to particular sites (Kingsbury 2012), the wind-dispersed grasses would readily colonise other disturbed sites. Other adventive grasses and common weeds would also invade. While most weed species would probably be shaded out in rehabilitated forest and scrub

areas in the long-term, this would not be the case in low-growing or more open vegetation, including 'pakihi'. The current intact and natural state of these communities would be permanently lost.

18. Overall, even in the best case scenario and accepting a long timeframe for vegetation development, rehabilitation would not fully remedy the effects of the proposal. The developing ecosystems would be less diverse, with different biological communities including invasive exotic species. Sandstone erosion pavements would be entirely lost, and boulderfields, as a new habitat type, would not replace these features. Overall, the area would lose some of its local biodiversity, and its current ecological integrity and naturalness would be permanently compromised. This assessment is in agreement with Tonkin & Taylor (2013) who state that "even if the proposed rehabilitation programme is as successful as is anticipated by BCL, there will still likely be some residual adverse effects for most species and communities" (Tonkin & Taylor 2013, p.19). The loss of integrity and naturalness would also affect adjacent areas, mainly through the spread of weeds from the mine site. Ongoing weed control would be required in perpetuity to maintain the area in at least a semi-natural state.

Uncertainties and risks

19. In my opinion, it is unlikely that the best case scenario described above would be achieved. A number of uncertainties concerning different aspects of the proposed rehabilitation suggest that at least parts of the rehabilitation may not be able to be completed to the proposed standards or techniques may not be as effective as hoped. This means the residual impacts and loss of conservation values would likely be higher than described above.

20. It is impossible to say with certainty how similar the rehabilitated vegetation would be to the current state. Invasion of weeds is unavoidable, permanently compromising the naturalness and ecological integrity of the vegetation (see pts.24.-26.). Native species composition would largely depend on local site

conditions. The outcomes would not be known for years or decades and, in the case of forest vegetation, for centuries.

21. A key issue is the question whether currently high soil moisture levels could be replicated in the rehabilitated area. Soil moisture is seen as one of the key determinants of vegetation patterns on the Denniston Plateau with a general vegetation sequence from obligate wetland species at the wettest sites over 'pakihi', manuka scrub and mountain beech-pink pine forest, as soils get increasingly drier, to beech forest on the driest sites (Lloyd 2013). A change in soil moisture characteristics would therefore mean a change in vegetation types, potentially leading to a fundamental change in the character and ecology of the area.

22. In my opinion, this issue cannot be resolved with certainty. To my knowledge, no examples exist where landform reconstruction and rehabilitation as proposed have been undertaken in comparable ecosystems and a comparable environment at a similar scale. Vegetation direct transfer techniques have been developed at the nearby Stockton Mine (Solid Energy) over the last 15 years, but long-term outcomes are not yet understood (Rodgers et al. 2011a, Rodgers 2011b).

23. However, I consider it unreasonable to expect the native communities to stay the same given the severity of the impact. Vegetation and soils would be completely removed and then placed onto an engineered landform.

24. Removal, transportation and subsequent placement of soils would damage the natural soil structure, making soils more vulnerable to drying out. This would be in particular the case for stockpiled and replaced soil (Ross 2013), but also to some degree for VDT soils.

25. The outcome of VDT would be highly dependent on the quality of the direct transfer. This is influenced by a wide range of factors not all of which could be controlled at all times (see pt.46.). I consider it likely that VDT areas would

be a patchwork of 'good bits' where soils are deep and sods well placed, and 'not so good bits' where soils are shallow or sods have been placed leaving gaps and soils exposed making them vulnerable to drying out (Ross 2013, Rodgers et al. 2011a).

26. In the current coal measures "pakihi', soils are on average 0.1-0.2m thick (Kingsbury 2012). During VDT recovery, transfer and placement, some soil loss is likely to occur, resulting in the placement of sods with soils <10cm in some areas. These soils would be more susceptible to drying out (C. Ross & M. Kingsbury in Joint expert witness statement to the Environment Court, 15 October 2012). Drier sites within 'pakihi' would most likely be colonised by manuka (in addition to weeds) resulting in an increase of this species in 'pakihi' vegetation. An increase in manuka cover was observed 6 years after VDT was undertaken for rehabilitation of a lowland pakihi in Central Westland (Ross et al. 2000).

27. Increased manuka cover in 'pakihi' vegetation could be interpreted as a return to pre-historic vegetation patterns (cf. Lloyd 2012), although the underlying ecology would be different.

28. In forest and scrub vegetation soils are generally deeper (average 0.3-0.4m, Kingsbury 2012) suggesting that desiccation due to thin soils would not be as much of an issue in forest and scrub rehabilitated using VDT. However, recovery and placement of sods would be more difficult because of the taller vegetation and steeper slopes. Therefore, a small scale patchwork of wetter and drier sites should also be expected in the rehabilitation areas. These effects may reduce over time, as soils settle and vegetation establishes. However, in the long-term, I expect vegetation patterns in forest and scrub to be more influenced by the underlying substrate than by small scale soil moisture patterns.

29. Areas of forest and scrub rehabilitated using stockpiled and replaced soil would initially be overall drier. Again, soil moisture levels may increase over

time, as soils settle and a vegetation cover develops (Ross 2013), but as above, I expect the long-term vegetation patterns to be more influenced by the underlying substrate.

30. The engineered land form would provide an entirely different substrate (see pt.14). This would introduce new ecosystem processes which, in my opinion, would lead to the establishment of different communities. Currently, soils are at most 1.3m thick and directly over the largely impermeable coal measures rock (Ross 2012). During rehabilitation, soils would be placed on relatively permeable broken rock, with a low permeability layer at greater depth (Ellis 2012, Kingsbury 2012). This would allow plant roots to penetrate deeper, depending on the depth of the water table, which in turn would depend on rainfall and local topography (Ellis 2012). These effects would be strongest in forest and scrub vegetation, as these would be placed on slopes and the low permeability layer would be 5m below the surface. Taller forest communities that are currently limited to the edges of the Plateau may establish, substantially changing the character of the local ecosystems (cf. Lloyd 2013).

31. There is also uncertainty around the construction and functioning of the low permeability layer itself. To resolve these uncertainties, the application proposes to "establish a trial ELF [Engineered Landform] area at the start of the creation of the ELF in order to evaluate surface run-off and leachate quantities and qualities … (and) to evaluate different options for the impermeable layer. As the ELF develops and possible AMD [Acid Mine Drainage] seeps appear, these will be monitored to improve Buller Coal's understanding of the processes within the ELF" (Buller Coal 2013, p.8/9).

32. The outcome of proposed rehabilitation works for threatened, at risk and locally notable plant species is uncertain (Kingsbury 2012, Tonkin & Taylor 2013). Plants may not establish at their translocation sites and planned habitat restoration may be unsuccessful.

33. Currently present small scale ephemeral wetlands, seepages and flushes would be lost (Tonkin & Taylor 2013, Lloyd 2012). Whether similar features would develop over time in the new landform is unknown. A specific rehabilitation plan for these features is not included.

34. Tonkin & Taylor (2013) highlight the risk that the proposed development could lead to the invasion of introduced invertebrates, posing a threat to the currently highly intact, native invertebrate communities in the area.

35. The rehabilitation proposal describes rehabilitation works to the highest standard and with full integration into mine scheduling. However, there is no certainty that this high standard would be achieved. Experience from other mines has shown that the supply of coal takes priority over rehabilitation needs, leading to the use of inferior techniques, e.g., increased stockpiling of organic material, stockpiling for longer periods or double handling of material. The latter has already been included in the amended application as Vegetation Indirect Transfer (VIT, Buller Coal 2013, section 7.3.1). This is not an established rehabilitation technique, but the need for VIT arises from a lack of rehabilitation areas to directly transfer vegetation material (Kingsbury 2012, pt.23.7). Double handling and interim storage of vegetation material decrease its quality and reduce the likelihood of successful establishment at the final destination (Buller Coal 2013, Kingsbury 2012). This technique would be inferior to VDT, but preferable to mixed stockpiling (Kingsbury 2012). Other uncertainties around the achievability of the described high rehabilitation standards are accommodated with phrases like “wherever practicable” (Kingsbury 2012, pt.29) or “whenever possible” (Kingsbury 2012, pt.31).

36. Estimated recovery rates for VDT and soils may not be achieved leading to the use of inferior rehabilitation techniques over a larger area. This would severely reduce the quality of the rehabilitation outcomes. Kingsbury (2012) calculates recovery of VDT and soils based on estimated average recovery rates for three broad slope categories (<20°, 20-30°, >30°). However, VDT

and soil recovery are also influenced by subsurface topography, rock and boulder content of the soil, vegetation height and soil depth (Buller Coal 2013, Kingsbury 2012, Rodgers et al. 2011a). Small scale, unexpected variation in any of these factors may well lead to a reduction in recovered material. According to Ross (2012, pt.55), soils in the area show complex and unpredictable patterns, and a shortfall in soil and plant material for rehabilitation can be expected (Ross 2012, pt.15.6).

37. Similarly, VDT quality is influenced by a range of factors including slope, vegetation height, soil depths, rock and boulder content, site access, machinery type and size, operator skill, transportation and mine scheduling (Kingsbury 2012, Rodgers et al. 2011a). Natural variability and unexpected difficulties during operations are likely to lead to lower quality VDT outcomes in at least some of the areas.

Conclusions

38. The above discussion of rehabilitation outcomes shows that even if the proposed rehabilitation strategies and techniques were implemented to the proposed high standard and proved successful, residual impacts would remain, that would fundamentally change the ecology of the application area and adjacent habitats. This would present a significant and permanent loss of currently high conservation values. Some of the current natural diversity would be lost, including rare habitats like sandstone erosion pavements. The area would lose its current ecological integrity and naturalness through permanent changes in substrate and weed invasion. These outcomes are certain.

39. In addition, a wide range of uncertainties around various aspects of the proposed rehabilitation suggests that the residual impacts would likely be larger, leading to additional biodiversity loss and potentially to further fundamental changes in the character of the area.

9.4 Summary and discussion

108 It is clear from both the application and the Department's review of the application that the proposed rehabilitation would not achieve full recovery and/or restoration of current habitat and ecological processes and that the proposal would therefore lead to a loss of biodiversity and conservation values. Fens, seepages and sandstone pavement areas would be permanently lost. The above analysis suggests that despite the use of 'best practice' there is no guarantee that the proposed rehabilitation would generate the ecological outcomes proposed by the Applicant, particularly in the longer term. The extent to which the proposed rehabilitation could reduce the loss of other values at the site is primarily dependent on how different the vegetation becomes over time; particularly how successful the proposed VDT is and how the changes to sub-soil processes affect vegetation over the long term.

109 In a best case scenario the proposed rehabilitation would retain some but not all of the key elements of BCM ecosystems at the site at roughly the same distribution and extent. However, due to the unique nature and limited extent of the existing ecosystems this best case scenario would still result in a significant loss of conservation values. There would be a progressively significant loss should results at the site tend toward a less optimistic scenario that the Department feels is more likely.

110 Given the above, it is considered that any approval for the application would require a compensation package to address the losses of conservation values of the land. Any approved AA would also need to provide a mechanism for ensuring the Department has resourcing to address ongoing monitoring and/or remedial work at the site over the long term or in perpetuity post the completion of mining. See Section 23.6 for detailed discussion of bonds and insurances.

111 *The Applicant has made comment that the Department's conclusions on rehabilitation may be overly conservative. In particular they do not believe the Department's*

conclusions regarding the potential 'drying out' of areas of VDT are correct. The Applicant is of the view that in alignment with their expert Dr Craig Ross (see Ross 2012, Ross 2013), there would be little if no 'drying out' of the soils subject to VDT. This scenario would reduce somewhat the potential changes to VDT'd habitat, particularly 'pakihi' vegetation. They also point out that they believe Dr Ross is the most qualified expert relating to this topic and point out that the Environment Court favoured Dr Ross' evidence in its interim decision.

112 *Likewise the Applicant believes the Department has taken an overly conservative view on the likely effects of the proposal on the vegetative successional pathways on the ELF. The Applicant feels that the Department's conclusions are at odds with the evidence presented in the Environment Court and the weight attached to evidence that suggests the ELF is likely to provide a surface that supports plant communities and permeability similar to that pre-mining.*

113 *As discussed above the potential outcomes of rehabilitation is an area of uncertainty and all experts agree that this is the case. In the Department's view Gruner (2013) provides a reasonable assessment of the likely outcomes for rehabilitation. The Department believes her view is not overly conservative but does reflect an appropriate amount of caution given the untested nature of the techniques and unique and high value habitats present at the site.*

114 The rehabilitation of mine sites, particularly the use of VDT and particularly at this scale, is a relatively new and developing field in New Zealand. The rehabilitation proposed by the Applicant may be considered 'best practice'. However, 'best practice' for mine site rehabilitation is still an evolving field and one that has not been fully tested and proven in New Zealand, particularly over the longer term, and it is acknowledged that one of Mr Kingsbury's roles is to "develop rehabilitation techniques" (Kingsbury, 2012, para 2). It is difficult to confidently assess the potential success of the proposed rehabilitation because there is no completed rehabilitation this type and scale available for assessment or comparison. The only similar examples

would be from nearby Stockton Mine but these are only 10-15 years old at the longest and the long term results can not be ascertained. There is therefore inherent uncertainty surrounding the proposed ecological outcomes from the proposal. The Applicant stresses that the strategies and techniques proposed for the EMP have been trialed at nearby Stockton mine and others. However, the techniques and results have not yet been proven over the longer term, and it is not yet clear how successful they have been.

115 The Applicant is proposing an 'adaptive management' approach to address ecological effects for the EMP, including the approach to rehabilitation. This approach would require them to revise and adjust rehabilitation strategies 'on the ground' as different scenarios and operational challenges are encountered. A valid question may be whether the area under application (that has very significant ecological and conservation values and is part of a wider unique and in parts under-represented ecosystem) is an appropriate environment for unproven rehabilitation approaches to be trialed and tested under an 'adaptive management' framework. There would be a significant risk to the ecological integrity of the area should the proposed rehabilitation not achieve the intended goal in the first instance and the time scale involved with assessing the success of rehabilitation in this environment (potentially centuries) would be such that even this approach does not offer any more certainty around the long term outcomes.

116 The draft AA (attached as Appendix 6) would require development of a substantial and detailed Closure and Rehabilitation Plan for the EMP. This plan would be thoroughly assessed and worked through during the subsequent Work Plan approval process. The Department would have input into the plan and retain the ability to determine its contents consistent with the AA and be involved in the subsequent long term management of the plan and rehabilitation of the site.

10 BIODIVERSITY OFFSET PROPOSAL

117 The Applicant had originally included a biodiversity offset model as part of their application. However, due to outcomes of the Environment Court appeal hearing for the EMP the Applicant has withdrawn this model from the application. Therefore the Department has not included analysis of the offset model. Elements of the offset, however, are still relevant to the Applicant's compensation proposal which is described later in this report.

11 NATURAL RESOURCES AND CONSERVATION VALUES

11.1 Brunner Coal Measure Ecosystems and the natural values of the Denniston Plateau

118 The Stockton and Denniston plateaux are the only elevated Brunner coal measure ecosystems in New Zealand. Elevated Brunner coal measure ecosystems support a unique association of native vegetation that is different from anywhere else in New Zealand (Overmars et al, 1998)[3]. The extent of Brunner Coal Measure (BCM) ecosystems is limited to approximately 6500 ha. The Denniston Plateau is the only elevated Brunner coal measure ecosystem (approximately 2026 ha) without large scale land conversion, and is the least modified in terms of roads and weeds. It is also distinctive from the Stockton in terms of topography and ecosystems.

119 In summary the Denniston plateau is of significance in terms of conservations value because:

[3] Overmars, F.B.; Kilvington M.J.; Gibson, R.S.; Newell C.L; Rhodes T.J. 1998. *Ngakawau Ecological district. Survey report for the protected natural areas programme. New Zealand Protected Natural Areas Programme Survey Report No. 11*, Department of Conservation, Hokitika.

- It has the most intact representative areas of remaining BCM ecosystems
- There are large and contiguous areas of the best remaining representative BCM ecosystems vegetation on the Denniston Plateau
- The Denniston Plateau, particularly the south and eastern areas, is acknowledged as having possibly the best remaining examples of historically rare sandstone erosion pavement and associated values
- Approximately half (circa 1,100 ha) the Denniston Plateau is a nationally significant wetland
- There are several nationally critical and nationally endangered plant species found on the Denniston Plateau, some of which are only found there. There are also numerous other At Risk and Threatened plant species found there.

11.2 Values within the proposed footprint

120 The key natural resources within the proposed open cast mine footprint are summarised as follows:

121 The area contains approximately 20ha of the remaining "originally rare sandstone erosion pavements" and these may be some of the best on the Denniston Plateau and Brunner coal measure.

122 There has been some anthropogenic disturbance of ecosystems in the past, including (to varying degrees) past mining, roads, bulldozed tracks and the spread of weeds. The areas toward the west of the proposed footprint are considered to be highly natural overall, while areas in the east have a higher degree of anthropogenic influence.

123 The proposed footprint contains a number of Threatened and At Risk plant species, including the North Westland snow tussock (*Chionochloa juncea*) (at risk of extinction;

in decline) , *Sticherus tener* (Nationally critical) and several nationally critical lichens and liverworts

124 The footprint contains an outstanding assemblage of plant species which have not been recorded (to date) elsewhere on the Denniston Plateau

125 Approximately 1137 hectares of the 2026 hectare elevated Brunner coal measures that comprise the Denniston Plateau is a nationally significant wetland including nationally significant fens, seepages and flushes that are located within the proposed footprint. The Denniston wetland is ranked within the top 30% of wetlands in the West Coast region and is ranked as number one in the northwest Nelson biogeographic zone.

126 Naturally uncommon and distinctive mountain beech-pink pine forest is well distributed within the footprint. This forest type is dominant at mid-elevation on the Denniston Plateau, but rarely occurs on the Stockton Plateau. This low stature forest includes some trees up to 500 years of age and provides outstanding habitat for bryophytes. The presence of pink pine in forests within the footprint indicates that it is likely to represent original forest cover.

127 The land contains freshwater streams containing low to moderate diversity and abundant macroinvertebrate communities due to natural acid rock drainage and mining induced acid mine drainage discharges. Koura were found in streams within the proposed footprint. They are likely to be unique (genetically) to this area and the Denniston plateau is considered an Ecologically Significant Unit (ESU) for koura.

128 The habitat within the 106ha footprint has indigenous terrestrial fauna values which are ‘typical’ of coal measure habitats on the Buller Coal Plateaux, and which are nationally rare and distinctive.

129 Fauna species recorded or possibly present in the footprint include a range of avifauna, including several Threatened and At Risk species and at least two pairs of Great Spotted Kiwi, lizards, long tailed bats, *P. patrickensis* and a range of other terrestrial invertebrate species

130 The Denniston *P. patrickensis* subpopulation is endemic to the Denniston Plateau. The footprint represents c.6% of the remaining subpopulation's habitat and c.5% of its population

131 The Denniston Plateau is home to a unique assemblage of lizards that exhibit a colour morph only found on the plateau. The lizard communities on the plateau are considered nationally significant.

132 The land forms part of the Denniston coal mining landscape which is a unique historic landscape. Historic sites within the proposed footprint are an integral part of this landscape.

133 The PNAP report states that after investigation into other occurrences of Brunner coal measure "Ngakawau ED is the only ecological district in New Zealand defined by the presence of extensive elevated coal measures rocks and associated landforms and vegetation (McEwan 1987), and as such could be regarded as a nationally outstanding natural landscape in its entirety." The experts for both the Applicant and the Department, however, consider that the landscape is not outstanding under the Pigeon Bay Criteria which are commonly applied when assessing landscape values under the RMA.

134 The proposed mine site has important recreational and scenic values. Visitors travel up to the Denniston Plateau to explore the wild and remote environment and to see the historic mining remnants. Recreational use mainly includes biking, walking and 4wd.

12 POTENTIAL EFFECTS ON NATURAL RESOURCES AND CONSERVATION VALUES

12.1 Summary of potential effects on Natural Resources and Conservation Values

135 Potential effects on natural resources and conservation values are summarised as follow:

- The permanent loss of 106 ha of elevated Brunner coal measure ecosystems on the Denniston Plateau which support a unique association of native vegetation that are different from anywhere else in New Zealand. The loss would be approximately 1.6% of all elevated Brunner coal measure ecosystems and approximately 5.2% of elevated Brunner coal measure ecosystems on the Denniston Plateau itself.
- A significant loss of 'coal measure pakihi' habitat dominated by *Chionochloa juncea*
- A loss of a majority of the known occurrences of *Sticherus tener*, a nationally critical plant specie
- A loss of distinctive assemblages of rare and threatened plant species not recorded (to date) elsewhere on the Denniston Plateau
- The permanent loss of originally rare sandstone pavement ecosystems and sandstone topography unique to the BCM. The areas within the proposed footprint have been described as some of the best on the BCM, and cannot be recreated using rehabilitation techniques.

- Permanent alteration of hydrological characteristics in disturbed and rehabilitated areas. *Note here that the Applicant believes the alteration of hydrological processes would be minimal*

- The establishment of different vegetative successional pathways and ecosystems within rehabilitated areas. The new ecosystems would be more prone to exotic weed incursion and likely require more ongoing pest management. *Note here that the Applicant believes the alteration of vegetative successional pathways would be less than the Department concludes*

- The temporary or permanent loss of *P. patrickensis* habitat in the proposed mine footprint (106 ha) and death of a large number of *P. patrickensis* snails. This would lead to a reduction in the range of *P. patrickensis* of about 4% (Walker, 2013, attached as Appendix 3.11). It would be unlikely that *P. patrickensis* would naturally recolonise planted rehabilitated areas (non-VDT). The likelihood of VDT areas providing good habitat for *P.patrickensis* is low because they have specific habitat requirements that may not be evident post mining despite best practice rehabilitation. *Note here that the Applicant believes a more optimistic result for* P.Patrickensis *in rehabilitated areas is likely*

- The temporary loss of 106 ha of habitat for terrestrial fauna including GSK, South Island fernbird, New Zealand Pipit, Western Weka and South Island Rifleman. These impacts would reduce over time assuming that natural vegetative cover is eventually restored

- The loss of stream habitat and invertebrate communities in the upper Whareatea River and upper Cascade Stream from the destruction of streams within the proposed footprint. The loss of Lake Brasil and associated ecosystems.

- A potential improvement in water quality of the Whareatea catchment in the long term

- Loss of nationally significant wetlands within the mine footprint.

- The production of acid mine drainage (AMD; acidic leachate with concentrated metals/ metalloids) and water contaminated with fine sediments. Potentially Acid Forming rock (PAF) would be capped under the engineered landform (ELF). Affected water would be treated and then discharged in the Whareatea catchment.
- The permanent loss of archaeological contextual values of the mines on the Denniston Plateau by the destruction of the Escarpment Mine and coal bins, Brazil's Dam, Birchall's Co-operative Mine and Plateau Mine. The physical loss of these sites would be a loss of values at a significant historic coal mining landscape.
- The landscapes and landforms of rocky pavement, escarpments, incised streams and vegetation of the mined area would be irreversibly altered by open cast mining and the vegetation. The effects on the overall landscape character of the Plateau would be minor but the effects on the site (open cast mine) would be significant during the mine operation.
- Recreational activities would be adversely affected to varying degrees. However, post mining impacts would lessen with appropriate restoration. Additionally, the applicant proposes to provide for other recreational opportunities as well as contributing to restoration of other historic sites.

13 PLANT ECOLOGY

13.1 Summary

136 The Stockton and Denniston plateaux are the only elevated BCM ecosystems in New Zealand. Elevated BCM ecosystems support a unique association of native vegetation

that is different from anywhere else in New Zealand (Overmars et al, 1998)[4]. The total area of elevated BCM ecosystems is approximately 6500ha. They are considered to be ecologically rare, regionally and nationally significant and have a high degree of vulnerability. They are therefore considered to have very high value for conservation.

137 The Denniston plateau (approximately 2026 ha) is the only elevated BCM ecosystem without large scale land conversion, and is the least modified in terms of roads and weeds (Marshall, 2010 attached as Appendix 3.2). The proposed footprint of the EMP is approximately 5.2 % of the elevated (above 600m a.s.l.) Denniston Plateau and 1.6 % of all elevated Brunner coal measure habitat.

138 The proposed footprint of the EMP is part of a larger area also including the Mt Rochfort, Whareatea West, and Trent Stream areas, that are some of the least modified and most representative examples of BCM. The floral values within the proposed footprint are both representative of BCM ecosystems overall, and include a number of nationally rare and threatened species. Many of these species have very limited distributions on the Denniston Plateau and the footprint contains an outstanding assemblage of plant species which has not been recorded (to date) elsewhere on the Denniston Plateau.

139 The proposal would involve the open cast mining of 106 ha of BCM ecosystems. It would permanently destroy areas of sandstone pavement, significantly impact a range of rare and threatened species, permanently alter the subsoil structure, establish different vegetative successional pathways, and increase the invasion of weeds leading to a reduction in overall ecological integrity. Proposed rehabilitation would help retain some of the species and plant assemblages but overall the proposal would permanently and significantly alter the nature of the ecosystems present.

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[4] Overmars, F.B.; Kilvington M.J.; Gibson, R.S.; Newell C.L; Rhodes T.J. 1998. *Ngakawau Ecological district. Survey report for the protected natural areas programme. New Zealand Protected Natural Areas Programme Survey Report No. 11*, Department of Conservation, Hokitika.

140 *The Applicant believes that the above conclusion on rehabilitation outcomes does not accurately reflect all possible outcomes. The Applicant suggests that there is the possibility for a more optimistic outcome and that if this did eventuate the alteration of existing ecosystems would be much less than the Department concludes. Subsequently they believe the Department has overstated the level of effects on flora and that this is reflected in the overall conclusions in the report.*

13.2 Information sources

141 The original application for the EMP included a technical vegetation report (Nichols and Overmars 2008, attached as Appendix 4.1). This report was reviewed by the Department's technical specialist Dr Jane Marshall in 2010. Dr Marshall also undertook an assessment of the flora of the area (including bryophytes), and an assessment of impacts and the proposed mitigation. This internal report is referred to as Marshall (2010) (attached a Appendix 3.2) *[note that Marshall's (2010) assessment was based on 152ha footprint so the area and percentage values identified in Marshall (2010) are now out of date].* As a result of the Environment Court proceedings relating to the EMP there has been a lot of new information on the flora of the Denniston Plateau and the proposed footprint gathered and available for analysis. Some of the content and conclusions of Marshall (2010) are now therefore out of date. However, some of the general descriptions and conclusions on representativeness and significance overall are still considered valid.

142 New and further information on the floral values within the proposed EMP and on the Denniston Plateau was submitted in support of the Applicant's AA application in June 2012. The relevant documents are listed below:

> Overmars and Lloyd (2012), attached as Appendix 4.4. *Proposed Escarpment Mine, Vegetation Survey of Trent Stream Area and Southern Denniston Plateau*

Statement of evidence of Fred Bernard Overmars, dated 18 June 2012 (submitted as additional information June 2012) and attached as Appendix 2.3.

143 The most up to date information has been reviewed for the Department by Dr Kelvin Lloyd from Wildlands Consultants. Dr Lloyd has provided a summary report on the information provided by the Applicant and the information arising from the Environment Court. His review is included as Appendix 3.3 and referred to hence forth as Wildlands (2013). Lloyd has drawn on the above information supplied by the Applicant and also the latest information available including various other evidence and joint witness statements form the Environment Court and a recent summary of vegetative surveys results provided by the Applicant.

144 The following review draws on both Marshall (2010) and Wildlands (2013) and other sources (cited) where necessary.

13.3 Assessment of terrestrial Flora

Description and composition

145 The Stockton and Denniston Plateaux are the only elevated BCM ecosystems in New Zealand and support vegetative assemblages that are different to anywhere else in New Zealand. The Stockton Plateau has large area land conversions and 18.5% of the elevated coal measures on Stockton are classed as cleared by mining, roading, pond construction and vegetation with significant exotic component. The Denniston Plateau, however, has no large area land conversions and the diffuse nature of the human induced modification leaves a largely naturally functioning ecosystem with only 6% of the elevated coal measures on Denniston classified as cleared by mining, roading, pond construction and vegetation with significant exotic component.

146 The Denniston Plateau has approximately 2026 ha of elevated coal measure ecosystems of which 92% is in public conservation land and has proportionately less of the roading and weed areas identified on the elevated Stockton Plateau; therefore provides the best examples of a full range of patterns and processes within this environment type.

147 The proposed footprint is part of a continuous sequence of predominantly intact vegetation associations that cross altitudinal sequences from 60 m asl to 1100 m asl in the west and drop steeply in the east to the Cascade River and large tracts of the Orikaka Ecological Area, all of which are held for the purposes of conservation.

148 The western portion of the revised footprint is largely unmodified while the eastern area includes several vehicle tracks skirted by some gorse and exotic weeds, the man made Lake Brasil and historic structures and mining infrastructure. Most of the modification is from historic underground coal mining, historic fires, road works, and the introduction of pest species. However, the vegetation associations are still dominated by native species, with a very low ratio of exotic weed species, and are natural and representative communities.

149 The vegetation associations within the proposed footprint are generally representative of the Denniston Plateau and consist of a mosaic of forest and non-forest associations which in places is distributed at a very fine scale (metres). A key driver of the mosaic configuration is the sandstone pavement base layer that supports poorly draining soils and distinctively small wetlands. Many areas of the Plateau are saturated permanently or a majority of the time. These areas are typified by low stature 'pakihi' type vegetation comprising of *Chionochloa juncea* wetland (henceforth referred to as 'coal measures pakihi'). The slightly drier areas (still very wet or saturated most of the time) are either dominated by mountain beech-pink pine forest or manuka scrubland, while better draining soils on slopes and the edges of gullies support mixed beech forest. Areas of exposed sandstone erosion pavement and sandstone scarp overhangs provide habitat for ferns and other vascular plants suited to these areas.

150 The revised 106ha footprint contains approximately 35ha of coal measures pakihi, 1.2ha of mixed beech forest, 53ha of mountain beech-pink pine forest, approximately 9ha of manuka scrubland and 20ha of sandstone erosion pavement.

151 A list of 'rare and distinct' species likely to be present in the revised footprint is included in Appendix 9 of BCL (2013) and is included here for reference:

Table 3: Plant species that are rare or distinct and which have been found or which are likely to be present within the propose pit area.

Division	Known or likely within pit footprint	Species	Current threat classification
Lichen	Yes	*Pertusaria dennistonensis*	Data deficient
Liverwort	Yes	*Acromastigum mooreanum*	At Risk, Naturally Uncommon
Liverwort	Yes	*Isolembidium anomalum var. anomalum*	Nationally critical
Liverwort	Yes	*Neogrollea notabilis*	Nationally Endangered
Liverwort	Yes	*Pallavicinia rubristipa*	At Risk, Naturally Uncommon
Liverwort	Yes	*Saccogynidium decurvum*	Nationally Vulnerable
Liverwort	Yes	*Telaranea inaequalis*	Nationally vulnerable
Lichen	Yes	*Austropeltum glareosum*	Nationally endangered
Lichen	Yes	*Pycnothelia caliginosa*	Nationally endangered
Vascular	Yes	*Actinotus novae-zelandiae*	Not threatened
Vascular	Yes	*Astelia subulata*	Not threatened
Vascular	Yes	*Brachyglottis bellidioides var. crassa*	Not threatened
Vascular	Yes	*Carex carsei*	At Risk, Declining.
Vascular	Yes	*Carex dallii*	At Risk, Naturally Uncommon.

Vascular	Yes	*Celmisia dubia*	Not threatened
Vascular	Yes	*Chionochloa juncea*	At Risk, Declining
Vascular	Yes	*Chionochloa rubra var. occulta*	Not threatened
Vascular	Yes	*Dracophyllum densum*	At Risk, Declining
Vascular	Yes	*?Euchiton paludosus*	At Risk, Naturally Uncommon
Vascular	Yes	*Euphrasia wettsteiniana*	At Risk, Naturally Uncommon.
Vascular	Yes	*Halocarpus bidwillii*	Not threatened
Vascular	Yes	*Libocedrus bidwillii*	Not threatened
Vascular	Yes	*Metrosideros parkinsonii*	Not threatened
Vascular	Yes	*Pseudowintera traversii*	At Risk, Naturally Uncommon
Vascular	Yes	*Sticherus tener*	Nationally Critical
Vascular	Yes	*Zotovia thomsonii*	Not threatened
Liverwort	No	Acromastigum brachyphyllum	Tax. Indet, Data deficient
Liverwort	No	Acromastigum verticale	Nationally vulnerable
Liverwort	No	Allisoniella scottii	Nationally critical
Liverwort	No	Bazzania engelii	Data deficient
Liverwort	No	Riccardia furtiva	At risk, naturally uncommon
Liverwort	No	Riccardia multicorpora	At risk, naturally uncommon
Liverwort	No	Zoopsis bicruris	At risk, Naturally uncommon
Liverwort	No	Zoopsis matawaia	At risk, naturally uncommon
Lichen	No	Calycidium cuneatum	At risk, naturally uncommon
Lichen	No	Icmadophila splachnirima	Nationally vulnerable
Lichen	No	Parasiphula jamesii	Data deficient
Vascular	No	Celmisia parva	Not threatened
Vascular	No	Forstera mackayi	Not threatened
Vascular	No	Mitrasacme montana var. helmsii	Nationally Endangered

Lichen	Probably at/near CPP	Pertusaria dennistonensis	Data deficient
Lichen	Unknown	Parasiphula elixii	Data deficient
Lichen	Unknown	Placopsis centrifuga	At risk, Naturally uncommon

Significance

152 In terms of the traditional meaning of representativeness, the Denniston Plateau is the only elevated BCM plateau, almost entirely within public conservation land, without a large area land conversion, and is therefore the largest, intact and most sustainable example of the elevated BCM environment; arguably these attributes trigger a high representative value (Marshall, 2010). Wildlands (2013) also indicates that "It is clear the indigenous vegetation within the proposed mine pit has a high level of ecological significance" (Wildlands, 2013, p. 3). This is also acknowledged by the Applicant in BCL (2013).

153 "Significance" assessments (*sensu* s 6(c) RMA) are not required as part of the Department's process, however they have become a generalised tool in ecological assessment reporting, and were provided as part of the AA application, therefore it was considered appropriate to comment on this in order to complete the assessment of information provided by the Applicant. For the purposes of the assessment against the relevant matters under the CMA 1991 the floral values within the proposed footprint are considered to be very high, and to form part of a unique group of vegetative assemblages that create an ecosystem found no where outside of the Denniston Plateau. The proposed footprint is part of a large continuous tract of public conservation land [The Denniston plateau] that is identified in the West Coast *Te Tai o Poutini* Conservation Management Strategy (CMS) as a priority area for ecosystem management.

154 On a finer scale the features of particular significance include:

- Coal measure pakihi – dominated by *Chionochloa juncea* (At Risk/Declining). Denniston Plateau is the national stronghold of this habitat type.

- Seepages and flushes and ephemeral wetlands – that provide habitat for nationally Threatened or At Risk species such as *Euphrasia wettsteiniana*, *Sticherus tener*, and *Pallavicinia rubristipa*.

- Several threatened or endangered liverwort species found within the proposed footprint *Isolembidium anomalum var. anomalum* (Threatened-Nationally Critical) and *Teleranea inaequalis* (Threatened-Nationally Endangered). *Isolembidium anomalum* var. *anomalum* is currently known from only five localities in New Zealand, two of which are threatened by mining (within the consented Cypress Mine) on the Stockton Plateau (Wildlands 2013*). Teleranea inaequalis* has been recorded at two sites within the revised mine footprint and is known from three other sites on the Stockton and Denniston Plateaux, and at two sites in Fiordland (Wildlands 2013). *Pallavicinia rubristipa* (At Risk-Naturally Uncommon) is present within the revised mine footprint, and is relatively common on the Denniston and Stockton Plateaux (Wildlands 2013).

- Two nationally threatened lichens (both classified as Threatened-Nationally Endangered) found within the revised mine footprint. *Austropeltum glareosum* has been recorded from two sites within the revised mine footprint, a few other sites on the Denniston Plateau, one site on the Stockton Plateau, and at one site on Stewart Island (Wildlands 2013). *Pycnothelia caliginosa* has been recorded from one site within the mine footprint and two other sites on the Denniston Plateau, and is known elsewhere in New Zealand in the Cobb Valley and Tasman Mountains.

- *Sticherus tener* – (Threatened - Nationally Critical) - has a very limited known distribution. Most known occurrences are at locations within the eastern part of the proposed footprint. However, it has been recently found at sites nearby but outside the footprint. The distinctive rock outcrop and cracks that *Sticherus tener* favour appear to be limited to this part of the Denniston Plateau.

- *Euphrasia wettsteiniana* (Threatened – Nationally Vulnerable) - has a very limited known distribution but is found outside of the proposed footprint. There are large populations within two small creek margins within the proposed footprint.

- *Celmisia similis* – a locally uncommon species that has extensive occurrences within the eastern part of the mine site. This wider distribution of this species on the Denniston Plateau is not well known but it is likely to be present on sandstone pavement habitat outside the mine site.

- *Forstera mackayi* - a local endemic that has substantial populations within the mine footprint, but is also found elsewhere on the Denniston Plateau.

- *Astelia subulata* and *Exocarpus bidwillii* - Both are locally uncommon and have small populations within the mine footprint, and are uncommon elsewhere on the Denniston Plateau.

- *Dracophyllum densum* (At Risk-Declining) - found within the revised mine footprint and throughout the Denniston and Stockton plateaux. Habitats and populations of both of these species would be significantly reduced by clearance for the revised mine footprint, but they would still retain substantial populations outside the mined area.

- *Meterosideros parkinsonii and Libocedrus bidwilli* are also likely found within the proposed footprint and are locally uncommon and regionally endemic (Marshall, 2010).

- Mountain beech-pink pine forest is a low growing nationally uncommon forest type that is dominant at mid-elevation on the Denniston Plateau, but rarely occurs on the Stockton Plateau. It is well distributed within the proposed footprint. The presence of pink pine (*Halocarpus biformis*) is thought to indicate absence of past fires, as this species is susceptible to fire and rarely recovers from it. As such, areas of mountain beech-pink pine forest on the Denniston Plateau are likely to represent original forest cover, with some of the trees being of substantial age.

155 For discussion on wetlands and wetland flora see Freshwater Section 15.

13.4 Recommended Areas for Protection

156 The plateaux and their western slopes were surveyed during the 1987/88 summer to identify the highest priority areas for nature conservation. This work was part of the Government's Protected Areas Scientific Advisory Committee's Protected Natural Areas (PNA) Programme (PNAP) which, centered around the ecological districts, sought to identify and protect a network of intact functioning areas which are representative of the full range of New Zealand's natural diversity (see Ngakawau Ecological District Survey Report for the Protected Natural Areas Programme, Overmars et al, 1998 (PNAP Report)).

157 As a result, for the BCM Plateau, four major and three minor areas were recommended for protection (RAPs) with the intention being to gazette the RAPs as Ecological Area. This has not occurred to date although some areas are currently in the process of being transferred from LINZ to public conservation land as a result of subsequent agreements between Solid Energy New Zealand (SENZ) and the Department.

158 In accordance with arrangements with the Ministry of Commerce (Energy) and Coalcorp (now SENZ) who had competing interests in the land, there were attempts to locate the RAPs away from known coal resources. The western part of the original application area (the area west of Trent Stream) was excluded from the Mt Rochfort RAP on account of the coal resources within the area, despite it being noted for containing values of similar value to the Mt Rochfort RAP [6].

159 As noted in the PNAP Report the authors found that it was not always possible to exclude all areas known to contain coal resources as they often had the highest ecological values. Since that time, there have been a number of areas within the RAPs that have been subject to mining applications and some of these have been mined to date or approved. This includes the Cypress Mine within the Upper Waimangaroa Valley Mt William RAP, the ridgeline and No.2 Block of Mt Frederick – Mt Augustus RAP, and the KEL pipeline through the Mt Rochfort RAP. The extent that this has impacted on the original intent to protect areas representative of the full range of diversity has not been quantified and the effects have not been determined. The RAPs have also not been reconsidered in light of the originally rare ecosystems that have

[6] Decision of Commissioners Appointed by West Coast Regional Council and Buller District Council, 26 August 2011in the matter of Buller Coal Ltd's application for resource consents for the Denniston Plateau Escarpment Mine Project. (para. 236 referring to Overmars statement).

been identified, nor the increased knowledge of *Powelliphanta* populations, in the twenty four years since the survey was undertaken.

160 Additionally, it should be noted that at the time of the PNAP report being completed (in 1998) it was considered that ensuring 10-20% of each vegetation association in each land system was protected, was sufficient for ensuring the ongoing security of that association. Today, best practice, and ecologists before the Environment Court, are questioning this assumption, which would indicate that the RAPS are the minimum areas that should be protected, and that protecting additional areas to better secure representative areas should be considered. During the Applicant's resource consent hearing their expert Fred Overmars acknowledged[7] that "perspectives have changed since the PNAP survey due to the ongoing decline in biodiversity, degradation of habitat, and the effect of predators…" and that "the Mt Rochfort RAP was probably not of sufficient size to be managed sustainably for protection and conservation of indigenous flora and fauna in the future."

161 It is likely that large areas of the Denniston Plateau will be subject to future mining applications, and as explained above, it is considered, by the applicant's expert and the Department's technical specialists, questionable whether the current RAPs would be sufficient to protect the full range of diversity. Not all of the RAPs are public conservation land and these are potentially at greater risk from mining interests. Where RAPs are also areas that have already been set aside for protection as public conservation land, then this provides perhaps the best legal opportunity to ensure their ongoing intactness and security. The importance of additional areas of high values and naturalness where they can help to secure representative areas on public conservation land should be carefully considered.

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[7] Decision of Commissioners Appointed by West Coast Regional Council and Buller District Council, 26 August 2011in the matter of Buller Coal Ltd's application for resource consents for the Denniston Plateau Escarpment Mine Project. (para. 237 referring to Overmars statement)

162 As discussed in Marshall (2012), the Mt Rochfort RAP area may not fully represent the vegetative associations and ecosystem types within the Denniston Plateau. The RAP has exceptional biological values, however it does not well represent the sandstone erosion pavements or the *Chionochloa juncea* grasslands. The spatial data provided by Wildlands (2009), attached as Appendix 9, suggests that only 1% of the sandstone environment is recognised in the RAP that totals approximately 5% of the entire elevated Denniston plateau area. Likewise approximately 11% (150ha) of *Chionochloa juncea* grassland is recognised in the RAP that totals approximately 35% of the entire elevated Denniston plateau area (pers. comm. Marshall, 2011). It should be noted here that there are limitations with the Wildlands spatial data (acknowledged by the authors) so the there may be some inaccuracy with the figures quoted above. However, the level of uncertainty in the data does not seem high enough to undermine the conclusion that the proportion of these two significant environment types are under represented in the RAP.

163 The area between the eastern boundary of the Mt Rochfort RAP (Conglomerate Stream) and Trent Stream, and between the Whareatea River and the escarpment appears to be in very good condition and have high naturalness. There is very little tracking (apart from the Mt Rochfort access road) and therefore few pest plant hotspots. Dr Marshall (Marshall, 2012 and pers. comm., Marshall, 2011) considers that the addition of this area to the existing RAP would make a valuable contribution to the protection of a significant representative area of elevated BCM habitat. It would protect approximately 10-15ha of additional sandstone erosion pavement and approximately 60ha more *Chionochloa juncea* grasslands. It would also protect other important elements of the distinct plateau environment such as the plateau gullies, which are not well represented in the lower slopes of the RAP, all of which would increase the protection of areas important for ensuring better representation of the environments that are special to and typical of the Ngakawau Ecological District (pers. comm. Marshall, 2011, Marshall 2012).

164 It is expected that the PNAP report and the above issues would be considered by a stakeholder working group convened to the Minister of Conservation to look into the

possibility of placing parts of the Denniston Plateau into permanent protection. This group is discussed in more detail in Section 24.4.

13.5 Assessment of effects on terrestrial Flora

165 The key effects on terrestrial flora from the proposal would be:

- The proposed open cast mine would permanently alter the vegetation and successional pathways (regardless of rehabilitation) over 106ha of elevated BCM ecosystem (being approximately 1.6% of all BCM ecosystem)
- There would be the permanent loss of approximately 20ha of sandstone erosion pavement and associated habitat
- The proposal would reduce the habitat (coal measure pakihi) for *Chionochloa juncea* "at risk of extinction: in decline" by 35 ha on the Denniston Plateau.
- The proposal would reduce the habitat of mountain beech-pink pine forest, comprising specimens up to 500 years of age
- Loss of an outstanding assemblage of plant species which has not been recorded (to date) elsewhere on the Denniston Plateau
- The proposal would have significant effects on a range of At Risk and Threatened species, including significant impacts on nationally endangered lichens and liverworts, and loss of many of the recorded occurrences of *Sticherus tener*
- The proposal would disrupt the level of intactness of the Denniston Plateau that currently has no large area land conversions

166 Overall there would be a significant loss of floral values should the EMP proceed. There would be both unavoidable permanent effects and those that can be partially or fully mitigated. The Applicant is proposing to undertake rehabilitation activities to

address some of the potential effects and much of the overall impact of the proposal on floral values will turn on the success or otherwise of the proposed rehabilitation. The proposed rehabilitation is discussed in detail earlier in this report (see Section 9) and is therefore not repeated here in any detail, unless required to articulate an effect.

167 The proposal would result in the unavoidable permanent loss of 20ha of sandstone erosion pavement. This historically rare ecosystem provides habitat for a range of rare and threatened species, including *Sticherus tener and Celmisia similis,* that form an outstanding plant assemblage that have not been recorded (to date) outside of the proposed footprint. Sandstone pavement could not be restored or recreated so this is a significant and un-mitigatable effect. Sandstone erosion pavement has a very limited extent and some of the areas that would be lost are some of the best remaining examples in the BCM ecosystem (Marshall, 2010). The overall significance of this loss is considered high.

168 The proposal would also impact upon 35 ha of 'coal measure pakihi' and associated *Chionochloa juncea* habitat. Some of this habitat would potentially be restored through VDT but (based on the conclusions made in Section 9) despite the proposed mitigation there would still be a significant loss of conservation value associated with this habitat type. As discussed earlier in the report the proposed rehabilitation, while establishing some form of vegetation and habitat, could not recreate existing vegetative pathways. Therefore even in the long term the resulting ecosystem would be different. It is likely that some of the VDT'd areas of 'coal measure pakihi' would retain at least some similar values, but also likely that some areas would be very much altered. On balance it is concluded that there is potential for significant losses of floral values associated with this habitat type.

169 Several individual species of significance for conservation would be impacted by the proposal. Again, the long term impacts would depend on the success, or otherwise of the proposed mitigation and rehabilitation. The Applicant would be required to propagate and/or translocate individuals of these species where possible. Information

from the Environment Court proceedings indicates that while some success may be had with some species, it may be very difficult for others. The successful propagation of *Sticherus tener,* for example, is noted as being very unlikely. The Department is therefore left in a very difficult position when trying to define the extent of the possible effects on these species. Should any number of individuals be lost it must be concluded that there would be a notable loss of floral values, particularly so for those species with limited distributions and populations such as *Sticherus tener*.

170 It is clear that there would be significant impacts on lichen and liverwort species and given their threat classifications this would be a significant impact. Likewise the impacts on *Sticherus tener* would be significant and likely result in the loss of many of the known occurrences of this species. Other species not so critically affected, but still significantly affected would include; *Euphrasia wettsteiniana, Celmisia similis, Forstera mackayi, Astelia subulata, Exocarpus bidwillii, Dracophyllum densum, Meterosideros parkinsonii* and *Libocedrus bidwilli.*

171 The proposal would result in a reduction in habitat of mountain beech-pink pine forest within the footprint. Rehabilitation is likely to be largely unsuccessful as podocarps such as pink pine are likely to handle vegetation direct transfer poorly (high mortality is expected) and propagation for planting would be difficult. The Applicant indicates that of the 38 ha of forest habitat within the footprint only 17 ha would be subject to vegetation direct transfer. Even in a best case scenario there would be a significant loss of this habitat type.

13.6 Mitigation for the effects on terrestrial Flora

172 The Applicant has proposed a combination of methods for avoidance, remediation and mitigation of adverse effects. These are described in more detail in Section 9. They include:

- Minimising disturbed areas
- Preparation of a comprehensive Rehabilitation Plan
- Direct transfer of vegetation (VDT) where possible
- Plateau wide pest control for an extended period that would include the proposed footprint and rehabilitated areas
- Survey for other At Risk and Threatened species and populations outside of the footprint

173 The potential success of the proposed mitigation would be variable (also see Section 9). Preparation of a rehabilitation plan and use of VDT would conform to best practice for rehabilitation. The proposed rehabilitation would address some adverse effects but overall there would be significant loss of biodiversity and conservations values. Off-site enhancement on the Denniston Plateau through pest control (DBEA) is likely to provide only a small benefit to conservation values as currently weeds have a very limited distribution and pest animals are also in naturally low numbers (Marshall, 2010, Wildlands, 2012, attached as Appendix 3.4).

174 The Applicant proposes to progressively rehabilitate the application area to achieve the following:

- In the short-term create stable landforms by establishing an exotic grass and native vegetation cover and erosion resistant surfaces which have physical and chemical characteristics that favour growth of sustainable native plant communities and manage runoff and sediment generation.
- In the medium to long term, establish ecosystems similar in plant and animal species diversity and functioning to undisturbed ecosystems surrounding the Land that enable the constructed landforms to blend into the adjacent landscape and prevent erosion and sediment generation.

- Re-create streams with similar channel complexity and macro-invertebrate diversity to the undisturbed streams on the Denniston Plateau.
- Develop self-sustaining ecosystems.

175 Kingsbury (2012) details the Applicant's rehabilitation proposal. VDT and planting are shown as the key rehabilitation techniques. VDT would be the preferred method by the Department as it provides a better starting point for the recovery of ecological values than other techniques. The use and success of VDT is limited by a number of factors including topography, vegetation height, soil depth, rock content of the substrate, availability of transfer sites and operator skill. BCL (2013) indicates that an estimated 56ha of existing vegetation could be VDT'd including VIT. This would be made up of 19ha of 'coal measure pakihi', 20ha of manuka scrub and 17ha of 'forest', and equate to 67% of existing vegetation at the site. There is some debate as to the potential outcomes of VDT. The Department's reviews suggest the Applicant may have been optimistic in their predicted ecological gains from VDT (see Section 9 for more detail).

176 Planting would be the other main approach used by the Applicant. Planting into soil could provide a low stature, indigenous vegetation cover after 30 - 50 years. This would likely take several decades longer where planting occurred straight into bare overburden material. Again, taller vegetation would take longer to establish, and re-establishment of forests would take centuries.

177 The availability of topsoil would be an important factor in the potential success of planting. Kingsbury (2012) suggested that, based on predicted soil recovery rates from the original 157 ha footprint, there would be enough topsoil to spread over the areas unable to be VDT'd and suitable for planting. However, Ross (2012) somewhat contradicted this assumption, *"…the short-fall in available soil and plant resources for land rehabilitation over the whole site. Replaced soil coverage can also be extended by spreading the soils more thinly than exists naturally"* (Ross, 2012, para 15.6). It is the Departments understanding that the revised footprint also excludes some of the

'better' sources of topsoil and therefore the Department has some concern over this aspect of the proposal. Gruner (2012) suggested that there is sufficient uncertainty around the availability of topsoil to warrant caution with the proposed outcomes for revegetation, and this view is still held with regard to the revised Application. If there were a shortfall in topsoil it would considerably extend the timeframes and further inhibit the recovery of ecological values.

178 It would be impossible to re-create the natural mosaic and unique environment of sandstone erosion pavements. The values of this originally rare ecosystem in the Application area would be permanently lost.

179 Even with intensive weed control, it would be unlikely that the rehabilitation areas would remain weed free. In particular, *Juncus squarrosus* is known to be highly invasive and once present, impossible to eradicate. This would permanently reduce the ecological value of the rehabilitated areas.

180 In summary, the proposed rehabilitation would address some adverse effects but there would be significant residual loss of biodiversity and conservations values. It is considered that it would not achieve the full recovery of ecological values, even in the long-term. The subsoil structure within the proposed footprint would be permanently altered and together with the proposed planting regimes and increased weed incursion would promote the establishment of different successional pathways and ecosystems. Areas of sandstone erosion pavement would be permanently lost, and weed incursion would permanently reduce the ecological value of the rehabilitated areas. The Applicant's claimed benefits from rehabilitation may be overly optimistic as there are a number of uncertainties around the potential success of the proposed rehabilitation (see Section 9). Overall, it is considered that the proposal would result in a significant loss of floral values that form an integral part of the highly vulnerable nationally significant elevated BCM ecosystems.

14 TERRESTRIAL FAUNA

14.1 Summary

- The habitat within the 106ha footprint has indigenous terrestrial fauna values which are 'typical' of coal measure habitats on the Buller Coal Plateaux, and which are nationally rare and distinctive.
- The Denniston Plateau contains a complex mosaic of interrelated habitats, a high degree of continuity and integrity, and a lack of exotic flora and fauna. It is nationally significant for terrestrial fauna. The West Coast CMS identifies the Denniston Plateau as a 'priority site for biodiversity'.
- The 106ha footprint represents 5.3% of the Denniston Plateau. Loss of this area of habitat would be significant for the fauna assemblages overall, particularly in the short to medium term
- Species recorded or possibly present in the footprint include a range of avifauna, including at least two pairs of Great Spotted Kiwi, lizards, long tailed bats, *P. patrickensis* and a range of other terrestrial invertebrate species.
- The Denniston Plateau is a national stronghold for lizards. The Plateau contains unique lizard habitats and a unique species assemblage, which are nationally significant.
- The Denniston *P. patrickensis* subpopulation is endemic to the Denniston Plateau. The footprint represents c.6% of the remaining subpopulation's habitat and c.5% of its population.
- The assemblage of large bodied invertebrate species is unique to the Plateau. There is a risk that as yet undetected invertebrate species of conservation interest and unique associations with limited distribution may be present within the footprint.
- The proposed mitigation measures would not adequately mitigate the loss of terrestrial fauna values.

- The most important mitigation measure is the rehabilitation of the footprint. However, re-colonization by faunal species would depend on the speed and success of re-vegetation, the quality of restored habitats achieved, the continued presence of the species in adjacent habitats, and the habitat needs of individual species.
- Predator control would provide some, albeit minimal, benefits to terrestrial fauna because predator numbers are naturally low on the Plateau. *Note here that the Applicant has a more optimistic view of the potential benefits of pest control on the Plateau* (see Applicant comments, Appendix 8 for detail)
- The compensation package offered by the Applicant would help to compensate for the loss of some but not all terrestrial fauna values.

14.2 Information sources

181 The original Application contains information relating to terrestrial fauna. The information (excluding *P. patrickensis*) was reviewed by Department Technical Science Officer Tim Shaw in 2010 (review attached as Appendix 3.5 and referred to in this report as 'Shaw, 2010'). The information relating to *P. patrickensis* was reviewed by Department Technical Science Officer Ingrid Gruner in 2010 (review attached as Appendix 3.1 and referred to in this report as 'Gruner, 2010').

182 In June 2012 the Applicant provided additional information relating to terrestrial fauna, including:

- *Statement of evidence of Rhys Buckingham*, dated June 2012 (submitted as additional information June 2012) attached as Appendix 2.7
- *Statement of evidence of Ralph Powlesend*, dated 18 June 2012 (submitted as additional information June 2012) attached as Appendix 2.8
- *Statement of evidence of Simon Chapman*, dated 18 June 2012 (submitted as additional information June 2012) attached as Appendix 2.6

- *Statement of evidence of Richard Toft*, dated 18 June 2012 (submitted as additional information June 2012) attached as Appendix 2.9
- *Statement of evidence of John Parkes*, dated 18 June 2012 (submitted as additional information June 2012) attached as Appendix 2.9

183 Some of the results from the March 2012 "BioBlitz" survey carried out on the Denniston Plateau by the New Zealand Forest and Bird Protection Society in conjunction with the Applicant have been included in the Applicant's assessments.

184 The terrestrial fauna information (excluding *P. patrickensis*) submitted in June 2012 was reviewed by Tim Shaw (report attached as Appendix 3.6 and referred to in this report as 'Shaw, 2012'). The *P. patrickensis* information submitted in June 2012 was reviewed by Ingrid Gruner (review attached as Appendix 3.7 and referred to in this report as 'Gruner, 2012').

185 The Applicant submitted a revised Application in March 2013. The Application included a reduced footprint from 157ha to 106ha. The various terrestrial fauna sections of the revised Application were reviewed by the following Department staff:

- Avifauna: Tim Shaw (report attached as Appendix 3.8 and referred to as 'Shaw, 2013')
- Herpetofauna: Jo Monks (report attached as Appendix 3.9 and referred to in this report as 'Monks, 2013')
- Terrestrial invertebrates: Eric Edwards (report attached as Appendix 3.10 and referred to in this report as 'Edwards, 2013')
- *P. patrickensis*: Kath Walker (report attached as Appendix 3.11 and referred to in this report as 'Walker, 2013')

186 The survey work undertaken specifically for the original Application was limited by its one off nature in winter, and did not include some groups of animals (Shaw, 2010). However, overall the Department considered the original Application to be supported by an accurate and well-researched technical assessment of terrestrial ecosystems that used standard survey methods and referenced appropriate current understanding (Shaw, 2010).

187 More recent survey work undertaken primarily in 2012, including the 'Bioblitz', has provided a great deal more information about terrestrial fauna on the Plateau. It is worth noting that the 'Bioblitz' identified and described several new or previously undescribed species within the proposed footprint.

188 Within the information provided there is least certainty in the assessments for bats, lizards and terrestrial invertebrates (excluding *P. patrickensis*). This reflects the poor general understanding of the distribution, abundance and, in some cases, taxonomy and threat status of these fauna.

189 The greatest risk in terms of a knowledge gap is for terrestrial invertebrates (excluding *P. patrickensis).* Although the footprint is likely to contain terrestrial invertebrate communities characteristic of coal measure habitats in the wider area, there is a risk that terrestrial invertebrate species of conservation interest and/or that unique associations of species with limited distribution may be present within the footprint but which as yet are unidentified or have not been found to be present. Groups such as this would be the most likely to display endemism to the area (Shaw, 2010).

190 The issue of insufficient data is inherent for certain species and explains some of the uncertainty around the assessments of them in the proposed footprint. In general the Department considers the current understanding of terrestrial fauna within and adjacent to the footprint sufficient for the consideration of this Application. Addressing the limitations in understanding of terrestrial fauna in a meaningful way

would require a considerable amount of work beyond a timeframe or scale reasonable for the consideration of this Application (i.e. over a range of seasons, with improvements in the understanding of the taxonomic status of some groups).

14.3 Assessment of terrestrial Fauna values

Avifauna

191 The Applicant recorded 26 avifauna species (including exotics) in the footprint and adjacent areas but suggests that at least 42 bird species could use the footprint, being the number of species recorded between Mt Rochfort and the Mokihinui River.

192 Most avifauna species that have been recorded in the footprint are those of forest and open country with a small number of wetland species associated with standing and flowing water habitats (Shaw, 2010). All species are widespread in similar habitats at least throughout Westland and generally throughout the country (Shaw, 2010).

193 The most notable 'threatened' bird species present within the footprint is the Great Spotted Kiwi. Based on past survey work, the Applicant believes the 106ha footprint is likely to contain fewer than two pairs of GSK. The Department cautions at suggesting the number could be less than two pairs. It should be noted also that original listening surveys were undertaken in winter when there are lower call rates and males are likely to be on nests (Shaw, 2010).

194 The estimated national population size for GSK is 16,000 individuals with an annual decline rate in the region of 2% (Holzapfel, 2008 in Shaw, 2010). At a national level the primary cause of decline is believed to be predation by introduced mammalian predators (Holzapfel, 2008 in Shaw, 2010). In terms of GSK, the Application Area is part of both the national stronghold for GSK, being the North West Nelson region, and the

local stronghold, being those populations associated with the Mt William Range (pers. comm. Shaw, 2011).

195 The most numerous 'at risk' bird species present within the footprint is the South Island fernbird. The Applicant believes the proposal would displace around 30-40 individuals, although the Department puts this figure at 60-80 individuals (Shaw, 2013).

P. patrickensis

196 The *P. patrickensis* ('threatened; nationally endangered') is endemic to the Buller Coal Plateaux. The populations on the Denniston Plateau and the Stockton Plateau are genetically distinct from each other, making the Denniston subpopulation endemic to the Denniston Plateau (Walker, 2013).

197 The genetic differences between the Denniston and Stockton subpopulations are not large but are marked (Walker, 2012 in Walker, 2013). Within-species genetic diversity is important to conserve as diversity is often linked to a species' resilience (Walker, 2013).

198 It was agreed in caucusing between experts during the EMP Environment Court Hearing that the two subpopulations should be maintained as strong viable populations in their own right. As such, the Denniston Plateau is the appropriate context in which to consider the proposal's impact on snails. It should be noted that the Denniston Plateau differs from the Stockton Plateau in terms of elevation, vegetation, landform and degree of disturbance.

199 The distribution of *P. patrickensis* closely follows that of the extractable coal resources on the Buller Coal Plateaux, although the reason for this is uncertain. The main cause of the decline of *P. patrickensis* is habitat loss to coal mining, which has accelerated in

recent years due to the change from underground to more destructive open cast mining methods (Walker, 2013).

200 Walker (2013) considers the methods used by the Applicant for the snail survey to be adequate, but considers the survey work itself to leave considerable uncertainties. The Applicant measured snail density in 25 plots in 4 blocks on the Plateaux (Whareatea south, proposed Escarpment Mine pit, BCL's previously proposed coal processing plant site and Deep Creek on Stockton Plateau). While a relatively large number of plots were measured, plot sites are not representative of the range of habitats used by *P. patrickensis*, with the proportion of high and moderate quality snail habitat sampled greater than that of low quality habitat (Walker, 2013). The Applicant has not adequately accounted for geographic variability in snail density, which has led to an overestimation in the size of the total population and an underestimation of the affected population (Walker, 2013).

201 The range of the Denniston subpopulation is small – at most about 2,109ha, although this area includes roads, reservoirs, buildings, old mine sites and a quarry where snails are absent, and extensive areas of sandstone pavement and forest where snails are very rare, making this estimate generous (Walker, 2013). The range also includes 318ha which is covered by the Sullivan Coal Mining Licence (CML 37 161) and is estimated to contain approximately 20% of the remaining Denniston subpopulation (Walker, 2013). Without the latter area, the range of the Denniston subpopulation is at best 1,791ha (Walker, 2013).

202 The Applicant believes that *P. patrickensis* are present in 49.4ha of the 106ha footprint, however, the Department believes them to be present in 99ha (Walker, 2013). The revised 106ha footprint is believed to support c.5% of the population and c.6% of the habitat of the remaining Denniston subpopulation of *P. patrickensis* (Walker, 2013).

203 *P. patrickensis* is likely to occur in moderate densities (100/ha) over approximately 82ha of the footprint, and in low densities (10/ha) over about 17ha in the southeastern portion of the footprint (Walker, 2013). They are absent from the southern part of the footprint where the mosaic of low vegetation and shrubland gives way to taller forest (Walker, 2013).

204 It is worth noting that almost 30% of the habitat of the Stockton subpopulation has been cleared or is consented to be cleared by Solid Energy for its Stockton Mine (Walker, 2013).

205 Walker (2013) considers the Applicant's assessment of predation levels on *P. patrickensis* to have overestimated the impact of possums, particularly because thrush damage to shells was mistaken for possum damage.

206 Best practice conservation management for *P. patrickensis* involves minimising habitat fragmentation and protecting areas of continuous habitat, with legal protection of habitat and protection from mining, burning or road development listed as the highest priority for the conservation management of *P. patrickensis* (Walker, 2013).

207 The Denniston Plateau, including the application area, is of high value for the conservation management of *P. patrickensis* as the area is legally protected as public conservation land and supports one of the largest areas with good spread and density of snails left on public conservation land (Walker, 2013). It provides the best opportunity to protect a meaningful proportion of the snail's range. It is worth noting that nearly all of the Denniston *P. patrickensis* subpopulation occurs on public conservation land while only about 23% of the Stockton subpopulation is found on public conservation land and is very fragmented (Walker, 2013).

208 *The Applicant provides comment that it believes that* P.Patrickensis *is not at carrying capacity and that there would be some potential for gains from pest control on the plateau. The Applicant also points out that the Environment Court found in favour of translocation of* P.Patrickensis*, although only for selected areas. The Applicant further adds that capture of* P.Patrickensis *may in fact provide a broad representation of local gene stock. The Applicant is also of the opinion that some snails would survive VDT and that the Court concluded that on balance it believed there would be some surviving* Powelliphanta *population in VDT pakihi and scrub. Likewise the Applicant believes its rehabilitation plan would result in* P.Patrickensis *populations subject to VDT being less fragmented than assessed by the Department.*

Herpetofauna

209 Survey work has confirmed the presence of three lizard species within the footprint: the West Coast green gecko, the forest gecko and the speckled skink, all of which are classified as either 'threatened' or 'at risk'. No unexpected lizard species have been found within the footprint.

210 Relative to avifauna, there is limited understanding about the herpetofauna of the Buller Coal Plateaux due to the fact that lizard populations tend to be low density, behave cryptically and occupy complex habitats, making detection difficult (Shaw, 2010).

211 The distribution of lizard species on the West Coast is undoubtedly wider than currently recorded and it is possible that species are yet to be identified (Shaw, 2010). However, local lizard endemism is rare on the West Coast; the risk that a new lizard species is present within the footprint is very low and the risk that a new lizard species is present in only the footprint (given that it is part of a much larger area of similar habitat) is close to non-existent (Shaw, 2010).

212 Chapman (2012), (attached as Appendix 2.6), suggests that despite the potentially low abundance of invertebrate prey and windblown sand and gravel inhibiting potential habitat in areas adjacent to anthropogenic disturbance, the Denniston Plateau appears to represent high quality lizard habitat. According to Chapman (2012), all lizards and lizard habitats on the Denniston Plateau (including the footprint) are ecologically significant.

213 The unique species assemblage and unique lizard habitats in which they occur on the Denniston Plateau are considered to be of national significance (Monks, 2013).

Terrestrial Invertebrates (excluding P. patrickensis)

214 It was not possible for experts (in their respective assessments) to list terrestrial invertebrate species and their relative abundance or biomass in a range of habitats. Some of the terrestrial invertebrate species present within the footprint are worms, flatworms, snails, slugs, moths, butterflies, beetles, weta and other insects (Edwards, 2013).

215 Both the Applicant (Toft, 2012) and the Department (Shaw, 2012) consider there to be a large knowledge gap in terms of terrestrial invertebrates, but that this would require a considerable amount of work beyond a reasonable timeframe or scale. As such, it is difficult to establish the significance of various invertebrate fauna (Toft, 2012).

216 Recent survey work confirmed the presence of many terrestrial invertebrate species common to coal measure habitat that were originally thought to be present within the original footprint as well as the presence of 10 new or previously undescribed species. The assemblage of large bodied invertebrate species is unique to the Plateau.

217 Overall the Plateau is considered to have a relatively low abundance of invertebrates but a high level of integrity, which is surprising given the Plateau's long history of mining (Toft, 2012).

218 According to Toft (2012), one of the primary biodiversity values of the invertebrate communities on the Plateau is the particular assemblage of species present, particularly large bodied invertebrates. The assemblage includes a number of taxa that are at their lowest altitudinal limits as well as a range of undescribed species.

219 There is a risk that undetected terrestrial invertebrate species of conservation interest and unique associations of species with limited distribution are present within the footprint (Shaw, 2013).

Bats

220 No specific bat survey has been completed as part of the Application, however, it is not considered practicable to carry out such a survey (pers comm Shaw, 2011). A large amount of additional survey work would be required, both within and outside of the footprint, for many seasons, before more robust conclusions than those currently possible could be made.

221 It is possible that long tailed bats (LTB) and extremely unlikely that short tailed bats (STB) use habitats within the footprint.

222 It is unlikely that the footprint area is important for LTB but it is possible that roost sites occur in limited parts of the tall forest habitat within the footprint and that LTB feed across edge habitats.

14.4 Assessment of effects on terrestrial Fauna

223 For all terrestrial fauna species, the main impact would arise from habitat clearance. Other impacts that would affect all species include increased likelihood of fire, water discharge and diversion, wetland disruption, weed incursion, dust, vegetation edge effects and erosion/deposition. The above impacts would affect individuals within the footprint as well as those in adjacent areas. As well as these impacts, there would be a number of species-specific effects, which are discussed below.

Avifauna

224 According to Shaw (2013) and pers. comm. with Shaw in 2011, the following effects on avifauna are likely:

- Displacement/disturbance of at least two pairs of GSK and around 60-80 fernbird individuals. This impact would be locally significant but would not extend beyond the local Denniston level because the overall number of birds that would be affected is small relative to the regional and national population size.
- Reduction in the size, distribution, resilience and connectivity of local bird populations due to the loss of vegetated habitat. The scale of habitat loss on indigenous bird species would be significant at the local scale but would not affect avifauna species at an ecological district, region or national level. The loss of c.63ha of woody vegetation is of most significance to the majority of the indigenous bird species present.
- Lowered survival rates and reduction in energy, fitness and the reproductive potential of displaced individuals during relocation attempts.
- Death of non-mobile life stages of nests and unfledged juveniles through habitat clearance.

P. patrickensis

225 According to Walker (2013), the main potential effects on the Denniston subpopulation of *P. patrickensis* are:

- The long-term and possibly permanent loss of c.6% of remaining habitat and c.5% of the remaining subpopulation (c.8,400 individual snails) from public conservation land, resulting in further range contraction. This equates to c.4% loss of the species from public conservation land across both Plateaux.
- Fragmentation and reduction in ecological integrity of the largest continuous tract of public conservation land supporting *P. patrickensis*. The Application Area provides the only secure connection between the snail populations west and east of the Sullivan CML; the proposal would sever this connection, which could permanently remove natural gene flow between the eastern and western portions of the subpopulation and reduce the effective population size and hence resilience of each portion of the subpopulation.
- Significant contribution to the ongoing decline of a threatened and historically rare absolutely protected species.
- Degradation of habitat in adjacent and rehabilitated areas due to changes in hydrology, soil chemistry and vegetation, weed incursion, and the dispersal of coal fines over adjacent snail habitat.

Herpetofauna

226 According to Shaw (2010) and Monks (2013), the following effects on lizards are likely:

- Death or injury of most individual lizards within the mine footprint, likely to number in the 100s, through habitat clearance.
- Reduction in the size, distribution, resilience and connectivity of the local populations of up to six lizard species.
- Reduction in habitat available for foraging, breeding, avoiding predators and dispersing. The scale of habitat loss could be severe for lizards at the local level but would not affect species at an ecological district, region or national level. Cumulative habitat loss as a consequence of mining on the Buller Coal Plateaux is of great

concern for the lizard assemblages that are unique to this area and to the lizard populations that are of high densities relative to other West Coast populations.

Terrestrial Invertebrates (excluding Powelliphanta)

227 According to Toft (2012) and Edwards (2013), the following effects on terrestrial invertebrates (excluding *Powelliphanta*) are likely:

- Loss of habitat and the death of most slow moving and non-flying invertebrate individuals. It is unlikely that the proposed scale of habitat loss would include the majority of the range of any unique terrestrial invertebrate species/associations.
- Reduction in dispersal and breeding potential of many insects (primarily moths, beetles, flies and other winged insects) from swarming around industrial lighting.
- Increased risk of introduced terrestrial invertebrate species from increased activity in the area, which could be significant for existing terrestrial communities considering they demonstrate high level of natural integrity.

Bats

228 According to Shaw (2010), habitat loss would have a minimal to nil effect on bats and the risk that a bat roost is within the footprint and that bats could be harmed as a result of this roost being destroyed during construction is negligible.

14.5 Mitigation for effects on terrestrial Fauna

Great Spotted Kiwi

229 The Applicant has suggested translocation of GSK where required, which the Department agrees is appropriate.

230 According to Shaw (2010), the following standard practice steps should be undertaken to manage affected GSK which, if undertaken sufficiently, should prevent the death or injury of any adult GSK:

- Detailed monitoring of GSK individuals within and adjacent to the footprint prior to mine activities to determine where their territories lie in relation to habitat loss and mine disturbance. This requires the capture and attachment of transmitters to all potentially affected individuals and regular telemetry monitoring for upwards of six weeks. Qualified staff and dog teams are required for this work.
- Analysis of information to determine the proportion and distribution of territories affected. A decision would then be made by the Department (in consultation with the mine operator) as to which birds could adapt their territories and should remain and which birds are likely to have to completely abandon the area and re-establish elsewhere – in which case they would need to be translocated.
- Birds that use parts of the mine footprint and that are chosen to be managed in situ would need to be monitored with transmitters for the duration of habitat disturbance to allow their positions to be known so that they can be moved on if they are roosting in front of a bulldozer and have their eggs salvaged if they are nesting. Transmitters need to be replaced annually.
- A destination site outside of the region (c.100km away) would have to be selected for any translocated birds. Any translocation should occur as close to habitat disturbance as possible to avoid other GSK occupying the vacant territory.
- Translocation proposals and Wildlife Act permits covering all aspects of moving adults or salvaging nests are required to undertake the above processes.

P. patrickensis

231 The Applicant proposes the following mitigation measures for *P. patrickensis*:

- Translocation of snails prior to mining (subject to finalisation of resource consent conditions)
- Re-location of snails incidentally discovered during mining
- Maximise the use of VDT in rehabilitation of the mine pit

- Pest and predator control

232 The translocation of snails before or during mining to other parts of the Denniston Plateau is not a suitable mitigation measure (Walker, 2013). In the areas of habitat suitable for *P. patrickensis*, snails are already present in about the numbers the habitat can support. Transferred snails would simply compete with resident snails for shelter and food. This would most likely result in the death of either the re-located snails or the resident snails they displace.

233 Furthermore, only a small proportion of the snails resident in the footprint would be able to be found, without intensive and expensive search effort, so any relocation efforts would most likely be at a scale that would make no substantive difference to the population trajectory of the species (Walker, 2013).

234 In terms of rehabilitation, the post-mining landform is unlikely to support *P. patrickensis* even in the long term because essential components of the snail's existing habitat would not be restored (Walker, 2013). As such, snails are likely to be permanently excluded from the footprint despite rehabilitation efforts.

235 Experts agreed during the EMP Environment Court Hearing that, at least in the medium term, snails would not be restored to those parts of the footprint rehabilitated through planting, and that the long-term ability of the rehabilitated site to support snails was unknown, with any recovery likely to be slow. Walker (2013) states that this is because overburden rehabilitated in this way lacks earthworms, has no structure, little soil, and many decades would be required before planted vegetation could grow sufficiently to provide the organic material required to start the process of making soil.

236 Knowledge of long-term outcomes for snails in those parts of the footprint rehabilitated using VDT is lacking. Attempts to use VDT to re-establish *P. patrickensis* populations to mined areas on Stockton Plateau are still in their infancy (Walker, 2013). Limitations of using VDT to re-establish snail populations include a reduction in anecic (deep-burrowing) earthworms, which form a major component of a snail's diet, in rehabilitated soils following VDT (Walker, 2013). Many anecic earthworms are killed in the transfer process as the deeper soil they inhabit is broken apart when lifted. Furthermore, the survival of shifted worms is likely to be low as the material that transferred sods are placed on lacks the structure essential for anecic earthworm survival. Also water can percolate more freely through the compacted overburden above the low permeability layer than it can through undisturbed Denniston subsoils (Walker, 2013).

237 Any surviving snails that are returned to the rehabilitated pit on VDT sods are likely to be left in small fragmented populations, separated from other VDT areas and from undisturbed ground by planted areas with thin stockpiled soil without earthworms (Walker, 2013). This fragmentation would reduce the effective population size and hence resilience of each population. Fragmentation of populations in this manner is a leading contributor to biodiversity loss.

238 Around 56ha of the 106ha mine pit is proposed to receive VDT material. At least half of this is likely to suffer extensive die-back. The erosion of soils around the edges of the shifted sods is cause for concern because it results in a lack of shade and vegetative material needed by snails and their earthworm prey to survive (Walker, 2013). New vegetation would eventually return to the site but many snails are likely to die in the interim (Walker, 2013). Furthermore, the final vegetation and moisture regime of the rehabilitated site is likely to be different and may not be compatible with the long-term survival of snails due to the fact that snails have very specific habitat requirements (Walker, 2013).

239 There are likely to be deleterious alterations to the area's hydrology and soil chemistry even in the areas rehabilitated by VDT, which would result in a vegetation type and soil moisture regime less favoured by this snail species.

240 Predator control would provide some mitigation for the loss of snails, although the benefits for snails would be minimal as predator numbers on the Plateau are naturally low and their predation on snails is rare (Walker, 2013).

Herpetofauna

241 The Applicant's Lizard Management Plan (part of BCL's Ecology and Heritage Management Plan attached as Appendix 1.20) details measures to mitigate losses to lizard fauna. These include:

- Relocation of lizards
- Habitat rehabilitation through VDT
- Relocation of rock slabs
- Implementation of a pest control programme within the footprint

242 According to Monks (2013), relocating lizards and undertaking pest control on the Plateau is not considered suitable mitigation for the following reasons:

- The naturally low predator densities on the Plateau mean that lizard populations are already likely to be at carrying capacity and the Plateau is unlikely to be able to support higher density lizard populations. *The Applicant makes comment here that during caucusing in the Environment Court both the Applicant and Forest and Birds experts agreed that there would be the possibility of small increases in lizards populations from predator control, therefore suggesting that lizards are not currently at carrying capacity.*

- Based on previous research, it is likely that most individuals translocated to places close to the pit would return to their home site and remain in harm's way or would experience a higher risk of predation being away from known refugia and be at a competitive disadvantage for food and shelter relative to resident lizards.
- Only a small proportion of lizards are likely to be found and able to be translocated.
- Death and injury are a likely outcome of salvage attempts due to unintended crushing.

243 Experts agree that lizards would be killed if rock slab relocation is attempted (Monks, 2013).

244 Experts disagree over the effects of VDT on lizards. Chapman (2012) stated that lizards may be able to survive VDT unharmed. However, Monks (2013) considers Chapman (2012)'s evidence of this (that individual lizards are known to have survived tree-fall events) to be irrelevant.

Terrestrial Invertebrates

245 The revised Application states that VDT is likely to be possible for c.67% of the footprint. Edwards (2013) agrees with BCL expert Gibbs that, for invertebrates, VDT would provide the best opportunity for re-establishment of populations and at least some components of the ecosystems services they provide.

246 Mitigating the loss of terrestrial invertebrate fauna would hinge on the ability to encourage appropriate terrestrial invertebrate assemblages to recolonise rehabilitated surfaces (Edwards, 2013).

247 In the view of Edwards (2103), the rehabilitation proposed is likely to result in future indigenous dominance regarding ecosystems and fauna, but the complex assemblages of species is likely to be grossly simplified and much more spatially homogenous than

at present. Some of the unusual species associations and assemblages are irreplaceable and are likely to be permanently lost.

248 The representative value of invertebrate species and faunal ecosystem associations together with the nationally rare and distinct context would also be permanently lost within the mine footprint (Edwards, 2013).

Summary of mitigation for terrestrial fauna

249 Arguably the most important mitigation measure for all terrestrial fauna species is rehabilitation of the area proposed to be mined (see Section 9 for discussion on the proposed rehabilitation). Assuming that a natural vegetative cover is eventually restored to the footprint, most terrestrial fauna species would re-colonise the area to some degree.

250 The speed of re-colonisation would depend on the speed of revegetation, the quality of restored habitats achieved, the continued presence of the species in adjacent habitats, and the habitat needs of individual species. Weka (as an omnivorous habitat generalist) would probably remain in edge habitats created by the mine and re-colonise the footprint as soon as vegetation cover is achieved and invertebrate and fruit food sources are available (Shaw, 2010). GSK, fernbird and *P. patrickensis* would be slower, requiring vegetation to be relatively complex and continuous (Shaw, 2010). The Latter would require the presence of an earthworm population within rehabilitated areas and recreated soils (Walker, 2013).

251 The Applicant also proposes to undertake a pest and predator control programme over 4,500ha on the Denniston Plateau. This would provide some, albeit minimal, benefit to terrestrial fauna values because weeds have a limited distribution and exotic predator levels are naturally low (Walker, 2013).

252 According to Shaw (2010), predator control has a number of limitations; it is expensive, difficult, not guaranteed to work for all predator-vulnerable species, relies on the ongoing commitment of the Applicant in the long term, and requires ongoing involvement and therefore investment of resources by the Department.

253 *The Applicant believes that the Department is understating the potential benefits of the proposed pest control for fauna species, including birds, lizards and snails. (see Applicant comments, Appendix 8 for detail). The Applicant refers to their expert's views that snails and lizards are not at carrying capacity and there could be benefits above and beyond that concluded by the Department. They also indicate that the Environment Court largely accepted their expert's view on this issue.*

254 The general and species-specific mitigation measures proposed capture all that can practicably be done to mitigate the loss of terrestrial fauna values from the proposal. These measures would not fully mitigate the potential adverse effects on any terrestrial fauna species.

255 To compensate for the residual loss of fauna values, the Applicant has proposed a compensation package which includes off-site habitat restoration involving pest and predator control at two separate sites, known as the 'Denniston Biodiversity Enhancement Area (DBEA) and Heaphy Biodiversity Enhancement Area (HBEA)'. These proposed predator control programmes are discussed in detail in Section 24.5.

256 Furthermore, it should also be noted that the HBEA portion of the off-site compensation package would not provide any specific compensation for the loss of some terrestrial fauna species within the footprint as some affected species are endemic to the Denniston Plateau, particularly *P. patrickensis*.

15 FRESHWATER

15.1 Summary

- A large portion of the Denniston Plateau is classified as a wetland and ranked by WONI as the number one wetland in the North West Nelson Biogeographic region. The wetland habitat on the Denniston Plateau is considered nationally significant
- The proposal would have significant impacts on the nationally significant wetland habitat within the proposed footprint. The long term impacts are somewhat dependent on the success or otherwise of the proposed rehabilitation, particularly VDT
- There would likely be an improvement in the water quality of the Whareatea catchment due to the removal of existing AMD discharges from the footprint
- There are risks and uncertainties associated with the management of AMD and the ELF. There is the potential for untreated discharge into receiving waterways and associated impacts on freshwater values, although dilution would mitigate some of these impacts
- Streams within the footprint would be re-established with habitat suitable for recolonisation of aquatic invertebrates and koura
- There have been no fish recorded on the Denniston Plateau

15.2 Information sources

257 An assessment of the Applicant's original application relating to surface and ground water was completed by the Department's technical specialist Dr Darin Sutherland. This internal report is referred to as Sutherland (2010) (attached as Appendix 3.13).

258 In June 2012 the Applicant provided additional information for freshwater ecosystems and wetland communities on the plateau. This information is listed below:

Statement of evidence of Kerry Bodmin, dated June 2012 (submitted as additional information June 2012) attached as Appendix 2.10

Statement of evidence of Don Jellyman, dated 18 June 2012 (submitted as additional information June 2012) attached as Appendix 2.11

Statement of evidence of John Stark, dated June 2012 (submitted as additional information June 2012) attached as Appendix 2.12

259 Bodmin (2012) addresses wetland communities on the Denniston Plateau. Jellyman (2012) addresses aquatic fauna of the Denniston Plateau, EMP and the existing aquatic environment of streams and rivers in the vicinity of the proposed EMP. Stark (2012) addresses aquatic macroinvertebrate.

260 BCL (2013) also provides a revised and updated Water Management Plan that ties in directly with the potential impacts on freshwater values. The control and treatment of discharges to receiving waterways is dependent on the implementation of this plan. This part of the proposal is discussed in the AMD section later in this report (Section 16).

261 Department Freshwater specialist Dr Dave West has reviewed the above information (including Dr Sutherland's original advice) and has provided two reports that cover the freshwater values, potential impacts and the broader water management approach proposed by the Applicant. These are:

West, D. 2012. *Mining Permit 51279 Buller Coal Limited: Advice on freshwater*. Department of Conservation internal report, attached as Appendix 3.20.

West, D. 2013. Mining Permit 51279 Buller Coal Limited: Further advice on freshwater. Department of Conservation internal report, attached as Appendix 3.12.

262 The key findings of these two reports are included both in the discussion of freshwater values below and also in the following AMD section.

15.3 Existing freshwater environment

Streams

263 The proposed open cast mine is located at the head of the Whareatea River and contributing streams and adjacent to Cascade Creek. The bedrock is generally impervious which limits the amount of groundwater present on the plateau but this is somewhat countered by the presence of wetland vegetation which increases water retention times.

264 There is variable coverage of fish sampling in the two catchments impacted by the proposal; The Cascade River and Whareatea River catchments. The upper catchments near the proposed mine remain largely unsampled (West, 2013). Sampling by Patrick (2008) and Jellyman (2012) has not recorded any fish on the Denniston Plateau. Sampling by Jellyman (2012), however, found koura at all sampled sites on the plateau and in Lake Brasil. Jellyman (2012) points out that the isolated plateau stock of koura may constitute an Ecologically Significant Unit (ESU).

265 The Whareatea catchment is considered to have the higher values of the two. At a national level the values of the Whareatea catchment would be highly complementary to those freshwater environments conferred some protection by their land tenure, i.e. Public Conservation Land, Queen Elizabeth II, and are accordingly ranked in the 10-20th percentile of river catchments outside national protected areas (West, 2013).

266 Water chemistry results show that the upper Whareatea is influenced by AMD near the entrance of the Whareatea Mine and is influenced by natural ARD from the very acidic soil types in the area. The upper Whareatea River pH ranges from 4.3 to 6.5 units with the lower pH during low flows (Sutherland, 2010). Heavy metals, metalloids and iron-hydroxide precipitates are associated with this AMD discharge.

267 Water chemistry results show that the upper Cascade Creek is influenced by two significant AMD discharges. The Cascade Creek and its tributaries have a pH range of 2.8 to 6.0 units and are contaminated with metals/ metalloids (Sutherland, 2010).

268 Sutherland (2010) and Stark (2012) indicate that macroinvertebrate communities of the Whareatea River are probably adversely affected by AMD and resulting low Ph levels. Stark (2012) also provides the following on the aquatic invertebrate communities on the Denniston Plateau:

- A total of 161 macroinvertebrate taxa have been recognised from the Cascade Creek, Deadmans Creek, Whareatea River, and Waimangaroa River catchments, with caddisflies (Trichoptera: 54) true flies (Diptera: 37), stoneflies (Plecoptera: 23), mayflies (Ephemeroptera: 11), beetles (Coleoptera: 10), and Crustacea (9) present in greatest variety. He notes however that the numbers are all over-estimates of true species richness due to the difficulty of identifying some taxa (or their earlier instars) beyond the generic level.

- Several freshwater invertebrates of conservation interest have been recorded from streams near the proposed EMP. Foremost amongst these is the stonefly *Spaniocercoides philpotti*, which is known from the northern half of the South Island (especially towards the west), and is one of the

more abundant taxa in acidic streams on the Denniston and Stockton Plateaus.

- In the acidic streams on the Denniston Plateau invertebrate densities tend to be very low although if one searches long enough a large number of different species may be encountered. Seventy one of the 161 taxa listed in the dataset examined by West, for example, are known from pH 4.5 or less. These invertebrates clearly are capable of tolerating the low pH and elevated metals levels typical of AMD streams, but their low densities confirms previous findings that bryophytes are not a good food source.

Lake Brasil

269 Lake Brasil is a water reservoir created for the hydro mining period at Whareatea Mine during the 1980s. Sampling at the lake discharge directly below the outlet of Lake Brasil showed the presence of three macro invertebrate species (Patrick, 2008) indicating that the water quality of the discharge from Lake Brasil can support aquatic life. Sampling in Jellyman (2012) indicates that there is a large population of koura in Lake Brazil.

Groundwater

270 There is very little groundwater due to the impervious nature of the bedrock and the groundwater quality and quantity has been extensively disturbed where underground mining has occurred.

Wetlands

271 Approximately 1137 hectares of the 2026 hectare elevated Brunner coal measures that comprise the Denniston Plateau is classified as wetland, and is ranked within the top 30% of wetlands in the region. The Waters of National Importance (WONI) exercise for wetlands ranks the wetland within the proposed mine footprint as number

one in the northwest Nelson biogeographic zone, based on its overall condition and how well it protects various wetland classes present; compared to other wetlands in the unit (Sutherland, 2010). West (2013) also notes that the wetland ranks highly at a FENZ (Freshwater Environments New Zealand) national scale analysis and a FENZ protected land tenure analysis.

272 The Denniston wetland is highly fragmented and is comprised of numerous smaller wetlands interspersed among dryland habitat (Sutherland pers. comm.). The small wetlands are generally poorly connected and are predominantly fed by rainfall. When considering the overall significance of the wetland the Department has noted Sutherland (2010) who suggests that in terms of its significance, given its mosaic nature, separating the wetland values from the surrounding habitat values would be an inappropriate artificial segregation. Therefore the value of the wetland is not just its individual components but also the role it plays in the overall unique vegetation and vegetative assemblages of the ecosystem of the plateau as a whole.

273 The wetland is recognised as a likely significant wetland under the Regional Council's Land and Riverbed Management Plan and proposed Land and Water Plan. The Denniston Plateau wetland is described as having good quality representativeness and as a key site for rarity in respect of *C. juncea*, *Dracophyllum densum* and *Powelliphanta patrickensis*. (Knightbridge, 2010).

274 The vegetation association consists of Manuka/wire rush *Chionochloa juncea* tussock-rushland with subalpine bog species and is interspersed with large coarse sandstone pavements in some areas making it a unique wetland type (Sutherland, 2010).

275 There is very little groundwater on the plateau due to the impervious nature of the bedrock that exists there and the wetland fragments are largely rain fed. As a result of this there is very little hydrological connectivity among wetland fragments (Sutherland pers. comm. 2011).

Wetlands continued (Bodmin, 2012)

276 The Applicant provided further information on wetlands in June 2012. The information is summarised below for reference and to usefully elaborate on the values present on the plateau. The information was not peer reviewed specifically by the Department as the descriptions and conclusions on habitat and significance (but excluding rehabilitation) are generally consistent with advice provided in Sutherland (2010) and West (2013).

277 Bodmin (2012) provides a general description of the wetland communities found on and outside the EMP footprint and an overview of the significance of these values on a local, regional and national scale.

278 Bodmin (2012) identifies three wetland types on the plateau; seepages and flushes, fens – red tussock wetland and pakihi/coal measures – prostrate vegetation, tussockland, grassland (para 24 – 35):

> "**Seepages and flushes**
>
> Seepages and flushes were most common on the upper Denniston Plateau and supported species commonly associated with montane and subalpine bog:*Drosera* spp., *Donatia novae-zelandiae*, *Liparophyllum gunnii*, *Lyperanthus antarcticus*, *Celmisia alpina*, *Utricularia novae-zelandiae* and *Astelia subulata* (Overmars et al. 1998).This suite of species has been described as occurring in seepages, cushion bogs and herbfields (Overmars et al. 1998; Wardle 2002; Lloyd 2010).
>
> No seepages and flushes were mapped on the Denniston Plateau by Lloyd (2010) as they were likely to have been too small to identify from aerial photography. Seepages and flushes have been identified by Williams et al. (2007) as a historically rare (prior to human colonisation) ecosystem type of New Zealand.

Holdaway et al. (in press) evaluated naturally uncommon ecosystem types of New Zealand and assessed seepages and flushes as Nationally Endangered"

"Fen - red tussock wetland

In fen wetland sites *Chionochloa rubra*(red tussock) predominantly occupies flat or undulating ground, at the bottom of hillside toe slopes or valley basins (Johnson & Gerbeaux 2004). Soils are moderately fertile, acidic and at least seasonally waterlogged (Wardle 2002).

The only known *Chionochloa rubra*subsp. *Occulta* wetland on the Denniston Plateau was identified and mapped by Overmars (2010). *C. rubra* subsp. *Occulta* wetland occupied approximately 2 ha, much of it within the proposed EMP (Marshall 2011).
Red tussock fen as mapped by Lloyd (2010) covered 38.1 ha, with the largest and best example in Cypress Valley. Most of this wetland area falls within the footprint of the consented Solid Energy New Zealand (SENZ) Cypress Mine (Lloyd 2010)"

"Pakihi / coal measures tussockland and grassland

The coal measures of the plateau contain a mosaic of vegetation on flat or gently sloping areas with poor drainage. The principal species were *Chionochloa juncea* tussock, stunted or prostrate manuka (*Leptospermum scoparium*) and wire rush (*Empodisma minus*).

Wardle (2002) described these areas as wet heath, montane to subalpine (500 – 1,000 m). Wet heathlands, or wet pakihi, occurred only on the West Coast of the South Island. Drainage at these sites was impeded by underlying rock or an impervious pan. Wet heaths were characterised by rush-like sedges (especially *Baumea* and *Lepidosperma*), the fern *Gleichenia*, manuka and other shrubs. The altitude of the Denniston Plateau meant there was a general absence of *Baumea* spp. and presence of *Chionochloa juncea* and montane to subalpine bog species. The genetically prostrate manuka has been identified as distinct from erect manuka (Wardle 2002). Common moss species on wet heaths were *Campylopus* spp. and *Dicranoloma robustum*.

Overmars et al. (1998) classified this vegetation community (association 11) as Manuka/Wire Rush-*Chionochloa juncea*Tussock-Rushland. The community had a dense vegetation cover with prostrate manuka shrub over *Chionochloa juncea* and wire rush. Other common species included *Donatia novae-zelandiae*, *Carphaalpina* s.s., *Celmisiadubia*, *Lycopodiumlaterale*, and *Oreobolus strictus*. This community is distinguished from that of the Stockton Plateau by higher cover of *Chionochloa juncea*and *C. australis*, less cover of *Dracophyllum politum* and the presence of the following species: *Dracophyllum palustre*, *Lepidothamnus laxifolius x intermedius*, and a range of species associated with montane and subalpine bogs and seepage areas (*Utriculariadichotoma*[*novae-zelandiae*]*, Schizaea australis, Drosera arcturi, Celmisia alpina, Liparophyllum gunnii* and the monocotyledons *Zotovia* [*Microlaena*] *thomsonii, Oreobolus pectinatus, Centrolepis ciliata, Gaimardia setacea, Herpolirion novae-zelandiae* and *Astelia subulata*).

This coal measures community occurred on the upper and lower slopes of the Denniston Plateau, as well as parts of the Mt William Range (the ridgeline and tussock slopes), and restricted slope areas on Mt Frederick (Overmars et al. 1998).

Lloyd (2010) identified this vegetation community as *Chionochloa juncea* grassland and it covered extensive areas (2,803 ha) of both Plateaux. Other associated species were stunted manuka, *Lepidothamnus intermedius*, wire rush, tangle fern (*Gleichenia dicarpa*), *Carphaalpina*, *Celmisiadubia*and *Dracophyllum politum*.

Williams et al. (2007) has recognised pakihi as a historically rare ecosystem type of New Zealand."

279 Bodmin identifies five 'At Risk" wetland vascular plant species recorded on the plateau:

- *Carex dallii* (Naturally Uncommon, Data Poor);
- *Chionochloa juncea* (Declining, Range Restricted);
- *Dracophyllum densum* (Declining, Range Restricted);
- *Euphrasia wettsteiniana* (Naturally Uncommon, Sparse); and
- *Mitrasacme montana* var. *helmsii* (Naturally Uncommon, Range Restricted,Sparse).

280 Pakihi and seepages and flushes are found within the proposed EMP footprint, but fen – red tussock grassland type is not. Rare and threatened plant species found within the proposed EMP footprint included:

Table 4: Rare and threatened species found within the proposed EMP footprint

Species	**Threat classification**
Bryophytes	
Acromastigum mooreanum (liverwort)	At Risk, Naturally Uncommon
Neogrollea notabilis (liverwort)	Nationally Endangered
Pallavicinia rubristipa (liverwort)	At Risk, Naturally Uncommon
Saccogynidium decurvum (liverwort)	Nationally Vulnerable
Vascular Plants	
Chionochloa juncea	At Risk, Declining
Dracophyllum densum	At Risk, Declining
Euphrasia wettsteiniana	At Risk, Naturally Uncommon

281 Bodmin assesses each wetland type found on the plateau using the significance criteria of Appendix 8 from the Environment Court decision on the West Coast Proposed Land and Water Plan 2011. Bodmin summarises (para 168 – 173):

> "Wetlands within the Freshwater Reservoir, CPP and proposed EM area were assessed for ecological significance using the criteria contained in the Environment Court decision Appendix 8. Only one criterion needed to be met in order for a wetland to qualify as ecologically significant.
>
> Wetlands within the Freshwater Reservoir, CPP and proposed EM areas triggered more than one criterion and have therefore been assessed as ecologically significant.
> Seepages, identified as a historically rare wetland class (Williams et al. 2007), would be of national significance…
>
> …The highly distinctive vegetation associated with Brunner coal measures on the Denniston and Stockton Plateaux have been identified as significant at an ecological district and national level (Overmars et al. 1998). As a component of this distinctive vegetation association, the elevated pakihi wetland with its unusual species assemblage and threatened plant species would be significant at an ecological district and national scale.
>
> *Celmisia dubia,Chionochloa juncea* and *Euphrasia wettsteiniana* all have endemic distributions to western Nelson. The Denniston Plateau is probably the southern distribution limit for all three species (New Zealand Virtual Herbarium http://www.virtualherbarium.org.nz; New Zealand Plant Conservation Network flora distribution maps, http://nzpcn.org.nz). In addition a number of rare fauna were found within or adjacent to wetlands across the EMP"

15.4 Assessment of effects on Freshwater Values

282 A summary of potential effects on the freshwater environment would include:

- Loss of nationally significant wetland habitat that is an integral part of the BCM ecosystems on the Denniston Plateau
- Loss of aquatic habitat by destroying all streams within the proposed footprint and Lake Brazil.
- Destruction of koura in streams within the proposed footprint and Lake Brazil
- Interference with the hydrological regime of the upper tributaries and main stem of Whareatea River from construction of the open cast mine and final ELF. Note this is an offsite effect that would effect other Public Conservation Land
- Altering the flow of the lower Cascade Creek by diverting 58 ha of upper Cascade Creek catchment into the Whareatea River. This equates to a 1.4% reduction in catchment area of the Cascade Creek and eliminates two AMD discharges (positive effect) from old mine workings.
- Small improvement in water quality in the Whareatea River by removing the Whareatea Mine AMD discharge.
- Altering the water quality of the Whareatea River by discharging treated AMD water from active water treatment systems during mining operations. Untreated water would also be discharged directly into the Whareatea catchment during times of peak high rainfall.
- Altering the water quality of the Whareatea River by discharging treated AMD water from the ELF after mining operations have been completed. This discharge would be actively treated for a period of approximately 30 years and then passively treated in perpetuity.

- Altering water quality of the Whareatea may impact the Kawatiri hydro-electric (KEL) scheme and domestic water users of Christmas Creek.

283 The proposal would have significant adverse effects on all the wetland values present within the mine footprint overall. There would be adverse effects on ecological connectivity and a significant reduction of nationally significant wetland habitat (seepages, fen and pakihi). The impacts on wetland habitat would be limited to the footprint itself because there is little hydrological connectivity among wetland fragments. In the long term aquatic invertebrates are likely to reestablish in reconstructed streams but the timeframes around the recolonisation are unclear (Stark, 2012, Edwards pers. comm., 2013, attached as Appendix 3.21).

284 The Applicant is proposing to mitigate the impacts by rehabilitating areas of pakihi (wetland) through VDT and reconstructing streams. As with the terrestrial flora, the overall impact will largely depend on the potential success or otherwise of the proposed rehabilitation. Based on the discussion in Section 9 it is considered the effects on freshwater values would be significant because in the long term there is likely to be a reduction in the quality and amount of wetland habitat (pakihi).

285 Sutherland (2010) suggests that altering the flow of the Cascade Creek by diverting the upper Cascade Creek catchment into the Whareatea River would have an insignificant effect on the flows in Cascade Creek.

286 Assuming the Department's proposed water quality limits are met the water quality of the Whareatea River should not be degraded during mining operations. Likewise there should not be any notable effects on the invertebrate communities of the catchment (Stark, 2012, Edwards, pers. comm. 2013). However, this is dependent on the successful re-creation of suitable habitat within streams on the ELF. Edwards (pers. comm., 2013) does note however that the effects on aquatic invertebrates in wetland habitat (non-flowing areas such as fens, seepages, bogs) are not well covered in the

information provided. All fens and seepages would be lost during mining operations so it is likely there would some loss of values. The extent of this loss cannot be established however without further survey work. There is likely to be a loss of Bryophytes from the streams in the footprint at least in the short term due to the removal of habitat. The long term outcomes for Bryophytes are uncertain.

287 There is some concern over certain aspects of the proposed water management, mainly relating to management of AMD. These are discussed in more detail in the AMD section later in this report.

288 Long term (decades) post mining it is most likely that there would be an improvement to the water quality of the Whareatea River because the proposed mining would remove two existing AMD discharges into the upper catchment. Again, however, this would depend on the successful implementation of the proposed water management over a long period. These issues are discussed in more detail in the AMD section later in this report. Should an improvement result it would likely benefit the aquatic environment and other users including KEL. KEL provided a letter to the Department in support of the Applicant's proposal. The letter states that; *"Kawatiri Energy fully supports Bathurst's proposed coal mining, processing and export project as complementary to Kawatiri's existing project…"*

289 The EMP proposal would result in the loss of koura in streams within the proposed footprint and Lake Brazil. The Applicant is proposing mitigation of this loss, and this is discussed later.

290 The Applicant has not provided survey information that accurately determines the extent of the wetlands within the application area. It is acknowledged however that this would be a very time-consuming task due to the fragmented nature of the wetlands and because some of the areas would be very small, being only a few square metres in size. The application footprint overlap with the mapped FENZ wetland is

6.8% of the FENZ mapped wetland, but due to mapping scales and inaccuracy the wetland fragments themselves may be somewhat less than this.

15.5 Mitigation for the effects on Freshwater Values

291 In summary the Applicant is proposing the following measures to mitigate the effects on freshwater values:

- Broadly maintain current drainage patterns after mining with the exception of diverting 58 ha of upper Cascade catchment to the Whareatea catchment. This would include the reconstruction of 1.3km of streams. The drainage would not be completely replicated.
- Prevention of AMD through capping of the ELF and ongoing water treatment (see AMD section for more detail)
- Physical separation of clean and contaminated water and treatment of the latter prior to discharge (see AMD section for more detail) during mining operations.
- Passive treatment systems to be implemented after a period of 30 years, or when monitoring indicates it is appropriate (this could be earlier)
- Rehabilitation during and after mining focused on the re-establishment of indigenous ecosystems. Rehabilitation would comprise VDT of wetland habitat (pakihi), creating areas of the ELF that would retain water to re-create wetland type conditions and recreating stream and boulder beds within re-established waterways.

292 There is uncertainty around the potential success of the proposed rehabilitation of pakihi (wetlands), see Section 9 for more detail. In summary the Department considers that the proposed rehabilitation would not restore current vegetative pathways and that in the long term there would be a loss of pakihi habitat. This would result in a

significant loss of conservation value. *As discussed earlier the Applicant believes the Department has been overly conservative in its assessment of the proposed rehabilitation and that there is the possibility that rehabilitation would generate better results for pakihithan described here.*

293 The proposed management of AMD is discussed in more detail in the AMD section later in this report. If the Applicant can achieve the proposed water management plan there would not be any significant impacts on the water quality of the Whareatea catchment. With the same caveat applied there would likely be an improvement in water quality over the long term.

294 The Applicant is proposing to re-construct an estimated 1.3km out of a total of 1.4km of streams within the proposed footprint. Jellyman (2012) suggests that reconstructed streams (see Section 9) would "provide reasonable habitat for koura" (Jellyman, 2012, para 29) providing that key habitat features were retained and key food sources, including macroinvertebrates, were available and/or provided. Were koura successfully reintroduced the effects in the longer term would be at least partially mitigatable. Jellyman recommends the trapping and retention of at least some broodstock from each stream in order to help re-establish populations post mining. The Applicant has suggested that a reservoir could be recreated in the ELF (currently the site of Lake Brazil) and that koura could be reintroduced to this waterway. However, West (2013) suggests the better use of this area would be to try and achieve viable wetland habitat and therefore discourages this mitigation measure but does favour the reintroduction of koura into recreated streams.

295 Providing appropriate habitat is constructed the re-colonisation of reconstructed streams by macroinvertebrate communities is likely, but the timeframe is uncertain (Stark, 2012, Edwards pers. comm., 2013). There would therefore likely be a loss of values in the short term but they may be restored in the long term (potentially decades).

16 ACID MINE DRAINAGE

16.1 Summary

296 Key points relating to AMD of the EMP are summarised as follows:

- Geology of the Application area consists of the BCM and acid based accounting results show that these rocks are acid forming when disturbed.
- Modeling shows that an adverse change in water chemistry of the Whareatea River would occur should the AMD from the proposed mine not be managed. pH would decrease to low acidic values and metal concentrations would increase to values that would prevent most aquatic life from surviving in the Whareatea River.
- Management of AMD would be required by the Applicant and involves a number of techniques including active and passive treatment of water and capping of the ELF.
- Capping of the ELF would reduce the amount of AMD production in the medium term (years) to allow passive treatment of the AMD and potentially prevent AMD production over the long term (decades if not longer).
- Water discharged from the mine would require active treatment to prevent impacts on receiving environments.
- Discharges from the mine and ELF would be required to meet the Department's proposed water quality limits (included in the draft AA)
- The effectiveness of the ELF cap (seal) is important to the long term environmental outcome of the EMP as it would determine the duration that passive treatment would be required.

- Long term improvement in water quality of the Whareatea River would occur due to the removal of two current AMD discharges from historic underground mines.

16.2 Background to Acid Mine Drainage

297 The Brunner Coal Measures contain potentially acid forming (PAF) sediments (sandstones and siltstones) that produce an acid leachate (AMD) when disturbed, for example, by mining activities. Mining activities break up the rock increasing the surface area of the sediments and expose minerals within the rocks to oxygen and percolating water. Primary factors of acid generation include sulfide minerals, water, oxygen, ferric iron, and bacteria to catalyse the oxidation reaction and generated heat. Pyrite is the predominant sulphide mineral associated with the BCM. Sulphuric acid is formed when the pyrite is exposed to oxygen and water. BCM product coal is not expected to generate a significant amount of AMD and is dependent on the ash content of the product. The majority of sulphur derived from pyrite within the coal would be washed out of the coal. Run of mine coal (pre-washed coal) can be expected to produce moderate AMD.

298 Secondary factors can either neutralise the sulphuric acid produced by the oxidation of sulphides or change the effluent character by adding metal ions mobilised by residual acid. Neutralisation of acid by carbonate minerals is an important means of moderating acid production. The most common neutralising minerals are calcite and dolomite and these minerals are present in the BCM. Metals and metalloids most commonly associated with BCM AMD with high concentrations are aluminium, iron, nickel, zinc, and manganese. Other metals and trace metals are also associated with BCM AMD at low concentrations.

299 Encapsulation (capping) is a technique that attempts to isolate acid generating wastes from oxygen and water, thereby reducing its potential to produce acid. It is

acknowledged that complete encapsulation using the methods proposed would not achieve a nil AMD discharge result, thus the need for ongoing water treatment. It is also very difficult to pre-determine exactly how material under a cap will react and behave over long periods of time. In many examples overseas there have been unexpected results and discharges so it is imperative that, should access be granted, appropriate mechanisms are in place for at least the medium term, and ideally in perpetuity.

300 AMD adversely affects water ecology and vegetation where it merges into the plant rooting zone. Plant survival at pH conditions below approximately 3.5 units is limited to mosses and lichens and a small number of slow-growing and very acid tolerant species. Similarly only a very few acid tolerant macroinvertebrate species will survive in water below about pH 4.0 units. Metal and metalloids can accumulate in the environment in aquatic ecosystems (fish and sediments) and in humans are often carcinogenic.

301 Acid leachate can also occur naturally from the natural weathering of materials (geogenic processes) as it does on the Denniston Plateau and is referred to as Acid Rock Drainage (ARD) in this report. Acid leachate from anthropogenic activities (mining activities in this situation) is referred to as AMD in this report and pH's as low as 2-2.5 units are well known (in published literature) to be associated with BCM AMD. Slightly higher acidic pH is associated with natural ARD as with the case of the Denniston Plateau (minimum pH of 4.2 units in streams). Specialist terrestrial plant ecosystems have developed on the very low fertility acidic soils (pH 3.9 – 4.5 units) on the Denniston Plateau (refer to Terrestrial Flora Section 13.3). It is important to stockpile these acidic soils for rehabilitation so that these acidic conditions can be recreated for the acid tolerant plant species to survive. The use of fertile non-acid soils or other materials would encourage native species to establish or thrive that don't naturally occur or thrive on the Denniston Plateau.

302 A number of prevention and mitigation measures are proposed by the Applicant to reduce the quantity and concentration of the AMD contaminants. These prevention and mitigation measures would not reduce the concentration of contaminants to an acceptable level and consequently treatment of water from the open cast mine during and after mining would be required. The 'burnout' of AMD material in the EMP ELF would be dependent on the effectiveness of the cap.

303 Active treatment systems are used during mining to treat AMD and passive treatment systems are typically used some time after mine closure to treat AMD. A change from an active to a passive treatment system could be achieved at mine closure providing capping is effective and the discharge of AMD is managed effectively. At this point it is unclear when the Applicant would propose to convert the active treatment system to a passive treatment system. The land area required for the passive treatment system would also be a factor and something that the Applicant would have to consider carefully going forward with any passive treatment system for the ELF. Land area could be estimated by modeling, but would be better understood by measuring discharge quality and quantity from field samples.

16.3 Management of Acid Mine Drainage

304 The Applicant's management strategy for AMD is summarised as follows:

- Selective handling of waste rock based on ABA.
- Cap the ELF with a compacted impermeable layer to prevent ingress of oxygen and water.
- As far as practicable, bury PAF materials below the permanent water table to reduce/eliminate the oxidation of pyrite.
- Provide active treatment of all contaminated water during mining and for a period of 30 years post completion mining
- Provide passive treatment of the ELF stormwater runoff and leachate drains after mine closure.

305 The design and construction of the cap for the ELF is critical for the long term environmental outcomes of the EMP. The eventual breakdown and prevention of acid production within the ELF is dependent on the effectiveness of the cap. Absolute sealing of the ELF would not be possible due to the climate and geomorphology of the application area. Therefore the best possible scenario would be to construct the most effective cap possible. The effectiveness of the cap would also determine the duration that treatment would be required to operate and the geochemical quality and quantity of the discharge. There are no published cases in the literature of acid production stopping from a waste dump that has been capped using compacted material. Provided that water is allowed to percolate through a waste dump, pyrite oxidation will occur deep within the dump, regardless of surface re-vegetation and stabilization efforts.

16.4 Potential effects of Acid Mine Drainage

306 The Applicant supplied a draft Water Management Plan (WMP) and a range of other information relating to water management as part of their application. The overall water management system is based on a model developed by Golder Associates called the "GoldSim Model v10.11 (SP4)". GoldSim is a simulation programme that models the quantity and quality of water in the area affected by the proposed open cast mine. Predictions from the model should be considered as order of magnitude estimates. Models are an attempt to predict and simulate naturally occurring events, occurrences, and outcomes. Consequently they are subject to degrees of uncertainty, and can only be validated by comparing model predictions with actual field sampling results.

307 Three model scenarios were considered:

- Pre development (Year 0): modeled for comparative analysis;
- Active mining (Year 5): assumed to be worse case mining scenario;

- Completion of mining (Year 15): mining has been completed and the period of active rehabilitation of the ELF is complete.

308 The Applicant completed an assessment of the anticipated changes in water quality and quantity at various sub-catchments downstream of the EMP (Prediction Points 1 to 3 located downstream in the Whareatea River). The predicted changes are based on modeling of actual and predicted data. Lysimeter geochemistry observations and analysis were used to predict water chemistry runoff from the different catchment types within the water management model prior to treatment (e.g. ELF runoff, highwall runoff, etc).

309 The model's predictions at the three sub-catchments points are based on the discharges being treated by the treatment systems described in the Section 8.4. Water treatment removal efficiencies for metals and metalloids are based on laboratory scale trials. Prediction Point 2 is considered to be the appropriate downstream location to measure potential effects of the discharges from the open cast mine. Prediction Point 2 is located directly below the confluence of the Whareatea River and Conglomerate Stream. This site is selected as there is a good assemblage of invertebrates indicating that there is little deterioration of the stream ecology from historic AMD and stream base flows are continuous. Prediction Point 1 shows affects from AMD and the stream is ephemeral at about this location.

310 Water quality limits proposed by the Applicant are shown in Table 5. They are considered appropriate by the Department and are included in the draft AA. These limits measured directly above the confluence of the Whareatea River and Conglomerate Stream would allow fish to populate the Whareatea River below the escarpment at the confluence of the V72 stream. The proposed metal limits would be

more than halved downstream below Conglomerate and V72 streams due to dilution. The monitoring site was selected at this location as it is not possible to access the Whareatea River directly below Conglomerate and V72 streams due to steep access. Also shown are the Applicant's proposed resource consent limits for the proposal.

Table 5: Proposed water quality limits

Receiving Waters Compliance Limits at monitoring Site W-M2

	Compliance Limits	
pH	Shall not fall outside a range of 4.5 – 6.5	
	Median concentrations, g / m^3 unless stated	
Total suspended solids	15	
Turbidity	15 NTU	
Iron + manganese	1.1	
Aluminium	0.5	
Median pH	pH >5.5	pH <5.5
Cadmium	0.0003	0.0012
Chromium	0.05	0.20
Cobalt	0.044	0.18
Copper	0.002	0.0013
Lead	0.0065	0.026
Nickel	0.017	0.068
Zinc	0.012	0.054
	95th percentile concentrations, g / m^3 unless stated	
Total suspended solids	30	
Turbidity	30 NTU	
Iron + manganese	2.2	
Aluminium	1.0	
Median pH	pH >5.5	pH <5.5
Cadmium	0.0011	0.004
Chromium	1.0	4.0
Cobalt	0.17	0.63

Copper	0.007	0.004
Lead	0.03	0.14
Nickel	0.26	1.0
Zinc	0.067	0.29

Notes:

1. All compliance limits are based on dissolved metal concentrations;
2. Limits for cadmium, copper, chromium, lead, nickel and zinc are based on median water hardness of 50gCaCO3/m3;
3. pH dependent limits based on biotic ligand model (BLM) predictions;
4. Chromium limit is based on CrIII and uses U.S. EPA criteria values

311 Rock samples were collected from a coal quality/quantity drilling programme (core samples) for ABA analysis in the BCM within the EMP area. ABA analyses indicate the majority of the bore holes contain potential acid forming rocks having low to high acid producing potential.

312 Pope (2012), attached as Appendix 2.4 provides results for 210 rock samples. In general these results indicate that there is acid producing potential in the majority (59%) of rock types sampled and that acid producing rocks are spread throughout the entire sequence of rocks within the EMP and are widely spread geographically.

313 Ideally the ELF would be capped with materials which are non-acid forming (NAF material) or acid consuming (AC) material; however the availability of these materials is limited. The Applicant has three sources of capping material available locally:

- Non-acid forming (NAF) granite.
- Low capacity PAG (5m weathered profile of the sandstone);
- Selected Low Capacity PAG (LC PAG), NAF, and AC lithologies from the overburden based on a drilling/sampling and ABA testing programme during stripping.

314 The proposed cap is a saturated cap consisting of two layers:

- 1 m thick low permeability layer (1 $X10^{-8}$ m/s) that is effectively an impermeable layer.
- [up to] 5 m thick protective upper layer (1 $X10^{-4}$ m/s) that has a high permeability and is designed to be saturated.

315 The likely volumes of available capping material are listed in Table 3.

Table 6: Volumes of capping material available to cap the ELF (Golders, 2013, p. 28)

Table 6: Volume of capping materials.

	Covered ELF area [1]	Required capping material volume [2]	Waste over-burden volume [3]	NAF % of over-burden [4]	Rock suitable for ELF capping – adjusted volume [5]	Enough NAF material for ELF capping per year?	Cumulative volume
	m^2	m^3	bcm	%	m^3		m^3
Year 0	0	0	3,049,000	29%	813,000	Yes	813,000
Year 1	77,000	460,000	6,223,000	34%	1,947,000	Yes	2,300,000
Year 2	208,000	1,248,000	11,829,000	10%	1,088,000	No	2,140,000
Year 3	334,000	1,531,000	2,528,000	60%	1,395,000	No	1,890,000
Year 4	326,000	1,431,000	1,169,000	87%	935,000	No	1,190,000
Year 5	121,000	673,000	9,915,000	16%	1,459,000	Yes	1,960,000
Totals	**1,066,000**	**5,343,000**	**34,712,000**		**7,638,000**		

Note: All numbers are rounded to three significant figures or less.
[1] Based on the ELF footprint rather than surface area
[2] Assumes a 1 m LPL layer and a 5 m protective cover for all areas except areas of pakihi vegetation where the protective layer was assumed to be 1 m
[3] Supplied by BCL based on mine plan scheduling
[4] Provided by BCL (McLaughlin 2013)
[5] The available capping material volume is adjusted by a 15% bulking factor and a discount contingency of 20% due to uncertainties in identifying NAF volumes

316 Based on this information there would be adequate volume of material available to cap the ELF, however material from years zero and one would need to be stockpiled to ensure the shortfall in years 2, 3, and 4 could be covered. It should be noted that the data the Applicant has used to calculate volumes of suitable material can not

distinguish what type of rock it would be (Pope, 2012, para 23). Therefore it is not possible to calculate the exact availability of mudstone or sandstone so there is some uncertainty remaining with these assumptions.

317 For NAF mud and sandstone to be suitable for capping it would need to be crushed to a size of 0.6mm (based on mathematical calculation) to ensure it would be impervious. This would require careful management to ensure the viability of the ELF. Field trials would need to be undertaken to determine the suitability of this material as a low permeability cap.

318 The Applicant's ecological experts have recommended that granite not be used in the top most layer of the ELF because it would, over a long period, increase the nutrient levels currently present. Therefore mud and sandstone is proposed to be used in the top most layer of the ELF. This layer would be 1-5m thick. Field trials would need to be undertaken to ensure that the material is NAF. If the weathered five metre surface was determined to be unsuitable for the ELF then an additional approximately 1 million m^3 of material would be required.

319 The kinetic testing employed by the Applicant on the BCM has included column leachate tests and field trials using lysimeters.[9] To date there has been 16 months of data collected. The data thus far suggests that PAF rocks react quickly, leaching 20-60% of available acid after one year. However, rates of release may vary greatly due to rock size and Pope (2012) suggests that the actual rock sizes of overburden may result in slower rates of release. It is acknowledged by Pope (2012) that further testing of waste rock sizes and capping material would be required to accurately assess the long term rates of acid release from PAF material.

[9] Lysimeters are drainage collection devices that simulate waste-rock dump leaching under natural field conditions.

320 Pope (2012, para 27) indicates that tests to date are not yet advanced enough to determine the accuracy of the ABA. Therefore the Applicant is proposing to undertake field based analytical tests of extracted rock to ensure suitability before use in capping. This would help ensure that no PAF material was included in the capping layer. This is important because only a small volume of acid forming material is required to contaminate a large volume of NAF material.

321 The availability of capping material remains a potential issue for BCL should predictions of availability prove optimistic. Pope (2012) provides estimates of available material for capping based on field tests of rock. The results indicate that 14% of all the available rock would be NAF, 59% would be PAF, and there is uncertainty around the remaining 27%. However, after further analysis he concludes that 71% of the uncertain rock would not be acid forming leading to an overall conclusion that 33% of the rock from within the proposed footprint would be suitable for capping. Should there be a shortage of NAF, BCL are proposing to use low potentially acid forming material. Should this be the case the capacity of the water treatment facility may need to be increased to accommodate the increase in acid influenced water. In a worst case scenario the Applicant would need to source appropriate material from elsewhere, or provide an alternative solution to the issue. As mentioned above it is imperative that AMD is managed effectively and for a suitably long period of time, if not in perpetuity.

Additional AMD Work Required if Approved

322 There are several aspects of the AMD issue that would need to be carefully addressed during any Work Plan approval process should access be granted for the EMP. These include:

- Detailed schedule of NAF availability and length of time PAF is uncapped
- Proof that mud and sandstone can be compacted to the desired impermeability levels
- Provision of contingencies and alternative solutions should proposed capping and control measures prove unsuccessful

323 The Applicant identifies that the following work would be undertaken should the EMP go ahead Pope (2012):

"35. A future work programme has been scoped for data collection during operations (Pope et al., in prep). This includes a detailed monitoring regime and programme of large scale field trials to improve knowledge of mine drainage chemistry, its rate of formation and optimal management strategies. This programme will have four main objectives.

1. Identify acid production rates under field conditions using real waste rock to eliminate grain-size and scale up issues from laboratory testing and field testing. In general, large scale tests demonstrate that reaction rates proceed more slowly than indicated by small scale trials such as those conducted to date.

2. To test the effectiveness of capping for minimising the volume of acid mine drainage that is formed.

3. To quantify lag periods that have been identified in small scale geochemical testing under conditions present at the mine and determine if they can be integrated with site operations to minimise and manage acid formation. Further study of lag periods could assist with prioritising cap emplacement for different waste rock.

4. Optimisation of rock classification procedures will be completed including field trials of relationships between rapid tests and acid base accounting data.

36. The future work programme includes four major aspects of work.

1. Establishment of a field trial (on the scale of hundreds of tonnes) of rock to characterise acid production from capped rocks. This study will enable correlation of the kinetic test data to field conditions and add value to the kinetic test data. This study will incorporate acid base accounting analysis of the rock used in the trial and will involve a mass balance components within and exported from the trial.

2. Establishment of field trial to assess the effectiveness of capping for the minimisation of acid mine drainage. It is possible that the cap will not only exclude water but also limit oxygen ingress into the ELF. If this is the case other more effective or efficient acid management and minimisation strategies might be developed as operations proceed.

3. Detailed monitoring seeps as they form during mining to improve certainty of mine drainage chemistry at the site. This testing will involve monitoring the evolution of mine drainage seeps with time so that mine drainage chemical evolution can be tracked and predicted under field conditions.

4. On-going acid base accounting testing and kinetic testing to complement field trials and mine drainage management process. These tests will include field based validation and use of portable XRF." (Pope, 2012, para 35-36)

324 These recommendations would be included in any potential ELF and Water Management Plans that would be subject to Department approval in any potential Work Plan approval process.

325 There is a potential for mine water to mix with groundwater (Whareatea mine water) via existing underground workings as the open cast mine is developed. Whareatea mine water would be treated with the active treatment system during mining. The historic underground workings in the highwall can be sealed prior to backfilling by using a geotextile/bentonite seal or other low permeability material.

Waste Products

326 There are various waste products that the Applicant proposes to dispose of in the open cast mine which would form part of the ELF. Sludge would be generated from the M/W WTP, SW WTP. Course (predominantly rock) and coal fine rejects (predominantly fine coal <100 microns in diameter) would also be generated from the CPP and back hauled to the open cast mine.

327 The Applicant proposes to encapsulate sludge in specially designed disposal cells within the ELF. The encapsulation of these wastes in the ELF and proposed treatment of the leachate would help mitigate any potential adverse effects.

328 The Department is also aware that chemicals used in active treatment of mine influenced water can 'drop out' of discharged water below discharge points. Treatment agents such as lime or lime can consolidate on stream beds for some distance below discharge points and have impacts on the freshwater communities there. The potential for this impact would be addressed in any water management plan approval process.

16.5 Discussion

329 The Applicant has provided detailed and up to date information on their proposed management of AMD for the EMP. The information provided suggests that there is enough material available (with careful management) for an impermeable and non acid forming cap for the ELF and that most of the PAF rocks would be leachable, i.e. lose their acid producing qualities over time. However, there are still areas of uncertainty:

1. The data from ABA testing does not identify what type of rock the available NAF may be. Should there be limited granite available the Applicant would likely have to undertake substantial crushing of sand and/or mudstone to generate suitable

material for the cap. This would be an operational issue for the Applicant. The Department has concerns about the ability to crush sandstone to the material size required to achieve the desired impermeability. A contingency plan for a NAF short fall scenario would be required as part of the ELF Management Plan.

2. The research to undertake and assess the rate of leaching and acid release from PAF material is not complete and needs to be qualified by field tests of actual overburden rock and sizes. Only after this has been completed could more robust predictions of long term acid production and leaching rates be established.

3. The proposed water management does not necessarily address the treatment of potential AMD in the longer term. The Applicant indicates that the MW WTP has a life of 25 - 30 years but that treatment beyond this timeframe may be required prior to passive treatment. It is assumed that an adaptive management approach would be taken. This would need to be addressed in any potential Water Management Plan and/or through long term funding mechanisms.

330 Even given the future work to address the uncertainty in 2. above there is no guarantee that modeled results would occur in the ELF. International experience suggests that the behaviour of PAF material under capping is very difficult to predict. There is inherent uncertainty with any such large scale overburden project. The Applicant would undertake current best practice to manage AMD but there is still a risk of significant adverse effects should this best practice be less than effective. As with the proposed rehabilitation it is worth considering whether the level of uncertainty around the management AMD is appropriate for the highly significant ecological context within which the ELF would be constructed and maintained. The ELF would be a potential long term liability for the Department and the Crown, and as yet the duration of potential risk is undetermined. The Department would be seeking guarantees and/or bonding for the long term monitoring and management of the ELF.

This would be particularly pertinent should a worst case scenario such as a large scale failure of the ELF occur at a distant point in the future, or if shortfalls in estimated NAF material necessitate expensive and unbudgeted transport or sourcing of appropriate NAF material from elsewhere.

17 GEOTECHNICAL

17.1 Summary

331 Key points relating to geotechnical aspects of the EMP are:

- Highwalls in the EMP would comprise of temporary highwalls existing for a short duration around the operational pit. Highwalls would be backfilled against, eliminating any long term post closure geotechnical risk as the pit is backfilled to form the final ELF.
- A potential geotechnical risk is associated with the final ELF where the ELF sits on basement rock slightly north of the actual physical escarpment. The additional loading of the material forming the ELF could cause failure of the Escarpment edge. This risk would be mitigated by leaving a minimum setback from the escarpment edge to the ELF slope toe.
- Maximum slope angles of the final ELF are relatively flat and would not pose a geotechnical risk assuming the ELF was appropriately constructed for the geotechnical properties of the materials.

332 A feasibility level geotechnical assessment of the application area was completed by the Applicant, along with an ELF philosophy design report. These have been reviewed both internally within the Department and also by RDCL (see RDCL 2013), attached as Appendix 3.22. In summary, the design is considered suitable to ensure the long term

stability and integrity of the ELF. Large scale slope failure of the peripheral mine benches during the operational phase of the mine could cause a loss in flora and fauna. Bench scale failure of the peripheral mine benches and slope failures within the open cast mine could have impacts on areas that have already been rehabilitated, and associated flora and fauna. However, due to the proposed slopes involved the risk is considered very low.

333 Highwalls in the EMP would comprise of temporary highwalls existing for a short duration around the operational pit. Highwalls would be backfilled against, eliminating any long term post closure geotechnical risk as the pit is backfilled to form the final ELF. The yield acceleration defines the maximum earthquake load the slope can withstand before it becomes unstable (factor of safety (FOS) < 1). Operational design criteria for the highwalls is based on an earthquake loading of 1: 150 years return period event (assumed to be 0.2-0.3 g horizontal peak ground acceleration) with a FOS greater than 1. A static loading minimum FOS design criterion has been set at 1.3 for the overall slope and 1.2 for multiple benches. The probability of a 1: 150 year return period event occurring during a 10 year period (approximate period of active mining) is <7%. Internationally where highwalls have been subject to strong earthquake shaking they have performed well with damage typically being limited to bench scale failure.

334 The proposed design of the ELF resulted in the following parameters; an overall pit slope in the order of 45°; comprising 15 metre high benches with 63° batter slopes (2V:1H) and 7.5 – 10 metre berms more detailed geotechnical design of highwalls would be required for any potential Work Plan approval process. The Department would evaluate this detail at that point should the AA be approved.

335 Uncertainty in the structural geology is a pervasive risk to all highwall designs. In particular the rock mass characterisation that forms the basis of the design is based primarily on drilling investigations and limited outcrop mapping, which do not necessarily identify significant faults and shears within the rock mass that may otherwise be masked by the weathered and eroded topography and dense vegetation cover. Adversely oriented and located faults (e.g. dipping out of the slope, just behind

the highwall) have the potential to affect the highwall stability on all scales. The uncertainty of the geological structure makes it difficult to design the highwall excavations in advance, and must be managed through ongoing geotechnical mapping and monitoring as the highwall is exposed. A buffer between the highwall crest and any AA boundary (mining permit boundary) is important to allow for this uncertainty. The buffer distance (hundreds of metres) between the pit crest and the mining permit boundary for the perimeter of the pit that is inside the mining permit is considered appropriate.

336 A potential geotechnical risk associated with the final ELF is the escarpment underground mine surface area where the ELF sits on basement rock slightly north of the actual physical escarpment. The additional loading of the material forming the ELF could cause failure of the Escarpment edge resulting in the loss of flora, fauna and aquatic life caused by the AMD material slipping into the Cascade catchment. The residual risk would be mitigated by leaving a minimum setback from the escarpment edge to the ELF slope toe. The Applicant proposes a 10m setback from the Escarpment edge. The Department would require a technical report to address this setback size as part of any initial Work Plan approval process and determine the setback distance in the relevant Management Plan if an AA were approved.

337 In summary there are certain inherent geotechnical risks associated with the proposed mine which cannot be completely eliminated, however they could be mitigated through the imposition of appropriate conditions of any potential AA and through any potential Work Plan approval process. Geotechnical risks which could cause the premature closure of the proposed mine could be bonded against to provide funds for environmental remediation. Geotechnical risks which do not cause the premature closure of the proposed mine would not be required to be bonded as the company would be required to remediate the environmental effects during the continuation of mining activities at its own real and operational costs.

18 ARCHAEOLOGY AND HISTORIC VALUES

18.1 Summary

338 Denniston is the premier historic coal mining site in New Zealand. The whole of the Denniston Plateau historic landscape is more than merely the sum of its parts. It is a complex place, replete with multi-layered history, social meaning and physical remains representing a continuum of use from the beginnings of coal mining and related activities on the Plateau up into the modern era.

339 The historic coal mining landscape at Denniston spans a depth of time and is more complete than any other in New Zealand. It played an important part in many aspects of the history of New Zealand, such as settlement and immigration, developing the nation, the trade union movement, technological innovation and contribution to an important resource extraction industry.

340 Historic sites within the EMP proposed footprint are an integral part of this historic landscape and would be permanently destroyed by the proposed mining activities.

341 The proposal will have a detrimental effect on the nationally important coal mining landscape, destroying Escarpment Mine and other adjacent small scale mining remains.

18.2 Information sources

342 An assessment of the Applicant's original application relating to historic values was completed by the Departments technical specialist Jackie Breen in 2009 and 2010. The

March 2013 revised application has also been reviewed by Ms Breen. Her reviews are documented in Breen (2010) attached as Appendix 3.14 and Breen (2013) Revised application – Escarpment MP 51-279, attached as Appendix 3.15.

343 The original application did not contain sufficient information for the Department to undertake a robust assessment of the historical sites in the proposed mine area. However, the Applicant addressed these deficiencies and, as of 2010, the Department was satisfied with the baseline archaeological survey work carried out for the Application. Breen (2013) indicates that the reduction in footprint from 157ha to 106ha does not reduce the effects on historical values as no features were within the area now excluded from the application, i.e. the area west of Trent Stream. As such the discussion and conclusions in Breen (2010) remain valid for the purpose of this report.

18.3 Historical sites within the proposed footprint

344 The Applicant's survey work identified four sites within the proposed footprint; Whareatea Mine, Plateau Mine, Birchall's Co-operative Party workings and the Escarpment Mine. Subsequently the Whareatea Mine was removed from consideration under the AA application as it is located outside of the Permit boundary. Consideration of the site is included in the Haul Road Concession application being assessed by the Department. The remaining three sites that would be impacted by the proposal are described below (Note that this description is taken from Breen 2013, see this document for references):

Escarpment Mine

345 The Escarpment Mine site consists of a group of features spread over a wide area relating to three distinct phases of use of the mine: 1) traditional underground mining 1963-1978; 2) underground hydro-mining 1979-1982; 3) water reservoir for the Whareatea Mine 1982-1989. The main features include 3 mine portals, a dam, water

fluming, coal bins (2 type sites), a power shed, pipeline remains, rail from the mine, access roads, building foundations, remains of a coal conveyor, coal fines settling pond, and the water reservoir dam (Brasils Dam) (see Watson 2009; Watson 2010, attached as Appendix 4.3).

346 The condition of the features at the site is variable, ranging from poor to good. However, the internal context of the site has been noted as being extremely good, retaining high integrity (elements of the process of mining still being present). The set of coal bins near the mine portals are rare, with few examples remaining in situ on the West Coast. Like other sites in the MP area, the historic and archaeological landscape that the Escarpment and the other mines in the MP area are a part of is nationally unique. The information potential of the Escarpment Mine is 'good', in that the remnants would enable comparative and spatial analysis in relation to other coal mines on the Plateau. This would in turn contribute to understanding generally about how mines of this period operated. The amenity value of the Escarpment Mine is noted by Watson (2009b:26-27) as being 'good' but then, coupled with the Whareatea is touted as providing: "…*an excellent example of mid-late twentieth century mining technology and infrastructure. These remains form a contrast to the remains of the nineteenth century mines on the plateau and are also an important part of the on-going story of the search for coal on the plateau, not to mention the development of new mines and the changes in mining technology*". The cultural associations of the sites can be seen in a limited way when confined to focusing solely on individual mine sites (as per Watson 2009). This narrow view of the esteem that the Denniston historic coal mining landscape is held in does not reflect the reality of the place of Denniston in the consciousness of the public today. Denniston has become synonymous with the struggles and perseverance of the people that lived and worked on the Hill, and has an almost iconic status as a place of kiwi identity.

Plateau Mine

347 The mine is located on the west side of the Whareatea to Escarpment road. It operated in the mid-1980s. Little remains of this site.

348 The condition of this site is poor as little remains. While small scale private and co-operative mines are not rare, the fact that so many of these small mines operated in such a discrete area (the Denniston Plateau) in the latter half of the 20th century is unique, as these small mines became a rare site on the coal fields both nationally and in Buller during this time. Given the poor condition of the site the internal context is also poor. However, given the mine's place in the wider Denniston historic landscape, the external context values are excellent. Because of the few physical remains at the Plateau Mine site, the information potential of the site is limited. The amenity value is deemed low for the Plateau mine site due to its poor state of repair. Cultural associations are similar to that noted for the Escarpment Mine.

Birchalls Mine

349 Birchalls Mine was a small scale co-operative mine that was worked in two phases – 1956 to 1965, and 1972-1973. The site consists of a small hut, an area of coal fines, the timber remnants of buildings and other structures, and fluming.

350 Of the two small scale mines in the MP area Birchalls is in better condition and more complete. While small private and co-operative coal mines are not a rare type of site, it is relatively rare to have private and State runs mines in such close proximately to one another. Birchall's, has a high degree of integrity with a shed, the building sites, the remains of fluming, mine portal, and settling ponds all being present. However, given the mine's place in the wider Denniston historic landscape, the external context values are excellent. The Birchall's Co-operative Mine, has good information potential due to the survival of more features (see Watson 2010 attached as Appendix 4.3). The amenity values of Birchall's Co-operative mine is deemed good, as it would "…*potentially provide an interesting contrast to the remains of the larger State mines and thus inform the visitor about the differences between the two different management systems*." (Watson 2009b:26,). Cultural associations are similar to that noted for the Escarpment Mine.

351 *Comment on 'internal context':* The remains at these mines within the MP area are an important contributor to the excellent external context/historic landscape values of the historic coal mining complex on the Denniston Plateau. The Denniston coal mining historic landscape has excellent integrity and is nationally significant. The time depth and unusual richness of the archaeological and historic landscapes at Denniston make it a nationally unique heritage mining landscape. The continuity of process at the site (the representation of all phases of coal mining on Denniston) is without parallel, and there is nowhere else in New Zealand that the history of coal mining industry can be traced so distinctly. Because of this it is the best historic coal mining landscape in New Zealand, and one of New Zealand's most significant industrial archaeological sites.

18.4 Assessment of historical values

352 The assessment of values carried out was based on guidelines for the assessment of archaeological sites produced by the New Zealand Historic Places Trust (Breen, 2010). As such the sites were assessed against the following criteria: condition, context, rarity, information potential, cultural associations, and amenity values. Historical values which are usually assessed at historic era sites were not part of the AA application. It is important to have historic values assessed (Breen, 2010) and an assessment of historic values has been completed by the Department.

353 The place that the Escarpment mine (along with the adjacent Whareatea Mine) has in the history of coal mining in the later 20th century is important. In conjunction with the other later 20th century coal mine remains on Denniston, they provide tangible examples of the innovation and change that had to take place in order to sustain the coal industry when markets for coal were declining, from the post WW2 period until the 1990s and the end of State coal mining at Denniston. The mines also represent the last days of underground mining in the Buller area and with it the end of traditional underground mining culture. In essence the development of these latter mines trace the long decline of Denniston's once productive and nationally important coal mines.

354 The proclivity of small private and co-operatively run mines that operated on the Denniston Plateau in the post-World War 2 era up to the 1990s are also indicative of the decline in the productivity and importance of the large mines. With the threat of closure of the State Mines miners sought to earn a better and more secure wage by working for themselves or smaller businesses. Technological innovation in coal extraction made these small enterprises viable and like the influence of such innovation in the larger State run mines, sustained the coal industry on the Plateau into the 1980s, albeit in a reduced scale.

Condition

355 The Applicant's evaluation of the condition of the physical features of the Escarpment Mine is that it is 'variable'. The condition of the features at the Whareatea Mine are cited as 'good' by the Applicant, and those of the two small mines (Birchall's and Plateau) are said to be reasonable with the remains at the Birchall's site being more complete (Breen, 2010). These estimations of the condition of the sites are adequate (Breen, 2010).

Rarity

356 The Escarpment Mine has a set of coal bins that have some wooden uprights of the bin superstructure still in place. The Applicant states that the remains of the bins at the mine are not rare and cites a number of other examples of similar bins. Breen (2010) considers that these bins are rare and that there are few other bins left that are as complete with the timber superstructure still in evidence as those at the Escarpment Mine. Moving the coal bins is not considered a practical option as the wooden uprights forming the bins are made of untreated native timber and show advanced signs of decomposition and decay. The wooden uprights are structurally unstable and unsafe. Some timber beams could be recovered from the structure if it was destroyed.

357 While small private and co-operative coal mines are not a rare type of site, it is relatively rare to have private and State runs mines in such close proximately to one another (Breen, 2010).

Context (Internal and External)

358 The Applicant describes:

- the internal contextual values of the Escarpment Mine as being good with evidence of most of the features of the mine site still present;
- the internal contextual values of the Whareatea Mine as being as good;
- the internal contextual values for the Plateau Mine as being poor, as the site has been modified;
- Birchall's as having a higher degree of integrity with a shed, the building sites, the remains of fluming, mine portal, and settling ponds all being present.
- The internal context of the mining remains can be said to be excellent, with the majority of features remaining at each site.

359 The 'external context' values are where "context or group value arises when the site is part of a group of sites which taken as a whole, contribute to the wider values of the group, or archaeological, historic or cultural landscape". One of the more important elements of the significance of the Escarpment Mine at Denniston is its place in the context of the evolution of mining on the Denniston Plateau (Breen, 2010).

360 The Applicant states: "*the Denniston Plateau is home to what is arguably New Zealand's most significant coal mining landscape*". The importance of the wider contextual values at Denniston has been noted by a number of other historic heritage professionals (see Breen, 2013, para 8 for references).

361 The mining systems present span the entire life of the coal mining there from inception in the 1870s to closure in the 1990s, thus demonstrating a continuity of historical process in one place (Breen, 2010).

362 The internal context of the mines in the proposed open cast mine area is good and has high integrity (Breen, 2010). This has the corollary that the remains at these mines are an important contributor to the excellent external context/historic landscape values of the historic coal mining complex on the Denniston Plateau (Breen, 2010). The Denniston coal mining historic landscape has excellent integrity (Breen, 2010). The continuity of process at the site (the representation of all phases of coal mining on Denniston) is without parallel, and there is nowhere else in New Zealand that the history of coal mining industry can be traced so distinctly (Breen, 2010).

Information Potential

363 The Applicant described the information potential of the Escarpment Mine as 'good', like that of the Whareatea Mine, in that the remains would enable comparative and spatial analysis of the remains in relation to other coal mines on the Denniston Plateau. The information potential of the Plateau Mine site is limited because of the few physical remains. The Birchall's Co-operative Mine, however has good information potential due to the survival of more features. Breen (2010) agrees that the information potential of the sites in the proposed open cast mine area is significant.

Cultural Associations

364 The main cultural associations for all the mine sites that the Applicant identifies are with the men who would have worked in the mines. This is a narrow view of the esteem that contemporary groups and organisations place on the Denniston Plateau (Breen, 2010). Friends of the Hill, Denniston Heritage Trust and the Department also have an interest in the Denniston Plateau (Breen, 2010).

365 The commitment made to ensuring ongoing historic preservation work and enhancing visitor facilities at the site [Denniston Plateau] for a range of users by the Department and community groups such as the Friends of the Hill and the Denniston Heritage Trust indicate an existing intense interest in the site [Denniston Plateau] and point to significant further development potential (Breen, 2010).

Amenity Values

366 The amenity value of the Escarpment Mine is noted by the Applicant as being 'good' and coupled with the Whareatea is said to provide an excellent example of mid-late twentieth century mining technology and infrastructure. These remains form a contrast to the remains of the nineteenth century mines on the Denniston Plateau and are also an important part of the on-going story of the search for coal on the Denniston Plateau, not to mention the development of new mines and the changes in mining technology. The amenity value is deemed low for the Plateau mine site due to its poor state of repair. Conversely, the potential amenity value of Birchall's Co-operative mine is deemed good, as it would potentially provide an interesting contrast to the remains of the larger State mines and thus inform the visitor about the differences between the two different management systems.

367 The amenity values of the mines (bar the Plateau Mine) has been deemed excellent, providing easily accessible and tangible examples of late 20th century mining that contrast with the remains of that of the 19th century. For this reason these sites also have high interpretative value (Breen, 2010).

368 The significance of the remnants of coal mining industry at Denniston has been recognised in the Department's strategic planning document the CMS. It is one of the key places identified for people to visit to interact with coal mining heritage, and sites at Denniston are recognised for their historic values and are 'actively managed' (Breen, 2010).

369 It is important to note a significant proportion of the coal mining sites at Denniston fall on public conservation land. Other similar historic landscapes, such as the Stockton Plateau, have mixed land tenure, and there has been more modification of historic features at Stockton.

18.5 Assessment of effects on Historical Values and proposed mitigation

370 There has been no assessment of effects on the historic values presented by the Applicant. It is not clear if consideration has been given to the option of avoiding or mitigating impacts on the archaeological sites (Breen, 2010).

371 A large part of the significance of the Denniston archaeological landscape is the degree of integrity of the site and the fact that evidence of the connections between the sites is still there (Breen, 2010). This contiguity or 'connectivity of features' is an important part of such a site's intrinsic value (Breen, 2010). The destruction of the archaeological landscape would destroy this aspect of the value of the site (Breen, 2010). Also, the remaining parts of the site would become divorced from the surrounding historic landscape and lose context, thus the contextual values for the remaining archaeological landscape would be negatively impacted (Breen, 2010).

372 With the history and the contextual values of the Escarpment and Whareatea Mine being so intertwined, the destruction of the Escarpment Mine would have a significant detrimental impact on the values of the Whareatea Mine (Breen, 2010). In spite of some of the excellent qualities of the Escarpment Mine, the Applicant's conclusions are seemingly counter intuitive – i.e. that no assessment of effects are carried out and the recording of the site is all that is required to mitigate for the loss of these significant values (Breen, 2010).

373 It is suggested by the Applicant that the proposed mine will enhance historic values. The extent of the enhancement is restricted to expanding knowledge of mining in the

area and the potential for interpretation. There would be some knowledge gain if the area is mapped extensively, or excavated, but this is not considered an enhancement of historic values (Breen, 2010).

Summary of Potential Effects

374 The proposal would:

- Destroy all features at the Escarpment Mine.
- Destroy the access road to the Escarpment Mine.
- Destroy Brasils Dam.
- Destroy all remains of fluming around the Escarpment Mine, any along the access road, leading to Brasils Dam and from Brasils Dam to the Whareatea.
- Destroy all traces of the Birchall's Co-operative Mine and Plateau Mine.
- Cause cumulative effects on the contextual values of the nationally important and unique historic landscape.
- The sites themselves have regionally rare features that would be lost if the proposal went ahead (such as the Escarpment bins; Breen, 2010).
- The cumulative effects of the proposal on the historic values at Denniston have not been discussed by the Applicant, but it is an important concept that needs to be considered (Breen, 2010). Ongoing large scale mining on the Denniston Plateau, specifically in areas where mining has occurred in the past, would cause the gradual destruction of the historic mining landscape (Breen, 2010). Incremental loss of parts of the historic landscape would lead to an overall negative effect to the nationally important and unique historic values on the Denniston Plateau (Breen, 2010).

Mitigation of effects on historic values

375 The Applicant does not provide any mitigation measures that would avoid the destruction of the historic values within the proposed footprint. However, the Applicant does suggest the recording of features prior to destruction, the implementation of an Accidental Discovery Protocol (ADP), worker inductions, and the installation of interpretation panels around the site. While not protecting the sites from destruction these measures may lead to an increase in knowledge of the sites prior to destruction.

19 RECREATIONAL VALUES

19.1 Assessment of Recreational Values

Recreational use on the Denniston Plateau

376 Visitors travel up to the Denniston Plateau to explore the wild and remote environment and to see the historic mining remnants. There is a car park at the head of the Denniston incline and at Burnetts Face, two of the more popular visitor destinations in the Buller area. Considerable resources have gone into developing the Denniston Incline and a train ride into an underground coal mine (marketed as 'the Denniston Experience').

377 Sign posts at Burnetts Face restrict road access to avoid the nearby mining operations at Brookdale Mine and Cascade Mine. From Burnetts Face car park, there is a walkway to the Coalbrookdale Fanhouse. All of these activities are within the Denniston Historic Place and are located two kilometres to the north of the EMP area. Very few tourists venture near the EMP area, as this requires 4WD vehicles to get access

378 The Department manages several mountain biking and walking tracks that traverse part of the Denniston Plateau including one cycle track that runs through the proposed open cast mine area. Tramping does occur on Denniston Plateau. However, it is

generally limited as the weather is unfavourable for tramping much of the time. There is a limited amount of recreational four wheel driving carried out on the Denniston Plateau due to the limited number of four wheel drive tracks available. The proposed footprint is not a focal point for tramping or four wheel drive enthusiasts and is considered to be of limited value for these pursuits.

379 For further discussion of recreational values see Section 19 Archaeology and 21 Landscape.

19.2 Assessment of effects on Recreational Values

380 The Applicant has not stated in their application which areas are required to be closed to the public for safety reasons under the Conservation Act. The entire area would need to be closed to the public for safety reasons. This closure may also need to extend to areas outside the boundary of any access arrangement, should it be granted, during periods of blasting (explosions) work.

381 The parts of the mountain biking track that runs through the proposed open cast mine area would be removed during the operation of the EMP. The Applicant proposes to develop a management plan with the Department to develop additional mountain bike tracks to replace those sections of track that would be lost as the result of the proposed mining.

382 The Applicant suggests that there would be negligible effects on tourism, tramping and four wheeled drive activities as this particular area of the Denniston Plateau is used very infrequently. The Applicant suggests that the planned rehabilitation of the open cast mine after mine closure would continue to accommodate ongoing recreational use.

383 The Applicant suggests there would be an opportunity to enhance tourism in the District through appropriate mine site visits. Mine site visits currently occur at other operational mine sites on the West Coast (Oceana and Solid Energy NZ operations). Any such venture would need to acquire the requisite resource consents and any others necessary approvals such as a Concession under the Conservation Act.

384 The Buller Area Office assessment of effects noted the effects on the historic values and the impact that that would have on the Department's historic development plans for the Denniston plateau, and subsequently the opportunities for visitor experience.

385 It noted that the road to Mt Rochfort is a popular drive for visitors with 4wd vehicles. While there is potential for viewing platforms of the operational mine to compliment present visitor developments it is also noted that this would be for the short term (5-6 yrs) and the longer term rehabilitated mine site is likely to be less of an attraction than the existing natural landscape.

386 While there would be visual and noise impacts the Area Office did not consider that the proposal would significantly impact on primary tourist areas on the plateau or existing tourist developments.

387 It is noted that high levels of truck traffic on the Denniston road (largely legal road) would impact on visitor traffic.

19.3 Mitigation for Effects on Recreational Values

388 The Applicant has proposed the following mitigation measures:

- The restoration of the open cast mine to allow recreational use, including reinstatement and potential extension of the existing mountain bike tracks.

- Enabling appropriate mine site visits and the establishment of visitor viewpoints in appropriate locations.
- The development of a management agreement with the Department to investigate options for extending the network of mountain bike tracks.

389 These measures are considered appropriate for mitigating the effects of the activity on recreational values, although it is noted that ancillary activities will cause additional effects on recreational values on the plateau, particularly relating to the associated haul road (subject to a Concession application).

20 CULTURAL VALUES

390 There is no documented or physical evidence of Maori occupation of the Stockton-Denniston Plateaux.

391 The West Coast Regional Council Water Management Plan has not identified any water bodies within the application area as areas of spiritual and cultural beliefs, values and uses of significance to Poutini Ngäi Tahu.

392 The Applicant has completed a cultural impact assessment for the open cast mine and Te Rünanga o Ngäti Waewae (Ngäti Waewae) has visited the site twice in 2008 and 2010. The Cultural Impact Assessment 2010 Ngati Waewae stated that they would want to see the following adverse effects avoided:

- Any deterioration to water quality.
- Unnatural changes to sediment flow and patterns of deposition.
- Any encroachment of adjacent land users onto river margins and riverbeds.

- Any dewatering or loss of small aquatic resources including streams and springs.
- Any loss of access to sites of significance, especially remaining mahinga kai sites.
- Any loss of mahinga kai habitats and mahinga kai species.
- Any loss of wahi tapu and wahi taonga.

393 Cultural associations relating to Archaeology are referenced in Section 18.

21 LANDSCAPE AND NATURAL CHARACTER

394 This section describes landscape and natural character issues. Natural character is considered in its landscape context. For consideration of ecological issues associated with natural character refer elsewhere in this report.

21.1 Summary

395 Key points relating to landscape and natural character are:

- The Denniston Plateau has high natural character and landscape values but is not considered an outstanding natural landscape (in the RMA context)
- There would be significant short and medium term effects on landscape values during mining operations and while vegetation re-establishes over the ELF

- The length of time until full re-vegetation occurs could be decades and for forested areas centuries. Until this is achieved the site would not be fully mitigated in terms of landscape values
- In the long term (once full revegetation is achieved) the loss of landscape values is considered to be low

21.2 Information sources

396 A landscape assessment was included in the original L&M application in 2008 (Glasson, 2008, attached as Appendix 4.2). This report was peer reviewed by Boffa Miskell Limited for the Department in 2009 (Boffa Miskell, 2009, attached as Appendix 3.18). There was also information related to landscape and natural character included in the Environment Court proceedings relating to the EMP. This material was not fully reviewed by the Department because an initial review indicated that it would not change any of the key conclusions made in the original reviews in 2008/2009.

Visual Description of Landscape

397 Glasson (2008) provided a description of the landscape which is summarised below:

398 A distinctive feature of the Denniston Plateau is the Whareatea River, which has formed an east-west trending gully extending approximately two thirds of the way into the Denniston Plateau. Both the landform and the topography change noticeably at this point and therefore, for the purposes of an assessment, the Denniston Plateau has been split into two distinct areas; one to the north of the river; and one to the south.

399 The southern part of the Denniston Plateau is where the proposed mining site would be located. The area is characterised by the northern slope of Mount Rochfort that steadily rises in one continuous sweep from approximately 680 metres to 1040 metres ASL.

400 The Whareatea River collects the majority of the Denniston Plateau's runoff, which discharges into the Tasman Sea between Fairdown and Waimangaroa. Lake Brasiland a few other minor tributaries discharge into Cascade Creek, south of the proposed open cast mine site. Like the northern part of the Denniston Plateau, the paths that streams flow in are affected by the location of rock outcrops. The alignment of the drainage channels and the pattern within the landscape are a unique feature of the Denniston Plateau.

401 The height of the ridges and the depth of the corresponding stream gullies in this part of the Denniston Plateau appear more extreme than those to the north. Much of the area is covered by more stunted vegetation, including shrubs and trees; probably due to the exposure and slightly higher altitude. As a result, the colour range is more diverse, ranging from tawny and ochre (the dominant element of the landscape) through to oranges on gentle slopes and olives and greens in gullies. In addition, the landscape appears less stark.

402 The landform of the northern section of the Denniston Plateau is low, rolling nature, with a substantial amount of rock exposed at the surface. Low-lying shrubs and grasses dominate the vegetation on this part of the Denniston Plateau, while larger shrubs exist where the disturbance of the surface occurs, or where the microclimate benefits growth. There are boggy areas throughout the site consisting of peaty soils.

403 Dams and weirs have been constructed to store water for previous mining, creating small lakes. A considerable amount of debris associated with past land use is evident throughout the area; including timber, metal, disused power poles and machinery parts.

404 Two significant features of the Denniston Plateau are:

405 The high voltage lines that cross the site in an east-west direction, noticeable due to the light reflecting off the cables and pylon structures.

406 The tracks that cut into the surface which are visible due to the sparse nature of the vegetation.

21.3 Assessment of Landscape and Natural Character

407 Glasson (2008) explained that landscape is interpreted as being more than just visual and includes factors relating to the physical landscape, people's perceptions of the landscape and the values or meanings that people associate with landscape. Both Glasson and Boffa Miskell refer to the Pigeon Bay criteria that have been accepted in landscape assessments particularly under the RMA. Boffa Miskell lists them as follows: Natural Science Factors, Aesthetic Factors, Expressiveness (Legibility), Transient Values, Whether the Values are Shared or Recognised, Value to Tangata Whenua and Historical Associations.

408 Boffa Miskell (2009) agreed with the Applicant's conclusion that the landscape is not outstanding under the criteria, but highlights that although the site has been modified by previous mining activities, it is clear that there are important historic, recreational, scenic and natural values that can be attributed to the wider area.

409 Boffa Miskell (2009) indicates that the proposed open cast mine site is not located in an area that has been identified as outstanding under the RMA by the relevant Councils. While this may be the case, the Buller Council has not yet undertaken an assessment of outstanding natural landscapes for the region. It must also be recognised that while RMA determinations can help inform, this application is not being considered under the RMA but rather the CMA which has different objectives and criteria for decision making.

The PNAP report states that after investigation into other occurrences of BCM "Ngakawau ED is the only ecological district in New Zealand defined by the presence of extensive elevated coal measures rocks and associated landforms and vegetation (McEwan 1987), and as such could be regarded as a nationally outstanding natural landscape in its entirety."

21.4 Assessment of effects on Landscape and Natural Character

Effects on the site with regards to natural character are summarised as follows:

- The open cast mine would permanently alter the vegetation (regardless of re-vegetation work) on approximately 1.6% of all elevated BCM
- The landforms of rocky pavement, escarpments and incised streams of the open cast mine site that form an integral part of the existing natural character and landscape would be irreversibly altered by open cast mining.

Effects on historical associations

410 The proposed open cast mine would result in the loss of archaeological contextual values of the mines on the Denniston Plateau by the destruction of the Escarpment Mine and coal bins, Brazil's Dam, Birchall's Co-operative Mine and Plateau Mine.

411 Boffa Miskell (2009) concluded that the Denniston Plateau is a distinctive landscape and the mining has contributed to this landscape. It is inevitable that mining would have an impact on the landscape however careful operations and an appropriate restoration proposal can ensure that impacts are minimised (Boffa Miskell, 2009). The loss of the prominent sandstone outcrops, scarps and overhangs could not be mitigated so there would be some loss of landscape values within the ELF even in the long term. This loss would not, however, significantly detract from the landscape values of the Denniston Plateau as a whole.

21.5 Mitigation for effects on Landscape and Natural Character

412 Boffa Miskell (2009) concluded that the progressive rehabilitation proposed in the application is essential to mitigate effects, and this view remains valid. As discussed in Section 9 the Applicant will most likely be able to re-establish vegetative cover over most of the ELF and reconstruct streams. However, it would not be able to restore areas of sandstone pavement, including large outcrops, scarps and overhangs.

413 The Applicant provided visual simulations of the site both during mining operations and also in the period after mining while rehabilitation is undertaken. The simulations provide representations of the existing landscape and landscape post mining and it is recommended the reader refer to these in order to appreciate the scale and context of the above discussion. These simulations are included as Appendix 5 to this report.

414 As noted above the long term outcomes for landscape values are wholly dependent on the proposed rehabilitation (see section 9 for more detail). The Applicant should be able to re-establish vegetation over the final ELF and therefore mitigate many of the effects on landscape values over the long term (decades to centuries).

22 CONSERVATION MANAGEMENT CONTEXT

22.1 Systematic Conservation Planning for Buller Coal Plateaux

415 The Department is currently undertaking a systematic conservation planning assessment of the Buller Coal Plateaux (Stockton and Denniston). A summary of this assessment to date is provided by Gruner (2012b), attached as Appendix 3.16. The assessment arose from a concern over the increasing conflict between protection of

conservation values on the plateaux and development proposals (including the EMP). The goal of the assessment is to help identify priority areas for conservation to protect a representative and long term viable sample of the full range of conservation values on the Buller Coal Plateaux.

416 Please note here that the boundary used in the following analysis differs lightly from that of the Brunner Coal Measure described throughout this report. The variance is because the analysis includes buffer areas and lower altitude habitat around the ecosystem, therefore the area subject to the analysis is larger.

417 Gruner (2012b) describes five scenarios that identify priority areas for conservation on the plateaux. All scenarios are based on achieving the following minimum protection targets for the Buller Coal Plateaux:

(a) 40% of the original extent of all vegetation types and ecosystems that are unique to the Plateau or integral components of the coal measures ecosystem,

(b) 50% of the original distribution of endemic species (*Powelliphanta patrickensis*),

(c) 100% of the remaining distribution of the nationally critically threatened land snail *Powelliphanta augusta*, and

(d) No specific targets for vegetation types, ecosystems or species that occur on the Plateau but are more widespread and not integral components of the coal measures ecosystem.

418 See Gruner (2012b) for explanation of why these targets were deemed appropriate.

419 The five scenarios are summarised and explained below:

Scenario 1: Priority areas on Public Conservation Land

420 Scenario 1 explores which areas would best achieve the minimum representation targets when selection of areas is restricted to public conservation land. Gruner (2012b), Figure 2, shows that almost all of the remaining undisturbed, higher altitude areas on the Plateau that are on public conservation land are included in the priority area, including the entire Escarpment Mine proposal area. Some biodiversity features (seepages, red tussock grassland, mountain beech-cedar forest, Plateau streams) are under-represented on public conservation land, as they are mainly held under other land tenure or have already been approved for clearance (see Gruner, 2012b, Table 1).

Scenario 2: Priority areas independent of land tenure

421 Scenario 2 explores the location of priority areas for conservation independent of current land tenure. The analysis is shown in Gruner (2012b) Figure 3). The priority area identified by this scenario achieves the highest overall conservation benefit, as the area is the least fragmented and retains the highest average proportion of unique and typical coal measures features (see Gruner, 2012b, Table 1). Some areas on public conservation land, such as the upper Waimangaroa gorge, the south-eastern edge of the Denniston Plateau and the ridgeline south-west of Mt Rochfort, are excluded from the priority area in favour of areas outside public conservation land, e.g., along the Waimangaroa River and around Deep Stream. Most of the proposed Escarpment Mine is included in the priority area, except the north-eastern corner around Lake Brasil and the old Escarpment Mine road.

Scenario 3: Priority areas based on RAPs and existing Reserves

422 Scenario 3 explores the representation levels achieved by areas previously identified as high value or representative of the Buller Coal Plateau. The analysis is shown in Gruner (2012b) Figure 4). These are the Recommended Areas for Protection (RAPs) identified in the Ngakawau PNAP survey (Overmars et al. 1998), existing Scenic and Historic Reserves, and parts of adjacent Ecological Areas. The analysis shows that these areas alone are not sufficient to meet the minimum representation targets. Notable additional priority areas occur on the slopes of Mt Stockton, around Deep

Stream and on the Denniston Plateau, including the western part of the proposed Escarpment Mine (as far east as the old Escarpment Mine road).

Scenario 4: Priority areas using minimum area, independent of land tenure

423 The previous three scenarios are based on a prioritisation algorithm in Zonation that aims to include in the priority area a core area for each feature included in the analysis (Core Area Zonation). Each feature is considered independently taking regard of its relative weight and its original and remaining extent. The minimum representation targets are used as a secondary criterion when identifying priority areas. Scenario 4, see Gruner (2012b) Figure 5, uses a different algorithm (Target-based Planning) that focuses on the minimum representation targets as the primary criterion and aims to identify the minimum area required to meet these targets. Biodiversity features for which no specific targets have been set are removed early in the analysis, and no consideration is given to the relative weight of features.

424 In addition, in this analysis, the extent of coal bearing rock was included so that, where possible, areas with coal bearing rock were avoided in the selection of conservation priorities. The extent of coal bearing rock was mapped based on geological maps (Nathan 1978, 1996; Nathan et al. 2002, attached as Appendices 1h and 1i) and information on known off-coal areas provided by L&M Mining (email from Dave Manhire to IG, 22/10/2010). On the geological maps, Brunner coal measures, Kaiata formation and overlying quarternary deposits were interpreted as potentially coal bearing rocks. Prioritisation was allowed to occur independent of land tenure.

425 In this scenario, only 32% of the plateaux study area is required to achieve the minimum representation targets, compared to 44% or more in the previous scenarios (Table 1). The priority area includes 37% of the extent of coal bearing rock compared to 47% or more in the other scenarios. The average proportion retained of unique and typical coal measures features is lower than those in Scenarios 2 and 3, but higher than what could be achieved with public conservation land alone (Scenario 1). The

priority area in Scenario 4 includes most of the Escarpment Mine proposal, except the north-eastern corner of the proposed pit, around Lake Brasil.

22.2 Summary and discussion of systematic conservation planning

426 The systematic conservation planning assessment of the Buller Coal Plateaux undertaken suggests that the proposed area for the EMP is a priority area for conservation. The various scenarios all include at least part of the proposed EMP as a priority area. It emphasises that the area under application is an important representative area of the unique Brunner Coal Plateaux ecosystems that are considered nationally significant. As noted above the analysis is based on data that excludes the latest botanical surveys of the eastern part of the proposed footprint around Lake Brasil that show some previously unknown high values. The inclusion of these values would likely increase the priority of this part of the proposed footprint.

427 It is worth discussing the broader land use context of the Buller Coal Plateaux and what the above analysis may indicate. Land use on the Buller Coal Plateaux is governed by several legislative mechanisms that together drive the land use on this nationally significant area. Much of the Plateaux is held as public conservation land under Conservation Act 1987 (mostly Stewardship area). Other land of the Crown is administered by LINZ under the Land Act. The various CMLs and ACMLs on the two plateaux were granted under the Coal Mines Act 1979. The numerous Exploration and Minerals Permits on the Plateaux are granted by the Crown Minerals Act 1991, and the same act provides for Access Arrangements including for those parts of permits that overlap public conservation land. The Resource Management Act 1991 regulates the activities within these permits and to a lesser degree within the licenses once consent is applied for and/or granted. As does the Wildlife Act 1953 through required permission processes with activities that disturb protected wildlife.

428 The areas of previous and future disturbance on the Buller Coal Plateaux that have resulted from the various mechanisms described above are shown in the scenario maps shown in Gruner (2012b). Note that the analysis assumes that areas within CMLs, such as Sullivans CML on the Denniston Plateau, will result in future mining and therefore the loss of the original BCM ecosystems.

429 What the analysis in Gruner (2012b) indicates is that the existing extent of disturbance of the BCM ecosystem has reached a point where very little more can be disturbed before preserving a viable representative sample of the nationally significant BCM ecosystem becomes very difficult. This therefore suggests that from an overall land use perspective a balance point may have already been reached and that further mining or other land use approvals, including the subject of this AA application would mean that retaining a viable representative sample of nationally significant BCM ecosystems may not be able to be achieved.

22.3 Prioritisation of ecosystems and species management

430 The Department has runs a prioritization process to help set clearer conservation goals and select priority places, species and actions for conservation work to help promote more effective and efficient conservation in New Zealand. The approach uses an integrated suite of tools and techniques and encompasses the terrestrial, freshwater and marine environments. One of the outcomes of this work is a ranking of natural heritage sites throughout New Zealand in terms of priority for conservation. The rankings are based on a wide range of parameters including ecological data, potential conservation gains and resources available to undertake conservation work. They provide the Department with an indication of where resources may be best utilised to achieve the best conservation outcomes.

431 The latest draft NHMS rankings (September 2012), attached as Appendix 7, rank the Denniston site (a 1,137.5 ha unit) 84th of 751 priority sites identified throughout New

Zealand. It should be noted that the top 38 ranked sites are all offshore islands. Therefore the Denniston ranks 46th of all sites on the mainland of New Zealand. The rankings suggest that the Denniston site is likely to be a significant priority site for the Department's future management of conservation in New Zealand.

23 LEGAL CONSIDERATIONS UNDER THE CROWN MINERALS ACT (1991)

23.1 Matters the Minister Shall Have Regard To

432 The considerations to take into account in making a decision on this application are set out in section 61(2) of the Crown Minerals Act (1991; CMA). Section 61(2) states that:

"In considering whether to agree to an access arrangement in respect of Crown land, the appropriate Minister shall have regard to:

(a) The objectives of any Act under which the land is administered; and
(b) Any purpose for which the land is held by the Crown; and
(c) Any policy statement or management plan of the Crown in relation to the land; and
(d) The safeguards against any potential adverse effects of carrying out the proposed programme of work; and
(e) Such other matters as the appropriate Minister considers relevant."

433 The relevant considerations detailed above are not necessarily those of local communities, regional or district councils, or other interests of the Crown. They principally relate to the statutory administration of the land as public conservation land, and the protection of it from adverse effects. They do not relate to the profitability of the proposed mine, or its possible economic benefits or other importance.

434 The following sections of this report set out and discuss the relevant matters the decision maker is required to have regard to, in making their decision, under s 61(2) Crown Minerals Act. In 'having regard to' a matter, it is not necessary to 'give effect' to it. The Oxford English dictionary (online version) defines 'regard' as 'attention to or concern for something'. So the matters listed in s 61(2)(a) – (e) must be given genuine attention, in the decision maker's consideration of this application.

435 The order in which the matters are presented in s 61(2), and in this report, does not denote a hierarchy of importance. The weight to be accorded to the matters, particularly where there are competing considerations which tell for or against the grant of an access arrangement, is a matter for the decision maker to consider and determine, subject to the limits of reason. Each of the matters described in s 61(2)(a) – (d) relates directly back to matters relevant to the Conservation Act 1987, and the Minister of Conservation's portfolio.

436 While s 61(2)(e) - "such other matters as the appropriate Minister considers relevant"- appears broad and somewhat open ended, it is to be interpreted in accordance with, and consistently with, the other matters listed in s61(2)(a) – (d). Accordingly, this consideration covers other matters which are properly relevant, in the decision maker's opinion, in relation to the Conservation Act, and the role and portfolio of the Minister of Conservation.

23.2 The Objectives of Any Act Under Which the Land is Administered

437 The land is administered under the Conservation Act 1987.

438 The Long Title to the Conservation Act 1987 states that it is an Act to promote the conservation of New Zealand's natural and historic resources. (The natural and historic resources within the application area, and the potential adverse effects of the proposed mining operations on them, are outlined above in Section 11.)

439 Under the Conservation Act, “conservation” is defined as “... the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations.”

440 The proposed mining operations would prima facie be inconsistent with the following objectives of the Conservation Act:

> *"(i) preserving and protecting the natural and historic resources on the land;*
> *(ii) maintaining the intrinsic values of the natural and historic resources on the land;*
> *(iii) providing for the appreciation and recreational enjoyment by the public with regard to the natural and historic resources on the land;*
> *(iv) safeguarding the options of future generations with regard to the natural and historic resources on the land."*

441 In summary the construction of the open cast mine would result in significant adverse effects on natural and historic resources of the land. These are summarised in Section 12, Summary of Potential Effects on Natural Resources and Conservation Values.

442 Some of the potential adverse effects could be safeguarded against by the imposition of appropriate conditions including rehabilitation, environmental quality limits, bonds and insurances, as well as addressed by the provision of compensation. These matters are discussed in more detail later in this report.

443 However, many of the potential adverse effects would be permanent, irreversible and by their nature not able to be safeguarded against. The most notable being the permanent loss of the areas of sandstone erosion pavement and unique coal measure habitat and vegetation. Rehabilitation of the 106 ha of BCM would likely take centuries for the slow growing species in this environment and the final ecosystem would be different to the present one (although there is some uncertainty as to the extent of difference). There is also the possibility of significant long term issues with acid mine drainage if management methods are not effective. In addition, there will be

permanent loss of historic features and permanent adverse effects on the historic contextual values of the entire Denniston site.

444 Providing for the appreciation and recreational enjoyment by the public cannot be safeguarded due to the permanent loss of natural and historic values. While over the medium – long term (decades to centuries) the proposed rehabilitation will lessen the adverse visual effects, the landscape will never be returned to the current diversity of landform and the natural vegetation will not be fully restored. The affect of this on visitor experience is likely to be different for different visitors.

445 Safeguarding the options of future generations would involve preserving the viability of the current vegetation and habitat so it can continue to support species and play an important continuing role in maintaining the biodiversity of New Zealand. As noted above the full viability of the current natural resources of the application area would be lost and a different ecosystem would recover over many decades and probably centuries.

446 The destruction of historic sites would not safeguard the options for future generations. However, other measures such as recording sites, providing interpretation and compensation could result in some benefits to the understanding of historic values lost.

447 Therefore, as stated above, this application would prima facie be inconsistent with the objectives of the Conservation Act.

23.3 Purpose for Which the Land is Held by the Crown

448 In the granting of any AA the Minister shall have regard to the purpose for which the land is held.

449 The land subject to the MP is contained within the Mount Rochfort Conservation Area – Conservation Unit K29001 and is deemed to be held under the Conservation Act for conservation purposes pursuant to section 62 of that Act. It is managed as if it were stewardship area specified under section 25 Conservation Act. Section 25 states that stewardship area shall '*…be so managed that its natural and historic resources are protected.*' [Sec 25, Cons. Act, 1987.].

450 Under this application the Applicant seeks to impact on land containing a largely intact, natural and unique environment. The wording in section 25 of the Conservation Act is mandatory in nature: it requires every stewardship area to be so managed that its natural and historic resources are protected. To allow an activity to occur which significantly undermines the natural resources/values of the land would therefore seem to be contrary to the intent of the section.

451 In this particular case, the proposed mining operations appear prima facie to be inconsistent with the purposes for which the land is held. While some of the potential adverse effects in relation to those purposes may, in some instances, be safeguarded against by the imposition of appropriate conditions, including rehabilitation, and/or addressed by the provision of compensation, none of these, either separately or collectively, seem likely to prevent significant loss to natural and historical resources over the short and long term (decades, centuries, and in some case permanently). Furthermore most of the application area contains particularly high quality BCM ecosystems that could usefully help to secure under protection, sufficient areas of representativeness of these unique and rare ecosystems.

452 Potential safeguards and other matters such as compensation are further discussed in more detail later in this report.

23.4 Policy Statements and Management Plans in relation to the application area

Conservation General Policy 2005

453 The Conservation General Policy does not provide any specific guidance with regard to considering mining applications. Where general policies are relevant to this application they are also captured in the CMS which must be in accordance with the General Policies.

West Coast Te Tai o Poutini *Conservation Management Strategy, May 2010 (CMS)*

454 The West Coast *Te Tai o Poutini* Conservation Management Strategy is prepared with public consultation and it sets out the legal, policy and strategic direction for ensuring the integrated management of natural and historic resources. It must be consistent with legislation, and the Conservation General Policy 2005. It establishes objectives and policies for ensuring authorisations on public conservation lands are consistent with broader objectives for the management of natural and historic resources.

455 This section provides an overview of the relevant statements, objectives, and policies in the CMS (see text in boxes). For ease of reading, individual policies etc. are then repeated with comments where appropriate.

456 The CMS, in addition to describing the land on the West Coast, sets the context for the management of the land (chapter 2) with management objectives and policies (chapter 3) together with desired outcomes (chapter 4). Specific reference to individual 'places' in the CMS indicates their significance and provides direction for how the land should be administered for the term of the strategy (10 years). The 'desired outcomes' effectively relate to how the land should 'appear' at the end of the strategy's life; with the Department being required, pursuant to section 17A of the Conservation Act 1987, "to administer and manage all conservation areas and natural and historic resources in accordance with (a) statements of general policy…; and (b) conservation management strategies…". The CMS explains how the Department

proposes to manage the natural, historical and cultural heritage values and recreational opportunities within the Conservancy for the term of the strategy (2010-2020). Relevant extracts from the CMS are discussed under the various sub-topics below (see boxes).

CHAPTER 2: CONTEXT

Chapter 2 provides an overview of the conservation values of significance in the West Coast *Tai Poutini* Conservancy. The West Coast is described as a 'land apart' from the rest of the country geographically, scenically, climatically and ecologically. It describes how the West Coast is distinct for its wild landscapes, ecological communities and threatened species, often once common in other parts of New Zealand, but now either extinct or reduced to scattered remnants; contains several high-profile threatened species; and is also outstanding nationally for a range of historical and cultural features.

Section 2.2.1.4 – National conservation significance

This section identifies sites of national conservation significance in the West Coast *Tai Poutini* Conservancy. The CMS states that *"the Buller coal plateaux (i.e. Denniston and Stockton plateaux) comprise a nationally outstanding natural landscape… the particular combination of plant communities and associated landscapes present on these plateaux occurs nowhere else in New Zealand"* [p. 23].

Full quote, pg 23 CMS:

"Coal plateau landscapes

In the coastal hills just north of the Buller Kawatiri River are the elevated coal measure plateaux - windswept areas that are often under snow in winter and frequently fog bound. The Buller coal plateaux (i.e. Denniston and Stockton plateaux) comprise a nationally outstanding natural landscape. The plateaux contain by far the largest occurrence of Brunner coal measures in New Zealand and have the greatest diversity of vegetation types on coal measures. Its ecosystems are defined by the presence of extensive coal measure rocks and associated landforms and vegetation (McEwen 1987). While some of the animal and plant communities of the plateaux are found elsewhere, some Powelliphanta snail populations and the communities containing the endemic coal measure tussock Chionochloa juncea are confined to these plateaux and are internationally unique (Walker 2003). The particular combination of plant communities and associated landscapes present on these plateaux occurs nowhere else in New Zealand (Overmars et al 1998).*

** A detailed assessment of Brunner and Paparoa coal measures outside the Buller coal plateaux was undertaken by the Department of Conservation (Appendix IX in Overmars et al 1998). Seventeen sites containing Brunner coal measures were identified. The*

assessment concluded that the Buller coal plateaux contain by far the largest occurrence of Brunner coal measures in New Zealand, with the greatest diversity of vegetation types on coal measures, and could thus be recognised as a nationally outstanding landscape in its entirety."

Comment

457 The proposal would have an adverse effect on the coal plateau landscape by permanently destroying areas of sandstone pavement and permanently altering areas of the 'particular combination of plant communities' described above.

CHAPTER 3: MANAGEMENT OBJECTIVES AND POLICIES

The CMS cites the Denniston Plateau as being a geological site of regional (scientific, educational or aesthetic) importance (CMS, Appendix 6, p.378) and a priority site for biodiversity management (CMS, section 3.3.3.2)

<u>Section 3.3.32 Maintenance and restoration of the indigenous natural character of ecosystems</u>

Section 3.3.3.2 explains that it is not possible with current techniques and resourcing to undertake active management of all threats at every site, therefore the Department prioritises where work is needed. The highest priority sites for work are generally those with high natural values which are currently threatened. The Buller Coal Plateaux is identified as one of these priority sites for biodiversity management.

A description of the manner in which the 'Buller coal plateaux priority site for biodiversity' should be managed is also provided. The management of threats to the species, habitats and ecosystems should be prioritised, taking into account the need to maintain the ecological integrity of indigenous ecosystems, consistent with the purposes for which the land is held. Integrated management should be undertaken for biodiversity protection at priority sites [pp. 78 - 82].

The following objectives and policies are particularly relevant;

Objective 1 To maintain, and restore where practicable, the indigenous natural character of the full range of West Coast Te Tai o Poutini terrestrial, freshwater and marine ecosystems.

Policy 1	*Management of threats to terrestrial and freshwater species, habitats and ecosystems across all public conservation lands on the West Coast Te Tai o Poutini should be prioritised, taking into account the need to:* *(a) prevent the loss of indigenous species and the full range of their habitats and ecosystems;* *(b) maintain contiguous sequences of indigenous ecosystems;* *(c) maintain representative examples of the full range of indigenous ecosystems;* *(d) maintain populations of indigenous species, habitats and ecosystems with unique or distinctive values;* *(e) achieve recovery of threatened species (including their genetic integrity and diversity) and restore their habitats where necessary;* *(f) restore threatened indigenous ecosystems and connections between ecosystems where necessary;* *(g) maintain the ecological integrity of indigenous ecosystems consistent with the purpose for which the land is held;* *(h) protect recreational freshwater fisheries and freshwater fish habitats; and* *(i) achieve integrated management at priority sites.*
Policy 2	*Integrated management should be undertaken for the following priority sites for biodiversity management:* *(f) Buller Coal Plateaux (see Map 8)*
Policy 3	*Highly significant terrestrial and freshwater ecosystems should be restored where necessary to improve their functioning.*
Policy 18	*The Department should advocate for appropriate action to be taken to protect, maintain and/or restore the integrity of freshwater ecosystems and habitats, including the protection of entire wetlands and river catchments, and their riparian margins.*

Chapter 3 of the CMS (section 3.3.4) also provides a broad description of the importance of the geological and landscape values on the West Coast. Geodiversity is an inherent component of the natural landscape, which is a visual expression of the cultural, physical and biological processes operating in the environment.

Individual conservation values, which the Conservancy is required to preserve and protect, are interwoven in the landscape. Hence their protection inevitably involves protecting patterns and rates of change in land and waters; i.e. landscapes which make up the Conservancy. Examples of the threats to Geodiversity include (among other things) excavation and mining; earthworks and roading, the development of utilities and infrastructure in natural settings and on skylines, and native vegetation clearance. The destruction or degradation of geological features, landforms, and their underlying processes impacts on the character and function of the natural landscape and its ecosystems.

Where change is proposed, landscape conservation seeks to ensure that the proposed change is integrated with appropriate regard to the effects the change will have on the landscape's broader character.

Objective 1 ***To maintain, and restore where practicable, the indigenous natural character of the full range of West Coast Te Tai o Poutini terrestrial, freshwater and marine ecosystems.***

Comment

458 The systematic conservation planning analysis outlined in section 9 suggests that it would be very difficult to achieve Objective (1) should the EMP go ahead. The EMP would not solely lead to the loss of any particular ecosystem, but it would make the maintenance of adequate representative areas very difficult if not impossible should the protection of existing ecosystems be limited to those on areas currently on Public Conservation Land.

459 Important components of the indigenous BCM ecosystems in the area, such as sandstone pavement, would be affected by the proposal and would be permanently lost. Accordingly the proposal would contribute to the cumulative effect of multiple developments in this Priority Site for Biodiversity Management, which collectively would threaten to prevent the achievement of Objective (1) for terrestrial and freshwater ecosystems.

460 The proposal has the potential to positively contribute to the restoration of the indigenous natural character of freshwater ecosystems by reducing AMD inputs should the management strategies be successful, but also carries the risk that AMD inputs could substantially increase.

Policy 1	***Management of threats to terrestrial and freshwater species, habitats and ecosystems across all public conservation lands on the West Coast Te Tai o Poutini should be prioritised, taking into account the need to:***
	(a) prevent the loss of indigenous species and the full range of their habitats and ecosystems;
	(e) achieve recovery of threatened species (including their genetic integrity and diversity) and
	restore their habitats where necessary;

Comment

461 The proposal would not prevent achievement of Policy (a) and (e).

462 This is because, with the exceptions of *Powelliphanta patrickensis*, and *Chionochloa juncea,* all known affected vertebrate species and the majority of invertebrate and plant species have a widespread distribution beyond the Ecological Region, habitat loss is not the major cause of the decline of the vast majority of unthreatened, at risk and threatened species present and the area of habitat loss is relatively small in the context of overall habitat available.

463 *P. patrickensis* (Nationally endangered threatened species) is known only from the Stockton and Denniston plateaux and this area is the stronghold for *C. juncea* (at risk species). Past habitat loss is the main cause for their current threat status.. However,

the level of loss for individual species from the proposal would still not preclude achievement of (a) and (e).

464 With regard to Policy (e), although the impacts of the proposal would not prevent recovery of threatened species, or restoration of their habitat in totality, it is clearly a step backwards rather than a step towards achieving the aim of this policy. This is especially notable for *P. patrickensis* and *C. juncea* but also should not be disregarded at a cumulative local level for other species such as *Sticherus tener,* several lichen and liverworts species, GSK and South Island fernbird.

465 With regard to Policy (a), no indigenous species or any of their unique habitats or ecosystems would be completely lost due to the impact of the proposal. There is some uncertainty around the impacts on little known invertebrates. However, it is very unlikely that such species are restricted to the application area and thus, the risk that a species would go extinct due to the proposal is very small.

(b) maintain contiguous sequences of indigenous ecosystems;
(c) maintain representative examples of the full range of indigenous ecosystems;
(d) maintain populations of indigenous species, habitats and ecosystems with unique or distinctive values;

Comment

466 The proposal would not necessarily prevent the achievement of Policies (b, or d). For policies b and d this is because no unique ecosystem type will be lost and overall, enough of all affected ecosystems would remain to allow for the maintenance of contiguity, and populations of indigenous species, habitats and ecosystems with unique or distinctive values. The proposal does, however, contribute to the cumulative losses which threaten overall the achievement of these policies for the Buller Coal Plateaux Priority Site and its unique mosaic of ecosystems. In particular it

would result in the loss of 20ha of originally rare sandstone erosion pavement ecosystems.

467 The proposal would prevent the achievement of policy c. For maintaining representativeness, the best work to date on determining appropriate areas to protect are the RAPs documented through the PNA survey of the plateaux (Overmars et al. 1998), and more recently the systematic conservation planning and zonation work described in Gruner (2012b). However, it is questionable whether the recommended areas would protect enough area to secure these ecosystems. In addition, once the increased understanding that has been gained in the past 15 years of the ecology and distribution of *P.patrickensis* and the rarity of sandstone erosion pavements is taken into account, it is likely that a total area greater than the RAPs is required to achieve these CMS policies.

(f) restore threatened indigenous ecosystems and connections between ecosystems where necessary;
(g) maintain the ecological integrity of indigenous ecosystems consistent with the purpose for which the land is held;

Comment

468 The proposal would not prevent 'ecosystem restoration' (Policy (f)). This is because the proposal footprint represents only a proportion of these types of ecosystems and the connections between them (c.2200ha of elevated coal measure habitat on the Denniston Plateau vs. c.106 ha footprint). However, the proposal does impact on the overall ability to achieve these policies for the plateau through cumulative loss of ecosystem size and shape (increased fragmentation, edge effects, weed ingression and sediment run-off).

469 The proposal would prevent the achievement of policy (g) as the purpose for which the land is held is 'to be so managed that its natural and historic resources are protected.' (Sec 25, Cons. Act, 1987).

470 Rather than 'restore and maintain' or 'protect' the proposal would set back threatened ecosystems, their connections and their integrity. Limited 'restoration of indigenous ecosystems' (Policy (f)) would be possible for the proposed footprint area but the ecological integrity (first part of Policy (g)) of indigenous ecosystems in the affected area would be permanently lost. This is because the proposal would result in the naturally thin soils with underlying impervious sandstone, incised gullies and outcropping sandstone being replaced with engineered surfaces with different hydrology, microclimate qualities and successional pathways.

471 In the tens to hundreds of year timeframe some elements of ecosystem function such as connectivity through modified indigenous vegetation could eventually be restored to the footprint and many of the currently resident indigenous species may return; albeit in different densities, distribution and species assemblages.

(h) protect recreational freshwater fisheries and freshwater fish habitats;

Comment

472 The proposal would not prevent the achievement of Policy (h).

473 There are no records of fish being present on the plateau and therefore it is considered that there are no freshwater fisheries or freshwater fish habitat present. The proposal is in the catchment of the Whareatea and Cascade Rivers which are affected by natural and mine induced acid drainage and the downstream sections of

these rivers are not a notable freshwater fish habitat and accordingly not a recreational resource for salmonoid or galaxid fishes.

474 Additionally, the proposal has the potential to positively contribute to the restoration of the indigenous natural character of freshwater ecosystems by reducing AMD inputs.

(i) achieve integrated management at priority sites.

Comment

See comments on Policy 2 below.

Policy 2	***Integrated management should be undertaken for the following priority sites for biodiversity management:*** *(f) Buller Coal Plateaux*

Comment

475 The proposal would not prevent achievement of Policy (2) for the Buller Coal Plateau as a priority site for biodiversity management.

476 The CMS defines integrated conservation management as 'the management of natural resources, and historical and cultural heritage, and existing or potential activities in a manner which ensures that priorities are clear and that the effects of each activity on others are considered and managed accordingly (Conservation General Policy 2005)' (see Glossary in the CMS). Priority sites for biodiversity management are 'those with high natural values which are currently threatened' (CMS, p.78).

477 From a biodiversity perspective, the RAPs in combination with the zonation work described in Gruner (2012b) currently provide the best known priorities for

management within the priority site as they were intended to ensure protection of a representative sample of the full range of ecosystems[10]. For species, priority is indicated by their ranking on the threatened species lists (and in the developing DOC system the species and ecosystem optimisation process).

478 The proposal would be one of the threats to the opportunity to manage the biodiversity values of an entire, relatively intact (in terms of open cast mining to date) Plateau. The proposal would reduce the size and resilience of populations of at risk and threatened species and would add to the cumulative effect of ecosystem fragmentation. The proposal would therefore make integrated management to protect biodiversity values on the Buller Coal Plateaux more difficult.

Policy 3	***Highly significant terrestrial and freshwater ecosystems should be restored where necessary to improve their functioning.***

Comment

479 Highly significant terrestrial and freshwater ecosystems, including currently high quality areas of their type would be adversely affected by, and set back by the proposal. Some freshwater values may be restored however habitat for species such as *P. patrickensis*, *S. tener* and would not be fully restored or improved.

480 The proposal would destroy the highly significant terrestrial and freshwater ecosystems within the mine footprint. This would be inconsistent with this Policy (3). The proposal would not prevent this Policy being achieved for the relatively unmodified 'Highly significant terrestrial and freshwater' Buller Coal Plateaux ecosystems outside the application area, however it would contribute to making

[10] However, note the comments made for policies 1.c regarding the probability that these RAPs would likely not be large enough to secure representative examples.

restoration of neighbouring ecosystems more difficult through increased habitat fragmentation, edge effects, weed ingression and sediment run-off.

481 Restoration could only be partially achieved in the footprint at the completion of mining because of permanent changes to hydrology, soils, microclimate and successional pathways. Although some aspects of indigenous vegetation and fauna composition could be restored to the site, these changes would preclude full restoration of existing indigenous ecosystem functioning.

482 Assuming that post mine water treatment is effective, the proposal could contribute to the achievement of Policy (3) through the potential for the proposal to positively contribute downstream to the restoration of the indigenous natural character of freshwater ecosystems by reducing AMD inputs. These improvements to water quality would predominately benefit the Cascade River and to a lesser extent the Whareatea River.

Section 3.3.3.5 – Threatened species management

A number of species on the West Coast are threatened with extinction, declining or are at risk of future declines. The relevant objectives and policies are as follows;

Objective 1 *To prevent further extinctions or range contractions of indigenous species…*

Objective 2 *To ensure, where practicable, that representative populations of all indigenous species have long-term security in predominantly natural habitats within their natural range.*

Policy 3 *Work on threatened species should focus on preventing extinction and maintaining genetic diversity. Subsequent priorities should include progressively increasing the security, range and population size of species.*

Policy 4	*Where possible, threatened species management should be implemented at sites where other biodiversity work is already happening (i.e. priority sites for biodiversity management) in order to maximise biodiversity gains.*

Objective 1 To prevent further extinctions or range contractions of indigenous species

Comment

483 The proposal would affect the Department's ability to achieve Objective (1).

484 The proposal would cause range contractions for a range of indigenous species. This range contraction would be of particular concern for *P. patrickensis, S.tener, C. juncea* and several lichen and liverworts species. These contractions in range are not of a scale as to cause further species extinctions. However, they need to be viewed in the context of past and likely future losses.

485 The same following general explanations for the above statements apply as those provided for Section 3.3.3.2; Policy 1 (a) and (e).

486 All vertebrate species and the majority of invertebrate and plant species within the footprint have a widespread distribution beyond the Ecological Region. Habitat loss is not the major cause of the decline of the vast majority of at risk and threatened species present and the area of habitat loss is small in the context of overall habitat available.

487 For some indigenous species present, the proposal would cause a small scale medium to long term contraction in range. For some such as *P.patrickensis, S. tener, C. juncea*, and several lichen and liverwort species, however, the effect would be greater. The proposed restoration would see the eventual return of some modified form of

indigenous vegetative cover, litter and soil and the return of most of the currently resident indigenous species; albeit in different densities, distribution and species assemblages.

488 There is a risk that unknown invertebrate species or invertebrate species associations may be present within the footprint, however the risk that these would be affected at a national or regional level by this proposal is low, as is the risk of extinctions.

489 As for other discussion around these CMS objectives and policies it is the contribution of this proposal to cumulative effects that is the most significant concern, with regard to the above objective.

Objective 2	***To ensure, where practicable, that representative populations of all indigenous species have long-term security in predominantly natural habitats within their natural range.***

Comment

490 The proposal would not prevent the achievement of Objective (2).

491 However, the cumulative threat to the Buller Coal Plateaux ecosystems, of which this proposal is part, means that representative populations of species and species assemblages indigenous to the Plateaux do not have long-term security in predominantly natural habitats within their natural range.

492 For maintaining representativeness, Overmars et al. (1998), and Gruner (2012b) indicate that it is questionable whether the current RAPs would protect enough area to secure these ecosystems and their component species. In addition, once the increased understanding that has been gained in the past 15 years of the ecology and

distribution of *P.patrickensis* is taken into account, it is likely that a total area greater than the recommended RAPs is required to achieve these CMS policies.

Policy 3	***Work on threatened species should focus on preventing extinction and maintaining genetic diversity. Subsequent priorities should include progressively increasing the security, range and population size of species.***

Comment

493 The proposal would adversely affect the Department's ability to achieve this policy.

494 The proposal would reduce the security, range and size of populations of several threatened species. However, the effects are not of a scale as to cause further species extinctions and would be temporary for some species.

Policy 4	***Where possible, threatened species management should be implemented at sites where other biodiversity work is already happening (i.e. priority sites for biodiversity management) in order to maximise biodiversity gains.***

Comment

495 The proposal would not prevent this policy being implemented in the wider context of the Buller Coal Plateaux Priority site for biodiversity.

496 Current biodiversity work in and adjacent to the proposed footprint includes weed control on disturbed surfaces undertaken by the Department; some pest control undertaken by Solid Energy to protect *P. augustus* around Mt Rochfort; and the Animal Health Board periodically treating areas with aerial 1080 targeting possums as part of their bovine TB vector control. Although it is always possible to do more to manage

the threat of invasive weeds and animals that cannot be eradicated, it is considered that the area does currently receive adequate protection.

497 As with Section 3.3.3.2 Policy (2), the proposal is one of the threats to the opportunity to manage the biodiversity of an entire, relatively intact (in terms of open cast mining) Plateau. The proposal would reduce the size and resilience of populations of at risk and threatened species and would add to the cumulative effect of ecosystem fragmentation. The proposal would therefore make management to protect threatened species values on the Buller Coal Plateaux more difficult.

Section 3.3.4.1, 3.3.4.2 & 3.3.4.3 – Geodiversity and landscapes values, threats and management

Geodiversity encompasses minerals, rocks, soils, geothermal resources and landforms and all of the processes which have formed these geological features, and is an inherent component of natural landscapes.

The West Coast is one of the few places in New Zealand where a range of relatively unmodified natural landscapes still exists. Landforms, landscapes and geologically significant sites are vulnerable to the effects of change from a variety of human activities, including excavation and mining; earthworks and roading; development of infrastructure in natural settings; wetland drainage; and native vegetation clearance. The destruction or degradation of geological features, landforms, and their underlying processes impacts on the character and function of the natural landscape and its ecosystems. The Denniston Plateau is identified as a nationally outstanding natural landscape (see CMS section 2.2.1.4).

The Department currently does not have a system for ranking the significance of geological features, thus the New Zealand Geopreservation Inventory (NZGI; maintained by the Geological Society of New Zealand) is used to identify, protect and advocate for internationally, nationally and regionally significant sites. The Inventory lists sites that are unique, important and are the best representative

examples of the country's diverse earth science heritage. The Denniston Plateau is listed as a site of regional importance, with a vulnerability score of 3[11].

Section 3.3.4.3 of the CMS states that "management of a natural landscape should ensure that the effects of change are accounted for beyond the immediate site and across time"… "Where change is proposed, landscape conservation seeks to ensure that the proposed change is integrated with appropriate regard to the effects the change would have on the landscape's broader character."
The following policy is relevant to the application;

Policy 1 *The Department should seek to protect and preserve the natural character, integrity and values of landscapes, landforms, geological and soil features and processes in all aspects of conservation management.*

Policy 1 ***The Department should seek to protect and preserve the natural character, integrity and values of landscapes, landforms, geological and soil features and processes in all aspects of conservation management.***

Comment

498 The proposal would adversely affect the Department's ability to achieve this policy.

499 The effects of the proposal would compromise the natural character and integrity of the wider Denniston Plateau landscape. The current natural landforms and soils in the footprint area would be destroyed. Impervious sandstone bedrock, incised with steep gullies with frequent highly weathered sandstone pavements and outcrops would be lost. Site rehabilitation would create an unnatural, engineered landform with permanently altered processes of soil formation.

[11] Vulnerability score: 1 = Highly vulnerable to complete destruction or major human modification; 2 = Moderately vulnerable to human modification; 3 = Unlikely to be damaged by humans; 4 = Could be improved by human activity; 5 = Site already destroyed. [CMS,p.375]

Chapter 3.4 of the CMS specifically relates to the historic and cultural heritage values on the West Coast, and states; "*Historic and cultural heritage resources are, by their nature, non-renewable; many are fragile and vulnerable to development pressures and natural processes".* [p.99]

Section 3.4.1.4 – Identification of threats to historical and cultural heritage values

The Department aims to preserve sites and features that represent the full spectrum of historical and cultural diversity. Historic buildings or structures, archaeological sites, traditional or sacred places, and historic or cultural landscapes can all be seen as taonga or national treasures. Coal mining is an important historic theme for the West Coast *Tai Poutini* Conservancy, with the Buller coal plateaux listed as an important site.

The following policy is relevant to the application;

Policy 1 *The integrity of actively managed historic places should be protected and, where this is in danger of becoming compromised, appropriate action should be taken…*

Policy 1 ***The integrity of actively managed historic places should be protected and, where this is in danger of becoming compromised, appropriate action should be taken…***

Comment

500 The proposal would adversely affect the integrity of actively managed sites on the Denniston Plateau.

501 The application would have significant and irreversible negative impacts on the integrity of Whareatea Mine. In particular the physical integrity of the Whareatea Mine site would be impacted with a haul road being constructed adjacent to the

entrance to the mine complex, and the route of this road would destroy the coal fines settling pond, associated with the hydro-mining phase of the coal mining.

502 The integrity of all the actively managed coal mining sites on the Denniston Plateau would be adversely affected in terms of their external context. They are part of one of the most important industrial archaeological landscapes in New Zealand which has excellent integrity. The degree to which these systems are preserved and readily accessible to the public for their appreciation and enjoyment adds to the significance of the place. The integrity of the external context values of these actively managed sites would not be protected, as adjacent elements of the historic landscape would be destroyed or modified resulting in a significant impact to the connectedness or contiguity of sites within the landscape and also the intactness of the representation of mining historic processes on the Denniston Plateau.

503 A new mine would continue the mining story on the plateau, but the location of this proposal would destroy historic sites, adversely affecting the context and integrity of the actively managed sites on the plateau.

504 The only way to prevent this loss of integrity would be to avoid the destruction of the historic sites. Other measures may be undertaken to improve other aspects of the historic context on the plateau.

Section 3.5 - Authorised uses of public conservation land

Conservation legislation provides for people to use public conservation lands in a manner compatible with the protection of conservation values and enjoyment by other people. The Objectives and Policies of Chapter 3.5 of the CMS relate to mining and exploration activities. The relevant objectives and policies are as follows:

Objective 2 To protect natural, historical and cultural heritage values from adverse effects of recreation, tourism or other uses.

Objective 3	*To protect recreational opportunities from adverse effects of authorised uses of public conservation lands.*
Objective 4	*To protect places and other taonga of cultural significance to Poutini Ngäi Tahu from adverse effects of authorised uses of public conservation lands.*
Policy 1	*The cumulative effects of other authorities for use, issued in respect of a particular area or opportunity, should be taken into account when considering new applications for those areas or opportunities.*

Objective 2	***To protect natural, historical and cultural values from the adverse effects of recreation, tourism or other uses.***

Comment

505 This proposal would prevent this objective being achieved for public conservation land within and immediately adjacent to the mine footprint. The wider implications have been discussed in detail within the comments for the previous relevant policies.

Objective 3	***To protect recreational opportunities from the adverse effects of recreation, tourism or other uses.***

Comment

506 This proposal would have an adverse effect on recreational opportunities in the short term in particular, during the term of the mining. Longer term, there will continue to be adverse effects due to the loss of historical values and the resulting altered ecosystem and landscape.

Objective 4	***To protect places and other taonga of cultural significance to Poutini Ngäi Tahu from the adverse effects of recreation, tourism or other uses.***

Comment

507 The proposal would not prevent this objective from being achieved. There is no documented or physical evidence of Maori occupation of the Stockton-Denniston Plateaux. The West Coast Regional Council Water Management Plan has not identified any water bodies within the application area as areas of spiritual and cultural beliefs, values and uses of significance to Poutini Ngäi Tahu (see Section 8.9 for assessment of cultural values).

Policy 1	***The cumulative effects of other authorities for use, issued in respect of a particular area or opportunity, should be taken into account when considering new applications for those areas or opportunities.***

Comment

508 Consideration of the cumulative effects of this and other authorised developments on the Denniston and Stockton Plateaux is an important consideration of this proposal and consequently this policy is being implemented.

509 This proposal would make a significant contribution to the cumulative effects of past and authorised future loss of natural, historical and cultural values. These cumulative impacts will mean that in the long term many of these CMS objectives, policies and desired outcomes would be more difficult to achieve.

510 An illustration of the impact of cumulative effects is the loss of greater than 100 hectares of BCM ecosystems recommended for protection over the 15 years since its documentation in 1998 in the PNAP report (Overmars et al. 1998). This vegetation and habitat has been, or is in the process of being lost through many developments of

varying scale including; Mt Augustus mine, Mt Frederick mine, Kawatiri Hydro, Cypress Mine and Stockton No. 2 cutbacks.

511 There is currently a significant mining operation occurring on the Stockton plateau, and the entire Denniston Plateau has minerals rights [Permits issued under the CMA 1991, or Licenses issued under the Coal Mines Act 1979] across it. The Applicant is actively conducting exploration operations throughout Denniston plateau and the north Buller area, and had applied for a 35 year term for their resource consents for their proposed Coal Processing Plant. Adjacent to the application area is SENZ's 'Sullivans' Coal Mining Licence (CML) which is located in the middle of the plateau and authorises open pit coal mining. It is considered that there is a high likelihood that a significantly larger area(s) will be the subject of future applications for opencast mining. The development of the proposed EMP opencast coal mine, therefore is of a high significance.

Section 3.7.5 – Crown Minerals

"The Crown Minerals Act 1991 requires minerals permit holders to apply for and obtain an access arrangement from the Minister of Conservation prior to commencing any prospecting, exploration or mining activities on public conservation land." [p.152]

"Mining sometimes involves large scale earthworks, which can have significant and long term effects on both the terrestrial and freshwater ecosystems. Many natural heritage and recreation values can eventually be rehabilitated once mining has ended. It may however take years, decades or even centuries for rehabilitation to be successful (i.e. for a similar habitat to be returned to an area). Other conservation values may be irreversibly destroyed, damaged or degraded by mining. Historical and cultural heritage and localised endemic species are particularly vulnerable, as the effects are irreversible once values are destroyed. In considering whether to agree to an access arrangement in respect of public conservation land, the Minister of Conservation shall have regard to the safeguards against any potential adverse effects of carrying out the proposed programme of work on natural, historical and cultural heritage and recreation opportunities (see also s61(2) Crown Minerals Act 1991).

Section 76 of the Crown Minerals Act 1991 provides for compensation for the loss of values as a result of the mining activity. Compensation is considered on a case-by-case basis and takes into account the temporary and permanent loss of conservation values in the permit area. This applies to both short- and long-term loss of conservation values, and also to any values that are permanently lost. For instance, it will be appropriate to seek compensation in addition to site rehabilitation in circumstances where it will take time for rehabilitation of a site to successfully occur following mining. In appropriate circumstances, consideration may also be given to the potential for restoration of other public conservation lands, to offset losses occurring in the permit area. In some situations, offers of work in kind or a contribution of services may be more appropriate forms of compensation than monetary payments.

If any part of a mining operation is likely to result in the disturbance, hunting or killing of any absolutely protected wildlife, a Wildlife Act permit will be required.

The following policies are relevant to the application;

Policy 1 *The Minister will consider each application for an access arrangement on a case-by-case basis, in accordance with the criteria set out in the relevant section (i.e. s61 or s61A and s61B) of the Crown Minerals Act 1991.*

Policy 2 *When assessing an application for an access arrangement for prospecting, exploration or mining, consideration should be given to (but not be limited to):*
a) the significance of the conservation values present and the effect the proposal will have on those values;
b) the adequacy and achievability of the proposed site rehabilitation work (see also Policy 3 below); and
c) the adequacy or appropriateness of any compensation offered for access to the area (see also Policy 4 below).

Policy 3 *Appropriate site rehabilitation methods should be employed.*

Policy 4	*Compensation should be required when damage to, or destruction of, conservation values can not be avoided, remedied or mitigated and will be determined on a case-by-case basis.*
Policy 5	*Where ancillary activities such as roads and infrastructure can reasonably be located off public conservation land, this will be expected.*
Policy 6	*The term of any access arrangement should be limited to the period reasonably required to carry out the defined work, including site rehabilitation after mining has been completed.*
Policy 7	*Low-impact access options will be preferred (e.g. the use of existing formed roads, or helicopters in areas without existing roads).*
Policy 8	*Evidence that a valid minerals permit has been obtained from the mineral owner will be required before the Minister of Conservation will make a final decision on an application for an access arrangement or minimum impact activity.*
Policy 9	*The granting of an access arrangement for prospecting or exploration does not place any obligation on the Minister of Conservation to grant a subsequent access arrangement for mining, or to grant further variations to a pre-existing access arrangement.*
Policy 10	*If monitoring reveals that the effects of mining activities on conservation values and recreational opportunities, including the desired outcomes described in Part 4 of this CMS, are greater than expected, or new effects have been discovered, the Department should review the conditions of the access arrangement.*
Policy 11	*Approval of any work plan may be subject to the permit holder obtaining all other necessary authorisations, such as a concession permit for aircraft landings or a Wildlife Act permit.*

Comment

512 The application is being processed in accordance with policies 1, 3, 4, 5, 6, 7, and 8 of this section. In particular, Policy 2 considerations are addressed through the body and conclusion of this report. If approved, policies 9-11 will be implemented in the AA or any work plan approval.

CHAPTER 4: DESIRED OUTCOMES

Chapter 4 describes what the different areas of the West Coast will be like in 2020 if the direction of the CMS is followed.

Chapter 4.2 – Desired Outcome for Places

The area under application is within the '*Kawatiri* Place' (section 4.2.2). The desired outcomes for the *Kawatiri* Place are described in respect of geodiversity, landforms and landscapes, indigenous biodiversity, human history, cultural values, people's benefit and enjoyment and other use of public conservation lands.

Section 4.2.2 describes the coal plateaux landscape as nationally outstanding and the biodiversity as unique, requiring integrated management as a priority site.

Section 4.2.2.2 – Geodiversity, landforms and landscapes in 2020

The rolling uplands of the Denniston Plateau are specifically mentioned as one of the distinctive features in the *Kawatiri* Place for its geodiversity, landforms and landscapes and the strategy's desired outcomes are that:

"The overall character of geodiversity, landforms and landscapes in Kawatiri Place is maintained in its 2010 condition" [p.196]. A summary of which is presented below."

"Kawatiri is one of the more geologically complex parts of the Conservancy, with its great diversity of landforms and varied landscapes. Among its most distinctive features are the deep gorges carved through the coastal ranges by the Buller Kawatiri and Mokihinui Rivers and the rolling uplands of the Denniston and Stockton coal plateau... The high infertile coal plateaux provide some of this Place's

highly distinctive ecological communities (see Section 2.2.1.4, Coal Plateau Landscape), as do similarly infertile areas of boggy upland and lowland 'pakihi' [p.196].

Section 4.2.2.3 – Indigenous biodiversity

The CMS says the following of the Denniston Plateau;

"The altitude of the treeline on the coastal ranges is generally 1000-1200m a.s.l, but several thousand hectares of gently rolling terrain on the Denniston and Stockton plateau at altitudes of 600-900m a.s.l continue to be dominated by non-forest vegetation communities. The infertile, acidic often waterlogged soils support distinctive open moorlands of specialist tussock and shrubland communities. These communities are dominated by the endemic coal measure tussock Chionochloa juncea, red tussock, and low shrublands of prostate manuka, yellow-silver pine and pygmy pine. A representative sample of viable coal measure ecosystems and landscapes on the Buller Coal Plateaux priority site is legally protected… The Buller Coal Plateaux priority site supports viable populations of locally endemic giant land snails, including Powelliphanta patrickensis and P. 'Augustus', the great spotted kiwi roroa and a high diversity of bryophytes."

The Buller Coal Plateaux is listed as one of the Department's 'priority sites for biodiversity management' due to its rare and important ecosystems and species. The Department's objective for indigenous biodiversity at priority sites by 2020 is that;
"Natural heritage values are maintained and, where practicable, protected and enhanced." [p.199]

Rivers and streams in the *Kawatiri* Place have high freshwater value. The desired outcome is that *"containment and/or treatment of acid mining discharges and other pollutants, along with restoration of freshwater fish habitats, result in no further degradation of aquatic ecosystems."* [p.200]

Section 4.2.2.4 – Human history

Historic places are one of the most important features of the *Kawatiri* Place and one of the major attractions of its public conservation lands. The Department's primary objective is that *"all actively managed historic places in public conservation lands are maintained in their 2010 condition or better".* Public conservation land on the Denniston coal plateau has such significant historic values that a desired outcome identified is for the Department to investigate the possibility of gazetting land

as an historic reserve. The Department actively manages a number of historic sites on the Denniston Plateau, two of which are in the near vicinity of the area under application: (a) Burnett's Face and Coalbrookdale; and (b) Coalbrookdale Rope-road and Mines. People are particularly encouraged to experience *Kawatiri's* mining history, with a focus on the Denniston Plateau.

Historical and cultural heritage in 2020

Historic places are one of the most important features of Kawatiri and also one of the major attractions of its public conservation lands.

Protection of historic places is a prominent management theme in Kawatiri. All actively managed historic places in public conservation lands (see Map 8) are maintained in their 2010 condition or better.

People are particularly encouraged to experience Kawatiri's mining history, with a focus on the Denniston and Millerton coal plateaux (see Section 4.2.2.6). The Department works with the local community and other people and organisations to develop and implement a concept plan for the Denniston coal plateau. Site management ensures that the protection of historic values takes priority over recreational use, with the emphasis on low-impact facilities and activities, such as walks and interpretation, which encourage people to learn about and understand the history of the site. In recognition of the area's significant values, the Department investigates the possibility of gazetting public conservation land on the Denniston coal plateau as an historic reserve.

<u>Section 4.2.2.6 – People's benefit and enjoyment in 2020</u>

The historic coalfields, communities and industrial heritage of the Denniston Plateau provide an outstanding opportunity for appreciating historic heritage and are a popular site for recreation. The Denniston Plateau is a popular site for day walks, with walking opportunities across the wider Plateau and up to Mount Rochfort. A four-wheel drive loop track on the Plateau provides a challenging journey across a spectacular sub-alpine environment and offers dramatic views of mountain and coastal landscapes, and mountain biking is becoming increasingly popular.

Intense interest sites and front-country sites

Recreational opportunities in this zone are dominated by the Tauranga Bay seal colony, Denniston and a range of other sites associated with the industrial heritage of Buller Kawatiri. These opportunities are safe and easily accessible.

The historic coalfields, communities and industrial heritage of the Buller Kawatiri plateaux are a popular recreational focus, where the emphasis is on day walks. Mount Rochfort is an easily accessible place to experience the coal measure ecosystems and landscapes of the coal plateaux. An outstanding opportunity for historic heritage appreciation is available at Denniston. People may take part in an underground museum experience via an interpretative journey along the restored Banbury rope-road by tram. The one kilometre journey begins at the brakehead and continues along the rope-road, past the restored Banbury Arch, into Banbury mine. The historic bridle track provides walking access to the brakehead and Denniston township. People can also drive up to the brakehead car park. Several walking opportunities are available within the township and across the plateau. A new track, incorporating above-ground sections of the old rope-road and Denniston Incline, provides access through to Burnetts face and Coalbrookdale areas and links to the town walk at Denniston. Interpretation on the plateau informs people about historic heritage values as well as natural heritage. A four-wheel drive loop track on the Denniston plateau provides a challenging journey across a spectacular sub-alpine environment, offering dramatic views of mountain and coastal landscapes. Due to the fragile nature of the area, access is restricted, and controlled by a locked gate (see Section 3.6.4.17). Formed roads also provide access to paragliding launch sites on the Denniston and Stockton Plateaux.

Within Kawatiri, four-wheel driving (see Section 3.6.4.17), mountain biking (see Section 3.6.4.9) and horse riding (see Section 3.6.4.3) are possible on some roads (e.g. four-wheel drive roads at Denniston and Rochfort). Additional mountain biking opportunities are also available on some tracks or routes (e.g. in the Denniston area and on the Charming Creek track).

Chapter 4.2 – Desired Outcome for Places

CMS Statement

Section 4.2.2 describes the coal plateaux landscape as nationally outstanding and the biodiversity as unique, requiring integrated management as a priority site.

Comment

513 This outcome statement reflects the goals of the management objectives and policy of Section 3.3.3.2, Policy (2) for integrated management of the biodiversity of the Buller Coal Plateaux as a priority site and in the same way:

- This proposal would not prevent integrated management of the Buller Coal Plateau as a priority site for biodiversity management.
- The proposal would be one of the threats to the opportunity to manage the biodiversity of an entire, relatively intact (in terms of open cast mining) Plateau.
- The proposal would reduce the size and resilience of populations of at risk and threatened species and would add to the cumulative effect of ecosystem fragmentation and habitat loss.
- The proposal would therefore make management to protect biodiversity values on the Buller Coal Plateaux more difficult.

Section 4.2.2.2 – Geodiversity, landforms and landscapes in 2020

CMS statements

The rolling uplands of the Denniston Plateau are specifically mentioned as one of the distinctive features in the Kawatiri Place for its geodiversity, landforms and landscapes and the strategy's desired outcomes are that:

"The overall character of geodiversity, landforms and landscapes in Kawatiri Place is maintained in its 2010 condition" [p.196]. A summary of which is presented below."

"Kawatiri is one of the more geologically complex parts of the Conservancy, with its great diversity of landforms and varied landscapes. Among its most distinctive features are the deep gorges carved through the coastal ranges by the Buller Kawatiri and Mokihinui Rivers and the rolling uplands of the Denniston and Stockton coal plateau... The high infertile coal plateaux provide some of this Place's highly distinctive ecological communities (see Section 2.2.1.4, Coal Plateau Landscape), as do similarly infertile areas of boggy upland and lowland 'pakihi'.[p.196]

Comment

514 This desired outcome provides more specific guidance for the geodiversity, landforms and landscapes of the Denniston Plateau than those general outcomes required for Section 3.3.4.1, 3.3.4.2 & 3.3.4.3, Policy 1.

515 The proposal would prevent the Department achieving the desired outcome of maintaining in its 2010 condition "the overall character of geodiversity, landform and landscape in the Kawatiri place". The current natural landforms and soils in the footprint area would be destroyed. Impervious sandstone bedrock, incised with steep gullies with frequent highly weathered sandstone pavements and outcrops would be lost. Site rehabilitation would create an unnatural, engineered landform with permanently altered processes of soil formation.

516 The Kawatiri place encompasses a wide variety of landscapes over a wide region. However, the significance of BCM landscapes within this context should not be discounted. The individual effects of this proposal, in particular the destruction of areas of some of the best examples of originally rare sandstone pavement, would add significantly to the cumulative effect of many authorised developments, both past and current, on the BCM landscapes.

Section 4.2.2.3 – Indigenous biodiversity

The CMS says the following of the Denniston Plateau:

"The altitude of the treeline on the coastal ranges is generally 1000-1200m a.s.l, but several thousand hectares of gently rolling terrain on the Denniston and Stockton plateau at altitudes of 600-900m a.s.l continue to be dominated by non-forest vegetation communities. The infertile, acidic often waterlogged soils support distinctive open moorlands of specialist tussock and shrubland communities. These communities are dominated by the endemic coal measure tussock Chionochloa juncea, red tussock, and low shrublands of prostate manuka, yellow-silver pine and pygmy pine. A representative sample of viable coal measure ecosystems and landscapes on the Buller Coal Plateaux priority site is legally protected… The Buller Coal Plateaux priority site supports viable populations of locally endemic giant land snails, including Powelliphanta patrickensis and P. 'Augustus', the great spotted kiwi roroa and a high diversity of bryophytes."

The CMS declares 'the Buller Coal Plateaux as priority sites for biodiversity management' due to its rare and important ecosystems and species.

The Department's objective for indigenous biodiversity at priority sites by 2020 is that;

"Natural heritage values are maintained and, where practicable, protected and enhanced." **[p.199]**

Rivers and streams in the *Kawatiri* Place have high freshwater value. The desired outcome is that

"containment and/or treatment of acid mining discharges and other pollutants, along with restoration of freshwater fish habitats, result in no further degradation of aquatic ecosystems."

[p.200].

Comment

517 This natural heritage desired outcome reflects the goals of the ecosystem and species objectives and policies of Sections 3.3.3.2 and 3.3.3.5, and in the same way:

- The proposal would prevent maintenance, protection and enhancement of the natural heritage values of the proposed footprint and does contribute to the cumulative loss and fragmentation which threaten overall the achievement of these policies for the Buller Coal Plateaux Priority Site and its unique mosaic of ecosystems.

- For maintaining representativeness, it is likely that a total area greater than the recommended RAPs is required to achieve these CMS policies.
- The proposal has the potential to positively contribute to the restoration of the indigenous natural character of freshwater ecosystems by reducing AMD inputs. However, as with all mines with AMD issues, there is inherent uncertainty around the long term management of AMD because it is a challenging issue to address.

518 The proposal would affect the desired outcome that; "*natural heritage values are maintained and, where practicable, protected and enhanced*", as natural heritage value in the proposal footprint would be lost, and unlikely to be fully restored, certainly not by 2020. Adjacent areas would also be negatively affected.

519 The ability to achieve the desired outcome that; "containment and/or treatment of acid mining discharges and other pollutants, along with restoration of freshwater fish habitats, result in no further degradation of aquatic ecosystems", could be improved through the elimination / treatment of historic AMD if the proposal were approved. However, as noted above, there is inherent uncertainty around the long term management of AMD because it is a challenging issue to address.

Section 4.2.2.4 – Human history

The CMS says the following for Historical and cultural heritage in 2020

Historic places are one of the most important features of Kawatiri and also one of the major attractions of its public conservation lands.
Protection of historic places is a prominent management theme in Kawatiri. All actively managed historic places in public conservation lands..are maintained in their 2010 condition or better. People are particularly encouraged to experience Kawatiri's mining history, with a focus on the Denniston and Millerton coal plateaux (see Section 4.2.2.6). The Department works with the local community and other people and organisations to develop and implement a concept plan for the

Denniston coal plateau. Site management ensures that the protection of historic values takes priority over recreational use, with the emphasis on low-impact facilities and activities, such as walks and interpretation, which encourage people to learn about and understand the history of the site. In recognition of the area's significant values, the Department investigates the possibility of gazetting public conservation land on the Denniston coal plateau as an historic reserve.

Comment

520 The proposal would partly prevent achievement of the desired outcome that "*Protection of historic places is a prominent management theme' f*or the Denniston Plateau, and by association for the Kawatiri Place. The loss of historic sites (such as the total loss of the Escarpment Mine and associated landscape) and historic features from the wider landscape would be an irreversible loss of values at a nationally important historic coal mining landscape – thus historic places will not be protected nor will the physical remains of the mines survive in such good condition. The sites themselves have regionally rare features that would be lost if the proposal went ahead. As well as this, parts of any sites that remain post-mining may become divorced from the surrounding historic landscape by losing context (see Section 3.4.1.4 above).

521 The proposal would prevent achievement of the desired outcome that "Actively managed sites maintained in 2010 condition or better". The cumulative loss of values in the wider historic landscape will mean that on the whole, the protection of all actively managed sites in the condition they are currently in will not be able to be achieved, especially with regards to their connectedness in the landscape.

522 The proposal will not hinder the ability to achieve the outcomes "People are particularly encouraged to experience Kawatiri's mining history, with a focus on the Denniston and Millerton coal plateaux (see Section 4.2.2.6). If the proposal were to proceed, mitigation is proposed to enhance the appreciation of the site via interpretation and education packages which would encourage an understanding and appreciation of the history of the site.

523 The proposal may have an impact on visitors' enjoyment of the site, for instance the quality of visitor experience being affected by the increase in large truck movements on the Plateau in the initial construction phases, and there will be an impact on amenity values with the intrusion of industrial plant and machinery on the Plateau. These are noted in Section 4.2.2.6 below.

Section 4.2.2.6 – People's benefit and enjoyment in 2020

The CMS says of intense interest sites and front-country sites

Recreational opportunities in this zone are dominated by the Tauranga Bay seal colony, Denniston and a range of other sites associated with the industrial heritage of Buller Kawatiri. These opportunities are safe and easily accessible.

The historic coalfields, communities and industrial heritage of the Buller Kawatiri plateaux are a popular recreational focus, where the emphasis is on day walks. Mount Rochfort is an easily accessible place to experience the coal measure ecosystems and landscapes of the coal plateaux. An outstanding opportunity for historic heritage appreciation is available at Denniston. People may take part in an underground museum experience via an interpretative journey along the restored Banbury rope-road by tram. The one kilometre journey begins at the brakehead and continues along the rope-road, past the restored Banbury Arch, into Banbury mine. The historic bridle track provides walking access to the brakehead and Denniston township. People can also drive up to the brakehead car park. Several walking opportunities are available within the township and across the plateau. A new track, incorporating above-ground sections of the old rope-road and Denniston Incline, provides access through to Burnetts face and Coalbrookdale areas and links to the town walk at Denniston. Interpretation on the plateau informs people about historic heritage values as well as natural heritage. A four-wheel drive loop track on the Denniston plateau provides a challenging journey across a spectacular sub-alpine environment, offering dramatic views of mountain and coastal landscapes. Due to the fragile nature of the area, access is restricted, and controlled by a locked gate (see Section 3.6.4.17). Formed roads also provide access to paragliding launch sites on the Denniston and Stockton Plateaux.

Within Kawatiri, four-wheel driving (see Section 3.6.4.17), mountain biking (see Section 3.6.4.9) and horse riding (see Section 3.6.4.3) are possible on some roads (e.g. four-wheel drive roads at Denniston and Rochfort). Additional mountain biking opportunities are also available on some tracks or routes (e.g. in the Denniston area and on the Charming Creek track).

Comment

524 The proposal has the potential to impact on the achievement of some of the above outcomes.

525 The proposal would affect the enjoyment of visitors: particularly for those with vistas of the coal measure habitats (and historic mine workings) from Mt Rochfort; and for those on the biking and walking tracks towards the southern end of the plateau. The experience of viewing historic features and a unique natural environment will become one affected to a much greater degree by industrial activity for the term of the mine.

23.5 Overall CMS Summary

526 In conclusion the CMS identifies the Buller coal plateaux (including the Denniston Plateau and the area under application) as:

- A landscape of national significance. *The Applicant has commented that this reference to 'landscape' was derived from the Department of Conservation's Ngakawau PNAP report and that it was intended to portray an 'ecological landscape' of national significance, rather than 'landscape' in its more common interpretation. The Department agrees with this interpretation.*
- A 'priority site for biodiversity' due to its rare and important ecosystems and species and associated landscapes, which are found nowhere else in New Zealand.
- Containing regionally important geological features [geological features and landforms and underlying processes are integral to the functioning of the natural landscape and ecosystem].

- A highly significant historic area, offering an outstanding opportunity for appreciating historic heritage, particularly historic coal mining sites and transport systems. Parts of the Denniston Plateau are potentially worthy of gazettal as a historic reserve.
- A popular site for other forms of recreation, in particular walking, four-wheel driving and mountain-biking.
- The intent of the CMS is that:
- The ecological, landscape and historical integrity of the Denniston Plateau should be maintained and enhanced.
- Historic values that best represent the range of cultural periods (1870's to 1980's) should be actively managed.

527 The key affects of the proposal on the objectives and the policies of the CMS under each category are:

Biodiversity

528 Although the proposal would not prevent the achievement of many of the biodiversity objectives, policies and desired outcomes, it would negatively affect the ability of the Department to achieve many others.

529 Both on its own, and cumulatively with other authorised developments, the EMP would make a significant contribution to the cumulative effects of habitat loss and modification of indigenous ecological values of the Buller Coal Plateaux Priority site for Biodiversity. These individual and cumulative impacts mean that in the long term many of the CMS objectives, policies and desired outcomes would be more difficult to achieve.

530 A key conclusion is that currently there is no 'long term security for representative populations in predominantly natural habitats' (Section 3.3.3.5 Objective 2) or any

certainty that 'contiguous sequences, representative examples or unique and distinctive values' of the Buller Coal Plateaux indigenous ecosystems will be maintained. (Section 3.3.3.2, Objective 1, Policies (b, c &d)).

531 As described previously, the RAPs of the PNAP were proposed to provide significant representation of the natural diversity of the coal plateaux. RAPs were selected to provide for long-term viability and connectivity, while avoiding, as much as possible, areas with coal resource. Since recommendation, these RAPs (totaling 5398ha) have been significantly compromised (loss of > 100ha) through completed and approved developments (including Mt Augustus mine, Mt Frederick mine, Kawatiri Hydro, Cypress Mine and Stockton No. 2 cutbacks). In addition, our knowledge with regard to the distinct values of the Buller Coal Plateaux has increased (e.g. distribution of *P. patrickensis*, importance of sandstone erosion pavements, assemblages of rare and threatened plant species). The analysis in Gruner (2012b), suggests that the RAPs would be a minimum target and it seems likely that to achieve the CMS' goals and achieve adequate protection of the unique Buller Coal Plateaux values, larger areas would be needed. Whilst this proposal does not affect any RAP, the affected area does have values independently recognised as equivalent and complimentary to the neighbouring Mt Rochfort RAP. The EMP may prevent the Department from achieving these related objectives and policies.

532 Landscape and geodiversity. The proposal would affect the Department's ability to deliver the policy from the geodiversity section of the CMS and prevent the Department achieving the desired outcome of maintaining in its 2010 condition 'the overall character of geodiversity, landform and landscape in the Kawatiri place.

533 *Historic.* The proposal would prevent the historic policy (Section 3.4.1.4, Policy 1) from being achieved and partly prevent the ability to achieve the management outcomes in desired outcome 4.2.2.4. The mining proposal would lead to the loss of historic values on the Denniston Plateau. It has been made clear in the CMS that the intent of managing these values is to maintain the integrity of actively managed sites, and to

generally protect historic places associated with the history of mining in the Kawatiri Place.

534 *People's benefit and enjoyment*. The proposal would not prevent the specific things listed for the desired outcome of people's benefit and enjoyment (4.2.2.6), although depending on how it is managed it may affect safety and accessibility for some activities. The experience would be adversely affected by the increased industrial presence across the plateau particularly during the term of mining.

535 Authorised uses of PCL. The proposal would prevent the objective of protecting the natural, historical and cultural heritage of the public conservation land within and immediately adjacent to the proposed footprint from the adverse effects of the proposal. It would also have an adverse effect on recreational opportunities in the short term.

536 The CMS does not specifically exclude mining from the Buller coal plateaux, and the Escarpment Mine proposal would not prevent the achievement of some of the management objectives and policies for the plateau. However, it would make it harder to achieve some of them and is contrary to others. The EMP would adversely affect the natural and historic values in the short and long terms and in some areas these adverse effects would be permanent. On the balance it is considered that the proposal is inconsistent with the key intent of the CMS to maintain and improve conservation values in this "priority site for biodiversity" and important historic landscape.

23.6 Safeguards against any potential adverse effects

Introduction

537 The Department needs to assess the potential adverse effects of carrying out the proposed programme of work on land held under the Conservation Act 1987.

538 These effects were analyzed throughout this report in terms of short and long-term outcomes against the objectives of the Conservation Act and purposes for which the land is held.

539 Next, the decision maker must consider whether safeguards against the likely adverse effects which may be proposed by either the Department or the Applicant, adequately protect the land's natural and historic resources. For example, land rehabilitation would be a necessary condition in order to safeguard as far as possible against unacceptable long-term potential adverse effects on natural values.

540 "Safeguard" is not defined in the CMA 1991. The Department notes that the term "safeguard" is also used in the Resource Management Act 1991, and that both the CMA and RMA were enacted at roughly the same time. In s 5(2) of the RMA, both the phrase "safeguarding" (s 5(2)(b)) and "avoiding, remedying and mitigating" (s 5(2)(c)) are used in the same section. The use of different phrases in a common context suggests that Parliament must have intended some difference in the meaning to be attributed to the phrases.

541 The Concise Oxford Dictionary meaning of safeguard is *"a measure taken to protect or prevent something".*

542 The Department considers that while measures which avoid, remedy or mitigate potential adverse effects may also be safeguards, it does not follow that the term safeguard is synonymous with, or simply means, "avoid, remedy or mitigate." The Department considers that the term safeguard imports a higher standard and, in particular, measures to mitigate an adverse effect (i.e. lessen or reduce it) may, in practice, not constitute a safeguard against that adverse effect.

543 While the Department is not aware of any judicial interpretation of "safeguard" in the context of the CMA 1991, we note that, in the context of the RMA 1991, the Environment Court has observed (*Interim Report to Minister of Conservation and Ors on an Inquiry into Aquaculture References to the Proposed Tasman District Council Proposed Resource Management Plan*, W42/2001, Judge Kenderdine, at para. 851).

> *"The TDC is required to safeguard the life supporting capacity of the ecosystem - a direction which in our view imports a precautionary approach to development".*

544 Clearly, the requirement to have regard to safeguards against potential adverse effects does not prescribe use or development in any circumstance. In this particular case, however, the concept of "safeguarding" has to be considered in the context of natural and historic resources on public conservation land administered under the Conservation Act. Where potential adverse effects are irreversible, they have not been safeguarded against. Similarly, where potential adverse effects are likely to be long term, it is not considered that they are safeguarded against in the short or medium term.

Safeguards proposed against adverse effects

545 A summary of the key potential adverse effects and the main operational safeguards proposed is provided in Table 6 below:

Table 7: Summary of the key potential adverse effects and main operational safeguards proposed

Key Potential Adverse effects	**Main Operational Safeguards Proposed**
Loss of 106 ha of elevated BCM ecosystems. Includes the following impact on terrestrial ecosystems: • Loss of 1.6% of unique BCM habitat • The permanent loss of sandstone pavement topography.	• Rehabilitation of the mine site in accordance with a Closure and Rehabilitation Management Plan and rehabilitation objectives and targets specified in the AA conditions. Rehabilitation would include VDT of vegetation onto reconstructed ELF, direct planting of seedlings, reconstructing streams, constructing boulder fields in place of sandstone pavement and re-establishing drainage patterns on the ELF. • AA conditions controlling management of GSK and other endangered species

Key Potential Adverse effects	Main Operational Safeguards Proposed
• A 35ha reduction in nationally significant wetland habitat • A reduction in habitat of several rare and threatened plant species, including assemblages not recorded (to date) outside of the footprint • Loss of habitat for mountain beech/pink pine, including specimens up to 500 years old • Death (excluding GSK) or loss of fitness of long tailed bat, 30 bird species (42 including exotics), and up to six species of lizards • Reduction in the range of *Powelliphanta patrickensis* of about 4% overall and 5% of the Denniston sub-species • Loss of habitat and seasonal food source for fauna, including GSK • Fragmentation of habitat	• Plant pest control programme top aid the prevention and control of invasive weeds. • The translocation out of harms way of incidentally encountered animals • Translocation of rate and threatened plants where possible
Loss of freshwater values including loss of nationally significant wetland habitat	• Comprehensive water management plan including surface and mine influenced water treatment and ongoing active treatment for circa. 30 years • Rehabilitation of the mine site in accordance with a Closure and Rehabilitation Management Plan and rehabilitation objectives and targets specified in the AA conditions, including water quality limits • Reconstruction of 1.3km of existing 1.4km of streams • Maintain [as close as possible] current drainage patterns after mining • Improvements to the water quality of the Whareatea River due to the removal of two AMD discharges from historic underground mines.
Production of AMD and water contaminated with fine sediments.	• Comprehensive water management plan including surface and mine influenced water treatment and ongoing active treatment for circa. 30 years • Rehabilitation of the mine site in accordance with a Closure and Rehabilitation Management Plan and

Key Potential Adverse effects	Main Operational Safeguards Proposed
	rehabilitation objectives and targets specified in the AA conditions, including water quality limits • Selective handling of AMD materials and capping of the ELF • Ongoing monitoring and water quality • Erosion and sediment control
Noise	• Noise Management Plan • Noise limits specified in management plan
Fire, flood, earthquake and slope failure.	• Emergency Response Plan. • Water Management Plan. • Fire Control Management Plan. • Fire fighting equipment to be kept on the Land. • Insurances. • Engineering design for flood events.
Loss of archaeological contextual values by the destruction of three underground coal mines, a water dam (Lake Brazil), and the Escarpment Mine coal bins.	• Protection of heritage via a Historic and Heritage Protection Plan. • AA condition requiring vegetation to be cleared from around historic features prior to earthworks commencing in the immediate vicinity. • AA condition requiring historic features to be mapped and surveyed. • AA condition requiring a 3D laser scan and detailed building archaeological work of the two coal bins. • AA condition requiring the relocation of the two remaining mine buildings for use as visitor interpretation purposes. • AA condition requiring the supply of historic heritage interpretation panels.
Loss of landscape and natural character	• Rehabilitation of the mine site in accordance with a Closure and Rehabilitation Management Plan and rehabilitation objectives and targets specified in the AA conditions. This would not be to the level that existed in the pre mining ecosystem. • Integration of the ELF with existing landscape as much as possible. • No highwalls would remain after mine closure.

Key Potential Adverse effects	Main Operational Safeguards Proposed
Loss of water quality	• Comprehensive water management plan including surface and mine influenced water treatment and ongoing active treatment for circa. 30 years • Potential improvements to the water quality of the Whareatea River due to the removal of two AMD discharges from historic underground mines.
Loss of cultural values	• AA condition protecting cultural sites.
Loss of recreational values	• Restoration of the open cast mine to allow recreational use, including reinstatement and potential extension of the existing mountain bike tracks. • Enabling appropriate mine site visits (subject to other necessary authorisations) and establishment of visitor viewpoints in appropriate locations. • The development of a management agreement with the Department to investigate options for extending the network of mountain bike tracks.
All of the above	• Annual Work Plan approval process, annual reporting requirements, and annual independent auditing of all operations. • Bonds including reviews of the bond quantum annually or for any variation to the AA.

546 Conditions in an AA require the Permit holder to supply a number of management plans and that these be approved by the Conservator, or amended such that the Conservator is prepared to approve them on an annual basis. The purpose of requiring the Permit holder to supply these management plans, and requiring their ongoing approval, is to ensure that operations are continuously modified as additional information is gained or new technologies are developed, and to ensure that strategies are put in place to improve the environmental outcome of the EMP. An annual third party audit of the operations is required for larger mining operations to

ensure compliance, look for environmental improvements, and ensure the conditions of the AA and management plans are being implemented and are effective in protecting conservation values.

547 AA conditions would clearly define, among other things:

- The maximum extent of the land to which access is authorised.
- The location and extent of disturbance and vegetation clearance permissible.
- Rehabilitation requirements of the land and water bodies.
- Monitoring requirements during and after mine closure.

548 Financial safeguard mechanisms are required as part of any AA in the form of cash and surety bonds and insurances. Bonds can be used for remedial work if the permit holder does not comply with the conditions of the AA and for rehabilitation of the land if the Permit holder abandoned the land. Bond quanta are determined by a risk assessment and bond report that are completed by an independent third party approved by the Department. Risk assessments are undertaken for the subsequent year of operation and are updated annually.

549 Financial assurances required for the EMP if approved would be:

(i) A financial guarantee (restoration bond) over the mining and closure period that if the operator defaults for any reason, adequate funds would be available to rehabilitate the site and compensate for adverse impacts.

(ii) A financial guarantee (post closure bond) in the form of a cash grant which ensures that funds would be available immediately after closure to capitalise management of the site in perpetuity. These funds would allow for

monitoring of any adverse effect and/or measures taken to avoid or reduce any adverse effect which may become apparent after completion of closure of the mining operations. Examples would include monitoring, management and maintenance (if necessary) of any passive water treatment system(s) to ensure appropriate water quality is maintained and any maintenance or remedial work on the ELF should failures in the ELF occur at a time beyond closure.

(iii) A financial guarantee to allow for the completion of any compensation work such as pest and predator programmes.

(iv) A range of requisite insurances that have been suggested by the Department's insurance brokers. These include: Public (General) Liability - including Forest and Rural Fires Act cover; Motor Vehicle Third Party; Statutory Liability Insurance; and Environmental Liability Insurance.

550 Amounts related to each type of insurance are included in the Access Arrangement document but will be subject to review during the final risk assessment process described below and would be required to be in place prior to the approval of any Work Plan.

551 Agreement and payment of bonds is a requirement of the Work Plan approval process. No mining could be undertaken without adequate bonds being in place.

552 A draft risk assessment and bond calculation has been prepared by the Applicant for the first year of operation. The assessment indicates that the total restoration bond would be approximately 60 million dollars. However, this would be a joint bond held between the Buller District Council, West Coast Regional Council and the Department. There remain a number of issues to work through with this draft assessment/calculation. For example the apportionment of the quantum is yet to be

resolved. The Department and Applicant would undertake further work around the bonds should access be granted.

553 While safeguards may limit potential adverse effects they may not be sufficient to adequately protect all the values of the site. Some adverse effects of the proposal would be permanent and as noted above where adverse effects are long term it is also considered that these have not been safeguarded against.

Safeguards against adverse effects on objectives of Conservation Act and purpose for which the land is held

554 Tables 7 and 8 below summarises the permanent and long term adverse effects of mining on the natural and historic resources on the land by reference to the objectives of the Conservation Act and the purposes for which the land is held while taking into account the possible safeguards including proposed rehabilitation.

Table 8: Assessment of Long-term Adverse Effects on natural and historic resources with respect to Objectives of the Conservation Act 1987 While Taking Into Account Safeguarding

Objectives of the Conservation Act 1987	**Conservation Act Objectives safeguarded long-term (i.e. after mining operations are complete)**
Objective (i) - preserving and protecting the natural and historic resources on the land	Loss of 106 ha (1.6%) of BCM ecosystems, including some particularly high value areas, and their intrinsic values cannot be safeguarded against as rehabilitation to an equivalent state is not possible. Complete rehabilitation would take centuries in this slow growing environment, and the final ecosystem will be different. Permanent loss of 20ha of sandstone erosion
Objective (ii) - Maintaining the intrinsic values of the natural and historic resources on the land	
Objective (iii) - providing for the appreciation and recreational enjoyment by the public with regard to the natural resources on the land	

Objective (iv) - safeguarding the options of future generations with regard to the natural and historic resources on the land	pavement areas as these cannot be recreated. Existing AMD problems may be remedied, but they may also be exasperated if the proposed capping measures are unsuccessful. While recording of historic sites and providing interpretation would mitigate to some degree the loss of historic sites and impacts, damage to the historic context of Denniston cannot be safeguarded against. In these aspects the loss of options of future generations would not be safeguarded against. In the long term the modified landform would continue to affect the visitor experience to varying degrees. This may be remedied to some extent through providing other visitor opportunities. Safeguards against some effects would be enhanced if mining and rehabilitation includes maintaining best mining practices at all times and meeting the closure criteria. For long-term risks such as fire and acid mine drainage, appropriate financial assurances would need to be in place including adequate bonds and insurances.

Table 9: Assessment of Long-term Adverse Effects On the Purposes for Which the Land is Held Taking Into Account Possible Safeguarding

Purposes For Which the Land is Held (under Conservation Act)	Purposes for which the land is held safeguarded in the long-term? (i.e. after mining operations are complete)
Stewardship area section 25 - - protection of natural and historic resources	Loss of 106 ha (1.6%) of BCM ecosystems and in particular high value areas and their intrinsic values cannot be safeguarded against as rehabilitation to an equivalent state is not possible. Complete rehabilitation will take centuries in this slow growing environment, and the final ecosystem will be different. Permanent loss of sandstone erosion pavement areas as these cannot be recreated. Existing AMD problems may be remedied, but they may also be exasperated if the proposed capping measures are unsuccessful. While recording of historic sites and providing interpretation would mitigate to some degree the loss of historic sites and impacts, damage to the historic context of Denniston cannot be safeguarded against. In the long term the modified landform would continue to affect the visitor experience to varying degrees. This may be remedied to some extent through providing other visitor opportunities. Safeguards against some effects would be enhanced if mining includes maintaining best mining practices and proper

	management at all times during mining operations. For long-term risks such as fire and acid mine drainage, appropriate financial assurances would need to be in place including adequate bonds and insurances.

Summary

555 Many of the adverse effects of the proposal could not be safeguarded against if the application were approved. Some of these adverse effects are significant. Where long term adverse effects cannot be safeguarded against this would be contrary to the objectives of the Conservation Act and the purpose for which the land is held.

24 ANY OTHER MATTERS THE MINISTER CONSIDERS RELEVANT

24.1 CoNsideration of Cumulative Impacts, existing CMLs, Sullivans CML and future mining

556 As noted in paragraph 50, the entire Denniston Plateau is subject to minerals privileges. These include a coal mining license which authorises Solid Energy New Zealand Ltd to conduct open cast coal mining over approximately 318 ha of the Plateau (the Sullivans CML).

557 Policy 1, Section 3.5 of the West Coast *Tai Poutini* CMS requires that:

558 "The cumulative effect of other authorisations for use, issued in respect of a particular area or opportunity, should be taken into account when considering new applications for those areas or opportunities."

559 A number of technical advisors to the Department have noted that the impacts of the EMP proposal on particular conversation values would be cumulative to the impact of other authorities for mining use, in particular the Sullivans CML.

560 While the Environment Court has recently held that the Sullivans CML is not part of the 'existing environment' for the purposes of the Resource Management Act 1991 (this decision is currently under appeal) the resource consent commissioners for the West Coast Regional Council and Buller District Councils also noted, when considering the EMP proposal that;

> " ..it is abundantly clear that large scale mining is poised to invade the entire Denniston Plateau coal reserves which if unchecked, will totally destroy the ecosystems which are present"

24.2 Resource Consents and interim Environment Court decision

561 The Environment Court released an interim decision, Decision no. [2013] NZEnvC 047, on 27 March 2013, regarding appeals by two parties against the earlier grant of resource consent for the EMP by Buller District and West Coast Regional Councils.

562 The Court considers that the grant of consent is "finely balanced" having weighed up the adverse effects and positive effects of the proposal, including economic considerations.

563 It should be noted that the Environment Court, in forming its interim decision, was applying the relevant legal considerations and tests applicable under the Resource Management Act 1991. As these are substantially different to the relevant considerations and tests for an access arrangement under the Crown Minerals Act 1991, some care is required in applying the Environment Court's conclusions to the present process. This need for care is further emphasised by the fact that the

Applicant has significantly varied its mine proposal, for which it is now seeking an access arrangement, from that which was considered by the Environment Court for resource consenting purposes.

564 Many of the matters which the Environment Court was required to consider in assessing the proposal under the Resource Management Act 1991, such as the social or economic effects of the mine development, are not relevant matters to have regard to when assessing an access arrangement application over public conservation land under the Crown Minerals Act 1991. Other matters which the Court considered, such as the ecological values of the site and the effects of the mine development on flora and fauna are relevant to both processes.

565 The findings of the Environment Court in assessing resource consent matters associated with the proposed Escarpment Mine are not binding on the Department. Nevertheless, the Court had the opportunity to hear a considerable body of expert witness testimony relating to the ecological values of the site and the likely outcomes of rehabilitation.

566 The Environment Court found that the Escarpment Mine proposal would have adverse effects of some proportion on areas of significant indigenous vegetation, including locally and nationally endangered plant species and ecosystems, and that these adverse effects would not be avoided, remedied or mitigated. In addition, the Court also found that the biodiversity that the rehabilitated ecosystems support on the mine site will be less fit, rich and diverse than those presently existing.

567 For example, in relation to significant indigenous vegetation, the Court found, in relation to the 157 ha proposal which it was considering; (at paragraph 327)

> *A number of rare species, notably two Sticherus species, Euphrasia wettsteniana and Peraxilla tetrapetala are likely to be lost. In the case of pink pine, even if a proportion of the species survive VDT, specimens hundreds of*

years old would be substantially cut back to achieve their translocation. Some species, on the applicant's own evidence, would take centuries to regain their present condition. These are significant effects. We reiterate the evidence of a witness called by the applicant, Dr Glenny amongst others, that the "Sticherous Ridge" is outstanding. … [W]e indicate here that we do not consider such effects offset, or compensated for. Significant areas of vegetation are not protected.

568 A number of technical advisors who have provided advice to the Department on the AA application have taken into account information provided to the Environment Court. This includes Briefs of Evidence and caucus statements provided by the Applicant and Forest and Bird, where this information was considered relevant to the AA application. In some instances, the advisors, or the Department, have also had access to additional information, or experts, who were not called before the Court.

569 The Applicant has raised a concern that in some instances the advice of the expert technical reviewers to the Department, including experts who provided evidence to the Environment Court, is at odds with the conclusions of the Environment Court on those particular issues. The Applicant has requested that greater consideration be given to the Environment Court's findings by the Department in this report, particularly where the Department's conclusions may differ to the findings of the Court.

570 The Department acknowledges that in some instances, in relation to specific matters, the conclusions of the Department's expert technical reviewers do differ from the conclusions of the Environment Court. However, the Department also considers that in a number of respects, the Environment Court's findings as to the significance of the ecological values of the proposed mine site, the long term duration of adverse effects, and the relative levels of uncertainty around rehabilitation outcomes, are not overly at odds with the Department's own analysis.

571 For example, at paragraph 40 of the Court's decision;

"*This seemingly inhospitable environment provides significant habitat for assemblages of invertebrates, lizards, snails and birds, found amongst vegetation that, in the unanimous opinion of the experts called, reaches a quality necessary for significance in RMA terms*"

And at paragraph 58 of the Court's decision;

"*The mine site itself supports 26 native [bird] species, a significant number of which are included in the threatened or at risk categories. Amongst the threatened and at risk species are the great spotted kiwi, the South Island fern bird, the South Island rifleman, the western weka and the New Zealand pipit*."

And at paragraph 221 of the Court's decision (bearing in mind that these figures and percentages related to the original 157 ha proposal rather than the revised 106 ha proposal being considered for access arrangement);

"*We find that the following would be lost from the mine site:*

- *Approximately 20 ha of sandstone pavement;*
- *Approximately 15ha of pakihi wetland vegetation;*
- *Approximately 2.8km of stream habitat for koura and aquatic invertebrates;*
- *Approximately 10% of the habitat of three lizard species over the whole plateau;*
- *0.1ha seepage wetland, a rare vegetation type in New Zealand*
- *The existing rifleman population and its habitat for some hundreds of years;*

- *A high proportion of the 15 – 18,000 Powelliphanta patrickensis residing on the mine site; and*
- *Fernbird and pipit habitat for a period until the habitat re-establishes. We also expect some members of these species to perish accidentally during the operation of the mine.*
- *The curtailing of the natural habitat range of bird species such as kiwi.*
- *The loss of overall species richness, including the presence of some rare plant species."*

572 The Applicant points to two particular areas where it considers that the Department's advisors have taken an unduly pessimistic or conservative approach, and points to the decision of the Environment Court as supporting the more optimistic views of its own experts. At the Applicant's request, these are now further discussed in some detail.

The effects of predators on the Denniston Plateau, and the benefits of predator control.

573 The Environment Court heard differing expert opinions as to the effect predators may be having on the plateau, and the benefits to be gained from predator or pest control in this environment. Dr Parkes is quoted as stating in evidence (at paragraph 93 of the interim decision) *"… What happens, of course, under predation, is that you can be at lower densities but quite at some equilibrium and that equilibrium can be very close to carrying capacity … or it can be zero*.". And further at paragraph 94, the Court observed "*There is no data on how severe the impacts on these fauna might be. Dr Parke's considered opinion was that, while rodent and stoat irruptions on the plateau might be less extensive than elsewhere, they would still have significant impacts. We consider that to be the best assessment of the current situation on the plateau available to us*." And then further at paragraph 100, "*… we conclude that predators are certainly having an effect on native fauna on the plateau, though the extent of that is not completely clear*." And further again, at paragraph 228, "*We believe we can hold on the evidence, and we do, that native populations on the plateau are at lower*

densities than carrying capacity, and if there were no predators they would increase. We simply do not know by how much."

574 The Department considers that predators are likely to be having some impact on native fauna on the plateau but that the extent of that impact is likely to be very limited. This is consistent with the a advice of its expert advisors, e.g. Walker (2013), as noted in Section 14.5 above.

The likely outcomes of rehabilitation

575 The Court observed (at paragraph 129 and 130);

"*… Mr Kessels, an ecologist called by the respondent councils, agreed that in the short (0-10 years) to medium (up to 50 years) term, ecologically significant eco-systems, habitats and species would be lost, as would important sites for rare vegetation types and threatened plants, a significant portion of population of Powelliphanta patrickensis, and significant habitat for avifauna and lizards.*

"*In the context of such significant temporary effects – and we note that the word temporary includes a range of time scales – much would turn on the willingness and ability of BCL to rehabilitate … the site such that the final landform be appropriately integrated into the landscape of the plateau, and indigenous ecosystems substantially re-introduced with the intention or restoration of a significant number of their presently valuable elements*."

576 The Department has reservations about characterising effects over 50 years as "temporary". The Court appears to have shared this reservation, -at paragraph 152 it commented that "*in addition to the biodiversity loss that would remain evident when the site appears to be fully rehabilitated, the greater temporary losses would persist for periods longer than usually associated with the phrase "<u>temporary effects</u>*". (original emphasis). Indeed, the Department notes that the applicant has described its commitment to undertake predator control on the Denniston Plateau over a 50 year

period as “in perpetuity”. Periods of 50 years or longer are considered to be medium to long term effects.

577 BCL appears to have acknowledged through the Environment Court process that the rehabilitated mine site “v*egetation would not replicate the pre-mining state in terms of cover, variation, composition or overall character*”. (paragraph 131). The Department would agree with this assessment.

578 There appears to have been considerable discussion, amongst witnesses before the Environment Court, as to whether impermeable substrates will be able to be recreated on the engineered landform, and if not, what the consequences of this would be for rehabilitation of the site, and importantly, future vegetation cover.

579 On balance the Court found that the hydrology of the engineered land form, where it is proposed to be rehabilitated to a pakihi wetland, will significantly resemble present hydrological patterns as to make its evolution to mixed beech forest unlikely, even on a time scale of some 300 years. (at paragraph 143)

580 Notwithstanding this finding, the Department does not understand the Court to be saying overall that vegetation on the engineered landform post mining will reinstate the significant vegetation currently present on site. Indeed, the Court went on to note; (at paragraph 145)

“… we consider the development of tall mixed beech forest on the deeper soil intended to support forestry, something of a potential effect. Such an effect, with the elimination of pink pine, if it were to eventuate, would not be negligible. Pink pine trees are some of the oldest on Denniston, 400- 500 years old.” And further, for example at paragraph 146 “*Some adverse effects of the mine project are much more certain. Mr Overmars and Dr K Lloyd concurred that the natural ecological character of the 20ha sandstone pavement would be lost*”. And at paragraph 150 *“… the loss of*

a number of rare wetland plants from the mine site is likely and constitutes an adverse effect of some significance".

581 In summary, while the Court found that the hydrological patterns would be able to be recreated on the engineered land form, the Department's understanding is that the Court also accepted that existing significant vegetation values would not be reinstated, or recreated over the mine site in its entirety, and that the time scale for rehabilitation was in some instances up to 500 years.

582 The Department has found these findings from the Court helpful in forming its own assessments of the likely outcomes of rehabilitation at the mine site, if access is approved. In addition, the Department is able to draw on its own practical experiences in observing and managing rehabilitation techniques at a considerable number of mine sites on public conservation land, on the West Coast and elsewhere.

583 Practicalities are important to consider when assessing mine site rehabilitation proposals and the likelihood of success. Vegetation direct transfer in particular can produce good results when conditions are right, but for some vegetation types, or terrain, the results can be less satisfactory. Planting produces more limited results over far greater timeframes than VDT. Only a little over half of the revised mine footprint is proposed to be VDT'd. The degree of success with VDT depends greatly on the skill and care of the operator and the budget of the company.

584 Despite the best endeavours available, successful rehabilitation of an open pit mine site of the scale proposed by BCL would be extremely challenging. The scale of these challenges is increased by the nature of the extreme climate, high altitude and low fertility of the Escarpment site, and the values which rehabilitation is attempting to reinstate or preserve to some degree. The only similar examples of such rehabilitation have been at the Stockton Mine on the Stockton Plateau. However, these examples are only 10-15 years in fruition and results to date are varied and offer no solid

indication of likely long term outcomes. Consequently the Department's approach to the assessment of likely rehabilitation outcomes reflects the lack of experiences and proven outcomes in New Zealand. The Department considers the long term outcomes for the EMP site, including for pakihi, to be less than certain.

585 The Environment Court has noted that considerable further work is required on resource consent conditions, and that there may be benefits from aligning the consent condition process with any conditions of an AA, if the Department were minded to grant access. The Environment Court was also interested in the suggested Denniston Permanent Protection Area, but noted that considerable further work was required in that respect.

24.3 New Zealand Biodiversity Strategy

586 The New Zealand Biodiversity Strategy is particularly relevant to this application as it is considered that the application may have adverse effects on the Department's ability to maintain the full range of diversity through ensuring representative areas of the Ngakawau Ecological District are protected.

24.4 Denniston Permanent Protection Area and wider reserves proposals

587 The Applicant has identified an area on the Denniston Plateau that they suggest could be set aside for permanent protection from mining. This area, described as the Denniston Permanent Protection Area (DPPA), is approximately 750 ha in size and shown in Figure XX. The Applicant currently holds an exploration permit (EP 40628, see Figure 2) over the area but does not hold a minerals permit over the area.

588 According to the Applicant's proposal the DPPA would be managed to provide two outcomes:

(i) to enhance biodiversity values within the DPPA area. In this respect the anticipated outcomes in the DPPA are higher than those applying to the DBEA and include an express requirement to achieve statistically significant improvements in certain specified biota; and

(ii) to address a concern raised by both the Council Hearing Commissioners and the Environment Court (and which is also quoted by the Department of Conservation in the draft report at paragraph 539) that:

> " ...it is abundantly clear that large scale mining is poised to invade the entire Denniston Plateau coal reserves which if unchecked, will totally destroy the ecosystems which are present"

589 The Applicant believes that the DPPA would achieve permanent protection of values within the area that are largely equivalent to those that would be lost from the footprint should the EMP proceed. The Department acknowledges that the values present within the DPPA area are relatively high and in some cases equivalent to those within the proposed mine footprint. However, notwithstanding the Applicant suggesting this area to be placed into permanent protection the process to achieve permanent protection would be a government administrative process that would not rely wholly upon the desires of one stakeholder. The Minister of Conservation has convened a stakeholder group to look at the possibility of placing parts of the Denniston Plateau into a form of permanent protection from future mining activities. Given the location, values present, and the low coal value resource present it is likely that the DDPA would form part of any area placed into permanent protection. However, at this stage no outcomes have been identified so little weight can be placed on this process. However, should a formal outcome of the stakeholder group process include placing parts of the Denniston Plateau into permanent protection from mining then it could be a relevant matter that could be considered in the consideration of this Access Arrangement.

590 The Department has considered the potential benefits for pest and predator control within the DPPA as part of the broader Denniston Biodiversity Enhancement Area proposal that is discussed in more detail in Section 24.5 below.

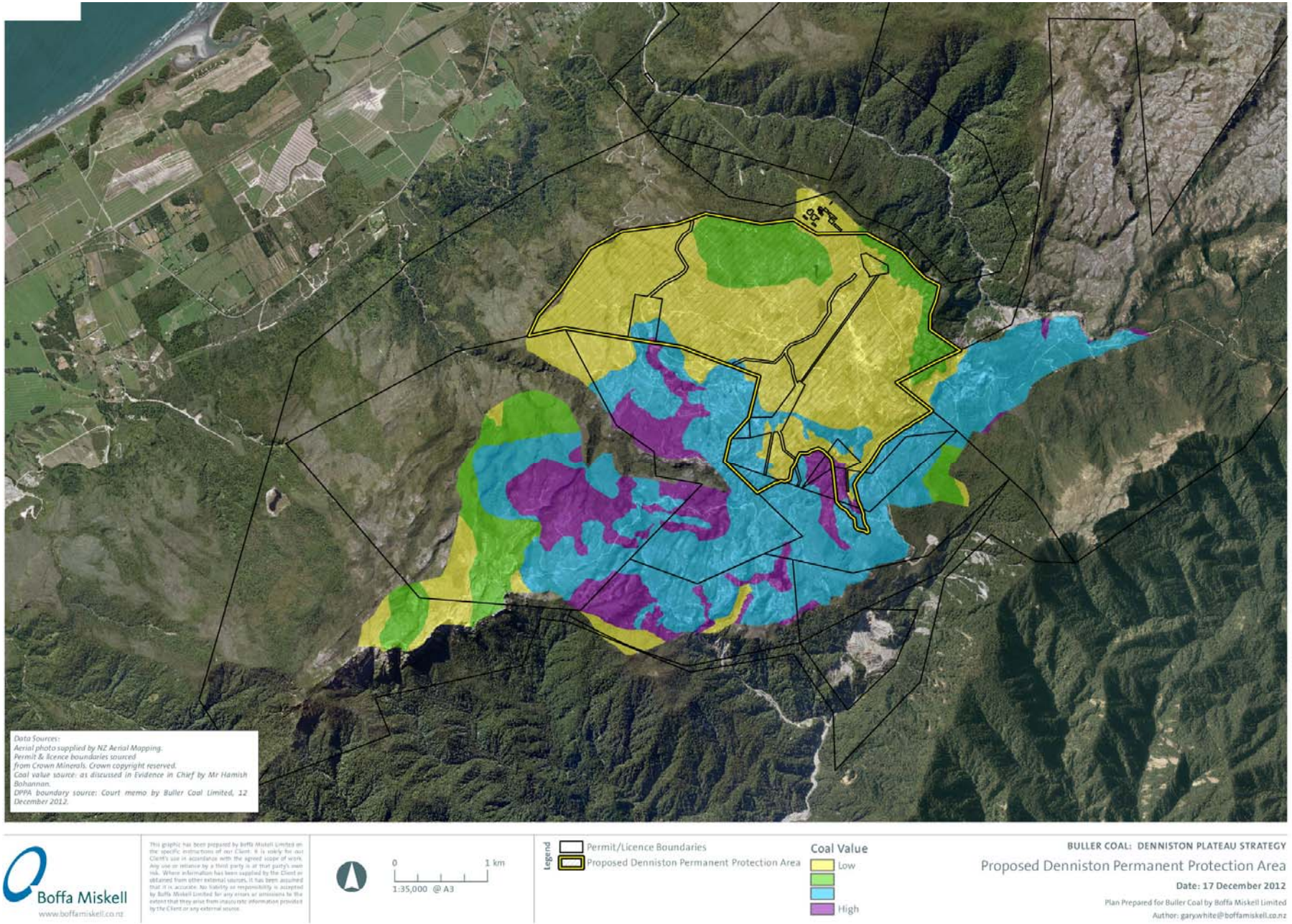

Figure 4: Denniston Permanent Protection Area

24.5 Compensation

591 The Applicant has offered a significant compensation proposal to address the loss of conservation values should access be granted and the proposed mining activities go ahead. The proposed compensation consists of funding biodiversity and historic enhancement work. The compensation consists of three distinct components:

(i) Funding a pest and predator control programme for 35 years over approximately 25,000 ha in the Heaphy River catchment within Kahurangi National Park. This area is described as the Heaphy Biodiversity Enhancement Area (HBEA)

(ii) funding a pest and predator control programme in perpetuity (50 years) over 4,500 ha of the Denniston Plateau and surrounding forest. This area is described as the Denniston Biodiversity Enhancement Area (DBEA)

(iii) funding four historic projects on the Denniston Plateau

592 This funding has been offered with the intent that the Department would manage and implement the work over the specified timeframes. The Department agrees that it is in the best position to undertake the work and would build project management and auxiliary costs into the final funding quanta. The total amounts for each package have not yet been finalised but are likely to be in the range of 15 million for the HBEA, 3 million for the DBEA and $500,000 for the historic work. Note these figures do not account for inflation, discounting and capital charges. The final funding figures would be dependent on several factors including the mechanism through which the funds were managed and calculations of inflation, discounting and capital depreciation. Treasury is advising the Department on these matters and any final Access Arrangement would include specification around the total amount of funding and the funding mechanism, should access be granted.

593 The Applicant would be required to pay the total funding amounts over the course of mining operations, scheduled over five years, to ensure that the loss of values would be compensated for in real time. This would also avoid the Department assuming risk with payments over a longer time period.

594 The proposed compensation would achieve significant gains for conservation. More detailed discussion of the three packages, potential conservation gains and methodology is included below:

Historic compensation package

595 The Historic package is proposed to address the loss of historic values from the proposed mining activities. The Applicant is offering funding for four projects on the Denniston Plateau that would provide significant benefits to the historic landscape of the Denniston Plateau. The four projects detailed below were chosen in consultation with the Department who consider that they represent four of the most beneficial historic projects that could be developed on the Plateau at the present time. These four projects include:

Conns Creek car park and enhancement

596 The proposed work to be funded would include restoration work along the incline, the refurbishment and installation of two Q wagons, install interpretation panels and incorporate the shunt line.

Burnetts Face enhancement

597 The proposed work to be funded would include establishing a car park, signage and new track to the roperoad, the provision of visitor interpretation, an inventory of artefacts and sites and the building of a bridge over the creek at Burnetts face.

Coalbrookdale enhancement

598 The proposed work to be funded would include upgrading the roperoad, obtaining and installing two coal tubs, securing mine portals, installing lighting and safety barrier at the fan house and provision of interpretation panels at the fan house.

Monitoring of sites

599 The proposed work to be funded would include visitor site monitoring and the monitoring of visitor impacts and historic site condition.

600 The total funding for the proposed historic compensation would be in the range of $500,000. However, as discussed above the final mechanism for managing the funds has not yet been finalised and this figure could change slightly. The final figure would be included in any Access Arrangement document should access be granted.

Heaphy Biodiversity Enhancement Area (HBEA):

601 The Applicant is offering to provide funding for pest and predator control for 35 years over an area of approximately 25,000 ha in the Heaphy River Catchment within Kahurangi National Park. The HBEA is shown in Figure 5 below. However, it should be noted that the final boundary of the area may be subject to slight change (depending on finalisation of proposed control specifications) and would be finalised in any Access Arrangement document should access be granted.

602 The proposed HBEA has high conservation values and the proposed pest and predator control would have obvious and significant benefit. The area, methods and desired outcomes are described below in more detail:

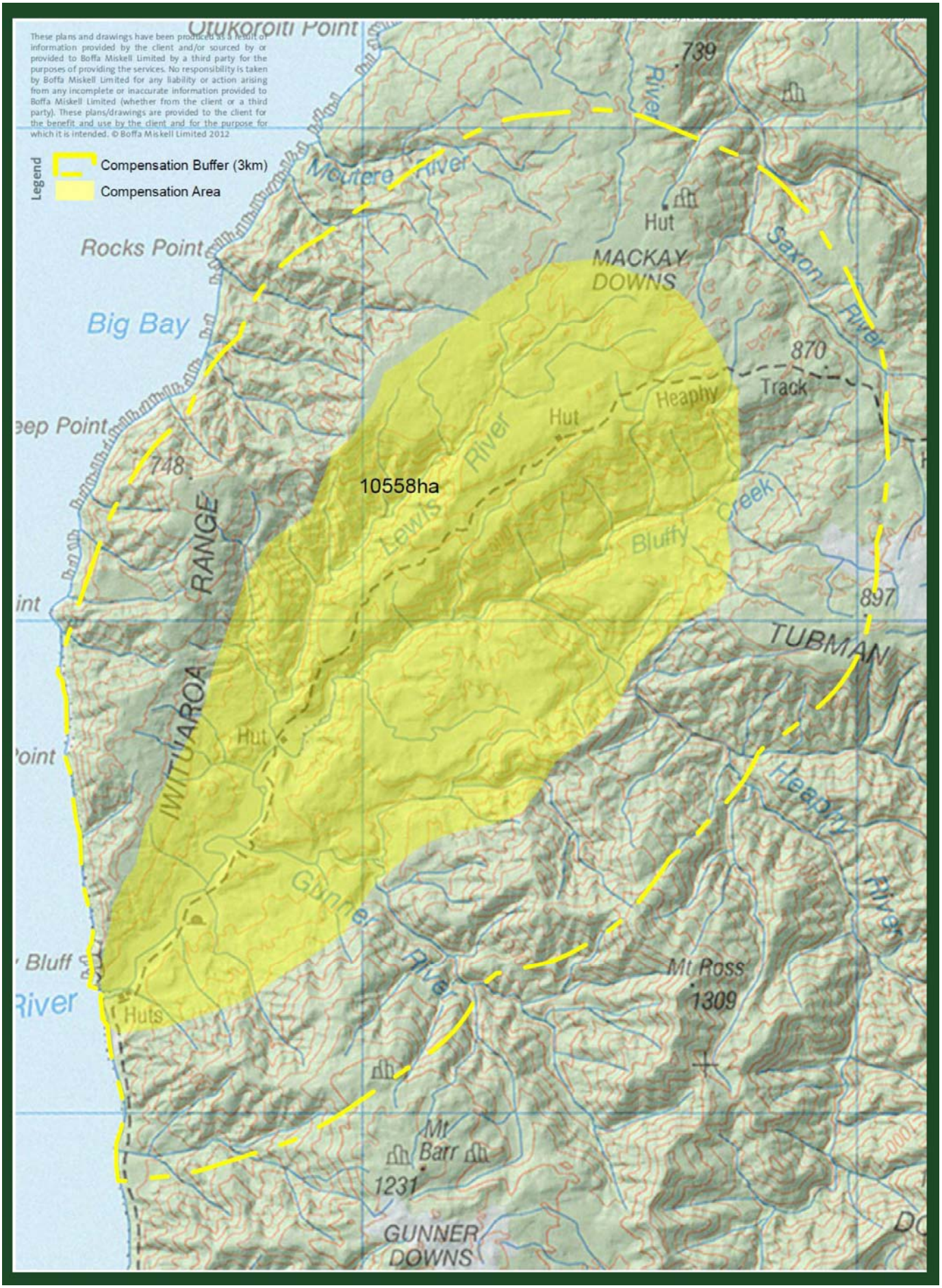

Figure 5: Heaphy Biodiversity Enhancement Area

HBEA

603 The northern West Coast is dominated by relatively pristine landscapes of rugged hillslopes and dense, wet sub-tropical coastal forests. Within this setting is the Kahurangi National Park, approximately 452 900ha a large, relatively intact area, of particular value to a wide range of native wildlife. The Heaphy management unit, lies within the National Park. It includes some of the best examples of luxuriant, warm-temperate forests of northern rata, kahikatea, and nikau on the fertile Heaphy River flats, and very good examples of a diverse range of ecosystem types, fauna habitats and vegetation associations.

604 The native biodiversity values of the Heaphy management unit are relatively high compared to many other places in New Zealand, however, predation and competition from introduced pest species have negatively impacted the native species and ecosystems in the area. Many of the common introduced mammalian species including deer, pigs, chamois, goats, rats, stoats, and possums are present in the Heaphy and have caused a decline in the health and functioning of these ecosystems.

605 The threatened and vulnerable species within the Heaphy ecosystem include;

- Kaka
- Great Spotted Kiwi/Roroa
- *Powelliphanta*
- Whio
- Short and long tailed bats
- Rockwren
- Nationally threatened, at risk and vulnerable plant species including red mistletoe, *Coprosma talbrockie*, *Libertia peregrinnans*, Northern rata and totara.

Desired outcomes and benefits

606 The desired outcomes for the HBEA would be to achieve consistency with the desired outcomes for the conservation management plan in Kahurangi National Park. This would be a healthy, functioning ecosystem where the potential suite of native species populations which occur naturally in the area are present, secure and sustainable, including those most vulnerable to the impacts of exotic species, and that natural processes such as gene flow, including pollination and seed dispersal, migration and succession are occurring.

607 The potential benefits for biodiversity from the proposed compensation within the HBEA are significant. It would significantly improve the health and functioning of the ecosystem and be of benefit to the threatened and vulnerable species present within the area. However, the benefits would not directly address the loss or safeguard all those values lost within the footprint of the mine. Some values such as sandstone pavement, the rare wetland habitat and outstanding plant assemblages can not be compensated for. The HBEA would likely provide complimentary or enhanced results for some bird species but many of the values within the footprint that would be lost are only found on the Denniston Plateau and wider BCM. Therefore the HBEA is not providing a 'like for like' scenario, but rather a range of benefits quite different to those potentially lost from the mine footprint. To quantify the 'like for unlike' exchange in this case has proven to be fraught with difficulty and uncertainty [the Applicant's biodiversity offset model was withdrawn from both the Access Arrangement application and the Environment Court for this reason] and as such no quantifiable measure of comparative loss/gain can be made in this case. The Department does acknowledge that the potential gains for the HBEA are significant but also acknowledges that the loss of the unique values within the proposed mine footprint would not be directly addressed or safeguarded by the proposal.

Methods

608 To achieve the desired outcomes the proposed funding would be put toward a range of pest and predator control, monitoring and advocacy work including:

- Possum control

- Ungulate control
- Pest plant control
- Stoat and rat control
- Pig control
- Monitoring including output monitoring, trend monitoring, outcome monitoring
- Species surveys
- Protection and enhancement of whio populations
- Protection and enhancement of kaka populations
- Advocacy for conservation of natural values on surrounding lands

609 The total funding for the proposed HBEA compensation would be in the range of 15 million dollars. However, as discussed above the final mechanism for managing the funds has not yet been finalised and this figure may change slightly. The final figure would be included in any final Access Arrangement document should access be granted.

Denniston Biodiversity Enhancement Area (DBEA)

610 The Applicant is offering to provide funding for pest and predator control in perpetuity (50 years) over an area of approximately 4,500 ha on the Denniston Plateau and surrounding forest. A finalised figure for the funding of this work has not yet been reached. The final figure would be included in any final Access Arrangement document. The DBEA is shown in Figure XXX below.

611 The proposed DBEA has high conservation values, particularly in the areas of the Plateau itself. Pest control work within the DBEA would result in benefits within areas of beech forest surrounding the Plateau. However, the proposal would not provide a 'like for like'

scenario for the values lost from within the mine footprint. Some values such as sandstone pavement, the rare wetland habitat and outstanding plant assemblages can not be compensated for. Also, in the opinion of the Department the DBEA would have only minimal benefit for those areas on the Plateau itself because the Department considers that pest and predator numbers on the Plateau are currently very low and there is little room for potential benefit. The Applicant, however, believes that the proposed work could lead to more significant gains on the Plateau and that the potential benefits would outweigh the loss of values from the proposed mining activity. Should the proposed work result in biodiversity gains on the areas of the Plateau (as the Applicant believes) there would be some equivalency of losses and gains for some fauna and flora habitat values found within the footprint.

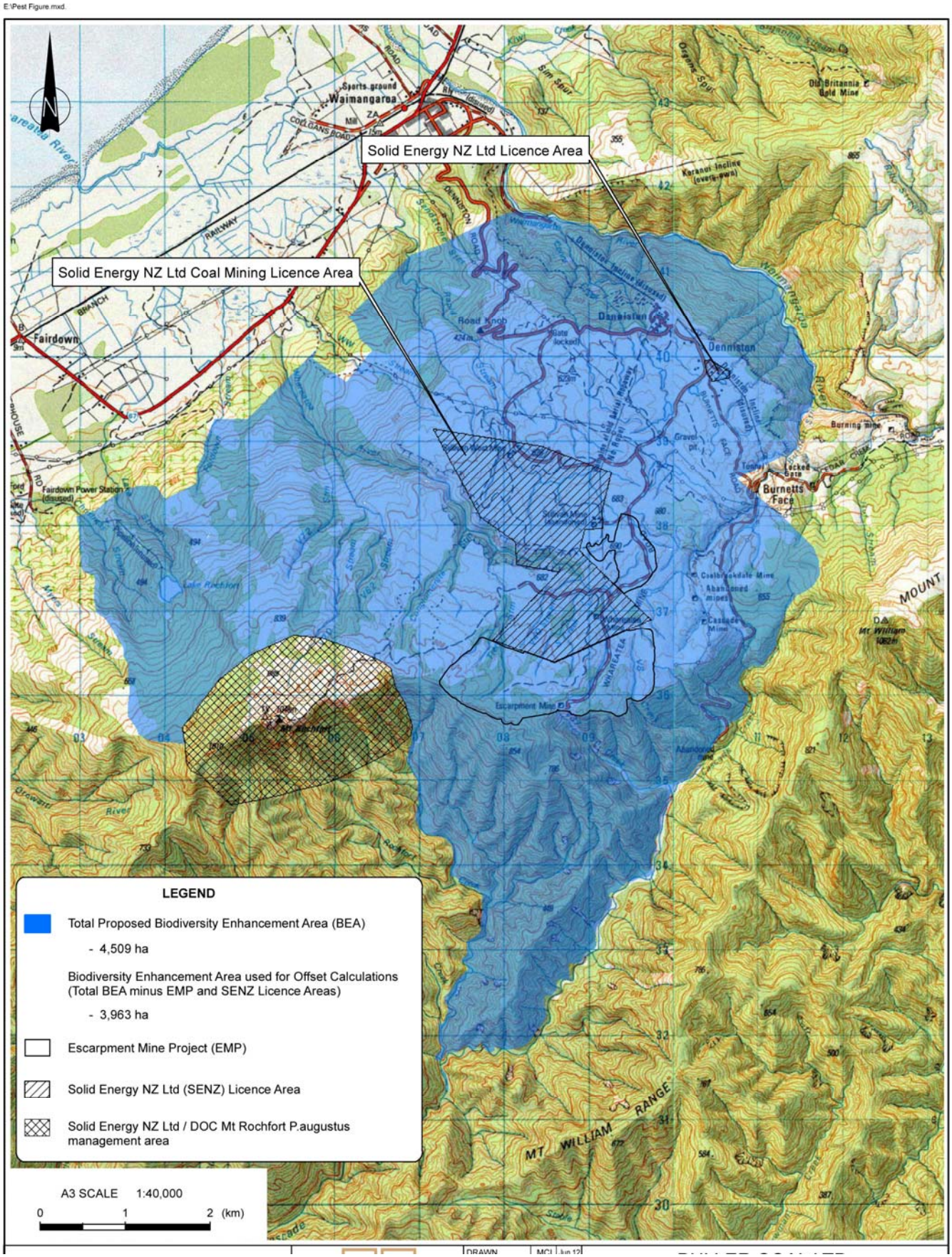

Figure 6: Denniston Biodiversity Enhancement Area

612 The values within the DBEA are not described here in detail as the general area and values within it are described in detail throughout the body of this report.

613 The desired outcomes for the DBEA would be similar to that of the HBEA; to promote a healthy, functioning ecosystem where the potential suite of native species populations which occur naturally in the area are present, secure and sustainable, including those most vulnerable to the impacts of exotic species, and that natural processes such as gene flow, including pollination and seed dispersal, migration and succession are occurring.

614 The areas of beech forest surrounding the Plateau would be subject to similar controls as the HBEA, i.e. possum control, ungulate control, pest plant control, stoat and rat control, pig control, monitoring including output monitoring, trend monitoring, outcome monitoring and species surveys. The plateau itself would not be suitable to more traditional forms of control, such as aerial 1080 treatment, so a range of other controls would be implemented. The formulation of this specification would be undertaken by the Department should the funding for the DBEA be triggered by the approval of the Access Arrangement.

615 As discussed above the Applicant is suggesting that an area within the DBEA be set aside for permanent protection from mining. This area, described by the Applicant as the Denniston Permanent Protection Area (DPPA) is approximately 750 ha in size and shown in Figure XX. The Applicant is requesting that the Department have particular consideration of this area and their proposition to achieve “statistically significant gains” for biodiversity within it. The Applicant has not provided detail of any pest or predator control in its application over and above that proposed for the DBEA. Therefore the Department’s view of the potential for benefits within the area is the same as discussed above for the DBEA. However, the Department does acknowledge that the Applicant is proposing to undertake specific monitoring and survey work to enable biodiversity gains to be accurately assessed

within the area. Conditions pertaining to this assessment could be included in the final Access Arrangement document.

24.6 Summary of compensation and discussion

616 The compensation package proffered by the Applicant would achieve significant conservation gains overall. The HBEA in particular offers the potential for significant gains for biodiversity over a large area for 35 years.

617 As discussed above the mechanisms for securing the funding and management of the proposed work has not been finalised but would be included in the final Access Arrangement should access be granted. The Department has acknowledged that it is in the best position to deliver the work and would be obligated to manage and deliver the work for the stipulated timeframes should funding become available through the triggering of the Access Arrangement. Project management and auxiliary costs would be factored into the final funding figures within any final Access Arrangement.

618 The Applicant, notwithstanding that it is offering the compensation packagedescribed above, believes that the Department has over-estimated the overall effects (post mitigation) of the proposal, particularly because of the analysis around rehabilitation outcomes and the potential benefits of pest control on the Denniston Plateau. They consider that the compensation package is reflective of the Department's over-estimation of overall effects and they believe the effects to be of a lesser extent on balance of all the information available and relating to the proposal.

24.7 Treaty of Waitangi Considerations

619 Under Section 4 of the CMA, anyone exercising any function under that Act is required to *"have regard to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)".* This

will usually entail the Department consulting with the local papatipu ruunanga if it is determined that an application would impact on their rights over their lands, resources and taonga. Refer to Section 20.

620 Te Rūnanga o Ngāti Waewae were supplied a copy of the revised AA application for consultation. Te Rūnanga o Ngāti Waewae provided the following comment:

> *"Te Rūnanga o Ngāti Waewae are happy to support this Escarpment Mine Access Arrangement, we have been working closely with Bathurst - Buller Coal on this project. The consultation process has been comprehensive and informative."*

24.8 West Coast *Tai Poutini* Conservation Board

A copy has not yet been forwarded to the board for comment.

25 CONCLUSIONS

621 In making a decision on the application the Minister of Conservation, or his delegate, must have regard to the criteria set out in section 61(2) of the Crown Minerals Act (CMA). Section 61(2) CMA states:

> *"In considering whether to agree to an access arrangement in respect of Crown land, the appropriate Minister shall have regard to:*
>
> *(a) The objectives of any Act under which the land is administered; and*
> *(b) Any purpose for which the land is held by the Crown; and*
> *(c) Any policy statement or management plan of the Crown in relation to the land; and*

(d) The safeguards against any potential adverse effects of carrying out the proposed programme of work; and

(e) Such other matters as the appropriate Minister considers relevant."

622 Provided all the matters in s 61(2) are given genuine thought and attention, then how they are taken into account and what weight is given to them are matters for the decision maker to determine, within the limits of reason.

623 In summary, the Department's conclusions are:

624 Buller Coal Limited's application is inconsistent with the matters covered by section 61(2)(a), (b), and (c); the objectives of the Conservation Act, the purpose for which the land is held by the Crown, and the conservation management strategy for the land for the following reasons:

625 The potential adverse effects of the proposed mining operations are inconsistent with the objectives of the Conservation Act 1987.

626 The potential adverse effects of the proposed mining operations are inconsistent in general terms with the purposes for which the land is held by the Crown; that is as stewardship area.

627 Although the CMS does not specifically exclude mining, the potential adverse effects of the proposed mining operations are overall considered inconsistent with the key intent of the CMS to maintain and improve conservation values in this "priority site for biodiversity" and important historic landscape.

628 In terms of section 61(2)(d) which covers the safeguards against any potential adverse effects of carrying out the proposed programme of work, the Department is particularly

concerned about losses to the following natural and historic resources of the proposed site:

- BCM ecosystems which support unique associations of native vegetation that are different from anywhere else in New Zealand.
- 20ha of the originally rare sandstone erosion pavements, which may be some of the best on the Brunner coal measure (Note that parts of these ecosystems are modified to varying degrees by past mining, fires, roads, bulldozed tracks and the spread of weeds)
- Significant areas of North Westland snow tussock (*Chionochloa juncea*) habitat on the elevated Denniston plateau.
- Several lichen and liverwort species classified as "Nationally endangered/Nationally critical".
- Loss of many of the known occurrences of *Sticherus tener*
- An outstanding assemblage of plant species not recorded (to date) elsewhere on the Denniston Plateau
- Indigenous terrestrial fauna values including nationally significant lizard assemblages and the Denniston sub-population of *P.patrickensis*
- Great Spotted Kiwi (GSK, Nationally Vulnerable).
- Areas of nationally significant wetland habitat (coal measures pakihi)
- The nationally unique Denniston coal mining landscape
- Local sandstone topography incised with steep gullies with frequent highly weathered sandstone pavements and outcrops
- Recreational and scenic values. Visitors travel up to the Denniston Plateau to explore the wild and remote environment and to see the historic mining remnants.

629 The adverse effects as a result of this mine proposal which would arise, despite best efforts to safeguard against them are:

- The loss of 106 ha (1.6%) of elevated BCM ecosystems
- Irreversible loss of originally rare sandstone pavement (potentially some of the best originally rare sandstone pavement topography unique to the BCM ecosystems), including the topography that lends significant landscape character
- Establishment of different vegetative successional pathways that would permanently alter the ecosystems within the proposed footprint
- The loss of rare and threatened plant assemblages not recorded (to date) outside of the footprint
- A reduction in habitat area of 35 ha for *Chionochloa juncea* and loss of nationally significant wetland including the permanent loss of fens, seepages and flushes
- Significant impact on several lichen and liverwort species classified as "Nationally endangered/Nationally critical".
- A significant loss of *P. patrickensis* and lizard species habitat, reduction in range of *P. patrickensis* and death of a large number of *P. patrickensis* snails.
- The temporary loss and long term degradation of 106 ha of habitat for terrestrial fauna including GSK, fernbirds and lizards. Individuals would be killed (excluding GSK) or suffer some loss of fitness
- The alteration of stream habitat and invertebrate communities in the upper Whareatea River catchment over the long term
- The generation of AMD that would require ongoing treatment for an undetermined period

- The permanent loss of archaeological contextual values of the mines on the Denniston Plateau and subsequent detraction from a unique historic coal mining landscape
- Recreational activities will be adversely affected to varying degrees. However, post mining impacts would lessen with appropriate restoration.

630 In terms of section 61(2)(e) Crown Minerals Act covering "such other matters as the appropriate Minister considers relevant" the compensation offer proposed by the Applicant would achieve significant conservation gains overall. The proposed compensation would not provide a 'like for like' exchange of biodiversity, but would contribute toward significant gains for biodiversity in the Heaphy River catchment and beech forest surrounding the Denniston Plateau and for historic values on the Denniston Plateau. The compensation would be funded by the Applicant but managed and implemented by the Department. The final funding figures and mechanism for the delivery of the funding have not yet been finalised but would be included in any final Access Arrangement document.

631 The Environment Court has released an interim decision relating to resource consents for the EMP. The Environment Court, in reading its interim decision, was applying the relevant legal considerations and tests applicable under the Resource Management Act 1991. As these are substantially different to the relevant considerations and tests for an access arrangement under the Crown Minerals Act 1991, some care is required in applying the Environment Court's conclusions to the present process. This need for care is further emphasised by the fact that the Applicant has significantly varied its mine proposal, for which it is now seeking an access arrangement, from that which was considered by the Environment Court for resource consenting purposes.

632 The West Coast *Tai Poutini* Conservation Management Strategy advises that "The cumulative effect of other authorisations for use, issued in respect of a particular area or opportunity, should be taken into account when considering new applications for those areas or opportunities." Therefore the cumulative effects of other mining activities on

the Denniston Plateau, such as the Sullivans Coal Mining License, is a relevant matter to consider.

633 The Department's view is also that the for the period that the site iwould be closed to the public and the loss of a relatively intact BCM is a matter to consider in respect to any assessment made under section 61(2)(a), (b) & (d) Crown Minerals Act.

634 The Applicant has made substantive comment on the draft report and its findings. The Applicant is of the opinion that the Department has over-estimated the adverse effects of the proposal and that this is reflected throughout the report. In particular, the Applicant feels the assessment of potential outcomes for rehabilitation is conservative and does not consider more than a 'worst case scenario'. Likewise the Applicant believes the Department has made an overly conservative assessment of the potential benefits of pest and predator control on the Denniston Plateau.

635 It is clear from the balance of the information provided by the Applicant and subsequent information provided by Department experts that there would be significant and irreversible adverse effects on the conservation values and overall ecological integrity of the application area and the Denniston Plateau should the proposed activity be approved. The Applicant has provided a substantial 'best practice' rehabilitation plan and various mitigation measures. Despite these, however, significant adverse effects can not safeguarded against, and nor is the EMP proposal considered to be consistent with the West Coast *Tai Poutini* Management Strategy, the purpose for which the land is held by the Crown, of the objectives of the Conservation Act 1987 under the Land is held. To address the residual loss of conservation values, the Applicant has proposed a substantial compensation package that would result in significant gains for biodiversity and conservation values.

636 The key issue for the Minister, or his delegate, to decide is whether the proposed partial safeguards and the compensation package offered by the Applicant, are sufficient to

outweigh the inconsistency of the application with the objectives of the Conservation Act, the purposes for which the land is held by the Crown and the Conservation Management Strategy.

26 APPENDICES